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SMITHSONIAN INSTITVTION WASHINGTON 1846

SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM
Bulletin 100
VOLUME 9

CONTRIBUTIONS TO THE BIOLOGY OF THE PHILIPPINE ARCHIPELAGO AND ADJACENT REGIONS

BRYOZOA OF THE PHILIPPINE REGION

BY

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UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1929

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The scientific publications of the National Museum include two series, known, respectively, as *Proceedings* and *Bulletin*.

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The *Bulletin*, the first of which was issued in 1875, consist of a series of separate publications comprising monographs of large zoological groups and other general systematic treatises (occasionally in several volumes), faunal works, reports of expeditions, catalogues of type-specimens, special collections, and other material of similar nature. The majority of the volumes are octavo in size, but a quarto size has been adopted in a few instances in which large plates were regarded as indispensable. In the *Bulletin* series appear volumes under the heading *Contributions from the United States National Herbarium*, in octavo form, published by the National Museum since 1902, which contain papers relating to the botanical collections of the Museum.

The present work forms No. 100, volume 9, of the *Bulletin* series.

Alexander Wetmore,

Assistant Secretary, Smithsonian Institution.

Washington, D. C., August 21, 1929.

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BRYOZOA OF THE PHILIPPINE REGION

By Ferdinand Canu

Of Versailles, France

and

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Of Washington, D. C.

INTRODUCTION

This contribution to the biology of the Philippine Archipelago is based upon the collections made by the United States Bureau of Fisheries steamer *Albatross* in the Philippine expedition of 1908–9. During this expedition special efforts were made to obtain dredgings from stations in the archipelago rich in mollusca and in shell débris. Dr. Paul Bartsch, in charge of the collecting work of the *Albatross* at this time, knowing our interest in material of this kind and appreciating the fact that the shelly bottoms would yield many forms of bryozoa often neglected in such expeditions, made unusually large collections of shell and other types of débris. As expected, most of these dredgings proved to be rich in the incrusting and free calcareous bryozoa and we are accordingly highly indebted to Doctor Bartsch for his efforts in securing this material. Certain large families as the Bugulidae and Flustridae and many of the Cellularines with little calcified zoaria are not represented at all in these dredgings, since their delicate zoaria seldom have a chance to be preserved in such débris and have to be collected by special means.

The completeness of the collections from this area will be evident when it is known that in 1910, dredgings from over 300 localities were placed in our hands for study. All of these were picked for their bryozoan contents, but as the end of the task did not appear in sight as the years went by, it was finally determined to restrict the study to about 50 of the most interesting localities. Even this was a great task, for in some cases the dredgings from a single locality amounted to several pecks of material. The separation of the picked material into species and their determination and description proved equally time consuming. Finally the illustration of the report was found to be a formidable task, for many hundreds of photographs which do not appear on our plates were necessary for purposes of comparison.

Without the generous aid of the Bureau of Fisheries in the preparation and illustration of material and of financial assistance from our friend F. Julius Fohs, of New York City, who has helped us in other works as well, this volume could not have been brought to a successful conclusion.

The authors are greatly indebted to Miss Jessie G. Beach, of the division of paleontology, who has not only been most active in the translation and preparation of the manuscript, but has assisted very materially in the numerous details which accompany such a work. They are also highly appreciative of the help of Miss Francesca Wieser in the preparation of the many drawings of opercula and other structures throughout this work. In practically all cases these illustrations are based upon actual photographs.

In our studies of American Tertiary bryozoa [1] we took the opportunity of publishing text figures and descriptions of the many families and genera concerned in that work. We have followed this practice in the present report so that in these three volumes a summary of the family and generic characters of most of the Post-Paleozoic bryozoa may be found. We have, therefore, endeavored to make these volumes of service as a guide to the study of the bryozoa in addition to a description of the special faunas considered. Our generic researches which have thus covered the whole field of Post-Paleozoic and recent bryozoa have been made possible through a grant from the American Association for the Advancement of Science. As in the past, we are again very grateful for this assistance in making the classification more available to the student.

In our monograph on the Early Tertiary Bryozoa of North America, we have given somewhat detailed descriptions of the methods of study and the various structural features as well as the principles of classification of the two predominating Post-Paleozoic orders, Cheilostomata and Cyclostomata, so that it is unnecessary to repeat this information at this time. However, a few words as to the preparation of suitable slides of the opercula and chitinous appendages for examination under the microscope are in order. Various methods for the separation of the opercula and other appendages from the zoarium and mounting them properly have been described by the authors, but we have found all of them to be very complicated and time consuming. Our numerous preparations have been made by simply scraping the surface of a few zooecia from the zoarium with a sharp scalpel and gently crushing the material thus obtained in a drop of water on a glass slide. The appendages being flexible are seldom crushed or broken in the process, so after spreading the crushed material in the water and allowing it to dry, Canada balsam and a cover glass are added as usual to complete the mount.

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[1] North American Early Tertiary Bryozoa. Bull. 106, U. S. National Museum, 1920. North American Later Tertiary and Quaternary Bryozoa. Bull. 125, U. S. National Museum, 1923.

BIBLIOGRAPHY

It was thought a needless duplication to print a bibliography of papers treating of the Philippine Bryozoa in the present volume since a very complete list of the literature covering this general area was given by Harmer in his *Siboga* report of 1926. Most of the papers upon fossil and recent bryozoa issued before 1899 are cited and classified in the Synopsis of American Fossil Bryozoa by Nickles and Bassler published as Bulletin 173, United States Geological Survey. The list from 1899 to 1923, inclusive, is printed by the present authors in North American Later Tertiary and Quaternary Bryozoa, Bulletin 125, United States National Museum. In addition, the student has the advantage of the excellent digest of the subject published annually in the Zoological Record and issued as a separate chapter on the Brachiopoda and Bryozoa by Miss Helen M. Muir Wood. The literature on the bryozoa is so assembled in these several lists that the present-day student is saved much time in the mechanical work of assembling titles.

FAUNAL LISTS

The following lists of bryozoa from the various dredgings studied are arranged numerically and the species alphabetically for convenience of reference and comparison. The exact data as to the locality, the character of the bottom, and other features are given in detail here, but elsewhere throughout the text abbreviations for some of them are used.

D. 4807. Cape Tsiuka, Sea of Japan (41° 36′ 12″ N.; 140°: 36′ E.):

Actinopora japonica, new species.
Adeonellopsis pentapora, new species.
Callopora horrida Hincks, 1880.
Cauloramphus disjunctus, new species.
Cellaria divaricata MacGillivray, 1895.
Cellaria japonica, new species.
Chaperia transversalis, new species.
Conescharellina catella, new species.
Conescharellina parviporosa, new species.
Costazia aculeata, new species.
Costazia pisiformis, new species.
Costazia radiata Ortman, 1890.
Filisparsa elegans, new species.
Flabellopora transversa, new species.
Hippothoa flagellum Manzoni, 1879.
Lichenopora buski Harmer, 1915.
Lichenopora quincuncialis, new species.
Lichenopora radiata Savigny-Audouin, 1826.
Mecynoecia rectangulata, new species.
Mecynoecia unifaciata, new species.
Membrendoecium japonicum, new species.
Microporina japonica, new species.
Monoporella waupukurensis Waters, 1887.

Myriozoum subgracile D'Orbigny, 1852.
Perigastrella ovalis, new species.
Posterula sarsei Smitt, 1877.
Rhamphostomella sollers, new species.
Schizellozoon luteum, new species.
Schizomavella ambita granulata, new variety.
Schizomavella cornuta, new species.
Schizoporella perforata, new species.
Smittina trispinosa applicata, new variety.
Steganoporella magnilabris Busk, 1854.
Stephanosella indistincta, new species.
Thalamoporella lioticha Ortmann, 1890.
Tretocycloecia pelliculata Waters, 1879.
Tubulipora varians, new species.

D. 5134. Balukbaluk Island, Sulu Archipelago (6° 44′ 45″ N.; 121° 48′ E.); 25 fathoms; fine sand; February 7, 1908:

Conescharellina delicatula, new species.
Conescharellina jucunda, new species.
Cupuladria tuberosa, new species.
Vibracellina viator, new species.

D. 5135. Jolo Light, Jolo (6° 11′ 50″ N.; 121° 08′ 20″ E.); 161 fathoms; fine coral sand; bottom temperature, 57.4° F.; February 7, 1908:

Conescharellina jucunda, new species.
Mecynoecia brevicula, new species.
Retepora (Reteporella) longicollis, new species.
Smittina tripora, new species.
Vibracellina viator, new species.

D. 5137. Jolo Light, Jolo (6° 04′ 25″ N.; 120° 58′ 30″ E.); 20 fathoms; sand with shells (S., Sh.); February 14, 1908:

Acanthodesia savarti Savigny-Audouin, 1826.
Actinopora phillipinensis, new species.
Adeonella minutipora, new species.
Adeonellopsis pentapora, new species.
Alderina imbellis Hincks, 1860.
Anoteropora magnicapitata Canu and Bassler, 1927
Arthropoma cecili Savigny-Audouin, 1826.
Caberea brevigaleata, new species.
Caleschara laxa, new species.
Callopora tenuirostris Hincks, 1880.
Calloporina sigillata, new species.
Chaperia acanthina Quoy and Gaimard, 1824.
Chaperia transversalis, new species.
Cheiloporina caerulea, new species.
Cigclisula occlusa Busk, 1884.
Coleopora erinacea, new species.
Coleopora seriata, new species.
Coleopora verrucosa Canu and Bassler, 1927.
Conescharellina elongata, new species.
Conescharellina milleporacea, new species.
Cosciniopsis coelatus Canu and Bassler, 1927.

Costazia rota MacGillivray, 1885.
Diaperoecia indistincta, new species.
Diaperoecia radicata Kirkpatrick, 1888.
Diaperoecia rosea, new species.
Diaperoecia scalaria Canu and Bassler, 1922.
Didymosella parvipora, new species.
Ellisina phillipinensis, new species.
Emballotheca (?) *capitifera*, new species.
Emballotheca latisinuata, new species.
Entalophora delicatula Busk, 1875.
Entalophora major, new species.
Exechonella magna MacGillivray, 1896.
Fenestrulina infundibulipora, new species.
Flabellopora elegans D'Orbigny, 1852.
Flabellopora irregularis, new species.
Flabellopora tubifera, new species.
Gephyrophora rostrigera Waters, 1888.
Gigantopora unirostris, new species.
Haswellia australiensis Haswell, 1880.
Haswellia longicollis, new species.
Hiantopora bidenticulata, new species.
Hiantopora laticella, new species.
Hippaliosina acutirostris, new species.
Hippaliosina triforma, new species.
Hippodiplosia baculina, new species.
Hippoporina fallax, new species.
Hippothoa flagellum Manzoni, 1870.
Holoporella pilifera, new species.
Holoporella subflava, new species.
Holoporella turrita Smitt, 1873.
Idmonea australis MacGillivray, 1884.
Labioporella crenulata Levinsen, 1909
Lichenopora mediterranea Blainville, 1834.
Lichenopora radiata Savigny-Audouin, 1826.
Mastigophora baculifera, new species.
Mastigophora pesanseris Smitt, 1873.
Mecynoecia rectangulata, new species.
Membrendoecium ovatum, new species.
Membrendoecium savarti MacGillivray, 1890.
Microporella ciliata Linnaeus, 1759.
Monoporella fimbriata Canu and Bassler, 1927.
Monoporella fimbriata carinifera, new variety.
Monoporella fimbriata crassa, new variety.
Onychocella subsymmetrica, new species.
Osthimosia simonensis Busk, 1884.
Parmularia cylindrica, new species.
Petraliella crassocirca, new species.
Petraliella gigantea, new species.
Petraliella tubulifera, new species.
Platonea philippsae Harmer, 1915.
Pleuronea decorata, new species.
Proboscina coapta, new species.
Psilopsella uniseriata Canu and Bassler, 1927.

Puellina radiata Moll, 1803.
Retepora (Reteporella) clypeata, new species.
Retepora (Reteporella) millespinae, new species.
Retepora (Reteporella) tenuitelifera, new species.
Schizellozoon phenicea Busk, 1852.
Schizomavella (Metroperiella) ovoidea, new species.
Schizoporella costulata, new species.
Smittina reticulata MacGillivray, 1842.
Smittina trispinosa munita Hincks, 1884.
Smittina trispinosa nitida Hincks, 1881.
Steganoporella magnilabris Busk, 1854.
Steganoporella mandibulata Harmer, 1926.
Stylopoma parviporosa, new species.
Thalamoporella expansa Levinsen, 1909.
Tremogasterina celleporoides Busk, 1884.
Tremopora ovalis, new species.
Tremopora radicifera Hincks, 1881.
Tretocycloecia ramosa, new species.
Trypostega pusilla, new species.
Tubucellaria cereoides gracilis, new variety.
Tubucellaria exilis, new species.
Tubulipora coerulea, new species.
Tubulipora (?)radicata, new species.
Velumella philippinensis, new species.

D. 5141. Jolo Light, Jolo (6° 09′ N.; 120° 58′ E.); 29 fathoms; coral sand; February 15, 1908:

Adeona arculifera, new species.
Adeona porosa, new species.
Adeonella gibbera, new species.
Adeonella minutipora, new species.
Adeonellopsis pentapora, new species.
Anoteropora magnicapitata Canu and Bassler, 1927.
Bracebridgia fissifera, new species.
Caberea brevigaleata, new species.
Calloporina sigillata, new species.
Chaperia transversalis, new species.
Cheiloporina coerulea, new species.
Coleopora seriata, new species.
Coleopora verrucosa Canu and Bassler, 1927.
Conescharellina elongata, new species.
Conescharellina milleporacea, new species.
Cosciniopsis coelatus Canu and Bassler, 1927.
Costazia radiata Ortmann, 1890.
Cupuladria hexagonalis, new species.
Dakaria granulata, new species.
Diaperoecia scalaria Canu and Bassler, 1922
Diaperoecia transversalis, new species.
Didymosella parvipora, new species.
Ellisina philippinensis, new species.
Emballotheca acutirostris, new species.
Entalophora major, new species.
Entomaria coronata, new species.
Exechonella magna MacGillivray, 1895

Figularia jucunda, new species.
Flabellopora elegans D'Orbigny, 1852.
Flabellopora tubifera, new species.
Galeopsis mutabilis, new species.
Gephyrophora rostrigera Waters, 1885.
Haswellia australiensis Haswell, 1880.
Haswellia longicollis, new species.
Hippaliosina acutirostris, new species.
Hippaliosina triforma, new species.
Holoporella erectorostris, new species.
Holoporella serratirostris MacGillivray, 1884.
Holoporella turrita Smitt, 1873.
Hornera pinnata, new species.
Mecynoecia geminata, new species.
Mecynoecia longipora MacGillivray, 1895.
Mecynoecia obesa Canu and Bassler, 1922.
Mecynoecia proboscidea Milne Edwards, 1838.
Membrendoecium ovatum, new species.
Membrendoecium savarti MacGillivray, 1890.
Microporella ciliata Linnaeus, 1759.
Monoporella fimbriata Canu and Bassler, 1927.
Onychocella subsymmetrica, new species.
Parmularia cylindrica, new species.
Petraliella echinata, new species.
Petraliella philippinensis, new species.
Platonea philippsae Harmer, 1915.
Polyascosoecia funicula, new species.
Puellina radiata Moll, 1803.
Retepora (Reteporella) millespinae, new species.
Schizellozoon phenicea Busk, 1852.
Schizomavella cornuta, new species.
Schizomavella (Metroperiella) ovoidea, new species.
Smittina ophidiana marginata, new variety.
Smittina trispinosa nitida Hincks, 1881.
Steganoporella magnilabris Busk, 1854.
Steganoporella mandibulata Harmer, 1926.
Stylopoma distoria, new species.
Stylopoma parviporosa, new species.
Tremogasterina celleporoides Busk, 1884.
Tubigerina rugosa, new species.
Tubucellaria cereoides gracilis, new variety.
Tubulipora coerulea, new species.
Tubulipora (?)radicata, new species.
Velumella philippinensis, new species.

D. 5144. Jolo Light, Jolo (6° 05′ 50″ N.; 121° 02′ 15″ E.); 19 fathoms; coral sand; February 15, 1908:

Adeonella minutipora, new species.
Anoteropora magnicapitata Canu and Bassler, 1927.
Caleschara laxa, new species.
Calloporina sigillata, new species.
Cheiloporina coerulea, new species.
Cigclisula occlusa Busk, 1884.
Coleopora verrucosa Canu and Bassler, 1927.

Conescharellina catella, new species.
Conescharellina elongata, new species.
Conescharellina grandiporosa, new species.
Cosciniopsis coelatus Canu and Bassler, 1927.
Crateropora expansa Harmer, 1926.
Cupuladria tuberosa, new species.
Dacryonella ogivalina, new species.
Didymosella parvipora, new species.
Ellisina philippinensis, new species.
Exechonella magna MacGillivray, 1895.
Fenestrulina infundibulipora, new species.
Figularia fissurata, new species.
Filifascigera parvipora, new species.
Flabellopora elegans D'Orbigny, 1852.
Flabellopora irregularis, new species.
Flabellopora tubifera, new species.
Galeopsis mutabilis, new species.
Galeopsis pupa Jullien, 1903.
Hiantopora bidenticulata, new species.
Hippaliosina acutirostris, new species.
Hippaliosina triforma, new species.
Hippoporina fallax, new species.
Hippoporina planulata, new species.
Hippothoa flagellum Manzoni, 1879.
Holoporella rosca, new species.
Holoporella turrita Smitt, 1873.
Inversiula inversa Waters, 1887.
Mastigophora baculifera, new species.
Mastigophora pesanseris Smitt, 1873.
Membrendoecium ovatum, new species.
Membrendoecium savarti MacGillivray, 1890.
Monoporella fimbriata Canu and Bassler, 1927.
Onychocella subsymmetrica, new species.
Osthimosia simonensis Busk, 1884.
Parmularia cylindrica, new species.
Petraliella echinata, new species.
Petraliella philippinensis, new species.
Puellina radiata Moll, 1803.
Schizomavella (Metroperiella) ovoidea, new species.
Schizopodrella cucullata, new species.
Schizoporella costulata, new species.
Smittina ophidiana marginata, new variety.
Stylopoma parviporosa, new species.
Thalamoporella hamata Harmer, 1926.
Tremogasterina celleporoides Busk, 1884.
Tremopora ovalis, new species.
Trypostega pusilla, new species.
Trypostega venusta Norman, 1864.
Tubulipora coerulea, new species.
Velumella pusilla, new species.
Vibracellina crassatina, new species.

D. 5145. Jolo Light, Jolo (6° 04′ 30″ N.; 120° 59′ 30″ E.); 23 fathoms; coral sand with shells (co. S., Sh.); February 15, 1908:

Acanthodesia savarti Savigny-Audouin, 1826.
Anoteropora magnicapitata Canu and Bassler, 1927.
Chaperia transversalis, new species.
Cheiloporina coerulea, new species.
Cheiloporina flava, new species.
Cheiloporina irregularis, new species.
Cigclisula occlusa Busk, 1884.
Coleopora erinacea, new species.
Coleopora seriata, new species.
Costazia radiata Ortmann, 1890.
Crepidacantha papulifera, new species.
Dacryonella minor Hincks, 1885.
Diaperoecia radicata Kirkpatrick, 1888.
Diaperoecia radicata fasciculata, new variety.
Diaperoecia scalaria Canu and Bassler, 1922.
Didymosella costulata, new species.
Emballotheca acutirostris, new species.
Emballotheca impar MacGillivray, 1890.
Emballotheca imperfecta, new species.
Emballotheca latisinuata, new species.
Flabellopora elegans D'Orbigny, 1862.
Gemellipora punctata, new species.
Gemelliporella areolata, new species.
Hippaliosina acutirostris, new species.
Hippoporina squamosa, new species.
Hippoporina verrucosa, new species.
Hippothoa flagellum Manzoni, 1870.
Holoporella pygmaea, new species.
Holoporella serratirostris MacGillivray, 1884.
Lichenopora radiata Savigny-Audouin, 1826.
Mastigophora pesanseris Smitt, 1873.
Mecynoecia geminata, new species.
Monoporella fimbriata Canu and Bassler, 1927.
Onychocella subsymmetrica, new species.
Parmularia cylindrica, new species.
Pleuronea? decorata, new species.
Polyascosoecia funicula, new species.
Puellina radiata Moll, 1803.
Schizomavella (Metroperiella) ovoidea, new species.
Schizoporella proditor, new species.
Smittina reticulata MacGillivray, 1842.
Smittina trispinosa Johnston, 1838.
Smittina trispinosa nitida Hincks, 1881.
Steganoporella magnilabris Busk, 1854.
Steganoporella mandibulata Harmer, 1926.
Stylopoma distorta, new species.
Tremogasterina celleporoides Busk, 1884.
Tremopora radicifera Hincks, 1881.
Trochiliopora (?) bartschi, new species.
Velumella philippinensis, new species.
Vibracellina viator, new species.

D. 5147. Sulade Island, Sulu Archipelago (5° 41′ 40″ N.; 120° 47′ 10″ E.); 21 fathoms; coral sand with shells (co. S., Sh.); February 15, 1908:

Acanthodesia savarti Savigny-Audouin, 1826.
Adeona arculifera, new species.
Adeonellopsis pentapora, new species.
Anoteropora magnicapitata Canu and Bassler, 1927.
Bracebridgia fissifera, new species.
Caberea brevigaleata, new species.
Calloporina sigillata, new species.
Canda philippinensis, new species.
Canda retiformis Pourtales, 1867.
Chaperia transversalis, new species.
Cheiloporina coerulea, new species.
Coleopora erinacea, new species.
Conescharellina elongata, new species.
Conescharellina lunata, new species.
Conescharellina milleporacea, new species.
Cosciniopsis fallax, new species.
Crepidacantha altirostris, new species.
Cupuladria hexagonalis, new species.
Dacryonella minor Hincks, 1885.
Dacryonella ogivalina, new species.
Dacryonella trapezoides, new species.
Diaperoecia indistincta, new species.
Diaperoecia intricaria Busk, 1875.
Diaperoecia rosea, new species.
Diaperoecia scalaria Canu and Bassler, 1922.
Didymosella costulata, new species.
Entalophora major, new species.
Fenestrulina infundibulipora, new species.
Flabellopora elegans D'Orbigny, 1852.
Flabellopora irregularis, new species.
Flabellopora tuberosa, new species.
Flabellopora tubifera, new species.
Galeopsis pupa Jullien, 1803.
Gemellipora biavicularia, new species.
Gephyrophora rostrigera Waters, 1885.
Haswellia australiensis Haswell, 1880.
Haswellia longicollis, new species.
Hippaliosina acutirostris, new species.
Hippaliosina triforma, new species.
Hippodiplosia baculina, new species.
Hippoporina planulata, new species.
Holoporella erectorostris, new species.
Holoporella pilifera, new species.
Holoporella pygmaea, new species.
Holoporella serratirostris MacGillivray, 1884.
Hornera pinnata, new species.
Idmonea australis MacGillivray, 1884.
Lepraliella granulata, new species.
Lichenopora buski Harmer, 1915.
Lichenopora radiata Savigny-Audouin, 1826.

Mastigophora pesanseris Smitt, 1873.
Mecynoecia longipora MacGillivray, 1895.
Mecynoecia obesa Canu and Bassler, 1922.
Mecynoecia proboscidea Milne-Edwards, 1838.
Mecynoecia rectangulata, new species.
Mecynoecia unifaciata, new species.
Membrendoecium ovatum, new species.
Microporella ciliata Linnaeus, 1759.
Monoporella fimbriata Canu and Bassler, 1927.
Monoporella fimbriata carinifera, new variety.
Onychocella subsymmetrica, new species.
Osthimosia simonensis Busk, 1884.
Petraliella crassocira, new species.
Petraliella gigantea, new species.
Petraliella philippinensis, new species.
Puellina radiata Moll, 1803.
Retepora (Reteporella) laxipes, new species.
Retepora (Reteporella) tenuitelifera, new species.
Rhynchozoon angulatum Levinsen, 1909.
Schizomavella (Metroperiella) lepralioides Calvet, 1903
Schizomavella (Metroperiella) ovoidea, new species.
Scrupocellaria ulrichi, new species.
Smittina ophidiana marginata, new variety.
Smittina trispinosa munita Hincks, 1884.
Smittina trispinosa nitida Hincks, 1881.
Steganoporella aviculifera, new species.
Steganoporella magnilabris Busk, 1854.
Stylopoma distorta, new species.
Stylopoma parviporosa, new species.
Thalamoporella granulata Levinsen, 1909.
Tremopora ovalis new species.
Tretocycloecia flabellaris, new species.
Tretocycloecia ramosa, new species.
Trypostega pusilla, new species.
Tubigerina rugosa, new species.
Tubucellaria cereoides gracilis, new variety.
Tubucellaria exilis, new species.
Tubucellaria filiformis, new species.
Tubucellaria fusiformis D'Orbigny, 1848.
Tubulipora coerulea, new species.
Tubulipora (?) *grandipora*, new species.
Velumella philippinensis, new species.

D. 5148. Sirun Island, Sulu Archipelago (5° 35′ 40″ N.; 120° 47′ 30″ E.); 17 fathoms; (coral sand); February 15, 1908:

Lichenopora buski Harmer, 1915.

D. 5149. Sirun Island, Sulu Archipelago (5° 33′ N.; 120° 42′ 10″ E.); 10 fathoms; coral shells (Co., Sh.); February 16, 1908:

Holoporella pilifera, new species.
Petraliella armata Waters, 1913.
Smittina ophidiana marginata, new variety.
Tremoschizodina crassa, new species.

D. 5150. Sirun Island, Sulu Archipelago (5° 23′ 20″ N.; 120° 35′ 45″ E.); 21 fathoms; coral sand with shells (Co. S., Sh.); February 16, 1908:

Adeonella minutipora, new species.
Cigclisula occlusa Busk, 1884.
Peristomella coccinea Abildgard, 1805.
Tremoschizodina crassa, new species.

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group (5° 24′ 40″ N.; 120° 27′ 15″ E.); 24 fathoms; coral sand with shells (Co. S., Sh.); February 18, 1908:

Acanthodesia savarti Savigny-Audouin, 1826.
Actinopora philippinensis, new species.
Adeona articulata, new species.
Adeonella minutipora, new species.
Arthropoma cecili Savigny-Audouin, 1826.
Bracebridgia fissifera, new species.
Caberea brevigalcata, new species.
Caberea transversa Harmer, 1926.
Callopora tenuirostris Hincks, 1880.
Calloporina sculpta, new species.
Calloporina sigillata, new species.
Chaperia transversalis, new species.
Cheiloporina coerulea, new species.
Cheiloporina flava, new species.
Cigclisula occlusa Busk, 1884.
Coleopora erinacea, new species.
Conescharellina elongata, new species.
Conescharellina milleporacea, new species.
Cosciniopsis fallax, new species.
Dacryonella minor Hincks, 1885.
Dacryonella trapezoides, new species.
Diaperoecia indistincta, new species.
Diaperoecia intricaria Busk, 1875.
Diaperoecia scalaria Canu and Bassler, 1922.
Diaperoecia transversalis, new species.
Emballotheca biavicularia, new species.
Entomaria coronata, new species.
Filisparsa sinuosa, new species.
Flabellopora asper, new species.
Flabellopora elegans d'Orbingy, 1852.
Gemellipora biavicularia, new species.
Gemellipora peristomaria, new species.
Haswellia australiensis Haswell, 1880.
Haswellia longicollis, new species.
Hiantopora bidenticulata, new species.
Hippaliosina acutirostris, new species.
Hippaliosina triforma, new species.
Hippoporina fallax, new species.
Holoporella inflata, new species.
Holoporella turrita Smitt, 1873.
Hornera pinnata, new species.
Idmonea australis MacGillivray, 1884

Inversiula inversa Waters, 1887.
Labioporella crenulata Levinsen, 1909.
Lepraliella granulata, new species.
Lichenopora buski Harmer, 1915.
Lichenopora radiata Savigny-Audouin, 1826.
Lichenopora wilsoni MacGillivray, 1886.
Mastigophora pesanseris Smitt, 1873.
Mecynoecia proboscidea Milne-Edwards, 1848.
Mecynoecia rectangulata, new species.
Membrendoecium ovatum, new species.
Membrendoecium savarti MacGillivray, 1890.
Mesonea simplex, new species.
Microeccia sinuosa, new species.
Microporella ventricosa, new species.
Monoporella fimbriata Canu and Bassler, 1927.
Onychocella subsymmetrica, new species.
Parmularia cylindrica, new species.
Peristomella coccinea Abildgard, 1805.
Petraliella falcifera, new species.
Platonea hirsuta Canu and Bassler, 1922.
Pleuronea (?)*striata*, new species.
Proboscina dichotoma D'Orbigny, 1837.
Puellina radiata Moll, 1803.
Retepora (*Reteporella*) *clypeata*, new species.
Retepora (*Reteporella*) *longicollis*, new species.
Retepora (*Reteporella*) *millespinae*, new species.
Retepora (*Reteporella*) *tenuitelifera*, new species.
Schizomavella (*Metroperiella*) *ovoidea*, new species.
Scrupocellaria securifera Busk, 1884.
Siphonoporella ovalis, new species.
Smittina ophidiana marginata, new variety.
Smittina reticulata MacGillivrary, 1842.
Smittina trispinosa Johnston, 1842.
Smittina trispinosa nitida Hincks, 1881.
Steganoporella magnilabris Busk, 1854.
Steganoporella mandibulata Harmer, 1926.
Stylopoma distorta, new species.
Stylopoma parviporosa, new species.
Thalamoporella granulata Levinsen, 1909.
Thalamoporella hamata Harmer, 1926.
Thalamoporella lioticha Ortmann, 1890.
Tremogasterina celleporoides Busk, 1884
Tremopora ovalis, new species.
Tremopora radicifera Hincks, 1881.
Tremoschizodina crassa, new species.
Tretocycloecia ramosa, new species.
Tubucellaria cereoides gracilis, new variety.
Tubucellaria exilis, new species.
Tubucellaria filiformis, new species.
Tubucellaria fusiformis D'Orbigny, 1848.
Tubulipora coerulea, new species.
Velumella philippinensis, new species.

D. 5155. Bakun Point, Sulu Archipelago, Tawi Tawi Group (5° 13′ 40″ N.; 119° 57′ 20″ E.); 12 fathoms; coral sand (co. S.); February 19, 1908:

Puellina radiata Moll, 1803.
Smittina tripora, new species.

D. 5159. Tinakta Island, Sulu Archipelago (5° 11′ 50″ N.; 119° 54′ E.); 10 fathoms; coral sand (co. S.); February 21, 1908:

Retepora pseudofinis, new species.

D. 5161. Tinakta Island, Sulu Archipelago, Tawi Tawi Goup (5° 10′ 15″ N.; 119° 53′ E.); 16 fathoms; fine sand with black specks (fne. s., blk. Sp.; February 22, 1908:

Cupuladria grandis, new species.

D. 5162. Tinagta Island, Sulu Archipelago, Tawi Tawi Group (5° 10′ N.; 119° 47′ 30″ E.); 230 fathoms; sand with broken shells (S., brk. Sh.); bottom temperature, 52.9° F.; February 22, 1908:

Adeonella gibbera, new species.
Adeonellopsis pentapora, new species.
Allantopora curta, new species.
Anoteropora magnicapitata Canu and Bassler, 1927.
Chaperia transversalis, new species.
Cheiloporina coerulea, new species.
Cigclisula occlusa Busk, 1884.
Conescharellina catella, new species.
Conescharellina elongata, new species.
Didymosella costulata, new species.
Fenestrulina infundibulipora, new species.
Flabellopora asper, new species.
Flabellopora elegans D'Orbigny, 1852.
Haswellia australiensis Haswell, 1880.
Haswellia longicollis, new species.
Hippoporina granifera, new species.
Labioporella crenulata Levinsen, 1909.
Lichenopora mediterranea Blainville, 1834.
Lichenopora radiata Savigny-Audouin, 1826.
Lichenopora (*Domopora*) *strictolamellosa*, new species.
Membrendoecium savarti MacGillivray, 1890.
Mesostomaria strictorama Canu and Bassler, 1927.
Microporella ventricosa, new species.
Parmularia elongata, new species.
Petraliella crassocirca, new species.
Petraliella gigantea, new species.
Petraliella philippinensis, new species.
Petraliella robusta, new species.
Petraliella tubulifera, new species.
Petraliella verrucosa, new species.
Puellina radiata Moll, 1803.
Smittina trispinosa nitida Hincks, 1881.
Steganoporella magnilabris Busk, 1854.
Stylopoma distorta, new species.
Tremogasterina celleporoides Busk, 1884.
Trypostega venusta Norman, 1864.
Tubucellaria cereoides gracilis, new variety.

D. 5163. Observation Island, Sulu Archipelago, Tawi Tawi Group (4° 59′ 10″ N.; 119° 51′ E.); 28 fathoms; coral sand (co. S.); February 24, 1908:

Tremoschizodina crassa, new species.

D. 5173. Jolo Light, Jolo (6° 02′ 55″ N.; 120° 53′ E.); 186 fathoms; shells, coral (sh., co.); March 5, 1908:

Smittina signata Waters, 1889.

D. 5174. Jolo Light Jolo (6° 03′ 45″ N.; 120° 57′ E.); 20 fathoms; coarse sand (crs. S.); March 5, 1908:

Acanthodesia savarti Savigny-Audouin, 1826.
Calloporina sigillata, new species.
Puellina radiata Moll, 1803.
Schismopora chrysalis, new species.
Smittina reticulata MacGillivray, 1842.
Steganoporella mandibulata Harmer, 1926.

D. 5179. Romblon Light, Romblon (12° 38′ 15″ N.; 122° 12′ 30″ E.); 37 fathoms; hard sand; bottom temperature 75.7° F.; March 25, 1908:

Adeonella gibbera, new species.
Amphiblestrum papillatum Busk, 1885.
Buffonellaria loculifera, new species.
Callopora subalbida, new species.
Calloporina sigillata, new species.
Costazia aculeata, new species.
Crepidacantha altirostris, new species.
Dacryonella subvespertilio, new species.
Emballotheca imperfecta, new species.
Flabellopora irregularis, new species.
Galeopsis pupa Jullien, 1903.
Gemellipora biavicularia, new species.
Gemelliporella areolata, new species.
Gephyrophora rostrigera Waters, 1885.
Hiantopora spathulata, new species.
Hippoporina fallax, new species.
Hippoporina squamosa, new species.
Holoporella erectorostris, new species.
Holoporella serratirostris MacGillivray, 1884.
Mastigophora pesanseris Smitt, 1873.
Membraniporidra tuberosa, new species.
Membrendoecium ovatum, new species.
Microecia sinuosa, new species.
Microporella ciliata Linnaeus, 1759.
Onychocella subsymmetrica, new species.
Osthimosia simonensis Busk, 1884.
Petraliella tubulifera, new species.
Puellina radiata Moll, 1803.
Puellina radiata flabellifera Kirkpatrick, 1888.
Retepora (Reteporella) clypeata, new species.
Retepora (Reteporella) spinosissima, new species.

Schizomavella (Metropcriella) lepralioides Calvet, 1903.
Schizoporella costulata, new species.
Smittina reticulata MacGillivray, 1842.
Smittina trispinosa munita Hincks, 1884.
Smittina trispinosa nitida Hincks, 1881.
Stylopoma parviporosa, new species.
Thalamoporella granulata Levinsen, 1909.
Tremoschizodina crassa, new species.
Velumella philipinensis, new species.

D. 5192. Jilantaguan Island, off northern Cebu Island (11° 09′ 15″ N.; 123° 50′ E.); 32 fathoms; green sand; April 3, 1908:

Adeonella minutipora, new species.
Conescharellina breviconica, new species.
Conescharellina milleporacca, new species.
Gemelliporella areolata, new species.
Hippoporina fallax, new species.
Holoporella inflata, new species.
Membrendoecium laguncululm, new species.
Puellina radiata Moll, 1803.
Tremogasterina celleporoides Busk, 1884.
Velumella philippinensis, new species.

D. 5202. Limasaua Island, Sogod Bay, Southern Leyte Island, (10° 12′ N.; 125° 04′ 10″ E.); 502 fathoms; gray mud; April 10, 1908:

Retepora (Reteporella) laxipes, new species.
Vibracellina viator, new species.

D. 5211. Panalangan Point, Talajit Island, east of Masbate Island (11° 51′ 35″ N.; 124° 14′ E.); 155 fathoms; green mud, sand (gn. M., S.); bottom temperature, 56.6° F.; April 17, 1908:

Retepora (Reteporella) laxipes, new species.

D. 5212. Panalangan Point Talajit Island, east of Masabate Island (12° 04′ 15″ N.; 124° 04′ 36″ E.); 108 fathoms; gray sand, mud (gy. S., M.) bottom temperature, 59.9° F.; April 20, 1908:

Conescharellina breviconica, new species.
Nitscheina tuberculata Bosc, 1802.
Retepora (Reteporella) clypeata, new species.
Retepora (Reteporella) laxipes, new species.

D. 5213. Destacado Island, east of Masbate Island (12° 15′ N.; 123° 57′ 30″ E.); 80 fathoms; sand, mud, shells (S., M., Sh.); April 20, 1908:

Conescharellina breviconica, new species.
Conescharellina catella, new species.
Conescharellina milleporacca, new species.
Flabellopora tuberosa, new species.
Gemellipora minutipora, new species.

D. 5217. Anima Sola Island, between Burias and Luzon (13° 20′ N.; 123° 14′ 15″ E.); 105 fathoms; coarse gray sand; bottom temperature 63.1° F.; April 22, 1908:

Adeonellopsis falcifera, new species.
Allantopora curta, new species.
Arthropoma cecili Savigny-Audouin, 1826.
Buffonellaria loculifera, new species.
Caleschara laxa, new species.
Crepidacantha grandis, new species.
Crepidacantha papulifera, new species.
Dacryonella ogivalina, new species.
Emballotheca subsinuata Hincks, 1884.
Fenestrulina infundibulipora, new species.
Filifascigera pluripora, new species.
Flabellopora tuberosa, new species.
Gemelliporella areolata, new species.
Holoporella (?) *convexa*, new species.
Idmonea pauper, new species.
Lichenopora radiata Savigny-Audouin, 1826.
Mastigophora grandicella, new species.
Mastigophora pesanseris Smitt, 1873.
Mecynoecia longipora MacGillivray, 1895.
Membranipora arcifera, new species.
Micropora rimulata, new species.
Microporella lineata, new species.
Microporella ventricosa, new species.
Porella purpurea Jullien, 1888.
Psilopsella uniseriata Canu and Bassler, 1927.
Puellina radiata Moll, 1803.
Pyripora tenuicaudata, new species.
Pyripora uncifera, new species.
Schizomavella ambita granulosa, new variety.
Schizomavella (*Metroperiella*) *lepralioides* Calvet, 1903.
Smittina trispinosa acuta, new variety.
Trypostega venusta Norman, 1864.

D. 5219. Mompog Island between Marinduque and Luzon (13° 21′ N.; 122° 18′ 45″ E.); 530 fathoms; green mud (gn. M.); bottom temperature, 50.8° F.; April 23, 1908:

Adeonellopsis pentapora, new species.
Conescharellina breviconica, new species.
Entalophora arcuata, new species.
Gemelliporella areolata, new species.
Idmonea australis MacGillivray, 1884.
Mecynoecia longipora MacGillivray, 1895.
Nitscheina tuberculata Bosc, 1802.
Pleuronea (?) *striata*, new species.
Puellina radiata Moll, 1803.
Schizomavella simplex, new species.
Smittina signata Waters, 1889.
Smittina trispinosa munita Hincks, 1884.
Smittina trispinosa nitida Hincks, 1881.

D. 5230. Limasaua Island, between Bohol and Leyte (10° 01′ 50″ N.; 124° 42′ 30″ E.); 118 fathoms; gray sand (gy. S.); bottom temperature, 57.6° F.; May 7, 1908:

Acanthodesia quadrata, new species.
Conescharellina breviconica, new species.
Cupuladria dentifera, new species.
Membranipora bartschi, new species.

D. 5235. Nagubat Island, Pacific Ocean, east coast Mindanao (9° 43′ N.; 125° 48′ 15″ E.); 44 fathoms; soft mud; May 9, 1908:

Acanthodesia quadrata, new species.
Adeonella minutipora, new species.
Calcschara junctifera, new species.
Canda philippinensis, new species.
Cellaria gracilis Busk, 1852.
Crisia delicatula, new species.
Crisina canariensis D'Orbigny, 1851.
Dacryonella minor Hincks, 1885.
Diaperoccia radicata Kirkpatrick, 1888.
Electra devinensis Robertson, 1921.
Ellisina coronata Hincks, 1881.
Exechonella discoidea, new species.
Figularia jucunda, new species.
Mastigophora pesanseris Smitt, 1873.
Nellia oculata Busk, 1852.
Scrupocellaria ferox Busk, 1852.
Scrupocellaria securifera Busk, 1884.
Smittina nitida delicatula Busk, 1885.
Tetraplaria gryllus, new species.
Tubucellaria filiformis, new species.

D. 5237. Sanco Point Island, east coast Mindanao (8° 9′ 6″ N.; 126° 31′ 45″ E.); 249 fathoms; green mud; bottom temperature, 46.4° F.; May 12, 1908:

Trochosodon decussis, new species.
Trochosodon parvulum, new species.
Trochosodon porcellanum, new species.

D. 5251. Linao Point, Gulf of Davao (7° 5′ 12″ N.; 125° 39′ 35″ E.); 20 fathoms; coral; May 18, 1908:

Chaperia acanthina Quoy and Gaimard, 1824.
Holoporella pilifera, new species.
Holoporella turrita Smitt, 1873.

D. 5255. Dumalag Island, Gulf of Davao (7° 03′ N; 125° 39′ E); 100 fathoms; soft mud; May 18, 1908:

Adeonella minutipora, new species.
Costazia aculeata, new species.
Mastigophora pesanseris Smitt 1873.
Smittina tripora, new species.

D. 5293. Escarceo Light, China Sea, vicinity southern Luzon (13° 28′ 15″ N.; 121° 4′ 30″ E.); 180 fathoms; fine black sand; bottom temperature, 57.4° F.; July 23, 1908:

Haswellia australiensis Haswell, 1880.

D. 5311. China Sea vicinity, Hong Kong (21° 33′ N.; 116° 15′ E.); 88 fathoms, coral sand, shells (crs. S., Sh.); November 4, 1908:

Acanthodesia grandicella, new species.
Adeonella minutipora, new species.
Cellepora sinensis, new species.
Conescharellina concava, new species.
Costazia pisiformis chinensis, new variety.
Ellisina philippinensis, new species.
Emballotheca ingens, new species.
Emballotheca subsinuata Hincks, 1884.
Flabellopora irregularis, new species.
Gephyrophora rostrigera Waters, 1885.
Hippoporina squamosa, new species.
Lichenopora radiata Savigny-Audouin, 1826.
Microporella ciliata Linnaeus, 1759.
Petralia japonica Busk, 1884.
Proboscina dichotoma D'Orbigny, 1837.
Puellina radiata Moll, 1803.
Puellina radiata flabellifera Kirkpatrick, 1888.
Schizomavella ambita granulosa, new variety.
Smittina trispinosa Johnston, 1838.
Steganoporella magnilabris Busk, 1854.
Thalamoporella linearis, new species.

D. 5325. Hermanos Island, North of Luzon (18° 34′ 15″ N.; 121° 51′ 15″ E.); 224 fathoms; green mud; bottom temperature, 53.2° F.; November 12, 1908:

Galeopsis brevicapitata, new species.

D. 5335. Observatory Island, Linapacan Strait (11° 37′ 15″ N.; 119° 48′ 45″ E.); 46 fathoms; sand, mud (S., M.); December 18, 1908:

Actisecos regularis Canu and Bassler, 1927.

D. 5336. Observatory Island, Linapacan Strait (11° 37′ 45″ N.; 119° 46′ E.); 46 fathoms; (Sand, mud); December 18, 1908:

Actisecos regularis Canu and Bassler, 1927.

D. 5341. Endeavor Point, Palawan Island (10° 57′ 51″ N.; 119° 17′ 26″ E.); 19–22 fathoms; gray mud; December 23, 1908:

Hippoporina squamosa, new species.

D. 5355. Balabac Light. N. Balabac Strait (8° 8′ 10″ N.; 117° 19′ 15″ E.); 44 fathoms; Coral, sand (Co., S.); January 5, 1909:

Mucronella uncifera, new species.

D. 5356. Balabac Light. N. Balabac Strait (8° 6′ 40″ N.; 117° 18′ 45″ E.); 58 fathoms; sand, shells (S., Sh.); January 5, 1909:

Hippothoa flagellum Manzoni, 1879.
Triphyllozoon magniscutulatum, new species.

D. 5358. Sandakan Light, Jolo Sea (6° 06′ 40″ N.; 118° 18′ 15″ E.); 39 fathoms; mud; January 7, 1909:

Cupuladria granulosa, new species.

D. 5392. Tubig Point, Destacado Island (12° 12′ 35″ N.; 124° 02′ 48″ E.) 135 fathoms; green mud, sand (gn. M., S.); March 13, 1909:

Flabellopora acuta, new species.
Gemellipora minutipora, new species.

D. 5478. Tacbuc Point, Leyte (10° 46′ 24″ N.; 125° 16′ 30″ E.); 57 fathoms; shells (Sh.); July 29, 1909:

Acanthodesia quadrata, new species.
Acanthodesia virgata, new species.
Actisecos regularis Canu and Bassler, 1927.
Adeonella minutipora, new species.
Adeonellopsis unilamellosa, new species.
Buffonellaria loculifera, new species.
Caberea brevigaleata, new species.
Canda philippinensis, new species.
Cellaria gracilis Busk, 1852.
Cigclisula occlusa Busk, 1884.
Coleopora erinacea, new species.
Cosciniopsis fallax, new species.
Costazia pisiformis, new species.
Costazia spathulata MacGillivray, 1887.
Crisia delicatula, new species.
Crisia hörnesi Reuss, 1847.
Crisina canariensis D'Orbigny, 1851.
Diaperoecia radicata minor, new variety.
Ellisina coronata Hincks, 1881.
Emballotheca acutirostris, new species.
Emballotheca impar MacGillivray, 1890.
Entalophora arcuata, new species.
Fenestrulina infundibulipora, new species.
Figularia fissurata, new species.
Filisparsa rugosa, new species.
Gemellipora biavicularia, new species.
Haswellia australiensis Haswell, 1880.
Haswellia longicollis, new species.
Hippoporina fallax, new species.
Holoporella erectorostris, new species.
Holoporella serratirostris MacGillivray, 1884.
Hornera pinnata, new species.
Idmonea parvula, new species.
Mastigophora pesanseris Smitt, 1873.
Membrendoecium laguneulum, new species.
Mesonea simplex, new species.
Microporella coronata Savigny-Audouin, 1826.

Nellia oculata Busk, 1852.
Onychocella inarmata, new species.
Petraliella verrucosa, new species.
Polyascosoecia funicula, new species.
Puellina radiata Moll, 1803.
Retepora (*Reteporella*) *clypeata*, new species.
Scrupocellaria curvata Harmer, 1926.
Scrupocellaria diadema Busk, 1852.
Scrupocellaria ferox Busk, 1852.
Scrupocellaria scrupea Busk, 1849.
Scrupocellaria securifera Busk, 1884.
Scrupocellaria ulrichi, new species.
Smittina nitida Waters, 1909.
Smittina trispinosa granosa, new species.
Stylopoma parviporosa, new species.
Tetraplaria gryllus, new species.
Triphyllozoon biseriatum, new species.
Triphyllozoon moniliferum MacGillivray, 1860.
Tubucellaria exilis, new species.

D. 5547. Noble Point, Tulayan Island, vicinity of Jolo (6° 09′ 20″ N.; 121° 13′ 40″ E.); 155 fathoms; fine sand; bottom temperature, 56.3° F.; September 15, 1909:

Diaperoecia scalaria Canu and Bassler, 1922.
Flabellopora tubifera, new species.

D. 5574. Simaluc Island, north of Tawi Tawi (5° 30′ 45″ N.; 120° 7′ 57″ E.); 340 fathoms; September 23, 1909:

Caleschara laxa, new species.
Cellaria granulata, new species.
Chaperia transversalis, new species.
Conescharellina radiata, new species.
Cryptostomaria crassatina Canu and Bassler, 1927.
Diaperoecia rosea, new species.
Flabellaris crassum, new species.
Flabellopora acutirostris, new species.
Flabellopora irregularis, new species.
Flabellopora pisiformis, new species.
Heterocella pentagona, new species.
Hippoporina verrucosa, new species.
Lichenopora holdsworthi Busk, 1875.
Lichenopora mediterranea Blainville, 1834.
Macropora centralis MacGillivray, 1895.
Monoporella tenuimargo, new species.
Omoiosia maorica Stoliczka, 1864.
Parmularia cylindrica, new species.
Parmularia depressa, new species.
Parmularia elongata, new species.
Petraliella philippinensis, new species.
Petraliella tubulifera, new species.
Petraliella verrucosa, new species.
Rectonychocella grandipora, new species.
Retepora (*Reteporella*) *spinosissima*, new species.
Steganoporella mandibulata Harmer, 1926.

Stomhypselosaria condylata Canu and Bassler, 1927.
Stomhypselosaria dupliforma, new species.
Thalamoporella insolita, new species.
Tretocycloecia parvula, new species.
Zeuglopora lanceolata Maplestone, 1909.

D. 5577. Mount Dromedario, Tawi Tawi (5° 20′ 36″ N.; 119° 58′ 51″ E.); 240 fathoms; coarse sand (crs. S.); September 23, 1909:

Adeonella minutipora, new species.
Anoteropora magnicapitata Canu and Bassler, 1927.
Callopora tenuirostris Hincks, 1880.
Calloporina sigillata, new species.
Chaperia pyriformis, new species.
Chaperia transversalis, new species.
Cheiloporina coerulea, new species.
Coleopora seriata, new species.
Conescharellina milleporacea, new species.
Crateropora expansa Harmer, 1926.
Cryptostomaria crassatina Canu and Bassler, 1927.
Diaperoecia radicata Kirkpatrick, 1888.
Diaperoecia scalaria Canu and Bassler, 1922.
Emballotheca latisinuata, new species.
Entalophora major, new species.
Fenestrulina infundibulipora, new species.
Flabellopora elegans D'Orbigny, 1852.
Flabellopora tubifera, new species.
Haswellia australiensis Haswell, 1880.
Hiantopora laticella, new species.
Hippaliosina triforma, new species.
Hippomenella porosa, new species.
Hippopleurifera (?) *philippinensis*, new species.
Hippoporina fallax, new species.
Holoporella erectorostris, new species.
Holoporella inflata, new species.
Holoporella pilaefera, new species.
Holoporella serratirostris MacGillivray, 1884.
Hornera pinnata, new species.
Idmonea pauper, new species.
Inversiula inversa Waters, 1887.
Labioporella crenulata Levinsen, 1909.
Lichenopora mediterranea Blainville, 1834.
Lichenopora radiata Savigny-Audouin, 1826.
Macropora centralis MacGillivray, 1895.
Mastigophora pesanseris Smitt, 1873.
Mecynoecia geminata, new species.
Mecynoecia longipora MacGillivray, 1895.
Membrendoecium savarti MacGillivray, 1890.
Monoporella fimbriata Canu and Bassler, 1922.
Onychocella subsymmetrica, new species.
Parmularia cylindrica, new species.
Petraliella crassocirca, new species.
Petraliella gigantea, new species.
Petraliella philippinensis, new species.
Petraliella tubulifera, new species.

Petraliella verrucosa, new species.
Pleuronea (?) *striata*, new species.
Porella purpurea Jullien, 1888.
Recionychocella grandipora, new species.
Retepora fissa MacGillivray, 1869.
Retepora granulata MacGillivray, 1869.
Retepora (*Reteporella*) *longicollis*, new species.
Retepora (*Reteporella*) *millespinae*, new species.
Schizellozoon phenicea Busk, 1852.
Smittina nitida Waters, 1909.
Smittina trispinosa munita Hincks, 1884.
Smittina trispinosa nitida Hincks, 1881.
Tremopora radicifera Hincks, 1881.
Tretocycloecia flabellaris, new species.
Tretocycloecia ramosa, new species.
Trochiliopora (?) *bartschi*, new species.
Tubucellaria cereoides gracilis, new variety.
Tubulipora (?) *grandipora*, new species.

D. 5579. Sibutu Island, Darvel Bay, Borneo (4° 54′ 15″ N.; 119° 09′ 52″ E.); 175 fathoms; fine sand, corals (fne. S., Co.); bottom temperature, 55.3° F.; September 25, 1909:

Adeonella minutipora, new species.
Anoteropora magnicapitata Canu and Bassler, 1927.
Cellaria granulata, new species.
Cellepora sinensis, new species.
Chaperia pyriformis, new species.
Conescharellina radiata, new species.
Costazia aculeata, new species.
Costazia pisiformis, new species.
Cryptostomaria crassatina, Canu and Bassler, 1927.
Cupuladria transversa, new species.
Diaperoecia scalaria Canu and Bassler, 1922.
Fenestrulina infundibulipora, new species.
Filisparsa sinuosa, new species.
Flabellaris crassum, new species.
Flabellopora arculifera, new species.
Flabellopora elegans D'Orbigny, 1852.
Flabellopora irregularis, new species.
Flabellopora lenticularis, new species.
Flabellopora planata, new species.
Flabellopora tuberosa, new species.
Flabellopora tubifera, new species.
Gemelliporella areolata, new species.
Gemellipora obesa, new species.
Gemellipora punctata, new species.
Haswellia australiensis Haswell, 1880.
Haswellia longicollis, new species.
Heterocella pentagona, new species.
Hiantopora laticella, new species.
Holoporella serratirostris MacGillivray, 1884.
Hornera pinnata, new species.
Idmonea crassimargo, new species.
Labioporella crenulata Levinsen, 1909.

Lagenipora (?) *perforata*, new species.
Lichenopora lamellosa, new species.
Lichenopora radiata Savigny-Audouin, 1826.
Mesostomaria strictorama Canu and Bassler, 1927.
Petralia japonica Busk, 1884.
Petraliella crassocirca, new species.
Petraliella elongata, new species.
Petraliella gigantea, new species.
Petraliella grandicella, new species.
Petraliella philippinensis, new species.
Petraliella trita, new species.
Petraliella verrucosa, new species.
Plagioecia reticuloides, new species.
Pleuronea (?) *striata*, new species.
Polyascosoecia funicula, new species.
Pyrulella pyrula Hincks, 1881.
Rectonychocella grandipora, new species.
Rectonychocella ovalis, new species.
Retepora granulata, MacGillivray, 1869.
Steganoporella magnilabris Busk, 1854.
Stomhypsclosaria condylata Canu and Bassler, 1927.
Tremogasterina celleporoides Busk, 1884.
Tremopora radicifera Hincks, 1881.
Tremoschizodina crassa, new species.
Tretocycloecia flabellaris, new species.
Tretocycloecia parvula, new species.
Tretocycloecia ramosa, new species.
Tubulipora (?) *radicata*, new species.

D. 5580. Sibutu Island, Darvel Bay, Borneo (4° 52′ 45″ N.; 119° 06′ 45″ E.); 162 fathoms; broken shells, corals (br. S., Co.); bottom temperature, 55.8° F.; September 25, 1909:

Caberea brevigaleata, new species.
Canda philippinensis, new species.
Cellaria gracilis Busk, 1852.
Crisia hornesi Reuss, 1837.
Diaperoecia rosea, new species.
Diaperoecia scalaria Canu and Bassler, 1922.
Figularia fissurata, new species.
Flabellaris crassum, new species.
Hornera pinnata, new species.
Lichenopora radiata Savigny-Audouin, 1826.
Nellia oculata Busk, 1852.
Parmularia cylindrica, new species.
Petraliella crassocirca, new species.
Petraliella gigantea, new species.
Petraliella trita, new species.
Polyascosoecia funicula, new species.
Rectonychocella ovalis, new species.
Steganoporella magnilabris Busk, 1854.
Stomhypsclosaria dupliforma, new species.
Tremopora intermedia Kirkpatrick- 1890.
Tubucellaria filiformis, new species.
Tubucellaria fusiformis D'Orbigny, 1848.

D. 5586. Sipadan Island, Sibuko Bay, Borneo (4° 06′ 50″ N.; 118° 47′ 20″ E.); 347 fathoms, gray mud; bottom temperature, 44° F.; September 28, 1909:

Trochosodon linearis Canu and Bassler, 1927.
Trochosodon quincuncialis, new species.

D. 5593. Mount Putri, Borneo (4° 02′ 40″ N.; 118° 11′ 20″ E.); 38 fathoms; fine sand; September 29, 1909:

Retepora (*Reteporella*) *longicollis*, new species.

D. 5634. Gomono Island, Pitt Passage (1° 54′ 00″ S.; 127° 36′ E.); 329 fathoms; December 3, 1909:

Palmicellaria coronopus, new species.

D. 5670. Chenoki Point, Macassar Strait (1° 19′ S.; 118° 43′ E.); 1181 fathoms; gray mud; bottom temperature, 38.2° F.; December 30, 1909:

Conescharellina radiata, new species.
Conescharellina transversa, new species.

Ship at Cavite, Philippines:

Acanthodesia lamellosa, new species.

Unknown Philippine locality:

Cheilopora grandis, new species.
Chorizopora ventricosa, new species.
Holoporella repens, new species.
Stylopoma grandis, new species.

Order CHEILOSTOMATA Busk

The structure of this order has been elaborated in some detail in our North American Early Tertiary Bryozoa, where also the various terms of nomenclature have been discussed and illustrated. For ready reference we are including in the present work a table showing the systematic classification of this order and an alphabetic list of genera giving their present standing, both of which were printed in our article on the Classification of the Cheilostomata published in 1927.

SYSTEMATIC CLASSIFICATION

Order CHEILOSTOMATA Busk

Suborder ANASCA Levinsen

Division 1. INOVICELLATA Jullien, 1888

Family AETEIDAE Smitt, 1867

Aetea Lamouroux, 1812 (*Aeteopsis* Boeck, 1862; *Filicella* Searles Wood, 1844; *Anguinaria* Lamarck, 1816; *Cercaripora* Fischer, 1866; *Salpingia* Coppin, 1848).

Division 2. MALACOSTEGA Levinsen, 1909

Family EUCRATIIDAE Hincks, 1880

Scruparia Hincks, 1857; *Eucratea* (Lamouroux, 1812) Hincks, 1880 (*Notamia* Fleming, 1828, preoccupied).

Family GEMELLARIIDAE Busk, 1859

Gemellaria Van Beneden, 1845; *Brettia* Dyster, 1858; *Corynoporella* Hincks, 1888; *Bugulella* Verrill, 1879.

Family BIFLUSTRIDAE Smitt, 1872

Acanthodesia Canu and Bassler, 1920; *Cupuladria* Canu and Bassler, 1920; *Adenifera* Canu and Bassler, 1917; *Trochopora* D'Orbigny, 1853; (*Heteractis* Gabb and Horn, 1862); *Otionella* Canu and Bassler, 1917; *Heliodoma* Calvet, 1907; *Conopeum* Norman, 1903; *Quadricellaria* D'Orbigny, 1851; *Cellarinidra*, Canu and Bassler, 1927 (*Cellarina* D'Orbigny, 1851, preoccupied); *Membranipora* Blainville, 1830, and *Membraniporina* Levinsen, 1909 (artificial group for unplaced Membraniporae); *Biflustra* D'Orbigny, 1852 (a general term of no generic value); *Pseudostega* Brydone, 1918.

Family ELECTRINIDAE D'Orbigny, 1851

Nitscheina Canu, 1900, *Electra* Lamouroux, 1816 (*Electrina* and *Reptelectrina* D'Orbigny, 1851, *Annulipora* Gray, 1848); *Pyripora* D'Orbigny, 1852; *Heterooecium* Hincks, 1892; *Herpetopora* Lang, 1914; *Tretosina*, Canu and Bassler, 1927; *Mystriopora* Lang, 1915; *Tendra* Nordman, 1839; *Aspidelectra* Levinsen, 1909; *Taphrostoma* Canu, 1905; *Rhammatopora*, *Charixa*, and *Distelopora*, all of Lang, 1915, are placed here with doubt.

Family FLUSTRIDAE Smitt, 1867

Flustra Linnaeus, 1761 (subgenera *Carbasea* Gray, 1848, and *Chartella* Gray, 1848); *Sarsiflustra* Jullien, 1903; *Spiralaria* Busk, 1861; *Retiflustra* Levinsen, 1909; *Kenella* Levinsen, 1909; *Heteroflustra* Levinsen, 1909 (artificial group for unplaced Flustridae).

Family HINCKSINIDAE Canu and Bassler, 1927

Hincksina Norman, 1903; *Membrendoecium* Canu and Bassler, 1917; *Biselenaria* Gregory, 1893 (*Diplotaxis* Reuss, 1867, preoccupied); *Setosellina* Calvet, 1906; *Aplousina*, Canu and Bassler, 1927; *Cribrendoecium* Canu and Bassler, 1917; *Ogivalina* Canu and Bassler, 1917; *Vibracellina* Canu and Bassler, 1917; *Antropora* Norman, 1903.

Family ALDERINIDAE Canu and Bassler, 1927

Callopora Gray, 1848 (subgenera *Doryporella* Norman, 1903; *Copidozeum* Harmer, 1926); *Amphiblestrum* Gray, 1848 (*Bathypora* MacGillivray, 1895); *Alderina* Norman, 1903; *Marssonopora* Lang, 1914; *Crassimarginatella* Canu, 1900 (*Grammella* Canu, 1917; *Oochilina* Norman, 1903); *Cauloramphus* Norman, 1903; *Membraniporella* Smitt, 1873; *Tegella* Levinsen, 1909; *Ramphonotus* Norman, 1894 (*Rhynchotella* Canu, 1900); *Stamenocella* Canu and Bassler, 1917; *Ammatophora* Norman, 1903; *Periporosella* Canu and Bassler, 1917; *Ellisina* Norman, 1903; *Membraniporidra* Canu and Bassler, 1917; *Larnacius* Norman, 1903; *Foveolaria* Busk, 1883; *Cribrilina* Gray, 1848; *Acanthocella* Canu and Bassler, 1917; *Gephyrotes* Norman, 1903; *Allantopora* Lang, 1914; *Frurionella* Canu and Bassler, 1927; *Euritina* Canu, 1900; *Marginaria* Roemer, 1841; ?*Pithodella* Marsson, 1887; *Pyriporella* Canu, 1911, *Valdemunitella* Canu, 1900, *Pyrulella* Harmer, 1926; *Synaptacella* Maplestone, 1911; *Heterocella* Canu, 1907.

Family SYNAPTACELLIDAE Mapletone, 1911

Family HIANTOPORIDAE MacGillivray, 1895

Tremopora Ortmann, 1890; *Hiantopora* MacGillivray, 1887 (*Membrostega* Jullien, 1903); *Tremogasterina* Canu, 1911; *Hoplocheilina* Canu, 1911.

Family ARACHNOPUSIIDAE Jullien, 1888

Exechonella Canu and Bassler, 1927; *Arachnopusia* Jullien, 1886.

Division 3. COILOSTEGA Levinsen, 1909

Family OPESIULIDAE Jullien, 1888

Subfamily Onychocellidae Jullien, 1881; *Onychocella* Jullien, 1881; *Rectonychocella* Canu and Bassler, 1917; *Velumella* Canu and Bassler, 1917 (*Diplopholeos* Canu and Bassler, 1917); *Floridina* Jullien, 1881; *Smittipora* Jullien, 1881; *Ogiva* Jullien, 1886; *Ogivalia* Jullien, 1886.

Subfamily Microporidae Hincks, 1880; *Rosseliana* Jullien, 1888; *Floridinella* Canu and Bassler, 1917; *Gargantua* Jullien, 1888; *Dacryonella* Canu and Bassler, 1917; *Aechmella* Canu and Bassler, 1917; *Homalostega* Marsson, 1887; *Micropora* Gray, 1848 (*Peneclausa* Jullien, 1888); *Nematoporella* Canu and Bassler, 1927; (*Nematopora* Duvergier, 1921, preoccupied); *Caleschara* MacGillivray, 1880; *Monsella* Canu, 1900; *Selenaria* Busk, 1854, *Vibracella* Waters, 1891; *Andreella* Jullien, 1888; *Selenariopsis* Maplestone, 1912.

Subfamily Lunulariidae Levinsen, 1909; *Lunularia* Busk, 1884 (*Lunulites* Authors, part; *Oligotresium* Gabb and Horn, 1862; *Dimiclausa* Gregorio, 1890).

Family CALPENSIIDAE Canu and Bassler, 1923

Microporina Levinsen, 1909; *Cupularia* Lamouroux, 1821; *Hemiseptella* Levinsen, 1909; *Diplodidymia* Reuss, 1869 (*Poricellaria* D'Orbigny, 1852); *Calpensia* Jullien, 1888; *Verminaria* Jullien, 1888; *Corynostylus* Canu and Bassler, 1919.

Family STEGANOPORELLIDAE Hincks, 1884

Steganoporella Smitt, 1873; *Siphonoporella* Hincks, 1880; *Labioporella* Harmer, 1926 (*Labiopora* Levinsen, 1909, preoccupied); *Gaudryanella* Canu, 1907.

Family THALAMOPORELLIDAE Levinsen, 1902

Thalamoporella Hincks, 1887; *Thairopora* MacGillivray, 1882 (*Diplopora* MacGillivray, 1881; *Diploporella* MacGillivray, 1885; *Pergensina* Jullien, 1888); *Manzonella* Jullien, 1888; *Woodipora* Jullien, 1888.

Family ASPIDOSTOMATIDAE Jullien, 1888

Monoporella Hincks, 1881 (*Haploporella* Hincks, 1881, *Chrossotoechia* Canu, 1925); *Macropora* MacGillivray, 1895; *Odontionella* Canu and Bassler, 1917; *Foraminella* Levinsen, 1909; *Rhagasostoma* Koschinsky, 1885; *Aspidostoma* Hincks, 1881; ? *Megapora* Hincks, 1877; *Mollia* Lamouroux, 1821.

Family SETOSELLIDAE Levinsen, 1909

Setosella Hincks, 1877; *Crateropora* Levinsen, 1909; *Entomaria* Canu, 1921 (*Lagarozoum* Harmer, 1926).

Family CHLIDONIIDAE Busk, 1884

Chlidonia (Savigny, 1811) Lamouroux, 1824 (*Cothurnicella* Wyville Thompson, 1858); *Crepis* Jullien, 1883.

Family ALYSIDIIDAE Levinsen, 1909

Alysidium Busk, 1852; *Catenariopsis* Maplestone, 1899; *Catenicula* O'Donoghue, 1924.

Division 4. PSEUDOSTEGA Levinsen, 1909

Family CELLARIIDAE Hincks, 1880

Cellaria (Ellis and Solander, 1786) Lamouroux, 1812 (*Salicornaria* Schweigger, 1819, *Farcimia* Fleming, 1828); *Cryptostomaria*, Canu and Bassler, 1927; *Melicerita* Milne-Edwards, 1836 (*Ulidium* Searles Wood, 1844); *Euginoma* Jullien, 1882; *Stomhypselosaria* Canu and Bassler, 1927; *Mesostomaria* Canu and Bassler, 1927; *Escharicellaria*, Voigt 1924; *Atelestozoum* Harmer, 1926; *Syringotrema* Harmer, 1926.

Family MEMBRANICELLARIIDAE Levinsen, 1909

Membranicellaria Levinsen, 1909; *Dictuonia* Jullien, 1881; *Erinella* Canu and Bassler, 1927; (*Erina* Canu, 1908 preoccupied); *Omoiosia* Canu and Bassler, 1927.

Family COSCINOPLEURIDAE Canu, 1913

Coscinopleura Marsson, 1887; *Escharifora* D'Orbigny, 1852.

Division 5. CELLULARINA Smitt, 1867

Family FARCIMINARIIDAE Busk, 1852

Nellia Busk, 1852; *Levinsenella* Harmer, 1926 (*Columnaria* Levinsen, 1909, preoccupied); *Farciminaria* Busk, 1852; *Farciminellum* Harmer, 1926; *Didymozoum* Harmer, 1923 (*Didymia* Busk, 1852, preoccupied.)

Family BUGULIDAE Gray, 1848

Bugula Oken, 1815 (*Bugulina* Gray, 1848; *Ornithopora* D'Orbigny, 1852; *Acamarchis* Lamouroux, 1816; *Avicella* Van Beneden, 1848; *Avicularia* Gray, 1848; *Crisularia* Gray, 1848; *Ornithoporina* D'Orbigny, 1852); *Dendrobeania* Levinsen, 1909; *Watersia* Levinsen, 1909; *Himantozoum* Harmer, 1923; *Caulibugula* Verrill, 1900 (*Stirpariella* Harmer, 1923, *Stirparia* Goldstein, 1880, preoccupied); *Camptoplites* Harmer, 1923; *Bugularia* Levinsen, 1909; *Euoplozoum* Harmer, 1923; *Kinetoskias* Danielsen, 1868 (*Naresia* Wyville Thompson, 1873); *Halophila* (Gray, 1843), Busk, 1852.

Family SCRUPOCELLARIIDAE Levinsen, 1909

Scrupocellaria Van Beneden, 1845; *Canda* Lamouroux, 1816; *Caberea* Lamouroux, 1816 (*Selbia* Gray, 1843); *Amastigia* Busk, 1852 (*Anderssonia* Kluge, 1914; *Caberiella* Levinsen, 1909); *Flabellaris* Waters, 1898 (*Craspedozoum* MacGillivray, 1895); *Monartron*, new genus; *Hoplitella* Levinsen, 1909; *Rhabdozoum* Hincks, 1882; *Notoplites* Harmer, 1923; *Jubella* Jullien, 1882; *Tricellaria*

Fleming, 1828 (*Ternicellaria* D'Orbigny, 1851; *Bugulopsis* Verrill, 1880); *Menipea* Lamouroux, 1816 (*Emma* Gray, 1843); *Maplestonia* MacGillivray, 1884.

Family BICELLARIELLIDAE Levinsen, 1909

Bicellariella Levinsen, 1909; *Bicellaria* Blainville, 1830, preoccupied); *Dimetopia* Busk, 1852; *Cornucopina* Levinsen, 1909; *Petalostegus* Levinsen, 1909; *Bicellarina* Levinsen, 1909; *Dimorphozoum* Levinsen, 1909; *Calyptozoum* Harmer, 1926.

Family BEANIIDAE Canu and Bassler, 1927

Beania Johnston, 1848 (*Chaunosia* Busk, 1867); subgenus *Diachoris* Busk, 1852; *Stolonella* Hincks, 1883.

Family EPISTOMIIDAE Gregory, 1903

Epistomia Fleming, 1828; *Synnotum* (Pieper, 1881) Hincks, 1886.

Suborder ASCOPHORA Levinsen, 1909

Family COSTULAE Jullien, 1888

Collarina Jullien, 1888; *Decurtaria* Jullien, 1886; *Lyrula* Jullien, 1888; *Costula* Jullien, 1886; *Barroisina* Jullien, 1886; *Scorpiodina* Jullien, 1886; *Colletosia* Jullien, 1886; *Mumiella* Jullien, 1886; *Steginopora* D'Orbigny, 1851 (subgenera *Ubaghsia* Jullien, 1886; *Thoracophora* Jullien, 1886); *Murinopsia* Jullien, 1880 (*Lagodiopsis* Marsson, 1887); *Puellina* Jullien, 1886; *Metracolposa* Canu and Bassler, 1917; *Kelestoma* Marsson, 1887; *Distanseschareila* D'Orbigny, 1852; *Corbulipora* MacGillivray, 1895; *Figularia* Jullien, 1886, *Reginella* Jullien, 1886; *Jolietina* Jullien, 1886; *Pliophloea* Gabb and Horn, 1862; *Pleuroschiziella* Canu, 1918; *Lepralina* Kühn, 1925.

Family MYAGROPORIDAE Lang, 1916 [2]

Myagropora Lang, 1916.

Family OTOPORIDAE Lang, 1916 [2]

Otopora, *Anotopora*, and *Anaptopora*, all of Lang, 1916.

Family CTENOPORIDAE Lang, 1916 [2]

Ctenopora Lang, 1916.

Family THORACOPORIDAE Lang, 1916 [2]

Thoracopora Lang, 1916.

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[2] The families so marked contain the many Cretaceous cribrimorph genera founded mainly by Lang. We have had no opportunity to study these genera and they are included at this point to complete the generic list

Family TARACTOPORIDAE Lang, 1916 [2]

Taractopora Lang, 1916.

Family LAGYNOPORIDAE Lang, 1916 [2]

Hexacanthopora, *Prodromopora*, *Lagynopora*, *Leptocheilopora*, all of Lang, 1916.

Family ANDRIOPORIDAE Lang, 1916 [2]

Andriopora, *Corymboporella*, *Polyceratopora*, *Argopora*, *Nannopora*, *Angelopora*, *Eucheilopora*, *Kankopora*, *Oligotopora*, *Tricolpopora*, *Monoceratopora*, *Hybopora*, *Hippiopora*, *Aeolopora*, *Auchenopora*, *Pancheilopora*, *Holostegopora*, *Trilophopora*, *Schistacanthopora*, all of Lang, 1916. *Lekythoglena* Marsson, 1887. *Pliophlœa* Gabb and Horn, 1863, *Distansescharella* D'Orbigny, 1853.

Family CALPIDOPORIDAE Lang, 1916 [2]

Calpidopora, *Rhabdopora*, *Graptopora*, all of Lang, 1916.

Family DISHELOPORIDAE Lang, 1916 [2]

Dishelopora, *Hystricopora* Lang, 1916.

Family RHACHEOPORIDAE Lang, 1916 [2]

Rhacheopora, *Prosotopora*, *Geisopora*, *Diancopora*, *Diceratopora*, all of Lang, 1916.

Family PELMATOPORIDAE Lang, 1916 [2]

Francopora, *Baptopora*, *Opisthornithopora*, *Morphasmopora*, *Tricephalopora*, *Haplocephalopora*, *Phractoporella*, *Polycephalopora*, *Coelopora*, *Pnictopora*, *Carydiopora*, *Anornithopora*, *Hesperopora*, *Rhiniopora*, *Phrynopora*, *Castanopora*, *Diacanthopora*, *Pelmatopora*, *Sandalopora*, *Ichnopora*, *Batrachopora*, all of Lang, 1916. *Decurtaria* Jullien, 1886 (*Prosoporella* Marsson, 1887), *Murinopsia* Jullien, 1886 (*Lagodiopsis* Marsson, 1887), *Pachydera* Marsson, 1887, *Disteginopora* D'Orbigny, 1852, *Ubaghsia* Jullien, 1886, *Stichocados* Marsson, 1887, *Kelestoma* Marsson, 1887, *Steginopora* D'Orbigny, 1851.

Family ACROPORIDAE Canu, 1913

Acropora Reuss, 1869; *Gastropella* Canu and Bassler, 1917; *Pachytheca* Canu, 1913; *Beisselina* Canu, 1913; *Columnotheca* Marsson, 1887.

[2] The families so marked contain the many Cretaceous cribrimorph genera founded mainly by Lang. We have had no opportunity to study these genera and they are included at this point to complete the generic list.

Family CYCLICOPORIDAE Hincks, 1884

Cyclicopora Hincks, 1884; *Kymella* Canu and Bassler, 1917.

Family EUTHYROIDAE Levinsen, 1909

Euthyroides Harmer, 1902.

Family HIPPOTHOIDAE Levinsen, 1909

Hippothoa (Lamouroux, 1821) Hincks, 1880 (*Diazeuxia* Jullien, 1886; *Celleporella* Gray, 1848); *Trypostega* Levinsen, 1909; *Chorizopora* Hincks, 1880; *Haplopoma* Levinsen, 1909; *Dacryopora* Lang, 1914; *Harmeria* Norman, 1903.

Family PETRALIIDAE Levinsen, 1909

Petralia MacGillivray, 1887; *Petraliella,* Canu and Bassler, 1927; *Coleopora* Canu and Bassler, 1927.

Family GALEOPSIDAE Jullien, 1903

Galeopsis Jullien, 1903; *Cosciniopsis* Canu and Bassler, 1927; *Stenopsis* Canu and Bassler, 1927; *Gephyrophora* Busk, 1884; *Haswellia* Busk, 1884; *Pachystomaria* MacGillivray, 1895; *Schizaropsis* Canu and Bassler, 1917; *Cylindroporella* Hincks, 1877 (*Porinula* Levinsen, 1916); *Gigantopora* Ridley, 1881; *Tremotoichos* Canu and Bassler, 1917; *Semihaswellia* Canu and Bassler, 1917; *Tessaradoma* Norman, 1868.

Family STOMACHETOSELLIDAE Canu and Bassler, 1917

Posterula Jullien, 1903; *Stomachetosella* Canu and Bassler, 1917; *Enoplostomella* Canu and Bassler, 1917; *Cigclisula* Canu and Bassler, 1927; *Ragionula* Canu and Bassler, 1927; *Diatosula* Canu and Bassler, 1927; *Leiosella* Canu and Bassler, 1917; *Schizemiella* Canu and Bassler, 1917; *Metradolium* Canu and Bassler, 1917; *Metrocrypta* Canu and Bassler, 1917; *Ochetosella* Canu and Bassler, 1917; *Escharoides* Milne-Edwards, 1836.

Family ESCHARELLIDAE Levinsen, 1909

Subfamily Schizoporellae Canu and Bassler, 1917; *Schizolavella* Canu and Bassler, 1920; *Stylopoma* Levinsen, 1909; *Dakaria* Jullien, 1903; *Emballotheca* (part) Levinsen, 1909; *Gemellipora* Smitt (part) 1872; *Gemelliporella* Canu and Bassler, 1920; *Gemelliporidra,* Canu and Bassler, 1927; *Characodoma* Maplestone, 1900; *Lacerna* Jullien, 1888; *Arthropoma* Levinsen, 1909; *Buffonellaria* Canu and Bassler, 1927; *Schizomavella* Canu and Bassler, 1920 (subgenus *Metroperiella* Canu and Bassler, 1917); *Schizoporella* Hincks, 1877; *Stephanosella*

Canu and Bassler, 1917; *Stephanallona* Duvergier, 1921; *Schizopodrella* Canu and Bassler, 1917; *Buffonella* Jullien, 1888; *Phonicosia* Jullien, 1888; *Schizobrachiella* Canu and Bassler, 1920; *Strophiella* Jullien, 1903; *Sphenella* Duvergier, 1924; *?Trypocella* Maplestone, 1902.

Subfamily Hippoporae Canu and Bassler, 1917; *Hippoporina* Neviani, 1895; *Hippopleurifera,* Canu and Bassler, 1927; *Hippoporella* Canu and Bassler, 1920; *Hippoponella* Canu and Bassler, 1920; *Hippomenella* Canu and Bassler, 1917; *Hippodiplosia* Canu, 1916; *Hippozeugosella* Canu and Bassler, 1917; *Hippadenella* Canu and Bassler, 1917; *Lepralia* Johnston, 1847; *Cryptosula* Canu and Bassler, 1925; *Cribella* Julien and Calvet, 1903.

Subfamily Peristomellae Canu and Bassler, 1917; *Bathosella* Canu and Bassler, 1917; *Romancheina* Jullien, 1888; *Peristomella* Levinsen, 1902; *Exochella* Jullien, 1888; *Didymosella* Canu and Bassler, 1917; *Trypematella* Canu and Bassler, 1920.

Subfamily Microporellae Canu and Bassler, 1917; *Microporella* Hincks, 1877 (subgenera *Diporula* Hincks, 1879, *Ellipsopora* Canu and Bassler, 1923, and *Flustramorpha* Gray, 1848); *Fenestrulina* Jullien, 1888; *Calloporina* Neviani, 1895; *Stephanopora* Kirkpatrick, 1888.

Divers genera: *Cyclocolposa* Canu and Bassler, 1920; *Cycloperiella* Canu and Bassler, 1920; *Aimulosia* Jullien, 1888; *Houzeauina* Pergens, 1889; *Pseudoflustra* Bidenkap, 1897; *Aptonella* Canu and Bassler, 1928.

Family EURYSTOMELLIDAE Levinsen, 1909

Eurystomella Levinsen, 1909.

Family SMITTINIDAE Levinsen, 1909

Smittina Norman, 1903 (*Smittia* Hincks, 1880; subgenus *Reussia* Neviani, 1895); *Mucronella* Hincks, 1880; *Porella* Gray, 1848 (*Marsillea* Neviani, 1895; *Levinseniula* Cossman, 1920); *Palmicellaria* Alder, 1864; *Rhamphostomella* Lorenz, 1886; *Cystisella* Canu and Bassler, 1917; *Plagiosmittia* Canu and Bassler, 1917; *Umbonula* Hincks, 1880 (*Umbonella* Hincks, 1880, preoccupied); *Phoceana* Jullien, 1903; *Bryocryptella* Cossman, 1906 (*Cryptella* Jullien, 1903, preoccupied); *Malleatia* Jullien, 1903; *Marguetta* Jullien, 1903; *Jaculina* Jullien and Calvet, 1903 (*Vibraculina* Neviani, 1895); *Codonella* Canu and Bassler, 1928.

Family TUBUCELLARIIDAE Busk, 1884

Tubucellaria D'Orbigny, 1852; *Tubucella* Canu and Bassler, 1917; *Tubiporella* Levinsen, 1909; *Siphonicytara* Busk, 1884.

Family RETEPORIDAE Smitt, 1867

I. *Retepora* Imperato, 1599 (subgenera *Reteporella* Busk, 1884, and *Sertella* Jullien, 1903); *Schizellozoon* Canu and Bassler, 1917; *Triphyllozoon* Canu and Bassler, 1917; *Phidolopora* Gabb and Horn, 1862; *Rhynchozoon* Hincks, 1891 (*Rhynchopora* Hincks, 1877, preoccupied); *Lepraliella* Levinsen, 1916; *Hippellozoon* Canu and Bassler, 1917; *Schizotheca* Hincks, 1877; *Schizoretepora* Gregory, 1893.

II. *Caberoides* Canu, 1900; *Psileschara* Busk, 1860; *Plagiopora* MacGillivray, 1895; *Sparsiporina* D'Orbigny, 1851; *Bulbipora* MacGillivray, 1895.

Family ADEONIDAE Jullien, 1903

Adeona (Lamouroux, 1816) Levinsen, 1909; *Bracebridgia* MacGillivray, 1886 (*Poristoma* Canu, 1907); *Laminopora* Michelin, 1842; *Anarthropora* Smitt, 1867; *Adeonella* (Busk, 1884) Waters, 1888 (*Reussina* Neviani, 1895); *Adeonellopsis* MacGillivray, 1886 (*Ovaticella* Maplestone, 1902), subgenera *Lobopora* Levinsen, 1909 (*Cribricella* Canu, 1904), and *Poricella* Canu, 1904; *Dimorphocella* Maplestone, 1903; *Triporula* Canu and Bassler, 1927; *Meniscopora* Gregory, 1903; *Metrarabdotos* Canu, 1914; *Schizostomella* Canu and Bassler, 1927 (*Schizostoma* Canu, 1907, not Lea, 1842); *Smittistoma* Canu, 1907; *Calvetina* Canu, 1907; *Inversiula* Jullien, 1888; *Cyclostomella* Ortmann, 1890.

Family HIPPOPODINIDAE Levinsen, 1909

Cheilopora Levinsen, 1909; *Cheiloporina* Canu and Bassler, 1923; *Tremoschizodina* Duvergier, 1921; *Hippaliosina* Canu, 1918; *Tetraplaria* Tenison-Wood, 1878 (*Bigemellaria* MacGillivray, 1895; *Arborella* Osburn, 1914); *Pollaploecium* Maplestone, 1909; *Diploecium* Kirkpatrick, 1888; *Hippopodina* Levinsen, 1909; *Watersipora* Neviani, 1895; *Cianotremella* Canu, 1911; *Hippopodinella* Barroso, 1924; *Cucullipora* MacGillivray, 1895.

Family PARMULARIIDAE Maplestone, 1912

Parmularia Maplestone, 1910; *Lanceopora* D'Orbigny, 1851; ?*Bathystoma* Marsson, 1887.

Family PHYLACTELLIDAE Canu and Bassler, 1917

Perigasterella Canu and Bassler, 1917; *Lagenipora* Hincks, 1877; *Psilopsella* Canu and Bassler, 1927; *Alysidota* Busk, 1866; *Phylactella* Hincks, 1880; *Temachia* Jullien, 1882; *Hemicyclopora* Norman, 1894; ?*Cheilonella* Koschinsky, 1885; ?*Teuchopora* Neviani, 1895.

Family CREPIDACANTHIDAE Levinsen, 1909

Crepidacantha Levinsen, 1909; *Mastigophora* Hincks, 1880; (*Pachykraspedon* Koschinsky, 1888); *Schizobathysella* Canu and Bassler, 1917; *Nimbella* Jullien, 1903; *Nimba* Jullien, 1903.

Family CELLEPORIDAE Busk, 1852

Hippoporidra Canu and Bassler, 1927; *Hippotrema* Canu and Bassler, 1927; *Tegminula* Jullien, 1882; *Holoporella* Waters, 1909; *Costazia* Neviani, 1895 (*Siniopelta* Levinsen, 1909); *Cellepora* Linnaeus, 1767; *Osthimosia* Jullien, 1888; *Schismopora* MacGillivray, 1888; *Acanthionella* Canu and Bassler, 1917; *Kleidionella* Canu and Bassler, 1917; *Aulopocella* Maplestone, 1903; (*Solenopora* Maplestone, 1903 preoccupied); *Omalosecosa* Canu and Bassler, 1925; *Dentiporella* Barrosa, 1926.

Family LIRIOZOIDAE Levinsen, 1909

Liriozoa (Levinsen, 1909) Lamarck, 1816 (*Epicaulidium* Hincks, 1881); *Pasythea* Lamouroux, 1816 (*Tuliparia* Blainville, 1834; *Gemellipora* Smitt, 1872 part, and Levinsen, 1909 part); *Dittosaria* Busk, 1866.

Family CATENICELLIDAE Busk, 1852

Strongylopora Maplestone, 1899 (*Hincksiella* Levinsen, 1909); *Strophipora* MacGillivray, 1895 (subgenera *Stenostomaria* MacGillivray, 1895; *Microstomaria* MacGillivray, 1895; *Ditaxipora* MacGillivray, 1895); *Claviporella* MacGillivray, 1868; *Calpidium* Busk, 1852; *Digenopora* Maplestone, 1899; *Cribricellina* Canu and Bassler, 1927 (*Cribricella* Levinsen, 1909, preoccupied); *Pterocella* Levinsen, 1909; *Costaticella* Maplestone, 1899 (*Costicella* Levinsen, 1909); *Cornuticella* Canu and Bassler, 1927; *Scuticella* Levinsen, 1909; *Vittaticella* Maplestone, 1900 (*Caloporella* MacGillivray, 1895; *Catenaria* Levinsen, 1909); *Catenicella* Blainville, 1834; *Catenicellopsis* Wilson, 1880.

Family CATENARIIDAE D'Orbigny, 1851

Catenaria D'Orbigny, 1851 (*Savignyella* Levinsen, 1909); *Halysis* Norman, 1909; *Huxleya* Dyster, 1858.

Family SCLERODOMIDAE Levinsen, 1909

Sclerodomus Levinsen, 1909; *Systenopora* Waters, 1904; *Cellarinella* Waters, 1904; ?*Semihaswellia* Canu and Bassler, 1917;? *Tessaradoma* Norman, 1868.

Family ONCHOPORIDAE Levinsen, 1909

Onchopora Busk, 1855; *Calwellia* W. Thompson, 1858; *Onchoporella* Busk, 1884; *Onchoporoides* Ortmann, 1890; *Ichthyaria* Busk, 1884.

Family EUTHYRIDAE Levinsen, 1909

Euthyris Hincks, 1882; *Pleurotoichus* Levinsen, 1909; *Urceolipora* MacGillivray, 1880 (*Calymmophora* Busk, 1884); *Neoeuthyris* Bretnall, 1921.

The following families are placed at the end of this division because they are either of doubtful value or are incompletely studied.

Bifaxariidae Busk, 1884, with *Bifaxaria* Busk, 1884; Bitectiporidae MacGillivray, 1895, with *Bitectipora* MacGillivray, 1895; Lekythoglenidae Marsson, 1887; *Lekythoglena* Marsson, 1887; Nephroporidae Marsson, 1887; *Nephropora* Marsson, 1887; Platyglenidae Marsson, 1887; *Platyglena* Marsson, 1887; and Prostomariidae MacGillivray, 1895, with *Prostomaria* MacGillivray, 1895.

Suborder HEXAPOGONA Canu and Bassler, 1927

Family CHAPERIIDAE Jullien, 1888

Chaperia Jullien, 1881.

Family MAMILLOPORIDAE Canu and Bassler, 1927

Mamillopora Smitt, 1873; *Fedora* Jullien, 1882; *Anoteropora*, Canu and Bassler, 1927; *Kionidella* Koschinsky, 1885; *Discoflustrellaria* D'Orbigny, 1853; *Prattia* D'Archiac, 1847; *Stenosipora*, Canu and Bassler, 1927; *Ascosia* Jullien, 1882.

Family ORBITULIPORIDAE Canu and Bassler, 1923

Orbitulipora Stoliczka, 1861; *Batopora* Reuss, 1867; *Stichoporina* Stoliczka, 1861; *Sphaerophora* Haswell, 1881; *Schizorthosecos* Canu and Bassler, 1917;? *Bicupularia* Reuss, 1864.

Family CONESCHARELLINIDAE Levinsen, 1909

Conescharellina D'Orbigny, 1852; *Bipora* Whitelegge, 1887; *Flabellopora* D'Orbigny, 1852; *Trochosodon* Canu and Bassler, 1927; *Zeuglopora* Maplestone, 1909.

Family MYRIOZOIDAE Smitt, 1866 (part)

Myriozoum Donati, 1750; *Myriozoella* Levinsen, 1909.

Family LEKYTHOPORIDAE Levinsen, 1909

Actisecos Canu and Bassler, 1927; *Lekythopora* MacGillivray, 1882; *Orthoporidra*, Canu and Bassler 1927; (*Orthopora* Waters, 1904, pre occupied); *Turritigera* Busk, 1884; *Poecilopora* MacGillivray, 1886; *Catadysis*, Canu and Bassler, 1927.

ALPHABETIC LIST OF GENERA OF CHILOSTOMATOUS BRYOZOA

Acamarchis Lamouroux, 1816. Synonym of *Bugula*.
Acanthionella Canu and Bassler, 1917. Family Celleporidae.
Acanthocella Canu and Bassler, 1917. Family Alderinidae.
Acanthodesia Canu and Bassler, 1920. Family Biflustridae.
Acerviclausa Gabb and Horn, 1860. Genotype, *A. vermicularis* Gabb and Horn, 1860. Journ. Acad. Nat. Sci., Phila., vol. 4, p. 403. Figure not recognizable.
Acropora Reuss, 1869. Family Acroporidae.
Actisecos Canu and Bassler, 1927. Family Lekythoporidae.
Adenifera Canu and Bassler, 1917. Family Biflustridae.
Adeona (Lamouroux, 1816) Levinsen, 1909. Family Adeonidae.
Adeonella (Busk, 1884) Waters, 1888. Family Adeonidae.
Adeonellopsis MacGillivray, 1886. Family Adeonidae.
Aechmella Canu and Bassler, 1917. Family Opesiulidae.
Aeolopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.
Aetea Lamouroux, 1812. Family Aeteidae.
Aeteopsis Boeck, 1862. Synonym of *Aetea*.
Aimulosia Jullien, 1888. Family Escharellidae.
Alderina Norman, 1903. Family Alderinidae.
Allantopora Lang, 1924. Family Alderinidae.
Alysidium Busk, 1852. Family Alysidiidae.
Alysidota Busk, 1856. Family Phylactellidae.
Amastigia Busk, 1852. Family Scrupocellariidae.
Ammaiophora Norman, 1903. Family Alderinidae.
Amphtblestrum Gray, 1848. Family Alderinidae.
Anaptopora Lang, 1916. Family Otoporidae. Cretaceous cribrimorph.
Anarthropora Smitt, 1867. Family Adeonidae.
Anderssonia Kluge, 1914. Synonym of *Amastigia*.
Andreella Jullien, 1888. Family Microporidae.
Andriopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.
Angelopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.
Anguinaria Lamarck, 1816. Synonym of *Aetea*.
Angularia Busk, 1881. No species indicated. Dropped by author.
Annulipora Gray, 1848. Genotype, *Eschara pilosa* Pallas, 1766. Synonym of *Electra*.
Anornithopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.
Anoteropora Canu and Bassler, 1927. Family Mamilloporidae.
Anotopora Lang, 1916. Family Otopotidae. Cretaceous cribrimorph.
Antropora Norman, 1903. Family Hincksinidae.
Antropora Lang, 1916 (preoccupied). See *Coelopora*.
Aplousina Canu and Bassler, 1927. Family Hincksinidae.
Aptonella Canu and Bassler 1928. Family Escharellidae.
Arachnopusia Jullien, 1886. Family Arachnopusiidae.
Arborella Osburn, 1914. Synonym of *Tetraplaria*.
Argopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.
Arthropoma Levinsen, 1909. Family Escharellidae.
Ascosia Jullien, 1882. Family Mamilloporidae.
Aspidelectra Levinsen, 1909. Family Electrinidae.
Aspidostoma Hincks, 1881. Family Aspidostomatidae.
Atelestozoum Harmer, 1926. Family Cellariidae.
Auchenopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.
Aulopocella Maplestone, 1903. Family Celleporidae.

Avicella Van Beneden, 1848. Synonym of *Bugula.*

Avicularia Gray, 1848. Synonym of *Bugula.*

Bactrellaria Marsson, 1887. Pal. Abh., vol. 4, p. 59. Type and only species, *B. rugica* Marsson, 1887. Idem, p. 59, pl. 5, fig. 18. Cretaceous. Figure incomplete.

Bactridium Reuss, 1848. Not recognized. *Scrupocellaria* (part) and *Hippozeugosella* (part).

Balantiostoma Marsson, 1887. Perhaps a member of the Escharellidae. Cretaceous.

Baptopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.

Barroisina Jullien, 1886. (Probably a synonym of *Pliophloea.*) Family Costulae.

Bathosella Canu and Bassler, 1917. Family Escharellidae.

Bathypora MacGillivray, 1895. Included in *Amphiblestrum.*

Bathystoma Marsson, 1887. Cretaceous. Perhaps Parmulariidae.

Batopora Reuss, 1867. Family Orbituliporidae.

Batrachopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.

Beania Johnston, 1840. Family Beaniidae.

Beisselina Canu, 1913. Family Acroporidae.

Bicellaria Blainville, 1830. See *Bicellariella.*

Bicellariella Levinsen, 1909 (*Bicellaria* Blainville, 1830, preoccupied). Family Bicellariellidae.

Bicellarina Levinsen, 1909. Family Bicellariellidae.

Bicupularia Reuss, 1864. Fossil. Perhaps Orbituliporidae. Further studies are necessary.

Bifaxaria Busk, 1884. Family Bifaxariidae Busk, 1884.

Biflustra D'Orbigny, 1852 Bry. Cret., p. 241. *Biflustra* is simply a bifoliate free form of Anasca and has no standing as a genus.

Bifrons MacGillivray, 1860. Synonym of *Dimetopia.*

Bigemellaria MacGillivray, 1895. Synonym of *Tetraplaria.*

Bimicroporella Canu, 1904. Synonym of *Microporella.*

Bipora Whitelegge, 1887. Family Conescharellinidae.

Biselenaria Gregory, 1893. Proposed in place of *Diplotaxis* Reuss, 1867, preoccupied. Genotype, *Diplotaxis placentula* Reuss. Applies to the bilamellar group of *Vibracellina* Canu and Bassler, 1917. Family Hincksinidae.

Bitectipora MacGillivray, 1895. Genotype, *B. lineata* MacGillivray, 1895. A fossil genus incompletely studied. Family Bitectiporidae MacGillivray, 1895.

Bracebridgia MacGillivray, 1886. Family Adeonidae.

Brettia Dyster, 1858. Family Scrupariidae.

Bryocryptella Cossman, 1906. Family Smittinidae.

Buffonella Jullien, 1888. Family Escharellidae.

Buffonellaria Canu and Bassler, 1927. Family Escharellidae.

Bugula Oken, 1815. Family Bugulidae.

Bugularia Levinsen, 1909. Family Bugulidae.

Bugulella Verrill, 1879. Allied to *Brettia* (see Harmer, 1923).

Bugulina Gray, 1848. Synonym of *Bugula.*

Bugulopsis Verrill, 1880. Synonym of *Tricellaria.*

Bulbipora MacGillivray, 1895. Fossil. Can not be recognized without further study. Perhaps Reteporidae with *Caberoides* Canu, 1918.

Caberea Lamouroux, 1816. Family Scrupocellaridae.

Caberiella Levinsen, 1909. Synonym of *Amastigia.*

Caberoides Canu, 1910. Genotype *C. canaliculata* Canu, 1910. Fossil. Perhaps Reteporidae.

Caleschara MacGillivray, 1880. Family Opesiulidae.
Callopora Gray, 1848. Family Alderinidae.
Calloporina Neviani, 1895. Family Escharellidae.
Caloporella MacGillivray, 1895 Synonym of *Vittaticella.*
Calpensia Jullien, 1888. Family Calpensiidae.
Calpidium Busk, 1852. Family Catenicellidae.
Calpidopora Lang, 1916. Family Calpidoporidae. Cretaceous cribrimorph.
Calvetina Canu, 1910. Family Adeonidae.
Calwellia W. Thompson, 1858. Family Onchoporidae.
Calymmophora Busk, 1884. Synonym of *Urceolipora.*
Calyptozoum Harmer, 1926. Family Bicellariellidae.
Camptoplites Harmer, 1923. Family Bugulidae.
Canda Lamouroux, 1816. Family Scrupocellariidae.
Carbasea (subgenus of *Flustra*) Gray, 1848. Family Flustridae.
Carydiopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.
Castanopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.
Catadysis Canu and Bassler, 1927. Family Lekythoporidae.
Catenaires Savigny, 1811. A qualitative and not a generic form.
Catenaria D'Orbigny, 1850 (*Savignyella* Levinsen, 1909). Family Catenariidae.
Catenaria Levinsen, 1909. Synonym of *Vittaticella.*
Catenariopsis Maplestone, 1899. Family Alysidiidae.
Catenicella Blainville, 1834. Family Catenicellidae. A confused genus, dismembered by modern authors. Now a general term for Catenicellidae, unclassified or insufficiently studied.
Catenicellopsis J. B. Wilson, 1880. Family Catenicellidae.
Catenicula O'Donoghue, 1924. Family Alysidiidae.
Caulibugula Verrill, 1900. Family Bugulidae.
Cauloramphus Norman, 1903. Family Alderinidae.
Cellaria (Ellis and Solander, 1786) Authors. Family Cellariidae.
Cellarina D'Orbigny, 1851. See *Cellarinidra.*
Cellarina Van Beneden, 1848 (Not D'Orbigny, 1851). *Menipea* in part.
Cellarinella Waters, 1904. Family Sclerodomidae.
Cellarinidra Canu and Bassler, 1927 (*Cellarina* D'Orbigny, 1851, preoccupied). Family Biflustridae.
Cellepora Linnaeus, 1767. Family Celleporidae. General term for bryozoa made up of cumulate zooecia.
Celleporaria Lamouroux, 1821. No standing. Refers to almost any incrusting form.
Celleporella Gray, 1848. Genotype, *Cellepora hyalina* Linnaeus, 1768. Not recognizable. Genotype is type of *Hippothoa.*
Celleporella Norman, 1868. Preoccupied. Dropped by author in 1903.
Celleporina Gray, 1848. Not defined so as to be recognized.
Celleporina D'Orbigny, 1852. Bry Cret., p. 212. Preoccupied and also not recognizable.
Cellularia Pallas, 1766. Not recognized. See Harmer, 1923.
Cercaripora Fisher, 1866. Synonym of *Aetea.*
Chaperia Jullien, 1881. Family Chaperiidae.
Characodoma Maplestone, 1900. Family Escharellidae.
Charixa Lang, 1915. Family Electrinidae.
Chartella Gray, 1848 (subgenus of *Flustra*). Family Flustridae.
Chaunosia Busk, 1867. Synonym of *Beania.*
Cheilonella Koschinsky, 1885. Fossil possibly close to *Psilopsella.* Perhaps Phylactellidae.
Cheilopora Levinsen, 1909. Family Hippopodinidae.

Cheiloporina Canu and Bassler, 1923. Family Hippopodinidae.
Chlidonia (Savigny, 1811) Lamouroux, 1824. Family Chlidoniidae.
Chorizopora Hincks, 1880. Family Hippothoidae.
Chrossotoechia Canu, 1925. Synonym of *Monoporella*
Cianotremella Canu, 1911. Family Hippopodinidae.
Cigclisula Canu and Bassler, 1927. Family Stomachetosellidae.
Claviporella MacGillivray, 1895. Family Catenicellidae.
Codonella Canu and Bassler, 1928. Family Smittinidae.
Coeleschara Busk, 1860. Nomen nudum.
Coelopora Lang, 1917. Family Pelmatoporidae. Cretaceous cribrimorph.
Coleopora Canu and Bassler, 1927. Family Petraliidae.
Collarina Jullien, 1888. Family Costulae.
Colletosia Jullien, 1886. Family Costulae. Genus requiring further study.
Columnaria Levinsen, 1909. See *Levinsenella* Harmer, 1926.
Columnotheca Marsson, 1887. Type and only species, *C. cribrosa* Marsson, 1887. Family Acroporidae. Cretaceous.
Conescharellina D'Orbigny, 1852. Family Conescharellinidae.
Conopeum Norman, 1903. Family Biflustridae.
Copidozoum Harmer, 1926. Synonym of *Callopora.*
Corbulipora MacGillivray, 1895. Family Costulae.
Cornucopina Levinsen, 1909 Family Bicellariellidae.
Cornuticella Canu and Bassler, 1927. Family Catenicellidae.
Corymbopora Lang, 1916 (preoccupied). See *Corymboporella.*
Corymboporella Lang, 1917. Family Andrioporidae. Cretaceous cribrimorph.
Corynoporella Hincks, 1888. Family Scrupariidae.
Corynostylus Canu and Bassler, 1919. Family Calpensiidae.
Cosciniopsis Canu and Bassler, 1927. Family Galeopsidae.
Coscinopleura Marsson, 1887. Family Coscinopleuridae.
Costaticella Maplestone, 1899. Family Catenicellidae.
Costazia Neviani, 1895 (*Siniopelta* Levinsen, 1909). Family Celleporidae.
Costicella Levinsen, 1909. Synonym of *Costaticella.*
Costula Jullien, 1886. Family Costulae. Genotype, *Escharella arge* D'Orbigny, 1851. Cretaceous. Genotype of doubtful position.
Cothurnicella Wyville Thompson, 1858. Synonym of *Chlidonia.*
Craspedozoum MacGillivray, 1895. *F roborata* group of *Flabellaris.*
Crassimarginatella Canu, 1909. Family Alderinidae.
Crateropora Levinsen, 1909. Family Setosellidae.
Crepidacantha Levinsen, 1909. Family Crepidacanthidae.
Crepis Jullien, 1882. Family Chlidoniidae.
Cribella Jullien and Calvet, 1903. Genotype, *C. nova* Jullien and Calvet, 1903. Family Escharellidae.
Cribrendoecium Canu and Bassler, 1917. Family Hincksinidae.
Cribricella Canu, 1902. Synonym of *Adeonellopsis.*
Cribricella Levinsen, 1909. See *Cribricellina.*
Cribricellina Canu and Bassler, 1927 (*Cribricella* Levinsen, 1909). Family Catenicellidae.
Cribrilina Gray, 1848. Family Alderinidae. The word is also used by different authors to designate costulate species imperfectly studied and by students who do not admit the recent classification.
Crisina Van Beneden, 1850. Synonym of *Scrupocellaria.*
Crisularia Gray, 1848. Synonym of *Bugula.*
Cryptella Jullien, 1903 (preoccupied). See *Bryocryptella.*
Cryptostoma Marsson, 1887. Pal. Abh., vol. 4, p. 96. Type and only species. *C. gastroporum* Marsson, 1887. Cretaceous. Incompletely studied.
Cryptostomaria Canu and Bassler, 1927. Family Cellariidae.

Cryptosula Canu and Bassler, 1925. Family Escharellidae.
Ctenopora Lang, 1916. Family Ctenoporidae. Cretaceous cribrimorph.
Cucullipora MacGillivray, 1895. Possibly related to *Watersipora.*
Cupuladria Canu and Bassler, 1919. Family Bitlustridae.
Cupularia Lamouroux, 1821. Family Calpensiidae.
Cycleschara Roemer, 1863. Genotype, *C. marginata* Roemer, 1863. Paleontographica, vol. 9, p. 204. Fossil never rediscovered.
Cyclicopora Hincks, 1884. Family Cyclicoporidae.
Cyclocolposa Canu and Bassler, 1920. Family Escharellidae.
Cycloperiella Canu and Bassler, 1920. Family Escharellidae.
Cycloporella Neviani, 1895. Synonym of *Costazia.*
Cyclostomella Ortmann, 1890. Family Adeonidae.
Cylindroporella Hincks, 1877. Family Galeopsidae.
Cyphonella Koschinsky, 1885. Only species, *C. nodosa* Koschinsky, 1885. Paleontographica, vol. 32, 1885, p. 59. Tertiary of Bavaria. Incomplete. Impossible to classify at present.
Cystisella Canu and Bassler, 1917. Family Smittinidae.
Dacryonella Canu and Bassler, 1917. Family Opesiulidae.
Dacryopora Lang, 1914. Family Hippothoidae.
Dakaria Jullien, 1903. Family Escharellidae.
Decuriaria Jullien, 1886. Family Costulae. Cretaceous. Referred by Lang to Pelmatoporidae.
Dendrobeania Levinsen, 1909. Family Bugulidae.
Dentiporella Barrosa, 1926. Family Celleporidae.
Dermatopora Hagenow, 1851. (*Batrachopora* Lang, 1916); Cretaceous. Incompletely studied.
Diacanthopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.
Diachoris (subgenus of *Beania*) Busk, 1852. Family Beaniidae.
Diancopora Lang, 1916. Family Rhacheoporidae. Cretaceous cribrimorph.
Diatosula Canu and Bassler, 1927. Family Stomachetosellidae.
Diazeuxia Jullien, 1886. Synonym of *Hippothoa.*
Diceratopora Lang, 1916. Family Rhacheoporidae. Cretaceous cribrimorph.
Dictuonia Jullien, 1881. Family Membranicellariidae.
Dictyopora MacGillivray, 1868. Synonym of *Adeona.*
Didymia Busk, 1852 (preoccupied). See *Didymozoum*
Didymosella Canu and Bassler, 1917. Family Escharellidae.
Didymozoum Harmer, 1923 (*Didymia* Busk, 1852, preoccupied). Family Farciminariidae.
Digenopora Maplestone, 1899. Family Catenicellidae.
Dimetopia Busk, 1852. Family Bicellariellidae.
Dimiclausa Gregorio, 1890. Synonym of *Lunularia.*
Dimorphocella Maplestone, 1903. Family Adeonidae.
Dimorphozoum Levinsen, 1909. Family Bicellariellidae.
Dioptropora Marsson, 1887. Pal. Abh., vol. 4, p. 96. Type and only species *D. devia* Marsson, 1887. Cretaceous. Genus problematic.
Diplodidymia Reuss, 1869. Family Calpensiidae.
Diploecium Kirkpatrick, 1888. Family Hippopodinidae.
Diplopholeos Canu and Bassler, 1917. Synonym of *Velumella.*
Diplopora MacGillivray, 1881. Synonym of *Thairopora.*
Diploporella MacGillivray, 1885. Synomym of *Thairopora.*
Diplotaxis Reuss, 1867. Preoccupied. See *Biselenaria.*
Diporula Hincks, 1879. Subgenus of *Microporella.* Family Escharellidae.
Discoescharites Roemer, 1863. Synonym of *Stichoporina.*

Discoflustrella D'Orbigny, 1853. Bry. Cret., p. 561. The two species described by D'Orbigny (*D. doma* and *D. complanata*) are now referred to *Cupularia*.

Discoflustrellaria D'Orbigny, 1851. Family Mamilloporidae.

Discopora Lamarck, 1836. Genotype, *Cellepora verrucosa* Esper, 1797. Not recognized.

Discoporella D'Orbigny, 1851. Synonym of *Cupularia*.

Dishelopora Lang. Family Disheloporidae. Cretaceous cribrimorph.

Distansescharella D'Orbigny, 1852. Family Costulae. Doubtful genus according to Waters, 1923. Referred by Lang to Andrioporidae.

Distansescharellina D'Orbigny, 1852. Bry. Cret., p. 451. Type and only species *Cellepora pteropora* Reuss, 1848. Miocene of Vienna Basin. D'Orbigny badly interpreted the poor figure of Reuss. Synonym of *Perisiomella*.

Disteginopora D'Orbigny, 1852. Bry. Cret., p. 235. Genotype, *D. horrida* D'Orbigny, 1852. Cretaceous Costulae. Referred by Lang to Pelmatoporidae.

Distelopora Lang, 1915. Family Electrinidae. Genus of uncertain affinities.

Ditaxipora MacGillivray, 1895. Subgenus of *Strophipora*. Family Catenicellidae.

Dittosaria Busk, 1866. Family Liriozoidae.

Doryporella Norman. Subgenus of *Callopora*.

Electra Lamouroux, 1916. Family Electrinidae.

Electrina D'Orbigny, 1851. Synonym of *Electra*.

Ellipsia Jullien, 1903. Synonym of *Retepora*.

Ellipsopora Canu and Bassler, 1923 (subgenus of *Microporella*). Family Escharellidae.

Ellisina Norman, 1903. Family Alderinidae.

Emballotheca Levinsen, 1909. Family Escharellidae.

Emma Gray, 1843. Synonym of *Menipea*.

Ennallipora Gabb and Horn, 1862. Genotype, *E. quadrangularis* Gabb and Horn, 1862. Jour. Acad. Nat. Sci. Phila., sec. 2, vol. 5, p. 141. Hardly recognizable although possibly a species of *Smittina*.

Enoplostomella Canu and Bassler, 1917. Family Stomachetosellidae.

Entomaria Canu, 1921. Family Setosellidae.

Epicaulidium Hincks, 1881. Synonym of *Liriozoa*.

Epistomia Fleming, 1828. Family Epistomiidae.

Erina Canu, 1908. See *Erinella*.

Erinella Canu and Bassler, 1927 (*Erina* Canu, 1908, preoccupied). Family Membranicellariidae.

Eschara (Raii, 1724) Linnaeus, 1785. Apparently based on same structural type as *Flustra* but used for any free form of Acophora with two lamellae back to back.

Escharella Gray, 1848. Genotype, *Berenicea immersa* Fleming, 1828. Not recognizable.

Escharellina D'Orbigny, 1852. Bry. Cret., p. 206. Not recognized.

Escharicellaria Voigt, 1924. Family Cellariidae.

Escharifora D'Orbigny, 1852. Family Coscinopleuridae.

Escharina M. Edwards, 1836 in Lamarck, Hist., ed. 2, p. 231. Type, *Eschara vulgaris* Moll, 1803. Not recognized.

Escharinella D'Orbigny, 1852. Bry. Cret., p. 200. Not recognized.

Escharipora D'Orbigny, 1852. Bry. Cret., p. 220. Cretaceous cribrimorph. See Lang, 1921.

Escharoides Milne-Edwards in Lamarck, 1836. Family Stomachetosellidae. Reserved for species incompletely studied.

Escharopsis Verrill, 1879. Genotype, *Eschara lobata* Lamarck, 1836. Not recognized.

Eucheilopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.

Eucratea Lamouroux, 1812. Family Scrupariidae.

Euginoma Jullien, 1882. Family Cellariidae.

Euoplozoum Harmer, 1923. Family Bugulidae.

Euritina Canu, 1900. Family Alderinidae.

Eurystomella Levinsen, 1909. Family Eurystomellidae.

Euthyris Hincks, 1882. Family Euthyridae.

Euthyroides Harmer, 1902. Family Euthyroidae.

Exechonella Canu and Bassler, 1927. Family Arachnopusiidae.

Exochella Jullien, 1888. Family Escharellidae.

Farcimia Fleming, 1828. Synonym of *Cellaria*.

Farcimia Pourtales, 1870. Bull. Mus. Comp. Zoöl. Harv. Coll., p. 110. Genotype, *F. cereus* Pourtales, 1870. Idem, p. 110. Not recognized. Probably a synonym of *Nellia*.

Farciminaria Busk, 1852. Family Farciminariidae.

Farciminellum Harmer, 1926. Family Farciminariidae.

Fedora Jullien, 1882. Family Mamilloporidae.

Fenestrulina Jullien, 1888. Family Escharellidae.

Figularia Jullien, 1886 (*Figulina* Levinsen, 1909). Family Costulae.

Figulina Levinsen, 1909. See *Figularia*.

Filicella Searles Wood, 1844. Synonym of *Aetea*.

Filiflustra D'Orbigny, 1852. Bry. Cret., p. 140. First species *Filiflustra compressa* D'Orbigny, 1852. Idem, p. 241, pl. 687, figs. 7–9. Cretaceous.

Filiflustrella D'Orbigny, 1853. Bry. Cret., p. 562. Type species *F. lateralis* D'Orbigny 1853. Idem, p. 562, pl. 730, figs. 1–4. Cretaceous.

Filiflustrellaria D'Orbigny, 1853. Bry. Cret., p. 512. First species figured *F. obliqua* D'Orbigny 1853. Idem, p. 513, pl. 123. figs. 1–4. Cretaceous.

Filiflustrina D'Orbigny, 1853. Bry. Cret., p. 575. Type species *F. cylindrica* D'Orbigny, 1853. Idem, p. 575, pl. 732, figs. 1–5. Cretaceous.

Flabellaria Gray, 1848. Cat. Rad. Brit. Mus., pp. 106, 146. Type, *Sertularia spiralis* Olivi, 1792, Zool. Adriat., p. 291, pl. 6, fig. 2. Genotype never rediscovered with certainty.

Flabellaris Waters, 1898. Family Scrupocellariidae.

Flabellina Levinsen, 1902. Preoccupied. See *Flabellaris*.

Flabellopora D'Orbigny, 1851. Family Conescharellinidae.

Floridina Jullien, 1881. Family Opesiulidae.

Floridinella Canu and Bassler, 1917. Family Opesiulidae.

Flustra Linnaeus, 1761. Family Flustridae.

Flustramorpha Gray, 1848. (Subgenus of *Microporella*). Family Escharellidae.

Flustrella D'Orbigny, 1852. Bry. Cret., p. 282. Genus not recognized. *Flustrella* employed in Ctenostomata (Gray, 1848).

Flustrellaria D'Orbigny, Bry. Cret., p. 513. Cretaceous. Applies to various genera of Membraniporae.

Flustrina Van Beneden, 1849. Synonym of *Carbasea*.

Flustrina D'Orbigny, 1852. Bry. Cret., p. 298. First species F. *transversa* D'Orbigny, 1852. Too poor for determination. Cretaceous.

Foraminella Levinsen, 1909. Family Aspidostomatidae.

Foratella Canu, 1900. Bull. Soc. Geol. France, ser. 3, vol. 28, p. 373. Genotype, *Flustrellaria forata* D'Orbigny, 1850. Bry. Cret., p. 528, pl. 726, figs. 10–13. Cretaceous.

Foveolaria Busk, 1884. Family Alderinidae.

Francopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.
Frurionella Canu and Bassler, 1927. Family Alderinidae.
Fusicellaria D'Orbigny, 1851. Bry. Cret., p. 185. Type species *F. pulchella* D'Orbigny, 1851. Idem, p. 186, pl. 680, figs. 1–6. Turonian of France, Cretaceous.
Galeopsis Jullien, 1903. Family Galeopsidae.
Gargantua Jullien, 1888. Family Opesiulidae.
Gastropella Canu and Bassler, 1917. Family Acroporidae.
Gaudryanella Canu, 1900. Family Steganoporellidae.
Geisopora Lang, 1916. Family Rhacheoporidae. Cretaceous cribrimorph.
Gemellaria (Savigny, 1826) Van Beneden, 1845. Synonym of *Eucratea.*
Gemellipora Smitt, 1872. Family Escharellidae.
Gemellipora Smitt, 1872 (part). Synonym of *Pasythea.*
Gemelliporella Canu and Bassler, 1920. Family Escharellidae.
Gemelliporidra Canu and Bassler, 1927. Family Escharellidae.
Gemicellaria Blainville, 1820. Synonym of *Gemellaria.*
Gephyrophora Busk, 1884. Family Galeopsidae.
Gephyrotes Norman, 1903. Family Alderinidae.
Gigantopora Ridley, 1881. Family Galeopsidae.
Grammella Canu, 1917. Synonym of *Crassimarginatella.*
Graptopora Lang, 1916. Family Calpidoporidae. Cretaceous cribrimorph.
Hagenowinella Canu, 1900. Bull. Soc. Geol. France, ser. 3, vol. 28, p. 377. Genotype, *Cellepora vaginata* Hagenow, 1851. Cretaceous.
Halophila (Gray, 1843) Busk, 1852. Family Bugulidae.
Halysis Norman, 1909. Family Catenariidae.
Haplocephalopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.
Haplopoma Levinsen, 1909. Family Hippothoidae.
Haploporella Hincks, 1881. Preoccupied. See *Monoporella.*
Harmeria Norman, 1903. Family Hippothoidae.
Haswellia Busk, 1884. Family Galeopsidae.
Heckelia Neviani, 1895. Synonym of *Adeona.*
Heliodoma Calvet, 1907. Family Biflustridae.
Hemeschara Busk, 1859. Not recognized. Used for unilamellar Ascophora by Busk.
Hemicyclopora Norman, 1894. Family Phylactellidae.
Hemieschara Reuss, 1869. An alteration of *Hemeschara* Busk, 1859.
Hemiseptella Levinsen, 1909. Family Calpensiidae.
Herentia Gray, 1848. Not recognized. Species of various genera included.
Herpetopora Lang. 1914. Family Electrinidae.
Hesperopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.
Heteractis Gabb and Horn, 1862. Synonym of *Trochopora.*
Heterocella Canu, 1907. Family Synaptacellidae.
Heteroflustra Levinsen, 1909. Family Flustridae.
Heterooecium Hincks, 1892. Family Electrinidae.
Hexacanthopora Lang, 1916. Family Lagynoporidae. Cretaceous cribrimorph.
Hiantopora MacGillivray, 1887. Family Hiantoporidae.
Himantozoum Harmer, 1923. Family Bugulidae.
Hincksiella Levinsen, 1909. Synonym of *Strongylopora.*
Hincksina Norman, 1909. Family Hincksinidae.
Hipodiplosella Barroso, 1920. Not defined.
Hippadenella Canu and Bassler, 1917. Family Escharellidae.
Hippaliosina Canu, 1918. Family Hippopodinidae.
Hippellozoon Canu and Bassler, 1917. Family Reteporidae.
Hippiopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.

Hippodiplosia Canu, 1916. Family Escharellidae.
Hippomenella Canu and Bassler, 1917. Family Escharellidae.
Hippopleurifera Canu and Bassler, 1927. Family Escharellidae.
Hippopodina Levinsen, 1909. Family Hippopodinidae.
Hippopodinella Barroso, 1924. Family Hippopodinidae.
Hippoponella Canu and Bassler, 1920. Family Escharellidae.
Hippoporella Canu and Bassler, 1920. Family Escharellidae.
Hippoporidra Canu and Bassler, 1927. Family Celleporidae.
Hippoporina Neviani, 1895. Family Escharellidae.
Hippothoa (Lamouroux, 1821) Hincks, 1880. Family Hippothoidae.
Hippothoida Vine, 1893. Misprint for *Hippothoa*.
Hippotrema Canu and Bassler, 1927. Family Celleporidae.
Hippozeugosella Canu and Bassler, 1917. Family Escharellidae.
Holoporella Waters, 1909. Family Celleporidae.
Holostegopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.
Holostoma MacGillivray, 1888. A group of Celleporidae.
Homalostega Marsson, 1887. Genotype, *Cellepora convexa* Hagenow, 1839. Cretaceous. Incompletely studied but related to *Aechmella*. Family Opesiulidae.
Hoplitella Levinsen, 1909. Family Scrupocellariidae.
Hoplocheilina Canu, 1911. Family Hiantoporidae.
Houzeauina Pergens, 1889. Family Escharellidae.
Huxleya Dyster, 1858. Family Catenariidae.
Hybopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.
Hystricopora Lang, 1916. Family Disheloporidae. Cretaceous cribrimorph.
Ichnopora Lang, 1916. Family Petaloporidae. Cretaceous cribrimorph.
Ichthyaria Busk, 1884. Family Onchoporidae.
Inversiula Jullien, 1888. Family Adeonidae.
Jaculina Jullien and Calvet, 1903. Family Smittinidae.
Jolietina Jullien, 1886. Costulae.
Jubella Jullien, 1882. Family Scrupocellariidae.
Kankapora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.
Kelestoma Marsson, 1887. Costulae, Cretaceous. (See Waters, 1923, p. 565.) Referred to Pelmatoporidae, by Lang.
Kenella Levinsen, 1909. Family Flustridae.
Kinetoskias Danielssen, 1868. Family Bugulidae.
Kionidella Koschinsky, 1885. Family Mamilloporidae.
Kleidionella Canu and Bassler, 1917. Family Celleporidae.
Kymella Canu and Bassler, 1917. Family Cyclicoporidae.
Labiopora Levinsen, 1909. See *Labioporella*.
Labioporella Harmer, 1926. Family Steganoporellidae.
Lacerna Jullien, 1888. Family Escharellidae.
Lagarozoum Harmer, 1926, synonym of *Entomaria*.
Lagenipora Hincks, 1877. Family Phylactellidae.
Lagodiopsis Marsson, 1899. Pal. Abh., vol. 4, p. 99, Type, *Multescharipora francqana* D'Orbigny, 1851, Costulae. Synonym of *Murinopsia*.
Lagynopora Lang, 1916. Family Lagynoporidae. Cretaceous cribrimorph.
Laminopora Michelin, 1842. Family Adeonidae.
Lanceopora D'Orbigny, 1851 (probably synonym of *Parmularia*). Family Parmulariidae.
Larnacius Norman, 1903. Family Alderinidae.
Latereschara D'Orbigny, 1852. Bry. Cret., p. 345. Type species, *L. achates* D'Orbigny, 1852. Senonian of Fecamp, France. Cretaceous.

Lateroflustrella D'Orbigny, 1853. Bry. Cret., p. 568. Type species, *L. complanata*, D'Orbigny, 1853. Cretaceous. Not recognized.

Lateroflustrellaria D'Orbigny, 1853. Bry. Cret., p. 512. Type *L. hexagona* D'Orbigny, 1853. Cretaceous.

Leieschara M. Sars, 1862, Genotype, *L. coarctata* Sars., 1862. Synonym of *Myriozoum*.

Leiosella Canu and Bassler. 1917. Family Stomachetosellidae.

Lekythoglena Marsson, 1887. Pal. Abh., vol. 4, p. 90. Genotype *L. ampullacea* Marsson, 1887. Idem. p. 90, fig. 7. Cretaceous. Family Lekythoglenidae Marsson, 1887. Referred by Lang to Andrioporidae. Cretaceous cribrimorph.

Lekythopora MacGillivray, 1882. Family Lekythoporidae.

Lepralia Johnston, 1838. Family Escharellidae. Formerly applied to almost any incrusting form but now employed for unplaced species of Hippoporae. See Lang 1917 and 1921.

Lepraliella Levinsen, 1909. Family Reteporidae.

Lepralina Kuhn, 1925. Family Costulae.

Leptocheilopora Lang, 1916. Family Lagynoporidae. Cretaceous cribrimorph.

Levinsenella Harmer, 1926. Family Farciminariidae.

Levinseniula Cossman, 1920. Synonym of *Porella*.

Licornia Van Beneden, 1850. Synonym of *Scrupocellaria*.

Liriozoa Lamarck, 1816 (Levinsen 1909). Family Liriozoidae.

Lobopora Levinsen, 1909 (subgenus of *Adeonellopsis*). Family Adeonidae.

Loricaria Lamouroux, 1821. Synonym of *Eucratea*.

Loricula Cuvier, 1830. Synonym of *Eucratea*.

Lunularia Busk, 1884. Family Opesiulidae.

Lunulites Authors. Family Opesiulidae. A general term of nomenclature for free turbinate conical forms.

Lyrula Jullien, 1888. Family Costulae.

Macropora MacGillivray, 1895. Family Aspidostomatidae.

Malakosaria Goldstein, 1881. Genotype, *M. pholaramphos* Goldstein, 1881. (*Onchopora sinclairi* Busk, 1881). Synonym of *Onchopora* (fide Busk, 1884).

Malleatia Jullien and Calvet, 1903. Family Smittinidae.

Mamillopora Smitt, 1872. Family Mamilloporidae.

Manzonella Jullien, 1888. Family Thalamoporellidae.

Maplestonia MacGillivray, 1884. Family Scrupocellariidae.

Marginaria Roemer, 1841. Cretaceous. Family Alderinidae. The nature of the pores figured by authors is not known.

Marguetta Jullien and Calvet, 1903. Family Smittinidae.

Marsillea Neviani, 1895. Synonym of *Porella*.

Marssonopora Lang, 1914. Family Alderinidae.

Mastigophora Hincks, 1880. Family Crepidacanthidae.

Megapora Hincks, 1877. Family Aspidostomatidae.

Melicerita Milne-Edwards, 1836. Family Cellariidae.

Melicertina Ehrenberg, 1839. Synonym of *Melicerita*.

Membranicellaria Levinsen, 1902. Family Membranicellariidae.

Membranipora Blainville, 1830. Family Biflustridae. The word *Membranipora* is employed by many authors as a general term to designate the Malacostega or as a general term for unplaced Membraniporae.

Membraniporella Smitt, 1873. Family Alderinidae.

Membraniporidra Canu and Bassler, 1917. Family Alderinidae.

Membraniporina Levinsen, 1909. Family Biflustridae. An artificial genus for Membraniporae incompletely known.

Membrendoecium Canu and Bassler, 1917. Family Hincksinidae.

Membrostega Jullien, 1903. Synonym for *Hiantopora*.
Menipea Lamouroux, 1816. Family Scrupocellariidae.
Meniscopora Gregory, 1903. Family Adeonidae.
Mesosecos Faura Y Sans and Canu, 1916. Diagnosis incorrect. Inner side of colony unknown. Probably same as *Cupuladria*.
Mesostomaria Canu and Bassler, 1927. Family Cellariidae.
Metracolposa Canu and Bassler, 1917. Family Costulae.
Metradolium Canu and Bassler, 1917. Family Stomachetosellidae.
Metrarabdotos Canu, 1914. Family Adeonidae.
Metrocrypta Canu and Bassler, 1917. Family Stomachetosellidae.
Metroperiella Canu and Bassler, 1917 (subgenus of *Schizomavella*). Family Escharellidae.
Micropora Gray, 1848. Family Opesiulidae.
Microporella Hincks, 1877. Family Escharellidae.
Microporina Levinsen, 1909. Family Calpensiidae.
Microstoma Gray, 1848. Preoccupied and also not defined.
Microstomaria MacGillivray, 1895. Subgenus of *Strophipora*. Family Catenicellidae.
Mollia Lamouroux, 1821. Family Aspidostomatidae.
Monartron, new genus. Family Scrupocellariidae.
Monoceratopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.
Monocerina Neviani, 1900. Fossil. Structure incompletely known.
Monoporella Hincks, 1881. Family Aspidostomatidae.
Monsella Canu, 1900. Family Opesiulidae.
Morphasmopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.
Mucronella Hincks, 1880. Family Smittinidae.
Multescharinella D'Orbigny, 1952. Bry. Cret., p. 431. Type species, *Cellepora prolifera* Reuss, 1848, which has not been rediscovered for further study.
Multescharipora D'Orbigny, 1853. Bry. Cret., p. 495. Cretaceous cribrimorph. See Lang, 1921, p. lxii.
Mumiella Jullien, 1880. Type, *Semiescharipora mumia* D'Orbigny, 1852. Family Costulae. Cretaceous.
Murinopsia Jullien, 1886. Type, *Multescharipora galeata* Beissel, 1868. Family Costulae. Cretaceous. Referred by Lang to Pelmatoporidae.
Myagropora Lang, 1916. Family Myagroporidae. Cretaceous cribrimorph.
Myriapora Blainville, 1830. Synonym of *Myriozoum*.
Myrioporina Ehrenberg, 1830. Synonym of *Myriozoum*.
Myriozoella Levinsen, 1909. Family Myriozoidae.
Myriozoum Donati. 1750. Family Myriozoidae.
Mystriopora Lang, 1915. Family Electrinidae.
Nannopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.
Naresia Wyville Thompson, 1873. Synonym of *Kinetoskias*.
Nellia Busk, 1852. Family Farciminariidae.
Nematopora Duvergier, 1921 (preoccupied). See *Nematoporella*.
Nematoporella Canu and Bassler, 1927. Family Opesiulidae.
Neoeuthyris Bretnall, 1921. Family Euthyridae.
Nephropora Marsson, 1887. Pal. Abh., vol. 10, p. 90. Type and only known species *N. elegans* Marsson. Family Nephroporidae Marsson, 1887.
Nichtina Canu, 1900. See *Nitscheina*.
Nimba Jullien, 1903. Family Crepidacanthidae.
Nimbella Jullien, 1903. Family Crepidacanthidae.
Nitscheina (*Nichtina* in error) Canu, 1900. Family Electrinidae.
Normanellina Cossman, 1920. Synonym of *Conopeum*.
Notamia Fleming, 1828. Synonym of *Eucratea*.

Notoplites Harmer, 1923. Family Scrupocellariidae.

Ochetosella Canu and Bassler, 1917. Family Stomachetosellidae.

Odontionella Canu and Bassler, 1917. Family Aspidostomatidae.

Ogiva Jullien, 1881. Family Opesiulidae. Genotype *Eschara actea* D'Orbigny, 1851. Cretaceous. An inexact Cretaceous genus.

Ogivalia Jullien, 1881. Family Opesiulidae. Cretaceous. Genotypes, *Vincularia elegans* D'Orbigny, 1851 and *Eschara santonensis* D'Orbigny, 1851. An inexact genus.

Ogivalina Canu and Bassler, 1917. Family Hincksinidae.

Oligotopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.

Oligotresium Gabb and Horn, 1862. Synonym of *Lunularia*.

Omalosecosa Canu and Bassler, 1925. Family Celleporidae.

Omoiosia Canu and Bassler, 1927. Family Membranicellariidae.

Onchopora Busk, 1855. Family Onchoporidae.

Onchoporella Busk, 1884. Family Onchoporidae.

Onchoporoides Ortmann, 1890. Family Onchoporidae.

Onychocella Jullien, 1881. Family Opesiulidae.

Oochilina Norman, 1903. Synonym of *Crassimarginatella*.

Opisthornithopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.

Orbitulipora Stoliczka, 1861. Family Orbituliporidae.

Ornatella Canu, 1900. Genotype *Membranipora ornata* D'Orbigny, 1850. Cretaceous. Incompletely studied.

Ornithopora D'Orbigny, 1852. Synonym of *Bugula*.

Ornithoporina D'Orbigny, 1852. Synonym of *Bugula*.

Orthopora Waters, 1904. See *Orthoporidra*.

Orthoporidra Canu and Bassler, 1927. Proposed for *Orthopora* Waters, 1904 (not Hall, 1886). Family Lekythoporidae.

Osthimosia Jullien, 1888. Family Celleporidae.

Otionella Canu and Bassler, 1917. Family Biflustridae.

Otopora Lang, 1916. Family Otoporidae. Cretaceous cribrimorph.

Ovaticella Maplestone, 1900. Type *O. turbinata* Maplestone, 1900. Tertiary of Australia. Type incomplete Synonym or close to *Adeonellopsis*.

Pachydera Marsson, 1887. Pal. Abh., vol. 4, p. 100. Type and only species, *P. grandis* Marsson. Costulae. Referred by Lang to Pelmatoporidae.

Pachykraspedon Koschinsky, 1885. First species, *P. clarum* Koschinsky, 1885. Palaeontographica, vol. 32, 1885, p. 43. ?Synonym for *Mastigophora*.

Pachystomaria MacGillivray, 1895. Family Galeopsidae.

Pachytheca Canu, 1913. Family Acroporidae.

Palmicellaria Alder, 1864. Family Smittinidae.

Pancheilopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.

Parmularia Maplestone, 1910. Family Parmulariidae.

Pasythea Lamouroux, 1812. Family Liriozoidae.

Pavolunulites D'Orbigny, 1852. Bry. Cret., p. 358. Only a growth form of *Lunularia*.

Pelmatopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.

Peneclausa Jullien, 1888. Synonym of *Micropora*.

Pergensina Jullien, 1888. Synonym of *Thairopora*.

Perigastrella Canu and Bassler, 1917. Family Phylactellidae.

Periporosella Canu and Bassler, 1917. Family Alderinidae.

Peristomella Levinsen, 1902. Family Escharellidae.

Periteichisma Koschinsky, 1885. Palaeontographica, vol. 32, p. 25. First species, *Vincularia geometrica* Reuss, 1869. Second species, *Cellepora deplanata* Reuss, 1847. Fossils incompletely studied.

Petalostegus Levinsen, 1909. Family Bicellariellidae.

Petralia MacGillivray, 1887. Family Petraliidae.

Petraliella Canu and Bassler, 1927. Family Petraliidae.

Phidolopora Gabb and Horn, 1862. Family Reteporidae.

Phoceana Jullien, 1903. Family Smittinidae.

Phonicosia Jullien, 1881. Family Escharellidae.

Phractopora Lang, 1916. Preoccupied. See *Phractoporella.*

Phractoporella Lang, 1917. Family Pelmatoporidae. Cretaceous cribrimorph.

Phrynopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.

Phylactella Hincks, 1880. Family Phylactellidae.

Pithodella Marsson, 1887. Pal. Abh., vol. 4, p. 53. Genotype, *P. cincta* Marsson, 1887, Idem, p. 53, pl. 5, fig. 7. Family Alderinidae? Cretaceous.

Plagiopora MacGillivray, 1895. Journal Royal Society Victoria, vol. 4, p. 79. Perhaps Reteporidae with *Bulbipora* and *Caberoides.* Fossil.

Plagiosmittia Canu and Bassler, 1917. Family Smittinidae.

Planicellaria D'Orbigny, 1851. Bry. Cret., p. 36. Type species, *Planicellaria oculata* D'Orbigny, 1851, Idem, p. 37, pl. 653, figs. 1–5. Cretaceous. Can not be classified at present.

Platyglena Marsson, 1887. Pal. Abh., vol. 4, p. 89. Genotype, *P. clava* Marsson, Idem. p. 89, pl. 9, fig. 3. Family Platyglenidae Marsson, 1887. Cretaceous.

Pleuroschiziella Canu, 1918. Costulae. Fossil.

Pleurotoichus Levinsen, 1909. Family Euthyridae.

Plicopora MacGillivray, 1895. Fossil. Type incomplete.

Pliophloea Gabb and Horn, 1862. Genotype, *Flustra sagena* Morton, 1834. Family Costulae. Referred to Andrioporidae by Lang.

Poecilopora MacGillivray, 1886. Family Lekythoporidae.

Poikilla Jullien, 1903. No species cited. According to description might be *Schizellozoon.*

Pollaploecium Maplestone, 1909. Family Hippopodinidae.

Polycephalopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.

Polyceratopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.

Polyeschara Reuss, 1867. Not defined. Genotype, *P. confusa* Reuss, 1867. Lower Oligocene of Germany.

Porella Gray, 1848. Family Smittinidae.

Porellina D'Orbigny, 1851. Bry. Cret., p. 476. First species, *Eschara macrocheila* Reuss, 1848. Foss. Poly. des Wiener, pl. 8, fig. 14 (=*Umbonula*). Second species, *Eschara coscinophora* Reuss, Idem, pl. 8, fig. 20 (=*Adeonellopsis*). Not recognized.

Poricella Canu, 1904 (subgenus of *Adeonellopsis*). Family Adeonidae.

Poricellaria D'Orbigny, 1852. Not figured. Synonym of *Diplodidymia.*

Porina D'Orbigny, 1852. Bry. Cret., p. 432. First species *Eschara filograna* Goldfuss, 1826. Genus reserved for incompletely studied fossil species, having a pore below the aperture. Lang erroneously chose *Eschara gracilis* Lamarck, 1816 as the genolectotype, as this species belongs to *Acropora* Reuss, 1869, where Peregens correctly placed it in 1889.

Porinula Levinsen, 1916. Synonym of *Cylindroporella.*

Poristoma Canu, 1907. Synonym of *Bracebridgia.*

Posterula Jullien, 1905. Family Stomachetosellidae.

Prattia D'Archiac, 1847. Family Mamilloporidae.

Prodromopora Lang, 1916. Family Lagynoporidae. Cretaceous cribrimorph.

Prosoporella Marsson, 1887. Pal. Abh., vol. 4, p. 100. Type and only species, *Semiescharipora cornuta* Beissel, 1865. Synonym of *Decurtaria* Jullien, 1886. Cretaceous.

Prosotopora Lang, 1916. Family Rhacheoporidae. Cretaceous cribrimorph.

Prostomaria MacGillivray, 1895. Fossil. Not recognized without more study. Family Prostomariidae MacGillivray, 1895.

Pseudoflustra Bidenkap, 1897. Family Escharellidae.

Pseudostega Brydone, 1918. Family Biflustridae.

Psileschara Busk, 1860. Family Reteporidae.

Psilopsella, Canu and Bassler, 1927. Family Phylactellidae.

Pterocella Levinsen, 1909. Family Catenicellidae.

Puellina Jullien, 1886. Family Costulae.

Pumiscaria Gabb and Horn, 1862. Jour. Acad. Nat. Sci. Phila., ser. 2, vol. 5, 1862, p. 179. Genotype, "*Alveolites glomeratus*" Say. Not recognizable.

Pyriflustrella D'Orbigny, 1853. Bry. Cret., p. 569. First species *Hippothoa tuberculum* Lonsdale, 1845. Not recognized. Founded on poor interpretation of Lonsdale's figure.

Pyriflustrina D'Orbigny, 1853. Bry. Cret., p. 580. Type species, *P. elegans* D'Orbigny, 1853. Cretaceous.

Pyripora D'Orbigny, 1852. Family Electrinidae.

Pyriporella Canu, 1911. Family Alderinidae. Cretaceous.

Pyrulella Harmer, 1926. Family Alderinidae.

Quadricellaria D'Orbigny, 1851. Family Biflustridae.

Quadricellaria Sars, 1863 (preoccupied). Synonym of *Tessaradoma*.

Ragionula Canu and Bassler, 1927. Family Stomachetosellidae.

Ramphonotus Norman, 1894. Family Alderinidae.

Rectonychocella Canu and Bassler, 1917. Family Opesiulidae.

Reginella Jullien, 1886. Type, *Cribrilina furcata* Hincks, 1882. Family Costulae.

Reptadeonella Busk, 1884. Genotype, *R. violacea* (Johnston). Synonym of *Adeona*.

Reptelectrina D'Orbigny, 1852. Bry. Cret., p. 333. Synonym of *Electra*.

Reptescharella D'Orbigny, 1852. Bry. Cret., p. 464. First species described and figured, *R.* (*Escharina*) *lorieri* D'Orbigny, 1852. Cretaceous cribrimorph.

Reptescharellina D'Orbigny, 1852. Bry. Cret., p. 451. Selected genotype, *R. horrida* D'Orbigny, 1852. Idem, p. 456, pl. 715, figs. 7–9. Cretaceous.

Reptescharinella D'Orbigny, 1852. Bry. Cret., p. 429. Genotype selected by Lang *Cellepora subgranulata* Hagenow, 1851. Cretaceous.

Reptescharipora D'Orbigny, 1853. Bry. Cret., p. 489. Genotype, *R. meudonensis* D'Orbigny, 1853. Pl. 719, figs. 17–19. Costulae. Cretaceous. Type lost.

Reptocelleporaria D'Orbigny, 1852. Bry. Cret., p. 421. Genotype, *R. cretacea* D'Orbigny, 1852. Cretaceous.

Reptoflustra D'Orbigny, 1852. Bry. Cret., p. 327. First species, *Flustra impressa* Lamouroux=*Calpensia impressa*. Not recognized.

Reptoflustrella D'Orbigny, 1853. Bry. Cret., p. 570. First species, (described but not figured) *R. cenomania* D'Orbigny. Cretaceous. Not recognized.

Reptoflustrina D'Orbigny, 1853. Bry. Cret., p. 581. First species, *R. marginata* D'Orbigny, 1853. No generic characters. Synonym of *Callopora*.

Reptolatereschara D'Orbigny, 1852. Bry. Cret., p. 417. Both recent species (*Eschara annularis* Moll and *Reptolatereschara capensis* D'Orbigny) referred here by D'Orbigny are now placed elsewhere. No generic characters given.

Reptolunulites D'Orbigny, 1852. Bry. Cret., p. 356. A form of *Lunulites* in which growth has been upon large objects and therefore appears incrusting.

Reptoporella D'Orbigny, 1853. Bry. Cret., p. 474. Type species, *R. regularis* D'Orbigny, 1853, Idem, p. 475, pl. 717, figs. 6, 7. Cenomanian of France. Cretaceous cribrimorph. See Lang, 1921, p. lxv.

Reptoporellina D'Orbigny, 1853. Bry. Cret., p. 477. First species, *Cellepora heckeli* Reuss, 1848. Synonym of *Adeona*.

Reptoporina D'Orbigny, 1852. Bry. Cret., p. 441. Numerous species referred to this genus by D'Orbigny but the only one described and figured by him is *Escharina micropora* D'Orbigny, 1847. (Prod. Pal., pp. 263 and 1852. Bry. Cret., p. 444, pl. 605, figs. 5–7). The figures represent a Membranipora with closed cells. Not recognized.

Retepora Imperato, 1599. Family Reteporidae.

Reteporella Busk, 1884. Subgenus of *Retepora*.

Retiflustra Levinsen, 1909. Family Flustridae.

Reussia Neviani, 1895. Subgenus of *Smittina*. The two species cited are incompletely figured.

Reussina Neviani, 1895. Genotype *Eschara polystomella* Reuss, 1847. Synonym of *Adeonella*.

Rhabdopora Lang, 1916. Family Calpidoporidae. Cretaceous cribrimorph.

Rhabdozoum Hincks, 1882. Family Scrupocellariidae.

Rhacheopora Lang, 1916. Family Rhacheoporidae. Cretaceous cribrimorph.

Rhagasostoma Koschinsky, 1885 (Levinsen, 1909). Family Aspidostomatidae.

Rhammatopora Lang, 1915. Family Electrinidae?

Rhamphostomella Lorenz, 1886. Family Smittinidae.

Rhebasia Jullien, 1881. Genotype, *Eschara dorilas* D'Orbigny, 1851. Bry. Cret., pl. 677, figs. 4–6. Cretaceous. Incompletely known.

Rhiniopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.

Rhynchopora Hincks, 1877, preoccupied. See *Rhynchozoon*.

Rhynchotella Canu, 1900. Synonym of *Ramphonotus*.

Rhynchozoon Hincks, 1891. Family Reteporidae.

Romancheina Jullien, 1888. Family Escharellidae.

Rosseliana Jullien, 1888. Family Opesiulidae.

Salicornaria Schweigger, 1819. Synonym of *Cellaria*.

Salpingia Coppin, 1848. Synonym of *Aetea*.

Sandalopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.

Sarsiflustra Jullien, 1903. Family Flustridae.

Savignella Van Beneden, 1850. Synonym of *Scrupocellaria*.

Savignyella Levinsen, 1909. Synonym of *Catenaria*.

Schismopora MacGillivray, 1888. Family Celleporidae.

Schismoporella Gregory, 1893. Genotype, *Cellepora schizogaster* Reuss, 1847. Tortonian of Austria. Structure of type incompletely known.

Schistacanthopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.

Schizaropsis Canu and Bassler, 1917. Family Galeopsidae.

Schizellozoon Canu and Bassler, 1917. Family Reteporidae.

Schizemiella Canu and Bassler, 1917. Family Stomachetosellidae.

Schizobathysella Canu and Bassler, 1917. Family Crepidacanthidae.

Schizobrachiella Canu and Bassler, 1920. Family Escharellidae.

Schizolavella Canu and Bassler, 1920. Family Escharellidae.

Schizomavella Canu and Bassler, 1920. Family Escharellidae.

Schizopodrella Canu and Bassler, 1917. Family Escharellidae.

Schizoporella Hincks, 1877. Family Escharellidae. Preserved for species incompletely studied.

Schizoporellopsis Maplestone, 1898. Proc. Royal Soc. Victoria, vol. 2 (new ser.), pt. 1, 1898, p. 21. Genotype, *S. abnormis* Maplestone, 1898. Structure incompletely known.

Schizoretepora Gregory, 1893. Family Reteporidae. Probably the same as *Schizellozoon*.

Schizorthosecos Canu and Bassler, 1917. Family Orbituliporidae.
Schizostoma Canu, 1907, (not Lea 1842). See *Schizostomella.*
Schizostomella Canu and Bassler, 1927. Family Adeonidae.
Schizotheca Hincks, 1877. Family Reteporidae.
Sclerodomus Levinsen, 1909. Family Sclerodomidae.
Scorpiodina Jullien, 1886. Family Costulae. Requires further study.
Scruparia Oken, 1815. Family Scrupariidae.
Scrupocellaria Van Beneden, 1845. Family Scrupocellariidae.
Scuticella Levinsen, 1909. Family Catenicellidae.
Scutularia Busk, 1860. Only species *S. prima* Busk (nomen nudum).
Selbia Gray, 1843. Synonym of *Caberea.*
Selenaria Busk, 1854. Family Opesiulidae.
Selenariopsis Maplestone, 1912. Family Opesiulidae.
Semicelleporaria D'Orbigny, 1852. Bry. Cret., p. 420. First species, *Cellepora cucullina* Michelin. Fossil incompletely figured and never rediscovered.
Semieschara D'Orbigny, 1852. Bry. Cret., p. 364. Genotype, *S. flabellata* D'Orbigny, 1852. Idem, p. 367, pl. 708, figs. 1–4. Used for zoarial forms.
Semiescharella D'Orbigny, 1852. Bry. Cret., p. 462. Type, *S. flexuosa* D'Orbigny, 1852. Idem, p. 462. Type not figured. Waters, 1905, recognized it as *Eschara pallasiana* Moll, 1803.
Semiescharellina D'Orbigny, 1852. Bry. Cret., p. 449. Type. *S. mumia* D'Orbigny, 1852. Idem, p. 450, pl. 714, figs. 17–20. Type lost. Genus not recognized.
Semiescharinella D'Orbigny, 1852. Bry. Cret., p. 427. Type, *S. complanata* D'Orbigny, 1852, Idem, p. 427, pl. 714, figs. 1–4. The figure and specimens do not correspond. The name had best be dropped.
Semiescharipora D'Orbigny, 1852. Bry. Cret., p. 479. Lang, 1917 has chosen *S. complanata* D'Orbigny, 1852, p. 484, pl. 718, figs. 17–20, as the type. This is an uncertain species and the generic name should be dropped Cretaceous.
Semiflustra D'Orbigny, 1852. Bry. Cret., p. 326. First species, *Flustra bombycina* Solander, 1787, not recognized. The second species (*S. frondiculosa*) has never been figured. The third is *Flustra carbasea* Ellis and Solander. 1786 Genus may therefore be considered a synonym of *Carbasea.*
Semiflustrella D'Orbigny, 1853. Bry. Cret., p. 563. First species, *S. rhomboidalis* D'Orbigny, 1852. Idem, p. 564, pl. 730, figs. 5–8, Cretaceous.
Semiflustrina D'Orbigny, 1853. Bry. Cret., p. 576. First species, *S. monilifera* D'Orbigny, 1855. Idem, p. 577, pl. 732, figs. 6–9. Included in *Callopora.* Cretaceous.
Semihaswellia Canu and Bassler, 1917. Family Galeopsidae or Sclerodomidae.
Semiporina D'Orbigny, 1852. Bry. Cret., p. 439. First species, *S. elegans* D'Orbigny, 1852. Idem, p. 440, described but not figured. Second species, *Vaginopora fissurella* Reuss, 1848. Foss. Polyp. du Wiener, pl. 9, fig. 5. Miocene of Austria, not rediscovered by Manzoni.
Sertella Jullien, 1903. Subgenus of *Retepora.*
Setosella Hincks, 1877. Family Setosellidae.
Setosellina Calvet, 1906. Family Hincksinidae.
Siniopelta Levinsen, 1909. Synonym of *Costazzia.*
Siphonella Hagenow, 1851. Bry Maastricht Kreide, p. 83. First species, *S. cylindrica* Hagenow, 1851. Idem, p. 84, pl. 6, figs. 5. Cretaceous. Incompletely known.
Siphonicytara Busk, 1884. Family Tubucellariidae.
Siphonoporella Hincks, 1880. Family Steganoporellidae.
Smittia Hincks, 1880, preoccupied. See *Smittina.*

Smittina Norman, 1903. Family Smittinidae.

Smittipora Jullien, 1881. Family Opesiulidae. A Cretaceous genus founded on a poor interpretation of a figure of Smitt.

Smittistoma Canu, 1907. Family Adeonidae.

Solenophragma Marsson, 1887. Pal. Abh., vol. 4, p. 54. Type and only species *Solenophragma baculina* Marsson, 1887 (not D'Orbigny), Cretaceous.

Solenopora Maplestone, 1903 (preoccupied). See *Aulopocella.*

Sparsiporina D'Orbigny, 1852. Family Reteporidae.

Sphaerophora Haswell, 1881. Family Orbituliporidae.

Sphenella Duvergier, 1924. Family Escharellidae.

Spiralaria Busk, 1861. Family Flustridae.

Stamenocella Canu and Bassler, 1917. Family Alderinidae.

Steganoporella Smitt, 1873. Family Steganoporellidae.

Steginopora D'Orbigny, 1853. Bry. Cret., p. 499. Genotype, *S. ornata* D'Orbigny, 1853. Cretaceous. Costulae. Referred by Lang to Pelmatoporidae.

Stenopsis Canu and Bassler, 1927. Family Galeopsidae.

Stenosipora Canu and Bassler, 1927. Family Mamilloporidae.

Stenostomaria MacGillivray, 1895. Subgenus of *Strophipora.*

Stephanollona Duvergier, 1921. Family Escharellidae.

Stephanopora Kirkpatrick, 1888. Family Escharellidae.

Stephanosella Canu and Bassler, 1917. Family Escharellidae.

Stichocados Marsson, 1887. Pal. Abh., vol. 4, p. 101. Type and only species, *S. verruculosus* Marsson, 1887. Idem, p. 101, pl. 10, fig. 15. See Lang, 1922, p. 174. Costulae. Cretaceous. Referred by Lang to Pelmatoporidae.

Stichopora Hagenow, 1851. Bry. Maastricht Kreide, p. 100, Genotype, *S. clypeata* Hagenow, 1851. Idem, p. 100, pl. 12, fig. 14, Cretaceous.

Stichoporina Stoliczka, 1861. Family Orbituliporidae.

Stirparia Goldstein, 1880. See *Stirpariella.*

Stirpariella Harmer, 1923. (*Stirparia* Goldstein, 1880, preoccupied.) Synonym of *Caulibugula.*

Stolonella Hincks, 1883. Family Beaniidae.

Stomachetosella Canu and Bassler, 1917. Family Stomachetosellidae.

Stomhypselosaria Canu and Bassler, 1927. Family Cellariidae.

Strongylopora Maplestone, 1899. Family Catenicellidae.

Strophiella Jullien and Calvet, 1903. Family Escharellidae.

Strophipora MacGillivray, 1895. Family Catenicellidae.

Stylopoma Levinsen, 1909. Family Escharellidae.

Synaptacella Maplestone, 1910. Family Synaptacellidae.

Synnotum (Pieper, 1881), Hincks, 1886. Family Epistomidae.

Syringotrema Harmer, 1926. Family Cellariidae.

Systenopora Waters, 1904. Family Sclerodomidae.

Systenostoma Marsson, 1887. Pal. Abh., vol. 4, p. 89. Type and only species, *S. asperulum* Marsson. Idem, p. 89, pl. 9, fig. 2. Cretaceous. Perhaps *Gemellipora* (Waters, 1904).

Taenioporina Marsson, 1887. Pal. Abh., vol. 4, p. 87. Type *Eschara arachnoidea* Goldfuss, 1826. Cretaceous.

Taphrostoma Canu, 1910. Genotype, *T. spinosum* Canu, 1910 Fossil. Family Electrinidae.

Taractopora Lang, 1916. Family Taractoporidae, Cretaceous cribrimorph.

Tata Van Beneden, 1849. Type, *T. rugosa* Van Beneden, 1849. Founded upon the primary cells of Membraniporae.

Tegella Levinsen, 1909. Family Alderinidae.

Tegminula Jullien, 1882. Family Celleporidae.

Teichopora Gregory, 1893. Genotype (only species), *T. clavata* Gregory, 1893. Trans. Zool. Soc. London, vol. 13, pt. 6, p. 249. Related to *Meniscopora?*

Temachia Jullien, 1882. Family Phylactellidae.

Tendra Nordman, 1839 Genotype, *Tendra zostericola* Nordman, 1839. Family Electrinidae.

Ternicellaria D'Orbigny, 1851. Synonym of *Tricellaria.*

Tessaradoma Norman, 1868. Family Galeopsidae or Sclerodomidae.

Tetraplaria Tenison-Wood, 1878. Family Hippopodinidae.

Teuchopora Neviani, 1895. Genotype, *Alecto castrocarensis* Manzoni, 1875. Fossil. Perhaps Phylactellidae.

Thairopora MacGillivray, 1887. Family Thalamoporellidae.

Thalamoporella Hincks, 1887. Family Thalamoporellidae.

Thoracophora Jullien, 1886. Synonym of *Disteginopora.*

Thoracopora Lang, 1916. Family Thoracoporidae. Cretaceous cribrimorph.

Tremogasterina Canu, 1911. Family Hiantoporidae.

Tremopora Ortmann, 1890. Family Hiantoporidae.

Tremoschizodina Duvergier, 1921. Family Hippopodinidae.

Tremotoichos Canu and Bassler, 1917. Family Galeopsidae.

Tretosina Canu and Bassler, 1927. Family Electrinidae.

Tricellaria Fleming, 1828. Family Scrupocellariidae.

Tricephalopora Lang, 1916. Family Pelmatoporidae. Cretaceous cribrimorph.

Tricolpopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.

Trigonopora Maplestone, 1902. Figure not recognizable.

Trilophopora Lang, 1916. Family Andrioporidae. Cretaceous cribrimorph.

Triphyllozoon Canu and Bassler, 1917. Family Reteporidae.

Triporula Canu and Bassler, 1927. Family Adeonidae.

Trochopora D'Orbigny, 1853. Family Biflustridae.

Trochosodon Canu and Bassler, 1927. Family Conescharellinidae.

Trypematella Canu and Bassler, 1920. Family Escharellidae.

Trypocella Maplestone, 1902. Genotype, *T. excavata* Maplestone. Proc. Roy. Soc. Victoria, vol. 14, new series, pt. 2, p. 73. Family Escharellidae.

Trypostega Levinsen, 1909. Family Hippothoidae.

Tubiporella Levinsen, 1909. Family Tubucellariidae.

Tubucella Canu and Bassler, 1917. Family Tubucellariidae.

Tubucellaria D'Orbigny, 1852. Family Tubucellariidae.

Tuliparia Blainville, 1834. Synonym of *Pasythea.*

Turritigera Busk, 1884. Family Lekythoporidae.

Ubaghsia Jullien, 1886. Family Costulae. Referred by Lang to Pelmatoporidae.

Ulidium Searles Wood, 1844. Synonym of *Melicerita.*

Umbonella Hincks, 1889, preoccupied. See *Umbonula.*

Umbonula Hincks, 1880. Family Smittinidae.

Uniretepora D'Orbigny, 1853. Bry. Cret., p. 820. Genotype, *Retepora granosa* Michelin, 1847. Icon. Zoophyt. p. 315, pl. 76, fig. 2, Miocene of Touraine, France. The figure appears to represent an alteration of *Hornera.*

Urceolipora MacGillivray, 1880. Family Euthyridae.

Valdemunitella Canu, 1900. Bull. Geol. Soc. Trans., ser. 5, vol. 28, p. 369. Genotype, *Membranipora valdemunita* Hincks, 1885. Family Alderinidae.

Velumella Canu and Bassler, 1917. Family Opesiulidae.

Verminaria Jullien, 1888. Family Calpensiidae.

Vibracella Waters, 1891. Family Opesiulidae.

Vibracellina Canu and Bassler, 1917. Family Hincksinidae.

Vibraculina Neviani, 1895. Synonym of *Jaculina* Jullien, 1903. *Vibraculina* is not adopted because founded on false characters, the genotype not having vibracula.

Vincularia Defrance, 1829. Dict. des Sci. Nat., vol. 58, p. 214. Type species, *Vincularia fragilis* Defrance, 1829, Idem, vol. 58, p. 214; atlas, pl. 67, figs. 3*a-b*. No generic determination. Refer to rod-like forms and now used only as a nomenclatorial term. See *Heterocella*.

Vincularina D'Orbigny, 1851. Bry. Cret., p. 91. First species described, *V. sulcata* D'Orbigny, 1851. Idem, p. 82, pl. 601, figs. 4–6. Cretaceous. According to Canu the figures and specimens do not correspond. The other species of the genus are based on worn specimens or the figures are ideal restorations. The genus had better be dropped.

Vittaticella Maplestone, 1900. Family Catenicellidae.

Watersia Levinsen, 1909. Family Bugulidae.

Watersipora Neviani, 1895. Family Hippopodinidae.

Woodipora Jullien, 1888. Family Thalamoporellidae.

Zeuglopora Maplestone, 1909. Family Conescharellinidae.

SYSTEMATIC DESCRIPTIONS

Order CHEILOSTOMATA Busk

Suborder ANASCA Levinsen

Division 1. INOVICELLATA Jullien, 1888

Family AETEIDAE Smitt, 1867

Descriptions and illustrations of the structure of this family and its single genus *Aetea* were given in our monograph of 1920, to which the reader is referred for details. A more extended discussion of the family, the genus *Aetea* and two species, *A. anguina* Linnaeus, 1758, and *A. truncata* Landsborough, 1852, is given in the Report on the Polyzoa of the *Siboga* Expedition, 1926, by Doctor Harmer, who notes the significance of the ctenostomatous characters in these species and refers the group to Jullien's division *Inovicellata.*

Division 2. MALACOSTEGA Levinsen, 1909

Family EUCRATIIDAE Hincks, 1880

The fertile zooecia are gonoecia (deprived of polypide with tentacles). The zooecia expand from the base upwards, with a terminal oblique opesium. Avicularia and vibracula are wanting. The zoarium is flexible and nonarticulated.

Special larva in which the terminal bud is much reduced, the aboral face is very much developed, the oral face is completely flat and the stomach trilobate. It forms a transition toward the Cyphonautes form. The zooecia are club-shaped. The zoarium is radicellate. The ancestrula is of a special type.

As noted by Harmer "The family is characterized by the erect, frequently uniserial, habit of its members, by the tendency of the zooecia to have a tubular form (perhaps a primitive feature) and by the correlated restriction of the opesia to a part of the frontal surface."

Hincks, 1880 classed in this family the following genera:

Eucratea Lamouroux, 1812; *Gemellaria* Savigny, 1811; *Scruparia* Hincks, 1880; *Brettia* Dyster, 1858, and *Huxleya* Dyster, 1858.

The genera *Gemellaria, Corynoporella* and *Brettia* are deprived of ovicells and we classify them in the family Gemellariidae Busk, 1859, to which we give a more restricted and exact meaning. The structure of *Huxleya* is not known and it is impossible to classify it; perhaps it will prove to belong to the Catenariidae.

Genus EUCRATEA Lamouroux, 1812 (Hincks, 1880).

The zooecia are sub-calcareous, rising immediately one from the other, so as to form a single series. The branches are given off from the front of a cell below the opesium. The zooecia have a large gymnocyst. The tentacular sheath terminates above in a ring of setae. The gonoecia have an endozooecial ovicell. 10–12 tentacles.

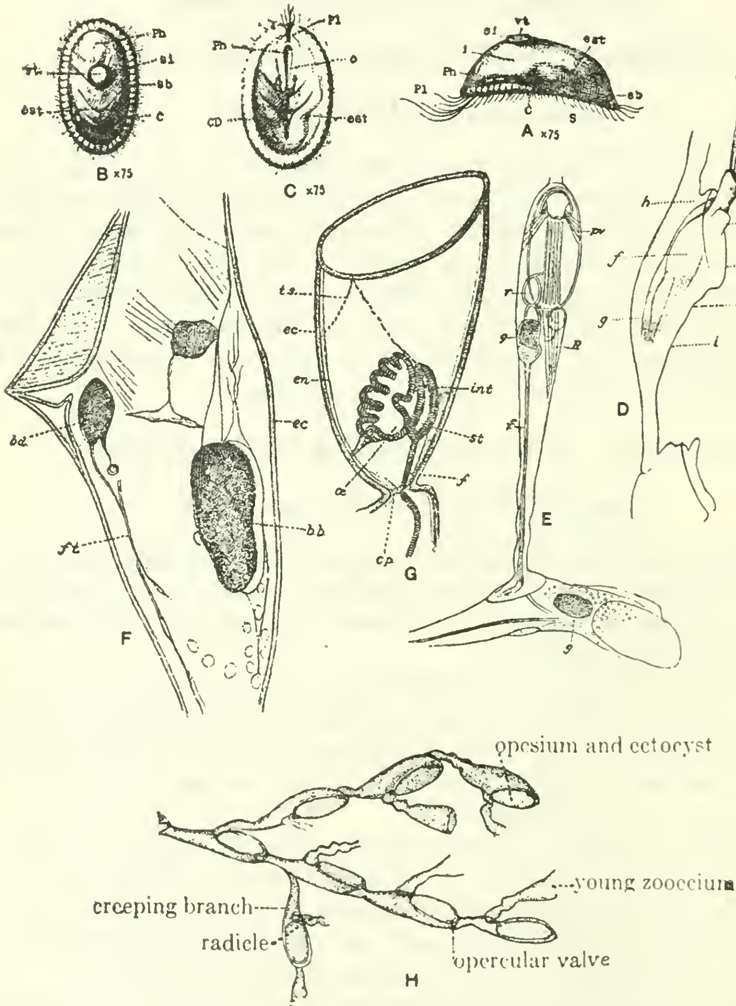

Fig. 1.—Family Eucratiidae Hincks, 1880

Genotype.—*Eucratea* (*Sertularia*) *chelata* Linnaeus, 1758. Recent. Harmer, 1923, by studying the old texts established that *Gemellaria* Van Beneden, 1845, is a synonym of *Eucratea* Lamouroux, 1912, and that *Sertularia chelata* Linnaeus, 1758, which has usually been regarded as the genotype of *Eucratea*, has no claim to this position.

The changing of two genera so well known, appears to us disastrous and perfectly useless. *Eucratea chelata* occurs in the list of Lamouroux, 1816, the author of the genus and under the same name, Milne Edwards, 1838, Smitt, 1867, Jolliet 1877, and Haddon, 1883 have studied its anatomy. Barrois, 1877, published its larva and Hincks, 1880 made known its gonoecia and its zooecial variations. To change this name would render these works unintelligible. The usage of a century is certainly to be respected more than an arbitrary rule whose object should be to clear up the nomenclature instead of disturbing it.

Genus SCRUPARIA Hincks, 1857

The zooecia form a single series or are in pairs back to back. The ovicelligerous cells are small (gonoecial) and placed back to back with the ordinary cells. The branches given off from the back of a cell are facing in the opposite direction.

Genotype.—Scruparia clavata Hincks, 1857. Recent.

Harmer, 1923, writes "*Scruparia chelata* should thus be regarded as the genotype of *Scruparia*. Hincks' later proposal (1880, p. 21) to make his own *S. clavata* the genotype is inadmissible, as this species is not included in Oken's original list." If we adopt the changes proposed by the English author it will result in an incredible mixture. *Gemellaria* would be *Eucratea*, *Eucratea* would become *Scruparia*, and it would be necessary to create two new genera for the typical Gemellariidae (without oviccll) and *Scruparia* of Hincks

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EXPLANATION OF FIGURE 1

A–G. *Eucratea chelata* Lamouroux, 1816. A. View in profile of free larva; the terminal bud is much reduced, the aboral face greatly developed and the oral face completely flattened. B. View of aboral face of larva showing the very simple teminal bud and the stomach visible from the side. C. View of oral face of larva showing the trilobate form of the stomach (after Barrois, 1877); *c*, coronna; *cd*, digestive cavity; *est*, stomach; *o*. orifice of the larva; *ph*, pharynx; *pl*. vibratile plume; *sb*, furrow of separation between aboral mass and expanded face; *vt*, terminal bud. D. Anatomy of a zooecium viewed in profile (after Milne Edwards, 1838); *a*, cellule; *b*, membraneous disk occupying the expanded part of the cellule (=ectocyst covering the opesium); *c*, opercular valve; *d*, tentacular sheath; *e*, ciliated tentacles; *f*, stomach; *g*, intestine recurved upon itself; *h*, anus; *i*, retractor muscles. E. View of frontal side showing anatomy of a zooecium (after Smitt 1865); *pv*, parieto-vaginal muscles; *R*, large retractor muscles of the polypide; *f*, filaments of mesenchymatous tissue. F. Origin of the bud in *Eucratea chelata*, as a thickening of the endocyst below the mouth of the zooecium, and possibly also from the funicular tissue. G. Young terminal zooecium, showing the double nature of the lophophore and the stomach, etc.; also the intimate relation of the latter to the funiculus (F, G, after Haddon, 1883); *bb*, brown body; *bd*, bud; *cp*, communication plate (septula); *ec*, ectocyst; *en*, endocyst; *f*, funiculus; *ft*, funicular tissue (=mesenchyme); *int*, intestine; *oe*, esophagus; *st*, stomach; *ts*, tentacular sheath. H. Zooecia showing terminology.

simply to render a little more intelligible the descriptions of the very mediocre classificator, Oken. We adopt the principle of least change based on long usage. It will always be very difficult to harmonize the ancient authors, ignorant of the structure of the bryozoa, with the precision and exactness of modern science.

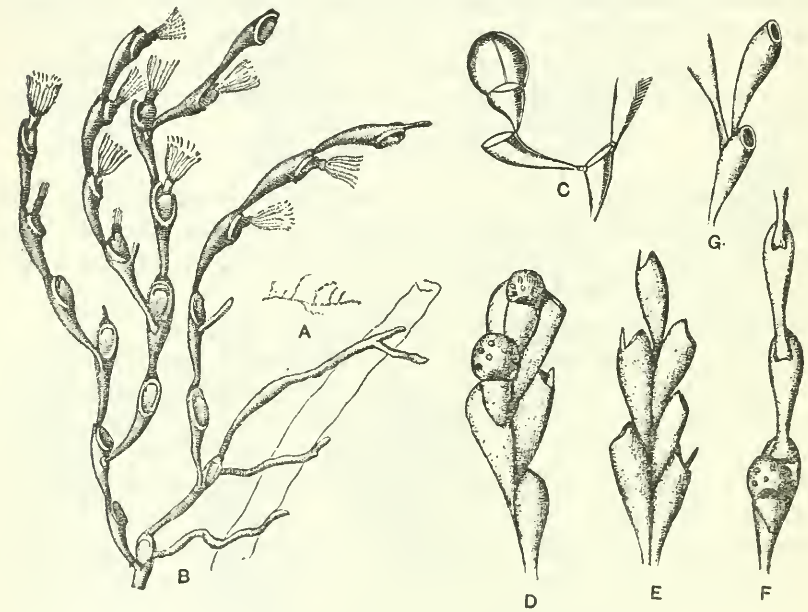

Fig. 2.—Genus *Eucratea* Lamouroux, 1812

A–C. *Eucratea chelata* Linnaeus 1758. A. Zoarium natural size. B. Zoarial fragment with its radicells, ×24. The basal edge of the distal wall is not angular, the ovicelled zooecia are attached either proximally to the frontal area or to the basal surface of other zooecia (after Milne Edwards). C. Ovicelled zooecium; it is of smaller size, ×25 (after Levinsen, 1894).

Fig. 3.—Genus *Scruparia* Hincks, 1857

D–G. *Scruparia clavata* Hincks, 1880. D. Biserial form with ovicelled zooecia, ×50. E. Basal side of biserial form, ×50. F. Uniserial form, ×50. G. Group showing the mode of branching, ×50. (A–D, after Hincks, 1880.)

Family GEMELLARIIDAE Busk, 1859

The zoarium is flexible, radicelled. The zooecia are club-shaped, with a large gymnocyst. No ovicell. Larva unknown.

Genus GEMELLARIA Van Beneden, 1845

The zooecia are in pairs back to back. The basal edge of the distal wall is angular. The radical fibers issue from the lateral margin in the proximal part of the zooecium. 12–14 tentacles.

Genotype.—Gemellaria (Sertularia) loricata Linnaeus, 1758. Recent.

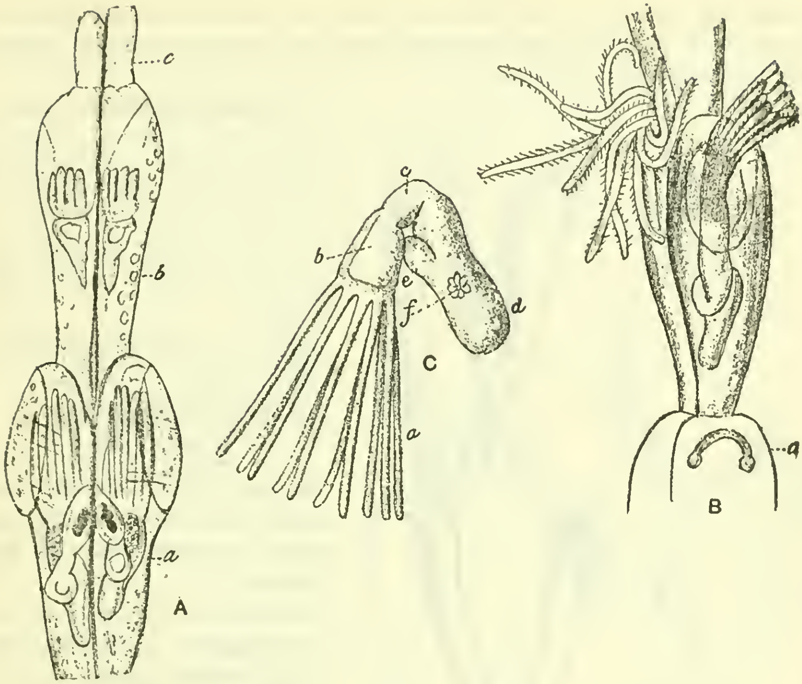

FIG. 4.—Family Gemellariidae Busk, 1859

A–C. *Gemellaria loricata* Linnaeus, 1758. A. Extremity of a branch showing the buds (*c*), some young zooecia in which the polypide is incomplete (*b*), and normal polypides (*a*). B. Animals in different stages of protrusion. (A, B. After Farre, 1837.) C. An isolated polypide (after Van Beneden, 1845), *a*, tentacles; *b*, buccal cavity; *c*, esophagus; *d*, stomachal coecum; *e*, stomach.

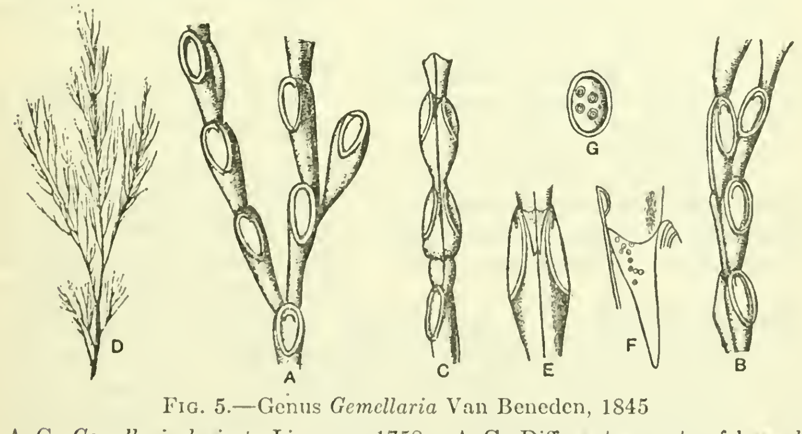

FIG. 5.—Genus *Gemellaria* Van Beneden, 1845

A–G. *Gemellaria loricata* Linnaeus 1758. A–C. Different aspects of branches of the same zoarium, ×25. The basal edge of the distal wall is angular. The radical threads issue from the lateral margin in the proximal part of the zooecium. D. Zoarium, natural size. (A–D. After Hincks, 1880, ×25.) E. Two zooecia and junction of two distal zooecia. F. Details of the junction of the distal zooecia to the proximal zooecia, ×116. G. Multiporous septular plate, ×250. (E–G. After Levinsen, 1896.)

Harmer, 1923, proved that this genus should be called *Eucratea* Lamouroux, 1816. We maintain it for the reason of least change and its use for half a century.

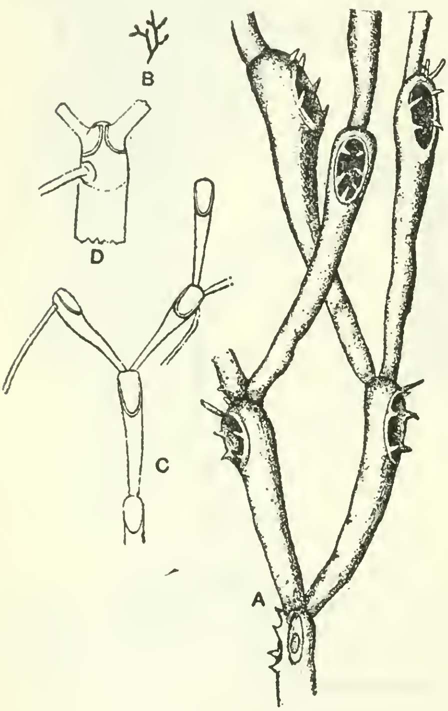

FIG. 6.—Genus *Brettia* Dyster, 1858

A. *Brettia pellucida* Dyster, 1858 (after Hincks, 1880). A. Zooecia. According to Levinsen, 1909, this genus is purely zoarial and its genotype is a *Gemellaria*.

B–D. *Brettia minima* Waters, 1900. B. Colony, natural size. C. Frontal view of zooecia, ×12. D. Dorsal surface ×25. The radicles start from the dorsal surface at the distal end. (After Waters, 1900.)

Genus BRETTIA Dyster, 1858

The zoarium with single rowed zooecia, the proximal portion of which is subtubular. The radicle starts from the *dorsal* surface at the dorsal end.

Genotype.—*Brettia pellucida* Dyster, 1858. Recent.

Genus CORYNOPORELLA Hincks, 1888

As in *Brettia*, but there is an articulated avicularium attached to the side of the opesium.

Genotype.—*Corynoporella tenuis* Hincks, 1888. Recent.

A superfluous genus according to Waters, 1900.

Family BIFLUSTRIDAE Smitt, 1872

Membraniporae without ovicells. The zooecia are rectangular (seen on their dorsal face). No spines.

In this family we classify all the genera of the first group of Membraniporae as we divided them in 1920 (p. 85), except *Discoflustrellaria* D'Orbigny, 1850, which we now refer to the family Mamilloporidae.

History.—*Biflustra* is a zoarial genus established by D'Orbigny, 1852, and classed in his family of Flustrellaridae. It embraced all of the bilamellar Membranipores. Three recent species were classed here: The first and the third are of the *Savartii* group (Waters, 1905) and the second is one of the Costulae.

Busk, 1859, classed *Biflustra* in the Escharidae: He introduced here *Biflustra delicatula* which we know to be a synonym of *Flustra savartii* Savigny-Audouin, 1926. Smitt, 1872, formed the family of Biflustridae for the reception of the genus *Biflustra*. "The quadrangular shape of the zooecia, as well as their strong usually high and hardly calcified and granular margins, in most cases will make the biflustridan type recognizable." He cites three species: *Flustra lacroixii* Savigny-Audouin, 1826, although under this name he figures *Aplousina filum* Jullien, 1902, *Biflustra denticulata* which is of very different structure (*Hemiseptella*) and *Flustra savartii* Savigny-Auduoin, 1826.

These three authors have then principally considered as types of the genus *Biflustra*, *Flustra savartii*, in which the colonies are frequently bilamellar. In accordance with the rules of nomenclature which require the recognition of old names, we might recognize *Biflustra* with *Flustra savartii* as the genotype, but as the paleontologists have introduced into this genus a great number of species of very different structure we created in 1917 the genus *Acanthodesia* in order to avoid all confusion. However, we can maintain Smitt's name for the family. In the absence of known larvae we can not state if this family is a natural one.

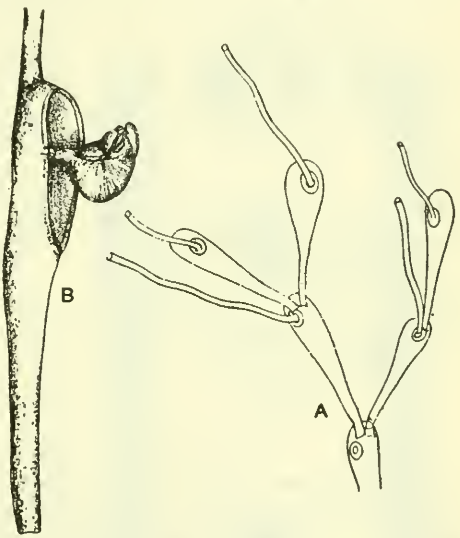

FIG. 7.—Genus *Corynoporella* Hincks, 1888

A, B. *Corynoporella tenuis* Hincks, 1888. A. Dorsal surface. Fibrils are given off from the dorsal surface of the cell a little below the summit towards one side. B. Lateral view of a zooecium showing the large articulated avicularium. (After Hincks, 1888.)

Conopeum Norman, 1903, *Acanthodesia* Canu and Bassler, 1920, *Adenifera* Canu and Bassler, 1917, *Cupuladria* Canu and Bassler, 1920, *Heliodoma* Calvet, 1907, *Otionella* Canu and Bassler, 1917, *Trochopora* D'Orbigny, 1852, *Crepis* Jullien, 1882, *Discoflustrellaria* D'Orbigny, 1851, and *Membraniporina* Levinsen, 1909, were described and illustrated by us under section 1 of Membraniporae (no ovicell) in our monograph of 1920. *Discoflustrellaria* is now referred to the Mamilloporidae but all the other genera and in addition *Cellarinidra* Canu and Bassler, 1927 (*Cellarina* D'Orbigny, 1851, preoccupied) and *Quadricellaria* D'Orbigny, 1850, here described and figured are now referred to the Biflustridae Smitt, 1872. *Membranipora* Blainville, 1830, which has the same standing as *Membraniporina* Levinsen, 1909, is likewise placed here.

Genus HELIODOMA Calvet, 1907

The zooecia are arranged following two spiral concentric series which are alternately separated by a spiral series of vibracula.

Genotype.—Heliodoma implicata Calvet, 1907. Recent (Tropical Atlantic).

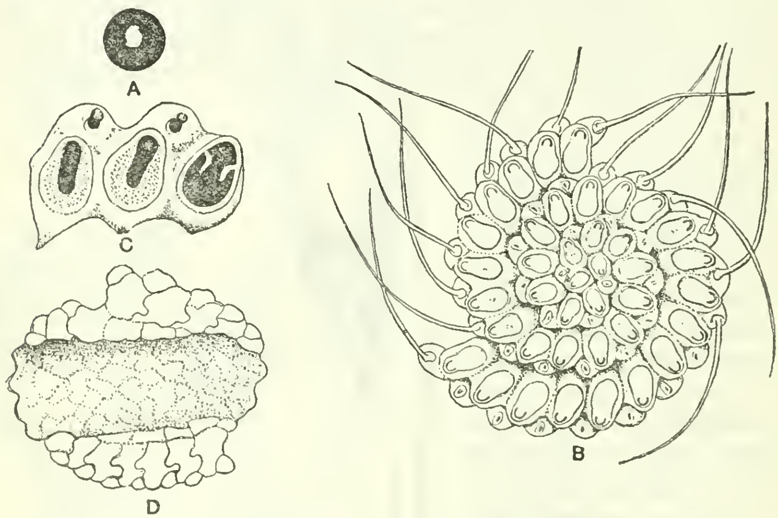

FIG. 8.—Genus *Heliodoma* Calvet, 1907

A–D. *Heliodoma implicata* Calvet, 1907. A. Free zoarium, natural size. B. Entire colony showing the spiral arrangement of the zooecia and the setiform vibracula. C. Aspect of the zooecia without ectocyst, ×25. D. Inferior face of the zoarium. (After Calvet, 1907.)

Genus CELLARINIDRA Canu and Bassler, 1927

1927. *Cellarinidra* CANU and BASSLER, Classification Cheilostomatous Bryozoa, Proc. U. S. Nat. Mus., vol. 69, Art. 14, p. 2. (*Cellarina* D'Orbigny, 1851, preoccupied.)

The zoarium is articulated; the segments are cylindrical with cells on all the faces. The zooecia have a cryptocyst more or less developed and angular; the opesium is elliptical. There are small interopesial avicularia.

Genotype.—Cellarinidra (*Cellarina*) *clavata* D'Orbigny, 1851. Cretaceous.

Genus MEMBRANIPORA Blainville, 1830

MEMBRANIPORA ARCIFERA, new species

Plate 2, fig. 6

Description.—The zoarium encrusts shells. The zooecia are distinct, separated by a deep furrow, very large, elliptical or irregular; the mural rim is thick, regular, finely granular with a salient and rounded termen likewise ornamented; the opesium has the same form as the zooecium and it is very finely denticulated. Distally, in the walls there is an *arch* limiting a transverse slit or two lateral cavities corresponding to the septulae. No dietellae. In the superior part of certain zooecia there is a large deep cavity (ovicell?) closed by a special chitinous membrane.

Measurements.[3]—

Opesium $\begin{cases} ho = 0.70\text{–}0.75 \text{ mm.} \\ lo = 0.50\text{–}0.60 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.85\text{–}1.10 \text{ mm.} \\ lz = 0.60\text{–}0.70 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Membranipora perversa* Waters which has an identical superior cavity, in the presence of the distal arch and the absence of cryptocyst. It differs from *Membranipora profunda* MacGillivray, 1895, provided with the same superior cavity in its greater dimensions and in the presence of the distal arch.

MacGillivray thought that the superior cavity was the trace of an avicularium but this is not possible. Our specimen shows the closing membrane well and it is not a mandible. This structure is perhaps a kind of endotoichal ovicell close to that of the Cellariidae or of the Setosellidae.

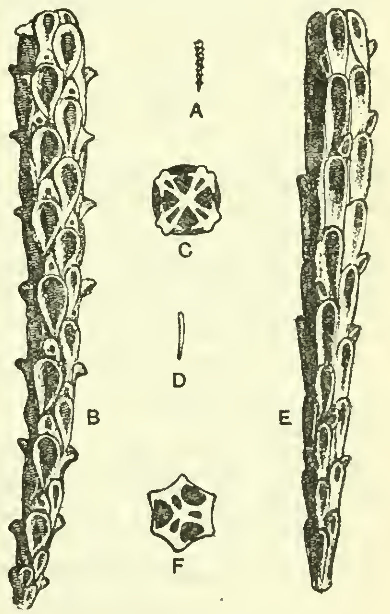

FIG. 9.—Genus *Cellarinidra* Canu and Bassler, 1927

A–C. *Cellarinidra clavata* D'Orbigny, 1851. A, B. Segment, natural size and much enlarged. C. Transverse section.

D–F. *Cellarinidra turonensis* D'Orbigny, 1851. D, E. Segment, natural size and enlarged. F. Distal extremity of a segment.

These three species appear to belong to a new genus characterized by the special ovicell. Unfortunately the single figured specimen has been found and it is too incomplete. The physiologic function of the distal arch is unknown. Perhaps it served for the attachment of retractor muscles of the operculum, as in *Chaperia*. In 1920 we figured as *Ellisina profunda* MacGillivray a species from the Jacksonian of South Carolina which is also provided with an identical arch. In its constancy the superior cavity has appeared to us to be a true avicularium. The distal arch is therefore not a generic character.

[3] In the citation of measurements *ho* is the length and *lo* the width of the opesia *Lz* and *lz*, similarly the length and width of the zooecia, *Lv* and *lv* the same for the vibraculum, *Lon* and *lon* for the onychocellaria, *ha* and *la* for the apertura, etc.

Occurrence.—D. 5217. Anima Sola Island between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.; 10.1° C.

Holotype.—Cat. No. 7839, U.S.N.M.

MEMBRANIPORA BARTSCHI, new species

Plate 3, figs. 9–11

Description.—The zoarium is free, quadrangular, bifurcated. The zooecia are distinct, separated by a furrow, large, elongated, elliptical; the mural rim is thin, salient; the cryptocyst is small smooth, somewhat convex. The opesium is large, elliptical, bordered by a cushion enlarged at the base and united to the mural rim on the sides.

Measurements.—

Opesium $\begin{cases} ho = 0.60 \text{ mm.} \\ lo = 0.26 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.90\text{–}1.00 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

Affinities.—We believe this rather rare species should be described because of its originality and of its similar appearance to that of many of the Cretaceous fossils of the zoarial group called *Biflustra* by authors. Unfortunately we have not seen the ovicell and the number of specimens is not sufficient to prove that it does not exist. The specific name is in honor of Dr. Paul Bartsch, whose collections in the Philippine waters have made the present work possible.

There are five uniporous septulae on the lateral walls. Belonging to the same group, there is in the Cretaceous, *Biflustra variabilis* D'Orbigny, 1852.

Occurrence.—D. 5230. Limasaua Island, between Bohol and Leyte; 10° 01′ 50″ N.; 124° 42′ 30″ E.; 118 fathoms; gy. S.; 14.3° C.

Cotypes.—Cat. No. 7840, U.S.N.M.

Genus ACANTHODESIA Canu and Bassler, 1920

ACANTHODESIA SAVARTII Savigny-Audouin, 1826

Plate 1, figs. 1–5

1920. *Acanthodesia savarti* Canu and Bassler, North American Early Tertiary Bryozoa, Bull. 106, U. S. National Museum, p. 100, pl. 21, figs. 2–4. (Bibliography, geologic and geographic distribution.)

1821. *Acanthodesia savarti* Duvergier, Note sur les Bryosoaires du Neogene de l'Aquitaine, Actes de la Societé linneene de Bordeaux, vol. 22, p. 8.

1923. *Acanthodesia savarti* Canu and Bassler, North American Later Tertiary and Quaternary Bryozoa, Bull. 125, U. S. National Museum, p. 31, pl. 11, figs. 1–3. (Paleontologic bibliography.)

1926. *Acanthodesia savartii* Harmer, Polyzoa *Siboga* Expedition, p. 213, pl. 13, figs. 8, 13, 14, 16 (recent bibliography).

Variations.—The bibliography of this species was given by Waters in 1909 and we completed it in 1920. In 1923 we printed the paleontological bibliography and tried to put some order among the numerous fossil forms, the determination of which remains always quite difficult. Finally in 1926 Harmer gave the recent bibliography.

In the Philippines the specimens occurred but rarely and they were almost always dead. A few preserving their ectocyst were of a beautiful brown violet color and retained the serrate denticle. Our specimens were encrusting algae or shells, were uni- or bilamellar and always deprived of their spicules, a condition very frequent, however, on the fossil forms. We have illustrated some interesting variations.

The opercular valve is thin, very fragile, transparent, transverse, surrounded by a rim of the same form; it is similar to those of all the other membranipores.

Waters, 1913, has described a great development of the funicular tissue (mesenchyme). Harmer, 1926, writes that in many of the cells the large retractor muscle of the polypide is inserted at the proximal angle without destroying the symmetry of the opesium.

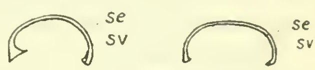

FIG. 10.—*Acanthodesia savartii* Savigny-Audouin, 1826

Two opercular valves, ×85; *sv*, sclerite of the valve; *se*, exterior sclerite of the ectocyst on which the opercular valve is supported.

Biology.—The geographic distribution indicates a purely tropical species, and the geologic distribution shows that in the ancient seas it digressed little from that region. Our specimens have all been found in the same region and at little depth. It is in effect a shore species which disappears at a depth of 60 meters, although Harmer did note it at 118 meters in one Malay locality. For this reason we wrote in 1920: "It appears sensitive to bathymetric variation, implying an elementary hydrostatic system, and the absence of powerful means of oxygenation." Its presence among the fossils is a good indication as to the bathymetric conditions of the ancient seas.

Occurrence.—

D. 5136. Sulu Sea, Jolo Light, Jolo; 6° 04′ 20″ N.; 120° 59′ 20″ E.; 22 fathoms; S. Sh.

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5174. Jolo Light, Jolo; 6° 03′ 45″ N.; 120° 57′ E.; 20 fathoms; crs. S.

Geographic distribution.—Atlantic: Morocco; Florida (53 meters); Gulf of Mexico (22 to 30 fathoms); Tortugas (16 meters). Pacific:

Australia, Victoria, Queensland, Torres Strait, Philippines (18 meters), Java. Different localities of the Malay region between Borneo and New Guinea (0–60 meters). Straits of Corea (93 meters), China Sea, Singapore (5–10 fathoms); Indian Ocean, Ceylon, S. W. India, Zanzibar (8 fathoms), Sudanese Red Sea (3–30 fathoms).

Plesiotypes.—Cat. Nos. 7841–7844, N.S.N.M.

ACANTHODESIA GRANDICELLA, new species

Plate 1, figs. 9–11

Description.—The zoarium is uni-or bilamellar; the two lamellae are back to back. The zooecia are *large*, distinct, separated by a furrow, elongated, elliptical; the mural rim is thick, regular, salient; the cryptocyst is shallow, smooth, very concave. The opesium is elongated, elliptical, garnished with very small spicules.

Measurements.—

Opesium $\begin{cases} ho = 0.40\text{–}0.60 \text{ mm.} \\ lo = 0.25\text{–}0.32 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60\text{–}0.85 \text{ mm.} \\ lz = 0.35\text{–}0.45 \text{ mm.} \end{cases}$

Variations.—According to the rule in this genus, the zooecia are broad or narrow. The series producing zooecia are a great deal larger than the others. The mural rim is surmounted with a calcareous piece finely denticulated.

Occurrence.—D. 5311. China Sea, vicinity of Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

Cotypes.—Cat. No. 7845, U.S.N.M.

ACANTHODESIA LAMELLOSA, new species

Plate 2, fig. 1

Description.—The zoarium is a globular, plurilamellar mass, attaining three centimeters in length and formed of very numerous distorted and anastomosed lamellae; it is of great lightness. The zooecia are distinct, separated by a slight furrow, elongated, elliptical; the mural rim is thin, finely denticulated, salient in its distal portion. The opesium is large, of the same form as the zooecia, ornamented with numerous and very short spicules. The series producing zooecia are much larger; the primoserial zooecia are smaller.

Measurements.—

Opesium $\begin{cases} ho = 0.40\text{–}0.50 \text{ mm.} \\ lo = 0.20\text{–}0.35 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.45\text{–}0.60 \text{ mm.} \\ lz = 0.30\text{–}0.45 \text{ mm.} \end{cases}$

Affinities.—The micrometric measurements are quite variable, but in the same zooecial range they increase regularly from the primoserial zooecia to the initial zooecium of a series. The septulae are multiporous. The opercular valve is a little removed from the mural rim. In its size this species is intermediate between *Acantho-*

desia grandicella, new species, and *Acanthodesia savarti* Savigny-Audouin, 1826. Our specimens were living.

Occurrence.—From bottom of a ship at Cavite, Philippines.

Holotype.—Cat. No. 7846, U.S.N.M.

ACANTHODESIA QUADRATA, new species

Plate 1, figs. 6–8

Description.—The zoarium is free and formed of small, *quadrangular* rods. The zooecia are distinct, large, elongated, subrectangular; the mural rim is thin, finely crenulated; the cryptocyst is large, smooth, shallow. The opesium is bordered, large, somewhat oval, with a proximal denticle very salient and oblique.

Measurements.—

Opesium $\begin{cases} ho = 0.50\text{–}0.56 \text{ mm.} \\ lo = 0.16 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.70\text{–}0.74 \text{ mm.} \\ lz = 0.44 \text{ mm.} \end{cases}$

Variations.—The four faces of the colony are not always identical; two of them are often narrower and here the zooecial width is only 0.24 mm but the length can attain to 0.80 mm.

Affinities.—The differences from *Acanthodesia virgata* are often difficult to see when the specimens are not well preserved, but the present species differs in its very thin mural rim, in its zooecial length never inferior to 0.70 mm., in its bordered opesium, and in its large cryptocyst almost as long as that of the opesium. Our specimens were dead.

Occurrence.—

D. 5230. Limasaua Island between Bohol and Leyte; 10° 01′ 50″ N.; 124° 42′ 30″ E.; 118 fathoms; gy. S.; 14.3° C.

D. 5235. Nagubat Island, east coast Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Cotypes.—Cat. Nos. 7847, 7848, U.S.N.M.

ACANTHODESIA VIRGATA, new species

Plate 2, figs. 2–5

Description.—The zoarium is formed of small bifurcated *rods*, quadrangular or more often cylindrical and formed of 6 longitudinal rows of zooecia. The zooecia are distinct, separated by a furrow, subrectangular, elongated; the mural rim is wide and finely crenulated transversely. The cryptocyst is small, concave, and bears a salient denticle more or less enlarged at its extremity. The opesium is elliptical or oval.

Measurements.—

Opesium $\begin{cases} ho = 0.40 \text{ mm.} \\ lo = 0.16 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.54\text{–}0.60 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Variations.—The variations are so great that the observer could distinguish many species. The length alone varies from 0.44 mm. to 0.60 mm., but it is never larger than 0.60 mm., which is the maximum observed. The zooecial width is smaller on slender branches and larger on the vigorous branches with many longitudinal rows.

Affinities.—This species differs from *Acanthodesia quadrata* in its cylindric or compressed zoarium, in its zooecial length never exceeding 0.60 mm.; in its small cryptocyst, and its never bordered opesium.

Certain specimens of *Caleschara* have altogether the aspect of this species, but it differs from them in its small cryptocyst and its smaller zooecial dimensions. All our specimens were dead.

Membranipora savarti var. *quadrilatera* Waters, 1887, from Darnley Island, Torres Strait, is possibly the same species but its opesium is much smaller. *Vincularia gracilis* D'Orbigny, 1852, of the French Cretaceous and *Membranipora regularis* Maplestone, 1900, belong perhaps to the same group, but the serrate denticle has not been observed.

Occurrence.—D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16, 30″ E.; 57 fathoms; Sh.

Cotypes.—Cat. Nos. 7849, 7850, U.S.N.M.

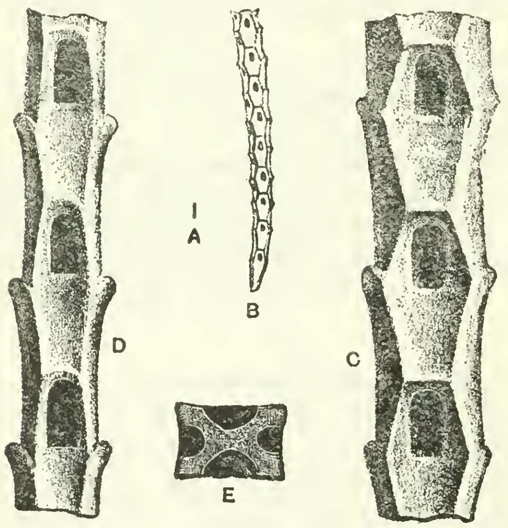

FIG. 11.—Genus *Quadricellaria* D'Orbigny, 1850

A–E. *Quadricellaria elegans* D'Orbigny, 1850. A. Segment, natural size. B. Entire segment, enlarged. C, D. Zooecia of the broad and narrow sides, enlarged. E. Upper end of segment. (A–E. After D'Orbigny, 1850.)

Genus QUADRICELLARIA D'Orbigny, 1851

The zoarium is articulated by segments. The zooecia are membraniporoid and arranged on 4 faces (of which two are narrower) placed back to back. No ovicell.

Genotype.—*Quadricellaria elegans* D'Orbigny, 1850. *Quadricellaria caraibica* Canu and Bassler, 1928, from the Gulf of Mexico, may be considered as a recent genotype.

Range.—Cretaceous (Turonian)—Recent.

Affinities.—The discovery in the present seas of this old genus is very important; it shows the great vitality of the genera of the group Ascophora or of the Flustrines as the old authors wrote it. Originating as far back as the Cretaceous they persist still in the equatorial zone of the recent seas.

Jullien, 1881, classed most of the Cretaceous species of *Quadricellaria* in his genus *Smittipora* but D'Orbigny's name has priority.

The number of specimens obtained is not large enough for us to affirm definitely the absence of ovicells. While waiting more information, it appears best to introduce this genus into the group of Membraniporae without ovicell.

Genus CUPULADRIA Canu and Bassler, 1920

The genotype *Cupuladria canariensis* Busk, 1859, has been studied in detail by Waters, 1921, who has made known some remarkable structures in sectioning decalcified specimens. The zoarium is formed essentially of small juxtaposed prisms containing a certain number of small parallel and superposed chambers. The basal structure has a series of parallel chambers filled with a granular substance and having a connection from each chamber to its neighbors through rosette-plates. The lateral walls are parallel with the axis of the zoarium. These chambers are partly shown by Busk in his *L. canariensis*.[4] The cells of the chambers, as well as of the zooecial and vibracular chambers, are lined by large square flat cells with a small nucleus. "These large cells seem to occur generally in the Selenariidae." "In whole stained preparations these chambers can be seen at the base forming squares or rectangles yet in many cases the calcareous zoarium shows no sign of these squares, but only the radial ridges meeting in the center of the lower wall." "These chambers must surely be homologous with those of *Conescharellina* even though the shape is somewhat different" (Waters 1921).

These small superposed chambers are restricted to the genotype as all of the other species that we have sectioned do not have them. They are replaced by canalicules analogous to those that Waters has noted in *Trochopora* and in *Selenaria*. But the small juxtaposed prisms are on the contrary very constant; they coincide probably with the small polygonal compartments visible on the inner face of the zoarium and which characterize the genus.

The inner face is ornamented with tuberosities sometimes grouped on the radial ribs; with small pores more or less apparent; they serve to differentiate the species. The tangential section is therefore very important in classification. Unfortunately we have discovered this too late and we have not had opportunity to section all of the species discovered.

The zoarial structure of all the cupuliform species of bryozoa is therefore very complicated. It reveals a system of adaptation most

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[4] Crag Polyzoa, pl. 13, fig. 2*e*.

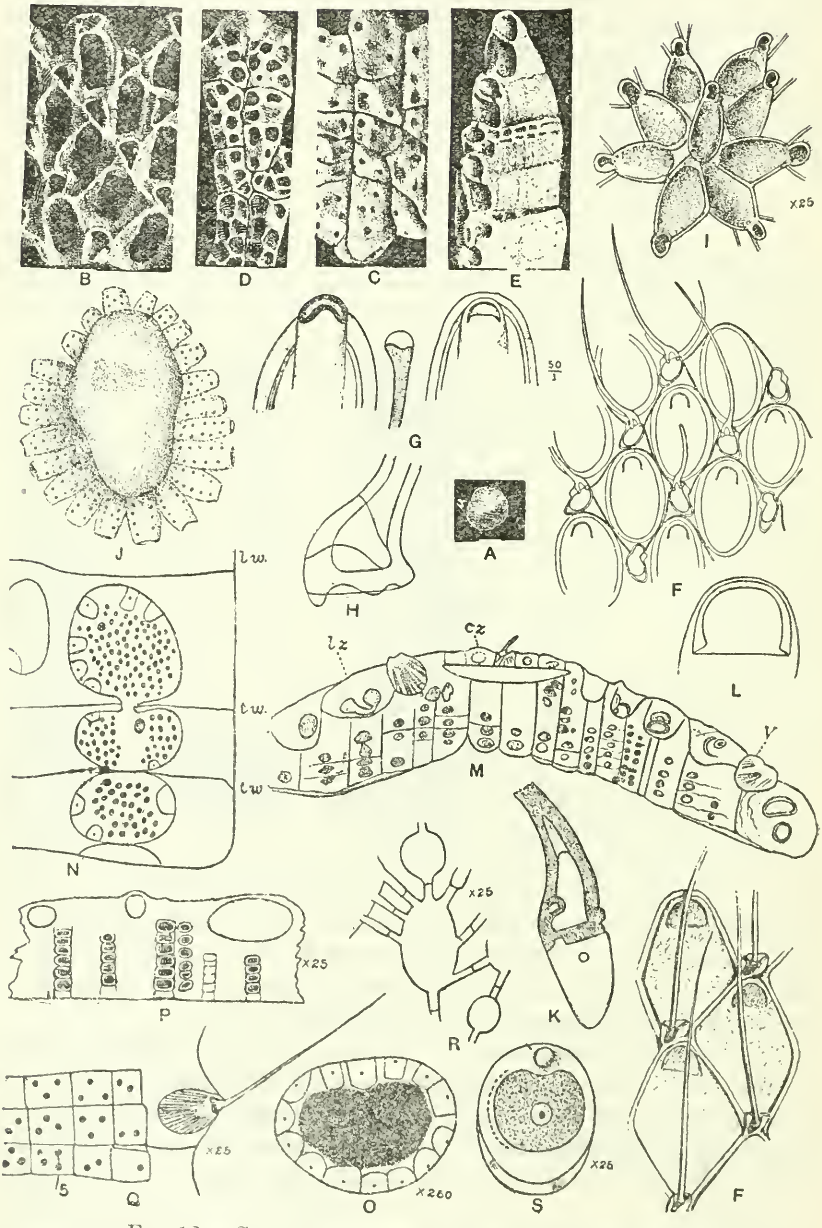

FIG. 12.—Genus *Cupuladria* Canu and Bassler, 1920

remarkable and perfectly coordinated and an incontestable unity of life in the entire colony. The cell or zooecium is only an inseparable fragment of the entire organism.

CUPULADRIA CANARIENSIS Busk, 1879

Plate 3, figs. 1, 2

1921. *Cupularia canariensis* WATERS, Observations upon the Relationship of the Selenariidae, Conescharellidae, etc., fossil and recent, Linnean Society's Journal, Zoology, vol. 34, p. 410. (Complete bibliography, geographic and geologic distribution.)
1921. *Cupularia guineensis* MARCUS, Results of Swedish scientific expeditions to Australia, Kungl, svenska Vetenskap-Akademiens Handlingar, vol. 61, p. 8. (Complete geographic distribution.)
1923. *Cupuladria canariensis* CANU and BASSLER, North American Later Tertiary and Quaternary Bryozoa, Bull. 125, U. S. National Museum, p. 28, pl. 1, figs. 7–9. (Complete geologic distribution.)
1925. *Cupuladria canariensis* CANU and BASSLER, Bryozoaires du Maroc, Mem. Soc. Sciences Nat. du Maroc. No. 10, p. 13.

Not *Cupuladria guineensis* Harmer 1926, Polyzoa *Siboga* Expedition, p. 266, pl. 16, figs. 5–7.

Affinities.—Our specimens from California correspond to the good figures published by the authors (Busk, Smitt, Norman, Waters,

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EXPLANATION OF FIGURE 12

A–S. *Cupuladria canariensis* Busk, 1859. A. Colony, natural size. B. Zooecia of the exterior surface with the proximal vibraculum. C.–D Aspect of the ribs of the inner face showing the polygonal prisms of the zoarium traversed by the superposed chambers. E. A radial lamella formed of adjacent prisms, ×25. (A–E. After Busk, 1859.) F. Exterior surface of the colony covered by the ectocyst. F′. Zooecia with their ectocyst showing vibracula with their seta and opercular valve (after Smitt, 1873). G. The membranous portion of the frontal wall projects, with the opercular aperture at the end; ×50. H. Base of vibraculum, ×85. (G, H. After Waters, 1889.) I. Central zooecia with eight surrounding zooecia, ×25. J. Under surface of same with large sand grain, ×15. K. Base of seta and front wall of the vibracular chamber, ×150. L. Operculum seen from inside together with the frontal membrane showing trabeculae, ×150. M. Stained transverse section showing the shallow central zooecia (*cz*) which have grown upon some substance removed in decalcification, and the large zooecia (*lz*) as well as the vibracular chamber (*v*) shown near the periphery of the zoarium. The lower part of the zoarium is formed by a series of parallel chambers filled with granular contents and connected by septulae, ×25. N. Lower part of chambers with contents. A and B are connected by a septula, whereas B and C are close together but not connected at this level. Transverse wall (*tw*), lateral wall of the series (*lw*), ×200. O. Transverse section showing contents of the chamber and the large cells, ×250. P. Transverse calcareous section showing chambers, ×25. Q. Decalcified base of the zoarium with muscles of one vibraculum, ×25. R. Sketch showing connecting tubes to the zooecia and to the vibracular chambers, ×85. S. Ovum in zooecial chambers, with portion of remains of polypide, ×25. (I–R. After Waters, 1921.)

Cupuladria canariensis is the single species of the genus having prisms with superposed chambers.

etc.) and characterized by the large size of the pores of the inner face. They were dead and very easy to compare with fossil forms. The colonies are large and irregular which is the usual case when they are able to develop freely.

After the studies which we have made of *Cupuladria*, we can now revise the very uncertain bibliography of *C. canariensis*. It is necessary to withdraw the following species.

1. *Cupularia stellata* Busk, 1854 from the Philippines. Our *Cupuladria dentifera* is very close and differs only in the tuberose inner face.

2. *Cupularia guineensis* Busk, 1854, characterized by polygons with tuberose surface decorating its noncostulated inner face. Our *Cupuladria hexagona* and *C. granulosa* are very close, but present moreover some constant differences to consider in order to be scrupulously exact.

3. *Cupularia guineensis* Busk, 1884, from Australia represented by a single specimen and moreover determined doubtfully. The pores of the compartments of the inner face are smaller than in *Cupuladria canariensis*. As Busk's figure of 1854 does not bear pores at all, we separate this form under the name of *Cupuladria intermedia*, new name.

4. *Cupuladria guineensis* Harmer, 1926. (Siboga p. 266, pl. 91, figs. 5–7.) Differs from *C. guineensis* Busk s. s. in its opesia, "rounded oval, slightly trifoliate or quadrangular" (and not elongated and elliptical) and in its inner surface, "imperforate or with small pores, even with radial grooves" and not tuberose, without pores and radial costules (words in quotation from Harmer). It differs from *Cupuladria canariensis* Busk, 1859, in the absence of the large characteristic pores on the inner face. It is close to our *Cupuladria transversata* in the form of the opesium, but as Harmer has not figured the inner face, it is not possible to make an exact identification. On account of the slight length of the opesia we separate this species under the name of *Cupuladria brevipora*, new name.

5. *Cupularia canariensis* Robertson, 1908. This is a very different species which we have already separated under the name of *Cupuladria robertsoniae* Canu and Bassler, 1923.

6. *Cupularia canariensis* Waters, 1886 (fossil from Australia) and 1887 (recent from Australia) are doubtful. According to the brief information given by the author, they belong perhaps to *Cupuladria intermedia*, new name.

The geographic distribution given by Marcus, 1921, is to be entirely revised by a new examination of the specimens not figured.

Occurrence.—D. 2826, Gulf of California.

Geographic distribution.—Mediterranean to the 38th parallel. Atlantic: Morocco, Madeira, Canaries, and Liberia; Gulf of Mexico.

Pacific: Gulf of California. *Cupuladria canariensis* has not been found in the Malay region (Harmer) or in the Philippines.

Plesiotypes.—Cat. No. 7851, U.S.N.M.

CUPULADRIA TRANSVERSATA, new species

Plate 3, figs. 3, 4

Description.—The zoarium is orbicular, little convex. The inner face is smooth; the compartments are distinct, separated by a deep furrow, irregularly polygonal, *transverse*, perforated by 2 or 3 pores. The zooecia are distinct, joined by their thin mural rim, broad, irregular, little elongated, vaguely ogival; the cryptocyst is quite convex, smooth, enlarged laterally and proximally; the opesium is elliptical, anterior, garnished sometimes with very short areal spicules arranged without symmetry. The vibraculum is large, auriculated, little salient.

Measurements.—

Opesium $\begin{cases} ho = 0.30 \text{ mm.} \\ lo = 0.16 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.25\text{–}0.50 \text{ mm.} \end{cases}$

Affinities.—This is the species closest to the genotype *Cupuladria canariensis* Busk, 1859 from which it differs in the much smaller pores of the inner face and in its transverse and non rectangular compartments. It differs from *C. brevipora*, new name in its somewhat elongated opesium and in the presence of slight tuberosities at the extremity of the radial ridges of the inner face. We have found only a single dead fragment of this species but we illustrate it however to show the great variety in aspect of the inner face.

Occurrence.—D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 9′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

Holotype.—Cat. No. 7852, U.S.N.M.

CUPULADRIA DENTIFERA, new species

Plate 3, figs. 5–8

Description.—The zoarium is orbicular, *denticulated* on the edge. The inner face bears lozenge shaped surfaces covered with large nonadjacent granules; the peripheral denticles are long, granulated and furnished with a salient longitudinal carina. The zooecia are pyriform, very much arched in their distal parts. The mural rim is thin and becomes merged laterally with the cryptocyst; the opesium is anterior and oval. The vibraculum is small, auriculated, embedded in the distal zooecium.

Measurements.—

Opesia $\begin{cases} ho = 0.40 \text{ mm.} \\ lo = 0.20 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.70 \text{ mm.} \\ lz = 0.40\text{–}0.50 \text{ mm.} \end{cases}$

Affinities.—The lozenge-shaped cells of the inner face as well as the zoarial denticles very well characterize this species. These denticles are very regular and long on the young colonies (fig. 6). The carinae which ornament them are of salient threads radiating from the center and outlining on the entire inner face an irregular grotesque ornament. We are ignorant of their use but perhaps they correspond to the vibices of the Reteporidae. The central zooecium is surrounded by eight other zooecia. The large colonies are very fragile and rarely entire. Our specimens were dead.

This species differs from *Cupuladria stellata* Busk, 1854, in which the zoarial form is identical, in its tuberose instead of smooth inner face.

Occurrence.—D. 5230. Limasaua Island between Bohol and Leyte; 10° 01′ 50″ N.; 124° 42′ 30″ E.; 118 fathoms.; gy. S.; 14.3° C.

Cotypes.—Cat. No. 7854, U.S.N.M.

CUPULADRIA TUBEROSA, new species

Plate 4, figs. 1–4

Description.—The zoarium is discoidal, little convex. The inner face is ornamented with radiating, convex costules bearing large adjacent tuberosities; the compartments, hexagonal and subtransverse, are arranged on two sides. The zooecia are distinct, adjacent through their mural rim, ogival; the cryptocyst is concave, smooth, supporting the vibraculum; the opesium is oval. The vibracula are large, auriculated, deeply embedded in the distal zooecium; their orifices are alternating in the same radial series.

Measurements.—

Opesium $\begin{cases} ho = 0.20\text{–}0.25 \text{ mm.} \\ lo = 0.15 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Cupuladria grandis*, new species in its large radiating costules and the large tuberosities of the inner face which moreover well characterize it.

Structure.—The tangential section through the base is characterized by an irregular reticulum with very thick lines and by very small pores in the compartments. The meridian section shows a series of juxtaposed prisms separated by a canalicule; the calcareous tissue is fibrous. Each prism supports the proximal portion of a cell and the distal portion of another. At the center of the colony there are two lamellae of superposed prisms. It differs very much from the section of *C. guineensis* given by Busk, 1854.

In transverse section each prism supports two halves of the cells and the mural rim which separates them. The arrangement is symmetrical. The prisms appear then to correspond to the radial ridges of the inner face but in no wise to the cells. This is not the structure observed in the genus *Cupularia*.

Occurrence.—

D. 5134. Balukbaluk Island, Sulu Archipelago; 6° 44′ 45″ N.; 121° 48′ E.; 25 fathoms; fine S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

Cotypes.—Cat. No. 7855, U.S.N.M.

CUPULADRIA GRANDIS, new species

Plate 4, figs. 10–13

Description.—The zoarium is conical, very *large*, measuring almost 2 centimeters in diameter and formed of calcite of a light rose color.

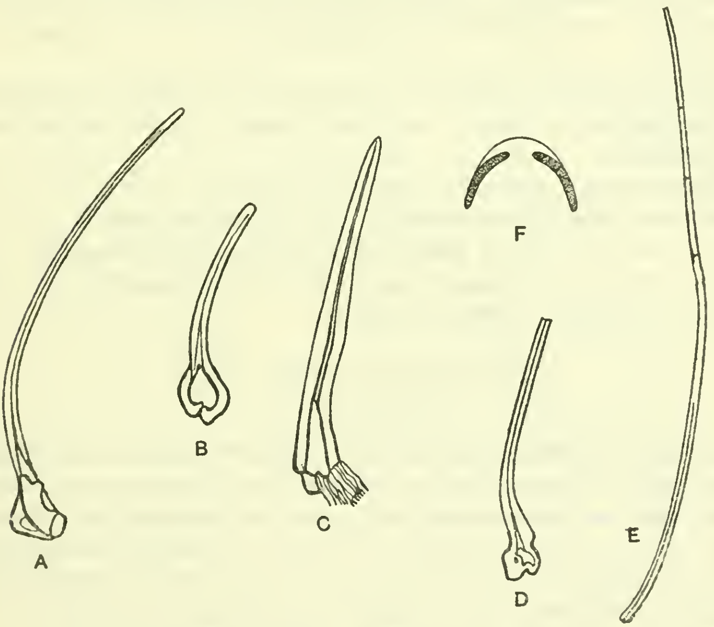

Fig. 13.—*Cupuladria grandis*, new species

A. A recurved seta, ×85. B. Pincer shaped articulation of a seta, ×85. C. A rectilinear seta and its articulation with a muscular attachment at the base, ×85. *Cupuladria granulosa*, new species. D. Articulation of the vibracular seta ×85. E. A long vibracular seta, ×85. F. Opercular valve with its two large lateral sclerites, ×85.

The inner face is smooth; it is divided into irregularly polygonal compartments each containing 2 or 3 small pores and sometimes large, little salient tuberosities. The zooecia are distinct, separated by a little salient thread much elongated, lozenge-shaped; the cryptocyst is smooth, concave, very much enlarged proximally; the opesium is elliptical, elongated, anterior, entire. The vibraculum is small, auriculated, embedded in the distal zooecium; the seta is along, curved or sinuous, transparent, with an articulation at the base and a central canalicule with thick walls.

Measurements.—

Opesium $\begin{cases} ho = 0.35 \text{ mm.} \\ lo = 0.175 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60 \text{ mm.} \\ lz = 0.45 \text{ mm.} \end{cases}$

Affinities and structure.—This species is very well characterized by the special ornamentations of the inner face. It differs from *Cupuladria tuberosa* new species in the absence of radial costules separated by a deep furrow and in the size of the colonies.

The tangential section of the inner face shows irregular polygons with thin walls containing at times pores perforating a tissue little compacted but alveolar. The tangential section in the specimens with granulated costules show radial regular costules with polygonal compartments.

The meridian thin section shows that the zoarium is formed of rectangular pieces, oblique and juxtaposed, with the walls more or less thickened.

The setae are rather long; their length is about 0.7 mm. The central zooecium is surrounded by eight adjacent zooecia.

Occurrence.—D. 5161. Tinakta Island, Sulu Archipelago; 5° 10′ 15″ N.; 119° 53′ E.; 16 fathoms; fine S., blk. sp. (common).

Cotypes.—Cat. No. 7856, U.S.N.M.

CUPULADRIA GRANULOSA, new species

Plate 4, figs. 5–9

Description.—The zoarium is orbicular, little convex, with irregular border. On the inner face the polygonal compartments are scarcely visible; they are ornamented with granules scattered and never adjacent. The zooecia are distinct, adjacent through their thin mural rim, ogival, acuminate; the cryptocyst is very concave, smooth, much enlarged at the base; the opesium is elliptical, anterior, entire. The vibraculum is small, auriculated, little salient, embedded in the distal zooecium. The setae are long, thin, little curved.

Measurements.—

Opesium $\begin{cases} ho = 0.28\text{–}0.30 \text{ mm.} \\ lo = 0.17 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.65 \text{ mm.} \\ lz = 0.35 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Cupuladria hexagonalis* in its little visible compartments of the inner face and in its granules smaller and never adjacent. It differs from *Cupuladria tuberosa* in the absence of large radial costules on the inner face. Finally it differs from *C. guineensis* Busk, 1854 only in its smooth cryptocyst and in the less distinct polygonal compartments of the inner face.

Structure.—The opercular valve is an ogival arch furnished with two strong lateral sclerites. The seta is long (1 mm.) thin, transparent; the walls of the central canalicule touch each other throughout almost their entire length.

In thin tangential sections of the inner face the compartments are irregularly polygonal, formed of a calcareous, alveolar tissue perforated by very small pores invisible externally (fig. 8). The thin section in the marginal zooecia shows (fig. 9) the special mode of gemmation characteristic of all species of this genus. Some of our specimens were living.

Occurrence.—D. 5358. Sandakan Light, Jolo Sea; 6° 06′ 40″ N.; 118° 18′ 15″ E.; 39 fathoms; M. (common).

Cotypes.—Cat. No. 7857, U.S.N.M.

CUPULADRIA HEXAGONALIS, new species

Plate 5, figs. 1–4

Description.—The zoarium is orbicular, little convex. The inner face is garnished with salient tuberosities, very close together, adjacent to each other; the compartments are distinct, separated by a furrow, irregularly *hexagonal:* The zooecia are little distinct, irregular, elongated; the cryptocyst is thick, shallow; the opesium is elliptical, denticulated. The vibraculum is small and auriculated.

Measurements.—

Opesium $\begin{cases} ho = 0.25 \text{ mm.} \\ lo = 0.15 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.25\text{–}0.30 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Cupuladria granulosa* in the presence on the inner face of adjacent tuberosities and not of scattered granules. It differs from *Cupuladria tuberosa* in its smaller tuberosities not arranged on the radial costules and from *C. guineensis* Busk, 1854, in its thicker mural rim and in the larger and more adjacent granulations.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

Cotypes.—Cat. No. 7858, U.S.N.M.

Family ELECTRINIDAE D'Orbigny, 1851

The genera which we now refer to this family are *Electra* Lamouroux, 1816, *Nitscheina* Canu, 1900, *Tretosina* Canu and Bassler, 1927, *Heterooecium* Hincks, 1892, *Pyripora* D'Orbigny, 1852, *Mystriopora* Lang, 1915, *Herpetopora* Lang, 1914, *Tendra* Nordman, 1839, *Aspidelectra* Levinsen, 1909, and *Taphrostoma* Canu, 1908, all of which, except *Tendra* and *Taphrostoma* are described and illustrated in our work of 1920, 1923, or 1927. The differences between *Tendra* and

Heterooecium are shown below. *Rhammatopora, Charixa,* and *Distelopora* all of Lang, 1915, are placed here doubtfully.

Genus HETEROOECIUM Hincks, 1892

Electrinidae in which there is an acanthostegous ovicell and the opercular valve is situated at the proximal end of the ovicell.

Genotype.—Heterooecium amplectens Hincks, 1881. Recent.

The acanthostegous ovicell is a space comprised between the frontal and the united hollow spines on the median line.

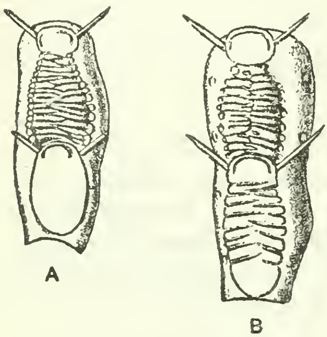

FIG. 14.—Genus *Tendra* Nordman, 1839

A, B. *Tendra zostericola* Nordman, 1839. A. Two zooecia, × 40, the uppermost with ovicell. B. Two zooecia, ×55, the uppermost with ovicell. The two rows of spines form a somewhat arched roof across the frontal membrance and thus a space (ovicell) is formed which opens outwards immediately on the distal side of the operculum of the proximal zooecium. (After Levinsen, 1909.)

Genus TENDRA Nordman, 1839

Like *Heterooecium* but the opercular valve is situated at the distal end of the ovicell.

Genotype.—Tendra zostericola Nordman, 1839–1842. Recent (Black Sea).

Genus NITSCHEINA Canu, 1900

The genus *Nitscheina* Canu, 1900 (printed in error, *Nichtina*, but plainly established in honor of Doctor Nitsche), established for the *Membranipora membranacea* group with Cyphonautes larvae, until recently was not recognized because it was thought contrary to the rules of nomenclature. Harmer, 1926, adopted it, however, as quite regular because the genotype *M. membranacea* (auct.), the very common and well studied ancient species is "probably" not the species of Linnaeus. We wish to adopt the name *Nitscheina* in order to retain *Membranipora* for the very numerous species, recent and fossil, incompletely known. However, we will not change *M. membranacea* (auct.) to *M. telacea* Lamarck, 1876, which has never been figured because it is absolutely trivial and even disastrous to students to change an old established name of a well known and well studied species on a simple probability.

NITSCHEINA TUBERCULATA Bosc, 1802

Plate 5, fig. 6.

1921. *Membranipora tehuelca* ROBERTSON, Bryozoa from the Bay of Bengal, Records of the Indian Museum, vol. 22, p. 47.

1923. *Membranipora tuberculata* CANU and BASSLER, North American Later Tertiary and Quaternary Bryozoa, Bull. 125, U. S. National Museum, p. 22, pl. 33, figs. 3–5 (Bibliography).

1926. *Nichtina tuberculata* HARMER, Polyzoa *Siboga* Expedition, p. 208, pl. 13, fig. 10. (Bibliography.)

Sporadically some cells contain 1–3 internal cryptocystal, comb-shaped structures or lateral, minute, branched spines beneath the ectocyst (Waters, 1898; Kluge, 1914; Harmer, 1926). The ovary contains numerous eggs and the body cavity, free, isolated eggs (Harmer, 1926).

This species lives on floating algae. It is universal, but it does not pass the polar circle and is more abundant in the tropical zone.

Occurrence.—D. 5212. Panalangan Point, east of Masbate Island; 12° 04′ 15″ N.; 124° 04′ 36″ E.; 108 fathoms; gy. S., M.

Geographic distribution.—Eastern Atlantic: France, Senegal, Madeira, Angola. Western Atlantic: United States, Chagos Islands, Pernambuco, Rio de Janeiro, Patagonia. Pacific: Kersachee, California. Indian Ocean: Bay of Bengal, Burmah.

Geologic distribution.—Pleistocene of California.

Plesiotype.—Cat. No. 7859, U.S.N.M.

Genus ELECTRA Lamouroux, 1816

ELECTRA DEVINENSIS Robertson, 1921

Plate 5, fig. 5

1921. *Membranipora devinensis* ROBERTSON, Bryozoa from the Bay of Bengal, Records of the Indian Museum, vol. 22, p. 51, fig. 7.

Measurements.—

Opesium $\begin{cases} ho = 0.68 \text{ mm.} \\ lo = 0.30 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.80 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

Operculum $\begin{cases} hop = 0.18 \text{ mm.} \\ lop = 0.14 \text{ mm.} \end{cases}$

Affinities.—The differences between our specimens and Miss Robertson's figures are of little importance; sometimes 3 tubercles instead of 2, 19 pairs of spines instead of 20, and hollow salient tubercles instead of simple pores.

This species belongs to the group of *Membranipora bengalensis* Stoliczka, 1860, the species of which live in brackish waters.

Our specimen was living and had been collected on a marine alga rather far from the coast in the Pacific. Miss Robertson's specimen was attached to a fragment of wood.

The chilostomatous bryozoa usually die in brackish waters as they are truly marine animals. Some Membranipores seem to make exceptions, such as those cited by Robertson, 1921, and by Stoliczka, 1860, as well as *M. combesi* Canu, 1907, a fossil from the French

Sparnacian. This adaptation is not extraordinary since there are also fresh-water bryozoa.

The general aspect of this species is that of *Electra*, but Miss Robertson mentioned a small ovicell "projecting over the zooecium above almost to its pores".

Occurrence.—D. 5235. Nagubat Island, east coast Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M., on floating algae. Orissa coast at the mouth of Devi River, Bay of Bengal, 23–25 fathoms (Robertson), on fragment of wood.

Plesiotypes.—Cat. No. 7860, U.S.N.M.

Genus PYRIPORA D'Orbigny, 1852

Lang in 1914 and 1915, in his studies of the uniserial bryozoa of the Cretaceous, created eight different genera taking into consideration the angle of divergence, and the presence of granules or of a rhamma. The angle of divergence is rather inconstant and varies a great deal with the irregularities of the substratum. Granules and rhamma are only exterior ornaments in connection with the single function of calcification. We can not therefore recognize this new classification. Without further study, *Rhammatopora*, *Charixa* and *Distelopora* seem to be synonyms for ordinary *Pyripora*. *Marssonopora* Lang, 1914 in its ovicells is one of the Membraniporae near *Callopora* and can be recognized for the special avicularia. *Mystriopora* Lang 1915, can also be recognized provisionally because of its avicularia. Finally *Dacryopora*, Lang, 1914, being operculated ought to be placed in the vicinity of the Hippothoidae.

PYRIPORA UNCIFERA, new species

Plate 5, figs. 7–9

Description.—The zoarium encrusts shells; the branches are uniserial and divide almost at right angles. The zooecia are large, pyriform; the gymnocyst is short, convex, smooth; the mural rim is thin and bears 4 or 5 pairs of small claws curved towards the interior; the opesium is elliptical or oval.

Measurements.—

Opesium $\begin{cases} ho = 0.20 \text{ mm.} \\ lo = 0.14 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.65 \text{ mm.} \\ lz = 0.35 \text{ mm.} \end{cases}$

Affinities.—This species is very well characterized by its small areal claws; unfortunately photography is unable to figure them adequately. We have observed a case of regeneration.

Two living specimens show that the membraneous ectocyst does not cover the gymnocyst.

Occurrence.—D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.; 17.2°C.

Cotypes.—Cat. No. 7861, U.S.N.M.

PYRIPORA TENUICAUDATA, new species

Plate 5, fig. 10

Description.—The zoarium encrusts shells; the branches are uniserial and ramify often at a very obtuse angle. The zooecia are very long, formed of a broad, elliptical or oval head and of a very long, very thin gymnocyst, smooth and convex; the mural rim is *thin* and little distinct.

Measurements.—

Opesium $\begin{cases} ho = 0.25 \text{ mm.} \\ lo = 0.125 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.75\text{–}0.85 \text{ mm.} \\ lz = 0.20 \text{ mm.} \end{cases}$

Affinities.—This species is very well characterized by its long and thin caudal portion. The latter is generally rectilinear but it may become sinuous. The general aspect is that of a vibrion or better that of a spermatozoid of a mammal. The left part of our figure shows a ramification at an acute angle. Our specimens were dead.

Occurrence.—D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.; 17.2° C.

Holotype.—Cat. No. 7862, U.S.N.M.

Family FLUSTRIDAE Smitt, 1867

The zoarium is corneous, flexible, expanded, foliaceous, erect. The zooecia are subrectangular, contiguous, multiserial. The ovicell is endozooecial (except in *Sarsiflustra*). No cryptocyst.

Genus FLUSTRA Linnaeus, 1758

The zoarium is multiserial, uni, or bilamellar. The mural rim is salient. The septulae of the lateral walls are multiporous. Spines and avicularia are present or absent; 13–16 tentacles.

Genotype.—*Flustra* (*Eschara*) *foliacea* Linnaeus, 1758.

Subgenus *Carbasea* Gray, 1848. The zoarium is unilamellar. Type: *Flustra* (*Carbasea*) *carbasea* Ellis and Solander, 1786; 22 tentacles.

Subgenus *Chartella* Gray, 1848. Type: *Flustra* (*Chartella*) *papyracea* Ellis and Solander, 1786.

Genus SARSIFLUSTRA Jullien, 1903

The larvae are ejected through a chitinous tube which opens distally to the zooecial operculum, and may be covered by a movable calcareous valve. The avicularia are lyriform, interzooecial, of the same size as the zooecia.

Genotype.—*Sarsiflustra* (*Flustra*) *abyssicola* Sars, 1872.

Genus KENELLA Levinsen, 1909

The zoarium is biserial. No spines, no avicularia.

Genotype.—*Kenella* (*Flustra*) *biseriata* Busk, 1884.

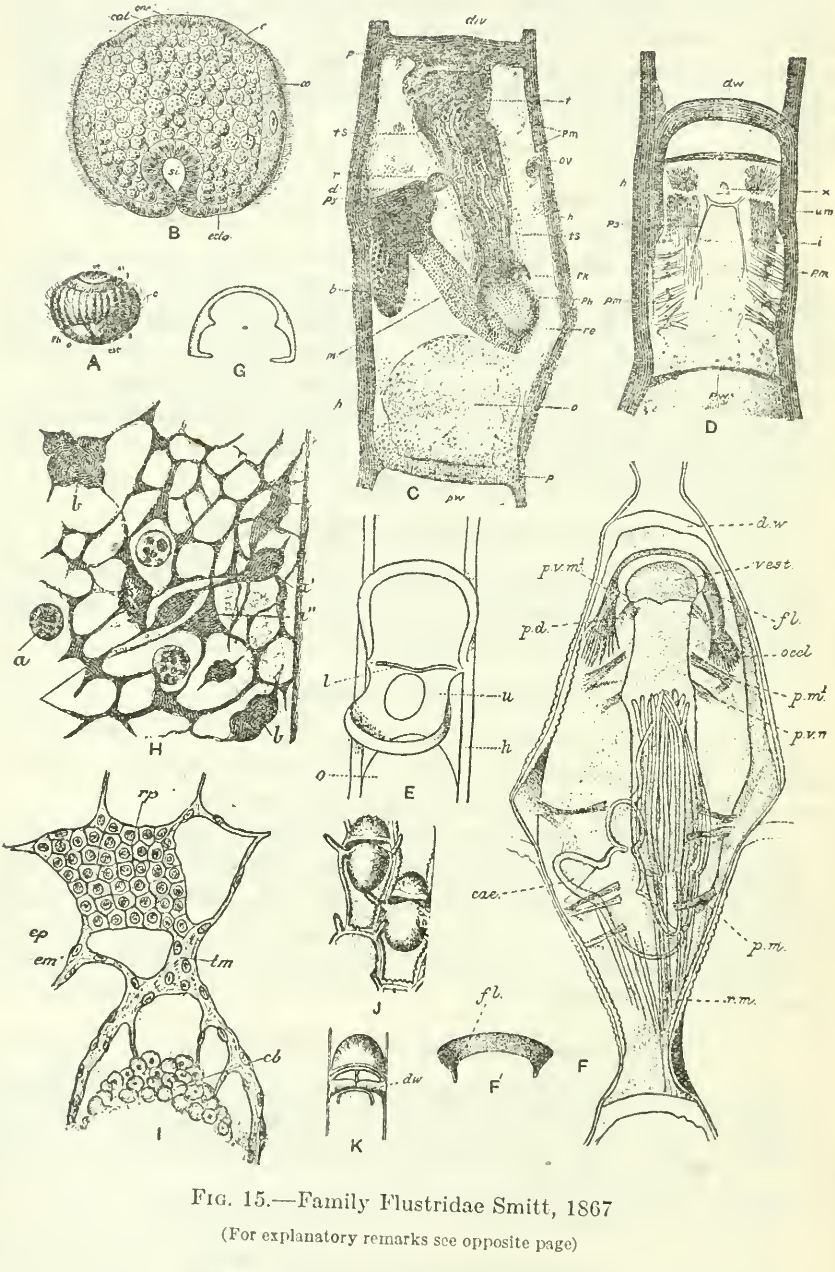

FIG. 15.—Family Flustridae Smitt, 1867

(For explanatory remarks see opposite page)

Fig. 15.—Family Flustridae Smitt, 1867

(Explanatory remarks)

A. Embryo of *Flustra foliacea* Linnaeus, 1758 ×56 (after Barrois, 1877); *c*, coronna; *est*, stomach; *I*, aboral face; *ph*, pharynx; *o*, mouth of gastrula; *S*, aboral face; *si*, separating thread in terminal bud and inferior portion of the aboral face; *vt*, terminal bud of the body.

B. *Flustra securifrons* Pallas, 1766. Meridian section of an embryo showing the oral ectoderm invaginated and forming the outline of the interior sac; *c*, mantle; *bl*, blastocoele; *cal*, calotte; *co*,coronna; *ecto*, ectoderm; *onc*, central nerve organ of the embryo; *si*, internal sac. (After Calvet, 1900.)

C–E. *Flustra membranaceo-truncata* Smitt, 1867. C. Drawing showing arrangement of the principal organs in the zooecium. D. Sketch illustrating arrangement of the muscles (after Vigelius 1884). Distal avicularium present. E. Sketch showing movement of the mandible of the avicularium (C–E, after Vigelius 1884); *an*, anus; *ca*, cardiac region of the stomach; *coec*, stomachic coecum; *dw*, distal wall; *est*, stomach; *h*, lateral wall of the zooecium; *l*, pivot of the avicularian mandible; *oes*, esophagus; *ov*, ovarium; *ph*, pharynx; *pm*, parietal muscles; *ps*, mesenchymatous tractus; *pv*, proximal wall; *py*, pyloris; *r*, rectum; *re*, large retractor muscle of the polypide; *rk*, circular canal; *t*, tentacles; *ts*, tentacular sheath; *u*, mandible of the avicularium; *um*, mandibular muscles; *x*, aborted polypide=ciliated organ of the avicularium.

F. *Flustra pisciformis* Busk, 1852. Anatomic structure of an entire zooecium; the distal group of parietal muscles (*pm'*) probably act as divaricators of the operculum (after Harmer, 1902); *cae*, coecum of the stomach; *dw*, distal wall; *fl*, vertical flange of operculum; *occl*, occlusor muscles of operculum; *pd*, parietal diaphragm muscles; *pm*, parietal muscles; *pm'*, distal group of parietal muscles; *pvm*, parieto-vaginal muscles and bands; *rm*, retractor muscles of polypide; *vest*, vestibule (=diaphragm). F.'. Distal view of operculum, showing the vertical flange, *fl*. G. Operculum, ×23.

H–I. *Flustra securifrons* Pallas, 1766. H. Mesenchymatous network and leucocytes observed on the living animal in the general cavity of an adult zooecium; *aa'*, univesicular leucocytes; *b*, pleurivesicular leucocytes (after Calvet, 1900). I. Section of a rudimentary mass of a regenerated polypide making part of the mesenchymatous network. This figure shows very well the essentially mesenchymatous origin (*tm*) of the regenerated polypide. The polypidian mass (*rp*) is removed from the zooecial walls and some distance from the brown body (*cb*). (H, I. After Calvet, 1900.)

J. *Flustra foliacea* Linnaeus, 1761, Two egg shaped ovicells, ×40, (G–J, after Levinsen, 1909).

K. *Flustra securifrons* Pallas, 1766. K. An ovicell from the frontal surface, ×40. The ovicellarian operculum, the proximal end of its muscles and the two cryptocyst processes (*dw*) are seen between the ovicell and the zooecial operculum.

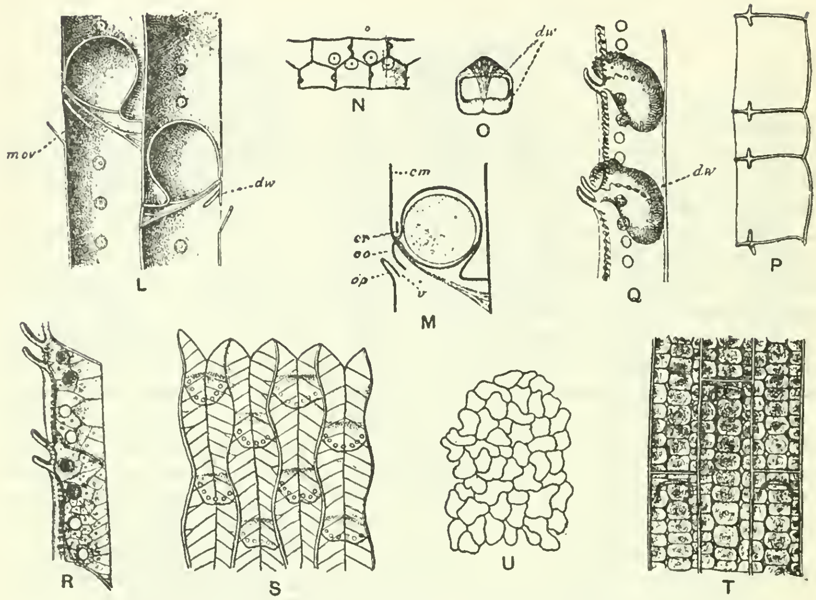

FIG. 15*a*.—Family Flustridae Smitt, 1867

L. *Flustra securifrons* Pallas, 1766. Longitudinal section through two zooecia, ×40. The muscle of the ovicellarian operculum (*m ov*) is seen in the angle between this operculum and its inner membraneous continuation; *dw*, cryptocyst process (after Levinsen, 1909).

M. *Flustra membranaceo-truncata* Smitt, 1867. Structure of the ovicell (after Levinsen, 1909); *cr*, cryptocyst; *cm*, covering membrane (ectocyst); *op*, operculum; *ov*, ovicellarian operculum; *v*, vestibule.

N, O. *Flustra securifrons* Pallas, 1766. N. The distal wall, ×26. (After Waters, 1896). O. The distal wall from the distal end of a zooecium with ovicell. The ovicellarian muscle and the two cryptocyst processes (*d w* are seen ×40).

P. *Flustra carbasea* Solander, 1786. A transverse section through a branch, ×40.

Q–S. *Flustra foliacea* Linnaeus, 1758. Q. Lateral view of the two ovicells; *d w*, distal wall, ×40. R. Two zooecia after boiling in caustic potash. The lateral walls' composition of small plates is seen, ×40. S. View from the basal surface, after boiling in potash. The distal wall with its septular plates is seen and the composition of the basal wall in small plates. A very few striations parallel to the distal lines cannot be seen in this figure, ×40.

T. *Flustra securifrons* Pallas, 1766. Some zooecia after boiling in potash, to show the process of calcification of the basal wall, ×33.

U. *Spiralaria denticulata* Busk, 1852. A portion of the basal surface, to show its composition of cell-like small plates (cell mosaic). (N–U. After Levinsen, 1909.)

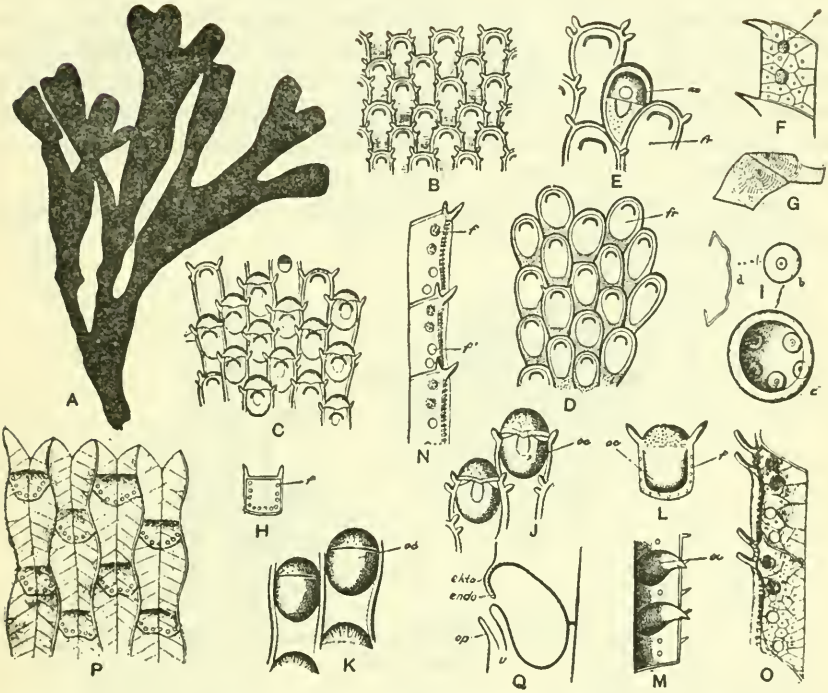

FIG. 16.—Genus *Flustra* Linnaeus, 1758

A–Q. *Flustra foliacea* Linnaeus, 1758. A. Colony, natural size. B. Group of nonovicelled zooecia, ×16. C. Group of ovicelled zooecia, ×16. D. Group of young zooecia without spines, ×16. E. Zooecium transformed into an avicularium ×32. F. Lateral face of a zooecium after boiling in caustic potash, showing its polygonal structure, ×41. G. Two small polygons of F concentrically striated, ×116. H. Distal wall with its uniporous septula. I. *a*, *b*, uniporous septulae of the distal wall, ×240, ×429; *c*, multiporous septulae of the lateral walls, ×240. J. Two ovicelled zooecia showing the true ends of the ovicell, ×32. K. Same as J, dorsal view, ×32. L. Interior view of an isolated ovicell (*oe*) without ectocyst, ×33.5. M. Longitudinal section through ovicelled zooecia. N. Lateral wall with its multiporous septulae. O. Two zooecia after boiling in potash. The lateral walls' composition of small plates is seen; ×40. P. Some zooecia from the basal surface after boiling in potash. The distal wall with its septula is seen and the composition of the basal wall in small plates. A very fine structure parallel to the distal lines is not visible in this figure; ×40. Q. Diagrammatic section through the ovicell; *op*, operculum; *v*, vestibulum; *ekto*, ectocyst; *endo*, endocyst.

Genus RETIFLUSTRA Levinsen, 1909

The distal wall, at any rate in the ovicelligerous zooecia, very often also in the ordinary zooecia, meets with the basal wall in an angularly bent or curved line. The free edge of the ovicells on the frontal side of the colony lies much lower than the basal edge. The avicularia have the same size as the zooecia. The zoarium much branched dichotomously, with frequently the branches meeting and thus forming an open network. Radical fibers occur in the angles of the branches. (Levinsen).

Genotype.—*Retiflustra* (*Retepora*) *cornea* Busk, 1852 (*Carbasea cribriformis* Busk, 1852).

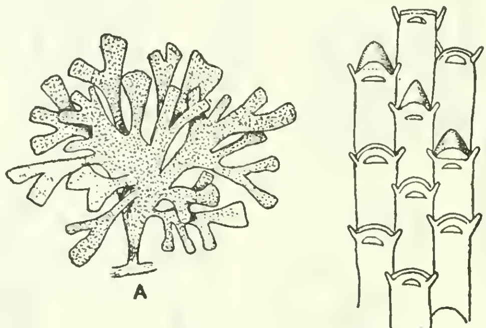

Fig. 17.—Genus *Flustra*, subgenus *Chartella* Gray, 1848

A, B. *Flustra* (*Chartella*) *papyracea* Ellis and Solander, 1786. A. Zoarium, natural size. B. Portion showing zooecia and ovicells. (After Hincks, 1890.)

Genus SPIRALARIA Busk, 1861

The lateral walls within the covering membrane generally with numerous spinelike denticles. The margins of the zooecium have as a rule more or fewer (occasionally numerous) spines. The avicularia have generally a pointed mandible (Levinsen).

Genotype.—*Spiralaria florea* Busk, 1861.

Genus HETEROFLUSTRA Levinsen, 1909

Artificial group for unplaced Flustridae.

Family HINCKSINIDAE Canu and Bassler, 1927

This family probably forms only a section of a more extended family comprising the Flustridae and Farciminariidae, but as the larvae are unknown we prefer not to make any more important changes in the nomenclature. *Hincksina* Norman, 1903, *Vibracellina*, *Ogivalina* and *Membrendoecium* Canu and Bassler, 1917, *Antropora* Norman, 1905, and *Setosellina* Calvet, 1907, of this family are described and illustrated in our work of 1920.

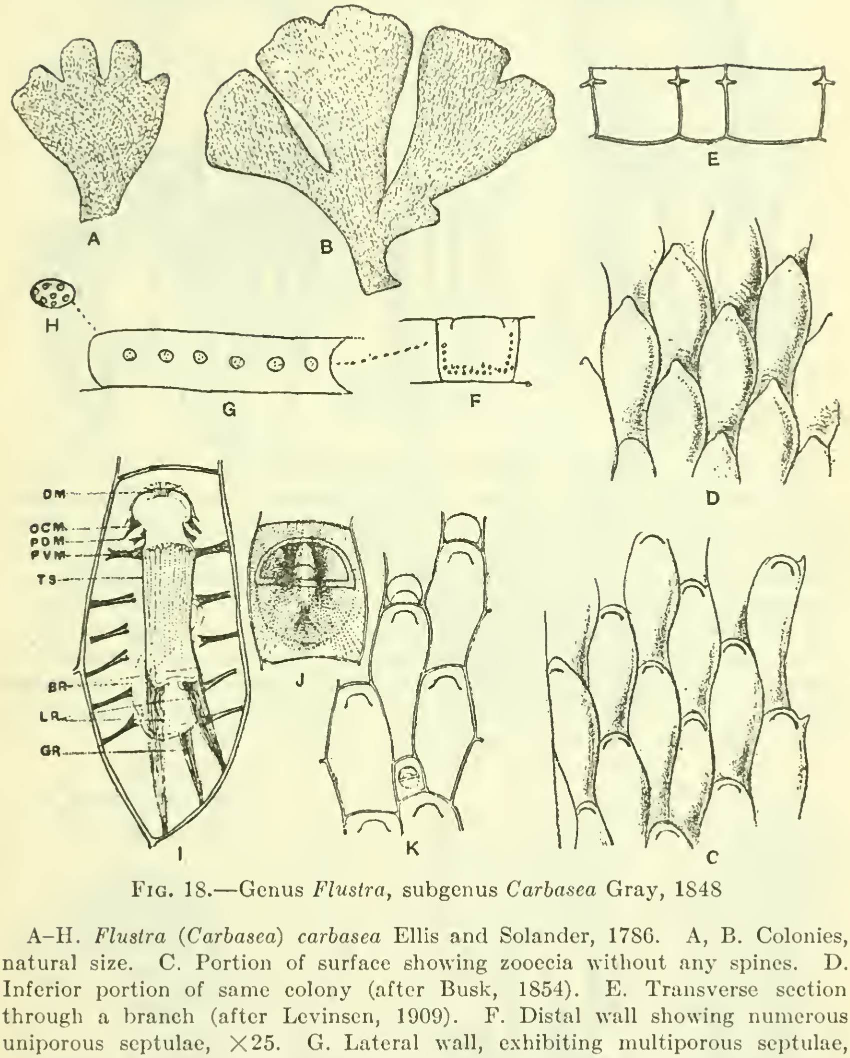

FIG. 18.—Genus *Flustra*, subgenus *Carbasea* Gray, 1848

A–H. *Flustra* (*Carbasea*) *carbasea* Ellis and Solander, 1786. A, B. Colonies, natural size. C. Portion of surface showing zooecia without any spines. D. Inferior portion of same colony (after Busk, 1854). E. Transverse section through a branch (after Levinsen, 1909). F. Distal wall showing numerous uniporous septulae, ×25. G. Lateral wall, exhibiting multiporous septulae, ×25. H. A multiporous septula, ×85. (F–H. After Waters, 1896.)

I–K. *Flustra* (*Carbasea*) *sagamiensis* Okado, 1921. I. Optical section of zooecium with zooid within, ×100; *dm*, distal muscle; *ocm*, occlusor muscle; *pdm*, parieto-diaphragmatic muscle; *pvm*, parietovaginal muscle; *ts*, tentacular sheath; *br*, branchial retractors; *lr*, lophoric retractor; *pm*, parietal muscles. *gr*, gastric retractor. J. Avicularian chamber to show the muscular arrangement, ×250. K. Frontal view of several zooecia, with two zooecia and an avicularium, ×25. (I–K. After Okado, 1921.)

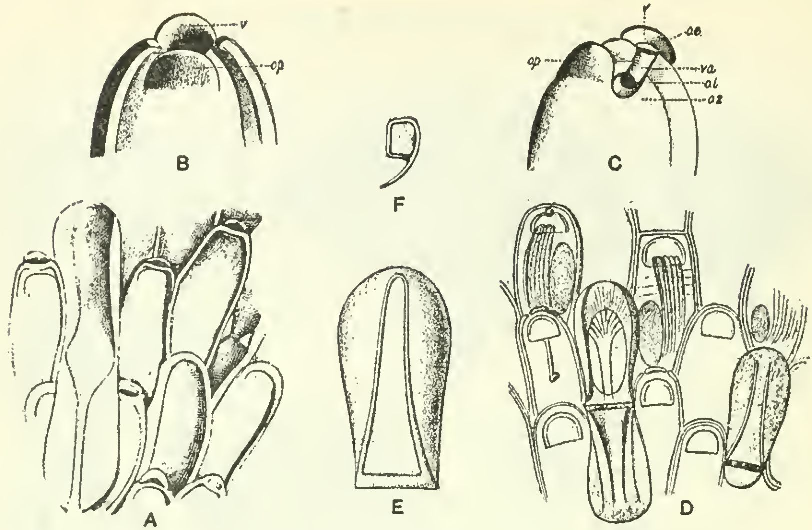

FIG. 19.—Genus *Sarsiflustra* Jullien, 1903

A–F. *Sarsiflustra abyssicola* Sars, 1872. A. Portion of colony, frontal face, ×25. B. Superior part of a zooecium bearing the velum replacing the ovicell. C. Superior part of a zooecium showing the arrangement of the vaginular system, evacuator of the larva. (A–C, after Jullien, 1903); *oe*, exterior orifice of vaginulum; *oi*, internal orifice of vaginulum; *op*, operculum; *oz*, zooecial orifice and tentacular sheath; *v*, velum; *va*, vaginulum. D. Zooecia viewed by transparency and showing many anatomical details. The left hand avicularium is shown open, the right closed, ×25 (after Waters, 1889). E. An avicularian mandible to show the internal cavity, ×13. F. A transverse section through the same mandible in its middle part, ×23. (After Levinsen, 1909.)

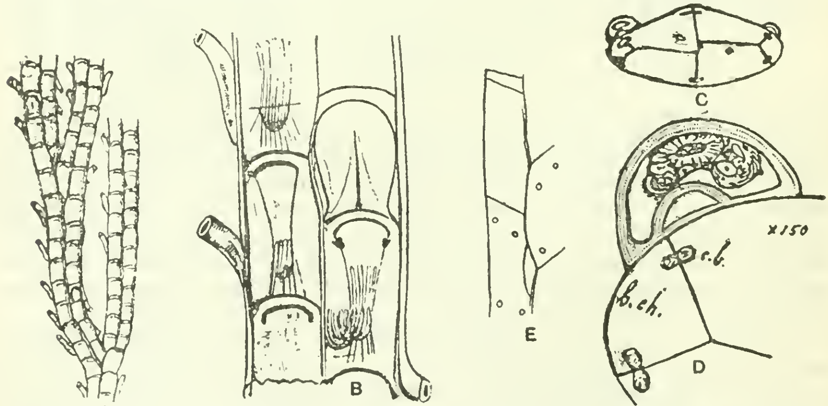

FIG. 20.—Genus *Kenella* Levinsen, 1909

A–E. *Kenella biseriata* Busk, 1884. A. Zoarium showing the chitinous calcareous band, *cb*, ×4. B. Same zoarium, ×25, showing the immersed ovicells (endozooecial) and the lateral chitinous tubes. C. Transverse section, showing distal septulae, the bordering chambers (*bch*) and section of the projecting chitinous tube, ×25. D. Transverse section, of bordering cells (*bch*) as Figure B, showing the chitinous calcareous band (*cb*) ×150. E. Lateral wall with septulae, ×25. (A–E, after Waters, 1896.)

The genus *Cribrendoecium* Canu and Bassler, 1920, is now referred to this family as it is derived normally from *Hincksina*. The following genus *Aplousina* also has the family character in simple form.

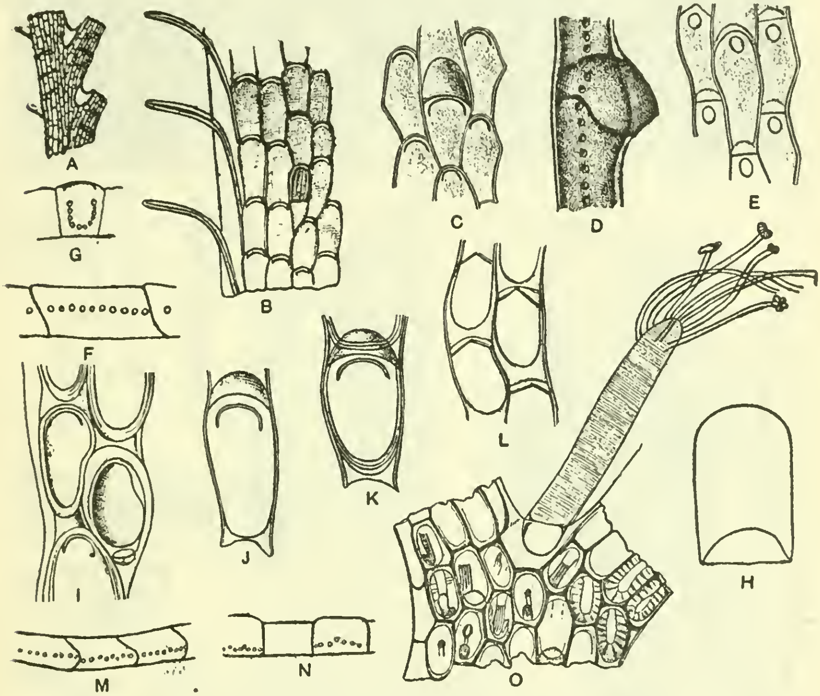

FIG. 21.—Genus *Retiflustra* Levinsen, 1909

A–H. *Retiflustra reticulum* Hincks, 1882. A. Dorsal surface of a zoarium, ×2. B. Portion of zoarium with avicularium and projecting chitinous tubes, ×12. (A, B after Waters, 1896.) C. Group of zooecia, ×23. D. A zooecium with ovicell, lateral view, ×40. E. Basal surface. The uppermost zooecium in the central row is furnished with an ovicell, ×23. (C–E, after Levinsen, 1909.) F, G. Lateral and distal wall, ×25. H. Avicularian mandible, ×85. (F–H. After Waters, 1896.)

I–L. *Retiflustra schönaui* Levinsen, 1909. I. With a pear-shaped avicularium, ×40. J. A young zooecium with ovicell, ×40. K. Another zooecium with ovicell. The proximal part of the ovicell is covered by a cryptocyst belt; ×40. L. Basal surface, ×23.

M–O. *Retiflustra cribriformis* Busk, 1853. M, N. Lateral and distal wall, ×25. O. Showing the radical attachment, and from the cells on the right the upper wall has been removed to show the basal wall, ×12. (M–O. After Waters, 1889 and 1896.)

Genus APLOUSINA Canu and Bassler, 1927

The ovicell is endozooecial. No spines, no avicularia, no dietellae.

Genotype.—Aplousina gigantea Canu and Bassler, 1927. Recent, Gulf of Mexico.

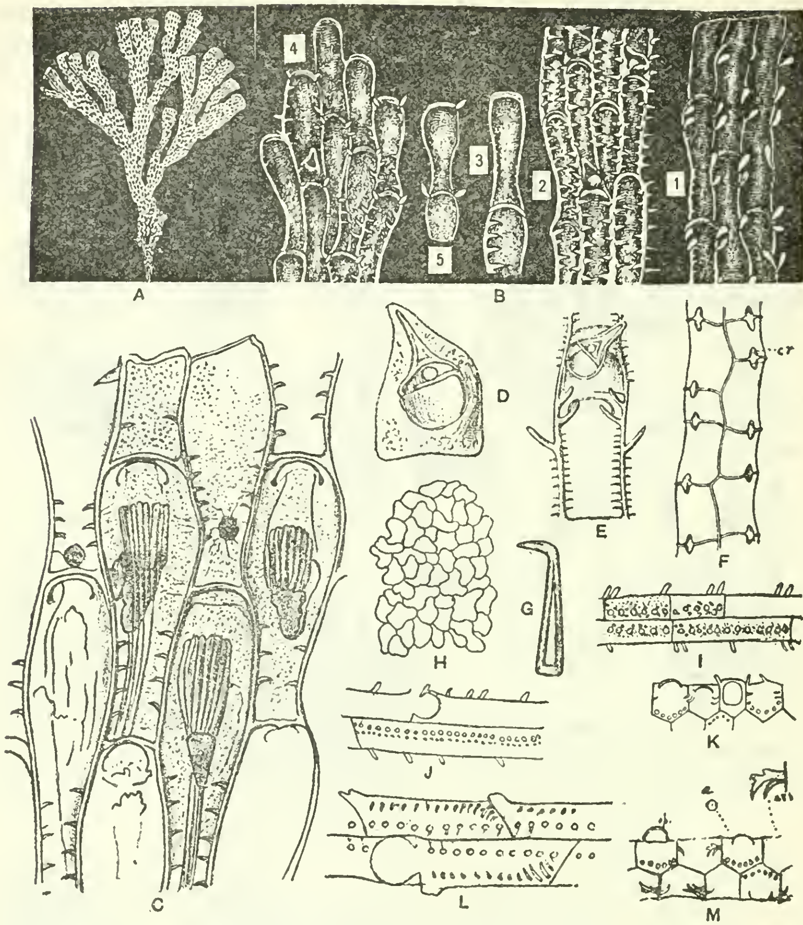

FIG. 22.—Genus *Spiralaria* Busk, 1861

A–I. *Spiralaria denticulata* Busk, 1861. A. Ordinary specimen, natural size. B. *1*, portion of Figure A showing two blunt processes on each side of the mouth; *2*, portion showing a series of large frontal processes along the margins of the cells; *3*, cell from near the end of the same specimen showing the minute submarginal denticles; *4*, portion of Figure A; *5*, cell towards edge of same showing the submarginal denticles (after MacGillivray, 1879). C. Preparation by transparency showing anatomical structure. D. An avicularium and its mandible. (C, D, after Busk, 1885.) E. An ovicelled zooecium. The ovicell is enclosed in an avicularium, ×40. F. A transverse section through a branch; *cr*, cryptocyst; ×55. G. A sagittal section through an avicularian mandible to show the internal cavity which corresponds with the vestibular cavity in the operculum. H. A portion of the basal surface to show its composition of celllike small plates (cell mosaic). (E–H, after Levinsen, 1909.) I. Lateral wall showing septulae and the internal denticles, ×25.

J, K. *Spiralaria spinuligera* Hincks, 1882, lateral and distal wall, ×25.

L, M. *Spiralaria dentigera* Hincks, 1882, lateral and distal wall, ×25. (I–M, after Waters, 1896.)

Range.—Miocene. Recent. *Membrendoecium grandis* Canu and Bassler, 1923, from the American Miocene, should be classed in this new genus which differs from *Membrendoecium* in the absence of avicularia.

Genus ANTROPORA Norman, 1903

The cryptocyst is largely displayed all around the opesium. A pair of avicularia with their pointed mandible directed inward and transversely situated above the oral opening. There are three pairs of lateral dietellae and several (four usually) lucid spots in the hind wall (Norman). Interzooecial (vicarious) avicularia with rounded mandible, occasionally present. Ovicells vestigial, endozooecial (Harmer, 1926).

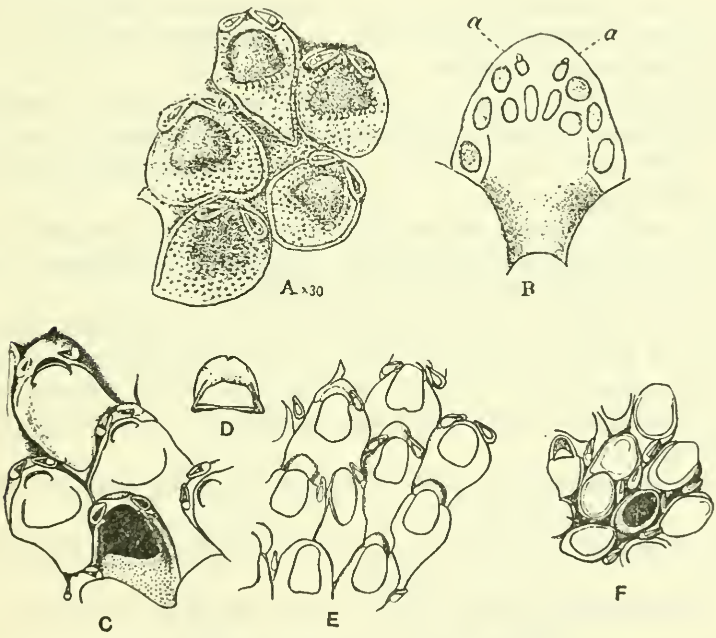

Fig. 23.—Genus *Antropora* Norman, 1903

A, B. *Antropora granulifera* Hincks, 1881. A. Several zooecia, ×30. (After Hincks, 1880.) B. View of the back of a zooecium; *a*, openings resulting from the avicularia; below these are seen the pair of lucid bays, and below again the lucid spots. (After Norman, 1903.) C. Uppermost zooecium with an ovicell. D. Mandible of vicarious avicularium. E. Avicularia partly transverse and partly longitudinal. F. Young state with a vicarious avicularium. (C–F. After Harmer, 1926.)

Genotype.—*Antropora* (*Membranipora*) *granulifera* Hincks, 1880. Recent.

Harmer, 1926, discovered that the two avicularia pertained in reality to the distal zooecium in spite of their appearance. We do not believe that *Membranipora pura* Hincks, 1880, and *Membranipora nigrans* Hincks, 1882, belong to this genus.

Genus MEMBRENDOECIUM Canu and Bassler, 1917

MEMBRENDOECIUM SAVARTI MacGillivray, 1890

Plate 6, figs. 1, 2

1891. *Biflustra savarti* MacGillivray, Description of new or little known Polyzoa, Transactions Royal Society of Victoria, p. 79, pl. 9, fig. 6.
1895. *Membranipora savarti* MacGillivray, Tertiary Polyzoa of Victoria, Transactions of the Royal Society of Victoria, vol. 4, p. 38, pl. 5, figs. 6, 7.

Measurements.—

Opesium $\begin{cases} ho = 0.24\text{–}0.29 \text{ mm.} \\ lo = 0.16\text{–}0.20 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.40\text{–}0.42 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Variations.—MacGillivray erroneously identified this species with *Acanthodesia savarti* Audouin, 1826, but the latter has never shown either ovicell or avicularium.

Our specimens are always incrusting very irregular substrata, shells, bryozoa, nullipores, algae, and their photography is very difficult. They have been collected among the innumerable isles of the Sulu Archipelago.

The ovicell is small, endozooecial, little visible. The ectocyst is colored green and hides the ovicells. The small avicularia are erect, salient, very fragile; their beak is often broken.

We have had the fortune to discover in a lot of fossils from the Miocene of Muddy Creek, Australia, two superb specimens in which the ornamentation is absolutely identical with that of a small variety from D. 5141 which we designate as variety *minor* (pl. 6, fig. 1).

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S. (var. *minor*).

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk. Sh.; 11.6° C.

D. 5577. Mount Dromedario, north of Tawi Tawi Group; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Geographic distribution.—West Australia (MacGillivray, 1890).

Geologic distribution.—Miocene of Australia (MacGillivray, 1895).

Plesiotypes.—Cat. Nos. 7865, 7866, U.S.N.M.

Holotype.—Cat. No. 7864, U.S.N.M. (var. *minor*).

MEMBRENDOECIUM OVATUM, new species

Plate 6, figs. 3–5

Description.—The zoarium encrusts shells, Orbitoides, nullipores and bryozoa. The zooecia are distinct, separated by a deep furrow, elongated, pyriform, enlarged at the base; the mural rim is salient, flat, thin at the top, very much enlarged at the base where it is often transformed into a cryptocyst. The opesium is anterior, oval, entire. The small avicularia are placed in the interzooecial angles; they are triangular, erect, with the beak turned toward the top. The ovicell is endozooecial, small, smooth, little convex. The ancestrula is smaller but of the same form as the other zooecia.

Measurements.—

Operculum $\begin{cases} ho = 0.30 \text{ mm.} \\ lo = 0.22 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.35\text{–}0.40 \text{ mm.} \end{cases}$

Affinities.—The species is closest to *Membrendoecium* (*Pyripora*) *confluens* Canu, 1907 from the Lutetian of the environs of Paris, but the present form differs in its greater dimensions and in its smooth and nongranular mural rim.

Polypidian regeneration is frequent in all the species of *Membrendoecium*, but it attains here an extraordinary frequence. Figure 3 shows a specimen in which all the zooecia have undergone a double or triple regeneration. All the specimens collected were dead. Almost all of them have been collected in the numerous isles of the Sulu Archipelago.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S., Sh.

D. 5139. Jolo Light, Jolo; 6° 06′ N.; 121° 02′ 30″ E.; 20 fathoms; co. S.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Islands, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Islands, Sulu Archipelago; 5° 28′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.

Cotypes.—Cat. No. 7868, U.S.N.M.

MEMBRENDOECIUM LAGUNCULUM, new species

Plate 6, figs. 6–11

Description.—The zoarium is unilamellar and incrusts algae, chitinous sponges, corals and bryozoa. The zooecia are distinct, separated by a furrow of little depth, elongated, elliptical; the mural rim is thick, flat, finely granulated, somewhat enlarged at the base; the opesium is elliptical, very finely denticulated. The ovicell is endozooecial, very small, transverse, smooth, very little salient. The avicularia are placed in the interzooecial angles; they are constant, small symmetrical, triangular, salient, erect. The initial zooecia of a series are often larger; their opesium is deformed, laterally constricted in the form of a small *bottle*.

Affinities.—The micrometric measurements are quite variable as the least variation of the substratum causes them to change considerably. The marginal zooecia are larger and their mural rim is thinner. The ovicell measures 0.10 mm. in height.

The particular form of the special zooecia well characterizes this charming species. Our specimen was ovicelled in July 1908.

Occurrence.—

D. 5192. Jilantaguan Island, off northern Cebu Island; 11° 09′ 15″ N.; 123° 50′ E.; 32 fathoms; green S.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Cotypes.—Cat. No. 7869, U.S.N.M.

MEMBRENDOECIUM JAPONICUM, new species

Plate 6, figs. 12, 13

Description.—The zoarium is unilamellar, free or encrusting shells, bryozoa or pebbles. The zooecia are distinct, separated by a very deep furrow, very little elongated, somewhat elliptical or orbicular; the mural rim is thin, sharp. The internal opesium is suborbicular. The ovicell is large, endozooecial, convex, separated from the zooecium by a prolongation of the mural rim or by a short partition. There are two small fusiform avicularia placed distally, their beak directed toward the zooecial axis.

Measurements.—

Opesium $\begin{cases} ho = 0.25\text{–}0.30 \text{ mm.} \\ lo = 0.20\text{–}0.25 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.65 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

Structure.—Between the opesia there is a large square area, shallow usually, formed by the frontal of the ovicell. It exists also between the nonovicelled zooecia but it is deeper and very irregular. It is always covered by the ectocyst.

This species differs from *Membranipora tripunctata* Waters, 1882 in its nonvinculariform and nonarticulated zoarium, in the absence of a scutum and in the rectangular unpartitioned space. It belongs probably to another family for it forms a very divergent type in the genus.

The ectocyst is quite transparent and covers also the rectangular area; the opercular valve closes a small apertura.

This species has a quite bizarre aspect. It was ovicelled in November 1904.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Cotypes.—Cat. No. 7870, U.S.N.M.

Genus VIBRACELLINA Canu and Bassler, 1917

VIBRACELLINA VIATOR, new species

Plate 7, figs. 1, 2

Description.—The zoarium incrusts small orbicular pebbles which it covers almost entirely. The zooecia are distinct, separated by a deep furrow, elongated, somewhat oval; the mural rim is thin, smooth, filiform; the opesium is large and of the same form as the zooecium. The ovicell is very small. The vibraculum is small, auriculate, interzooecial placed in the axis of the proximal zooecium. The ancestrula is always placed eccentrically.

Measurements.—

Large zooecium $\begin{cases} Lz=0.42 \text{ mm.} \\ lz=0.25 \text{ mm.} \end{cases}$ Opesium $\begin{cases} Ho=0.35 \text{ mm.} \\ lo=0.20 \text{ mm.} \end{cases}$

Biology.—This species is almost similar to *Vibracellina capillaria* Canu and Bassler, 1920, from the Claibornian of Texas and it differs only in its very small vibracula.

This is a small hydraulic wonder. The larva almost always affixes itself on small grains of sand (very rarely on fragments of shells), where it places itself eccentrically. Here it develops, and the colony, having covered the superior face, invades the inferior face. On the latter the zooecia are placed in an inverted position as if they radiated from an inaginary center, but they do not entirely cover it. However the ectocyst entirely covers the grain of sand and it is by its protection that the inversion can be made. The colony entirely developed, *travels* with its substratum and its vibracula assure the stability of all the system. The promenade is not long for we have not observed the species in many localities. The colony is not a reunion of zooecia but is an entity in itself. Species of *Vibracellina*, like *Cupularia* and *Lunulites* demonstrate perfectly the biological unity of the colony derived moreover from a single larva. It is very probable that the larva chooses its own substratum, for so far we have never observed this species on a large pebble. *Vibracellina capillaria* incrusted only very small shells (never grains of sand) and we have never observed it on large shells. It is an instinct wholly comparable to that in the insects.

Vibracellina is an elementary incomplete *Cupuladria*. The substratum is necessary for its life, while in *Cupuladria* it is necessary only at the birth of the colony. The present species lives at depths varying from 37 to 813 meters.

Occurrence.—

D. 5134. Balukbaluk Island, Sulu Archipelago; 6° 44′ 45″ N.; 121° 48′ E.; 25 fathoms; fine S.

D. 5135. Jolo Light, Jolo; 6° 11′ 50″ N.; 121° 08′ 20″ E.; 161 fathoms; fine co. S; 14.1° C.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S. Sh.

D. 5202. Limasaua Island, Sogod Bay, southern Leyte Island; 10° 12′ N.; 125° 04′ 10″ E.; 502 fathoms; gy. M.

Cotypes.—Cat. Nos. 7871, 7872, U.S.N.M.

VIBRACELLINA CRASSATINA, new species

Plate 7, figs. 3, 4

Description.—The zoarium surrounds grains of sand. The zooecia are distinct, separated by a deep furrow, elongated, pyriform; the mural rim is a small, salient collar, thin; a *thick* cryptocyst surrounds the opesium; the opesium is oval, anterior, entire. The ovicell is endozooecial. The vibraculum is interzooecial, large, auriculated, placed in the axis of the proximal zooecium. The ancestrula is small with thick mural rim. The marginal zooecia are closed or regenerated.

Measurements.—

Large zooecia (without vibracula) $\begin{cases} Lz = 0.45 \text{ mm.} \\ lz = 0.32 \text{ mm.} \end{cases}$ Opesium $\begin{cases} ho = 0.25 \text{ mm.} \\ lo = 0.15 \text{ mm.} \end{cases}$

Structure.—The zooecia of the ancestrular side are normal. On the other side not only are the zooecia reversed with respect to the primitive ancestrula but they almost all are closed and perforated by a simple median pore. While in *Cupularia* and *Lunularia*, this kind of cell (which we suppose to be hydrostatic and D'Orbigny called aborted) is at the center of the zoarium, here it is marginal, but the functions appear to be identical.

The zooecia of the non-ancestrular face, which are reversed with respect to the ancestrula, do not contain series of primitive zooecia. In reality, they are oriented in the same manner and in the same direction. This disposition is necessary for the hydrostatic equilibrium of the system as in *Cupularia* and *Lunularia*. The ectocyst entirely surrounds the zooecia and the grain of sand; the latter is incorporated in the colony absolutely as in the aforesaid genera.

This species differs from *Vibracellina capillaria* and from *V. viator* in the thick margin which surrounds the opesium.

Occurrence.—D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

Holotype.—Cat No. 7874, U.S.N.M.

Family ALDERINIDAE Canu and Bassler, 1927

This family was proposed for all the Membraniporae in which the ovicell is hyperstomial. It includes therefore the 3rd and 4th sections of Membraniporae of our classification of 1920.

Our section 3 of the Membraniporae (1920) contained *Periporosella* Canu and Bassler, 1917, *Ellisina* Norman, 1903, *Grammella* Canu, 1917 (*Crassimarginatella* Canu, 1909), *Membraniporidra* Canu and Bassler, 1917, *Tremopora* Ortmann, 1890, and *Larnacius* Norman, 1903, all of which except *Tremopora* (now referred to the Hiantoporidae) we now refer to the Alderinidae.

Section 4 of the Membraniporae of our 1920 classification contained *Alderina* Norman, 1903, *Callopora* Gray, 1848, *Tegella* Levinsen, 1909, *Amphiblestrum* Gray, 1848, *Ramphonotus* Norman, 1894, *Stamenocella* Canu and Bassler, 1917, *Ammatophora* Norman, 1903, and *Marssonopora* Lang, 1914, all now placed in the Alderinidae.

Our section 5 (Miscellaneous Membraniporae) contained *Cauloramphus* Norman, 1903, *Foveolaria* Busk, 1883, *Membrostega* Jullien, 1903, and *Antropora* Norman, 1903. Of this list *Membrostega* proves to be a synonym of *Hiantopora* MacGillivray (Hiantoporidae) and *Antropora* is referred to the Hincksinidae, but the other genera of section 5 are now placed in the Alderinidae. To this list we add *Doryporella* Norman, 1903, a subgenus of *Callopora*, *Frurionella* Canu and Bassler, 1927, *Euritina* Canu, 1900, *Allantopora* Lang, 1914, *Gephyrotes* Norman, 1903, *Cribrilina* Gray, 1848, *Acanthocella* Canu and Bassler, 1917, *Pyrulella* Harmer, 1926, and *Membraniporella* Smitt, 1873. All of these genera are illustrated in our 1920 work or in the present volume. A discussion of our reasons for including *Cribrilina*, *Acanthocella* and *Membraniporella* in this family is given in our work on the bryozoa of the Gulf of Mexico.

It is probable that certain articulated genera will some day be classed in this new family, but their larval system not being known, it is preferable to leave them in the families where now placed. There are also some exceptions to make regarding the genus *Amphiblestrum*, the anatomy of which is absolutely unknown; some species belong perhaps to the Opesiulidae.

Genus PYRULELLA Harmer, 1926

Zooecia with a distinct gymnocyst, which may be reduced. Opesia more or less oval, surrounded by spines; cryptocyst slight or moderate. Avicularia, if present, vicarious (interzooecial). Ovicells hyperstomial. Dietellae wanting (Harmer). The operculum closes the ovicell.

Genotype.—*Pyrulella* (*Membranipora*) *pyrula* Hincks, 1881.

Range.—Cretaceous—Recent.

Deceived by an erroneous observation of Levinsen, 1909, we have classed the *Corbula* group of Waters, 1898 in *Hincksina*. It is necessary to make a special genus since Harmer has observed that the ovicell is hyperstomial. All the fossil species which we described in 1920 are correctly classified; two species only which did not show the ovicell belonging perhaps to the new genus.

The recent species which must be classed in this genus with certainty from the appearance of the figures are as follows:

Pyrulella (*Membranipora*) *pyrula* Hincks, 1881.
Pyrulella (*Membranipora*) *corbula* Hincks, 1881.
Pyrulella (*Membranipora*) *maderensis* Waters, 1898.
Pyrulella (*Membranipora*) *sceletos* Busk, 1858.
Pyrulella (*Membranipora*) *corniculifera* Hincks, 1882.

PYRULELLA PYRULA Hincks, 1881, variety

Plate 5, fig. 11

1879. *Membranipora lineata* MacGillivray, Prodrome Zoology Victoria, dec. 3, p. 34, pl. 26, fig. 3.
1881. *Membranipora pyrula* Hincks, Polyzoa from Bass Straits, Annals and Magazine Natural History, ser. 5, vol. 8, p. 51 (sep) pl. 1, fig. 2.
1886. *Membranipora pyrula* MacGillivray, Prodrome Zoology Victoria, dec. 13, p. 103, pl. 127, fig. 1.
1887. *Membranipora pyrula* MacGillivray, Catalogue of the Marine Polyzoa of Victoria, p. 20.
1889. *Membranipora pyrula* Waters, Bryozoa from New South Wales, Annals and Magazine Natural History, ser. 6, vol. 4, p. 3.
1889. *Membranipora pyrula* Jelly, Synonymic Catalogue of Marine Polyzoa, p. 162.
1898. *Membranipora pyrula* Waters, Observations on Membraniporae, Linnean Society's Journal, vol. 26, p. 665, pl. 49, fig. 13.
1908. *Membranipora pyrula* Canu, Iconographie des Bryozoaires fossils de l'Argentine, Anales des Museo de Buenos Aires, vol. 17, p. 257, pl. 1, fig. 10.

Measurements.—

Opesium $\begin{cases} ho = 0.30\text{–}0.35 \text{ mm.} \\ lo = 0.20\text{–}0.22 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.50\text{–}0.55 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

Our specimen was dead; it incrusted a fragment of shell.

We have classed the specimen figured in *Pyrulella pyrula* because of the large spines, but in the form of the cells it is closer to *P. corbula* Hincks, 1881. The publication of this figure moreover is to recognize Harmer's genus and to indicate its presence in the Philippines.

Occurrence.—D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S, co.; 13° C.

Geological distribution.—Patagonian of Argentina (Canu).

Habitat.—Pacific, Australia.

Plesiotype.—Cat. No. 7863, U.S.N.M.

Genus CALLOPORA Gray, 1848

Harmer, 1926, formed the genus *Copidozoum* for the *tenuirostris* group of the genus *Callopora*. We are not able to recognize this genus. When a genus is very important and contains numerous species, certain ones among them resemble each other in the secondary characters and form groups more or less distinct. It is not necessary to make a new genus of such groups if the essential characters remain the same. This is the case in *Callopora* for the form and size of the avicularia are the only characters which differentiate the *tenuirostris* group from other species and these characters do not correspond at all to important or even known biologic functions.

Harmer compares *Copidozoum* to *Crassimarginatella* (*Grammella*), but the difference between the two genera is considerable. In *Crassimarginatella* the operculum closes the ovicell and the avicularia are sporadic and zoarial. In *Callopora* the operculum does not close the ovicell, the avicularia are constant and zooecial, and their function is totally different.

Membranipora permunita Hincks, 1881, has not been sufficiently studied to be correctly classified.

CALLOPORA SUBALBIDA, new name

Plate 7, fig. 5

1885. *Membranipora albida* Busk (part), Zoology Challenger Expedition, vol. 30, p. 63, pl. 15, fig. 4 (var. fide Waters).

1898. *Membranipora curvirostris* var. Waters, On Membraniporidae, Linnean Society Journal, Zoology, vol. 26, pl. 47, fig. 12.

Measurements.—

Opesium $\begin{cases} ho = 0.34 \text{ mm.} \\ lo = 0.22 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.44 \text{ mm.} \\ lz = 0.26 \text{ mm.} \end{cases}$

Affinities.—Hincks, 1890, did not believe that Busk's species of 1884 was the *Membranipora albida* Hincks, 1881, from Singapore in which the ovicell is small and shallow. The difference from *Membranipora curvirostris* Hincks, 1861, is too great to consider the present species as a simple variety as noted by Waters, 1898. We, therefore, propose the name *subalbida* to recall its affinities.

Callopora subalbida differs from *C. curvirostris* Hincks, 1861, in its smaller dimensions and in its smaller and less curved avicularium. It differs from *C. albida* Hincks, 1881, in its globular, salient ovicell.

The avicularium is placed in a heterozooecium as in the two species compared. This character not appearing in the genus *Ellisina*

Norman, 1903, it appears incorrect to us to classify this group here as Harmer has in 1926.

Occurrence.—D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

Geographic distribution.—Pacific: Nukatofa, Tongatuba (20 fathoms).

Plesiotype.—Cat. No. 7876, U.S.N.M.

CALLOPORA TENUIROSTRIS Hincks, 1880

Plate 3, fig. 6

1878. *Membranipora flemingii* WATERS, Bryozoa of the Bay of Naples, Annals and Magazine Natural History, ser. 5, vol. 3, p. 122, pl. 13, fig. 2.
1880. *Membranipora tenuirostris* HINCKS, Contributions History Marine Polyzoa, Annals and Magazine Natural History, ser. 5, vol. 6, p. 70 (sep. 2), pl. 9, fig. 3.
1882. *Membranipora tenuirostris* HINCKS, Polyzoa Queen Charlotte Islands, Annals and Magazine Natural History, ser. 5, vol. 10, p. 255.
1885. *Membranipora tenuirostris* WATERS, Journal Royal Microscopical Society, ser. 2, vol. 5, p. 5, pl. 15, fig. 41.
1887. *Membranipora tenuirostris* HINCKS, Polyzoa of the Adriatic, Annals and Magazine Natural History, ser. 5, vol. 19, p. 314.
1889. *Membranipora tenuirostris* JELLY, A Synonymic Catalogue of Marine Bryozoa, p. 167.
1891. *Membranipora tenuirostris* WATERS, North Italian Bryozoa, Quarterly Journal Geological Society, London, vol. 47, pl. 11.
1898. *Membranipora tenuirostris* WATERS, Observations on Membraniporidae, Linnean Society's Journal, Zoology, vol. 26, pp. 668, 685, pl. 47, fig. 7 (operculum).
1907. *Crassimarginatella tenuirostris* NORMAN, On the Polyzoa of Madeira, Linnean Society's Journal, Zoology, vol. 30, p. 288.
1918. *Membranipora tenuirostris* WATERS, Bryozoa from the Cape Verde Islands, Linnean Society's Journal, Zoology, vol. 34, p. 9 (bibliography).
1928. *Callopora tenuirostris* CANU and BASSLER, Fossil and Recent Bryozoa of the Gulf of Mexico Region, Proc. U. S. National Museum, vol. 72, art. 14, p. 31, pl. 3, fig. 4 (biologic distribution).

Our specimen from locality D. 5137 was dead; it encrusted a nullipore. The distal canal of the avicularium is slightly spatulate. This is the only difference from the known specimens. Perhaps later it will be necessary to create a new variety. Another specimen shows that this form of avicularium is not constant.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Geographic distribution.—Atlantic: Madeira, Cape Verde Islands (10 fathoms). Gulf of Mexico (24–56 fathoms). Mediterranean: Naples (10–42 fathoms), Capri, Rapallo, Oran (85 meters), Adriatic. Pacific: Queen Charlotte Islands.

Plesiotypes.—Cat. No. 7877, U.S.N.M.

CALLOPORA HORRIDA Hincks, 1880

Plate 7, fig. 7.

1880. *Membranipora horrida* Hincks, Contributions History Marine Polyzoa, Annals and Magazine Natural History, ser. 5, vol. 6, p. 82, pl. 10, fig. 6.
1898. *Membranipora californiensis* Waters, Observations on Membraniporidae, Journal Linnean Society, Zoology, vol. 26, p. 681, pl. 49, fig. 14.
1908. *Membranipora horrida* Robertson, The incrusting chilostomatous Bryozoa of North America, University of California Publications, vol. 4, p. 260, pl. 14, figs. 3, 4.

Our specimen does not exactly correspond to the published figures as the ovicell is distinctly separated from the large avicularia and bears an elliptical frontal area. Most of our specimens were dead and we have not been able to verify the number of spines. They incrust shells and algae. The other characters are quite identical. In contrast to the large avicularium there is a small orbicular avicularium and the form of the opesium is that figured by previous authors. Miss Robertson noted that the species has great variations and so we do not think that our determinations are erroneous. The ovicell is closed by the operculum.

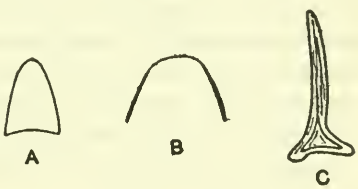

Fig. 24.—*Callopora horrida* Hincks, 1880

A. Mandible, ×85. *Ellisina philippinensis*, new species. B. Opercular valve, ×85. It is supported on the mural rim and there is no exterior sclerite. C. Mandible of avicularium, ×85.

A few living specimens showed them to be ovicelled in November, 1908.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Geographic distribution.—Pacific: California.

Plesiotype.—Cat. No. 7878, U.S.N.M.

Subgenus Doryporella Norman, 1903

The gymnocyst is much developed and bears a median avicularium, the mandible of which is large and lanceolated.

Example.—*Lepralia spathulifera* Smitt, 1867. Recent.

Genus AMPHIBLESTRUM Gray, 1848

AMPHIBLESTRUM PAPILLATUM Busk, 1885

Plate 7, fig. 8

1885. *Amphiblestrum papillatum* Busk, Report on Polyzoa collected by the Challenger, vol. 10, pt. 30, p. 66, pl. 33, fig. 1.

Our specimens were dead. The small interzooecial avicularium is rare and inconstant. The ancestrula is membraniporoid. The distal part of the mural rim bears 6 spines leaving only traces after their decay.

Measurements.—

$$\text{Opesium}\begin{cases} ho = 0.20 \text{ mm.} \\ lo = 0.14 \text{ mm.} \end{cases} \quad \text{Zooecium}\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.24\text{–}0.30 \text{ mm.} \end{cases}$$

In 1917 and 1920, when the ovicell of this species was not known, and misled by the incorrect synonymy of Waters, 1898, we quoted this species as the genotype of *Membrenoecium*, although our generic diagnosis was based on *M. pyriforme*, a new species from the Jacksonian and Vicksburgian. We believe it reasonable to retain *Membrendoecium* with *M. pyriforme* as the type, since this species possesses the generic characters as given by us.

Occurrence.—D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.

Geographic distribution.—Pacific: Philippine Islands (29 meters), 11° 37′ N.; 123° 31′ E.

Plesiotype.—Cat. No. 7879, U.S.N.M.

Genus ELLISINA Norman, 1903

ELLISINA CORONATA Hincks, 1881

Plate 7, figs. 9, 10

1881. *Membranipora coronata* Hincks, Contributions toward a general History of Marine Polyzoa, Annals and Magazine Natural History, ser. 3, vol. 7, p. 34, 81 (sep.), pl. 10, fig. 1.

1882. *Membranipora hastilis* Kirkpatrick, Annals and Magazine Natural History, ser. 5, vol. 9, p. 188, pl. 5, fig. 3.

1890. *Membranipora coronata* Kirkpatrick, Polyzoa from Torres Strait, Scientific Proceedings Royal Dublin Society, vol. 6, p. 615.

1898. *Membranipora coronata* Waters, Observations on Membraniporidae, Linnean Society's Journal, Zoology, vol. 26, p. 669.

1920. *Ellisina coronata* Canu and Bassler, North American Early Tertiary Bryozoa, Bulletin 106, U. S. National Museum, p. 110.[5]

1926. *Setosellina coronata* Harmer, Polyzoa *Siboga* Expedition, p. 265, pl. 16, figs. 3, 4. (Bibliography.)

Not 1888. *Membranipora coronata* Jullien, Mission Scientifique du Cap Horn, Bryozoaires, p. 76 (= *M. incrustans* according to Waters).

[5] Our discussion of this species in 1920 is incorrect and was based on incomplete published figures.

Measurements.—

Opesium $\begin{cases} ho = 0.35\text{–}0.45 \text{ mm.} \\ lo = 0.22\text{–}0.30 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.60\text{–}0.65 \text{ mm.} \\ lz = 0.25\text{–}0.40 \text{ mm.} \end{cases}$

Structure.—The distal portion of the mural rim is a special smooth piece *crowning* the zooecium. The pivot of the distal avicularium is indicated by two denticles very visible but difficult to illuminate for photography. The mandible is long arched, setiform, winged.

"Dietellae extremely conspicuous and about four in the distal half of the lateral wall, their openings to the zooecia often large" (Harmer, 1926).

The ovicell is here very small, little salient, somewhat convex, transverse, smooth. The opesium is finely crenulated.

Harmer found an embryo in the zooecial cavity and placed in an ovisac. The ovicell shelters the embryo, therefore, only at the moment of escape.

Harmer described a vibraculum but he distinctly figures a setiform (vibraculoid) avicularium.

Affinities.—This species differs from *Ellisina philippinensis* in its greater micrometric dimensions ($Lz > 0.50$ mm.), in its denticulated opesium, in its mural rim not enlarged at the base, and in its mandible.

In introducing this species in *Setosellina* Calvet, 1907, Harmer wrote (p. 264) "As originally introduced, *Setosellina* so named from its resemblance to the microporoid *Setosella*, Hincks, was defined as having the main axis of its vibracular opesia in the same line as that of the zooecium. I think it necessary to modify this part of the diagnosis in order to include *Membranipora coronata.*" This modification is not possible, and is not reasonable moreover, because the genotype, *S. roulei* is still imperfectly known. Norman having classed *M. coronata* in *Ellisina* it is preferable to leave it there provisionally.

Evidently *Ellisina* (as the *Coronata* group of Waters, 1898) is a genus not appearing to have a great constancy even in its definition. Most of the species introduced by simple appearance are imperfectly studied and their essential organs (ovicells, avicularia, ancestrula) are not even figured. It is for this reason that Waters, 1904 (p. 31), wrote "There are several species of *Membranipora* with oval zooecia and an avicularium at the distal end and this group is a difficult one on account of the few characters available."

We could separate a special group having an endozooecial ovicell and a vibraculoid (setiform) distal avicularium composed of *Ellisina coronata* Hincks, 1881, *E. philippinensis*, new species, *E. laxa* and *E. brevis* Canu and Bassler, 1920, for which we might propose a special genus, clearly equatorial but it is absolutely necessary that the other species of *Ellisina* be better studied and known.

Biology.—Our specimens incrusted shells, corals, and nullipores; they were dead. This is a shallow-water species and exclusively tropical.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 9′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5235. Nagubat Island, east coast of Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Specimens on a *Tridacna* from an unknown Philippine locality.

Geographic distribution.—Pacific: Murray Islands, Torres Strait (24–32 meters). China Sea: Macclesfield Bank (58 meters). Indian Ocean: Ceylon, Borneo Bank, Makassar Straits (59 meters); northern end of New Guinea (18 meters); South of the Celebes (0–36 meters); Loyalty Islands; Singapore.

The station of the North Pacific noted by Waters, 1898, is not known to us. Jullien did not figure his specimen and said that it corresponded very well to Hincks' drawing but Waters having examined it in 1905 at the Museum of Paris, identified it with *Ellisina incrustans* Waters, 1898. The certain localities are those in the tropical zone.

Plesiotypes.—Cat. Nos. 7880, 7881, U.S.N.M.

ELLISINA PHILIPPINENSIS, new species

Plate 8, fig. 1

Description.—The zoarium encrusts shells and nullipores. The zooecia are distinct, separated by a deep furrow, little elongated, oval, ventricose; the mural rim is thick, finely granulated, much enlarged at the base; the opesium is oval. The ovicell is endozooecial, very small, transverse. The avicularium is small, transverse, triangular, a little salient at the point; the mandible is short, without wing, subsymmetrical, acuminate. The opercular valve is supported on the mural rim (hr = 0.12 mm.).

Measurements.—

Opesium $\begin{cases} ho = 0.30 \text{ mm.} \\ lo = 0.15\text{–}0.20 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.45\text{–}0.50 \text{ mm.} \\ lz = 0.32\text{–}0.36 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Ellisina coronata* Hincks, 1881, in its smaller dimensions (Lz < 0.50 mm), and in its mural rim enlarged at the base. It differs from *Ellisina incrustans* Waters, 1898, in its more thickened mural rim enlarged at the base and in the oval form of the zooecia. Our specimen did not appear in reproduction in February, 1908.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5311. China Sea, vicinity of Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S, Sh.

Holotype.—Cat. No. 7882, U.S.N.M.

Genus ALLANTOPORA Lang, 1914

We already knew two tropical species of this genus discovered by Lang in the Cretaceous, and in addition to these are the following:

Allantopora translucens Harmer, 1926, Malay region.

Allantopora curta, new species, Philippines.

ALLANTOPORA CURTA, new species

Plate 2, fig. 7

Description.—The zoarium encrusts bryozoa, in uniserial, ramified series. The zooecia are elongated, elliptical, ornamented by a short smooth, convex, narrow gymnocyst. The mural rim is thick, rounded; the opesium is elliptic or somewhat pyriform. The ovicell is hyperstomial, narrower than the zooecium.

Measurements.—

Opesium $\begin{cases} ho = 0.35 \text{ mm.} \\ lo = 0.25 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.65\text{–}0.70 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

Affinities.—Our specimens being dead and dried up, we can not observe if they bore spines. The species differs from *Allantopora translucens* Harmer, 1926 in its very short and rectilinear gymnocyst.

Occurrence.—

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms.

D. 5217. Anima Sola Island; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms.

Holotype.—Cat. No. 8468, U.S.N.M.

Genus MEMBRANIPORIDRA Canu and Bassler, 1917

MEMBRANIPORIDRA TUBEROSA, new species

Plate 8, fig. 3

Description.—The zoarium encrusts orbitoid foraminifera. The zooecia are distinct, separated by a deep furrow, oval, large, little elongated; the mural rim is thin, salient, but much enlarged at the base into a true cryptocyst, granulated; the gymnocyst is very short, convex, smooth. The opesium is oval, large, anterior. The ovicell is convex, smooth, covered by an incomplete pleurocyst, surrounding a very irregular area; it is deeply embedded in the distal zooecium. In almost all the interzooecial angles there is a large *tuberosity.* Regeneration is frequent.

Measurements.—

Opesium $\begin{cases} ho = 0.34 \text{ mm.} \\ lo = 0.30 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.70\text{–}0.74 \text{ mm.} \\ lz = 0.44 \text{ mm.} \end{cases}$

Affinities.—Our specimen is well preserved but it is dead so that we are not certain that the operculum closes the ovicell. We judge that as on the fossil forms the distal part of the mural rim was buried by the ovicell. If in the future, this observation be not confirmed it will be necessary to classify the species in *Alderina.* The species differs from *Membranipora marginata* Kirkpatrick, 1888, in the presence of interzooecial tuberosities.

Occurrence.—D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

Holotype.—Cat. No. 7883, U.S.N.M.

Genus ALDERINA Norman, 1903

ALDERINA IMBELLIS, Hincks, 1860

Plate 8, fig. 2

1889. *Membranipora imbellis* Jelly, A synonymic Catalogue of the Marine Bryozoa, p. 151 (bibliography).

1903. *Alderina imbellis* Norman, Notes on the Natural History of East Finmark, Annals and Magazine of Natural History, ser. 7, vol. 21, p. 596, pl. 13, fig. 8.

1907. *Membranipora imbellis* Calvet, Expéditions scientifiques du *Travailleur* et du *Talisman*, p. 389 (bibliography).

1918. *Alderina imbellis* Barroso, Notas sobre Bryozoos, Boletin de R. Sociedad espanola de Historia Natural, vol. 18, p. 207, fig. 1.

1921. *Alderina imbellis* Duvergier, Note sur les Bryozoaires du Néogène de l'Aquitaine, Actes de la Société Linnéene de Bordeaux vol. 72, p. 8.

This species had been found only in boreal seas, but recently Duvergier discovered it in the Burdigalian of the neighborhood of Bordeaux, where the waters were certainly warm. Its presence in equitorial waters was therefore very probable. We have discovered a good specimen on a nullipore but it was dead.

Measurements.—

Opesium $\begin{cases} ho = 0.28 \text{ mm.} \\ lo = 0.18\text{–}0.20 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.40 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Occurrence.—D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

Geographic distribution.—Atlantic: Shores of Ireland and Shetland Islands; Norway, North Sea at the Kattegat, Gulf of Gascony (550 meters) and at Santander.

Geologic distribution.—Miocene (Burdigalian): Cestas (Gironde), France (Duvergier).

Plesiotype.—Cat. No. 7884, U.S.N.M.

Genus CAULORAMPHUS Norman, 1903

CAULORAMPHUS DISJUNCTUS, new species

Plate 8, figs. 4–6

Description.—The zoarium encrusts siliceous pebbles. The zooecia are distinct, separated by a deep furrow, elongated, pyriform and bear at their base a very small concave gymnocyst; the mural rim is broad and rounded and bears 8 to 9 pairs of spicules placed close together and 4 to 6 somewhat smaller distal spines; the opesium is oval, entire. On the mural rim in the vicinity of the aperture there is a pedunculate avicularium rather long, triangular, erect. The zooecia are separated but they are united by connecting tubes.

Measurements.—

Opesium $\begin{cases} ho = 0.32\text{–}0.35 \text{ mm.} \\ lo = 0.15\text{–}0.18 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.50\text{–}0.60 \text{ mm.} \\ lz = 0.35 \text{ mm.} \end{cases}$

Affinities.—This species is perfectly characterized by the separated zooecia. Hincks, 1885, proved that the separation of the zooecia is not a generic character and that it can occur in species belonging to different families. On worn specimens the trace of spines is revealed by irregular tuberosities and that of the large pedunculate avicularia is marked by a pit. Our specimens were not ovicelled.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Cotypes.—Cat. No. 7885, U.S.N.M.

Genus GEPHYROTES Norman, 1903

1920. *Gephyrotes* Canu and Bassler, North American Early Tertiary Bryozoa, Bull. 106, U. S. National Museum, p. 300.

In introducing this genus into our nomenclature of 1920 we considered especially the spiramen which we thought corresponded to a special function. Also all the species do not have the same frontal structure and often it is totally different from that of the genotype; in *Gephyrotes spinosa* it is identical with that in *Acanthocella.* If this genus is indeed natural, it will be proof once more that the aspect of the frontal can not furnish generic characters since it results simply from the ordinary variations of the primitive spines. If we are deceived in our views it is necessary to range the species with dietellae in *Cribrilina* as Levinsen thought in 1909. Lang, 1922, gave the greatest importance to the form and the arrangement of the costules. This is not our view for the exterior ornamentation can not serve to establish a natural classification.

Genus FRURIONELLA Canu and Bassler, 1925

1925. *Frurionella* Canu and Bassler, Fauna of the Ripley Formation on Coon Creek, Tennessee, Bryozoa, Prof. Paper 137, U. S. Geological Survey, p. 35.

The frontal is a very thick olocyst bearing opesial avicularia and some scattered pores. The opesium is small and has the form of the aperture. The ovicell is hyperstomial, buried in the parietal thickening; it is closed by the operculum.

Genotype.—*Frurionella parvipora* Canu and Bassler, 1925. Upper Cretaceous of Tennessee. (Pl. 94 fig. O.)

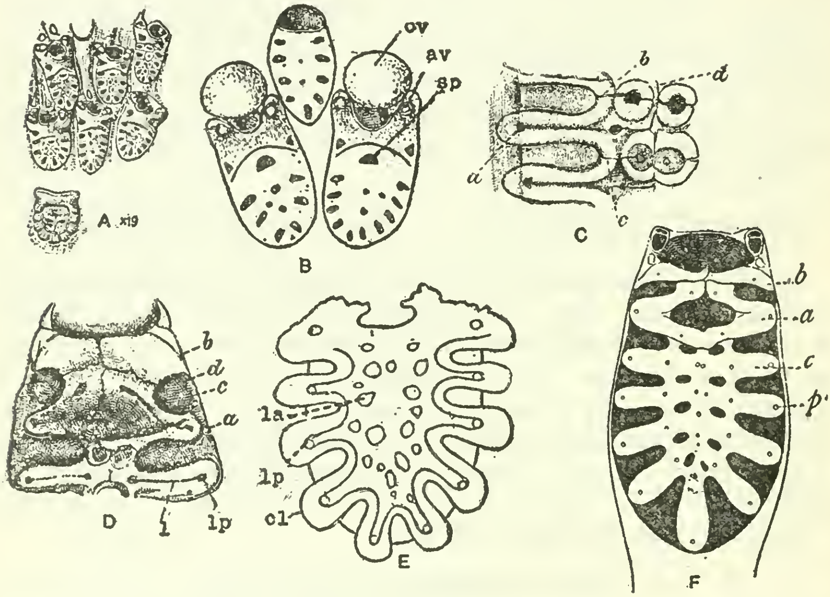

Fig. 25.—Genus *Gephyrotes* Norman, 1903

A–F. *Gephyrotes nitido-punctata* Smitt, 1868. A. Zooecium, ×19 (after Smitt 1868). B. Zooecia, showing avicularia (*av*) ovicell (*ov*) and spiramen (*sp*) (after Nordgaard, 1895). C. Middle bars of the zooecium; *a*, lumen; *b*, *c*, union of the arched costules at their extremity; *d*, median line of the zooecium. D. The anterior portion of a zooecium to show the structure of the bridge and oral opening; *a*, bifurcated costule; *b*, solid outspread costule; *c*, spiramen; *d*, lateral foramen; *l*, lumen; *lp*, lumen pore (after Norman, 1903). E. Costular system, ×83 (after Nordgaard, 1903); *cl*, loop of the costule; *la*, lacuna; *lp*, lumen pore. F. Diagram of a zooecium and two avicularia, from above, ×85. *p*, pelmatidium; *b*, proximal apertural spine; *a*, bifurcated apertural bar; *c*, costa (after Lang, 1922).

This new genus differs from *Foveolaria* Busk, 1884 (see pl. 94, figs. P, Q) in its ovicell closed by the operculum and exteriorily invisible. The other characters are identical.

Family SYNAPTACELLIDAE Maplestone, 1911

No ovicells. The zooecia are ovoid, with gymnocyst, arranged more or less obliquely; the opesium is bordered by a salient mural rim; the basal wall bears three large septulae. The colonies are articulated and radicellate.

The cellular structure is rather far from that of *Caberea* Lamouroux, 1816 of the family Scrupocellariidae.

Genus SYNAPTACELLA Maplestone, 1911

"Zoaria free, rigid. Zooecia in a single series" (Maplestone).

Genotype.—*Synaptacella asymetrica* Maplestone, 1911 (first species).

Range.—Miocene of Australia.

Genus HETEROCELLA Canu, 1907

1920. *Heterocella* Canu and Bassler, Monograph North American Early Tertiary Bryozoa, Bull. 106, U. S. National Museum, p. 198.

Zoarium articulated, quadriserial.

Genotype.—*Heterocella* (*Vincularia*) *fragilis* Defrance, 1820.

Range.—Eocene (Lutetian). Recent.

In 1920 Canu and Bassler doubtedly classified *Heterocella* in the Farciminariidae. To-day we would ally this genus with the Synaptacellidae. The general aspect of the zooecia, the presence of an interior opesium and of two distal septulae on the false cryptocyst account for this change. The collection of better specimens is desirable in order to clear up the structure of this mysterious genus.

HETEROCELLA PENTAGONA, new species

Plate 9, figs. 13–16

Description.—The zoarium is articulated. The segments are very long, thin at their base, much enlarged at their summit; they are formed of five longitudinal rows of zooecia. The zooecia are distinct, separated by a shallow furrow, elongated, elliptical; they are subrectangular; the mural rim is thick, rounded, nondistinct from the pseudocryptocyst which surrounds the interior opesium. The external opesium is large, of the same form as the zooecium; the internal opesium is small, submedian, orbicular or somewhat elongated, surmounted by two large distal septulae. The ovicelled zooecia are larger with two lateral septulae and a large distal septula surmounted by a large ogival indentation. The zooecia increase in size from the base to the summit of a segment.

Measurements.—

Large zooecia $\begin{cases} Lz = 0.90 \text{ mm.} \\ lz = 0.70 \text{ mm.} \end{cases}$ Ovicelled zooecia $\begin{cases} Lz = 1.00 \text{ mm.} \\ lz = 0.65 \text{ mm.} \end{cases}$

Internal opesia $\begin{cases} Lo = 0.25 \text{ mm.} \\ lo = 0.25 \text{ mm.} \end{cases}$

Affinities.—This species is not a typical *Heterocella* as it differs in its zooecial arrangement in five longitudinal ranges and not in four and in its opesia which do not converge two by two. Having only dead specimens, we did not believe it advisable to create a new genus for them.

Occurrence.—

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 40′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5579. Sibutu Island, Darval Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fne. S., Co.

Cotypes.—Cat. Nos. 7906, 7907, U.S.N.M.

Family HIANTOPORIDAE MacGillivray, 1895

The larva of this family is not known. The species which it contains were classified in the Beaniidae by Kirkpatrick in 1890 and in the Bicellariidae by Levinsen in 1909. As they form a group rather distinct from the Membraniporae we have adopted MacGillivray's solution of the matter. The known genera are: *Tremopora* Ortmann, 1890, *Hiantopora* MacGillivray, 1886, *Tremogasterina* Canu, 1911 and *Hoplocheilina* Canu, 1911. Levinsen unites *Tremopora* and *Hiantopora* in a single genus, but we maintain both genera because it appears that the function of the opercular valve is not identical in the two. *Hoplocheilina* Canu, 1911 which we described and illustrated in 1920, we now refer to this family.

Genus TREMOPORA Ortmann, 1890

Tremopora Canu and Bassler, North American Early Tertiary Bryozoa, Bull. 106, U. S. National Museum, p. 139, fig. 33.

The opercular valve always closes the ovicell. The mural rim bears one or two large bifurcated oral spines and an avicularium more or less developed.

Genotype.—*Tremopora dendracantha* Ortmann, 1890.

Range.—Miocene (Helvetian)—Recent.

TREMOPORA RADICIFERA, Hincks 1881

Plate 11, figs. 2–6

1889. *Membranipora radicifera* Jelly, Synonymic Catalogue of Marine Bryozoa, p. 162 (bibliography).

1890. *Membranipora radicifera* Kirkpatrick, Hydroida and Polyzoa Torres Strait, Proceedings Royal Society Dublin, vol. 6, p. 616, pl. 16, fig. 1.

1909. *Hiantopora radicifera* Levinsen, Morphologic studies on the cheilostomatous Bryozoa, p. 111, pl. 4, fig. 6.

1926. *Hiantopora radicifera* Harmer, Polyzoa *Siboga* Expedition, p. 256, pl. 34, fig. 4 (bibliography).

Measurements.—

Opesium $\begin{cases} ho = 0.45 \text{ mm.} \\ lo = 0.25 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60\text{–}0.65 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

This species is quite polymorphic. We recognize (1) the typical form, (2) the variety *separata* with separated cells, both fossil and recent, (3) the variety *bifoliata* formed of two lamellae back to back and occurring fossil and (4) the variety *biavicularia* with two symmetrical avicularia, also occurring fossil. The variety *intermedia* Kirkpatrick, 1890, is a special species of the *cervicornis* group.

Typical form.—The avicularium is unilateral. The two lateral spines are very short and often absent. The large branched spine is attached to the base of the avicularium; it is very sporadic and most of the cells are deprived of it.

The zoarium is very rarely incrusting and is almost always unilamellar, foliaceous, or tubular. It grows on soft algae. The radicular fibers are attached to small hollow tuberosities on the inferior face. The separation of the cell is never apparent on the cellular face and it is inconstant on the other side. There are two distal spines.

Variety separata. (pl. 11, figs. 5, 6)—The separation of the cells is visible on the cellular face and the connecting tubes appear on the inferior face. The oral spine is quite rudimentary and the distal spines are absent.

Biology.—All the chitinous appendages and the ornamentations of this species are very fragile and disappear rapidly, even on old zooecia of a living zoarium. In our specimens we have seen neither ovicells nor ancestrula. No reproduction has occurred in February or in September, the two months when collected.

The sporadic spines are adaptations to depth or to the oscillation of the algae; they do not exist on specimens of shallow waters. Commensal on the delicate algae this species participates in all the events of the life of the latter.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5151. Sirun Island, Tawi Tawi Group, 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, Tawi Tawi Group; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S. co.; 13° C.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S. co.

Pacific: Australia (Hincks, MacGillivray, etc.)

Geologic distribution.—Miocene (Helvetian) Touraine and Gard, France (Canu collection). Miocene (Tortonian), Austria-Hungary (U. S. National Museum). Miocene of Australia (Waters).

Plesiotypes.—Cat. Nos. 7908–7911, U.S.N.M.

TREMOPORA INTERMEDIA Kirkpatrick, 1890

Plate 11, fig. 1

1889. *Tremopora dendracantha* ORTMANN, Japan Bryozoen Fauna, Archiv für Naturgeschichte, vol. 50, p. 29, pl. 2, fig. 6. (After Harmer.)
1890. *Membranipora radicifera* var. *intermedia* KIRKPATRICK, Torres Straits, Sci. Proc. Royal Dublin Soc. (n. s.), vol. 6, pp. 612, 615, pl. 16, fig. 2.
1926. *Hiantopora intermedia* HARMER, Polyzoa *Siboga* Expedition, p. 237, pl. 34, figs. 1–3, text fig. 2 (Bibliography).

In this species the lateral spines assume a great development and ramify many times in covering over a portion of the opesium. The other characters are identical with those of *Tremopora radicifera.* The fossils and the incomplete specimens are difficult to differentiate.

Tremopora dendracantha Ortmann 1890, as well as the Japanese specimen figured by Harmer appears to us to be a different species.

Occurrence.—D. 5580. Sibuta Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 6′ 45″ E.; 162 fathoms; 13.2° C.

Plesiotype.—Cat. No. 8464, U.S.N.M.

TREMOPORA OVALIS, new species

Plate 11, figs. 7, 8

Description.—The zoarium encrusts shells and nullipores. The zooecia are distinct, united by their mural rim, somewhat elongated, *oval;* the mural rim is thin, very salient in its distal portion where it bears two large spines; two elliptical avicularia, symmetrically arranged, appear on the superior half of the mural rim. The opesium is entire and oval. From the inferior portion of each avicularium a large ramified spine proceeds, arranged perpendicularly to the zooecial plane.

Measurements.—

Opesium $\begin{cases} ho = 0.35 \text{ mm.} \\ lo = 0.25 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.55 \text{ mm.} \\ lz = 0.45 \text{ mm.} \end{cases}$

Affinities.—This new species differs from *Membranipora bellis* Maplestone, 1900, in its oval and nonelliptical opesium. It differs from *Membranipora intermedia* Kirkpatrick, 1890, in its oval opesium and in the constant presence of two avicularia on the mural rim. It differs from *Membranipora cervicornis* Busk, 1852, also ornamented with large ramified spines in the presence of two oral avicularia placed on the mural rim.

Occurrence.—

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Cotypes.—Cat. No. 7912, U.S.N.M.

Genus HIANTOPORA MacGillivray, 1887

1887. *Hiantopora* MacGillivray, Catalogue Marine Polyzoa of Victoria, Trans. Royal Society Victoria, vol. 23, p. 208.
1902. *Membrostega* Levinsen. See Canu and Bassler, North American Early Tertiary Bryozoa, p. 174, fig. 41C.

The ovicell is deeply buried in the distal zooecium and never closed by the operculum. The frontal membrane is covered by branched projections; these are hollow and originate from the avicularia. The ectocyst is below the perforated frontal.[6]

Genotype.—*Hiantopora ferox* MacGillivray, 1868.

Range.—Miocene to Recent.

The known species of this genus are as follows:

Hiantopora ferox MacGillivray, 1868	Recent.
Hiantopora spathulata, new species	Recent.
Hiantopora bidenticulata, new species	Recent.
Hiantopora laticella, new species	Recent.
Hiantopora halli MacGillivray, 1895	Miocene.
Hiantopora liversidgei MacGillivray, 1895	Miocene.

Jullien in 1903 applied the name *Membrostega* to this genus and erroneously attributed the formation of the frontal to the fusion of the branches of two large bifurcated oral spines.

HIANTOPORA BIDENTICULATA, new species

Plate 11, figs. 9–11

Description.—The zoarium encrusts nullipores and shells. The entire zooecia are little distinct; they are somewhat elongated and elliptical; the mural rim is thin, regular, with two distal bifurcated spines and two elliptical, oral avicularia; the opesium (invisible) is large and of the same form as the zooecia. The frontal is perforated with 5 or 6 large round pores. The orifice, placed above the opercular valve is elliptical, transverse, with a proximal salient lip ornamented with *two* large *spicules*. The ovicell is immersed in the distal zooecium, little apparent, convex.

Variations.—The adventitious frontal formed by the ramifications and union of the spines developed at the base of the two avicularia, is quite variable. The two avicularia themselves have their orifice sometimes perpendicular and sometimes parallel to the zooecial plane; in the first case they are very salient.

The visible orifice is neither an opesium nor a regular aperture; it serves, however, for the passage of the tentacles. The use of the bidenticulate mucro is difficult to understand.

Affinities.—The structure is absolutely analogous with that of the genotype *Hiantopora ferox* MacGillivray, 1868, but the present species differs in the occurrence of two avicularia and in the bidenticulated mucro on the frontal.

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[6] We are naming this calcareous frontal above the chitinous ectocyst, the pericyst.

Biology.—This species occurs in the same localities as *Tremopora radicifera* and *T. ovalis.* It prefers calm, shallow waters and coral, sandy, and shelly bottoms.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5144. Jolo Light, Jolo; 6° 05′ 15″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Cotypes.—Cat. Nos. 7914, 7915, U.S.N.M.

HIANTOPORA SPATHULATA, new species

Plate 11, fig. 12

Description.—The zoarium encrusts foraminifera. The zooecia are distinct, separated by a furrow, elongated; the frontal is convex and perforated by a dozen large round pores. The apertura is orbicular, oblique, limited inferiorily by an umbo more or less salient; the peristome is thin and bears 5 distal spines. The ovicell is hyperstomial, deeply embedded in the distal zooecium, never closed by the operculum, quite globular, verrucose. On each side of the orifice there are two *spatulate* avicularia with pivot longitudinal and with rounded beak.

Measurements.—

Orifice $\begin{cases} ho = 0.10 \text{ mm.} \\ lo = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.45 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$

Biology.—This species is very well characterized by its avicularia. The passage of eggs is assured by the immersion of the ovicell and protection by the operculum in opening. Our specimens were living and in reproduction in March, 1908.

Occurrence.—D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.

Holotype.—Cat. No. 7916, U.S.N.M.

HIANTOPORA LATICELLA, new species

Plate 11, figs. 13, 14

Description.—The zoarium is unilamellar. The zooecia are little distinct, separated by a very slight furrow, very *broad;* the frontal is somewhat convex and perforated by 3 to 7 very large orbicular pores; the orifice is semielliptical, transverse; the costules are finely granulated. The ovicell is deeply immersed in the distal zooecium; it is smooth, convex, transverse. On each side of the orifice there are two small transverse, triangular, avicularia with two denticles as a pivot.

Measurements.—

Orifice $\begin{cases} ho = 0.17 \text{ mm.} \\ lo = 0.25 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60 \text{ mm.} \\ lz = 0.55 \text{ mm.} \end{cases}$

Affinities.—The orifice is regular; it corresponds rigorously to the form of the opercular valve attached to the ectocyst, placed below the frontal. Our specimens were dead and we have not been able to verify the degree of chitinization of the valve.

This species differs from *Hiantopora liversidgei* MacGillivray, 1895, in its more numerous frontal pores and its much broader zooecia.

Biology.—This is a species of deep waters. It is larger and more calcified than *Hiantopora bidenticulata* from waters of less depth. This is a frequent rule in the Tropical Zone. As the specimens were unilamellar, it is not certain that they were living in the depths where they were dredged.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

Cotypes.—Cat. No. 7917, U.S.N.M.

Genus TREMOGASTERINA Canu, 1911

This genus was discovered by Canu in 1911 in the Cretaceous rocks (Rocanean) of Argentina. Its discovery in the Philippines permits a description of its structure. It belongs to the special group in which the zooecia are entirely membraneous but covered with a cellular carapace or pericyst. In its large trifoliate frontal pore and its large interzooecial avicularia it approaches *Hiantopora;* but this is only an exterior aspect which is not trustworthy. Here the operculum appears to indicate the existence of a compensatrix, an organ which has not yet been really noted in *Hiantopora* and which is lacking surely in *Tremopora.*

The same phenomena can be observed in the artificial group of the Costules. *Membraniporella*, *Cribrilina*, and *Figularia* have also an internal ectocyst but *Figularia* alone has a compensatrix. *Tremogasterina* would perhaps be better classed next to *Figularia.*

The study of these fantastical forms leads us to the consideration of a new product of calcification, the *pericyst,* an addition to the tremocyst, olocyst, and pleurocyst already known.

But as its origin is still obscure, further researches are necessary. It is certain now that the presence of costules can not be considered as a family character.

We published a special study of this genus in our Gulf of Mexico report in 1928, although in the text of this work it is now necessary to replace pleurocyst by pericyst.

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This is a tropical genus and Smitt's species, more easily accessible for study, should be regarded as most typical.

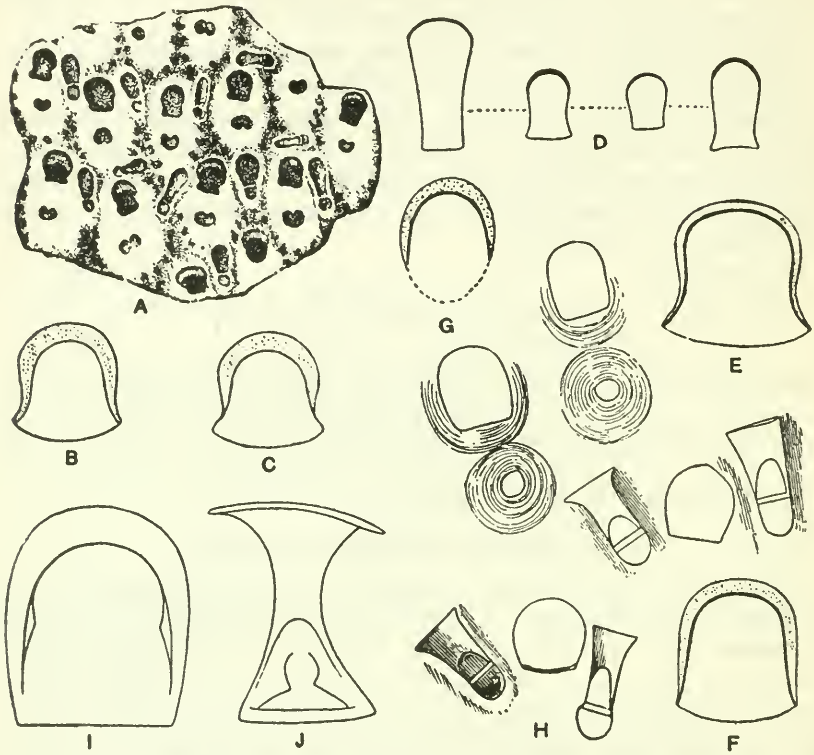

FIG. 26.—Genus *Tremogasterina* Canu, 1911

A–D. *Tremogasterina celleporoides* Busk, 1884. A. Aspect of the zooecia and of the large avicularia. (After Busk, 1884.) B, C. Opercula, ×85. D. Forms of avicularian mandibles, ×85. E, F. *Tremogasterina granulata* Canu and Bassler. Two forms of opercula, ×85. G. *Tremogasterina lanceolata* Canu and Bassler. Operculum, ×85. H–J. *Tremogasterina celleporoides* Busk. var. H. Sketch of apertures, pores and avicularia. I, J. Operculum and avicularian mandible, ×85. (After Water's sketches.)

TREMOGASTERINA CELLEPOROIDES Busk, 1884

Plate 12, figs. 1–6

1884. *Lepralia celleporoides* BUSK, Polyzoa collected by Challenger., vol. 10, pt. 30, p. 142, pl. 17, fig. 4.
1890. *Lepralia mucronata* KIRKPATRICK, Hydroida and Polyzoa, Torres Strait, Scientific Proceedings Royal Dublin Society, new ser., vol. 6, p. 612.

The various synonymies given by Waters, 1881–1887, are not exact but the assembled forms are indeed of the same genus. The zoarium is rarely bilamellar; more often it is subcylindrical, hollow, encrusting probably some small alga, and multilamellar. The ovicell is hyperstomial, convex, deeply embedded in the distal zooecium; its orifice can not be closed by the operculum.

There is never an ectocyst. This appears in the interior of the zooecium and is visible by the frontal pore which appears thus closed by a thin membrane. The operculum is feebly chitinized and is not clearly separated from the compensatrix; its form resembles a great deal that in the Petraliidae.

The structure of the frontal is very different from that of the species covered by the ectocyst and we can not conceive that the frontal results from the union of the spines or of the spicules.

The marginal pores have the aspect of those in the Adeonidae but they are not special to each zooecium and there is only a single range between two adjacent zooecia; they appear to be really parietal

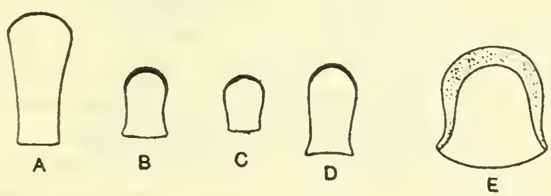

Fig. 27.—*Tremogasterina celleporoides* Busk, 1884

A–D. Different mandibles of zooecial avicularia, ×85. E. Operculum, ×85.

dietellae. With age and wear the zooecia assume most fantastic aspects.

Biology.—Almost all our specimens were dead and nonovicelled but a few living examples have permitted the study of the structure; they were in reproduction (ovicelled) February 21, 1908 (372 meters).

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms.

D. 5151. Sirun Island, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.

D. 5192. Jilantaguan Island, off northern Cebu Island; 11° 09′ 15″ N.; 123° 50′ E.; 32 fathoms, green S.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms, fine S., co.; 13, 2° C.

Torres Strait, Station 186, 8 fathoms (Busk); Albany Pass, Somerset, N. Queensland, 10 fathoms (Kirkpatrick).

Plesiotypes.—Cat. Nos. 7918–7921, U.S.N.M.

Family ARACHNOPUSIIDAE Jullien, 1888

Orifice trapezoidal; frontal perforated by pores irregularly arranged in the place of which origelles (tremopores) can not be distinguished on examples decalcified and tinted with the picrocarminate of ammonia; operculum pellucid, very thin, quite difficult to see and of doubtful existence. Ancestrula membraniporoid, spiny. (Translation after Jullien.) The ovicell is hyperstomial always closed by the operculum. The zooecia are entirely adjacent. The frontal is a pericyst with large pores arranged above a membranous ectocyst. The ectocyst, therefore, is buried under the frontal.

Levinsen, 1909, writes that the frontal is formed by branched projections which are solid and originate from the lateral margins. According to Waters, 1903, there are oral glands. The term peripore is applied to the salient collar which surrounds the large pores of the pericyst.

In order not to always change the nomenclature we follow here the same rule as for the Hiantoporidae and accept Jullien's family. The true nomenclature of all these forms can be definitely established only with the knowledge of their larvae.

To the genus *Arachnopusia* Jullien, 1888, now better known, we have added the genus *Exechonella* which has a great geological distribution. The genus *Arachnopusia* has been described and illustrated by the present writers in 1920 (North American Early Tertiary Bryozoa, p. 311).

Genus EXECHONELLA Canu and Bassler, 1927

The pores of the pericyst are large, orbiculur, marginated. A peristomie very much thickened surrounds an orifice closed by a true operculum. The ectocyst is hidden under the frontal. The microscopic study of the frontal having indicated to us that it is not formed by the fusion of hollow spines, causês us to ally this genus with *Arachnopusia* Jullien, 1888. It differs from it in the presence of an operculum and of large orbicular, frontal pores. We are still unfortunately ignorant of the nature of the ovicell.

Genotype.—*Exechonella* (*Hiantopora*) *magna* MacGillivray, 1895.

Range.—Eocene (Lutetian)—Recent.

We have classed the known species in three groups as follows:

1. AVICULARIA PRESENT

Exechonella (*Hiantopora*) *magna* MacGillivray, 1895	Miocene, Recent.
Exechonella (*Cyclicopora*) *laticella* Canu and Bassler, 1920	Jacksonian.
Exechonella (*Cheilopora*) *prelucidioides* Canu and Bassler, 1920	Jacksonian
Exechonella auriculata, new species	Vicksburgian.
Exechonella (*Phylactella*) *magniporosa* Canu, 1918	Lutetian.

2. AVICULARIA ABSENT

Exechonella pumicosa Canu and Bassler, 1928	Recent (Gulf of Mexico).
Exechonella (*Cyclicopora*) *grandis* Duvergier, 1921	Aquitanian.
Exechonella (*Lepralia*) *lucernula* Manzoni, 1869	Miocene.

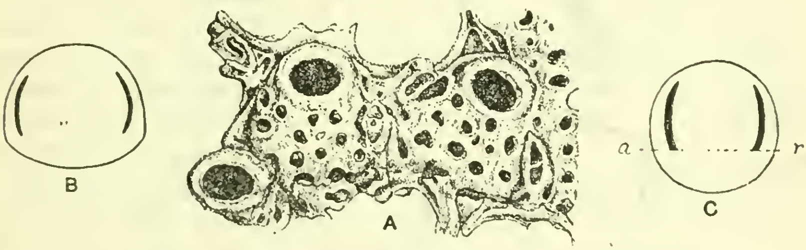

FIG. 28.—Genus *Exechonella* Canu and Bassler, 1927

A, B. *Exechonella magna* MacGillivray, 1895. A. Zooecia, ×26. The ectocyst is hidden by the porous calcified frontal. (After MacGillivray, 1895.) B. Operculum, ×85 (Philippines).

C. *Exechonella pumicosa* Canu and Bassler, 1928. Operculum, ×85 (Gulf of Mexico).

3. AVICULARIA ABSENT BUT VERY LONG PERISTOMIE PRESENT

Exechonella discoidea, new species	Recent (Philippines).
Exechonella (*Cellepora*) *tubulosa* D'Orbigny, 1851	Burdigalian.
Exechonella (*Tubucellaria*) *marginata* MacGillivray, 1895	Miocene.

The third group in which the ovicell is known, could perhaps be separated as a special genus, but the number of specimens known is really very small.

EXECHONELLA MAGNA MacGillivray, 1895

Plate 19, figs. 1–4

1895. *Hiantopora magna* MACGILLIVRAY, Monograph of the Tertiary Polyzoa of Victoria, Transactions Royal Society Victoria, vol. 4, p. 62, pl. 8, fig. 23, pl. 10, fig. 27.

Description.—The zoarium encrusts nullipores, sponges and shells. The zooecia are distinct, separated by a furrow, somewhat elongated, elliptical or orbicular; the frontal is convex, perforated by 10–15 large orbicular pores with small salient peristomes; it bears laterally two small triangular avicularia with pivot, in which the beak is salient and turned towards the base. The aperture is semielliptical, transverse; the peristome is thick and very salient.

Measurements.—

Aperture $\begin{cases} ha = 0.17 \text{ mm.} \\ la = 0.25 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.10 \text{ mm.} \\ lz = 0.85 \text{ mm.} \end{cases}$

Structure.—Our specimens were living at the time of dredging and provided with their ectocyst; we have therefore been able to recognize the true structure of the zooecia. The ectocyst is thick and forms on the interior a large chitinous sack attached to the frontal peristomie. The operculum remains attached to the ectocyst, but it is supported on the concave border of the aperture; it is therefore not arranged at the bottom of the peristomie as in the Phylactellidae. In consequence the frontal is only an adventitious frontal covering over the true opesium of the membraniporoid zooecia. The pores being round as in *Hiantopora* we suppose they have the same origin and that the frontal results from the union of the ramifications of one or several oral spines; but this is purely a hypothesis.

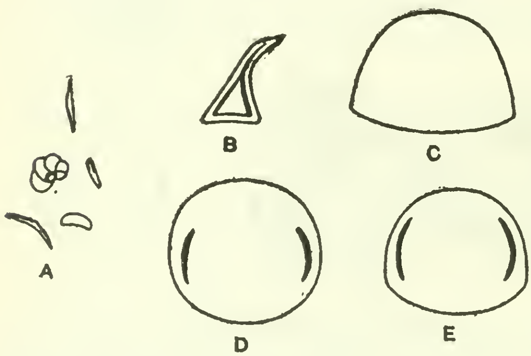

FIG. 29.—*Exechonella magna* MacGillivray, 1895

A. Organisms found in cell, ×85. B. Mandible, ×85. C. Operculum, ×85, without muscular attachments. D, E. Two opercula, ×85.

The zooecia are very deep and juxtaposed as can be seen in our figure representing the zoarial section. The structure of the frontal is very different from that of a tremocyst (fig. 4) in perfect conformity with the observations of Jullien regarding *Arachnopusia.*

MacGillivray, 1895, referred this species doubtfully to his genus *Hiantopora.* We can not see any real difference between his figures and our photographs.

Biology.—This is a species of quiet waters of little depths.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

Miocene of Australia (MacGillivray).

Plesiotypes.—Cat. No. 7966, U.S.N.M.

EXECHONELLA DISCOIDEA, new species

Plate 20, figs. 5, 6

Description.—The zoarium is discoidal, free, small. The zooecia are distinct, separated by a deep furrow, elongated, oval; the frontal is very convex and perforated by large pores with salient peristomes; the peristomie is long, smooth, oblique, tubular. The peristome is thin, orbicular, entire, laciniated or crenulated. The ovicell is small, punctured by small pores and opens into the peristomie above the apertura.

Measurements.—

Peristomice $\begin{cases} hpi = 0.30 \text{ mm.} \\ lpi = 0.30 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.1 \text{ mm.} \\ lz = 0.65 \text{ mm.} \end{cases}$

Affinities.—The long and tubular peristomie characterizes very well this species. The ectocyst is not visible; it is buried under the frontal. The frontal pores with the salient peristome are not tremopores for they are never traversed by the mesenchymatous fibers. According to Levinsen, 1909, these are lacunae left between the primitive costules, perfectly and regularly united together. Our specimens were dead.

Occurrence.—D. 5235. Nagubat Island, east coast Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

Division 3, COILOSTEGA Levinsen, 1909

Family OPESIULIDAE Jullien, 1888

Subfamily ONYCHOCELLIDAE Jullien, 1881

Genus ONYCHOCELLA Jullien, 1881

For description see Canu and Bassler, 1920. North American Early Tertiary Bryozoa, Bull. 106, U. S. National Museum, p. 105.

We have recently undertaken a revision of the known species and a more detailed study of specimens covered by their ectocyst. We have observed the following facts.

1. The dimensions of the opesium are quite variable. When the large opesia are adjacent to the smaller opesia a false appearance of opesial dimorphism appears (*Onychocella dupliciter* Canu and Bassler, 1920). In reality there are opesia of all sizes between these extreme cases. Often the elongated opesia are those of ovicelled zooecia.

2. The size of the opercular valve is constant and without relation to that of the subjacent opesium. This valve is more or less removed from the distal border of the zoarial mural rim.

3. The opesiular indentations are quite variable in the same species and according to the species. They are very little apparent in the species in which the proximal border of the opesium is concave.

They are clearly developed and deep in species where the proximal border of the opesium is convex. The intensity of calcification of the cryptocyst and the position of the opesiular muscles are the sole causes of these variations. We preserve the genus *Ogivalia* Jullien, 1881, for species absolutely deprived of opesiules. The great regularity of the opesium seems to indicate a special arrangement of the opesiular muscles and even their total absence.

4. The onychocellarium is always falciform; there is only a single membrane. It is dissymmetrical like the zooecia themselves, because the retractor muscles of the polypide are often inserted close to one of the proximal angles of the zooecia and not in the zooecial median axis.

ONYCHOCELLA SUBSYMMETRICA, new species

Plate 12, figs. 7, 8

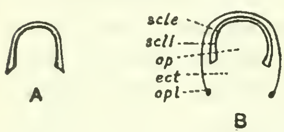

FIG. 30.—*Onychocella subsymmetrica*, new species

A. Operculum, ×85. B. Operculum attached to ectocyst, ×85; *scle*, exterior sclerite; *scli*, interior sclerite; *op*, operculum; *ect*, ectocyst; *opl*, base of fold with two black points.

Description.—The zoarium is flesh colored and encrusts nullipores and shells. The zooecia are distinct, united by their mural rim, hexagonal, very little elongated; the mural rim is thick and salient; the cryptocyst is flat and deep. The opesium is semielliptical, transverse, very close to the mural rim; the proximal border is somewhat convex and the two lateral indentations are of little depth and *almost symmetrical.* The onychocellarium is falciform, a little longer than the zooecium; its opesium is elliptical.

Measurements.—

Opesium B $\begin{cases} ho = 0.16 \text{ mm.} \\ lo = 0.18 \text{ mm.} \end{cases}$ Opesium a $\begin{cases} ho = 0.12 \text{ mm.} \\ lo = 0.14\text{–}0.18 \text{ mm.} \end{cases}$

Zooecium $\begin{cases} Lz = 0.40 \text{ mm.} \\ lz = 0.36 \text{ mm.} \end{cases}$

Opesium of onychocellarium $\begin{cases} ho = 0.20 \text{ mm.} \\ lo = 0.10 \text{ mm.} \end{cases}$ Onychocellarium $\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.22\text{–}0.24 \text{ mm.} \end{cases}$

Structure.—We have succeeded in securing a good opercular preparation. The opercular valve is bordered by a sclerite, little thickened; it is inserted into another exterior sclerite attached to the ectocyst. The ectocyst which surmounts the opesium is separated by a fold of the entire ectocyst; at the base of the fold are two black points which mark the attachment of the opesiular muscles. This opercular structure is absolutely identical with that of *Smittipora* as already noted by Levinsen in 1909.

Affinities.—The micrometric dimensions are intermediate between *Onychocella angulosa* Reuss, 1847, and *Onychocella dupliciter* Canu and Bassler, 1920. The two opesiular indentations are almost symmetrical. As in all the species of this genus there are larger opesia (B) producing a false cellular dimorphism.

Biology.—Almost all of our specimens were dead. This is a species of rather shallow waters, 19 to 37 fathoms. It can live at greater depth but it is very rare there.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 9′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 5′ 50″ N.; 121° 2′ 15″ E.; 19 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 4′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

D. 5577. Mount Dromedaria; north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Cotypes.—Cat. No. 7922, U.S.N.M.

ONYCHOCELLA (?) INARMATA, new species

Plate 12, figs. 9, 10

Description.—The zoarium encrusts other bryozoa particularly *Adeonellopsis* and *Retepora*. The zooecia are distinct, united by their mural rim, elongated, oval, narrowed inferiorily; the mural rim is thin, salient, granular; the cryptocyst is of little depth, flat, smooth. The opesium is semielliptical, very elongated, occupying more than half of the zooecial length; the polypidian convexity is very irregular, always dissymetrical and sometimes replaced by a very salient and excentric serrate denticle; the opesiular indentations are deep irregular, dissymetrical. The ovicell is endozooecial and marked exteriorily by a simple cushion little salient and narrow.

Measurements.—Zooecial length =0.45–0.55 mm.

Variations and structure.—The micrometric measurements are really so irregular that it is impossible to note them. The zooecia are arranged in rather constant linear series; the primoserial zooecia are small, while the initial zooecia of the series are very large.

The characteristic of this species is the serrate denticle which replaces sporadically the polypidian convexity. It resembles that of *Acanthodesia savarti* Audouin, 1826, *Acanthodesia limosa* Waters and *Hemiseptella labiata* Busk, 1885, but it is always eccentric.

We have collected a dozen dead specimens none of which had the onychocellarium. The absence of this organ as well as the special form of the ovicell are perhaps the characteristics of a different genus. Our material was not sufficient and we maintain this species in *Onychocella* because of the general form of the opesium.

Occurrence.—D. 5478. Pacific, Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; sh.

Cotypes.—Cat. No. 7923, U.S.N.M.

Genus RECTONYCHOCELLA Canu and Bassler, 1917

We now know numerous recent species of this important genus which differs from *Velumella* Canu and Bassler, 1917 only in its rarely visible opesiular indentations, these corresponding to the opesiular muscles placed low and to less calcification of the frontal. We have noted the same phenomenon in *Dacryonella*. In the equitorial zone this is a genus of depths from 296 to 622 meters with a temperature of 12.4° to 13° Centigrade. In the northern part of the temperate zone it is found at 210 meters but it is very rare here. It is an equatorial genus especially, little sensible to variations of temperature of the pelagic depths. The following species can be cited for this genus.

Rectonychocella (*Smittipora*) *abyssicola* Smitt, 1872 (fig. 61)	Recent, Gulf of Mexico.
Rectonychocella (*Onychocella*) *solida* Nordgaard, 1907	Recent, Atlantic.
Rectonychocella ovalis, new species	Recent, China Sea.
Rectonychocella grandipora, new species	Recent, Philippines.
Rectonychocella bilamellaria Canu and Bassler, 1920	Eocene, United States.
Rectonychocella semiluna Canu and Bassler, 1920	Eocene, United States.
Rectonychocella tenuis Canu and Bassler, 1920	Eocene, United States.
Rectonychocella elliptica Canu and Bassler, 1920	Eocene, United States.
Rectonychocella (*Eschara*) *didyma* D'Orbigny, 1852	Cretaceous, Europe.
Rectonychocella (*Biflustra*) *ligeriensis* D'Orbigny, 1852	Cretaceous, Europe.

An important biological observation to be noted is that the species of *Rectonychocella* resist the pressure of the great depths better than the species of *Velumella*. The bathymetric changes could therefore in that group of animals be the causes of variations and of specific differences. It is in error then that some paleontologists attribute the variations of species only to the contraction of the tropical zone.

The paleontological interpretation of these observations is very interesting. The disappearance of the genus in the Vicksburgian indicates an almost total elevation of the sea bottom. This phenomenon must have occurred slowly and progressively for considering the size of the zooecia, the upper Jacksonian of the Chipola River and Sepulga River localities indicate water of less depth than the Middle Jacksonian of Wilmington, North Carolina, and the largest species was moreover from the Lower Jacksonian of Jackson, Mississippi.

RECTONYCHOCELLA OVALIS, new species

Plate 12, fig. 11

Description.—The zoarium is free and bilamellar. The zooecia are distinct, separated by a furrow, elongated, ogival; the mural rim is very thin, rounded, little salient, finely granular; the cryptocyst is concave, smooth, of little depth. The opesium is *oval*, the point at top, without opesiular indentations. The onychocellarium is broad, fusiform of the same length as the zooecia; its opesium is elliptical.

Measurements.—

Opesium of zooecium	$ho = 0.24$ mm. $lo = 0.20$ mm.	Zooecium	$Lz = 0.44–0.48$ mm. $lz = 0.36$ mm.
Opesium of onychocellarium	$ho = 0.16$ mm. $lo = 0.10$ mm.	Onychocellaria	$Lon = 0.50$ mm. $lon = 0.40$ mm.

Affinities.—This species differs from *Rectonychocella grandipora* in its smaller dimensions, in its superficial cryptocyst and in the total absence of opesiular indentations. Our specimens were rare and dead.

Occurrence.—

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S. co.; 13° C.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S., co.; 13.2° C.

Holotype.—Cat. No. 7925, U.S.N.M.

RECTONYCHOCELLA GRANDIPORA, new species

Plate 13, figs. 5–7

Description.—The zoarium is free and bilamellar. The zooecia are distinct, large, elongated, ogival, united by their mural rim; the mural rim is thin, salient, round, smooth; the cryptocyst surrounds the opesium and is deep, concave, smooth. The opesium is *large*, oval, very finely denticulated, with a proximal border a little concave or slightly convex. The ovicell is endozooecial. The onycho cellarium is elliptical, very elongated, a little longer than a zooecium; its beak is rounded and its opesium is median and elliptical.

Measurements.—

Opesium of zooecium	$ho = 0.30–0.35$ mm. $lo = 0.25–0.30$ mm.	Zooecia	$Lz = 0.60$ mm. $lz = 0.40–0.50$ mm.
Opesium of onychocellaria	$ho = 0.30–0.35$ mm. $lo = 0.15$ mm.	Onychocellaria	$Lon = 0.60–0.90$ mm. $lon = 0.35$ mm.

Affinities.—When the proximal border of the opesium is convex the opesiular indentations are somewhat visible. The opesium is almost orbicular in the broad zooecia. The onychocellarium is always primoserial but all the primoserial zooecia are not onychocellaria. Our specimens were dead.

We have found at Tinagta Pass, Sulu Archipelago, in the vicinity of the Celebes Sea, a species still larger, but the specimens deprived of onychocellaria were not sufficient for description.

Occurrence.—

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

Cotypes.—Cat. Nos. 7926–7928, U.S.N.M.

Genus VELUMELLA Canu and Bassler, 1917

In our studies on the bryozoa of the Gulf of Mexico we have noted that the genus *Smittipora* Jullien was established on a bad interpretation of an incomplete figure, a combination of errors which necessitates the suppression of the genus. It is possible that Smitt's figure represents *Velumella americana* Canu and Bassler but this can not be proved. We are now convinced that opesial polymorphism is the general rule in all the Onychocellae and for that reason we suppress our genus *Diplopholeos.*

The recent genotype was badly chosen, but it was the only species known in 1917. It is preferable to add as a second genotype *Velumella americana* Canu and Bassler, 1928, from the Gulf of Mexico, a species easily collected and already well studied.

The known species of *Velumella* are listed below:

Velumella (*Eschara*) *argyrias* D'Orbigny, 1852	Cretaceous.
Velumella (*Eschara*) *callirhoe* D'Orbigny, 1852	Cretaceous.
Velumella (*Eschara*) *chloris* D'Orbigny, 1852	Cretaceous.
Velumella levigata Canu and Bassler, 1920	Eocene.
Velumella plicata Canu and Bassler, 1920	Eocene.
Velumella (*Diplopholeos*) *fusiforme* Canu and Bassler, 1920	Eocene.
Velumella (*Diplopholeos*) *sagitellarium* Canu and Bassler, 1920	Eocene.
Velumella (*Diplopholeos*) *sagittarium* Canu and Bassler, 1920	Eocene.
Velumella (*Diplopholeos*) *parvuliporum* Canu and Bassler, 1920	Eocene.
Velumella (*Diplopholeos*) *lineatum* Canu and Bassler, 1920	Eocene.
Velumella (*Membranipora*) *depressa* MacGillivray, 1895	Miocene.
Velumella americana Canu and Bassler, 1928	Recent (Gulf of Mexico).
Velumella philippinensis, new species	Recent (Phillippines).
Velumella (*Onychocella*) *levinseni* Canu and Bassler, 1917 (genotype).	Recent (locality unknown).
Velumella acutirostris Canu and Bassler, 1928	Recent (Brazil).
Velumella tuberculata Canu and Bassler, 1928	Recent (Brazil).
Velumella harmeriana, new name (*Smittipora abyssicola* Harmer, 1926).	Recent (Malasia)
Velumella (*Smittipora*) *cordiformis* Harmer, 1926	Recent (Malasia)

This is an equatorial genus.

VELUMELLA PHILIPPINESIS, new species

Plate 13, figs. 1–4

Description.—The zoarium encrusts shells. The zooecia are distinct, united by their mural rim, elongated, rectangular; the mural rim is thick, salient, flat, with sharp or fringed termen; the cryptocyst is deep, somewhat concave, raised toward the opesium, smooth or sometimes granulated. The opesium is semielliptical, very little elongated; the proximal border is very little convex and bears two small lateral symmetrical and very regular indentations. The oviceII is endozooecial. The onychocellarium is primoserial, as large as a

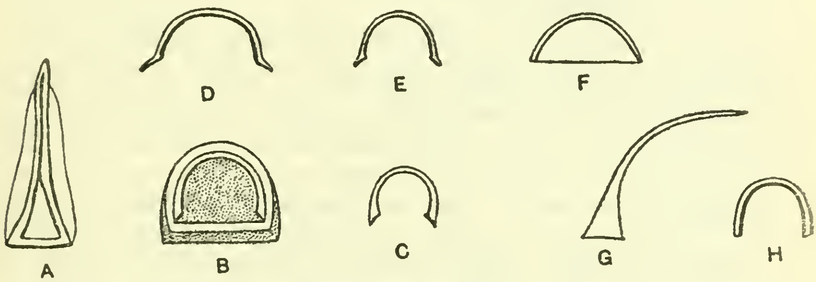

FIG. 31.—*Velumella philippinensis*, new species, and also other species

A. Mandible of onychocellarium, ×85. B. Much chitinized operculum, ×85. Around each opercular valve there is a chitinous peristome supported on the zooecial mural rim. C. Opercular valve, nonchitinized, ×85. D, E. *Dacryonella trapezoides*, new species. Large and small opercular valves, ×85. F. *Micropora rimulata*, new species. Operculum, ×85. G, H. *Cupularia umbellata* DeFrance, 1823. G. Seta of vibraculum, ×85. H. Opercular valve, ×85.

zooecium; its beak is narrow or rounded; its opesium is median, oval, with the point below.

Measurements.—

Opesium (small zooecia)	$ho = 0.12$ mm. $lo = 0.10$ mm.	Zooecia (small)	$Lz = 0.50$ mm. $lz = 0.32$ mm.
Opesium (large zooecia)	$ho = 0.18$ mm. $lo = 0.14$ mm.	Zooecia (large)	$Lz = 0.50$–0.60 mm. $lz = 0.30$–0.36 mm.
Opesium of onychocellarium	$ho = 0.20$ mm. $lz = 0.10$ mm.	Onychocellarium	$Lon = 0.50$ mm. $lon = 0.24$ mm.

Structure.—The opercular valve is bordered by a sclerite which fits into an exterior sclerite attached to the ectocyst. It is absolutely similar to that in *Onychocella*. It is sometimes strongly chitinized and has the opaque aspect of our Figure 2.

The rachis of the onychocellarium is bordered inferiorily by a double sclerite; the interior sclerite is median and thickened in the superior linear portion. The two membraneous wings are small, very thin, slightly contracted at the superior two-thirds and rounded at their extremity.

The opesium is often bordered by a little salient peristome, the proximal border of which easily closes the hypostege. The onychocellarium is always primoserial but all the primoserial zooecia are not necessarily onychocellaria.

Biology.—Almost all of our specimens were living, but the ovicells were very rare. This is a species of rather shallow waters, 20 to 37 fathoms. It incrusts shell fragments, nullipores and foraminifera. Our speciments were in reproduction February 16, 1908. The species seems to prefer warm waters.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 4′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.

D. 5192. Jilantaguan Island, off northern Cebu Island; 11° 09′ 15″ N.; 123° 50′ E.; 32 fathoms; green S.

Cotypes.—Cat. Nos. 7929–7932, U.S.N.M.

Subfamily Microporidae Hincks, 1880

Genus DACRYONELLA Canu and Bassler, 1917

When we created this genus for two fossil species of the Jacksonian we had no idea that it was so well represented in the recent seas. A recent species therefore could be added as a second genotype, and we choose *Dacryonella trapezoidea* for this purpose.

The various known species can be arranged in two groups, those which have interzooecial avicularia and those which have avicularia symmetrically placed on the distal border of the mural rim. Only *D. ogivalina* and *D. papillata* belong to the second group. These differences are not of generic order.

As in *Onychocella* and *Velumella*, the place of the opesiular muscles is rather variable. When they are placed very low the opesiular indentations are little apparent and the opesia are very large, as, for instance, *D. papillata*. When they are placed very high the opesiular indentations are deep and the opesia are small, as, for instance, *D. subvespertilio* and *D. vespertilio*. Moreover, in the two genera mentioned there is a kind of cellular dimorphism; but we know that here it appears to be in relationship with the irregularities of the substratum.

The species of this genus did not live in very deep waters but lived from preference at depths of 30 to 60 meters. Only the robust *D. ogivalina* with opesiular muscles placed very low could live up to 170 meters. The temperature observed, 17.2° and 24.2° C., did not seem to influence their life.

Species of *Velumella* are, on the contrary, bryozoa of the high sea. The only anatomical difference between the two genera is that of their avicularia. Very powerful, much developed, and quite complete in *Velumella,* they are very minute and elementary in *Dacryonella.* It must, then, be supposed that the onychocellaria are organs for adaptation to great depths and to bathymetric variations.

Dacryonella is a special genus of the equatorial zone.

The known species of this genus are:

Dacryonella (*Repteschariella*) *transversa* D'Orbigny, 1852	Cretaceous.
Dacryonella (*Homalostega*) *vespertilio* Marsson, 1887	Cretaceous.
Dacryonella (*Homalostega*) *pavonia* Marsson, 1887	Cretaceous.
Dacryonella octonaria Canu and Bassler, 1920	Eocene.
Dacryonella octonaria minor Canu and Bassler, 1920	Eocene.
Dacryonella ogivalis Duvergier, 1921	Miocene.
Dacryonella ogivalina, new species	Recent.
Dacryonella (*Membranipora*) *minor* Hincks, 1885	Recent.
Dacryonella trapezoides, new species	Recent.
Dacryonella subvespertilio, new species	Recent.
Dacryonella typica Canu and Bassler, 1928	Recent (Mexico).

DACRYONELLA MINOR Hincks, 1885

Plate 13, Figs. 9–12

1881. *Membranipora trifolium* var. *minor* Hincks, Annals and Magazine of Natural History, ser. 3, vol. 6, p. 19 (sep.) pl. 11, fig. 6.

1885. *Membranipora trifolium* var. *minor* Hincks, Annals and Magazine of Natural History, ser. 5, vol. 15, p. 299 (sep. 147), pl. 8, fig. 7

Measurements.—

SMALL ZOOECIUM

$$\text{Opesium}\begin{cases} ho = 0.15 \text{ mm.} \\ lo = 0.11 \text{ mm.} \end{cases} \qquad \text{Zooecium}\begin{cases} Lz = 0.35 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$$

LARGE ZOOECIUM

$$\text{Opesium}\begin{cases} ho = 0.25 \text{ mm.} \\ lo = 0.20 \text{ mm.} \end{cases} \qquad \text{Zooecium}\begin{cases} Lz = 0.45 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$$

Affinities.—On the same zoarium there are both large and small zooecia according to the irregularities of the substratum. The large zooecia are in the hollows and the small ones on the elevations. The large zooecia have a small cryptocyst as figured by Hincks (1885), while the small zooecia have a large cryptocyst (Hincks, 1881). It may therefore be possible that contrary to the opinion of Waters, 1898, all of Hincks specimens belong to the same species.

In this species the small avicularium is interzooecial and placed at the base of each zooecium; it is oval or triangular and its beak is very salient. The distal border of the mural rim bears sometimes two avicularia placed almost symmetrically. This double arrangement exists also in the species from the Jacksonian.

The opesiular indentations are very shallow and very often they even do not exist. The ectocyst is quite transparent and the opercular valve is borne upon the distal border of the mural rim. The ovicell is very small and endozooecial.

According to Waters, 1898, the species from Bahia (1881) can not be that from Tahiti (1885). As he has examined the types, we accept his determination. Our specimens appear to be related to the species from Tahiti figured by Hincks, 1885. We are not certain of our determination, as Hincks did not give the micrometric measurements.

Biology.—Our specimens encrust shells and spines of echinoids. They were dead except those from locality D. 5147. The species was in reproduction, February 16, 1908.

Occurrence.—

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Salade Islands, Sulu Archipelago; 5° 41′ 40″ E.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5235. Nagubat Island, east coast of Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

Chatham Island (Waters); Red Sea (Waters).

Pacific: Tahiti (Hincks, 1885).

Plesiotypes.—Cat. Nos. 7933, 7934, U.S.N.M.

DACRYONELLA OGIVALINA, new species

Plate 13, fig. 8

Description.—The zoarium encrusts pebbles and shells. The zooecia are distinct, separated by a shallow furrow, little elongated, broad, generally *ogival;* the mural rim is small, round, little salient; the cryptocyst is smaller than the opesium, little deep, smooth. The opesium is large, ogival, little elongated, somewhat convex at the distal border. The small avicularia are interzooecial and placed at the base of each zooecium; they are triangular, with slender beak.

Measurements.—

Opesium $\begin{cases} ho = 0.20\text{–}0.22 \text{ mm.} \\ lo = 0.18\text{–}0.20 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.48\text{–}0.50 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Affinities.—The distal edge of the mural rim bears sometimes two small avicularia arranged symmetrically. The species differs from *Dacryonella trapezoides* in its small interzooecial avicularia, not arranged in pairs on the distal border of the mural rim. It has much resemblance to *Dacryonella minor* Hincks, 1885, but its larger micrometric dimensions are not in accord with the name given by the English author.

The opesiular indentations are rarely apparent and the opesium is never contracted at the level of articulation of the opercular valve. Our specimens were dead.

Occurrence.—

D. 5144. Jolo Light, Jolo; 6° 5′ 50″ N.; 121° 2′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5217. Anima Sola Island between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.; 17.2° C.

Holotype.—Cat. No. 7935, U.S.N.M.

DACRYONELLA TRAPEZOIDES, new species

Plate 14, figs. 2, 3

Description.—The zoarium encrusts nullipores. The zooecia are distinct, separated by a deep furrow a little elongated, oval, the point above; the mural rim is broad, salient; the cryptocyst is shallow, somewhat convex, smooth and never surrounding the opesium. The opesium is large, terminal, semielliptical, very little transverse, *trapezoid* in form. The ovicell is endozooecial, small, convex, smooth, transverse. Two small triangular avicularia are placed on the distal border of the mural rim; the beak is turned towards the median zooecial axis.

Measurements.—

Opesium $\begin{cases} ho = 0.20\text{–}0.22 \text{ mm.} \\ lo = 0.20\text{–}0.25 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.55 \text{ mm.} \\ lz = 0.45 \text{ mm.} \end{cases}$

Structure.—The opercular valve is a transverse arch supported on the interior part of the distal border of the mural rim; it is bordered by a very much thickened sclerite enclosed in a very thin sclerite attached to the ectocyst. This is the usual structure in the Microporidae. The dimensions on the same specimen are quite variable.

At the bottom of the opesium, almost at the level of the hinge of the opercular valve there are two small symmetrical fosettes.

The place of the opesiular muscles is indicated on the ectocyst by two black points nonsymmetrically located. The opesiular indentations to which they correspond are little deep and very irregular.

Biology.—Our specimens were living, ovicelled and preserved the ancestrula. The extrusion of the larvae was early in February, 1908.

Affinities.—This species differs from *Dacryonella subvespertilio*, in which the avicularia are also placed on the mural rim, in its large micrometric dimensions and in its opesiules placed much lower.

Occurrence.—

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Cotypes.—Cat. No. 7936, U.S.N.M.

DACRYONELLA SUBVESPERTILIO, new species

Plate 14, fig. 1

Description.—The zoarium encrusts foraminifera. The zooecia are distinct, united by their mural rim, broad, often transverse; the mural rim is very thin, salient, round; the cryptocyst is large, little deep, smooth, somewhat convex. The opesium is small, trifoliated, transverse; the proximal border is convex with two lateral opesiular indentations rather deep and rounded. The distal border of the mural rim bears two small triangular avicularia, arranged transversely, the point directed towards the median axis of the zooecia.

Measurements.—

$$\text{Opesium}\begin{cases} ho = 0.19 \text{ mm.} \\ lo = 0.11 \text{ mm.} \end{cases} \qquad \text{Zooecia}\begin{cases} Lz = 0.35 \text{ mm.} \\ lz = 0.40\text{-}0.45 \text{ mm.} \end{cases}$$

Affinities.—This species much resembles *Dacryonella vespertilio* Marsson, 1887, from the Cretaceous (Campanian) of the Island of Rugen. It differs in its small avicularia placed transversely on the mural rim and not interzooecial and parallel to the zooecial axis.

The cryptocyst is very finely granulated, but this character is little apparent at the magnification of our photographs. Our specimens were dead.

Occurrence.—D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

Holotype.—Cat. No. 7937, U.S.N.M.

Genus CALESCHARA MacGillivray, 1880

The ovicell is endozooecial, enormous, very salient and quite convex. The polypidian lamella is very long; the opesiules are long and linear. Neither avicularia nor onychocellaria.

Genotype.—*Caleschara denticulata* MacGillivray, 1869.

Range.—Eocene (Montian)—Recent.

The opesiular muscles are here very powerful and united in long linear bundles. This is an equatorial genus. The different species can live both in the great depths (598 meters) and in the lesser depths (36 meters).

The polypidian lamella is the anterior wall of a kind of incomplete polypide tube for the other walls do not exist; it is distinctly separated from the cryptocyst.

The known species are as follows:

Caleschara (Membranipora) squamosa Pergens, 1886	Eocene.
Caleschara denticulata MacGillivray, 1869	Miocene.
Caleschara plana, new species	Miocene.

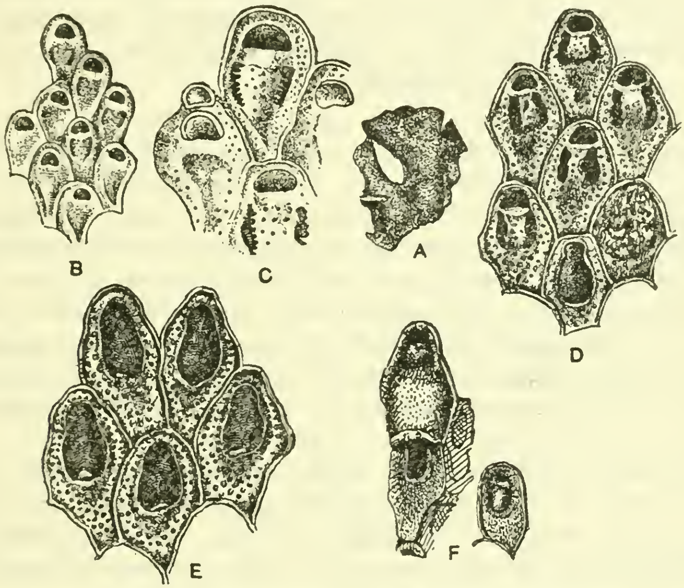

FIG. 32.—Genus *Caleschara* MacGillivray, 1869

A–E. *Caleschara denticulata* MacGillivray, 1869. A. Zoarium natural size. B. Portion magnified. C. Several zooecia more highly magnified, one cell still covered with the ectocyst, the others showing the calcareous lamina and denticulated openings. (Recent, after MacGillivray, 1880.) D. A fossil specimen showing the lateral fissures and crossbar, ×28. E. Group of zooecia of fossil specimen with the central portion and crossbar worn away. D, E. After MacGillivray, 1895.)

F. *Caleschara parva* Maplestone, 1900. Fossil specimen, ×25, showing the large ovicell. (After Maplestone, 1900.)

Caleschara parva Maplestone, 1900	Miocene.
Caleschara denticulata MacGillivray, 1869	Recent, Australia.
Caleschara (Steganoporella) minuta Maplestone, 1908	Recent, Gilbert Island.
Caleschara laxa, new species	Recent, Philippines.
Caleschara junctifera, new species	Recent, Philippines.
Caleschara levinseni Harmer, 1926	Recent, Malay region.

This is an equatorial genus.

CALESCHARA JUNCTIFERA, new species

Plate 14, figs. 7, 8

Description.—The zoarium is free and formed of small quadrangular rods. The zooecia are distinct, separated by a furrow, elongated, subelliptical; the mural rim is thick, round, salient, granulated; flat; the superior cryptocyst is a very long, convex, true polypidian lamella, separated from the mural rim by opesiular indentations at the bottom of which are three or four small trabeculae or connecting bars. The opesium is large, very elongated, semielliptical; the proximal border is elevated and laciniated.

Measurements.—

Opesium $\begin{cases} ho = 0.44 \text{ mm.} \\ lo = 0.20 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.80 \text{ mm.} \\ lz = 0.36\text{–}0.40 \text{ mm.} \end{cases}$

Affinities.—The long polypidian lamella is very fragile and complete examples of it are very rare; the small trabeculae which unite it to the mural rim and strengthen it are themselves very fragile. Most often the opesium is a large opening with its proximal border bearing a kind of serrate denticle. There are, moreover, all the stages between the small denticle and the completely developed polypidian lamella. We have not observed the ovicell. Our specimens were dead.

The species resembles very much *Acanthodesia savartii cetrata* Harmer, 1926, where the exaggerated development of the serrate denticle makes it resemble a polypidian lamella. It differs however in the regularity and the great convexity of the median process, in the presence of a greater number of trabeculae, in the greater micrometric measurements and in its granulated cryptocyst.

This species differs from the quadrangular form of *Caleschara denticulata* MacGillivray, 1869, in its narrower opesiular indentations with trabeculae.

Occurrence.—D. 5235. Nagubat Island, east coast of Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; soft M.

Cotypes.—Cat. No. 7938, U.S.N.M.

CALESCHARA LAXA, new species

Plate 14, figs. 5, 6

Description.—The zoarium is free, unilamellar or encrusting pebbles and nullipores. The zooecia are distinct, joined by their mural rims or separated by a small discontinuous furrow, hexagonal, broad, and spread out. The mural rim is thick, granulated, broad, rounded, little salient; the cryptocyst is shallow, plain, granulated; the polypidian lamella is subcylindrical, very salient, bordered by two very deep and divergent opesiular indentations. The opesium is orbicular, the proximal border straight. The ovicell is endozooecial, very large, quite convex, smooth.

Measurements.—

Opesium $\begin{cases} ho = 0.25 \text{ mm.} \\ lo = 0.25 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.70 \text{ mm.} \\ lz = 0.65 \text{ mm.} \end{cases}$

Structure.—The general trifoliate aspect of the opesium and the absence of onychocellaria caused us to classify our first specimens in *Floridinella*, but the discovery of the ovicell which is perfectly identical with that of the genotype, *Caleschara denticulata* MacGillivray, 1869, obliges us to introduce the species in *Caleschara*. The differences, polypidian convexity shorter and opesiules united to the opesium are in reality only differences in calcification.

The opercular valve is supported on the distal border of the mural rim but it is detached from it laterally. The ectocyst is thick and of a beautiful flesh color; it is often pigmented with green on the same zoarium.

Affinities.—This species differs from *Caleschara levinseni* Harmer, 1926, from the Malay region in its much wider zooecia (0.65 mm. and not 0.50 mm.) in its shorter polypidian lamella and in its ovicell placed on a zooecium with ordinary and reduced cryptocyst.

This species reveals the structure of the two Lower Eocene species *Planicellaria eocena* Pergens, 1886, and *Membranipora squamosa* Pergens, 1886. The first provided with avicularia and articulated can be maintained in a closely related but distinct genus which, however, is not at all D'Orbigny's genus.

Biology.—Many specimens were living; they were in reproduction on the 15th of February, 1908. The large dimensions of this species as well as its vigorous bundles of opesiular muscles permit it to resist the great depth, for it has been dredged as deep as 551 meters.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S., Sh.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″E.; 19 fathoms; co. S.

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy S.; 17.2° C.

D. 5574. Simaluc Island, N. of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

Cotypes.—Cat. Nos. 7940, 7941, U.S.N.M.

Genus MICROPORA Gray, 1848

MICROPORA RIMULATA, new species

Plate 14, fig. 4

Description.—The zoarium encrusts pebbles. The zooecia are distinct, adjacent through their mural rim, ogival, a little elongated or transverse; the mural rim is thin and little salient; the cryptocyst is large, porous, shallow, flat, or very little convex; the opesiules are very small lateral slits. The opesium is small, transverse, semielliptical. The ovicell is endozooecial, salient, convex, much narrower than the zooecium; the opesium of the ovicelled zooecia is much larger than the others. A small triangular transverse avicularium surmounts some zooecia; its beak is turned toward the base.

Measurements.—

Opesium (ordinary) $\begin{cases} ho = 0.07 \text{ mm.} \\ lo = 0.15 \text{ mm.} \end{cases}$ Opesium (ovicelled) $\begin{cases} ho = 0.10 \text{ mm.} \\ lo = 0.20 \text{ mm.} \end{cases}$

Zooecium $\begin{cases} Lz = 0.65 \text{ mm.} \\ lz = 0.60\text{–}0.70 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Micropora stenostoma* Busk, 1852, in its much narrower ovicells and in its opesiules of very small slits instead of large pores. It differs from *Micropora brevissima* Waters, 1904, from the Antarctic in its ovicells of less height and in its opercular dimorphism. It differs from *Micropora coriacea* Esper, 1791, in its large dimensions and its linear opesiules.

The small opesiules are quite variable and are sometimes reduced to minute pores.

Occurrence.—D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy S.; 17.2° C.

Holotype.—Cat. No. 8343, U.S.N.M.

Genus VIBRACELLA Waters, 1891

The ovicell is endozooecial. The cryptocyst is developed. The opesium frequently bears lateral opesiular indentations. There are auriform avicularia sporadically intercalated between the zooecia. The colonies are generally free and orbicular.

Genotype.—*Vibracella* (*Cellepora*) *trapezoidea* Reuss, 1847.

Range.—Eocene (Lutetian)—Pliocene.

Following are the known species:

SOUTHERN HEMISPHERE

Vibracella grandicella, new species	Miocene (Australia).
Vibracella trifoliata, new species	Miocene (Australia).

NORTHERN HEMISPHERE

Vibracella orbicularis Canu, 1907	Lutetian of Paris Basin.
Vibracella (*Selenaria*) *auriculata* Canu and Bassler, 1923.	Claibornian of Alabama.
Vibracella (*Pavolunulites*) *buski* Reuss, 1867	Lower Oligocene.
Vibracella vicksburgica, new species	Vicksburgian of Mississippi.
Vibracella trapezoidea Reuss, 1847	Priabonian, Vicentin, Italy.
Vibracella miocenica Seguenza, 1877	Tortonian of Italy.
Vibracella seguenzai Neviani, 1898	Tortonian and Plaisancian of Italy.

The genus *Vibracella* differs from *Selenaria* Busk, 1854, only in the form of the vibracula. They are auriform and not ornamented with a convex frontal more or less finely perforated. This character does not appear to correspond to a difference of any important function. Also in our opinion it would be convenient to combine *Selenaria* and *Vibracella* and to consider the latter simply as a division of the genus developed in the Northern Hemisphere up to the Pliocene. The branch with cribrimorph vibracula (*Selenaria*) arose in the southern seas and still exists in the equatorial zone and has never crossed the Equator.

Genus MONSELLA Canu, 1900

The zoarium is articulated and radicellate. The polypidian lamella is very long; the opesiules are very long linear slits. The opesium is orbicular. The avicularia are arranged in all the interzooecial angles.

Genotype.—*Monsella* (*Planicellaria*) *eocena* Pergens, 1886. Eocene (Montian).

Genus ANDREELLA Jullien, 1888

The cryptocyst is complete; it is perforated laterally by an opesiule in the form of a cross. The opesium is semilunar with a proximal border more or less concave. The avicularia are constant and epizooecial. 10 tentacles.

Genotype.—*Andreella* (*Micropora*) *uncifera* Busk, 1884. Recent.

In *Micropora* the muscular fibers unite their tendons into a single one in order to traverse a small opesiule. The reunion is not made in *Andreella*. Moreover the avicularia are here constant and not sporadic. These differences do not appear to be of generic order to recent authors and they consider *Andreella* as a subgenus of *Micropora*.

Family CALPENSIIDAE Canu and Bassler, 1923

This family and the seven genera referred here have been described and illustrated in our Late Tertiary Monograph of 1923.

Genus MICROPORINA Levinsen, 1909

MICROPORINA JAPONICA, new species

Plate 14, figs. 9–11

Description.—The zoarium is articulated; each segment is narrowed at the base and formed of 10 longitudinal rows of cells. The zooecia are distinct, united by their mural rim or separated by a furrow, very elongated, rectangular; the mural rim is thick, smooth, rounded, very salient; the cryptocyst is deep, flat, covered by a multitude of small tremopores, and elevated above in order to form the inferior lip of the opesium. The opesium is small, transverse, semielliptical. The two opesiules are large and placed in the vicinity of the opesium. The avicularium is placed at the base of each zooecium; it is oval, with pivot, with the beak turned towards the base.

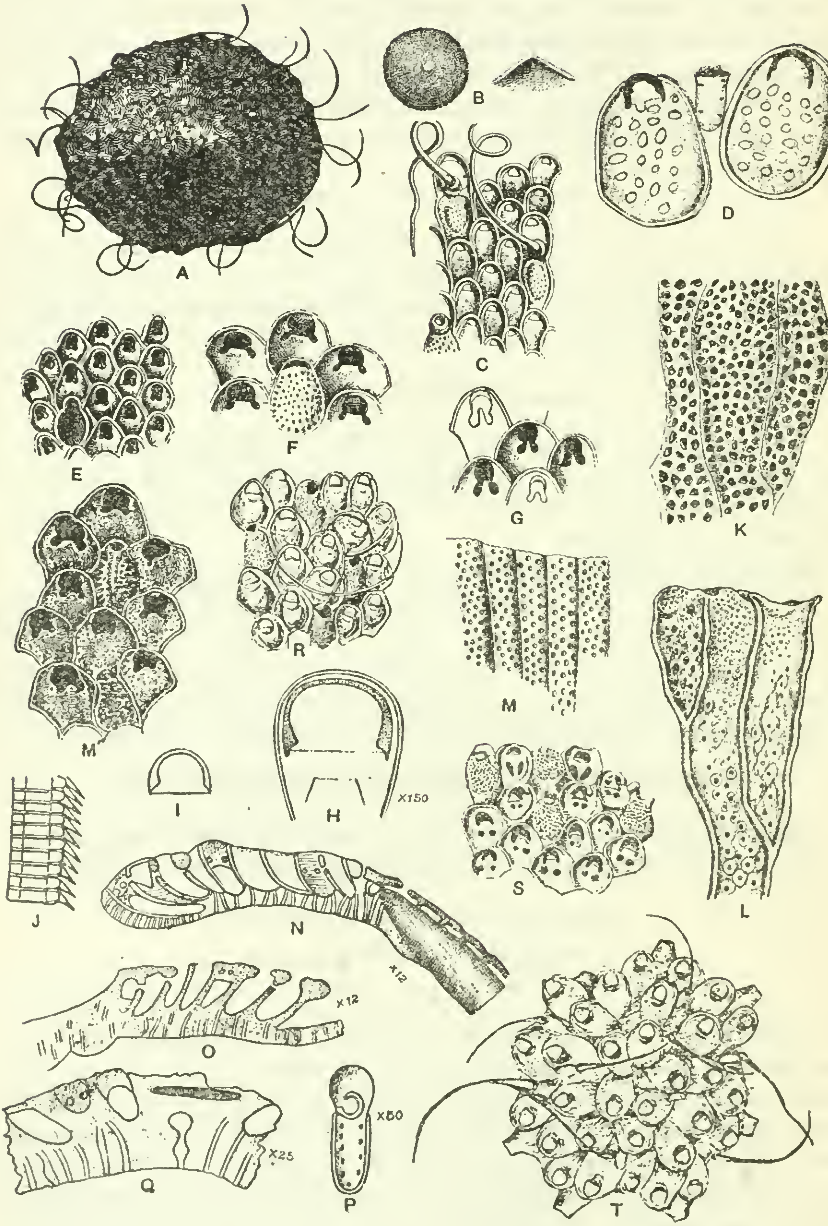

FIG. 33.—Genus *Selenaria* Busk, 1854

(Explanatory remarks on opposite page)

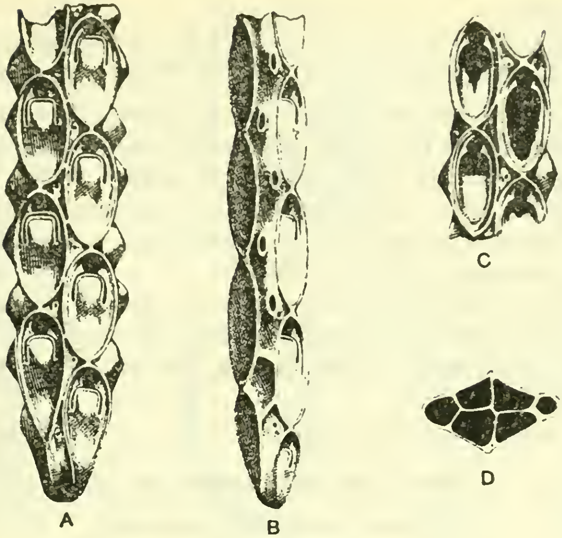

Fig. 34.—Genus *Monsella* Canu, 1900

A–D. *Monsella* (*Planicellaria*) *eocena* Pergens, 1886. A. Front view, ×25. B. Side view, ×25. C. Poorly preserved fragment, ×25, showing zooecia in which the anterior calcareous lamella is partly or totally destroyed. D. Transverse section, ×25. (A–D. After Pergens, 1886.) Eocene (Montian), of Belgium.

(Explanation of fig. 33)

A. *Selenaria flagellifera* Maplestone, 1910. Colony with its vibracula in movement, ×6. (After Maplestone, 1910.)

B–N. *Selenaria maculata* Busk, 1854. B. Colony, natural size. C. The zooecia and vibracula are covered by the ectocyst. (B, C. After Busk, 1854.) D. The membrane covering the front of the zooecium has trabeculae surrounding the operculum, ×85. (After Waters, 1889.) E, F, G. Zooecia without ectocyst showing the opesiular indentations. E. A recent specimen. (After Busk, 1874.) F, G. Fossil and recent specimens. (After Waters, 1887.) H. Operculum from inside, showing trabeculae, and below the operculum two muscles attached to the frontal membrane, ×150. I. Operculum, ×85. Size for comparison with Figure H. J. Portion of vibracular seta showing spinous fringe on one side, ×325. (H–J. After Waters, 1921.) K, L. Inner face of zoarium of fossil specimens. (K, L, M. After MacGillivray, 1895.) M. Inner face of a recent zoarium (after Busk, 1854); M[1]. zooecia enlarged. N. Sagittal section showing a piece of shell on which the colony has commenced to grow. It will be noticed that the early central zooecia are very small, ×12.

O. *Selenaria punctata* T. Woods, 1880. Section showing a piece from which the central supporting flake has disappeared, ×12.

P, Q. *Selenaria concinna* T. Woods, 1880. P. Vibraculum, ×50. At the distal end of the vibraculum there is an incomplete ring attached by a kind of stalk at one side of the vibraculum. Q. Section showing double expansion of a pore tube under the supporting flake, ×25. (N–Q. After Waters, 1921.)

R, S. *Selenaria parvipunctata* Maplestone, 1903. Zooecia with and without ectocyst. There are two opesiules perforating the cryptocyst. T. *Selenaria flagellifera* var. *minor* Maplestone, 1910. There are six marginal zooecia having a peculiar inverted infundibular peristome. (R–T. After Maplestone.)

Measurements.—

Opesium $\begin{cases} ho = 0.10 \text{ mm.} \\ lo = 0.15 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.90 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Affinities.—This species is very close to *Microporina borealis* Smitt 1867, but differs from it only in its smaller opesium and in its smaller zooecia (0.30 and not 0.40 mm.). It differs from *Microporina elongata* Hincks, 1881, in its large and non oblique avicularia. The longitudinal section shows that the avicularium is independent of the two zooecia between which it is placed.

Microporina is a genus of the northern portion of the temperate zone. Our very numerous specimens were all dead.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Cotypes.—Cat. No. 8349, U.S.N.M.

Genus CUPULARIA Lamouroux, 1821

CUPULARIA UMBELLATA Defrance, 1823

Plate 15, figs. 5–11

1907. *Cupularia umbellata* Calvet, Expeditions scientifique du *Travailleur* et du *Talisman*, p. 393.

1921. *Cupularia umbellata* Waters, Observations upon the relationships of the (Bryozoa) Selenariidae, etc., fossil and recent. Linnean Society's Journal, Zoology, vol. 34, p. 414 (not synonymy).

1923. *Cupularia umbellata* Canu and Bassler, North American Later Tertiary and Quaternary Bryozoa, Bull. 125, U. S. National Museum, pp. 76, 80, pl. 2, figs. 15–19 (bibliography, occurrence).

We are not in accord at all with Waters on the synonymy of the various species of *Cupularia*. He compares notably *Cupularia haidingeri* Reuss, 1847, with the present species; but the fossil is absolutely distinct and very well characterized by its spicules never united. This beautiful species has never been noted in the Pacific; it is probable that it is necessary to refer to it the species figured by Miss Robertson and to which we have given the name of *Cupularia robertsoniae*, our material for study being insufficient.

Waters ranges in *Cupularia lowei* Busk, 1859, all the irregular zoaria, more or less lobed. We did not believe that this difference is distinctly specific.

Structure.—The operculum is detachable; its proximal border is straight or concave. The cilium of the vibraculum is falciform; its articulation resembles somewhat that of the avicularia. Viewed on the interior and by transparency, the frontal is perforated laterally by the opesiules and in the middle by small irregularly arranged pores; the union of the lateral spicules is therefore not complete.

The tangential section through the interior face shows well the small pores discovered by Waters, 1921, which serve as passages for the zoarial hydrostatic muscles.

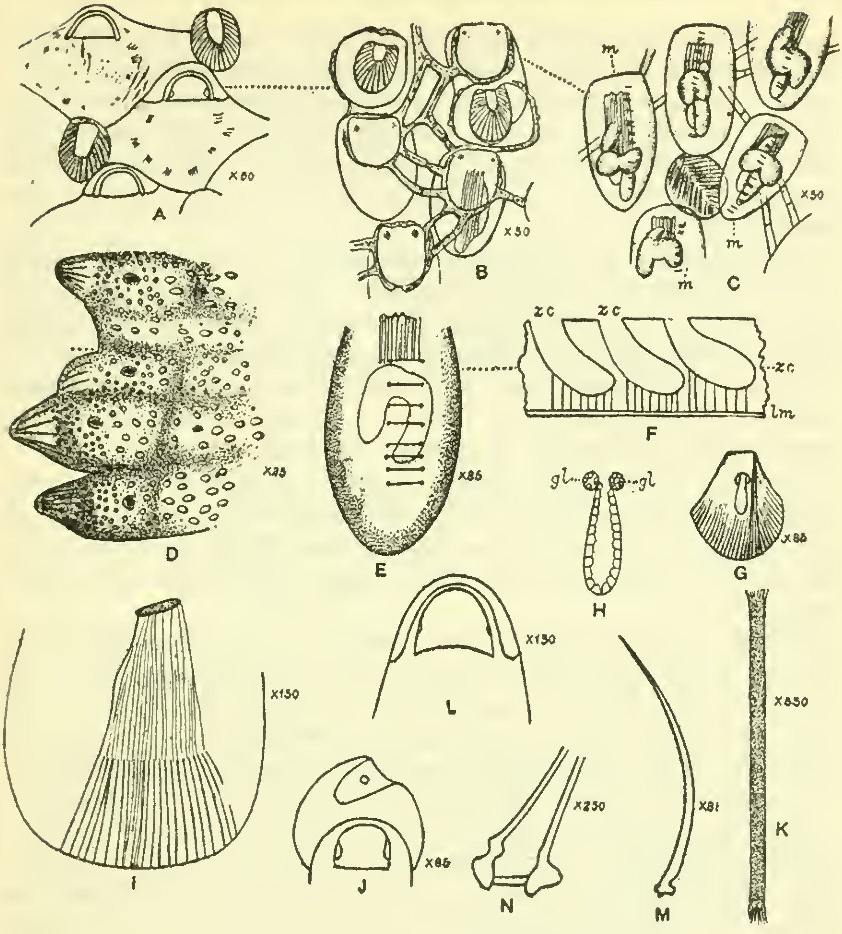

Fig. 35.—Genus *Cupularia* Lamouroux, 1821

A–K. *Cupularia lowei* Busk, 1852. A. Decalcified preparation, looked at from the front. Through the membrane the bundles of muscles attached to it can be seen and they pass through the frontal pores, ×50. B. The same preparation focused at a lower level, ×50. The circular opening is shown through which the polypide passes and the tubular connection from this opening to the neighboring zooecia. The polypide is faintly shown in the right-hand zooecium. C. The same preparation seen from the dorsal surface, ×50. A line of muscles (*m*) reaching down to the zooecial chamber is seen, and the polypides are usually alternately right and left in each radial row of zooecia. D. Dorsal surface showing pore at the end of the groove, ×25. E. Somewhat pressed down, so that the row of muscles are seen laterally, ×85. F. Lateral section, diagrammatic, showing rows of muscles attached to the lower membrane (*l. m.*) and to the zooecial chamber (*z. c.*). G. Vibracular chamber, showing the peculiar body ending at the circle in the membrane, ×85. One bundle of long muscles, as well as the short ones, is shown. H. Chamber of peculiar body of the vibracula showing two small glands (*gl.*), ×250. I. Muscles leading to fascia, which is attached to the base of the seta, ×150. J. Vibracular chamber above the zooecial chamber, ×85. K. Muscle of vibraculum, ×550.

L–N. *Cupularia johnsoni* Busk, L. Operculum from inside, ×150, with the bordering ridge or trabeculae united to the zooecial border. M. Seta, ×85. N. Base of seta, ×250. (A–N. After Waters, 1921.)

Variations.—Our specimens were numerous and living; the variations shown by them are important. The central zooecia are never calcified on the small colonies but become calcified when the zoarium increases in size. The zooecia are very irregular in dimensions and form; some are very elongated and others are transverse. The number of opesiules is from 8 to 9. The vestibular arch is very constant.

On the interior face the radial ribs are not always clearly visible. At the center the tuberosities are hollow; they are solid at the middle and very thin along the border. This arrangement is a little different from that which is ordinarily observed on specimens from the Atlantic. The interior face is formed of many irregularly superposed and juxtaposed disks. We have already published the same observation for the fossil forms from the Antilles.

When the frontal is broken the zooecial aspect is in effect that of *Cupularia haidingeri* Reuss, 1847, or of *Cupularia denticulata* Conrad, 1841; but the microscopic examination shows clearly that the visible spicules are broken and not fringed and denticulated as in these two species.

Biology.—This species has been dredged in very great depths and it is one of the rare species characteristic of the abyssmal ooze. On account of its mobility it can live above the shifting sea floor. Its bathymetric distribution arises only to 80 meters and it does not appear to adapt itself easily to less depths of water (Calvet, 1907).

Occurrence.—D. 2826. Pacific between California and the Hawaiian Islands; 29° 50′ 30″ N.; 141° 40′ E.; 2,723 fathoms; brown ooze.

Geologic distribution.—Mediterranean: Oran (87 meters). Atlantic: Cape Verde Islands (1,900 meters) (Calvet), Canary Islands (80 meters) (Calvet), Florida (7–30 fathoms) (Smitt). Indian Ocean: Mergui Archipelago (Hincks).

Plesiotypes.—Cat. No. 7942, U.S.N.M.

Family STEGANOPORELLIDAE Hincks, 1884

See Canu and Bassler, 1920, for descriptions and illustrations of the members of this family.

Genus STEGANOPORELLA Smitt, 1873

STEGANOPORELLA MAGNILABRIS Busk, 1854

Plate 15, figs. 1, 2

1923. *Steganoporella magnilabris* Canu and Bassler, North American Later Tertiary and Quaternary Bryozoa, Bull. 125, U. S. National Museum, p. 63, pl. 14, figs. 12, 13 (Bibliography).

1926. *Steganoporella magnilabris* Harmer, Polyzoa "*Siboga*" Expedition, pt. 2, p. 277, pl. 17, figs. 1–3, 7, 9, 12, text fig. 10. (Bibliography and anatomical studies.)

1927. *Steganoporella magnilabris* Canu and Bassler, Bryozoaires des Iles Hawaï, Bull. de la Société des Sciences de Seine-et-Oise, fasc. 7, p. 8, pl. 2, figs. 5, 6 (Biology and geographic distribution).

1928. *Steganoporella magnilabris* Canu and Bassler, Fossil and Recent Bryozoa of the Gulf of Mexico Region, Proc. U. S. National Museum, vol. 72, art. 14, p. 64, pl. 7, figs. 8–10, pl. 32, fig. 6.

All of our specimens were dead and we have been unable to make many observations. We cite only a case of opesiular calcification.

We still do not know the mode of fixation of this species; it is in effect quite widespread but seldom abundant in one locality. It lives especially at depths of 30 to 50 meters but it can descend much lower. Its presence in the fossils does not have a great bathymetric significance.

Occurrence.—

D. 4807. Cape Tsiuka, Sea of Japan; 41 ° 36′ 12″ N.; 140° 36′ E.

D. 5132. Off Panabutan Pt., Sulu Sea, west of Mindanao; 26 fathoms; gn. M., S.

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

D. 5311. China Sea, vicinity Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S., co.; 13.2° C.

Plesiotypes.—Cat. Nos. 7943–7945, U.S.N.M.

STEGANOPORELLA MANDIBULATA Harmer, 1926

Plate 15, figs. 3, 4

1926. *Steganoporella mandibulata* Harmer, Polyzoa "Siboga" Expedition, p. 279, pl. 16, fig. 20; pl. 17, fig. 4.

Description.—The zoarium is unilamellar or encrusts nullipores and shells. The zooecia are distinct, separated by a furrow, large, elongated, elliptical; the mural rim is thin, salient, enlarged into a dome in its proximal portion; the cryptocyst is small, transverse, semielliptical or crescentric, perforated by very small tremopores, surrounded by a special thick and granulated mural rim; the opesium is semielliptical, transverse, large; it contains a vestibular arch. The opesiular indentations are large, round, symmetrically arranged on each side of a salient lip attached to the proximal mural rim of the cryptocyst. The polypide tube is buried behind the salient lip (and visible only in elevating the preparation). The avicularium is primoserial, large, triangular, without pivot, with an oval opesium; the mandible is small, ungulate, The superior sclerite of the operculum bears four hooks. The number of hooks to the mandibular operculum is variable for we have noted 4 to 6 and there are 8 on

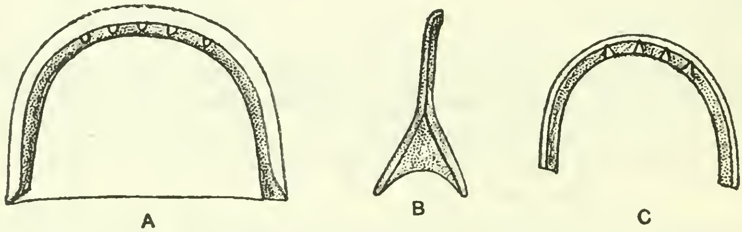

FIG. 36.—*Steganoporella mandibulata* Harmer, 1926

A. Large operculum, ×85. B. Avicularium mandible, ×85. C. Small operculum, ×85.

Harmer's figure. The details of this operculum are shown on Harmer's figure.

Measurements.—

Opesium $\begin{cases} ho = 0.35 \text{ mm.} \\ lo = 0.50 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.90\text{–}1.10 \text{ mm.} \\ lz = 0.60\text{–}0.75 \text{ mm.} \end{cases}$

Avicularium $\begin{cases} Lav = 0.45 \text{ mm} \\ lav = 0.35 \text{ mm.} \end{cases}$

Structure.—We have had the chance to study living specimens. All of the details of the zooecia are covered over by a thick opaque ectocyst; the articulation of the opercula is a line somewhat concave attached laterally to the two inferior extremities of the distal dome. The ectocyst entirely covers the avicularium and it contains only a small perforation corresponding to the mandible.

There is only one form of zooecia. In spite of the presence of the primoserial avicularia this species is indeed a *Steganoporella;* its opesium contains the characteristic polypide tube; its operculum is provided with a sclerite with a prong as in most other species of this genus.

Biology.—The species prefers depths from 30 to 40 meters but can descend to a greater depth. The larvae became fixed toward the end of the month of February, 1909. The species accompanies *Steganoporella magnilabris* but it is much more uncommon.

ccurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S., Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5145. Jolo Light, Jolo 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5174. Jolo Light, Jolo; 6° 03′ 45″ N.; 120° 57′ E.; 20 fathoms; crs. S.

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms; 11° C.

Plesiotypes.—Cat. Nos. 7946–7948, U.S.N.M.

Geographic occurrence.—South of Halmaheira (Djilolo), Malay region 45 meters (Harmer).

Genus LABIOPORELLA Harmer, 1926

No ovicell; distinct raised margins; frontal wall of polypide tube not quadrangular and not surrounded by projecting flanges (=polypidian lamella). Polypide tube bilabiate, on either side connected with the lateral wall by a vertical calcareous lamina; multiporous septulae (Levinsen). Mandible chitinous and spatulate.

Genotype.—*Labiopora crenulata* Levinsen, 1909. Recent.

Range.—Miocene (Burdigalian)—Recent.

The known species of this genus are as follows:

Labioporella crenulata Levinsen, 1909	Philippines, Malay region.
Labioporella (*Membranipora*) *bursaria* MacGillivray, 1879	Pacific.
Labioporella cornuta Harmer, 1926	Australia, Malay region.
Labioporella thorneleyae Harmer, 1926	Ceylon.
Labioporella spatulata Harmer, 1926	Malay region.
Labioporella sp. (Duvergier)	Miocene (Burdigalian).
Labioporella altavilla Cipolla, 1920	Pliocene.
Labioporella miocenica Canu and Bassler, 1919	Miocene.
Labioporella adeliensis Livingstone, 1928	Australia.

Levinsen erroneously assigned this genus to the Aspidostomidae although he noted the absence of the ovicell. The new study of the genotype made by us as well as comparison with living specimens of *Siphonoporella* collected in the Gulf of Mexico has led us to introduce it into the Steganoporellidae. Nevertheless Harmer, 1926 considers it as the single genus of his new family Labioporellidae. The larvae being unknown, the creation of the two families Labioporellidae and Siphonoporellidae appears unjustified because *Labioporella* and

Siphonoporella to us are only simplified *Steganoporella.* The genus is usually equatorial although in the Southern Hemisphere it reaches the fortieth parallel.

LABIOPORELLA CRENULATA Levinsen, 1909

Plate 16, figs. 2, 3

1909. *Labiopora crenulata* LEVINSEN, Morphological studies on the Cheilostomatous Bryozoa, p. 174, pl. 6, fig. 4.

1926. *Labioporella crenulata* HARMER, Polyzoa "Siboga" Expedition, p. 282, pl. 21, figs. 1–3.

Measurements.—

Opesium $\begin{cases} ho = \text{———}. \\ lo = 0.15 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.60\text{–}0.65 \text{ mm.} \\ lz = 0.30\text{–}0.35 \text{ mm.} \end{cases}$

Onychocellarium $\begin{cases} Lon = 0.87 \text{ mm.} \\ lon = 0.30 \text{ mm.} \end{cases}$

An excellent specimen provided with its ectocyst shows that the opercular valve is removed from the mural rim; it is semielliptical elongated, bordered by a sclerite; its straight border for articulation is placed at the middle of the height of the opesium which is quite visible by transparency. This is indeed the structure in the opercular valve of *Onychocella* and related genera and not the operculum detachable from the ectocyst of the Aspidostomatidae.

The polypidian lamella is an incomplete fragment of a kind of polypide tube placed between two opesiules, but in this species the tube is often complete.

In spite of exterior appearances there is no true onychocellarium; the mandible is not bimembranous but is a spatulate chitinous membrane having the exact form of the cell in which it is inserted and which resembles absolutely that of *Siphonoporella.*

The presence of the polypidian lamella, the absence of ovicell and the form of the avicularian mandible are characters of the Steganoporellidae in which family it is necessary to classify this genus.

Biology.—The avicularian mandible is fragile and the muscles are feeble for they are detached easily when the specimen becomes dry. Our living specimens had an ectocyst of a light color without any trace of special pigmentation. They incrusted nullipores, bryozoa, and dead shells. "The opercula are yellowish in color, the mandibles are somewhat darker and the sclerites of both structures are brown" (Harmer).

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S., Sh.

D. 5147. Sulade Island; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms.

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S. co.; 13° C.

Geographic distribution.—Torres Strait (Harmer).

Plesiotypes.—Cat. Nos. 7950, 7951, U.S.N.M.

Genus SIPHONOPORELLA Hincks, 1880

SIPHONOPORELLA OVALIS, new species

Plate 16, fig. 1

Description.—The zoarium encrusts nullipores. The zooecia are distinct, separated by a thread, very large, *oval*, elongated; the mural rim is thick, salient, rounded, with two distal tuberosities; the cryptocyst is very small, sunken, flat, smooth. The opesium is very large, oval, occupying the larger part of the zooecium; the polypidian tube is wide, excentric, expanded distally; the opesiular indentations are deep and irregular.

Measurements.—

$$\text{Opesium}\begin{cases} ho = 0.40 \text{ mm.} \\ lo = 0.35\text{–}0.45 \text{ mm.} \end{cases} \qquad \text{Zooecia}\begin{cases} Lz = 0.65\text{–}0.90 \text{ mm.} \\ lz = 0.60\text{–}0.70 \text{ mm.} \end{cases}$$

Affinities.—The initial (serialogene) zooecia of a double series are a little wider. This species differs from the two Australian species *Siphonoporella delicatissima* Busk, 1861, and *Siphonoporella nodosa* Hincks, 1880, in its large micrometric dimensions and in the oval form of the zooecia. It differs from the Australian fossil species *Siphonoporella lateralis* MacGillivray, 1893, in its very small cryptocyst. It is the sixth known species of this curious genus. The other two species are *S. dumonti* and *S. granulosa* Canu and Bassler, 1928, from the Gulf of Mexico. Our specimens were dead.

Occurrence.—D. 5151. Sirun Island, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Holotype.—Cat. No. 7949, U.S.N.M.

2182—29——11

Family THALAMOPORELLIDAE Levinsen, 1909

See Canu and Bassler, 1920 and 1923, for description of this family and its genera.

Genus THALAMOPORELLA Hincks, 1887

THALAMOPORELLA GRANULATA Levinsen, 1909

Plate 16, fig. 6; Plate 17, fig. 3

1909. *Thalamoporella granulata* var. B Levinsen, Morphological and systematic studies upon the Cheilostomatous Bryozoa, p. 188, pl. 6*a*, fig. 1.
1926. *Thalamoporella granulata* Harmer, Polyzoa Siboga Expedition, p. 297.

Measurements.—

Opesium $\begin{cases} ho = 0.16 \text{ mm.} \\ lo = 0.14 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60\text{–}0.70 \text{ mm.} \\ lz = 0.40\text{–}0.44 \text{ mm.} \end{cases}$

Levinsen, 1909, divided his species in three varieties as follows: (A) Var. *stapifera* (pl. 6, fig. 5); (B); (C) Var. *tubifera* (pl. 6*a*, fig. 2). Harmer, 1926, studying the same material believed there are three distinct species and preserves the name of *granulata* for variety B which is precisely the species which we have found. It is very well characterized by the duck bill form of the interzooecial avicularia. He does not think that *Thalamoporella granulata* Osburn 1914 from the Gulf of Mexico and *T. granulata* Canu and Bassler, 1919, from the Miocene of San Domingo are correctly determined. We likewise feel doubtful of our own determination.

Our specimens were unilamellar or encrusting bryozoan fronds (*Adeonellopsis*); they were dead. Between the granules of the cryptocyst there are very small pores.

Occurrence.—

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

Distribution.—Torres Strait.

Plesiotypes.—Cat. Nos. 7952, 7953, U.S.N.M.

THALAMOPORELLA LIOTICHA Ortmann, 1890

Plate 17, figs. 1, 2

1890. *Micropora lioticha* Ortmann, Die japanische Bryozoen-Fauna, Archiv für Naturgesch, vol. 50, p. 30, pl. 2, fig. 11.
1909. *Thalamoporella lioticha* Levinsen, Morphological and Systematic studies upon the Cheilostomatous Bryozoa, p. 179, pl. 6, fig. 7; pl. 6*b*, fig. 4.

Our specimens were dead and we have no new observations to add

Occurrence.—

D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.; Sagami Bay, 40 fathoms (Ortmann).

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Plesiotypes.—Cat. No. 7954, U.S.N.M.

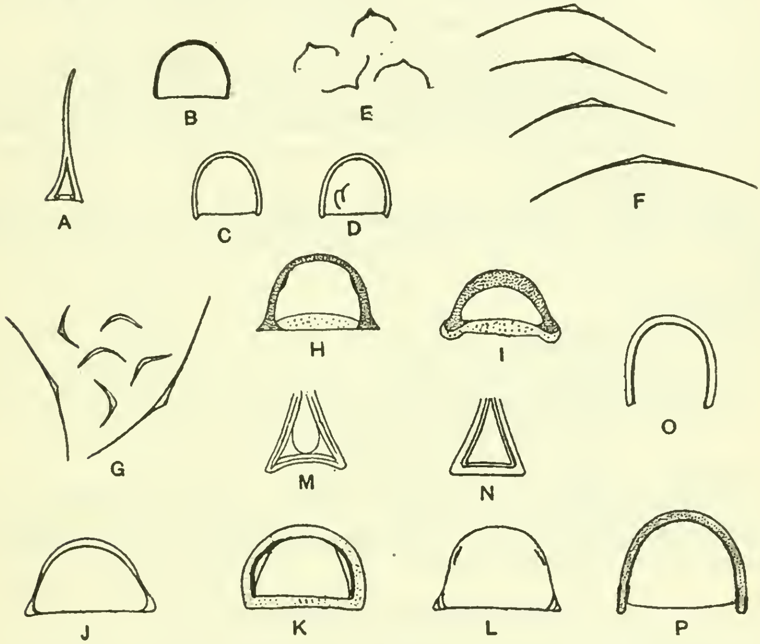

FIG. 37.—*Thalamoporella hamata* Harmer, 1926, and other species

A. Mandible, ×85. B–D. Three opercula, ×85, with hooklets in the last. E. Hooklets, ×50. F. Four hooklets, ×85. G–N. *Thalamoporella granulata* Levinsen, 1909. G. Hooklet, ×85. H, I. Two opercula, ×85. J, K, L. Three opercula, ×85, showing variations in thickness of proximal portion. M, N. Two mandibles, ×85. O. *Thalamoporella linearis*, new species. Operculum, ×85. P. *Thalamoporella expansa* Levinsen, 1909. Operculum, ×85.

THALAMOPORELLA HAMATA Harmer, 1926

Plate 16, figs. 4, 5

1926. *Thalamoporella hamata* HARMER, Polyzoa "Siboga" Expedition, p. 301, pl. 20, figs. 17–20.

Description.—The zoarium encrusts bryozoa and shells. The zooecia are distinct, elongated, adjacent through their mural rim, elliptical; the mural rim is thin, salient, rounded; the cryptocyst is sunken, flat, smooth; the opesiules are small, round. The apertura is small, terminal, semielliptical; the peristome is thin and salient and bears two large lateral tuberosities. The avicularium is interzooecial, smaller than a zooecium, thin, *lanceolate*, with long beak, very pointed and somewhat curved.

Measurements.—

Apertura $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.32 \text{ mm.} \end{cases}$

Avicularium $\begin{cases} Lav = 0.40 \text{ mm.} \\ lav = 0.15\text{–}0.20 \text{ mm.} \end{cases}$

Affinities.—The operculum is bordered by two sclerites very close together. The hooks are long, somewhat curved, very thin. This species differs from *Thalamoporella falcifera* Hincks, 1880, in its avicularium almost straight and in wider and much smaller opesiules. It differs from *Thalamoporella indica* Hincks, 1880, in its avicularium with very pointed beak, in its smaller opesiules and in the presence of two oral tuberosities.

Biology.—The larvae had become affixed early in February, 1908. Our observations and figures accord perfectly with those of Harmer, 1926.

Occurrence.—

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5151. Sirun Island, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Plesiotypes.—Cat. No. 7956, U.S.N.M.

Geographic distribution.—Pacific (Malay region): N. Ubian, Sulu Archipelago, 16–23 meters; west of north end of New Guinea, 32 meters; Torres Strait (Harmer).

THALAMOPORELLA LINEARIS, new species

Plate 16, figs. 7, 8

Description.—The zoarium encrusts shells; it is formed of a linear series of zooecia branching dichotomously. The zooecia are large, much elongated, elliptical, little swollen; the mural rim is very thin, scarcely salient, little visible; the cryptocyst is large, convex, smooth; the opesiules are large, crescent shaped, denticulated. The apertura is orbicular; the peristome is thin, sharp, little salient. The ancestrula is a smaller zooecium.

Measurements.—

Apertura $\begin{cases} ha = 0.20\text{–}0.25 \text{ mm.} \\ la = 0.20 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.85\text{–}0.90 \text{ mm.} \\ lz = 0.55\text{–}0.60 \text{ mm.} \end{cases}$

Structure.—The operculum is bordered with a double sclerite; the interior sclerite is thicker; there are two small lateral expansions at the level of articulation. It is attached to the ectocyst. Except for accidental disarrangement the primoserial zooecia are adjacent by their base and arranged in different axes. The ancestrular zooecia are on the contrary placed in the same longitudinal axis. One branch never cuts across another, a phenomenon which has been found also in *Stomatopora*.

This is as remarkable a species as it is bizarre. The larvae were affixed at the end of October, 1908. Our specimens were living.

Occurrence.—D. 5311. China Sea, vicinity Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

Cotypes.—Cat. No. 7956, U.S.N.M.

THALAMOPORELLA EXPANSA Levinsen, 1909

Plate 17, fig. 5

1909. *Thalamoporella expansa* Levinsen, Morphological and Systematic Studies Cheilostomatous Bryozoa, pp. 179, 190, pl. 6*B*, fig. 5.

1926. *Thalamoporella expansa* Harmer, Polyzoa *Siboga* Expedition, p. 300,pl. 20, figs. 2, 3.9, 10.

Description.—The zoarium encrusts nullipores. The zooecia are distinct, united by their mural rim, large, elliptical, little elongated; the mural rim is salient, thin, granulated; the cryptocyst is shallow, flat, much granulated and perforated by very small pores. The aperture is transverse, semielliptical; the peristome is thin, very little salient and bears two large, hollow, lateral tuberosities. Above each aperture there is a cavity. The opesiules are small, rounded, placed at the base of the ascending portion of the cryptocyst.

Measurements.—

Aperture $\begin{cases} ha = 0.10\text{–}0.12 \text{ mm.} \\ la = 0.20 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.80\text{–}1.00 \text{ mm.} \\ lz = 0.60 \text{ mm.} \end{cases}$

Affinities.—The operculum is bordered by a thick sclerite and its proximal border is slightly concave.

As in *Thalamoporella* this species has opesiules and oral tuberosities; the operculum is also very similar; but we have not observed either the ovicell or the characteristic hooks. Similarly as in *Steganoporella* the zooecia have a distal cavity, but we have not observed the polypidian tube.

Levinsen names the curious distal concavity the aureola. It is placed on the frontal of the superior zooecium where the cryptocyst is often covered by a thin calcareous epitheca. It is covered by the ectocyst which often forms at the same place a salient, hollow cushion. It simulates thus a sort of small distal hypostege.

Our micrometric measurements are in perfect accord with those of Harmer but not with Levinsen. Levinsen and Harmer have described an avicularium with triangular mandible. Our specimens do not show this.

Our three specimens are very small and we have not been able to make detailed observations. The specimens were dead but still contained some opercula.

Occurrence.—D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms.; S., Sh.

Plesiotypes.—Cat. No. 7957, U.S.N.M.

THALAMOPORELLA (?) INSOLITA, new species

Plate 17, fig. 4

Description.—The zoarium is free and cylindrical. The zooecia are distinct, united by their mural rim, large, elongated, lozenge shaped; the mural rim is thin and salient; the cryptocyst completely surrounds the aperture and is finely granulated. The aperture is semielliptical, transverse; the peristone is thin and very salient; there is a kind of lyrula in the aperture. On the cryptocyst there are above the aperture three small pores in a triangle and two, large salient avicularia, elliptical, transverse with pivot; on each side of the aperture are two fosettes and above the aperture a small median avicularium and two large opesiules.

Measurements.—

Aperture $\begin{cases} ha = 0.17 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.05 \text{ mm.} \\ lz = 0.85 \text{ mm.} \end{cases}$

Affinities.—The figured specimen only has been found; it was dead and we have been able to make no useful observations permitting us to classify the species exactly. This is an entirely strange animal to which we are calling attention.

Occurrence.—D. 5574. Simalac Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

Holotype.—Cat. No. 7958, U.S.N.M.

Genus THAIROPORA MacGillivray, 1882

The ovicells are unknown. The opesiules are very unequal in size and the smaller one may disappear. The larger opesiule differs from that of *Thalamoporella* in being transversely slit-like, often oblique and a number of denticles commonly project across it from its proximal wall. The cryptocyst is transversely depressed at about the middle of the zooecium and the polypide tube commences at a great distance from the frontal membrane, rising steeply to the orifice. The cryptocyst is usually divided into four "segments" separated by ridges; a proximal and distal portion extending across the whole width of the zooecium, and two lateral portions between them meeting in a median suture. The avicularia are the pointed type, in the species of which satisfactory descriptions have been given (Harmer 1926).

Genotype.—*Thairopora* (*Membranipora*) *dispar* MacGillivray, 1869.

Range.—Recent.

The zooecial structure is so close to that of *Thalamoporella* that Levinsen, 1909, reunited the two genera in a single one, but Harmer, 1926, noting that the ovicells are unknown in *Thairopora*, preferred to separate them.

Family ASPIDOSTOMATIDAE Jullien, 1888

We have discussed this family and its genera in our works of 1920 and 1923. Certain genera there placed here are now referred elsewhere as will be noted by consulting our alphabetical generic list. Following is our present classification.

I. *Aspidostoma* Hincks, 1881, *Monoporella* Hincks, 1881, *Macropora* MacGillivray, 1895, *Rhagasostoma* Koschinsky, 1885 (Levinsen, 1907, emend).

II. (Uncertain) *Foraminella* Levinsen, 1907; *Odontionella* Canu and Bassler, 1917; *Megapora* Hincks, 1877; *Mollia* Lamouroux, 1821.

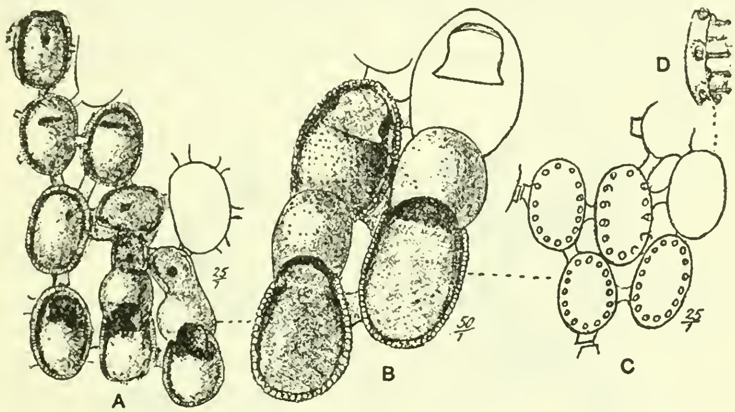

FIG. 38.—Genus *Mollia* Lamouroux, 1821

A–D. *Mollia patellaria* Moll, 1803. A. Incrusting specimen, ×25, showing closed cells. B. Ordinary and ovicelled zooecia, ×50. The cryptocyst is covered by the ectocyst. The ovicell is hyperstomial. C. Dorsal side of zooecia. From the base there are thrown out a number of radicular fibers by which the colony is fastened to stones, sponges, etc. D. Radicular fibers seen in profile. (After Waters, 1879.)

Genus MOLLIA Lamouroux, 1821

The ovicell is hyperstomial and closed by the operculum. The zooecia are disjointed and united by cylindrical junctures. The opesium is trifoliated. The opercular valve is supported on the two lateral teeth but does not touch the distal portion of the mural rim. No spines, no avicularium. The zoarium is unilamellar. No dietellae.

Genotype.—*Mollia* (*Eschara*) *patellaria* Moll, 1803. Recent.

Genus MONOPORELLA Hincks, 1881

The ovicell is hyperstomial, closed by the operculum, entirely buried in the distal zooecium, surrounded with costules or with a fringe. The apertura bears proximally two, very small, lateral indentations. Two small opesiules perforate the porous cryptocyst. The operculum is detachable. Spines on the peristome. There is a very small polypidian lamella in the apertura.

Genotype.—*Monoporella nodulifera* Hincks, 1881. Recent, Bass Strait.

Range.—Cretaceous (Campanian)—Recent.

The polypidian lamella is a fragment of an incomplete polypide tube.

The figure of *Monoporella nodulifera* Hincks, 1881, is quite inadequate and the structure of this species would have remained unknown without the studies made by Harmer in 1926. We can not subscribe to the introduction of the genus in the Microporidae because the ovicell is clearly hyperstomial and even of a special type. In awaiting studies of the larva we have classed it in the Aspidostomatidae. It is

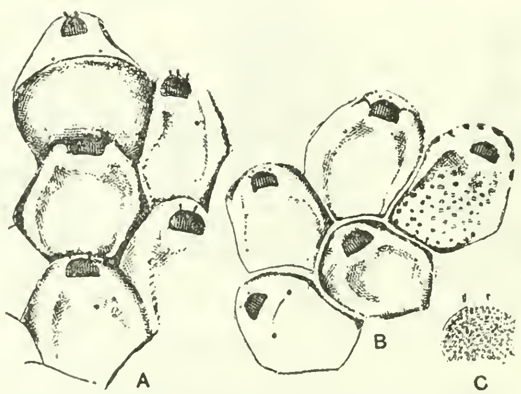

Fig. 39.—Genus *Monoporella* Hincks, 1881

A–C. *Monoporella nodulifera* Hincks, 1881. A. Zooecia and ovicell, enlarged. B. Zooecia. C. Operculum. (After Harmer, 1926.)

a tropical genus. The known species of this new genus are as follows, the first five without question and the last four very probably:

Monoporella fimbriata Canu and Bassler, 1927	Recent, Philippines.
Monoporella nodulifera Hincks, 1881	Recent, Bass Strait.
Monoporella tenuimargo, new species	Recent, Philippines.
Monoporella (*Lepralia*) *venusta* Eichwald, 1868	Miocene (Helvetian, Tortonian).
Monoporella (*Micropora*) *carinata* Maplestone, 1900	Miocene.
Monoporella (*Micropora*) *convexa* Canu, 1911	Cretaceous (Rocanean).
Monoporella (*Hippoporina*) *planulata* Canu, 1911	Cretaceous (Rocanean).
Monoporella (*Homalostega*) *exsculpta* Marsson, 1887	Cretaceous (Campanian).

MONOPORELLA FIMBRIATA Canu and Bassler, 1927

Plate 17, figs. 6–11

1927. *Monoporella fimbriata* Canu and Bassler, Classification Cheilostomatous Bryozoa, Proc. U. S. Nat. Mus., vol. 69, Art. 14, p. 4, pl. 1, fig. 2.

Description.—The zoarium encrusts nullipores and fragments of shells. The zooecia are distinct, separated by a thread, elliptical, broad, little elongated; the mural rim is thick, round, salient, growing thin towards the base; the cryptocyst is shallow, convex, sometimes carinated, covered with tremopores and with granules. The apertura is small, terminal, semielliptical, transverse; the proximal border is straight and bears two very small lateral indentations; the peristome is salient, thick, decorated with 5 to 8 spines; the operculum is thick and black. The ovicell is very large, globular, smooth, buried in the distal zooecium, surrounded by costules and *fringes*, closed by the operculum. The ectocyst is light or rose colored. The ancestrula is small.

Measurements.—

Apertura $\begin{cases} ha = 0.08\text{–}0.12 \text{ mm.} \\ la = 0.16\text{–}0.18 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60\text{–}0.90 \text{ mm.} \\ lz = 0.56\text{–}0.70 \text{ mm.} \end{cases}$

Variety *crassa* new variety (pl. 17, fig. 10). The mural rim and the peristome are thicker; the dimensions are somewhat larger.

Variety *carinifera* new variety (pl. 17, fig. 11). The cryptocyst bears a constant carina; the zooecia are generally a little narrower.

Structure.—The ectocyst is thin, somewhat transparent; the place of the opesiules is marked by two black spots. The opesiules are little apparent; they are visible on specimens prepared with Javelle water and they then have a small, slightly salient peristome. The pigmentation of the ectocyst is rather variable and appears to depend on the color of the neighboring algae.

The conformation of the ovicell is remarkable. It is formed a long time after the calcification of the distal zooecium probably by the regeneration of an ordinary polypide into an oviferous polypide. The operculum is of great regularity. The polypidian lamella is very small and little visible.

Affinities.—This fine species differs from *Monoporella venusta* Eichwald, 1868, in its greater zooecial dimensions, in the presence of granules on the cryptocyst and in having a much smaller vestibular arch. It differs from *Monoporella nodulifera* Hincks, 1881 in the presence of 5 to 8 spines (and not 2 to 4) and in its fringed ovicell.

It differs from *Monoporella carinata* Maplestone, 1900, in the broad instead of long zooecia, in the crowded, very numerous tremopores and in its noncylindrical zoarium. This species does not have a large geographical distribution, for it is confined to the southern part of the Sulu Archipelago. It was in reproduction and the larvae became fixed in the month of February (7–18).

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh. (typical form and var. *crassa* and *carinifera*).

Occurrence—Continued.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh. (typical form and var. *carinifera*).

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

Cotypes.—Cat. Nos. 7960, 7957, U.S.N.M. (var. *carinifera.*)

Holotype.—Cat. No. 8417, U.S.N.M. (var. *crassa*)

MONOPORELLA TENUIMARGO, new species

Plate 18, fig. 1

Description.—The zoarium is unilamellar. The zooecia are distinct, separated by a furrow, large, somewhat elongated, elliptical; the mural rim is *very thin*, salient, finely granulated, attenuated at the base; the cryptocyst is shallow, carinated, convex, perforated by extremely small, little apparent tremopores. The apertura is large, terminal, transverse to the concave proximal border; two small lateral indentations occur; the salient peristome bears six spines.

Measurements.—

$$\text{Apertura}\begin{cases} ha = 0.18\text{–}0.20 \text{ mm.} \\ la = 0.35\text{–}0.40 \text{ mm.} \end{cases} \qquad \text{Zooecia}\begin{cases} Lz = 1.25 \text{ mm.} \\ lz = 0.80 \text{ mm.} \end{cases}$$

Affinities.—This large and beautiful species is very well characterized. The carina is a very thin lamella the height of which depends on the longitudinal cavity of the cryptocyst. Unfortunately only the figured specimen has been found. The other species does not appear to exist in this locality of much deeper water; the zooecial size appears therefore in relationship to the depth as in certain genera of the Microporidae.

Occurrence.—D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

Holotype.—Cat. No. 7962, U.S.N.M.

MONOPORELLA (?) WAIPUKURENSIS Waters, 1887

Plate 38, figs. 6–8

1887. *Monoporella waipukurensis* WATERS, On Tertiary Chilostomatous Bryozoa from New Zealand, Quarterly Journal Geological Society London, vol. 43, p. 50, pl. 6, fig. 11.

Description.—The zoarium is bilamellar; the two lamellae are placed back to back. The zooecia are distinct, separated by a deep furrow, very elongated, clavulate; the frontal is convex, perforated with tremopores, covered by a thick ectocyst and impregnated with calcite; in front of the proximal border of the apertura there is a wide umbo, hollow, little salient, containing a pair of glands. The apertura is transverse, ogival, with two minute cardelles placed very low. The ovicell is very large, globular, buried in the distal zooecium, closed by the operculum, punctated.

Measurements.—

Apertura $\begin{cases} ha = 0.15 \text{ mm.} \\ la = 0.20 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.80 \text{ mm.} \\ lz = 0.30\text{–}0.40 \text{ mm.} \end{cases}$

Structure.—We have found many kinds of opercula and we do not know to what the light colored, thick, elliptical opercula without

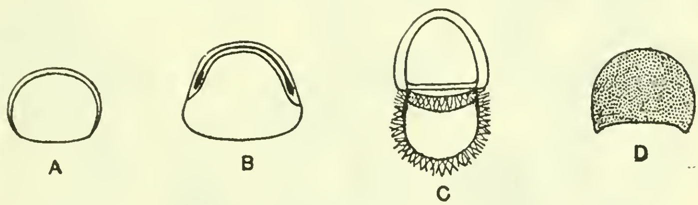

FIG. 40.—*Monoporella* (?) *waipukerensis* Waters, 1887

A. The simple elliptical type of operculum, ×85. B. Usual form of operculum, ×85. C. Operculum showing position above glandular umbo, ×85. D. *Monoporella fimbriata* Canu and Bassler, 1927. Operculum, ×85.

accessories can correspond. The others with peripheral sclerite of varied and complex structure, correspond to the opercula visible on our figure.

The frontal is formed by a thin tremocyst. The tremopores are buried in the thick ectocyst and are not visible on the living specimens.

The broken umbo revealed a small yellow body which seemed to us to be a glandular apparatus. Now that Harmer has fixed the true limits of *Monoporella* it is evident that this species is not correctly placed.

Our species may not be exactly the species of Waters, but by inspection of the figures they are certainly very close. The three specimens collected have not permitted a detailed study.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.; Tertiary of New Zealand (Waters).

Plesiotype.—Cat. No. 8091, U.S.N.M.

Genus MACROPORA MacGillivray, 1895

Levinsen, 1909 states that there is no ovicell in this genus, but two species however have them. In *Macropora crassatina* Waters, 1882, the ovicell is "very large much raised both broader and longer than the length or width of a zooecium." (Waters). In *Macropora* *cribrilifera* Maplestone, 1900, it is large, oval, ribbed, with a central keel, sessile on zooecia." (Maplestone). This ovicell appears to us to be hyperstomial, closed by the operculum and almost of the same nature as that of *Monoporella*. In *Macropora cribrilifera* the operculum is calcareous (Maplestone). In *Macropora crassatina* "the operculum is thick, membraneous, not chitinous, except at the border and has two lateral projections directed toward the basal wall of the zooecium, showing similarity in this respect, to *Membranipora* and *Cellaria*" (Waters). It therefore has resemblances to the ovicell of

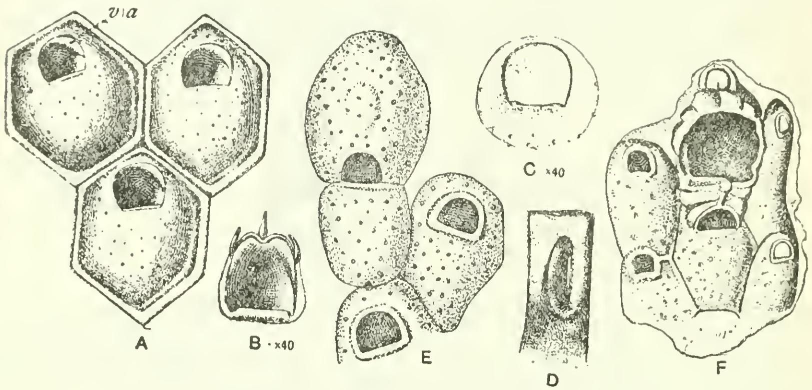

FIG. 41.—Genus *Macropora* MacGillivray, 1895

A–D. *Macropora centralis* MacGillivray, 1895. A. Three zooecia, ×23; *va*, vestibular arch. B. The aperture of a special form of zooecium (avicularium(?)), ×40. C. An operculum with its surroundings, ×40. D. A dietella, ×40. (A–D. After Levinsen, 1909.)

E. *Macropora crassatina* Waters, 1887. Oviceled zooecia. Fossil. (After Waters, 1887.)

F. *Macropora cribrilifera* Maplestone, 1900. Zooecia showing broken ovicell indicating that it is hyperstomial. (After Maplestone, 1900.)

Monoporella. Finally the form of the aperture is identical in the two genera.

In 1920 we introduced this genus into the Coscinopleuridae but these new observations lead us to place it in the Aspidostomatidae with the reservation that only the knowledge of the larva will permit the definite classification. *Macropora* differs from *Monoporella* in the absence of opesiules and peristomial spines.

Genotype.—*Macropora centralis* MacGillivray, 1895.

The known species are as follows:

Macropora cribrilifera Maplestone, 1901	Miocene.
Macropora centralis MacGillivray, 1895	Miocene and Recent.
Macropora (*Monoporella*) *crassatina* Waters, 1882	Miocene and Recent.
Macropora vincularioides, new species	Miocene.
Macropora (*Eschara*) *clarkei* Tenison-Woods, 1876	Miocene.
Macropora aquiae Canu and Bassler, 1920	Eocene.
Macropora multilamellosa Canu and Bassler, 1920	Eocene.
Macropora (*Homalostega*) *convexa* Marsson, 1887	Cretaceous (Campanian).

MACROPORA CENTRALIS MacGillivray, 1895

Plate 18, fig. 4

1895. *Macropora centralis* MacGillivray, Tertiary Polyzoa of Victoria, Transactions Royal Society of Victoria, vol. 4, p. 55, pl. 8, fig. 3.
1909. *Macropora centralis* Levinsen, Morphological and Systematic Studies upon the Cheilostomatous Bryozoa, p. 163, pl. 7, fig. 1.

Measurements.—

Opesium $\begin{cases} ho = 0.20 \text{ mm.} \\ lo = 0.28 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.90 \text{ mm.} \\ lz = 0.90 \text{ mm.} \end{cases}$

Levinsen thinks that *Monoporella crassatina* Waters, 1882, is identical with this species. Our specimen was dead. It corresponded closely with the figure of Levinsen, 1909.

Occurrence.—

D. 5574. Simaluc Island, south of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Geographic distribution.—Pacific Ocean: Wanganui.

Geologic distribution.—Miocene of Australia (MacGillivray).

Plesiotype.—Cat. No. 7963, U.S.N.M.

Family SETOSELLIDAE Levinsen, 1909

The ovicell is endotoichal and placed at the distal extremity of the zooecium.

The known genera of this family are: *Setosella* Hincks, 1877, *Crateropora* Levinsen, 1909, and *Entomaria* Canu, 1914.

Levinsen, 1909, grouped in this family the species provided with a polypidian lamella, that is to say with a very elementary rudiment of a polypide tube but we have seen that the latter have very different ovicells and can not be placed in the same family. There is no ovicell in *Labioporella* (Steganoporellidae), an endozooecial one in *Caleschara* (Microporidae), *hyperstomial* in *Monoporella* (Aspidostomatidae) and endotoichal in *Setosella*.

The presence of the polypidian lamella indicates perfection in the hydrostatic system of the hypostega or more exactly, a special relation between the system and the extrusion of the tentacles. *Setosella* in which opesiular muscles are placed lower, accommodates itself to great oceanic depths, for it has been observed as deep as 1,200 meters. *Crateropora* with its opesiular muscles placed close to the aperture does not descend below 385 meters. In comparing *Rectonychocella* and *Velumella* we have made similar observations.

Genus SETOSELLA Hincks, 1877

The endotoichal ovicell is closed by the operculum. Two opesiules placed very low. Vibracula occur.

Genotype.—*Setosella vulnerata* Busk, 1860. Recent.

Genus CRATEROPORA Levinsen, 1909

The ovicell is endotoichal and placed at the distal extremity of the zooecia; it is open above the opesium. The aperture is closed by an operculum attached to the ectocyst; its proximal border bears a very short polypidian lamella, on each side of which there is an opesiule. Reticulocellaria present.

Genotype.—*Crateropora falcata* Levinsen, 1909.

Range.—Cretaceous (Rocanean)—Recent.

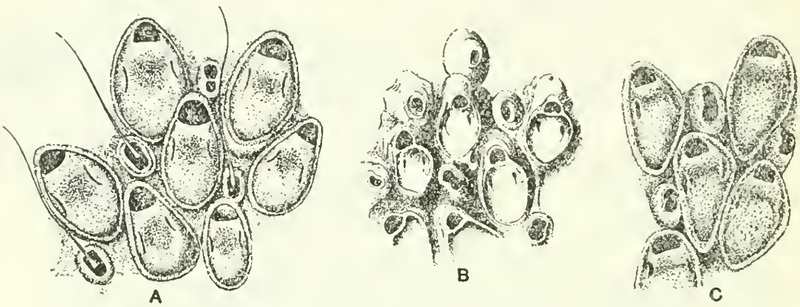

Fig. 42.—Genus *Setosella* Hincks, 1877

A–C. *Setosella vulnerata* Busk, 1860. A. Group of zooecia, ×25, with their vibracula. B. Ovicelled zooecia, ×25. The ovicell is endotoichal and placed on the distal part of the zooecium (after Jullien, 1882). C. Group of zooecia without ectocyst, ×25, showing the form of the opesiules and the vibracula. (A–C. After Hincks, 1880, 1881.)

The known species of this genus are as follows:

Crateropora falcata Levinsen, 1909	Recent.
Crateropora (*Steganoporella*) *patula* Waters, 1881	Miocene.
Crateropora (*Aspidostoma*) *flammula* Canu, 1911	Miocene (Patagonian).
Crateropora (*Aspidostoma*) *onychocellifera* Canu, 1907	Cretaceous (Rocanean).
Crateropora (*Onychocella*) *cucullata* Thornely, 1905	Recent (Ceylon).
Crateropora expansa Harmer, 1926	Recent (Malay region).
Crateropora foraminata Harmer, 1926	Recent (Malay region).

The diagnosis of Levinsen, 1909, is incomplete as he did not indicate the nature of the ovicell and moreover he noted the presence of a polypide tube where there is only a simple convex lamella which can be considered merely as a very incomplete rudiment of a polypide tube. The reticulocellaria are avicularia (or onychocellaria) with the cryptocyst perforated by one or many pores. Canu and Bassler, 1920, mentioned the possibility of ovicells in this genus; they are now known in three species.

CRATEROPORA EXPANSA Harmer, 1926

Plate 18, figs. 2, 3

1926. *Crateropora expansa* Harmer, Polyzoa *Siboga* Expedition, p. 331, pl. 22, figs. 8–13.

Description.—The zoarium is free, bilamellar or encrusting other bryozoa. The zooecia are distinct, separated by a deep furrow, very large, elliptical, broad and a little elongated. The mural rim is very thick, convex, smooth, very salient distally, attenuated laterally; the cryptocyst is shallow, oblique towards the aperture, covered with small tremopores. The aperture is small, semielliptical, transverse; it bears inferiorily a very short polypidian lamella. The ovicell is convex, transverse, porous and granular. Straight reticulocellaria occur.

Measurements.—

Apertura $\begin{cases} ha = 0.16 \text{ mm.} \\ la = 0.28 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.70\text{–}0.75 \text{ mm.} \\ lz = 0.60\text{–}0.70 \text{ mm.} \end{cases}$

Structure.—Our specimens were dead and deprived of the ectocyst. A single specimen was ovicelled; it bears three ovicells one of which is complete, a second has a frontal fissure while the third is broken and shows its endotoichal structure. The communication of the ovicell with the zooecium appears to be made by a longitudinal slit above the distal wall of the zooecium. The structure which MacGillivray, 1895, has taken for an ovicell in *Crateropora patula* is a monstrosity analogous to that which appears in our figured specimen. We are ignorant of the mode of fixation.

Affinities.—Harmer, 1926, figured only the transverse zooecia (as at the top of our figure) but in his descerpition he says "zooecia usually wider than long" which proves that long zooecia may be present. On our specimens the cells are somewhat longer than wide. In spite of this difference we do not believe our determination is incorrect.

Harmer was able to study the operculum, the mandible and to show the position of the opercular and opesiular muscles.

Occurrence.—

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

Geographic distribution.—Several localities in the Malay region, 9–45 meters.

Plesiotypes.—Cat. No. 7964, U.S.N.M.

Genus ENTOMARIA Canu, 1925

1925. *Entomaria* Canu, Bryozoaires cheilostomes des faluns de Touraine et d'Anjou, Mémoires de la Société géologique de France, new ser., vol. 2, fasc. 3, pl. 4, figs. 11–13.

The ovicell is endotoichal and placed at the distal extremity of the zooecia; it is opened by a frontal pore on the same plane as the operculum; it is ornamented with two lateral fissures. The aperture is closed by an operculum with double sclerite; it bears inferiorily a short polypidian lamella which is elevated and convex. Two opesiules symmetrically placed on each side of the polypidian lamella. Spines and reticulocellaria present.

Harmer, 1926, has created the genus *Lagarozoum* for a recent species of this genus. He classed it in the Aspidostomatidae, but the ovicell being endotoichal and not hyperstomial and placed on the distal zooecium, we prefer to place it in the Setosellidae, the larva being unknown.

Genotype.—Entomaria (*Rhagasostoma*) *spinifera* Canu, 1914. Recent type, *E. coronata* new species.

Range.—Eocene (Lutetian)—Recent.

The known species of the genus follow.

Entomaria coronata, new species	Recent.
Entomaria (*Lagarazoum*) *profundum* Harmer, 1926	Recent, Malay region.
Entomaria (*Rhagasostoma*) *spinifera* Canu, 1914	Miocene (Helvetian).
Entomaria (*Semieschara*) *dutempleana* d'Orbigny, 1852	Eocene (Lutetian).

Canu, 1921,[7] chose *Rhagasostoma spinifera* Canu 1914, as the type of the genus but now that we know a recent species, it is preferable to at least consider it as a second genotype.

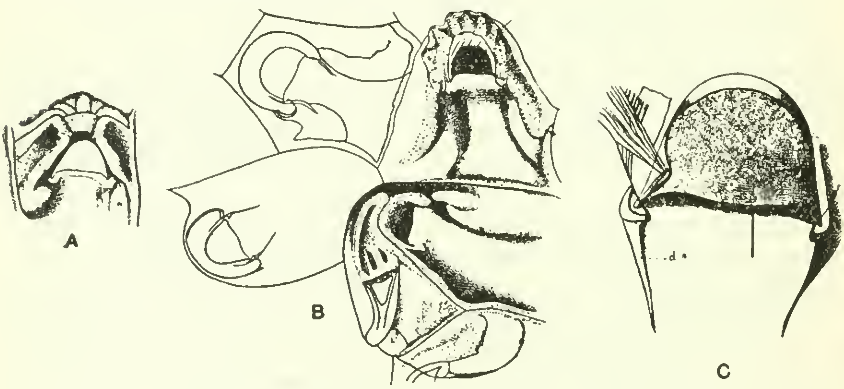

Fig. 43.—Genus *Lagarozoum* Harmer, 1926

A–C. *Lagarozoum profundum* Harmer, 1926. A. Distal end of a fertile zooecium. B. Avicularium and zooecia, two with depressor sclerites. C. Part of frontal membrane with depressor sclerites (*d. s.*) (After Harmer, 1926.).

ENTOMARIA CORONATA, new species

Plate 18, figs. 5, 6.

Description.—The zoarium is free and unilamellar or encrusting nullipores. The zooecia are distinct, separated by a furrow, large, elliptical, elongated; the mural rim is thin, distally salient, attenuated laterally, smooth; the cryptocyst is shallow, oblique toward the aperture, finely granulated. The aperture is semielliptical transverse; it bears on the proximal border a short convex polypidian la-

[7] Canu in list given by Duvergier, Bryozoaires du Néogène de l'Aquitaine, Soc. Linnéenne de Bordeaux, vol. 72, p. 10.

mella in the vicinity of which are two complete opesiules. The endotoichal ovicell is small, convex, transverse; it opens by a round pore closed by a broken-down operculum; it is ornamented by two lateral slits covered by the ectocyst. At the base of some zooecia there is a falciform avicularium. The mural rim bears a *crown* of 6 spines.

Measurements.—

$$\text{Opesium}\left\{\begin{array}{l} ho = 0.12 \text{ mm.} \\ lo = 0.30 \text{ mm.} \end{array}\right. \qquad \text{Zooecia}\left\{\begin{array}{l} Lz = 0.90\text{–}1.75 \text{ mm.} \\ lz = 0.60\text{–}0.50 \text{ mm.} \end{array}\right.$$

Structure.—A light colored thick ectocyst covers the zooecia, hiding the mural rim, the opesiules, and the slits of the ovicell, but allowing one to perceive the broken down operculum of the ovicell and the zooecial operculum attached to the ectocyst. The operculum is thin, semielliptical transverse, bordered with a double sclerite. Two lateral indentations, corresponding to the opesiules, bear the trace of the opesiular muscles. This is the same form as in *Aspidostoma* and *Cellaria*. The communication of the ovicell with the zooecia is established by three septulae.

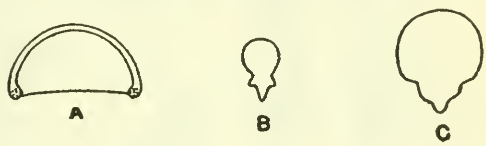

Fig. 44.—Opercula, ×85. A. *Entomaria coronata*, new species. B. *Trypostega pusilla*, new species. C. *Haswellia australiensis* Haswell, 1880

Affinities.—This species differs from *Entomaria* (*Lagarozoum*) *profunda* Harmer, 1926, in its superficial cryptocyst and in its more salient and more visible ovicell.

Biology.—Some of our specimens were living. Reproduction occurred in February, 1908.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5151. Sirun Island, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Holotype.—Cat. No. 7965, U.S.N.M.

Family CHLIDONIIDAE Busk, 1884

The jointed colonies, springing from a stolonate network consist of a stem, two main branches and a number of zooecia-bearing secondary branches, and besides the zooecia we may distinguish between three different forms of kenozooecia, namely, the partitions of the stolon, the stem internodes and the bifurcate internodes of the main branches. Moreover, the main branches and the secondary branches may be transformed into zooecia. The zooecia, which lack pores and spines, have a deeply depressed cryptocyst, pierced by a small transverse slit,

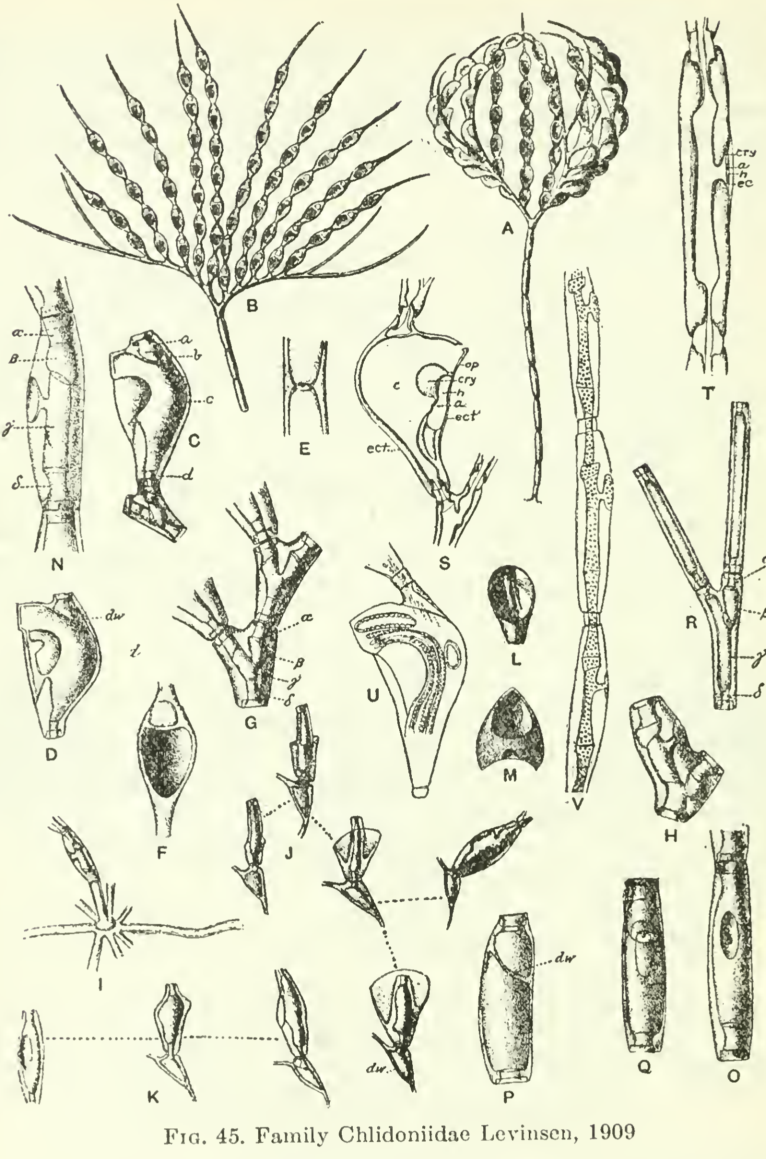

Fig. 45. Family Chlidoniidae Levinsen, 1909

A–V. *Chlidonia cordieri* Savigny-Audouin, 1828. A. Ordinary colony, ×12. B. Colony in which the branches are spread out on the same plane, ×12, C. An internode (kenozooecium) of a main branch with a zooecium rising from it; ×55. The segments indicated by *a*, *b*, *c*, *d*, correspond with similar segments in the internodes of the trunk and the main branches. D. A zooecium, lateral view, ×55. The concavity of the frontal surface is seen greatly thickened in its distal half; in the distal part of this cavity a smaller one is seen corresponding with the small distal pore in Figure F. Farther backwards is a connection between the frontal cavity and the cavity of the zooecium corresponding to the second pore in Figures F, D, P. E. Separating wall with septula in the stolonate network, ×200. F. A zooecium from the frontal surface, ×55. G. Two internodes (kenozooecia) and have a simple, semi-elliptical operculum, ending in a straight proximal margin. The stem-internodes have a small depressed cryptocyst with one pore at the bottom; and excepting the partitions of the stolon the other individual forms have their inner cavity divided into a series of segments (generally four), separated by more or less sharp constrictions. The distal walls have a single pore septula. No ovicell and no avicularia. (Levinsen, 1909.) A single genus, *Chlidonia.*

Genus CHLIDONIA Lamouroux, 1824

Description.—Same as above for family.

Genotype.—*Chlidonia* (*Eucratea*) *cordieri* Audouin, 1826. Recent.

Family ALYSIDIIDAE Levinsen, 1909

The jointed colonies, springing from a stolonate network, consist of zooecia and gonozooecia. The zooecia, the distal half of which has a depressed cryptocyst, are furnished with a simple opercular valve and with two opesiulae. Valved ovicell. No avicularia. The gemmation is lateral.

Three genera, *Alysidium*, Busk, 1852, *Catenariopsis* Maplestone, 1899, and *Catenicula* O'Donoghue, 1924.

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of a main branch with some of the adjacent zooecia, ×75. H. The forked distal internode of the stem, ×75. I. A portion of the stolonate network with the proximal part of a stem, ×75. J. Cylindrical internodes being transformed into zooecia by the development of a cup-shaped expansion (the zooecium in an embryo state) from the proximal part of the internode, ×55. K. Cylindrical internodes which apparently are changing into zooecia by a gradual swelling of the internode, ×55. L. A cylindrical internode with its cup-shaped proximal expansion, from the frontal aspect, ×55. M. A transverse section through a zooecium. The thick frontal wall, the small concavity (corresponding with the distal pore in Figure F) and the septula are seen, ×75. N. An internode of the stem, lateral view. Between B and C a distal wall with a uniporous septula is seen. The funnel-shaped concavity is in communication through a pore with the interior of the zooecium, ×75. O. An internode of the stem, from the frontal surface. The oval funnel-shape concavity with its pore is seen, ×72. P. A quite young internode of the stem, the walls of which are still very thin. On account of this the extent of the distal wall (*dw*) is considerable, and the funnel-shaped concavity is not yet developed. In its place is found an oval opening, ×76. Q. A young internode of the stem, from the basal aspect. The uniporous septula is seen as also the oval opening, ×75. R. A forked cylindrical internode connected with two single ones. Between B and C the distal wall is seen with a uniporous septula, ×100. (A–R. After Levinsen, 1909.) S. Optic section of the skeleton of a zooecium; *a*, thinness of cryptocyst, (*cry*); *c*, general cavity; *ect*, dorsal ectocyst; *ect,'* ectocyst proper; *h*, hypostege; *op*, operculum, ×75. T. Optic section of a basal joint, ×80. (S, T, after Calvet, 1920.) U. Zooecium, showing the position occupied by the polypide and also the small separate chamber from which the next zooecium starts, ×85. V. Stalk showing disk to which the parenchyme is attached, ×25. (V. After Waters, 1896.)

Genus ALYSIDIUM Busk, 1852

The gonozooecia are borne by stemlike kenozooecia. The cryptocyst is entirely calcified. The ovicell is bivalve.

Genotype.—*Alysidium parasiticum* Busk, 1852. Recent (Australia).

Genus CATENARIOPSIS Maplestone, 1899

The zooecia are pyriform and ventricose. The cryptocyst is partially calcified. Ovicell?

Genotype.—*Catenariopsis morningtonensis* Maplestone, 1899. Miocene.

This genus appears to us to be a synonym of *Alysidium.*

Genus CATENICULA O'Donoghue, 1924

The ovicell of the gonoecium is multivalve.

Genotype.—*Catenicula corbulifera* O'Donoghue, 1924. Recent (South Africa).

Division 4. PSEUDOSTEGA Levinsen, 1909

Family CELLARIIDAE Hincks, 1880

See Canu and Bassler, 1920 and 1923 for description and illustration of this family and its genera.

Genus CELLARIA Ellis and Solander, 1786

CELLARIA DIVARICATA MacGillivray, 1895

Plate 20, fig. 8

1895. *Cellaria divaricata* MacGillivray, Monograph Tertiary Polyzoa of Victoria, Transactions Royal Society of Victoria, vol. 4, p. 30, pl. 3, fig. 25.

We have found only two dead segments but they are quite similar to the figures of MacGillivray. We figure some transverse sections through the zoarium at different heights.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Geologic distribution.—Miocene of Australia (MacGillivray).

Plesiotypes.—Cat. No. 7970, U.S.N.M.

CELLARIA GRACILIS Busk, 1852

Plate 20, fig. 7

1926. *Cellaria punctata* Harmer, Polyzoa "Siboga" Expedition p. 337, pl. 21, figs. 14–16, text fig. 13*a* (Bibliography, geographic distribution).

1895. *Cellaria gracilis* MacGillivray, Monograph Tertiary Polyzoa Victoria, Transactions Royal Society Victoria, vol. 4, p. 30, pl. 3, fig. 26 (Miocene of Australia).

History.—Harmer changed the name of *Cellaria gracilis* Busk, 1852, which had predominated up to 1913, to *Cellaria punctata* Busk, 1852.

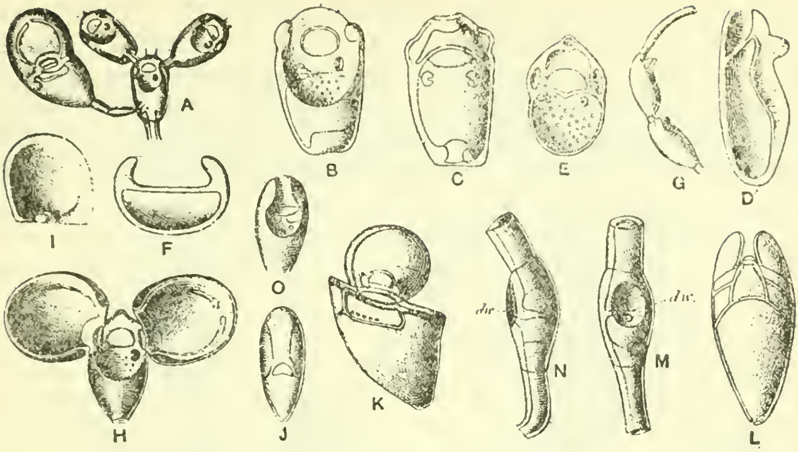

FIG. 46.—Genus *Alysidium* Busk, 1852

A–O. *Alysidium parasiticum* Busk, 1852. A. A gonozooecium with a double-valved ovicell is seen on the lowermost zooecium, ×40. B. A zooecium, ×75. C. A zooecium from the basal surface. The bent distal wall is seen, ×75. D. A longitudinal section through a zooecium, ×75. E. A gonozooecium from the frontal zooecia bearing surface after the removal of the ovicell. The two elongated openings are seen, through which the ovicellarian valves have been in communication with the dietellae of the gonozooecium, ×75. F. A transverse section through the distal end of a zooecium. A row of uniporous septulae is (very indistinctly) seen, ×75. G. The end of a branch with a cylindrical internode, ×40. H. A gonozooecium with the ovicellarian valves open, ×55. I. An ovicellarian valve from the internal surface, ×55. J. A gonozooecium with ovicell seen from the basal edge, ×40. K. A gonozooecium with developing ovicellarian valves, lateral view. A lateral dietella and a part of the basal one are seen, ×75. L. The same gonozooecium from the basal edge, ×75. M. The stem of the gonozooecium. The distal wall (*d w*) and a uniporous septula are seen, ×75. N. The stem of the gonozooecium, lateral view. Opposite the proximal part of the oval depression the oblique distal wall is seen, ×75. O. An oblique section through the middle part of the stalklike kenozooecium, seen from the basal surface. The three septulae of the distal wall are seen, ×75. (A–O. After Levinsen, 1909.)

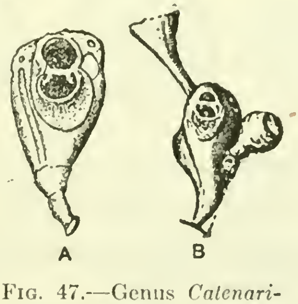

FIG. 47.—Genus *Catenariopsis* Maplestone, 1899

A, B. *Catenariopsis morningtonensis* Maplestone, 1899. A. A single zooecium, enlarged. B. Several zooecia adhering to a shell. (After Maplestone, 1899 and 1902.) Miocene, of Australia.

The arguments given are really of little importance. First, *Cellaria punctata* not having been figured, Busk had a perfect right to give to it a name more exact and significant. The abominable figure of *Cellaria gracilis* Phillipi, 1843, did not at all represent a *Cellaria*, even in the ideas of the time. Reuss, 1864 (p. 664), thinks that it is perhaps a *Myriozoum*. The type having disappeared, the paleontologists

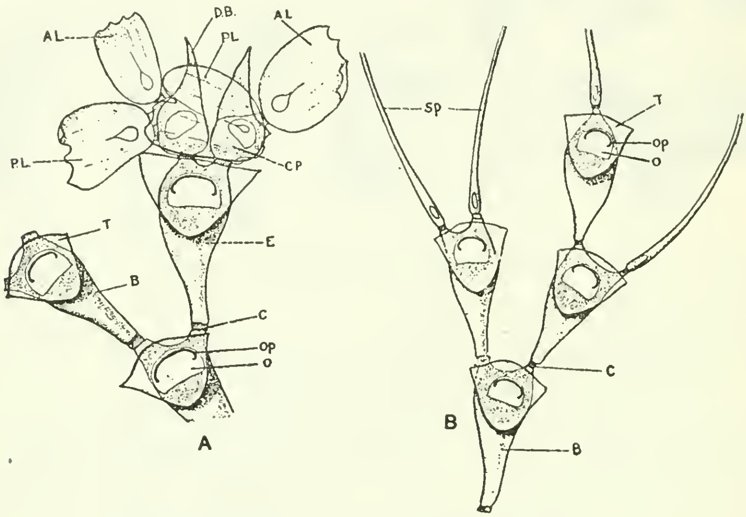

FIG. 48.—Genus *Catenicula* O'Donoghue, 1924

A, B. *Catenicula corbulifera* O'Donoghue, 1924. A. End of branch, ×57, bearing an ooecium which is somewhat flattened and the lateral plates opened out. *b*, Body of zooecium; *c*, Chitinous annular joint; *cp*, central almost circular joint; *db*, dorsal, bladelike plate; *e*, enlarged zooecium with modified triangular sac; *o*, semicircular opening of body; *op*, operculum; *pl*, posterior lateral plate; *sp*, spines; *t*, triangular sac. B. End of a branch showing the spine bearing zooecia, ×57. (After O'Donoghue, 1924.)

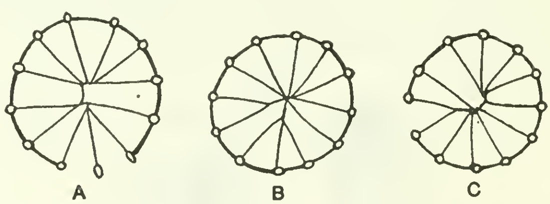

FIG. 49.—*Cellaria divaricata* MacGillivray, 1895

Three transverse thin sections, ×20, made through the same segment.

have a long time ago erased Philippi's name from the nomenclature. We maintain then the name of Busk.

Affinities.—This species is very well characterized by the thinness and gracility of the segments in which the length sometimes attains 1 centimeter, in its small micrometric dimensions, in the presence of a special mural rim to the cryptocyst and different from the cellular mural rim, in the presence of small transverse avicularia facing proximally and in the occurrence of wide ovicellarian cells, grouped on the enlarged portions of the segments.

None of the published figures give a satisfactory ensemble but we believe our photographs will permit easy and exact determination. Harmer 1926, has well figured the relations between the interior of the cells and their exterior decoration, the form of the ovicellarian orifice and the mandible of the curious elliptical avicularia.

Measurements.—

Aperture $\begin{cases} ha = 0.075 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.36 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$

Occurrence.—

D. 5235. Nagubat Island, east coast Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S., co.; 13.2° C.

Plesiotype.—Cat. No. 7971, U.S.N.M.

CELLARIA JAPONICA, new species

Plate 20, fig. 9

Description.—The zoarium is free, articulated; the segments are long, cylindrical, formed of eight rows of cells. The zooecia are distinct, separated by a slight furrow, hexagonal, a little elongated, arranged in transverse rows. The mural rim is thick, smooth; the cryptocyst is deep, lozengeshaped, smooth. The aperture is semielliptical, transverse, bordered by a thick, salient peristome; the proximal border is straight and bears two small lateral denticles. The ovicell is endotoichal and opens by a small orbicular pore.

Measurements.—

Apertura $\begin{cases} ha = 0.06 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.40 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Affinities.—The zooecia of articulation have a large orbicular orifice. Often the cryptocyst is limited laterally by a special, mural rim distinct from the exterior rim.

This species much resembles *Cellaria malvinensis* Busk, 1852, but we have not observed a single characteristic avicularium and we can not make the identification. It resembles also *Cellaria triangularis* Ortmann, 1892, but differs in the absence of avicularian zooecia. Our specimens were dead.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Cotypes.—Cat. No. 7972, U.S.N.M.

CELLARIA GRANULATA, new species

Plate 21, figs. 4–6

Description.—The zoarium is free and articulated; the segments of 1 centimeter in length are thin, cylindrical, narrower at the base, and inflated at the level of the ovicelled zooecia. The zooecia are distinct, separated by a minute furrow, elliptical, elongated, arranged in quincunx; the mural rim is thin, salient, *granulated;* the cryptocyst is rather deep, concave, granulated proximally. The apertura is large, semilunar, surrounded by a thin, granulated peristome; the proximal border bears laterally two small indentations and sometimes two minute denticles. The ovicell is endotoichal, large, covered over by a lamella, convex and transverse; its orifice is very large and oblique on the plane of the aperture. The avicularium is lozenge shaped, almost as large as a zooecium; its opesium is elliptical and median. The ovicelled zooecia are broader, grouped on a swollen portion of the segment.

Structure.—The orifice of the ovicell is orbicular and normally placed above the aperture and in the same plane, but it is frequently covered and protected by a convex, fragile, lamella rising from the cryptocyst of the distal zooecium. This arrangement gives to some ovicells the aspect of *Stomhypselosaria.* Lifting the convex lamella with the scalpel, shows immediately the normal orifice, so that the resemblance is only a false appearance. Harmer, 1926, has noted the same structure in *Cellaria tecta.* It is clearly visible on our photographs. The granules and especialy the proximal denticles of the aperture disappear rapidly at the least weathering.

Measurements.—

Apertura $\begin{cases} ha = 0.14 \text{ mm.} \\ la = 0.14 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

Affinities.—In its avicularium, this species much resembles *Cellaria contigua* MacGillivray, 1895, but differs from it in its convex ovicell and its wide ovicelled zooecia. It differs from *Cellaria tecta* Harmer, 1926, in its more elongated cells, its regularly concave cryptocyst, and its larger opesium of the avicularium. All of our specimens were dead and deprived of their chitinous appendages; they did not live where they were dredged. The Cellariidae are commensals on the large floating algae.

Occurrence.—

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.

Cotypes.—Cat. Nos. 7979, 7980, U.S.N.M.

Genus CRYPTOSTOMARIA Canu and Bassler, 1927

The ovicell is endotoichal, and deprived of any apparent orifice; t is situated at the base of the zooecia where it forms a semicircular convexity. The apertura bears two small lateral indentations; it is deprived of denticles.

Genotype.—*Cryptostomaria crassatina* Canu and Bassler, 1927. Recent. *Farciminaria biseriata* Waters, 1888, probably belongs to this genus.

CRYPTOSTOMARIA CRASSATINA Canu and Bassler, 1927

Plate 20, figs. 2, 3

1927. *Cryptostomaria crassatina* Canu and Bassler, Classification Cheilostomatous Bryozoa, Proc. U. S. Nat. Mus., vol. 69, art. 14, p. 4, pl. 1, fig. 5.

Description.—The zoarium is free, cylindrical, bifurcated. The zooecia are distinct, separated by a furrow, ogival, broad; the mural rim is *very thick*, enlarged laterally, convex, smooth; the cryptocyst is small, rectangular, very deep in its distal portion where it rises perpendicularly to form the proximal border of the apertura. The apertura is small, embedded, semielliptical, transverse; its proximal border is a thin lip, elevated and bordered by two small, lateral indentations. The ovicell is a semicircular convexity without visible orifice.

Measurements.—

Apertura $\begin{cases} ha = 0.08 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60\text{–}0.75 \text{ mm.} \\ lz = 0.50\text{–}0.55 \text{ mm.} \end{cases}$

We are ignorant of the mode of fixation of the zoarium. This is probably a deep-water species. Our specimens were dead.

Occurrence.—

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.: 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.; 13° C.

Cotypes.—Cat. Nos. 7973, 7974, U.S.N.M.

Genus STOMHYPSELOSARIA Canu and Bassler, 1927

The ovicell is endotoichal; it is opened by a wide semicircular orifice placed obliquely above the operculum; it is situated at the base of the distal zooecium, where it forms a very salient convexity. The apertura bears two very small lateral indentations; it is deprived of denticles. The apertura is terminal, adjacent distally to the mural rim.

Genotype.—*Stomhypselosaria condylata* Canu and Bassler, 1927.

This genus differs from *Cellaria* in the terminal arrangement of the aperture, in the absence of a salient thread around it, in its ovicell, in which the visible part is formed by the development of the mural rim, and in the ovicell orifice facing proximally.

The known species of this genus are:

Stomhypselosaria condylata Canu and Bassler, 1927	Recent.
Stomhypselosaria dupliforma, new species	Recent.
Stomhypselosaria (*Quadricellaria*) *laciniosa* Canu and Bassler, 1920	Jacksonian.
Stomhypselosaria (*Quadricellaria*) *burnsi* Canu and Bassler, 1920	Jacksonian.

The ovicell of *Salicornaria dubia* Busk, 1885, has been figured by Waters, 1904. It is salient and globular as that of *Stomhypselosaria*, but the orifice is much more distant from the apertura, and there are zooecia transformed into avicularia. We hesitate, then, in introducing this species in this genus, especially because the figures of Busk, 1885, and of Waters, 1904, are very different.

There are two groups in the genus, one articulated and the other not articulated but all the species appear radicelled.

STOMHYPSELOSARIA CONDYLATA Canu and Bassler, 1927

Plate 20, fig. 1

1927. *Stomhypselosaria condylata* Canu and Bassler, Classification Cheilostomatous Bryozoa, Proc. U. S. Nat. Mus., vol. 19, art. 14, p. 4, pl. 1, fig. 3.

Description.—The zoarium is free, cylindrical, bifurcated. The zooecia are distinct, separated by a furrow, elongated, ogival; the mural rim is thin above, enlarged on the sides, convex, smooth; the cryptocyst is small, rectangular, very deep in the vicinity of the apertura, where it rises in order to form the proximal lip of the apertura. The apertura is deep, oblique, semielliptically transverse; the proximal border is a thin salient lip with two small lateral indentations. The ovicell is large, convex, opening obliquely above the apertura. The ovicelled zooecia bear on the mural rim two large salient *condyles* placed between the ovicell and the apertura.

Measurements.—

Opesium $\begin{cases} ho = 0.10\text{–}0.12 \text{ mm.} \\ lo = 0.14\text{–}0.16 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.50\text{–}0.60 \text{ mm.} \\ lz = 0.40\text{–}0.50 \text{ mm.} \end{cases}$

Affinities.—This new species differs from *Stomhypselosaria dupliforma* in the absence of a double mural rim, in its rectangular cryptocyst, and the presence of condyles. It differs from *Cryptostomaria crassatina* in the visible orifice of its ovicell and in its smaller dimensions. Our specimens were dead and deprived of all chitinous appendages. We are ignorant of their mode of fixation.

Occurrence.—

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.; 13° C.

Cotypes.—Cat. Nos. 7975, 7976, U.S.N.M.

STOMHYPSELOSARIA DUPLIFORMA, new species

Plate 21, figs. 1–3

Description.—The zoarium is free, quadrangular, bifurcated. The zooecia are distinct, separated by a small thread, smooth, little elongated, wide; the mural rim is very thick laterally, granulated, separated into two portions by a furrow; the cryptocyst is shallow, elliptical, smooth. The aperture is semielliptical, transverse; the proximal border bears two small lateral indentations and sometimes two very small denticles. The ovicell is convex, salient, transverse, opening obliquely above the apertura.

Measurements.—

Apertura $\begin{cases} ha = 0.08\text{–}0.10 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60\text{–}0.70 \text{ mm.} \\ lz = 0.36\text{–}0.40 \text{ mm.} \end{cases}$

Affinities.—This species is very well characterized by its apparent *double* mural rim. Well-preserved specimens alone are granulated. The ovicell is much smaller than that of *Stomhypselosaria condylata.* Our specimens were dead and deprived of ectocyst. We are ignorant of their mode of fixation. It is a species of very deep water.

Occurrence.—

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S., Co.

Cotypes.—Cat. Nos. 7977, 7978, U.S.N.M.

Genus MESOSTOMARIA ,Canu and Bassler, 1927

The ovicell is endotoichal; it is convex; its orifice is large and placed obliquely above the apertura. The apertura is removed from the distal border of the mural rim and surrounded by a special peristome; it is deprived of denticles. The zooecia are arranged in transverse rows.

Genotype.—*Mesostomaria strictoramae,* Canu and Bassler, 1927.

Range.—Miocene to Recent.

The known species of this genus are as follows:

Mesostomaria strictoramae, Canu and Bassler, 1927	Recent.
Mesostomaria (*Melicerita*) *atlantica* Busk, 1885	Recent.
Mesostomaria (*Cellaria*) *angustiloba* Busk, 1885	Miocene, Recent.
Mesostomaria (*Cellaria*) *acutimarginata* MacGillivray, 1895	Miocene.
Mesostomaria (*Salicornaria*) *magnifica* Busk, 1885	Recent.

The operculum is identical with that of *Stomhypselosaria.*

Not a single ovicell of the old species has been figured and MacGillivray, 1895, alone noted broken ovicells on *M. angustiloba.* We have observed beautiful ovicells on the fossil forms of the latter from Australia and on *M. acutimarginata.*

In its operculum and its cylindrical zoarium, *Mesostomaria magnifica* is, according to Busk, an intermediate species. All the recent species come from very deep water.

MESOSTOMARIA STRICTORAMAE Canu and Bassler, 1927

Plate 21, figs. 7–9

1927. *Mesostomaria strictoramae* CANU and BASSLER, Classification Cheilostomatous Bryozoa, Proc. U. S. Nat. Mus., vol. 69, art. 14, p. 5, pl. 1, fig. 4.

Description.—The zoarium is free, dichotomous with compressed narrow fronds. The zooecia are distinct, separated by a deep

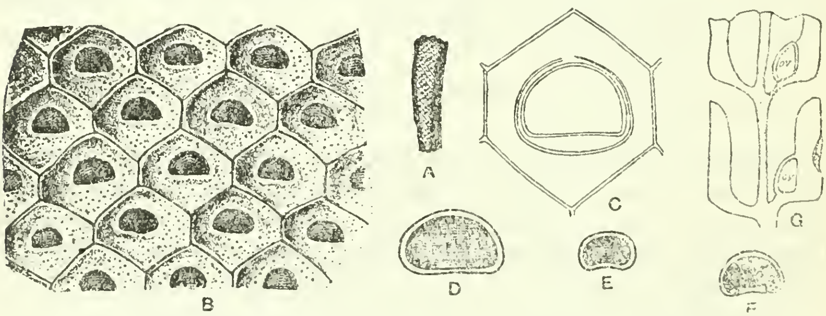

FIG. 50.—Genus *Mesostomaria* Canu and Bassler, 1927

A–G. *Mesostomaria* (*Melicerita*) *atlantica* Busk, 1884. A. Zoarium, natural size. B. Group of zooecia, ×30. C. Portion of the operculum on the aperture. D–F. Orifices of *M. atlantica* (D), *M. charlesworthi* (E), and *M. angustiloba* (F), showing relative proportions. (A–F, after Busk, 1884.) G. Longitudinal section, ×12, showing the position of the ovicell. (After Waters, 1889.)

furrow, hexagonal; the mural rim is wide, especially laterally, convex, smooth, attenuated inferiorily where it unites with the cryptocyst. The apertura is submedian; semielliptical, transverse, surrounded by a thin, salient peristome; its proximal border frequently bears two very small denticles. The ovicell is a little convex, transverse, smooth, fragile; its orifice is very large and placed obliquely above the apertura.

Measurements.—

Apertura $\begin{cases} ha = 0.05 \text{ mm.} \\ la = 0.08\text{–}0.09 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.24\text{–}0.28 \text{ mm.} \\ lz = 0.28 \text{ mm.} \end{cases}$

Affinities.—This species is distinguished from the other known species by its narrow almost cylindrical branches. Our specimens were dead and deprived of ectocyst. The ovicelled zooecia are joined together by their mural rim.

Occurrence.—

D. 5162. Tinagta Island; Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs; 11.6° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.; 13° C.

Cotypes.—Cat. Nos. 7981, 7982, U.S.N.M.

Genus SYRINGOTREMA Harmer, 1926

Zoarium free, cylindrical, unjointed, attached by chitinous rootlets. Zooecia with lozenge-shaped or pentagonal areas, bounded by raised walls. Cryptocyst convex and little depressed proximally, produced round the distal border of the orifice, which is far removed from the distal end of the area. Opesia and orifice almost co-extensive, sur-

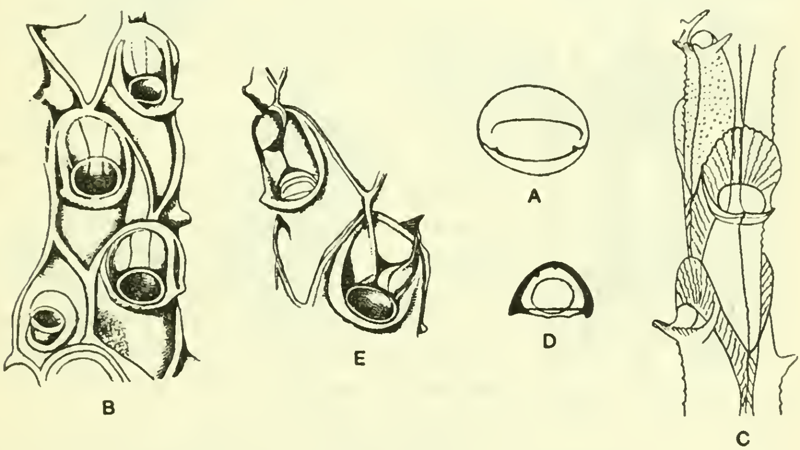

Fig. 51.—Genus *Syringotrema* Harmer, 1926

A–E. *Syringotrema auriculatum* Harmer, 1926. A. Operculum with its sclerite on the proximal side of which is another sclerite belonging to the margin of the opesia. B. Zooecia and avicularium. C. Young zooecia. D. Mandible. E. Ovicells and parts of zooecia. (All magnified and after Harmer, 1926.)

rounded proximally and laterally by a cryptocyst-ridge within which is a complete, nearly vertical, calcareous tube terminating in the orifice. Avicularia vicarious. Ovicells with a distal hood, on the proximal side of which are two lateral flaps or auricles.

Genotype.—*S. auriculatum* Harmer, 1926. Recent.

Genus ATELESTOZOUM Harmer, 1926

Zoarium free, the zooecia opening principally on two opposite faces. Zooecia with a depressed horizontal cryptocyst, of considerable extent, its distal lobes prolonged round the border of the orifice without completely uniting on its distal side. Vertical walls much raised, their edges marking off large, angular areas which occupy the entire surface. Opesia and orifice practically coextensive, widely separated from the distal end of the area, with a raised oral arch and a distinct median process. Avicularia and ovicells unknown.

Genotype.—*A. obliquum* Harmer, 1926. Recent.

Family MEMBRANICELLARIIDAE Levinsen, 1909

The ovicells, situated on the distal part of each zooecium, are inner spaces in the frontal wall of the zooecia and open outwards through a variously shaped opening. The frontal and the dorsal of each zooecium have not the same form. There are avicularia or interzooecial onychocellaria. The opesium is surrounded by a raised rim with only the distal part filled by a membranous opercular valve; it perforates the cryptocyst.

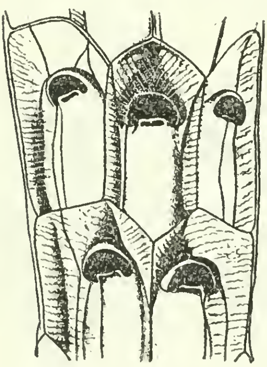

Fig. 52.—Genus *Atelestozoum* Harmer, 1926

Zooecia of *A. obliquum* Harmer, 1926, magnified.

Structure.—The ovicell is hyperstomial but never placed on the distal zooecium; it is formed by the development of the mural rim.

The opercular valve has a membranous frontal surface, but a well chitinized and strongly developed opercular arch. The membrane covering the aperture has on either side toward the center a parietal muscle attached to a very fine sclerite.

The opesium is completely surrounded by the cryptocyst; it is median or anterior, but never terminal as in the Biflustridae and Onychocellidae.

Classification.—Levinsen cited only the genus *Membranicellaria.* He refers here correctly a number of Cretaceous species whose structure is thus explained. But the list he gives is absolutely identical with that which Jullien, 1881, gave for his genus *Dictuonia.* It is convenient to preserve the latter name because of the presence of onychocellaria. The latter have persisted in the long succession of the ages as *Vincularia maorica* from the Philippines is provided with them.

The known genera of the Membranicellariidae are as follows:

Membranicellaria Levinsen, 1909. The interzooecial organs are avicularia with wide mandibles.

Genotype.—*Membranicellaria* (*Melicerita*) *dubia* Busk, 1885. Recent.

Omoiosia Canu and Bassler, 1927. The interzooecial organs are straight onychocellaria.

Genotype.—Omoisia (*Vincularia*) *maorica* Stoliczka, 1864. Tertiary—Recent.

This genus is perhaps identical with *Dictuonia*.

Erinella Canu and Bassler, 1927. (*Erina* Canu, 1908.) There are no interzooecial organs.

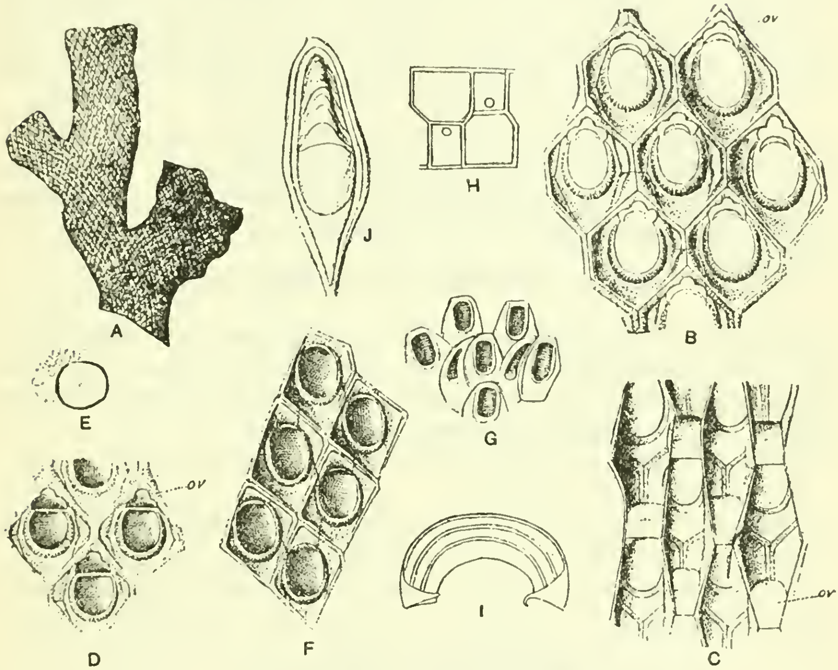

FIG. 53.—Genus *Membranicellaria* Levinsen, 1909

A–J. *Membranicellaria dubia* Busk, 1884. A. Zoarium, natural size. B. Zooecia with ovicell. The elongated hexagonal zooecia are partly visible through the frontal surface, which is divided into hexagonal, rhombic areas, ×17. C. From the basal aspect after removal of the basal surface the cavity of the elongated zooecia is visible and the hexagonal rhombic areas of the frontal surface are seen at the same time. On the distal portion of each zooecium an ovicell (*ov*) with its oblique, basal surface is seen, ×17. D. Zooecia with endotoichal ovicell The covering membrane is removed, ×17. E. Uniporous septula, ×75. F. Group of zooecia. The separating walls of the elongated zooecia are visible through the frontal surface, divided into broad areas, ×17. (A–F. After Levinsen, 1909.) G. Zooecia with avicularia, ×6. H. Diagrammatic transverse section with a septula situated in the distal wall near the base, ×12. I. Operculum with membraniporidan character. It has not any direct connection with the calcareous wall, ×85. (G–I. After Waters, 1889.) J. Avicularium. (After Busk, 1884.)

Genotype.—Erinella (*Erina*) *patagonica* Canu, 1908. Helvetian. The ovicell of this species was not well understood by Canu from the single mediocre specimen studied.

Dictuonia Jullien, 1881. There are straight onychocellaria. The orifice of the ovicell is not trilobate. Cretaceous. The known species of this genus are *Eschara echinata, E. cynara, E. elea, E. acis, Vincularia tuberculata* D'Orbigny, 1852, and *Eschara matrona* Hagenow, 1839. The ovicells of all these are known.

Among the species cited by Jullien and by Levinsen, the group *E. danae—E. nerei*, has never afforded ovicells in spite of the large number of specimens studied. The external appearances are then very deceiving in this group as in all the other families of bryozoa.

The general structure is membraniporoid and in spite of the presence of onychocellaria, it is altogether different from that of the Onychocellidae in which the ovicell is endozooecial. This latter family has numerous well characterized representatives in the Cretaceous.

Genus OMOIOSIA Canu and Bassler, 1927

The zooecia are hexagonal. The opesium perforates the cryptocyst; it is bordered by a salient thread. The accessory zooecia (onychocellaria?) are quite *similar* to the others, but the distal portion of their cryptocyst is much larger.

Genotype.—*Omoiosia* (*Vincularia*) *maorica* Stoliczka, 1864.

Range.—Miocene, Recent.

The only other known species is *Omoiosia* (*Melicerita*) *elliptica* Maplestone, 1900, from the Miocene of Australia.

The ovicell not being known, a better place for this genus might be in the Biflustridae.

OMOIOSIA MAORICA Stoliczka, 1864

Plate 21, fig. 10

1864. *Vincularia maorica* Stoliczka, Fossil Bryozoa aus dem Tertiary Grünsandstein der Orakei-Bay, Reise des Oest. Fregatte Novara, vol. 1, p. 153, pl. 20, fig. 8.

Measurements.—

Opesium $\begin{cases} ho = 0.25 \text{ mm.} \\ lo = 0.15 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

Structure.—The colony is bilamellar, free, of regular fronds containing 4 longitudinal rows of zooecia on each face. The two lamellae are separable. On the dorsal the zooecia are visible, rectangular, of the *Biflustra* type. The zooecia are hexagonal, elongated, regular; the mural rim is thin and may become rounded, distally pointed; the cryptocyst is shallow, smooth, and completely surrounds the opesium.

The opesium is oval, anterior (not terminal) bordered by a salient pad very constant in its dimensions. This great regularity indicates a very special internal structure, very different from the other recent species provided with onychocellaria.

The onychocellarium is an ordinary zooecium perforated by an elliptical, median opesium without a peripheral pad.

Affinities.—In the regularity of its opesium, this species appears to have the structure of the Membranicellariidae. It can not, however, be classed in the genus *Membranicellaria* Levinsen, 1909, for the frontal of the zooecia is not rhomboidal and the dorsal is not elliptical. As our specimens had neither ovicells nor chitinous appendages we can not create for them a special genus since we would not be able to define it.

Erina patagonica Canu, 1908, of the Argentina Helvetian is more of the type of *Membranicellaria*. *Melicerita elliptica* Maplestone, 1900, from the Australian Miocene is of absolutely identical structure and presents the same onychocellaria and the same colony. If the enlargement indicated be exact it is a smaller species but positively of the same genus.[8]

Membranipora regularis Maplestone, 1900, belongs prehaps to the same group, but no onychocellaria are shown on the figure.

Eschara amyntas D'Orbigny, 1852, of the French Senonian has the same zooecial form but the opesium of the onychocellarium is large, elliptical, and not median. It is very small on *Eschara alimena* D'Orbigny, 1852.

Vincularia perforata and *Eschara arcas* D'Orbigny, 1852, of the French Senonian are figured without onychocellaria, but the zooecial form is also hexagonal.

Eschara echinata D'Orbigny, 1892, of the French Senonian in zooecial form belongs also to the same group. However, the latter on the same colony can be ogival, rhomboidal, or indistinct. Besides the ovicell is hyperstomial and of a type altogether different, for it is never buried on the distal zooecium. The onychocellarium is also a more differentiated structure.

Omoiosia maorica is a very remarkable species. It indicates manifestly that the onychocellarium is not an organ particular to one family as Jullien thought in 1881 for it certainly exists in the Membranicellariidae.

Occurrence.—D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

Plesiotypes.—Cat. No. 7983, U.S.N.M.

Family COSCINOPLEURIDAE Canu, 1913

Description of the family and the principal genus *Coscinopleura* is given in our 1920 monograph. *Macropora* MacGillivray, 1895, and *Quadricellaria* D'Orbigny, 1850, which we placed here in 1920, are

[8] What the Australian author considered as an avicularium is a perforation of external origin.

now referred elsewhere while *Escharifora* D'Orbigny, 1850, a description of which follows, is the only other known genus of the family.

Genus ESCHARIFORA D'Orbigny, 1851

1851. *Escharifora* D'ORBIGNY, Paléontologie française, Terrain Crétacé, Bryozoaires, p. 208.

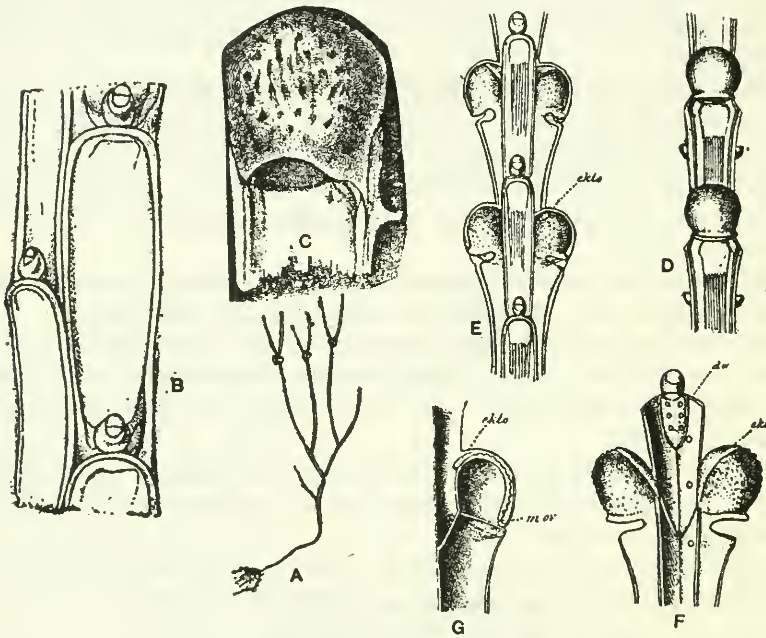

FIG. 54.—Genus *Levinsenella* Harmer, 1926. (*Columnaria* Levinsen, 1909, preoccupied)

A–C. *Levinsenella brasiliensis* Busk, 1884. A. Zoarium natural size. B. Ordinary zooecia. C. Ovicell. (A–C, after Busk, 1884.)

D–G. *Levinsenella borealis* Levinsen, 1909. D. Two zooecia with ovicells. On each side of the ovicell in its distal half is seen a cryptocyst plate, ×17. E. The membranous ectooecium and the triangular cryptocyst plate (*ekto*) of the ovicell are seen, ×17. F. The membranous parts of the zooecia have been removed. The lateral walls and the distal wall (*dw*) with septulae in addition to the cryptocyst plate of the ovicell (*ekto*) are seen, ×23. G. Longitudinal section through a zooecium with ovicell. The membranous ektooecium, the cryptocyst plate (*ekto*) of the ovicell and the membranous wall between the zooecium and the ovicell (*m. ov.*) are seen, ×23. (D–G. After Levinsen, 1909.)

Coscinopleuridae in which the zooecia are surrounded by orbicular avicularia and pores.

Genotype.—*Escharifora argus* D'Orbigny, 1852. Cretaceous.

As in the genus *Coscinopleura*, the ovicell is superfrontal and is formed by the development of the distal portion of the mural rim.

Division 5. CELLULARINA Smitt, 1867

Family FARCIMINARIIDAE Busk, 1852

The zooecia are furnished with an obliquely ascending distal wall and separated by common lateral walls, which are furnished with a small number (2–4) of uniporous septulae; no true spines. The avicularia dependent, sometimes depressed, sometimes strongly projecting. The ovicells are endozooecial. The zoaria are dicho-

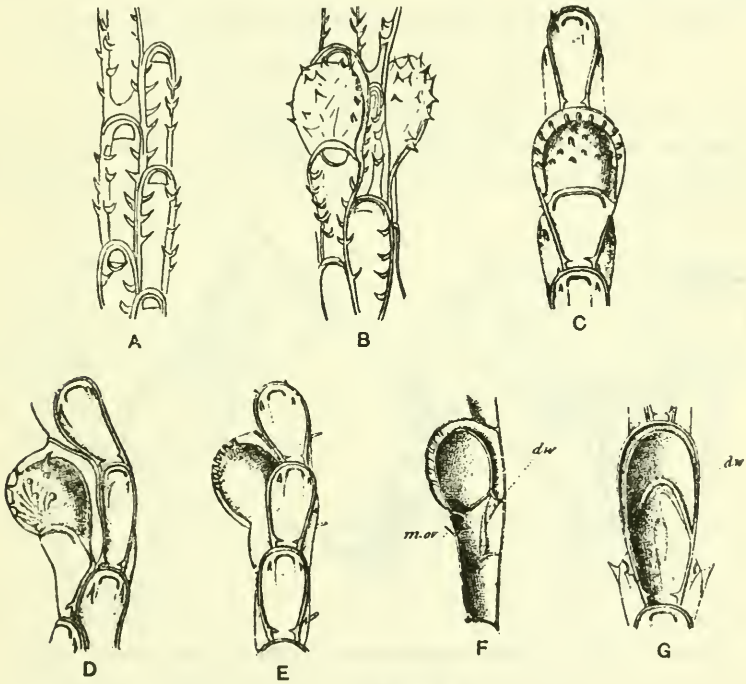

Fig. 55.—Genus *Farciminaria* Busk, 1852

A, B. *Farciminaria aculeata* Busk, 1852. Ordinary and ovicelled zooecia. (After Busk, 1852.)

C–G. *Farciminaria uncinata* Hincks, 1884. C. Ovicelled zooecium, ×20. D. The ovicell and the surrounding kenozooecium, lateral view, ×23. E. The ovicell partly from the basal surface, ×23. F. A longitudinal section through the gonozooecium, the ovicell, and the surrounding kenozooecium. The distal wall (*dw*) between the gonozooecium and the kenozooecium is seen; *m. ov.*, the membranous wall separating the zooecium from the ovicell, ×23. G. A longitudinal section through the gonozooecium but parallel to the frontal wall. The angular distal wall between the gonozooecium and the kenozooecium is seen, ×40. (D–G. After Levinsen, 1909.)

tomously branched tufts, with slender, prismatic, sometimes jointed segments, on which the zooecia are arranged in longitudinal rows (generally 4–6) around an axis formed by the adjoining separating walls. (After Levinsen, 1909.)

There have as yet been no anatomical researches on the representatives of this family.

Genus LEVINSENELLA Harmer, 1926

(*Columnaria* Levinsen, 1909; preoccupied)

The ovicells are strongly prominent. The zooecia are without spinous processes; the distal wall has a number of scattered uniporous septulae. The avicularia are capitate, attached to the distal wall at their proximal part and firmly fixed with their basal wall to the frontal membrane of the distal zooecium. The colonies are not jointed. (Levinsen, 1909.)

Genotype.—Columnaria borealis Levinsen, 1909. Recent.

Genus FARCIMINARIA Busk, 1852

"The ovicells are surrounded by kenozooecia. The zooecia have a larger or smaller number of small, spinelike processes, which are placed either on the frontal membrane or on the lateral margins; the

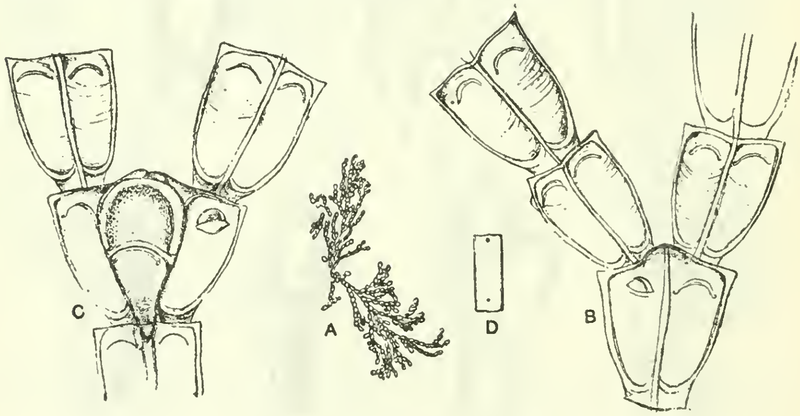

FIG. 56.—Genus *Didymozoum* Harmer, 1923 (*Didymia* Busk, 1852)

A–D. *Didymozoum simplex* Busk, 1852. A. The zoarium, natural size. B. Anterior side of a fragment. The zooecia are placed on the same plane and open on the anterior face. C. The ovicelled zooecia are located between two zooecia in a bifurcation. (A–C. After Busk, 1852.) D. Lateral wall, showing uniporous septulae, ×85. (After Waters, 1887.)

colonies are chitinous and are not jointed" (Levinsen, 1909). Numerous chitinous radicells twisted on the length fix the zoarium in the sand (Jullien, 1903).

Genotype.—Farciminaria atlantica Busk, 1884. Recent.

Genus DIDYMOZOUM Harmer, 1923

Special method of bifurcation (type 1 of Harmer). The zoaria are biserial. The ovicell-bearing zooecia placed between two zooecia in a bifurcation. No septules between two neighboring zooecia.

Genotype.—Didymozoum (Didymia) simplex Busk, 1852. Recent.

Genus FARCIMINELLUM Harmer, 1926

Branches pluriserial, bilaminar, flattened, with at least 3 series of zooecia on each face, those of the basal surface being kenozooecia, without orifice or operculum, with the exception of the marginal row on each side. Median and lateral zooecia differentiated, as in *Himantozoum* (Bicellariellidae), their proximal ends not conspicuously forked, and hardly overlapping their predecessors. Spines and avicularia present or absent, the mandibles rounded. Ovicells present (*F. alice*) or large eggs in the zooecial cavity, correlated with the absence of ovicells as in *Himantozoum*.

Genotype.—Farciminaria hexagona Busk, 1884. Recent.

Genus NELLIA Busk, 1852

NELLIA OCULATA Busk 1852

Plate 5, figs. 12, 13

1920. *Nellia oculata* Canu and Bassler, North American Early Tertiary Bryozoa, Bull. 106, U. S. National Museum, p. 196 (Paleontological bibliography).

1921. *Nellia oculata* Marcus, Bryozoa of Swedish scientific expeditions, Kongl. Svenska Vetenskaps academiens Handlingar, vol. 61, p. 5.

1921. *Farcimia tenella* Duvergier, Note sur les Bryozoaires du Neogene de l'Aquitaine, Actes de la Societé Linnaean de Bordeaux, vol. 72, p. 8.

1923. *Nellia oculata* Canu and Bassler, Late Tertiary and Quaternary Bryozoa, Bull. 125, U. S. National Museum, p. 55, pl. 2, figs. 5–7.

This charming little species is well known. The segments are rather variable. The zoarium is attached to marine algae, forming thick bushes. The recognition of the depth in which the dead segments are found is not yet useful. The species does not appear to occur far from the shore. It is a tropical species and has already been noted in the Philippines. Its presence in the fossils is an exact method to indicate the variations of the tropics. Waters has noted that the ovicell is visible with difficulty.

Occurrence.—

D. 5235. Nagubat Island, east coast of Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; sh.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S., co.; 13.2° C.

Geographic distribution.—Atlantic: Florida, Bahia, Tortugas, St. Thomas and Texas. Pacific: Torres and Bass Straits, Queensland, Victoria, Cape Grenville, Cape Jaubert, Heard Island, Crozet Island Philippines. Indian Ocean: Merqui Archipelago, Ceylon, Sudanese Red Sea, Wasin (16m), Zanzibar (5–16m).

Geologic distribution.—Lutetian of the environs of Paris (Canu); Vicksburgian of Alabama and Mississippi (Canu and Bassler);

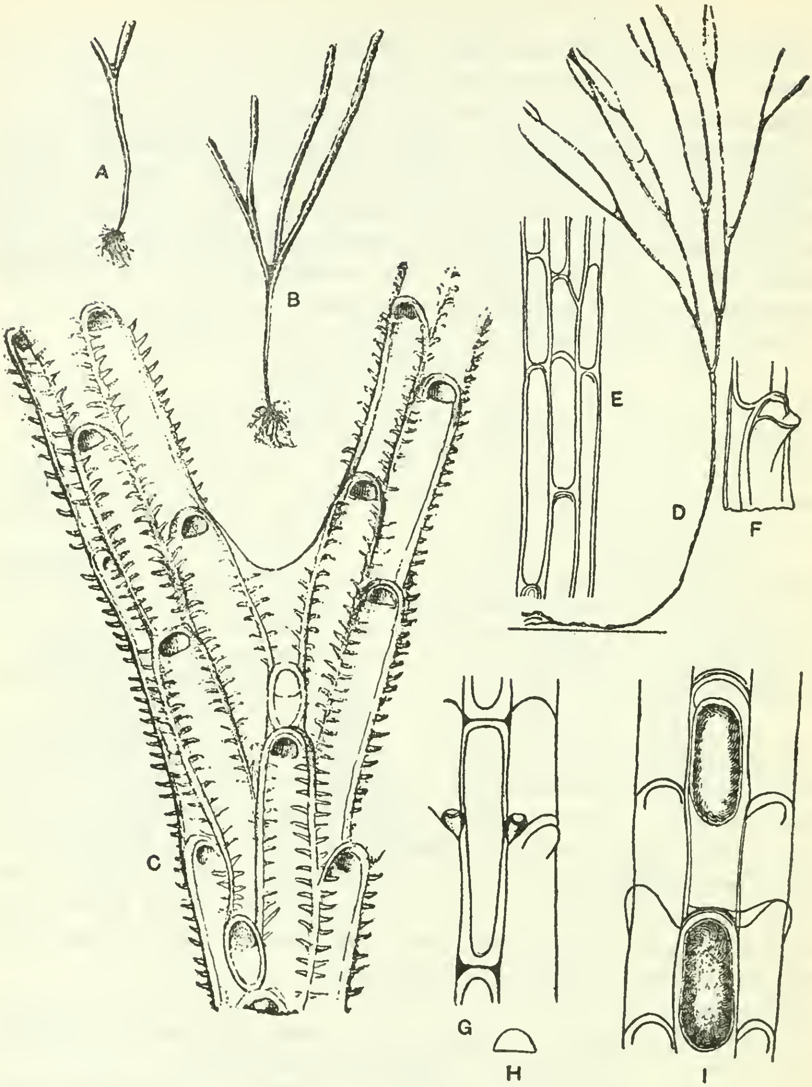

Fig. 57.—Genus *Farciminellum* Harmer, 1926

A–C. *F.* (*Farciminaria*) *atlantica* Busk, 1884. A, B. Two zoaria, natural size. C. Aspect of the zooecia on a bifucated frond. The sides of the front beset with numerous, simple, incurved, equidistant, aculcate spines. (A–C. After Busk, 1884.)

D–F. *F. hexagonum* Busk, 1884. Zoarium (D), half natural size with surface magnified (E) and orifice (F) more highly magnified. (After Busk, 1884.) G–I. Basal view (G) enlarged, mandible (H) and frontal view (I) showing two eggs. (After Harmer, 1926.)

Burdigalian of Bordeaux (Duvergier) and Santo Domingo (Canu and Bassler); Helvetian of Egypt (Canu); Miocene of Australia (MacGillivray, Waters).

Plesiotypes.—Cat. No. 7875 U.S.N.M.

Family BUGULIDAE Gray, 1848

The larva is higher than wide. The ovicell is hyperstomial and free. The zooecia are subrectangular with gymnocyst absent or very small. The colonies are flexible, nonarticulated, radicelled.

The genera of the Bugulidae are arranged in two groups as follows:

I. *Bugula* Oken, 1815 (*Bugulina* Gray, 1848; *Ornithopora* D'Orbigny, 1852; *Acamarchis* Lamouroux, 1816; *Avicella* Van Beneden, 1848; *Avicularia* Gray, 1846; *Crisularia* Gray, 1848; *Ornithoporina* D'Orbigny, 1851); *Watersia* Levinsen, 1909; *Dendrodeania* Levinsen, 1909; *Caulibugula* Verrill, 1900 (*Stirpariella* Harmer, 1923, *Stirparia* Goldstein, 1880); *Bugularia* Levinsen, 1909.

II. *Euoplozoum* Harmer, 1923; *Himantozoum* Harmer, 1923; *Camptoplites* Harmer, 1923; *Kinetoskias* Danielsen, 1868 (*Naresia* W. Thomson, 1872); *Halophila* (Gray, 1843) Busk, 1852.

The various methods of ramification of the branches in the Bugulidae and Scrupocellariidae have been studied by Waters and by Harmer. A digest of their results is as follows:

TYPES OF RAMIFICATION

(After the figures of Waters and of Harmer)

I. Two normal zooecia separating at first and then each simultaneously emitting two zooecia. Each segment is therefore unicellular at the base (*Caulibugula*).

II. Two normal adjacent zooecia, each emitting simultaneously and distally two zooecia of which the interior ones divide (*Didymozoum*, now placed in Farciminariidae).

III. A single normal zooecium gives rise to two distal converging zooecia, the inner one of which emits proximally the inner zooecium of the other branch (*Bugula, Euoplozoum*).

IV. A normal zooecium emits two distal divergent zooecia, one of which gives rise to the inner zooecium of the other branch (*Kinetoskias*).

V. A complementary intercalated zooecium emits two divergent separated zooecia serving as inner zooecia to two new branches (Scrupocellariidae).

VI. A complementary intercalated zooecium emits proximally a single divergent zooecium which becomes the unicellular base of the new segment (*Monartron* placed in Scrupocellariidae). In this type of branch the zooecia also arise laterally without addition of the complementary zooecium.

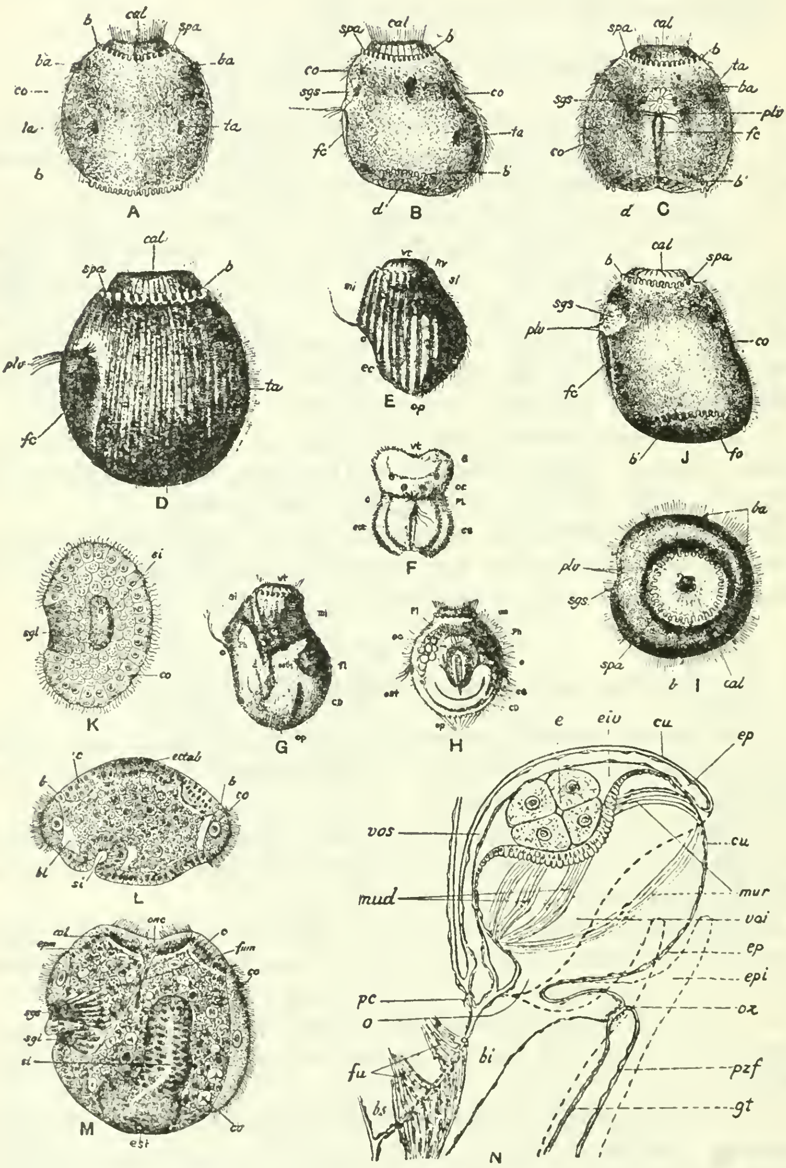

FIG. 58.—Family Bugulidae Gray, 1848

(Explanatory remarks on opposite page)

FIG. 58.—Family Bugulidae Gray, 1848

(Explanatory remarks for fig. 58)

A–C. Posterior, lateral and anterior face of larva, *Bugula sabatieri* Calvet, 1900. D. Free larva viewed in profile of *Bugula neritina* Linnaeus, 1758. (A–D. After Calvet, 1900.)

E. Larva in profile of *Bugula plumosa* Pallas, 1766, showing the exact limits of the cellules of the coronna which extends from the opening *op*, up to the border of the sheath of the ventouse in order to form all the external covering, ×100.

F. Anterior face of *Bugula plumosa;* commencement of the diffluence showing the opening *op* which is prolonged into an obscure band *ce* on each side of the stomach, ×75.

G. Free larva, seen in profile, of *Bugula flabellata* J. W. Thompson, 1868. The change in symmetry is complete, ×100.

H. Anterior face of the larva of *Bugula flabellata,* ×75. (E–H. After Barrois, 1877.)

I. Free larva of *Bugula turbinata* Alder, 1857, seen from the dorsal face normally with relation to the calotte.

J. Free larva of *Bugula turbinata* Alder, 1857, viewed from the left lateral face.

K. Equatorial section of a young embryo of *Bugula avicularia* Linnaeus, 1758, showing the differentiation of the inferior glandular system; *b*, vesicular superior collerette; *b′*, inferior vesicular collerette; *ba*, palettes of pigment spots of the larva; *CD*, digestive cavity; *cal*, calotte; *c*, coronna; obscure portion of cavity of the body comprised between the two branches of the stomach; *co*, coronna; *bl*, blastocoele; *d*, vaginal diaphragm; *ectab*, aboral ectoderm; *epm*, mesodermic thickening; *est*, stomach; *fc*, ciliated slit; *fl*, flagellum; *fum*, neuro-muscular bundle; *fo*, ventral or oral face; *mi*, aboral mesoderm; *ms*, oral (labial) mesoderm; *o*, orifice of the gastrula; *oc*, oculiform points; *op*, orifice; *ph*, pharynx; *plv*, vibratile plumet; *RV*, point of maximum width of the ventouse (border of the ventouse); *sp*, spermatoblastic morules; *sgi*, inferior glandular system; *sgs*, superior glandular system; *si*, *si′*, internal sack; *spa*, paleal furrow; *ta*, pigmentary spots of the larva; *vt*, ventouse.

L. Median sagittal section of an embryon of *Bugula calathus* Norman, 1868. The internal sac is at the beginning of its formation.

M. Sagittal section of an embryon which has almost attained its complete development. The two glandular systems are quite apparent. The mantle is not yet invaginated. The mesodermic thickening is outlined.

N. Optic section of an ovicell of *Bugula sabatieri* Calvet, 1900. (I–N. After Calvet.) *bi*, inferior bryozoid (=proximal zooecium); *bs*, superior bryozoid (=distal zooecium); *cu*, cuticle; *e*, embryon; *eiv*, intervescicular space=cavity of incubation; *ep*, epidermis; *epi*, spines; *gt*, tentacular sheath; *mud*, dilator muscles of the cavity of incubation; *mur*, retractor muscles of the frontal wall of the inferior vesicle; *o*, orifice of communication of the cavity of the inferior vesicle with the general cavity of the inferior bryozoid; *oz*, zooecial orifice; *pc*, communication pore; *pzf*, frontal zooecial wall; *voi*, inferior ovicell vesicle; *vos*, superior ovicell vesicle.

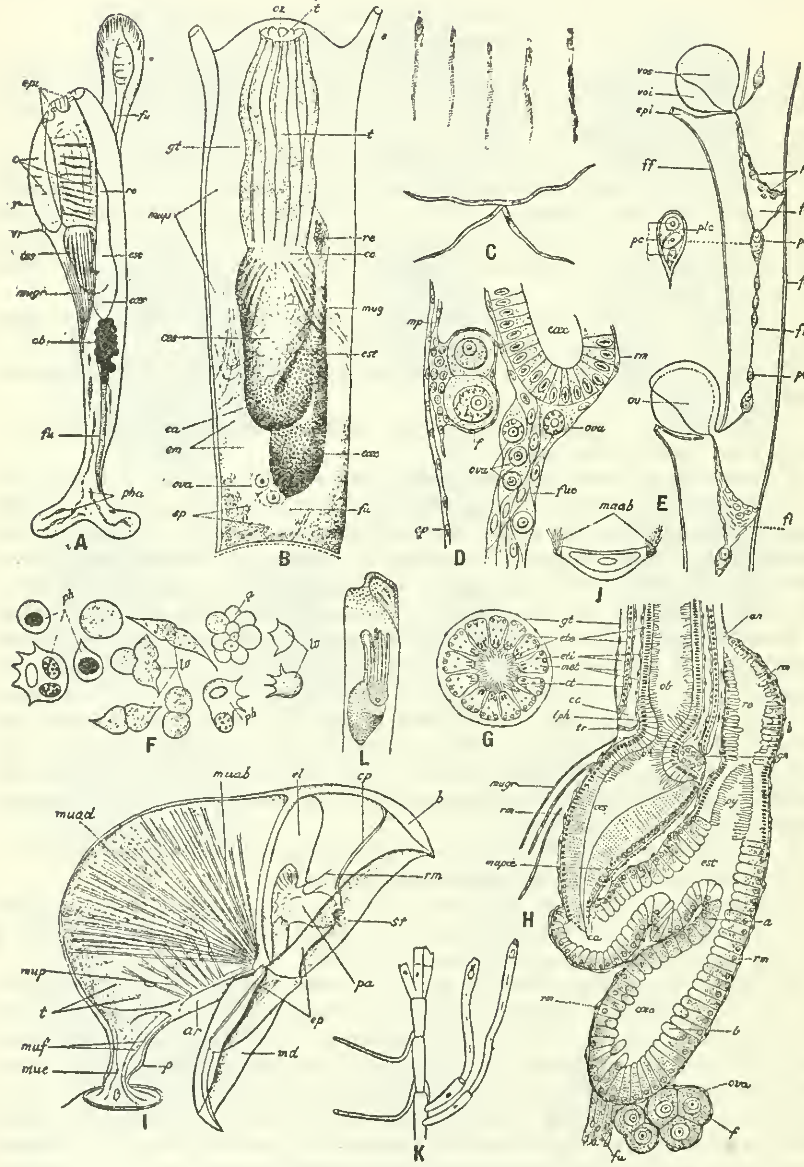

Fig. 59.—Family Bugulidae Gray, 1848

(Explanatory remarks on opposite page)

FIG. 59.—Family Bugulidae Gray, 1848

(Explanatory remarks for fig. 59)

A–J. *Bugula sabatieri* Calvet, 1900. A. Oozoid (ancestrula) and first blastozoid seen from the left side. The endodermic elements, *pha*, incompletely differentiated already from part of the mesenchymatous tissue.

B. Bryozoid without avicularia, seen from the frontal face.

C. Successive stages of formation of the spermatozoids. Four spermatozoids united by a portion of disintegrating protoplasm in which their heads are still buried.

D. Parietal ovary and ovular cellules differentiated in the middle of the central funicular cord.

E. Parietal structure of a zooecium; *ff*, frontal face of zooecium; *fd*, dorsal face; *fl*, lateral face; *fs*, superior face; *fi*, interior face; *pc*, communication pores (uniporous septulae); *plc*, communication plates (multiporous septulae); *ov*, ovicell; *vos*, inferior vesicle; *epi*, spines.

F. Vesicular leucocytes of a bryozoid in which the polypide has degenerated. Some of the leucocytes, *ph*, are phagocytes the products of degeneration.

G. Transverse section of the tentacular region of an adult polypide.

H. Portion of a front-dorsal longitudinal section of an adult polypide.

I. Structure of an avicularium; *ar*, area; *b*, beak; *cl*, partition; *ep*, epidermis; *l*, leucocytes; *md*, mandible; *muab*, abductor mandibular muscles; *muad*, adductor mandibular muscle; *mue*, extensor muscle of the avicularium; *muf*, flexor muscle of the avicularium; *mup*, parietal muscles; *p*. peduncle; *pa*, aborted polypide=ciliated organ; *rm*, mesenchymatous network; *s*, cilia of the ciliated organ.

J. Basal face of mandible showing the insertion of the two abductor muscles *muab*. (A–J. After Calvet, 1900.)

K. Colony of *Bugula plumosa* Pallas, 1766, showing young zooecium from the extremity of a long basal process, ×12.

L. A young zooecium of figure K with a young polypide, ×85. (K, L. After Waters, 1896.)

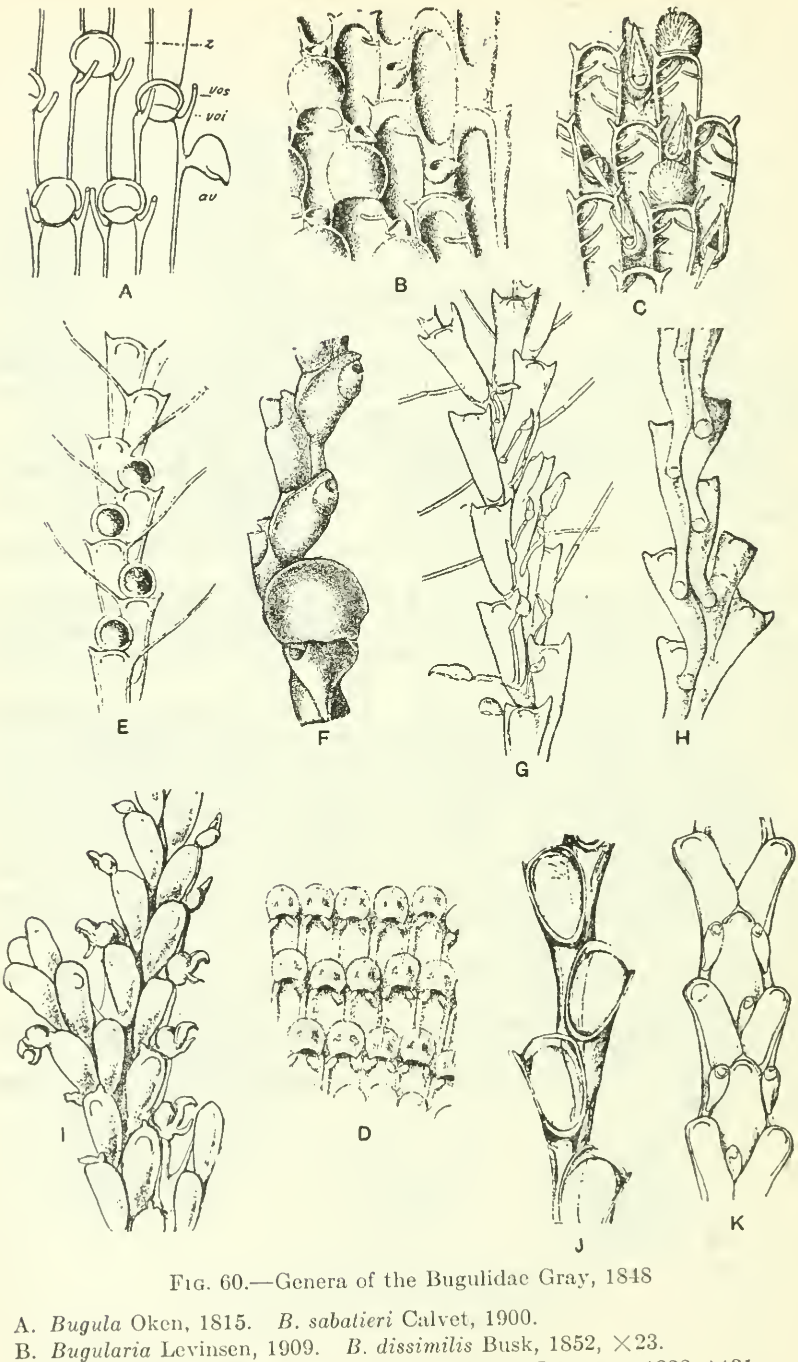

FIG. 60.—Genera of the Bugulidae Gray, 1848

A. *Bugula* Oken, 1815. *B. sabatieri* Calvet, 1900.
B. *Bugularia* Levinsen, 1909. *B. dissimilis* Busk, 1852, ×23.
C. *Dendrobeania* Levinsen, 1909. *D. murrayana* Johnston, 1838, ×31.
D. *Watersia* Levinsen, 1909. *W. militaris* Waters, 1887, ×16.
E. *Caulibugula* Verrill, 1900. *C. caliculata* Levinsen, 1909, ×40.

VII. A normal zooecium emits distally two separated or united zooecia (*Maplestonia* in Scrupocellariidae).

Genus BUGULA Oken, 1815

The operculum is wanting. The avicularia are capitate, pedunculate, freely movable and situated on the lateral zooecia. The radical fibers issue both from the frontal, basal, and lateral aspects of the colony. There is a row of distal septulae. The zoaria are bi-multiserial. 13–15 tentacles.

Genotype.—Bugula (*Cellularia*) *neritina* Linnaeus, 1758. Recent.

Genus CAULIBUGULA Verrill, 1900

Stirpariella Harmer, 1925, *Stirparia* Goldstein, 1880, preoccupied

The stem is jointed and consists of a row of long narrow segments. The zoaria are biserial.

Genotype.—Caulibugula (*Bugula*) *armata* Verrill, 1900. Recent.

Genus BUGULARIA Levinsen, 1909

The avicularia are sessile and placed on the proximal gymnocyst of each zooecium.

Genotype.—Bugularia (*Carbasea*) *dissimilis* Busk, 1852. Recent.

Genus WATERSIA Levinsen, 1909

No avicularia. The radical fibers issue everywhere from the covering membrane of the frontal surface in the two layered colony.

Genotype.—Watersia (*Flustra*) *militaris* Waters, 1887. Recent.

Genus DENDROBEANIA Levinsen, 1909

The freely movable avicularia are situated upon all the zooecia. The radical fibers issue from the second (more seldom also from the first) septula of the marginal zooecia. 18–21 tentacles.

Genotype.—Dendrobeania (*Flustra*) *murrayana* Johnston, 1847. Recent.

Genus EUOPLOZOUM Harmer, 1923

The zooecia are large and obliquely alternating. Special method of bifurcation (type 6 of Harmer). The zoarium is biserial.

Genotype.—Euoplozoum (*Cellularia*) *cirrata* Busk, 1884. Recent.

F. *Euoplozoum* Harmer, 1923. *E. cirratum* Busk, 1884.
G, H. *Camptoplites* Harmer, 1923. *C. bicornis* Busk, 1884.
I. *Kinetoskias* Koren Danielsen, 1877. *K. arborescens* Koren Danielsen, 1877.
J. *Halophila* Busk, 1852. *H. johnstoniae* Busk, 1852 ×30.
K. *Himantozoum* Harmer, 1923. *H. mirabilis* Busk, 1884.

FIG. 61.—Genus *Bugula* Oken, 1815

A. *Bugula sabatieri* Calvet, 1900. Zoaria, natural size (after Calvet).

B, C. *Bugula neritina* Linnaeus, 1758 (genotype), anterior and posterior sides. (After Busk, 1852.)

D–I. Mandibles. *D. Bugula dentata* Lamouroux, 1826. E. *Bugula neritina* Linnaeus, 1758, ×85. F. *Bugula capense* Waters, 1887. G. *Bugula bicornis* Waters, 1903, ×85. (D–G. After Waters, 1887.) H. *Bugula spicata* Hincks, 1886, ×85. I. *Bugula ditrupae* Busk, ×85. (H, I. After Waters, 1896.)

J–O. Ancestrulae and primary zooecia. J, Young colony and ancestrula of *Bugula sabatieri* Calvet, 1900. (After Calvet, 1900.) K. *Bugula plumosa* Pallas, 1766. Process showing first and second zooecium. L, L′ *Bugula calathus* Norman, 1868. L. Primary and second zooecium, ×25. L′ Primary zooecium, ×25. M–P. *Bugula ditrupae* Busk. O. Primary zooecium, ×85. P. Commencement of the colony, ×85. (K–M, P, after Waters, 1896). N. *Bugula robusta* MacGillivray, 1868. The earlier zooecia, ×25. (After Waters, 1913.)

Q–W. Avicularia (lateral and dorsal views). Q. *Bugula avicularia* Linnaeus, 1758. R. *Bugula sabatieri* Calvet, 1900. S. *Bugula flabellata* J. V. Thompson, 1868. (Q–S. After Calvet, 1900.) T. *Bugula turbinata* Alder, 1857. U. *Bugula calathus* Norman, 1868. V. *Bugula robusta* MacGillivray, 1868. (After Waters, 1913.) W. *Bugula plumosa* Pallas, 1766. (T, U, W. After Hincks, 1880.)

Genus CAMPTOPLITES Harmer, 1923

The peduncle of the avicularia is very long, flexible, larger than the head. The proximal ends of the zooecia are not forked.

Genotype.—Camptoplites (*Bugula*) *bicornis* Busk, 1884. Recent.

Genus KINETOSKIAS Danielssen, 1868

The avicularia are pedunculate. Special method of bifurcation (type 8 of Harmer). Two successive zooecia are separated by a small uncalcified space.

Genotype.—Kinetoskias smitti Danielssen, 1868. Recent.

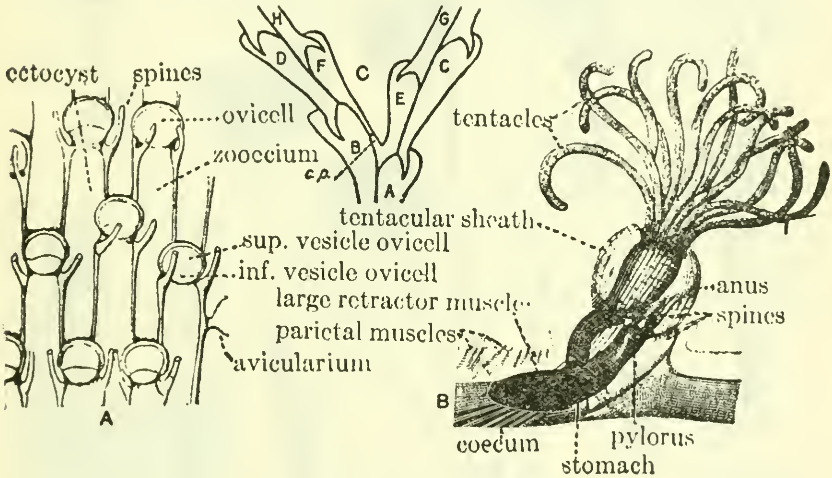

Fig. 62.—Genus *Bugula* Oken, 1815

A. Portion of branch of colony of *B. sabatieri* Calvet, 1900. B. Young polypide with its extended tentacle. (A, B, after Calvet, 1900.) C. Mode of branching of *Bugula johnstoniae* Gray, 1843, and of a large number of other *Bugulas*. (After Harmer, 1923.)

Genus HIMANTOZOUM Harmer, 1923

Asymmetrical zooecia between which are intercalated one or more of median symmetrical zooecia. The unstalked avicularia are attached to the proximal ends of the zooecia, those of the lateral and median rows more or less unlike. Special method of bifurcation (type 8 of Harmer). No ovicell. The egg which is of large size, develops in the body-cavity of the fertile zooecium.

Genotype.—Himantozoum (*Bugula*) *mirabilis* Busk, 1884. Recent.

Genus HALOPHILA (Gray, 1843) Levinsen, 1909

The distal, broader, more or less symmetrical part of the zooecium is separated from a nearly as long proximal, narrow, cylindrical part by a constriction just distally to the distal wall. No avicularia. No ovicell. The zoarium is biserial.

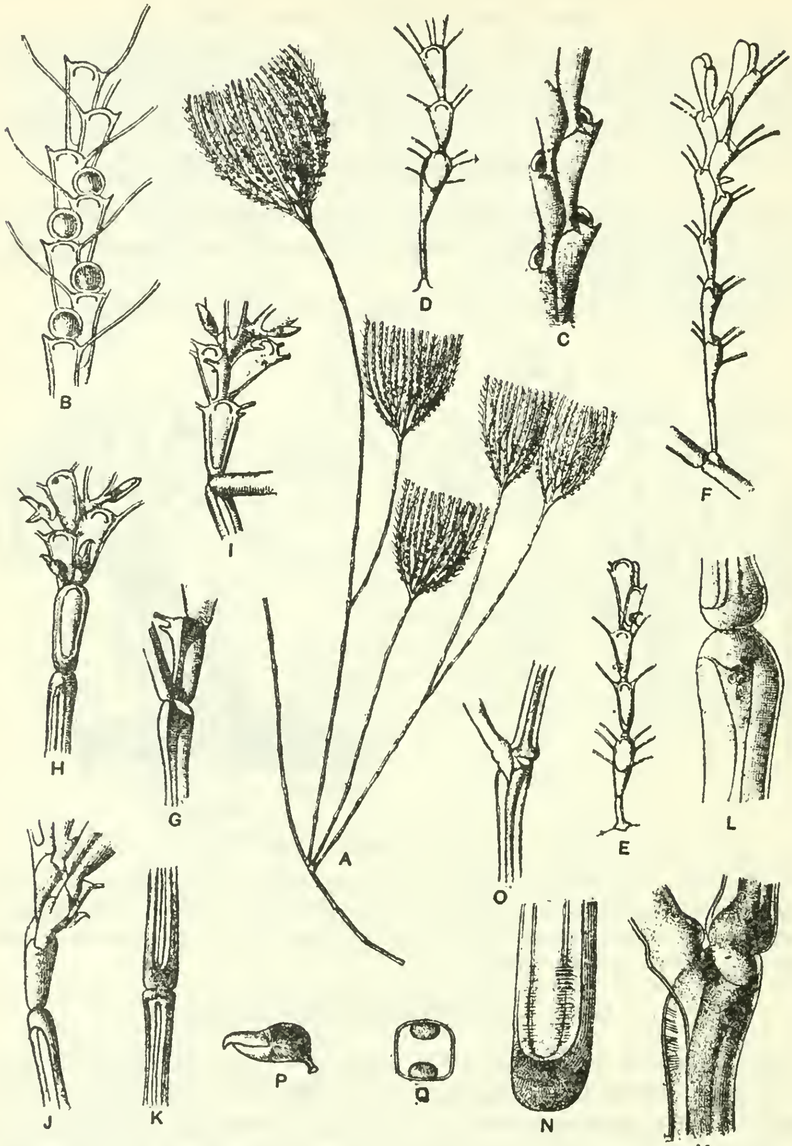

Fig. 63.—Genus *Caulibugula* Verrill, 1900. *C. caligulata* Levinsen, 1909

A. A composite colony. B. Zoarial fragment with ovicelled zooecia, ×40. C. Ovicelled zooecia from the basal surface, ×40. D, E. Two incipient colonies, ×23. F. An incipient colony from the basal surface, ×23. G. An old zooecium and the adjacent internode (segment) of the stem, seen half from the basal surface. The calcified lateral border, which is a continuation of the distal wall, is seen. Between the zooecium and the internode, an internode of a new stem is beginning, ×40. H. The proximal end of a young colony, ×40. I. A part of a young colony, on which an internode of a new stem begins between the proximal zooecium and the adjacent internode, ×40. J. A part of a young colony from the basal surface, ×40. K. Two stem internodes, ×40. L. The adjacent

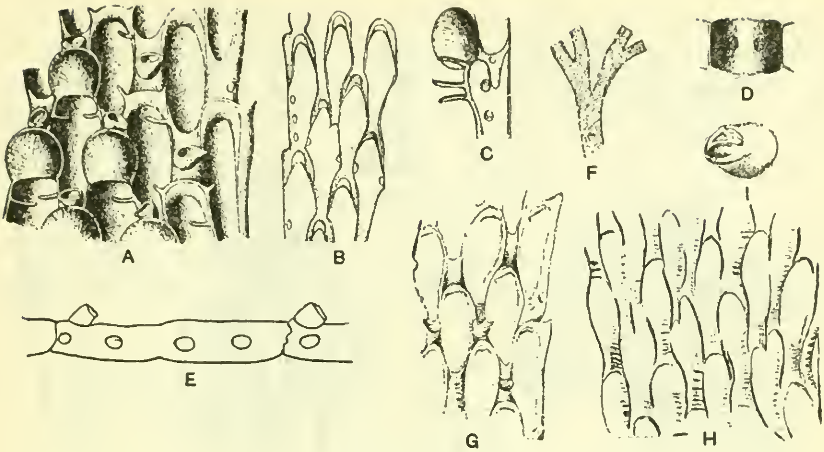

FIG. 64.—Genus *Bugularia* Levinsen, 1909

A–E. *Bugularia dissimilis* Busk, 1852. A. Zooecium with free ovicell and sessile avicularia, ×23. B. Basal surface; the strongly angularly bent distal wall is seen, ×23. C. Lateral view of the ovicell, ×23. D. Distal wall viewed from above, ×40, with two multiporous septulae. (A–D, after Levinsen, 1909.) E. Lateral wall, ×25 (after Waters, 1896). F. A frond, natural size. G. Usual aspect of frontal side. H. Basal surface showing mode of gemmation of cells. I. Avicularium enlarged, viewed from the front. (F–I, after Busk, 1852.)

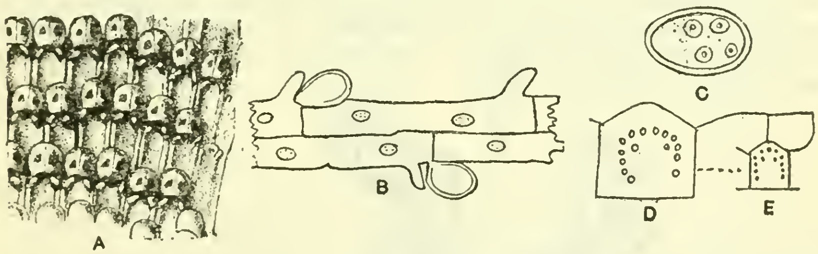

FIG. 65.—Genus *Watersia* Levinsen, 1909

A–E. *Watersia militaris* Waters, 1887. A. Fragment of zoarium showing the ovicelled zooecia, ×16. The radical fibers issue everywhere from the covering membrane of the frontal surface in the two layered colony. (After Waters, 1887.) B. Lateral wall showing raised ovicells and multiporous septulae, ×25. C. A multiporous septula, ×250. D, E. Distal wall showing uniporous septula, ×25 and ×85. (B–E, after Waters, 1896.)

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ends of two internodes of the stem. On the lower the distal wall and one of the lateral thickenings are seen; on the upper the two lateral thickenings annularly connected in the proximal end of the internode, ×100. M. Two adjacent internodes of the stem, between which a new one is beginning. The lateral thickenings and the parietal muscles, ×100. N. The distal end of a new formed internode of the stem (in an inverted position) with parietal muscles, ×100. O. A new formed stem internode beginning between two older ones, ×40. P. Avicularium, ×100. Q. A transverse section through a stem-internode to show two lateral thickenings, ×100. (A–Q. After Levinsen, 1909.)

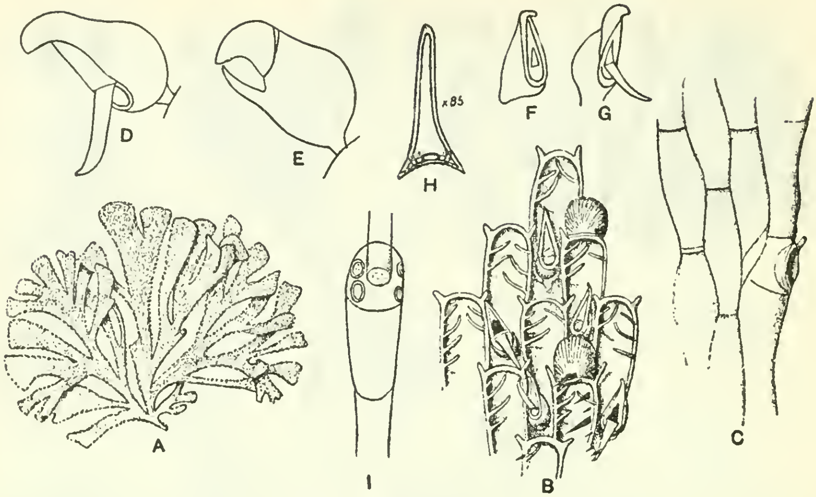

Fig. 66.—Genus *Dendrobeania* Levinsen, 1909

A–I. *Dendrobeania murrayana* Johnston, 1838. A. Zoarium, natural size. B. Zooecia of the normal form, ×31. C. Dorsal (basal) surface, ×31. The radical threads are issued from the second (more seldom also from the first) septula of the marginal zooecia (after Hincks, 1880). D–G. Freely movable avicularia showing the difference in size between those on the front and margin of the cells, ×50. H. Mandible of the avicularium, ×85. (After Waters, 1887.) I. Dorsal surface of the uniserial zoarium (forma *frigida* Waters, 1900) showing the distal multiporous septula, through the transparent wall, and the two multiporous septula placed close together in the distal part of each lateral wall, ×25. (After Waters, 1900.)

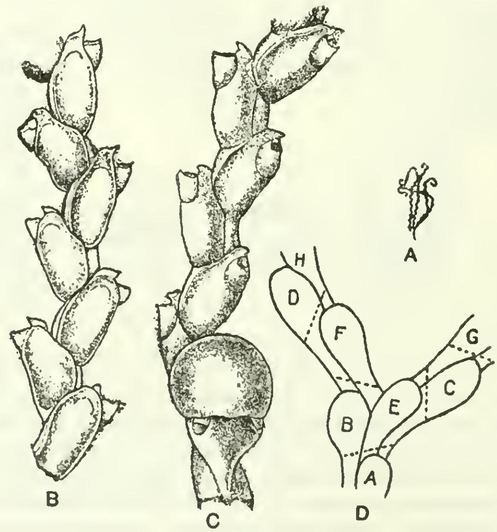

Fig. 67.—Genus *Euoplozoum* Harmer, 1923

A–D. *Euoplozoum cirratum* Busk, 1884. A. A tuft, natural size. B. View of the frontal of a fragment. C. An ovicelled fragment (after Busk, 1884). D. Sketch showing arrangement of cells at the bifurcations (after Harmer, 1923).

Genotype.—Halophila johnstoniae Gray, 1843. Recent.

Harmer 1923, thinks that *Halophila* is perhaps synonymous with *Bugula*. *Himantozoum* and *Halophila* form a special group in the family. We are ignorant of the larva and their position is not therefore definite.

Family SCRUPOCELLARIIDAE Levinsen, 1909

The larva is wider than high; the terminal bud is small; the vibratile plume is subproximal; the corona is sinuous. The ramification of the branches is occasioned by the formation of a supplementary median zooecium. The ovary is distal and a large egg passes into the ovicell. The zoarium is free, erect, unilamellar, radicellate and generally articulated. The zooecia have an opesium and a gymnocyst and bear heterozooecia. Typically there are one or two frontal avicularia, a lateral superior avicularium, distal spines, a proximal radicular dietella, a dorsal vibraculum (basal of Harmer and Levinsen) and a scutum on the opesium.

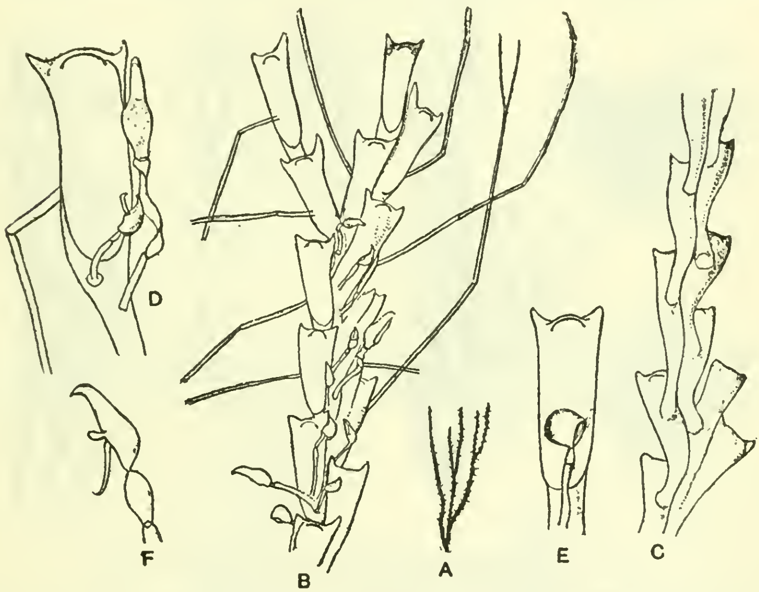

FIG. 68.—Genus *Camptoplites* Harmer, 1923

A–F. *Camptoplities bicornis* Busk, 1884. A. Branch, natural size. B. View of frontal of a branch, ×13. C. Dorsal view, ×13. D. Two avicularia and radical tube, ×25. E. Smaller avicularium arising close below the opesium, ×25. F. Larger avicularium showing the digitiform process, ×25. (After Busk, 1884.)

The list of genera in this family is as follows:

I. Ovicell hyperstomial. *Scrupocellaria* Van Beneden, 1845; *Canda* Lamouroux, 1816; *Caberea* Lamouroux, 1816 (*Selbia* Gray, 1848); *Amastigia* Busk, 1852 (*Caberiella* Levinsen, 1909); *Jubella* Jullien, 1882; *Notoplites* Harmer, 1923; *Tricellaria* Fleming, 1828 (*Ternicellaria* D'Orbigny, 1851); *Monartron*, new genus; *Bugulopsis* Verrill, 1880; *Flabellaris* Waters 1898 (*Craspedozoum* MacGillivray, 1886); ? *Hoplitella* Levinsen, 1909; ? *Rhabdozoum* Hincks, 1882.

II. Group with endozooecial ovicell. *Menipea* Lamouroux, 1816; (*Emma* Gray, 1843); *Maplestonia* MacGillivray, 1884.

The classification recognized is purely morphologic and is established principally on the study of heterozooecia, organs of adaptation

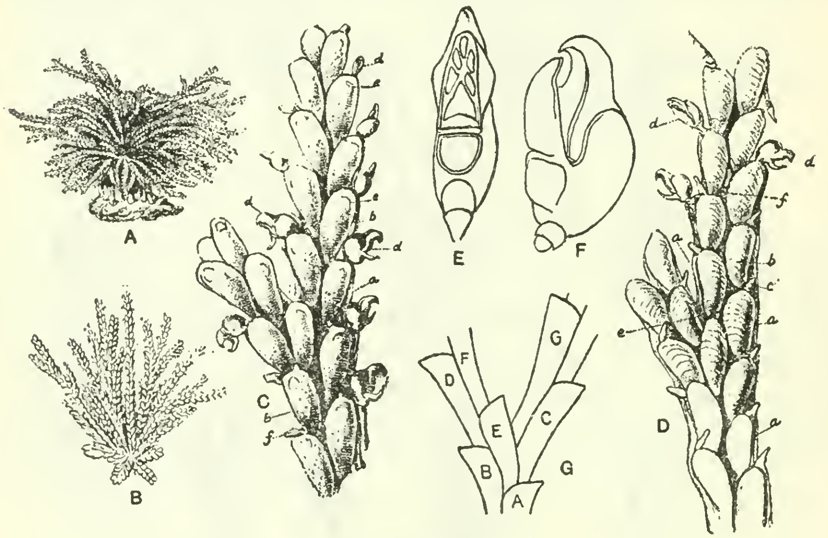

FIG. 69.—Genus *Kinetoskias* Koren-Danielsen, 1877

A–F. *Kinetoskias arborescens* Koren-Danielsen, 1877. A, B. Zoaria, natural size. C. Anterior face of zoarium. D. Posterior face, *a*, zooecia; *b*, opesium closed by the ectocyst; *c*, spine; *d*, avicularium; *e*, opercular valve; *f*, uncalcified interzooecial space. E. Front view of an avicularium, showing the mandible. F. Side view of an avicularium. Each zooecium has a strong muscle, which at its distal end is attached to the inner side of the external wall of the zooecium, and at the other to a conical projection from the distal wall of the next lower zooecium (after Koren-Danielsen, 1877). G. Diagram of bifurcation. (After Harmer, 1923.)

quite variable and inconstant even on the same colony. Each author changes the genera according to his particular ideas. The principal attempts at classification are those of Busk 1852, Smitt 1867, Hincks 1880, Levinsen 1909, Waters 1913, and Harmer 1923. We have nearly followed the three latter authors without being able however to place them in accord. With Waters we believe that reasoning on other characters we could establish a different and also valuable classification.

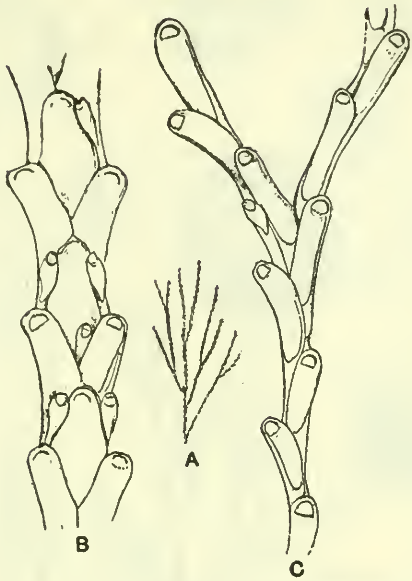

FIG. 70.—Genus *Himantozoum* Harmer, 1923

A–C. *Himantozoum mirabilis* Busk, 1884. A. Group of branches, natural size. B. Upper or triserial portion. C. Lower or biserial part (after Busk, 1884).

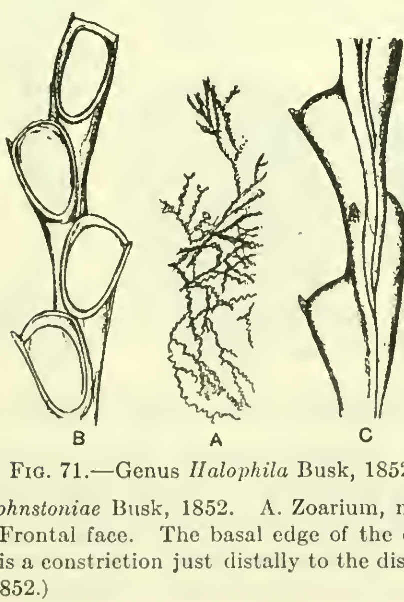

FIG. 71.—Genus *Halophila* Busk, 1852

A–C. *Halophila johnstoniae* Busk, 1852. A. Zoarium, natural size. B. Dorsal face, ×30. C. Frontal face. The basal edge of the distal wall is angular; no avicularia; there is a constriction just distally to the distal wall. No ovicell. (A–C. after Busk, 1852.)

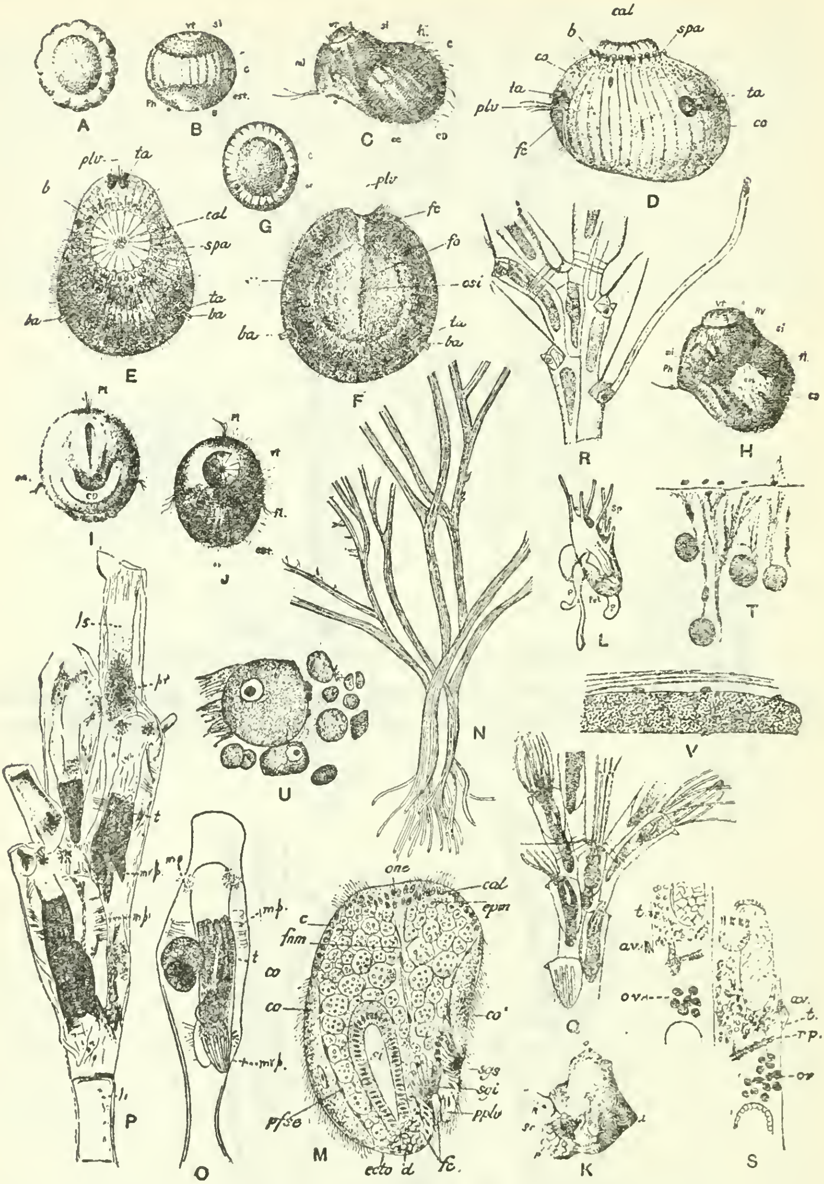

FIG. 72.—Family Scrupocellariidae Levinsen, 1909

A–F. *Scrupocellaria scruposa* Linnaeus, 1758. A. Embryo. Aboral face before the appearance of the furrow *si* originating the terminal bud, and with cells of the corona still voluminous, ×140. B. Embryo showing the extension and the distinctness of the corona, ×140. C. Larva, viewed in profile. There are tufts of small flagella, some crystalline stems and an aboral mesoderm, ×200; (A-C, after Barrois, 1877); *ce*, obscure portion of body cavity comprised between the two branches of the stomach; *C*, corona; *C, D*, digestive cavity; *est*, stomach;

In each genus recognized there are some exceptions and it is very difficult to find a general characteristic. In the following table we have tried to give at least one.

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fl, flagellum; *mi*, aboral mesoderm; *O*, orifice; *op*, large cells; *ph*, pharynx; *P*, posterior face; *gr*, masses of grease globules; *R*, rectum; *R*, *V*, point of maximum width of the terminal bud; *S*, oral face or the vestibule; *si*, cavity comprised between the corona and the aboral face; *sp*, spines of cells, *pl*, ciliary plumet; *vt*, terminal bud. D. Larva viewed from the left lateral side. E. Larva viewed from the dorsal side of the terminal bud. F. Larva from the ventral or oral side; *b*, cells of the vesicular superior collarette; *ba*, palettes with pigmentary spots of the larva; *cal*, terminal bud; *co*, corona; *fc*, ciliated slit; *fo*, oral face; *osi*, orifice of internal sac; *plv*, vibratile plumet; *spa*, pallial furrow; *ta*, pigmentary spots of the larva. (D–F. After Calvet, 1900.)

G–L. *Scrupocellaria reptans* Linnaeus, 1758. G. Embryo showing the position of the red pigment spots on the corona, ×140. H. Larva, viewed in profile, ×200. I. Larva; view of the oral face showing the depression *ce* and the large cells, *op*; ×150. J. Larva seen from the aboral face; ×150. K. First stage of metamorphosis; *R*, racine; *l*, primitive bud; *P*, prominences serving to show attachment; *OL*, buccal area, ×70. L. Primitive partition (ancestrula); spines have appeared around the buccal cavity, ×70. (G–L, after Barrois, 1877.) (Abbreviations as under *S. scruposa*).

M. *Caberea boryi* Savigny-Audouin, 1826. Median sagittal section of an embryo in a later stage of development; *c*, mantle; *cal*, terminal bud; *co*, corona; *d*, vaginal diaphragm; *fc*, ciliated slit, *fnm*, neuro-muscular bundle; *ecto*, oral ectoderm; *epm*, mesoderm thickening; *onc*, central nerve organ of the embryo; *pplv*, papilla of the vibratile plume; *sgi*, inferior glandular system; *sgs*, superior glandular system. (After Calvet, 1900.)

N, O. *Amastigia benemunita* Busk, 1884. N. Dorsal face of a zoarium to show the insertion of radicells, ×15. O. Zooecia with the detailed anatomy; *mo*, opercular muscles; *mp*, parietal muscles, *mrp*, retractor muscles of the polypide; *t*, tentacles. (N, O, after Jullien, 1889.)

P. *Monartron fuegensis* Busk, 1852. Dorsal of a trizooecial segment in which the diminution of activity has accentuated different polypides; the arrangement of the parietal or expulsor muscles (*mp*) of the polypide is perfectly clear. The superior ligament (*ls*) shows a rudimentary polypide (*pr*) which disappears in an inferior ligament (*li*). (After Jullien, 1888.)

Q, R. *Scrupocellaria inermis* Norman, 1868. Q. Anterior surface of a zoarium showing the position of the polypide at the articulation, ×25. R. Dorsal surface of a zoarium. Transparent preparation showing the method of articulation and the position of the polypide in the articulating joint. The vibracular chambers, and the chambers from which the radical starts are also shown, ×25. (Q, R. After Waters, 1896.)

S–U. *Scrupocellaria wasinensis* Waters, 1913. S. Zooecia showing the position of the ovaria (*ov*), testes (*t*), rosette-plates (*rp*) (=septulae), ×85. T. Ovarian cells with protoplasmic threads from the rosette-plates (or septulae), ×250. U. Ovaria showing two nucleated ovarian cells, ×250.

V. *Scrupocellaria ferox* Busk, 1852. Band which starts near the distal end and passes down the side of the zooecium; also small bundle of protoplasmic threads running parallel with the granular band, ×250. (S–V. After Waters, 1913.)

FIG. 73.—Genera of the Scrupocellariidae Levinsen, 1909

A, B, C. *Scrupocellaria* Van Beneden, 1845. *S. scruposa* Linnaeus, 1758.
D, E. *Canda* Lamouroux, 1816. *C. retiformis* Pourtales, 1867.
F, G. *Caberea* Lamouroux, 1816. *C. ellisi* Fleming.
H, I. *Menipea* Lamouroux, 1816. *M. cirrata* Lamouroux, 1816.
J. *Flabellaris* Waters, 1898. *F. roborata* Hincks, 1881.
K. *Tricellaria* Fleming, 1828. K. *T. ternata* Ellis and Solander, 1786.
L, M. *Bugulopsis* Verrill, 1882. *Bugulopsis peachi* Busk, 1859.
N, O. *Hoplitella* Levinsen, 1909. *H. armata* Busk, 1852.
P. *Amastigia* Busk, 1852. *A. benemunita* Busk, 1885.
Q, R. *Rhabdozoum* Hincks, 1882. *R. wilsoni* Hincks, 1882.

Ovicell hyperstomial:
  Vibraculum dorsal—
    Seta (or flagellum) short, without tooth .... Scrupocellaria.
    Long denticulated cilium; longitudinal fibrous bundles on the dorsal .... Caberea.
    Ovicell surmounted by an avicularium; nonarticulated colony .... Canda.
    Fibrous radicular bundles on the margins of the colony .... Amastigia.
    Avicularium dorsal .... Notoplites.
  Dorsal without heterozooecia—
    No radicular dietella .... Jubella.
    Radical inserted below the chitinous joints—
      Avicularia present .... Tricellaria.
      No avicularia .... Bugulopsis.
    A single chitinous joint .... Monartron.
    Segments at the extremity of long radicular pedicells .... Rhabdozoum.
    Ovicell as in the Alderinidae; internal avicularia .... Flabellaris.
Ovicell wanting .... Hoplitella.
Ovicell endozooecial:
  Colony biserial .... Menipea.
  Segments formed of one or two zooecia on the same colony .... Maplestonia

Group 1. OVICELL HYPERSTOMIAL

Genus SCRUPOCELLARIA Van Beneden, 1845

The ovicell is smooth or perforated. There is a frontal avicularium, a distal marginal avicularium and a proximal dorsal avicularium. A radicular dietella is enclosed in the dorsal avicularium. The seta of the vibraculum is short and without teeth (lateral branches of Harmer). The articulation has two chitinous tubes but the outer zooecium has the articular tube near the middle of the zooecium. 14–16 tentacles. A scutum often present.

Genotype.—*Scrupocellaria* (*Sertularia*) *scruposa* Linnaeus, 1758.

Range.—Eocene (Lutetian)—Recent.

SCRUPOCELLARIA SECURIFERA Busk, 1884

Plate 8, figs. 9–11

1884. *Scrupocellaria securifera* Busk, Polyzoa collected by *Challenger*, Report Scientific Results Voyage of the Challenger, vol. 10, pt. 30, p. 24, pl. 11, fig. 2 (Admiralty Islands, Pacific).

1890. *Scrupocellaria securifera* Kirkpatrick, Polyzoa, China Sea, Annals and Mag. Nat. Hist., ser. 6, vol. 5, p. 16.

1926. *Scrupocellaria securifera* Harmer, Polyzoa "Siboga" Expedition, p. 373, pl. 25, figs. 9–11.

S. *Monartron*, new genus. *M. cyathus* W. Thompson, 1858.

T, U. *Notoplites* Harmer, 1923. *N.* (*Scrupocellaria*) *aviculariae* Yanagi and Okada, 1918.

V, W. *Jubella* Jullien, 1882. *J. enucleata* Jullien, 1882.

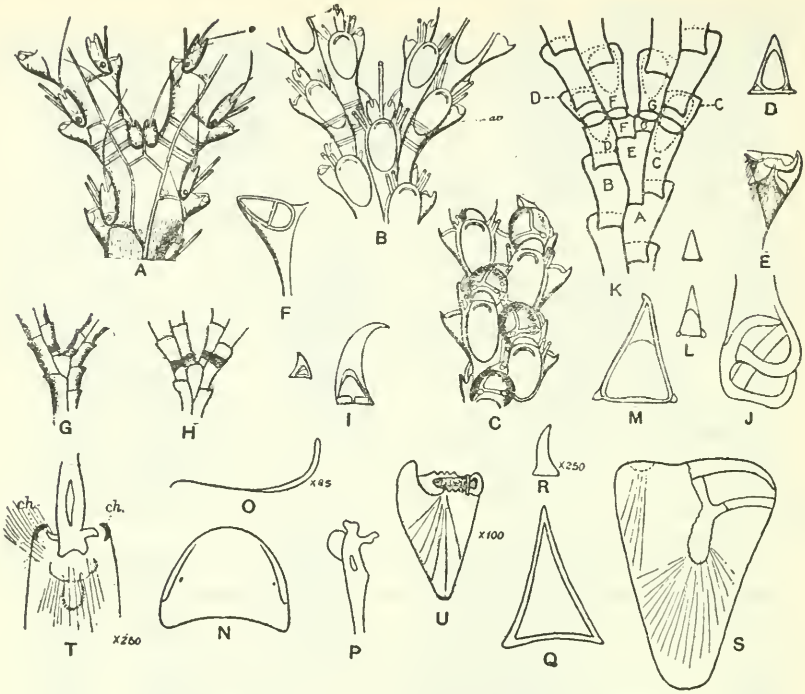

FIG. 74.—Genus *Scrupocellaria* Van Beneden, 1845

A–F. *Scrupocellaria scruposa* Linnaeus, 1758. A. Posterior face of a fragment, ×33.5. B. Anterior face, ×33.5. C. Group of ovicelled zooecia. D, E. Lateral avicularium, ×61, and its mandible, ×106. F. Frontal avicularium, ×175. (A–F. After Levinsen, 1894.)

G. *Scrupocellaria jalloisi* Savigny-Audouin, 1826. Dorsal surface, to show the articulation. (After Waters, 1913.)

H–K. *Scrupocellaria ferox* Busk, 1852. H. Dorsal surface showing articulation. I. A mandible of an anterior (large) and of a lateral (small) avicularium, ×85. J. Base of vibracular seta. (H–J. After Waters, 1913.) K. Diagram of bifurcation. The joint traverses the opesia (dotted lines) of the outer zooecia. (After Harmer, 1923.) L, M. *Scrupocellaria antarctica* Waters, 1904. L. Mandible of lateral avicularium, ×85. M. Mandible of median avicularium, ×250. (L, M. After Waters, 1904.)

N–U. *Scrupocellaria macandrei* Busk, 1852. N. Separable operculum, ×250, a unique case in this genus. O. Smooth seta of the vibraculum, ×85. P. Base of seta with several irregular projections, ×250. Q. Mandible of lateral avicularium, ×250. R. Mandible of anterior (axial) avicularium, ×250. S. Vibracularian chamber decalcified, ×250. T. Base of seta with muscles and lateral chitin pieces (*ch*), ×250. U. Lateral avicularium, ×100. (N–U. After Waters, 1918.)

Our specimens present some slight differences from the figure of Busk. The scutum hides more of the opesium; the dorsal vibracular chamber is smaller and has a small radicular pore. The internal opesium is not visible and appears to be confused with the external opesium.

Occurrence.—

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; W. S, Sh.

D. 5235. Pacific, Nagubat Island, east coast Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; sh.

Geographic distribution.—China Sea; Tizard Bank, 27 fathoms. Pacific; Admiralty Islands, north of New Guinea and several localities in Malay region given by Harmer.

Plesiotypes.—Cat. No. 7886, U.S.N.M.

SCRUPOCELLARIA CURVATA Harmer, 1926

Plate 8, figs. 12, 13

1926. *Scrupocellaria curvata* Harmer, Polyzoa *Siboga* Expedition, p. 380, pl. 26, figs. 11–15.

Description.—The zoarium is articulated, ramified, dichotomous; the segments are long and regular. On the frontal the zooecia are indistinct. The opesium is almost entirely covered over by a broad, convex, striated scutum. The lateral avicularium is very small, not salient. The axial avicularia are transverse, salient, triangular; the beak salient and elongated, is turned alternately to the right and to the left. On the dorsal the zooecia are oblong and lozenge shaped. The vibracular chamber is triangular, raised, long as half a zooecium; the groove is deep, oblique, regular; the radicular pore is of medium size.

Measurements.—

Zooecia[9] $\begin{cases} Lz = 0.64 \text{ mm.} \\ lz = 0.16 \text{ mm.} \end{cases}$ Width of segments = 0.52 mm. Avicularian chamber = 0.28 mm.

Affinities.—Harmer, 1926, figures the joints "en echelon," the articulation, the mandible and the remarkable structure of the scutum. The striae decorating the latter are produced by "a broad median cavity, passing into an external marginal tube, which gives off recurrent, caecal branches running transversely, parallel to the main cavity." This species differs from *Scrupocellaria securifera* Busk, 1884, in its nonclaviform, broader and striated scutum and in its narrower segments. Our specimens were dead.

[9] In *Scrupocellaria* the zooecial dimensions are those of the two axes of the lozenge shaped area.

Occurrence.—D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; sh.

Geographic distribution.—China Sea: Singapore, 8–16 meters. Pacific; Torres Strait and 7 localities in the Malay region cited by Harmer, the deepest 113 meters.

Plesiotype.—Cat. No. 7888, U.S.N.M.

SCRUPOCELLARIA ULRICHI, new species

Plate 9, figs. 1–3

Description.—The articulation is complete; the segments are straight or curved. The zooecia are distinct, separated by a deep furrow; the inner opesium is elliptical; the external opesium is oval with its point above; the mural rim is wide and rounded; the scutum short. The lateral avicularium is small, scarcely salient with the triangular beak turned towards the base, placed between the mural rim and the vibracular chamber. The axial avicularia are small, triangular, with very salient beak. The ovicell is globular, smooth, placed on the distal zooecium, opening betwen the two opesia. On the dorsal face the zooecia are little distinct, lozenge shaped, ornamented with scattered granulations. The vibracular chamber is small, one-third the length of a zooecium, oblique, very convex; the groove of the seta is narrow and regular. The radicular pore is small.

Measurements.—

External opesium $\begin{cases} ho=0.32 \text{ mm.} \\ lo=0.20 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz=0.72 \text{ mm.} \\ lz=0.28 \text{ mm.} \end{cases}$

Avicularian chamber = 0.28 mm.

Width of segments = 0.40 mm.

Affinities.—This splendid species, named in honor of Dr. E. O. Ulrich, differs from *Scrupocellaria diadema* Busk, 1852 in its thick mural rim, its complete articulation and its longer vibracular chamber. It is very well characterized by the distal indentation of its external opesium. All of the specimens studied were dead.

Occurrence.—

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; sh.

Cotypes.—Cat. Nos. 7889, 7890, U.S.N.M.

SCRUPOCELLARIA SCRUPEA Busk, 1849

Plate 8, figs. 7, 8

1889. *Scrupocellaria scrupea* Jelly, Synonymic Catalogue of marine Bryozoa, p. 242 (Synonymy).

1890. *Scrupocellaria scrupea* Ortmann, Die Japanische Bryozoen-fauna, Archiv fur Naturgesch., p. 21, pl. 1, fig. 3.

1896. *Scrupocellaria scrupea* CALVET, Bryozoaires du Caudan, Archives de l'Université de Lyon, p. 252.

1896. *Scrupocellarai scrupea* WATERS, Notes on Bryozoa from Rapallo, Linnean Society's Journal, Zoology, vol. 26, p. 7.

1900. *Scrupocellaria scrupea* NEVIANI, Briozoi neogenici delle Calabria Palaeontographia italica, vol. 6, p. 149 (local bibliography).

1902. *Scrupocellaria scrupea* CALVET, Bryozoaires marins de la région de Cette, Institut de Zoologie de l'Université de Montpellier, vol. 2, mem. 11, p. 17 (geographic distribution).

1902. *Scrupocellaria scrupea* CALVET, Bryozoaires marins des côtes de Corse, Institut de Zoologie de l'Université de Montpellier, vol. 2, mém. 12, p. 7.

1903. *Scrupocellaria scrupea* JULLIEN and CALVET, Bryozoaires provenant des campagnes de l'Hirondelle, pp. 34, 125.

1905. *Scrupocellaria scrupea* THORNELY, "On the Polyzoa" Herdman, Rep. on Pearl Oyster Fisheries of the gulf of Manaar, p. 109.

1905. *Scrupocellaria scrupea* NEVIANI, Briozoi fossil di Carrubare (Calabria), Bollettino della Società Geologica Italiana, vol. 23, p. 516.

1909. *Scrupocellaria scrupea* WATERS, Report on the Marine Biology of the Sudanese Red Sea. Bryozoa, Linnean Society's Journal, Zoology, vol. 31, p. 134 (variety *dongolensis*).

1912. *Scrupocellaria scrupea* GUERIN-GANIVET, Contributions á l'etude des Bryozoaires des cotes armoricaines, III, Région de Concarneau et de l'archipel de Glenan, Travaux scientifiques du Laboratoire de Zoologie Concarneau, vol. 4, p. 7.

1918. *Scrupocellaria scrupea* YANAGI and OKADA, On a Collection of Japanese cheilostomatous Bryozoa, Annotationes Zoologicae Japonenses, vol. 9, p. 415.

We have found some dried specimens of this species, one only of which retained the scutum. The zoarium is commonly attached to stones and shelly debris of the depths which are not muddy; but as it can also fasten itself to algae the specimens attached directly to their substratum, alone have a bathymetric value. It lives as well at low ebb as at 500 meters of depth.

The geographical distribution is almost universal; however it does not cross the polar circle.

Occurrence.—D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms, Sh.

Geographic distribution.—Mediterranean: Naples, Rapallo (Waters) Porto d'Anzio (Neviani), Adriatic (Heller), Corse 40–100 mm., (Calvet), Cette (Calvet). Atlantic: Gulf of Gascony, 130–500 m. (Calvet, Jullien), Glenan Island (Guerin-Ganivet), British Channel (Calvet), Shores of Brittany (Hincks), North Sea (Kirchenpauer). Red Sea: Khor Dongola (Waters). Indian Ocean: Manaar (Thornely), Singapore (Hincks). Pacific: Japan (Ortmann, Okada), Australia (Waters, MacGillivray).

Geologic distribution.—Sicilian of Southern Italy (Seguenza, Neviani); Quaternary of South Italy (Seguenza).

Plesiotypes.—Cat. No. 7891, U.S.N.M.

SCRUPOCELLARIA FEROX Busk, 1852

Plate 9, figs. 6, 7

1852. *Scrupocellaria ferox* Busk, Catalague Marine Polyzoa, p. 25, pl. 22, figs. 1, 2, 5.
1890. *Scrupocellaria cyclostoma* Kirkpatrick, Polyzoa . . . China Sea, Annals and Magazine of Natural History, ser. 6, vol. 51, p. 16.
1913. *Scrupocellaria ferox* Waters, Zanzibar, Proc. Zool. Soc. London, p. 476, pl. 68, figs. 11–15; pl. 69, figs. 7, 20.
1926. *Scrupocellaria ferox* Harmer, Polyzoa "Siboga" Expedition, p. 367, pl. 25, figs. 1–6.

Description.—The zoarium is articulated, the segments are straight or somewhat curved. The zooecia are distinct, separated by a furrow, large, with a small convex gynmocyst. The exterior opesium is large, oval, the top below; the interior opesium is small, elliptical; no scutum: The mural rim is straight, a little enlarged at the base, and ornamented with two superior spines. The lateral avicularium is quite small, transverse, triangular, placed at the base of the vibracular chamber. The axial avicularia are triangular, with salient and pointed beak. On the dorsal face, the zooecia are little distinct, little oblique, rectangular or somewhat lozenge shaped. The vibracular chamber is narrow, erect, little oblique with a groove enlarged at its extremity; the radicular pore is large.

Measurements.—

Internal opesium $\begin{cases} ho = 0.22\text{–}0.24 \text{ mm.} \\ lo = 0.18\text{–}0.20 \text{ mm.} \end{cases}$ External opesium $\begin{cases} ho = 0.40 \text{ mm.} \\ lo = 0.28 \text{ mm.} \end{cases}$

Zooecium $\begin{cases} Lz = 0.60\text{–}0.65 \text{ mm.} \\ lz = 0.34\text{–}0.35 \text{ mm.} \end{cases}$

Width of segment = 0.68 mm.; length of vibracular chamber = 0.28 mm.

Structure.—Almost all of our specimens were dead and the few living examples were without the scutum. The size of the interior opesium is very variable; it is generally smaller at the bottom of the segments.

The axial avicularium increases in size from the base to the summit of the segments. The worm-like body discovered by Waters, 1913, in some cells considered by him as a testis is according to Harmer, 1926, a special development of the funicular tissue. There are very short distal spines on the mural rim.

Waters gave 24 tentacles and described the degeneration. Harmer, 1926, figured the ovicell, the bifurcation, the unguiculate mandible and the axial avicularium.

The species is well characterized by the large size of the zooecia and its curious frontal avicularium. It lives principally in waters less than 45 meters in depth. It has been dredged only once at a depth of 275 meters in the Sulu Archipelago, where we have not discovered it anew.

Occurrence.—
D. 5235. Nagubat Island, east coast Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.
D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; Sh.; 57 fathoms (common).

Geographic distribution.—Indian Ocean: Zanzibar, 13–16 meters. China Sea: Tizar Bank, 44 meters; Singapore, 12 meters. Pacific: 15 localities of Malay region cited by Harmer; Louisiade Archipelago.

Plesiotypes.—Cat. Nos. 7892, 7893, U.S.N.M.

SCRUPOCELLARIA DIADEMA Busk, 1852

Plate 9, figs. 4, 5

1926. *Scrupocellaria diadema* Harmer, Polyzoa "Siboga" Expedition, p. 379, pl. 25, figs. 20–25 (Bibliography).

Measurements.—

External opesium $\begin{cases} ho = 0.32 \text{ mm.} \\ lo = 0.14 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.52 \text{ mm.} \\ lz = 0.16 \text{ mm.} \end{cases}$

Width of a segment = 0.48 mm. Vibracular chamber = 0.16 mm.

Structure.—Harmer, 1926, gave a very good account of this common species. He figures the porous ovicells, the articulation, the variations of the scutum, the mandible and rectifies the synonymy. Marcus, 1922, figures the chitinous joints "en echelon."

"It may be distinguished by its robust habit, by its short ovicells with large tubular pores, by its very variable scutum (sometimes wanting) and by the tendency to produce gigantic frontal avicularia on the axillary zooecia." All these essential characters (save the latter) are visible on our photographs.

Geographic distribution.—Pacific: Queenland, Torres Strait, Society Islands, Southern Japan, all of the Malay Peninsula, Amboine, Aru Islands, Java, New Guinea, Sumatra, and 25 localities cited by Harmer. China Sea: Singapore. Indian Ocean: Andamans Islands, Merqui Archipelago, off Negrais (Burmah) (69–80 meters), Madras (6–10 meters), Ganjam coast (38–48 meters), Ceylon. Essentially tropical in the southern hemisphere this species extends to the 40th parallel in the northern hemisphere.

Occurrence.—D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh. (common).

Plesiotypes.—Cat. No. 7894, U.S.N.M.

Genus CANDA Lamouroux, 1816

1816. *Canda* Lamouroux, Histoire des polypiers coralligenes flexibles, p. 132.

The ovicell bears an avicularium. The cilium of the dorsal vibraculum is serrate. The radicular dietellae are united to each other by parallel radicles. The articulation is simple, buried in the zooecium; often a scutum; 16 tentacles.

Genotype.—*Canda arachnoides* Lamouroux, 1816.

Range.—Eocene—Recent.

CANDA RETIFORMIS Pourtales, 1867

Plate 9, figs. 11, 12

1913. *Canda retiformis* WATERS, The marine fauna of British East Africa and Zanzibar, Bryozoa, Proceedings of the Zoological Society, pl. 479, pl. 69, figs. 1, 2, 6. (Bibliography.)

1928. *Scrupocellaria retiformis* CANU and BASSLER, Fossil and Recent Bryozoa Gulf of Mexico Region, Proc. U. S. National Museum, vol. 72, art. 14, p. 43.

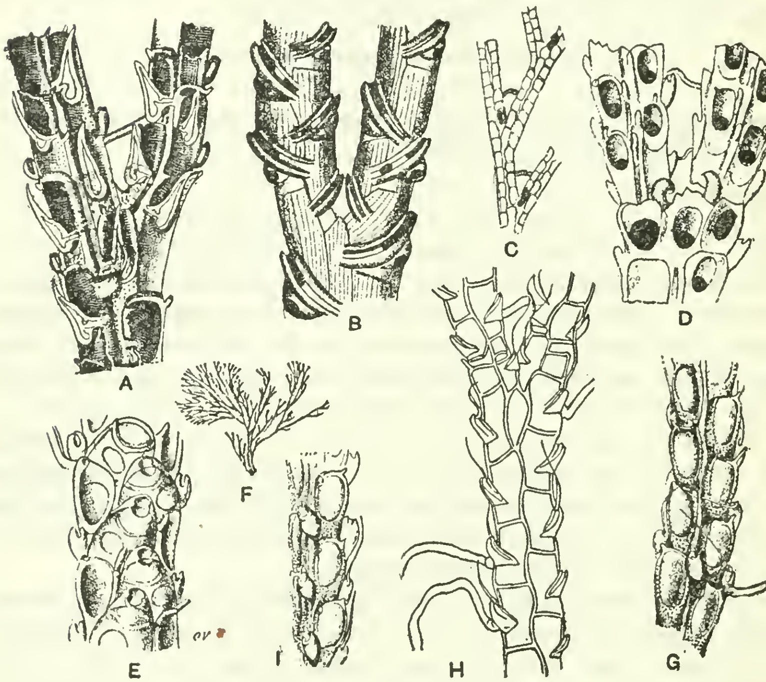

FIG. 75.—Genus *Canda* Busk, 1852

A–C. *Canda retiformis* Pourtales, 1867. A. Frontal surface of a zoarium, ×25. B. Dorsal surface, ×25. C. Dorsal surface to show the articulation, ×6. (A–C, after Waters, 1913.)

D–I. *Canda arachnoides* Lamouroux, 1816. D. Anterior face showing chitinous tubes at the articulation, ×25. (After Waters, 1887.) E. The ovicells are inclosed in avicularia, ×40. (After Levinsen, 1909.) F. Zoarium, natural size. G, H. Frontal and dorsal surfaces, enlarged. I. Lateral view. (F. I., after Busk, 1852.)

Waters, 1913, made an excellent study of this equatorial species. We have found only a single dead segment. It resembles very much the specimens from the Gulf of Mexico.

Occurrence.—D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

Plesiotypes.—Cat. No. 7895, U.S.N.M.

CANDA PHILIPPINENSIS, new species

Plate 9, figs. 8-10

Description.—The zoarium is formed of rectilinear or slightly curved segments, dichotomous, without apparent articulation (but hidden by the calcification), triangular in section. The zooecia are distinct, rectangular; the exterior opesium is small, somewhat oblique, pyriform, the point below. The mural rim is somewhat salient, rounded, thin; the cryptocyst is concave, smooth, as long as the opesium. The attachment of the scutum is on the proximal portion of the mural rim. The ovicell is small, little salient, convex. There are neither lateral nor axial avicularia. On the dorsal face the zooecia are little distinct, convex; the vibracular chamber is large, very little salient outside of the segment; the groove is long, located almost on the median axis, a little curved, enlarged at its extremity; the radicular pore is large.

Measurements.—

External opesium $\begin{cases} ho = 0.16 \text{ mm.} \\ lo = 0.06 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.36 \text{ mm.} \\ lz = 0.14 \text{ mm.} \end{cases}$

Width of segment = 0.32 mm.
Length of groove = 0.22 mm.

Affinities.—In general appearance this species recalls *Canda fossilis* Waters, 1881, of the Australian Miocene. It differs in the attachment of the scutum placed higher, in the large groove of the vibracular chamber, in its shorter opesium and in its smaller micrometric dimensions. Our specimens bore ovicells in June 1905. No complete zoarium has been found.

Occurrence.—

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; W, S, Sh.

D. 5235. Nagubat Island, east coast Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh. (common).

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S., Co.; 13.2° C.

Cotypes.—Cat. Nos. 7896, 7897, U.S.N.M.

Genus CABEREA Lamouroux, 1816

1816. *Caberea* Lamouroux, Polypiers coralligenes flexibiles, p. 130.

The zoaria appear nonarticulated, the articulation being formed of internal tubes. The radicells of the radicular dietellae of the dorsal vibracula form longitudinal bundles arranged on the median axis of the dorsal. The cilium of the dorsal vibraculum is very long and smooth. The operculum is detachable. There are spines, a scutum and a frontal avicularium. 13 tentacles.

Genotype.—*Caberea dichotoma* Lamouroux, 1816.

Range.—Oligocene (Vicksburgian)—Recent.

The specimens of this genus are rather common in the Philippine Islands and seem to belong to several perfectly distinct species. In our material however we have found only detached fragments, often dead.

CABEREA TRANSVERSA Harmer, 1926

Plate 38, figs. 9, 10

1926. *Caberea transversa* HARMER, Polyzoa "Siboga" Expedition, p. 363, pl. 24, figs 5, 10.

This species is common in the Malay region where Harmer found it at 13 localities. He writes (p. 364), "The strong transverse scuta, more or less expanded at the ends, the large projecting vibracula, forming lateral serrations of the branches, the short ovicells with a large frontal fenestra and the small, single, frontal avicularia are characteristic features." These different features are quite visible on our photographs.

Occurrence.—D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; coarse sand.

Distribution.—Various localities in the Malay region; Singapore, 8–16 meters.

Plesiotype.—Cat. No. 8422, U.S.N.M.

. CABEREA BREVIGALEATA, new species

Plate 10, figs. 1–9

Description.—The zoarium is formed of straight or undulating segments, dichotomous, inarticulated. The zooecia are distinct, united by their mural rim, arranged in 3 or 4 longitudinal rows, rectangular. The mural rim is thin and rounded; the external opesium is very large, elliptical or oval; the internal opesium is small, inferior or submedian, surmounted by two large septules. The ovicell is *very short*, little salient, convex, transverse, smooth. The lateral avicularia are very small and inconstant. The frontal avicularia are small, little salient, interopesial, very inconstant in form and in number. The vibracular chamber is very large and covers almost all the dorsal of the zooecia; the groove is prolonged to the median axis and is deep and quite broad at its extremity. The radicular pore is small; the radicells form often a large dorsal cushion.

Measurements.—

External opesium $\begin{cases} ho = 0.25\text{–}0.30 \text{ mm.} \\ lo = 0.15 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.40\text{–}0.45 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$

Width of segments at bifurcations = 1.00 mm.

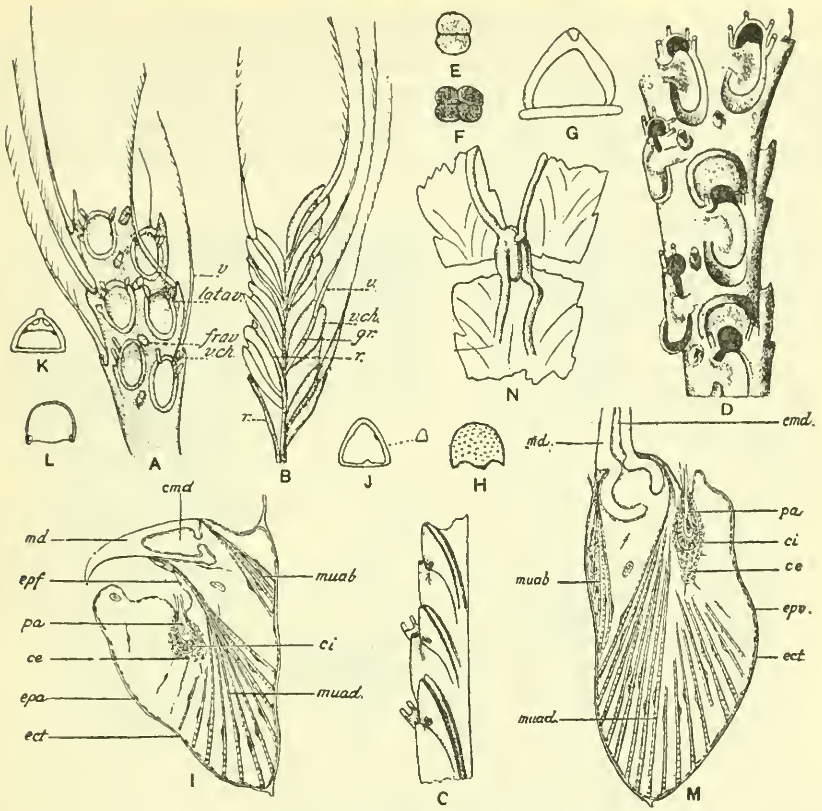

Fig. 76.—Genus *Caberea* Lamouroux, 1816

A, B. *Caberea ellisi* Fleming, 1818. A. A few zooecia enlarged. Vibracular chamber visible from the front (*v. ch*); the minute lateral avicularia (*lat. av*); serrated vibraculum (*v*); ×50. B. Dorsal view of a few zooecia to show vibracular chambers (*v. ch*) extending obliquely across the back of each zooecium, the groove (*gr*) and the long vibraculum (*v*); also the rootlets (*r*) arising from each vibracular chamber and proceeding downward through the middle of the branch. Rootlets from one side only shown, ×50. (A, B, after Robertson, 9905.)

C–M. *Caberea darwini* Busk, 1884. C. Lateral surface, ×25. D. Anterior surface, ×50. E, F, Ova out of the ovicells, ×85. G. Avicularian, mandible, ×250. H. Operculum, ×85. (C–H, after Waters, 1896.)

I. Longitudinal section through an avicularium; *ce*, external layer of the ciliated organ; *ci*, internal layer of the same organ; *cmd*, mandibular cavity; *ect*, ectocyst; *epa*, avicularian epiderm; *epf*, facial epiderm (endocyst); *md*, mandible (=endocyst); *muab*, abductor muscle of the mandible; *muad*, adductor or retractor muscles of the mandible; *pa*, aborted polypide (=ciliated organ) (after Calvet, 1900). J. Lateral avicularian mandible, ×85, ×250. K. Anterior avicularian mandible, ×250. L. Operculum, ×85. (J–L, after Waters, 1883.)

M. Longitudinal section of a vibraculoid avicularium (after Calvet, 1900); *cmd*, cavity of the vibraculum (=endocyst); *ect*, ectocyst; *epv*, vibracular epidermis; *md*, vibraculoid mandible; *muab*, abductor mandibular muscle; *muad*, adductor mandibular muscle; *pa*, aborted polypide (=ciliated organ peculiar body with *ci*, its internal layer, and *ce*, its external layer.

N. *Caberea lata* Busk, 1852. Sketch showing chitinous tubes at the articulation, ×25. (After Waters, 1887.)

Affinities.—This species differs from *Caberea lata* Busk, 1885, in its much smaller and less salient interopesial avicularia, in its very different micrometric dimensions, and in its transverse and nonglobular ovicell. It differs from *Caberea rudis* Busk, 1852, and from *Caberea grandis* Hincks, 1881, from Australia, in the absence of the scutum and in its transverse ovicell.

This species is very irregular especially when it has lost its chitinous appendages. The irregularity of calcification is compensated by the ectocyst. As in the other genera of the family, we do not understand the uses of the double opesium. The operculum closes the ovicell.

Occurrence.—

D. 5134. Balukbaluk, Sulu Archipelago; 6° 44′ 45″ N.; 121° 48′ E.; 25 fathoms; fne. S.

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S., Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; W. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; W. S. Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; Co. S., Sh.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S., Co.; 15.2° C.

Cotypes.—Cat. Nos. 7898–7902, U.S.N.M.

Genus AMASTIGIA Busk, 1852

(*Caberiella* Levinsen, 1909)

The ovicell is small. The zoarium is continuous, inarticulated (except *A. kirkpatricki*); it is pluriserial on the cellular face and biserial on the dorsal because of the covering of the axial zooecia; the branches are semicylindrical and the zooecia open on the convex face. The cilium of the dorsal vibraculum is short and without teeth. The radicells issuing from the dietellae are grouped in longitudinal bundles on the margins of the colony. Spines, scutum, frontal avicularium, marginal avicularium, present or absent.

Genotype.—*Amastigia nuda* Busk, 1852. Recent (Southern Hemisphere).

Genus NOTOPLITES Harmer, 1923

The ovicell is large with a frontal fenestra. The dorsal vibraculum is replaced by an adjacent avicularium, also with a radicular dietella. The zoarium is biserial and articulated. The radicells are often grouped in marginal bundles. Spines, scutum, and frontal avicularia present or absent, 25 tentacles?

Genotype.—*Notoplites rostratus* Harmer, 1923. Recent.

Genus TRICELLARIA Fleming, 1828

The zoarium is articulated and biserial; the segments have 3 zooecia at least. There are spines, a frontal avicularium, and a marginal avicularium; the dorsal vibraculum alone is lacking. The radicular dietella is placed on the proximal portion of the external

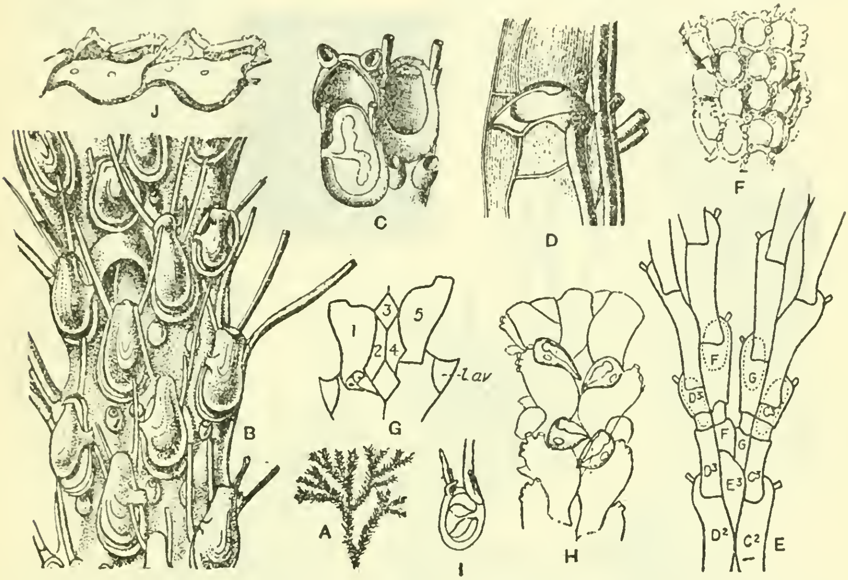

FIG. 77.—Genus *Amastigia* Busk, 1852

A–D. *Amastigia benemunita* Busk, 1885. A. Zoarium, natural size. B. Segment showing the anterior face. (A, B, after Busk, 1885.) C. Anterior face, ×55. D. Basal surface. A transversely placed vibraculum is seen, ×55. (C, D, after Levinsen, 1909.)

E. *Amastigia kirkpatricki* Levinsen Mss. Diagram showing bifurcation.

F–J. *Amastigia nuda* Busk, 1852. F. Frontal view. G. Diagram of basal surface; *l. av.*, lateral avicularium; 1, 5, marginal zooecia; 3, median zooecium; 2, 4, submedian zooecia. H. Basal view of a 5-serial branch showing 4 basal avicularia, and 2 ovicells on marginal zooecia. I. Frontal view of part of a zooecium with scutum. J. Lateral view of two zooecia with frontal avicularium (paired). (E–J, after Harmer, 1923.)

zooecium below the chitinous tube. The opesium is small and the gymnocyst is long.

Genotype.—*Tricellaria* (*Cellaria*) *ternata* Ellis and Solander, 1786. Recent.

Genus BUGULOPSIS Verrill, 1880

The zoarium is articulated and biserial. In the ramification the two zooecia emitted by the intercalated zooecium are adjacent at their base below the chitinous joints. Neither vibraculum nor scutum nor adventitious avicularia. The radicular dietella is placed on the proximal portion of the exterior zooecium below the chitinous tube. The opesium is longer than the gymnocyst.

Genotype.—Bugulopsis (*Cellularia*) *peachi* Busk, 1851. Recent.

Waters, 1913, and Harmer, 1923, range in a single genus the species of *Tricellaria* and *Bugulopsis*. As we believe both of them are artificial, we prefer to separate them in order to give more cohesion to the diagnoses. A diagnosis containing exceptions is no longer a

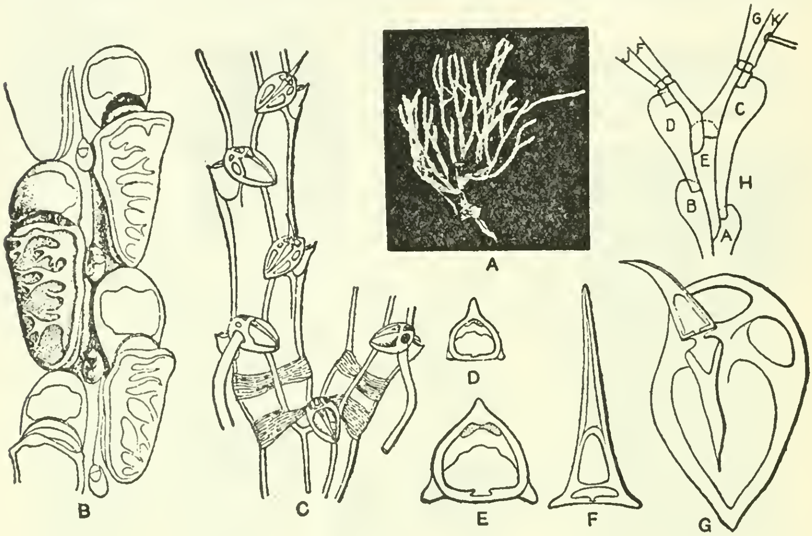

FIG. 78.—Genus *Notoplites* Harmer, 1923

A–G. *Notoplites* (*Serupocellaria*) *aviculariae* Yanagi and Okado, 1918. A. Zoarium natural size. B. Portion of a branch in frontal view, showing ovicell, frontal avicularia, and operculum, ×48. C. Dorsal view of the bifurcating parts of a branch, to show the position of vibracula and the origin of rootlets, ×32. D. Mandible of frontal avicularium, ×150. E. Mandible of lateral avicularium, ×150. F. Mandible of dorsal avicularium (basal of Harmer) ×150. G. Dorsal avicularium chamber, ×120. (A–G, after Yanagi and Okado, 1918.)

H. *Notoplites rostratus* Harmer, 1923. Diagram of bifurcation of the colony. A rootlet occurs on the distal segment of K. (After Harmer, 1923.)

diagnosis. The characters of a genus ought to be positive and never negative.

Genus JUBELLA Jullien, 1882

The zoarium is articulated. The segments are quadriserial on the convex face and biserial on the dorsal face because of the covering of the axial zooecia. There are no heterozooecia.

Genotype.—Jubella enucleata Jullien, 1882. Recent.

Genus RHABDOZOUM Hincks, 1882

The segments are cylindrical and attached to the extremity of long fibrous pedicells radiating from a principal trunk. The opesium is very small. The radicular dietella is proximal. Some marginal zooecia are ornamented at the front of the opesium with two long hollow spines.

Genotype.—Rhabdozoum wilsoni Hincks, 1882. Recent (Australia).

Genus FLABELLARIS Waters, 1898

The structure of the ovicell is that of the family Alderinidae; an incomplete calcification forms a frontal cicatrix of variable shape; the opercular valve does not close the ovicell. The zoarium is

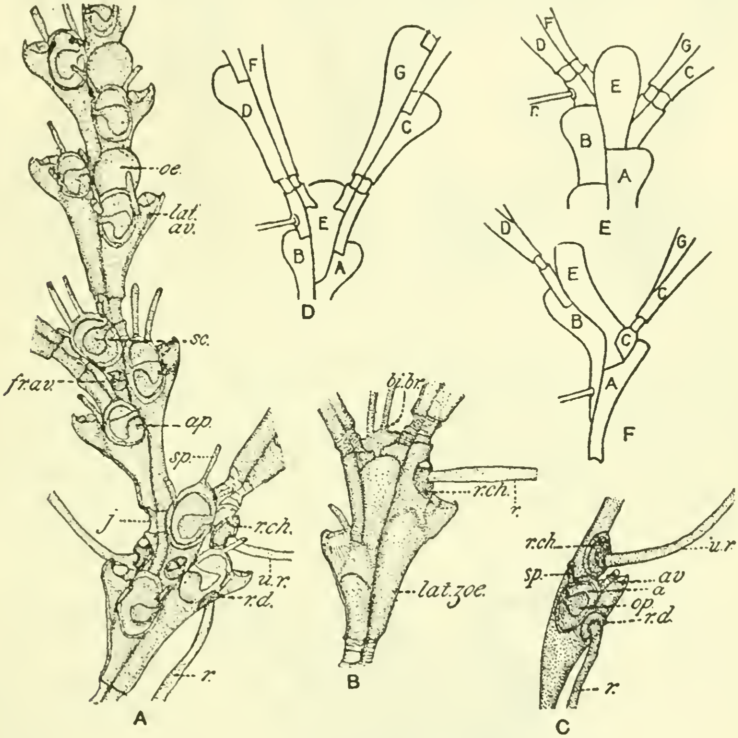

FIG. 79.—Genus *Tricellaria* Fleming, 1828

A–C. *Tricellaria* (*Cellaria*) *ternata* Ellis and Solander, 1786. A. Enlarged portion of colony, ×30, showing zooecia in groups of three, except the ooecial internodes (*oe*). Lateral avicularia (*av*) well developed; *fr av*, frontal avicularium; *ap*, aperture; *sp*, spine; *j*, joint; *sc*, scutum. B. Dorsal view of zoarium ×30 at the bifurcation of a branch (*bi. br*) showing the adjoining zooecia (*lat. zoe*) and root chamber (*r. ch*) with upward extending rootlet (*r*). C. Single zooecium, ×30, to show the position of the two kinds of root fibers, those anchoing the colony (*r*), arising in a simple root disk (*r. d*) on the front wall of the zooecium; those extending upward (*u. r*) arising from a rather large chamber (*r. ch*) projecting from the zooecial wall just above the lateral avicularium. (A–C, after Robertson, 1905.)

D–F. Diagram of bifurcation in *Tricellaria*. D. *T. ternata* Ellis and Solander, 1786. E. *T. occidentalis* var. *dilatata* Harmer 1923. F. *T. aculeata* D'Orbigny, 1816. (D–F, after Harmer, 1923.)

radicellate, unilamellar, flexible, or articulated, almost always multiserial. The articulation is apparent, hidden, or absent. Very frequently one of the frontal avicularia develops in the interior of the zooecium itself. The zooecia are elliptical, with gymnocyst small or absent. No scutum.

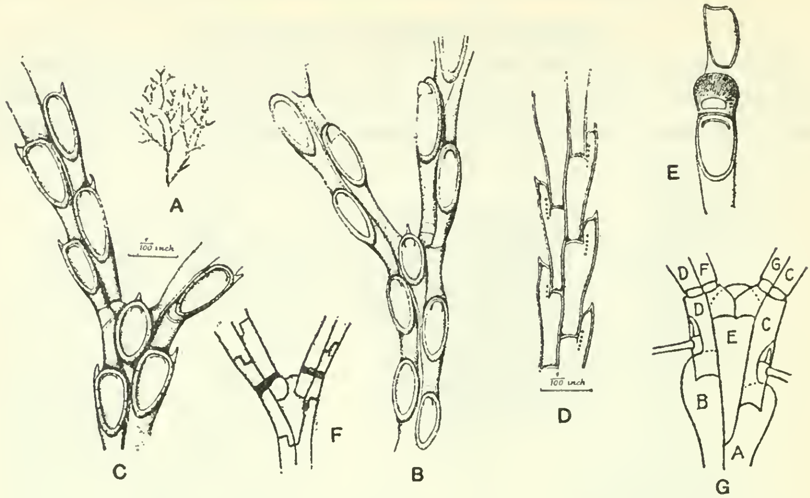

FIG. 80.—Genus *Bugulopsis* Verrill, 1880

A–G. *Bugulopsis peachi* Busk, 1851. A. Zoarium, two-thirds natural size. B, C. Frontal side of two branches, showing their bifurcation. D. Dorsal side of branch. (A–D. After Hincks, 1880.) E. Zooecium with ovicell. (After Smitt, 1867.) F. Sketch, ×12, showing articulation. (After Waters, 1913.) G. Diagram of bifurcation. The radicular dietella is placed on the proximal portion of the exterior zooecium but below the chitinous tube. (After Harmer, 1923.)

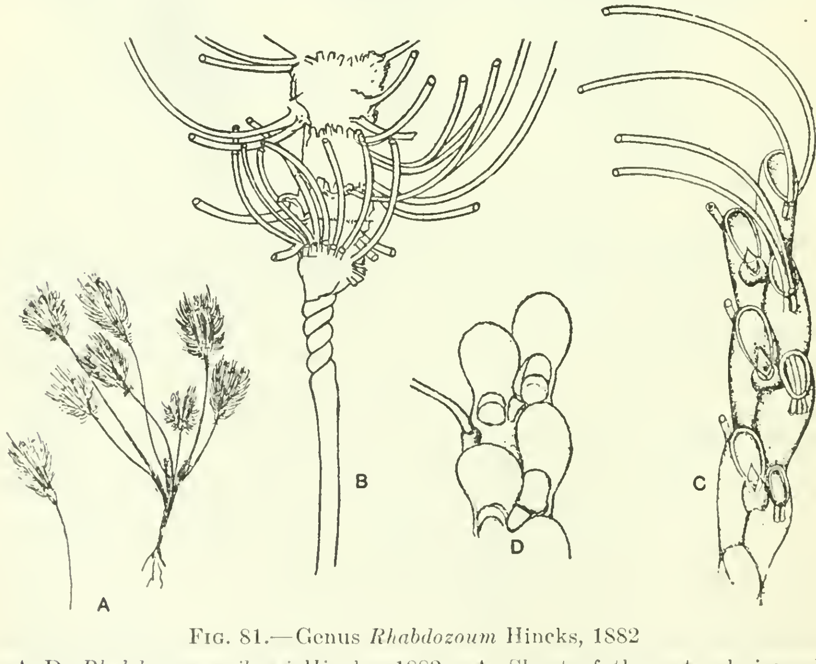

FIG. 81.—Genus *Rhabdozoum* Hincks, 1882

A–D. *Rhabdozoum wilsoni* Hincks, 1882. A. Shoot of the natural size. B. Summit of one of the chitinous rods, showing the annulation, the cuplike expansion and the basal portion of the upper celliferous stems. C. Portion of a celliferous stem, magnified, showing the arrangement of the zooecia, avicularia, and spines. D. Zooecia with ovicells. (After Hincks, 1882.)

Genotype.—*Flabellaris* (*Cellaria*) *flabellum* Ellis and Solander, 1786. Recent (Southern Hemisphere).

The synonymy of the genotype being under dispute (see Harmer, 1923, p. 340), another species might have been chosen. The species of *Craspedozoum* MacGillivray, 1886, belong to this genus.

We believe like Waters, 1913, that *Flabellaris* would be better classified in the Alderinidae.

FLABELLARIS CRASSUM, new species

Plate 10, figs. 10–13

Description.—The zoarium is free and nonarticulate in appearance, *very thick*, formed of two ranges of alternate zooecia. The dorsal face is almost flat, smooth, slightly hollowed by furrows limiting the zooecia. On the cellular face the zooecia are little distinct, hexagonal, elongated, provided with a gymnocyst, more or less long; the mural rim is very thick. The exterior opesium is large, elliptical, little elongated; the interior opesium is smaller and subcircular. The frontal avicularium is small, triangular, nonsalient, without pivot or denticles. The ovicell is large, very convex, smooth, buried on the distal zooecium, certainly closed by the opercular valve.

Measurements.—

External opesium $\begin{cases} ho = 0.25 \text{ mm.} \\ lo = 0.20\text{–}0.25 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.65.0.70 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

Affinities.—This species resembles very much *Menipea lineata* MacGillivray, 1895, but differs from it in its nonoval opesium and in its greater dimensions. It differs from *Menipea innocua* Waters, 1881, of the Australian Miocene in its bifurcated branches, its narrower mural rim, and its smaller measurements.

All our specimens were dead and the variations are considerable.

Occurrence.—

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S, co.; 13° C.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. s., co.; 13.2° C.

Cotypes.—Cat. Nos. 7904, 7905, U.S.N.M.

MONARTRON, new genus

Greek monos, single; artron, articulation.

The zoarium is articulated. The segments are monoserial at their base and bound to each other by a single chitinous joint. The ramification appears (1) on the tricellular segments by the appearance of an intercalated zooecium emitting proximally a single divergent zooecium, (2) occasionally by a lateral budding on a zooecium.

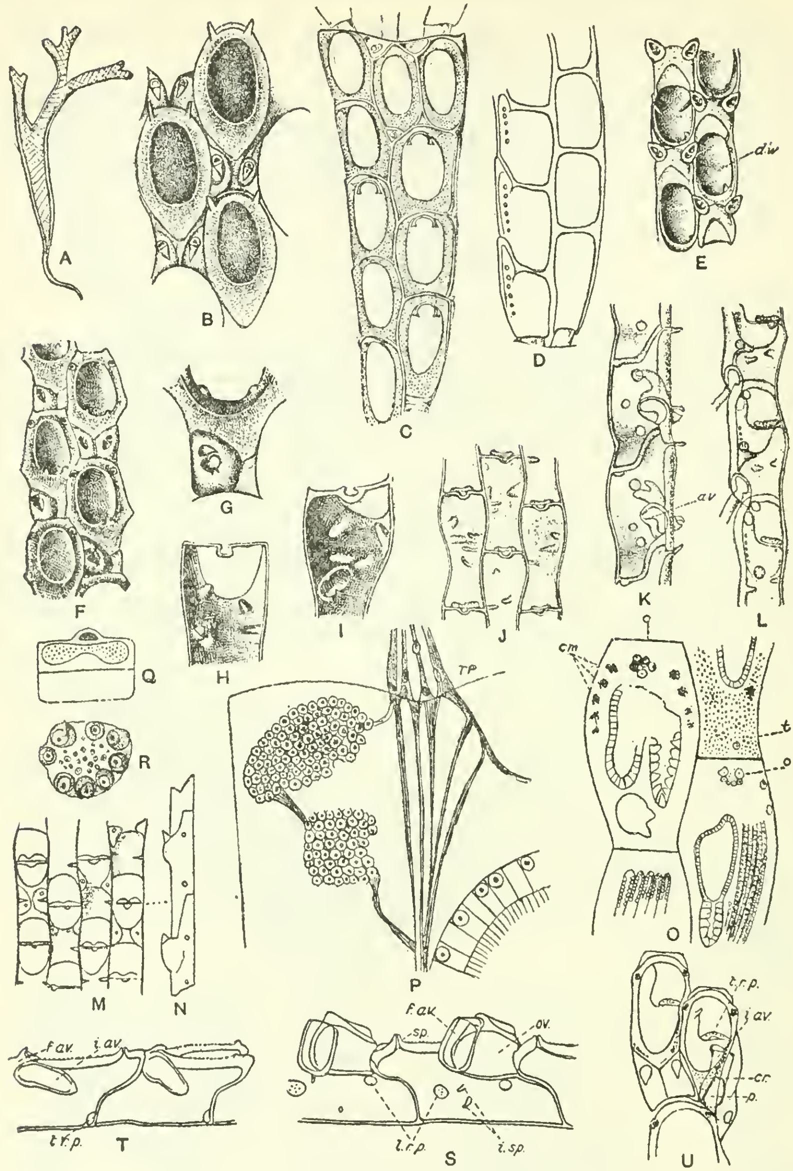

Fig. 82.—Genus *Flabellaris* Waters, 1898

A–U. *Flabellaris roborata* Hincks, 1881. A. Zoarium, natural size. B. Three zooecia, much enlarged, devoid of their ectocyst. (A, B, after Hincks, 1888.) C. Segment containing the zooecia provided with their ectocyst and opercular valve. D. Dorsal of the same segment. (C, D, after Busk, 1852.) E. Ovicelled zooecia, ×40. The proximal part of the ectooecium is uncalcified, whereby a triangular area is formed. The horizontal part of the distal wall (*d. w.*) is visible. F. Zooecia not ovicelled, ×40. Three of the zooecia which show only a single avicularium have an internal avicularium (placed in the cavity of the zooecium); this avicularium is attached just inside of the small area beside the external avicularium. G. The proximal end of a zooecium, ×75, with a

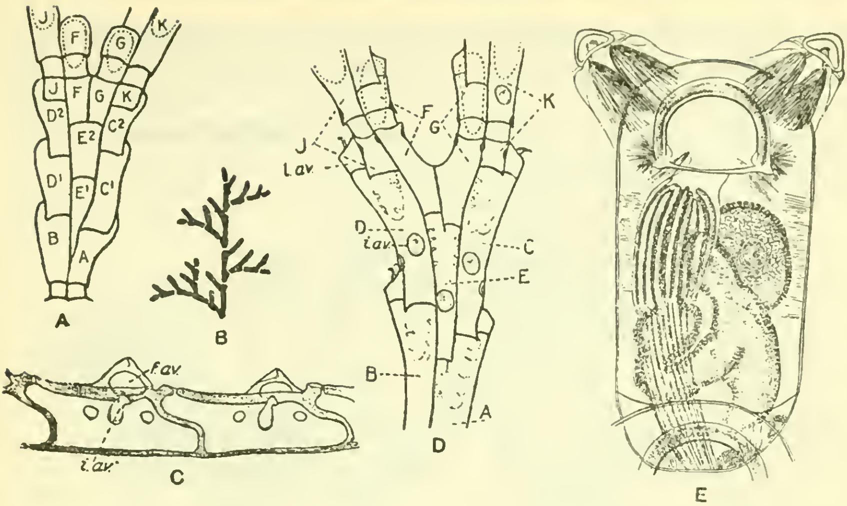

Fig. 83.—Genus *Flabellaris* Waters, 1898

A. *Flabellaris triseriata* Busk, 1852. Diagram showing bifurcation.

B, C. *Flabellaris spicata* MacGillivray 1886. B. A system of branches showing a sympodial form of colony associated with the suppression of one of the joints at each bifurcation. C. Lateral view of two zooecia without ovicells; *f. av.*, frontal avicularium; *i. av.*, internal avicularium.

D. *Flabellaris marionensis* Busk, 1884. Basal view showing four internal avicularia (*i. av.*); *l. av.*, lateral avicularium. (C, D, after Harmer, 1923.)

E. *Flabellaris ornata* Busk, 1852. Anatomical structure (after Marcus, 1922).

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single external avicularium. The ends of two interior robust spinous processes are seen in the proximal portion of the frontal area. H. The proximal half of a zooecium from the basal surface after the removal of the latter, ×75. An internal avicularium, four spinous processes and the horizontal part of the distal wall with its pore chamber (dietella) are seen. I. The proximal half of another zooecium treated in the same way, ×75. The mandible of the avicularium has been removed. J. Some zooecia from the basal surface, ×40. The internal spinous processes, the dietella of the distal wall and the heart-shaped septula are seen. K. Same zooecia, lateral view, ×55. The bent distal wall, the internal avicularium (*a v*) and a robust forked process are visible. L. Some marginal zooecia, lateral view, ×40. Two radical fibers seen to originate from their chambers. M. Dorsal surface showing the internal denticles, ×25. N. Lateral view showing septulae, ×25. The lower part of the younger zooecia comes under the aperture of the older ones. (E–M, after Levinsen, 1907.) O. Section, ×85, showing the position of the ovarium (*o*) and the cellular mass (*c. m.*). P. Cellular masses of the parenchym threads (mesenchyme) attached to those passing through a septula (*r. p.*) and also attached to the walls of the stomach, ×500. Q. Distal septula, ×85. R. The ovarium, ×500, consisting of a large number of ova around the border. (M–R, after Waters, 1898.) S. Lateral view of two zooecia, with ovicells (*ov.*) and frontal avicularia (*f. av.*); *l. r. p.*, lateral rosette-plates; *sp.*, base of spine; *i. sp.*, internal calcareous spines. T. Lateral view of two zooecia without ovicells; *f. av.*, frontal avicularium; *i. av.*, internal avicularium; *t. r. p.*, terminal rosette-plate. U. Frontal view; *cr.*, the part of the cryptocyst which overlies the internal avicularium (*i. av.*), of which the proximal end (*p.*) is seen partly through the frontal wall and partly through the lateral wall of the zooecium; *t. r. p.*, terminal rosette-plate. (S–U, after Harmer, 1923.)

Radicular dietellae are placed on the proximal portion of the zooecium and above the chitinous joint. A marginal avicularium, spines, and a scutum are present.

Genotype.—*Monartron* (*Menipea*) *cyathus* Wyville Thompson, 1858.

The species of the genus are as follows:

Monartron (*Menipea*) *fuegensis* Jullien, 1888.
Monartron (*Menipea*) *fuegensis* Busk, 1852.
Monartron (*Tricellaria*) *aculeata* D'Orbigny, 1839.
Monartron (*Menipea*) *longispina* Yanagi and Okada, 1918.
Monartron (*Menipea*) *cyathus* Wyville Thompson, 1858.

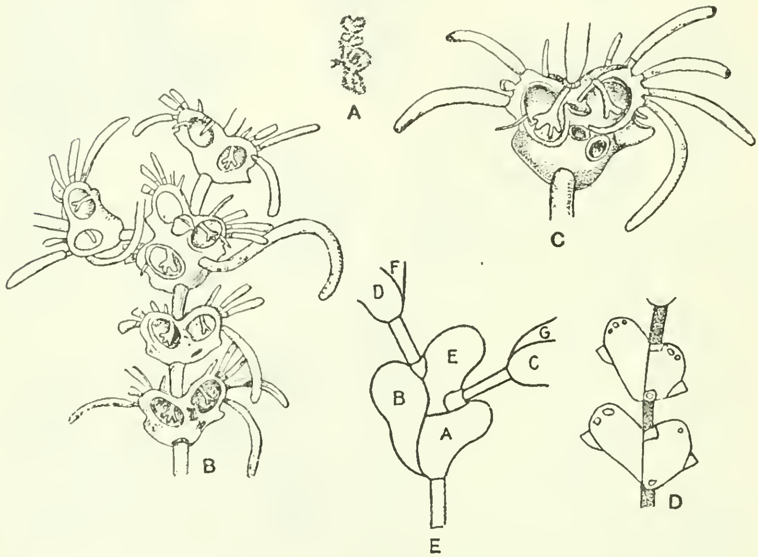

FIG. 84.—Genus *Monartron*, new genus

A–E. *Monartron cyathus* W. Thompson, 1858. A. Specimen, natural size. B. Small portion, magnified; small sessile avicularia are shown on the front of three of the internodes (=segments), and in the internode of bifucation a radicle tube is also seen. C. Single internode; in addition to the constant round mark there is in the specimen another similar mark immediately below the anterior sessile avicularium. (A–C, after MacGillivray, 1881.) D. Dorsal surface to show the articulation. (After Waters, 1913.) E. Sketch showing bifurcation. (After Harmer, 1923.)

The latter species is a little divergent in its zooecial form and in the insertion of a joint but its ovicell is hyperstomial. Harmer, 1923, identified the first three species. This is not the opinion of Waters, 1904. Inspection of the published figures does not, moreover, permit this identification.

Genus HOPLITELLA Levinsen, 1907

The avicularia appear only on marginal zooecia which have a large avicularium, the inner half of which is immersed; the distal wall has on each side a long narrow continuation running along the corresponding lateral wall; the entire frontal surface membranous. No spines, no ovicell. The zoarium is membranous, nonarticulated with branches, unilamellar, and multiserial.

Genotype.—Hoplitella (*Carbasea*) *armata* Busk, 1852. Recent.

We have introduced this genus into the Scrupocellariidae after Levinsen, 1909, but it is little probable that it has been correctly classified.

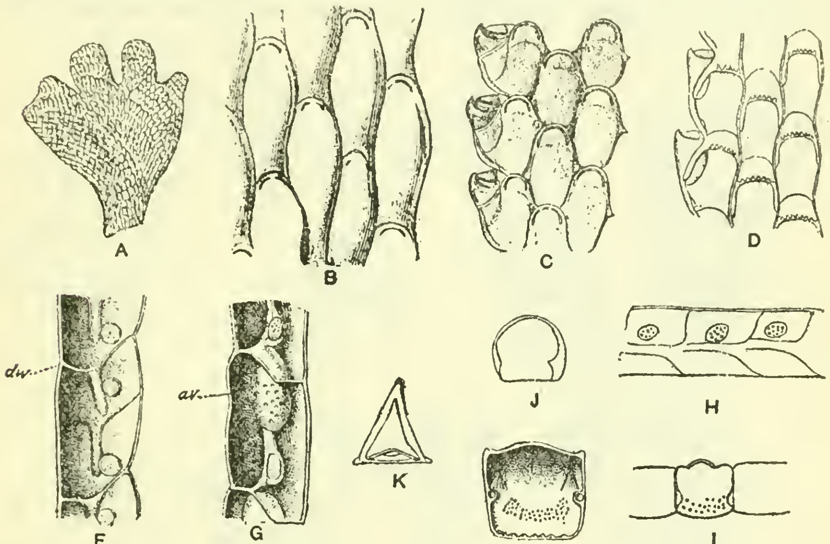

Fig. 85.—Genus *Hoplitella* Levinsen, 1909

A–K. *Hoplitella armata* Busk, 1852. A, B. Zoarium, natural size and enlarged (after Busk 1852). C. Anterior face, ×23. D. Basal view. The proximal part of the zooecia is furnished with two long lateral expansions, but only with a single one in the marginal zooecia; ×23. F. The distal wall, from the proximal end. On each side is seen the transverse section of an expansion. The occlusor muscles of the operculum are also seen, ×55. E. A longitudinal section through a zooecium. The bent distal wall (*d. w.*) and one of the expansions are seen, ×40. G. A longitudinal section through a marginal zooecium. The internal aspect of the avicularium (*av*) and the strong marginal thickening which surrounds the rosette plates are seen, ×40. (C–G, after Levinsen, 1909.) H, I. Lateral and distal wall, ×25 (after Waters, 1896). J. Operculum, ×85. K. Avicularian mandible, ×250. (J, K. After Waters, 1885.)

GROUP 2. OVICELL ENDOZOOECIAL

Genus MENIPEA Lamouroux, 1812

(*Emma* Busk, 1852)

The ovicell is endozooecial. The zoarium is articulated; the segments are short, narrow proximally, formed of 2 to 5 zooecia. There are spines and a frontal avicularium. The lateral avicularium is attached at the level of the proximal portion of the opesium. The radicular dietella is placed above the chitinous joint.

Genotype.—*Menipea* (*Cellaria*) *cirrata* Ellis and Solander, 1786. Recent (Southern Hemisphere).

In the group *Emma* Busk, 1892 (genotype, *Emma crystallina* Gray, 1843), the segments are short and a scutum is present.

Genus MAPLESTONIA MacGillivray, 1884

The ovicell is endozooecial. The zoarium is articulated. The segments are formed on the same colony of one or two zooecia. The

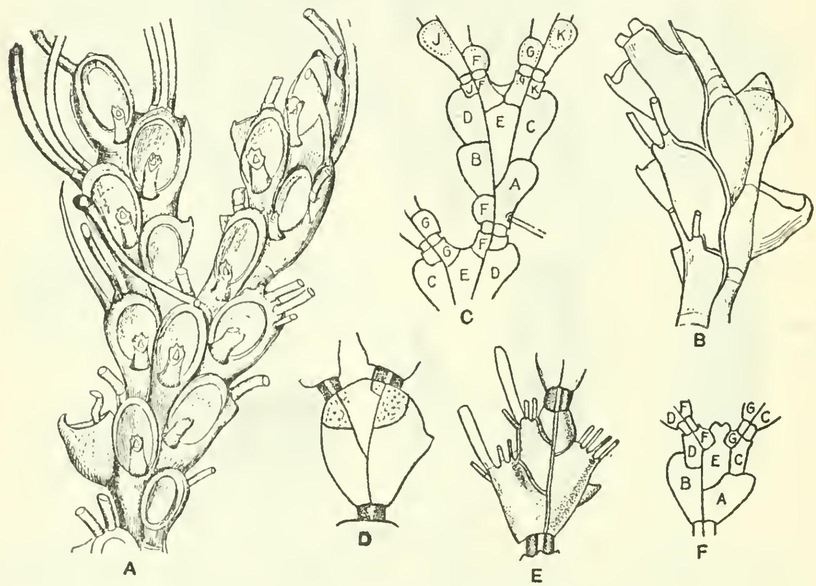

FIG. 86.—Genus *Menipea* Lamouroux, 1812

A, B. *Menipea cirrata* Lamouroux, 1816. Anterior and posterior sides (after Busk, 1852). C. Sketch showing that the joint traverses the opesia (dotted lines) of the inner zooecia. (After Harmer, 1923.) D–F. *Menipea* (*Emma*) *buskii* W. Thompson, 1858. D. Sketch ×25, showing the articulation. E. Dorsal surface of the same, ×25, showing the two small chambers, from which the next zooecium starts. (D, E. After Waters, 1913 and 1896.) F. Sketch showing bifurcation. (After Harmer, 1923.)

new branches issue from the distal or the lateral portion of a zooecium.

Genotype.—*Maplestonia cirrata* MacGillivray, 1884. Recent (Australia).

This genus may belong to another family.

Family BICELLARIELLIDAE Levinsen, 1909

The larva is broader than high (long). The zooecia are club-shaped, very little calcified, with narrowed gymnocyst. The planes of the opesium and of the frontal are oblique. The ovicell is hyperstomial and free. The colonies are free, bushy, and provided with radical fibers.

Genus BICELLARIELLA Levinsen, 1909

(*Bicellaria* Blainville, 1830, preoccupied)

The ovicells are free and issue from the boundary between two zooecia placed in the same longitudinal row. The zooecia are twinned. Each zooecium consists of three sections separated by constrictions of which the middle one is elongated, cylindrical, while the distal one is obliquely funnel-shaped. Avicularia freely movable. The basal

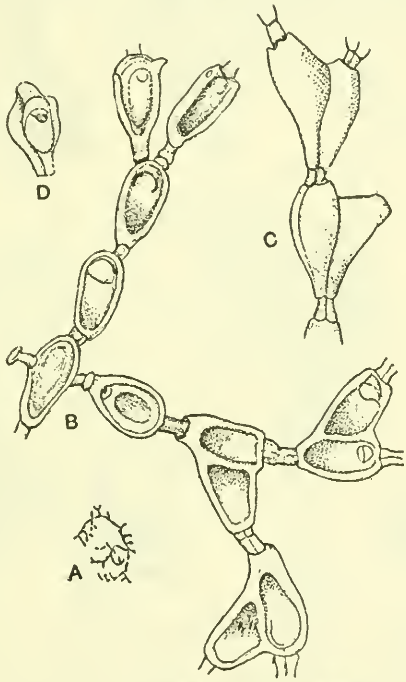

Fig. 87.—Genus *Maplestonia* MacGillivray, 1884

A–D. *Maplestonia cirrata* MacGillivray, 1884. A. Specimen, natural size. B. Portion magnified to show the anterior surface of the zooecia and the mode of branching. C. Small portion of the same to show the posterior surface. D. Ovicelled zooecium. (After MacGillivray, 1884.)

edge of the distal wall unequally asymmetrically angular; the radical fibers issue from the basal side of the zooecium (after Levinsen, 1909), 12–16 tentacles.

Genotype.—Bicellariella (*Sertularia*) *ciliata* Linnaeus, 1758. Recent.

Genus BICELLARINA Levinsen, 1909

The ovicells are free and issue from the boundary between two zooecia placed in the same longitudinal row. The zooecia are twinned, not divided into three segments separated by constrictions. The basal edge of the distal wall is angular, with small uniporous

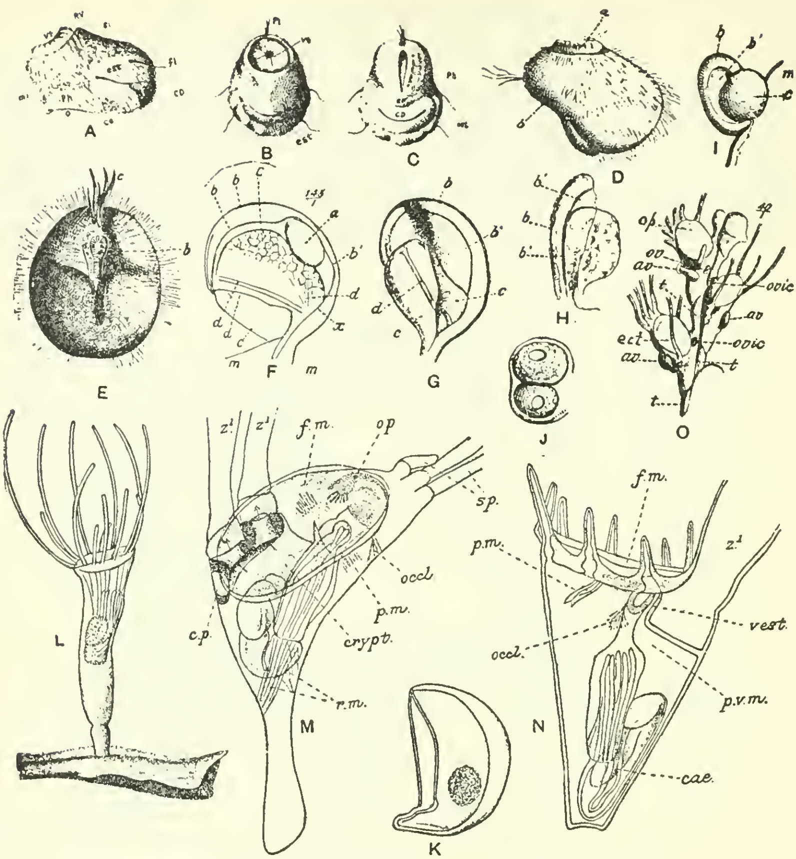

FIG. 88.—Family Bicellariellidae Levinsen, 1909

A–L. *Bicellariella ciliata* Linnaeus, 1758. A. Larva viewed in profile, ×100. The terminal bud is inclosed in a kind of sheath. B. Aboral side of larva, ×62.5. C. Oral side, ×62.5; (A–C, after Barrois, 1877); *ce*, obscure portion of the body cavity comprised between the two branches of the stomach; *fl.*, flagellum; *mi.*, aboral mesoderm; *ph.*, pharynx; *o*, mouth of larva; *C. D.*, digestive cavity; *Pl.*, vibratile plume; *Vt.*, terminal bud; *op.*, large elements. D, E. Larva viewed in profile and from the oral side; *a*, evaginated process; *b*, mouth; *c*, flagellum; *d*, rosette figure; *e*, color spot. F, G, H, I. Different stages of an ovicell; (D–I, after Nitzche, 1876); *m*, border of mouth area; *a*, fertilized edge; *b*, spoon-shaped or dome-shaped cyst; *c*, rounded fissure (covering cyst); *d*, muscle fibers within the latter. J. Two eggs with their enveloping membrane. K. Ovicell with the embryo. L. An erect zooecium showing some anatomical details and the tentacular sheath. (K, L. after Smitt, 1868.)

M. *Cornucopina grandis* Busk, var. *producta* MacGillivray. Anatomical details showing the frontal membrane (*fm*) into which a single pair of parietal muscles (*p. m.*) are inserted; the plate (*crypt*) is probably a cryptocyst. The zooecium has given rise by budding to two younger zooecia (*z'*) and is connected with its lateral neighbors by the communication pore (*c. p.*). Each of the three communication pores (septulae) is surrounded by a strong calcareous ring; *occl.*, occlusor muscles; *rm*, large retractor muscle. (After Harmer, 1902.)

septulae. The avicularia are free. The radical fibers issued from the lateral margins of the zooecia (after Levinsen, 1909).

Genotype.—Bicellarina (*Bicellaria*) *alderi* Busk, 1852. Recent.

Fig. 89.—Family Bicellariellidae Levinsen, 1909

A, B. *Bicellariella* Blainville. Posterior and frontal faces of *Bicellariella ciliata* Linnaeus, 1758, ×33. C. *Cornucopina* Levinsen, 1909. Two zooecia of *C. grandis* Busk, 1852, ×40. D. *Dimetopia* Busk, 1852. View of *D. spicata* Busk, 1852. E. *Petalostegus* Levinsen, 1909. A zooecium of *P. bicornis* Busk, 1885. F, G. *Bicellarina* Levinsen, 1909. Frontal and dorsal sides of *B. alderi* Busk, 1852.

N. *Dimetopia spicata* Busk. Anatomy. The funnel shaped zooecium is closed by a terminal frontal membrane which is depressed by a single pair of parietal muscles (*pm*). *cae*, coecum of stomach; *fm*, frontal membrane (ectocyst); *occl.*, occlusor muscles of operculum; *p.m.*, parietal muscles; *pvm.*, parieto-vaginal muscles and bands; *vest*, vestibule (diaphragm); *z'*, daughter zooecium; *t*, tentacles.

O. Sketch of zooecia, ×40, showing terminology; *av.*, avicularium; *ovic.*, ovicell; *t*, lower part of zooecium in which the spermatozoa originate; *ov.*, ova; *op.*, opercular valve, *ect.*, opesium covered by the ectocyst.

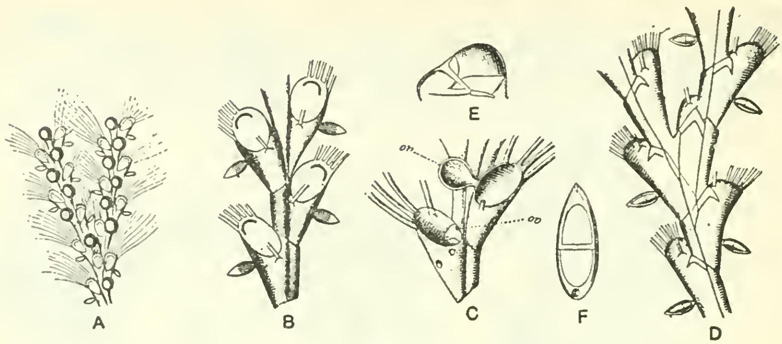

FIG. 90.—Genus *Bicellariella* Levinsen, 1909

A–F. *Bicellariella ciliata* Linnaeus, 1758. A. Zoarium, ×13. B. Fragment showing the zooecia with their freely movable avicularia, ×33.5. Each zooecium consists of three sections separated by constrictions, of which the middle one is elongated cylindrical, while the distal is obliquely funnel shaped. C. Ovicelled zooecia. The ovicell (*ov*) is old and leaves after its decay a cicatrix, *cov*. Proximally to this the forked distal wall is seen, ×40. D. Posterior face of the zooecia, ×335. The basal edge of the distal wall is unequally asymmetrically angular; the radical fibers are issued from the basal side of the zooecium. E. An avicularium, profile view, ×106. F. An avicularium, front view, ×106. (A–F. After Levinsen, 1894.)

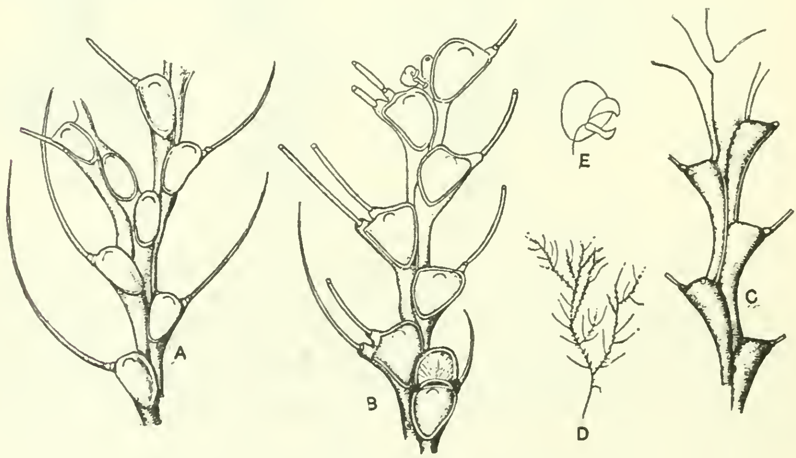

FIG. 91.—Genus *Bicellarina* Levinsen, 1909

A–E. *Bicellarina alderi* Busk, 1859. A. Usual form. Distal wall with small uniporous septulae; free avicularia; zooecia widening from a narrow cylindrical proximal part into an obliquely funnel-shaped extremity; radical fibers issue from the lateral margins of the zooecia. B. Zooecia with ovicell and a double spine. C. Dorsal surface of branch. D. Natural size of zoarium. E. Avicularium. (After Hincks, 1880.)

Genus DIMETOPIA Busk, 1852

The free ovicell issues from the boundary between two zooecia placed in the same longitudinal row. The zooecia in pairs apposed back to back, each pair facing in a direction at right angles to that of the next; at a bifurcation each of the separate zooecia gives off a secondary pair. The distal wall furnished with four uniporous septulae each of which is placed at the bottom of a separate chamber (Levinsen 1909).

Genotype.—Dimetopia cornuta Busk, 1852. Recent.

Genus CORNUCOPINA Levinsen, 1909

The zooecia widening from a long, tube-shaped proximal end obliquely upwards, funnel-shaped, with a ring-shaped constriction

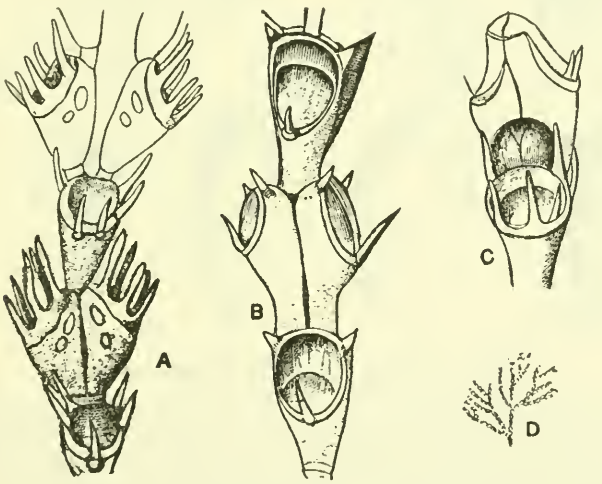

FIG. 92.—Genus *Dimetopia* Busk, 1852

A. *Dimetopia spicata* Busk, 1852. Portion of a zoarium.
B–D. *Dimetopia cornuta* Busk, 1852. B. Several zooecia. The distal wall is furnished with four uniporous septulae, each of which is placed at the bottom of a separate chamber. No avicularia. C. Ovicell. D. Zoarium natural size. (A–D. After Busk, 1852.)

at a greater or less distance from the distal wall. The ovicells which are not placed between two zooecia in the same longitudinal row but on the zooecial distal margin, which is directed outwards from the middle of the colony, are surrounded by kenozooecia. The radial fibers which run down along the basal side of the colony issue far distally on the individual zooecia (Levinsen, 1909).

Genotype.—Cornucopina (*Bicellaria*) *grandis* Busk, 1852. Recent.

Genus PETALOSTEGUS Levinsen, 1909

The membranous frontal area is covered by a circle of mutually connected platelike or leaf-like hollow spines; a slightly chitinous, semicircular simple operculum. The avicularia are sessile. The zooecia are in one row (Levinsen, 1909).

Genotype.—Petalostegus (*Catenaria*) *bicornis* Busk, 1884. Recent.

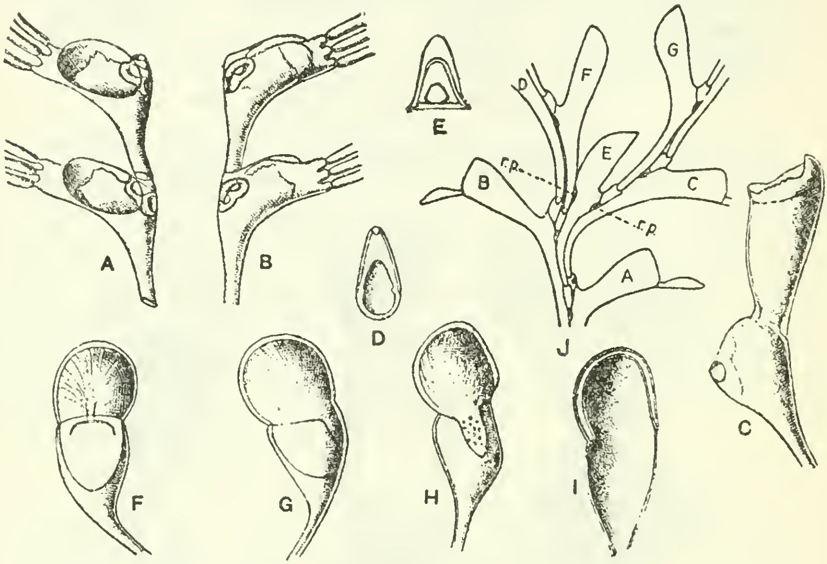

FIG. 93.—Genus *Cornucopina* Levinsen, 1909

A–E. *Cornucopina grandis* Busk, 1852. A. Two zooecia showing a finely dentated cryptocyst, ×40. The zooecia are very asymmetrical, from the narrow tubelike proximal part widening into an obliquely funnel shaped extremity. B. The same zooecia from the basal surface. The radical fibers, which go down along the basal surfaces of the colony, are issued from a septula a good ways distally on the basal aspect of the zooecia, ×40. C. A zooecium with a large avicularium, ×40. D. The frontal surface of the avicularium, ×40. E. The avicularian mandible, ×55.

F–I. *Cornucopina infundibulata* Busk, 1885. F–H. A zooecium with ovicell in three different positions; the distal wall is seen in G and H, ×23. The ovicells are placed on zooecia of ordinary size. I. A sagittal section through the same ovicell bearing zooecium; it shows that the ovicell is surrounded by a kenozooecium, ×23. (Figs. A–I. After Levinsen, 1909.)

Family BEANIIDAE Canu and Bassler, 1927

No ovicell; the larva develops in the interior of the female zooecia in which the polypide is small. The zooecia are little calcified and are joined together by stoloniform prolongations containing a multiporous septule. Often there are pedunculate avicularia. The dorsal frequently bears large radicells with multifid base. The colonies are unilamellar, uni or multiserial.

Genus BEANIA Johnston, 1847

(*Diachoris* Busk, 1852, and *Chaunosia* Busk, 1867)

The mural rim of the zooecia bears areal spinules and apertural spines. The operculum frequently bears ramose appendages. 20–30 tentacles.

Genotype.—Beania mirabilis Johnston, 1847. Recent.

Diachoris Busk, 1852, is a subgenus containing only the multiserial forms with six connecting tubes. Levinsen, 1909, thought

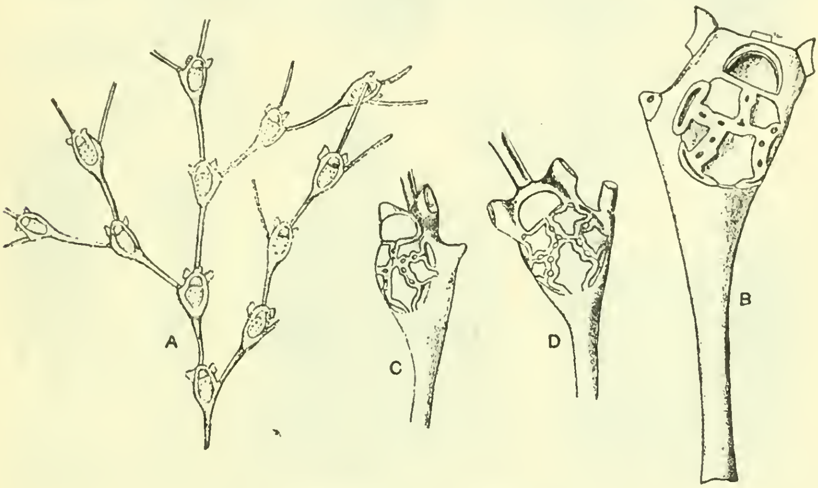

Fig. 94.—Genus *Petalostegus* Levinsen, 1909

A–D. *Petalostegus bicornis* Busk, 1885. A. Zoarium showing the general arrangement of the zooecia (after Busk, 1885). B. Zooecium, ×85. There is a frontal shield, formed by five broad hollow spines lobed at the edge and separated by rows of pores. (After Waters, 1889.) C, D. Zooecia with a simple, completely chitinized operculum; sessile avicularia. B–D. (After Levinsen, 1909.)

that it could be preserved for species with opercular valve if its presence is confirmed.

In *Chaunosia* Busk, 1867, the branches are multiserial and have two connecting tubes.

Genus STOLONELLA Hincks, 1883

The areal spinules are joined together by their extremity and form above the ectocyst, a false cribrimorph frontal.

Genotype.—Stolonella clausa Hincks, 1883. Recent.

Family EPISTOMIIDAE Gregory, 1903

(*Notamiidae* Hincks, 1880)

Zoarium erect or partially prostrate, jointed and attached by rootlets. Zooecia paired, extending into three internodes, each of which consists of the distal or largest section of a pair of zooecia, the smaller middle sections of two zooecia of the succeeding internode, and the still smaller proximal sections of two zooecia of the next internode but one. Avicularia sessile or pedunculate, borne by the middle sections of the zooecia, the mandibles acute. Gonozooecia formed

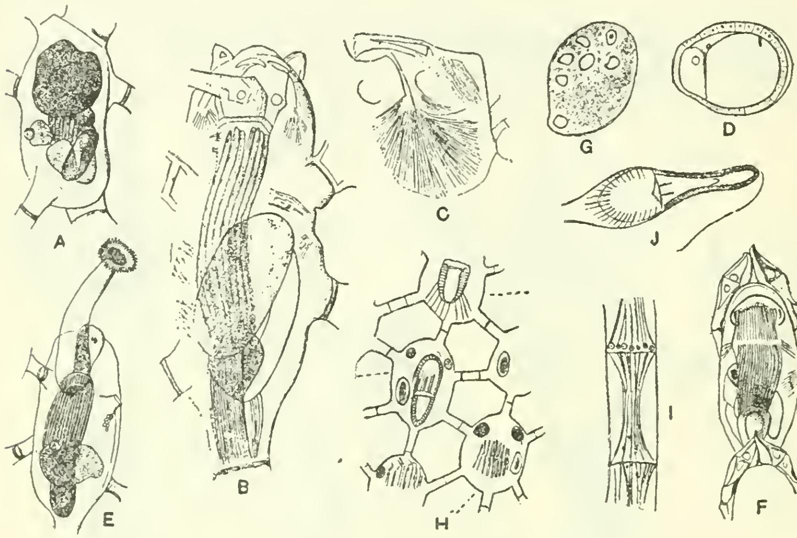

Fig. 95.—Family Beaniidae, Canu and Bassler, 1927

A–D. *Diachoris costata* Busk, 1852. A. Female zooecium containing a larva very well developed, placed in an ovicell sac (not drawn). The polypide is very small, ×50. B. Arrangement of the principal elements of a zooecium, ×100. C. Avicularium with its muscles. The flexor muscle of the mandible is very much developed. D. Ovary appearing in the form of the vesicle of Graaf, with many ovules. (A–D. After Jullien, 1888.)

E–L. *Diachoris magellanica* Busk, 1852. E. Dorsal of a zooecium bearing a thick radicell terminated by an adherent disk finely denticulated on its edge, ×34. F. Frontal of a zooecium showing the internal organization. (E, F. After Jullien, 1888.) G. Egg mass, ×250. H. Section in a zoarium showing position of egg masses, ×25. (G, H. After Waters, 1896.) I. Connecting tube with two septa, ×190. The parenchym threads are attached to both and pass through the junction. J. Avicularium, ×85. Besides the large adductor muscles (fig. C) there is a semicircular row of short muscles, which no doubt contracts the integument behind the mandible and thus helps in the slow opening of the beak. (After Waters, 1896.)

by the enlargement of certain individuals, ovicells wanting. (Harmer, 1926).

Genus EPISTOMIA Fleming, 1828

(*Notamia* Fleming, 1828, preoccupied)

The zooecia are united laterally in pairs; each pair arising by tubular prolongations from the pair next but one below it; at each bifurcation a new series of cells is intercalated into the branches.

Above each pair two long-stalked fixed avicularia originating, one on each side, from the inferior tubular prolongation of one of the cells immediately above. The gonozooecia resemble in form the

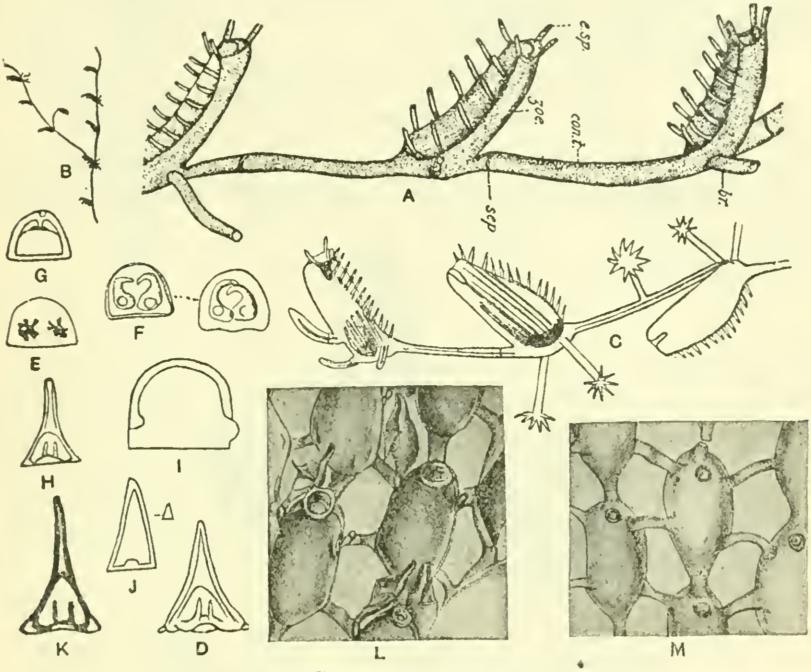

FIG. 96.—Genus *Beania* Johnston, 1847

A–C. *Beania mirabilis* Johnston, 1847. A. A few zooecia enlarged to show mode of connection, the erect and decumbent portions, the former with margins armed with spines, ×50 (after Robertson); *con. t*, connecting tube; *csp.*, erect spine; *br*, branch; *sep*, septum; *zoe*, zooecia. B. Zoarium natural size. C. Fragment of colony showing the two radical processes and also the diaphragm in the stolon near to the zooecium from which it has risen, ×25. The septal division takes place in the stolon very soon after its formation. (B, C. After Waters, 1896.)

Opercula and mandibles. D. *Beania* (*Diachoris*) *magellanica* Busk, 1852; mandible with double columellae. (After Waters, 1906.) E. *Beania* (*Diachoris*) *maxilla* Jullien, 1888; operculum ×76. F. *Beania* (*Diachoris*) *costata* Busk, 1852; operculum, ×76. (E, F. After Jullien, 1888.) G. *Beania* (*Diachoris*) *hirtissima* Heller; mandible, ×85. (After Waters, 1885.) H, I. *Beania* (*Diachoris*) *bilaminata* Hincks, 1881; mandible and operculum, ×85. J. *Beania* (*Diachoris*) *intermedia* Hincks, 1881; mandible, ×85. (H–J. After Waters, 1906.) K. *Beania erecta* Waters, 1903; mandible with double columella, ×85. (After Waters.) L, M. Subgenus *Diachoris* Busk, 1852. *Diachoris magellanica* Busk, 1859, frontal and dorsal faces. (After Busk.)

ordinary zooecia, but twice as large and without ovicell (gigantic cells of Hincks); 10 tentacles.

Genotype.—*Epistomia* (*Sertularia*) *bursaria* Linnaeus, 1758. Recent.

Hincks placed this genus in the Notamiidae with *Synnotum*. It constitutes, however, a very divergent ensemble in the form of zooecia and in the nature of the gonoecia. The larva is not known. *Notomia* Fleming, 1828 being replaced by *Epistomia*, it was necessary to replace Notamiidae by Epistomiidae.

Genus SYNNOTUM Hincks, 1886

(Alteration of *Synnota*, Pieper, 1881)

The zooecia are in pairs back to back, each pair connected by tubular prolongations with the next pair but one below it. There

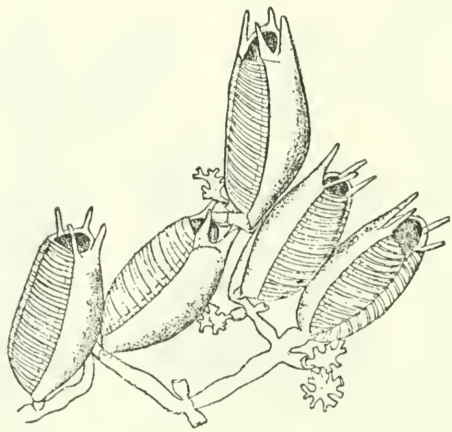

FIG. 97.—Genus *Stolonella* Hincks, 1883

Stolonella clausa Hincks, 1883. The colony is attached by a radical fiber which issues from a creeping stolon. The zooecia which issue separately from the stolon are furnished with two rows of spines, joined together in pairs and separated by a single row of transverse slits. No avicularia. No ovicell.

are sessile lateral avicularia and an articulated avicularium between the cells in each pair at the summit.

Genotype.—*Synnotum* (*Gemellaria*) *avicularia* Pieper, 1881. Recent.

Suborder ASCOPHORA Levinsen, 1909

THE COSTULAE

Family CRIBRILINIDAE Hincks, 1880

We have treated this family and its genera at some length in our Monograph of North American Early Tertiary Bryozoa. In the following pages we are adding descriptions of genera not discussed in 1920, but we are not taking into account the many genera and families proposed in recent years by Lang.

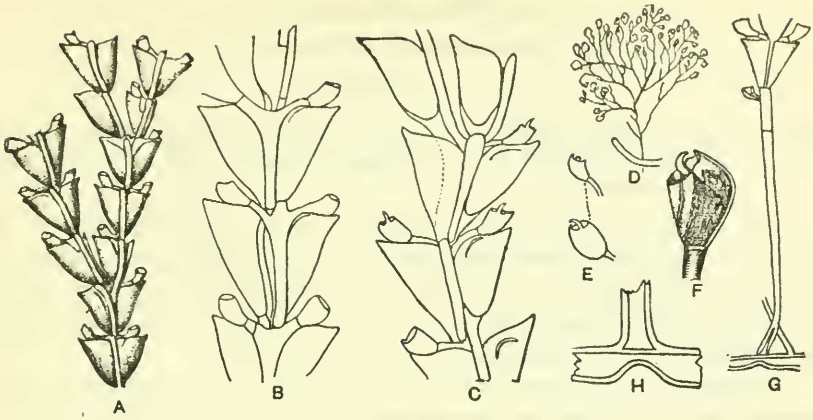

FIG. 98.—Genus *Epistomia* Fleming, 1828

A–D. *Epistomia bursaria* Linnaeus, 1758. A. General aspect of the zoarium and arrangement of the zooecia. The basal edge of the distal wall is not angular. There is no constriction distally to the distal wall. No ovicell. B. Front of the zoarium. C. Dorsal surface. D. Natural size. E. Long-stalked, fixed avicularia showing the differences in size. (A–E, after Hincks, 1880.) F. Avicularium, showing the arrangement of the muscles for opening and closing the mandible (after Busk, 1852). G. Stalk and the lower part of colony, ×25. H. Origin of stalk from the creeping stolon, ×85. (G, H. After Waters, 1896.)

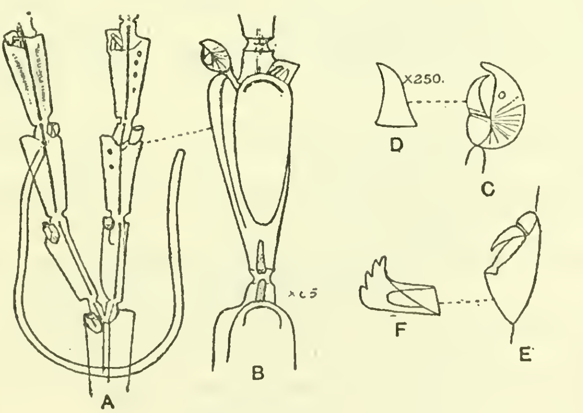

FIG. 99.—Genus *Synnotum* Hincks, 1886

A, B. *Synnotum aviculare* Pieper, 1881. A. Showing the lateral sessile avicularia, ×26. (After Waters, 1896.) B. The large pedunculate avicularium, ×85. C, D. *Synnotum pembaensis* Waters, 1913. Avicularium, ×85, and its mandible, ×290. E, F. *Synnotum contorta* Waters, 1913. Avicularium, ×150, and its mandible, ×250. (C–F. After Waters, 1913.)

Genus PUELLINA Jullien, 1886

PUELLINA RADIATA Moll, 1803

Plate 22, fig. 1

1920. *Puellina radiata* Canu and Bassler, North American Early Tertiary Bryozoa, Bull. 106, U. S. National Museum, p. 295, pl. 41, fig. 14–18 (bibliography).

The epitheca covers the costules. In the Philippines, in the tropical zone, the frontal ornament is much accentuated, especially the tuberosity placed at the end of each costule which is very salient. Unfortunately we have not had time to make any sections in spite of the abundance of materials.

Biology.—This species is extremely prolific. Almost all our specimens were ovicelled and ancestrulated. The laying of eggs and the fixation operate almost all the year without any interruption. The larva fixes itself on all marine objects; pebbles (rare), shells, corals, bryozoa, sponges, nullipores, foraminifera, but never on algae. It prefers shallow waters from 30 to 50 meters, but it lives very well at the depth of 372 meters. It does not pass beyond the polar circle. With the same fecundity, it has lived in the ancient seas since the Eocene (Lutetian) both in Europe and America.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5155. Bakun Point, Tawi Tawi Group; 5° 13′ 40″ N.; 119° 57′ 20″ E.; 12 fathoms; co. S.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

D. 5174. Jolo Light, Jolo; 6° 03′ 45″ N.; 120° 57′ E.; 20 fathoms; crs. S.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

D. 5192. Jilantaguan Island, off northern Cebu; 11° 09′ 15″ N.; 123° 50′ E.; 32 fathoms; green sand.

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.

D. 5219. Mompog Island, between Marinduque and Luzon; 13° 12′ N.; 122° 18′ 45″ E.; 530 fathoms; gn. M.

D. 5311. China Sea, vicinity Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Plesiotypes.—Cat. Nos. 7984–7989, U.S.N.M.

PUELLINA RADIATA FLABELLIFERA Kirkpatrick, 1888

Plate 22, fig. 2

1888. *Cribrilina radiata* var. *flabellifera* KIRKPATRICK, Polyzoa of Mauritius. Annals and Magazine of Natural History, ser. 6, vol. 1, p. 75, pl. 10, fig. 4.

Measurements.—

$$\text{Aperture}\begin{cases} ha = 0.04 \text{ mm.} \\ la = 0.06 \text{ mm.} \end{cases} \qquad \text{Zooecia}\begin{cases} Lz = 0.30\text{–}0.40 \text{ mm.} \\ lz = 0.26\text{–}0.22 \text{ mm.} \end{cases}$$

$$\text{Zooeciules}\begin{cases} Lz = 0.24 \text{ mm.} \\ lz = 0.16 \text{ mm.} \end{cases}$$

Structure.—The zooeciule is always primoserial; it is a veritable avicularium with frontal much developed and with very small triangular mandible. Similar zooeciule avicularia have been noted by Canu, 1918 in *Pleuroschiziella* of the French Lutetian. The ancestrula is membraniporoid. All the frontal characters are identical with those of *Cribrilina innominata* Couch, 1844; the ascopore appears constant; the papillae are often very visible.

Occurrence.—

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.

D. 5311. China Sea, vicinity of Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

Indian Ocean; Mauritius (Kirkpatrick).

Plesiotype.—Cat. No. 7990, U.S.N.M.

Genus FIGULARIA Jullien, 1886

FIGULARIA FISSURATA, new species

Plate 22, figs. 4–6

Description.—The zoarium is unilamellar or incrusting sponges or shells. The zooecia are distinct, separated by a deep furrow, much elongated, elliptical; the frontal is convex, smooth and bears a costulated area of great variability. The aperture is suborbicular with a small concave poster and a large circular anter. The ovicell is very large, convex, hyperstomial, closed by the operculum, carinated and provided with two triangular transverse *slits*. The aperture of the ovicelled zooecia is larger. The interzooecial avicularium is large, elongated, with a spathulate beak.

Measurements.—

Zooecia (ovicelled)	$Lz=0.70$ mm. $lz=0.30$ mm.	Aperture	$ha=0.20$ mm. $la=0.26$ mm.
Zooecia (ordinary)	$Lz=0.60$ mm. $lz=0.30$ mm.	Aperture	$ha=0.18$ mm. $la=0.18$ mm.

Structure.—The ectocyst is placed below the costules but applied closely against them; it is united with the proximal portion of the aperture which serves thus for the tentacles and the compensatrix. The costulated area is of variable size and according to the zooecia contains from 3 to 12 costules. The chitinous mandible of the avicularium measures 0.40 by 0.24 mm. The ovicell is formed by the union of the inferior spicules of the distal zooecium; its structure

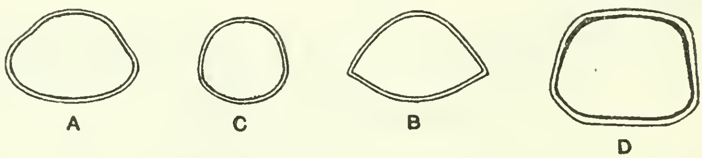

Fig. 100.—Opercula of *Figularia* Jullien, *1886*. ×85. *Figularia jucunda*, new species

A, B. Operculum of ovicelled zooecia. C. Nonovicelled zooecium. D. *Figularia fissurata*, new species.

is identical with that of the frontal; the real ovicell is placed below. All the exterior covering of this species is only a protective covering.

The operculum of the ovicelled zooecia is in the form of a trapezium with truncated corners. It has a compensatrix.

Affinities.—This species differs from *Figularia clithridiata* Waters, 1887, in the orbicular form of the aperture; from *Figularia figularis* Johnston, 1847, in its smaller dimensions and its much smaller and much more variable costulated area and from *Figularia patagonica* Waters, 1905, in the absence of supraoral avicularium. Our living specimens from Tacbuc were ovicelled on July 29, 1908; the specimens from other localities were dead.

Occurrence.—

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S., co.; 13.2° C.

Cotypes.—Cat. Nos. 7991–7993, U.S.N.M.

FIGULARIA JUCUNDA, new species

Plate 22, fig. 3

Description.—The zoarium encrusts nullipores; it separates easily from its substratum. The zooecia are distinct, separated by a furrow, a little elongated, elliptical, swollen; the surface is convex and bears a subcircular cribriform area surrounded by a circle of pores with salient peristomes. The apertura is semielliptical, transverse, with a very concave proximal border. The ovicell is very large, globular, carinated, with two small transverse slits symmetrically arranged on each side of the median carina. The aperture of the ovicelled zooecia is larger; the operculum closes the ovicell.

Measurements.—

Zooecia (ovicelled) $\begin{cases} Lz = 0.60 \text{ mm.} \\ lz = 0.50 \text{ mm.} \end{cases}$ Aperture $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.20 \text{ mm.} \end{cases}$

Zooecia (ordinary) $\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.36\text{–}0.40 \text{ mm.} \end{cases}$ Aperture $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.14 \text{ mm.} \end{cases}$

Structure.—The structure of this species is identical with that of *Figularia fissurata;* its ectocyst is placed below the costules. The exterior decoration is most charming and worthy of inspiring the artistic decorator.

The operculum of the ordinary zooecia is orbicular and surrounded by a thick sclerite. The operculum of the ovicelled zooecia is formed like a bell like that of *Figularia clithridiata* Waters, 1887. The operculum does not bear any trace of muscular attachments.

Biology.—Our specimens were in reproduction in February, 1908.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5235. Nagubat Island, east coast of Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

Holotype.—Cat. No. 7994, U.S.N.M.

Genus BARROISINA Jullien, 1886

The ovicell is hyperstomial. The frontal is costulated. The apertura bears a proximal rimule. The avicularia are more or less constant and dispersed between the zooecia.

Genotype.—*Semiescharipora elegantula* Beissel, 1865. Cretaceous. Lang, 1917, considered the genotype as synonymous with *Cellepora cornuta* Hagenow, 1839, and placed it in *Pliophloea* Gabb and Horn, 1862. The second species cited by Jullien is *Lepralia haueri* Reuss, 1874 from the Miocene.

Genus PLEUROSCHIZIELLA Canu, 1918

The ovicell is hyperstomial and closed by the operculum. The frontal is formed of costules. The apertura bears a triangular proximal rimule. The apertura of the ovicelled zooecia is larger and without rimule. Irregular zooeciules are scattered among the zooecia.

Genotype.—*Pleuroschiziella anaticula* Canu, 1918. Eocene (Lutetian).

Genus DECURTARIA Jullien, 1886

Zooecia with the frontal formed by robust ribs forming a relief on the exterior surface and separated from each other by narrow deep furrows at the bottom of which exist pores of variable dimensions. Orifice semilunar in the young zooecia becoming constricted by two lateral spines in the old zooecia where the inferior lip sometimes bears a small protuberance which divides again the inferior portion of the orifice into two lobes; no marginal spines. The avicularia correspond to the intercostal spaces. (Translation from Jullien.)

Genotype.—*Decurtaria* (*Semiescharipora*) *cornuta* Beissel, 1865.

Range.—Cretaceous (Campanian)—Miocene (Tortonian).

Genus uncertain, the ovicell being unknown. Waters places the second species (*Lepralia peltata* Reuss, 1874) cited by Jullien in *Figularia.* See also Lang, 1922, p. 385.

Genus COLLETOSIA Jullien, 1886

The frontal is formed by more or less voluminous ribs, the margins of which unite with neighboring margins forming wide furrows entirely deprived of pores. Orifice semilunar, deprived of marginal spines. (Translation after Jullien, 1886.)

Genotype.—*Colletosia* (*Lepralia*) *endlicheri* Reuss, 1874. Miocene.

Genus uncertain, the ovicell being unknown. It may not belong to the Costulae.

Genus COLLARINA Jullien, 1886

Zooecia in which the frontal is completely surrounded, except at the base, by a kind of collar or border, pierced by wide pores; the talon of the ribs may be pierced by a large pore; the ribs are borne by a smooth surface more or less extended which extends always between them and the zooecial border. Orifice semilunar, deprived of marginal spines. Avicularia marginal or dispersed on the border of the zooecia" (translation after Jullien). The ovicell is endozooecial.

Genotype.—*Collarina* (*Lepralia*) (*Cribrilina*) *chelys* Koschinski, 1885.

Range.—Cretaceous (Coniacian), Eocene.

Genus MURINOPSIA Jullien, 1886

Zooecia with the frontal formed by ribs showing no relief on the exterior surface, separated by transverse lines of rounded pores. Orifice subcircular, deprived of marginal spines. Avicularia arising on the zooecial circumference and forming a group in front of the orifice. Zooecia resembling the body of a bat. (Translation after Jullien, 1886; see also Lang, 1922, p. 390.)

Genotype.—Murinopsia (*Semiescharipora*) *galeata* Beissel, 1865. Cretaceous.

Genus LYRULA Jullien, 1886

Zooecia with the frontal formed by a few, voluminous ribs bearing on their talon a pore of large size. These ribs are separated transversely by furrows usually wider than the ribs or by elongated pores forming, by their general ensemble, portions of concentric ellipses appearing to pass below the ribs. The intercostal furrows entirely traverse the zooecium and separate each pair of transverse ribs. Orifice in form of an inverted lyre, deprived of marginal spines. Avicularia unknown. (Translation after Jullien, 1886.)

Genotype.—Lyrula (*Cribrilina*) *hippocrepis* Hincks, 1882. Recent.

Genus REGINELLA Jullien, 1886

Zooecia with the frontal formed by voluminous ribs much in relief on the exterior surface, with the pores diminishing in size from the talon of the rib to its extremity; between each pair of ribs transversely is found a furrow often as broad as the rib, at the bottom of which each pore occupies the middle of a calcareous polygonal cell. These intercostal furrows traverse entirely the zooecium and separate completely each pair of transverse ribs. Orifice arched in front with the inferior lip mucronated, marginal spines. Avicularia unknown. (Translation after Jullien, 1886.)

Genotype.—Reginella (*Cribrilina*) *furcata* Hincks, 1882. Recent.

Genus STEGINOPORA D'Orbigny, 1851

Castanoporinae in which there is a tertiary front wall, the "lamina peristomica" of Jullien, largely, if not entirely, formed by the upgrowth and lateral expansion of paired apertural avicularia; apertural spines not branched; colony unilamellar" (Lang, 1922).

Genotype (chosen by Lang, 1916)—*Steginopora ornata* D'Orbigny, 1857. Cretaceous.

Jullien, 1886 chose as genotype *Steginopora ocellata* Jullien, 1886, which Lang, 1922 classed in the genus *Ubaghsia* of Jullien. It is interesting to note the wide divergence of opinion between the authors concerned.

Genus UBAGHSIA Jullien, 1886

Castenoporinae in which there is a tertiary front wall (lamina peristomica of Jullien), largely if not entirely formed by the secondary thickening and lateral spreading of the apertural spines until neighboring expansions meet and fuse; the distal apertural spines are branched. (Lang, 1922.)

Genotype.—Steginopora reticulata Ubaghs, 1865. Cretaceous.

Genus DISTEGINOPORA D'Orbigny, 1851

Castanoporinae in which there is a tertiary front wall, the lamina peristomica of Jullien, largely if not entirely formed by the upgrowth and lateral expansion of paired avicularia; apertural spines not branched; colony erect, bilaminar. (Lang, 1922.)

Genotype.—Disteginopora horrida D'Orbigny, 1850. Cretaceous (Campanian).

Genus SCORPIODINA Jullien, 1886

Zooecia in which the frontal is formed by robust ribs promptly fused after the talon to form a broad sternum entirely deprived of furrows and of pores, or the proliferation gives rise to large excrescences of irregular forms. Orifice subcircular, deprived of marginal spines.

Genotype.—Scorpiodina (*Lepralia*) *scorpioides* Manzoni, 1869. Miocene.

This genus is perhaps not a member of the Costulae.

Genus JOLIETINA Jullien, 1886

The ovicell is endozooecial and closed by the operculum. The aperture is semicircular with a slightly concave poster. The frontal is formed by robust ribs, separated by furrows, at the bottom of which are large rounded pores. There are large interzooecial and sporadic vibracula on which the setum operates on an incomplete pivot.

Genotype.—Jolietina (*Cribrilina*) *latomarginata* Busk, 1884. Recent.

Family ACROPORIDAE Canu, 1913

This family and its component genera are described and illustrated in our Monograph of North American Early Tertiary Bryozoa. No species of the family have been found in the Philippine waters by us.

Family CYCLICOPORIDAE Hincks, 1884

We are preserving this family provisionally for the two genera, *Cyclicopora* Hincks, 1884, and *Kymella* Canu and Bassler, 1917, which in 1920 we described and illustrated as miscellaneous genera of the Escharellidae. Hinck's definition of the family follows: "Zooecia having the front wall wholly calcified and destitute of raised margins or depressed areas, with a more or less orbicular orifice." No ectocyst.

Family EUTHYROIDAE Levinsen, 1909

The zooecia are slightly calcified and have no pores and no ectocyst. On the proximal side of the operculum they are provided with 1-3 pairs of flat hollow spines which meet in the central line and cover the entrance of the compensatrix. The operculum is compound. The lateral walls have multiporous septulae. Interzooecial avicularia occur. The ectooecium of the hyperstomial ovicell is provided with a

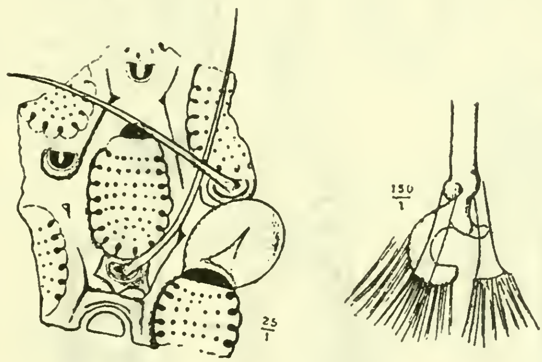

FIG. 101.—Genus *Jolietina* Jullien, 1886

A, B. *Jolietina* (*Cribrilina*) *latimarginata* Busk, 1884. A. Calcined zooecia, ×25. A thick calcareous growth is seen surrounding the area, leaving small triangular hollows where the neighboring zooecia meet or nearly meet, and a thick membrane covers the whole. B. The vibraculum has a process at one side of the base and this is situated below the bar, with one muscle attached to it and two powerful ones higher up. The base is unsymmetrical, ×150. (After Waters, 1889.)

pair of large fenestrae. The zoaria are free, branched, flustra-like (after Levinsen, 1909).

This family is close to Arachnopusidae and to Cyclicoporidae, and to the genus *Figularia* Jullien.

Genus EUTHYROIDES Harmer, 1903

Characters as above.

Genotype.—*Euthyroides* (*Carbasea*) *episcopalis* Busk, 1852.

Range.—Recent (Australia).

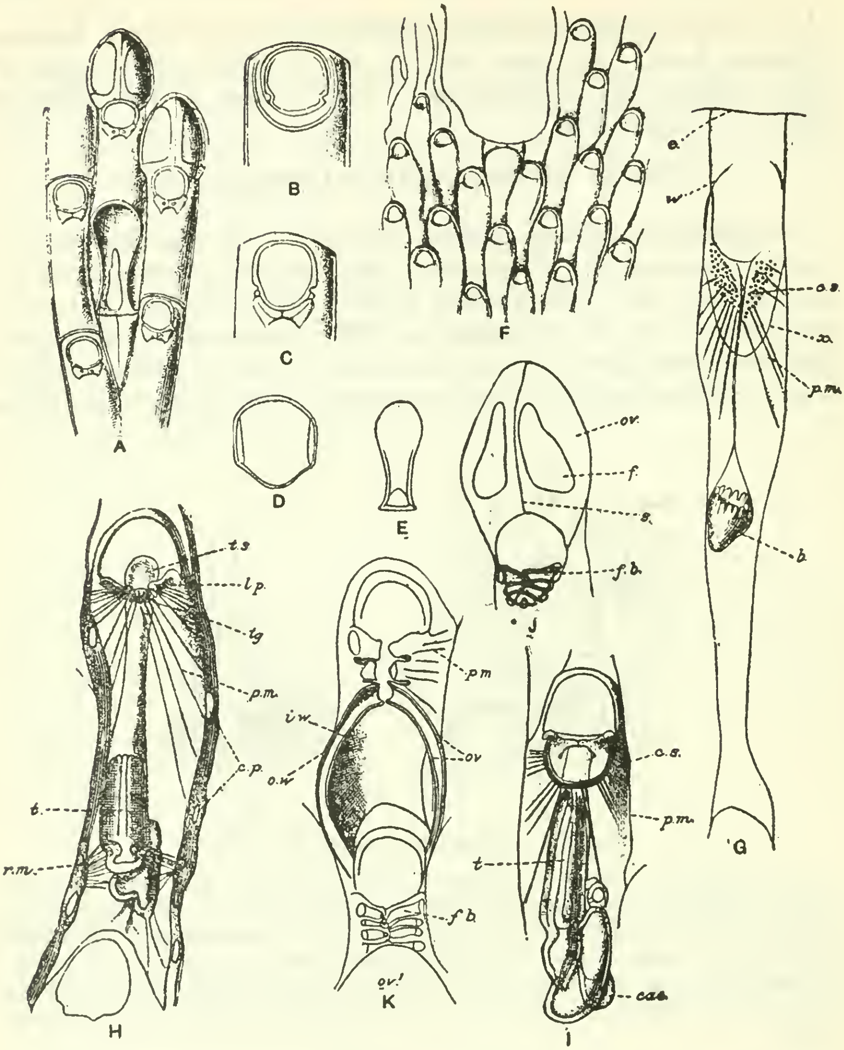

FIG. 102.—Genus *Euthyroides* Harmer, 1903

A–E. *Euthyroides jellyae* Levinsen, 1909. A. Portion of zoarium showing the interzooecial avicularium and two ovicelled zooecia, ×40. B. The distal end of a young zooecium. The frontal surface is calcified right up to the operculum, ×75. C. The distal end of an older zooecium in which a resorption of the lime has taken place proximally to the operculum. The two hollow spines are formed which cover the entrance of the compensatrix, ×75. D. An operculum, ×100. E. An avicularian mandible, ×40. (A–E, after Levinsen, 1909.)

F–K. *Euthyroides episcopalis* Busk, 1852. F. A portion of a zoarium, ×25. (After Busk, 1852.) G. Young zooecium. The line of calcification is the line *x*, distal to which is an accumulation of nuclei (*c. s.*) to which the parietal muscles (*p. m.*) radiate. The distal wall (*w.*) of the zooecium is not completely calcified; *e*, growing edge of the zoarium (corresponding to fig. B). H. An older but much shorter zooecium, in which calcification is nearly complete. The

Family HIPPOTHOIDAE Levinsen, 1909

See Canu and Bassler, 1920, for description of this family and its genera.

Genus HIPPOTHOA Hincks, 1880

HIPPOTHOA FLAGELLUM Manzoni, 1870

Plate 22, fig. 7

1889. *Hippothoa flagellum* JELLY, Synonymic Catalogue of Marine Bryozoa, p. 112 (bibliography).
1889. *Hippothoa distans* MACGILLIVRAY Prodromus Zoology Victoria, Decade 19, p. 321, pl. 187, fig. 10–13.
1900. *Hippothoa flagellum* NEVIANI, Bryozoi neogenici delle Calabrie, Palaeontographia italica, vol. 6, p. 146 (sep. 32).
1903. *Hippothoa flagellum* JULLIEN and CALVET, Bryozoaires, Résultats des Campagnes scientifiques du Prince de Monaco, fasc. 23, p. 87.
1905. *Hippothoa flagellum* NEVIANI, Bryozoi fossili de Carrubare (Calabria), Bollettina della Societa Geologica italiana, vol. 23, p. 515, fig. 2.
1907. *Hippothoa flagellum* CALVET, Expéditions scientifiques du *Travilleur* et du *Talisman* p. 423 (bibliography).

Affinities.—It is quite true that *Hippothoa distans* MacGillivray, 1868, is synonymous with *Hippothoa flagellum* Marsson, 1870, and the first author would have had right of priority if he had figured his specimens.

Occurrence.—

D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121′ 02′ 15″ E.; 19 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5356. Balabac Light, N. Balabac Strait; 8° 06′ 40″ N.; 117° 18′ 45″ E.; 58 fathoms; S., Sh.

Geologic distribution.—Pliocene: Zanclean of Italy (Seguenza), Plaisancian of Italy (Manzoni), Astian of Italy (Seguenza), Sicilian of

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median pore is becoming delimited by the simultaneous growth of the median tongue (*tg*) of calcareous matter and the lateral processes (*l. p.*). The parietal muscles (*p. m.*) radiate towards a mass of tissue at the base of the operculum; (*c. p.*) septules. I. Older zooecium, with completely calcified walls. The compensatrix (*c. s.*) now possesses a distinct cavity, but is still of small extent (corresponding to fig. C). J. Mature ovicell, borne by a fertile zooecium which has an ordinary zooecium on its proximal side. K. A fertile zooecium with a young ovicell (*ov.*) represented by a concave plate which will constitute the inner wall (*i. w.*) of the ovicell, and by a second plate, which will form the outer wall (*o. w.*). The cribrilinelike frontal bars (*f. b.*) differ from those shown in Figure 1 in correlation with the presence of an ovicell (*ov.*) on the proximal side of the zooecium. On the distal side of the young ovicell (*ov.*) is a still younger fertile zooecium whose frontal bars are only half developed. (G–K. After Harmer, 1902.)

Italy (Seguenza, Manzoni). Postpliocene of Italy (Seguenza, Neviani). Pliocene of New Zealand (Waters).

Habitat.—Mediterranean, Atlantic, English Channel (47–72 fathoms), Spain (717 meters), Azores (80–115 meters), Cape Verde Island (21 meters). Pacific: Australia and Heard Island. Indian Ocean: Singapore.

Plesiotype.—Cat. No. 7995, U.S.N.M.

Genus TRYPOSTEGA Levinsen, 1909

TRYPOSTEGA PUSILLA, new species

Plate 22, fig. 8

Description.—The zoarium encrusts shells. The zooecia are distinct, separated by a furrow, elongated, oval, the point below; the frontal is a little convex, smooth; the aperture is small, elongated, with a triangular elongated rimule. The ovicell is very large, almost as broad as the zooecium, carinated on the median axis. The zooeciules are very short.

Measurements.—

Zooecia (zoarial) $\begin{cases} Lz = 0.40 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$ Operculum $\begin{cases} ho = 0.09 \text{ mm.} \\ lo = 0.07 \text{ mm.} \end{cases}$

Female zooecia (with ovicells) $\begin{cases} Lz = 0.60 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$ Aperture $\begin{cases} ha = 0.06 \text{ mm.} \\ la = 0.075 \text{ mm.} \end{cases}$

Zooeciules $\begin{cases} Lz = 0.10 \text{ mm.} \\ lz = 0.075 \text{ mm.} \end{cases}$ Orifice $\begin{cases} ho = 0.01 \text{ mm.} \\ lo = 0.01 \text{ mm.} \end{cases}$

Affinities.—This species is very well characterized by its small dimensions and especially by the form of its operculum appearing as an elongated small tongue, proximally triangular; moreover, we have not observed on the latter the two lateral indentations noted by Levinsen, 1909, in *Trypostega venusta* Norman, 1864. (See text fig. 41.)

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S., Sh.

D. 5144. Jolo Light, Jolo; 6° 5′ 50″ N.; 121° 2′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

Holotype.—Cat. No. 7996, U.S.N.M.

TRYPOSTEGA VENUSTA Norman, 1864

Plate 22, figs. 9–11

1920. *Trypostega venusta* Canu and Bassler, North American Early Tertiary Bryozoa, Bull. 106, U. S. National Museum, p. 330, pl. 85, figs. 15, 16 text figure 49 (bibliography, distribution).

Measurements.—

Zoarial zooecia	$Lz = 0.50\text{–}0.55$ mm. $lz = 0.30\text{–}0.35$ mm.	Apertures	$ha = 0.10$ mm. $la = 0.08$ mm.
Female zooecia (with ovicell)	$Lz = 0.65\text{–}0.70$ mm. $lz = 0.30\text{–}0.35$ mm.	Apertures	$ha = 0.10$ mm. $la = 0.10$ mm.
Aborted zooecia	$Lz = 0.35$ mm. $lz = 0.20\text{–}0.25$ mm.	Aperture	$ha = 0.015$ mm. $la = 0.015$ mm.
Zooeciules	$Lz = 0.15$ mm. $lz = 0.12$ mm.	Aperture	$ha = 0.01\text{–}0.02$ mm. $la = 0.015$ mm.

Affinities.—Our specimens present almost all the groups of zooecia with very small aperture called by Hincks "aborted" although in reality we are absolutely ignorant of their structure and their physiological function. It is likewise with the zooeciules.

The micrometric measurements given above are somewhat different from those which we have observed on the figures published by the authors; but this is a very variable species susceptible to the least undulation of the substratum. The ovicells are also shorter and wider; they have a mitriform aspect. We have never observed frontal tuberosities. We are therefore not absolutely certain of our determination.

All of our specimens were dead; they encrust pebbles and shells. This is the first time that this species has been dredged from depths so great.

Occurrence.—

D. 5144. Jolo Light, Jolo; 6° 5′ 50″ N.; 121° 2′ 15″ E.; 19 fathoms; co. S.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs; 11.6° C.

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.; 17.2° C.

Geological distribution.—Vicksburgian and Miocene of the United States; Miocene of Australia.

Geographical distribution.—Atlantic: English Channel, Madeira, Azores, Cape Verde Islands. Pacific: Loyalty Island, Torres Straits, China Sea, Tizar Bank. Indian Ocean: Saya de Malha, Mauritius, Wasin, British East Africa.

Plesiotype.—Cat. No. 7997, U.S.N.M.

Genus CHORIZOPORA Hincks, 1880

CHORIZOPORA VENTRICOSA, new species

Plate 22, fig. 12

Description.—The zoarium encrusts shells. The zooecia are distinct, separated by a furrow, a little elongated, elliptical, *ventricose*, bound together by connecting tubes; the frontal is convex, transversely striated. The aperture is semielliptical, transverse. The ovicell is hyperstomial, closed by the operculum, small, convex, pointed distally. Each zooecium is surmounted by a small orbicular avicularium without pivot.

Measurements.—

Aperture $\begin{cases} ha = 0.05 \text{ mm.} \\ la = 0.075 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.35 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$

Affinities.—This new species differs from *Chorizopora brongniarti* Savigny-Audouin, 1826, in its much wider zooecia with a quite different aspect. Our specimen was dead and was encrusting a *Stylopoma* itself growing on a *Tridacna.*

Occurrence.—From an unknown Philippine locality associated with *Stylopoma grandis.*

Holotype.—Cat. No. 7998, U.S.N.M.

Family PETRALIIDAE Levinsen, 1909

The ovicell is hyperstomial; it is formed of an olocyst surmounted by a tremocyst with very small pores. The aperture is surrounded by a shield placed next to the tremocyst. On the inferior face of the unilamellar colonies there is at the distal extremity of each zooecium a perforated area with small radicular pores.

Levinsen, 1909, thought that many genera could be recognized in this family. In fact we have been able to distinguish three genera in the material from the Philippines, following the usual rules of our classification. These are *Petralia* (MacGillivray, 1887) Levinsen, 1909, *Petraliella* and *Coleopora* Canu and Bassler, 1927. Although the genus *Petralia* is perfectly characterized by its genotype, we continue to classify here all the species which we have been unable to study or to place in the two following genera. *Petralia tuberosa* Busk, 1884 is very probably the type of a new genus.

Compensatrix.—"The compensation-sac of *Lepralia dorsiporosa* Busk, 1884, is seen with great distinctness in a decalcified preparation. It underlies the whole of the frontal wall on the proximal side of the operculum, and it is provided with typical parietal muscles. The distal group on each side is especially strong and it appears to me that the part of the compensation sac immediately adjacent to the base of the operculum into which these muscles are inserted, is somewhat fascia-like, an arrangement which confirms the view that the muscles function as divaricators" (Harmer, 1902).

Operculum.—"The operculum, which may be more or less chitinized, is often almost membranous and not distinctly separated from the compensation-sac."

"Lyrule and cardelles resemble in form and position the hinge teeth in many *Smittina* species, but they can not be compared with these, as they are placed outside the operculum." (Levinsen, 1909.)

The operculum bears a wide, marginal sclerite thicker at the two lateral bases. The two small occlusor muscles are inserted on the inner border of this sclerite as it is easy to see on the operculum of *Petraliella chuakensis* Waters, 1913, and *Petraliella armata* Waters, 1913, which we figure.

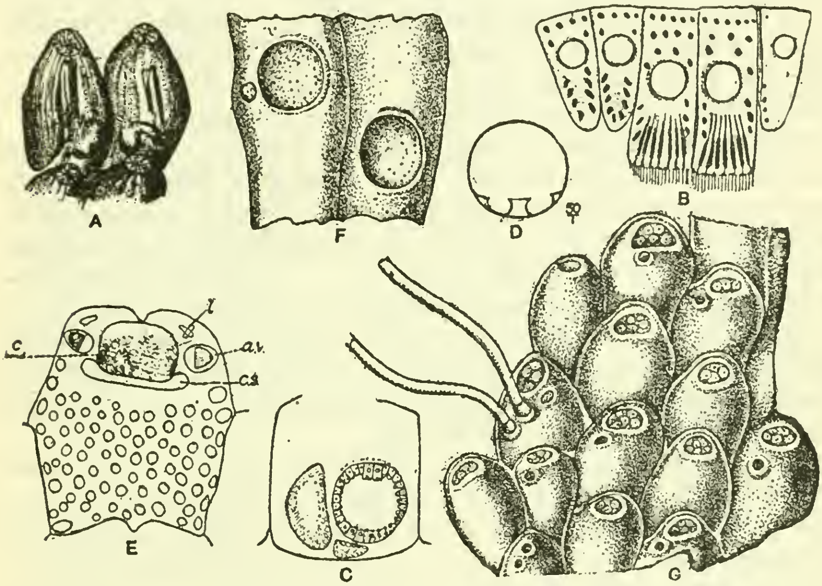

FIG. 103.—Family Petraliidae Levinsen, 1909

A. *Petraliella dorsiporosa* Busk, 1884. Distal pore chambers, tentacles, and alimentary canal (dorsal side), ×25. (After Marcus, 1921.)

B, C. *Petraliella vultur* Hincks, 1882 var. *armata* Waters, 1913. B. Section of tentacles near the base, ×550, showing the two large fin-shaped tentacles with long nuclei near the edge. C. Section, ×85, through the zooecium showing the tentacles, with two larger than the other.

D. *Petraliella elleri* MacGillivray, var. *biavicularia* Waters, 1889. Structure of the aperture with lyrule and cardelles, ×50. (After Waters, 1889.)

E. *Petraliella dorsiporosa* Busk, 1884. The distal lobes of the frontal shield have nearly united on the distal side of the operculum. The compensatrix underlies the whole of the frontal wall on the proximal side of the operculum (after Harmer, 1902); *l*, distinct lobes of the shield; *av*, avicularia of the frontal shield; *c*, condyle; *cs*, distal portion of the compensatrix.

F. *Petraliella chuakensis* Waters, 1913. Dorsal surface showing spaces for the attachment of radicle tubes, ×25. (B, C, F. After Waters, 1913.)

G. *Petraliella dorsiporosa* Busk, 1884. Dorsal face showing the radicells. (After Busk, 1884.)

The operculum in opening operates around an axis without any apparent lateral support, cardelles or condyles. The pseudolyrules and cardelles which ornament the proximal border of the aperture, have for their object the arresting and fixing of the operculum when it is closed. The study of the interior shows often the two condyles on which the operculum is supported, but they are almost always invisible exteriorily.

Tentacles.—There are about 25 tentacles in *P.* (*Lepralia*) *japonica.* "Sections show that two of the tentacles are larger than the others, extending beyond them and having larger nuclei. This is the case in a large number of species." (Waters, 1907.)

"In the species of this group which it has been possible to examine there is a large number of tentacles, namely, *Petralia undata* MacGillivray, 26; *P. japonica* Busk, 25; *P. castanea*, 23; *P. vultur* var. *armata* Waters, 25; *P. chuakensis* Waters, 25 (Waters, 1913).

"In *Petralia vultur* var. *armata*, there seem to be two tentacles larger than the rest (figs. 15–17), and these, instead of being triangular, have the inner surface nearly straight with a number of long nuclei. On this inner surface there are cilia, but unfortunately the condition does not admit of exact study of this point. These two larger tentacles occur in all the species examined of the group and larger tentacles occur in other groups to which I have previously alluded. These large tentacles are most marked near the base of the tentacles when they are commencing to divide, whereas nearer to the ends there is but little difference." (Waters, 1913.)

Shield.—"In one respect *Lepralia dorsiporosa* appears to me to show more primitive characters than *L. pallasiana.* The distal prolongations (*f. sh. d.*) of the frontal shield do not completely surround the orifice, the point where they meet being commonly indicated by a slight emargination on the distal side of the zooecium. Each distal prolongation typically bears an avicularium (*avic*)." (Harmer, 1902.) The presence of the distal shield on each zooecium is a veritable character of the family. Like all calcareous secretions it is very variable and appears to be a special adaptation to the biological conditions of the surrounding medium. It is often bipartite. The distal portion and its lateral margins are much reduced when it bears under the aperture the avicularian umbo. It is a piece juxtaposed to the tremocyst and superposed on the subjacent olocyst. Rarely it is partially hidden by the tremocyst and its limits are perfectly marked. In the description of species we have occasion to indicate the variations.

Radicles.—"With few exceptions the colonies are free, one-layered, laminate, and in such cases the basal wall of the colony is provided either with numerous pores or more frequently with one or a few pore chambers placed at the distal end from which radical fibers sometimes issue." (Levinsen, 1909.)

"*In Petralia chuakensis* the perforated area in the dorsal surface is for a broad radicle, which, however, is not always developed; a similar area occurs in *Petralia vultur,* and also in *Petralia japonica* there is often a similar large radicle. Levinsen refers to the radicle tube in *P. dorsiporosa.*" (Waters, 1913.)

"In *Petralia vultur* Hincks var. *armata* Waters, on the dorsal surface there are perforated spaces, no doubt for radicles, but there are usually several small ones instead of one large one as in *Lepralia dorsiporosa* Busk." (Waters, 1913.)

"It may be considered as a good family character that the basal wall in all these species is provided with pores, which otherwise appear only very exceptionally on the basal wall of free, one-layered colonies within the division Ascophora. Whilst these pores occur scattered over the whole of the basal wall in *P. undata* and *P. japonica*, in all the other species they appear in one or more, rarely several (*P. dorsiporosa*) pores chambers, which are situated at the distal end of the basal wall." (Levinsen, 1909.)

On the interior face, each zooecium bears in the distal regions a more or less large fosette, elliptical or circular, at the bottom of which is a calcareous membrane finely perforated; this is the "perforated area" of Waters, who claims that it is intended for the insertion of a large radicle. We have not been able to verify this but we know that Waters is too good an observer to publish a statement without verifying it. A chitinous membrane often closes this facette, especially on the zoarial margins.

Around the perforated area there are frequently some small pores which are radicular; the radicles are very fine and cling especially to algae or to small shells.

The radicular pores as well as the perforated area have a very variable size, even on the same zoarium. We have had the occasion to study these variations on the species described.

Septules.—"The distal half of each lateral wall is provided with 3 to 8, as a rule few-pored, very rarely uniporous, rosette-plates." (Levinsen, 1909.)

"In *Petralia chuakensis* there are numerous uni or few-pored rosette-plates (septules) scattered over the distal wall.. On the lateral wall, about halfway between the frontal and basal walls, there is a row of about 5 few-pored rosette-plates." (Waters, 1913.)

Ovaria.—In *Petralia chuakensis*, in the ovarium there are but few ovarian cells." (Waters, 1913.)

Genus PETRALIA (MacGillivray, 1887), Levinsen, 1909

The ovicell is hyperstomial, always closed by the operculum, deeply immersed in the distal zooecium. The poster is wider than the anter. The shield is a regular smooth pad around the aperture; it bears sometimes two small lateral avicularia, 25 or 26 tentacles. The radicular pores are numerous.

Genotype.—*Petralia japonica* Busk, 1884.

Range.—Recent.

PETRALIA JAPONICA Busk, 1884

Plate 23, figs. 1–3

1909. *Lepralia japonica* Waters, Bryozoa of the Sudanese Red Sea, Linnean Society Journal, Zoology, vol. 31, p. 149, pl. 13, figs. 10–12. (Bibliography, geographic distribution.)

1921. *Petralia japonica* Marcus, Bryozoen, Results of Swedish scientific expeditions to Australia, Kungl. svenska Vetenskaps-Akademiens Handlinger, vol. 61, No. 5, p. 26, pl. 1, figs. 16, 17; pl. 2, fig. 3. (Bibliography.)

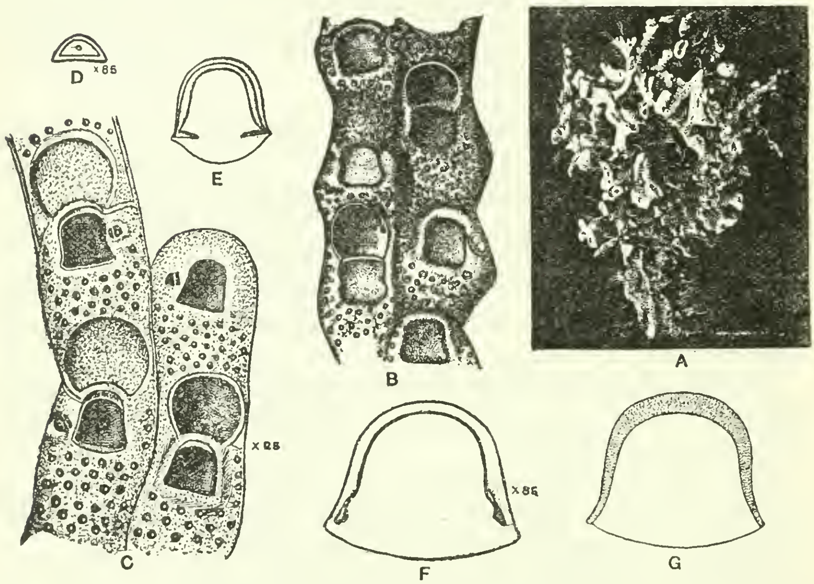

Fig. 104.—Genus *Petralia* Levinsen, 1909

A–G. *Petralia japonica* Busk, 1884. A. Zoarium, one-half natural size (after Marcus, 1920). B. Zooecia, ×20. The lowermost zooecium to the left shows a hollow, from which the whole ovicell has been removed; the uppermost to the right shows on the other hand an ovicell with the frontal wall removed (after Levinsen, 1909). C. Zooecia, ×25, with ovicells and one broken-down ovicell. D. Avicularian mandible, ×85. (C, D. After Waters, 1909.) E, F, G. Opercula, ×85. (E. After Levinsen, 1909. F. Waters, 1909. G. Canu and Bassler.)

Measurements.—

Aperture $\begin{cases} ha = 0.45 \text{ mm.} \\ la = 0.40 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.25 \text{ mm.} \\ lz = 0.70 \text{ mm.} \end{cases}$

Structure.—The poster is wider than the anter; they are separated from each other. On the interior this separation is indicated by two lateral condyles altogether invisible exteriorily. The frontal is a tremocyst supported by a perforated olocyst.

The structure of the ovicell is analogous to that of the frontal, but the tremopores are finer.

Biology.—*Petralia japonica* lives at all depths of water from 16 to 262 meters. It does not like waters too calm or too warm and we see it descend in depth on approaching the equator; the locality of the deepest, Sibutu, is situated at 4° 54′ N. latitude.

Occurrence.—

D. 5311. China Sea, vicinity Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S. Co.; 13.2° C.

Geographic distribution.—Sea of Japan: Cobie, 8–50 fathoms (Busk); Sagamibar, Kadayama, slight depths; Maizuru, 35–40 fathoms (Ort-

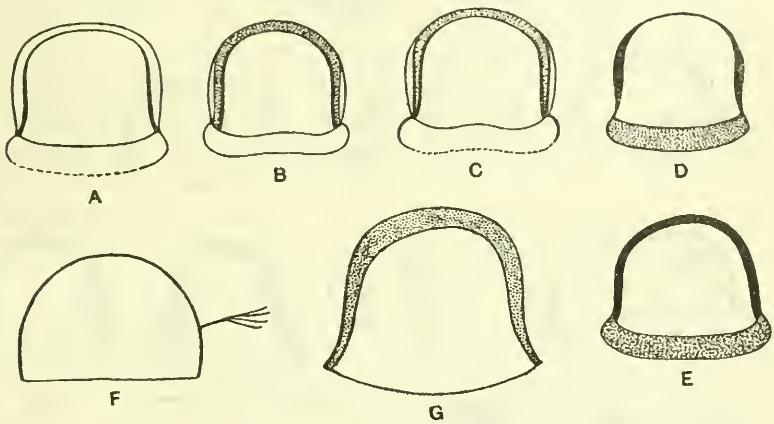

Fig. 105.—Opercula of *Petralia* and *Petraliella*, ×85

A–E. *Petraliella crassocirca*, new species. A. Operculum with wide band, little chitinized. B, C. Two opercula with chitinized bands. D, E. Two variations. F. *Petraliella vorax*, new species. G. *Petralia japonica* Busk, 1884.

mann); island of Enoshima near Yokohoma (Waters). China Sea: Formosa channel, 270 meters (Levinsen). Indian Ocean: Mauritius (Kirkpatrick), Trincomalee (Hincks). Gulf of Manaar (Thornely), Natal (Waters), Wasin, British East Africa, 10 fathoms (Waters). Red Sea: Khor Dongola, off Shukak, 9 fathoms, Bay of Agig Suraza (Waters).

Plesiotype.—Cat. No. 7999 U.S.N.M.

Genus PETRALIELLA Canu and Bassler, 1927

The ovicell is hyperstomial, never closed by the operculum, buried in the distal zooecium. The shield-like area is very well developed but irregularly around the aperture; it is very often bipartite; it bears almost always two small lateral avicularia; in its proximal portion a large avicularian umbo often appears. Twenty-five tentacles.

Genotype.—*Petraliella* (*Escharella*) *bisinuata* Smitt, 1872.

Range.—Miocene—Recent.

FIG. 106.—Genus *Petraliella* Canu and Bassler, 1927

A. *Petraliella bisinuata* Smitt, 1873. Zooecia, enlarged (after Smitt, 1873). B. *Petraliella chuakensis* Waters, 1913. Ovicelled zooecia, ×25. C–E. *Petraliella porosa* Hincks, 1882. C. Operculum, ×85. D. Avicularian mandible, ×85. E. Aperture, ×50. (After Waters, 1887, 1889.) F. *Petraliella vorax* Canu and Bassler. Operculum, ×85. G–I. *Petraliella vultur* Hincks, 1882 var. *armata* Waters, 1913. G. Operculum, ×85; H, I. Avicularian mandibles, ×85. J, K. *Petraliella chuakensis* Waters, 1913. J. Operculum, ×85. K. Avicularian mandible, ×85. (G–K. After Waters, 1913.) L, M. *Petraliella castanea* Busk, 1884. Avicularian mandible and operculum, ×85. (After Waters, 1889.) N, O. *Petraliella thenardi* Kirkpatrick, 1890. Avicularian mandible and aperture. (After Kirkpatrick, 1890.) P. *Petraliella bisinuata* Smitt, 1873. Operculum, ×85. Q. *Petraliella marginata* Canu and Bassler. Operculum, ×85. R, S. *Petraliella aviculifera* Hincks, 1891. Operculum and avicularian mandible, ×85. (After Marcus, 1922.) T. *Petraliella elleri* MacGillivray, 1868, var.

We have chosen Smitt's species as a genotype because it is not rare in the Gulf of Mexico and the American students will be able to more easily study its habits and anatomical characters.

Lepralia corrugata Waters, 1881, a beautiful fossil of the Australian Miocene, should be classed in this genus.

PETRALIELLA CRASSOCIRCA, new species

Plate 23, figs. 4–9

Description.—The zoarium is unilamellar. The zooecia are distinct, separated by a deep thread, a little elongated, large, rectangular; the frontal is convex and covered with granules and with tremopores; the distal portion is a large bipartite shield supporting two lateral longitudinal, triangular avicularia with pivot. The aperture is transverse; the wider poster is separated from the higher anter by two lateral denticles; the peristome thin, very distinct from the shield, is finely crenulated. The ovicell is hyperstomial, very globular, finely punctuated. On the inferior face, each zooecium bears a distal perforated area (0.10–0.20 mm. width).

Measurements.—

Aperture $\begin{cases} ha = 0.25\text{–}0.27 \text{ mm.} \\ la = 0.32\text{–}0.35 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.10 \text{ mm.} \\ lz = 0.75\text{–}0.85 \text{ mm} \end{cases}$

Structure.—In the interior two lateral condyles separate the anter from the poster; the tremopores are visible. On dead specimens the perforated area is often closed by a kind of chitinous operculum.

Affinities.—This species differs from *Petralia chuakensis* Waters, 1913, in its bipartite shield and in its straight and much smaller avicularia. It differs from *Petralia dorsiporosa* Busk, 1884, in the bipartite shield, in its longitudinal and not transverse avicularia, in its much larger shield, and in the presence of a cribriform area without other radicular pores.

The specimen from Jolo bears 4 small radicular pores around the perforated area.

Biology.—Almost all of our specimens were dead. They are more abundant in great depths of 250–300 meters. This species appears then to keep away from waters too warm.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

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biavicularia Waters, 1887. Aperture, ×50. (After Waters, 1881.) U. *Petraliella biincisa* Waters, 1882. Aperture, ×50. (After Waters, 1889.) V. *Petraliella verrucosa* Canu and Bassler. Operculum, ×85. W. *Petraliella crassocirca* Canu and Bassler. Operculum, ×85. X. *Petraliella echinata* Canu and Bassler. Operculum, ×85.

Occurrence—Continued.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; brk. Sh. crs.; 11.6° C.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S., co.; 13.2° C.

Cotypes.—Cat. Nos. 8000, 8001, U.S.N.M.

PETRALIELLA GIGANTEA, new species

Plate 23, figs. 10, 11

Description.—The zoarium is unilamellar. The zooecia are distinct, separated by a deep furrow, *very large*, elongated, elliptical; the frontal is convex and covered by large tremopores; the shield is bipartite distally, cushionlike laterally, and bears a dissymetric avicularian umbo before the aperture. The aperture is very large, semicircular, and provided with two small cardelles, one of which is always more salient than the other; the peristome is very thin and often little visible. The ovicell is buried in the distal zooecium, covered with an olocyst. Sometimes small sporadic avicularia appear either on the shield or in its vicinity. On the interior face each zooecium bears a large distal perforated area.

Measurements.—

Aperture $\begin{cases} ha = 0.31\text{–}0.40 \text{ mm.} \\ la = 0.45\text{–}0.50 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.75\text{–}2.25 \text{ mm.} \\ lz = 1.00 \text{ mm.} \end{cases}$

Variations.—As on all the giant species, the micrometric measurements are variable and there are some small cells at the side of the very large ones. The small avicularia are very inconstant in position and in frequency. Our specimens were dead. The cells are visible to the naked eye.

Biology.—This is a species of great depths.

Occurrence.—

D. 5162. Tinagta Island, Sulu Archipelago; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., co.

Cotypes.—Cat. Nos. 8014, 8015, U.S.N.M.

PETRALIELLA GRANDICELLA, new species

Plate 24, figs. 1–4

Description.—The zoarium is unilamellar. The zooecia are distinct, separated by a very deep furrow, *large*, elongated, elliptical; the frontal is very convex and covered with granules and with large widened tremopores; an enormous bifid avicularian umbo hides almost all the aperture; there is no shield. The aperture is large, transverse; its proximal border is straight and bears laterally two indentations limited by two small cardelles; the peristome is very thin, little visible. On the inferior side the zooecia bear distally 2 radicular pores and a perforated area a little larger (0.10–0.15 mm.).

Measurements.—

Aperture $\begin{cases} ha = ? \\ la = 0.50 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.10\text{–}1.35 \text{ mm.} \\ lz = 0.90\text{–}1.00 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Petraliella gigantea* in the absence of a shield and in the enormous bifid avicularian umbo.

Biology.—Our specimens were dead. Sibutu (283 meters) is the home of the giant *Petraliella.* They appear to have found here the most favorable conditions for their development.

Occurrence.—D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

Cotypes.—Cat. No. 8003, U.S.N.M.

PETRALIELLA ELONGATA, new species

Plate 24, fig. 8

Description.—The zoarium is unilamellar. The zooecia are distinct, separated by a deep furrow, very much *elongated,* elliptical; the frontal is convex and punctured with widened tremopores; the bipartite shield is wide, convex and bears a little salient avicularian umbo before the aperture; two or three small avicularia appear on the shield. The aperture is semielliptical, transverse; the proximal border is straight and bears two small lateral indentations limited by two small inequal cardelles. The peristome is thin. There are small elliptical avicularia irregularly placed around the aperture. On the inferior face there is only a small distal radicular pore on each zooecium.

Measurements.—

Aperture $\begin{cases} ha = 0.25 \text{ mm.} \\ la = 0.30\text{–}0.35 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.40\text{–}1.50 \text{ mm.} \\ lz = 0.70 \text{ mm.} \end{cases}$

Affinities.—This new species differs from *Petraliella gigantea* in its smaller measurements and in its smaller and more numerous tremopores. Our specimens were dead and non ovicelled.

Occurrence.—D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

Holotype.—Cat. No. 8004, U.S.N.M.

PETRALIELLA TRITA, new species

Plate 24, figs. 5–7

Description.—The zoarium is unilamellar. The zooecia are distinct, separated by a deep furrow, elongated, elliptical; the frontal is convex, covered with small tremopores, separated by smooth intervals giving them a *worn* aspect; the shield is reduced to a distal line;

it enlarges a little laterally and bears before the aperture a large avicularian umbo, covering the tremopores and hiding a large part of the aperture. The aperture is semielliptical; the proximal border is straight and bears a narrow pseudolyrula and two salient cardelles; the peristome is very thin. On the inferior face each zooecium bears a large perforated area accompanied by 2 to 4 radicular pores; the area is transverse and measures 0.20 mm. in width.

Measurements.—

Aperture $\begin{cases} ha = 0.20 \text{ mm.} \\ la = 0.30 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.90\text{–}1.00 \text{ mm.} \\ lz = 0.60\text{–}0.70 \text{ mm.} \end{cases}$

Affinities.—This species is very well characterized by the aspect of its frontal and by its very small pseudolyrula. It is rare. Our specimens were dead.

Occurrence.—

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S. co.; 13° C.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S. co.; 13.2° C.

Cotypes.—Cat. No. 8005, U.S.N.M.

PETRALIELLA ROBUSTA, new species

Plate 26, fig. 3

Description.—The zoarium is unilamellar. The zooecia are distinct, separated by a very deep furrow, much elongated, oval; the frontal is very convex and covered with large expanded tremopores; the shield is little developed distally but the avicularian mucro is very well developed, enormous, *robust*, bifurcated, covering the aperture, with an oblique, lateral mandible. The aperture is semielliptical, transverse; the proximal border bears two lateral indentations limited by two small cardelles placed very low.

Measurements.—

Aperture $\begin{cases} ha = ? \\ la = 0.40 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.10\text{–}1.25 \text{ mm.} \\ lz = 0.65 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Petraliella vultur* Hincks, 1882, in the absence of spines and in the presence of a nonstriated avicularian umbo, much larger and bifurcated. Our specimens were dead.

Occurrence.—D. 5162. Tinagta Island; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 24.2° C.

Holotype.—Cat. No. 8006, U.S.N.M.

PETRALIELLA ARMATA Waters, 1913

Plate 25, figs. 1, 2

1913. *Petralia vultur* var. *armata* WATERS, Bryozoa from Zanzibar, Proceedings Zoological Society of London, p. 518, pl. 70, figs. 15-20.

Measurements.—

Aperture $\begin{cases} ha = 0.25 \text{ mm.} \\ la = 0.30 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.25 \text{ mm.} \\ lz = 0.50 \text{ mm.} \end{cases}$

There are too great differences between the figures of Hincks, 1882, and Waters, 1913, to class them in the same species so we prefer to recognize the variety as distinct.

Our specimen has the general aspect shown in Waters's figures and the differences are quite secondary; the measurements are a little smaller and the large avicularium has a dissymetric beak.

On the inferior face there are only small radicular pores; very fine radicells were attached to a small fragment of alga; all the marginal radicular pores distant from the alga were closed by a small membraneous operculum.

The avicularian umbo is erected almost perpendicularly to the zooecial plane; it is therefore in reality larger than it appears to be in the figure.

This charming species is very rare. Our specimens were living.

Biology.—The species was in reproduction February 18, 1908. The delicacy of its ornament and the multiplicity of the avicularia indicate very calm waters.

One of our opercula still retains an occlusor muscle; it is attached to the internal sclerite as Waters has figured in *Petraliella chuakensis* and is identical with that of Waters.

Occurrence.—D. 5149. Sirun Island, Sulu Archipelago; 5° 33′ N.; 120° 42′ 10″ E.; 110 fathoms; co. Sh.

Plesiotypes.—Cat. No. 8007, U.S.N.M.

PETRALIELLA PHILIPPINENSIS, new species

Plate 25, figs. 3–11

Description.—The zoarium is unilamellar. The zooecia are distinct, separated by a deep furrow, elongated, elliptical or rectangular; the frontal is convex and covered with widened tremopores grouped in radial lines; the shield is very small distally, enlarged and rounded laterally and bears before the aperture, a large avicularian umbo dissymetric with oblique mandible. There are two small lateral avicularia on the shield. The aperture is large, semielliptical, transverse; the proximal border bears a wide lyrula separated by two indentations with two cardelles placed on the same line; the peristome is thin and little salient; a very long spatulate avicularium appears sometimes. The ovicell is buried in the distal zooecium and covered with small tremopores. Some small sporadic avicularia appear irregularly in the vicinity of the aperture distally. On the inner face there is on each zooecium a perforated area of variable size accompanied by one or many radicular pores.

Measurements.—

Aperture $\begin{cases} ha = 0.24\text{–}0.28 \text{ mm.} \\ la = 0.30 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.90\text{–}1.10 \text{ mm.} \\ lz = 0.40\text{–}0.70 \text{ mm.} \end{cases}$

Variations.—The variations of this species are very great. Although much reduced the shield is often entirely visible and bears two oblique triangular avicularia; but when the avicularian umbo is much developed this shield disappears almost entirely with its avicularia. It does not appear to have the function of compensation; but we believe rather that the development of the umbo being correlative with an intense frontal calcification the latter covers the primitive shield.

The very long spatulate avicularium is attached to the proximal border of the shield; it is rare and appears without apparent reason. The small oral avicularia are lacking very often; they appear irregularly in variable numbers from 1 to 5. This irregularity of the avicularia is discouraging; their presence is certainly not a whim of the animal, but it ought to correspond to some vital necessity. As long as we are ignorant of the function of the avicularium, the biology of the bryozoa can not make great progress. When the avicularia are regular in form and position we can conceive their function to be that of oxygenation (Waters), but in the present case we can not even make a guess.

The size of the avicularian umbo is very variable; sometimes it is easy to see the lyrula and the cardelles but on other zooecia the umbo hides one half of the aperture. However the neighboring cells always have an umbo equally developed; never have we observed a cell without umbo at the side of one with a large umbo.

The size of the radicular pores is rather constant in the neighborhood of 0.05 mm. diameter. The perforated area is on the contrary quite variable, even on the same lamella, ranging from 0.15 to 0.35 mm. in diameter; it is frequently closed by a chitinous pellicule independent of the ectocyst.

Affinities.—This species differs from *Petraliella falcifera* in its large avicularium which is rare and nonfalciform. It differs from *Petraliella armata* Waters, 1913, in its nonfalciform and large oblique avicularium and in its much smaller micrometric measurements.

Biology.—Without being numerically abundant, this species appear to be well distributed in the Philippines, especially in the south of the Sulu Sea and in its outlet into the China sea. It is insensible to bathymetric variations (34–618 meters) and to the correlative thermal variations. All of our specimens were dead and deprived of radicells.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S. co.; 13° C.

Cotypes.—Cat. Nos. 8008–8010, U.S.N.M.

PETRALIELLA FALCIFERA, new species

Plate 26, figs. 1, 2

Description.—The zoarium is unilamellar. The zooecia are distinct, elongated, elliptical; the frontal is convex and covered by tremopores; the shield very thin distally and enlarged laterally bears before the aperture a large avicularian umbo with oblique mandible. A large *falciform* avicularium arranged obliquely is attached to the shield.

Measurements.—

Aperture $\begin{cases} ha = 0.16 \text{ mm.} \\ la = 0.30 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.00 \text{ mm.} \\ lz = 0.85 \text{ mm.} \end{cases}$

Affinities.—Two large marginal zooecia have absolutely the aspect and the dimensions of *Petraliella philippinensis.* We would have considered the rare specimens of *P. falcifera* as a variety only if we had found them in the same locality.

Occurrence.—D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Cotypes.—Cat. No. 8011, U.S.N.M.

PETRALIELLA VERRUCOSA, new species

Plate 26, figs. 4–8

Description.—The zoarium is unilamellar. The zooecia are distinct, separated by a furrow, elongated, elliptical; the frontal is covered with tremopores; the shield is flat laterally and bears before the aperture an avicularian umbo very little salient in which the mandible opens obliquely; 2–6 small elliptical avicularia with pivot appear laterally. The aperture is semielliptical, transverse; the proximal border bears a small lyrula and two small cardelles; the peristome is thin and immersed. Two to four small elliptical avicularia with pivots are arranged above the aperture. The ovicell is quite globular, very salient and formed of an olocyst covered by a tremocyst with very fine pores.

Measurements.—

Aperture $\begin{cases} ha = 0.16 \text{ mm.} \\ la = 0.20\text{–}0.24 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.70\text{–}0.80 \text{ mm.} \\ lz = 0.50 \text{ mm.} \end{cases}$

Affinities.—In its zooecial aspect this species is close to *Petraliella philippinensis;* it differs from it in its much smaller micrometric measurements and in the absence of a large spatulate avicularium. It differs also from *Petraliella armata* in its much smaller lyrula, in the absence of a large avicularium and in the presence of a larger number of small adventitious avicularia. The operculum is not very distinctly separated from the compensatrix.

Biology.—All of our specimens were dead. This is a species of great depths. The specimen from Tacbuc (103 meters) the locality of least depth, was most highly ornamented.

Occurrence.—

D. 5162. Tinagta Island;. 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E; 57 fathoms; Sh.

D. 5574. Simaluc Island, north of Tawi Tawi Group; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S, co.; 13° C.

Cotypes.—Cat. Nos. 8012, 8013, U.S.N.M.

PETRALIELLA TUBULIFERA, new species

Plate 27, figs. 7–12

Description.—The zoarium is unilamellar or incrusting; it is a very clear rose brown with the opercula colored yellow. The zooecia are distinct, separated by a furrow, elongated, elliptical; the frontal is convex and covered with widened, crowded tremopores; the shield is much ornamented and bears distally 3–6 large hollow spines, laterally 2 small salient avicularia and before the aperture an enormous avicularian mucro bifurcated or branching, adorned with very salient tubules. The aperture is semielliptical transverse; the proximal border bears two indentations separating a small lyrula from two large triangular cardelles. The ovicell is hyperstomial and formed of an olocyst covered by a tremocyst with very fine pores. The inferior face is deprived of radicular pores.

Measurements.—

Aperture $\begin{cases} ha = 0.15 \text{ mm.} \\ la = 0.20\text{–}0.23 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60 \text{ mm.} \\ lz = 0.34\text{–}0.40 \text{ mm.} \end{cases}$

Variations.—We have observed some specimens encrusting nullipores; they were ancestrulated. Like all the species with intense calcification the exterior variations are considerable; there is not a single cell exactly similar to its neighbor nor one lamella like another; the decoration of the shield varies according to the needs of the animal as shown in our photographs chosen from more extreme cases. The avicularian umbo is almost perpendicular to the zooecial plane and often the photograph gives only an incomplete idea of its form and of size.

Affinities.—This species differs from *Mucronella* (*Petraliella*) *thenardi* Kirkpatrick, 1888, in the presence of large distal spines and in the absence of a large trifurcated, frontal spine. The ornamentation also is very different. It differs from *Petralia laccadivensis* Robertson, 1921, in the presence of large distal spines.

Biology.—The specimens from Jolo (20 fathoms) were in reproduction and fixation on February 15, 1908. The larva fixes itself on an alga or on a small nullipore. The zoarium then develops into free lamellae. The ornaments of the shield increase with the depth of the water. It is easy to see the progression on our figures. The avicularian umbo is little salient at Jolo (20 fathoms), it increases at Romblon (37 fathoms) it becomes very large at Tinagta (230 fathoms) and acquires an enormous development at Simaluc (340 fathoms). It appears therefore as an organ of oxygenation. Our specimens were dead.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5162. Tinagta Island; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Cotypes.—Cat. Nos. 8017–8019, U.S.N.M.

PETRALIELLA ECHINATA, new species

Plate 27, figs. 1–6

Description.—The zoarium encrusts nullipores without any free lamellar expansion. The zooecia are distinct, separated by a deep furrow, elongated, enlarged distally; the frontal is convex, punctured with small widened tremopores in the midst of which small hollow rods appear. The shield bears distally 6 large very long spines, laterally two small salient avicularia, and before the aperture an enormous avicularian umbo very robust with large oblique mandible and garnished with long hollow spines which give it a fantastic aspect. The aperture is semielliptical, transverse; the proximal border bears a small lyrula and two small cardelles far apart from each other; the peristome is thin and little visible. The ovicell is hyperstomial, buried in the distal zooecium, very globular and formed of an olocyst surmounted by a tremocyst with very small pores.

Measurements.—

$\text{Aperture}\left\{\begin{array}{l} ha=0.24 \text{ mm.} \\ la=0.30 \text{ mm.} \end{array}\right. \qquad \text{Zooecia}\left\{\begin{array}{l} Lz=1.10 \text{ mm.} \\ lz=0.70 \text{ mm.} \end{array}\right.$

Affinities.—The spinous aspect of this species is very characteristic; each colony is truly a small forest of spines. The species differs from *Petraliella tubulifera* in the presence of spines on the frontal, in its smaller cardelles and in the larger dimensions. Its aspect is still more fantastic.

Biology.—The zoarium is sometimes greenish, sometimes of a superb clear rose; it is the ectocyst which is thus colored. It is difficult to

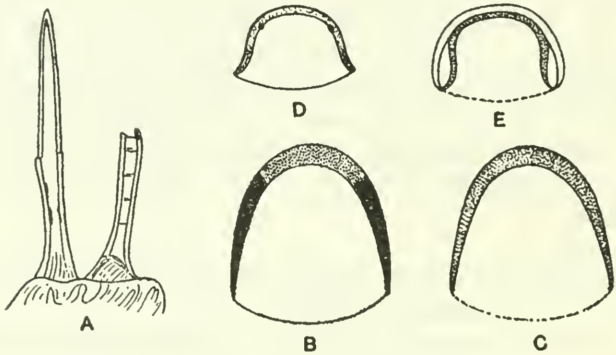

FIG. 107.—A–C. *Petraliella echinata*, new species

A. Oral spines, ×85, of olocystal structure. B. Operculum, ×85, with marginal band much chitinized. C. Usual form, ×85. D, E. *Petraliella verrucosa*, new species. D. Operculum, ×85, showing point of attachment of occlusor muscles. E. Another operculum, ×85.

understand the difference in pigmentation as two small colonies on the same nullipore may have different colors.

The operculum is white; it see saws on the transverse axis of the aperture without any apparent lateral support; the lyrula and the cardelles serve only to stop the movement of the operculum when it becomes closed.

Our specimens were living. The species was in full reproduction and fixation February 1, 1908 (34–52 meters). It does not occur at the same localities as *Petraliella tubulifera* and contrary to this species, it preserves all its ornamentation in slight depths of water.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

Cotypes.—Cat. Nos. 8020, 8021, U.S.N.M.

Genus COLEOPORA Canu and Bassler, 1927

The zooecia are exceptionally large; the frontal is a tremocyst with small pores. The ovicell is hyperstomial and never closed by the operculum. The apertura is buried at the bottom of a long tubular peristomie with structure different from that of the frontal. The operculum bears two long lateral attachments.

Genotype.—*Coleopora verrucosa* Canu and Bassler, 1927.

Range.—Miocene (Tortonian) to Recent.

We believe that it is indeed the shield which forms the characteristic peristomie, for on certain decorticated zooecia one can note that their exterior peristomie envelopes a primitive peristome. The peristomial lyrule so frequent in *Petraliella* appears here only sporadically.

This is a typical genus of waters with little depth for the known species live in preference from 36 to 55 meters. Specimens dredged at greater depths were dead. One fossil species *Coleopora tubulosa* Canu and Bassler, 1927, has been discovered by us in the Tortonian (Miocene) of Austria-Hungary and another *Coleopora granulosa* Canu and Bassler, 1928, in the Pliocene of Panama.

COLEOPORA VERRUCOSA Canu and Bassler, 1927

Plate 20, fig. 4. Plate 26, fig. 9

1927. *Coleopora verrucosa* Canu and Bassler, Classification Cheilostomatous Bryozoa, Proc. U. S. National Museum, vol. 69, Art. 14, p. 6, pl. 1, fig. 7.

Description.—The zoarium encrusts shells. The zooecia are distinct, separated by a furrow, very large, elongated, ovoid; the frontal is convex, punctured by small very numerous tremopores among which spring forth salient thickened tubes giving to it a *verrucose* aspect; the shield is tubular, salient, provided with irregular distal spicules and with an enlarged lip in front of the aperture. The aperture hidden at the bottom of the peristomie is orbicular; its peristome is thin and often apparent with perpendicular illumination. The peristomice is irregularly elliptical, thick, crenulated. The ovicell is globular.

Measurements.—

Aperture $\begin{cases} ha = 0.25 \text{ mm.} \\ la = 0.27\text{–}0.30 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.00\text{–}1.15 \text{ mm.} \\ lz = 0.75\text{–}0.90 \text{ mm.} \end{cases}$

Affinities.—This species has the aspect of a giant *Lagenipora,* but the peristomie of very different origin shows peculiarities unknown in that genus. Thus it is ornamented especially distally with flat spicules, irregular in form and position; the latter are not hollow and cylindrical like the spines.

The frontal is formed of a weblike network perforated by very small tremopores, an arrangement different from the structure in *Petraliella.* The operculum is semielliptical. It is circumscribed by a chitinous band as in *Petraliella* and bears two long, thick, lateral attachments little distant from the border.

Biology.—The species was in reproduction and fixation on February 15, 1908 (14–47 meters). Our specimens were living. The large dimensions of this species permit it to absorb relatively large organisms. Thus we have found in the cells, diatoms, spicules, radiolaria and small foraminifera.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 4′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 9′ N.; 120° 58′. E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 5′ 50″ N.; 121° 2′ 15″ E.; 19 fathoms; co. S.

Holotype.—Cat. No. 8465, U.S.N.M.

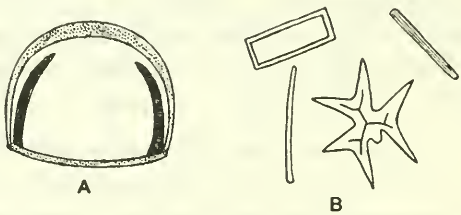

FIG. 108.—*Coleopora verrucosa* Canu and Bassler, 1927

A. Operculum, ×85. B. Small organisms, ×85, found in the cell.

COLEOPORA ERINACEA, new species

Plate 19, figs. 5–8

Description.—The zoarium encrusts nullipores. The zooecia are distinct, separated by a deep furrow, very large, elongated, elliptical or oval, swollen; the frontal is very convex, covered with large round scattered pores arranged in quincunx; each pore is surrounded by a salient peristome and bears distally a small triangular very salient galea. The apertura is hidden by a peristomie in which the operculum operates; the peristomice is suborbicular. The ectocyst is hidden by the frontal; it is of a light color but sometimes green or very pale rose.

Measurements.—

Peristomice $\begin{cases} Lp = 0.28\text{–}0.34 \text{ mm.} \\ lp = 0.28\text{–}0.34 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.00\text{–}1.10 \text{ mm.} \\ lz = 0.80 \text{ mm.} \end{cases}$

Structure.—The ensemble of the small helmetlike protruberances (galea) of the pores gives a *spiny* aspect to each of the zooecia. This ornamentation disappears easily, for it is very fragile and the large tremopores are more visible. Almost all our specimens were living, but we have not found the ovicell.

The frontal shows in tangential section a close network of very large tremopores with thick walls, an arrangement very different from the ordinary tremocyst. As in all species with long peristomie the operculum is very thin. It is a simple semicircular valve scarcely chitinized, not separated from the ectocyst which is itself thin and fragile. The preparation of such opercula is very difficult and we are never certain of results.

The micrometric variations are considerable for the species thrives on irregular substrata; we have observed small fragments on which the zooecia have no more than 0.60 mm. in width. The ancestrula is a small zooecium without peristomie.

Affinities.—As the small crests of the tremopores are more often lacking on dead specimens, the latter have somewhat the aspect of *Exechonella.* But as the tremopores are smaller and more numerous and as the peristomie is tubular, it is rather easy to avoid error

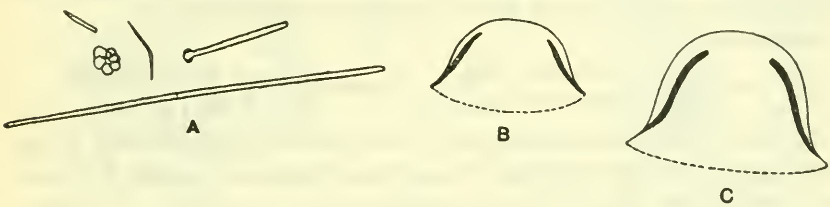

Fig. 109.—*Coleopora erinacea*, new species

A. Foraminifera and other bodies found in the cells, ×85. B. Incomplete operculum, ×85, undoubtedly deformed. C. Probable restoration of operculum.

in determination. This species differs from *Coleopora verrucosa* in its much larger tremopores which are always adorned with a crest in living specimens.

Biology.—Almost all our specimens were living, but we have not found the ovicell. The interior of the zooecia contains most diverse and often very large organisms; spicules, rectilinear or curved, large or small foraminifera, diatoms, spines, etc. The variable pigmentation of the ectocyst is rather difficult to explain and it is necessary to examine that of the internal organs of specimens in alcohol or recently dredged.

This is a species of waters of little depth (20–24 fathoms). The single specimen from D. 5478 (57 fathoms) was dead and unilamellar, that is to say, detached from its substratum.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Cotypes.—Cat. Nos. 7967, 7968, U.S.N.M.

COLEOPORA SERIATA, new species

Plate 19, figs. 9–12

Description.—The zoarium encrusts shells and especially nullipores; the branches, bi to multiserial, are brown colored, narrow, linear or curved. The zooecia are distinct, separated by a deep furrow, very large, lageniform, terminated by a very long, smooth peristomie; the frontal is quite convex and perforated by very small tremopores separated by minute protuberances. The peristomice is orbicular or somewhat elliptical; the aperture, buried at the bottom of a very long peristomie, is orbicular and bears frequently a wide lyrule.

Measurements.—

Peristomice $\begin{cases} hp = 0.25\text{–}0.30 \text{ mm.} \\ lp = 0.30\text{–}0.40 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.25\text{–}1.70 \text{ mm.} \\ lz = 0.60\text{–}1.00 \text{ mm.} \end{cases}$

Affinities.—The absence of crests to the tremopores, the long peristomie and the colonies formed of multiserial branches clearly differentiate this species from *Coleopora verrucosa* and *C. erinacea.* We have not observed the ovicell.

Biology.—The ectocyst covering the cells is colored deep brown. All our specimens were dead, so that we are not sure that the example from D. 5577 was really living at the great depth of 240 fathoms.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Cotypes.—Cat. No. 8216, U.S.N.M.

Family GALEOPSIDAE Jullien, 1903

As now understood by us this family includes all the genera referred here in our 1920 work except *Semihaswellia* and *Tessaradoma,* which are now assigned to the Sclerodomidae.

Genus GALEOPSIS Jullien, 1903

We now know a score of species of this tropical genus and we are beginning to recognize its structure. Our new observations have resulted in the following conclusions.

1. The spiramen is not constant. In *Galeopsis pupa* Jullien, 1903, the sporadic zooecia actively living, are deprived of it; in *Galeopsis mutabilis* there are zooecia with spiramen which are sporadic and almost all the others lack it. The spiramen is therefore a character of adaptation to some local peculiarity remaining to be discovered and we can imagine species of the genus without spiramen at all.

2. *Lepralia vestita* Hincks, 1885 has an operculum absolutely identical with that of *Galeopsis pupa* which implies quite similar anatomical characters; but in that species the operculum closes the

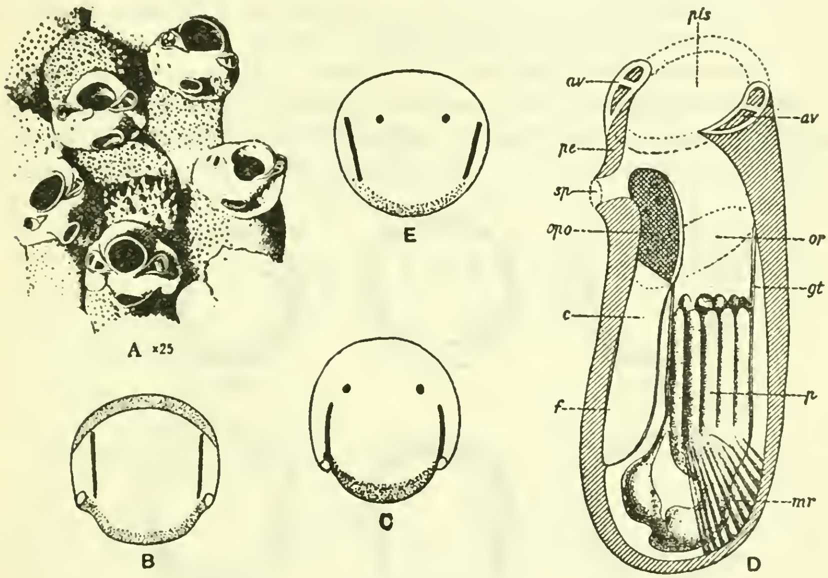

Fig. 110.—Genus *Galeopsis* Jullien, 1903

A–D. *Galeopsis pupa* Jullien, 1903. A. Zooecia, ×25. B, C. Opercula, ×85. D. Schematic view showing the general organization of a zooecium; *av*, avicularium; *c*, compensatrix; *f*, frontal wall; *gt*, tentacular sheath; *mr*, retractor muscles of polypide; *opo*, operculum; *or*, true orifice or aperture; *p*, polypide; *pe*, peristome; *pis*, peristomice; *sp*, spiramen.

E. *Galeopsis mutabile*, new species. Operculum, ×85. (A–D. After Jullien, 1903.)

ovicell in opening. This identity permits us to classify *Lepralia vestita* in *Galeopsis* or a closely related genus. Moreover it confirms our idea of 1922 that the spiramen is more in rapport with the larval life than with the hydrostatic system, without it being itself necessary.

3. The genus *Gephyrophora* Busk, 1884 is almost identical with *Galeopsis*. Not only are the exterior characters identical but the spiramen is also inconstant and the genus contains also species without spiramen. The sole difference is in the operculum; in *Gephyrophora* it has a schizoporid aspect and is without lateral bands. From

the physiological standpoint this difference is insignificant because it does not correspond to a different function; a simple rimule or poster—it is always the entrance of the compensatrix.

GALEOPSIS PUPA Jullien, 1903

Plate 28, figs. 1, 2

1903. *Galeopsis pupa* Jullien, Bryozoaires de l'*Hirondelle*, Resultats Campagnes scientifiques du Prince de Monaco, fasc, 23, p. 95, pl. 12, fig. 1.

Affinities.—In general our specimens are not as pretty as those figured by Jullien; the presence of a large salient spiramen renders the frontal very fragile when the polypide is dead.

The operculum is very large and of variable dimensions; its margins are strongly chitinized. The muscular insertions are large, removed from the border and placed at the extremity of two lateral chitinous bands. The general aspect is that of a *Lepralia* with a small poster

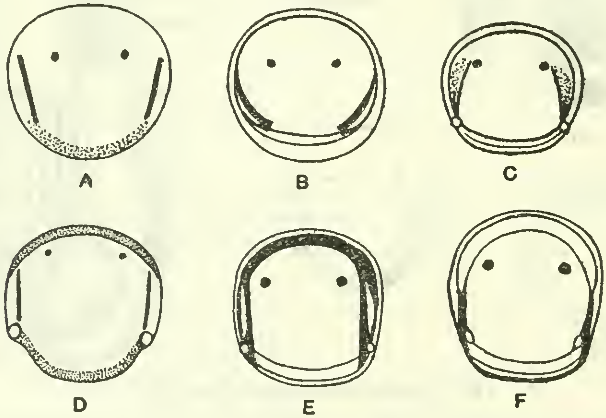

Fig. 111.—Opercula of *Galeopsis*, ×85

A. B. *Galeopsis mutabilis*, new species. Two forms of opercula. C–F. *Galeopsis pupa* Jullien, 1903. C. Operculum probably of zooecium with spiramen. D. Operculum of probably ovicelled zooecium. E. Operculum of ovicelled zooecium. F. Operculum of zooecium probably without spiramen.

and the operculum is almost identical with that of *Gephyrophora polymorpha* Busk, 1885. It is therefore with reason that in 1923 we placed the two genera in the same family.

Biology.—The proximal border of the aperture is placed just at the level of the orifice; this disposition facilitates the passage of the eggs, the operculum closing the spiramen.

The ectocyst is very pale green; some zooecia have a clear rose color. Our specimens were in full reproduction and fixation February 15, 1908. There are three kinds of opercula probably corresponding to ovicelled zooecia, to zooecia with spiramen and to those without spiramen.

Occurrence.—

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

Pacific: Gambier Isles (Jullien).

Plesiotype.—Cat. No. 8022, U.S.N.M.

GALEOPSIS BREVICAPITATA, new species

Plate 28, fig. 3

Description.—The zoarium encrusts nullipores. The zooecia are distinct, separated by a deep furrow, very large, elongated, elliptical; the surface is convex, granulated, perforated by very small tremopores. The aperture is suborbicular and hidden at the bottom of the peristomie. The salient spiramen is placed on the frontal on the median axis almost at the middle of the length. The *ovicell* is *short,* of the same nature as the frontal. On each side of the peristomice there are two triangular transverse avicularia.

Measurements.—

Peristomice $\begin{cases} hp = 0.17 \text{ mm.} \\ lp = 0.25 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.00-1.25 \text{ mm.} \\ lz = 0.90 \text{ mm.} \end{cases}$

Affinities.—Some zooecia are deprived of spiramen; their aperture is deep and furnished with two large lateral tuberosities. The species differs from *Galeopsis pupa* Jullien, 1903, in its very short ovicell and in its spiramen placed lower and more salient. Our specimen was dead.

Occurrence.—D. 5325. Hermanos Island, off northern Luzon; 18° 34′ 15″ N.; 121° 51′ 15″ E.; 224 fathoms; gn. M.

Holotype.—Cat. No. 8023, U.S.N.M.

GALEOPSIS MUTABILIS, new species

Plate 28, figs. 4–6

Description.—The zoarium is encrusting nullipores or shells. The zooecia are distinct, separated by a deep furrow, elongated, elliptical, very irregular; the frontal is convex, punctured with funnel shaped tremopores and sometimes ornamented with a large transverse spiramen which is little salient. The aperture is large, elongated, elliptical, arranged at the bottom of a short peristomie. The peristomice is transverse. The ovicell is globular, small, of the same nature as the frontal. In the vicinity of the aperture there are 1 or 2 small avicularia.

Affinities.—The micrometric variations are very large and the general character very *inconstant;* the zooecia with spiramen are rare.

The aperture seen under a good light, is in reality transverse with schizoporidan aspect and a wide rimule; there is therefore a very large semielliptical anter and a small, concave poster.

The operculum is black; it opens in the peristomie without closing the ovicell.

Biology.—We have some specimens which were in reproduction February 15, 1908. There are some ovicelled zooecia deprived of spiramen and also some nonovicelled zooecia which lack it; the spiramen is therefore no more necessary to the function of reproduction than to the hydrostatic system.

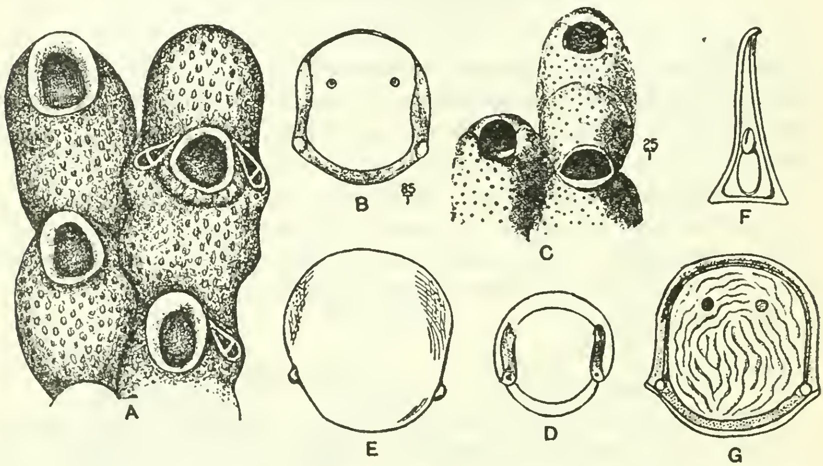

FIG. 112.—Genus *Cosciniopsis* Canu and Bassler, 1927

A, B. *Cosciniopsis vestita* Hincks, 1882. A. Ovicelled specimen (after Hincks, 1882). B. Operculum, ×85. (After Waters, 1889.)

C–F. *Cosciniopsis vestita* var. *australis* Waters, 1887. C. Zooecia, ×25. D. Operculum, ×85. (After Waters, 1887, 1889.)

E, F. *Cosciniopsis lonchoea* Busk, 1884. Operculum and avicularian mandible, ×140 (after Busk, 1884).

G. *Cosciniopsis caelatus*, new species. Operculum, ×85.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

Cotypes.—Cat. Nos. 8024, 8025, U.S.N.M.

Genus COSCINIOPSIS Canu and Bassler, 1927

The ovicell is hyperstomial; it is closed by the operculum and is porous like the frontal. The aperture bears two cardelles placed low. The frontal is a tremocyst. The operculum bears two large lateral bands; the two muscular attachments are removed from the border. Sporadic avicularia appear in the vicinity of the peristome.

Genotype.—*Cosciniopsis coelatus* Canu and Bassler, 1927. Recent. The operculum is absolutely identical with that of *Galeopsis* and there is therefore no anatomical difference. But all the peristomial apparatus having disappeared, the operculum closes the ovicell in order to facilitate the passage of the eggs. In *Galeopsis* the operculum has the same function but closes the spiramen. Four species are referred to this genus.

Cosciniopsis vestita Hincks, 1885 .... Recent.
Cosciniopsis coelatus Canu and Bassler, 1927 .... Recent.
Cosciniopsis australis Waters, 1889 .... Recent.
Cosciniopsis (*Emballotheca*) *laticapitata* Canu and Bassler, 1920 .... Eocene.

COSCINIOPSIS VESTITA Hincks, 1885

1885. *Lepralia lonchaea* Busk, Polyzoa collected by *Challenger*, Report scientific results Voyage *Challenger*, Zoology, vol. 10, p. 146, fig. 43.
1885. *Lepralia vestita* Hincks, Contributions General History Marine Polyzoa, Annals Magazine Natural History, ser. 5, vol. 15, p. 256 (sep. 148) pl. 9, fig. 9.
1887. *Lepralia vestita* Waters, Bryozoa from New South Wales, North Australia, Annals and Magazine Natural History, ser. 5, vol. 20, p. 194, pl. 6, figs. 19, 20 (var. *australis* and *typica*) (fig. 21 regarded by us as a distinct species).
1889. *Lepralia lonchaea* Waters, Polyzoa collected by *Challenger*, Report scientific results *Challenger* Zoology, vol. 31, p. 28.
1890. *Lepralia lonchaea* Kirkpatrick, Hydrozoa and Polyzoa, China Sea, Annals Magazine of Natural History, ser. 6, vol. 6, p. ——.
1890. *Lepralia lonchaea* Kirkpatrick, Hydroida and Polyzoa, Torres Strait, Scientific Proceedings Royal Dublin Society, new ser., vol. 6, p. 612.

We have not found this species in the Philippines. Examination of the figures shows that it differs from *Galeopsis* only in the absence of a spiramen.

Geographic distribution.—Pacific: Tahiti, Fiji Islands (Hincks), Admiralty Islands (Busk), Port Jackson (*australis*) (Waters), Murray Islands, Torres Strait, 15, 20 fathoms (Kirkpatrick). China Sea: Tizard Reef, 27 fathoms (Kirkpatrick).

COSCINIOPSIS COELATUS Canu and Bassler, 1927

Plate 29, figs. 1–3

1927. *Cosciniopsis coelatus* Canu and Bassler, Classification Cheilostomatous Bryozoa, Proc. U. S. Nat. Mus., vol. 69, Art. 14, p. 6, pl. 1, fig. 8.

Description.—The zoarium encrusts nullipores or other bryozoa; the ectocyst is light colored or golden. The zooecia are distinct, separated by a deep furrow, very large, elongated, utricular; the frontal is convex and formed of a tremocyst with very numerous small pores. The aperture is suborbiculate with two cardelles placed low; the peristome is wide and smooth. The ovicell is enormous, globular, embedded in the distal zooecium, closed by the operculum. The orifice of the ovicelled zooecia is larger and transverse. The operculum is *embossed* with concentric arabesques.

Measurements.—

Aperture $\begin{cases} ha = 0.35 \text{ mm.} \\ la = 0.30 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.40 \text{ mm.} \\ lz = 1.10 \text{ mm.} \end{cases}$

Structure.—In the interior the size of the tremopores varies according to the direction of the light; the two cardelles are triangular and little salient; there is no olocyst.

The operculum is yellow and has two lateral teeth supported on the cardelles; the large lateral bands are prolonged over all the distal portion where they are less thickened; the surface presents very elegant concentric ornamentation; there are two muscular attachments some distance from the border.

The ovicells are rare. The zoarium may cover many square centimeters.

Affinities.—This new species differs from *Cosciniopsis vestita* in the absence of large avicularia and from *C. australis* Waters, 1889 in the ornamentation of the operculum.

Biology.—All our specimens were living. They were ovicelled and ancestrulated February 15, 1908. Like *Cosciniopsis vestita* Hincks, 1885, this is a species of shallow waters.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

Cotypes.—Cat. Nos. 8026, 8027, U.S.N.M.

COSCINIOPSIS FALLAX, new name

Plate 28, fig. 7

1891. *Lepralia feegensis* MacGillivray (not Busk, 1885), Description of new or little-known Polyzoa, XIII, Proceedings Royal Society Victoria, new ser., vol. 3, p. 81, pl. 10, fig. 1–3.

Description.—The zoarium is unilamellar and encrusts algae or bryozoa (*Adeonellopsis*). The zooecia are distinct, separated by a deep furrow, very large, rectangular, elongated; the frontal is convex and ornamented with granulations or with very small tremopores. The aperture is large, elliptical, a little elongated; two large triangular cardelles separating a small poster from a larger anter; the peristome is thin and little salient. The ovicell is enormous, buried in the distal zooecium, globular, perforated by a large number of small tremopores, closed by an operculum larger than that of the ordinary zooecia. The two distal avicularia are long, triangular; their beak is pointed toward the median axis of the zooecium.

Measurements.—

Aperture $\begin{cases} ha = 0.22 \text{ mm.} \\ la = 0.17 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.75\text{–}0.95 \text{ mm.} \\ lz = 0.55\text{–}0.65 \text{ mm.} \end{cases}$

Affinities.—This species is very *deceiving;* the ordinary zooecia have the aspect of *Lepralia feegensis* Busk, 1885, but the present form differs in the hyperstomial (and not endozooecial) nature of its ovicell. Waters in 1913 (p. 514) noted MacGillivray's error of determination, an error very excusable however since Busk did not figure the ovicell of his species.

The operculum in its dimensions, its form and its large lateral bands, is very close to the operculum of *Cosciniopsis caelatus* but without visible muscular attachments.

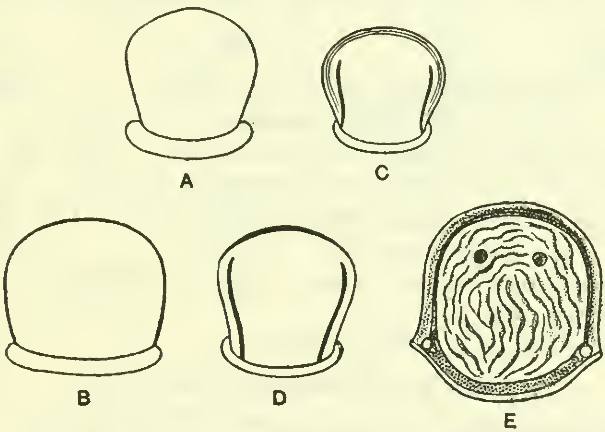

FIG. 113.—A–D. *Cosciniopsis fallax*, new species

A. Operculum of ordinary (A) and ovicelled zooecium (B), ×85. C, D. Two ordinary opercula showing variation, ×85 E *Cosciniopsis caelatus*, new species. Operculum, ×85.

The arrangement of the avicularia on the ordinary zooecia is also contrary to that of the genotype which bears its avicularia on the ovicelled zooecia.

Emballotheca laticapitata Canu and Bassler, 1920, of the Jacksonian of North Carolina is almost identical. But the recent species differs in its more elongate and more irregular ovicell in its smaller frontal pores and in its still smaller apertural dimensions.

These two species differ from *Emballotheca quadrata* MacGillivray, 1879, a recent species and type of the genus *Emballotheca* Levinsen, 1909, in their two, lower placed and less salient cardelles, in the presence of two constant distal avicularia the points of which converge toward the median zooecial axis, and in a very different operculum.

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The near identity of these two species permits us now to fix the biologic conditions of the marine waters (depth, temperature, salinity, etc.), at Wilmington, North Carolina, the Jacksonian locality for the fossil form.

Biology.—MacGillivray's specimens encrust shells and corals in perfect accord with the nature of the bottom where this species has been collected in the P ilippines. Our specimens were in reproduction February 16, 1908 (38 meters).

The physiologic function of the distal avicularia is evidently the same as in *Lepralia feegensis* Busk, 1885 but it is very difficult to conceive what it may be. The geographic distribution of this species is very large since it has already been observed in Australia. It is certain that it will be discovered in other localities of the equatorial Pacific.

Occurrence.—

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Geographic distribution.—Nichol Bay, Northwestern Australia. (MacGillivray, 1891.)

Holotype.—Cat. No. 8028, U.S.N.M.

Genus GEPHYROPHORA Busk, 1884

The apertura bears a proximal rimule. The frontal is a tremocyst. The ovicell is hyperstomial; it opens into the peristomie and is never closed by the operculum. The opercula are dimorphic.

The operculum in this genus is not provided with lateral bands; it has the schizoporid aspect, that is to say, the proximal border of the posterior is sinuous. Its differences from *Galeopsis* are of little importance. The transition between the lepralian and schizoporellid opercula is impossible to establish.

All of the species do not have ovicells concealed like the genotype, but they are all much immersed in the distal zooecium. The genotype *G. polymorpha* Busk is deprived of a spiramen; *G. biturrita* Hincks sometimes has zooecia with spiramen; *G. rostrigera* Waters, never has them.

GEPHYROPHORA ROSTRIGERA Waters, 1885

Plate 29, figs. 6–8

1885? *Lepralia rostrigera* Waters, Chilostomatous Bryozoa from Aldinga, Quarterly Journal Geological Society London, vol. 41, p. 248 (not Busk, not Smith).

1887. *Lepralia rostrigera* Waters, Tertiary Chilostomatous Bryozoa from New Zealand, Quarterly Journal Geological Society London, vol. 43, p. 61, pl. 7, fig. 17.

Description.—The zoarium encrusts nullipores and foraminifera; its color is light or rose tint. The zooecia are distinct, separated by a deep furrow at the bottom of which is often a salient thread, very large, elongated, oval, spread out; the frontal is convex, granular, perforated by a multitude of very small tremopores. The aperture is oval, elongated, formed of a very large anter separated from a small concave poster by two cardelles placed low; the peristome is

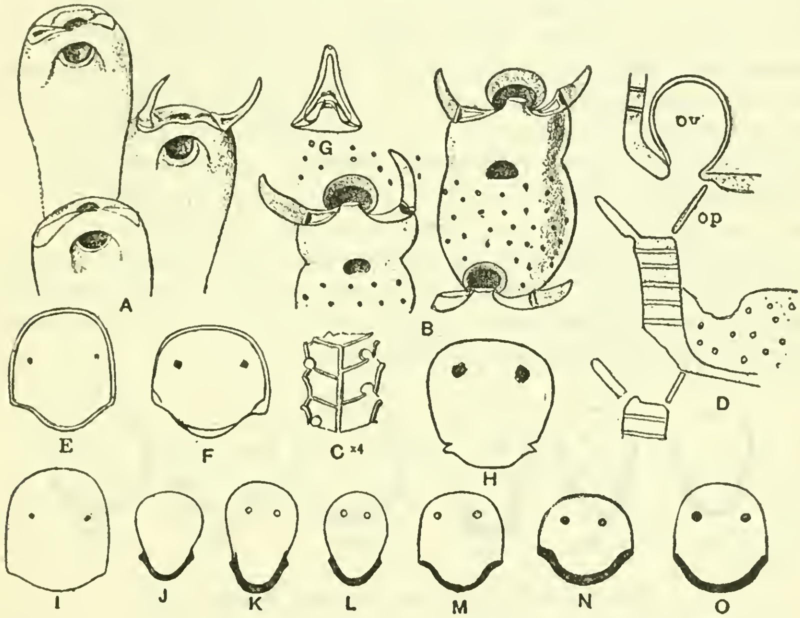

FIG. 114.—Genus *Gephyrophora* Busk, 1884

A–G. *Gephyrophora polymorpha* Busk, 1884. A. Zooecia, ×25 (after Busk, 1884). B. Zooecia, ×25. C, D. Longitudinal section, ×4 and ×25, showing the oviccll (*ov*) opening in the peristomie above the operculum (*op*). E. Operculum, ×85. (B–E. After Waters, 1889.) F, G. Operculum and avicularian mandible, ×85.

H. *Gephyrophora* (*Schizoporella*) *vitrea* MacGillivray, 1879. Operculum, ×85 (after Waters, 1888).

I. *Gephyrophora* (*Schizoporella*) *polymorpha* Waters, 1904. Operculum, ×85. (F–I. After Waters 1904.)

J–O. *Gephyrophora rostrigera* Waters, 1887. J, K, L. Different forms of opercula of nonovicelled zooecia, ×75. M, N, O. Opercula of ovicelled zooecia, ×75.

wide, smooth, somewhat salient. The peristomice bears two transverse triangular avicularia with pivot; the beak is turned toward the median axis of the zooecia. The ovicell is large, globular, bordered by a smooth, salient thread very much immersed in the distal zooecium, of the same nature as the frontal. The operculum of the ovicelled zooecia is wider; the proximal border is very thick.

Measurements.—

Apertura	ha=0.25 mm. la=0.17 mm.	Ordinary zooecia	Lz=0.95–1.10 mm. lz=0.60–0.65 mm.
Ovicelled zooecia (including ovicell)	Lz=1.50 mm. lz=0.75 mm.	Apertura	ha=0.20 mm. lz=0.20 mm.

Affinities.—The micrometric measurements are quite variable and vary much according to the irregularity of the substratum. We know the New Zealand species only from Waters' figure of 1887. Our specimens are very closely allied to it and differ only in their separating thread much less salient and scarcely visible; the micrometric measurements are very close. We do not believe that a new species should be created but it is possible that a better study of the fossil form will show differences invisible on Waters' figure. *G. rostrigera* differs from *G. biturrita* Hincks, 1885, in its much smaller and marginated ovicell, and in its less salient avicularia.

Biology.—Our specimens were living and in reproduction (ovicelled) February 15, 1908. Unfortunately our specimens from the China Sea were dead and deprived of chitinous appendages. We are ignorant therefore of the duration of reproduction.

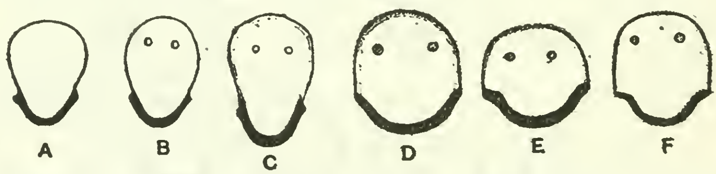

FIG. 115.—*Gephyrophora rostrigera* Waters, 1885

A–C. Different form of opercula of ordinary zooecia, ×85. D–F. Three opercula, ×85, of ovicelled zooecia.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.

D. 5311. China Sea, vicinity of Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

Plesiotypes.—Cat. Nos. 8029–8032, U.S.N.M.

Genus HASWELLIA Busk, 1884

HASWELLIA AUSTRALIENSIS Haswell, 1880.

Plate 30, figs. 6–9

1887. *Porina coronata*. var. *b* WATERS, Bryozoa from New South Wales, North Australia, Annals and Magazine of Natural History, ser. 5, vol. 20, p. 190, pl. 6, fig. 5.
1890. *Haswellia australiensis* KIRKPATRICK, Hydroids and Polyzoa Torres Strait, Scientific Proceedings Royal Dublin Society, new series, vol. 6, p. 612.
1913. *Haswellia australiensis* WATERS, Marine Fauna British East Africa and Zanzibar, Proceedings Zoological Society of London, p. 513 (bibliography).
1913. *Haswellia australiensis* CANU, Etudes morphologiques sur 3 nouvelles familles de Bryozoaires, Bulletin Société Geologique de France, ser. 4, vol. 13, p. 144 (bibliography).
1921. *Haswellia australiensis* MARCUS, Results of Swedish scientific expeditions to Australia, Köngl. Svenska Vetenskaps-Akademiens Handlinger, vol. 61, No. 5, p. 18.

Measurements.—Distance of verticels, 1.00 mm.; diameter of peristome, 0.24–0.28; zooecial width, 0.40; and diameter of branches, 1.50.

Structure.—Our sections confirm those of Levinsen and Waters; the spiramen opens into the peristomie, very much above the operculum; the orifice of the ovicell is placed in the peristomie between the spiramen and the operculum which never closes it. A transverse section made at the level of a verticel of apertures is very instructive; it shows three concentric zones, that of the peristomies, that of the bases of the distal zooecia and that of the walls of adjacent zooecia. The section of Busk made between two verticels is quite different. The operculum is similar to that of Waters 1887; the muscular attachments are placed almost at the border. (See text fig. 41.)

This species is common; it has been the object of excellent studies by Waters and Levinsen. Nevertheless we are still ignorant of many details of its organization; larva, anatomy, mode of fixation, number of tentacles, etc.

Biology.—The species is particularly abundant from 30 to 40 meters; it has not been observed in the littoral zones less than 10 meters; it remains then a bryozoan of the high seas. In the Philippines it has been dredged to a depth of 378 meters; never before had it been observed at so great a depth. At all the depths it is identical in character and dimensions.

Almost all of our specimens were dead; a few living specimens have permitted us to observe that it was in reproduction February 15, 1908. These living specimens were colored green.

This is a tropical species with a much reduced geological distribution.

Occurrence.—

D. 5134. Balukbaluk Island, Sulu Archipelago; 6° 44′ 45″ N.; 121° 48′ E.; 25 fathoms; fine S.

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh. (common).

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S. Sh. (very common).

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

D. 5293. Escarceo Light, vicinity southern Luzon; 13° 28′ 15″ N.; 121° 04′ 30″ E.; 180 fathoms; fine bk. S.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.; 14° C. (common).

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S. Co.; 13° C.

Geographic distribution.—Pacific: Holborn Island, Queensland (Haswell); Thursday Island, Torres Strait (Meissner); Albany Pass, Somerset, Queensland, 10 fathoms (Kirkpatrick); Murray Island, 5–20 fathoms (Kirkpatrick); Cape Jaubert, 19 meters (Marcus); near Torres Strait, southern New Zealand, 8–50 fathoms (Busk). China Sea: Formosa Channel (Levinsen). Indian Ocean: Wasin, British East Africa, 10 fathoms (Waters).

Geologic distribution.—Miocene of Australia. Pliocene of New Zealand (Waters).

Plesiotypes.—Cat. No. 8053, U.S.N.M.

HASWELLIA LONGICOLLIS, new species

Plate 30, figs. 1–5

Description.—The zoarium is free, cylindrical, bifurcated. The zooecia are elongated, very little distinct, arranged in verticels; the frontal is convex, covered with small tubular tremopores, arranged in quincunx; the spiramen is placed on the median axis, very far from the peristomice, and is surrounded by a salient peristome. The apertura is hidden at the bottom of a very *long peristomie;* the peristome is very salient, somewhat widened at its extremity, thick and sharp. The ovicell is a simple convexity surrounding a peristomie; it is hyperstomial, buried, opening into the peristomie.

Measurements.—Diameter of peristome, 0.20 mm.; diameter of zooecium, 0.40; distance of verticels, 1.50; and diameter of zoarium, 0.90.

Affinities.—This new species differs from *Haswellia australiensis* Haswell, 1880, in its smaller dimensions, its peristomes more scattered in a verticel, and in its spiramen more distant from the peristomice.

On certain branches some tubules have a salient peristome appearing like false spiramens.

Structure.—This is absolutely identical with that of *Haswellia australiensis.* We illustrate a longitudinal section and a transverse one made between two verticels. Likewise this species lives in the same localities.

Occurrence.—

D. 5134. Balukbaluk Island, Sulu Archipelago; 6° 44′ 45″ N.; 121° 48′ E.; 25 fathoms; fine S.

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S. Sh. (common).

D. 5162. Tinagta Island, Tawi Tawi; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

D. 5478. Taebuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S. Co.; 13° C.

Cotypes.—Cat. No. 8034, U.S.N.M.

Genus CYLINDROPORELLA Hincks, 1877

(*Porinula* Levinsen, 1916)

The zooecia are cylindrical and terminated by a long tubular salient, free, peristomie; the spiramen is large salient and placed at the base of the peristomie; the frontal is a tremocyst with starred pores. The ovicell is hyperstomial, opening into the peristomie above the operculum, smooth, with or without pores. No avicularia.

Genotype.—*Cylindroporella* (*Lepralia*) *tubulosa* Norman, 1868. Recent (Northern Atlantic).

Hincks, 1880, abandoned his genus of 1877 and classified the genotype in *Porina* D'Orbigny, 1848. The latter has fallen into disuse, the function of the frontal pore not having been indicated; it still remains a rejected genus.

Our definition of *Cylindroporella* is established on the section given by Osburn in 1912, which we reproduce. It appears to us best to place this genus in the Galeopsidae, until the time when the studies of the larva will permit the classification of the principal genera of the family.

Genus PACHYSTOMARIA MacGillivray, 1895

"Zoarium unilaminate. Zooecia broad above, narrowed below; surface cribriform; apertura rounded or elliptical; peristome much thickened, entire, and, as well as the portion of the zooecium immediately below and to the sides elevated; a large triangular avicularium to one side of the apertura." (MacGillivray, 1895). The zoecia with salient peristome have an orbicular spiramen.

Genotype.—Pachystomaria parvipuncta MacGillivray, 1895.

Range.—Miocene of Australia.

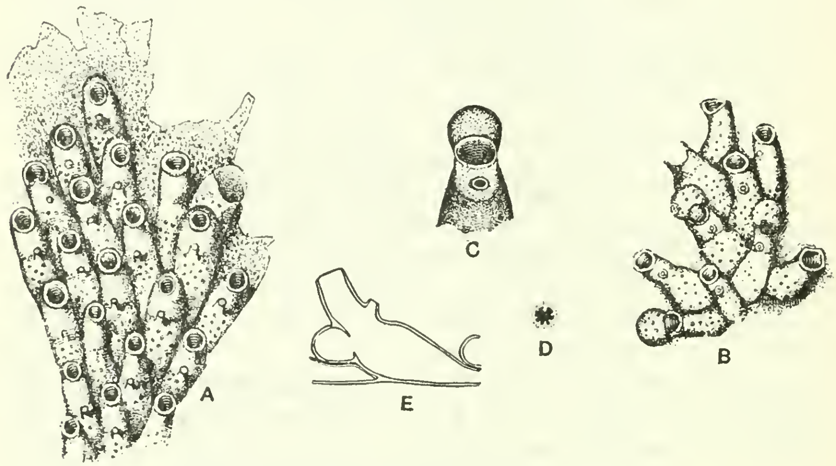

FIG. 116.—Genus *Cylindroporella* Hincks, 1877

A–E. *Cylindroporella tubulosa* Norman, 1868. A. Group of zooecia in which the spiramen is placed at the base of the peristomie. B. Group of zooecia with the spiramen on the peristomie. (A, B. After Hincks, 1880.) C. Details of aperture, ovicell, and spiramen. D. One of the small frontal punctures, highly magnified. E. Diagram of side view of cell, ovicell, and spiramen. (C–E. After Osburn, 1914.)

Genus STENOPSIS Canu and Bassler, 1927

The ovicell is hyperstomial. The aperture is rounded-quadrangular, without cardelles. The peristomie is elongated. The spiramen is broad and salient. The frontal is a tuberose tremocyst. The operculum is thin, semielliptical and without muscular attachments. Avicularia.

Genotype.—Stenopsis (*Porina*) *fenestrata* Smitt. 1873. Recent.

Range.—Eocene (Jacksonian). Recent.

The known species are as follows:

Stenopsis (*Porina*) *fenestrata* Smitt, 1873	Gulf of Mexico.
Stenopsis cylindrica, new name=*Gigantopora fenestrata* Waters, 1908)	Red Sea.
Stenopsis (*Galeopsis*) *longicollis* Canu and Bassler, 1920	Jacksonian.
Stenopsis (*Galeopsis*) *cyclops* Canu and Bassler, 1920	Jacksonian.
Stenopsis (*Porina*) *tuberculosa* Maplestone, 1902	Miocene.
Stenopsis (*Cellaria*) *duplicata* Reuss, 1847	Priabonian.

This is an equatorial genus. The ovicell opens into the peristomie.

Affinities.—*Stenopsis* differs from *Galeopsis* Jullien, 1903, in the absence of cardelles and in its opercula without bands or points. It differs from *Gigantopora* Ridley, 1881, which it resembles in general aspect, in the presence of a granular tremocyst. It differs from *Gephyrophora* Busk, 1884, in its longer peristomie and in the absence of rimule and points to the operculum.

Genus GIGANTOPORA Ridley, 1881

GIGANTOPORA UNIROSTRIS, new species

Plate 28, fig. 8

Description.—The zoarium encrusts shells. The zooecia are distinct, separated by a deep furrow, very elongated, subcylindrical; the peristomie is large, longer than half of the zooecium, smooth, limited by an enormous salient, transverse spiramen almost as wide as the zooecium; the frontal situated in the inferior part bears only very short and small spicules. The apertura bears a short rimule. The peristomice is elliptical, transverse, surrounded by a fringed peristome. The ovicell is small, convex, transverse, opening into the peristomie. Each zooecium bears laterally on the peristomie a triangular avicularium in which the beak is turned toward the aperture.

FIG. 117.—Genus *Pachystomaria* MacGillivray, 1895

Pachystomaria parvipuncta MacGillivray, 1895. MacGillivray's original figure, which does not show the spiramen. Miocene of Australia.

Measurements.—

Peristomice $\begin{cases} hp = 0.08\text{–}0.10 \text{ mm.} \\ lp = 0.12\text{–}0.15 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Affinities.—This new species differs from *Galeopsis columnata* Waters, 1881, and from *Galeopsis tuberculosa* Maplestone, 1902, in its encrusting zoarium, in the presence of a single avicularium and in its spiramen placed at the middle of the zooecium (and not in the superior third). It differs from *Gigantopora lyncoides* Ridley, 1881 in the presence of its large peristomial avicularia. Our specimen was dead.

Occurrence.—D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

Holotype.—Cat. No. 8035, U.S.N.M.

Family STOMACHETOSELLIDAE Canu and Bassler, 1920

We created this family for an assemblage of genera based upon American Tertiary species which it was absolutely impossible to classify conveniently in the known families. We believed, indeed, that the family was not limited either to America or to the Eocene, but our zoological studies were then incomplete and we preferred to await further researches. Levinsen, 1909, classed in the family Myriozoumidae a rather anomalous ensemble of forms which did not appear to have any close relationship with *Myriozoum*. Waters,

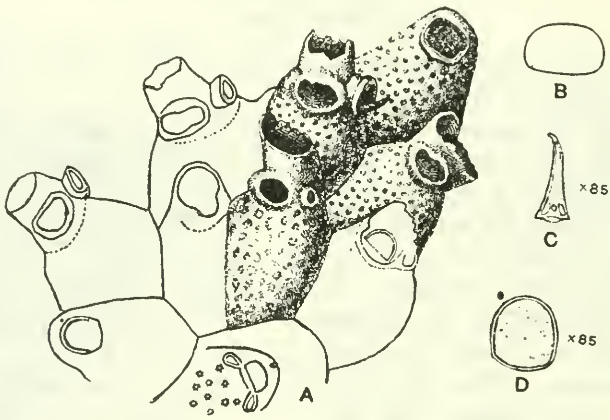

FIG. 118.—Genus *Stenopsis* Canu and Bassler, 1927

A, B. *Stenopsis fenestratus* Smitt, 1873. A. Zooecia, ×40 (after Smitt, 1873). B. Operculum, ×85.

C, D. *Stenopsis cylindricus*, new name. Avicularian mandible and operculum, ×85. (After Waters, 1909.)

1913 (p. 519) has pointed out the artificial character of these references.

Among the species classed by Levinsen in *Myriozoum* and which the preceding authors have changed from family to family, there is an important group having exactly the essential characters of our family Stomachetosellidae, namely *Escharoides* Smitt, 1867. We have been fortunate enough to discover well preserved recent specimens and thus have been able to make studies and comparisons of interest.

The genus "*Escharoides*" is an artificial grouping already criticized by Waters in 1909. We have dismembered it, following rigorously the physiological principles which have guided us in our former studies. The new genera thus established are *Escharoides* Milne Edwards, 1812, *Posterula* Jullien, 1903, *Cigclisula*, new genus, *Ragionula*, new genus, and *Diatosula*, new genus.

Genus ESCHAROIDES Milne Edwards, 1812

This genus is very poorly defined. The only recognizable species in it have passed into synonymy in different genera. Those which remain in the second edition of the "Animaux sans vertèbres," of Lamarck, have never been figured; the name of Milne Edwards ought to be preserved for them. Moreover in 1836, in his remarkable study on the Eschares, Milne Edwards did not mention *Escharoides*.

In 1867, Smitt recognized *Escharoides* without defining it and classed in it *E. sarsi* Smitt, 1867, and *E. rosacea* Busk, 1856. In 1880, Hincks defined the genus, basing it upon the structure of *E. sarsi* Smitt, 1867, and added *E. quinconcialis* Norman, 1867. In 1884, Busk followed the classification of Hincks and added *E. occlusum* Busk, 1884 and *E. verruculata* Smitt, 1872. The interpretation of Smitt prevailed up to 1888, when Waters classified *E. occulsum* in *Lepralia*.

In this mixup we do not see what rules of nomenclature can be applied. It may be added that at the Paris Museum the genus *Escharoides* has never been taken into consideration and D'Orbigny, 1852, did not mention it.

Genus POSTERULA Jullien, 1903

The ovicell is concealed, hyperstomial, closed by the operculum. The frontal is an olocyst covered by a much thickened pleurocyst, traversed by much scattered, closed tubules. It is surrounded by large areolar pores separated by short radiating costules. The aperture is orbicular with concave and deep poster, covered by a crescentic operculum, in which the posterior concavity has no relationship to the form of the orifice, leaving the compensatrix widely open. The peristomie is hollowed out in the great thickening of the frontal; its orifice or peristomice bears a pseudorimule surrounded by many avicularia.

Genotype.—Posterula (*Escharoides*) *sarsi* Smitt, 1867. Recent.

The frontal of the ovicell bears 1 to 4 pores more or less buried according to the thickness of the tubular tissue which envelopes the entire zooecium and its ovicell. The polypide is provided with 16 (Waters) or 18 (Jullien) tentacles. "The testicle is diffuse. The spermatozoids disperse and fill the perigastric cavity at their maturity. The ovary placed close to the wall of the endoderm in the perigastric cavity contains many ovules at different stages of development."

"The operculum is thin and difficult to study, for it is dragged under the influence of dessication to the interior of the zooecium by the tentacular sheath; it includes a very thin foliaceous border surrounding a central chitinous core in the form of a crescent with rounded ends." (Translation after Jullien, 1903.) The tubules are frequently open (Robertson, 1908, fig. 67). There are oral glands (Waters, 1900).

POSTERULA SARSII Smitt, 1867

Plate 31, figs. 1, 2

1889. *Escharoides sarsi* JELLY, A synonymic Catalogue of Marine Bryozoa, p. 91.
1900. *Escharoides sarsii* NORDGAARD, Polyzoa, Den Norske Nordhavs Expedition, Zoology No. 27, vol. 27, p. 12.
1903. *Posterula sarsii* JULLIEN, Bryozoaires de *l'Hirondelle*, Resultats des Campagnes scientifiques du Prince de Monaco, fasc. 23, pp. 89, 145, pl. 11, fig. 4 (bibliography and operculum).
1905. *Escharopsis* (*Escharoides*) *sarsi* NORDGAARD, Hydrographical and biological investigations in Norwegian fiords, Bergen Museum, p. 169.

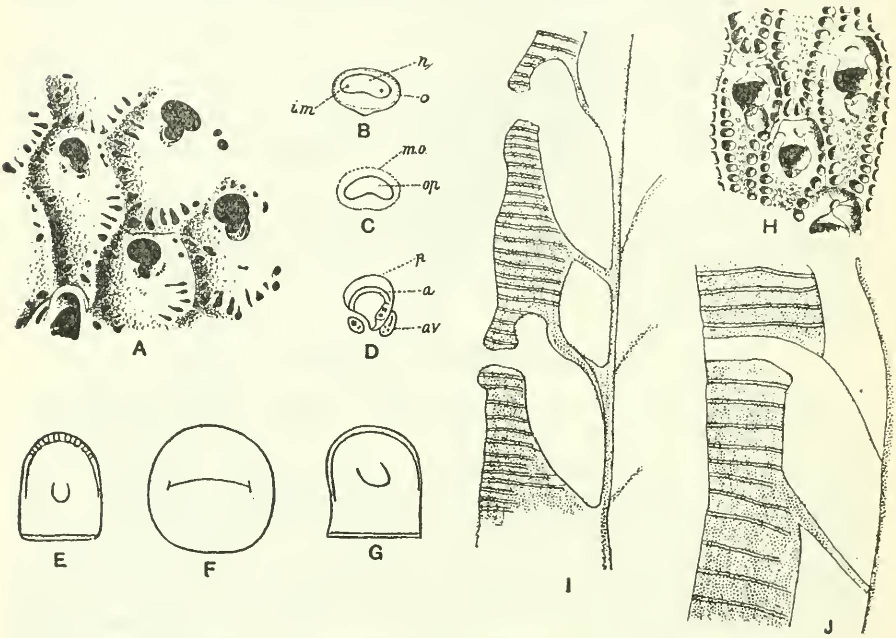

FIG. 119.—Genus *Posterula* Jullien, 1903

A–J. *Posterula sarsi* Smitt, 1868. A. Frontal face of portion of a colony, ×25. B. Operculum in place with its chitinous nucleus enveloped by the opercular membrane. C. Operculum isolated. D. Peristomice with its avicularia. (A–D. After Jullien, 1903.) E. Mandible, ×250. F. Operculum, ×85. G. Mandible, ×250. (E–G. After Waters, 1900.) H. Ovicelled zooecia, ×25. The ovicells show a more or less well-developed ovicellarian area (after Levinsen, 1909). I. Longitudinal section, ×25, through an ovicelled zoarium. The ovicell is hyperstomial, closed by the operculum, embedded in the tubular wall of the distal zooecium. J. Longitudinal section through a thick colony, ×25, showing the arrangement of the tubules.

1908. *Escharoides sarsi* ROBERTSON, The incrusting Chilostomatous Bryozoa of the west coast of North America, University of California Publications Zoology, vol. 4, p. 301, pl. 22, fig. 66, 67.
1909. *Discopora sarsii* LEVINSEN, Morphologic and Systematic Studies on the Cheilostomatous Bryozoa, p. 344, pl. 24, fig. 2 (ovicell).
1912. *Discopora sarsi* NORDGAARD, Bryozoaires de la Campagne arctique de 1907 de Duc d'Orléans, p. 17.

1916. *Discopora sarsi* LEVINSEN, Danmark-Ekspeditionen til Grönlands Nordostkyst, vol. 3, p. 462.
1918. *Discopora sarsi* NORDGAARD, Bryozoa from the Arctic region, Tromso Museums Aarschefter, vol. 40, no. 1, p. 76.

Measurements.—

Peristomice $\begin{cases} hp = 0.15\text{–}0.17 \text{ mm.} \\ lp = 0.20 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.80 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

Variations.—The zooecia of our specimens are a little smaller than those of specimens collected in the northern seas. The zoarium is not pigmented. These small differences would be sufficient possibly for the formation of a new variety *japonica.*

This species is very common and has been dredged very frequently, but only Waters, 1900, and Jullien, 1903, have studied it in detail. In the *Albatross* material there were only seven dead specimens which have not permitted us to make a serious study. Our thin sections were made from specimens from Greenland presented to us by Levinsen.

Biology.—This is a circumpolar species. Nordgaard, 1912, has published a chart of the boreal region showing its geographic distribution. It has not been cited in the West Pacific so that our discovery completes his chart.

It was in reproduction (ovicelled) August 2, 1887 (1,267 meters). It can live at a temperature of 0° C. It is particularly abundant at depths of 20 to 160 meters; but it has, however, been dredged at 249 meters north of Norway and at 1,267 meters at Newfoundland.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

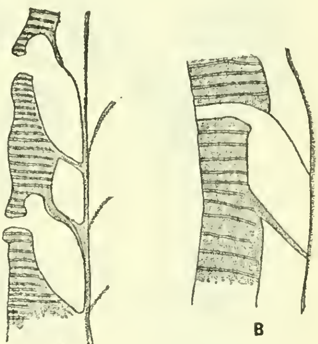

FIG. 120.—*Posterula sarsi* Smitt, 1867

A. Longitudinal thin section, ×16 cutting two ovicelled zooecia. The ovicell is concealed and closed by the operculum. B. Section through an ordinary zooecium, ×16 showing the arrangement of the tubules.

Geographic distribution.—The reader will find the geographic distribution of this species given by the authors listed above, especially on the excellent chart of Nordgaard, 1912.

Plesiotypes.—Cat. No. 8036, U.S.N.M.

Genus CIGCLISULA Canu and Bassler, 1927

The ovicell is hyperstomial, opening in the peristomie, never closed by the operculum with the frontal perforated by very large pores. The frontal is a thick tremocyst with tubules. The apertura is oval; the peristomice bears a wide pseudorimule bordered by a peristomial avicularium. The operculum bears two large lateral bands terminated

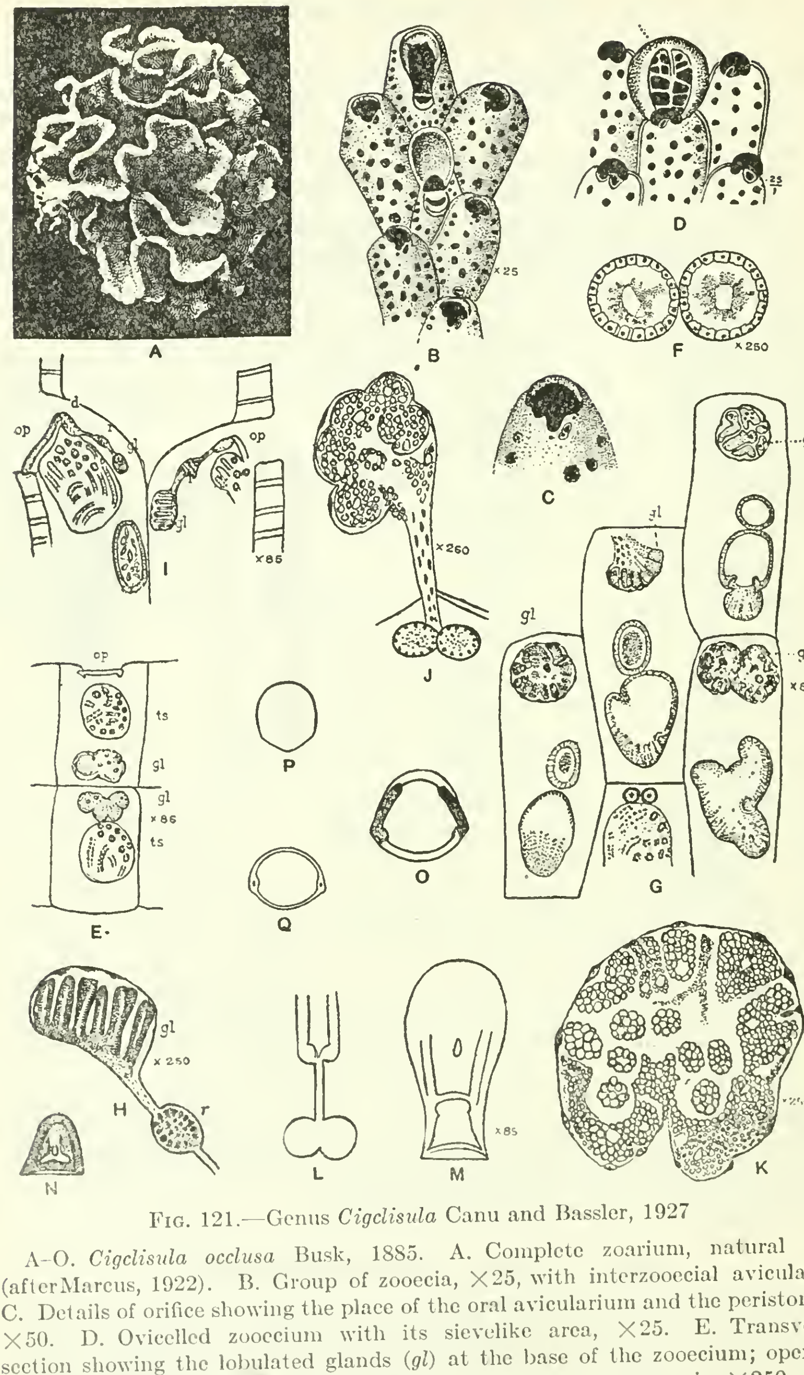

FIG. 121.—Genus *Cigclisula* Canu and Bassler, 1927

A–O. *Cigclisula occlusa* Busk, 1885. A. Complete zoarium, natural size (afterMarcus, 1922). B. Group of zooecia, ×25, with interzooecial avicularia. C. Details of orifice showing the place of the oral avicularium and the peristomie, ×50. D. Ovicelled zooecium with its sievelike area, ×25. E. Transverse section showing the lobulated glands (*gl*) at the base of the zooecium; operculum (*op*), tentacles (*ts*); ×85. F. Section of the duct or reservoir, ×250. G. Longitudinal section through the broader axis of the zoarium, showing the lobuby two strong muscular attachments. There are large sporadic interzooecial avicularia, 17–19 tentacles. Special oral glands.

Genotype.—Cigclisula (Escharoides) occlusa Busk, 1884. Recent.

Retepora has 11 tentacles and *Myriozoum* has 28 tentacles; the present genus therefore can not be compared with these two genera in spite of the aspect of the ovicell or of the frontal with tubules.

The structure of *Cigclisula occlusa* was published by Waters, 1909; in 1913 he indicated that it should be the type of a new genus.

CIGCLISULA OCCLUSA Busk, 1884

Plate 31, figs. 3–10

1884. *Escharoides occlusum* Busk, Polyzoa collected by *Challenger*, Report Scientific results Voyage *Challenger*, vol. 10, p. 150, pl. 21, fig. 8.

1888. *Lepralia occlusa* Waters, Supplementary Report Polyzoa collected by *Challenger*, Report Scientific Results Voyage *Challenger*, vol. 31, p. 26, pl. 3, fig. 32–34.

1890. *Lepralia occlusa* Kirkpatrick, Hydroida and Polyzoa Torres Strait. Proc. Royal Dublin Society, new ser., vol. 6, p. 612; var. *areolata*, p. 618.

1909. *Myriozoum occlusum* Levinsen, Morphological and Systematic Studies on Cheilostomatous Bryozoa, p. 301 (gen. ref.).

1909. *Lepralia occlusa* Waters, Marine Biology of the Sudanese Red Sea, Journal Linnean Society, Zoology, vol. 31, p. 152, pl. 13, fig. 15, pl. 14, figs. 1 to 9 and 13.

1913. *Escharoides occlusa* Waters, Marine Fauna British East Africa and Zanzibar, Proc. Zoological Society, London, p. 519.

1921. *Myriozoum occlusum* Marcus, Bryozoen Swedish Scientific Expedition Australia, Kongl. Svenska Vetenskaps-Akademiens Handlingar, vol. 61, p. 20, pl. 1, fig. 8; pl. 2, figs. 1, 2.

Measurements.—

Aperture (interior) $\begin{cases} ha = 0.17 \text{ mm.} \\ la = 0.15 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.70 \text{ mm.} \\ lz = 0.50 \text{ mm.} \end{cases}$

Variations.—In the interior the operculum articulates on two small lateral condyles. With the intensity of calcification the zooecia present exteriorily variable and often fantastic forms. The large sporadic avicularia have their beak directed toward the top; but frequently the beak is directed toward the bottom and they are spatulated; they have a pivot or denticles. The frontal grating of the ovicell is very fragile; it is covered by the ectocyst. Around the peristomice some small tubules at times become transformed into

lated glands (*gl*) and the ducts in section in the lowest middle zooecium, ×85. H. Showing gland (*gl*) and reservoir (*r*), ×250. I. Longitudinal section through the shorter axis, showing the gland (*gl*), reservoir (*r*), diaphragm (*d*), and operculum (*op*), ×85. J. Showing lobulated gland and the muscles by which it is attached, ×250. K. Longitudinal section through a lobulated gland, ×250. L. Glands and duct shown diagrammatically. M. Mandible of an interzooecial avicularium, ×85. N. Mandible of a peristomial avicularium, ×85. O. Operculum of an ordinary zooecium, ×85. (B–N. After Waters, 1889 and 1909.) P, Q. Opercula of ordinary and ovicelled zooecia, ×85 of *Cigclisula serrulata* Smitt, 1873.

small round avicularia without pivot. On the basal fronds, groups of smooth zooecia more or less erect, arranged without order appear. The oral avicularium opens in the peristomie, it is little visible. The oral glands have been well described by Waters, 1909.

We are not in accord with Waters on the details of the operculum. We possess many preparations containing a dozen opercula all quite similar to those we describe.

Biology.—This is a tropical species. It lives in waters of from 19 to 24 fathoms; but it can descend deeper, because we have found it at Tinagta at 230 fathoms. The sandy, coralline, and shelly bottoms suit it especially well. The thickness of the fronds increases with depth.

Almost all our specimens were dead. Those from Sirun were living; they were in reproduction February 16, 1908 (37 meters).

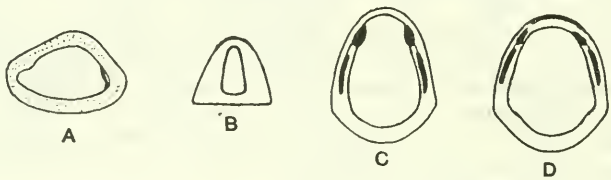

FIG. 122.—*Cigclisula occlusa* Busk, 1884

A. Operculum of abnormal zooecium, ×85. B. Mandible of inverted avicularium, ×85. C, D. Two forms of opercula, ×85.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5150. Sirun Island, Sulu Archipelago; 5° 23′ 20″ N.; 120° 35′ 45″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk. Sh. crs.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Geographic distribution.—Pacific: Crozet Island, 210 fathoms; Cape York, 8 fathoms; Simboangan, 10 fathoms; Albany Pass, 10 fathoms, and Murray Islands, 15–20 fathoms; Torres Strait, Cape Jaubert, Australia. Indian Ocean: Wasin, British East Africa, 10 fathoms; Ras Osowemembe, Zanzibar Channel, 10 fathoms; Bay of Agig Suraga, South Sudan coast.

Plesiotypes.—Cat. No. 8037–8040, U.S.N.M.

Genus DIATOSULA Canu and Bassler, 1927

The ovicell is hyperstomial and opens in the peristomie; it bears a triangular area bordered with pores. The frontal is very thick and smooth. The apertura is formed of a large anter separated from the small poster by two cardelles. The peristomice bears a pseudo-rimule limited laterally by two peristomial avicularia more or

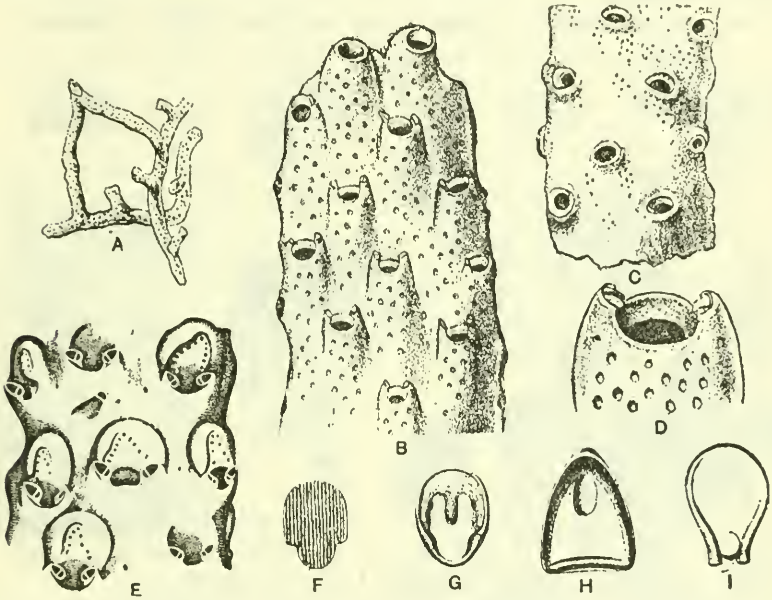

FIG. 123.—Genus *Diatosula* Cann and Bassler, 1927

A–D. *Diatosula marionense* Busk, 1884. A. Zoarium natural size. B. Young distinct zooecia, ×25. C. Old indistinct zooecia, ×25. D. Details of the orifice showing the oral avicularia and the peristomie, ×50. (A–D. After Busk. 1884.)
E–I. *Diatosula marionense* Calvet, 1903 (not Busk, 1844). E. Ovicelled zooecia, ×40. F. Real form of the aperture at the bottom of the peristomie, ×100. G. Operculum, ×100. H. Mandible of a peristomial avicularium, ×260. I. Mandible of an interzooecial (zoarial) avicularium, ×90. (E–I. After Calvet, 1909.)

less salient and more or less visible. On the frontal a large spathulated avicularium sometimes appears.

Genotype.—*Myriozoum marionense* Busk, 1884. Recent.

Waters, 1903 (p. 47), says that the species of Calvet, 1903, is not that of Busk, 1884. They certainly belong to the same genus and our definition is in agreement with the text and figures of Calvet. Waters, 1913 (p. 130), said that Busk's species should be more a *Cellarinella;* but the latter genus belongs to a group deprived of opercula.

Genus RAGIONULA Canu and Bassler, 1927

The ovicell is hyperstomial, opening into the peristomie, not closed by the operculum. The frontal is (in appearance) a very thick, granular pleurocyst. The apertura is semicircular. The peristomice bears a pseudorimule bordered by a small eccentric peristomial avicularium. The operculum and the mandible are of the type of *Porella*.

Genotype.—Ragionula (*Eschara*) *rosacea* Busk, 1856. Recent.

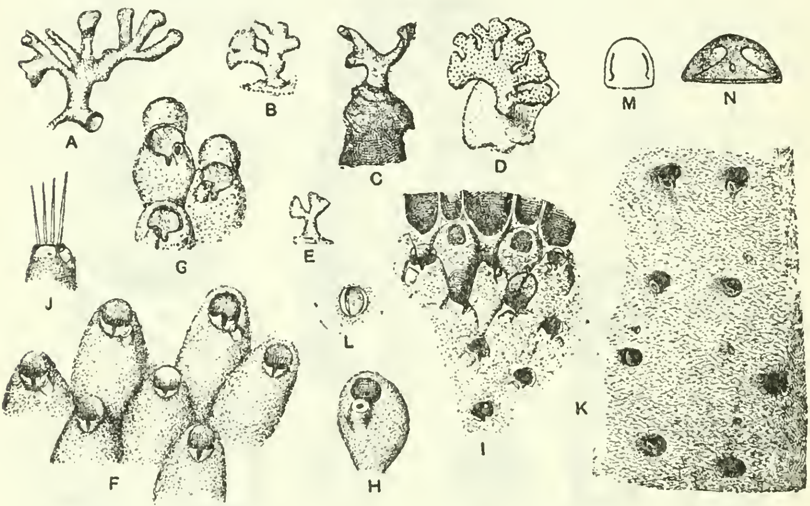

FIG. 124.—Genus *Ragionula* Canu and Bassler, 1927

A–N. *Ragionula rosacea* Busk, 1856. A–E. Different aspects of zoaria, natural size. F. Adult zooecia, ×40. G. Ovicelled zooecia. (After Norman, 1868.) H. A young zooecium showing the avicularium before it is enclosed in the peristomice, ×40. (F, H. After Hincks, 1880.) I. Aspect of the marginal zooecia and the basal lamella. J. A zooecium seen in profile. K. Portion of a zoarium in which the zooecia are indistinct and ornamented with an avicularium. L. The poriform avicularium, much enlarged. (I–L, after Smitt, 1867.) M. Operculum, ×85. N. Mandible of peristomial avicularium, ×250. (M, N. After Waters, 1900.)

Waters, 1900, has figured the operculum of the genotype; it is the operculum of a *Porella*. The genus would then belong to the Smittinidae where, however, the oral avicularia are median. We know that external appearances are very deceiving and that the deduction of Waters is quite logical. Canu and Bassler have figured the Smittinidae ornamented with tubules.[10]

In order to facilitate determination we leave the genus provisionally in the Stomachetosellidae.

[10] North American Early Tertiary Bryozoa, pl. 62, fig. 7, pl. 64, fig. 22, pl. 95, fig. 7.

Genus LEIOSELLA Canu and Bassler, 1920

Eschara quinconcialis Norman, 1867 is a recent species of the genus *Leiosella*. The comparison of figures of *Leiosella orbicularis* and of *Leiosella rostrifera* is very conclusive. Norman's species ought to become the genotype; it has been discovered at Corse by Calvet, 1902, and it has been dredged in the Gulf of Oran (Canu Collection) by P. Pallary; its detailed study will therefore be possible.

Echaroides billardi Calvet, 1906, belongs also to this genus. It is a Morrocan species still more southern than the preceding.

Family ESCHARELLIDAE Levinsen, 1909

The characteristics of this family and the many genera of the four subfamilies recognized by us have been given in our volumes of 1920 and 1923 and in our Gulf of Mexico paper. We here add diagnoses of genera which have been overlooked in our previous works.

Subfamily SCHIZOPORELLAE Canu and Bassler, 1917

Genus SPHENELLA Duvergier, 1924

The hyperstomial ovicell is profoundly embedded in the distal zooecium and can not be closed by the operculum. The apertura bears a long proximal rimule. The frontal is a granular pleurocyst surrounded by areolar pores. There are aborted zooecia and also erect zooecia.

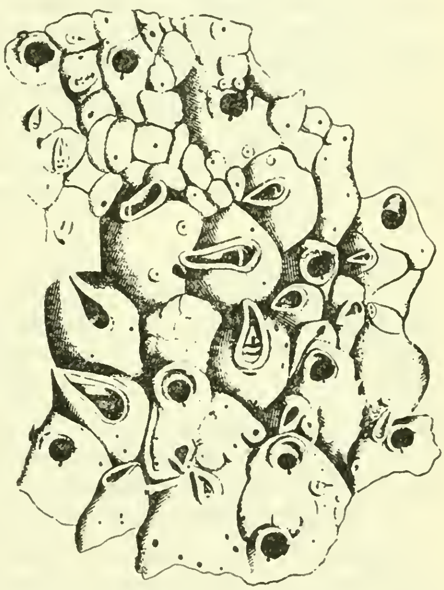

FIG. 125.—Genus *Strophiella* Jullien, 1903

Strophiella tuberigera Jullien, 1903. Zooecia, ×25. The rimule is triangular on the ovicelled zooecia (after Jullien, 1903), Gulf of Gascogny.

Genotype.—Sphenella polymorpha Duvergier, 1924.

Range.—Miocene (Helvetian) of France.

Genus STROPHIELLA Jullien, 1903

The ovicell is hyperstomial and never closed by the operculum. The aperture bears a circular beaded anter and a rimule circular on the ordinary zooecia and triangular on the ovicelled ones. The frontal bears some areolar pores in the form of superficial verrucosities without avicularia. There are numerous interzooecial avicularia.

Genotype.—*Strophiella tuberigera* Jullien, 1903. Recent (Gulf of Gascony).

Genus ARTHROPOMA Levinsen, 1909

ARTHROPOMA CECILI Savigny-Audouin, 1826

Plate 32, fig. 1

1889. *Schizoporella cecili* JELLY, a synonymic catalogue of recent marine Bryozoa, p. 223. (Bibliography.)
1890. *Schizoporella cecili* ORTMANN, Die japanische Bryozoen Fauna, Archiv für Naturgeschichte, vol. 50, p. 51, pl. 1, fig. 4.
1890. *Schizoporella cecili* var. KIRKPATRICK, Report on Polyzoa in China Sea, Annals and Magazine Natural History, ser. 6, vol. 5, p. 22, pl. 5, fig. 8.
1895. *Schizoporella cecilii* MACGILLIVRAY, Tertiary Polyzoa of Victoria, Transactions Royal Society of Victoria, vol. 4, p. 33, pl. 11, fig.
1907. *Schizoporella cecili* CALVET, Expédition scientifique du *Travailleur* et du *Talisman*, p. 415. (Complete bibliography.)
1908. *Schizoporella cecilii* ROBERTSON, Incrusting Chilostomatous Bryozoa West Coast North America, University of California Publications, Zoology, vol. 4, No. 5, p. 288, pl. 19, fig. 43.
1909. *Arthropoma cecilii* LEVINSEN, Morphological Studies on the Chilostomatous Bryozoa, p. 232.
1910. *Schizoporella cecili* THORNELY, Marine Polyzoa of the Indian Ocean, Trans. Linnean Society Zoology, vol. 15, p. 147.
1913. *Arthropoma cecili* WATERS, Marine Fauna of British East Africa and Zanzibar, Proc. Zoological Society London, 1913, p. 508.
1918. *Arthropoma cecili* WATERS, Bryozoa Cape Verde Islands, Journal Linnean Society Zoology, vol. 34, p. 20. (Geographic distribution.)

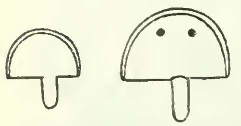

FIG. 126.—*Arthropoma cecilii* Savigny-Audouin, 1826. Two opercula of different sizes. ×85

Variations.—The zooecia are often poorly oriented and arranged in every direction. The intensity of calcification is extreme and a second layer sometimes covers the zooecial tremocyst. The size of the operculum is variable.

Biology.—This species is found only on the northwest coast of America but its distribution elsewhere is very great especially in the northern hemisphere. However it did not reach the polar circle. It is never abundant in a given locality.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.; 17.2° C.

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.

Geographic distribution.—Western Atlantic: British Channel, Gulf of Cadiz (717 m.), Cape Blanc (1,235 m.), Cape Verde. Mediterranean. Eastern Pacific: Galapagos (62 meters), La Jolla, California, Queen Charlotte Islands. Western Pacific: Japan (74-274 meters), Australia, China Sea (49 m.). Indian Ocean: Reunion Island, Prizon Island, Zanzibar Channel.

Plesiotypes.—Cat. No. 8041, U.S.N.M.

Genus DAKARIA Jullien, 1903

DAKARIA GRANULATA, new species

Plate 32, fig. 2

Description.—The zoarium is unilamellar. The zooecia are distinct, separated by a furrow, lozenge-shaped, very broad; the frontal is a granular tremocyst. The apertura is placed at the bottom of a short peristomie; it is composed of a large anter separated clearly from a smaller concave poster. The ovicell is very large, convex, embedded in the distal zooecium, closed by the operculum and of the same nature as the frontal.

Measurements.—

$\text{Apertura}\begin{cases} ha = 0.16 \text{ mm.} \\ la = 0.20 \text{ mm.} \end{cases}$ $\text{Zooecia}\begin{cases} Lz = 0.80\text{–}0.85 \text{ mm.} \\ lz = 0.85 \text{ mm.} \end{cases}$

Affinities.—This new species differs from *Dakaria chevreuxi* Jullien, 1903, in its granular frontal. The apertura is formed by the subjacent olocyst. It is not entirely covered by the tremocyst but remains visible. The rimule is terminated laterally by the two characteristic condyles. The apertura of the ovicelled zooecia measures 0.22 by 0.24 mm. Our specimen was dead.

Occurrence.—D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

Holotype.—Cat. No. 8042, U.S.N.M.

Genus EMBALLOTHECA Levinsen, 1909

EMBALLOTHECA IMPAR MacGillivray, 1890

Plate 32, figs. 3, 4

1890. *Schizoporella impar* MacGillivray, Description of new or little known Polyzoa, Trans. Royal Society of Victoria, vol. 2, p. 107, pl. 5, fig. 3.

Measurements.—

$\text{Apertura}\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.15\text{–}0.18 \text{ mm.} \end{cases}$ $\text{Zooecia}\begin{cases} Lz = 0.54\text{–}0.60 \text{ mm.} \\ lz = 0.36\text{–}0.40 \text{ mm.} \end{cases}$

Structure.—At the bottom of the separating furrows there is a thin salient thread. The frontal is covered with a multitude of small infundibuliform tremopores. The ovicell is enormous, buried in the distal zooecium, broader than the zooecium and of the same nature as the frontal; it is closed by a large operculum. The oral avicularium is very salient, transverse, the beak turned toward the median axis of the zooecium. All of our specimens were dead.

Schizoporella nodulifera MacGillivray, 1890, and *Schizoporella speciosa* MacGillivray, 1890, belong to this same group, *Emballotheca.*

Occurrence.—

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh. Western Port, Australia (MacGillivray).

Plesiotypes.—Cat. No. 8043, U.S.N.M.

EMBALLOTHECA SUBSINUATA Hincks, 1884

Plate 32, figs. 11, 12

1884. *Schizoporella subsinuata* Hincks, Polyzoa from Victoria, Annals and Magazine of Natural History, ser. 5, vol. 14, p. 280, pl. 8, fig. 1.

Measurements.—

Apertura $\begin{cases} ha = 0.14 \text{ mm.} \\ la = 0.17\text{–}0.18 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.75 \text{ mm.} \\ lz = 0.60\text{–}0.75 \text{ mm.} \end{cases}$

Structure.—In the vicinity of the aperture, there is a very small, very thin, oblique avicularium with the beak directed toward the base. The operculum of the ovicelled zooecia is larger than the others. The frontal is very finely granulated and is perforated by a multitude of very small tremopores which appear more distinctly in tangential sections. The place of the condyles of the apertura is indicated on the opercula by two small lucidae.

On the figure of Hincks, 1884, the rimule of the apertura is subtriangular; it is clearly concave on our specimens.

Biology.—Our living specimens from Anima Sola were ovicelled on April 22, 1908.

Occurrence.—

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy S.

D. 5311. China Sea, vicinity of Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms, crs. S., Sh.

Australia (Hincks).

Plesiotypes.—Cat. No. 8044, U.S.N.M.

EMBALLOTHECA ACUTIROSTRIS, new species

Plate 32, figs. 8–10

Description.—The zoarium is unilamellar; it encrusts nullipores. The zooecia are distinct, separated by a furrow, elongated, ovoid; the frontal is convex, finely granulose and covered by small tremopores. The apertura is orbicular with two small cardelles separating a small poster from a large anter. The ovicell is large, globulose, marginated finely perforated and granulated; it is hyperstomial, closed by an operculum larger than that of the zooecia. The frontal avicularium is placed in the neighborhood of the apertura; it is oblique, very thin, with a *very sharp* beak.

Measurements.—

Aperture $\begin{cases} ha = 0.15 \text{ mm.} \\ la = 0.17 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60\text{–}0.65 \text{ mm.} \\ lz = 0.50\text{–}0.60 \text{ mm.} \end{cases}$

Variations.—The micrometric dimensions are little regular. A little salient thread is often placed at the bottom of the furrow separating the zooecia. The operculum is of the *Schizomavella* type but

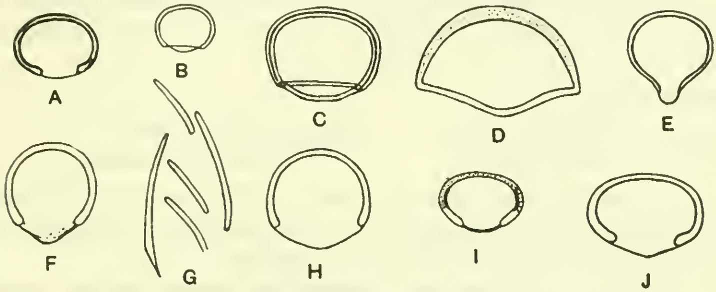

Fig. 127.—Opercula, etc., ×85 of Emballotheca

A. *E. biavicularia,* new species. B, C. *E. imperfecta,* new species. Operculum, ×85. and ×170. D. *E. capitifera,* new species. Operculum of ovicelled (D) and ordinary zooecium (E). F, G. *E. acutirostris,* new species. F. Operculum. G. Small rods (diatoms?) found in the cells and occupying probably the compensatrix. H. *E. latisinuata,* new species. I, J. *E. subsinuata,* new species. Operculum of unovicelled (I) and ovicelled zooecium (J).

with a very narrow margin. The structure of the frontal is that of the ordinary tremocyst.

Affinities.—This species differs from *Emballotheca quadrata* MacGillivray, 1880, in its marginated ovicell in its very thin and not elliptical avicularium and in its very different operculum from that figured by Levinsen, 1909.

Biology.—Our specimens from Jolo were living but nonovicelled. The zooecia contained a large number of small rods (diatoms) which were probably introduced in the compensatrix; we have figured some of them. The intestine is too small to contain them. The diatoms found in the digestive organs of the bryozoa are always much smaller. The function of the avicularia is therefore not to chase them away.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Cotypes.—Cat. Nos. 8045, 8046, U.S.N.M.

EMBALLOTHECA BIAVICULARIA, new species

Plate 32, figs. 6, 7

Description.—The zoarium encrusts bryozoa (*Adeonellopsis*). The zooecia are distinct, separated by a salient thread arranged at the bottom of a furrow, somewhat elongated, hexagonal; the frontal is slightly convex and covered with small infundibuliform tremopores. The apertura is elliptical, transverse; the peristome is thin and scarcely salient. The two small oral avicularia are placed in the vicinity of the median zooecial axis; one is always larger than the other.

Measurements.—

Apertura $\begin{cases} ha = 0.08 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

Structure.—The operculum is clearly elliptical but the poster is nevertheless plainly separated from the anter; its structure is identical with other opercula of the same group.

This species is very well characterized by its two frontal avicularia. Our specimens were living but nonovicelled.

Occurrence.—D. 5151. Sirun Island, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. Sh.

Holotype.—Cat. No. 8047, U.S.N.M.

EMBALLOTHECA (?) CAPITIFERA, new species

Plate 32, fig. 5

Description.—The zoarium encrusts nullipores. The zooecia are distinct, separated by a deep furrow, elongated, rectangular; the frontal is convex and covered with small tubular tremopores. The apertura is elliptical, transverse, with a wide rimule little apparent. The ovicell is enormous, globular, deeply embedded in the distal zooecium, wider than the zooecium; it is of the same nature as the frontal and bears a small circular or elliptical area; it is closed by a large transverse operculum. There are large interzooecial avicularia with pivot and spatulate beak.

Measurements.—

Apertura $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.15 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.55 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

Variations.—The large avicularia are always primoserial but all the primoserial zooecia do not have avicularia. The opercula are black, the tremopores are light colored and the ectocyst is very thin.

This is a diverging type in the group of *Emballotheca*. It has in common with it only the large opercular dimorphism and the schizoporidian aspect.

Biology.—Our specimens were living and were reproducing (ovicelled) on February 14, 1908 (36 meters).

Occurrence.—D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

Holotype.—Cat. No. 8048, U.S.N.M.

EMBALLOTHECA (?) IMPERFECTA, new species

Plate 33, figs. 2–4

Description.—The zoarium encrusts shells and Orbitulites. The zooecia are distinct, separated by a furrow, small, somewhat elongated; the frontal is convex, with granular tremocyst and bears the ovicell of the proximal zooecium and on the median axis a transverse avicularium. The apertura is small, transverse, elliptical. The ovicell is large, orbicular, incompletely calcified, with membraneous frontal.

Measurements.—

Apertura $\begin{cases} ha = 0.07 \text{ mm.} \\ la = 0.08\text{–}0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.35\text{–}0.40 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$

Structure.—Everything is original in this small species. The structure of the frontal presents a complicated network of intertwined lines in the midst of which the tremopores are not visible. The structure of the dorsal is that of a minute drafting board. The operculum does not resemble any other known operculum; it is characterized by its double proximal armature. We do not know where to classify this small species properly.

Biology.—The ovicell is never complete; it is almost reduced to its membraneous frontal. It is never formed with the zooecium itself as occurs most commonly. It is formed on an old distal zooecium after the regeneration of an ordinary polypide into a female polypide. The passage of the eggs is made under the ectocyst before the complete formation of the ovicell which develops thus with the embryo itself. Very probably the escape of the larvae occurs by the rupture of the ectocyst. This species was in reproduction (ovicelled) and fixation (ancestrula) February 15 to March 25, 1908 (42–67 meters).

Occurrence.—

D. 5145. Jolo Light, Jolo.; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hrd. S.; 24.2° C.

Holotype.—Cat. No. 8049, U.S.N.M.

EMBALLOTHECA LATISINUATA, new species

Plate 33, fig. 5

Description.—The zoarium is rarely unilamellar and encrusts nullipores and especially shells. The zooecia are distinct, separated by a salient thread, arranged at the bottom of a furrow, somewhat elongated, hexagonal; the frontal is convex and covered with scattered tremopores; a submedian, triangular, elongated, oblique avicularium appears in the vicinity of the apertura. The apertura is transverse and is formed of a semicircular anter and of a broad rimule; the peristome is thin and little salient. The ovicell is globular, buried in the distal zooecium, closed by the operculum of the same nature as the frontal and entirely surrounds the peristome.

Measurements.—

$$\text{Apertura}\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.15 \text{ mm.} \end{cases} \qquad \text{Zooecia}\begin{cases} Lz = 0.50\text{–}0.60 \text{ mm.} \\ lz = 0.40\text{–}0.50 \text{ mm.} \end{cases}$$

Affinities.—The operculum is almost orbicular; it bears a strong peripheral sclerite with two lateral attachments.

This species differs from *Schizoporella lata* MacGillivray, 1882, in the form and direction toward the top of the avicularium; the two species are very closely allied. It differs from *Schizoporella pachnoides* MacGillivray, 1886, in its nonmedian and nonlongitudinal avicularium.

Biology.—The species was in reproduction and fixation on February 15, 1908 (36–42 meters).

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Holotype.—Cat. No. 8050, U.S.N.M.

EMBALLOTHECA INGENS, new species

Plate 33, fig. 1

Description.—The zoarium encrusts shells. The zooecia are distinct, separated by a deep furrow, somewhat elongated, elliptical; the frontal is very convex, covered with small tremopores, separated by granules; it bears close to the apertura an elliptical transverse avicularium with pivot and a very salient beak. The apertura is transverse with a concave proximal border; the apertura of the ovicelled zooecia is larger. The ovicell is *very large* and covers almost all the frontal of the distal zooecia; it is absolutely identical in nature with that of the frontal.

Measurements.—

Apertura $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.16 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.56 \text{ mm.} \\ lz = 0.36 \text{ mm.} \end{cases}$

Affinities.—The orifice of the ovicelled zooecia measures 0.14 by 0.18 mm. We have found only a dead specimen of this species, but we believe it ought to be figured because of its distinctness from others.

Occurrence.—D. 5311. China Sea, vicinity of Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S. Sh.

Holotype.—Cat. No. 8052, U.S.N.M.

Genus SCHIZOMAVELLA Canu and Bassler, 1917

SCHIZOMAVELLA AMBITA Waters, 1889

1889. *Schizoporella ambita* Waters, Bryozoa from New South Wales, Annals and Magazine Natural History, ser . 6, vol. 4, p. 77, pl. 2, fig. 7.

1902. *Schizoporella ambita* Calvet, Bryozoaires marins de la region de Cette, Travaux Institut de Zoologie Universite Montpellier, ser. 2, mem. 11, p. 46, pl. 2, figs. 1, 2.

We have found in different localities specimens close to the species of Waters and that of Calvet but which could not be referred exactly to either of them; we consider them provisionally as varieties and we figure them. Not only are we not certain that Calvet's species is identical with that of Waters but also a very fine specimen presented by Miss Jelly shows different characters; the median avicularium notably is oblique and frequently doubled.

SCHIZOMAVELLA AMBITA var. GRANULOSA, new variety

Plate 33, fig. 11

The frontal is perforated by small tremopores separated by granulations very close together. The area of the ovicell is much attenuated but it is placed as in the figure of Waters. The operculum does not resemble that of Waters. It is closer to that of Calvet, but it is not transverse. Our specimens were living.

Occurrence.—D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.; 17.2° C.

Holotype.—Cat. No. 8059, U.S.N.M.

SCHIZOMAVELLA AMBITA var. GRANULATA, new variety

Plate 33, fig. 10

The frontal is perforated by small tremopores separated by scattered granulations. The other characters and notably those of the ovicell are identical with those figured by Calvet. The specimens were living.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Holotype.—Cat. No. 8057, U.S.N.M.

SCHIZOMAVELLA CORNUTA, new species

Plate 34, figs. 3, 4

Description.—The zoarium is free and unilamellar, creeping usually over sponges. The zooecia are distinct, separated by a deep furrow, elongated, elliptical or subrectangular, arranged in linear series; the frontal is convex, garnished with numerous, small tremopores and with a small, median, triangular avicularium with beak raised in the form of a *horn.* The apertura is large, suborbicular, somewhat transverse; the peristome is thin, little salient, complete. The ovicell is large, globular, of the same structure as the frontal,

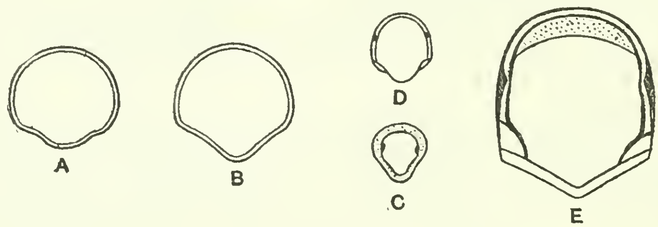

Fig. 128.—*Schizomavella* Canu and Bassler, 1917

A, B. *S. cornuta*, new species. Opercula, ×85, showing variations. C. *S. ambita granulosa*, new variety. Operculum ×85. D, E. *S. simplex*, new species. Operculum ×85 and another example highly magnified.

decorated with a very small median carina and a large circular area, and closed by the operculum.

Measurements.—

Apertura $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.15 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50\text{–}0.60 \text{ mm.} \\ lz = 0.30\text{–}0.35 \text{ mm.} \end{cases}$

Affinities.—The small median avicularium is lacking sometimes; it is then replaced by a large spathulate avicularium arranged laterally. The operculum is fragile.

This species differs from *Schizomavella auriculata* Hassall, 1842, in its broader and shallow rimule and in its triangular instead of poriform avicularium. It differs from *Schizomavella linearis* Hassall, 1841, in the presence of a median avicularium, in its suborbicular operculum of quite different form and in the absence of small lateral avicularia.

The arrangement of the zooecia in linear series is general in this genus; it appears to form a secondary, generic characteristic more constant than the arrangement of the avicularia.

Biology.—Our specimens were living. They were in reproduction and fixation in November, 1904, and February, 1908. This species is also found in the temperate zone where other species of the genus abound.

Occurrence.—

D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

Holotype.—Cat. No. 8058, U.S.N.M.

SCHIZOMAVELLA SIMPLEX, new species

Plate 34, fig. 2

Description.—The zoarium encrusts nullipores. The zooecia are distinct, separated by a deep furrow, little regular, subrectangular, little elongated; the frontal is convex and perforated by a multitude of small tremopores. The aperture is very little elongated, almost orbicular with a broad triangular shallow rimule; the peristome is broad, salient, and bear some short spines. The ovicell is globular, separated from the frontal by a sutural line, of the same structure as the frontal, closed by the operculum. Frequently there are two small avicularia on each side of the apertura.

Measurements.—

$$\text{Apertura}\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases} \qquad \text{Zooecia}\begin{cases} Lz = 0.36 \text{ mm.} \\ lz = 0.24\text{–}0.30 \text{ mm.} \end{cases}$$

Affinities.—Two lucidae on the operculum mark the position of the two condyles of articulation. As in *Schizomavella linearis* Hassall, 1841, the operculum closes the ovicell in this species and in spite of the absence of the frontal avicularium we are obliged to classify it in *Schizomavella.* The avicularia, again, do not furnish an exclusive generic character. Moreover their presence in *Schizomavella* is quite variable and causes the determination of species of this genus to be very difficult.

Biology.—Our specimens were living. The species was in reproduction April 23, 1908 (930 meters).

Occurrence.—D. 5219. Mompog Island, Marinduque; 13° 21′ N.; 122° 18′ 45″ E.; 530 fathoms; gn. M.; 10.4° C.

Holotype.—Cat. No. 8060, U.S.N.M.

SCHIZOMAVELLA (METROPERIELLA) OVOIDEA, new species

Plate 33, figs. 6–8

Description.—The zoarium is very rarely unilamellar but encrusts shells and much more frequently bryozoa (*Adeonellopsis*) The zooecia are distinct, separated by a shallow furrow, somewhat elongated, ovoid; the frontal is little convex and formed by a tremocyst with small pores superposed on a thin olocyst. The apertura is transverse or orbicular; two small cardelles separate a large anter from a very broad rimule; the peristome is olocystal and nonsalient. Near the aperture is a very small avicularium placed on the median zooecial axis. The ovicell is very large, embedded in the distal zooecium, closed by the operculum and covered by the tremocyst as the frontal. The ancestrula is a very small zooecium. Frequently a large interzooecial avicularium is present.

Measurements.—

Apertura $\begin{cases} ha = 0.14 \text{ mm.} \\ la = 0.16 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.44\text{–}0.54 \text{ mm.} \\ lz = 0.26\text{–}0.30 \text{ mm.} \end{cases}$

Structure.—Frequently there is a separating thread at the bottom of the furrow. The orifice of the ovicelled zooecia is larger and measures 0.15 by 0.19 mm. The operculum is elongated contrarywise to the apertura; it bears a peripheral sclerite, two broad lateral bands and two lucidae at the level of the cardelles. The difference from typical *Schizomavella* is little apparent. The frontal and dorsal

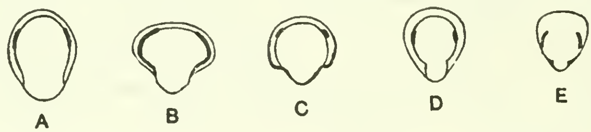

FIG. 129.—Opercula, ×85, of *Schizomavella* (*Metroperiella*)

A, B. *S. ovoidea*, new species. Two opercula, ×85. C.–E. *S. lepralioides*, new species. Opercula of ovicelled (C) and ordinary zooecia (D, E.)

structures are also identical with those of *Emballotheca* and of *Schizomavella.*

Biology.—We have already noted a large analogous avicularium in *Metroperiella avicularis* Canu and Bassler, 1920, a fossil from the Eocene (Jacksonian). Our living specimens show that they were in reproduction and fixation during all the month of February, 1908 (36 meters). This species frequents shallow waters and sandy, coralline and shelly bottoms.

Occurrence.—

D. 5134. Balukbaluk Island, Sulu Archipelago; 6° 44′ 45″ N.; 121° 48′ E.; 25 fathoms; fine S.

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S., Sh.

D. 5141. Jolo Light, Jolo, Sulu Archipelago; 6° 09′ N.; 120° 58′ E.; 26 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co., S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co., S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co., S., Sh.

D. 5151. Sirun Island, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co., S., Sh.

Cotypes.—Cat. Nos. 8053–8055, U.S.N.M.

SCHIZOMAVELLA (METROPERIELLA) LEPRALIOIDES Calvet, 1903

Plate 33, fig. 9

1903. *Schizoporella lepralioides* Calvet, Bryozoaires de l'Hirondelle, Resultats des Campagnes scientifiques du Prince de Monaca, fasc 23, p. 142, pl. 16, fig. 8.

Measurements.—

Apertura $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.07 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.40\text{–}0.55 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

The zooecial dimensions are in accord with those which can be measured on the figures of Calvet, 1903. The difference from *Schizomavella subimmersa* MacGillivray, 1879 is very small and consists only in the special arrangement of the ovicell, entirely surrounding the apertura; the operculum is almost identical with that which Waters, 1889, has given for MacGillivray's species; it is a little less elongated than the operculum figured by Calvet, 1903. These different authors have not noted the opercular dimorphism which is very evident on our specimens. The general structure of the operculum is that of *Schizomavella*.

Our specimens encrust nullipores, Orbitoides, and especially pebbles. They were generally living. The operculum closes the ovicell in opening.

Biology.—This species appears to descend to greater depths as the distance from the equator increases but the number of our stations is not sufficient to be positively certain of this phenomenon. The species was in reproduction and fixation in March and April, 1908 (36–192 meters).

Occurrence.—

D. 5147. Sulade Islands, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co., S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S., 24.2° C.

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs., gy. S.; 17.2° C.

Atlantic: Picot Fayal, Azores, 136 meters.

Plesiotypes.—Cat. No. 8056, U.S.N.M.

Genus BUFFONELLARIA Canu and Bassler, 1927

The ovicell is hyperstomial and not closed by the operculum. The frontal is an olocyst with vein like markings. There is a small oral avicularium.

Genotype.—*Hippothoa divergens* Smitt, 1873. Recent.

BUFFONELLARIA LOCULIFERA, new species

Plate 34, figs. 9, 10

Description.—The zoarium encrusts pebbles, shells, and orbitoid foraminifera. The zooecia are distinct, separated by an elongated furrow, subrectangular; the frontal is convex and bears a large semicircular area with salient walls at the middle of which the ovicell is developed. The apertura is suborbicular with a broad triangular sinus; the peristome is thin, little salient. The ovicell is very salient, globular, smooth, fragile; it is never closed by the operculum. On each side of the apertura there is a small salient avicularium, adjacent to the peristome.

Measurements.—

Apertura $\begin{cases} ha = 0.08\text{–}0.09 \text{ mm.} \\ la = 0.08\text{–}0.09 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.40\text{–}0.45 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Variations.—The young marginal zooecia have absolutely the aspect of *Stephanosella biaperta* Michelin, 1848; but their frontal is uniquely an olocyst only and presents no traces of perforations.

The ovicell is always much smaller than the area in which it is developed. Beyond this area the frontal bears another semicircular line arranged inversely turning around the apertura and terminating laterally at the small avicularia.

The surface covered by young zooecia is generally rather small but, however, on the young colonies the cellules with thread like ridges are sometimes very rare.

Affinities.—This species can be compared only to *Buffonellaria reticulata* Canu and Bassler, 1928 from the Gulf of Mexico but differs from it in its two semicircular ridges arranged in inverse direction quite regularly. Our specimens were living and were in reproduction July 29, 1909.

Occurrence.—

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy.; 17.2° C.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Holotype.—Cat. No. 8061, U.S.N.M.

Genus LACERNA Jullien, 1888.

LACERNA SIGNATA Waters, 1889

Plate 42, figs. 10, 11

1889. *Smittia signata* WATERS, Bryozoa from New South Wales, Annals and Magazine Natural History, ser. 6, vol. 4, p. 17, pl. 3, fig. 4.

Measurements.—

Apertura $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.45\text{–}0.55 \text{ mm.} \\ lz = 0.35\text{–}0.50 \text{ mm.} \end{cases}$

Variations.—The general characters noted by Waters are quite visible on our specimens. The apertura is buried at the bottom of the peristomie; the rimule is rectangular and is visible only by inclining the preparation. But there are some slight differences, notably the micrometric dimensions are somewhat larger, the ovicell has a perforated frontal area, the frontal avicularia are smaller and often arranged symmetrically and finally the internal armature of the operculum is triangular. Our specimens are unilamellar and not encrusting.

We have a specimen from Sydney furnished by Miss Jelly which corresponds well to Water's figure although the frontal surface is granulated as in ours, and the zooecia are narrower than ours.

In the interior, the rimule is placed between two small tuberosities. The operculum is very thin and difficult to prepare; its structure is quite identical with that indicated by Waters but its form is different. The operculum closes the ovicell.

Waters stated that he did not know into what genus to class his species but we believe *Lacerna* is correct.

One of the frontal avicularia may become very large and spatulate as in *Smittina trispinosa*.

Biology.—Our specimens were in reproduction May 5, 1908 (340 meters). They occur in deep waters (340–970 meters). Those from Mompog were dead and encrusting.

Geographic distribution.—Sydney and Green Point, Port Jackson, Australia.

Occurrence.—

D. 5173. Jolo Light, Jolo; 6° 02′ 55″ N.; 120° 53′ E.; 186 fathoms; Sh., co.

D. 5219. Mompog Island, between Marinduque and Luzon; 13° 21′ N.; 122° 18′ 45″ E.; 530 fathoms; gn. M.; 10.4° C.

Plesiotypes.—Cat. No. 8131, U.S.N.M.

Genus GEMELLIPORELLA Canu and Bassler, 1920

GEMELLIPORELLA AREOLATA, new species

Plate 34, figs. 5, 6

Description.—The zoarium encrusts shells, nullipores and *Orbitoides*. The zooecia are distinct, separated by a furrow, elongated, deformed by an enormous oral avicularium with denticles or with pivot; the frontal is convex, and formed by a granular pleurocyst surrounded by areolar pores more or less large. The apertura is large, much elongated, triangular, with a small rimule. The ovicell is globular, buried in the distal zooecium, of the same nature as the frontal.

Measurements.—

Apertura $\begin{cases} ha = 0.14\text{–}0.16 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.40\text{–}0.50 \text{ mm.} \\ lz = 0.35\text{–}0.45 \text{ mm.} \end{cases}$

Affinities.—The micrometric measurements are very variable. The interareolar costules are often much attenuated and little visible.

This species differs from *Gemellipora auriculata* Maplestone, 1901, in its granular frontal and from *Gemellipora elegantissima* MacGillivray, 1895 in the presence of a large oral avicularium.

Biology.—Almost all of our specimens were dead and we do not know the time of reproduction and of fixation. This is a deep water species; it accommodates itself to the bathymetric conditions of the north of Sulu Sea while those of the Sulu Archipelago where the water is warm, shallow, and very calm, appear rather unfavorable to it.

Occurrence.—

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

D. 5192. Jilantaguan Island, off northern Cebu Island; 11° 09′ 15″ N.; 123° 50′ E.; 32 fathoms; green sand.

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S. (common).

D. 5219. Mompog Island, between Marinduque and Luzon; 13° 21′ N.; 122° 18′ 45″ E.; 530 fathoms; gn. M.; 10.4°.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ N.; 119° 09′ 52″ E.; 175 fathoms; fine, S. co.; 13° C.

Cotypes.—Cat. Nos. 8062, 8063, U.S.N.M.

Genus GEMELLIPORIDRA Canu and Bassler, 1927

The ovicell is hyperstomial and is always closed by the operculum. The frontal and the ovicell are covered by tremopores. The aperture bears two small lateral indentations separating a very large suborbicular anter from a very small concave poster. The operculum bears two lateral marks corresponding to oral indentations and two linear muscular attachments. There are two oral avicularia irregularly arranged on each side of the aperture. The complete colonies are multilamellar and the zooecia are then poorly oriented.

Genotype.—*Gemelliporidra typica* Canu and Bassler, 1927. Recent.

Range.—Pleistocene. Recent.

Genus GEMELLIPORA Smitt, 1872

GEMELLIPORA PERISTOMARIA, new species

Plate 34, fig. 1

Description.—The zoarium encrusts shells. The zooecia are distinct, separated by a deep furrow, somewhat elongated, swollen, bottle-shaped; the frontal is quite convex, finely granular and ornamented with very small tremopores; the frontal avicularium is transverse, elliptical, with pivot. The apertura is elongated, triangular; the peristome is much developed, very salient, more or less complete, infundibuliform.

Measurements.—

Apertura $\begin{cases} ha=0.10 \text{ mm.} \\ la=0.07 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz=0.50 \text{ mm.} \\ lz=0.35 \text{ mm.} \end{cases}$

This species is very well characterized by its peristome. The operculum shows two lateral habitual and characteristic indentations. Our specimens were living but not ovicelled.

Occurrence.—D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Holotype.—Cat. No. 8064, U.S.N.M.

GEMELLIPORA PUNCTATA, new species

Plate 34, fig. 8

Description.—The zoarium encrusts fragments of shells. The zoaria are distinct, separated by a furrow, little elongated, broad, deformed laterally by a large avicularium with pivot; the frontal is convex, *punctured* with large tremopores and bears in the vicinity of the poster a small transverse avicularium with pivot. The apertura

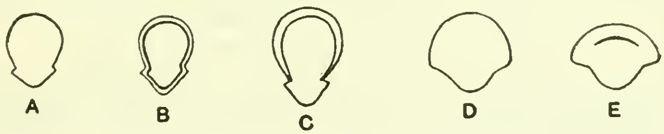

Fig. 130.—Opercula of Schizoporellae, ×85

A. *Gemellipora peristomaria*, new species. B. *Gemellipora biavicularia*, new species. C. *Gemelliporella areolata*, new species. D, E. *Schizoporella costulata*, new species.

is large, triangular, elongated, with two triangular cardelles characteristic of the genus. The ovicell is large, globular, porous, buried in the distal zooecium.

Measurements.—

Apertura $\begin{cases} ha=0.14\text{–}0.16 \text{ mm.} \\ la=0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz=0.48\text{–}0.50 \text{ mm.} \\ lz=0.36\text{–}0.40 \text{ mm.} \end{cases}$

Affinities.—This superb species possesses two avicularia as in *Gemellipora biavicularia* but differs from it in its much larger measurements and in the presence of much larger and more numerous tremopores. Of all of the known species it bears the largest tremopores; these are generally very small and often little visible.

Our specimens were dead. Those from the China sea (175 fathoms) showed no differences from the others.

Occurrence.—

D. 5134. Balukbaluk Island, Sulu Archipelago; 6° 44′ 45″ N.; 121° 48′ E.; 25 fathoms; fine S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S. Sh.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

Holotype.—Cat. No. 8066, U.S.N.M.

GEMELLIPORA BIAVICULARIA, new species

Plate 34, fig. 7

Description.—The zoarium encrusts shells and orbitoides. The zooecia are distinct, separated by a furrow somewhat elongated, much enlarged and deformed by a large, lateral, elliptical avicularium with pivot; the frontal is convex, ornamented with large tremopores borne on the olocyst; there is a second small median, transverse avicularium with pivot. The apertura is elongated, triangular, with two characteristic cardelles on each side. The ovicell is globular and buried in the distal zooecium.

Measurements.—

Apertura $\begin{cases} ha = 0.14 \text{ mm.} \\ la = 0.08 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.36\text{–}0.40 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Affinities.—The presence of two avicularia very well characterizes this species; however, the small median avicularium is sometimes lacking. In the interior the olocyst is rather thick. It is perforated at the level of the tremopores. The operculum is thick.

Biology.—The species was in reproduction and fixation on March 26, 1908 (locality D. 5179). The specimens from other localities were very rare and dead.

Occurrence.—

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Holotype.—Cat. No. 8067, U.S.N.M.

GEMELLIPORA MINUTIPORA, new species

Plate 35, figs. 1, 2

Description.—The zoarium encrusts shells. The zooecia are distinct, separated by a furrow, somewhat elongated, deformed by an enormous lateral avicularium, the orifice of which is in the vicinity of the apertura; the frontal is covered with very small tremopores and surrounded by larger areolar pores. Sometimes there is a second, smaller avicularium on the other side of the apertura. The apertura is elongated, triangular, with two small cardelles and a sharp pointed rimule. The ovicell is globular, buried in the distal zooecium not closed by the operculum.

Measurements.—

Apertura $\begin{cases} ha = 0.18 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60 \text{ mm.} \\ lz = 0.40\text{–}0.50 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Gemellipora auriculata* Maplestone, 1901, in its much larger micrometric dimensions and its avicularia placed higher and at the side of the apertura. The tremopores are generally visible only at a magnification of 50 diameters or more.

Biology.—The larva affixes itself only on small convex shells which makes the photography of the colony quite difficult. Our specimens were dead. Species of *Gemellipora* are abundant in the channels which connect the Sulu Sea with the Pacific.

Occurrence.—

D. 5213. Destacado Island, east of Masbate Island; 12° 15′ N.; 123° 57′ 30″ E.; 80 fathoms; S. M. Sh.

D. 5392. Tubig Point, Destacado Island; 12° 12′ 35″ N.; 124° 02′ 48″ E.; 135 fathoms; gn. M., S.

Cotypes.—Cat. No. 8068, U.S.N.M.

GEMELLIPORA OBESA, new species

Plate 35, figs. 3, 4

Description.—The zoarium encrusts fragments of shells. The zooecia are distinct, separated by a deep furrow, very little elongated, deformed, *obese;* the frontal is covered with very small tremopores and covered with large much decorated granules. Below the apertura there is a large transverse elliptical avicularium with denticles. Frequently there is a second smaller avicularium at the side of the apertura. The apertura is triangular, elongated, with a very straight, proximal rimule.

Measurements.—

Apertura $\begin{cases} ha = 0.15 \text{ mm.} \\ la = 0.09 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50\text{–}0.60 \text{ mm.} \\ lz = 0.45\text{–}0.65 \text{ mm.} \end{cases}$

Affinities.—The interior of the olocyst is very thin and the tremopores which are little visible externally can be seen by transparency. Although quite rare, this small species appears charming to us and deserving of illustration.

Occurrence.—D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.

Cotypes.—Cat. No. 8069, U.S.N.M.

Genus STEPHANOSELLA Canu and Bassler, 1917

STEPHANOSELLA INDISTINCTA, new species

Plate 35, figs. 7, 8

Description.—The zoarium is bilamellar and formed of lamellae back to back; the fronds are small, undulated. The zooecia are *indistinct* very little elongated, rectangular; the frontal is convex, smooth, perforated by some scattered, irregular pores. Two sessile avicularia are placed on each side of the apertura; a frontal, transverse avicularium with pivot appearing frequently below the apertura. The apertura is formed of a semilunar anter and of a wide triangular rimule. The ovicell is large, buried in the distal zooecium, not closed by the operculum; the area is subcircular, striated fanshaped.

Measurements.—

Apertura $\left\{\begin{array}{l} ha=0.15 \text{ mm.} \\ la=0.15 \text{ mm.} \end{array}\right.$ Zooecia $\left\{\begin{array}{l} Lz=0.60 \text{ mm.} \\ lz=0.40\text{–}0.50 \text{ mm.} \end{array}\right.$

Affinities.—This species differs from *Stephanosella biaperta* Michelin, 1845, in its larger tremopores and in the presence of the frontal avicularium. Our specimens were dead.

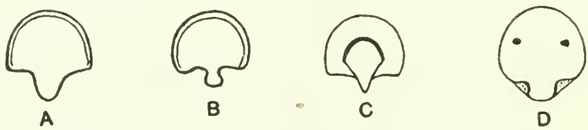

Fig. 131.—Opercula of Schizoporellae. ×85

A. *Stylopoma distorta*, new species. B. *Stylopoma parviporosa*, new species. C, D. *Lacerna signata* Waters, 1889.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E. (common).

Cotypes.—Cat. No. 8070, U.S.N.M.

Genus STYLOPOMA Levinsen, 1909

STYLOPOMA DISTORTA, new species

Plate 36, figs. 1, 2

Description.—The zoarium is multilamellar and encrusts pebbles. The zooecia are distinct, separated by a deep furrow, somewhat elongated, irregularly hexagonal, *deformed;* the frontal is convex, covered with closely arranged tremopores, bearing frequently a small oral avicularium or a small lateral one. The apertura is very little elongated and is formed of a semicircular anter and of a narrow and rounded rimule. The ovicell is porous and entirely covers the apertura. The spathulate interzooecial avicularium is very rare.

Measurements.—

Apertura $\left\{\begin{array}{l} ha=0.16 \text{ mm.} \\ la=0.15 \text{ mm.} \end{array}\right.$ Zooecia $\left\{\begin{array}{l} Lz=0.55 \text{ mm.} \\ lz=0.45 \text{ mm.} \end{array}\right.$

Affinities.—Our micrometric measurements are the average for the variations are very great. The zooecia are not rigorously oriented but they are never in disorder as in *Stylopoma spongites* Pallas or in *Stylopoma grandis.* The lamellae easily become detached when the colony is dead.

Biology.—Our largest zoarium is from locality D. 5162 (372 meters) so that great depths are favorable to the species. The species was in reproduction February 18 to 22; the depth therefore does not modify the time of reproduction.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5162. Tinagta Island; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

Cotypes.—Cat. Nos. 8071, 8072, U.S.N.M.

STYLOPOMA PARVIPOROSA, new species

Plate 36, figs. 3–6

Description.—The zoarium encrusts fragments of shells or of sea urchins. The zooecia are distinct, separated by a furrow, elongated, hexagonal, very regular; the frontal is convex and perforated by a multitude of small tremopores; it bears in the immediate vicinity of the apertura a very small avicularium with a salient beak. The apertura is small, as long as broad; the anter is semielliptical; the poster is rectilinear and notched by a narrow, expanding rimule. The ovicell is large globular, porous; it entirely surrounds the apertura and its avicularium.

Measurements.—

Apertura $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.42\text{–}0.54 \text{ mm.} \\ lz = 0.30\text{–}0.40 \text{ mm.} \end{cases}$

Affinities.—This species is very well characterized by its small tremopores with thick borders very visible at a magnification of 85 diameters. The ancestrula is very small and reduced to an elliptical aperture.

At first glance this species resembles very much *Schizopodrella isabelleana* Smitt, 1873, but differs, however, in its regular zooecia, in its smaller micrometric measurements, in its much more numerous and smaller tremopores and in its shorter oral avicularium arranged almost longitudinally and rarely transversely.

The rimule of the apertura is often separated from the apertura and represented simply by a small pore; but the proximal tongue of the operculum is quite constant.

Biology.—This species was in reproduction and fixation in February and March, 1908 (37–67 meters). Our specimens from Tacbuc, collected in July were ovicelled but as they were dead we can not be sure that their reproduction continued until them. This is a species of shallow water, living by preference in the channels and numerous straits of the Philippine Islands. Its geographic distribution in the region is great, but it is always rare.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Tawi Tawi Group; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; S. Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Cotypes.—Cat. Nos. 8073–8075, U.S.N.M.

STYLOPOMA GRANDIS, new species

Plate 37, figs. 1–3

Description.—The zoarium encrusts shells (*Tridacna*) in plurilamellar masses. The zooecia are *large*, distinct, separated by a deep furrow, arranged in every direction without apparent order; the frontal is convex and perforated by large expanded tremopores and bears on each side of the rimule of the apertura a small triangular oblique avicularium with a very pointed and salient beak. The apertura is large, transverse; the anter is semielliptical; the proximal border is straight and notched by a broad shallow, rounded rimule. The ovicell is enormous (0.75 mm. in diameter), porous and entirely covers the apertura and its avicularia. The large interzooecial avicularia are modified zooecia. They have a pivot and a long very pointed canal.

Measurements.—

Apertura $\begin{cases} ha = 0.20 \text{ mm.} \\ la = 0.22 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.75\text{–}1.00 \text{ mm.} \\ lz = 0.50\text{–}0.75 \text{ mm.} \end{cases}$

Biology.—One of our specimens covering a surface of 6 square centimeters contained 18 superposed lamellae. Exteriorly the color is gray but on the broken edge it is green; it is the calcite itself that is pigmented. In tropical seas the richness of coloration is much greater than in northern seas.

Affinities.—In its zooecial and zoarial aspects this species approaches very much *Stylopoma spongites*, Pallas, 1766, from the Gulf of Mexico; but the zooecia are twice as large, the small avicularia are adjacent to the apertura and the interzooecial avicularium is not spathulated.

Occurrence.—On *Tridacna* from an unknown Philippine locality.

Holotype.—Cat. No. 8076, U.S.N.M.

Genus SCHIZOPODRELLA Canu and Bassler, 1917

SCHIZOPODRELLA CUCULLATA, new species

Plate 35, fig. 5

Description.—The zoarium encrusts shells. The zooecia are distinct, separated by a furrow, somewhat elongated or orbicular; the frontal is convex and covered with very small tremopores. The apertura is small, transverse with a wide triangular, short rimule; the peristome is complete, salient and formed of a broad lip in front of the apertura. The ovicell is small, triangular, in the form of a *hood*, smooth, not closed by the operculum. Between the apertures there is a spathulate avicularium with a much enlarged beak and turned towards the top.

Measurements.—

Apertura $\begin{cases} ha = 0.07 \text{ mm.} \\ la = 0.08 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$

This small species is quite distinct, and we believe it ought to be figured in spite of its rarity. Only the figured specimen has been found; it was dead.

Occurrence.—D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

Holotype.—Cat. No. 8077, U.S.N.M.

Genus SCHIZOPORELLA Hincks, 1880

SCHIZOPORELLA COSTULATA, new species

Plate 36, figs. 10, 11

Description.—The zoarium encrusts shells and bryozoa (*Adeonellopsis*). The zooecia are distinct, separated by a deep furrow, elongated, elliptical; the frontal is somewhat convex, smooth, surrounded by areolar pores and costules. The apertura is suborbicular, without visible cardelles. The operculum is schizoporellid.

Measurements.—

Apertura $\begin{cases} ha = 0.14 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.24 \text{ mm.} \end{cases}$

Affinities.—The operculum is not in agreement with the exterior aspect of the apertura. The latter appears to us to be of the lepralioid nature, especially since on a well preserved specimen we have noticed two minute cardelles. The operculum is clearly schizoporellid and with a simplicity which approaches that of the genus *Schizopodrella.* We found two forms, one recalling *Schizopodrella unicornis* Johnston, 1847, and the other *Schizopodrella nivea* Busk, 1884.

Exteriorily this species could be classed in the fossil genus *Cyclocolposa* Canu and Bassler, 1920, of the American Miocene, but lacking specimens we have not been able to verify the presence of the characteristic parietal dietellae. This species is quite variable in aspect.

Biology.—Our specimens from Jolo were living but they were not ovicelled.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S; 24.2° C.

Cotypes.—Cat. Nos. 8078–8080, U.S.N.M.

SCHIZOPORELLA PERFORATA, new species

Plate 35, fig. 9

Description.—The zoarium is rose color and encrusts shells. The zooecia are little distinct, separated by a furrow of little depth elongated, elliptical; the frontal is very slightly convex, perforated with large tremopores. The apertura is elliptical, transverse, with a short, triangular rimule and two internal condyles. The ovicell is deeply embedded in the distal zooecium; it is orbicular, granular, little globular, and little salient; it is *perforated* by an enormous frontal pore.

Measurements.—

Apertura $\begin{cases} ha = 0.15 \text{ mm.} \\ la = 0.20\text{–}0.25 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.65\text{–}0.70 \text{ mm.} \\ lz = 0.35\text{–}0.45 \text{ mm.} \end{cases}$

Variations.—The orifice of the ovicelled zooecia appears different from the other apertures but this is an illusion caused by the embedding of the ovicell in the distal zooecium. The visible orifice is a false aperture for in dissection the true aperture appears; its operculum closes the ovicell.

Biology.—Our specimens were rose colored. This pigmentation of calcite is not rare in the bryozoa but we are ignorant if it has any relationship to the nature of alimentation. Our specimens were dead.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Holotype.—Cat. No. 8081, U.S.N.M.

SCHIZOPORELLA PRODITOR, new species

Plate 35, fig. 6

Description.—The zoarium is free and unilamellar. The zooecia are distinct, separated by a deep furrow, elongated, rectangular; the frontal is convex and perforated with large tremopores. The apertura is suborbicular, somewhat elongated; it is formed of a semicircular anter and of a very broad rimule. At the side of the apertura there is a long slender avicularium with a very pointed beak turned towards the base and attached to the distal zooecium.

Measurements.—

Apertura $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.11 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50\text{–}0.60 \text{ mm.} \\ lz = 0.35\text{–}0.40 \text{ mm.} \end{cases}$

Biology.—This species is very well characterized by its oral avicularium attached to the distal zooecium. Although incomplete this small fragment appeared interesting enough for description; it reveals once more the biologic unity of a bryozoan colony. It is absolutely false that each zooecium is independent for all the zooecia lived one for the other to the profit of the entire zoarium. They are obedient to an instinctive law of which the ancestrula arising from the larva is the necessary origin.

Occurrence.—D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

Holotype.—Cat. No. 8082, U.S.N.M.

Subfamily HIPPOPORAE Canu and Bassler, 1917

Genus HIPPOPORINA Neviani, 1895

HIPPOPORINA GRANIFERA, new species

Plate 35, fig. 10

Description.—The zoarium encrusts entirely small fragments of shells. The zooecia are distinct, separated by a little elongated furrow, deformed by a lateral avicularium; the frontal is very convex and bears large *granulations*. The apertura is small, elongated; the anter is pyriform; the poster is enlarged in the proximal portion. The ovicell is globular, placed on the distal zooecium, not closed by the operculum.

Measurements.—

Apertura $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.07 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.40 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$

Affinities.—This species is very well characterized by its large frontal granulations. The figured zoarium forms a small fusiform mass. Our specimens were dead.

Occurrence.—D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

Holotype.—Cat. No. 8083, U.S.N.M.

HIPPOPORINA FALLAX, new species

Plate 37, figs. 4, 5

Description.—The zoarium encrusts Orbitoides, nullipores, and small fragments of shells; it is sometimes multilamellar. The zooecia are distinct, separated by a furrow, somewhat elongated, deformed by a very large lateral avicularium; the frontal is expanded, convex,

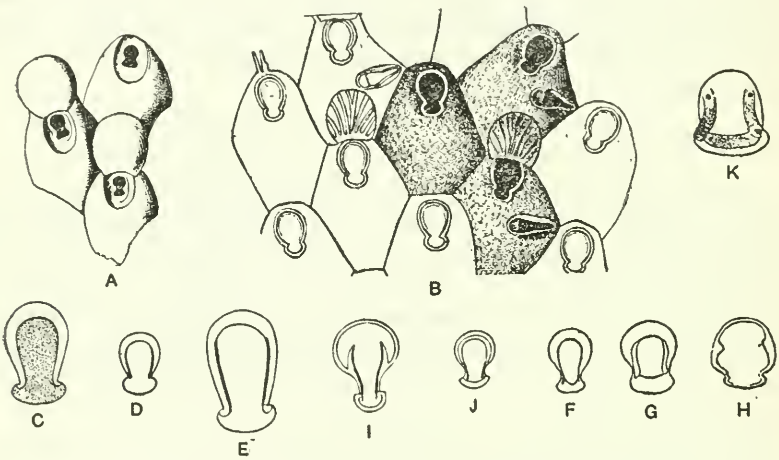

Fig. 132.—Genus *Hippoporina* Neviani, 1895

A. *Hippoporina integra* Neviani, 1895. Ovicelled and ordinary zooecia, ×25. (After Neviani, 1895.)

B–E. *Hippoporina cleidostoma* Smitt, 1873. B. View of zooecia. (After Smitt, 1873.) C, D, E. Various opercula, ×85.

F–H. *Hippoporina porcellana* Busk, 1860. F. G. Opercula from same colony, ×85 (after Waters, 1898). H. Operculum. (After Norman, 1909.)

I. *Hippoporina fallax* Canu and Bassler. Operculum, ×85.

J. *Hippoporina planulata* Canu and Bassler. Operculum, ×85.

K. *Hippoporina eliminata* Waters, 1887. Operculum, ×85. (After Waters.)

very finely granular. The apertura is elongated, bordered, the anter is quite large and pyriform. The poster is small and enlarged in its proximal portion. The ovicell is smooth, convex, not closed by the operculum, globulose.

Measurements.—

Apertura $\begin{cases} ha = 0.14 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.40 \text{ mm.} \\ lz = 0.30\text{–}0.40 \text{ mm.} \end{cases}$

Affinities.—At the first examination and in the presence of a large lateral avicularium this species has the aspect of a *Gemellipora*. This appearance is *deceiving* as close examination of the aperture indicates a true *Hippoporina,* for the poster is not triangular. The operculum confirms the examination of the aperture. There are two large condyles on the interior.

Biology.—The marginal zooecia are not ovicelled, the ovicell being placed on the distal zooecium forms later and when by regeneration a female polypide succeeds an ordinary one.

This species is never abundant, but it has been dredged to the north and south of the Sulu Sea in several localities. The specimens from the deep water near Mount Dromedario are similar to the others and the species does not appear sensible to bathymetric influence.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S. Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.

D. 5192. Jilantaguan Island, off northern Cebu Island; 11° 09′ 15″ N.; 123° 50′ E.; 32 fathoms; green S.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Cotypes.—Cat. Nos. 8084, 8085, U.S.N.M.

HIPPOPORINA PLANULATA, new species

Plate 37, fig. 6

Description.—The zoarium encrusts bryozoa. The zooecia are distinct, separated by a furrow, small, hexagonal; the frontal is plain and smooth. The apertura is very small; the anter is pyriform; the poster is somewhat enlarged in its proximal portion. The ovicell is large, placed on the distal zooecium of which it covers a large part, smooth and globular.

Measurements.—

Apertura $\begin{cases} ha = 0.09 \text{ mm.} \\ la = 0.07 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.25\text{–}0.30 \text{ mm.} \\ lz = 0.25\text{–}0.30 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Hippoporina porcellana* Busk, 1860, in its much smaller micrometric measurements and its plain frontal. It is one of the smallest species known.

Biology.—Our specimens were living and were in reproduction and fixation February 15, 1908. The ectocyst alone is pigmented and of a beautiful, clear light color.

Occurrence.—

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; S. Sh.

Holotype.—Cat. No. 8086, U.S.N.M.

HIPPOPORINA SQUAMOSA, new species

Plate 37, figs. 8, 9

Description.—The zoarium encrusts Orbitoides and small fragments of shells. The zooecia are distinct, separated by a furrow, small, elliptical, deformed laterally by one or two small oral avicularia; the frontal is smooth and convex. The apertura is suborbicular; two minute cardelles placed very low, separate the anter from the poster; the latter is buried under a convex oral mucro. The ovicell is embedded in the distal zooecium, globular, smooth, not closed by the operculum.

Measurements.—

Apertura $\begin{cases} ha = 0.05 \text{ mm.} \\ la = 0.05 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.27 \text{ mm.} \\ lz = 0.25\text{–}0.30 \text{ mm.} \end{cases}$

Affinities.—The ancestrula is a very small zooecium. The presence of an oral mucro gives to the zooecia a very characteristic aspect for they appear like small scales regularly imbricating in many rows around the ancestrula.

Biology.—All our specimens were dead. The geographic distribution of this species is rather large for it has been dredged along the two shores, western and eastern of the Sea of China.

Occurrence.—

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

D. 5311. China Sea, vicinity of Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

D. 5341. Endeavor Point, Malampya Sound; 10° 57′ 51″ N.; 119° 17′ 26″ E.; 20 fathoms; gy. M.

Cotypes.—Cat. No. 8087, U.S.N.M.

HIPPOPORINA (?) VERRUCOSA, new species

Plate 37, fig. 7

Description.—The zoarium is unilamellar. The zooecia are distinct, separated by a furrow of little depth, large elongated, elliptical; the frontal is somewhat convex and covered with small hollow warts regularly arranged in quincunx. The apertura is placed at the bottom of a peristomie formed by the thickening of the frontal;

the anter is a large oval arch distinct from the peristomie; the poster is very short and reduced to a simple concavity. The ovicell is convex, short, transverse, verrucose and can not be closed by the operculum. Some zooecia bear on the frontal a large oblique elliptical avicularium with pivot.

Measurements.—

Apertura $\begin{cases} ha = 0.22 \text{ mm.} \\ la = 0.20 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.75\text{–}0.85 \text{ mm.} \\ lz = 0.60 \text{ mm.} \end{cases}$

Affinities.—There is a great difference in the size of the zooecia in this species from all the other known species. We may therefore doubt our generic determination but we have not enough specimens to clarify this point. The only important difference that we have seen exteriorily, is the presence of a large frontal avicularium on some zooecia a character of doubtful generic order.

Biology.—Our specimens were dead. Those from Jolo dredged in shallow waters have much smaller warts and a less thickened frontal.

Occurrence.—

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

Holotype.—Cat. No. 8088, U.S.N.M.

Genus HIPPOMENELLA Canu and Bassler, 1917

HIPPOMENELLA REPUGNANS, new species

Plate 38, figs. 1, 1′

Description.—The zoarium encrusts shells. The zooecia are distinct, separated by a deep furrow, very large, elongated, deformed laterally and superiorily by two very long narrow, arched avicularia; they are poorly ornamented and sometimes arranged in opposite directions; the frontal is convex, smooth in the middle, perforated laterally by a large number of tremopores. The apertura is elongated, ovoid, provided with two salient cardelles placed in the inferior third; the anter is very large; the poster is small and narrow; the peristome wide and little salient, bears 10 to 12 spines. The ovicell is relatively small, embedded in the distal zooecium. It opens above the operculum by a narrow slit; it bears two large frontal areas surrounded by a salient collar and closed by a very fragile, perforated, calcareous membrane.

Measurements.—

Apertura $\begin{cases} ha = 0.24 \text{ mm.} \\ la = 0.18 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.00 \text{ mm.} \\ lz = 0.70 \text{ mm.} \end{cases}$

Affinities.—We know only two recent species of the genus *Hippomenella* so common in the Eocene and Oligocene of America. The present and the following species complete the series but we have also some incomplete specimens of another species dredged to the north of Tawi Tawi.

This species is very *repugnant* in the variation of its ovicells and unexpected arrangement of its zooecia. The beak of the avicularium is turned toward the base and has a pivot.

Biology.—It is rare to find zooecia of this size. Certain species of Petraliidae and of Hippopodinidae alone reach such size. Gigantism in the Bryozoa as in other animals is not a proof of longevity. Our specimens were dead.

Occurrence.—On *Tridacna* from an unknown Philippine locality.

Holotype.—Cat. No. 8366, U.S.N.M.

HIPPOMENELLA POROSA, new species

Plate 38, figs. 2, 3

Description.—The zoarium encrusts cellepores and debris. The zooecia are distinct, separated by a shallow furrow, very large, elongated, elliptical, swollen; the frontal is little convex, ornamented with a double row of large areolar pores and with thick costules smooth in the vicinity of the aperture. The aperture is large and suborbicular, with a smooth vestibular arch; the peristome is thin and little salient. The ovicell is very large, convex, imbedded in the distal zooecium, ornamented with large costules directed toward a median knob; the two areas are deep, triangular, and limited by the costules; the orifice is a narrow slit placed above the aperture. The avicularia are small, triangular, transverse, scattered among the pores.

Measurements.—

Apertura $\begin{cases} ha = 0.20\text{–}0.25 \text{ mm.} \\ la = 0.20\text{–}0.25 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 1.05 \text{ mm.} \\ lz = 0.75 \text{ mm.} \end{cases}$

Affinities.—This superb species is easily distinguished from *Hippomenella repugnans* by its small avicularia and the unusual richness of its ornamentation. At the base of the ovicell there are two large hollow spines. Only the figured specimen has been found.

Occurrence.—D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; coarse sand.

Holotype.—Cat. No. 8466, U.S.N.M.

Genus HIPPODIPLOSIA Canu, 1916

HIPPODIPLOSIA(?) BACULINA, new species

Plate 36, figs. 7, 8

Description.—The zoarium is free and formed of small *rods* containing 4 longitudinal rows of zooecia. The zooecia are distinct, separated by a deep furrow, little elongated, rectangular; the frontal is quite convex, very thick, granular, covered by small expanded tremopores and with a small triangular mucro above the apertura. The apertura is deep, placed at the front of a peristomie formed by the thickening of the frontal; it is semielliptical, with a very concave proximal border and two small cardelles placed very low. Two small avicularia with pivot are arranged symmetrically on each side of the apertura.

Measurements.—

Apertura $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.17 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.80\text{–}0.85 \text{ mm.} \\ lz = 0.60 \text{ mm.} \end{cases}$

Affinities.—The operculum exhibits the two small linear attachments of *Hippodiplosia*, because of which we class this species in this genus, although, since we do not know the ovicell, our arrangement

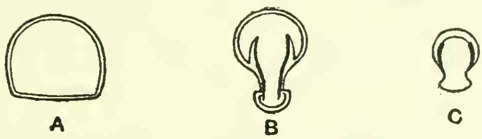

Fig. 133.—Opercula of Hippoporae, ×85

A. *Hippodiplosia baculina*, new species. B. *Hippoporina fallax*, new species. C. *Hippoporina planulata*, new species.

is doubtful. The species is very well characterized by its zoarial form; unfortunately it is very rare.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

Cotypes.—Cat. Nos. 8089, 8090, U.S.N.M.

Genus CRYPTOSULA Canu and Bassler, 1925

There is no external ovicell; the egg evolves in the interior of a membranous pocket formed by a dorsal evagination of the subdiaphragmatic part of the sheath. The frontal is a tremocyst. The operculum bears two linear muscular attachments very close to the edge; 16, 18 tentacles.

Genotype.—*Cryptosula* (*Eschara*) *pallasiana* Moll, 1803 (not Hincks, 1880).

Range.—Recent.

History.—Our description of the genus *Hippodiplosia* Canu, 1916, given in 1920 (p. 393) was based on the figure given by Hincks, 1880,[11] of *Lepralia pallasiana* from Madeira. This is not *Eschara pallasiana* Moll, 1803, which is never ovicelled and in which the poster

[11] Annals and Magazine of Natural History, p. 9 (sep.), pl. 10, fig. 3.

is always broader than the anter. This latter species now very well known from the work of Calvet, 1900, becomes the type of our new genus *Cryptosula*. We class it in the Escharellidae because of the nature of its larva.

There is no necessity for change in the genus *Hippodiplosia*. Its genotype *Lepralia pallasiana* Hincks, 1880, is very rare and it is unfortunate that a more common species was not chosen. The error of synonymy made by Hincks, 1880, and by Jelly, 1889, is the cause of the initial confusion which caused us to write Pallas, 1803, instead of Hincks, 1880.

Genus HIPPOPLEURIFERA Canu and Bassler, 1927

The ovicell is hyperstomial and is not closed by the operculum. The frontal bears at least a double row of areolar pores separated by radial costules. The cardelles are small. There are spines on the peristome and zooecial avicularia in which the beak is always oriented toward the top of the zooecia.

Genotype.—*Hippopleurifera* (*Eschara*) *sedgwicki* Milne-Edwards, 1838.

Range.—Miocene (Helvetian)—Recent.

This genus differs from *Hippomenella* Canu and Bassler, 1917, in the inverse orientation of the avicularia and in the absence of areas on the ovicell. It differs from *Umbonula* Hincks, 1880, in the presence of two cardelles, in a strongly chitinized operculum, in the presence of lateral avicularia and of rows of interareolar costules.

The greater part of the time an oral mucro is much developed. It has for its function the protection of the entrance of the compensatrix which is very large. When it does not exist, it is replaced by a small avicularium in which the movements of the mandible have the same function.

The genus is well represented in the Helvetian and the Tortonian of Europe. The genotype is from the English Pliocene but it is more variable than the other species.

HIPPOPLEURIFERA(?) PHILIPPINENSIS, new species

Plate 38, fig. 5

Description.—The zoarium encrusts bryozoa. The zooecia are distinct, separated by a deep furrow, large, elongated, elliptical. The frontal is very convex and is a smooth pleurocyst surrounded by a double row of small areolar pores separated by short costules. The aperture is suborbicular; the peristome is thin, salient, garnished with 6 large distal spines. The zooecial avicularia are large, elongated, the beak at the top, with two denticles for pivot.

Affinities.—The figured specimen only, consisting of six zooecia, has been found. The aperture and the dimensions are quite variable;

the cardelles are hardly visible; the ovicell is lacking. It is then doubtfully that we class it in *Hippopleurifera*. However, the structure of the frontal and the aspect of the avicularia are indeed of this genus.

The great deep, near Tawi Tawi (D. 5577), which has furnished us many giant species, affords great biological interest. Further dredgings there are most desirable.

Occurrence.—D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Holotype.—Cat. No. 8092, U.S.N.M.

Subfamily PERISTOMELLAE Canu and Bassler, 1917

Genus PERISTOMELLA Levinsen, 1902

PERISTOMELLA COCCINEA Abildgard, 1805

Plate 38, fig. 4

1920. *Peristomella coccinea* Canu and Bassler, North American Early Tertiary Bryozoa, Bull. 106, U. S. National Museum, p. 409, pl. 87, fig. 18 and 14 (bibliography, geologic and geographic distribution).

Although rather common, the biology of this species still remains to be studied. Our specimens were dead.

Occurrence.—

D. 5150. Sirun Island, Sulu Archipelago; 5° 23′ 20″ N.; 120° 35′ 45″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Plesiotypes.—Cat. Nos. 8093, 8094, U.S.N.M.

Genus DIDYMOSELLA Canu and Bassler, 1920

We created this genus basing it upon a fossil form of the American Vicksburgian very close to *Porina larvalis* MacGillivray. We have had the good fortune to discover two recent species which confirm our interpretation of 1920. As these species were entirely deprived of chitinous appendages we are not able to add many new observations.

Didymosella is a tropical genus of shallow waters although it does not fear a depth of 372 meters. We have already noted the elevation of the sea bottom in the Vicksburgian and the presence of *Didymosella* is only another proof. When we know the biology of the bryozoa better we can then easily study the oscillation of the sea bottom.

DIDYMOSELLA PARVIPORA new species

Plate 39, fig. 1

Description.—The zoarium is unilamellar or encrusting shells and nullipores. The zooecia are little distinct, separated by a furrow or by a very small thread, elongated, swollen; the frontal is convex and bears infundibuliform tremopores, two small special pores and laterally an elliptical avicularium with pivot. The apertura is buried at the bottom of a deep peristomie. The peristome is thick and orbicular.

Measurements.—

Peristomice $\begin{cases} hp = 0.10 \text{ mm.} \\ lp = 0.10\text{–}0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50\text{–}0.75 \text{ mm.} \\ lz = 0.50 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Didymosella crassa* Canu and Bassler, 1920, and from *Didymosella porosa* Stoliczka, 1864, in its especially small pores. These three species are very close together. Our specimens were dead and very rare.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

Holotype.—Cat. No. 8095, U.S.N.M.

DIDYMOSELLA COSTULATA, new species

Plate 39, figs. 2, 3

Description.—The zoarium is unilamellar. The zooecia are little distinct, somewhat elongated, swollen; the frontal is an olocyst bearing a costulated tremocyst; it has the two characteristic pores and laterally an elliptical, transverse avicularium. The apertura is buried at the bottom of an irregular peristomie; the peristome is very thick and bears some spines. The ovicell is deeply embedded in the distal zooecium; it is formed of an olocyst incompletely covered by a costulated tremocyst. The operculum closes the ovicell.

Measurements.—

Peristomice $\begin{cases} hp = 0.15\text{–}0.18 \text{ mm.} \\ lp = 0.15\text{–}0.18 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.70\text{–}0.75 \text{ mm.} \\ lz = 0.55\text{–}0.65 \text{ mm.} \end{cases}$

Our specimens were dead and we were not able to make any further observations.

Occurrence.—

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5162. Tinagta Island, Tawi Tawi; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

Cotypes.—Cat. Nos. 8096, 8097, U.S.N.M.

Subfamily Microporellae Canu and Bassler, 1917

Genus FENESTRULINA Jullien, 1888

FENESTRULINA INFUNDIBULIPORA, new species

Plate 39, figs. 4–6

Description.—The zoarium encrusts shells, nullipores and bryozoa. The zooecia are distinct, separated by a deep furrow, little elongated, hexagonal; the frontal is convex and covered by large *infundibuliform* pores; the ascopore is orbicular, median and surrounded by a salient peristome. The ovicell is salient, convex, hyperstomial, closed by the operculum, marginated and of the same nature as the frontal; the orifice of the ovicelled zooecia is larger.

Measurements.—

Apertura $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.12\text{–}0.15 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.65 \text{ mm.} \\ lz = 0.50\text{–}0.55 \text{ mm.} \end{cases}$

Affinities.—This new species differs from *Fenestrulina malusi* avigny-Audouin, 1826, in its frontal entirely covered by pores.

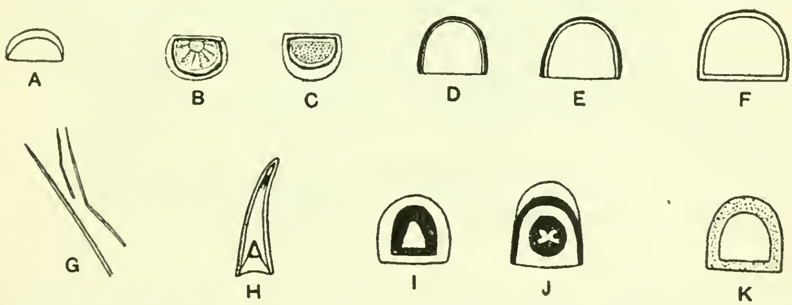

Fig. 134.—Opercula, etc., of Microporellae, ×85

A. *Microporella ciliata* Linnaeus, 1759. B, C. *Inversiula inversa* Waters, 1887. D–G. *Fenestrulina infundibulipora*, new species. D, E, F. Variations in opercula. G. Small rods (diatoms?) in the cell. H–K. *Calloporina sigillata*, new species. H. Avicularian mandible. I, J. Opercula with opaque armature. K. Operculum with central armature transparent.

It differs from *Fenestrulina punctata* Canu and Bassler, 1923, from the Pleistocene of California in its orbicular ascopore, its infundibuliform and larger frontal pores and in its ovicell as wide as the zooecium.

The frontal of certain zooecia appears to be formed of 2 or 3 superposed pellicules. The operculum is bordered by a thick sclerite. In the interior of the zooecia we have found some small hooks as in *Thalamoporella.*

Biology.—Almost all of our specimens were living. The reproduction and fixation were observed from February 15th to September 25th so that it is rather probable that this continued all the year without interruption. There is no difference between the specimens from deep waters (439 meters) and the specimens of sublittoral waters (36 meters).

The color of the ectocyst is that of the substratum although one of our specimens is of an intense beautiful red.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.; 17.2° C.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.

Cotypes.—Cat. Nos. 8098–8100, U.S.N.M.

Genus INVERSIULA Jullien, 1888

INVERSIULA INVERSA Waters, 1887

Plate 39, fig. 7

1887. *Porina inversa* Waters, Bryozoa from New South Wales, etc., Annals and Magazine Natural History, ser. 5, vol. 20, p. 190, pl. 4, fig. 23; pl. 5, fig. 5.

1889. *Microporella inversa* Waters, Bryozoa from New South Wales, Annals and Magazine Natural History, ser. 6, vol. 4, p. 6, pl. 1, figs. 11–12.

1890. *Microporella ciliata* Kirkpatrick, Hydroida and Polyzoa from Torres Strait, Scientific Proc. Royal Dublin society (n. s.), vol. 6, p. 612.

The zoarium encrusts spines of sea urchins, nullipores and shells; it is white or pale rose color. The zooecia measure about 0.50 mm. by 0.40–0.45 mm. There is no ovicell. The geometric decoration of the frontal is remarkable and marvelous. It is necessary therefore to compare the genus *Inversiula* with the genus *Anarthropora* and *Triporula.*

The operculum is very thick and difficult to prepare. It is covered with various ornaments somewhat more crowded than in Water's figure of 1886 but absolutely identical in its general aspect. Moreover our opercula are surrounded by a very thin and narrow membrane which enlarges it somewhat. This is a very special opercular organization which has never been observed in any other genus.

Biology.—This species was in complete fixation (ancestrulated) on February 18, 1908 (44 meters).

Occurrence.—

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Geographic distribution.—Pacific; Sow-and-Pigs Reef, 3–4 fathoms; Port Jackson, 10 fathoms; Green Point, Australia; Murray Island, Torres Strait, 15–20 fathoms.

Plesiotypes.—Cat. Nos. 8101, 8102, U.S.N.M.

Genus MICROPORELLA Hincks, 1877

MICROPORELLA CILIATA Linnaeus, 1759

Plate 40, figs. 2–4

1852. *Porina africana* D'Orbigny, Paleontologie francaise, Terrain Crétacé, vol. 5, p. 434 (fide Waters 1905).

1852. *Reptescharellina armata* D'Orbigny, Paleontologie francaise, Terrain Crétacé, vol. 5, p. 453 (fide Waters, 1905).

1918. *Microporella ciliata* Waters, Bryozoa Littoral Marine Fauna of the Cape Verde Islands, Linnean Society Journal, Zoology, vol. 34, p. 23 (bibliography).

1923. *Microporella ciliata* Canu and Bassler, North American Later Tertiary and Quaternary Bryozoa, Bull. 125, U. S. National Museum, p. 119, pl. 20, figs. 1–6; pl. 36, figs. 4, 5. (Bibliography and geologic distribution.)

This cosmopolitan species is not rare but its biology is still unknown. Certainly assembling the numerous published works on the species some important notes will be made.

Biology.—Our living specimens indicate that they were in reproduction and fixation during the months of February and March, 1908 (36–37 meters). The peristome which developed around the ascopore is quite variable according to the localities; our specimens with it most salient came from Hong Kong.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5179. Romblon Light; Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

D. 5311. China Sea, vicinity of Hong Kong; 21° 33′ N.; 116° 15′ E.; crs. S., Sh.

Plesiotypes.—Cat. Nos. 8103–8106, U.S.N.M.

MICROPORELLA CORONATA Savigny-Audouin, 1826

Plate 40, fig. 1

1826. *Flustra coronata* SAVIGNY-AUDOUIN, Description de l'Egypte, p. 239, pl. 9, fig. 6.
1881. *Lepralia lunifera* HASWELL, Polyzoa from Queensland Coast, Proc. Linnean Society New South Wales, vol. 5, p. 40.
1887. *Lepralia ciliata* var. WATERS, Bryozoa from New South Wales, Annals and Magazine Natural History, ser. 5, vol. 20, p. 188.
1907. *Microporella coronata* WALES, Bryozoa of the Sudanese Red Sea, Journal Linnean Society Zoology, vol. 31, p. 142, pl. 12, figs. 6–9 (opercula, mandible).
1909. *Microporella coronata* NORMAN, Polyzoa of Madeira, Journal Linnean Society, Zoology, vol. 30, p. 297, pl. 39, fig. 4.
1925. *Microporella coronata* CANU and BASSLER, Les Bryozoaires du Maroc et de Mauritanie (Mem. 1), Memoires de la Societé des Sciences du Maroc, vol. 10, p. 37, pl. 3, figs. 4.
1928. *Microporella coronata* CANU and BASSLER, Les Bryozoaires du Maroc et de Mauritanie, mem. 2, p. 39.

Waters identified this species with *Microporella californica* Busk, 1852, but we are not certain of the exactitude of this synonymy. Our specimens were dead; they bear 4 to 6 spines.

Occurrence.—D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Geologic distribution.—Pacific; Holborn Island, Queensland, Haswell and Sydney (Waters). Red Sea; Suez docks and Gimsah Bay (Waters). Atlantic; Madeira (Norman).

Plesiotypes.—Cat. No. 8107, U.S.N.M.

MICROPORELLA LINEATA, new species

Plate 40, fig. 5

Description.—The zoarium encrusts a black pebble. The zooecia are arranged in uniserial and linear rows; they are elongated, elliptical; the frontal is convex and ornamented with a large number of small tremopores; the ascopore is little removed from the aperture, orbicular surrounded by a salient peristome. The apertura is semi-elliptical, transverse; the peristome is salient and bears 6 hollow spines. There is a marginal avicularium placed below the ascopore.

Measurements.—

Apertura $\begin{cases} ha = 0.07 \text{ mm.} \\ la = 0.11 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.80 \text{ mm.} \\ lz = 0.50 \text{ mm.} \end{cases}$

Occurrence.—D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.; 17.2° C.

Holotype.—Cat. No. 8108, U.S.N.M.

MICROPORELLA VENTRICOSA, new species

Plate 40, fig. 6

Description.—The zoarium encrusts shells and especially pebbles. The zooecia are distinct, separated by a furrow, very little elongated, hexagonal, swollen; the frontal is convex, covered with very small, little visible tremopores; the ascopore is large, orbicular, surrounded by a very salient peristome. The apertura is semielliptical, transverse; the peristome is salient and bears 4 short, hollow spines. A lateral, triangular avicularium appears at the level of the ascopore.

Measurements.—

Apertura $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.15 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.75 \text{ mm.} \\ lz = 0.70 \text{ mm.} \end{cases}$

Affinities.—The frontal pores of this species are still finer and more numerous than those of *Microporella heermanni* Gabb and Horn, 1862.

Occurrence.—

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.

Holotype.—Cat. No. 8109, U.S.N.M.

Genus CALLOPORINA Neviani, 1895

CALLOPORINA SIGILLATA, new species

Plate 40, figs. 9, 10

Description.—The zoarium encrusts nullipores, shells, foraminifera, and sea urchins; the ectocyst is yellow or rose color. The zooecia are distinct, separated by a deep furrow, elongated, elliptical, irregular; the frontal is convex, surrounded by interareolar, salient costules; the ascopore is orbicular and very salient; the two triangular, lateral avicularia have their pivots placed between the ascopore and the apertura. The apertura is semielliptical, elongated; the peristome is very thick, very salient and bears 6 large hollow spines. The ovicell is large, globular, decorated with from 2 to 3 semicircular, deep furrows.

Measurements.—

Apertura $\begin{cases} ha = 0.15 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.75 \text{ mm.} \\ lz = 0.45 \text{ mm.} \end{cases}$

Affinities.—This splendid species is ornamented with sculpture in relief which highly decorates it. This same ornament exists on *Microporella decorata* Reuss, 1847, but it is there more attenuated and the micrometric measurements are much smaller.

This species differs from *Microporella diadema* MacGillivray, 1895, and its varieties in the arrangement of its frontal ornament and its ascopore.

Structure.—In the interior there is a thick olocyst and the ascopore is very small. The operculum is quite complicated and variable. The central armature is opaque, transparent or absent. The mandible is falciform.

Biology.—Our specimens were almost all living and were in reproduction and fixation in February and March, 1908 (36–55 meters).

The color of the ectocyst is not constant and depends either on the substratum or on some unknown cause; mimicry in the bryozoa is very frequent in the tropical seas.

This is a species of shallow water and it becomes very rare in greater depths. In order to develop its ornament, the waters must be calm.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5174. Jolo Light, Jolo; 6° 03′ 45″ N.; 120° 57′ E.; 20 fathoms; crs. S.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard sand; 24.2° C.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 48′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Cotypes.—Cat. No. 8110, U.S.N.M.

CALLOPORINA SCULPTA, new species

Plate 40, figs. 7, 8

Description.—The zoarium encrusts shells. The zooecia are distinct, separated by a furrow, somewhat elongated, hexagonal; the frontal is admirably sculptured; it bears infundibuliform areolar pores, a salient concave, oblique peristome supporting the ascopore with a salient peristome, and two longitudinal triangular avicularia arranged symmetrically on each side of the ascopore. The apertura is semilunar, the peristome is salient and bears 6–7 hollow spines.

Measurements.—

Apertura $\begin{cases} ha = 0.08 \text{ mm.} \\ la = 0.07 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.40 \text{ mm.} \\ lz = 0.30\text{–}0.35 \text{ mm.} \end{cases}$

Affinities.—This species is very well characterized by the presence of its frontal lamella. Although very rare, it appeared to us as interesting as beautiful. Our specimens were dead.

Occurrence.—D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Holotype.—Cat. No. 8111, U.S.N.M.

Genus STEPHANOPORA Kirkpatrick, 1888

Zooecia with semicircular orifice, lower margin straight, not dentate, without sinus; peristome raised posteriorily; from anterior margins of walls thus formed, a process is given off on each side uniting in front to form with posterior wall a tubular peristome incomplete below. From lower margin of peristome a broad branched process is given off uniting with processes from other zooecia to form a secondary cribriform roof (Kirkpatrick).

Genotype.—*Stephanopora cribrispinata* Kirkpatrick, 1888. Recent (Indian Ocean).

Fig. 135.—Genus *Stephanopora* Kirkpatrick, 1888

A, B. *Stephanopora cribrispinata* Kirkpatrick, 1888. A. Anterior view of zooecia. From the lower margin of the peristome a broad branched process is given off, uniting with the processes from other zooecia to form a secondary cribriform roof. B. Cell showing semicircular shape of the orifice. (After Kirkpatrick, 1888.

MISCELLANEOUS GENERA OF ESCHARELLIDAE

Genus PSEUDOFLUSTRA Bidenkap, 1897

The ovicell is hyperstomial and porous. The frontal is smooth and bordered with small areolar pores; it bears a median and linguiform avicularium. There are two distal septulae and 7–8 lateral ones. The apertura is semicircular. No oral glands; no avicularian glands. The colony is radicelled and formed of lamellar segments united by the radical fibrils; 18 tentacles.

Genotype.—*Pseudoflustra* (*Flustra*) *solida* Stimpson, 1853.

Range.—Recent (northern seas).

Levinsen, 1887, and Waters, 1900, are not in accord as to the form of the operculum. This genus appears to us almost identical with *Houzeauina* Pergens, 1889 (fossil). We can make our conclusions only after comparison of the apertural form viewed from the interior in the two genera.

Family EURYSTOMELLIDAE Levinsen, 1909

We have reproduced practically all that is known of this family in our 1923 work and have here also illustrated the two species referred to the family. *Eurystomella* Levinsen, 1909, is the only known genus.

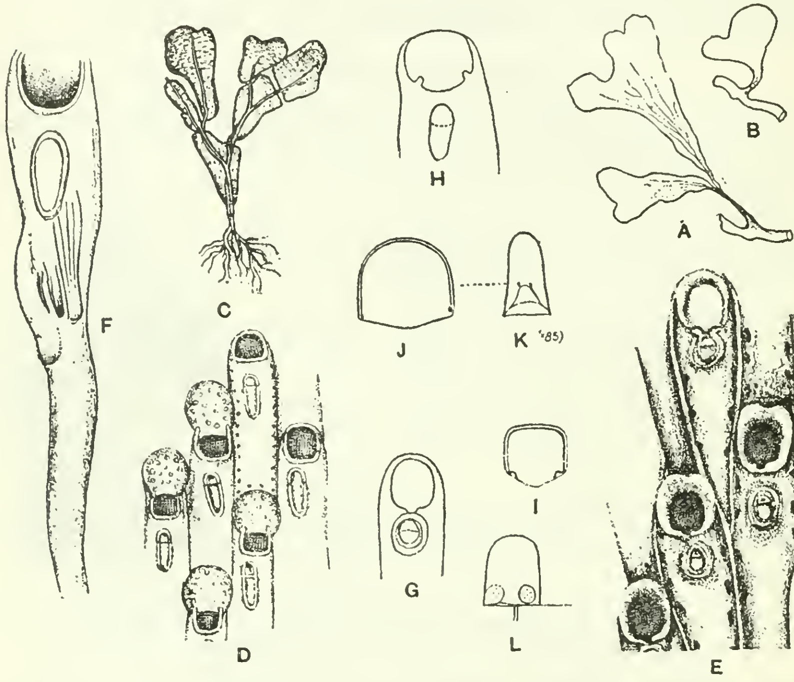

Fig. 136.—Genus *Pseudoflustra* Bidenkap, 1897

A–I. *Pseudoflustra solida* Stimpson. A, B. Zoarial fronds, natural size. (After Vigelius, 1882.) C. Zoarium with numerous tubular fibers which pass downward from various points on both the surfaces of the zoarium, uniting below to form a kind of stem. D. Zooecia with ovicells and long frontal avicularia. (C, D. After Hincks, 1880.) E. Zooecia with much-developed peristomes and short salient frontal avicularium. F. Showing the connection between the epidermal covering of the cell and the tubular fiber. G. Outline of orifice of smaller form. H. Same of larger form. (E–H. After Hincks, 1892.) I. Form of the apertura. (After Levinsen, 1887.) J. Operculum ×85. K. Mandible of the avicularium, ×250. L. Transverse section showing the two distal septulae. (I–L. After Waters, 1900.)

Family SMITTINIDAE Levinsen, 1909

We have described and illustrated this family and its various genera in our 1920 work with the exception of the two genera *Malleatia* and *Marguetta* Jullien, 1903, now referred here, descriptions of which follow:

Genus MARGUETTA Jullien, 1903

The aperture is semilunar with neither lyrule nor cardelles; the anter is formed conformable to a curve which plunges at 45° below and forward; the poster forms a vertical arch above the extremities of the anter and bears a median avicularium. The frontal is bordered by areolar pores transformed sporadically into avicularia. The zoarium is free and bilamellar. The operculum is convex.

Genotype.—Marguetta pulchra Jullien, 1903. Recent (Atlantic).

Genus MALLEATIA Jullien, 1903

The aperture is formed of a curvilinear anter and of a concave poster bearing a lyrule. The peristomice bears a rimule in which one of the teeth contains a small triangular oblique peristomial avicularium. The frontal is a tremocyst with small pores and it bears small sporadic avicularia. The zoarium is reticulated and bears the apertures only on one side.

Genotype.—Malleatia rara Jullien, 1903. Recent (Azores).

In spite of the presence of a lyrule (?) this genus has the greatest affinity with true *Retepora* but as the ovicell and the operculum are unknown it is preferable to leave it in the family indicated by Jullien.

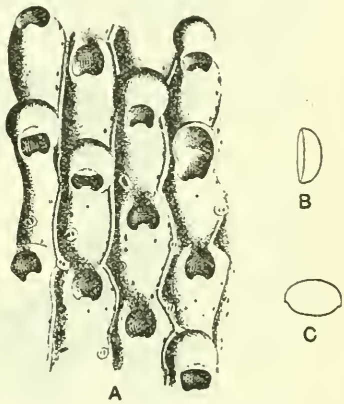

Fig. 137.—Genus *Marguetta* Jullien, 1903

A–C. *Marguetta pulchra* Jullien, 1903. A. Portion of a bilamellar colony. Zooecia, ×25, showing the ovicells not closed by the operculum and the mucronate aperture. B. Dried operculum. C. Form of the aperture. (After Jullien, 1903.)

Genus SMITTINA Norman, 1903

SMITTINA RETICULATA MacGillivray, 1842

Plate 39, figs. 8–10

1889. *Smittia reticulata* Jelly, A synonymic Catalogue of Marine Bryozoa, p. 250. (General bibliography.)

1895. *Smittia reticulata* MacGillivray, Tertiary Polyzoa of Victoria, Transactions of the Royal Society of Victoria, vol. 4, p. 93, pl. 12, figs. 20–21.

1895–1900. *Smittia reticulata* Neviani, Briozoi neozoici di alcune localita d'Italia, Bolletino della Società Romana per gli Studi Zoologici, Parte 1, vol. 4, p. 5 (1895); Parte 2, vol. 4, p. 211 (7), 1895; Parte 3, vol. 5, p. 112 (11) (1896); Parte 5, vol. 7, p. 102 (8), 108 (14), (1898); Parte 6, vol. 1 (Series 2), p. 66 (9), 67 (10), (1900).

1900. *Smittia reticulata* Neviani, Briozoi neogenici della Calabrie, Palaeontographia italica, vol. 6, p. 206 (96). (Regional bibliography.)

1905. *Smittia reticulata* Neviani, Briozoi fossili di Carrubare, Bolletino Societa geologica italiana, vol. 23, p. 338 (36).

1907. *Smittia reticulata* Calvet, Campagnes scientifique du *Travailleur* et du *Talisman*, p. 432. (Zoological bibliography.)

1908. *Smittia reticulata* Robertson, The incrusting cheilostomatous Bryozoa of North America, University of California, Publications vol. 4, p. 308, pl. 23, figs. 75, 76.

1912. *Smittia reticulata* GUERIN-GANIVET, Contributions à l'étude des Bryozoaires des Côtes armoricaines, 3. Région de Concarneau, Travaux scientifiques du Laboratoire de Zoologie de Concarneau, vol. 4, p. —.

1912. *Smittia reticulata* NORDGAARD, Revision av universitets museets samling av norske Bryozoer, Kgl. norske videnskabers selskabs skrifter, p. 22.

1921. *Smittia reticulata* CIPOLLA, Briozoi pliocenici di Altavilla presso Palermo, Giornale della Societa di Scienze Naturali ed Economiche di Palermo, vol. 32, p. 114, pl. 6, fig. 17.

1928. *Smittina reticulata* CANU and BASSLER, Bryozoaires du Maroc et de Mauritanie, Mémoires de la Société des Sciences Naturelles du Maroc, vol. 18, p. 41.

Some small fragments are unilamellar, but all the other specimens encrust Orbitoides, corals, serpulae, débris of shells and *Adeonel-*

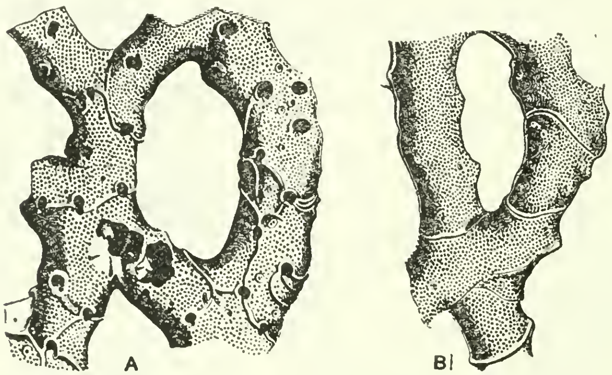

FIG. 138.—Genus *Malleatia* Jullien, 1903

A, B. *Malleatia rara* Jullien, 1903. A. Frontal side, ×30, bearing vibices. The lyrule, noted by Jullien on the poster, is not visible. B. Dorsal side, ×30. (After Jullien, 1903.)

lopsis. They are quite typical. The development of the median avicularium is variable according to the locality and sometimes even on zooecia of the same colony. The lyrule is broad and flat and often visible at the bottom of the peristomie.

Biology.—The large median avicularium is much more salient in specimens from calm waters; it is little developed in agitated waters. It can be deeply immersed in the frontal when the calcification is active. The larva affixes itself on the most varied objects. The species accommodates itself to the most varied depths provided that they are somewhat sandy.

In the polar seas this species lives only at great depths; in the Mediterranean, they do not pass beyond 280 meters and in the equatorial zone they have been collected only in waters of little depth.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S., Sh.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5174. Jolo Light, Jolo; 6° 03′ 45″ N.; 120° 57′ E.; 20 fathoms; crs. S.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.6° C.

Geologic distribution.—Sannoisian of Styria (Reuss); Burdigalian of Gard, France (Pergens); Helvetian of Touraine, France (Canu), of Italy (Seguenza), Tortonian of Italy (Seguenza), of Austria Hungary (Reuss); Zanclean of Italy (Seguenza); Plaisancian of Italy (Manzoni); Astian of Italy (Neviani, Seguenza, Cipolla); Pleistocene of Italy (De Stefani, Seguenza, Neviani); Miocene of Australia (Waters, MacGillivray).

Geographic distribution.—Although never very abundant, this species has been observed from the poles to the Equator. Arctic Ocean; Sea of Kara (349 m.), Spitzbergen (36–146 m.), Jean Mayen (160–180 m.). Atlantic; Norway (65–97 m. up to 324–486 m.), Denmark, Great Britain, English Channel, France, Gulf of Gascony (135 m.). Mediterranean; Cette (30–70 m.), Corse (15–280 m.), Adriatic, Aegean Sea. Pacific; California (18 m.), Japan (73–146 m.), China (49 m.), Philippines, Indian Ocean; Mauritius.

Plesiotypes.—Cat. Nos. 8112, 8113, U.S.N.M.

SMITTINA OPHIDIANA Waters, 1879, var. MARGINATA, new variety

Plate 29, figs. 4, 5

Bibliography of S. ophidiana.

1879. *Lepralia reticulata* var. *ophidiana* WATERS, Bryozoa Bay of Naples, Annals and Magazine Natural History, ser. 5, vol. 3, p. 40, pl. 9, fig. 1.

1903. *Smittia ensifera* JULLIEN and CALVET, Bryozoaires des Campagnes des *Hirondelle*, p. 102, pl. 12, fig. 4; p. 149, pl. 17, fig. 5.

1907. *Smittia ophidiana* CALVET, Expidition scientifique *Travailleur* et *Talisman*, p. 433 (synonymy).

1923. *Smittia ensifera* (Jullien) CANU and BASSLER, North American Later Tertiary and Quaternary Bryozoa, Bull. 125, U. S. National Museum, p. 144, pl. 3, fig. 3.

Measurements.—

Peristomice (with rimule)	$hp=0.15$ mm. $lp=0.12$ mm.	Zooecia	$Lz=0.50$–0.60 mm. $lz=0.35$–0.40 mm.

Variations.—In the ensemble of characters, our specimens much resemble the species of Waters, 1879; the same peristomice, the same lyrula, the same frontal avicularium and the same ovicell. There are however some small differences; the areolar pores are larger, the micrometric dimensions are smaller and especially the zooecia are clearly marginated by a thick and very salient thread. The latter feature has caused us to propose the variety *marginata* for none of the published figures indicate such marginal threads.

Calvet, 1907, on the advice of Waters identified *Smittia ensifera* Jullien, 1903, with *Smittia ophidiana* Waters, 1879. We belive that this identification is exact. We have found the species of Jullien, 1903 as a Miocene fossil at Bowden, Jamaica but here the measurements of the peristomice are much larger.

The variations of *Smittina* are so great that we prefer to preserve the synonymy of Calvet in order to avoid the multiplication of species with slight differences. A species like *Smittina ensifera* Jullien, 1903, with a great geologic distribution (Burdigalian-Recent) is necessarily quite variable. Its geographic distribution was also very large.

Biology.—The ectocyst of our living specimens was of clear rose color. The larva affixes itself on various substrata; bryozoa (Retepores or Cellepores), fragments of shells or small calcareous grains but always irregular. The colony rarely develops on a plane surface. Our variety appears particular to coralline bottoms. It was in reproduction and fixation February 15–18, 1908 (18–34 meters).

Occurrence.—

D. 5141. Jolo Light Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Islands, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. sh.

D. 5149. Sirun Island, Sulu Archipelago; 5° 33′ N.; 120° 42′ 10″ E.; 10 fathoms; co. Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S. sh.

Geographic distribution (*S. ophidiana*).—Mediterranean: Naples. Atlantic: Pico-Fayal, Azores (80–130 meters).

Cotypes.—Cat. Nos. 8114, 8115, U.S.N.M. (var. *marginata*).

SMITTINA TRISPINOSA Johnston, 1838

Plate 41, figs. 1–3

1923. *Smittina trispinosa* Canu and Bassler, North American Later Tertiary and Quaternary Bryozoa, Bull. 125, U. S. National Museum, p. 143, pl. 22, figs. 7–14. (Bibliography.)

This species is very variable and we catalogue in the present work 15 distinct varieties. Nevertheless there are some constant features. The ovicell never measures more than 0.25 mm. in diameter. The frontal pleurocyst is more or less finely granulated. The avicularia are never placed on the median line of the zooecia. There are no interareolar costules. Two to 4 spines (frequently 3).

Variations.—The nature of the avicularia especially is very variable and gives to each variety a special aspect. They are acuminated and ascendant (directed upward) or quite elliptical or oval and descendant (directed downward). They are again small or gigantic. Finally they appear in the vicinity of the aperture or they may be irregularly disseminated on the frontal. But the greater part of the time they are absent. A special combination of these different characters marks each variety. The ascendant avicularia are the more abundant in the northern seas while the descendant avicularia occur more frequently in the equatorial seas.

TYPICAL FORM

1880. *Smittia trispinosa* HINCKS, British Marine Polyzoa p. 353, pl. 49, figs. 1–8.
1912. *Smittia trispinosa* OSBURN, Bryozoa of Woods Hole region, Bull. Bureau Fisheries, vol. 30, p. 246, pl. 27, fig. 65. (Variation.)

Measurements.—

Peristomice $\begin{cases} hp = 0.10 \text{ mm.} \\ lp = 0.08 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50\text{–}0.60 \text{ mm.} \\ lz = 0.25\text{–}0.30 \text{ mm.} \end{cases}$

Description.—The peristomice is oval and bears a false, small, proximal rimule. The lyrula is broad. The ovicell bears two or three large pyriform punctures. The avicularium is triangular, ascendant; it is placed in the vicinity of the aperture.

The typical form, very frequent in the temperate seas is very rare in the Philippine waters. Our specimens were dead.

Occurrence.—

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5311. China Sea, vicinity of Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

Plesiotypes.—Cat. Nos. 8116, 8117, U.S.N.M.

SMITTINA TRISPINOSA var. MUNITA Hincks, 1884

Plate 41, figs. 4, 5

1884. *Smittina trispinosa* var. *munita* HINCKS, Contributions to history Marine Polyzoa, Annals Magazine Natural History, ser. 5, vol. 14, p. 134, pl. 9, fig. 5.
1889. *Smittina trispinosa* var. *munita* WATERS, Bryozoa from New South Wales, Annals Magazine Natural History, ser. 6, vol. 4, pl. 3, fig. 12.

There is a wide lyrula and two small cardelles placed at the same height. The frontal avicularium is adjacent to the proximal border of the peristomice. The peristomice bears a rather deep proximal sinus. The large avicularium is straight or somewhat falciform; the beak is pointed and never spathulate; it is always somewhat removed from the separating thread of the zooecia.

Measurements.—

Peristomice $\begin{cases} hp = 0.08\text{–}0.10 \text{ mm.} \\ lp = 0.07\text{–}0.09 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.45 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$

Variations.—The variations are very large. The greater part of the zooecia are without avicularia and are separated by a salient thread. When it appears, the frontal avicularium does not have a fixed position, but it is always attached to the proximal border of the peristome. The large avicularia are very rare, isolated or in groups; they are narrow or somewhat falciform; the beak is very thin. The mandible is slightly unguiculate at its extremity. The areolar pores are numerous. The frontal is granulose and often bears two isolated pores.

Biology.—The large avicularia are most frequent at Romblon. The specimens from great depths (Mompog) were identical with those

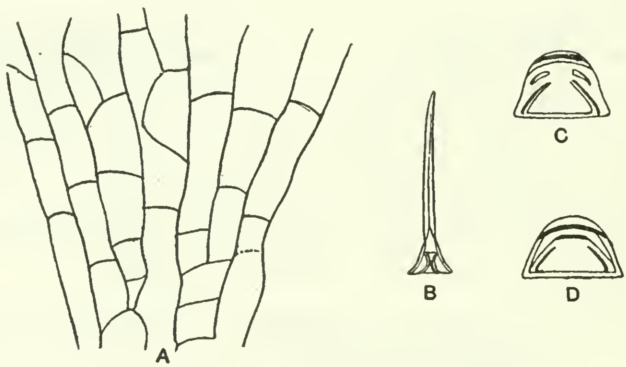

Fig. 139.—Family Smittinidae Levinsen, 1909

A. *Smittina trispinosa nitida* Hincks, 1881. Section ×25 through a cylindrical zoarium at the base of the basal lamella. The special method of gemmation explains the great zooecial irregularity. B. *Smittina trispinosa munita* Hincks, 1884. Mandible of median avicularium, ×85. C, D. *Ramphostomella sollers*, new species. Two avicularian mandibles, ×85.

from Romblon and we have used them for the preparation of the mandible. In the other localities, the large avicularia are very rare. It must be that the waters here are less calm.

The species was in reproduction from February to April, 1908 (36–970 meters). The depth of water has no influence on the time of reproduction.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hrd. S.; 24.6° C.

D. 5219. Moinpog Island, between Marinduque and Luzon; 13° 21′ N.; 122° 18′ 45″ E.; 530 fathoms; gn. M.

D. 5577. Mount Dromedario, Tawi Tawi Group; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Geographic distribution.—Pacific; Victoria and Green Point, Australia.

Plesiotypes.—Cat. No. 8118, U.S.N.M.

SMITTINA TRISPINOSA var. NITIDA Hincks, 1881

Plate 41, figs. 6–12

1881. *Smittia nitida* Hincks, Contribution to general history Marine Polyzoa, Annals and Magazine Natural History, ser. 5, vol. 1, p. 159, pl. 9, fig. 5.

Measurements.—

Peristomice $\begin{cases} hp = 0.09 \text{ mm.} \\ lp = 0.08\text{–}0.09 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Corrections.—Waters, 1909, classed this variety of Hincks, 1881, in the variety *protecta* Thornely, 1905, in which the peristomice bears a constant and well outlined sinus. Certainly this was a slip of the pen, for it is the variety *spathulata* Hincks, 1884, which much resembles his figure of the variety *protecta.*

Description.—The peristomice is suborbicular; the proximal border is straight or somewhat concave. The lyrula is broad; the two cardelles are small, triangular and placed at the same height as the lyrula. The small avicularia are elliptical and placed at the side of the aperture. The large avicularia are lateral; they are attached at the side of the aperture; their beak is spathulate, very broad and turned toward the base. The separating thread of the zooecia is salient. The frontal is finely granulated. The ovicell is globular, as large as the peristomice.

Variations.—The variations are numerous and somewhat regular specimens are very rare; the latter are often unilamellar. The zoarium encrusts Orbitoides, fragments of shells, bryozoa, especially (*Adeonellopsis* and Retepores). The zooecial length varies from one to twice on the same colony; the giant zooecia bear small sporadic avicularia. It is likewise with the zooecial width. The zooecia are generally poorly oriented and are sometimes even entirely reversed. Finally the intensity of calcification can render specimens almost unrecognizable. The peristomice is oval or transverse; but there is never a pseudorimule clearly indicated on the peristome. The ovicell is never more than 0.25 mm. in diameter.

Zooecia without avicularia are the most frequent. The latter are inconstant in form and position, but the beak is always enlarged at the extremity in the large forms. Finally there is hardly a single zooecium resembling its neighbor.

Biology.—The specimens from great depths resemble the others. Those from Romblon and Mompog to the north of the Sulu Sea resemble those from the Sulu Archipelago. There is a large avicularium on specimens from all of the localities. This variety appears to prefer the sandy and shelly bottoms. Our specimens were dead.

Geographic distribution.—Africa, on coral (Hincks).

Occurrence.—This is the most common variety in the region of the Philippines.

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S., Sh.

D. 5141. Jolo Light, Jolo; 6° 09° N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh. (common).

D. 5162. Tinagta Island, Tawi Tawi Group; 5° N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E., 37 fathoms; hard S.; 24.2° C. (common).

D. 5219. Mompog Island, between Marinduque and Luzon; 13° 21′ N.; 122° 18′ 45″ E.; 530 fathoms; gn. M.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

The fossils from the American Miocene and Pliocene belong to this variety. However, the zooecia are arranged very much more regularly and the large avicularia are never as expanded at the extremity.

Plesiotypes.—Cat. Nos. 8119–8124 U.S.N.M.

SMITTINA TRISPINOSA var. ACUTA, new variety

Plate 41, figs. 13, 14

Description.—The peristomice is oval, the proximal border is very concave. The lyrula is narrow and the two cardelles are small and placed at the same height. A salient thread separates the zooecia. The frontal is granular. The ovicell is globular and transverse (0.25 mm. in diameter). On the frontal there is a small excentric avicularium attached to the proximal border of the peristome; it is very thin, little salient, and its beak is quite pointed.

Measurements.—

Peristomice $\begin{cases} hp = 0.10 \text{ mm.} \\ lp = 0.09 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50\text{–}0.55 \text{ mm.} \\ lz = 0.30\text{–}0.40 \text{ mm.} \end{cases}$

This charming variety, rather regular in its general aspect, has been found only in a single locality. Our specimens were dead.

Occurrence.—D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.; 17.2° C.

Cotypes.—Cat. No. 8125, U.S.N.M.

SMITTINA TRISPINOSA, var. GRANOSA, new variety

Plate 42, figs. 1, 2

Description.—The apertura is orbicular or oval and finely denticulated; the peristome is thin, salient, complete, with two distal spines. The lyrula is wide, the two cardelles are triangular and placed a little higher. The frontal is covered with scattered *granules* and surrounded by small areolar pores. The large avicularia are attached to the side of the apertura and arranged on the zooecial border; they are largely spatulate. The small avicularia are elliptical or triangular, they are irregularly placed on the frontal to the number of 2 or 3; the beak is turned toward the base and sometimes toward the top. The ovicell is globular, trinervate, and measures 0.25 mm. in diameter.

Measurements.—

Apertura $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60\text{–}0.80 \text{ mm.} \\ lz = 0.40\text{–}0.60 \text{ mm.} \end{cases}$

Affinities.—In its dimensions and its large avicularia this variety much resembles the variety *spatulata* Smitt, 1872, but it differs in the nature of its more granular frontal, in its peristome without pseudorimule and in the presence of small elliptical avicularia. It has been observed only in a single locality. Our specimens are unilamellar; they were dead.

Occurrence.—D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Cotypes.—Cat. No. 8126, U.S.N.M.

SMITTINA TRISPINOSA var. APPLICATA, new variety

Plate 42, fig. 3

Description.—The peristomice is orbicular or oval without proximal pseudorimule. The lyrula is wide and little salient. The ovicell is small and measures 0.20–0.25 mm. in diameter. At the side of the apertura and attached to the peristome there is frequently a small ascendant, triangular, avicularium, in which the pointed beak is turned toward the top.

Measurements.—

Peristomice $\begin{cases} hp = 0.09 \text{ mm.} \\ lp = 0.08 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.35\text{–}0.45 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$

Affinities.—This variety differs from the variety *japonica* Ortmann, 1890, in its much smaller avicularium which is not arranged on the frontal below the apertura. Our specimens encrust shells; they were dead. It differs from the type of the species in the constancy in the position of the avicularia.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Holotype.—Cat. No. 8127, U.S.N.M.

VARIETIES FOREIGN TO THE PHILIPPINES

SMITTINA TRISPINOSA var. SPATHULATA MacGillivray, 1882

1881. *Smittia reticulata* var. HINCKS, Contributions History Marine Polyzoa, Annals and Magazine Natural History, ser. 5, vol. 8, p. 123.
1882. *Smittia reticulata* var. *spathulata* MACGILLIVRAY, Descriptions of new or little known Polyzoa, Trans. Royal Society Victoria, p. 135 pl. 3, fig. 14.
1887. *Smittia spathulata* MACGILLIVRAY, Catalogue Marine Polyzoa Victoria, Trans. Royal Society Victoria, vol. 23, p. 27.
1890. *Smittia spathulata* KIRKPATRICK, Zoological Collections made in Torres Strait, Scientific Proc. Royal Dublin Society, new ser., vol. 6, p. 619, pl. 17, fig. 1.
1909. *Smittia spathulata* WATERS, Bryozoa from the Sudanese Red Sea, Journal Linnean Society, Zoology, vol. 31, p. 156 (Bibliography, oral glands).
1913. *Smittina trispinosa* var. *spathulata* WATERS, Marine Fauna of British East Africa and Zanzibar, Proceedings Zoological Society London, p. 513.

Description.—The peristomice is oval with a short pseudorimule. The lyrula is narrow. The avicularia are attached to the proximal portion of the peristome. The areolar pores are large and little numerous.

Geographic distribution.—Pacific: Victoria; Bass Straits; Murray Island, Torres Straits, 15–20 fathoms. Red Sea. Indian Ocean: Wasin, British East Africa, 10 fathoms; Zanzibar Channel, 10 fathoms.

SMITTINA TRISPINOSA var. INAEQUALIS Waters, 1879

1879. *Lepralia reticulata* var. *inaequalis* WATERS, Bryozoa Bay of Naples, Annal Magazine Natural History, ser. 5, vol. 3, p. 41, pl. 9, fig. 13.
1887. *Smittia reticulata* var. *spathulata* HINCKS, Critical Notes on Polyzoa, Annals and Magazine Natural History, ser. 5, vol. 19, p. 304, pl. 9, fig. 3 (fide Waters 1909).

Description.—The peristomice bears a pseudorimule. The avicularia are placed at the side of the apertura. The lyrula is narrow. The zooecia are elongated. The areolar pores are small.

Geographic distribution.—Mediterranean: Naples; Adriatic.

Calvet, 1902, identifies this variety with the var. *nitida* Hincks, 1884 and with Verrill's species under the name of *Smittina nitida*.

SMITTINA TRISPINOSA var. PROTECTA Thornely, 1905

1884. *Smittia trispinosa* var. *spathulata* HINCKS, Contributions history marine Polyzoa, Annals and Magazine Natural History, vol. 14, p. 133, pl. 9, fig. 4.
1905. *Smittia trispinosa* var. *protecta* THORNELY, "On the Polyzoa," in Herdman, Rep. on Pearly Oyster Fisheries of the Gulf of Manaar, p. 123.
1909. *Smittia trispinosa* var. *protecta* WATERS, Bryozoa Sudanese Red Sea, Journal Linnean Society Zoology, p. 173, pl. 17, fig. 5, 6.

1913. *Smittina trispinosa* var. *protecta* WATERS, Bryozoa British East Africa and Zanzibar, Proceedings Zoological Society of London, p. 513.

1918. *Smittina trispinosa* var. *protecta* WATERS, Bryozoa, Cape Verde Islands, Journal Linnean Society, Zoology, vol. 34, p. 21.

Description.—The peristomice bears a proximal pseudorimule. The lyrula is narrow. The avicularia are placed at the side of the apertura. Waters has indicated as a synonym the variety *nitida* Hincks, 1885, which has no pseudorimule. This was probably an error, as the two figures were close together on the same plate.

Geographic distribution.—Indian Ocean: Gulf of Manaar (Thornely); Africa (Jelly): Red Sea (Waters), Wasin, British East Africa, 10 fathoms (Waters). Atlantic; Cape Verde Islands (Waters).

SMITTINA TRISPINOSA var. BIMUCRONATA Hincks 1884 (var. 3)

1884. *Smittia trispinosa* var. *bimucronata* HINCKS, Contributions general history marine Polyzoa, Annals Magazine Natural History, ser. 5, vol. 13, p. 118 (sep.) pl. 13, fig. 6.

1884. *Smittia trispinosa* var. *bimucronata* HINCKS, Annals Magazine Natural History, ser. 5, vol. 14, p. 284.

1887. *Smittia trispinosa* var. *bimucronata* MACGILLIVRAY, Catalogue Marine Polyzoa Victoria, Trans. Royal Society Victoria, vol. 23, p. 27 (sep.).

Description.—The peristomice bears two salient lateral lips. The large avicularium is pointed and not spatulate.

Geographic distribution.—Indian Ocean: Burmah; India, Pacific; Australia (Hincks).

SMITTINA TRISPINOSA var. 1 Hincks, 1884

1884. *Smittia trispinosa* var. 1 HINCKS, Contributions general history Marine Polyzoa, Annals and Magazine Natural History, ser. 5, vol. 13, p. 361 (118 sep.) pl. 13, fig. 7.

Description.—The proximal border of the peristomice is straight. The lyrule is broad. The avicularia are ascendant, small, triangular, adjacent laterally to the peristome. No large avicularia. The zooecia are short.

Geographic distribution.—Indian Ocean; Burmah, India.

SMITTINA TRISPINOSA var. JAPONICA Ortmann, 1890

1890. *Smittia trispinosa* var. *japonica* ORTMANN, Die japanische Bryozoen-Fauna, Arch für Naturgeschichte, vol. 50, p. 45, pl. 3, fig. 26.

Description.—The peristomice bears a very long pseudorimule. On the frontal there is a large ascendant, triangular avicularium in which the beak is very thin and placed at the side of the apertura.

Geographic distribution.—Sea of Japan: Sagamibai, 40 fathoms.

SMITTINA TRISPINOSA var. LAMELLOSA Smitt, 1867

1867. *Escharella jacotini* forma *lamellosa* SMITT, Kritisk förteckning Skandinaviens Hafsbryozoer, Kongl. Vetenskeps-Akademiens Forhandlinger, vol. 24, p. 11, pl. 24, fig. 53–57.

1876. *Lepralia jeffreysii* NORMAN, Prelim. Report "Valorous" cruise, Proc. Royal Society No. 173, p. 208.

1877. *Lepralia trispinosa* var HINCKS, Contributions general history Marine Polyzoa, Annals and Magazine Natural History, ser. 4, vol. 19, p. 100, pl. 11, fig. 1.

1886. *Smittia trispinosa* var *arborea* LEVINSEN, Bryozoer fra Kara-Havet, Dijmphma-Togtets Zoologisk-botaniske Udbytte, p. 320 (16) pl. 27 figs. 7, 8.

1900. *Smittia trispinosa* var *lamellosa* WATERS, Bryozoa from Franz-Josef Land, Journal Linnean Society, Zoology, vol. 28, p. 88, pl. 12, fig. 19–21 (opercula, mandible, synonymy).

1902. *Smittia trispinosa* var *arborea* HARMER, Morphology of Cheilostomata, Quarterly Journal Microscopical Science, new ser., vol. 46, p. 304, fig. 42.

We believe that only figures 56 and 57 of Smitt, 1867, represent this variety. Hincks, 1880, has already made this correction. Figures 53, 54, 55 represent the type of the species itself. We believe also that it is necessary to add to the synonymy given by Waters. Hincks, 1880, British Marine Polyzoa pl. 49, fig. 4. (var. *jeffreysi*).

Description.—The peristomice is not raised, the aperture having a quadrate appearance. The avicularia are triangular and are directed upwards, usually by the side of the aperture; 17 tentacles; oral glands (Waters).

The peristomice bears a straight or convex proximal border. The lyrula is wide. The avicularium is placed on the side of the frontal and below the apertura.

Geographic distribution.—Spitzbergen (Smitt): Greenland, 100 fathoms; Kara Sea; Davis Straits, 100 fathoms; Dogger Bank, Reykjavik Harbor, Iceland, 15–20 fathoms.

SMITTINA TRISPINOSA var. NITIDA (Verrill) Osburn, 1912

1912. *Smittia trispinosa* var *nitida* OSBURN, Bryozoa of Woods Hole region, Bulletin Bureau of Fisheries, vol. 30, p. 246, pl. 27, fig. 66, pl. 30, fig. 88.

History.—The incomplete figure of Verrill, 1875, has been diversely interpreted by the authors. Moreover, under the same name, Verrill has sent to the British Museum a small lot containing several species. We believe that it is preferable to adopt the synonymy of Osburn, who has been able to study abundant material collected in the same locality as Verrill's species.

Description.—The peristomice is orbicular with a proximal concave border (without pseudorimule). The lyrula is broad and there are two small triangular cardelles placed a little higher. The avicularia are arranged in every direction on the frontal; the small avicularia are elliptical or oval; the large avicularia are spathulate.

Geographic distribution.—Vineyard, Nantucket, and Long Island Sounds, Buzzards and Narraganset Bays, low water to 20 fathoms (=32 meters).

SMITTINA TRISPINOSA var. SPATHULATA Smitt, 1872

1872. *Escharella jacotini* var. *spathulata* SMITT, Floridan Bryozoa, Kongl. Svenska Vetenskeps-Akademiens Handlingar, vol. 10, p. 60, pl. 10, figs. 201, 202.
1928. *Smittina trispinosa spathulata* CANU and BASSLER, Fossil and Recent Bryozoa of the Gulf of Mexico Region, Proc. U. S. National Museum, vol. 72, art. 14, p. 114, pl. 15, figs. 9-13.
1928. *Smittina trispinosa spathulata* CANU and BASSLER, Bryozoaires du Brésil, Bulletin de la Sociéte des Sciences de Seine-et-Oise, vol. 9, p. 29, pl. 6, fig. 3.

Description.—The peristomice has a proximal pseudorimule. The lyrula is wide. The avicularia are placed at the side of the aperture; the small avicularia are thin and elongated; the large avicularia are spathulate. The frontal is covered by small false tremopores (not granulated).

Geographic distribution.—Florida, 13–44 fathoms.

SMITTINA NITIDA Waters, 1909

Plate 42, fig. 4

(?) 1875. *Discopora nitida* VERRILL, American Journal Science, ser. 3, vol. 9, p. 415, pl. 7, fig. 3.
1909. *Smittina nitida* WATERS, Marine Biology of the Sudanese Red Sea, Journal Linnean Society, Zoology, vol. 31, p. 173, pl. 17, figs. 19, 20.

Description.—The zoarium is unilamellar. The zooecia are distinct, separated by a shallow furrow, more or less elongated, rectangular; the pleurocyst is smooth or a little rugose; the frontal is very little convex and bordered by numerous small areolar pores. The apertura is suborbicular; the peristome is thin, a little salient, complete with two distal spines; the lyrula is broad, flat, little salient. The ovicell is globular, very salient, quite large (0.40 mm. in diameter); the frontal area is large and bears pores. Sometimes there is a small elliptical, descending avicularium at the side of the apertura.

Measurements.—

Apertura $\begin{cases} ha = 0.10\text{–}0.12 \text{ mm.} \\ la = 0.12\text{–}0.14 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.56\text{–}0.80 \text{ mm.} \\ lz = 0.44\text{–}0.50 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Smittina trispinosa* Johnston, 1838, in its larger micrometric dimensions, in the absence of a salient separating thread between the zooecia, in the nongranular frontal and especially in the presence of a very large ovicell.

We have many specimens in which the zooecia are absolutely like those in the figures of Verrill, 1875, and of Waters, 1908. The latter author does not figure the ovicells, but he wrote that they are "large and raised with a central area in which are large pores." He also does not figure any frontal granulations.

The present species is quite distinct and can not be considered as a variety of *Smittina trispinosa* Johnston, 1838. As Verrill's species has passed into synonymy (Osburn, 1910) we can preserve the name of Waters, 1908, for the species.

Biology.—Our living specimens were in reproduction and fixation in July, 1909. Some specimens from Mount Dromedario encrust Retepores.

Occurrence.—

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh. (common).

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 11° C.

Plesiotypes.—Cat. No. 8128, U.S.M.N.

SMITTINA NITIDA DELICATULA Busk, 1883

Plate 42, figs. 5, 6

1885. *Mucronella delicatula* Busk, Polyzoa collected by *Challenger* Scientific Results Voyage *Challenger*, vol. 10, p. 196, pl. 18, fig. 2.

1889. *Smittia trispinosa* var. *delicatula* Waters, Supp., Report Polyzoa collected by *Challenger* Scientific Results Voyage *Challenger*, vol. 31, p. 24, pl. 3, fig. 26.

Measurements.—

Peristomice $\begin{cases} hp = 0.09 \text{ mm.} \\ lp = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.40\text{–}0.50 \text{ mm.} \\ lz = 0.30\text{–}0.40 \text{ mm.} \end{cases}$

The apertura is transverse; the peristome does not bear a pseudorimule; the proximal border is straight or a little convex. The zooecia are rectangular. The small avicularia are elliptical or triangular, the beak turned towards the base; they are placed in the vicinity of the aperture, and little distant from the separating thread of the zooecia. The frontal is finely granular. The lyrula is broad.

This variety is little different from variety *nitida* figured by Verrill, 1875; it is simply more regular and the avicularia are placed a little lower. The ovicell measuring 0.40 mm is larger than in the variety *nitida*, Hincks, 1881. This simple character indicates to us clearly that the species is not *Smittina trispinosa* in spite of the very small frontal granulations. We have made a variety of *Smittina nitida*, Waters, 1908, of which it has the essential characters. Our specimens are unilamellar and dead.

Occurrence.—D. 5235. Nagubat Island, east coast of Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

Geographic distribution.—Pacific: Honolulu, 20–40 fathoms (Busk).

Plesiotypes.—Cat. No. 8129, U.S.N.M.

SMITTINA TRIPORA, new species

Plate 42, figs. 7–9

Description.—The zoarium is unilamellar or encrusting. The zooecia are distinct, separated by a little salient thread, more or less elongated, transverse on the zoarial margin, rectangular; the frontal is convex, smooth or rugose. The apertura is oval, elongated; the peristome is very salient, complete, thin, with two distal spines, a proximal pseudorimule and two lateral very salient lips; the lyrula is broad but little salient; the two cardelles are quite minute. The ovicell is small, globular, rugose. Two small triangular, ascendant avicularia are located near the peristome on each side of the apertura. One of these is sometimes transformed into a large spatulate avicularium with much enlarged beak.

Measurements.—

Apertura $\begin{cases} ha = 0.14 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50\text{–}0.85 \text{ mm.} \\ lz = 0.60\text{–}0.75 \text{ mm.} \end{cases}$

Variations.—The ancestrular zooecia are very small. The median zooecia are elongated and much larger; the marginal zooecia are quite large and wide, transverse. The initial zooecia (serialogene) of a series are also quite wide.

The two oral avicularia are rather constant but they disappear sometimes. The large spatulate avicularium is rare. Small sporadic, elliptical avicularia directed downward appear either on the frontal or on the line of areolar pores.

Affinities.—This species differs from *Smittina trispinosa* var. *bimucronata* Hincks in the presence of two oral avicularia adjacent to the two lateral lips.

Biology.—This species presents some interesting features. The zoarium creeps over the sea bottom; its small fronds surround specimens of *Globigerina* and unite them together. The small avicularia do not appear by chance but they are always placed close to the aperture of an adjacent zooecium. This observation shows that the avicularia are in intimate relationship with the tentacular life of the polypide and with the function of the operculum. Moreover it proves again the biologic unity of the zoarium. The zooecia are not isolated organisms sufficient unto themselves but they serve one another, appearing to obey some central organ.

The species was in reproduction and fixation in February and May, 1908 (183–294 meters). It inhabits the great depths. The little complexity of the mandibles should be in harmony with the tranquility of the water.

Occurrence.—

D. 5135. Jolo Light, Jolo; 6° 11′ 50″ N.; 121° 08′ 20″ E.; 161 fathoms, fine co. S.

D. 5255. Dumalag Island, Gulf of Davao; 7° 03′ N.; 125° 39′ E.; 100 fathoms, sft. M.

Cotypes.—Cat. No. 8130, U.S.N.M.

Genus MUCRONELLA Hincks, 1880

MUCRONELLA(?) UNCIFERA, new species

Plate 42, fig. 12

Description.—The zoarium is unilamellar, cupuliform, convex. The zooecia arranged in radial series, are distinct, short, transverse, trapezoid; the frontal is convex and formed of a tremocyst with large pores. The apertura is very large, semielliptical, transverse, with proximal concave border. The peristome bears three distal *claws*, canaliculate and curved over on the aperture; the proximal mucron is a large foliated oblique palette, erect, hiding a part of the aperture. Sometimes a large ascending ungulated avicularium with pivot is attached laterally to the peristome.

Measurements.—

Apertura $\begin{cases} ha = 0.30 \text{ mm.} \\ la = 0.35 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50\text{–}0.55 \text{ mm.} \\ lz = 0.75 \text{ mm.} \end{cases}$

Affinities.—Our specimen is not a *Mucronella*, the frontal being a tremocyst. The genus is certainly new, but as we have not yet found either ovicell or operculum we are unable to correctly define it.

Biology.—The singular and unexpected architecture of this strange animal could inspire the sculptors of designers searching for new models. The zooecia being short, the tentacles must be also. How could they move in the spiniform complexity of the peristome. For reasons of equilibrium of the cupuliform colonies, the large avicularia frequently alternate in the same radial series of zooecia. We have no idea of the best characters of such species in the present state of the science.

Occurrence.—D. 5355. Balabac Light, N. Balabac Strait; 8° 08′ 10″ N.; 117° 19′ 15″ E.; 44 fathoms; co. S.

Holotype.—Cat. No. 8132, U.S.N.M.

Genus PORELLA Gray, 1848

PORELLA PURPUREA Jullien, 1888

Plate 43, fig. 1

1888. *Smittia purpurea* JULLIEN, Bryozoaires Mission Scientifique du Cape Horn, vol. 6, p. 54, pl. 2, fig. 4.

Measurements.—

Apertura $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.55\text{–}0.65 \text{ mm.} \\ lz = 0.50\text{–}0.50 \text{ mm.} \end{cases}$

Affinities.—Our specimens encrust shells; they were dead and we can not determine their color. All the characters indicated by Jullien may be observed on them even the salient threads that encircle the zooecia. Our measurements accord rather well with those shown on his figures.

Biology.—This is a deep-water species in the Philippines and a littoral one in South America; it appears therefore more sensible to temperature than to hydrostatic pressure.

Occurrence.—

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S; 12.4° C.

Geographic distribution.—Hoste Island, Orange Bay, Cape Horn (Jullien).

Plesiotype.—Cat. No. 8132, U.S.N.M.

Genus PALMICELLARIA Alder, 1864

PALMICELLARIA(?) CORONOPUS, new species

Plate 43, figs. 2, 3

Only the superb specimen figured has been found. As it appears to belong to a new genus we prefer to delay detailed description until the discovery of its ovicell and operculum.

Occurrence.—D. 5634. Gomomo Island, Pitt Passage; 1° 54′ 00″ S.; 127° 36′ 00″ E.; 329 fathoms.

Holotype.—Cat. No. 8135, U.S.N.M.

Genus RHAMPHOSTOMELLA Lorenz, 1886

RHAMPHOSTOMELLA SOLLERS, new species

Plate 43, figs. 4–10

Description.—The zoarium is unilamellar; the fronds are large and flat. The zooecia are distinct, separated by a deep furrow, very large, little elongated, swollen, the frontal is quite convex and formed of a pleurocyst with scattered granules supported by a very thin olocyst; the areolar pores are large and triangular; the interareolar costules are thin, very long, radial and converge towards an avicularian umbo placed eccentrically on the proximal border of the apertura. The apertura is large, transverse, trapezoid; the vestibular arch is smooth and little visible; the peristome is thin, nonsalient, surrounded with a pleurocystal peristome very irregularly developed. The ovicell is large, very convex, covered by scattered granules, never closed by the operculum. On the frontal there is frequently developed a large elliptical avicularium with very large and convex chamber; the orifice is terminal, elliptical, with pivot. The operculum is thin and fragile. On the inferior face of the fronds there are small scattered granules. (See text fig. 139.)

Measurements.—

$$\text{Apertura}\begin{cases} ha = 0.25 \text{ mm.} \\ la = 0.35 \text{ mm.} \end{cases} \qquad \text{Zooecia}\begin{cases} Lz = 0.90 \text{ mm.} \\ lz = 0.65 \text{ mm.} \end{cases}$$

Variations.—The avicularium of the umbo is very constant but its position is quite variable; it is triangular, oblique with pivot, visible or hidden.

The large frontal avicularium is irregular and inconstant, some fronds being without it. They appear more often in groups and disappear without reason. They cover always the line of areolar pores on one side of the zooecium. Their physiologic function appears to be very different from that of the small avicularia placed on the oral umbo.

On the inferior face the zooecia are arranged in linear series. They have in their longitudinal axis a kind of median suture which appears still more clearly in transparency. The surface is covered with small, scattered granules quite visible in black by transparency. The structure and the aspect of the dorsal are identical with the frontal; these two sides are of pleurocystal nature. This species is very well characterized by its large frontal avicularia.

Biology.—The specimens were living and ovicelled on November 6, 1904. The large avicularia are probably in harmony with the zoarial life of the species. Its processes of adaptation to marine conditions are very *ingenious*.

The ovicell develops on the distal zooecium when a female polypide replaces an ordinary polypide.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Cotypes.—Cat. No. 8136, U.S.N.M.

Family TUBUCELLARIIDAE Busk, 1884

For description and illustration of this family and its genera, see 1920 work of Canu and Bassler.

Genus TUBUCELLARIA D'Orbigny, 1852

TUBUCELLARIA CEREOIDES, Ellis and Solander, 1786

1786. *Cellaria cereoides* Ellis and Solander, Natural History of Zoophytes, p. 26, pl. 5, figs. B–E.

1889. *Tubucellaria opuntioides* Jelly, Synonymic Catalogue of Marine Bryozoa, p. 261 (not *Vincularia fragilis* De France and Michelin).

1890. *Tubucellaria cereoides* Kirkpatrick, Report upon Hydrozoa and Polyzoa from China Sea, Annals and Magazine Natural History, ser. 6, vol. 5, p. 16.

1890. *Tubucellaria cereoides* Kirkpatrick, Hydrozoa and Polyzoa from Torres Strait, Proc. Royal Dublin Society (n. s.) vol. 6, p. 611.

1895. *Tubucellaria cereoides* and variety MacGillivray, Tertiary Polyzoa Victoria, Transactions Royal Society of Victoria, vol. 4, p. 105, pl. 4, fig. 1 (var. *areolata*).

1902. *Tubucellaria opuntioides* Calvet, Bryozoaires marins de la région de Cette, Travaux Institut de Zoologie Université Montpellier, ser. 2, mém. No. 11, p. 28.

1902. *Tubucellaria opuntioides* CALVET, Bryozoaires marins de cotes de Corse, Travaux Institut de Zoologie Université Montpelier, ser. 2, mém. no. 12, p. 11.

1904. *Cellaria cereoides* NEVIANI, Appunti sui Briozoi del Mediterraneo, 2, Bolletino Societia Zoologica Italiana, ser. 2, vol. 5, p. 2.

1907. *Tubucellaria opuntioides* CALVET, Expedition scientifique du *Travailleur* et du *Talisman*, p. 402.

1907. *Tubucellaria cereoides* WATERS, *Tubucellaria*, its species and ovicells, Linnean Society Journal, Zoology, vol. 30, p. 129, pl. 15, figs. 8, 9, 15, 16 (geographic distribution).

1909. *Tubucellaria cereoides* WATERS, Bryozoa of the Sudanese Red Sea, Journal Linnean Society London, vol. 31, p. 142.

1909. *Tubucellaria opuntioides* LEVINSEN, Studies upon Cheilostomatous Bryozoa, p. 305, pl. 16, fig. 4.

1912. *Tubucellaria cereoides* CANU, Bryozoaires Helvétiens de l'Egypte, Mémoires de l'Institut Egyptien, vol. 6, p. 207, pl. 11, fig. 13. (Paleontologic bibliography and geologic distribution.)

1917. *Tubucellaria cereoides* CANU, Bryozoaires du fossiles des Terrains du Sud-Ouest de la France, Bull. de la Societé geologique de France, ser. 4, vol. 17, p. 356.

1920. *Tubucellaria cereoides* CANU and BASSLER, North American Early Tertiary Bryozoa, Bull. 106, U. S. National Museum, p. 542.

1921. *Tubucellaria cereoides* ROBERTSON, Bryozoa from the Bay of Bengal. Records Indian Museum, vol. 22, p. 53.

This very abundant Mediterranean species, the bibliography of which is given above, is represented in the Philippines by numerous specimens to which we apply the new varietal name *gracilis*.

TUBUCELLARIA CEREOIDES GRACILIS, new variety

Plate 44, figs. 1, 2

The spiramen is removed from the peristomice; the segments are more *slender* than in the typical form.

Measurements.—Zooecia $\begin{cases} Lz = 1.3 \text{ mm.} \\ lz = 0.45 \text{ mm.} \end{cases}$

Peristome, 0.22 mm.; length of segments, 13.00; and diameter of segments, 0.80–1.00.

It is difficult to separate our specimens from the species of Ellis and Solander, the micrometric measurements and the general aspect being identical. However, the segments are much smaller and the ascopore is more distant from the peristomice than in the Mediterranean species. The latter character has already been figured by MacGillivray, 1886, from more typical, Australian specimens. We propose therefore the variety *gracilis* which appears limited to the Philippines. The "basis ramae" or pores for insertion of the articulation fibers, are placed irregularly on the zooecia but always distant from the peristomes. They are generally triperforate:

Biology.—The life of the articulated bryozoa is always difficult to observe, for it is very rare that the entire zoarium is found. Our material has afforded only detached segments and we are not certain that they have lived at the place where they were collected.

In the Mediterranean, according to Calvet (1902) this species is frequently fixed to the rhizomes of *Posidonia.* Although it has been dredged at Corse in depths of 40 to 60 meters, it is not rare in the sand of the shores in the vicinity of Ajaccio where certainly it did not live. Our specimens were dead and we have sectioned one which was ovicelled. The occurrence of this variety is as follows:

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh., crs.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

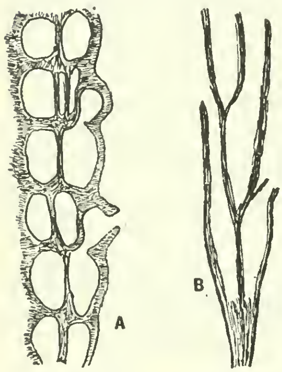

Fig. 140.—Genus *Tubucellaria* D'Orbigny, 1852

A. Longitudinal section of *T. cereoides gracilis*, new variety, ×16, through an ovicelled fragment. B. Longitudinal section through the basal part of a segment of *T. fusiformis* D'Orbigny, 1848.

Geographic distribution (species).—Atlantic: Saint Paul Rocks and John Adam Bank. Mediterranean: Cette; Nice, 45 meters; Bonifacio, 55–77 m.; Bastia, Pietranera, Saint Florent, 40–60 m. and shores in the vicinity of Ajaccio at Corse; Banyuls and Palavas; Naples, Adriatic, Aegean Sea; Shubuk, Red Sea. Indian Ocean: Port Elizabeth, South Africa; Manaar, Andamans, India, 20 fathoms. Pacific: China Sea, Cape Tizard, 27 fathoms; Loyalty Islands; Torres Straits, Murray Islands, 15–20 fathoms; Queensland, New South Wales, Victoria and the south of Australia; Tasmania. Waters, 1907, cites also Madeira and the Cape Verde Islands but we have not found confirmation of this in the special works of that author on the localities.

Geologic distribution.—Miocene (Helvetian) of Touraine (Canu); Egypt (Canu); Tortonian of Austria-Hungary (Reuss); Miocene of Australia (MacGillivary); Pliocene (Zanclean) of Italy (Seguenza); Sahelian of Oran (Canu); Plaisancian of Italy (Manzoni); Astian of Italy (Seguenza, Neviani); Sicilian of Italy (Neviani), and Rhodes (Pergens); Quaternary of Italy (Seguenza).

Cotypes.—Cat. No. 8137, U.S.N.M.

TUBUCELLARIA FUSIFORMIS D'Orbigny, 1848

Plate 44, figs. 3, 4

1848. *Tubucellaria fusiformis* D'ORBIGNY, Paléontologie française, Terrains crétacés, vol. 5, p. 337.
1907. *Tubucellaria fusiformis* WATERS, *Tubucellaria* its species and ovicells, Linnean Society Journal, Zoology, vol. 30, p. 131, pl. 15, figs. 1-3, 14.
1913. *Tubucellaria fusiformis* WATERS, Bryozoa from British East Africa and Zanzibar Proceedings Zoological Society London, p. 512.

Measurements.—Zooecia $\begin{cases} Lz = 2.20 \text{ mm.} \\ lz = 0.75 \text{ mm.} \end{cases}$

Diameter of peristome, 0.30 mm.; length of segments, 10.00 mm.; and diameter of segments, 0.80 mm.

Variations.—Our specimens correspond rigorously to the figure of Waters, 1907, and to D'Orbigny's specimen. Their micrometric dimensions are a little smaller by only a few hundredths millimeters. The base of a segment is elongated, with peduncle. The peduncle is partitioned in the interior and contains a base of four zooecia. The fibers of articulation are thus divided into four bundles corresponding to each interpartitional space. Somewhat higher each segment bears 6 longitudinal rows of zooecia.

Biology.—Our specimens were dead and nonovicelled. This species is peculiar to the Tropical Zone and to the Indian Ocean. It penetrates into the China and Sulu Seas. The great bathymetric distribution probably permits it to pass into the Pacific where it may be found some day. Moreover, the variety *areolata* MacGillivray, 1895 of *Tubucellaria cereoides*, an Australian fossil, appears much closer to the present species.

Occurrence.—

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh. (common).

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S. Sh.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S. co.; 13.2° C.

Geographic distribution.—Indian Ocean: Chuaka, Zanzibar, 3 fathoms, Wasin, British East Africa, 10 fathoms; Marie Louise, Amirantes Island, 17 fathoms; Straits of Malacca.

Plesiotypes.—Cat. No. 8138, U.S.N.M.

TUBUCELLARIA EXILIS, new species

Plate 44, figs. 5–9

Description.—The zoarium is jointed; the chitinous articulation of the segments is complex; the segments are long, *thin*, more or less curved, little narrowed at the base. The zooecia are distinct, separated by a furrow of little depth, elongated, fusiform; the frontal is little convex, covered with linear, very elongated tremopores; the spiramen is placed at the superior third of the zooecial length. The apertura is placed at the bottom of a short peristomie; the peristome is thin, orbicular, little salient, nonoblique. There is frequently a large radicular pore adjacent to the peristome.

Measurements.—Zooecia $\begin{cases} Lz = 1.00\text{–}1.20 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Diameter of peristome, 0.16 mm.; length of segments, 10.00; and diameter of segments, 0.54.

Structure.—The basis ramae is complex; the principal bundle of articulation issues from a much larger aperture (0.12–0.14 mm.); it is surrounded by thinner bundles issuing from an adjacent ordinary aperture and from some tremopores surrounding the apertura; the latter are very inconstant and are frequently lacking. The segments are replaced sometimes by ascending radicels as is visible on our figure.

Affinities.—This species resembles *Tubucellaria cereoides* variety *gracilis*, but is thin and lean. The dimensions approach very closely to *Tubucellaria zanzibarensis* Waters, 1907, but the present species differs in its short peristome and in its different articulations. It differs moreover from *Tubucellaria filiformis* new species in its nonoblique peristomice, in its larger dimensions, in its salient spiramen and in its long tremopores.

Biology.—Our specimens from the Sulu Archipelago were living but they did not bear ovicells. Some are attached by chitinous joints, but we have no entire colony and even are ignorant of the mode of fixation.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Cotypes.—Cat. Nos. 8139–8141, U.S.N.M.

TUBUCELLARIA FILIFORMIS, new species

Plate 44, figs. 10–13

Description.—The zoarium is articulated; the segments are regular, rectilinear or a little curved, *filiform*. The zooecia are little distinct, elongated, fusiform; the frontal is somewhat convex and covered with short linear tremopores; the spiramen, little salient, is placed at the middle of the zooecial length. The peristomice is orbicular, oblique, salient only in its proximal portion. The base of the joints is large, orbicular, adjacent to the peristome and placed on the peristomie.

Measurements.—Zooecia $\begin{cases} Lz = 0.80\text{–}0.90 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Diameter of peristome, 0.14 mm.; length of segments, 0.90; and diameter of segments, 0.40–0.50.

Affinities.—The basis ramae is placed as in *Tubucellaria exilis;* it is a large orbicular unpartitioned orifice placed on the peristomie and adjacent to the peristome. The present species differs from that mentioned, in its oblique peristomice, its smaller micrometric measurements, and its shorter frontal pores.

Biology.—Single segments only have been dredged; they were dead and nonovicelled. The geographic distribution from the China Sea to the Pacific, appears very large.

Occurrence.—

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5235. Nagubat Island, east coast of Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′45″ E.; 162 fathoms; br. S., co.; 13.2° C.

Cotypes.—Cat. No. 8142, U.S.N.M.

Family RETEPORIDAE Smitt, 1867

Descriptions and illustrations of this family and most of its genera are contained in our 1920 work. The following notes on the biology of the Reteporidae are added to supplement our previous discussion.

The genera of this family may be classified in two sections as follows:

I. *Retepora* Imperato, 1599 (Subgenera: *Reteporella* Busk, 1884; *Sertella* Jullien, 1903); *Schizellozoon* Canu and Bassler, 1917; *Triphyllozoon* Canu and Bassler, 1917; *Hippellozoon* Canu and Bassler, 1917; *Phidolopora* Gabb and Horn, 1862; *Rhynchozoon* Hincks, 1891 (*Rhynchopora* Hincks, 1877, preoccupied); *Lepraliella* Levinsen, 1909; *Schizotheca* Hincks, 1877.

II. *Psileschara* Busk, 1860; *Sparsiporina* D'Orbigny, 1851; *Bulbipora* MacGillivray, 1895; *Plagiopora* MacGillivray, 1895; *Caberoides* Canu, 1910.

The Reteporidae are great builders for their colonies frequently grow as large as the fist. Their reticulated fronds are twisted and folded in every direction and intermingle to form a meandriform ensemble of the most elegant aspect. Their graceful colonies can not be the work of true artists since no matter how beautiful it appears to the eye, the reteporidan structure is only a regular trap. Here diatoms and radiolaria accumulate and woe to the innocent protozoan involved in this labyrinth for it can not escape. Hundreds of tentacles snap up this easily digested prey. In order to build so large an edifice the quantity of nourishment is considerable and the millions of minute organisms necessary for this purpose is beyond the imagination.

The organization of the reteporidan zooecium is very complicated but this is only the result of the same necessity—the absorption of a large quantity of food. The number of tentacles (11 to 15) is rather small, compared to that of the giant cheilostomes such as *Tubucellaria*, (22–27), *Petralia* (23–28), and *Umbonula* (20–30), but the very small zooecium not only compensates for this apparent inferiority but also offers a more effective superiority because for the same amount of surface the number of tentacles is much greater.[12] Moreover, the reteporidan zooecium has a complex system of adventitious organs (avicularia) which it develops in the most propitious places. As its relative position in the colonial ensemble is extremely variable the variability of the avicularium is necessarily correlative and indefinite. Their place, their form, and their size are absolutely dependent on the alimentary necessities or of the immediate biologic needs. But all do not have identical function. The frontal avicularia by their incessant movements, facilitate the circulation of the water and drive the prey towards the tentacles in calm waters; in the deeper or sheltered portions of the colony they are larger and more powerful but they are smaller on the contrary on the better exposed zooecia. The large fenestrular avicularia drive the prey into the thousand and one meshes of the network and distribute the zoarial capture. In the vicinity of the fenestrules where well exposed or conveniently oriented they disappear. The oral avicularia are the guardians of the entrance to the compensatrix; they regulate the introduction of the minute drop of water at the moment of evagination; they repulse also the organisms which are too large, for the obstruction of the hydrostatic sac provokes death by asphyxiation of the polypide buried in its

[12] A zooecium of *Petralia* measures frequently 1.0 by 0.5 mm. or 0.5 sq. mm. and has 25 tentacles. In *Retepora* these measurements are 0.5 by 0.2 mm. or 0.10 sq. mm. with an average of 12 tentacles. There are therefore 5 zooecia with 60 tentacles in *Retepora* on the same space as one zooecium of *Petralia*.

lodging place. If the avicularia appear so irregular it is because all the zooecia are not in the same hydrostatic or alimentary position. Their activity is equal to that of the tentacles for they are the sentinels of the zoarium.

In the life of a Retepora there is another feature, the reteporidan mystery. Never is a complete living colony encrusted by another organism. No larva has been able to develop here and disturb the harmony, no spores of the nullipores have been able to propagate themselves. The residue of digestion expelled with each evagination does not accumulate in any of the numerous zoarial folds.

The fecundity of the Reteporidae is unbelievable. On an entire colony the number of ovicelled zooecia is immense and reproduction is incessant. The quantity of larvae thus ejected into the sea is very great. Never are they able to fix themselves on the trabeculae but they are pitilessly chased away and must search far for the rescuing substratum. However, few have the fortune to find it for their enemies are innumerable and hence Reteporas never dominate a fauna by the number of specimens. The immutable justice which presides over the universal equilibrium here opposes force with force and voracity with voracity.

Genus RETEPORA Imperato, 1599

RETEPORA (RETEPORELLA) LAXIPES, new species

Plate 45, figs. 1–12

Description.—The zoarium is free, subcylindrical, dendroid; the base is large and much expanded; the branches are very irregular in length and in size. The zooecia are distinct, separated by a very salient thread, elongated, in the form of a shield; the frontal is smooth, concave longitudinally. The apertura buried at the bottom of a long peristomie is semielliptical; the peristome is very salient, complete or strongly indented distally; incised by the presence of 4 to 8 large salient spines and bearing in front a pseudorimule of variable size. The ovicell is salient, globular elongated, ornamented with a median, longitudinal canalicule; its orifice is placed in the peristomie and protected by a small tongue. The frontal frequently bears two small porelike avicularia.

Measurements.—

Apertura (interior) $\begin{cases} ha = 0.07 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$

Zooecia (interior) $\begin{cases} Lz = 0.60\text{–}0.65 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Zooecia (exterior) $\begin{cases} Lz = 0.55\text{–}0.70 \text{ mm.} \\ lz = 0.30\text{–}0.40 \text{ mm.} \end{cases}$

Peristome, 0.25 mm.

Variations and structure.—The base is much expanded but none of our specimens was fixed to a substratum. The vibices here form very irregular polygons containing a large hollow tuberosity surrounded by a variable number of small salient pores. In the interior the base is formed of long aborted cells with much thickened walls, quite variable in form; the exterior pores are very visible. The ectocyst is quite brilliant; it covers the entire organism and hides the details.

The branches are dichotomous and arranged nearly in the same plane; they are developed without any regularity and without any symmetry; a thick one at the side of a thin one and a young one beside an old one. The principal trunk attached to the base does not bear a single normal zooecium but shows on its two sides vibices forming irregular polygons with 1 or 2 small pores. A little higher the latter are accompanied by a true aperture. Finally the real zooecia appear with their salient, separating threads. The thin branches alone have zooecia with very salient and complete peristomes. The dorsal of the branches is traversed by salient vibices forming very irregular lozengeshaped areas; it is smooth, somewhat concave in the direction of the large axis.

The peristomice is very thick; its anterior lip is notched by a pseudorimule which terminates in a very narrow true rimule quite visible in the peristomie especially if the preparation be elevated. In the interior this rimule is invisible and the aperture has the usual semielliptical form of the Retepores. However, when the peristomie is visible, it is traversed by a small, very thin, longitudinal canalicule, the physiologic use of which is unknown.

The exterior dimensions are larger than the interior in consequence of the great thickness of all the zooecial walls. The characteristic fissure of the ovicell in the genus Retepora is here replaced by a simple canalicule which is sometimes lacking.

Affinities.—This species appears to us rather close to *Filiflustrella pacifica* Stoliczka, 1864, a fossil of New Zealand, in the presence of two small porelike avicularia, but the illustrations are not good, the magnification not being indicated. Without comparison with the types it is difficult to establish a certain relationship.

Biology.—This is a species of the great depths; it lives on the mud and its large base is a necessity for their habitat without rigidity. All the complicated ensemble of vibices, pores, and tuberosities which decorate the base and the dorsal are probably special adaptations to bathymetric conditions; its zoarial life, the details of which escape our investigations, must be very intense. We can not explain especially the astonishing irregularity of the branches so contrary in appearance to the most elementary rules of symmetrical stability.

These small beings secrete an enormous carapace with respect to their dimensions. The peristomie is not a simple ornament but it takes care of important functions as the passage of the eggs and the escape of the larva; it is also the indispensable regulator for the size of the minute drop of water which must penetrate into the compensatrix by the pseudorimule and the peristomial canalicule. Some specimens were in reproduction in August 1909 (750 meters).

The presence of the ovicells at the extremity of the young branches indicate that the ovicelled zooecia form in order with their sex and their ovicell and that there is no regeneration after the consolidation of the skeleton.

The zooecial vigor is to be noted on this species of very deep water; it forms the largest cellules.

Occurrence.—

D. 5202. Limasaua Island, Sogod Bay, southern Leyte; 10° 12′ N.; 125° 04′ 10″ E.; 502 fathoms; gy. m.; 9.2° C.

D. 5212. Panalangan Point, east of Masbate Island; 12° 04′ 15″ N.; 124° 04′ 36″ E.; 108 fathoms; gy. S. Sm.; 12.4° C.

D. 5219. Mompog Island, between Marinduque and Luzon; 13° 21′ N.; 122° 18′ 45″ E.; 530 fathoms; gn. M.; 10.4° C.

D. 5511. Camp Overton, northern Mindanao; 8° 15′ 20″ N.; 123° 57′ E.; 410 fathoms; gy. ms.; 9.4° C.

Cotypes.—Cat. Nos. 8143, 8144, U.S.N.M.

RETEPORA (RETEPORELLA) TENUITELIFERA, new species

Plate 45, figs. 13–17

Description.—The zoarium is free, ramose, dichotomous, compressed; the fronds are short; their dorsal is ornamented with vibices rather regularly arranged on each side of an axial thread; the base is small, concave, attached to a small solid body. The zooecia are distinct, separated or not by a salient thread, a little elongated, irregular; the frontal is smooth and convex; it bears in the vicinity of the apertura a long and *very thin*, oblique avicularium; the peristome is scarcely salient and is indented in front by a rather regular pseudorimule. The ovicell is small, convex, smooth, adorned with a small median fissure.

Measurements.—

Peristomice $\begin{cases} hp = 0.12 \text{ mm.} \\ lp = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.35\text{–}0.40 \text{ mm.} \\ lz = 0.20 \text{ mm.} \end{cases}$

Variations.—The zooecia are marginated only in the young branches; on the others the peristomice is buried, the oral avicularium is less visible because it opens perpendicularly to the zooecial plane and the zooecia are indistinct. On certain specimens the large oral avicularium covers a part of the frontal.

Affinities.—This species differs from *Reteporella spinosissima* and from *R. clypeata* in the constant presence of the oral avicularium. It differs from *Reteporella dendroides* Ortmann, also with an identical avicularium in its much smaller micrometric dimensions and in its ovicell of very different form.

Biology.—Our specimens were dead. This is a species of slight depths. The zooecia are much smaller than those of *Reteporella laxipes* and possess adventitious organs.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Cotypes.—Cat. No. 8467, U.S.N.M.

RETEPORA (RETEPORELLA) SPINOSISSIMA, new species

Plate 46, figs. 1–6

Description.—The zoarium is free, dichotomous; the fronds are short, compressed. The zooecia are distinct, separated by a salient thread, elongated, hexagonal; the frontal is smooth, little convex, often decorated with a small orbicular avicularium. The peristome is complete, salient (especially on young fronds) and adorned with a large number of very *small spines.* The ovicell is small, convex, opening into the peristomie, decorated with a median pore. The dorsal bears oblique vibices arranged rather regularly on each side of a longitudinal threadlike ridge and outlining irregular lozenge-shaped areas, concave in the direction of the large axis.

Measurements.—

$$\text{Zooecia}\begin{cases} Lz = 0.45 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases} \quad \text{Peristome (diameter)} = 0.15\text{–}0.20 \text{ mm.}$$

Affinities.—This species differs from *Reteporella clypeata,* new species which it resembles in its zooecial and dorsal aspects, in its complete and tubular peristome and in the absence of a proximal pseudorimule to the peristomice.

Biology.—Our specimens were dead. The one from Simaluc had simply a thicker peristome.

Occurrence.—

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C. (common).

D. 5574. Simaluc Island, Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

Cotypes.—Cat. Nos. 8145, 8146, U.S.N.M.

RETEPORA (RETEPORELLA) CLYPEATA, new species

Plate 46, figs. 7–10

Description.—The zoarium is free, dendroid, dichotomous; the branches are rather long, compressed with 3 to 4 longitudinal rows of zooecia. The zooecia are distinct separated by a salient thread, somewhat elongated, broad in the form of a *shield;* the frontal is smooth and little convex. The peristome is salient principally on the sides; it is incomplete on the young zooecia only; it is indented in front by a short, rounded pseudorimule; it bears laterally two large spines. The ovicell is very small, deeply immersed; it bears a median fissure and its orifice is protected by a small tongue. The dorsal bears vibices arranged on each side of a median sinuous thread; they separate the zoarial surface into two longitudinal series of irregular polygons.

Measurements.—

Zooecia $\begin{cases} Lz = 0.45 \text{ mm.} \\ lz = 0.25\text{–}0.30 \text{ mm.} \end{cases}$ Peristome (diameter) = 0.30 mm.

Affinities.—This species differs from *Reteporella spinosissima* in its peristome not projecting into a tube, and in its axial and not rectilinear vibices. It differs from *Reteporella tenuitelifera* new species, in the absence of avicularia.

Biology.—Our specimens were dead and worn. This species accommodates itself to rather varied depths of water. Its geographic distribution is also rather extended.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard sand; 24.2° C.

D. 5212. Panalangan Point, east of Masbate Island; 12° 04′ 15″ N.; 124° 04′ 36″ E.; 108 fathoms; gy. S., M.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Cotypes.—Cat. No. 8147, U.S.N.M.

RETEPORA (RETEPORELLA) LONGICOLLIS, new species

Plate 46, figs. 11–18

Description.—The zoarium is free, dendroid, dichotomous; the fronds are short, broad, alternate, much compressed. The dorsal is ornamented with oblique vibices rather regularly arranged on each side of a median sinuous line; the irregular lozenge shaped areas outlined by them are ornamented with 2 or 3 large hollow tuberosities. The zooecia are little distinct, limited only in young stages by a separating thread, elongated, subcylindrical; the frontal is smooth, convex, ornamented in its inferior parts by a small round or elliptical avicularium placed on the median axis. The *peristome* is *long;* it is complete and very salient on the lateral zooecia; itis incomplete and its proximal portion only is very salient on the axial zooecia; it always bears on the median axis a long fissure spiramen. The peristome of the lateral zooecia is somewhat indented distally and bears six spines which give to it a slit aspect; the peristome of the axial zooecia is much excavated distally, bears laterally two large spines and two smaller ones. The ovicell is very small, convex, deeply embedded, ornamented with a median fissure.

Measurements.—

Zooecia $\begin{cases} Lz=0.45 \text{ mm.} \\ lz=0.25 \text{ mm.} \end{cases}$ Peristome $\begin{cases} \text{(lateral)}=0.15 \text{ mm.} \\ \text{(axial)}=0.25 \text{ mm.} \end{cases}$

Variations.—On the dorsal the number of tuberosities placed in the lozenge shaped areas is rather variable. They are frequently

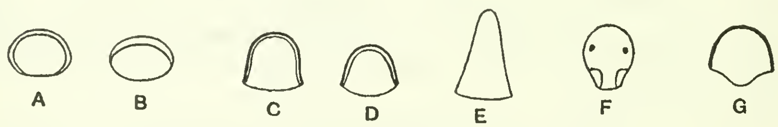

Fig. 141.—Family Reteporidae Smitt, 1867

A, B. *Retepora* (*Reteporella*) *longicollis,* new species. Two opercula, ×85. C–E. *Triphyllozoon magniscutulatum,* new species. C, D. Two opercula, ×85. E. Mandible of a large avicularium, ×85. F. *Schizellozoon pheniceum* Busk 1852. Operculum, ×85. G. *Lepraliella granulata,* new species. Operculum ×85.

accompanied with much smaller tuberosities; they are always placed in the vicinity of the longitudinal axis of the fronds. The vibices are hollow and stop within a small distance of the zoarial margin; this character is quite visible on the edge. The young zooecia of a terminal frond are marginated; the peristome is indented proximally by a pseudorimule replacing the cleft of the spiramen. The zooecia of a very young zoarium are much smaller, delicate and have a general aspect very different although all the characters are present; however, there is not an avicularium on the frontal. The operculum is elliptical, transverse; the interior sclerite is more or less removed from the border.

Affinities.—The distinction from *Reteporella millespinae,* new species, in which the dorsal is almost identical, is often difficult to make, but the present species differs in the presence of marginal zooecia with peristome complete and salient without in the absence of two large lateral tuberosities on the peristome and in the absence of a small oral avicularium.

Biology.—Our specimens from Borneo were living. They were in reproduction and fixation in September, 1909 (69 meters). The specimens from shallow waters show no noticeable difference from the specimens of greater depths.

Occurrence.—

D. 5135. Jolo Light, Jolo; 6° 11′ 50″ N.; 121° 08′ 20″ E.; 16 fathoms; fine co. S.; 11.3° C.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5593. Mount Putri, Sibuko Bay, Borneo; 4° 02′ 40″ N.; 118° 11′ 20″ E.; 38 fathoms; fine S. (common).

Cotypes.—Cat. Nos. 8149–8151, U.S.N.M.

RETEPORA (RETEPORELLA) MILLESPINAE, new species

Plate 47, figs. 1–11

Description.—The zoarium is free, dendroid, dichotomous; the fronds are wide, covered at a maximum by 8 longitudinal rows of zooecia; the base is thick, little expanded, concave, attached to small pebbles; the dorsal is ornamented with oblique vibices arranged on each side of a longitudinal sinuous thread; each irregular lozenge shaped area is very finely granulated and bears 2 or 3 large hollow tuberosities. The zooecia are distinct, separated by a little salient and little visible thread, enlarged distally; the frontal is smooth and decorated inferiorily by a small poriform avicularium placed on the median zooecial axis. The peristome is little salient; it is formed by two large lateral tuberosities and by a salient avicularian umbo, oblique, arranged on the side of an irregular pseudorimule; some spines are attached here and their ensemble on the zoarium give to the latter the aspect of being covered with a *large number of spines.* The spiramen fissure is placed on the frontal. The ovicell is very small, convex, deeply buried, with a small median cleft.

Measurements.—

Zooecia $\begin{cases} Lz = 0.40 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$ Peristome = 0.25 mm.

Apertura (interior) $\begin{cases} ha = 0.07 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$

Variations.—The dorsal tuberosities are very irregular in their arrangement; on the young branches they are grouped in the vicinity of the median axis; on the adult branches the vibices are more numerous, arranged without symmetry and the tubercules are irregularly distributed over all the zoarial surface; finally on the basal branches on the primitive trunk, the dorsal is very thick and smooth.

On the young branches the peristome is little salient; the frontal has the form of a shield, flat and quite visible. The characteristic of the adult branches is formed by the presence of two large peristomial tubercles surmounted often with a large spine.

The small oral avicularium is more or less visible according to its inclination; it is triangular and pointed in every direction. On the interior the aperture is semielliptical and transverse and the micrometric measurements are somewhat smaller.

Affinities.—In the almost identical dorsal and in the general aspect, this species much resembles *Reteporella longicollis*, new species, but differs from it in its never complete and little salient peristome, in the presence of two large peristomial tuberosities and of a small oral avicularium and in the spiramen fissure placed on the dorsal (and not on the peristomie). It differs from *Retepora pseudofinis* in the presence of two peristomial tuberosities in the zoarial margins normally arranged and in the absence of large perforations on the dorsal lozenge shaped areas.

We have found a variety of this species in the Miocene at Bairnsdale, Australia.

Biology.—Our specimens were dead; it is not certain that the four fragments from Mount Dromedario lived at the depth from which they were dredged. The larva affixes itself only on small fragments of shells, bryozoa, and pebbles. Although the waters of the Sulu Archipelago ought to be very calm, there results, however, for the colonies, a great instability of equilibrium which must be remedied by the ensemble of zoarial organs as well as the system of ramification. The cells are very small and the zoarium very thick; their power of calcification is then very large. In the mode of the fixation of its larva this species subsists only on the sand and shaly bottoms.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh. (common).

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

Cotypes.—Cat. Nos. 8152–8155, U.S.N.M.

RETEPORA PSEUDOFINIS, new species

Plate 47, figs. 12–14

Description.—The zoarium is large, flabelliform, developed on the same plane, width at least 4 cm.; the fenestrules are quite large and long (3 to 4 by 1 mm.); the dorsal is convex and ornamented with large, irregular, very elongated, lozenge-shaped areas, separated by vibices and decorated with granules and 1 or 2 large tuberosities. The zooecia are indistinct; the salient threads which ornament them do not correspond to the true zooecial limits, but they outline rather regular lozenge-shaped areas in which are arranged two lateral tuberosities, a central poriform avicularium, the fissured spiramen, and inferiorily the peristomice of the proximal zooecium. The peristomice is semilunar, embedded; it bears a very small proximal pseudo-rimule. The ovicell is very small, deeply buried, convex, with a median fissure.

Measurements.—

Apertura (interior) $\begin{cases} ha = 0.07 \text{ mm.} \\ la = 0.10\text{–}0.12 \text{ mm.} \end{cases}$	Zooecia (interior) $\begin{cases} Lz = 0.45 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$

Affinities.—The salient thread which decorates the zooecia forms false exterior limits which do not correspond to the true limits because the aperture is placed at the base of the lozenge-shaped areas thus formed.

This species differs from *Reteporella millespinae* in the place of the tuberosities, which are not peristomial, in the presence of large perforations in the lozenge-shaped dorsal areas, and in the absence of an avicularian umbo.

Biology.—Our magnificent colony was fixed by a very small base on a fragment of shell from which it was separated. Most of the Retepores, moreover, adhere but slightly to their substratum. This specimen was in reproduction on February 21, 1908.

Occurrence.—D. 5159. Tinagta Island, Sulu Archipelago; 5° 11′ 50″ N.; 119° 54′ E.; 10 fathoms; co. S.

Cotypes.—Cat. No. 8156, U.S.N.M.

RETEPORA FISSA MacGillivray, 1869

Plate 47, figs. 15, 16

1889. *Retepora fissa* JELLY, Synonymic Catalogue of Marine Bryozoa, p. 216 (bibliography).

1895. *Retepora fissa* MACGILLIVRAY, Tertiary Polyzoa Victoria, Trans. Royal Society Victoria, vol. 4, p. 111, pl. 15, figs. 9, 10.

The published figures are incomplete or very variable. The synonymies published by MacGillivray, 1895, do not seem to us exact. We are not positively certain of our determination. Three fragments only have been found. They were dead.

Occurrence.—D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 199° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Geographic distribution.—Pacific; Victoria, Australia, and New South Wales.

Geologic distribution.—Miocene of Australia (MacGillivray).

Plesiotype.—Cat. No. 8157, U.S.N.M.

RETEPORA GRANULATA MacGillivray, 1869

Plate 48, figs. 6–8

1869. *Retepora granulata* MacGillivray, Descriptions Australian Polyzoa, Transactions Royal Society Victoria, vol. 9, p. 15 (sep).
1878. *Retepora granulata* Hincks, On the genus *Retepora*, Annals and Magazine Natural History, ser. 5, vol. 1, p. 363, pl. 19, fig. 13.
1882. *Retepora granulata* MacGillivray, Descriptions New Polyzoa, Part 2, Proceedings Royal Society Victoria, vol. 19, p. 4, pl. 2, fig. 7.
1885. *Retepora granulata* MacGillivray, Prodromus Zoology Victoria, Decade 10, p. 29, pl. 94, fig. 11, (opercula) pl. 99, fig. 1–3.

Biology.—MacGillivray did not indicate the depths at which his specimens were found. In the Philippines this is a species of great depths.

Occurrence.—

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S, Co.; 13° C.

Port Philipp Head, Australia (MacGillivray).

Plesiotypes.—Cat. Nos. 8158, 8159, U.S.N.M.

Genus SCHIZELLOZOON Canu and Bassler, 1917

SCHIZELLOZOON PHENICEUM Busk, 1852

Plate 48, figs. 1–5

1889. *Retepora phenicea* Jelly, Synonymic Catalogue of Marine Bryozoa, p. 218.
1890. *Retepora phenicea* Kirkpatrick, Hydrozoa and Polyzoa of the China Sea, Annals Magazine Natural History, ser. 6, vol. 5, p. 17.
1890. *Retepora phenicea* Kirkpatrick, Hydrozoa and Polyzoa from Torres Straits, Proceedings Royal Dublin Society, vol. 6, p. 612.

Measurements.—

Apertura $\begin{cases} ha = 0.14 \text{ mm.} \\ la = 0.08 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.40 \text{ mm.} \\ lz = 0.20 \text{ mm.} \end{cases}$

Structure.—The published figures are incomplete, for, according to Hincks, 1878, MacGillivray, 1885, and Waters, 1887, the frontal bears sometimes "large foramina." There is in fact from 3 to 5 areolar pores never symmetrically arranged and clearly visible in tangential section. They are always hidden by the ectocyst.

The frontal avicularium appears rarely on our specimens. It appears sometimes with the aspect described by Hincks, 1878, that is to say in "a depression on the front of the cell below the mouth from which a pointed avicularium extends upwards to the lower margin."

There appears to be two kinds of opercula figured by MacGillivray, 1885. Busk, 1884, figured one and Waters, 1887, figured the other. Those which we have prepared correspond to the figure of Waters, 1887; however, the muscular attachments are more distant from the edge.

The ovicell is not fissured, but it bears sometimes the "broad mesial plate" indicated by MacGillivray, 1885. A simple small tongue protects the orifice. (See text, fig 141.)

All the authors speak of this species with enthusiasm because of its beautiful red coral color. It is the calcite itself that is thus colored; but the coloring material is so fine that it is not apparent at the usual magnification (×85) of our tangential sections. The dorsal is often deprived of vibices and the foramina are very inconstant.

Biology.—Our specimens were in reproduction on February 7, 1908 (53 meters). This species is common in Australia; its discovery in the Sea of China by Kirkpatrick, 1890, renders its presence very probable in the intermediate areas. It is rare, nevertheless, in the Philippines and it appears to live mainly in the Sulu Archipelago. It has been noted only at shallow depths although we have found two dead fragments at 439 meters but we are ignorant if they had lived at this place.

Complete colonies have never been figured by the author and we are ignorant of the mode of fixation of the larvae.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 30 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

Geographic distribution.—Pacific: Around Australia, Moncour Islands. China Sea: Cape Tizard, 35 fathoms. Victoria; Port Phillip Heads; Portland, King's Island in Bass's Straits, 38 fathoms. New South Wales: Port Jackson, 5 to 8 fathoms. South Australia: Adelaide and Glenely, Torres Strait; Murray Island, 15–20 fathoms.

Plesiotypes.—Cat. Nos. 8160–8162, U.S.N.M.

SCHIZELLOZOON LUTEUM, new species

Plate 49, figs. 1–6

Description.—The zoarium is free, reticulated, yellow; the fenestrules are large, elongated, narrower than the trabeculae; the dorsal is rugose or finely granulated and it bears transverse vibices very irregularly arranged. The zooecia are distinct, elongated, separated by a salient thread, hexagonal; the frontal is concave longitudinally, smooth, cordiform; it bears an elliptical avicularium in which the beak is turned towards the base and is very salient. The peristomice is semicircular; it bears on its proximal lip a narrow pseudorimule; the apertura hidden at the bottom of the peristomie bears a wide shallow rimule. The ovicell is globular, salient, marginal; its frontal is very fragile.

Measurements.—

Zooecia $\begin{cases} Lz = 0.80 \text{ mm.} \\ lz = 0.44 \text{ mm.} \end{cases}$ Peristomice $\begin{cases} hp = 0.15 \text{ mm. (with rimule).} \\ lp = 0.12 \text{ mm.} \end{cases}$

Variations.—Many of the zooecia are deprived of avicularia. The latter are small or large (L=0.15 mm.). The large avicularia are most frequently on the zooecia bordering the fenestrules. The ovicells are of great fragility and are rarely entire on dead specimens.

The zoarium is yellow; but it is the ectocyst that gives it this beautiful color. However, the calcareous zoarium is also lightly tinted.

Affinities.—At first appearance this species much resembles *Retepora monilifera* var. *munita* MacGillivray, 1883; but differs in the absence of an oral avicularium bordering the pseudorimule.

Biology.—Our specimens were small fragments and dead.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ 00″ E. (common).

Cotypes.—Cat. No. 8169, U.S.N.M.

Genus TRIPHYLLOZOON Canu and Bassler, 1917

TRIPHYLLOZOON BISERIATUM, new species

Plate 48, figs. 9–12

Description.—The zoarium is free, reticulated with large fenestrules wider than the branches; the trabeculae bear most often 2 longitudinal rows of zooecia; the dorsal is very convex, slightly granulated provided with short vibices and small elliptical avicularia widely spaced. The zooecia are distinct, separated by a little salient thread, elongated, subcylindrical; the frontal is convex, smooth and sometimes bears a small avicularium in the vicinity of the peristome of an adjacent zooecium. The peristome is scarcely salient in its proximal parts; it bears a very salient avicularian mucron in front. The ovicell is large, globular, fragile, ornamented with a trifoliated stigma.

Measurements.—

Zooecia $\begin{cases} Lz = 0.45\text{–}0.50 \text{ mm.} \\ lz = 0.20 \text{ mm.} \end{cases}$ Peristomice = 0.06–0.08 mm.
Fenestrules = 1.00–2.00 by 0.50–0.60 mm.

Variations.—The dorsal is frequently smooth; the dorsal avicularia are sometimes long and thin. The avicularian mucro is very fragile. It has no precise form on the dead specimens. The trabeculae are not always biseriated and three rows of zooecia are sometimes present.

Affinities.—This species resembles very much *Retepora tessellata* variety *pubens* Busk, 1884, but differs in the presence of a very salient avicularian mucron. It differs from *Retepora mucronata* Busk, 1884, in the occurrence of large fenestrules and of two longitudinal rows of zooecia instead of 3 to 5.

Our specimens were dead and reduced to very small fragments.

Occurrence.—D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh. (common).

Cotypes.—Cat. No. 8164, U.S.N.M.

TRIPHYLLOZOON MAGNISCUTULATUM, new species

Plate 49, figs. 7–12

Description.—The zoarium is free, not bush like; the fenestrules (or *meshes* of the network) are *very large*, elongated, fusiform, wider than the trabeculae; the branches bear very frequently only two longitudinal rows of zooecia; the dorsal is finely granulose, decorated with longitudinal vibices and small poriform avicularia. The zooecia are distinct, separated by a salient thread, elliptical; the frontal is smooth, concave longitudinally, ornamented with a small elliptical avicularium or with a large spatulated avicularium. The peristome is incomplete, very salient in its proximal portion where it bears a small spiramen; the apertura is semielliptical with a concave proximal border. The ovicell is large, globular, magnificently decorated with the characteristic trifoliated stigma.

Measurements.—

Peristomice $\begin{cases} hpi = 0.08 \text{ mm.} \\ lpi = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.42\text{–}0.44 \text{ mm.} \\ lz = 0.20 \text{ mm.} \end{cases}$

Ovicell $\begin{cases} ho = 0.30 \text{ mm.} \\ lo = 0.24 \text{ mm.} \end{cases}$ Large avicularium $\begin{cases} La = 0.22 \text{ mm.} \\ la = 0.08 \text{ mm.} \end{cases}$

Fenestrules $\begin{cases} L = 1.20\text{–}1.40 \text{ mm.} \\ l = 0.50\text{–}0.60 \text{ mm.} \end{cases}$

Variations.—The spiramen is often replaced by a pseudorimule more or less broad. The small avicularia are elliptical, always placed laterally on the frontal; the large avicularia are sometimes acuminate and sometimes widely spatulate at their extremity. The small avicularia have no definite position but the large avicularia are always placed on the borders of the fenestrules.

The operculum is small with a concave proximal border and double distal sclerite. Finally the dorsal avicularia always placed in the vicinity of the fenestrules are lacking on many of the trabeculae. (See text fig. 141.)

Affinities.—This species differs from *Retepora gigantea* Busk, 1884, in its zooecial dimensions, much smaller fenestrules, and in the nature of its dorsal.

Biology.—Our specimens were living and were in reproduction on January 5, 1909 (106 meters).

Occurrence.—D. 5356. Balabac Light, north of Balabac Strait; 8° 6′ 40″ N.; 117° 18′ 45″ E.; 58 fathoms; S. Sh. (common).

Cotypes.—Cat. No. 8165, U.S.N.M.

TRIPHYLLOZOON MONILIFERUM MacGillivray, 1860

Plate 50, figs. 1–6

1889. *Retepora monilifera* Jelly, Synonymic Catalogue of Marine Bryozoa, p. 217.
1890. *Retepora monilifera* Kirkpatrick, Hydrozoa and Polyzoa from China Sea, Annals and Magazine Natural History, ser. 6, vol. 5, p. 17.
1895. *Retepora monilifera* MacGillivray, Tertiary Polyzoa Victoria, Trans. Royal Soc. Victoria, vol. 4, p. 114.
1921. *Retepora monilifera* Marcus, Indo-Pacifische Bryozoen aus dem Ricks Museum in Stockholm, Arkiv. für Zoologie utgivet ar K. svenska vetenskapsakademien, vol. 14, p. 14.

Variations.—All our specimens were dead, reduced to small fragments and deprived of all chitinous appendages. Nevertheless the specific characters are quite visible; the dorsal granulations, longitudinal vibices, large avicularia, variations of the peristome and traces of two large antenniform spines. However, the fenestrules are frequently larger than the trabeculae.

Biology.—This is a shallow water species which is abundant around Australia.

Occurrence.—D. 5478. Tacbuc Point; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Geographic distribution.—Pacific: Australia, Gaspardstrasse, 18 fathoms. China Sea: Cape Tizard, 27 fathoms.

Plesiotypes.—Cat. No. 8166, U.S.N.M.

Genus RHYNCHOZOON Hincks, 1891

RHYNCHOZOON ANGULATUM Levinsen, 1909

Plate 50, fig. 8

1909. *Rhynchopora angulata* Levinsen, Studies upon the Cheilostomatous Bryozoa, p. 225, pl. 23, fig. 4.

We have by chance discovered a magnificent specimen of this charming specimen at Sulade; it is incrusting a shell.

Occurrence.—D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

Geographic distribution.—Pacific: Stewart Island.

Plesiotype.—Cat. No. 8167, U.S.N.M.

Genus LEPRALIELLA Levinsen, 1916

LEPRALIELLA GRANULATA, new species

Plate 50, figs. 11, 12

Description.—The zoarium encrusts shells. The zooecia are little distinct, somewhat elongated, elliptical; the frontal is a little convex, covered with large *granules* and ornamented with a lateral, triangular avicularium with pivot, in which the beak touches almost always the proximal border of the apertura. The apertura is suborbicular with a concave proximal border. The ovicell is deeply embedded, convex, with a large median triangular fissure. The operculum closes the ovicell; it is transverse, suborbicular, without visible muscular attachments. (See text fig. 141.)

Measurements.—

Apertura $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.40 \text{ mm.} \\ lz = 0.25 \text{ mm.} \end{cases}$

The unovicelled zooecia bear 2 to 3 spines on the peristome. The aperture bears a large internal mucron on the proximal border.

Biology.—The genus *Lepraliella* had been noted only in the northern seas, but the discovery of a fossil species in the French Aquitanian by Duvergier, 1921, forecasted a much larger geographic extension. Its discovery in the Philippines is the equatorial zone justified this probability. Our living specimens were in reproduction and fixation February 16, 1908 (38 meters).

Occurrence.—

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Cotypes.—Cat. Nos. 8168, 8169, U.S.N.M.

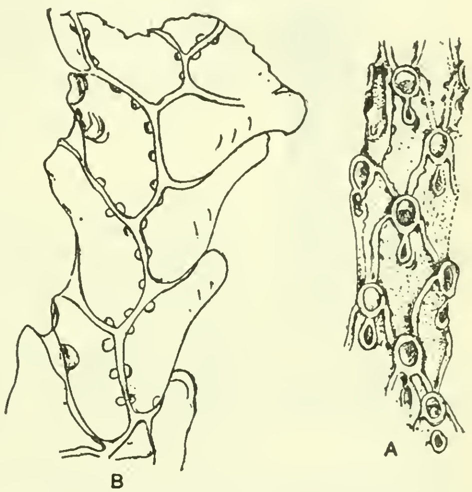

Fig. 142.—Genus *Psileschara* Busk, 1860

A, B. *Psileschara maderensis* Busk, 1860. Frontal and dorsal surfaces (after Busk, 1860).

Genus PSILESCHARA Busk, 1860

"Zoarium erect, branched; branches linear, compressed; cells opening in one side only, quincuncial in longitudinal series." (Busk.)

Genotype.—*Psileschara maderensis* Busk, 1861.

Range.—Recent (Madeira).

This type being preserved in the British Museum, a more exact study can be made.

Genus SPARSIPORINA D'Orbigny, 1851

The ovicells are recumbent. The suboral pore is at the end of a groove. The zooecia are wide at the distal end, but narrow at the proximal. The frontal is an olocyst. The zoarium is ramose, dendroid, compressed; there are 3–4 longitudinal series of zooecia on the apertural face; on the other face the zooecia are turned alternately to the right and to the left.

Genotype.—Retepora elegans Reuss, 1847. Oligocene.

The genotype is a very rare fossil. The structure appears to us to be rather removed from true Retepora to justify the employment of D'Orbigny's genus. We class it in the second group of Reteporidae (After Waters) awaiting more complete studies. It does not have vibices.

Family ADEONIDAE Jullien, 1903

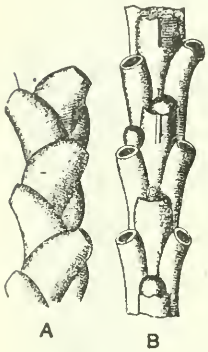

Fig. 143.—Genus *Sparsiporina* D'Orbigny, 1851.

A, B. *Sparsiporina elegans* Reuss, 1848. A. Dorsal side with its characteristic appearance of the zooecia turned alternately to the right and to the left, ×25. B. Frontal side of a branch, ×25, showing the recumbent ovicell. (After Waters, 1891.)

See Canu and Bassler, 1920 and 1923, for description of this family and its genera.

Genus ADEONA (Lamouroux, 1816) Levinsen, 1909

ADEONA POROSA, new species

Plate 50, fig. 7

Description.—The zoarium encrusts nullipores. The zooecia are distinct, separated by a deep furrow, large, elongated, elliptical, completely surrounded by a line of parietal dietellae; the frontal is convex and *porous*. The apertura is semielliptical, transverse and placed at the bottom of a short peristomie. The peristome is smooth, thick, nonsalient. The ascopore is large and placed in the middle of the frontal. The avicularium is located between the ascopore and the apertura; it is large, oblique, triangular, with the point directed upward.

Measurements.—

$$\text{Apertura}\begin{cases} ha = 0.08 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$$

$$\text{Zooecia}\begin{cases} Lz = 0.50\text{–}0.60 \text{ mm.} \\ lz = 0.30\text{–}0.40 \text{ mm.} \end{cases}$$

Affinities.—In its dimensions, its aspect and its oblique avicularium, this species resembles *Adeona plagiopora* Busk, 1859, which Smitt, 1872, found in the Gulf of Mexico. It differs from it in its porous frontal and in the absence of tuberosities on the peristome. It has much resemblance to *Adeona grisea* MacGillivray, 1895, but differs from it in its zoarium, which is encrusting and not bilamellar, fenestrated, and radicellate.

Only the figured specimen has been found and it is incomplete, but we name the species in order to avoid any confusion with *Adeona plagiopora* Busk, 1859.

Occurrence.—D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

Holotype.—Cat. No. 8170, U.S.N.M.

ADEONA ARCULIFERA, new species

Plate 52, figs. 1, 2

Description.—The zoarium is free, bilamellar; the fronds are narrow, compressed, flat or somewhat undulated. The zooecia are distinct, separated by a deep thread, much elongated, completely surrounded by a line of very small and closely arranged parietal dietellae; the frontal is convex, smooth and forms a pad around the ascopore and the avicularium. The ascopore is orbicular and placed in the middle of the frontal. The avicularium is oblique, triangular, located in the peristomic and adjacent to the apertura.

Measurements.—

Peristomice $\begin{cases} hp=0.15 \text{ mm.} \\ lp=0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz=0.50\text{–}0.55 \text{ mm.} \\ lz=0.25\text{–}0.30 \text{ mm.} \end{cases}$

Affinities.—The peristomice is very irregular and deformed by the avicularium. There is no peristome on the adult zooecia and the peristomie is formed by the great thickening of the frontal.

The aspect of this species is very deceiving; in the arrangement of its avicularium it is a *Bracebridgia;* in the form of zooecia it is an *Adeonellopsis;* but the presence of an ascopore obliges us to class it in *Adeona.*

Biology.—The avicularium is very constant; it is a zooecial avicularium. Its physiologic function is identical in the different genera of the family. It is an absolutely essential organ indispensable to the life of the zooecium. In its position it appears to be in relationship with the hydrostatic system. All of our specimens were dead.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

Holotype.—Cat. No. 8171, U.S.N.M.

ADEONA ARTICULATA, new species

Plate 52, figs. 9–12

Description.—The zoarium is bilamellar, *articulated;* the segments are long, compressed, bifurcated, decorated with a wide longitudinal crest; the fibers of articulation are short, chitinous, adjacent in a thick bundle. The zooecia are distinct, separated by a deep thread, small, elongated, elliptical, surrounded completely by a line of small parietal dietellae; the frontal is convex and bears the ascopore and avicularium arranged in a median furrow. The avicularium is oblique, long, triangular, adjacent to the ascopore. On the edge of the segments there are numerous zooecia transformed into avicularia with large mandible.

Measurements.—

Peristomice $\begin{cases} hp = 0.07 \text{ mm.} \\ lp = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.35\text{–}0.40 \text{ mm.} \\ lz = 0.18\text{–}0.20 \text{ mm.} \end{cases}$

Structure.—The axial zooecia are shorter; their frontal is much thickened and forms the large longitudinal carina which decorates the segments. The beak of the avicularium is always turned toward the zoarial margin with much regularity. Only in the vicinity of the ramifications there are sometimes zooecia transformed into zoarial avicularia. The ascopore is closely united with the avicularium. Certainly the latter is indispensable to the hydrostatic function.

The bundle of fibers in each articulation is short and thick and gives to the colonies a relative flexibility but not perfect articulation as in many of the jointed bryozoa. It is remarkable also that the articulation does not form at the same time a method of branching, for the segments are always ramified in the manner of rigid colonies. It is therefore very difficult to know what special adaptation this mode of articulation observed for the first time corresponds.

Fig. 144.—*Adeona articulata*, new species

Mandible of a large avicularium, ×85, from the edge of a segment.

Biology.—We have not had the fortune to find an entire colony fixed to its substratum, and it is very difficult to learn the life history of this very special species. The zoarial life of the Adeonidae is quite varied; one can observe creeping, arborescent, dichotomous, and fenestrated zoaria, but the utility of a semirigid colony rendered flexible by the powerful articulations escapes our comprehension. However, we can infer that the formation of the median crest of the segments is a means of stabilization and permanent equilibrium, while the large avicularia along the edge of the segments have simply the function of assuring a momentary stabilization.

Among the fossil forms *Kleidionella cristata* Canu and Bassler, 1920, from the Jacksonian of South Carolina, presents the same peculiarities. Its colony was as semirigid and formed of segments more or less truncated at their extremity.

Once more and in a very rare case we can note that the zoarial form is only a character of adaptation and that perfectly identical zoarial forms can be observed in very different families and even from widely separated geologic epochs with many kilometers of distance and with millions of years of time.

Occurrence.—D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Cotypes.—Cat. No. 8173, U.S.N.M.

Genus ADEONELLA (Busk, 1884) Waters, 1888

ADEONELLA MINUTIPORA, new species

Plate 51, figs. 1–13

Description.—The zoarium is free, bilamellar; the fronds are large, dichotomous, broad, ornamented with lateral lobes more or less developed. The zooecia are distinct, separated by a deep furrow, fusiform, surrounded by a line of small parietal dietellae. The frontal is convex, irregular; it bears a large spiramen in the vicinity of the apertura, a frontal avicularium with very salient beak and a small avicularium in the vicinity of the apertura and the spiramen. The marginal zooecia are provided with a tremocyst but are deprived of the large avicularium. The peristomice is *small* and transverse. At the bifurcations there are large interzooecial avicularia where the zooecia have tremopores.

Measurements.—Peristomice$\begin{cases} hp = 0.06 \text{ mm.} \\ lp = 0.08 \text{ mm.} \end{cases}$

Variations.—The young zooecia do not have a spiramen but their apertura bears a rimule for the entrance of the compensatrix. In the superior part of the fronds the frontal avicularium has its very salient beak directed towards the base while the small oral avicularium has its beak turned towards the top. In the inferior part of the basal fronds the frontal avicularium no longer exists. It is replaced by an avicularium placed on the line of the lateral pores and in which the beak is turned towards the top.

On many of the zooecia, principally in the young colonies, there are two small oral avicularia arranged symmetrically on each side of the spiramen.

On the edge of the fronds the zooecia are transformed in large spatulated avicularia analogous to those which are arranged sporadically on the surface.

On the living colonies the calcite is white or light brown; it is covered by a brown ectocyst, which makes it very difficult to study this species. The operculum is thin and semicircular. The base is circular and little spread out.

Biology.—This species is very common in the Philippines. Its geographic distribution is very large. To the west it passes around Borneo and penetrates into the China Sea which it entirely traverses as we have found it in the vicinity of Hong Kong. To the east it penetrates the Strait of Surigao and then becomes diffused in the Pacific. In latitude it lives from parallels 5 to 21. Space does not exist for the bryozoa for although the colonies are immovable on the substratum, some hours of freedom of the larva is sufficient to diffuse the species across the oceans.

This is not a deep-water species for it swarms from 36 to 100 meters. It becomes rare in deep waters especially in the more northern localities. It appears sensible to temperature and can hardly exist in cold waters of a temperature inferior to 10° C. Almost all of the Adeonidae moreover live only in the tropical zone. This species prefers sandy bottoms. The little stability of such substrata explain the colonial irregularity and the presence of large zoarial avicularia whose powerful mandibles assure equilibrium and avoid instability.

The variations of exterior ornament are not occasioned by surrounding causes but are principally in relation to the age of the colony. The small oral avicularia certainly in connection with the hydrostatic system are more abundant at the extremity of the fronds; their mandibles are turned toward the top although they are turned toward the base on the frontal avicularium. The physiologic function of the latter is therefore surely different, although unfortunately we do not know what it is.

The marginal zooecia whose aspect is different from the others are probably gonoecia. Why did they not have a frontal avicularium? In the fenestrate Adeonidae we frequently see such zooecia around the fenestrules but the reason for their occurrence is also obscure. By simple deduction we can only with difficulty reach a knowledge of the biology of these oceanic pygmies. They give up their secrets only on the day when we acclimate them in the aquarium. We note finally that this species does not live in the same localities as *Adeonella gibbera*.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5150. Sirun Island, Sulu Archipelago; 5° 23′ 20″ N.; 120° 35′ 45″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5192. Jilantaguan Island, off northern Cebu Island; 11° 09′ 15″ N.; 123° 50′ E.; 32 fathoms; green sand.

D. 5235. Nagubat Island, east coast of Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

D. 5273. Corregidor Light, China Sea, vicinity of Luzon; 13° 58′ 45″ N.; 120° 21′ 35″ E.; 114 fathoms; M., Sh., co. S.; 13.5° C.

D. 5311. China Sea, vicinity of Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 78 fathoms; Sh.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.; 13° C.

Cotypes.—Cat. Nos. 8174–8181, U.S.N.M.

ADEONELLA GIBBERA, new species

Plate 52, figs. 3–8

Description.—The zoarium is free, bilamellar violet colored; the fronds are compressed, of little width, bifurcated. The zooecia are distinct, separated by a deep furrow, elongated, irregularly elliptical; the frontal is smooth, gibbose, surrounded by parietal dietellae. The peristomice is suborbicular, a little transverse or elongated; the spiramen is very large and placed in the immediate vicinity of the apertura. The frontal boss bears the point of a small very salient and triangular avicularium. The marginal zooecia have a tremocyst and do not bear avicularia. Sometimes at the bifurcations there is a large interzooecial avicularium. The gonoecia have a transverse peristomice.

Measurements.—

Peristomice (ordinary) $\begin{cases} hp = 0.08 \text{ mm.} \\ lp = 0.06\text{–}0.08 \text{ mm.} \end{cases}$ Peristomice (gonoecia) $\begin{cases} hp = 0.06 \text{ mm.} \\ lp = 0.10 \text{ mm.} \end{cases}$

Zooecia $\begin{cases} Lz = 0.36\text{–}0.40 \text{ mm.} \\ lz = 0.20\text{–}0.24 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Adeonella minutipora* in appearance very slightly and the eye must be well trained to see it. With a little attention it is however easy to note that it differs in the presence of a single avicularium and especially in a large peristomice; the fronds are smaller and narrower; finally there are never two oral avicularia.

The spiramen, although very large exteriorily, appears on the contrary rather narrow in sections. The frontal is much thickened and parietal dietellae appear under the form of tubes with expanded walls.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

Cotypes.—Cat. Nos. 8182, 8183, U.S.N.M.

Genus ADEONELLOPSIS MacGillivray, 1886

ADEONELLOPSIS PENTAPORA, new species

Plate 53, figs. 1–5

Description.—The zoarium is free, bilamellar; the fronds are flat or somewhat undulated, compressed, narrow, bifurated; the base is very narrow. The zooecia are distinct, separated by a deep furrow, surrounded by a line of small parietal dietellae, elongated, pyriform; the frontal is a large smooth pad surrounding a depression in which are lodged the apertura, the avicularium and the cribriform area. The apertura is little visible, embedded, semicircular, transverse; the cribriform area is small and perforated by three stellate pores. Between the apertura and the cribriform area there are two small avicularia very little separated, sometimes adjacent and symmetrically arranged. On the frontal, at the base of each zooecium there is a salient, poriform avicularium.

Measurements.—

Apertura $\begin{cases} ha = 0.04 \text{ mm.} \\ la = 0.07 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.35\text{–}0.40 \text{ mm.} \\ lz = 0.30\text{–}0.35 \text{ mm.} \end{cases}$

Affinities.—We have not found young branches and we are ignorant of the aspect of the young zooecia but we know that in the genus *Adeonellopsis* the zooecial variations on the same colony are very large. The aperture, the two avicularia, the cribriform area and the frontal avicularia form a group of 5 pores which occasions our specific name. The species differs from *Adeonellopsis symmetrica* Waters, 1881, in a much smaller cribriform area, in the presence of a frontal avicularium and in its fronds three times as broad. It differs from *Adeonellopsis coscinophora* Kirkpatrick, 1890 (not Reuss, 1847), in its much smaller cribriform area provided with fewer pores and in the little separation of the oral avicularia. When the variations of the two species are better known it may be necessary to unite them. It differs from *Adeonellopsis tuberculata* Busk, 1852, figured by Ortmann, 1890, in the nearness of the avicularia, in a smaller area and much smaller dimensions.

The figures of Kirkpatrick, 1890, and Ortmann, 1890, represent the young zooecia so that comparison with our specimens presents necessarily uncertainties.

Biology.—All our specimens were dead. The one from Mompog is much worn and it can not be proved that it lived at the depth considered. Everywhere this species is rare.

The base that we figure is more narrow than a frond. Ortmann, 1890, has figured a specimen of the related species *Adeonellopsis tuberculata* Busk, 1852, attached to a minute gastropod. All the colonies of the various species of this genus assure their equilibrium by themselves, magnificent example of vital unity. Each cell is an organ and not an independent, complete being. Each colony of Adeonidae is an animal with a perfect knowledge of the rules of hydrostatics.

Occurrence.—

D. 4807. Cape Tsiuka, Sea of Japan, 41° 36′ 12″ N.; 140° 36′ E.

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S., Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

D. 5219. Mompog Island, between Marinduque and Luzon; 13° 21′ N.; 122° 45′ E.; 530 fathoms; gn. M.; 10.4° C.

Cotypes.—Cat. Nos. 8184–8186, U.S.N.M.

ADEONELLOPSIS UNILAMELLOSA, new species

Plate 53, figs. 6, 7

Description.—The zoarium is *unilamellar* and creeps on fragments of sponges. The zooecia are distinct, separated by a furrow, somewhat elongated, elliptical, surrounded by a line of parietal dietellae, separated by short costules; the frontal is convex, ornamented with a large oblique avicularium and a cribriform area very narrow and in the form of a cleft. The gonoecia have much larger dimensions. The peristome is salient and slightly tuberose; the apertura is semi-elliptical and transverse.

Measurements.—

$$\text{Apertura}\begin{cases} ha = 0.05 \text{ mm.} \\ la = 0.07 \text{ mm.} \end{cases} \qquad \text{Zooecia}\begin{cases} Lz = 0.35 \text{ mm.} \\ lz = 0.20 \text{ mm.} \end{cases}$$

Affinities.—This species is very well characterized by its unilamellar zoarium and by the very narrow cleft which forms the cribriform area. It is very rare.

Occurrence.—D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Holotype.—Cat. No. 8187, U.S.N.M.

ADEONELLOPSIS FALCIFERA, new species

Plate 53, fig. 8

Description.—The zoarium is free and bilamellar; the fronds are broad and bifurcated. The zooecia are distinct, separated by a deep furrow, large, elongated, elliptical; the frontal is convex and forms a collar surrounding the oral avicularium the cribriform area and the frontal avicularium. The apertura is small, semilunar, transverse. The oral avicularium is triangular, the point above and arranged on the median axis. The cribriform area is small, elliptical, perforated by 5 stellate pores. The frontal avicularium is very large, *falciform*, very narrow. Its length is at least half that of the zooecium. The apertura of the gonoecia is much wider (0.12–0.14 mm.).

Measurements.—

Apertura $\begin{cases} ha = 0.07 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.55\text{–}0.60 \text{ mm.} \\ lz = 0.30\text{–}0.35 \text{ mm.} \end{cases}$

Width of fronds, 2.5 mm.

Occurrence.—D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.; 17.2° C.

Cotypes.—Cat. No. 8188, U.S.N.M.

Genus DIMORPHOCELLA Maplestone, 1903

Adeonidae having an oral sinus for the opening of the compensatrix. The gonoecia are large, provided with a polypide, with an ascopore and with ovarian organs.

Genotype.—*Dimorphocella* (*Adeonella*) *triton* MacGillivray, 1895. Miocene.

The known species belonging to this genus are the following:

Dimorphocella triton MacGillivray, 1895	Miocene.
Dimorphocella pyriformis Maplestone, 1903	Miocene.
Dimorphocella (*Schizoporella*) *submersa* Waters, 1881	Miocene.

Dimorphocella differs from the genus *Schizostoma* Canu, 1907, in the presence of an ascopore (and consequently of a polypide) on the gonoecia.

Historical.—Maplestone, 1913, added to his genus, *Dimorphocella portmarina* Maplestone, 1913, a recent species. In 1920 we followed him with some reservations. Now we think that *Dimorphocella portmarina* is a true *Adeona* although its zooecia like its gonoecia are perforated by an ascopore. It is however deprived of the frontal avicularium, rather constant in the other species of the genus. Future studies may permit us perhaps to make it the genotype of a new genus when the physiologic functions of the frontal avicularium will be better known, but it is necessary to remove this species from *Dimorphocella*.

Genus BRACEBRIDGIA MacGillivray, 1886

BRACEBRIDGIA FISSIFERA, new species

Plate 50, figs. 9, 10

Description.—The zoarium is free, bilamellar; the fronds are compressed, undulated, rarely flat, dichotomous, branching like the horns of a deer. The zooecia are distinct, separated by a deep furrow, elongated, pyriform; the frontal is smooth, little convex, surrounded by a line of parietal dietellae. The peristomice is elongated, elliptical. A small oblique, triangular avicularium is lodged in the peristomie; it is supported on the inner lateral border of the peristome and a *fissure* separates it from the other border.

Measurements.—

Peristomice $\begin{cases} hp = 0.15 \text{ mm.} \\ lp = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.40\text{–}0.50 \text{ mm.} \\ lz = 0.20\text{–}0.25 \text{ mm.} \end{cases}$

Affinities.—At the extremity of the fronds, the avicularium of the young zooecia is not yet lodged in the peristomie; it is exterior and salient. It becomes immersed progressively with the thickening of the calcareous walls.

This new species differs from *Bracebridgia pyriformis* Busk, 1885, in the absence of an oral mucro and in the presence of a fissure in the peristomie. All our specimens were dead.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; Co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh. (common).

Holotype.—Cat. No. 8172, U.S.N.M.

Genus TRIPORULA Canu and Bassler, 1927

The apertura is semicircular. The peristomice is elliptical and transverse. The frontal is covered by stellate pores, each placed in a polygonal area. There are three avicularia adjacent to the aperture, two proximal to the beak oriented superiorily and one distal to beak oriented inferiorily. No spines. No ovicell.

Genotype.—*Triporula* (*Escharipora*) *stellata* Smitt, 1873.

Range.—Miocene. Recent.

The generic name is in allusion to the presence of three oral avicularia.

The only known species are: *Triporula* (*Escharipora*) *stellata* Smitt, 1873, Recent (Gulf of Mexico). *Triporula maplestoniana*, new name. Proposed for *Escharipora stellata* Maplestone, 1904, not Smitt, 1873, Miocene of Australia. Although Smitt, 1873, cited his species as common in the Gulf of Mexico, we have not had the chance to discover a specimen in the dredgings of the *Albatross.*

This genus appears naturally placed in the group of Adeonidae without gonoecia with *Inversiula*, *Cyclostomella* and *Anarthropora*. The principal relationships are with the latter genus, from which it differs simply in the presence of two proximal avicularia arranged symmetrically.

Family HIPPOPODINIDAE Levinsen, 1909

Most of the genera now referred to this family are described in our works of 1920 and 1923.

Genus CHEILOPORA Levinsen, 1909

CHEILOPORA(?) GRANDIS, new species

Plate 53, fig. 9

Description.—The zoarium encrusts bryozoa (*Stylopoma*). The zooecia are distinct, separated by a deep furrow, large, elliptical, more or less broad; the frontal is convex, thick, granular, covered with numerous tremopores; it bears on the median axis an oblique triangular avicularium with beak pointed and turned superiorly. The apertura is buried at the bottom of a deep peristomie; the peristome is broad and salient; the peristomice is orbicular or trans-

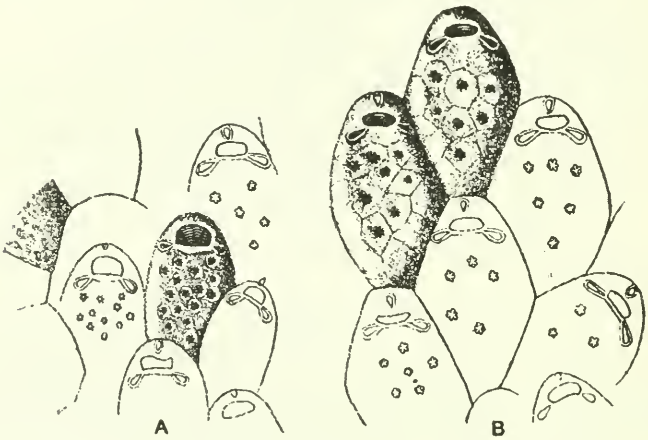

FIG. 145.—Genus *Triporula* Canu and Bassler, 1927

A, B. *Triporula stellata* Smitt, 1873. A. Zooecia enlarged, the shaded one showing the primary aperture almost unaltered. B. Zooecia showing different forms of the aperture. (After Smitt, 1873.)

verse. The ovicell is endozooecial, convex, of the same structure as the frontal and is borne on a zooecium with a large aperture.

Measurements.—

Peristomice $\begin{cases} hp = 0.10 \text{ mm.} \\ lp = 0.10\text{–}0.15 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.00 \text{ mm.} \\ lz = 0.70 \text{ mm.} \end{cases}$

Affinities.—This species is probably not a true *Cheilopora* but we have classed it provisionally in this genus not having been able to procure a specimen with opercula.

Occurrence.—From an unknown locality in the Philippines.

Holotype.—Cat. No. 8189, U.S.N.M.

Genus CHEILOPORINA Canu and Bassler, 1923

CHEILOPORINA FLAVA, new species

Plate 53, figs. 10, 11

Description.—The zoarium encrusts fragments of shells and dead *Adeonellopsis;* the ectocyst and the opercula are light colored. The zooecia are distinct, separated by a shallow furrow or by a little salient thread, somewhat elongated elliptical or lozenge-shaped; the frontal is a little convex, perforated by very numerous and very small tremopores. The apertura is subelliptical and transverse; two cardelles, placed at the inferior third separate a broad poster from a narrower anter; the peristome is broad, salient, separated in two parts by two lateral notches. The ovicell is small, endozooecial,

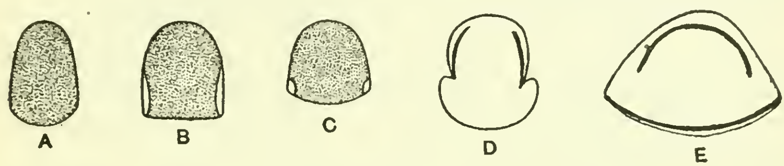

FIG. 146.—Opercula of *Cheiloporina*, $\times 85$

A–C. *C. caerulea*, new species. Three forms. D, E. *C. flava*, new species. Operculum of ordinary (D) and ovicelled zooecium (E).

little salient; its operculum is larger and the apertura often bears a small, little salient mucro.

Measurements.—

Apertura $\begin{cases} ha = 0.15 \text{ mm.} \\ la = 0.20 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60\text{–}0.70 \text{ mm.} \\ lz = 0.40\text{–}0.50 \text{ mm.} \end{cases}$

Affinities.—The present species differs from *Cheiloporina caerulea* in its transverse aperture and in its little visible ovicell.

The structure of the operculum is very close to that of the genotype; the two faces are not identical, one of them bearing small veins. It is very fragile, especially on the borders, and difficult to prepare.

Biology.—Our specimens were living and in reproduction in February, 1908 (39 meters).

Occurrence.—

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Holotype.—Cat. No. 8190, U.S.N.M.

CHEILOPORINA CAERULEA, new species

Plate 54, figs. 2–4

Description.—The zoarium encrusts shells, corals, large bryozoa, and nullipores; it is very deep *blue*, almost black. The zooecia are distinct, separated by a furrow, rather large, elongated, elliptical; the frontal is convex, finely granulated, and perforated by very small, numerous tremopores. The apertura is elliptical, a little elongated; two small cardelles placed in the lower third separate a small poster from a large anter; the peristome is complete, salient, thick, smooth. The ovicell is convex, transverse, of the same nature as the frontal; the zooecium which bears it has an orbicular aperture.

Measurements.—

Apertura $\begin{cases} ha = 0.18 \text{ mm.} \\ la = 0.14\text{–}0.16 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.70\text{–}0.80 \text{ mm.} \\ lz = 0.40\text{–}0.50 \text{ mm.} \end{cases}$

Affinities.—This new species differs from *Mucronella ventricosa multispinata* Busk, 1885, in its endozooecial, transverse ovicell. It differs from *Cheiloporina flava* in its nonenlarged anter, in its peristome without lateral notch, and its larger ovicell.

The operculum in place is black and appears very thick. Detached it is thin, little transparent, covered with veinules widely spaced in the ordinary zooecia and crowded in the ovarian zooecia.

Biology.—The very intense pigmentation of this beautiful species renders it quite easy to recognize; it is never in conformity with the color of the shells and nullipores. Our specimens were in reproduction and fixation in February, 1908.

The species is found in the Sulu Archipelago at shallow depths of water. Nevertheless it lives very well in the Strait of Tinagta at 419 meters, but the specimens are less beautiful and the aperture of the ovicelled zooecia is transverse. It lives on the coral bottom of this region, but the larvæ do not attach themselves to corals but prefer the débris of shells.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5162. Tinagta Island; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Cotypes.—Cat. Nos. 8191–8193, U.S.N.M.

CHEILOPORINA IRREGULARIS, new species

Plate 54, fig. 1

Description.—The zoarium is free and unilamellar. The zooecia are distinct, separated by a furrow, very little elongated, *irregular;* the frontal is convex and covered with very numerous and very small tremopores. The apertura is semielliptical, transverse; two strong salient cardelles placed very low separate a wide poster from a narrower and subcircular anter. The ovicell is very small, endozooecial, scarcely convex.

Measurements.—

Apertura $\begin{cases} ha = 0.13 \text{ mm.} \\ la = 0.16 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50\text{–}0.60 \text{ mm.} \\ lz = 0.40\text{–}0.60 \text{ mm.} \end{cases}$

Affinities.—We have found only two very small fragments of this species. It was interesting to note in one of them an aperture transformed into an avicularium with pivot. This species approaches the genotype *Cheiloporina circumcincta* Neviani more than the two preceding species, which are provided with a thick peristome.

Occurrence.—D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

Holotype.—Cat. No. 8194, U.S.N.M.

Genus TREMOSCHIZODINA Duvergier, 1922

TREMOSCHIZODINA CRASSA, new species

Plate 54, figs. 8–11

Description.—The zoarium is unilamellar and encrusts small algae or shells; the ectocyst is rose colored. The zooecia are distinct, separated by a deep furrow, elongated, elliptical; the frontal is convex, *thick*, rugose; it is formed by a tremocyst with large, widened pores surmounting a thin olocyst. The aperture is round or somewhat transverse; the anter is semicircular and two strong cardelles separate it from the poster; the proximal border is triangular. The peristome is wide, little salient and ornamented with hollow tuberosities. The endozooecial ovicell is large convex of the same structure as the frontal. The orifice of the ovicelled zooecia is much larger and transverse. An orbicular avicularium with pivot appears sometimes in the vicinity of the apertura. The opercula of the ordinary zooecia are transverse; the proximal sinus is very broad and subtriangular.

Rarely they are triangular. The operculum of the ovicelled zooecia is large, elliptical, transverse; the proximal sinus is very wide but very little concave; the surface is finely wrinkled concentrically and

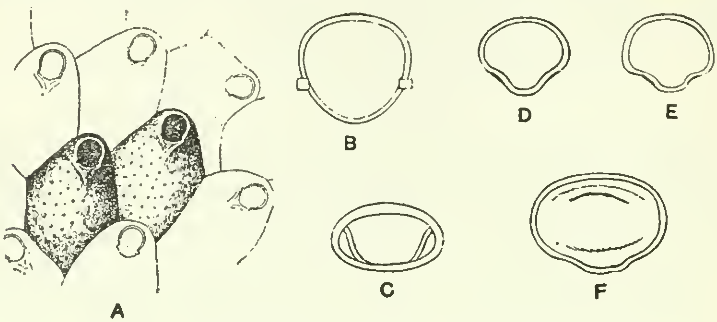

FIG. 147.—Genus *Tremoschizodina* Duvergier, 1922

A–C. *Tremoschizodina lata* Smitt, 1873. A. Nonovicelled zooecia (After Smitt, 1873). B. Operculum of ordinary zooecium, ×85. C. Operculum of ovicelled zooecium, ×85.

D–F. *Tremoschizodina crassa* Canu and Bassler. Opercula of ordinary and ovicelled zooecia, ×85.

bears two large transverse wrinkles. The muscular attachment is a convex transverse line.

Measurements.—

$$\text{Apertura (ordinary)}\begin{cases} ha = 0.12\text{–}0.15 \text{ mm.} \\ la = 0.15 \text{ mm.}\end{cases} \quad \text{Apertura (ovicelled)}\begin{cases} ha = 0.20 \text{ mm.} \\ la = 0.25\text{–}0.30 \text{ mm.}\end{cases}$$

$$\text{Zooecia}\begin{cases} Lz = 0.50\text{–}0.60 \text{ mm.} \\ lz = 0.35\text{–}0.50 \text{ mm.}\end{cases}$$

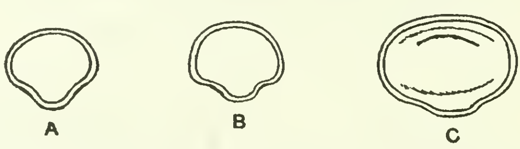

FIG. 147*a*.—*Tremoschizodina crassa*, new species

A. A rare form of operculum and B, the usual type, ×85. C. Operculum of ovicelled zooecium, ×85.

Affinities.—This beautiful species resembles very much *Dakaria torquata* D'Orbigny but differs from it in its very characteristic aperture bearing two triangular cardelles.

The inconstancy of the avicularium is inexplicable, for it appears to us too small for performing a zoarial function.

In the interior the walls are thin and the zooecia rectangular; the cardelles do not correspond to the interior condyles.

Biology.—Almost all our specimens have been dredged living; they were in reproduction in February, 1908 (18–37 meters).

This species is not rare in the vicinity of Borneo but its geographic distribution is greater because we have found it at Romblon on the 13th parallel. It appears to live especially in shallow waters on floating algae. Our specimens from 37 fathoms and 175 fathoms were dead and did not appear to have lived at the same place where they were dredged.

Occurrence.—

D. 5149. Sirun Island, Sulu Archipelago; 5° 33′ N.; 120° 42′ 10″ E.; 10 fathoms; co. Sh.

D. 5150. Sirun Island; 5° 23′ 20″ N.; 120° 35′ 45″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5163. Observation Island, Sulu Archipelago; 4° 59′ 10″ N.; 119° 51′ E.; 28 fathoms; co. S.

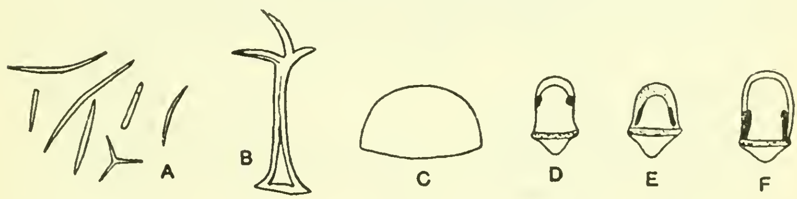

Fig. 148.—*Hippaliosina acutirostris*, new species

A. Small bodies found in the interior of the zooecia, ×85. B. Mandible, ×85. C. Operculum of ovicelled zooecium, ×85. D–F. Different form of opercula of ordinary zooecia, ×85.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard sand; 24.2° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S. co.; 13° C.

Cotypes.—Cat. Nos. 8175, 8196, U.S.N.M.

Genus HIPPALIOSINA Canu, 1918

HIPPALIOSINA ACUTIROSTRIS, new species

Plate 55, figs. 1–4

Description.—The zoarium is uni or multilamellar; it encrusts nullipores, the debris of shells and bryozoa. The ectocyst is light colored. The zooecia are distinct, separated by a furrow, elongated claviform; the frontal is convex, surrounded by small, scattered areolar pores and covered by a granular pleurocyst. The apertura is large, elongated; its proximal border is triangular. Two avicularia are symmetrically arranged above the apertura; the beak is sharp pointed; the mandible is ramified like the horn of a deer.

Measurements.—

Apertura $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.16 \text{ mm} \end{cases}$ Zooecia $\begin{cases} Lz = 0.40 \text{ mm.} \\ lz = 0.22\text{–}0.28 \text{ mm.} \end{cases}$

Affinities.—This new species differs from *Hippaliosina triforma* in the triangular form of its avicularia. It differs from *Hippaliosina rostrigera* Smitt, 1872, in the triangular form of the operculum. The avicularia are somewhat variable in their arrangement and in the direction of their beak. When one of the two is aborted, the other is much larger; then it is placed somewhat below the aperture.

Biology.—Our specimens showed no ovicelled zooecia in February, 1908. This species is found in the Sulu Archipelago in shallow waters of about 25° temperature. It lived especially on nullipores, but here it could subsist only on small fragments. It could expand into large multilamellar colonies on bryozoa; we figured a portion of such a colony which had covered the two faces of an *Adeonellopsis*. It nourishes itself on diatoms and various spicules.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Cotypes.—Cat. Nos. 8197–8199, U.S.N.M.

HIPPALIOSINA TRIFORMA, new species

Plate 54, figs. 5–7

Description.—The zoarium encrusts nullipores and fragments of shells. There are *three kinds* of zooecia. The ordinary zooecia are distinct, separated by a furrow, elongated, claviform; the frontal is convex, surrounded by small, scattered, areolar pores, covered by a granular pleurocyst. The apertura is elongated; the rounded rimule is occupied by a peristomial tongue on which is supported the proximal portion of the operculum. The ovicelled zooecia are broader; the endozooecial ovicell is large, transverse, convex, granular like the frontal. There are always two small oral poriform avicularia. The special zooecia are decorated in front by a salient convex border; the apertura is large, mitriform, elongated.

Measurements.—

Zooecia (ordinary) $\begin{cases} Lz = 0.50\text{–}0.55 \text{ mm.} \\ lz = 0.35 \text{ mm.} \end{cases}$ Apertura $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.07 \text{ mm.} \end{cases}$

Zooecia (ovicelled)	Lz =0.50–0.55 mm. lz =0.40 mm.	Apertura	ha =0.10 mm. la =0.15 mm.
Zooecia (special)	Lz =0.50 mm. lz =0.35 mm.	Apertura	ha =0.18–0.20 mm. la =0.10 mm.

Variations.—The dimensions of the ovicelled zooecia are rather variable as well as the size of their opercula; the aperture bears also a proximal tongue of such a nature that the water can enter into the compensatrix only through two very small lateral slits.

In place the operculum of the third zooecial form appears a little like an avicularian mandible but detached; it is a true schizoporid operculum indicating on its proximal sinus the existence of a compensatrix and of a polypide. We have no anatomical knowledge which will permit us to recognize the function of these curious cellules.

Affinities.—This curious species differs from *Hippaliosina rostrigera* Smitt, 1872, in its much smaller operculum and its different dimensions. It differs from *Hippaliosina depressa* Busk, 1892, figured by Waters, 1889, in its much larger measurements, in its higher ovicell and in its inferiorly rounded operculum.

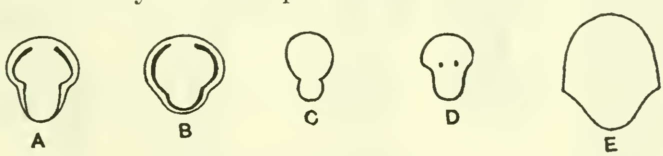

FIG. 149.—Opercula, ×85, of *Hippaliosina triforma*, new species

A, B. Ovicelled zooecia. C, D. Ordinary zooecia ×85. E. Special zooecium.

Biology.—Our specimens were almost all living at the time of dredging; they were in reproduction February 15–18, 1908. The species is found in the Sulu Archipelago at shallow depths. We have found only one poor, dead specimen at 388 meters. The larva fixes itself primarily on dead nullipores. The third zooecial form is perhaps an adaptation to a special form of nutrition.

This species is very prolific, although the specimens are never abundant. The larvae certainly have a large number of enemies to which they serve as food.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Cotypes.—Cat. Nos. 8200–8202, U.S.N.M.

Genus TETRAPLARIA Tenison-Woods, 1878

(*Bigemellaria* MacGillivray, 1895, and *Arborella* Osburn, 1914)

The ovicell is endozooecial. The apertura is schizoporidan with a more or less broad sinus. The frontal is a tremocyst. The zoarium is articulated; the segments bear 4 longitudinal rows of zooecia ar-

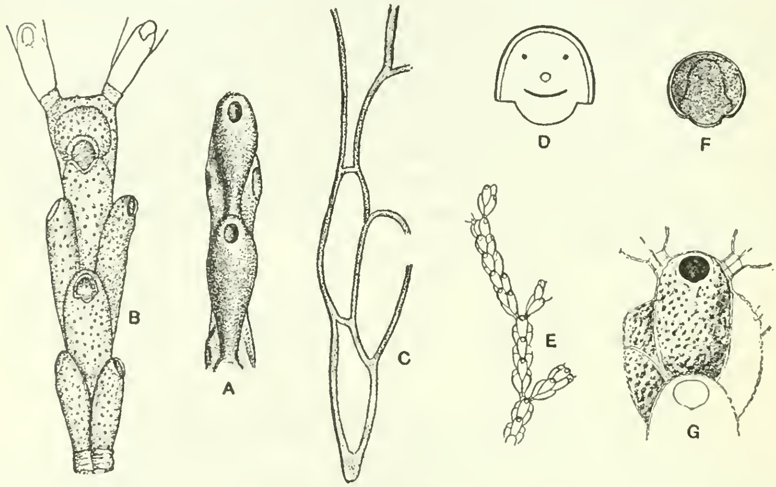

Fig. 150.—Genus *Tetraplaria* Tenison-Woods, 1878

A. *Tetraplaria australis* Tenison-Woods, 1879. Portion of a zoarium. (After Tenison-Woods, 1878.)

B. *Tetraplaria simplex* Robertson, 1921 (not Kirkpatrick, 1888). Segment with one ovicelled zooecium. (After Robertson, 1921.)

C, D. *Tetraplaria gryllus* Canu and Bassler. C. Longitudinal section, ×20, in a segment showing the endozooecial ovicell. D. Operculum, ×85.

E–G. *Tetraplaria* (*Arborella*) *dichotoma* Osburn, 1914. E. Portion of colony enlarged, showing mode of branching. F. Operculum. G. Zooecia. (E–G. After Osborn, 1914.)

ranged back to back, the opposite pairs of two sides alternating at right angles with the other two.

Genotype.—*Tetraplaria australis* Tenison-Woods, 1878.

Range.—Eocene (Priabonian)—Recent.

In 1920 we were acquainted with this genus only from the figures given by the authors, and we placed it in the Escharellidae according to the form of the aperture, the ovicell not being known. Now the discovery of the endozooecial ovicell obliges us to classify it with the Hippopodinidae.

The known species of the genus are as follows:

Tetraplaria gryllus, new species	Pacific.
Tetraplaria (Pollaploecium) brevis Canu and Bassler, 1927	Pacific.
Tetraplaria (Diploecium) simplex Robertson, 1921	Indian Ocean.
Tetraplaria (Arborella) dichotoma Osburn, 1914	Gulf of Mexico.
Tetraplaria (Onchopora) mutria Busk, 1855	Pacific.
Tetraplaria (Cellaria) schreibersi Reuss, 1869	Eocene (Priabonian).
Tetraplaria australis Tenison-Woods, 1878	Miocene.
Tetraplaria (Schizoporella) australis MacGillivray, 1895 (not Tenison-Woods)	Miocene.
Tetraplaria (Smittea) laevigata Waters, 1881	Miocene.
Tetraplaria (Bigemellaria) pedunculata MacGillivray, 1895	Miocene.
Tetraplaria caudifera Canu and Bassler, 1920	Eocene (Jacksonian).
Tetraplaria tuberculata Canu and Bassler, 1920	Eocene (Jacksonian).

Pollaploecium Maplestone, 1909, in which the cells of the segments are facing all ways and *Diploecium* Kirkpatrick, 1888, in which the segments have only two cells, belong probably to the same genus. The differences are only zoarial. We have maintained them because we have not had opportunity to study them directly.

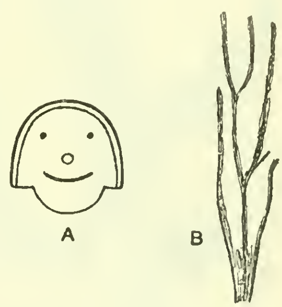

FIG. 151.—*Tetraplaria gryllus*, new species. A. Operculum, ×85. B. Longitudinal section, ×25

TETRAPLARIA GRYLLUS, new species

Plate 55, figs. 6–10

Description.—The zoarium is articulated. The segments are quadrangular, narrowed at the base, enlarged at the summit. The zooecia are arranged in four longitudinal ranges at right angles to each other. The zooecia are distinct, separated by a salient thread, much elongated, lozenge shaped; the frontal is very convex, granular, perforated by a large number of small tremopores. The apertura is orbicular and bears proximally a broad semicircular sinus. The peristome is complete, salient; the operculum bears two muscular attachments, distant from the border and various ornaments more or less constant. The ovicell is endozooecial, large, very convex, of the same structure as the frontal.

Measurements.—

$$\text{Apertura}\begin{cases} ha = 0.16 \text{ mm.} \\ la = 0.16 \text{ mm.} \end{cases} \qquad \text{Zooecia}\begin{cases} Lz = 1.30 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$$

Structure.—This charming species is very constant in its characters with the exception that the separating threads of the opposite zooecia are not always adjacent. The number of cells in a longitudinal row varies from 3 to 5. The operculum is a veritable humorous caricature but the two muscular attachments are alone very constant and the transverse bands appear somewhat variable. In longitudinal sections the walls are thin and moniliform, the zooecia are clavular and the ovicell is endozooecial without any separation from the zooecium itself. The structure of the frontal is the usual structure of the tremocyst.

Affinities.—This species is very close to *Tetraplaria australis* Tenison-Woods, 1878, and differs only in its larger aperture provided with a wide sinus. It differs from *Tetraplaria simplex* Robertson, 1921, in the constant presence of separating threads. It differs from *Tetraplaria dichotoma* Osburn, 1914, in its small ovicelled zooecia.

Biology.—Our living specimens were ovicelled in July, 1909. As they were dredged alive, they were indeed in the vicinity of the bottom. This species therefore does not appear to be parasitic on marine algae, which is confirmed moreover by the absence of all zoarial appendages. The articulation appears then to be an adaptation to a more or less rapid marine current. The absence of zooecial avicularium and the proximity of the strait of Surigao confirm this deduction.

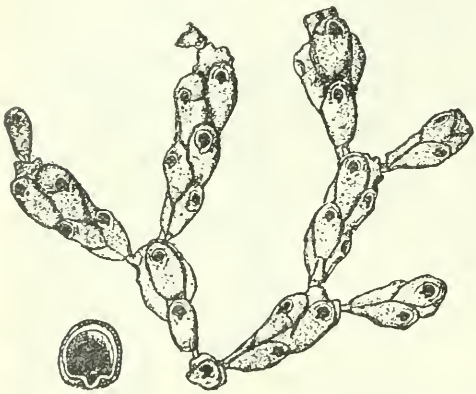

Fig. 152.—Genus *Pollaploecium* Maplestone, 1908

A, B. *Pollaploecium gilbertensis* Maplestone, 1909. A. Zoarium, ×12. B. Aperture, more enlarged. (After Maplestone, 1909.)

Occurrence.—

D. 5235. Nagubat Island, east coast of Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh. (common).

Cotypes.—Cat. No. 8403, U.S.N.M.

Genus POLLAPLOECIUM Maplestone, 1908

1908. *Pollaploecium* Maplestone, Polyzoa from Gilbert Islands, Proceedings Royal Society Victoria, vol. 21, p. 417, pl. 28, fig. 18.

The ovicell is endozooecial. The apertura is schizoporidan with a small and deep sinus in the middle. The frontal is a tremocyst. The zoarium is articulated. The segments are composed of six to ten zooecia, united on their dorsal surface, facing all ways.

Genotype.—*Pollaploecium gilbertensis* Maplestone, 1909. Recent.

Genus DIPLOECIUM Kirkpatrick, 1888

The ovicell is endozooecial. The aperture is schizoporidan with notch in lower border. The frontal is marked with a mosaic pattern.

The zoarium is articulated; the segments are formed of two zooecia back to back; each segment is a right angle to those above and below.

Genotype.—*Diploecium simplex* Kirkpatrick, 1888. Recent.

In some parts of the branches the internodes (segments) are suppressed; but the general arrangement of the zooecia is as described above (Kirkpatrick).

Genus **HIPPOPODINELLA** Barroso, 1924

The ovicell is endozooecial. The frontal is a tremocyst. The apertura bears two salient cardelles. The anter is longer and narrower than the poster. The operculum is contracted laterally and bears two median muscular attachments. The lateral walls of the frontal are perforated by parietal dietellae.

Genotype.—*Hippopodinella* (*Lepralia*) *adpressa* Busk, 1854

Range.—Pliocene. Recent.

Family PARMULARIIDAE Maplestone, 1912

Stoloniferous cheilostomata with hyperstomial ovicells closed by the operculum.

Genus **PARMULARIA** Maplestone, 1910

(?)1852. *Lanceopora* D'Orbigny, 1852, Paleontologie francaise, Terrains cretacés, vol. 5, p. 186.

1910. *Parmularia* Maplestone, Transactions Royal Society Victoria, vol. 23, p. 42.

1924. *Parmularia* Livingstone, a revision of the genus Parmularia, Records of the Australian Museum, vol. 14, p. 189.

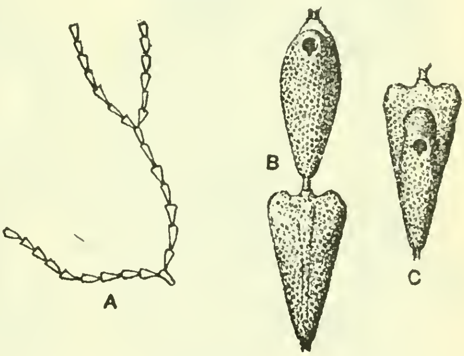

Fig. 153.—Genus *Diploecium* Kirkpatrick, 1888

A–C. *Diploecium simplex* Kirkpatrick, 1888. A. Colony, natural size. B. Two segments arranged at right angles. C. View of an ovicelled zooecium. (A–C. After Kirkpatrick, 1888.)

The ovicell is hyperstomial. The frontal is a tremocyst. The aperture is schizoporidan. The zooecial walls are curved and parallel, two by two. The growth is as usual in the two axial rows of each segment and laterally oblique in the rest of the colony. The zoarium is stoloniferous; the segments are bilamellar and irregularly lobed.

Genotype.—*Parmularia* (*Eschara*) *obliqua* MacGillivray, 1868.

Range.—Miocene. Recent.

Historical.—The segments are generally lobed but some are lanceolate and symmetrical. It is probably such lanceolate specimens that

D'Orbigny, 1852, has described as *Lanceopora.* Unfortunately the genotype no longer exists at the Paris Museum and as the French author described a round aperture we can not with certainty establish the synonymy. We retain therefore the name of Maplestone.

Structure.—The zooecial form is very special; on the interior, it appears lozenge-shaped, but the walls are arched and parallel two by two. This arrangement is absolutely different from that of other bilamellar cheilostomes. As a consequence, the aperture undergoes the same deviation; it is not oriented in the apparent linear axis of the zooecium but is oriented in the curved axis of the latter.

The mode of gemmation is altogether special. The zooecia of the two axial rows of each segment are arranged normally. They are

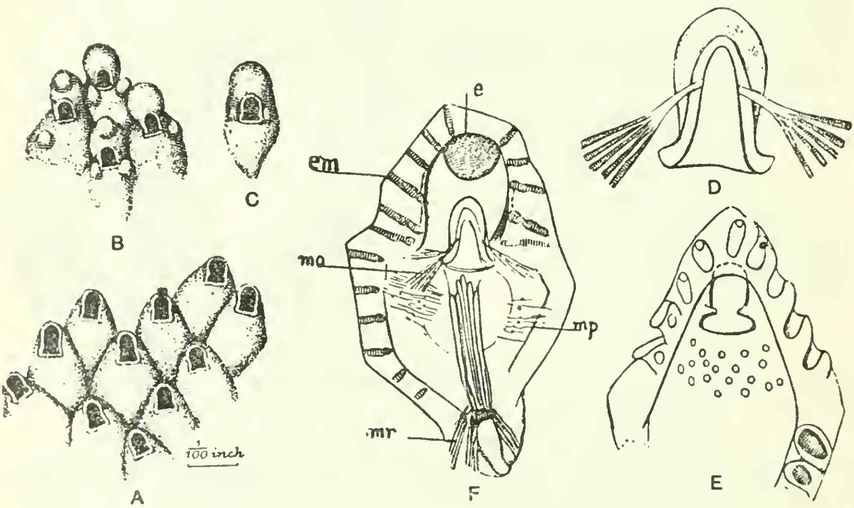

FIG. 154.—Genus *Hippopodinella* Barroso, 1924

A–F. *Hippopodinella adpressa* Busk, 1854. A. Zooecia without tuberosities ×30. B. Zooecia with tuberosities ×30. C. A zooecium showing the endozooecial ovicell. (A–C. After Hincks, 1880.) D. Operculum, ×140. E. Different aspects presented by the marginal cavities when the zooecium is viewed from the dorsal side. F. Ovicelled zooecium decalcified, viewed from the dorsal side; *e*, embryo; *em*, mesenchymatous elements; *mo*, opercular muscles; *mp*, parietal muscles; *mr*, retractor muscles. (D–F. After Barroso, 1924.)

alternate and engender a distal zooecium and a lateral zooecium. All the other zooecia engender only a lateral zooecium. The general growth is therefore peripheral and the basal lamella (germinale lamella of D'Orbigny) entirely surrounds the segment. In all other cheilostomes this lamella is always terminal.

"The zoarium is furnished with a long flexible stem or filament some 6 or 7 cm. long and 2 mm. thick, upon the summit of which the zoarium is attached. The point of attachment is at the curved indentation in the center of the lower margin of the zoarium. The

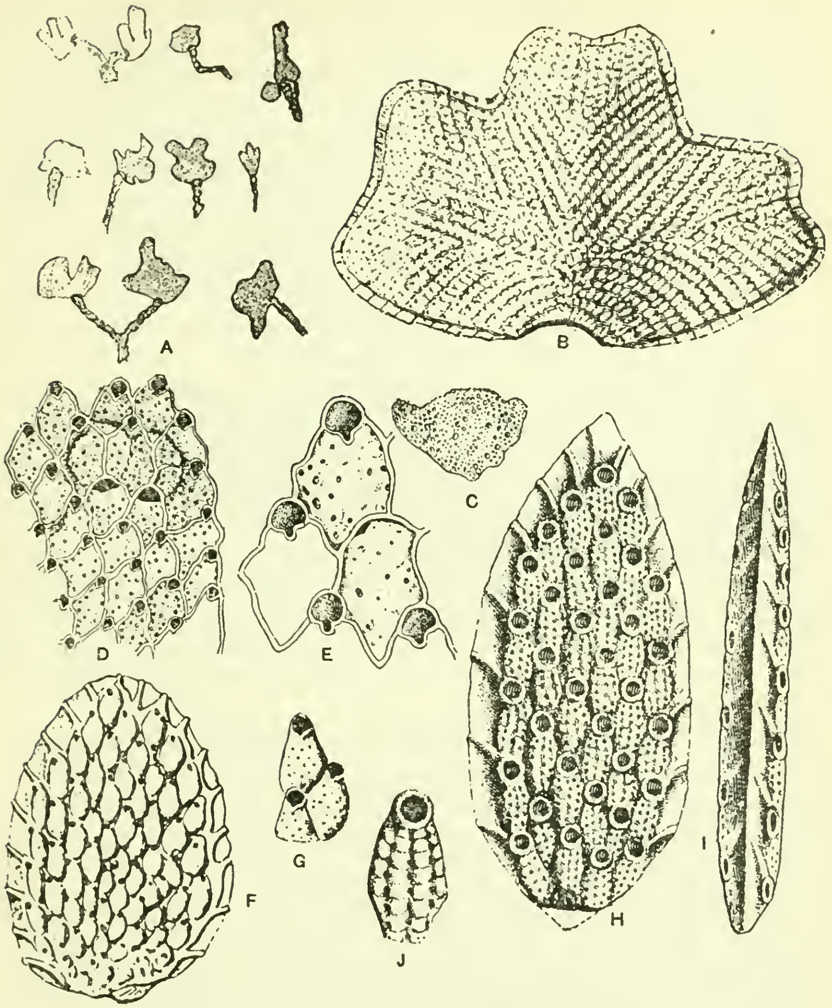

Fig. 155.—Genus *Parmularia* Maplestone, 1910

A–E. *Parmularia obliqua* MacGillivray, 1868. A. Stoloniferous zoaria ×0.5. The segments attached to the extremity of the stolons are bilamellar. B. A symmetrical segment, ×8 (A, B. After Maplestone, 1910, 1913) C, D, E. A zoarial fragment (C) showing the form of the zooecia. (D, E. After MacGillivray, 1880.)

F, G. *Parmularia flabellata* Maplestone, 1901. Segment enlarged and zooecia further magnified. (After Maplestone, 1901.)

H–J. *Parmularia* (*Lanceopora*) *elegans* D'Orbigny, 1852. H, I. Front and side views of a segment. J. Zooecium, enlarged. (H–J. After D'Orbigny, 1852.)

filament is in the living state, succulent, translucent and of a pale flesh color or very light terra cotta tint. An examination of the specimens (segments) does not disclose any signs of a single primary zooecium; instead of which there is a row of zooecia (16 in the specimen figured), somewhat different in form from the succeeding ones, from the bases of which there are numerous short filamentary processes which project over the cavity that in the living state was occupied by the stem, and which apparently were embedded in it and by them the zoarium was attached to the stem" (Maplestone, 1910).

In effect the base of an intact segment shows a series of long, narrow, parallel zooecia, more and more curved in receding from the center. The study of the proximal section shows that each zooecium is divided into 4 or 5 longitudinal compartments (or tubules) separated by very thin partitions. The exterior filament branches therefore in a rather large number of secondary filaments which penetrate into the segment and support it. Moreover we have been able to observe in our very well preserved specimen that these cells do not perhaps have a rimule to their aperture and therefore they do not contain a polypide. However, this observation requires confirmation. The basal tubules are quite visible in the longitudinal sections on our figure of the interior. Our studies of this genus had been completed when Livingstone published upon it in 1924. The student is referred to his work.

Biology.—The filament which bears the segments appear to us analogous, according to the description of Maplestone, to the stolon of the Ctenostomata. Like it, this filament ought to be formed of modified individuals deprived of polypides; the latter by blastogenesis, engender the normal zooecia but in a very different manner because the normal zooecium is not in immediate contact with the central filament. The latter ramifies first into secondary filaments; many secondary filaments form a calcified zooecium without polypide and this latter only engenders the normal zooecium. The zoarium is therefore not articulated, but stoloniferous. This distinction is very important, for it implies a very different adaptation. The articulation has for its object to give flexibility to the colonies with fragile zooecia. The stolon has for its object to permit colonies to escape from the substratum chosen by the larva. The absence of all zoarial avicularia well confirms the observation that the present case is not an articulation.

The genus *Parmularia* being the only stoloniferous cheilostomatous genus known, we are obliged to class it in a special family; the larva ought to have according to resemblances observed in the Ctenostomata very different characters from those of other known genera with endozooecial ovicell. The special and very unusual mode of gemmation and the anatomical modifications resulting from the curving of the zooecia, confirm this classification.

The known species of this genus are as follows:

Parmularia (*Eschara*) *obliqua* MacGillivray, 1868	Recent (Australia).
Parmularia (*Lanceopora*) *elegans* D'Orbigny, 1852	Recent (Malacca).
Parmularia cylindrica, new species	Recent (Sulu Sea).
Parmularia elongata, new species	Recent (Sulu Sea).
Parmularia depressa, new species	Recent (Sulu Sea).
Parmularia quadlingi Haswell, 1880	Australia.
Parmularia (*Schizoporella*) *flabellata* Maplestone, 1901, Fossil of Australia	Miocene.
Parmularia macneilli Livingstone, 1924	Australia.
Parmularia integer Livingstone, 1924	Australia.

PARMULARIA CYLINDRICA, new species

Plate 56, figs. 3–8

Description.—The zoarium is articulated. The segments are bilamellar, symmetrical or not, lanceolated or irregularly lobed. The zooecia are distinct, separated by a deep furrow, elongated, cylindrical; the frontal is convex, rugose, perforated by large expanded tremopores. The aperture is suborbicular, a little transverse, deep; the proximal border is concave and bears in the middle a small rounded rimule. The ovicell is endozooecial, large, little convex, of the same structure as the frontal. The aperture of the ovicelled zooecia is large, elliptical, transverse.

Measurements.—

$$\text{Apertura}\begin{cases} ha = 0.08 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases} \qquad \text{Zooecia}\begin{cases} Lz = 0.65\text{–}0.75 \text{ mm.} \\ lz = 0.20\text{–}0.30 \text{ mm.} \end{cases}$$

Variations.—The zoarial variations are great for there is not a specimen closely resembling another. The lanceolate form is very rare. The ovicells are often little visible for their convexity is very slight; they are rarely tripartite. At the bottom of the separating furrow of the zooecia there is frequently a very thin little salient thread.

Affinities.—This new species differs from *Parmularia obliqua* MacGillivray, 1868, in its very narrow and cylindrical zooecia. It differs from *Parmularia elongata* in its smaller micrometric measurements and its convex frontal.

Biology.—All of our specimens were dead and deprived of chitinous joints. This species is restricted to the Sulu Archipelago. Our lanceolated specimen was dredged in the China Sea. It is also from the same area (Straits of Malacca) that D'Orbigny received his specimens of *Lanceopora elegans*.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S. co.; 13.2° C.

Cotypes.—Cat. Nos. 8203–8209, U.S.N.M.

PARMULARIA ELONGATA, new species

Plate 55, figs. 11, 12

Description.—The bilamellar segments are irregularly lobed. The zooecia are distinct, separated by a salient thread arranged at the bottom of a deep furrow, very *elongated*, fusiform; the frontal is flat, granular, perforated by expanded tremopores. The aperture is orbicular or a little transverse; it bears a rather wide, rimule proximally rounded; the peristome is thin, somewhat salient, complete.

Measurements.—

Apertura $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.12\text{–}0.15 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.00\text{–}1.10 \text{ mm.} \\ lz = 0.35 \text{ mm.} \end{cases}$

Affinities.—The present species differs from all the known species of *Parmularia* in its great zooecial length.

Occurrence.—

D. 5162. Tinagta Island; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk, Sh. crs.; 11.6° C.

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms (common).

Cotypes.—Cat. Nos. 8210, 8211, U.S.N.M.

PARMULARIA DEPRESSA, new species

Plate 55, fig. 13

Description.—The bilamellar segments are irregular. The zooecia are distinct, separated by a very deep furrow, elongated, fusiform; the frontal is concave, *depressed* throughout its length, perforated by expanded tremopores. The aperture is orbicular; the concave proximal border bears a rather wide, semicircular rimule; the peristome is thin, somewhat salient, complete.

Measurements.—

Apertura $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.65\text{–}0.85 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Affinities.—This new species differs from *Parmularia cylindrica* in its concave frontal (and not convex) and from *Parmularia elongata*, in its much smaller micrometric measurements. Only the figured specimen has been found.

Occurrence.—D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

Holotype.—Cat. No. 8212, U.S.N.M.

Family PHYLACTELLIDAE Canu and Bassler, 1917

Genus PERIGASTRELLA Canu and Bassler, 1917

We created this genus in 1917 before we had received the later work of Levinsen. We are now able to complete our text figure from a study of a recent typical species.

To the list of recent species given by us in 1920 it is necessary to add the following:

Perigastrella (*Escharella*) *abyssicola* Norman, 1868.
Perigastrella (*Discopora*) *stenostoma* Smitt, 1871.
Perigastrella (*Lepralia*) *microstoma* Norman, 1868.
Perigastrella (*Escharella*) *indivisa* Levinsen, 1916.
Perigastrella (*Escharella*) *macrodonta* Levinsen, 1916.

All the recent species inhabit the arctic regions or the northern part of the temperate zone. *Perigastrella contracta* Waters, 1899, from Madeira is a very aberrant type for which it may become necessary perhaps to form a special genus. The 14 known fossil species in Europe as well as in America, are on the contrary species of the tropical zone or of the southern region of the temperate zone. There has therefore been a regular emigration from the south toward the north of all the species of the genus and this migration is the cause of the specific differentiations. The theory which takes into consideration the contraction of the equatorial zone as the cause of these differences is therefore quite false for the bryozoa, for we can cite other examples.

PERIGASTRELLA OVALIS, new species

Plate 56, figs. 1, 2

Description.—The zoarium encrusts pebbles. The zooecia are distinct, separated by a very deep furrow, large, elongated, *oval*; the frontal is quite convex, formed by a smooth or very finely granulated tremocyst, bordered by a line of small, spaced pores, ending distally in a peristomie more or less developed. The apertura is semielliptical, transverse; the peristome is thin and garnished by four distal spines. The ovicell is globular, of the same structure as the frontal and opens above the operculum; the aperture of the ovicelled zooecia is larger than the others (0.10 by 0.15 mm.). The ancestrula is membraniporoid and surrounded by 10 spines.

Measurements.—

Apertura $\begin{cases} ha = 0.09 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60\text{–}0.75 \text{ mm.} \\ lz = 0.40\text{–}0.50 \text{ mm.} \end{cases}$

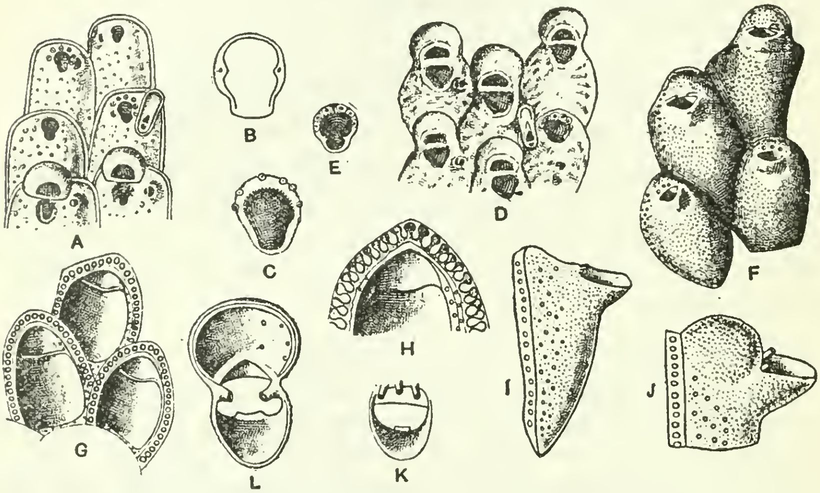

FIG. 156.—Genus *Perigastrella* Canu and Bassler, 1917

A–E. *Perigastrella contracta* Waters, 1899. A. Zooecia, ×25. B, C. Operculum and apertura, ×85. (A–C after Waters, 1899.) D, E. Zooecia and apertura. (After Norman, 1909.)

F–L. *Perigastrella labiata* Boeck, 1861. F. Zooecia showing the marginal pore and the spout-shaped projection towards the aperture. G. Basal view of the zooecia showing the arrangement of the dietellae. H. Upper part of a zooecium in basal view. I. Lateral view of a zooecium. J. Lateral view of an ovicell and the upper part of a zooecium. K. Aperture with oral spines. L. Base of an ovicell. (F–L. After Levinsen, 1916.)

Affinities.—The measurements are quite variable and the marginal cells are very large. The ancestrula is variable; when it is small it presents only an orifice surrounded by spines; if it is larger it has a real orifice and a membranous frontal.

This species is very close to *Perigastrella indivisa* Levinsen, 1916, from the shores of Greenland but differs from it in the oval zooecia (and not hexagonal), in the absence of an oral mucron, in the presence of four spines (and not six), and in the development of a peristomie. The latter is much less developed than in *Perigastrella labiata* Boeck (Smitt, 1867). Our specimens were dead.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Cotypes.—Cat. No. 8213, U.S.N.M.

Genus PSILOPSELLA Canu and Bassler, 1927

The zooecia are large and surrounded by parietal dietellae; the frontal is surrounded with large areolar pores distinct from the dietellae. The aperture is orbicular and buried at the bottom of a long peristomie.

Genotype.—*Psilopsella uniseriata* Canu and Bassler, 1927. Recent.

PSILOPSELLA UNISERIATA Canu and Bassler, 1927

Plate 57, figs. 1–3

1927. *Psilopsella uniseriata* Canu and Bassler, Classification Cheilostomatous Bryozoa, Proc. U. S. Nat. Mus., vol. 69. art. 14, p. 8, pl. 1, fig. 10.

Description.—The zoarium is uniserial and encrusts pebbles, shells and corals presenting numerous asperities. The zooecia are very large, elliptical; the walls are much thickened and excavated with dietellae opening outward; the frontal is very convex, smooth, surrounded by a line of large areolar pores perfectly distinct from the dietellae; the peristomie is large, salient, tubular; the peristome is thick and orbicular.

Measurements.—

Peristomice $\begin{cases} hpi = 0.30 \text{ mm.} \\ lpi = 0.30 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.50 \text{ mm.} \\ lz = 0.80\text{–}1.00 \text{ mm.} \end{cases}$

Affinities.—This species on account of its gigantic dimensions, appeared to us interesting to figure although our specimens were incomplete. The presence of parietal dietellae as in *Perigastrella* causes us to introduce this genus provisionally in the Phylactellidae.

Biology.—This large species never spreads out over a smooth surface but it creeps between the asperities of the substratum and around them in order to take advantage of this shelter. It appears thus to profit from the natural protection formed by the irregularities of the body on which the larva is fixed. The quantity of nourishment necessary for the construction of a single zooecium is considerable and it can subsist only in localities enormously rich in diatoms. Our specimens were dead.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.; 17.2° C.

Holotype.—Cat. No. 8214, U.S.N.M.

2182—29——27

Genus LAGENIPORA Hincks, 1877

LAGENIPORA(?) PERFORATA, new species

Plate 55, fig. 5

Description.—The zoarium is free, unilamellar. The zooecia are distinct, lageniform, terminated by a long, erect but oblique peristomie. The frontal is convex and free; it bears at the base two large *perforations* a higher triangular avicularium with pivot and with beak more or less salient. The aperture is terminal; it is formed of a semicircular anter and a proximal straight border notched by a narrow rectangular rimule; the peristome is very thick and ornamented sometimes by short spicules.

Affinities.—We describe this species even though our unique specimen is incomplete because it is so strange an animal that we thought it well to figure it. It resembles in its exterior aspect *Celleporella castrocarensis* Manzoni, 1875, a fossil from the Pliocene (Plaisancian) of Italy but differs from it in its very straight rimule and in the presence of avicularium and frontal perforations.

Fig. 157.—Genus *Phylactella* Hincks, 1880

Phylactella collaris Norman, 1866. Ovicelled zooecia, ×20 (After Hincks, 1880).

Occurrence.—D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

Holotype.—Cat. No. 8215, U.S.N.M.

Genus ALYSIDOTA Busk, 1856

The apertura is more or less circular; it bears either a lyrule or some cardelles. The thick band of the operculum is at a small distance from the edge. The apertura is surrounded by a peristomie more or less funnel-shaped and much dilated proximally; the peristome is interrupted distally and replaced by a small tongue. The frontal is a tremocyst with very fine pores. No spines.

Genotype.—*Alecto* (*Lepralia*) *labrosa* Busk, 1852.

Range.—Eocene (Jacksonian). Recent.

This is the definition which Canu and Bassler, 1920 gave for the genus *Phylactella*. The genus *Alysidota* has not yet been admitted by zoologists for it was purely zoarial. Busk created it for all the incrusting uniserial Lepralias. The zoarial form not being a generic character, Busk's genus had disappeared, the species classed here in fact belonging to three different genera. According to the new laws of nomenclature it must be held for its genotype, *Lepralia labrosa* which was chosen by Busk himself.

Genus PHYLACTELLA Hincks, 1880

Hincks, 1880, created this genus for species with long peristomie with peristome much enlarged in its proximal portion and with recumbent ovicell. He cited three species, *P. labrosa* Busk, 1852, *P. collaris*, Norman, 1866, and *P. eximia* Hincks, 1880. The first being the type of *Alysidota*, the second may be selected as the type of the genus *Phylactella*, but the authors are not in accord on the frontal structure or on the synonymy of this species. It is necessary

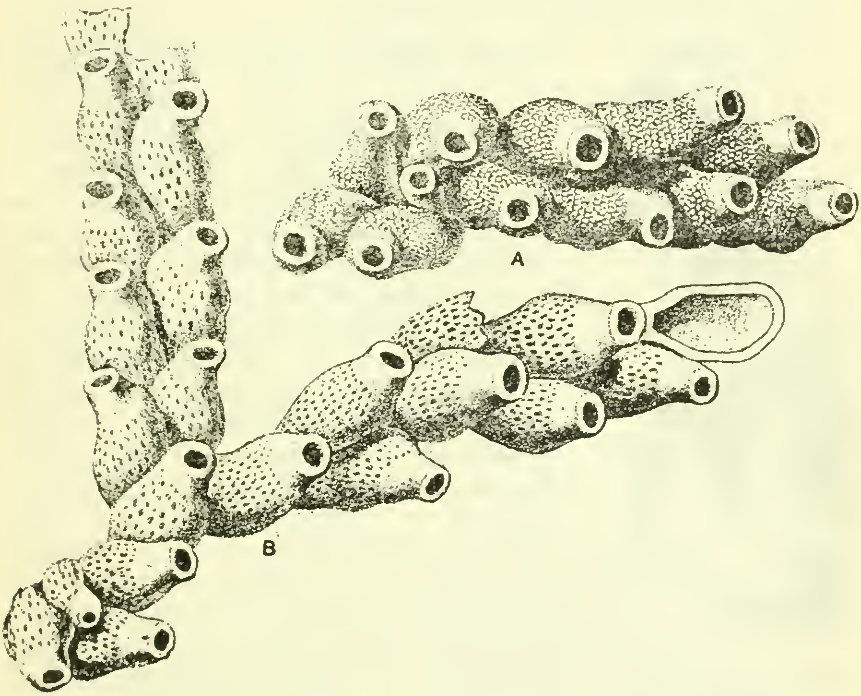

FIG. 158.—Genus *Teuchopora* Neviani, 1895

Teuchopora (*Alecto*) *castrocarensis* Manzoni, 1875. Pliocene (Plaisancian) of Italy. (After Manzoni.)

to await more exact studies. The third is the type of a new genus close to but distinct from *Perigastrella* Canu and Bassler, 1920.

Genus TEUCHOPORA Neviani, 1895

The zooecia are lageniform; the frontal is covered by tremopores; the peristomie is free, smooth, oblique, salient; the peristome is orbicular. The apertura bears a small proximal rimule. The zoarium is encrusting and formed by the generally biserial branches. Ovicell?

Genotype.—*Teuchopora* (*Alecto*) *castrocarensis* Manzoni, 1875. Pliocene of Italy.

Genus CHEILONELLA Koschinsky, 1885

The zooecia are very large; the frontal is smooth and ornamented with very small marginal pores. The peristomie is free, salient; the peristome is orbicular with a proximal denticle. The zoarium is uniserial. Aperture, ovicell?

Genotype.—Cheilonella gigas Koschinsky, 1885. Eocene (Lutetian).

Psilopsella and *Cheilonella* with their giant cells do not belong to the family of Phylactellidae but as they are incompletely described we are not able to classify them correctly.

Fig. 159.—Genus *Cheilonella* Koschinsky, 1885

Cheilonella gigas Koschinsky, 1885. Zooecia, ×25. Lutetian of Bavaria. (After Koschinsky.)

Family CREPIDACANTHIDAE Levinsen, 1909

In 1920 we classed *Crepidacantha* Levinsen, 1909, in the family Phylactellidae, in company with *Mastigophora*, because of the recumbent nature of the ovicell. Now that we have been able to study three species of *Crepidacantha*, we believe it necessary to maintain Levinsen's family. In reality the large larva of the Phylactellidae, measuring according to Waters 0.30 to 0.35 mm. in length, could not possibly develop in the ovicells of *Crepidacantha* and *Mastigophora* that measure only from 0.15 to 0.25 mm. in diameter. A different larva corresponds always to a different family. On the other hand, inspection of the figures alone reveal close analogies between the two genera cited. The three known genera of this family are, then, *Crepidacantha* Levinsen, 1909, *Mastigophora* Hincks, 1880, and *Schizobathysella* Canu and Bassler, 1917.

Genus CREPIDACANTHA Levinsen, 1909

The ovicell is recumbent and closed by the operculum. The frontal is a tremocyst with very small pores. The aperture shows a semicircular anter and a poster shorter and wider, separated by two salient cardelles. Long setiform spines corresponding to the parietal dietellae surround the zooecia.

Genotype.—Crepidacantha (*Flustra*) *poissonni* Savigny Audouin, 1826. Recent.

Historical.—The synonymy of the genotype, *Flustra poissonni* Savigny Audouin, 1826, is very confused. Several very distinct species can be separated.

1. *Crepidacantha poissonni* Savigny Audouin, 1826, of which Norman, 1909, has given an exact bibliography. It is characterized by its two vibracula placed well below the aperture. All the other species have the vibracula placed laterally on each side of the aperture. Two species are mucronated.

2. *Crepidacantha crinispina* Levinsen, 1909, from Siam and Australia. The frontal bears a characteristic median pustule.

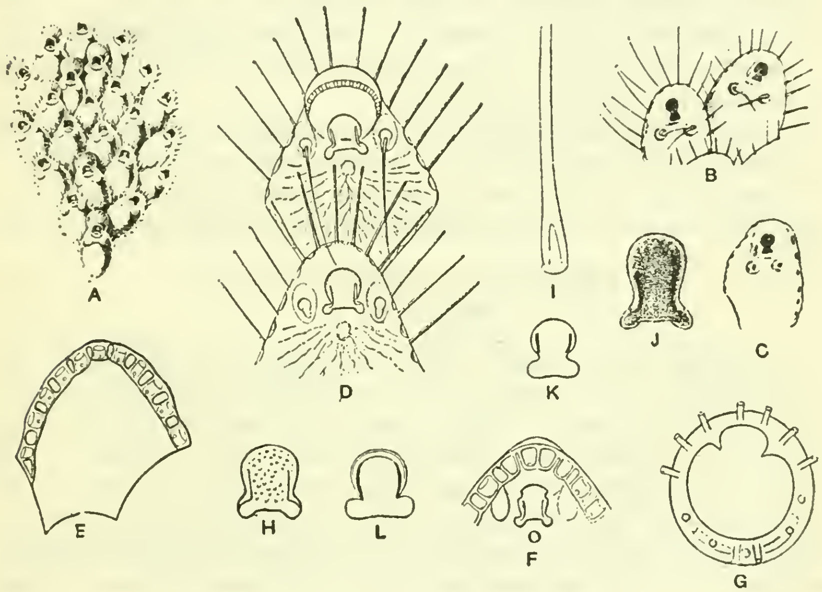

Fig. 160.—Genus *Crepidacantha* Levinsen, 1909

A–C. *Crepidacantha poissoni* Savigny-Audouin, 1826. A. The original figure of Savigny-Audouin. B. Two zooecia with their lateral spines. C. A zooecium without spines and without flagellum. (B, C. After Norman 1909.)

D–I. *Crepidacantha crinispina* Levinsen, 1909. D. Two zooecia, ×55. E. A zooecium seen from the basal wall. Dietellae alternate with intermediate spaces, ×55. F. The distal part of a zooecium with ovicell seen from the basal wall, ×55. G. An ancestrula of a variety of the same species, ×175. H. Operculum ×140. I. The proximal part of the flagellum, ×200.

J. *Crepidacantha poissoni* (?) Waters 1887. Operculum. (After Waters.)

K. *Crepidacantha papulifera*, new species. Operculum.

L. *Crepidacantha grandis*, new species. Operculum.

3. *Crepidacantha setifera*, new name for *Lepralia setigera* MacGillivray, 1882, from Australia. The frontal is without ornament; the ovicell is large and the vibracula are lateral, but placed at the level of the proximal border of the aperture. Two species are not mucronated.

4. *Crepidacantha setigera* Smitt, 1872, from the Gulf of Mexico. The frontal is not perforated.

5. *Crepidacantha solea*, new name for *Lepralia poissonni*, Kirkpatrick, 1888 from Mauritius, Sea of China and Australia.

Waters, 1889, figures still a variety from Australia which belongs perhaps to another genus.

Waters, 1887, figured an operculum of a specimen from New Zealand which appears to us distinct. Provisionally until more complete figures are given, we may call this little known species *C. zelanica*.

As in the Philippines there are several species of *Crepidacantha*, certainly in Australia there are also several species confounded with Audouin's species which must still be studied.

The vibracula of this genus are not very characteristic. The threads are designated as vibraculoid mandibles by Kirkpatrick and as setiform mandibles by ourselves.

We have a specimen very close to *Crepidacantha grandis* and which is provided with two triangular avicularia with pivot. Certainly, as in *Mastigophora*, all the species are not provided with vibracula so that the presence of them alone can not be considered as a generic character.

CREPIDACANTHA PAPULIFERA, new species

Plate 57, fig. 8

Description.—The zoarium encrusts shells. The zooecia are distinct, separated by a deep furrow, elongated, hexagonal, or oval; the frontal is convex and bears very close to the aperture a small salient *pustule*; it is formed of a tremocyst with very small pores. The aperture is small, nonterminal, with convex proximal border; the poster is wider than the anter and the two cardelles are salient; the peristome is thin and crenulated. The ovicell is small, recumbent, marginated, of the same structure as the frontal; it bears a longitudinal carina. The aperture of the ovicelled zooecia is a little larger. It has two poriform vibracula on each side of the aperture; just at the level of the cardelles.

Measurements.—

Apertura $\begin{cases} ha = 0.07 \text{ mm.} \\ la = 0.07 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz0 = .50 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Affinities.—In its oral mucro and its frontal pustule this species is very close to *Crepidacantha crinispina* Levinsen, 1909, but differs in the carina of the ovicell, in the presence of short spines on the peristome, in the pustule adjacent to the aperture and in its ovicell with straight proximal border and not convex.

Biology.—Our specimens were living. They were in reproduction from February 15 to April 21, 1908. The species is very rare.

Occurrence.—

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.

Cotypes.—Cat. Nos. 8217, 8218, U.S.N.M.

CREPIDACANTHA ALTIROSTRIS, new species

Plate 57, fig. 9

Description.—The zoarium encrusts Orbitoides. The zooecia are distinct, separated by a deep furrow, somewhat elongated, large, ovoid; the frontal is convex, finely porous, and granular. The aperture is small, nonterminal, with convex proximal border; the poster is wider than the anter; the peristome is a little salient, thin, sometimes crenulated; the cardelles are salient. The ovicell is small, elongated, globular, carinated. The two poriform vibracula are placed *very high* at the level of the anter.

Measurements.—

Apertura $\begin{cases} ha = 0.08\text{–}0.10 \text{ mm.} \\ la = 0.08 \text{ mm.} \end{cases}$ Zooecium $\begin{cases} Lz = 0.40\text{–}0.50 \text{ mm.} \\ lz = 0.30\text{–}0.40 \text{ mm.} \end{cases}$

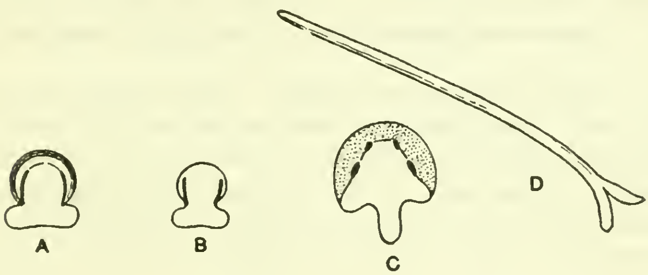

FIG. 161.—Family *Crepidacanthidae* Levinson, 1909

A. *Crepidacantha grandis*, new species, operculum, ×85. B. *Crepidacantha papulifera*, new species, operculum, ×85. C, D. *Mastigophora baculifera*, new species. C. Operculum, ×85. D. Setiform spine, ×85.

Affinities.—This species much resembles *Lepralia setigera* MacGillivray, 1882 (=*Crepidacantha setifera*, new name) but differs in its wider zooecia, in its vibracula placed much higher, and in its smaller ovicell which is also carinated and marginated.

Biology.—This species is very rare. Some living specimens were in reproduction in February, 1908 (38 meters). All of the specimens were deprived of their lateral setiform spines.

Occurrence.—

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

Holotype.—Cat. No. 8219, U.S.N.M.

CREPIDACANTHA GRANDIS, new species

Plate 57, figs. 4–7

Description.—The zoarium encrusts shells. The zooecia are distinct, separated by a deep furrow, elongated, *large*, oval, surrounded by a dozen of setiform spines corresponding to the dietellae, more or less visible; the frontal is convex, very finely granular and porous; the tremocyst is very thin. The aperture is small, nonterminal, provided with two strong cardelles; the poster is a little wider than the anter; the proximal border is convex (mucronated); the peristome is thin and little salient. The ovicell is globular, of varied form, closed by the operculum. From each side of the aperture arise short setae.

Measurements.—

Apertura $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60 \text{ mm.} \\ lz = 0.46\text{–}0.50 \text{ mm.} \end{cases}$

Affinities.—This beautiful species is very well characterized by its large micrometric dimensions. It presents some other interesting features. On the nonmarginal zooecia the setiform spines are short (=0.15–0.20 mm.) and all equal; they are very long on the contrary (=0.60 mm.) on the free side of the marginal zooecia. The marginal dietellae are visible even through the ectocyst which, moreover, is very thin.

Biology.—Our specimens were living. They were in reproduction in April, 1908. Their spines are very fragile and they can not live in rough waters; further at 170 meters a current alone could disturb the tranquility of the sea. But then in the depth around Anima Sola what cause could bring in the rich plancton which exists there?

Occurrence.—D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.

Cotypes.—Cat. No. 8220, U.S.N.M.

Genus MASTIGOPHORA Hincks, 1880

MASTIGOPHORA PESANSERIS Smitt, 1873

Plate 58, figs. 4–8

1909. *Schizoporella pesanseris* Waters, Marine biology of the Sudanese Red Sea, Bryozoa, Journal Linnean Society, Zoology, vol. 21, p. 169.

1909. *Escharina pesanseris* Levinsen, Morphologic and Systematic Studies on the Cheilostomatous Bryozoa, p. 326, pl. 18, fig. 1.

1909. *Escharina pesanseris* Norman, The Polyzoa of Madeira, Journal Linnean Society, Zoology, vol. 30, p. 302, pl. 40, fig. 7.

1914. *Escharina pesanseris* Osburn, The Bryozoa of the Tortugas Islands, Pub. No. 182, Carnegie Institution of Washington, p. 207.

1927. *Mastigophora pesanseris* Canu and Bassler, Bryozoaires des Iles Hawai, Bulletin de la Société des Sciences de Seine et Oise, ser. 2, vol. 8, p. 36 (ref.), pl. 8, fig. 5 (Biology).

1928. *Mastigophora pesanseris* Canu and Bassler, Bryozoaires du Bresil, Bulletin de la Société des Sciences de Seine et Oise, ser. 2, vol. 9, p. 96, pl. 9, fig. 1 (Biology and geographic distribution).

Measurements.—

Apertura $\begin{cases} ha = 0.12\text{–}0.14 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60\text{–}0.80 \text{ mm.} \\ lz = 0.40\text{–}0.50 \text{ mm.} \end{cases}$

Affinities.—Waters, 1909, says "*Mastigophora* was separated from *Schizoporella* as having vibracula; but this species has avicularia, and therefore I retain it with *Schizoporella*, and it belongs to the *S. cecili* Audouin group." In 1920[13] we admitted this opinion. The genus *Escharina* of Levinsen does not appear more natural than the genus *Schizoporella*. As paleontologists we did not go into the matter further but now since we have studied specimens from the Gulf of Mexico and the Philippines we have arrived at the following:

1. The operculum figured by Levinsen, 1909, is more exact than the figure of Waters, 1909; this species is not an *Arthropoma*.

2. We have observed all the essential characters of *Mastigophora*, namely, recumbent ovicell, complete and salient peristome, distal tongue, frontal with tremocyst and avicularia placed exactly as in *Mastigophora dutertrei*.

3. The only difference is the palmate form of the mandibles which are not setiform.

Considering that the form of the mandibles varies very much in the same colony (*Cellepora*) and even on the same zooecium (*Smittina*) we can not regard this as a generic character. The genus *Mastigophora* can have species with varied mandibles like many other genera of cheilostomes (*Smittina*, *Schizomavella*, *Retepora*, etc.).

We do not hesitate therefore to class *Hippothoa pesanseris* Smitt, 1872, in *Mastigophora*, and we would add even to the same genus the *Lepralia simplex* Johnston, 1847, which is totally deprived of avicularia.

The zoarium encrusts shells, orbitoides, and other bryozoa (*Adeonellopsis*). The avicularia are without pivot; the ancestrular zooecia are frequently deprived of avicularia. The ancestrula is an ordinary, small zooecium.

The peristome bears six spines. Their union combined with the great development of the inferior lip of the peristome forms the complex peristomie of the genus *Schizobathysella*.

The operculum is very fragile and difficult to prepare.

Biology.—Dead or alive, almost all of our specimens are ovicelled and often ancestrulated. Reproduction probably occurred throughout the year but the abundance of specimens in a given region has no connection with the fertility of this species. The larva must have a great number of enemies.

This is a species of slight depth (16–113 meters), but it can, however, accidentally descend to much greater depths. It is sensitive to temperature, for it is rare in great depths and has its abode in the equatorial zone. The fertility gives it a distribution throughout the equatorial zone. It is always attached to small fragments. The palmate mandibles are perhaps in relationship with a special mode of nutrition.

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[13] North American Early Tertiary Bryozoa, p. 351, fig. 105.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 4′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 4′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.

D. 5235. Nagubat Island, east coast of Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

D. 5255. Dumalag Island, Gulf of Davao; 7° 3′ N.; 125° 39′ E.; 100 fathoms; sft. M.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Geographic distribution.—Eastern Atlantic, Madeira, 70 fathoms; western Atlantic, Bahamas; Gulf of Mexico, Habana, 193 fathoms; Florida, 42 fathoms; Tortugas, 8–42 fathoms; western Pacific, Philippine Islands, 20–240 fathoms; eastern Pacific, Hawaiian Islands, 91–406 meters, 20.5° C.; Indian Ocean, Mauritius, 10 miles off Gable; Manaar, 34 fathoms; Providence, 50–70 fathoms; Gimsah Bay, Gulf of Suez; Siam

Plesiotypes.—Cat. Nos. 8221–8224, U.S.N.M.

MASTIGOPHORA GRANDICELLA, new species

Plate 58, figs. 1–3

Description.—The zoarium encrusts shells. The zooecia are distinct, separated by a deep furrow, *large*, elongated, elliptical, arranged in linear series, bi or multiserial; the frontal is formed of a detachable tremocyst with very small pores arranged on a perforated olocyst. The aperture is small, semilunar, with a very narrow linear rimule; the peristome is thin, very little enlarged proximally and bears 6 spines. Two small triangular avicularia with pivot are adjacent to the peristome. The ovicell is small, recumbent, closed by the operculum.

Measurements.—

Apertura (including rimule) $\begin{cases} ha = 0.15 \text{ mm.} \\ la = 0.12\text{–}0.15 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 1.00 \text{ mm.} \\ lz = 0.70 \text{ mm.} \end{cases}$

Affinities.—The beak of the avicularium expands often into a spatulate form in order to receive a wide mandible. This species is therefore very close to *Mastigophora pesanseris* Smitt, 1872, and differs simply in its much larger zooecial dimensions.

Biology.—All our specimens were ovicelled; some were living. The latter were in reproduction April 22, 1908.

Occurrence.—D. 5217. Anima Sola Island; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.; 17.2° C.

Cotypes.—Cat. No. 8225, U.S.N.M.

MASTIGOPHORA BACULIFERA, new species

Plate 58, figs. 9, 10

Description.—The zoarium encrusts nullipores. The zooecia are distinct, separated by a deep furrow, elongated, oval or clavate; the frontal is convex and formed by a tremocyst with very small pores; it bears a dozen large spines around the aperture in the form of *small staffs.* The aperture is semicircular with a very narrow linear rimule; the peristome is little apparent. The ovicell is amall, recumbent, globular, closed by the operculum. The aperture of the ovicelled zooecia is larger (0.16 mm.).

Measurements.—

Apertura $\begin{cases} ha = 0.14 \text{ mm.} \\ la = 0.14 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60\text{–}0.70 \text{ mm.} \\ lz = 0.50 \text{ mm.} \end{cases}$

Affinities.—The length of the staff-like spine is rather variable; it can measure a half millimeter. They are not arranged at all as in *Crepidacantha* since they are placed on the tremocyst; they correspond to the tremopores and not to the dietellae. Levinsen called them acropetalous (or annular); they grow by means of a membrane at their free end.

A certain number of species are thus ornamented with spines like small staffs; *Schizoporella biserialis* Hincks, 1885, *Schizoporella arachnoides* MacGillivray, 1882, *Lacerna* (*Schizoporella*) *chondra* Marcus, 1921, and *Schizoporella patagonica* Waters, 1905 (=*S. longispinata* Busk, 1852). The affinities of *M. baculifera* are especially with the last, principally in its micrometric measurements; it differs in the greater (double) number of spines.

Biology.—We possess only two colonies of a dozen cells of this charming species. It is extremely fragile and can live only in very calm waters. It was in reproduction February 15, 1908. This species lives in the same localities as *Mastigophora pesanseris* Smitt, 1872. The substitution of spines for avicularia is not then a special adaptation to a medium determined by depth, temperature and salinity; their presence appears to reveal rather a particular kind of capture or more exactly a special means of capture of certain very mobile organisms.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5144. Jolo Light, Jolo; 6° 05′ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

Cotypes.—Cat. Nos. 8226, 8227, U.S.N.M.

Genus NIMBELLA Jullien, 1903

The frontal is smooth or granulose. The apertura is semilunar, with festooned anter, and the poster is limited by two large cardelles which cover it except at its middle, where a large rimule is formed;

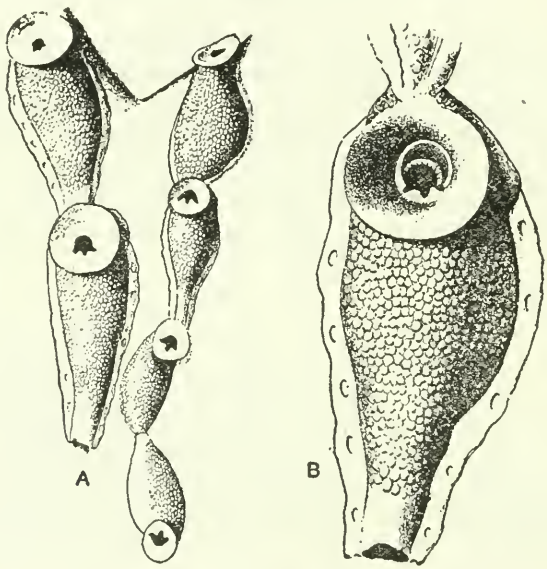

Fig. 162.—Genus *Nimbella* Jullien, 1903

A, B. *Nimbella limbata* Jullien, 1903. A. A linear colony, ×25. Each aperture is surrounded by a wide areola. B. A zooecium, ×58. (After Jullien, 1903.)

at each extremity of the poster there exists a rimule narrower or as long as the median rimule. The peristome forms an aureola around the aperture. The zooecia are surrounded by a perforated lamella with large pores (translation after Jullien, 1903).

Genotype.—*Nimbella limbata* Jullien, 1903. Recent (Azores).

Family CELLEPORIDAE Busk, 1852

This family and the genera then referred here, namely *Holoporella* Waters, 1909, *Costazia* Neviani, 1895, *Osthimosia* Jullien, 1888, *Schismopora* MacGillivray, 1888, *Acanthionella* Canu and Bassler, 1917, and *Kleidionella* Canu and Bassler, 1917, retaining *Cellepora* Linnaeus, 1767 for the reception of species with doubtful relationships were described in our 1920 work. We now add to the Celleporidae *Hippoporidra* and *Hippotrema* Canu and Bassler, 1927, *Tegminula* Jullien, 1882, *Aulopocella* (*Solenopora*) Maplestone, 1903, and *Omalosecosa* Canu and Bassler, 1925. Descriptions of these latter genera are given below.

The zooecia of the Cellepores are accumulated one upon the other without any apparent order. They are of mediocre and little artistic architecture, but as they swarm in all the seas it must be admitted that this arrangement much facilitates their existence and their dissemination. The larva alone has need of a minute fragment in order to affix itself; the zoarium is then independent of the nature of the bottom. The rarity of the frontal pores is compensated from the viewpoint of the respiratory function by the number (16) and the length of the tentacles. These are then animals with cutaneous respiration; in order to live they have to remain evaginated. This peculiarity appears to be the cause of the erectness of the zooecia. The extremely fragile operculum appears to be only an accessory, certainly indispensable but of a secondary use.

Genus AULOPOCELLA Maplestone, 1903

(*Solenopora* Maplestone, 1903, preoccupied)

"Zooecia ovoid. Aperture oval, within which is a tubular process with a circular pore on the summit. Ovicell large, globular, subimmersed." (Maplestone.)

Genotype.—Aulopocella (*Solenopora*) *tubulifera* Maplestone, 1903. Recent.

Genus TEGMINULA Jullien, 1882

The zooecia are urceolate, irregularly erect, close to each other; the frontal is smooth. The orifice is absolutely circular and surmounted by a tubular peristome in part opened in front (Jullien).

Genotype.—Tegminula venusta Jullien, 1882. Recent (Gulf of Gascony).

Genus OMALOSECOSA Canu and Bassler, 1925

The zooecia are cumulate. The ovicell is hyperstomial, not closed by the operculum, smooth. The aperture is semicircular, with a somewhat concave proximal border. The frontal is entirely smooth. The muscular attachments are placed on the border of the operculum.

Genotype.—Omalosecosa (*Cellepora*) *ramulosa* Linnaeus, 1766.

Range.—Pliocene. Recent.

Genus HIPPOPORIDRA Canu and Bassler, 1927

The ovicell is hyperstomial and bears a frontal area. The zooecia are accumulated; the frontal is surrounded by areolar pores and often bears small avicularia. The aperture is formed of an anter and a poster separated by two cardelles. The large interzooecial avicularia are acuminated.

Genotype.—*Hippoporidra* (*Cellepora*) *edax* Busk, 1859.

Range.—Miocene—Recent.

The known species of this genus are as follows:

Hippoporidra (*Cellepora*) *edax* Busk, 1859 ---------- Recent, fossil.
Hippoporidra (*Lepralia*) *calcarea* Smitt, 1873 ---------- Recent, fossil.
Hippoporidra (*Lepralia*) *maculata* Ulrich and Bassler, 1904 ------ Miocene.
Hippoporidra (*Lepralia*) *parvula* Canu and Bassler, 1923 -------- Miocene.

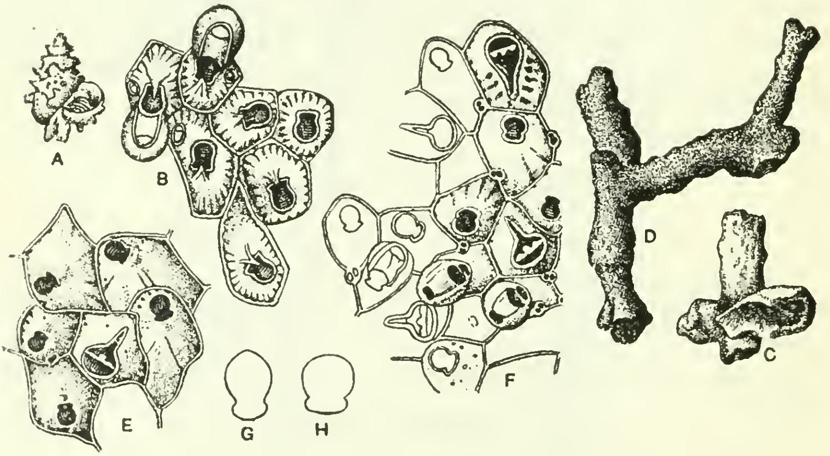

Fig. 163.—Genus *Hippoporidra*, new genus

A, B. *Hippoporidra edax* Busk, 1859. A. Zoarium, natural size. B. Zooecia ×40. (A, B. After Hincks, 1880.) C–H. *Hippoporidra calcarea* Smitt, 1873. C, D. Subcylindrical colonies, natural size. E. Ordinary zooecia, ×40. F. Surface with ovicelled zooecia and avicularia, ×40. (C–F. After Smitt, 1873.) G, H, Two opercula, one (G) of ordinary zooecium and another (H) of an ovicelled one, ×85.

Genus HIPPOTREMA Canu and Bassler, 1927

The ovicell is hyperstomial and is not closed by the operculum. The zooecia are piled upon each other in disorder; their frontal is perforated by tremopores. The aperture is formed by a large orbicular anter and by a short poster, separated by two cardelles. The operculum does not have lateral linear attachments.

Genotype.—*Hippotrema* (*Lepralia*) *janthina* Smitt, 1873.

Range.—Recent.

This is the *C. janthina* group of Waters of which we have published a text figure.[14] The genus differs from *Hippoporidra* in the transformation of the pleurocyst into a tremocyst, in the different form of the poster, and in the absence of linear attachments to the operculum. The only known species are:

Hippotrema (*Lepralia*) *janthina* Smitt, 1873 .... Florida.
Hippotrema (*Lepralia*) *rotundora* Norman, 1909 .... Madeira.

Waters, 1899, and Norman, 1909, are not in accord on the character of the second species.

Genus HOLOPORELLA Waters, 1909

HOLOPORELLA INFLATA, new species

Plate 59, figs. 6-9

Description.—The zoarium is free and unilamellar; it surrounds delicate radicels or takes the form of a semiglobular mass. The zooecia are very large, very convex; the frontal is garnished with large and scattered tremopores. The apertura is suborbicular, somewhat transverse; the peristome is thick and bears a salient, avicularian umbo. The interzooecial avicularia are relatively small; they have a pivot and their beak is spatulate. The deep zooecia and the incomplete zooecia are rare.

Measurements.—

Apertura $\begin{cases} ha = 0.20 \text{ mm.} \\ la = 0.25 \text{ mm.} \end{cases}$ Zooecial diameter = 0.65–0.75 mm.

Affinities.—This species is very well characterized by its large dimensions and by its frontal tremopores; the presence of these latter differentiates it from *Holoporella magnifica* Osburn.

The interior shows a large frontal depression appearing like another superposed cell. Our largest colonies measure 20 by 12 mm., which is not at all in accord with the great size of the zooecia. All our specimens were dead.

Biology.—Celleporidae with giant zooecia exist only in the tropical zone.

Occurrence.—

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5192. Jilantaguan Island, off northern Cebu Island; 11° 09′ 15″ N.; 123° 50′ E.; 32 fathoms; green S.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Cotypes.—Cat. Nos. 8228, 8229, U.S.N.M.

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[14] Canu and Bassler, 1920, p. 615, fig. 185.

HOLOPORELLA TURRITA Smitt, 1873

Plate 59, figs. 1–5

1873 *Lepralia turrita* SMITT, Floridan Bryozoa, pt. 2, Kongl. Svenska Vetenskaps-Akademiens Handlingar, vol. 11, no. 4, p. 65, pl. 11, figs. 226–228.

Description.—The zoarium forms small globular masses attached to algae or more often fixed to nullipores; the color is a beautiful flesh rose. The zooecia are little distinct, orbicular, or hexagonal, little convex, of large dimensions; the frontal is covered over by 5 large avicularia, the orifice of which is small and poriform. The latter is often surrounded by a tubular and very salient peristome. The apertura is median; the anter is in the form of a bell and the poster is concave. The ovicell is smooth, small, globular. The interzooecial avicularia (=zoarial) are relatively small; the orifice is orbicular, small, and traversed by a pivot; the beak is wide and rounded; the mandibular cavity is smooth and shallow. On the

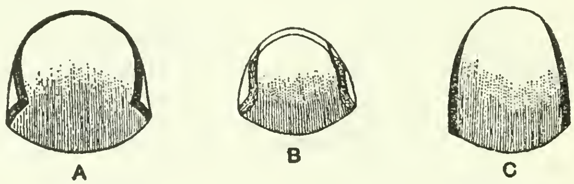

FIG. 164.—Opercula, ×85, of *Holoporella turrita* Smitt, 1873

A. Ordinary zooecia. B, C. Two forms of salient zooecia.

zoarial surface there are often large salient zooecia with smooth frontal, arranged in sporadic groups of 2 or 3.

Measurements.—Aperture of ordinary zooecia=0.20 mm.; aperture of sporadic zooecia=0.20–0.25; ordinary zooecia=0.60; sporadic zooecia=0.60–0.70; and length of zoarial avicularia, 0.50.

Variations.—The sporadic zooecia are not formed by all the colonies. On the same colony and without apparent reason the poriform avicularia are sometimes little salient, sometimes very salient (length=0.20 mm.). The incomplete zooecia are very rare; they engender the sporadic zooecia.

The opercula of the ordinary zooecia are somewhat transverse, but the opercula of the sporadic zooecia are a little elongated. The muscular attachments are always lateral. The inferior portion is always thicker and granular. The arrangement of the attachments on the opercula is rather variable and changes according to the locality.

Biology.—All our specimens were living; they were ovicelled February 15–18, 1908 (32–39 meters). They have a beautiful flesh color with the opercula of a deeper shade. This is a true equatorial species; it prefers warm waters and little depths. Here in the

Philippines it does not pass beyond the 7th parallel. It has been observed more to the north in the Gulf of Mexico and in the China Sea.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S., Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5251. Gulf of Davao, Linao Point; 7° 05′ 12″ N.; 125° 39′ 45″ E.; 23 fathoms; Co., S.

Gulf of Mexico, waters off Florida (14–71 m.) (Smitt). Pleistocene of Panama Canal Zone.

Plesiotypes.—Cat. Nos. 8231–8232, U.S.N.M.

HOLOPORELLA (?) CONVEXA, new species

Plate 60, fig. 1

Description.—The zoarium is free, unilamellar, and forms irregular masses of more than 2 square cm. The zooecia are large, salient, very *convex;* the frontal is smooth and surrounded by large areolar pores. The apertura is suborbicular and surrounded by a thick peristome; the latter bears a small avicularium more or less salient. The interzooecial avicularia are relatively small, with convex walls; their beak is rounded; the mandibular cavity is little deep. The deep zooecia have their orifice alone visible.

Measurements.—

Apertura $\begin{cases} ha = 0.20 \text{ mm.} \\ la = 0.20 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.75 \text{ mm.} \\ lz = 0.60 \text{ mm.} \end{cases}$

Length of zoarial avicularium = 0.50 mm.

Affinities.—This species differs from *Cellepora simplex* MacGillivray, 1888, in the presence of areolar pores, in its smooth frontal, in its much smaller micrometric measurements and in the avicularian beak not acuminate but rounded. The marginal zooecia are oriented and little erect. Our specimens were dead. Having neither opercula nor ovicell, our generic reference remains a little doubtful.

Occurrence.—D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.

Holotype.—Cat. No. 8233, U.S.N.M.

2182—29——28

HOLOPORELLA PILAEFERA, new species

Plate 60, figs. 2–6

Description.—The zoarium is large, unilamellar greenish, it creeps most often over the debris of shells and the pebbles of the bottom. The superficial zooecia are distinct, very convex, rarely entirely erect; the frontal is finely granular; it bears an enormous cylindrical beak, very salient, very long, in the form of a pillar. The apertura is a little transverse; the peristome frequently bears a more or less salient avicularium. The ovicell is globular, granular, its orifice is large. The zoarial avicularium is relatively small; its beak is spatulate.

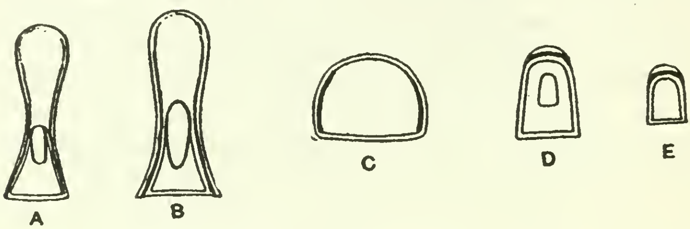

Fig. 165.—*Holoporella pilaefera*, new species

A, B. Mandibles of spatulate zoarial avicularia, ×85. C. Operculum of superficial zooecia, ×85. D, E. Mandible of two types of interzooecial avicularia, ×85.

Measurements.—

Apertura $\begin{cases} ha = 0.16 \text{ mm.} \\ la = 0.22 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.45\text{–}0.65 \text{ mm.} \\ lz = 0.40\text{–}0.50 \text{ mm.} \end{cases}$

Length of avicularium = 0.35 mm.

Variations.—The size of the colonies varies from 2 to 6 square centimeters; they are always convex and irregularly undulated. On certain zoaria the pillars are very frequent, on others they are very rare. The operculum is very thin, very fragile and difficult to prepare. It is curtailed laterally and the muscular attachment are little apparent.

The length of the mandibles of the zoarial avicularia is very variable; they can measure 1.5 mm. in length.

Affinities.—This new species differs from *Cellepora honolulensis* Busk, 1884, in which the frontal is also granulose in the presence of its large cylindrical beak. It differs from *Holoporella foliata* MacGillivray, 1888, from Australia in its spatulate mandibles, in the less salient and less acuminate oral umbo and in its unilameller zoarium.

Biology.—Our living specimens were in reproduction February 15–18, 1908 (16–32 meters). They have been dredged in waters of little depths. The larger colonies bristling with a large number of columnlike beaks have been dredged only at 16 meters depth. The colony dredged at 388 meters was multilamellar, dead and in bad condition; it probably did not live at this depth. The specimen from the Gulf of Davao does not bear large beaks and its determination is doubtful under these circumstances. We think that this species can prosper only in warm, calm waters and at shallow depths.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 4′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5149. Sirun Island, Sulu Archipelago; 5° 33′ N.; 120° 42′ 10″ E.; 10 fathoms; co. Sh.

D. 5251. Gulf of Davao, Linao Point; 7° 05′ 12″ N.; 125° 39′ 35″ E.; 20 fathoms; co. S.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Cotypes.—Cat. Nos. 8234–8236, U.S.N.M.

HOLOPORELLA SERRATIROSTRIS MacGillivray, 1884

Plate 61, figs. 7–10

1884. *Cellepora serratirostris* MacGillivray, Descriptions of new or little known Polyzoa. Part 8, Proceedings Royal Society Victoria, vol. 21, p. 9, pl. 3, fig. 4.

1886. *Cellepora serratirostris* MacGillivray, Bryozoa in Prodromus Zoology Victoria, decade 13, p. 109, pl. 128, fig. 2; pl. 168, fig. 13.

1887. *Cellepora serratirostris* MacGillivray, Catalogue marine Polyzoa of Victoria, Trans. Royal Society Victoria, vol. 23, p. 29.

1889. *Cellepora serratirostris* Jelly, Synonymic Catalogue of Marine Bryozoa, p. 59.

Measurements.—

Apertura $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.15 \text{ mm.} \end{cases}$ Zooecia (marginal) $\begin{cases} Lz = 0.60\text{–}0.70 \text{ mm.} \\ lz = 0.50 \text{ mm.} \end{cases}$

Maximum length of zoarial avicularium = 0.75 mm.

Structure.—The zoarium is a free globular, mass or a convex, irregular expanded lamella; its color is brown. The aperture bears in its proximal portion a small lyrula and two very fragile cardelles. The avicularian beak is oblique and very salient; it persists with the aperture, on the deep zooecia but it is elongate and becomes cylindrical and opens at the same level as the avicularia of the superficial zooecia. The interzooecial avicularia are quite variable in form and position; the more characteristic ones have a deep mandibular cavity surrounded by a serrate wall. On each side of the apertura there is a long peristomial spine the extremity of which can reach the aperture of the distal zooecium. The frontal is finely granular especially on the distal zooecia.

The zoarial avicularia are more numerous in the zoarial portions where the zooecia are deprived of the avicularian beak. The latter is longer in the concave parts of the zoarium and much shorter in the convex parts.

MacGillivray has well studied this species and our photographs simply confirm his admirable drawings.

Affinities.—The differences from *Holoporella tridenticulata* are difficult to make out for the specimens are not absolutely complete. The present species differs, however, in its longer avicularian beak, in the beak of the interzooecial avicularia serrate and never elevated above the zooecial plane, in the absence of long cylindrical beaks and in the somewhat larger micrometric measurements.

The two species often live together and the separation of the specimens is very delicate; they are possibly two varieties of the same species.

Biology.—Almost all our specimens were dead. That is generally the case, however, for all the Cellepores, as the life of a colony is never very long.

The geographic distribution of this species in the region is large. Moreover it has been found in Australia by MacGillivray. This

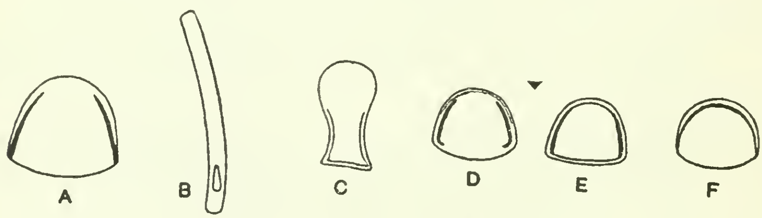

Fig. 166.—Genus *Holoporella* Waters, 1909

A, B. *Holoporella servatirostris* MacGillivray, 1884. A. Operculum ×85. B. Large oral articulated spines, ×85, showing structure. C–F. *Holoporella erectorostris* Busk, 1881. C. Mandible, ×85. D, E, F. Three forms of opercula, ×85; the last a rare occurrence.

distribution is moreover in relationship with its bathymetric distribution because it has been dredged as deep as 240 fathoms and can live at a temperature of more than 12° C.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 9′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 4′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 58′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh. (common).

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.

Plesiotypes.—Cat. Nos. 8237–8241, U.S.N.M.

HOLOPORELLA ERECTOROSTRIS, new species

Plate 61, figs. 1–6

Description.—The zoarium is massive, irregular, globular, free, or fixed. The zooecia are distinct, little erect, almost buried; the frontal is smooth, convex, granular on the zoarial margins. The apertura is semielliptic, transverse, with two small denticles placed on the lower third of the anter and a small denticle placed on the poster. There are 3 or 4 small distal spines. The operculum is very fragile and of ordinary form. The avicularian umbo is small, little salient, placed in the vicinity of the aperture; it is very long on the deep zooecia and can be transformed sporadically into real columns. The interzooecial avicularia are numerous, rather large, oval, curved; the beak is free, quite raised, suberect and clearly detached from the adjacent zooecia. The mandible is spathulate. The ovicell is globular, smooth, transverse, hyperstomial and generally placed on the deep zooecia.

Measurements.—

Apertura $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.12\text{–}0.14 \text{ mm.} \end{cases}$ Length of the larger avicularia = 0.40 mm.

Affinities.—This species belongs to the *tridenticulata* group. However, it differs from *Holoporella tridenticulata* Busk, 1881, in its much smaller and less apparent oral armature, in its smaller oral dimensions and in the presence of numerous free, curved avicularia. It differs from *H. serratirostris* MacGillivray, 1884, in its little salient beak, in the presence of 3 or 4 small distal spines, in the free and salient beak of the interzooecial avicularia and in the possible transformation on the deep zooecia of the avicularian beak into small pillars or columns. The latter are never so large nor so frequent as in *Holoporella pilaefera*, new species.

Biology.—The colonies measure more than 1 cm. in diameter. They are free and fixed to corals, Serpulae, shells, foraminifera, Retepores, and nullipores. Their color is brown. Many of our specimens were living and were in reproduction from February 19 to July 29, so it is probable that the species was in continuous reproduction. It is associated with *Holoporella serratirostris*, but its geographical distribution in the Philippine region appears to be more restricted.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.; 12.4° C.

D. 5577. Mount Dromedario, Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

Cotypes.—Cat. Nos. 8242–8244, U.S.N.M.

HOLOPORELLA DISCOIDEA Busk, 1884

Plate 60, figs. 7–9

1884. *Cellepora discoidea* Busk, Polyzoa collected by *Challenger*, Report Scientific Results *Challenger*, vol. 10, p. 197, pl. 30, fig. 8.

1890. *Cellepora discoidea* var. *frutetosa* Kirkpatrick, Hydoida and Polyzoa from Torres Strait, Scientific Proceedings Royal Dublin Society, p. 621, pl. 17, fig. 3 (opercula).

1909. *Holoporella discoidea* var. *frutetosa* Waters, Bryozoa, Sudanese Red Sea, Journal Linnean Society London, vol. 31, p. 161 (cited).

1921. *Holoporella discoidea* var. *frutetosa* Marcus, Swedish Scientific Expedition to Australia, Kongl Svenska Vatenskaps-Akademiens Handlingar, vol. 61, p. 25, pl. 1, figs. 12–15.

Measurements.—

Apertura $\begin{cases} ha = 0.08 \text{ mm.} \\ la = 0.11 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Maximum length of avicularium = 0.50 mm.

Structure.—This species is very deceiving and appears like a *Schismopora*. In reality the aperture is hidden at the bottom of the peristomie; it is semielliptical like the operculum; the peristomice almost always bears a proximal notch with an avicularian oral umbo on one side. This character is little visible on the variety *frutetosa*.

The marginal zooecia are much buried and oriented, while the central zooecia are erect with a central aperture. Close examination of the inferior face of the colony shows on our irregular fragments that the zooecia are arranged in radial rows and that the complete zoarium is really discoidal.

The ovicells are large, salient, transverse, opened by a large orifice not closed by the operculum.

The zoarial avicularia are large with a pivot; the beak is spatulate and the mandibular cavity is concave, smooth, rather deep. They are much smaller in the variety *frutetosa*.

Affinities.—Our fragments were dead; but they appear really to belong to Busk's species. It is very probable that the variety *frute-*

tosa Kirkpatrick is a distinct species, for the differences cited by Kirkpatrick and Marcus appear to us very large; but we do not have the data for comparison.

Occurrence.—D. 5134. Balukbaluk Island, Sulu Archipelago; 6° 44′ 45″ N.; 121° 48′ E.; 25 fathoms; fine S.

Geographic distribution.—Pacific: Cape York, 8 fathoms (Busk); Cape Taubert (Marcus), Australia; Thursday Island (Haswell), Albany Passage, 10 fathoms; Saibai Channel, 10–17 fathoms; Torres Strait (Kirkpatrick).

Plesiotype.—Cat. No. 8245, U.S.N.M.

HOLOPORELLA REPENS, new species

Plate 62, figs. 2–6

Description.—The zoarium is large, lamellar, *expanded*, formed of a large number of irregular superposed lamellae; on the inferior face the zooecia are distinct, arranged in longitudinal or radiating rows with the dorsal ornamented by scattered granules. The zooecia are distinct, separated by a furrow, very little erect, more or less elongated very irregular; the frontal is granular, surrounded by areolar pores and terminated by a very salient oral beak. The aperture is semi-elliptical, transverse. The ovicell is hyperstomial, globular, surrounding almost all of the aperture. There are incomplete zooecia and some deep zooecia.

Measurements.—Apertura $\begin{cases} ha = 0.12\text{–}0.16 \text{ mm.} \\ la = 0.20 \text{ mm.} \end{cases}$

Variations.—The transverse section is not that of a true Cellepore; the zooecia are arranged in superposed lamellae and appear little accumulated. This peculiarity arises from the little erect arrangement of the zooecia. However the presence of incomplete zooecia and of deep zooecia, the irregularity of the zooecial measurements, the very variable cellular orientation are on the contrary features absolutely characteristic of the Celleporidae.

Although free, the zoarium is attached to a *Tridacna* on which the larva was undoubtedly fixed. Sometimes very short cylindrical pillars appear as in *Holoporella pilaefera*. Finally another characteristic of this species is the formation of a salient ovicell on the deep zooecia which is very rare in the Celleporidae. Our specimens were dead.

Occurrence.—From an unknown Philippine locality.

Holotype.—Cat. No. 8246, U.S.N.M.

HOLOPORELLA SUBFLAVA, new species

Plate 61, figs. 11, 12

Description.—The zoarium is free, orbicular, fragile, *yellowish*, forming a somewhat convex mass. The zooecia are obliquely erect; the frontal is convex, very finely granular, surrounded by very small, areolar, scattered pores, terminated by a long and triangular avicularian beak. The aperture is somewhat elongated and partially buried by the avicularian beak. The aperture is only visible on the deep zooecia. The zooecial avicularia are very rare, small; their mandible is very narrow. The incomplete zooecia are closed by a thick ectocyst.

Measurements.—

Apertura $\begin{cases} ha = 0.13 \text{ mm.} \\ la = 0.11 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.30\text{–}0.50 \text{ mm.} \end{cases}$

Variations.—The zoarial surface is very irregular and the photography of it is very difficult. On the inferior face the zooecia are distinct, separated by a furrow and arranged in radial rows. The operculum is very fragile, the proximal border and the muscular attachments are thick, there are transverse ornaments in the inferior portion.

Occurrence.—D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

Holotype.—Cat. No. 8247, U.S.N.M.

HOLOPORELLA PYGMAEA, new species

Plate 62, fig. 1

Description.—The zoarium is a *small* mass, more or less globular, attached to bryozoa or to fragments of shells. The zooecia are *small*,

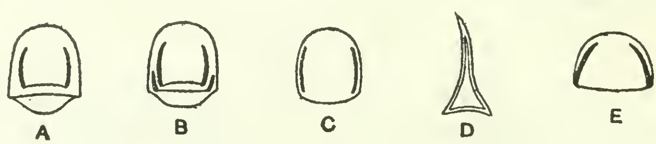

FIG. 167.—Genus *Holoporella* Waters, 1909

A–D. *H. subflava*, new species. Three forms of opercula, and a mandible of an interzooecial avicularium, ×85. E. *H. pygmaea*, new species. Operculum, ×85.

globular, erect; the frontal is smooth and bears in front of the aperture an erect and very salient avicularian beak. The aperture is median, somewhat transverse, semielliptical. On the deep zooecia the aperture and the avicularian beak only are visible; the latter is large, very salient, cylindrical and elevated almost to the level of the avicularian beak of the superficial zooecia.

Measurements.—

Apertura $\begin{cases} ha = 0.08 \text{ mm.} \\ la = 0.11 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.30 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Variations.—As in all the Celleporidae the zooecial measurements are only approximate and are very variable. We have not observed zoarial avicularia. The opercula are small, very thin; the muscular attachments are placed near the border and are often little distinct. Our specimens were living.

Occurrence.—

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

Holotype.—Cat. No. 8248, U.S.N.M.

Genus OSTHIMOSIA Jullien, 1888

OSTHIMOSIA SIMONENSIS Busk 1884

Plate 62, figs. 7–10

1884. *Cellepora simonensis* Busk, Polyzoa collected by *Challenger*, Scientific Results Voyage *Challenger*, vol. 10, p. 200, pl. 29, fig. 9; pl. 76, fig. 8 (operculum).

Measurements.—

Apertura $\begin{cases} ha = 0.20 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.90 \text{ mm.} \\ lz = 0.44 \text{ mm.} \end{cases}$

Structure.—The zoarium forms small irregular masses free or attached to nullipores, orbitoides or fragments of shells. The

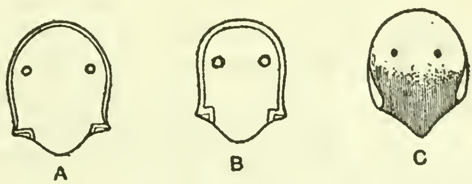

Fig. 168.—*Osthimosia simonensis* Busk, 1884.
Three aspects of the operculum, ×85

zooecia are erect or buried, very convex; the frontal bears large scattered granules; it is surrounded by widely-spaced areolar pores more or less separated by short and little salient costules; it bears in the vicinity of the aperture a salient avicularium with pivot. The aperture is pyriform with two salient condyles placed at the inferior third. The ovicell is globular, salient, smooth, opened by a wide slit which the operculum is never able to close. The operculum is variable in size; its proximal border is triangular; two lucidae are arranged laterally at the level of the condyles; there are two strong muscular attachments at some distance from the border.

Biology.—Our specimens were living and were in reproduction in February and March, 1908. If we are not mistaken in our determination, the geographic distribution of this species is great, because Busk has noted it at Simon's Bay at the Cape of Good Hope. It belongs to a small group of Cellepores which passes the tropics and accommodates itself to waters which are colder or have a more varied food supply.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

Plesiotypes.—Cat. Nos. 8250–8252, U.S.N.M.

Genus SCHISMOPORA MacGillivray, 1888

SCHISMOPORA CHRYSALIS, new species

Plate 62, figs. 11, 12

Description.—The zoarium is large, fusiform, hollow, encrusting fine radicells of algae; the surface is mammillated; the salient portions are black, while the remainder is rose brown. The zooecia are very erect, almost orbicular; the frontal is granular and surrounded by scattered areolar pores. The aperture is semielliptical, somewhat transverse, with a very wide concave proximal rimule; the peristomice is orbicular and frequently bears a narrow rimule bordered on one side by an avicularian umbo. The ovicell is globular, surrounding the aperture which it partially covers, granular and perforated by very small tremopores; its orifice is very large and is not in agreement with the operculum. The aperture of the deep zooecia is only visible. The zoarial avicularia are elongated, elliptical; their beak is rounded, non salient; their mandible is slightly spatulate.

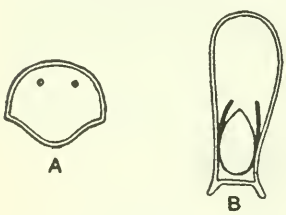

Fig. 169.—*Schismopora chrysalis*, new species. Operculum and mandible, ×85

Measurements.—

Apertura $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

Affinities.—The avicularian beak is very inconstant in form and position; it is sometimes little visible. The operculum is very thin; it bears a sinuous proximal border and two muscular attachments little distant from the border.

The form of the colony recalls the *chrysalis* of many insects; our largest specimen attained a length of 5 cm. It is rather difficult to conceive how so large colony can hold in equilibrium on such a minute radicell.

Biology.—Our specimens were in reproduction March 5, 1908 (36 meters).

Occurrence.—D. 5174. Jolo Light, Jolo; 6° 03′ 45″ N.; 120° 57′ E.; 20 fathoms; crs. S.

Holotype.—Cat. No. 8253, U.S.N.M.

Genus COSTAZIA Neviani, 1895

COSTAZIA ROTA MacGillivray, 1885

Plate 63, fig. 3

1885. *Cellepora rota* MacGillivray, Description new Polyzoa, Transactions Royal Society Victoria vol. 21, p. 116. (sep. 11.)

1887. *Cellepora rota* MacGillivray, Catalogue Marine Polyzoa Victoria, Transactions and Proceedings Royal Society Victoria, vol. 23, p. 29.

1887. *Cellepora rota* MacGillivray, Prodromus Zoology Victoria, decade 15, p. 184, pl. 148, fig. 3.

1905. *Lagenipora rota* Waters, On Bryozoa from near Cape Horn, Linnean Society's Journal, Zoology vol. 29, p. 241.

1913. *Lagenipora rota* Waters, The Marine Fauna of British East Africa and Zanzibar, Bryozoa, Proceedings of the Zoological Society of London, p. 510.

1920. *Lagenipora rota* Marcus, Bryozoen von den Juan-Fernandez Inseln, vol. 3, p. 110, fig. 12 (opercula).

Measurements.—

Apertura $\begin{cases} ha = 0.20 \text{ mm.} \\ la = 0.18 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.75 \text{ mm.} \\ lz = 0.60 \text{ mm.} \end{cases}$

Our beautiful specimen was dead. It was attached to a *Serpula*. As usual our zooecial measurements are only the average. This species has a great geographical distribution as noted below.

Occurrence.—D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

Geographic distribution.—Pacific: Nasatierra, Juan Fernandez, 35 meters (Marcus); Port Phillip, Australia (MacGillivray), Bass Strait (Marcus); Cape Horn (Waters). Indian Ocean: Wasin, East Africa, 18 meters (Waters), Gulf of Manaar (Thornely).

Plesiotype.—Cat. No. 8254, U.S.N.M.

COSTAZIA SPATHULATA MacGillivray, 1887

Plate 63, figs. 1, 2

1885. *Cellepora costazei* MacGillivray, Description new Polyzoa, Transactions Royal Society Victoria, vol. 21, p. 114, pl. 3, fig. 3.

1887. *Cellepora costazei* var. *spathulata* MacGillivray, Prodromus Zoology of Victoria, decade 15, p. 185, pl. 148, fig. 6.

1887. *Cellepora costazei* MacGillivray, Catalogue Marine Polyzoa Victoria, Transactions Royal Society of Victoria, vol. 23, p. 29.

1905. *Cellepora spatulata* Waters, On Bryozoa from near Cape Horn, Linnean Society Journal, Zoology, vol. 29, p. 241.

1909. *Lagenipora spathulata* Waters, Bryozoa of the Sudanese Red Sea, Journal Linnean Society, Zoology, vol. 31, p. 159.

1921. *Lagenipora costazzi* var. *spathulata* Marcus, Bryozoen von den Auckland and Campbell Inseln, Saertryk af Vidensk. Medd. fra Dansk Naturh. Foren, vol. 73, p. 113, fig. 8 (Opercula).

Measurements.—

Apertura $\begin{cases} ha = 0.15 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50 \text{ mm.} \\ lz = 0.40 \text{ mm.} \end{cases}$

Length of interzooecial avicularium = 0.45–0.50 mm.

Variations.—Our specimens are unilamellar and of small dimensions. The marginal zooecia are buried and much longer (0.75 mm.) than the others. The orifice of the avicularia is small and traversed by a pivot. The ovicell is large, very convex; its area is perforated by large pores spaced along the periphery; it is never closed by the operculum.

This is certainly not the species of Audouin, 1826. Since 1887 MacGillivray has noted a fundamental difference regarding the avicularia.

Our specimens were dead. The species appear to have a large geographic distribution. It is rare in the Philippines.

Occurrence.—D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Geographic distribution.—Pacific: Port Phillip, Australia (MacGillivray), Carnley Harbor, Auckland Island, 45 fathoms (Marcus); Indian Ocean: Suez, Red Sea (Waters).

Plesiotype.—Cat. No. 8255, U.S.N.M.

COSTAZIA RADIATA Ortmann, 1890

Plate 63, figs. 8, 9

1890. *Cellepora radiata* Ortmann, Die japonische Bryozoen Fauna, Archiv für Naturgeschichte, vol. 50, p. 56, pl. 1, fig. 14.

Measurements.—Apertura $\begin{cases} ha = 0.14 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$

Affinities.—The measurements of the apertures are rather variable, for the aperture is sometimes a little transverse.

This species differs from *Costazia costazii* Savigny-Audouin, 1826, in its longer and thinner peristomial avicularia. It differs from *Costazia spathulata* MacGillivray, 1887, in its nonspathulated zoarial avicularia.

The zoarium forms small convexities attached to shells; it is sometimes globular and free. Our specimens from the Philippines are identical with those of the Sea of Japan. They are always very rare. They were dead in the dredging.

Occurrence.—

D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

Shado Isles and Sagami Bay, Japan Sea (Ortmann).

Plesiotype.—Cat. Nos. 8256, 8257, U.S.N.M.

COSTAZIA PISIFORMIS, new species

Plate 63, figs. 6, 7, 10

Description.—The zoarium forms small spherical masses in which the size does not exceed that of a *pea*. The zooecia are small somewhat extended on the borders of the colony, very erect at the center; the frontal is convex, perforated by tremopores and ornamented with costules; it bears a small tubular avicularium forming an umbo when it is close to the aperture.

The aperture is buried at the bottom of a peristomie in which the peristomice is ogival; it bears a very wide proximal rimule of little depth. The ovicell is large, globular, or somewhat transverse; the frontal area is large, deep, costulated; the corresponding aperture is a little larger. The oral avicularia, are long, thin, fusiform, placed on the very thin peristome. The zoarial avicularia are elongated, elliptical immersed; their orifice is large and traversed by a pivot.

Measurements.—

Apertura $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zooecia (recumbent) $\begin{cases} Lz = 0.60 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Affinities.—The zooecial measurements have no value for determination for they are too variable; most of the erect zooecia measure only 0.30–0.35 mm. in diameter.

This species is very well characterized by its oral fusiform avicularia and by the presence of frontal fusiform avicularia, but it is of a disconcerting variability.

The specimens from the China Sea are ornamented with a much larger and a little elongated ovicell and with numerous zoarial avicularia; these may be designated as variety *sinensis* (pl. 63, fig. 10); the oral avicularia are a little shorter. The other characters are identical with those of the specimens from Japan.

The specimens of Strait of Surigao bear a cribriform area on the ovicell; this form may be another variety.

Occurrence.—

D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E. (common).

D. 5311. China Sea, vicinity of Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., S. Co.; 13° C.

Cotypes.—Cat. No. 8258, U.S.N.M.

Holotype.—Cat. No. 8259, U.S.N.M. (var. *sinensis*).

COSTAZIA ACULEATA, new species

Plate 63, fig. 4

Description.—The zoarium is free, cylindrical, bifurcated. The zooecia are distinct, separated by a furrow or by interzooecial avicularia; the frontal is little convex, smooth, ornamented by rare areolar pores. The apertura is orbicular with a small linear proximal rimule cut in a special lamella; the peristomie is deep; the peristome is thin, salient, ornamented by a small proximal avicularium, generally somewhat elongated and elliptical. The ovicell is convex, embedded in the distal zooecium, adorned with a very fragile cribriform area. The interzooecial avicularia are numerous, thin, narrowed in the middle. The beak is rounded and oriented as the zooecium more often toward the base of the colony.

Measurements.—

Peristome $\begin{cases} hp = 0.14 \text{ mm.} \\ lp = 0.10 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.50\text{–}0.56 \text{ mm.} \\ lz = 0.34 \text{ mm.} \end{cases}$

Variations.—This is a species absolutely disconcerting in its unexpected aspects and its variable micrometric measurements. All the specimens are dissimilar, no one resembling another. There are nevertheless some common characters; deep aperture, small proximal avicularium on the peristome, large interzooecial avicularia long and thin, and cribriform ovicell. The measurements of the real aperture are rather constant in spite of the variations of the peristome.

The small lamella in which the rimule of the aperture is cut is rarely visible, either that it is too deep, or that it is hidden by the small peristomial avicularium. All the zooecia of the same branch do not have the same orientation.

Affinities.—*Costazia aculeata* belongs to a special group which we refer provisionally to *Costazia* because of the presence of a cribriform area on the ovicell. The chitinous appendages not being known, the creation of a new genus is not desirable. The known species of this group are *Costazia aculeata*, new species, Recent; *C.* (*Cellepora*) *yarraensis* Waters 1881, Tertiary of Australia; *C.* (*Haswellia*) *producta* MacGillivray 1895, Tertiary of Australia; *Costazia convexa*, new name, Tertiary of Australia; *C.* (*Haswellia*) *longirostris* MacGillivray, 1884.

This species differs from *Cellepora yarraensis* Waters, 1881, in its very little convex, cellular frontal, in the absence of a straight border to the peristome and in its avicularia oriented toward the top of the colony.

Biology.—The geographic distribution of this species is rather great. We have found it in fact from the Island of Shado in Japan, as far as Borneo in the China Sea. It does not penetrate into the Archipelago of the Philippines for we have found only a single specimen at Romblon. Contrary to the other species of *Costazia* it descends to great marine depths, but only when the temperature is still rather warm. All our specimens were dead.

Occurrence.—

D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard S.; 24.2° C.

D. 5273. Corregidor Light, China Sea, vicinity of Luzon; 13° 58′ 45″ N.; 120° 21′ 35″ E.; 11 fathoms; M. Sh. co. S.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 9′ 52″ E.; 175 fathoms; fine S. co.; 13.2° C.

Holotype.—Cat. No. 8260, U.S.N.M.

Genus CELLEPORA Linnaeus, 1767

CELLEPORA SINENSIS, new species

Plate 63, fig. 5

Description.—The zoarium is free, cylindrical, bifurcated. The zooecia are indistinct, irregularly erect; the frontal is covered by raised perforated protuberances which are avicularian chambers; their orifice is poriform or elliptical and with pivot. The aperture is little visible and buried at the bottom of a long peristomie; the peristomice is very irregular, suborbicular or transverse. The zoarial avicularia are rare, triangular, pointed; their pivot bears a median hook.

Affinities.—In its zoarium this species resembles very much *Costazia yarraensis*, but its structure is entirely different; the numerous small interzooecial avicularia arranged on the frontal are very characteristic.

Our specimens were dead and nonovicelled. We have not then been able to class this species generically and we place it in the old group *Cellepora* which is now rejected as a valid genus.

Occurrence.—

D. 5311. China Sea, vicinity of Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.; 13° C.

Cotypes.—Cat. Nos. 8261, 8262, U.S.N.M.

Family LIRIOZOIDAE Levinsen, 1909

"The slender, elongated zooecia, which may have a single spine at the distal end, are provided as a rule with scattered pores and the lateral walls with one or several uniporous septulae. The aperture has a broad and low sinus and a weakly chitinized operculum. Avicularia and ovicells are wanting. Free, jointed colonies with the zooecia arranged in pairs or in triads; in the latter case they arise from an axis consisting of kenozooecia." (Levinsen 1909.)

The species of this family are very rare. We know only three and each characterizes a special genus. The known genera are *Liriozoa*, Lamarck, 1812, *Pasythea* (Lamouroux) Busk, 1884, and *Dittosaria* Busk, 1866.

Genus LIRIOZOA Lamarck, 1812

"The colony consists of an axis of kenozooecia, each of which bears two opposite triads of zooecia. Of the three zooecia, the longest, central one has the aperture directed outwards, whilst the two outer, which have a distal spine, have theirs directed obliquely inwards." (Levinsen, 1909.)

Genotype.—*Liriozoa* (*Cellaria*) *tulipifera* Ellis and Solander. Recent.

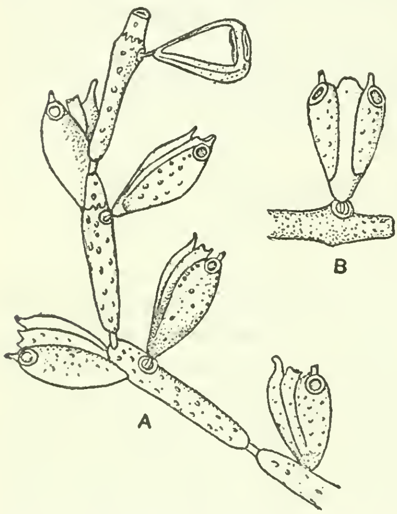

Fig. 170.—Genus *Liriozoa* Lamarck, 1816 (Levinsen, 1909)

A–B. *Liriozoa tulipifera* Ellis and Solander, 1786. A. Portion of zoarium. B. A single triplet of cells. The colony consists of an axis of kenozooecia, each of which bears two opposite tracts of zooecia. Of the three zooecia the longest, central one has the aperture directed outward, whilst the two outer, which have a distal spine, have theirs directed obliquely inward. (A, B. After Hincks, 1881.)

Genus PASYTHEA (Lamouroux, 1812) Busk, 1884

The colony consists of paired zooecia and in each pair the slightly spirally turned zooecia have their basal sides directed toward each other; no spines.

Genotype.—*Pasythea* (*Gemellipora*) *eburnea* Smitt, 1873. Recent.

Cellaria tulipifera Solander, 1786, has been classed as a genotype by three different authors, *Liriozoa* Lamarck, 1812, *Pasythea* Lamouroux, 1812, and *Epicaulidium* Hincks, 1881. It is impossible to be sure of the priority of the authors of 1812. Busk, 1884, thinks that it is Lamouroux, but Levinsen, 1909, believes it is Lamarck.

Smitt, 1873, discovered an allied species, *Gemellipora eburnea* and created the genus *Gemellipora* for it and other species. Busk, 1884, thinks that *G. eburnea* ought to be placed in the same genus as *Cellaria tulipifera* and he selected as the genotype of *Gemellipora*, *G. glabra* Smitt, 1873. MacGillivray, 1895, Waters, 1898, Maplestone, 1901, Waters, 1904, and others agree with Busk's conclusion. We are ignorant of the anatomy of the two species considered and even the larva so that it is still impossible to know if they belong to the same genus or not. Under the circumstances we follow the authors and adopt *Gemellipora* for the type of structure exemplified by *G. glabra* and leave *G. eburnea* under *Pasythea*.

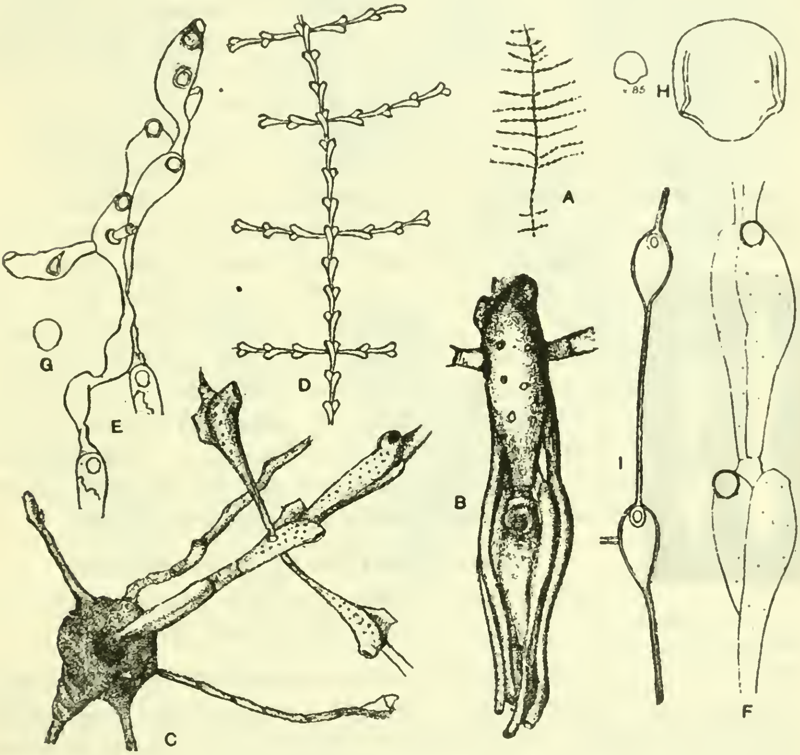

FIG. 171.—Genus *Pasythea* Lamouroux, 1812

A–H. *Pasythea eburnea* Smitt, 1873. A. Colony, natural size. B. Zooecia with radical fibers. C. Erect zooecia arranged back to back in pairs. From the outer border of the radical disk proceed four or five very slender and delicate, adnate, stoloniferous jointed tubes. (B, C. After Busk, 1884.) D. Arrangement of the segments of the colony. E. Part of the creeping stem showing adnate zooecia. F. Part of branch with erected zooecia. G. Outline of a zooecial aperture. (D–G, I. After Smitt, 1872.) H. Operculum, ×250 and ×85. (After Waters, 1899). I. Zooecia with elongated proximal portions.

Genus DITTOSARIA Busk, 1886

The zoarium is rigid, calcareous, erect, phytoid, dichotomous. The zooecia are adnate by the back and throwing out a double cell at each dichotomy; the surface is ornamented with a double series of areolae. The aperture is nearly round. No ovicell.

Genotype.—Dittosaria wetherelli Busk, 1886.

Range.—Ypresian, Stampian.

Family CATENICELLIDAE Busk, 1852

The colonies are radicelled, articulated, ramified. Each segment is formed of 1, 2 (biglobulus), 3 (triglobulus) zooecia. The zooecia are connected with a number of lateral chambers; suprascapular, scapular (avicularian of Harmer and Waters), infrascapular and pedal. The frontal is porous or garnished with fenestrae or vittae. The gonoecia are surmounted by endozooecial ovicells. There is a compensatrix; opercula and avicularia are present.

The *abzooecial* sides are the outer sides of the two zooecia in a bizooecial segment and the *adzooecial* sides are the inner sides.

The fenestrae are the chitinous interruptions on the calcareous frontal of the cells. The *vittae* are sunken perforated grooves in the calcareous wall and along each groove there is a cylindrical tube and within this, from the pore-tubes (the perforations just mentioned) organic cords spread out and reach the upper free surface at definite spots or pores. (Waters.)

The sternal area is the space (cryptocyst of Levinsen) occupied by the fenestrae. The gonoecia are cells without polypide and having only ovaria. There are endozooecial ovicells in this family.

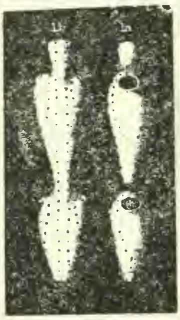

FIG. 172.—Genus *Dittosaria* Busk, 1886

Dittosaria wethereli Busk, 1866. Dorsal and lateral views of a segment ×25, showing the arrangement of the zooecia. (After Gregory, 1892.) Eocene of England.

Genus VITTATICELLA Maplestone, 1900

Catenaria Levinsen, 1909; *Catenicella* Blainville, 1830; *Calloporella* MacGillivray, 1885

The ovicell occurs in a node with other zooecia, between two zooecia in a straight and longitudinal line. It is partly imbedded in the distal zooecium and is surrounded by beaded structure. The frontal surface is provided with extremely fine scattered pores. The aperture, which has a concave, thickened, protruding, proximal rim, has two well developed conspicuous hinge-teeth and is closed finally by three (one distal and two proximal) calcareous processes, springing from its inner margin and meeting in the center. Vittae.

Genotype.—*Vittaticella* (*Eucratea*) *contei* Audouin, 1826.

Range.—Miocene of Australia—Recent.

The word "Catenaires" of Savigny, 1811, is a qualificative and not a generic substitive. *Calloporella* is preoccupied. *Catenicella* is now reserved for species incompletely studied.

Genus CATENICELLOPSIS J. B. Wilson, 1880

Ovicell as in *Vittaticella* but the ovicell is perforated all over. Vittae.

Genotype.—*Catenicellopsis delicatula* J. B. Wilson, 1880. Recent.

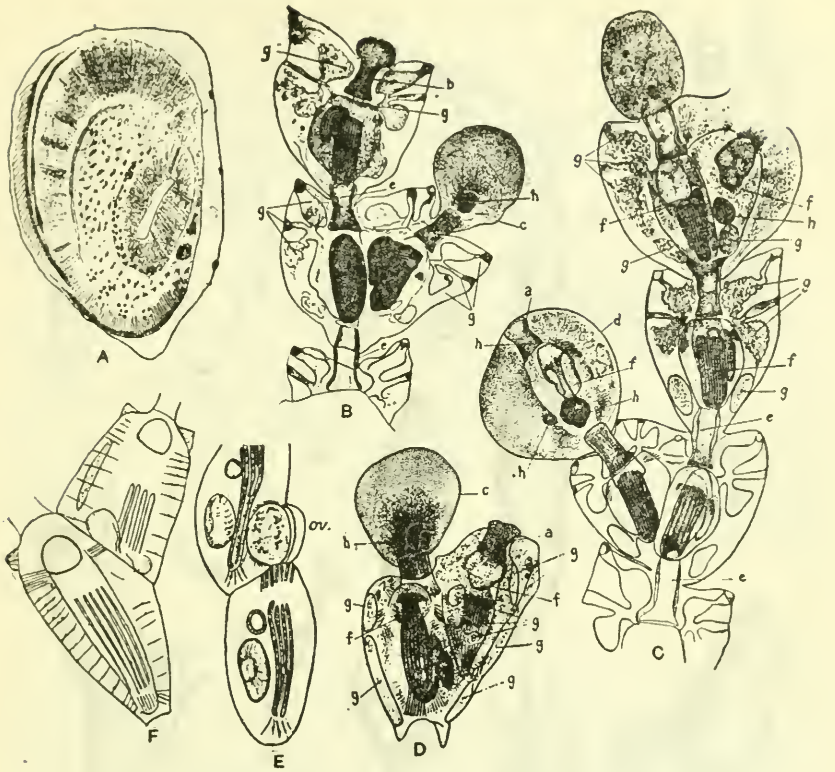

Fig. 173.—Family Catenicellidae Busk, 1852

A. *Vittaticella elegans* Busk, 1852. Section of a ciliated embryo in the oviccll, ×400. (After Waters, 1913.)

B, C. *Pterocella* (*Catenicella*) *alata* Wy. Thompson, 1858. Dorsal and frontal face.

D. *Scuticella* (*Catenicella*) *ventricosa* Busk, 1852. Frontal face of the extremity of the branch. (B–D. After Jullien, 1888.) *a.* Appearance of the ligament containing the rudimentary polypide. *b.* Ligament in which the endocyst, developed by the multiplication of the mesenchymatous elements, projects outward in the form of a vesicle. The rudimentary polypide is represented by the black spot which occurs close to the bottom of this ligament. *c.* Zooecial ligament in which the embryo has been carried. They are almost entirely covered by the elements of the mesenchyme. *d.* Very young zooecium on which appears the apparition of the lateral daughter zooecium with a young polypide in the rudimentary state. On its superior part, below the operculum, there is found a young zooecium very little like its apparition. One may note in this figure that the new buds do not await the zooecium in order to show themselves that the zooecium from which they depend has attained its complete development. This method of budding is almost general among the bryozoa. *e.* Chitinous ligaments almost empty of mesenchymatous tissue. They appear always on the zooecium which follows them. *f.* Compensation chamber in various stages of development. *g.* Fenestrae of Busk. These are chitinous productions. *h.* Young polypide of a zooecium.

E. *Vittaticella elegans* Busk, 1852. Section showing zooecium with polypides and ovicells (*ov*) in position, ×85.

F. *Vittaticella elegans* var *zanzibarensis* Waters, 1913. Sections showing internal zooecial muscles. (E, F. After Waters, 1913.)

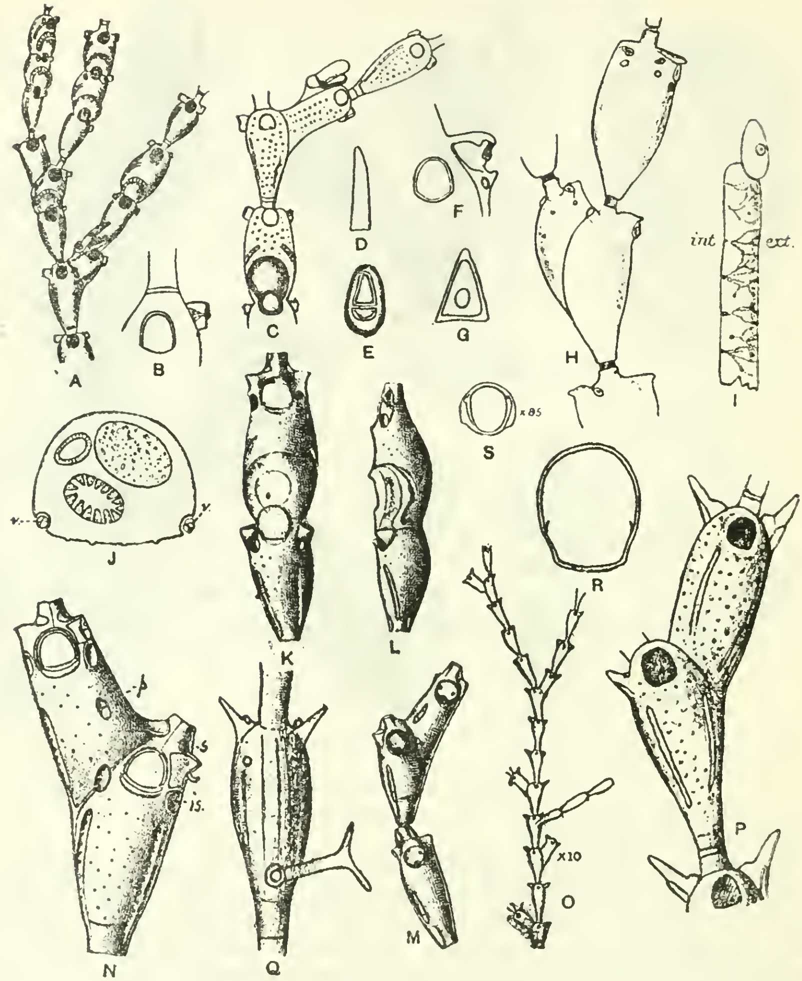

FIG. 174.—Genus *Vittaticella* Maplestone, 1900

A–N. *Vittaticella elegans* Busk, 1872. A. Showing internodes composed of many zooecia with ovicells, ×15. B. Distal end showing the avicularium, ×85. C. Showing large avicularium, ×25. D. Mandible of large avicularium, ×85. E. Small avicularium, ×150. F. Distal end of variety *zanzibarensis*, showing the avicularium. G. Mandible of the avicularium of Fig. F, ×250. H. Variety *zanzibarensis* (H–J), showing small avicularium on the dorsal surface. I. Upper half of the contents of the vittae, ×250. J. Semidiagrammatic transverse section through the vittae (*v*), ×200. (A–J. After Waters, 1913.) K. Gonozooecium and a corresponding covering zooecium, ×40. L. A gonozooecium and corresponding covering zooecium, lateral view, ×40. M. Three old zooecia of the same species, the apertures of which are on the point of closing. ×40. N. The suprascapular (*s*), the infrascapular (*is*), and the pedal (*p*) chambers are seen. A boundary chamber between the mother and daughter zooecium, ×55. (J–N. After Levinsen, 1909.)

Genus CORNUTICELLA Canu and Bassler, 1927

The tuberculate imperforate ovicell is at the end of a mother zooecium of a globulus. Vittae.

Genotype.—*Cornuticella* (*Catenicella*) *cornuta* Busk, 1852. Recent. Levinsen, 1909, considered the type as a *Vittaticella*.

Genus PTEROCELLA Levinsen, 1909

The ovicell with a double area belongs to the mother zooecium of a triglobulus. The ovicelligerous apertura is different from that of the ordinary zooecia. The sternal area has 3-7 fenestrae disposed in a curve and a rounded cryptocyst lamina on its inner surface. The aperture, the posterior part of which is trapeziform or arch-shaped, is provided with two strongly developed, freely projecting hinge-teeth. The lateral chambers form a wing-like marginal portion on either side in the whole length of the zooecium. The mother zooecium has a small avicularium on its adzooecial side. 12 tentacles.

Genotype.—*Pterocella* (*Catenicella*) *alata* W. Thompson, 1858. Recent.

Genus STRONGYLOPORA Maplestone, 1899

The perforated ovicell belongs to the mother zooecium of a triglobulus. The operculum is straight at the proximal edge of both the ordinary zooecia and the ovicelligerous zooecia, although the notch in the calcareous wall has been taken for an oral sinus. The sternal area has a number of fenestrae arranged in a submarginal row. The hinge-teeth are rudimentary or indistinct. Of lateral chambers only the suprascapular and the scapular occur, and these form together a winglike flange on either side of the zooecium.

Genotype.—*Strongylopora* (*Catenicella*) *pulchella* Maplestone, 1880 (first species).

Range.—Miocene of Australia. Recent.

O–R. *Vittaticella contei* Audouin, 1826. Genotype. O. Portion of zoarium, ×10. P. Several zooecia enlarged. Q. Lateral view. R. Operculum. (After Waters, 1912.) S. Operculum of *V. buski* W. Thompson, 1858. (After Waters, 1887.)

The vittae are sunken perforated grooves in the calcareous walls and along each groove there is a cylindrical tube, and within this, from the pore tubes (the perforations just mentioned) organic cords spread out and reach the upper free surface at definite spots or pores. It thus seems that the vittae should be compared with the pore chambers (diatellae) of many Cheilostomata in so far as there is indirect communication from the interior to the water surface through the vittae (Waters, 1913).

Fig. 175.—Genus *Cornuticella* Canu and Bassler, 1927

A–H. *Cornuticella cornuta* Busk, 1852. A. A branch with a bizooecial internode. B. The same from the basal surface. C. Lateral view of a zooecium. (A–C. After Busk, 1852.) D. In the bizooecial internode the mother-zooecial, small, oval, infrascapular chamber is seen on the boundary between the mother and daughter zooecium, ×55. E. A gonozooecium with appertaining daughter zooecium, ×40. F. The same from the basal surface, ×40. G. Lateral view of a gonozooecium. The internal ovicell and the covering kenozooecium are seen, ×40. (D–G. After Levinsen, 1909.) H. Zooecium showing terminology. (After Harmer, 1902.) *b*, polypide bud; *c. s.*, compensatrix; *f*, membranous fenestra; *h*, lateral horn; *h'*, vestigial horn of the proximal zooecium of the biglobulus; *j*, chitinous joint; *j'*, young joint; *pm*, distal group of parietal muscles; *v*, vittae.

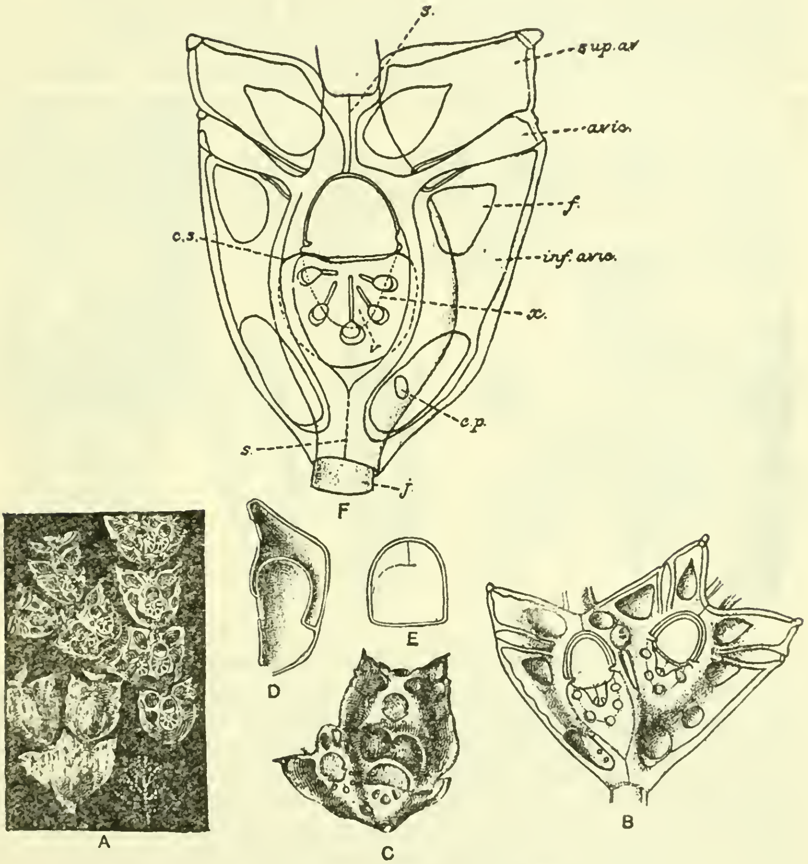

Fig. 176.—Genus *Pterocella* Levinsen, 1909

Pterocella alata W. Thompson, 1858. A. General aspect, ×½, and frontal and basal surface enlarged. (After MacGillivray, 1879.) B. Bizooecial internode. The mother zooecial fissure like infrascapular chamber is seen proximally at the small avicularium, ×46. C. An internode with ovicell ×40. D. Sagittal section through the gonozooecium and the ovicell and the covering kenozooecium, ×40. (B–D. After Levinsen, 1909.) E. Operculum, ×85. (After Waters, 1887.) F. Zooecium showing terminology: *avic*, avicularium; *cp*, septulae; *cs*, compensatrix; *f*, membraneous fenestra; *inf. avic.*, infr-avicularian compartment; *j*, chitinous joint; *s*, suture in calcareous wall; *sup. avic.*, supra-avicularian compartment; *x*, edge of calcareous plate. (After Harmer, 1902.)

Genus CLAVIPORELLA MacGillivray, 1895

The perforated ovicell belongs to the mother zooecium of a triglobulus. The aperture is triangular in both forms of zooecia. On either side of the aperture is a cylindrical acropetal spine, and the pedal chamber situated far proximally, is rudimentary and only communicates with the zooecium through a single septula. Behind the aperture there is an oval median pore, a remnant from the primary frontal sinus.

Genotypes.—*Claviporella* (*Catenicella*) *longicollis* Waters, 1893 (fossil), and *Claviporella* (*Catenicella*) *geminata* W. Thompson, 1858 (recent).

Range.—Miocene of Australia. Recent.

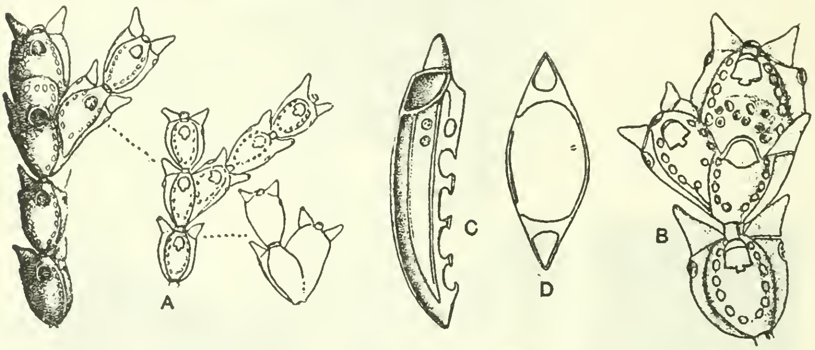

FIG. 177.—Genus *Strongylopora* Maplestone, 1899

A–D. *Strongylopora pulchella* Maplestone, 1880. A. General aspect, an ovicelled branch, dorsal and frontal. (After MacGillivray, 1885.) B. With ovicell, ×40. C. A longitudinal section through a lateral margin of the zooecium. Uppermost the small suprascapular chamber and lowermost the inner wall of the long scapular chamber which is connected with the zooecium through two uniporous septulae, ×75. D. A transverse section through a zooecium. The extremely thick walls which separate the lateral chambers from the zooecium are seen, ×75. (B–D. After Levinsen, 1909.)

Genus SCUTICELLA Levinsen, 1909

The ovicell is a terminal gonoecium. The operculum has a straight or but slightly curved edge. The operculum of the gonoecium much wider has a straight proximal edge. The sternal area has 3–14 fenestrae disposed in a curve or an angle and on its inner surface a rounded calcareous lamina springing from the proximal margin of the aperture. The proximal margin of the apertura may be straight, concave or convex, sometimes with a small sinus or indentation, to which, however, the operculum never corresponds. The lateral chambers are wholly or mostly membraneous, and the adzooecial, scapular chamber of the daughter-zooecium is never developed into an avicularium. 19 tentacles.

Genotype.—*Scuticella* (*Catenicella*) *plagiostoma* Busk, 1852.

Range.—Recent.

Genus COSTATICELLA Maplestone, 1900

The ovicell is a terminal gonoecium. The operculum has a slightly curved edge. The operculum of the gonozooecium much wider, has a straight proximal edge. The sternal area which is provided with 4–14 fenestrae is to a greater or smaller extent formed by a number of generally hollow spines, springing from the sternal sinus and

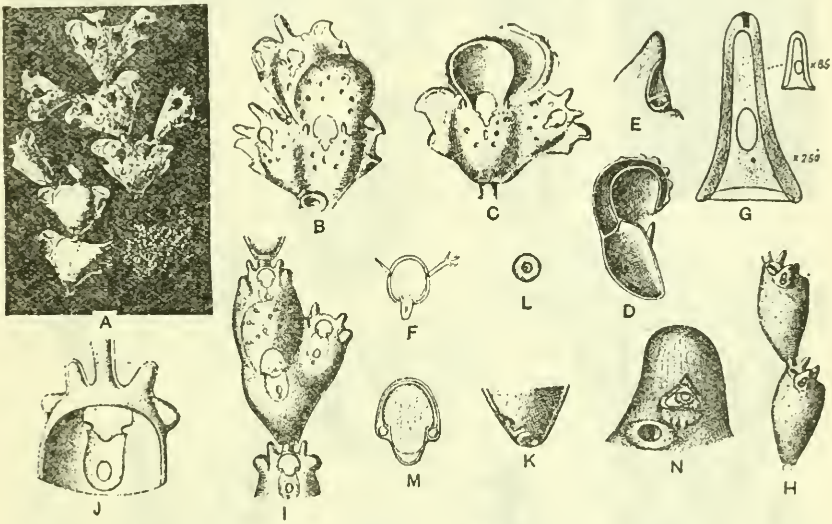

FIG. 178.—Genus *Claviporella* MacGillivray, 1895

A–G. *Claviporella geminata* W. Thompson, 1858. A. General aspect, ½ natural size and the frontal and basal surface. (After MacGillivray.) B. A trizooecial internode with ovicell, ×40. C. A similar internode on which the frontal wall of the ovicell and the covering kenozooecium have been removed. The basal wall of the endozooecial ovicell is seen, ×40. D. A sagittal section through the gonozooecium and the ovicell, ×40. E. A small avicularium, ×100. (B–E. After Levinsen, 1909.) F. Operculum, ×85. G. Mandible of the avicularium, ×85 and ×250. (F, G, After Waters, 1887.)

H–N. *Claviporella pusilla* Wilson, 1880. H. Lateral view of two zooecia. In the proximal part of each zooecium the extremely small pedal chambers, ×26. I. An internode with ovicell, ×40. J. The distal end of a zooecium from the basal surface after the removal of the basal wall. The suture in which the two spines meet is not seen in this figures but on the uppermost zooecium in figure I, ×75. K. The proximal end of a zooecium. The rudimentary pedal chambers are seen, ×75. L. The inner wall of the pedal chamber forming a uniporous septula, ×200. M. The operculum, ×100. N. The scapular and the infrascapular chambers, ×200. (H–N. After Levinsen, 1909.)

separated by fissures. The hinge teeth are rudimentary or indistinct. The suprascapular chamber has a calcified roof. The frontal surface of the covering kenozooecium of the ovicell has two large, transversely oval fenestrae.

Genotypes.—*Costaticella* (*Catenicella*) *lineata* MacGillivray, 1895 (fossil), and *Costaticella* (*Catenicella*) *hastata* Busk, 1852 (recent).

Range.—Miocene (of Australia). Recent.

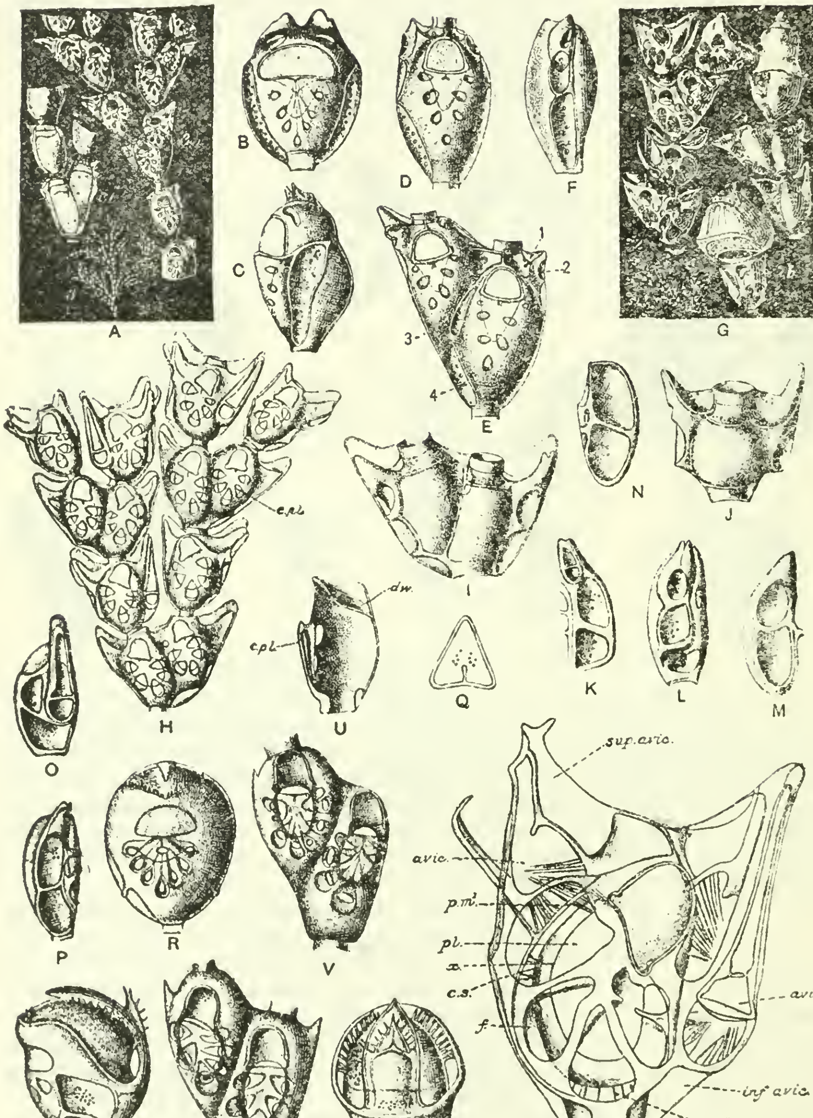

Fig. 179.—Genus *Scuticella* Levinsen, 1909

[Explanatory notes on next page]

Genus *Scuticella* Levinsen, 1909

Explanatory notes for fig. 179

A–F. *Scuticella ventricosa* Busk, 1852. A. Zoarium, ½ natural size and general aspect, frontal and dorsal of a branch. (After MacGillivray, 1888.) B. Terminal gonozooecium, ×40. C. The same gonozooecium, viewed laterally, ×40. D. A zooecium, ×40. E. A bizooecial internode, ×40; 1, the suprascapular chamber; 2, the scapular chamber; 3, the infrascapular chamber; 4, the pedal chamber. F. A zooecium lateral view. The scapular, infrascapular and pedal chambers are seen.

G–W. *Scuticella plagiostoma* Busk, 1852. G. General aspect, frontal and dorsal, of a branch. (After MacGillivray, 1888.) H. The lateral chambers are furnished with their membraneous walls, ×23. I. A bizooecial internode from the basal surface. Between the two zooecia uppermost, the adzooecial suprascapular chambers of the mother zooecium and lowermost its adzooecial pedal chamber. The scapular and infrascapular chambers are united or incompletely separated, ×40. J. The zooecium which arises from the mother zooecium of the bizooecial internode from the basal surface. The floor of the 2 suprascapular chambers is seen uppermost while the membranous cover is removed. The latter is seen in figure H. The two suprascapular chambers are also shown, ×40. K. A part of the same zooecium from the surface furnished with a small avicularium. The infrascapular and the pedal chambers are seen; ×40. L. The daughter zooecium of a bizooecial internode from the external surface. Uppermost the unseparated distal chambers (the scapular and the infrascapular) and under them the pedal chamber of the daughter zooecium and the adzooecial pedal chamber of the mother zooecium; ×30. M. The mother zooecium of a bizooecial internode. Uppermost the two unseparated chambers and under these the pedal chamber; ×40. N. The zooecium which arises from a daughter zooecium from the internal surface (that is, opposite an avicularium) (see fig. H). Uppermost the distal unseparated chambers and below the pedal; ×40. O. A part of the same zooecium with a large avicularium. The infrascapular chamber (on the basal surface) is seen and also the pedal; to the left of the tip of the avicularium the floor of the suprascapular chamber; ×40. P. The same zooecium from the other surface. The corresponding chambers are seen; ×40. Q. The separating wall between the cover and kenozooecium and the small spinous basal chamber; ×40. R. A gonozooecium of the var. *setifera*, ×40. S. A gonozooecium of the same form, lateral view; ×40. T. The same from basal surface; ×40. U. A sagittal section through a zooecium. The angularly bent distal wall (*dw*) and the cryptocyst plate (*cpl*) are seen, ×40. V. An old bizooecial internode of the variety *setifera*. The aperture is closed by a calcified plate and this is further connected with a cryptocyst which is placed inside of the sternal area and may finally form a continuous cover inside the last; ×40. W. Another old bizooecial internode of the same form; ×40. (B–F, H, W. After Levinsen, 1909.) X. Zooecium showing terminology, *avic*, avicularium; *cs.*, compensation sack; *f*, membranous fenestra; *inf. avic.*, infra-avicularian compartment; *j*, chitinous joint; *pl*, calcareous plate; *pm*, parietal muscles; *pm'*, distal group of parietal muscles; *sup. avic*, supra-avicularian compartment; *x*, free edge of plate. (After Harmer, 1902.)

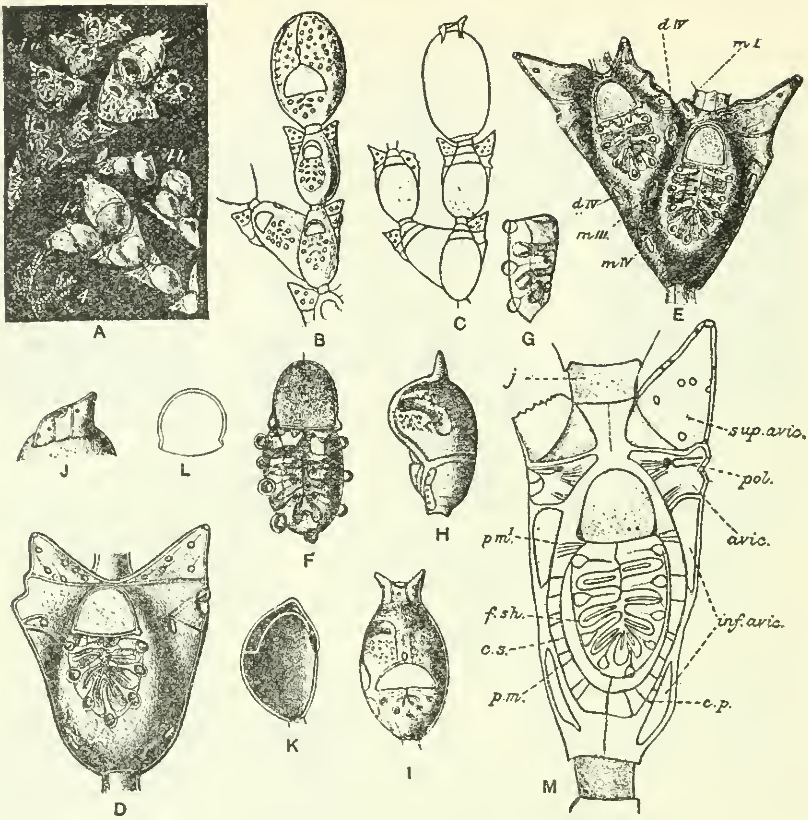

FIG. 180.—Genus *Costaticella* Maplestone, 1899. (*Costicella* Levinsen, 1909)

A–L. *Costaticella hastata* Busk, 1852. A. General aspect, frontal and dorsal of two branches and zoarium ½ natural size. (After MacGillivray, 1888.) B. A branch bearing a gonoecium; frontal view. (B, C. After Busk, 1852.) C. The same from the basal surface. D. A zooecium; ×75. E. A bizooecial internode. The longitudinal sternal sinus can be seen, ×75 *m*, mother zooecium, *d*, daughter zooecium; I, the suprascapular chamber; II, the scapular chamber; III, the infrascapular chamber; IV, the pedal chamber, ×40. F. Sternal area and aperture. The long frontal sinus is distinctly visible, ×40. G. A part of the sternal area from the internal surface. Outermost the margin of the cryptocyst plate, further in the frontal surface, ×40. H. A terminal gonoecium, lateral view, ×40. I. A gonoecium from the frontal surface, ×40. J. The distal end of another gonoecium, ×55. K. A sagittal section through a gonoecium. The endozooecial ovicell formed from the distal wall and covered by a kenozooecium is seen, ×40. (D–K. After Levinsen, 1909.) L. Operculum, ×85. (After Waters, 1887.) M. A zooecium of the genotype *Costaticella lineata* MacGillivray, 1895, showing terminology. *j*, chitinous joint; *pm'*, distal group of parietal muscles; *f. sh.*, frontal shield; *cs*, compensatrix; *pm*, parietal muscles; *sup. avic*, supra avicularian compartment; *pol.*, rudimentary avicularian polypide; *avic*, avicularian compartment; *inf. avic*, infra-avicularian compartment; *cp*, septula. (After Harmer, 1902.)

Genus DIGENOPORA Maplestone, 1899

The zooecia have two sets of pores or fenestrae, one set submarginal, segregated, oval or round, the other set on the front of the zooecium below the apertura, pyriform.

Genotype.—*Digenopora compta* Maplestone, 1899.

Range.—Miocene of Australia.

Genus uncertain, the gonoecia not being known.

Genus CRIBRICELLINA Canu and Bassler, 1927

(*Cribricella* Levinsen, 1909, preoccupied)

The ovicell is a terminal gonoecium. The operculum has a straight or but slightly curved edge. The operculum of the gonozooecium much wider, has a straight proximal edge. The sternal area has numerous scattered pores, of which the outermost are arranged in a distinct curved line, and a small transversely oval cryptocyst lamina on its inner surface. The hinge-teeth are rudimentary or indistinct.

Genotype.—*Cribricella* (*Catenicella*) *rufa* MacGillivray, 1868. Recent.

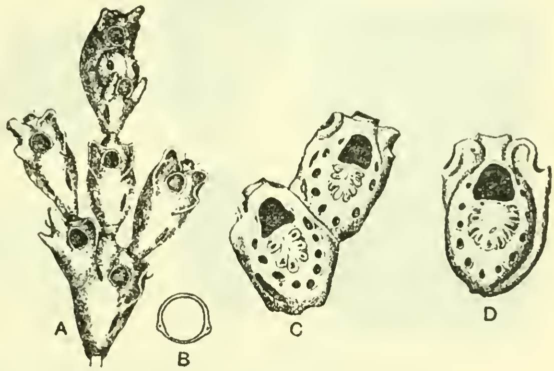

FIG. 181.—Genus *Catenicellopsis* Wilson, 1880, and Genus *Digenopora* Maplestone, 1899

A, B. *Catenicellopsis delicatula* Wilson, 1880. A. A branch with ovicelled zooecium, the ovicells perforated. (After MacGillivray, 1885.) B. Operculum, ×85. (After Waters, 1887.) C, D. *Digenopora compta* Maplestone, 1899. Two zooecia united and a single zooecium. (After Maplestone, 1899.) Miocene of Australia.

Genus CALPIDIUM Busk, 1852

The ovicell is a terminal gonoecium. The operculum has a sinus. The operculum of the gonozooecium much wider, has a straight proximal edge. The sternal area has 5 fenestrae. The aperture, the anter of which is surrounded by a strongly projecting margin, has a trilobed or triangular sinus ending in a point, and is provided with two very strong hinge teeth, projecting within the aperture. The septulae of the lateral chambers are placed in small rounded depressions.

Genotype.—*Calpidium ornatum* Busk, 1852.

Range.—Miocene of Australia. Recent.

Genus STROPHIPORA MacGillivray, 1895

The gonoecia are unknown. No sternal area. The whole of the frontal surface is covered by the two infrascapular chambers, which are separated by a narrow longitudinal ridge in the central line. A little proximally to the aperture we find a median pore surrounded by a ring which is continuous with the longitudinal ridge. The

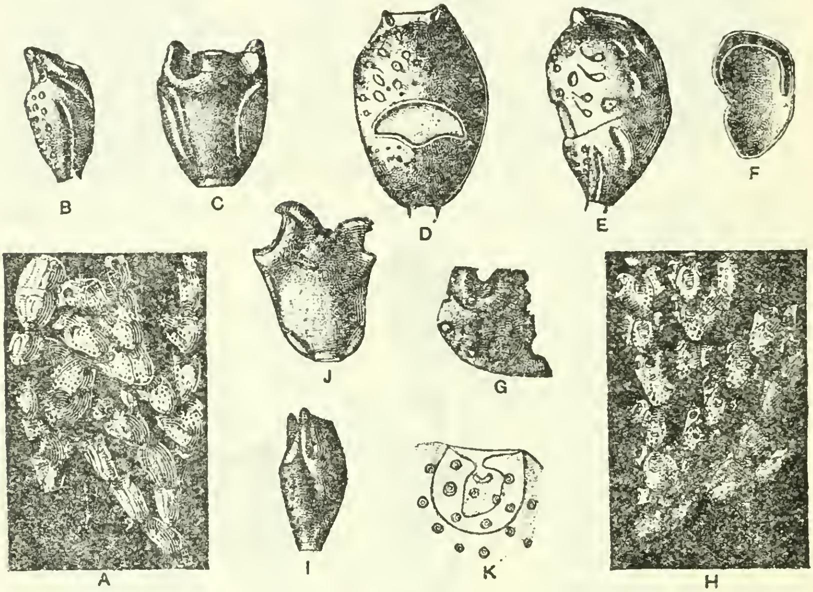

Fig. 182.—Genus *Cribricellina* Canu and Bassler, 1927

A–G. *Cribricellina rufa* MacGillivray, 1868. A. General aspect, frontal and basal, of the branches. B. Lateral view of the zooecia. The small suprascapular chamber, the greatly bent infrascapular chamber and the slightly bent pedal chamber are seen; ×55. C. A zooecium from the basal surface. The suprascapular and the infrascapular chambers are seen and less distinctly the pedal, ×55. D. A terminal gonozooecium, ×40. E. Lateral view of the gonozooecium, ×40. F. A sagittal section of a gonozooecium, ×23. G. A portion of the sternal area from the internal surface. The cryptocyst plate is seen, ×100.

H–K. *Cribricellina cribraria* Busk, 1852. H. General aspect, frontal and basal, of the branches. (A, H. After MacGillivray.) I. Lateral view of a zooecium, ×55. J. Basal surface of a zooecium, ×55. K. A portion of the external area from the internal surface. The cryptocyst plate is seen, ×100. (B–G, I–K, after Levinsen, 1909.)

aperture is provided with well developed distinct hinge-teeth and has a proximal concave margin.

Genotype.—*Strophipora* (*Catenicella*) *harveyi* W. Thompson, 1858.

Range.—Miocene of Australia. Recent.

In this genus are included the three following subgenera of MacGillivray which differ only in secondary characters.

Subgenus *Microstomaria* MacGillivray, 1895. The zooecia are small. The apertura is small, nearly circular and projecting forward. Example: *Microstomaria tubulifera* MacGillivray, 1895, from the Miocene of Australia.

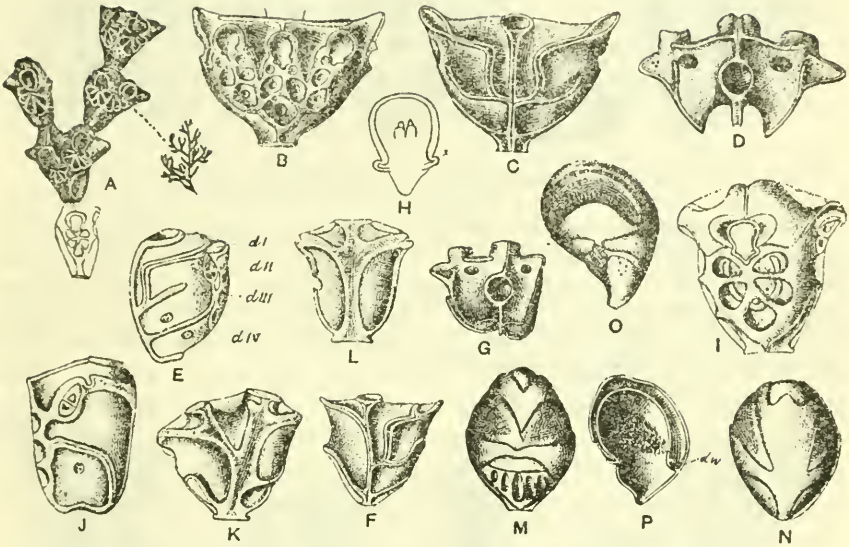

FIG. 183.—Genus *Calpidium* Busk 1852

A–H. *Calpidium ornatum* Busk, 1852. A. General aspect of a ramifying branch, natural size and enlarged. (After MacGillivray, 1888.) B. Trizooecial internode, ×23. C. Trizooecial internode from the basal surface, ×23. D. Trizooecial internode from the distal end, ×23. E. Lateral view of a trizooecial internode, ×23. I, suprascapular chamber; II, scapular chamber; III, infrascapular; IV, pedal chamber. F. Bizooecial internode from the basal surface, ×23. G. Bizooecial internode from the distal end, ×23. H. Operculum, ×85.

I–P. *Calpidium ponderosum* Goldstein. I. The internal cryptocyst plate is seen and a strong cryptocyst formation in the five fenestrae, ×55. J. Lateral view of a zooecium. The suprascapular, infrascapular, and pedal chambers seen, ×40. K. A bizooecial internode from the basal surface. The uppermost triangular cavity is the adzooecial suprascapular chamber of the mother zooecium. To the left is seen a suprascapular and infrascapular and a pedal chamber; to the right the pedal is on the other hand not visible; the infrascapular is on this side divided into two, ×40. L. A bizooecial internode from the distal end, ×23. M. A terminal gonozooecium, ×23. N. The same from the basal surface, ×23. O. The same, lateral view, ×23. P. A sagittal section through a gonozooecium. The covering kenozooecium and the distal wall transformed into an ovicell are seen ×23 (B–O). (After Levinsen, 1909.)

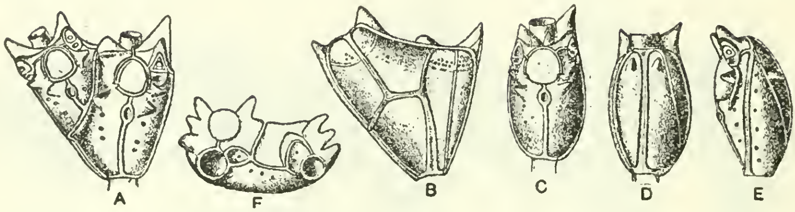

FIG. 184.—Genus *Strophipora* MacGillivray, 1895

A–F. *Strophipora harveyi* W. Thompson, 1858. A. The suprascapular and the infrascapular chambers are seen, ×40. B. A bizooecial internode from the basal surface. The four pedal chambers are seen, ×40. C. A zooecium from the frontal surface, ×40. D. The same from the basal surface, ×40. E. The same, lateral view, ×40. F. A bizooecial internode from the distal end, ×55. (A–F. After Levinsen, 1909.)

FIG. 185.—Genus *Strophipora* MacGillivray, 1895

A–C. Subgenus *Stenostomaria* MacGillivray, 1895. *S. solida* Waters, 1881. A, B. Front and dorsal views of a geminate pair of zooecia. C. Dorsal view of another pair not showing the elevation on the zooecial back. D, E. Subgenus *Microstomaria* MacGillivray, 1895. *M. tubulifera* MacGillivray, 1895. Single zooecium, front and dorsal views. F, G. Subgenus *Ditaxipora* MacGillivray, 1895. *D. internodia* Waters, 1891, 1895. Front and dorsal views. (After MacGillivray, 1895, and all three species from the Miocene of Australia.)

Subgenus *Stenostomaria* MacGillivray, 1895. The zooecia are wide. The apertura bears a proximal and peristomial sinus. Example: *Stenostomaria* (*Catenicella*) *solida* Waters, 1881, of the Miocene of Australia.

Ditaxipora MacGillivray, 1895. Zooecia alternate in two contiguous rows facing the same way, distinct but closely united; upper outer angle produced and pointed, bearing a sessile avicularium with long triangular mandible and sharp upturned mucro. Ovicells large, imbedded in the distal zooecia. Example: *Ditaxipora* (*Catenicella*) *internoda* Waters, 1881, of the Miocene of Australia.

Introduced in *Strophipora* by Levinsen, 1909. *Ditaxipora* could be preserved as a true genus of the family.

Family CATENARIIDAE D'Orbigny, 1850

(*Savignyellidae* Levinsen, 1909)

The zoaria are richly branched, jointed, chainlike and each segment consists of a single zooecium. The zooecia are narrow, elongated, rather slightly calcified; the frontal surface, provided with scattered pores, is separated from the basal surface by a more or less sharp boundary line. The ovicell is recumbent. The distal wall has a number of septulae in its periphery (Levinsen, 1909).

All the other genera placed in this family by D'Orbigny have been classed in other families. *Huxleya* is placed here doubtfully.

Genus CATENARIA D'Orbigny, 1850

(*Savignyella* Levinsen, 1909)

The aperture is surrounded by spines, with a concave poster and with no sinus. An avicularium is situated proximally to the aperture. The distal wall has uniporous septulae (Levinsen). The ovarium has two ovarian cells; 15–17 slender tentacles (Waters, 1907).

Genotype.—*Catenaria* (*Eucratea*) *lafontii* Audouin, 1826.

Range.—Eocene (Priabonian). Recent.

The fossil *Unicrisia tenerrima* Reuss, 1869, belongs to this genus.

Genus HALYSIS Norman, 1909

The aperture is round or ovate with a rounded sinus. The distal wall has multiporous septulae. No spines, no avicularium. (Levinsen, 1909.) The ovarium has many ovarian cells; 20–22 tentacles (Waters, 1907).

Genotype.—*Halysis* (*Scruparia*) *diaphana* Busk, 1860. Recent.

According to Waters, 1913, this genus is synonymous with *Catenaria*.

Genus HUXLEYA Dyster, 1858

The aperture is semicircular with a straight poster. No spines no avicularium, no boundary line; 10 tentacles.

Genotype.—Huxleya fragilis Dyster, 1858. Recent.

The ovicell is unknown. The type has never been rediscovered.

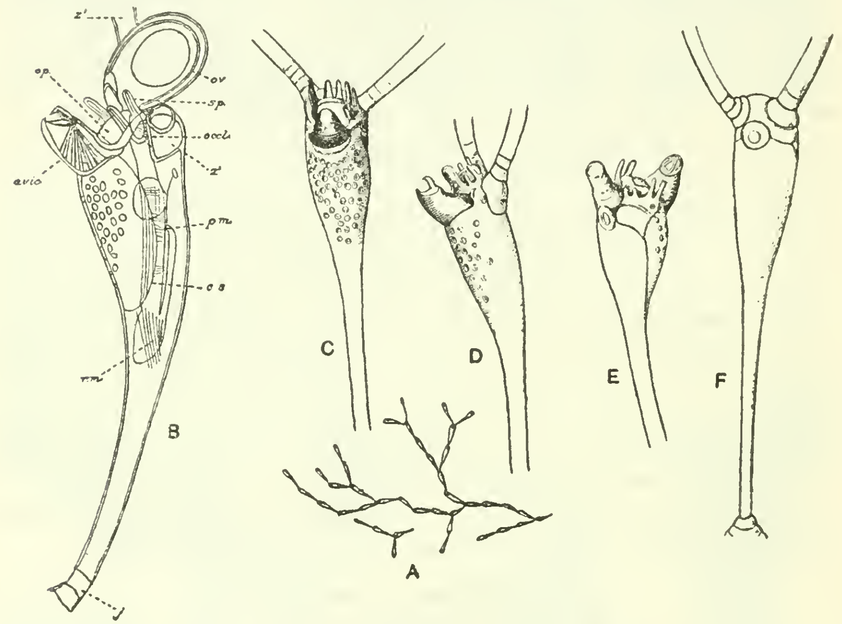

FIG. 186.—Genus *Catenaria* D'Orbigny, 1850

A–F. *Catenaria lafontii* Audouin, 1826. A. The articulated colony, natural size. Each segment is formed of a simple zooecium. B. Side view, showing the compensatrix, the ovicell and the muscular system (after Harmer, 1902); *avic,* avicularium, strong, suboral, at the entrance of the compensatrix; *cs,* compensation sac; *j,* chitinous joint; *occl,* occlusor muscles of operculum; *op,* operculum; *ov,* ovicell placed obliquely on distal side of orifice; *pm,* parietal muscles; *rm,* retractor muscles of polypide; *sp,* circle of short hollow spines surrounding oral extremity of zooecium; z^1, a pair of new zooecia originating from the back of the distal end. According to Waters, 1907, the ovicell is a thrown-back open one and not closed by the operculum. C. Anterior side of a zooecium showing the distal spines and the concave poster. D. Zooecium viewed from the left side showing the proximal avicularium and the articulation of the distal zooecium. E. Zooecium from the right side. F. Posterior side exhibiting the mode of branching. (A, C–F. After Busk, 1854.)

Family SCLERODOMIDAE Levinsen, 1909

The zooecia are formed by a very thick tremocyst with tubules; the very small distal wall is adorned with uniporous septules; the lateral walls have bi-triporous septules. The apertura is buried at the bottom of a long peristomie. The avicularia are placed in the peristomie or on the peristome. The ovicell is hyperstomial and visible only on the young zooecia. The colonies are free and branched.

Levinsen established this family principally on the nature of the calcification and classed here *Sclerodomus* and *Tessaradoma* Norman, 1868 the latter of which we introduced in the family Galeopsidae.

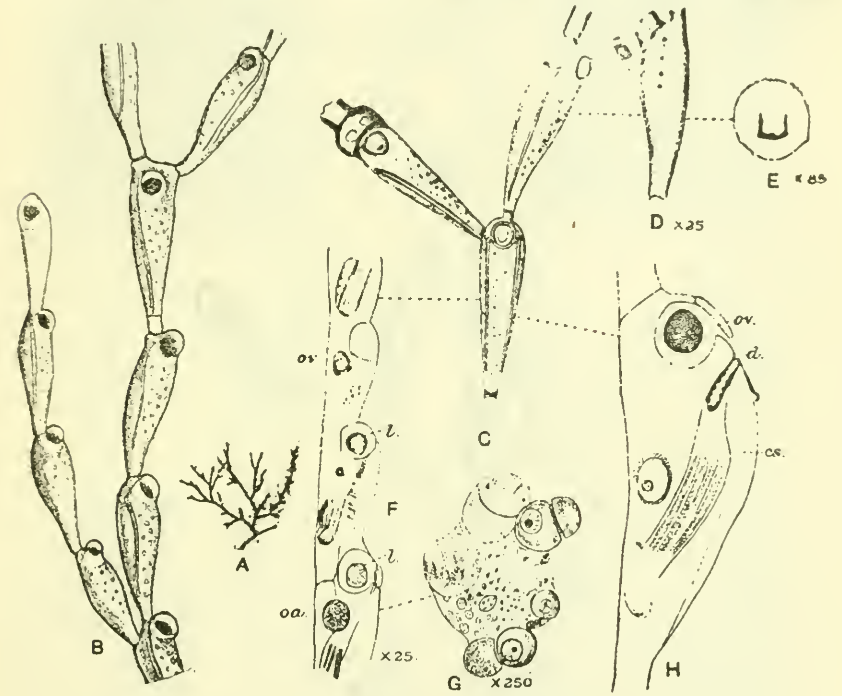

FIG. 187.—Genus *Halysis* Norman, 1909

A–H. *Halysis diaphana* Busk, 1860. A. Colony, natural size. B. Zoarial fragment showing the anterior face of the zooecia and the mode of branching. There are no spines and the aperture bears a rounded sinus. (After Busk, 1884.) C. Group of three zooecia of which one is oviceelled, ×25. D. Lateral view of a zooecium, ×25. E. Operculum, ×85. F. Section showing embryos (*l*) in the ovicell, also an ovum (*ov*) in the zooecium, and ovaria (*oa*) below the ovicell, ×25. G. Ovarium, ×250, with many ovarian cells. H. Section of zooecium showing endozooecial ovicell (*ov*) diaphragm (*d*) and compensation sac (*cs*), ×85. (C–H. After Waters, 1913.)

The Sclerodomidae seems to us rather close to the Stomachetosellidae, Canu and Bassler, 1920. It is to be noted that Jullien, 1903, has already indicated a family, Tessaradomidae. The larvae of the different genera of these families are still unknown, so that a natural classification is still impossible.

Genus SCLERODOMUS Levinsen, 1909

The peristome is funnel shaped, immersed, not projecting, provided with avicularia; no peristomial pore; in the ovicelled zooecia the distal wall is provided with an expansion ending in a thickened crenulated margin, which partly separates the ovicell from the zooecium. Operculum chitinized.

Genotype.—Sclerodomus (*Bifaxaria*) *denticulatus* Busk, 1884.

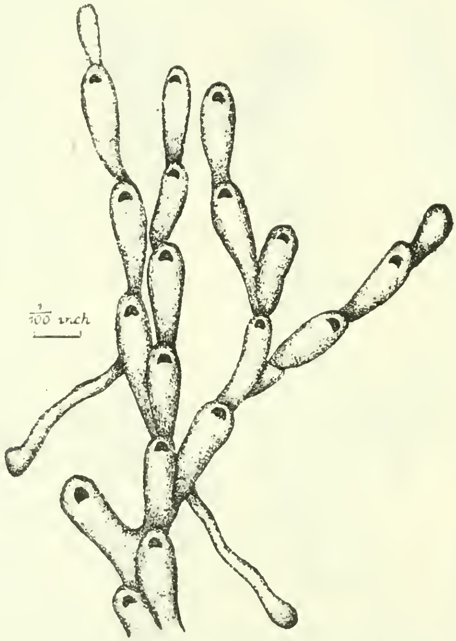

Fig. 188.—Genus *Huxleya* Dyster, 1858

Huxleya fragilis Dyster, 1858. (After Busk, 1852.)

Genus SYSTENOPORA Waters, 1904

The aperture is suborbicular, transverse, without operculum. The peristomice is auricular; it is a longitudinal slit placed between two lateral lamellae, one concave and the other convex with a proximal avicularium. There is an avicularium in the peristomic and also small zooecial avicularia; 20 tentacles. The colonies are free and radicellate.

Genotype.—Systenopora contracta Waters, 1904. Recent (Northern Hemisphere).

Genus CELLARINELLA Waters, 1904

The zoarium is free, erect and sometimes radicellate. The frontal of the zooecia is a thick tremocyst with tubules. The apertura is

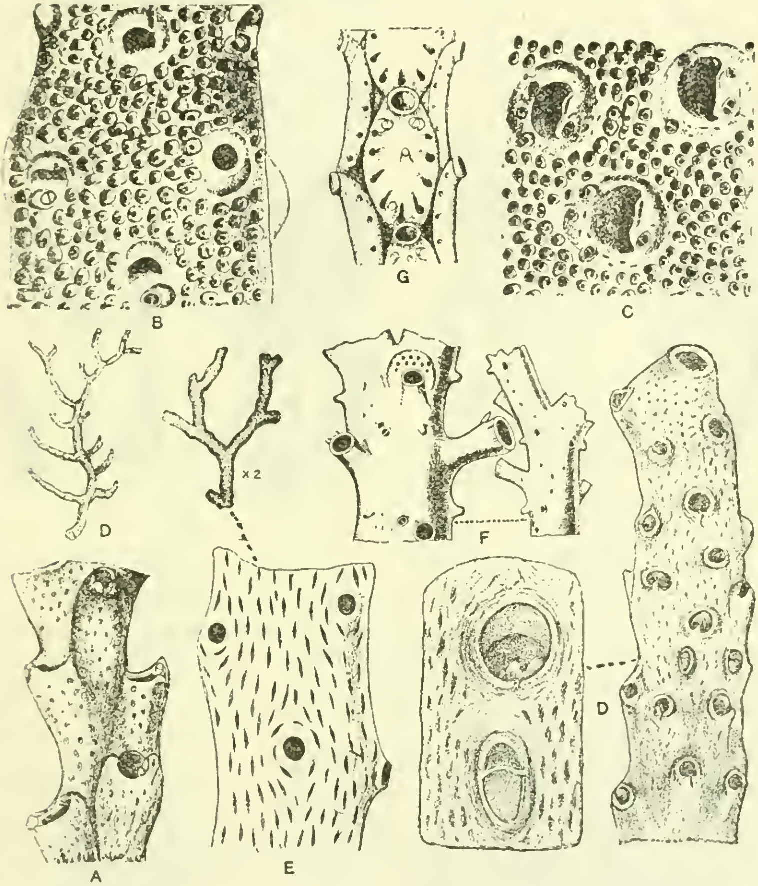

FIG. 189.—Genera of the family Sclerodomidae Levinsen, 1909

A. *Sclerodomus* Levinsen, 1909. *S. denticulatum* Busk, 1884. B. *Cellarinella* Waters, 1904. *C. foveolata* Waters, 1904, ×25. C. *Systenopora* Waters, 1904. *S. contracta* Waters, 1904, ×25. D. New genus. *Reteporella myriozoides* Busk, 1884. E. New genus. *Bifaxaria rustica* D'Orbigny, 1838. F. *Semihaswellia* Canu and Bassler, 1917. *S. proboscidea* Waters, 1889. (After Levinsen, 1909.) G. *Tessarodoma* Norman, 1868. *T. gracilis* Sars, 1850. (After Levinsen, 1909.)

hidden at the bottom of a long peristomie. There is no operculum, but a membrane bearing very strong muscles. The ovicell is hyperstomial and opens into the peristomie; 22 tentacles.

Genotype.—*Cellarinella foveolata* Waters, 1904. Recent (Australia).

Family ONCHOPORIDAE Busk, 1884

The zoarium is free, continuous ramified, flexible. The zooecia are slightly calcified; they are decorated exteriorly by apertural septulae and frontal septulae, grouped or not in special areas. The

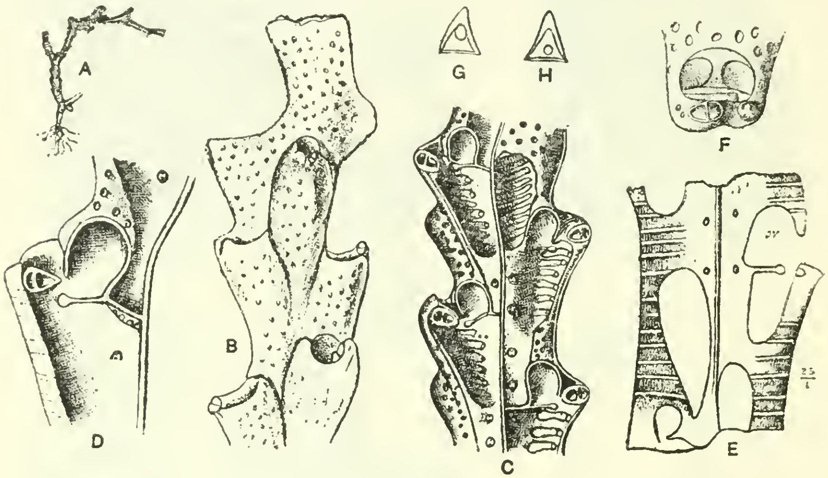

Fig. 189*a*.—Genus *Sclerodomus* Levinsen, 1909

A–G. *Sclerodomus denticulatus* Busk, 1884. A. Zoarium, natural size. B. Part of a zoarium. The peristome is funnel-shaped, immersed, not projecting, provided with avicularia; no peristomial pore. (After Busk, 1884.) C. A sagittal section through some ovicellarian zooecia. The avicularium is seen on the internal surface of the peristome and the plate originating from the distal wall; ×23. D. A sagittal section, ×40. The distal wall is provided with an expansion ending in a thickened, crenulated margin, which partly separates the ovicell from the zooecium. The operculum is membraneous and feebly chitinized. E. Longitudinal section showing the ovicell above the oral aperture, ×25. (After Waters, 1889.) F. An ovicell and its surroundings, seen from the frontal surface, ×40. (C–E after Levinsen, 1909.) G. Mandibles of the avicularium, ×85. (After Waters, 1904.)

ovicell is hyperstomial, generally closed by the operculum. The ascopore, generally present, is crescentic.

The genera of this family, in which the larva is unknown, are based on zoarial differences. The secondary characters added to differentiate them will probably be insufficient when the number of known species is greater.

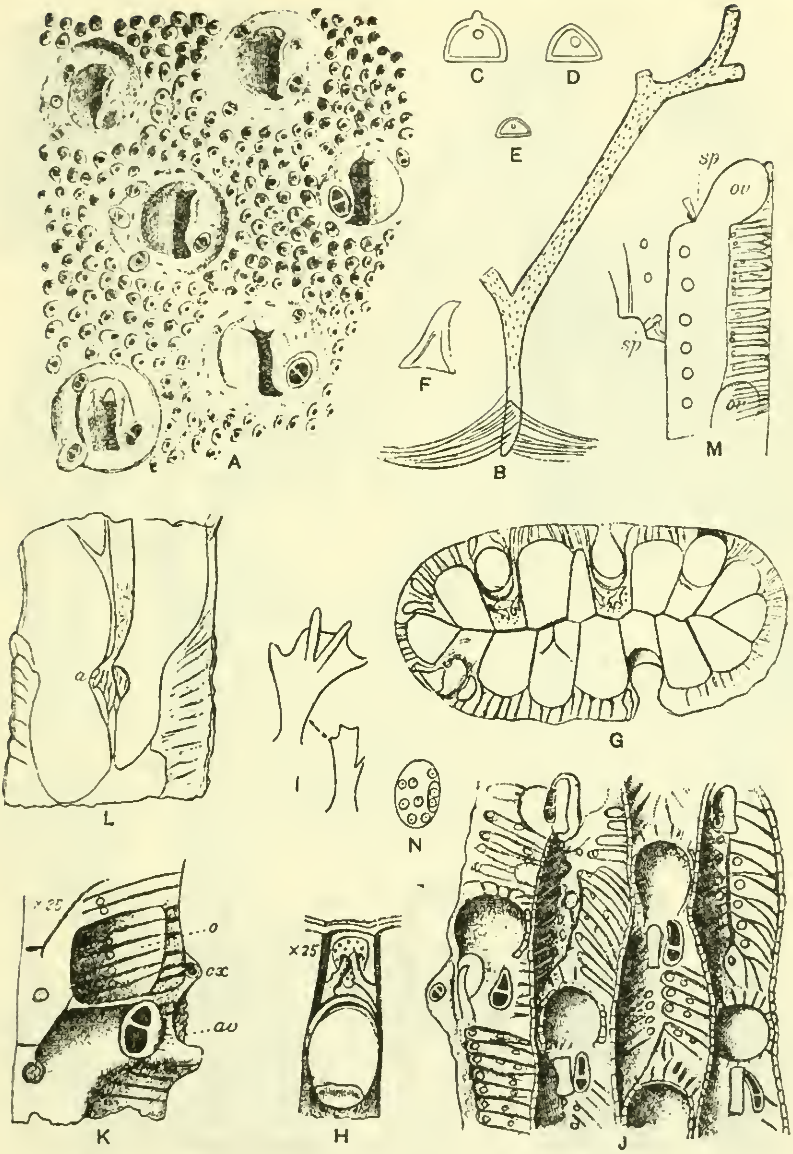

FIG. 190.—Genus *Systenopora* Waters, 1904

A–N. *Systenopora contracta* Waters, 1904. A. Part of a zoarium, ×25, 20 tentacles. B. Natural size. C. Mandible of the oral avicularium, ×85. D, E. Mandibles of zooecial avicularium, ×85. F. Mandible of the internal avicularium, ×85. G. Transverse calcareous section, ×12. H. Transverse calcareous section of a zooecium showing the multiporous septula, over which there is the pair of irregular processes, ×25. I. The processes more magnified. J. The interior as seen in thick section, prepared in order to show the interior triangular avicularia by the side of the aperture. The ovicells are also seen; ×25. K. Section showing the oral aperture with the interior avicularium (*av*) external one (*ex*) and ovicell (*o*); ×25. L. Decalcified sections cut through the shorter axis

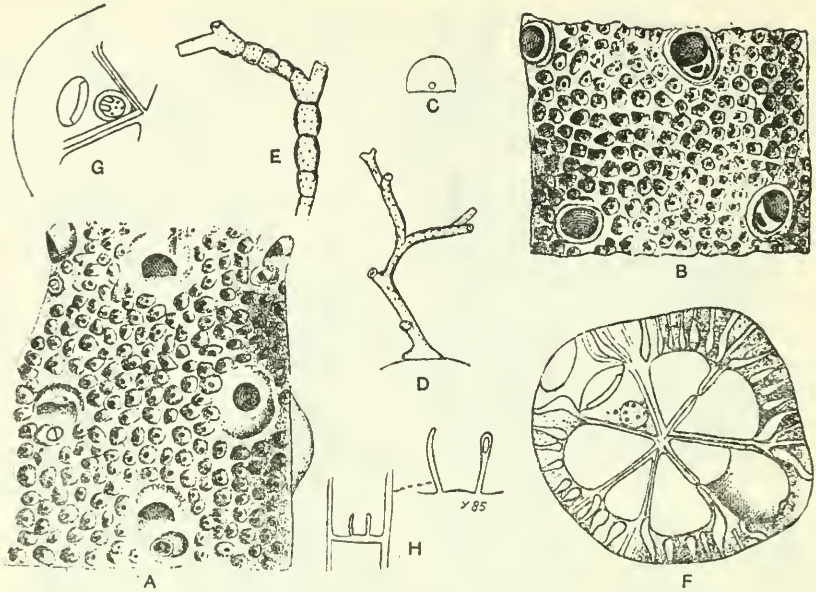

FIG. 191.—Genus *Cellarinella* Waters, 1904

A–H. *Cellarinella foveolata* Waters, 1904. A. Younger part, ×25. The aperture is a considerable distance from the peristomice and at right angle to it; 22 tentacles. B. Older part, ×25. The peristomice is round. C. Mandible, ×85. D. Zoarium, natural size. E. Natural size, nodulated form. F. Calcareous section showing the underside of the distal multiporous septula, ×25. G. Section showing the septula from above protected by a pair of spinous processes, ×85. H. The spinous processes seen in longitudinal section ×25 and ×85. (A–H. After Waters, 1904.)

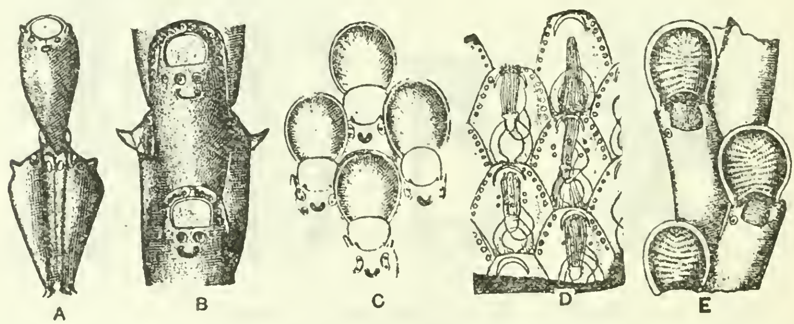

FIG. 192.—Genera of the Onchoporidae

A. *Calwellia* W. Thompson, 1838. *C. bicornis* W. Thompson, 1858, ×40. B. *Onchopora* Busk, 1852. *O. sinclairi* Busk 1855, ×40. C. *Onchoporella* Busk, 1852. *O. bombycina* Busk, 1852. D. *Onchoporoides* Ortmann, 1890. *O. moseleyi*, Busk, 1884. E. *Ichthyaria* Busk, 1884. *I. oculata* Busk, 1884.

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showing a reticulate connection between the two layers of zooecia; ×25. M. Longitudinal section showing the lateral wall with the lateral septulae, ovicell (*o*) and the processes (*sp*) over the distal septula; ×12. N. A multiporous septula, ×89. (A–M. After Waters, 1904.)

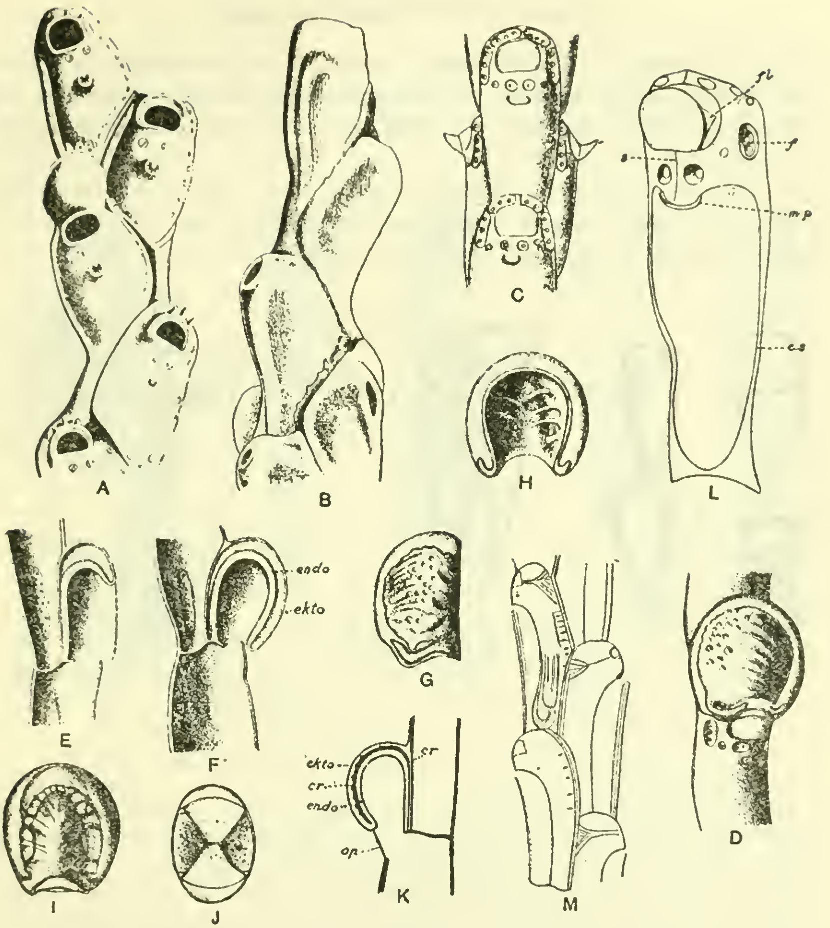

FIG. 193.—Genus *Onchopora* Busk, 1855

A, B. *Onchopora grimaldi* Jullien, 1903. A. Anterior face showing the form of the ascopore and the membraneous fenestrules; ×20. B. Posterior or dorsal face. (A, B. After Jullien, 1903.)

C–M. *Onchopora sinclairi* Busk, 1857. C. In two of the zooecia the operculum is open and the inwardly directed, angularly bent lateral parts of the vestibulum are seen; ×40. D. A zooecium with ovicell of the same species; ×40, E. Sagittal section through an unfinished ovicell. The cryptocyst which rises from the distal wall, is incorrectly drawn as connected with the membraneous endooecium. F. A sagittal section through an ovicell. Here also the cryptocyst is drawn as connected with the endooecium; ×40. G. An ovicell, lateral view; ×40. H. An undeveloped ovicell from the frontal surface; ×40. I. An ovicell from the basal surface; ×40. J. A transverse section through a branch. Two distal walls with septulae and two compensatrices are seen; ×40. K. Diagrammatic section showing the structure of the ovicell. (C–K, After Levinsen, 1909.) L. Seen somewhat obliquely. The compensatrix (*c. s.*) opens by the crescentic median pore (*m. p.*), *fl.*, vertical flange of operculum; *f.*, membraneous fenestra *m. p.* median pore; *s.*, suture in calcareous wall. (After Harmer, 1909.) M. Section showing the membrane dividing the zooecia, ×25. It is the wall of the compensatrix. (After Waters.)

Genus ONCHOPORA Busk, 1852

The colonies are bi or quadriserial. The operculum is simple. The ovicell has a couple of proximal, free, rib-like processes. At least 6 apertural septulae of which two small ones are between the ascopore and the apertura.

Genotype.—Onchopora sinclairi Busk, 1852. Recent. *Onchopora picoensis* Jullien 1903 and *Onchopora grimaldi* Jullien, 1903 (which we figure), belong to another genus, according to Levinsen, 1909.

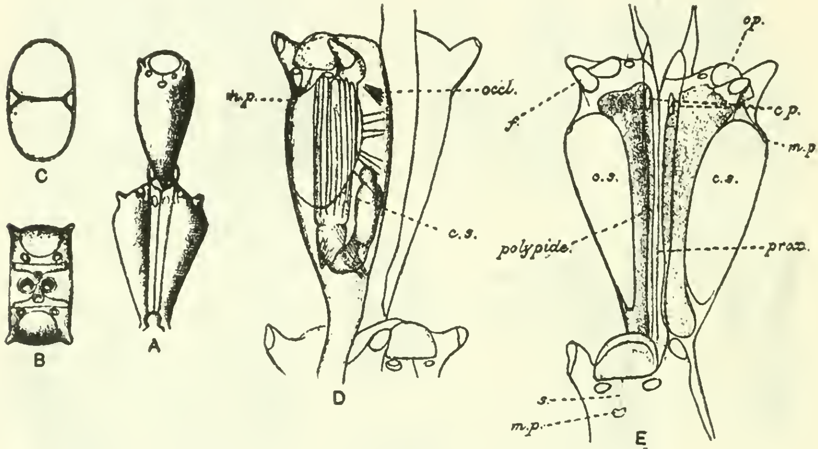

Fig. 194.—Genus *Calwellia* W. Thompson, 1858

A–C. *Calwellia bicornis* W. Thompson, 1858. A. The one-half of the distal wall of the lowermost pair of zooecia is seen and also two of the internal oval septulae through which the stalk-like proximal end of a pair of zooecia is in communication with the wider distal part of another pair; ×40. B. A transverse section through a branch; between the stalk-like proximal part and the wider distal part. A pair of zooecia is seen from the distal end, and also the forked distal walls and four intersected stalklike proximal parts; ×55. C. A transverse section through a branch approximately through the middle of the wider distal part of a pair of zooecia; ×55. (A–C After Levinsen, 1909.)

D, E. *Calwellia gracilis* Maplestone, 1882. D. Young zooecium and parts of its neighbors. E. Two mature zooecia, showing the large compensation sacs (*c. s*); *c. p.* communication pores (septulae); *prox.* the narrow proximal part of a distal zooecium; *occl.*, occlusor muscles of operculum; *m. p.*, median pore; *op.*, operculum; *s.*, suture in calcareous wall; *f.*, membraneous fenestra. (D. E. After Harmer, 1902.)

Genus CALWELLIA W. Thompson, 1858

The zooecia horn-shaped and provided with a narrow caudal portion are joined together back to back with perpendicular pairs between them.

Genotype.—Calwellia bicornis W. Thompson, 1858. Recent.

Genus ONCHOPORELLA Busk, 1852

The zoarium is foliate, unilamellar, ligulate or lobate. There are lateral septulae and apertural septulae. The operculum is composite.

Genotype.—Onchoporella (*Carbasea*) *bombycina* Busk, 1852 (not Ellis and Solander, 1786). Recent.

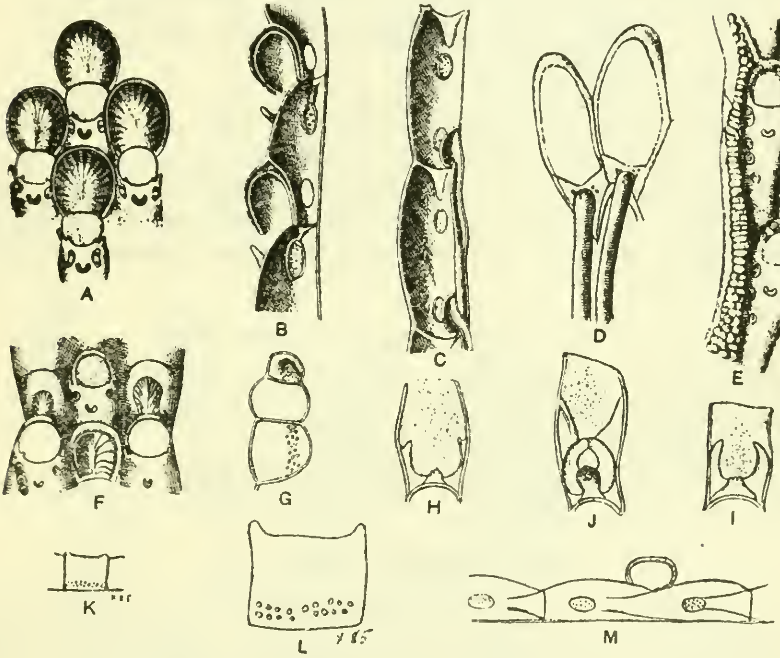

FIG. 195.—Genus *Onchoporella* Busk, 1852

A–M. *Onchoporella bombycina* Busk, 1852. A. Ovicelled zooecia, ×40. B. A sagittal section through two zooecia with ovicell; the cryptocyst removed; ×40. C. A sagittal section through two zooecia, furnished with radical fibers. The one descending part of the distal wall is seen, ×40. D. Two zooecia with radical fibers from the basal surface, ×40. E. A part of the margin of a colony, ×40. F. Zooecia with developing ovicells ×40. G. Transverse sections of two zooecia and of a kenozooecium ×40. H. The first beginning of an ovicell, ×40. I. Developing ovicell, a little older. J. Developing ovicell, in which the basal surface of the cryptocyst is almost formed, ×100. (A–J. After Levinsen, 1909). K. Distal wall, ×25. L. Distal wall, ×85, with uniporous septulae. M. Lateral wall, ×25, showing raised ovicell and multiporous septulae (K–M. After Waters, 1896).

Genus ONCHOPOROIDES Ortmann, 1850

The zoarium is unilamellar, clavulate. No ascopore visible. The compensatrix opens immediately on the proximal border of the apertura. There are frontal and lateral septulae.

Genotype.—Onchoporoides (*Carbasea*) *moseleyi* Busk, 1884. Recent.

Genus ICHTHYARIA Busk, 1884

The zoarium is unilamellar and biserial. There are apertural septulae. The ovicell is not closed by the operculum.

Genotype.—Ichthyaria oculata Busk, 1884. Recent.

There is no ascopore shown on the figures of Busk, 1884, or of Waters, 1889, but there is one on the figure of Harmer, 1902.

Family EUTHYRIDAE Levinsen, 1909

The zooecia are slightly calcified, and in a larger or smaller part of their surface the surrounding ectocyst is kept distended by ridge-like or rod-shaped processes from the sub-adjacent olocyst which has a number of superficial septulae. The interzooecial walls have scattered uniporous septulae. The operculum is compound. The ovicell is wanting or endozooecial. The zoarium is free, branched, flexible (after Levinsen).

Genus URCEOLIPORA MacGillivray, 1881

The ovicell is endozooecial. The apertura is provided with a narrow sinus. The ectocyst is everywhere kept distended by narrow ridges from the olocyst (after Levinsen).

Genotype.—Urceolipora nana MacGillivray, 1881. Recent (Australia).

Genus EUTHYRIS Hincks, 1882

No ovicell, but two different forms of zooecia. The aperture has two cardelles. The frontal forms a continuous calcareous surface. The ectocyst is on the frontal as well as on the basal surface distended by means of rod-shaped processes from the olocyst. (After Levinsen, 1909.)

Genotype.—Euthyris obtecta Hincks, 1882. Recent (Australia).

Genus PLEUROTOICHUS Levinsen, 1909

No ovicell, but two different forms of zooecia. The apertura has two cardelles. The frontal is formed by a number of narrow, only partially meeting, ribs; the ectocyst is distended only on the basal surface of the colony by means of the wedge-shaped, projecting, central portion of the separate zooecia (after Levinsen).

Genotype.—Pleurotoichus (*Euthyris*) *clathratus* Harmer, 1902. Recent (Australia).

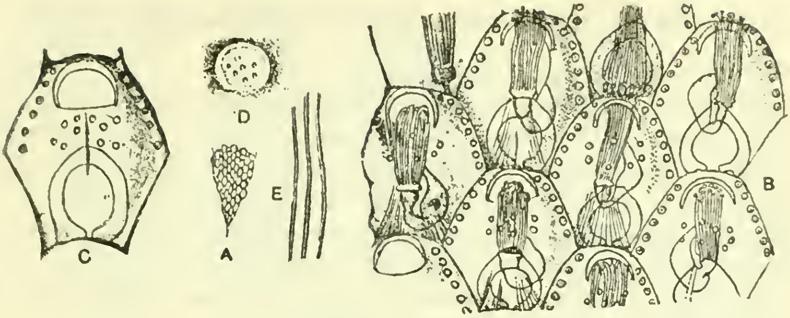

FIG. 196.—Genus *Onchoporoides* Ortmann, 1890

A–E. *Onchoporoides moseleyi* Busk, 1884. A. Natural size. B. Zooecia with their polypide. C. Zooecium more highly magnified, showing horseshoe mark. D. Septular plate (multiporous septula). (A–E. After Busk, 1884.) E. Retractor muscles. (A–E. After Busk, 1884.)

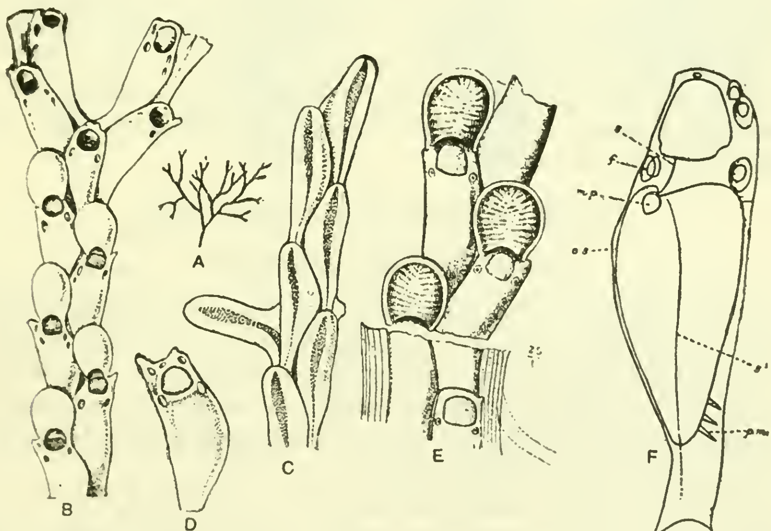

FIG. 197.—Genus *Ichthyaria* Busk, 1884

A–F. *Ichthyaria oculata* Busk, 1884. A. Colony, natural size. B. Frontal side of a branched fragment, ×12. C. Back view, ×12, showing an elongated, vertical fissure remaining membranous. D. A zooecium, ×25 showing the conical process on the upper and outer angle perforated at the base. (A–D. After Busk, 1884.) E. Segments showing ovicells ornamented with radiating lines and at the lower part the lateral chitin growth. (After Waters, 1887.) F. Zooecium preceding a bifurcation of the branch and therefore less curved than most of the zooecia. The compensatrix (*c. s.*) opens by the ascopore (*m. p.*) which is asymmetrical and connected with the operculum by a longitudinal suture in the calcareous wall (*s*). On each side of the latter is a funnel-shaped fenestra (*f*). The parietal muscles (*p. m.*) occur as a series of definite groups. (After Harmer, 1902.)

Suborder Hexapogona Canu and Bassler, 1927

The ancestrula engenders six zooecia.

The families belonging to this suborder of cheilostomatous bryozoa are the Chaperiidae Jullien, 1888, Conescharellinidae Levinsen, 1909, Mamilloporidae Canu and Bassler, 1927 and doubtfully the Myriozoumidae Smitt, 1867, and Lekythoporidae MacGillivray, 1882.

We class here *Myriozoum* by simple cell analogy but the ancestrula has not yet been published. Of the Lekythoporidae we know only the ancestrula of the genus *Actisecosa* and we are not certain that the family is a very natural one.

In the suborder *Pentapogona* here proposed must be classed all the other known cheilostomatous bryozoa. However, we must confess that in a large number of families the ancestrula is not yet known and that modifications of this classification are always possible. The presence of five zooecia about the ancestrula appears to be the rule in all the species with buried or heaped up zooecia. The erect zooecia belong to the type of Hexapogona.

Among the fossil genera we can cite as belonging to this group are *Stichopora* Hagenow, 1851, *Discoflustrellaria* D'Orbigny, 1851, and *Hagenowinella* Canu, 1900.

Family CHAPERIIDAE Jullien, 1888

Genus CHAPERIA Jullien, 1888

In 1888, Jullien, in creating this family classed it correctly in his tribe of the Superovicellata. In 1898, Waters introduced it in the group of Membraniporae because of its exterior aspect. We followed the English naturalist in 1920 but in 1923 we showed the necessity of separating Jullien's genus into two sections according to the escharian or flustrine appearance of the frontal.

Now that we have been able to study recent specimens we can finally class the genus more naturally. The exterior aspect of the frontal concave or convex does not have great value and must depend upon some special adaptation; moreover we can see on *Chaperia albispina* MacGillivray these two frontal aspects on the same zooecium. Furthermore, the operculum in the two groups is identical and constant in its general structure. The observations of Levinsen, 1909, are incomplete; the genus *Chaperia* belongs to the suborder Hexapogona; until the discovery of the larva it will be necessary to maintain the present classification and adopt provisionally the family Chaperiidae, Jullien.

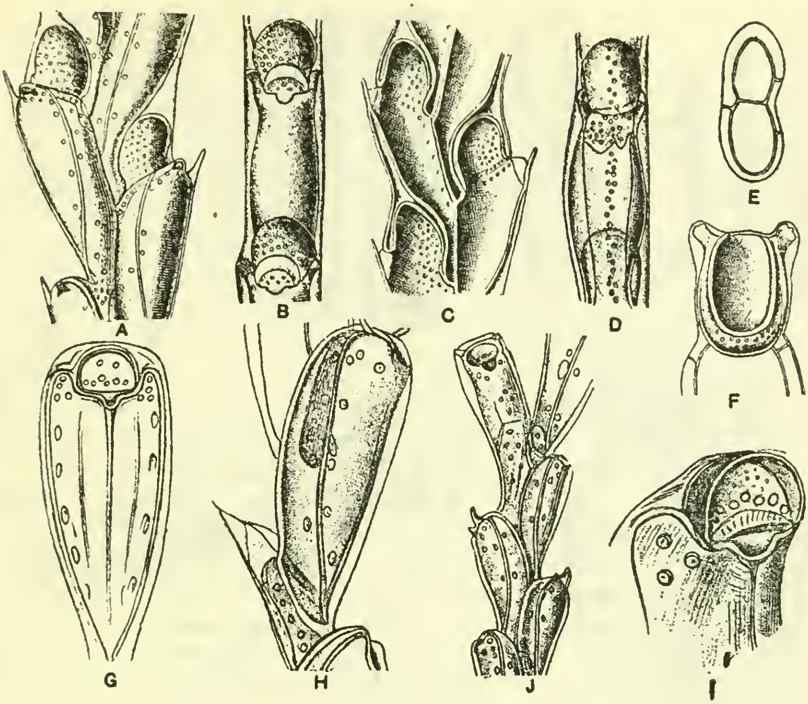

FIG. 198.—Genus *Urceolipora* MacGillivray, 1881

A–J. *Urceolipora nana* MacGillivray 1881. A. Zooecia with open operculum. The figure only shows the strongest of the longitudinal ridges which keep the covering membrane (ectocyst) stretched, ×40. B. Two zooecia with ovicell, from the frontal surface; ×40. C. A sagittal section through three zooecia with endozooecial ovicell. The covering membrane, the lowermost part of which represents the ectozooecium, is too thick, as it has been drawn with a double outline to make it distinct, ×40. D. A zooecium with ovicell, from the basal surface. The uniporous septulae of the basal surface and of the distal wall are seen; ×40. E. A transverse section through a branch. Two zooecia and three of the ridges, which keep the covering membrane stretched, are seen; ×40. F. A transverse section through the proximal part of an ovicell and through a portion of the adjacent zooecium. The endozooecium is seen innermost and on each side of its aperture one of the trapeziform projections which contribute to keep the covering membrane stretched. On each side of the covering membrane internally is seen the collar-shaped ridge which surrounds the proximal part of the ovicell, and lowest down the separating wall towards the adjacent zooecium. Outside the endozooecium the distal wall with its septulae is seen (On account of incorrect shading it seems to be arched) ×55. (A–F. After Levinsen, 1909.) G. Frontal view of a zooecium showing the arrangement of pores; ×50. H. Lateral view of a zooecium, ×50. I. View of aperture showing the movements of the operculum and the entrance of the compensatrix, ×100. J. A fragment of a colony, ×25. (G–J. After Busk, 1884.)

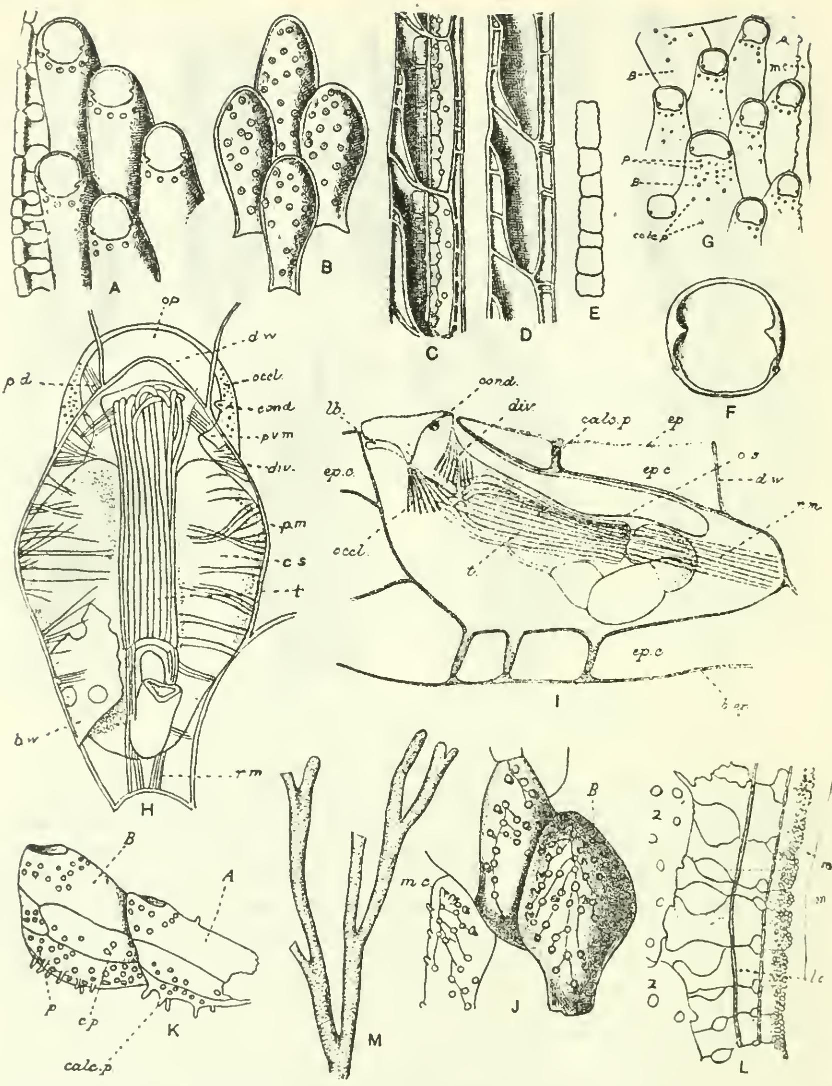

FIG. 199.—Genus *Euthyris* Hincks, 1882

A–M. *Euthyris obtecta* Hincks 1882. A. On the marginal zooecia the peculiar processes are seen, by which the covering membrane (ectocyst) is kept outstretched, ×40. B. Four zooecia, from the basal surface. Besides the septulae a number of filiform calcified elongations are seen; ×40. C. A sagittal section through two marginal zooecia. The internal lateral processes are visible and also the connections between the cryptocyst and the covering membrane (ectocyst): ×40. D. Sagittal section through ordinary zooecia; ×40. E. The processes of the lateral wall, from the outer surface, ×40. F. Operculum, ×100. (A–F. After Levinsen, 1909.) G. Part of the frontal surface of a branch, showing two of the large zooecia (B) *m. c.*, marginal cavity of frond; *calc. p.*, calcareous papillae supporting the frontal epitheca; *p.* pores. H. Basal view of a B-zooecium from which most of the basal calcareous wall (*b. w.*) has been removed. The

CHAPERIA JUDEX Kirkpatrick, 1888

Plate 64, figs. 2–4

1888. *Lepralia judex* KIRKPATRICK, Polyzoa of Mauritius, Annals and Magazine of Natural History, ser. 6, vol. 1, pt. 8, fig. 4.

Structure.—A beautiful figure of this species has been published. Our photographs have not such a beautiful aspect, but they have the advantage of conforming more to reality. Our specimens crept over nullipores. The oral spines are long (0.30 mm.); they are articulated at their base by a corneous joint, are quite large (0.08 mm.) and number 15 (14–16 according to Waters, 1924).

The form of the operculum is almost that of *Anoteropora magnicapitata*, but its structure is very different. It is a deep brown, almost black, and surrounded by a clearer zone; it bears laterally two large black bands for the insertion of the opercular occlusor muscles; the latter are attached to two oral trabeculae (occlusor laminae of Harmer) as Jullien has shown in 1888.

Waters, 1924, has shown according to the nature of the ancestrula that *Chaperia judex* Kirkpatrick, 1890, was a distinct species from *Chaperia acanthina.* Our Philippine species is therefore more probably *C. judex.* The bibliography given by Miss Jelly, 1889, and Marcus, 1921, must be revised. *C. judex* differs from *C. acanthina* in the greater number of spines (15 instead of 8).

Our opercula differ notably from those published in 1890 by Kirkpatrick and in 1898 by Waters for *Chaperia acanthina.*

Biology.—This species is beautiful only in appearance and when it has been well cleaned. In reality it is quite squalid; it lives in the slime and the purpose of its powerful armature of spines appears to be for extrusion of the tentacles.

It is a species of shallow water everywhere wherever it has been dredged. Its geographic distribution is very large and our rare specimens come from two localities, 450 kilometers apart.

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tentacles (*t*), contained in their tentacle sheath, lie in a groove of the compensatrix (*c. s.*), which bulges out on each side of the tentacles. The operculum (*op.*) is seen partly through the distal wall (*d. w.*); *p. d.* parieto-diaphragmatic muscles; *occl.* occulsor muscles of operculum; *cond.* condyle; *p. v. m.* parieto-vaginal muscles and bands; *div.* divaricator muscle of operculum; *p. m.* parietal muscles; *r. m.* retractor muscles of polypide. I. Thick longitudinal section, showing the frontal epitheca (*ep*) and the basal epitheca (*b. ep.*) held at a distance from the calcareous walls of the zooecia by the calcareous papillae (*calc. p.*); *lb*, labium; *ep. c.* cavity beneath epitheca. J. Basal view of a B zooecium (B) and several others; from the edge of a frond. K. B-zooecium and a-zooecium, calcined. The zooecia are in contact with their neighbors by small parts only of their walls, which are perforated by communication pores (*c. p.*-septulae). The remaining pores (*p.*) are in relation with its cavity beneath the epitheca. L. Basal view of a part of the marginal thickening of an old branch. *z*, zooecia; *m* free margin of branch; *l. c.* longitudinal calcareous ridges; *m. c.* marginal cavity of frond. (H-L. After Harmer, 1902.) M. A zoarium, natural size. (After Hincks, 1882.)

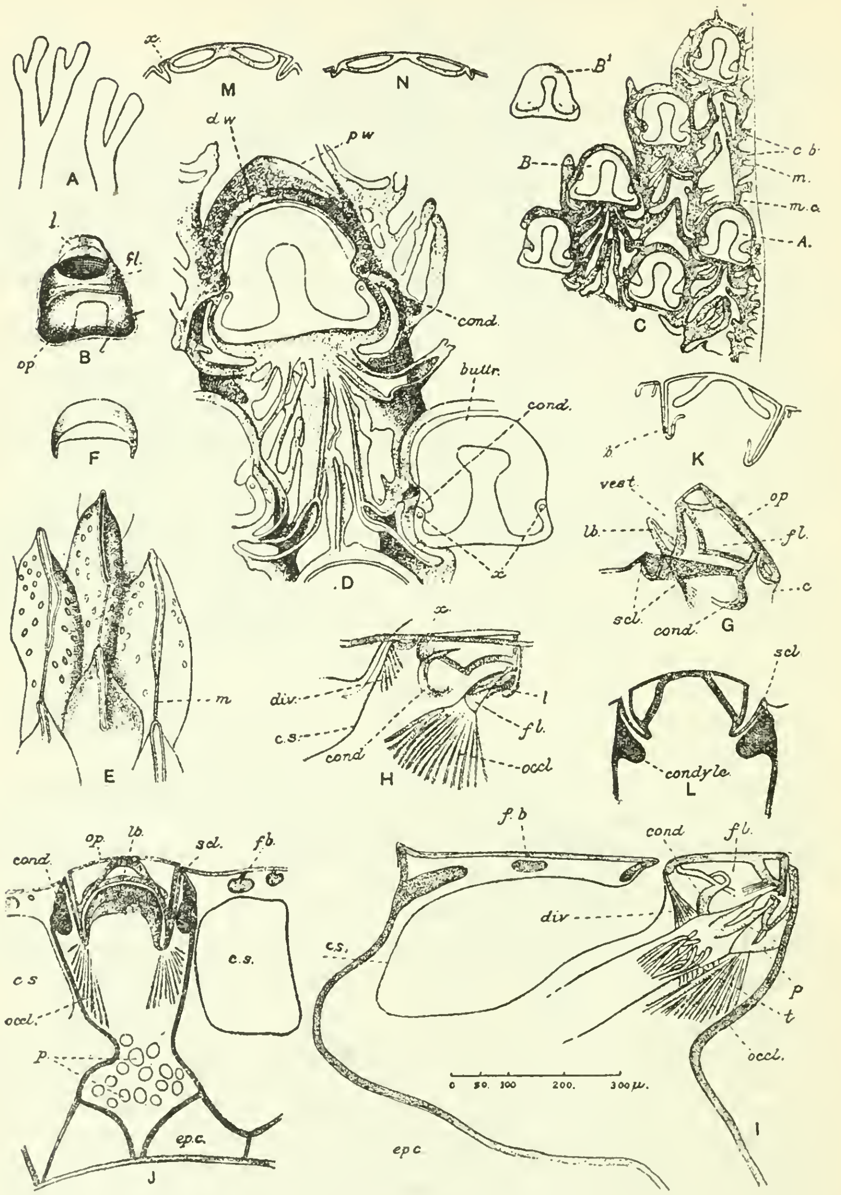

Fig. 200.—Genus *Pleurotoichus* Levinsen, 1909

A–J. *Pleurotoichus clathratus* Harmer, 1902. A. Ends of several branches, natural size. B. Operculum and labium (*l*) from a dry specimen. The arrow indicates the entrance of the compensatrix. C. Part of the frontal surface of a branch; *m.* lateral margin of the frond, the epitheca of which covers a continuous marginal cavity (*m. c.*) strengthened by calcareous bars (*c. b.*) in its frontal wall. Two of the opercula B and B′ are different from the others (*A*). D. The zooecium B and parts of its neighbors, of the preceding figures; *d. w.* distal wall of B; *p. w.* proximal wall of distal neighbor. (For × see fig. M). E. Basal

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 4′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.;

D. 5251. Gulf of Davao, Linao Point; 7° 5′ 12″ N.; 125° 39′ 35″ E.; 20 fathoms; Co.;

Indian Ocean: Mauritius.

Plesiotypes.—Cat. Nos. 8263, 8264, U.S.N.M.

CHAPERIA PYRIFORMIS, new species

Plate 64, fig. 1

Description.—The zoarium is unilamellar. The zooecia are distinct, separated by a deep furrow, imbricated, *pyriform;* the frontal is anterior, concave, very small. The aperture is elongated and *pyriform;* the peristome is very thick and bears 4 to 6 large articulated spines. The ovicell is large, globular, hyperstomial, smooth.

Measurements.—

Aperture $\begin{cases} ha = 0.40 \text{ mm.} \\ la = 0.26 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.70 \text{ mm.} \\ lz = 0.34 \text{ mm.} \end{cases}$

Affinities.—This new species differs from *Chaperia transversalis* in its pyriform aperture and in the lateral arrangement (and nondistal) of its peristomial spines. We have not observed the trabeculae at the bottom of the aperture, but our specimens were dead.

Occurrence.—

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 9′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

Holotype.—Cat. No. 8265, U.S.N.M.

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wall of several zooecia; *m*, mesentery-like lamella of chitin connecting the proximal part of the basal wall of the zooecium with the basal epitheca. F. Labium, seen from the distal side. G. Open operculum (*op.*) and labium (*l. b.*) in side view; *cond.* chitinous lamella covering the condyle (decalcified); *scl.*, sclerite surrounding the cavity in which the operculum lies; *c.*, beginning of floor of compensatrix; *vest*, entrance to vestibule. H. Closed operculum and labium; *occl.* occlusor muscles, *div.* divaricator muscles. (For ×, see fig. M.) I. Longitudinal section (thick) of a zooecium; *b. ep.*, basal epitheca. *ep. c.*, cavity beneath epitheca; *f. b.* a bar belonging to the frontal shield. J. Distal part of the operculum with the labium (*lb*), seen a thick transverse section of the zooecium (not decalcified). The condyles (*cond.*) are in the foreground, and the part of the operculum immediately connected with them (fig. L) is not indicated. The labium and the edge of the operculum are seen at a much deeper focus; *p.* pores.

K–N. Transverse sections of opercula. K. On the distal side of the condyle, showing the great extent of the vertical lateral flanges and the free termination of the buttresses of the operculum. L. Through the region of the condyles; the operculum is partially open. M. On the proximal side of the condyles; showing the way in which the circular marks (×) which appear in fig. D are formed. N. Immediately distal to the basal sclerite. (A–N. After Harmer 1902.)

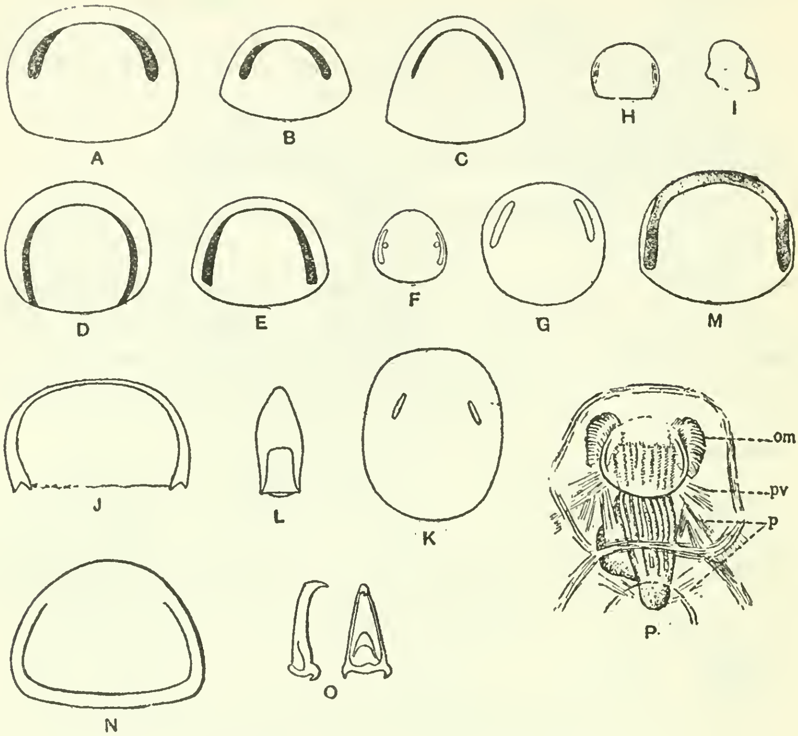

FIG. 201.—Genus *Chaperia* Jullien, 1881

A–C. *Chaperia transversalis* Opercula, ×85. D–G. *Chaperia acanthina* Quoy and Gaimard, 1824. Four opercula. (F. After Kirkpatrick, 1890; G, ×85. After Waters, 1895.) H, I. *Chaperia spinosissima* Calvet, 1904. Two opercula. (After Calvet, 1904.) J, K, L. *Chaperia galeata* var. *bilaminata* Waters, 1898. J. Operculum of ovicell. K. Operculum of the aperture. L. Avicularian mandible, ×85. (After Waters, 1898.) M. *Chaperia capensis* Busk, 1884. Operculum. N, O. *Chaperia imbricata* Busk, 1884. N. Operculum. O. Avicularian mandibles. (M–O After Busk, 1884.) P. *Chaperia australis* Jullien, 1884, sketch showing the arrangement of muscles, ×45. *om*, opercular muscles; *pv*, parietovaginal muscles; *p.*, parietal muscles. (After Marcus, 1922.)

FIG. 202.—*Chaperia acanthina* Quoy and Gaymard, 1824. Two opercula, ×85

CHAPERIA TRANSVERSALIS, new species

Plate 64, figs. 5–9

Description.—The zoarium is unilamellar; it is free or creeps over nullipores, bryozoa, or fragments of stone; it is rose color. The zooecia are distinct, separated by a deep furrow imbricated, quite erect distally, a little *transverse;* the frontal is small, proximal, concave. The aperture is large suborbicular, somewhat *transverse;* the peristome is thin, sharp; it bears 4 large distal articulated spines. The trabeculae form an armature in the form of a horseshoe. The ovicell is large, convex, hyperstomial. There is sometimes a small triangular avicularium on the frontal. On the inner face the zooecial bases are hexagonal and ornamented with large tuberosities.

Measurements.—

Aperture $\begin{cases} ha = 0.25\text{–}0.30 \text{ mm.} \\ la = 0.30\text{–}0.35 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.80\text{–}085 \text{ mm.} \\ lz = 0.65 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Chaperia galeata* Busk, 1852, in its trabecular armature in the shape of a horseshoe, in the absence

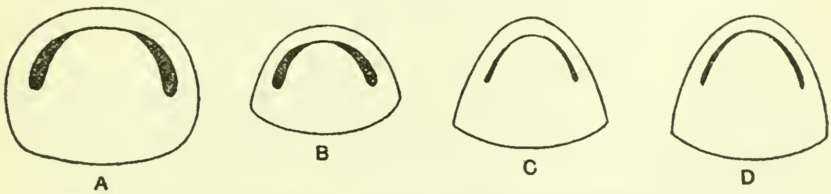

FIG. 202*a*.—*Chaperia transversalis* new species

Opercula, ×85, of ordinary zooecium (A) and regenerated zooecium (B). C, D. Opercula with narrow muscular attachments.

of a large and constant frontal avicularium and in its transverse and not elongated aperture. Total regeneration is rather common; it is manifested by the presence of an inner peristome thinner and ornamented with two spines.

Waters, 1898, published two opercula of *Chaperia galeata;* only the first (fig. 8) approaches ours. Perhaps though the structure of the operculum is variable on the same specimen. It is certainly in rapport with the form of the oral trabeculae which appears rather variable themselves.

Biology.—The unexpected presence of this species in the Sea of Japan was a surprise to us, but the published figures show that our determination is perfectly correct. This large geographic distribution is in close connection with its bathymetric occurrence. However our specimens from deep waters are rare, and the species prefers less depths of water. It was certainly oviceIled in the months of February, September, and November. The species is therefore apparently in continual reproduction and neither depth, season, nor locality appears to have any influence on this reproduction.

The study of the inner face is very interesting. Manifestly the animal wishes to remove itself from its substratum and for this reason it constructs this bizarre formation of tuberosities and spines as may be readily observed.

Occurrence.—

D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

D. 5137. Jolo Light, Jolo; 6° 4′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 9′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 4′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Cotypes.—Cat. Nos. 8267–8270, U.S.N.M.

Family MAMILLOPORIDAE Canu and Bassler, 1927

Hexapogona with orbicular zoarium without pit. The cells are juxtaposed. The proximal border of the apertura is oriented towards the apex. The ovicell has a special interzooecial cavity and is closed by the operculum.

We believe that the genera of the old family of Conescharellinidae can be separated into two groups. The first is one rich in species with very frequent ovicells; the second comprises the species with very rare ovicells. It is very difficult to conceive that their larvae are identical. Moreover *Conescharellina* with its distal sinus and its inferior aperture is certainly of very different anatomical structure.

The genera of this family are *Mamillopora* Smitt, 1872, *Fedora* Jullien, 1881, *Ascosia* Jullien, 1882, and *Anoteropora* and *Stenosipora* Canu and Bassler, 1927.

According to Waters, 1919, it is necessary to class with *Mamillopora* the ancient genera *Discoflustrellaria* D'Orbigny, 1852, (part); *Kionidella* Koschinski, 1875 and *Prattia*, D'Archiac., 1847.

Genus MAMILLOPORA Smitt, 1873

1873. *Mamillopora* SMITT, Floridan Bryozoa, Kongl. Svenska Vetenskaps, Akademiens Handlingar, vol. 11, p. 33.

The zoarium is cupuliform or conical and floating. The two faces are covered by mammilosities. The superior face contains only the aperture and its wide peristome. The aperture is subelliptical with two submedian cardelles. The peristome bears an elliptical or oval avicularium. The ovicelled zooecia are much larger.

Genotype.—*Mamillopora cupula* Smitt, 1873. (See pl. 94, figs. A–F.)

Range.—Eocene—Recent.

The other known species of the genus are as follows:

Mamillopora (*Cupularia*) *bidenta* Reuss, 1869 (according to Waters), Eocene (Priabonian).

Mamillopora tuberosa Canu and Bassler, 1919, Miocene (Bowden).

Mamillopora cavernulosa, new name (= *M. tuberosa* Canu and Bassler, part), Miocene (Costa Rica).

Genus FEDORA Jullien, 1882

Plate 93, figs. K–M

1882. *Fedora* JULLIEN, Dragages du Travailleur, Bulletin Societe Zoologique France, vol. 7, p. 17.

Zooecia subhexagonal with circular orifice, thick but not salient, indented on its posterior fourth where it is thin, finally placed nearer the center of the zooecium, where it occupies a third of the diameter; ovicell non-salient indicated exteriorily by a smooth band forming an obtuse angle, with the summit turned toward the orifice; the summit of the angle is crowned by a calcareous lamella which bears behind a broad opening. Avicularia not constant, situated on the sides and outside of the orifice. (Translation after Jullien.)

Genotype.—*Fedora edwardsi* Jullien, 1882.

Range.—Recent.

In 1923 we gave too much latitude to this genus. It should be maintained with the exact limits of its author because of the special nature of its ovicell and of the particular structure of its operculum.

Genus ANOTEROPORA Canu and Bassler, 1927

Plate 94, figs. G–N

The zoarium is cupuliform. The inferior base of each zooecium is porous. The superior base is convex, perforated proximally by the apertura and decorated distally by a triangular avicularium arranged transversely. The aperture is elliptical with two submedian cardelles. The ovicelled zooecia are much larger and their aperture is transverse; the ovicell is very large, occupying the place of a zooecium and closed by the operculum.

Genotype.—*Anoteropora magnicapitata* Canu and Bassler, 1927.

Range.—Pliocene, Recent.

The species belonging to this genus are as follows:

Anoteropora (*Stichoporina*) *simplex* Kirkpatrick, 1890	China Sea.
Anoteropora magnicapitata Canu and Bassler, 1927	Philippines.
Anoteropora (*Stichoporina*) *persimplex* Neviani, 1895	Pliocene.
Anoteropora (*Mamillopora*) *smitti* Calvet, 1907	Atlantic (Cape Verde Island).

ANOTEROPORA MAGNICAPITATA Canu and Bassler, 1927

Plate 65, figs. 1–4; plate 94, figs. L–N

1927. *Anoteropora magnicapitata* Canu and Bassler, Classification Cheilostomatous Bryozoa, Proc. U. S. Nat. Mus., vol. 69, Art. 14, p. 10, pl. 1, fig. 11.

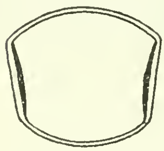

Fig. 203.—*Anoteropora magnicapitata* Canu and Bassler, 1927 Operculum, ×85

Description.—The zoarium is free, discoidal, convex, and can be as much as 12 millimeters in diameter. The zooecia are distinct, separated by a deep furrow, somewhat elongated, elliptical; the frontal is convex, arranged distally, and bears a large transverse triangular avicularium with pivot. The aperture is large, a little transverse, arranged proximally and ornamented with two triangular cardelles. The ovicell is *very large*, hyperstomial, embedded in the adjacent zooecium, closed by the operculum. The inferior face of the colony bears the bases of the zooecia; they are hexagonal, convex, covered with large pseudopores.

Measurements.—

Aperture $\begin{cases} ha = 0.23 \text{ mm.} \\ la = 0.25\text{–}0.27 \text{ mm.} \end{cases}$ Zooecia $\begin{cases} Lz = 0.60\text{–}0.65 \text{ mm.} \\ lz = 0.50\text{–}0.55 \text{ mm.} \end{cases}$

Affinities.—The exterior dimensions are rather variable and depend on the convexity of the zoarium. The operculum is large, fragile, a little transverse, with a proximal concave border; the two muscular attachments are long and placed close to the edge.

This species differs from *Stichoporina simplex* Kirkpatrick, 1891, in the much larger ovicells and in the apertures and opercula of different forms. The aperture of the ovicelled zooecia is much larger (0.30–0.35 mm.) than that of the adjacent zooecia. The pores of the inferior face are simple cavities without depth.

Biology.—Many of our specimens were dead. The species was certainly in reproduction February 15, 1908. Our single complete colony was dredged at Sulade.

The species can descend to great depths (415 meters) but it is much more abundant in shallow depths from 36–54 meters. Its geographic distribution is rather small and it is restricted to the Sulu Archipelago.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.; 13.2° C.

Cotypes.—Cat. Nos. 8271–8274, U.S.N.M.

Genus STENOSIPORA Canu and Bassler, 1927

The zoarium is cupuliform. The inferior base of each zooecium is hexagonal and porous. The superior base is little convex, perforated in the middle by the aperture and often decorated laterally by one or two avicularia. The aperture is elliptical with two cardelles placed more or less low. The ovicell is hyperstomial, closed by the operculum, embedded in the distal zooecium; the ovicelled zooecia are no larger than the others.

Genotype.—*Stenosipora* (*Stichoporina*) *protecta* Koschinsky, 1885.

Range.—Eocene (Lutetian, Priabonian).

The known species of the genus are as follows:

Stenosipora (*Stichoporina*) *protecta* Koschinsky, 1885	Lutetian of France and Bavaria.
Stenosipora (*Stichoporina*) *simplex* Koschinsky, 1885 (*S. reussi* Canu, 1907).	Lutetian of France and Bavaria.
Stenosipora (*Stichoporina*) *crenilabris* Koschinsky, 1885	Lutetian.
?*Stenosipora* (*Cupularia*) *bidentata* Reuss, 1869	Priabonian.

Genus KIONIDELLA Koschinsky, 1885

1885. *Kionidella* Koschinsky, Beitrag zur Kenntnis der Bryozoenfauna der alteren Tertiärschichten des Südlichen Bayerns, Paleontographica, vol. 32, p. 67. (=*Discoflustrellaria* D'Orbigny, 1853.)

The zoarium, rarely cupuliform, is principally cylindrical, conical at its extremity and much elongated. The inferior base of each zooecium is fusiform and decorated by a large distal septula. The superior base is convex, perforated in the middle by the aperture and decorated laterally by two triangular avicularia with the beak converging toward the median axis of the zooecium. The aperture is elliptical with two submedian cardelles. The ovicell is hyperstomial, closed by the operculum, embedded in the distal zooecium.

Genotype.—*Kionidella excelsa* Koschinsky, 1885.

Range.—Eocene (Lutetian)—Oligocene (Vicksburgian).

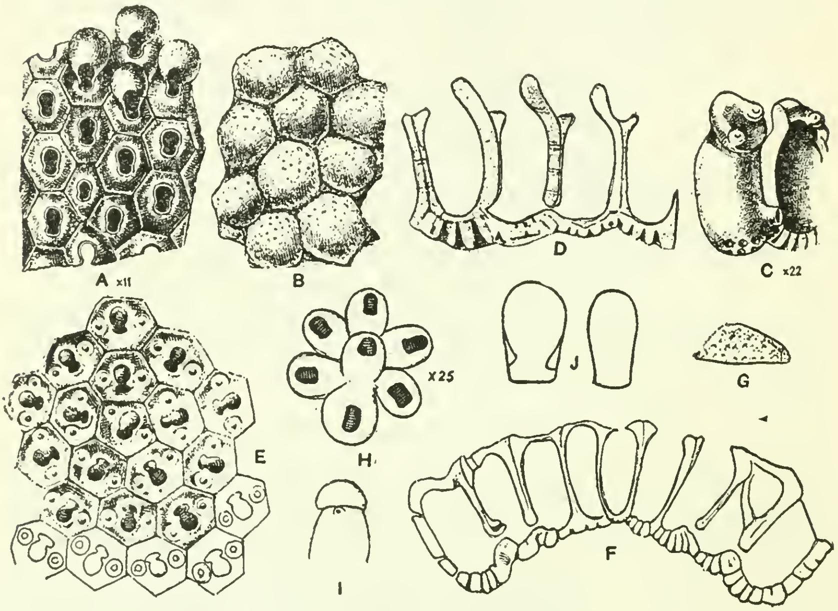

Fig. 204.—Genus *Stenosipora* Canu and Bassler, 1927

A–B. *Stenosipora* (*Stichoporina*) *simplex* Koschinsky, 1888. A. Portion of external surface, ×11, with ovicelled zooecia. B. Portion of the inner surface, ×15, showing the hexagonal form of the zooecia.

C, D. *Stenosipora* (*Stichoporina*) *crenilabris* Koschinsky, 1885. C. Isolated zooecia, ×22. D. Meridian section, ×22, showing the parietal septulae.

E, F. *Stenosipora* (*Stichoporina*) *protecta* Koschinsky, 1885. E. Ancestrula and the six ancestrular zooecia, ×11. F. Meridian section showing the basal septulae and the cavities of the internal face, ×22.

G–J. *Stenosipora bidentata* Reuss, 1869. G. Zoarium, natural size. H. View showing the ancestrula and the six surrounding zooecia, ×25. I. An ovicelled zooecium, ×25. J. Oral aperture, ×85. (G–J. After Waters, 1919.)

This genus differs from *Stenosipora* in little of importance. The difference consists in the cylindrical form of the colonies, in the converging direction of the avicularian beak and in the fusiform base of the zooecia.

The known species of this genus are as follows:

Kionidella excelsa Koschinsky, 1885	Lutetian.
Kionidella obliqueseriata Koschinsky, 1885	Lutetian.
Kionidella (*Discoflustrellaria*) *dactylus* D'Orbigny, 852	Lutetian.
Kionidella (*Stichoporina*) *protecta* Canu and Bassler, 1920 (not Koschinsky, 1885).	Jacksonian.
Kionidella (*Fedora*) *pusilla* Canu and Bassler, 1920	Vicksburgian.

D'Orbigny's name is the older, but the French author did not give a single figure of the genotype. The latter was figured only in 1908 by Canu.

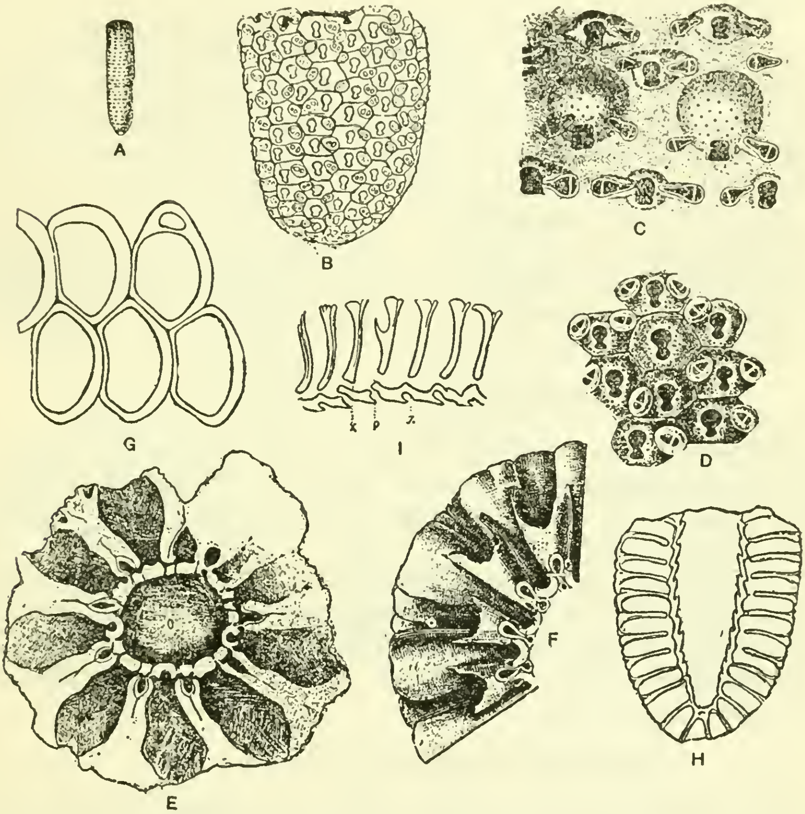

Fig. 205.—Genus *Kionidella* Koschinsky, 1885

A–I. *Kionidella* (*Fedora*) *excelsa* Koschinsky, 1885. A. Zoarium, ×2. B. Zoarium, magnified. C. Ovicelled zooecia, ×25. (A–C. After Waters, 1891.) D. Ordinary zooecia, ×22. E. Transversal section showing the zooecia and the basal septules; ×22. F. Transversal break showing that the zooecia arise on the internal walls of the zoarium. G. Tangential section, ×22, taken just below the surface. H. Longitudinal section through a zoarium, ×11. I. Enlargement of a longitudinal section, ×22, showing the basal septules (*p*), parietal septules (*x*), and the hydrostatic cavity (*z*). (B, D–I After Koschinsky, 1885.)

Genus PRATTIA D'Archiac, 1847

1847. *Prattia* D'Archiac, Memoires de la Société Geologique de France (2), vol. 3, p. 407.

The zoarium is long, tubular, hollow. The superior base is perforated by a median aperture surrounded by a thick peristome. Certain cells are transformed sporadically into large unguiculated oblique avicularia with pivot. The aperture is suborbicular, without cardelles. The ovicell is small, hyperstomial.

Genotype.—*Prattia glandulosa* D'Archiac, 1847. (See pl. 93, figs. I, J).

Range.—Eocene (Auversian).

Family ORBITULIPORIDAE Canu and Bassler, 1923

Diagnoses and illustrations of this family and its genera were given in our work of 1923. *Mamillopora* Smitt, 1872, and *Fedora* Jullien, 1882, included in this family at that time are now referred to the Mamilloporidae. With the elimination of these two genera the following definition is more exact.

Hexapogona in which the colony bears a central or terminal pit. The ovicell is hyperstomial and recumbent and always oriented towards the pit although the proximal border of the aperture is always turned towards the periphery.

Family CONESCHARELLINIDAE Levinsen, 1909

The zooecia are prismatic, hexagonal and surmounted by two hexagonal, attenuated or potential pyramids. The aperture has a distal sinus and is accompanied by a proximal pore. The colonies are free and floating.

The known genera of this family are *Flabellopora* D'Orbigny, 1852, *Conescharellina* D'Orbigny, 1852, *Trochosodon* Canu and Bassler, 1927, and *Zeuglopora* Maplestone, 1909. The recent studies of Livingstone, 1926, shows that *Bipora* Whitelegge, 1887, is a synonym of *Flabellopora* D'Orbigny, 1852.

Genus CONESCHARELLINA D'Orbigny, 1852

The zoarium is conical. The zooecia are hexagonal and superposed. The aperture is placed on the distal wall; its sinus is distal toward the growing periphery of the colony. The avicularia are small and placed in the interzooecial angles.

Genotype.—*Conescharellina augustata* D'Orbigny, 1852.

Range.—Upper Eocene—Recent.

Structure.—The structure of the zooecia is identical with that of *Flabellopora.* They are also superposed, however their length increases without ceasing and their walls are slightly curvilinear and very thick. They are supported on a group of internal axial zooecia deprived of polypides and of which the number is often very large.

The ovicells have been observed in *Conescharellina philippinensis* Busk, 1854, and figured by Maplestone, 1910, and in *C. crassa* Tenison-Wood, 1879, figured by Livingstone in 1924. These two species with *C. ampulla* Maplestone, "would be conveniently associated in a new genus" (Livingstone, 1924). All the other species are absolutely deprived of them. Under the name of semilunar slits

(=luneocia Levinsen, 1909) the authors have noted the presence of small special openings perforating the colony; they are always very rare and the greater part of the colonies are deprived of them. They have been observed only in the following species; *C. philippinensis* Busk, 1854 (Maplestone 1910, Waters 1921), *C. angulopora* T. Woods, 1880 (Whitelegge, 1887, Waters 1921, Levinsen 1909), *Bipora elegans* Whitelegge, 1887 and *Trochosodon decussis*, new species. The great rarety of these zooeciules indicate that they

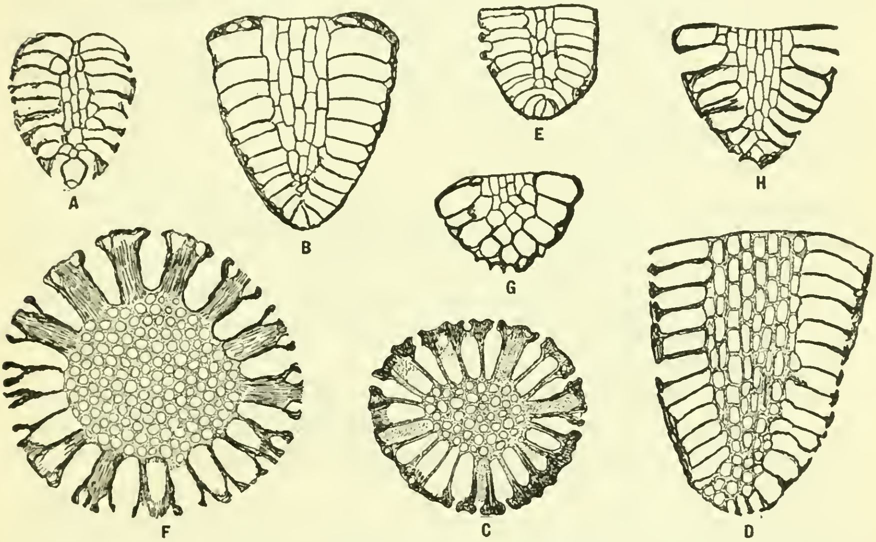

FIG. 206.—Thin sections of *Conescharellina*, all $\times 10$

A. *C. jucunda*, new species. Meridian section. B. *C. milleporacea*, new species. Meridian section. C, D. *C. catella*, new species. Transverse and median section. E. *C. delicatula*, new species. Meridian section. F. *C. elongata*, new species. Transverse section in the vicinity of the base. The shaded cells are cut tangentially with their walls. G, H. *C. breviconica*, new species. G. Meridian section through a small colony in which the base is little cancellated. H. Similar section through a large colony with much cancellated base.

are only morphological accidents and their study is absolutely secondary.

We have observed much more frequently and on almost all the species, "special zooecia" characterized by the presence of a very large orbicular aperture. These are perhaps gonoecia but we have no proof in confirmation of this idea. They are not incomplete zooecia for they are arranged among the others. (Pl. 68, fig. 4.)

The zoarial architecture is not so beautiful nor so varied as that in *Flabellopora*, in which the diversity of forms is remarkable; large or small, broad or elongated, it is always a cone.

The exterior ornamentation is certainly a special adaptation of a function determined by the aquatic medium and which is difficult to understand without exact knowledge of the physical characters of the medium. Why are the costules more or less salient? Why are the zooecia sometimes in radial series, and sometimes in quincunx? These are some of the questions for study.

Biology.—Species of *Conescharellina* live with the apex downward and the base upward (Maplestone, 1910). They are attached by extended fine filaments, half an inch long, attached in some cases to tubes of annelids and fragments of shell and issued from pores of the apex. (Whitelegge, 1887, Maplestone, 1910). These radicells must be of an extreme fragility for we have never observed them even on our colonies that have preserved their ectocyst and their chitinous appendages. Perhaps they are perishable and disappear after a certain development of the cone.

It is hard to understand how a conical colony can maintain its equilibrium even in the water, in a position absolutely inverse to the ordinary laws of statics. One hypothesis is possible to explain this apparent anomaly, namely that of rotation. The small colonies turn without ceasing around their axis and develop their costules in inverse proportion to the facilities which they find to operate this gyratory motion.

The fixed bryozoa develop their avicularia on their concave portions. *Conescharellina* does the opposite; the avicularia are small and at the bottom of the intercostular furrows for the rotation renders their function absolutely useless.

The growth in height of the colony is not indefinite; each species appears to have a special maximum height. When this is reached the true base forms with its pores and its small avicularia. During all the time of growth the base presents a porous center surrounded by the radiating zooecia of the last formed ring. The life of these small beings must be precarious and short, for in each species, there is always a large number of colonies that show an incomplete base and do not attain their complete development. Indeed very little is necessary to compromise the stability of this small hydraulic system. It is at the mercy of a false maneuver of the tentacles or of the avicularia, of an error of architecture of a thread of aberrant water, of a fish that passes or of an obstacle to the rotation. There is no life more strange than that of *Flabellopora* or *Conescharellina.* They escape the immovable substratum but at the price of a perpetual movement. One dances, the other turns, but in order to flee from the dangerous bottom, in order to escape the immobility, in order to attain the necessary prey, they construct these complicated boats which human science can imitate but never perfect.

CONESCHARELLINA RADIATA, new species

Plate 67, figs. 1–3

Description.—The zoarium is conical, little elevated, more often wider than high; the apex is very obtuse. The zooecia are arranged in very salient fascicles, 12 to 16 in number, and on which the peristomes are always adjacent. The aperture is elongated, oval, with a small distal sinus; the peristome is thin and salient. At the bottom of the furrows separating the fascicles there is a row of small scattered poriform avicularia. The base is crenulated, quite convex, finely granulated, and decorated with large and small scattered pores.

Measurements.—Aperture $\begin{cases} ha = 0.07 \text{ mm.} \\ la = 0.05 \text{ mm.} \end{cases}$

Biology.—Our specimens are rare; they were dredged from rather great depths.

Occurrence.—

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S. Co.

D. 5670. Chenoki Point, Macassar Strait; 1° 19′ 00″ S.; 118° 43′ 00″ E.; 1,181 fathoms; gy. M.; 2.8° C.

Cotypes.—Cat. No. 8275, U.S.N.M.

CONESCHARELLINA JUCUNDA, new species

Plate 67, figs. 12–14

Description.—The zoarium is conical, small, almost as wide as high; the apex is sharp or rounded. The zooecia form wide radial costules separated by deep and narrow furrows. The aperture is somewhat elongated with a distal sinus rounded and narrow; the proximal pore is distinct and a little removed from the aperture. Between the apertures of the same costule there are two small avicularia symmetrically placed. The interzooecial avicularia are small, close together, poriform and arranged almost in linear series at the bottom of each furrow. The base is very little convex; it bears, some widely scattered avicularia. It is entire or denticulated according to the thickness of the costules.

Measurements.—

Aperture $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.11 \text{ mm.} \end{cases}$ Zoarium $\begin{cases} h = 1.5 \text{ mm.} \\ l = 1.5 \text{ mm.} \end{cases}$

Affinities.—The base is not always as we figure it; most of the specimens die before their complete development; their base presents wide costules formed by the last zooecia radiating around a porous center.

This *charming* species differs from *Conescharellina delicatula* in its salient radial costules and its large apertures. It differs from *Conescharellina milleporacea* in its more separated apertures, in its wider costules and in its smaller zoarium.

Occurrence.—

D. 5134. Balukbaluk Island, Sulu Archipelago; 6° 44′ 45″ N.; 121° 48′ E.; 25 fathoms; fine S.

D. 5135. Jolo Light, Jolo; 6° 11′ 50″ N.; 121° 08′ 20″ E.; 161 fathoms; fine Co. S.; 11.3° C.

Cotypes.—Cat. No. 8276, U.S.N.M.

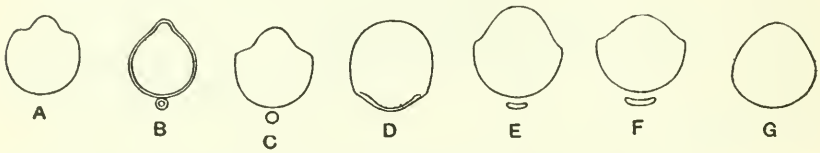

Fig. 207.—Genus *Conescharellina* D'Orbigny, 1852

A. *C. jucunda,* new species. Aperture. B. *C. milleporacea,* new species. Aperture. C. *C. concava,* new species. Aperture. D-F. *C. elongata,* new species. D. Operculum, ×85. E, F. Orbicular and transverse apertures. G. *C. breviconica,* new species. Operculum, ×85.

CONESCHARELLINA MILLEPORACEA, new species

Plate 67, figs. 4–11

Description.—The zoarium is conical, always higher than wide with a *very porous* general appearance. The apex is sharp pointed. The zooecia from salient radial costules on which the apertures are very close together and surrounded, each by four avicularia; in the intercostular furrows there is a row of avicularia very close together and somewhat alternated. The aperture is elongated, elliptical, with a small distal rounded sinus. The proximal pore is transformed into an avicularium with pivot. The base is entire or a little crenulated; it bears a large number of pores and elliptical avicularia with pivot.

Measurements.—

Aperture $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.09\text{–}0.11 \text{ mm.} \end{cases}$ Zoarium $\begin{cases} h = 3.00 \text{ mm.} \\ d = 2.00 \text{ mm.} \end{cases}$

Variations.—As with all the abundant species this *Conescharellina* is very variable. When the zoarium dies before its entire development, the base exhibits some large ribs surrounding a large cancellated area. There are small colonies ($h = 2$mm.) which are nevertheless complete. On the latter the number of oral avicularia is much more variable than on the large specimens. All the pores of the base appear to be avicularia; but we are not positively certain, never having found a specimen intact. After death these small zoaria are rolled around easily and become altered rapidly.

In meridian section there are 5 longitudinal rows of internal cells arranged in quincunx. We have observed some special cells with their large orbicular aperture.

Affinities.—This species differs from *Conescharellina jucunda* which also bears avicularia on the costules in its larger colonies, its much closer and more numerous apertures and in its very porous base.

Biology.—This species is rather common in the Philippines where its geographic distribution is large; nevertheless it does not leave the interior of the Archipelago and we have not observed it in the China Sea or in the Pacific. It is limited to tranquil waters of little depths; moreover the avicularia are very numerous. The two specimens dredged at Mount Dromedario at 437 meters of depth, are very vigorous, much calcified and belong to a special variety adapted to a greater depth.

This species is indifferent to the nature of the bottom, although we have noted that it shuns the rocky bottoms and that sand is necessary to its biologic evolution for sand occurs in all the localities observed

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh. (common).

D. 5192. Jilantaguan Island, off northern Cebu Island; 11° 09′ 15″ N.; 123° 50′ E.; 32 fathoms; green sand.

D. 5213. Destacado Island, east of Masbate Island; 12° 15′ N.; 123° 57′ 30″ E.; 80 fathoms; S. M. Sh. (common).

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S. (variety.).

Cotypes.—Cat. Nos. 8277–8279, U.S.N.M.

CONESCHARELLINA CATELLA, new species

Plate 68, figs. 8–10

Description.—The zoarium is conical, much higher than wide; the apex is sharp. The radial costules are salient, rounded; they bear laterally the apertures very close together and have the general aspect of small *chains*. The apertures are oval, elongated, with a small distal sinus; the proximal pore is rather large, adjacent to the aperture, often transformed into a small avicularium. The avicularia placed at the bottom of the intercostular furrows are small, elliptical, with pivot, close together, somewhat alternate. The base is entire, a little undulated on the periphery; it bears a large number of pores; it is somewhat convex or slightly costulated.

Measurements.—

Aperture $\begin{cases} ha = 0.14 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zoarium $\begin{cases} h = 3.00 \text{ mm.} \\ d = 2.5 \text{ mm.} \end{cases}$

Affinities.—The pores of the base are very variable; they are very inequal and somewhat oriented although sometimes they are equal and arranged in quincunx. We have observed special zooecia characterized by a very large circular aperture. We are ignorant of its function.

This new species differs from *Conescharellina milleporacea* in the absence of avicularia on the radial costules, in a large aperture and in its larger colonies.

The longitudinal section shows 8–9 longitudinal rows of inner zooecia and with thick walls in which the avicularia are lodged. Around the apex there are avicularia only.

The wall of the inner zooecia is very thick and this character is quite visible on the transverse section.

Biology.—Specimens from the Sulu Sea have an aspect somewhat different from those of the Sea of Japan, but it is impossible to discover different specific characters. The aspect of the exterior calcification is evidently in close connection with the habitat.

This is one of the rare species which passes beyond the Tropics and penetrates into the temperate zone. It appears to accommodate itself to the most variable depths.

Occurrence.—

D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk, Sh., crs.; 11.6° C.

D. 5213. Destacado Island, east of Masbate Island; 12° 15′ N.; 123° 57′ 30″ E.; 80 fathoms; S. M., Sh.

Cotypes.—Cat. Nos. 8280, 8281, U.S.N.M.

CONESCHARELLINA TRANSVERSA, new species

Plate 68, figs. 11–13

Description.—The zoarium is conical, little elevated, *transverse;* the apex is very obtuse. The zooecia are arranged along the side of 12–16 salient smooth costules and bearing poriform avicularia. The aperture is elongated, oval, with a small distal sinus. At the bottom of the furrows, there are large elliptical, separated avicularia. The base is crenulated at the circumference, a little convex, ornamented with large pores arranged vaguely in radial lines.

Measurements.—Aperture $\begin{cases} ha = 0.17 \text{ mm.} \\ la = 0.11 \text{ mm.} \end{cases}$

Affinities.—The apertures are arranged laterally on the radial crest as in *Conescharallina catella* but the present species differs in its transverse (and not elongated) zoarium in its larger and less numerous apertures, and in the scattered pores of the base.

Occurrence.—D. 5670. Chenoki Point, Macassar Strait; 1° 19′ 00″ S.; 118° 43′ 00″ E.; 1,181 fathoms; gy. M.; 2.8° C.

Cotypes.—Cat. No. 8282, U.S.N.M.

CONESCHARELLINA DELICATULA, new species

Plate 65, figs. 5–8

Description.—The zoarium is conical, small, somewhat higher than wide; the apex is sharp. The zooecia are arranged in radial rows and form wide costules very little salient. The aperture is located at the bottom of a small elliptical area; it is suborbicular with a small, distal, rounded sinus. The avicularia are small, elliptical, with pivot, widely scattered, alternate. The base is a little convex, entire; it bears irregular perforations and avicularia with pivot widely spaced.

Measurements.—

Aperture $\begin{cases} ha = 0.07 \text{ mm.} \\ la = 0.07 \text{ mm.} \end{cases}$ Zoarium $\begin{cases} h = 2.00 \text{ mm.} \\ d = 1.50 \text{ mm.} \end{cases}$

Affinities.—The meridianal section shows 4 longitudinal rows of small internal zooecia; the exterior cells with polypides are relatively very long.

This delicate little species differs from *Conescharellina jucunda* in the presence of scarcely visible radial costules, in scattered alternating interzooecial avicularia and in its more or less elongated zoarium.

Occurrence.—

D. 5134. Balukbaluk Island, Sulu Archipelago; 60° 44′ 45″ N.; 121° 48′ E.; 25 fathoms; fine S.

D. 5135. Jolo Light, Jolo; 6° 11′ 50″ N.; 121° 08′ 20″ E.; 161 fathoms; fine co. S.; 11.5° C. (common).

Cotypes.—Cat. No. 8283, U.S.N.M.

CONESCHARELLINA PARVIPOROSA, new species

Plate 66, figs. 5–7

Description.—The zoarium is conical, more elevated than wide; the apex is pointed. The zooecia are arranged in radial rows. The aperture is *small*, orbicular or somewhat elliptical; the peristome is a little salient; the proximal pore is adjacent to a peristome. The avicularia are small, orbicular, with pivot, scattered, alternating in each radial row. The external walls are very finely granulose. The base is oval or orbicular, entire, convex, ornamented with small poriform avicularia widely spaced and with pivot.

Measurements.—

Aperture $\begin{cases} ha = 0.07\text{–}0.10 \text{ mm.} \\ la = 0.07\text{–}0.10 \text{ mm.} \end{cases}$ Zoarium $\begin{cases} h = 4.00 \text{ mm.} \\ d = 3.00 \text{ mm.} \end{cases}$

Affinities.—This species is very well characterized by the presence of its small avicularia and small apertures. It is rare and peculiar to the Sea of Japan.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Holotype.—Cat. No. 8284, U.S.N.M.

CONESCHARELLINA CONCAVA, new species

Plate 66, figs. 8, 9

Description.—The zoarium is large, conical, transverse; the apex is obtuse. The zooecia are arranged in radial rows, with apertures very close together. The aperture is suborbicular with a wide distal semielliptical sinus; the proximal pore is rather large and distant. The radial rows are separated by shallow furrows containing a row of small poriform avicularia very close together. The base is *concave;* it is perforated by large scattered pores between which there are numerous small, elliptical avicularia with pivot.

Measurements.—

Aperture $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zoarium $\begin{cases} h = 3.50 \text{ mm.} \\ l = 5.50 \text{ mm.} \end{cases}$

Affinities.—In the relative arrangement of the apertures and the avicularia, this species is very close to *Conescharellina catella* but differs from it in its concave base, in its transverse and much larger zoarium, and in the absence of radial costules. The figured specimen only has been found.

Occurrence.—D. 5311. China Sea, cicinity of Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

Holotype.—Cat. No. 8285, U.S.N.M.

CONESCHARELLINA LUNATA, new species

Plate 68, figs. 4, 5

Description.—The zoarium is conical, in form of a bell, as high as broad. The zooecia are arranged in very regular radial rows separated by rows of small interzooecial orbicular, alternating avicularia with pivot; they form a *crescent* around each aperture. The aperture is large, suborbicular, a little elongated; the proximal pore is large, placed on a small salient convexity. The base is concave with very convex zooecia; the center is ornamented with large and small polygonal pores irregularly arranged.

Measurements.—

Aperture $\begin{cases} ha = 0.16 \text{ mm.} \\ la = 0.15 \text{ mm.} \end{cases}$ Zoarium $\begin{cases} h = 4.00 \text{ mm.} \\ d = 4.00 \text{ mm.} \end{cases}$

Affinities.—This superb species is very well characterized by the crescent-shaped cushion around each aperture. There are two very small pores above each aperture (distally); moreover similar small pores are arranged between each avicularium and the neighboring apertures.

The figured specimen is the only one found but it is a magnificent example.

Occurrence.—D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

Holotype.—Cat. No. 8286, U.S.N.M.

CONESCHARELLINA GRANDIPOROSA, new species

Plate 68, figs. 6, 7

Description.—The zoarium is conical; the height is 4 mm. The apex is very obtuse. The zooecia are arranged in very regular radial rows separated by rows of alternate, orbicular avicularia. The aperture is *large*, elongated, with a wide, distal, ogival sinus. The base is concave, bordered by zooecia and garnished by small irregular pores.

Measurements.—Aperture $\begin{cases} ha = 0.16\text{–}0.18 \text{ mm.} \\ la = 0.14\text{–}0.16 \text{ mm.} \end{cases}$

Affinities.—This species is very well characterized by the special form of its aperture. The figured specimen is the only one that has been found but it is a very beautiful example.

Occurrence.—D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

Holotype.—Cat. No. 8287, U.S.N.M.

CONESCHARELLINA ELONGATA, new species

Plate 69, figs. 1–9

Description.—The zoarium is conical, *very long*, much longer than wide. The zooecia are arranged in quincunx, in radial or in oblique rows; the interzooecial avicularia are large, elongated, oval, with pivot. The aperture is orbicular or transverse with a very wide distal sinus. The peristome is thin and very little salient; the proximal pore is large, round, or arched into a transverse cleft; the base is entire, orbicular, with a large cancellated center; the pores are polygonal and sometimes some of them are closed by a perforated calcareous pellicle.

Measurements.—

Aperture (orbicular) $\begin{cases} ha = 0.12\text{–}0.14 \text{ mm.} \\ la = 0.12\text{–}0.14 \text{ mm.} \end{cases}$ Aperture (transverse) $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.14 \text{ mm.} \end{cases}$

Variations.—This species is very variable. The length of the zoarium varies from 3 to 10 millimeters and its diameter from 2 to

4 millimeters. The dimensions of the aperture are equally variable according to their position on the colony; the dimensions indicated are those of the largest zooecia. We have observed some special zooecia with very large orifice. The small superficial ornament disappears with the least wear and each aperture appears to be accompanied by 6 large irregular pores. The operculum is very thin, with a very wide triangular rimule. The meridianal section shows a large number of inner rectangular zooecia arranged in a dozen longitudinal rows. The transverse section is very regular and shows the interior polygonal zooecia.

Affinities.—In the aspect of the base, in the form of the avicularia and in the arrangement in quincunx of the apertures, this species resembles *Conescharellina angulopora* T. Woods, 1880 but differs in its transverse and not elongated aperture and in the presence of a very large rimule to the operculum.

Biology.—This is a species special to slight depths for we have found only a single specimen at Tinagta (230 fathoms). All the localities observed are more or less sandy.

Finally it has been observed only in the Sulu Archipelago and its geographic distribution is very small.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S. Sh.

D. 5162. Tinagta Island; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk, Sh. crs.; 11.6° C.

Cotypes.—Cat. Nos. 8288–8291, U.S.N.M.

CONESCHARELLINA OBLIQUA, new species

Plate 68, figs. 1–3

Description.—The zoarium is conical, small, somewhat higher than broad; the apex is obtuse. The zooecia are arranged in *oblique* rows and in quincunx. The aperture is suborbicular with a large distal semicircular sinus; the peristome is very little visible; the proximal pore is distant from the aperture. The avicularia are elliptical, with pivot and arranged alternately between the oblique rows of the aperture. The base is entire or a little crenulated at the periphery; the cellules form here wide convex, costules radially arranged around a small central pore.

Measurements.—Aperture $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.09 \text{ mm.} \end{cases}$

Affinities.—This species resembles *Conescharellina delicatula* in the form of the aperture but differs from it in the oblique arrangement of the apertural rows which do not converge toward the apex, and in the non convex base with pores only at the center.

Occurrence.—D. 5134. Balukbaluk Island, Sulu Archipelago; 6° 44′ 45″ N.; 121° 48′ E.; 25 fathoms; fine S.

Cotypes.—Cat. No. 8292, U.S.N.M.

CONESCHARELLINA BREVICONICA, new species

Plate 69, figs. 10–17

Description.—The zoarium is a small cone, very *short*, with a sharp pointed apex; it is always wider than high. The zooecia are large, little numerous, arranged in quincunx; the interzooecial avicularia are large, elliptical, with very fragile pivot. The aperture is large, orbicular or elliptical, with a very wide, little distinct sinus; the proximal pore is large and distinct. The base is flat and exhibits zooecial ribs arranged around a more or less large cancellated center.

Measurements.—

Aperture $\begin{cases} ha = 0.20 \text{ mm.} \\ la = 0.15 \text{ mm.} \end{cases}$ Zoarium $\begin{cases} h = 1.25\text{–}1.50 \text{ mm.} \\ l = 2.00 \text{ mm.} \end{cases}$

Variations.—This species is very variable, the base especially presenting various aspects according to the development of the central cancellated portion. The orifices are hexagonal and many of them are closed by a perforated pellicle. Around the base the zooecia are much larger and often incomplete.

In meridian section the internal zooecia are small, rectangular, quite variable in number. As in all the other species, these have no communication among themselves nor with the pores of the base. The walls of the other zooecia are very thick.

The operculum is very thin, oval and the distal rimule is visible and marked only by a gradual narrowing of the width.

Affinities.—This species differs from the other species with zooecia in quincunx, *Conescharellina elongata* and *C. obliqua*, in its large oral dimensions and in its large cancellated basal center; its very spinous apex is also characteristic.

Biology.—This species has furnished most of the specimens of the genus. Its habitat is in the interior of the oriental portion of the Archipelago between the tenth and fourteenth parallels. It prefers the narrow passes between the islands and the more or less sandy bottoms. It lives at depths of 145 to 214 meters, but we have a single dead specimen dredged at 858 meters.

Occurrence.—

D. 5192. Jilantaguan Island, off northern Cebu Island; 11° 09′ 15″ N.; 123° 50′ E.; 32 fathoms; green sand.

D. 5212. Panalangan Point, east of Masbate Island; 12° 04′ 15″ N.; 124° 04′ 36″ E.; 108 fathoms; gy. S., M.

D. 5213. Destacado Island, east of Masbate Island; 12° 15′ N.; 123° 57′ 30″ E.; 80 fathoms; S. M. Sh. (common).

D. 5219. Mompog Island, Marinduque; 13° 21′ N.; 122° 18′ 45″ E.; 530 fathoms; gn. M.; 10.4° C.

D. 5230. Limasaua Island; 10° 01′ 50″ N.; 124° 42′ 30″ E.; 118 fathoms; gy. S.; 14.3° C. (very common).

Cotypes.—Cat. Nos. 8293, 8294, U.S.N.M.

TABLE FOR THE DETERMINATION OF CONESCHARELLINA

1.	Zoarium with salient radial costules	2
	Zooecia arranged in radial rows	6
	Zooecia arranged in quincunx	10
2.	Apertures in the middle of the costule	3
	Apertures on the side of the costule	5
3.	Costules very salient	**radiata.**
	Costules little salient	4
4.	Base little porous	**jucunda.**
	Base very porous	**milleporacea.**
5.	Base very porous	**catella.**
	Base little porous	**transversa.**
6.	Base convex	7
	Base concave	8
7.	Zoarium small, scarcely higher than wide with a diameter less than 2 mm	**delicatula.**
	Zoarium high, higher than wide, with basal diameter more than 2 mm; small aperture	**parvipora.**
8.	Interzooecial avicularia very close together and almost in straight lines	**concava.**
	Interzooecial avicularia, alternate and scattered	9
9.	Pad around the aperture, large proximal pore	**lunata.**
	Zooecia smooth, very small proximal pore, aperture elongated	**grandiporosa.**
10.	Zoarium large, more than 3 mm. high	**elongata.**
	Zoarium small, less than 3 mm. high	11
11.	Zoarium somewhat higher than wide; zooecia arranged in oblique rows	**obliqua.**
	Zoarium transverse, zooecia little numerous	**breviconica.**

The other known species of the genus are as follows:

Conescharellina angustata D'Orbigny, 1852	Basilan.
Conescharellina dilatata D'Orbigny, 1852	Malacca.
Conescharellina philippinensis Busk, 1854	Australia.
Conescharellina angulopora T. Woods, 1880	Australia.
Conescharellina cancellata Busk, 1854	Australia.
Conescharellina conica Haswell, 1880 (=*C. angulopora*)	Australia.
Conescharellina eocena Neviani, 1900	Eocene of Italy.
Conescharellina crassa T. Woods (after Maplestone, 1910)	Australia.
Conescharellina depressa Haswell (after Maplestone, 1910)	Australia.

Conescharellina incisa Hincks, 1881 (=*C. angulopora*) --------- Australia.
Conescharellina eburnea Maplestone, 1909 -------------------- Australia.
Conescharellina biarmata Maplestone, 1910 (=*C. angulopora*) -- Tasmania.
Conescharellina multiarmata Maplestone 1910 ---------------- Tasmania.
Conescharellina magniarmata Maplestone, 1910 (=*C. angulopora*) -- Tasmania.

We have therefore 10 species in the Australian region and 15 in the Philippines. The species most known, *Conescharellina philippinensis* does not occur in the Philippine Islands. The latter region is very rich in species for besides the described species there is still in the collections of the United States National Museum a number of specimens certainly belonging to very distinct species.

Genus TROCHOSODON Canu and Bassler, 1927

The zooecia are not entirely covered and are separated by pores; the base is crenulated by the last formed range of zooecia. Interzooecial pores are present.

Genotype.—*Trochosodon linearis* Canu and Bassler, 1927. Recent.

This new genus differs from *Conescharellina* in the absence of avicularia, in convex instead of perfectly conical zoaria and in the zooecia which present a visible portion.

We do not yet understand the biology of these small organisms of which we possess only a small number of specimens. These are animals of great depths.

Bipora ampulla Maplestone 1910, from Tasmania is the only other known species of the genus.

TROCHOSODON LINEARIS Canu and Bassler, 1927

Plate 70, figs. 11–13

1927. *Trochosodon linearis* Canu and Bassler, Classification Cheilostomatous Bryozoa, Proc. U. S. Nat. Mus., vol. 69, art. 14, p. 11, pl. 1, fig. 12.

Description.—The zoarium is orbicular, very convex, subconical. The zooecia are arranged in radial, linear series, each series containing only 2 or 3 zooecia; the interzooecial pores are far apart. The aperture is hidden at the bottom of a peristome and bears a little visible distal sinus; the peristome is oval. The base is convex, finely granulated and ornamented with small, irregularly disseminated pores; it is bordered by 12 salient zooecia.

Measurements.—Zoarial diameter, 2.5 mm.

Affinities.—This species differs from *Trochosodon quincuncialis* in the linear arrangement of the zooecial series and in the regular base without zooecial convexities. Sometimes the aperture is aborted and is replaced by a pore.

Occurrence.—D. 5586. Sipadan Islands, Sibuko Bay, Borneo; 4° 06′ 50″ N.; 118° 47′ 20″ E.; 347 fathoms; gy. M.; 6.8° C.

Holotype.—Cat. No. 8295, U.S.N.M.

TROCHOSODON QUINCUNCIALIS, new species

Plate 70, figs. 7–10

Description.—The zoarium is orbicular, very convex, subconical. The zooecia are arranged in *quincunx* and form three circular rows; the interzooecial pores are separated. The aperture is buried at the bottom of the peristomie; it is orbicular with a wide, little apparent, distal sinus; the peristome is thin and salient. The base is little convex, with irregular convexities; it is decorated with pores arranged in quincunx and very finely granular; it is bordered with 10–16 salient zooecia.

Measurements.—Zoarial diameter, 2.5 mm.

Affinities.—This species differs from *Trochosodon linearis* in the arrangement in quincunx of its apertures and in the presence of large convexities on its base. The general surface is finely granulated and of an elegant aspect.

Occurrence.—D. 5586. Sipadan Island, Sibuko Bay, Borneo; 4° 06′ 50″ N.; 118° 47′ 20″ E.; 347 fathoms; gy. M.; 6.8° C.

Cotypes.—Cat. No. 8296, U.S.N.M.

TROCHOSODON PORCELLANUM, new species

Plate 70, figs. 4–6

Description.—The zoarium is a small, denticulated, very convex disk. The zooecia are indistinct, arranged in quincunx, and oriented towards the circumference. The aperture is oval with a small distal sinus; the peristome is incomplete, developed only in the proximal portion; it supports a very small proximal pore. The base bears 8 convexities corresponding to the peripheral zooecia. The zoarial surface is finely granulated, brilliant like porcelain with some disseminated pores.

Measurements.—

Aperture $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$ Zoarium, $D = 2.00$ mm.

Affinities.—This species differs from *Trochosodon quincuncialis* in its more scattered and less numerous apertures and in its more separated and fewer decorative granules.

Occurrence.—D. 5237. Sanco Point, east of Mindanao; 8° 09′ 06″ N.; 126° 31′ 45″ E.; 249 fathoms; 8° C.

Cotypes.—Cat. No. 8297, U.S.N.M.

TROCHOSODON PARVULUM, new species

Plate 70, figs. 1–3

Description.—The zoarium is orbicular, *very small*, convex. The zooecia are arranged in radial series, two to each series; they bear some sporadic pores. The aperture is oblique, suborbicular, with a little apparent, distal sinus. The peristome is incomplete and developed only in the proximal portion. The base is denticulated by the presence of eight exterior zooecia; it is very finely granulated.

Measurements.—

Aperture $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Zoarium, $D = 1.5$ mm.

Affinities.—This species is very close to *Trochosodon linearis* but differs from it in its very small zoarium, the small number of lateral teeth, and in the nonconvex base. Should we find these two species in the same locality we would probably identify them as unequally developed colonies, but the habitats are too different to justify this hypothesis.

Occurrence.—D. 5237. Sanco Point, east of Mindanao; 8° 9′ 6″ N.; 126° 31′ 45″ E.; 249 fathoms; gn. M; 8° C.

Cotypes.—Cat. No. 8298, U.S.N.M.

TROCHOSODON DECUSSIS, new species

Plate 71, figs. 7–10

Description.—The zoarium is in the form of a *cross* with bifurcated branches. Each branch bears three longitudinal rows of zooecia, some pores, and semilunar slits. The aperture is elliptical, transverse, with a very wide rimule. The base is convex, very finely granulose; it bears very scattered pores laterally.

Measurements.—

Aperture $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.16 \text{ mm.} \end{cases}$ Zoarium, $D = 3.00$ mm.

Affinities.—This species is very remarkable because of the form of its rays. It would be difficult to classify it from incomplete specimens. The presence of a distal sinus to the aperture and of semilunar slits indicate clearly that it belongs to the Conescharellinidae. The small pores of the surface are often replaced by small avicularia with pivot.

Occurrence.—D. 5237. Sanco Point, east of Mindanao; 8° 09′ 06″ N.; 126° 31′ 45″ E.; 249 fathoms; gn. m.; 8° C.

Cotypes.—Cat. No. 8299, U.S.N.M.

Genus FLABELLOPORA D'Orbigny, 1852

The zoarium is bilamellar, flabelliform and grows at the periphery. The zooecia are prismatic, hexagonal, with frontal gemmation, accumulated geometrically in linear rows issuing from the initial base; the part visible externally is the ensemble of the parietal faces. The aperture is eccentric, suborbicular, ornamented with a small proximal pore and with a distal sinus directed toward the growing margin of the zoarium. The avicularia are arranged in one or two rows between the rows of apertures.

Genotype.—Flabellopora elegans D'Orbigny, 1852. Recent.

Structure.—The zooecia are short, hexagonal prisms surmounted by two hexagonal pyramids one of which (exterior) is more or less potential. The transverse section shows therefore regular hexagons; the longitudinal section shows elongated hexagons and the meridian section exhibits hexagons enlarging toward the zoarial periphery. The zooecial walls are very thick and in common with each other; the zooecia are therefore not detachable since they have no individual walls. Moreover there is no basal lamella for the same reason and the two juxtaposed zoarial lamellae are perfectly and inseparably united.

The zooecia are superposed and not juxtaposed as in the other Cheilostomata. This arrangement obliterates the apertures, so the latter instead of being arranged on the frontal are located on the distal wall. Moreover the anatomical arrangements being constant in all the cheilostomes, the aperture is by force eccentric and the sinus, the orifice of the compensatrix, is distal. Figure (B) shows the section through an ordinary cheilostome zooecium while figure (C) is a section through a zooecium of *Flabellopora.* It is easy to see that the special arrangement of the aperture is the consequence of the superposition of the zooecia and of a different mode of gemmation. In these two drawings, in order to be better understood, we have projected on the plane of the figure the aperture which is normally placed on the perpendicular plane.

The visible part of each zooecium is its distal wall, that portion which is usually hidden in the other Cheilostomata. Although this wall bears the aperture, it bears also avicularia, the adventitious organs of oxygenation absolutely indispensable to zooecial life.[15] They are very numerous and arranged geometrically between oblique rows of apertures (fig. D). By rubbing away the surface in order to examine the interior the very special arrangement of the apertural orifice can be easily verified; it is always eccentric and the sinus is immediately adjacent to the frontal wall. In this section that which is visible at the bottom is the distal wall and the vertical walls are the frontal and dorsal walls. This is an arrangement absolutely opposite to that observed in other Cheilostomata (fig. B). However, if the anatomical arrangements are quite identical, there is necessarily a slight displacement in the disposition and the basal insertions of the opercular muscles.

A particular character in *Flabellopora* and *Conescharellina* is the presence of a proximal pore. It is very small, little deep, oblique, opening in the peristomie, excavated in a single parietal thickness. Very often it is united to the aperture from which it is scarcely separated. The latter then assumes a deceptive schizoporid form,

[15] They are lodged precisely in the free intervals arising from the narrowing of the theoretical pyramid which surmounts externally the hexagonal zooecial pyramid.

but a little attention allows the recognition of this feature. Moreover the proximal pore is so shallow that it disappears with the least abrasion and many of the zooecia appear deprived of it. We have not observed ovicells nor have we discovered the arrangement of the zooecia around the ancestrula and we are ignorant of the mode of formation of the two adjacent zoarial lamellae. For this a large number of sections is necessary and our specimens are too few. The ancestrula is always placed at the base of the colony on the median

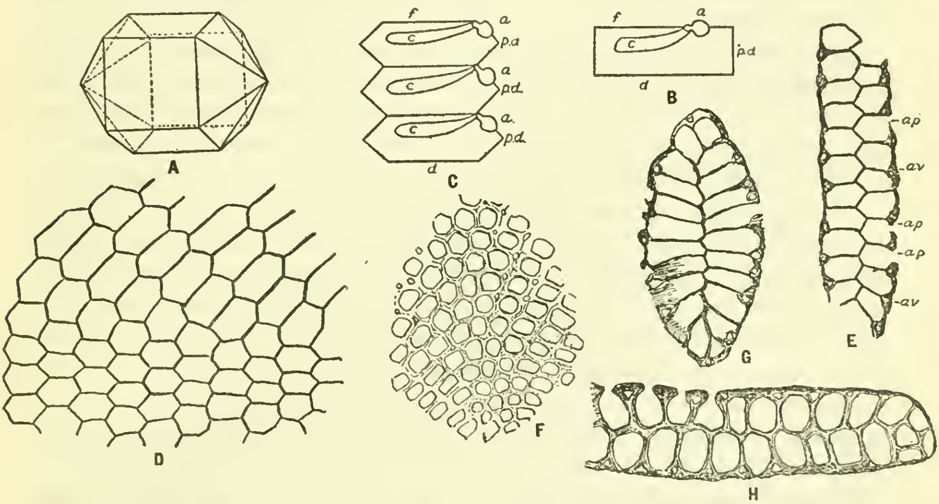

FIG. 208.—Structure of *Flabellopora* D'Orbigny, 1852

A. Theoretic form of a zooecium of *Flabellopora* and *Conescharellina*. B. Section through a zooecium of a Cheilostome; *a*, aperture; *c*, compensatrix; *d*, dorsal; *p. d*, distal wall; *f*, frontal. C. Longitudinal section in three superposed zooecia of *Flabellopora* or *Conescharellina*. The anatomical arrangements are identical with those of other Cheilostomes, but the apertures open in the distal wall. D. Portion of a meridian section, ×45, showing the difference in orientation between the zooecia of the basal region and the others. E. *Flabellopora elegans*, new species. Longitudinal section, ×16. *ap*, aperture; *av*., avicularium. F. *F. acuta*, new species. Meridian section, ×16, showing the geometric arrangement of the cells. G. *F. aspera*, new species. Longitudinal section, ×16. H. *F. transversa*, new species. Transverse section ×16.

axis and at a slight distance from the inferior border. The first cells formed are exactly the most inferior ones. They serve as supports of the oblique heaps of superposed zooecia. They are arranged in V shape, which gives a great solidity to the entire structure developed upon the ancestrula. We have called this the *initial base*, the proximal part of the colony; it corresponds absolutely to the basal lamella of other Cheilostomata. It always constitutes the broader portion of the colony; its point is more or less obtuse.

We have designated the distal portion of the zoarium the *terminal border,* its form depends rigorously on the inferior angle of the initial V and is mathematically inverse to it. The wider the inferior angle the smaller the distal angle (*Flabellopora acuta*); the more the inferior angle approaches 90 degrees the larger is the distal angle (*Flabellopora transversa*). When the inferior angle is close to 180 degrees the colony becomes orbicular (*Flabellopora lenticularis*). The initial angle is not constant in the same species although the amount of the variations is so small that all the colonies of the same species have almost the same form.

The zooecia of the initial base are smaller, but their walls are very thick. The growth is peripheral but it is essential that the first zooecium formed be on the branch of the initial V and it is for this reason that one frequently finds incomplete zooecia on the edge of the terminal border and almost always at its distal extremity.

Biology.—The colonies of *Flabellopora* float freely; they are not attached at all and are not supported on any substratum. They are all experienced aquatic equilibrists. We are certain that all the bryozoa are masters of hydraulics and that certain forms like *Retepora* and *Frondipora* are marvellous architects but *Flabelloporas,* with the same qualities are preeminent geometricians. Their symmetry is perfect and their internal structure is the expression of a rigorous calculation without any visible error. Each colony is an absolute geometrical construction, an algebraic equation solved. This mathematical exactness does not exclude elegance of form (*F. elegans*), richness of ornamentation (*F. tuberosa*), variety of aspect (*F. variabilis*), multiplicity of details (*F. tubifera*), or strangeness of appearance (*F. asper*).

Such an architecture is possible only in calm, tranquil waters in sheltered and little frequented localities, where nothing can derange the small workers.

There are no sand grains, no calcareous particles in our sections in the vicinity of the ancestrula. The larva chooses then as a support a minute organic fragment. It envelops it in its development and destroys it after its transformation. Then begins in the mysterious obscurity of the oceanic depths the magnificent work of construction which will make of each colony a marvel of architecture, a masterpiece of hydraulics.

The *Flabelloporas* live free above the submarine bottom. They are not immobile for their general form is fashioned for vertical movements. As the ascending motion is more laborious and more difficult than the descending movement the terminal angle of the colony is smaller than the inferior angle of the initial base. But this colony does not elevate itself very high; it does not proceed at hazard like a fish. In effect the *Flabelloporas* are rare; they are not observed in all localities without distinction but they are domiciled on the contrary in places favorable to their life and activities.

Another movement is suggested to us by the symmetry of the colony and by the thinness of the edges, namely rotation around the axis. This rotation is partial; the animal presents its border (the cross section) to the current and can then oppose a certain resistance to it. Although very feeble, this resistance is sufficient to bring automatically diatoms to the entrance to the tentacles. This rotation varies then according to local conditions and can be only of slight amount. The vertical movement is the principal one; it permits the zoarium to reach its prey more easily and to escape famine. It is in order to accomplish this simple movement that the *Flabelloporas* construct their marvellous architectural system. They mount and descend without cessation.

They are ravishing small dancers which enliven the somber oceanic passages.

The previously described species of this genus are as follows:

Flabellopora (*Bipora*) *umbonata* Haswell........................ Australia.
Flabellopora (*Bipora*) *flabellaris* Levinsen, 1909.................. Australia.
Flabellopora elegans D'Orbigny, 1882........................ Malacca.
Flabellopora (*Bipora*) *mamillosa* Maplestone, 1909.................. Australia.

FLABELLOPORA ELEGANS D'Orbigny, 1852

Plate 71, figs. 1–6

1852. *Flabellopora elegans* D'Orbigny, Paleontologie francaise, Terrains cretaces, pp. 53, 482, pl. 661, figs. 1–5.

1905. *Flabellopora elegans* Waters, Notes on some recent Bryozoa in D'Orbigny's collection, Annals Magazine Natural History, ser. 7, vol. 15, p. 3, pl. 1, fig. 5.

Description.—The zoarium is free, elongated (2.5 mm. to 5 mm.); the basal angle is larger than the terminal angle; the general form is amygdaloid. The walls [16] of the axial zooecia are decorated with a lozenge-shaped or flabelliform area with salient walls. Each area contains the aperture, a distal elliptical, transverse avicularium with pivot and a small proximal poriform avicularium. The zooecia of the initial base and the lateral zooecia are deprived of this area. The aperture is somewhat oval; the distal sinus is wide and semicircular; the peristome is very thin and little salient; the proximal pore is surrounded by a small peristome adjacent to that of the aperture.

Measurements.—Aperture$\begin{cases} ha = 0.08 \text{ mm.} \\ la = 0.08 \text{ mm.} \end{cases}$

History.—The colony figured by D'Orbigny is a short and somewhat fantastic zoarium. We have had the fortune to discover a very similar one, but this short form passes imperceptibly into the

[16] We can not employ the usual word "frontal" in spite of appearances.

elongated amygdaloidal form which is the more frequent; the details of the surface are moreover identical on all the colonies.

The drawings of Waters, 1905, are perfectly exact and give the true form of the lozenge-shaped area, poorly figured by D'Orbigny. However the proximal sinus figured is only an alteration very common in all the genus and arising from the union of the aperture and of the proximal pore; in reality the real sinus in close connection with the compensatrix is indeed proximal.

Variations.—We have figured the basal angle with small pores, a terminal angle with incomplete zooecia and a superior lateral cross section showing also some zooecia in process of formation. On the longitudinal section the zooecia are hexagonal, elongated with one of the exterior sides occupied by the aperture. The interior con-

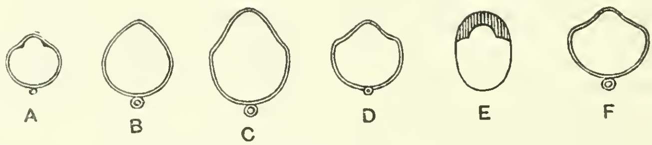

FIG. 209.—Apertures of *Flabellopora*

A. *F. elegans*, new species. B. *F. tuberosa*, new species. C. *F. irregularis*, new species. D., E. *F. tubifer*, new species. F. *F. transversa*, new species.

firms the eccentric position of the aperture and there is no connection with the exterior area.

Biology.—All our specimens were dead. They probably did not live at the depth at which they were dredged, although they are small free colonies submerged in the sea like submarines. We are ignorant of the habits of the larva and we do not know if it lived in the vicinity of the sea bottom.

Occurrence.—

D. 5134. Balukbaluk Island, Sulu Archipelago; 6° 44′ 45″ N.; 121° 48′ E.; 25 fathoms; fine S.

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S. (common).

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S. Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5162. Tinagta Island; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11 6° C.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S. Co.

According to Waters 1905 the specimen in the Paris Museum is from Malacca. D'Orbigny has, however, cited Ouantang and Hainan, 20 meters, in the China Sea.

Plesiotype.—Cat. Nos. 8300–8303, U.S.N.M.

FLABELLOPORA ARCULIFERA, new species

Plate 72, fig. 12

Description.—The zoarium is free, lanceolate; the angle of the initial base is somewhat larger than the terminal angle; the zoarial length is 4 mm. The exterior walls of the zooecia are decorated with a hexagonal area with rounded and salient ribs in form of a cushion; each area contains the aperture and a large distal avicularium with pivot with the beak turned toward the ancestrula; another identical avicularium is lodged between the areas. The aperture is orbicular and bears a distal semicircular sinus; the peristome is salient; the proximal pore is small and surrounded by a peristome adjacent to that of the aperture.

Measurements.—Aperture $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$

Affinities.—This new species differs from *Flabellopora elegans* D'Orbigny, 1852, in its smaller frontal areas with thicker walls and in the presence of avicularia between them.

Occurrence.—D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.

Holotype.—Cat. No. 8304, U.S.N.M.

FLABELLOPORA TUBEROSA, new species

Plate 74, figs. 4–6

Description.—The zoarium is free, amygdaloidal or lanceolate (5 mm.); the angle of the initial base is much larger than the terminal angle. The exterior walls of the superior central zooecia are decorated with a deep flabelliform area; each area contains a subdistal aperture, a distal elliptical, transverse avicularium with pivot and a proximal avicularium; between the areas are arranged tuberosities formed by the union of a distal avicularium, a proximal one and two small triangular erect avicularia. The lateral zooecia are poriferous. The aperture is suborbicular, very little elongated; the distal sinus is wide and triangular; the peristome is thin and salient; the proximal pore is very small and adjacent to the peristome.

2182—29——33

Measurements.—Aperture $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.10\text{–}0.12 \text{ mm.} \end{cases}$

Affinities.—This species is very well characterized by its large tuberosities. It differs from *Flabellopora lenticularis* in its elongated colonies (and nondiscoidal), in its larger oral dimensions and in the presence of exterior areas.

As in *Flabellopora elegans* and in *F. arculifera* the orifice of the avicularia is not on the plane of the aperture; it is arranged on a plane almost perpendicular.

Biology.—The geographic distribution of this species is rather large in the interior of the Philippines but it has not been noted on the oceanic borders.

Occurrence.—

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5213. Destacado Island, east of Masbate Island; 12° 15′ N.; 120° 57′ 30″ E.; 80 fathoms; S. M., Sh.

D. 5217. Anima Sola Island; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.; 17.2° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.

Cotypes.—Cat. Nos. 8305, 8306, U.S.N.M.

FLABELLOPORA IRREGULARIS, new species

Plate 72, figs. 1–11

Description.—The zoarium is free, irregular either of narrow lamellae or broad fronds; the length varies from 5 to 15 mm.; the angle of the initial base is larger than the terminal angle. The walls of the zooecia are ornamented with granules separated by pores and avicularia of which one is in the immediate vicinity of the aperture; the avicularia are large, orbicular or elliptical with pivot, with beak of variable direction. The aperture is orbicular or oval; the distal sinus is wide, shallow, semielliptical; the peristome is thin and little salient; the proximal pore is large and placed on the peristome.

Measurements.—Aperture $\begin{cases} ha = 0.15 \text{ mm.} \\ la = 0.11 \text{ mm.} \end{cases}$

Variations.—The variations are not solely zoarial; the exterior ornamentations are also very irregular. The granules disappear with abrasion or age. The peristome is generally thick but it is thin on the little calcified specimens. The vigorous specimens have a salient cushion around the apertures. Finally the latter are often very deep and arranged at the bottom of a sort of funnel.

On the large colonies the zooecia of the initial portion are not directed in the same way as the others.

The longitudinal section shows that the zooecia of the two lamellae are very closely bound one to the other.

This species is very well characterized by the numerous pores which ornament the zoarial surface, which permits the easy determination of the specimens in spite of the great general irregularity.

Biology.—The geographic distribution of this species is rather large. We observe it throughout the Sulu Sea, but often it is rare. On the contrary, in the China Sea the specimens are more abundant and we know it as well on the Asiatic side as on the Borneo side. Our Figure 8 belongs probably to a closely related but distinct species. We reproduce it because of its particular aspect. The specimen shows between the zooecia linear or curved interzooecial cavities resulting from incomplete calcification. This arrangement is rather frequent in a large number of Cretaceous genera and causes the determination to be very difficult. The genus *Beisselina* notably presents most fantastic variations. But here the interstices are occasioned by the narrowing of the pyramid which surmounts the hexagonal zooecial prism.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5144. Jolo Light, Jolo; 6° 5′ 50″ N.; 121° 2′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 51′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hard sand; 24.2° C.

D. 5311. China Sea, vicinity of Hong Kong; 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh. (common).

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 7′ 57″ E.; 340 fathoms.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 9′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

Cotypes.—Cat. Nos. 8307–8311, U.S.N.M.

FLABELLOPORA LENTICULARIS, new species

Plate 74, figs. 1–3

Description.—The zoarium is free, lenticular, 3 mm. in diameter. The angle of the initial base and the terminal angle are almost equal. The external walls are adorned with a very large tuberosity formed by the union of the two avicularia, distal and proximal; the orifice of the avicularia is large, elliptical, transverse, placed on a plane perpendicular to that of the aperture. The peripheral zooecia do not have tuberosities but they bear two salient avicularia. The aperture is small, orbicular; the distal sinus is scarcely distinct; the proximal pore is little visible.

Measurements.—Aperture$\begin{cases} ha = 0.07 \text{ mm.} \\ la = 0.07 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Flabellopora tuberosa* in the absence of a parietal area and peristome, in smaller oral dimensions, and in the lenticular form of the colony. There are other species with small orbicular colonies but none of them is ornamented with large tuberosities.

Occurrence.—D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 9′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

Cotypes.—Cat. No. 8312, U.S.N.M.

FLABELLOPORA ACUTA, new species

Plate 73, figs. 1–5

Description.—The zoarium is free, arrow-shaped; the angle of the initial base is much broader than the terminal angle, which is quite *acute;* the length varies from 5 to 9 mm. The avicularia which decorate the external wall of the zooecia are poriform with salient peristome; they are almost regularly arranged two and two between the apertures and in their median axis. The aperture is orbicular; the peristome is thin and salient; the proximal pore is small and placed on the peristome.

Measurements.—Aperture$\begin{cases} ha = 0.09\text{–}0.11 \text{ mm.} \\ la = 0.09\text{–}0.11 \text{ mm.} \end{cases}$

Structure.—The zoarial form is rather variable; there are broad colonies and also very narrow colonies but the terminal angle always remains acute.

In spite of appearances the avicularia and the apertures are not arranged together longitudinally. The oblique rows of apertures are separated by a double parallel row of alternating avicularia. But the architecture is so perfect that the appearance is deceiving.

Very often the proximal pore is united with the aperture; the latter then takes a false schizoporoid aspect, but with the microscope it is easy to prove that the proximal sinus thus formed has no depth.

The avicularia are formed by small adventitious orbicular cells very visible in the longitudinal section.

We have prepared an excellent meridian section which shows that the internal structure is a true master piece of geometry. The interior show well an orbicular aperture without any apparent sinus.

Affinities.—This species differs from *Flabellopora tubifera* in its larger aperture, in its avicularia less numerous and non salient tube.

Biology.—This species was dredged only in the single locality of Tubig Point, at the western extremity of Bernardina Channel. This locality has furnished us only a very small fauna of bryozoa of small dimensions and of original forms.

Occurrence.—D. 5392. Tubig Point, Destacado Island; 12° 12′ 35″ N; 124° 02′ 48″ E.; 135 fathoms; Gn. M., S. (common).

Cotypes.—Cat. No. 8313, U.S.N.M.

FLABELLOPORA TUBIFERA, new species

Plate 73, figs. 6–7

Description.—The zoarium is free, amygdaloidal, wide from 6 to 7 mm. in length, of semitransparent calcite. The angle of the initial base is larger than the terminal angle. The external wall of the zooecia is decorated with tuberosities, poriform avicularia and the larger elliptical avicularia with pivot; the avicularian chamber is a veritable *tube* salient but very oblique. The aperture is small, somewhat elongated; the peristome is little visible; the distal sinus is minute; the proximal pore is placed on the peristome and is scarcely discernible.

Measurements.—

Superficial aperture $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$ Deep aperture $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.08 \text{ mm.} \end{cases}$

Structure.—The zoarium is semitransparent and gives to this beautiful species a strange and very special aspect. By an optical effect the apertures seem small; but under the microscope their dimensions are close to those of all the other *Flabellopora.* When the colony is calcified the aspect is somewhat different but the presence of granules still permits the identification.

The richness of ornamentation is peculiar to each colony, for it is difficult to find two colonies identical in aspect. Moreover when the zoarium is dead and when it is little worn the surface is easily altered.

The view of the interior shows the usual arrangement of the difference of orientation of the zooecia of the initial base. The longitudinal and transversal sections show the avicularian chambers excavated in the great thickness of the distal wall of the zooecia.

The tangential section reveals the arrangement of the avicularia; although they appear at the surface as irregularly scattered, they are in reality arranged only in the usual manner, that is in double rows and avicularia alternating between the oblique rows of apertures.

The superficial apertures on the calcified specimens appear somewhat larger than the apertures arranged at the bottom of an elliptical peristomie. The apertural measurements vary in different specimens.

Affinities.—This species is perhaps identical with *Flabellopora mamillata* Maplestone, 1909, from Australia and differs from it only in its tubifer avicularia.

Biology.—This species is not rare in the calm waters of the Sulu Archipelago. It appears also in the China Sea and we have found it in the very rare locality of Sibutu. The largest of our specimens were dredged in deep waters.

The special nature of the zoarium indicates a particular nourishment which can not be discovered without the examination of specimens preserved in alcohol.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh. (common).

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ E.; 19 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 7′ 57″ E.; 340 fathoms.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.; 13.2° C.

Cotypes.—Cat. Nos. 8314, 8315, U.S.N.M.

FLABELLOPORA ACUTIROSTRIS, new species

Plate 75, fig. 2

Description.—The zoarium is free, small (2.5 mm.), suborbicular; the angle of the initial base is large and about the same as the terminal angle. The external walls of the zooecia are decorated with pores and irregular granules, an aperture, a transverse avicularium with pivot, with the beak pointed and placed near the distal portion of the aperture and a tubifer avicularium with pivot and with pointed beak turned toward the base. The aperture is rather large, suborbicular; the distal sinus is wide and shallow; the peristome is very thin and very little salient; the proximal pore is adjacent to the peristome.

Measurements.—Aperture $\begin{cases} ha = 0.12 \text{ mm.} \\ la = 0.14 \text{ mm.} \end{cases}$

Affinities.—This species has a distal avicularium similar to that of *Flabellopora elegans* and a tubifer avicularium as in *F. tubifera;* but the zoarium is orbicular and very different from that of these two species. It is moreover very well characterized by the pointed form of the beak of its avicularia.

Biology.—In the Simaluc locality (550 meters) we have found *Flabellopora acutirostris* and *F. pisiformis* which are of very small dimensions and some very small specimens of *F. irregularis.* The logical deduction of this observation is that the great depth of water is injurious to the development of *Flabellopora.*

Occurrence.—D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

Holotype.—Cat. No. 8316, U.S.N.M.

FLABELLOPORA PLANATA, new species

Plate 75, fig. 5

Description.—The zoarium is free, flabelliform, 5 mm. in length; the angle of the initial base is much larger than the terminal angle. The external walls of the zooecia are *flat* and decorated with oblique and divergent rows of apertures and avicularia; the avicularia are elliptical with a beak somewhat enlarged and directed toward the ancestrula. The aperture is suborbicular or somewhat oval; the distal rimule is small and somewhat rounded; the peristome is scarcely visible; the proximal pore is constant and adjacent to the peristome.

Measurements.—Aperture $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.10 \text{ mm.} \end{cases}$

Affinities.—In the form of the aperture this species is close to *Flabellopora irregularis* but differs from it in its flabellate zoarium, in the absence of granules and pores, and in the superficial aperture with very small peristome.

Occurrence.—D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.; 13.2° C.

Holotype.—Cat. No. 8317, U.S.N.M.

FLABELLOPORA TRANSVERSA, new species

Plate 75, fig. 3

Description.—The zoarium is free, flabelliform, transverse, measuring 5 to 7 mm.; the angle of the initial base is small and the terminal angle does not exist. Each external wall of the zooecia is decorated with 3 areas rather deep and hexagonal; one containing the aperture, the second a transverse elliptical avicularium, with pivot and the beak turned toward the base, the third a triangular avicularium with the beak turned towards the top. The aperture is orbicular, somewhat transverse; the distal sinus is wide and shallow; the peristome is thin and salient; the proximal pore is large and surrounded by a peristome adjacent to the peristome of the aperture. All the zoarial surface is finely granular.

Measurements.—Aperture $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$

Variations.—This description is taken from very well preserved specimens but the superficial alterations are rather frequent. The granulations disappear at the least weathering. Sometimes the aperture alone is surrounded by a hexagonal area. The pivots of the elliptical avicularia are very fragile and frequently lacking.

The longitudinal section show two external walls, one containing the aperture and the other an avicularium.

The meridian section shows that the zooecia of the terminal portion of the zoarium enlarge more and more as they approach the external border. But all the concentric series without exception are borne upon the branches of the initial V which is the equivalent of the basal lamella of the other cheilostomata. It is also the same in the section of *Orbitulipora excentrica.*

This species is very well characterized by its very constant zoarial form.

Biology.—This form is very divergent from the preceding forms studied. This locality is far from the China Sea and the Sulu Sea which is a division of it. We are thus obliged to admit that the configuration of the sea exercises an indisputable influence on its own fauna.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Cotypes.—Cat. No. 8318, U.S.N.M.

FLABELLOPORA ASPER, new species

Plate 75, fig. 1

Description.—The zoarium is free, small, suborbicular, 2 to 3 mm. in diameter; the angle of the initial base is small and there is no terminal angle. The external walls of the zooecia are ornamented with an aperture, a small avicularium placed distally and close to an aperture and a much larger poriform avicularium, arranged among many asperities more or less salient. The aperture is small, orbicular, with peristome little salient and arranged between two large zoarial asperities; the distal sinus is little apparent; the proximal pore is rather large and surrounded with a peristome adjacent to the oral peristome.

Measurements.—Aperture$\begin{cases} ha = 0.08 \text{ mm.} \\ la = 0.08 \text{ mm.} \end{cases}$

Variations.—Although very short the zoarium is clearly flabelliform and deprived of a terminal angle; it belongs then to the *F. transversa* group. But it is perfectly characterized by its parietal asperities.

We have prepared some thin sections which confirm the preceding observations; the internal structure of these flabellate forms is absolutely identical with the structure of the forms provided with a terminal angle.

Biology.—This is one of the rare forms peculiar to the Celebes Sea. It indicates however a beginning of the divergence which ought certainly to be greater in the southeast in the vicinity of the Pacific.

Occurrence.—

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sn.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh., crs.

Cotypes.—Cat. Nos. 8319, 8320, U.S.N.M.

FLABELLOPORA PISIFORMIS, new species

Plate 64, fig. 10

Description.—The zoarium is small (2.5 mm), suborbicular, very thick, *pisiform*; the basal portion is narrower than the terminal portion and an entire colony is slightly flabelliform. The external walls of the zooecia are decorated with an aperture, some small pores and an avicularium with pivot in which the beak is turned toward the ancestrula. The aperture is suborbicular or transverse; the distal sinus is very wide and shallow; the peristome is very thin and little salient; the proximal pore may be confounded with the other small pores.

Measurements.—Aperture $\begin{cases} ha = 0.10 \text{ mm.} \\ la = 0.12 \text{ mm.} \end{cases}$

Structure.—The great thickness of the initial base is very characteristic; the longitudinal section resembles that of *Conescharellina* a great deal, but there are no central hydrostatic chambers. This is a very interesting intermediate structure. Unfortunately the small number of specimens discovered does not permit us to make a detailed study.

Affinities.—In the presence of pores between the aperture this species approaches *Flabellopora irregularis* but differs from it in its much smaller pores, in the absence of granules and in its remarkable internal structure. It appears limited to great depths as 550 meters, with *Flabellopora acutirostris* which is also of rather small dimensions.

Occurrence.—D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

Holotype.—Cat. No. 8321, U.S.N.M.

FLABELLOPORA PUSILLA, new species

Plate 75, fig. 4

Description.—The zoarium is very small, discoid (2 mm. in diameter); the angle of the initial base is large and there is no terminal angle so that the colony is only slightly flabellate. The external walls of the zooecia are smooth and decorated only with the aperture and with an avicularium with pivot with pointed beak turned towards the base; the avicularian chamber is large, convex, and fusiform. The aperture is suborbicular; the distal sinus is wide and shallow; the peristome is thin and little salient; the proximal pore is surrounded by a salient peristome adjacent to the oral peristome.

Measurements.—Aperture $\begin{cases} ha = 0.09 \text{ mm.} \\ la = 0.09 \text{ mm.} \end{cases}$

Affinities.—This species differs from *Flabellopora pisiformis* in the absence of parietal pores. It differs from *Flabellopora acutirostris* in the absence of a transverse distal avicularium and in its flabellate zoarium. It is the smallest species known. It was dredged at 260 meters of depth which confirms the idea of the influence of depth on the zoarial size.

Occurrence.—D. 5135. Jolo Light, Jolo; 6° 11′ 50″ N.; 121° 08′ 20″ E.; 161 fathoms; fine co., S.

Holotype.—Cat. No. 8322, U.S.N.M.

KEY FOR THE DETERMINATION OF FLABELLOPORA

1.	The angle of the initial base is larger than the terminal angle. (Colony elongated)	2
	The angle of the initial base is smaller than the terminal angle. Colony flabellate)	8
	The angle of the initial base is clearly equal to the terminal angle. (Colony small, discoid)	9
2.	The aperture is placed in a lozenge-shaped area	3
	The aperture is not placed in an area	5
3.	A large tuberosity between the areas	**F. tuberosa.**
	No tuberosity	4
4.	Avicularia elliptical	**F. elegans (D'Orbigny).**
	Avicularia round	**F. arculifera.**
5.	Zoarium irregular, little or not flabellate, in lamella or in fronds.	**F. irregularis.**
	Zoarium geometric	6
6.	Large apertures (0.12 by 0.14 mm.)	**F. acuta.**
	Small aperture (not more than 0.10)	7
7.	Avicularia tubifer	**F. tubifera (12).**
	Avicularia elliptical	**F. planata.**
8.	No asperities between the apertures; large colonies	**F. transversa.**
	Asperities between the apertures; small colonies	**F. aspera.**
9.	Large tuberosity between the apertures	**F. lenticularis.**
	No large tuberosity	10
10.	Parietal pores between the apertures and the avicularia	**E. pisiformis.**
	No parietal pores	11
11.	Avicularia long	**F. acutirostris.**
	Avicularia short	**F. pusilla.**
12.	Avicularia not tubifer, mamillosities not adjacent.	**F. mamillosa** (Maplestone, 1909).

Fourteen species are known of which one only is from the southern hemisphere.

Genus ZEUGLOPORA Maplestone, 1909

"Zoarium bilaminate, lanceolate. Zooecia on both surfaces, immersed, undefined. Thyrostome suborbicular, with a raised semi-elliptical ridge on proximal margin." (Maplestone, 1909.)

To the above original incomplete description we would add the following: The colony is a *Flabellopora* in which the oblique rows of the zooecia are not supported on an initial base but on a much larger and more salient zooecium. The aperture is suborbicular; the sinus is distal; the peristome is very much developed in its proximal part and forms a semi-peristomie on which the proximal pore is placed. The avicularia are arranged alternately between the oblique rows of apertures.

Genotype.—*Zeuglopora lanceolata* Maplestone, 1909. Recent.

Discussion.—Maplestone did not note the distal sinus but it does exist. Nor did he see the proximal pore which is quite visible in its usual place as may be observed on our photographs. The avicularia are arranged in the same manner as in *Flabellopora* as may be noted on our photograph as well as on Maplestone's figure. But the architecture is different, a fact which justifies us in maintaining this curious genus. The series of zooecia are indeed arranged in oblique rows but they are not supported on a zooecium of the initial base. This distinction is essential for it implies a different mode of growth. The lack of material has prevented us from making the necessary sections for further study.

We believe that Livingstone, 1924, is in error in uniting this genus with *Bipora* Whitelegge, 1887, regarded as a synonym of *Flabellopora* D'Orbigny, 1852.

ZEUGLOPORA LANCEOLATA Maplestone, 1909

Plate 75, fig. 6

1909. *Zeuglopora lanceolata* Maplestone, The results of deep sea investigations in the Tasman Sea, Records of the Australian Museum, vol. 7, p. 272, pl. 78, fig. 11.

The observations given above on the genus *Zeuglopora* have been made after an examination of this species so that it is not necessary to repeat them. Our specimens conform to Maplestone's figure, if we consider the details of the surface and the dimensions of the peristome. However the Australian author did not figure the large salient lateral zooecia although he wrote "Under the microscope the crenulated edges of the zoarium are seen to be due to the projecting parts of the marginal zooecia." It is difficult to make determinations without comparison of actual specimens. The interior view shows that the lateral zooecia are larger than the axial zooecia. As the lateral zooecia are not placed exactly in the meridian plane of the colony, the meridian section shows inevitably on its sides cells of the two faces.

Occurrence.—

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

Tasman Sea, 80 fathoms, (Maplestone).

Plesiotypes.—Cat. No. 8323, U.S.N.M.

Family MYRIOZOUMIDAE Smitt, 1867

A description of this family and its genera is given in our 1923 work.

Genus MYRIOZOUM Donati, 1750

MYRIOZOUM SUBGRACILE D'Orbigny, 1852

Plate 65, figs. 9–13

1889. *Myriozoum subgracile* Jelly, Synonymic Catalogue of Marine Bryozoa, p. 198.
1900. *Myriozoum subgracile* Waters, Bryozoa from Franz Josef Land, Linnean Society's Journal, Zoology, vol. 28, p. 69, pl. 9, figs. 4–8.
1912. *Myriozoum subgracile* Nordgaard, Campagne arctique du Duc D'Orleans Bryozoaires, p. 9.

Waters, 1900, has published a masterly study of this species and we have no new information to add. Nordgaard, 1912, cites the

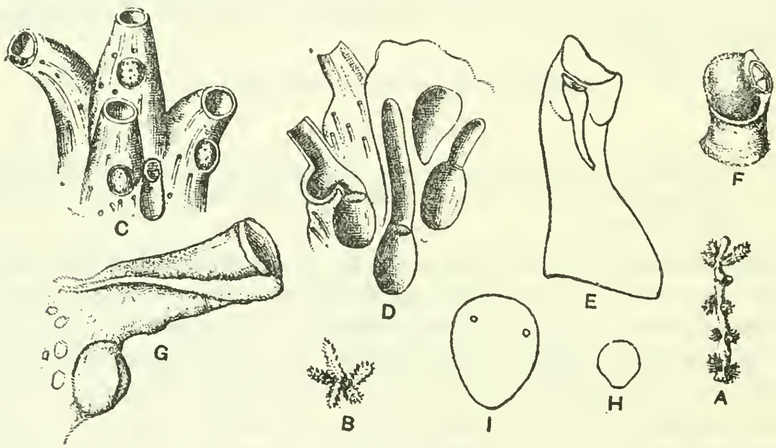

Fig. 210.—Genus *Lekythopora* MacGillivray, 1882

A–I. *Lekythopora hystrix* MacGillivray, 1882. A, B. Zoarium, natural size. C. View of three ovicelled zooecia and an interzooecial avicularium, ×65. D. A sagittal section through an ovicell, ×23 (A–D. After Levinsen, 1909). E—G, Divers views showing the form and the arrangement of the peristomal avicularium. H, I. Opercula, ×55, and more magnified. (E–I. After Levinsen 1909 and MacGillivray 1882.)

Kara Sea (35–127 meters) and the Mourmane Sea (90 meters). In order to establish that this is a circumpolar species, he has listed all known localities where it has been dredged. There was an area missing in the western Pacific which our discovery in the Sea of Japan completes.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Plesiotypes.—Cat. No. 8324, U.S.N.M.

Family LEKYTHOPORIDAE Levinsen, 1909

The zooecia are much calcified; the walls are thickened. The peristomie is long and tubular; the peristome, more or less salient, bears 1–5 avicularia. The aperture is buried at the bottom of the peristomie; it is closed by a highly chitinized operculum. The ovicell,

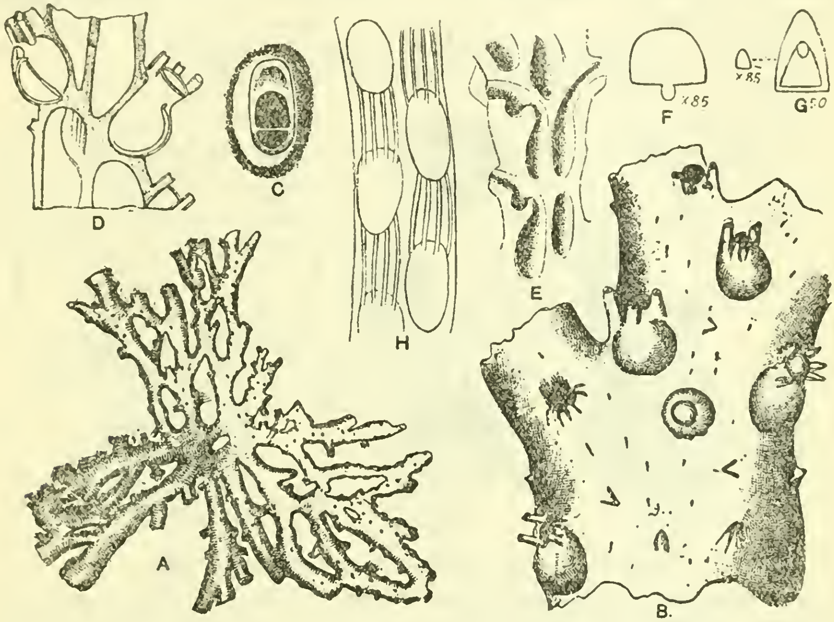

Fig. 211.—Genus *Turritigera* Busk, 1884

A–H. *Turritigera stellata* Busk, 1884. A. A colony, ×3. B. Anterior surface, ×25. Around the aperture there are avicularia on cylindrical processes. The zooecial surface has elongate pores. 18 tentacles. C. Avicularium from the surface of the zooecium, ×85. D. Sagittal section showing the proximal ovicell opening in the peristomie. E. Sagittal section, ×17. (After Levinsen 1909). F. Operculum, ×85. It is thin. The muscular attachment is some distance from the border. G. Mandible of the peristomial avicularium, ×85 and ×250. H. Decalcified showing connecting tubes from zooecium to zooecium. (A–D, F–H. After Waters, 1888 and 1909.)

more or less distinct, is placed on the proximal portion of the peristomie into which it opens.

This family is characterized by the abnormal position of the peristomial ovicell. This is placed on the proximal side of the apertura whereas in all the other Cheilostome ovicells it is placed in the distal portion of the aperture. The larva is unknown.

The known genera are *Lekythopora* MacGillivray, 1882; *Poecilopora* MacGillivray, 1886; *Turritigera* Busk, 1884; *Orthoporidra, Catadysis,* and *Actisecos* Canu and Bassler, 1927.

Genus LEKYTHOPORA MacGillivray, 1882

The colony is encrusting. The peristomie is free above the ovicell; the very salient peristome bears only a small avicularium. The apertura bears a wide rimule; the operculum is ornamented with two points of attachment, removed from the border. The ovicell largely opens into the peristomie above the apertura. Interzooecial avicularia are present.

Genotype.—*Lekythopora hystrix* MacGillivary, 1882.

Range.—Miocene. Recent.

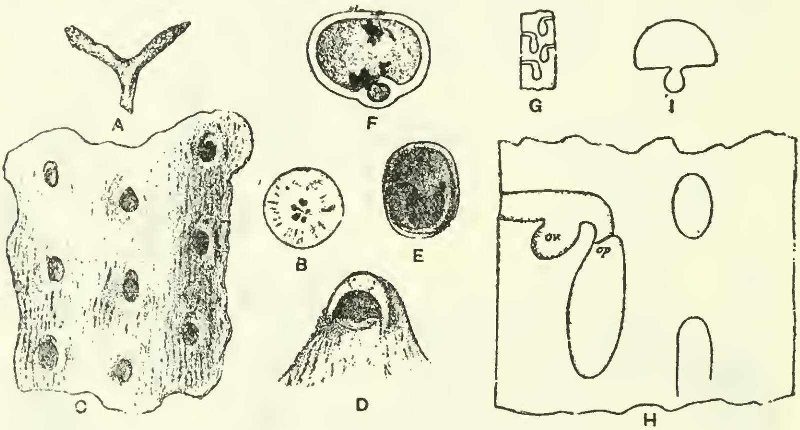

FIG. 212.—Genus *Catadysis* Canu and Bassler, 1927

A–I. *Catadysis challengeriana* Waters, 1888. A. Zoarium, natural size. B. Transversal section. C. Portion of a zoarial surface, ×25. The peristomies are buried in a tremocyst with tubules. D. View of a young peristomice. E. Lower part of the secondary orifice; the tube leading to the avicularium projects into the immersed peristome; this is shown in section in Fig. F. (A–E. After Busk, 1884.) F. Section through the peristomial aperture, showing the tube leading to the avicularium, ×85. G. Diagramatic section of zoarium, ×3. H. Section showing the position of the operculum and the ovicell below the peristome. I. Operculum, ×85. (F–I. After Waters, 1888.)

Genus TURRITIGERA Busk, 1884

The ovicell opens into the proximal portion of the peristomie. The zooecia are indistinct, arranged on one side of the colony with very thick walls, united to each other by connecting tubes. The apertura buried at the bottom of the peristomie, bears a proximal rimule; the peristome bears small salient avicularia; 18 tentacles.

Genotype.—*Turritigera stellata* Busk, 1884. Recent (Southern Hemisphere).

Genus CATADYSIS Canu and Bassler, 1927

The ovicell is hyperstomial, buried in the interior of the zooecial walls and opening in the inferior part of the peristomie. The zooecia are indistinct; the frontal is striated longitudinally; the walls much thickened are formed by a tremocyst with very small tubes. The apertura is buried at the bottom of the peristomie and bears a proximal tongue. In the peristomie there are very small triangular avicularia.

Genotype.—Catadysis (*Schizoporella*) *challengeriana* Waters, 1888. Recent.

This genus was suggested by Waters in 1888.

Genus POECILOPORA MacGillivray, 1886

The colony is erect, bilaminate, branched. The zooecia are indistinct. The apertura (primary mouth) has a distinct sinus. The peristome begins as an elevated point with a small avicularium on the summit, finally becoming a tumid, subcircular ring. Ovicell immersed, closed by a perforated plate.

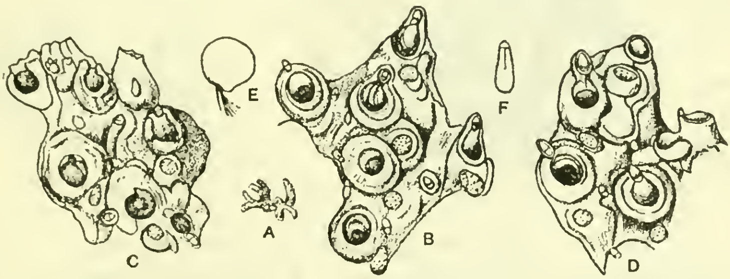

FIG. 213. Genus *Poecilopora* MacGillivray, 1886

A–F. *Poecilopora anomala* MacGillivray, 1886. A. Zoarium natural size. B. Portion from the growing edge. C. Portion from the extremity of a branch, one of the zooecia showing the internal or primary mouth (aperture). D. Another portion showing the growth of the ovicell. E. Operculum. F. Avicularian mandible. (After MacGillivray, 1886.)

Genotype.—Poecilopora anomala MacGillivray, 1886. Recent (Australia).

Genus ORTHOPORIDRA Canu and Bassler, 1927

(*Orthopora* Waters, 1904, preoccupied)

The colony is free and branched. The peristomie is long and partially free; the peristome bears a "long process" terminated by an avicularium with triangular mandible. The proximal border of the apertura and of the operculum is straight; the muscular attachments are close to the distal edge of the operculum. The ovicell is situated proximally to the oral aperture; it opens into the peristomie below the operculum; 24 tentacles.

Genotype.—Orthopora compacta Waters, 1904. Recent (Antarctic).

Genus ACTISECOS Canu and Bassler, 1927

The zooecia are tubular, swollen at their base; the frontal is a tremocyst with very small pores. The ovicell is peristomial and placed on the dorsal. The aperture is ogival and buried at the bottom of a long peristomie. The base of the zooecia is hexagonal.

Genotype.—Actisecos regularis Canu and Bassler, 1927. Recent.

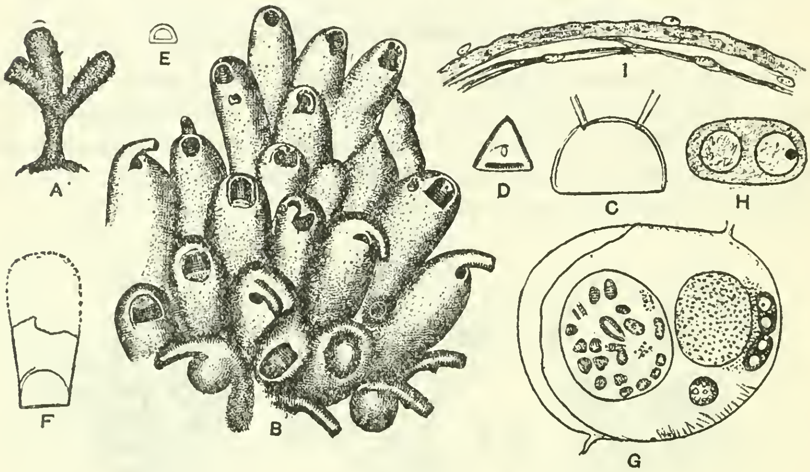

FIG. 214. Genus *Orthoporidra* Canu and Bassler, 1927

A–I. *Orthoporidra compacta* Waters, 1904. A. Zoarium, natural size. B. Portion of a zoarium, ×25. The lower edge of the oral aperture is straight. Above the oral aperture there is a long process bearing an avicularium with a triangular mandible. The zooecia are porcellaneous. 24 tentacles. C. Operculum, ×85. It is straight below, and the muscular attachments are quite at the distal end. D. Mandible from small avicularium on the zooecium, ×85. E. Rostral mandible, ×85. F. Mandible of vicarious avicularium. (A–F. After Waters, 1904.)

G. Section through a zooecium showing tentacles, ovaria and ova, and the wall of the compensatrix, ×85. H. Ovarium, ×250. I. Wall of the tentacular sheath, ×750. The tentacular crown is three or four times thicker and shows the darkly stained longitudinal muscular band, a character which does not appear to exist in the other genera of the family. (G–I. After Waters, 1905.)

This genus very much resembles *Ascosia* Jullien, 1881, but differs from it in having 6 cells around the ancestrula, in the absence of oral avicularia and in the peristomial and not recumbent ovicells. Waters was in error in comparing *Ascosia* with *Mamillopora.*

The differences are great for *Ascosia* belongs to the Pentapogona according to the figure of Jullien while *Mamillopora* has 6 cells around the ancestrula. *Ascosia* is ornamented with long peristomies. The recumbent ovicell is borne on the peristomie in *Ascosia* and by the zooecium in *Mamillopora.*

The mere presence of hexagonal bases to the zooecia is not sufficient to characterize a genus and we can state that it is a deceiving character.

ACTISECOS REGULARIS Canu and Bassler ,1927

Plate 66, figs. 1–4

1927. *Actisecos regularis* Canu and Bassler, Classification Cheilostomatous Bryozoa, Proc. U. S. National Museum, vol. 69, art. 14, p. 11, pl. 1, fig. 13.

Description.—The zoarium is orbicular, convex; on the inner face, the hexagonal zooecial bases, a peripheral row of zooecia without peristome and the ovicells are visible. The zooecia are very *regularly* arranged around the membraniporoid ancestrula; they are long, lageniform, tubular, terminated by a very long narrower peristomie; the frontal is a tremocyst with very small pores. The operculum is ogival. The ovicell is globular, salient, placed on the peristomie of the peripheral zooecia, opening widely toward the middle of the peristomie.

Measurements.—

Operculum $\begin{cases} hop = 0.14 \text{ mm.} \\ lop = 0.13 \text{ mm.} \end{cases}$ Zooecia peripheral $\begin{cases} Lz = 0.75 \text{ mm.} \\ lz = 0.30 \text{ mm.} \end{cases}$

Biology.—These discoidal colonies appear to have been more or less floating and arranged so as to escape the sandbanks or being engulfed. There is not a single avicularium, no zoarial apparatus as in *Lunularia*. The currents alone could turn them and cause them to float by tangential pressure.

Fig. 215.—*Actisecos regularis* Canu and Bassler, 1927. Operculum, ×85

The mechanical actions by their constancy are incompatible with the biological irregularities. Thus the very regular colonies can live only in running waters and the very regular and symmetrical development of the peristomie is the essential condition of equilibrium. This species can not then live in calm waters; it only has been dredged in the two Straits of Linapacan and Surigao. Our specimens were living and in reproduction.

Occurrence.—

D. 5335. Linapacan Strait, Observatory Island; 11° 37′ 15″ N.; 119° 48′ 45″ E.; 46 fathoms; S. M.

D. 5336. Linapacan Strait, Observatory Island; 11° 37′ 45″ N.; 119° 46′ E.; 46 fathoms; S. M.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Cotypes.—Cat. No. 8325, U.S.N.M.

2182—29——34

Order CYCLOSTOMATA Busk

Division INOVICELLATA

Family DIASTOPORIDAE Gregory, 1899

Forma PROBOSCINA Audouin, 1826

PROBOSCINA DICHOTOMA D'Orbigny, 1839

Plate 76, figs. 1, 2

1837. *Criserpia dichotoma* D'Orbigny, Voyage dans l'Amerique Méridionale, vol. 5, pt. 4, p. 19, pl. 9, figs. 7–13.
1904. *Stomatopora dichotoma* Waters, Résultats Voyage Belgica, Zoologie, p. 87.
1905. *Stomatopora dichotoma* Waters, Recent Bryozoa in D'Orbigny's Collection, Annals Magazine Natural History, ser. 7, vol. 15, p. 14.

Measurements.—Diameter of peristome, 0.16 mm.; distance of orifices, 0.56; and width of branches, 0.36.

Our photograph resembles D'Orbigny's figure very much. The diameter of the aperture indicated as 0.14 mm. by Waters, measured 0.12 mm. on our specimen for the peristome is thick.

Specific determinations can not be rigorously exact in this genus and it is necessary, the greater part of the time, to be content with simple approximation.

We have found in the Philippine Archipelago, as well as in the China Sea, various specimens of *Proboscina* and of *Stomatopora* but we did not think it advisable to publish them as species on account of the inexact relation between such examples.

Occurrence.—

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5311. China Sea, vicinity of Hong Kong, 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

Geographic distribution.—Malouines Islands, Cape Horn (D'-Orbigny). Antartic; 70° 23′ S.; 82° 47′ W. long; 80 meters; 0.8° C. (Waters).

Plesiotype.—Cat. No. 8326, U.S.N.M.

PROBOSCINA COAPTA, new species

Plate 76, fig. 10

Description.—The zoarium encrusts shells; it is formed of wide branches ramified at a large angle and containing 5 to 6 longitudinal rows of tubes. The tubes are distinct, convex, separated by a deep furrow, short; the orifices are subelliptical and arranged in oblique or transverse rows.

Measurements.—Diameter of peristome, 0.12 mm.; diameter of tubes, 0.16; distance of tubes, 0.34; and width of branches, 0.70.

Affinities.—This species is very well characterized by the closeness of the orifices. However, among the fossil forms there are some species rather close to this one, notably *Proboscina cornucopiae* D'Orbigny, 1847 of the French Cretaceous. The persistance of the Cretaceous forms in the present equatorial zone is a constant phenomenon.

Occurrence.—D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms, S. Sh.

Holotype.—Cat. No. 8327, U.S.N.M.

Forma FILISPARSA D'Orbigny, 1853

FILISPARSA RUGOSA, new species

Plate 76, figs. 7–9

Description.—The zoarium is free, formed of three longitudinal rows of tubes, narrow, a little compressed, bifurcated. The tubes are arranged only on the anterior face; they are little distinct and much *wrinkled* transversely. The orifice is orbicular; the peristome is thin and the peristomie very salient and erect. The posterior face of the zoarium is also covered with large transverse wrinkles.

Measurements.—Diameter of peristome, 0.28–0.30 mm.; distance of orifices, 1.12–1.84; and width of branches, 0.50–0.60.

Affinities.—This is a beautiful and quite vigorous species which appears to us interesting enough to figure in spite of the absence of the ovicell.

Occurrence.—D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Cotypes.—Cat. No. 8328, U.S.N.M.

FILISPARSA ELEGANS, new species

Plate 76, fig. 3

Description.—The zoarium is free, bifurcated; the branches are compressed, broad and bear cellules only on a single side. The tubes are visible; the peristome is salient, arched; the peristomes are thin, arranged in irregular quincunx.

Measurements.—Diameter of peristome, 0.24–0.25 mm.; and width of branches 0.80.

Affinities.—This is an elegant and robust species quite easy of determination. It differs from *Filisparsa rugosa* in its more closely arranged peristomes and in the absence of transverse wrinkles.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Holotype.—Cat. No. 8415, U.S.N.M.

FILISPARSA SINUOSA, new species

Plate 76, figs. 4–6

Description.—The zoarium is free, much compressed, bifurcated; the branches are wide sinuous, with the tubes on one side only and arranged in quincunx. The dorsal bears transverse wrinkles. The tubes are visible, separated by a little salient thread, very slightly convex; the peristome is orbicular, quite salient, very thin.

Measurements.—Diameter of peristome, 0.20–0.22 mm.; and width of branches, 1.00.

Affinities.—This species differs from *Filisparsa orakeiensis* Stoliczka in its transversally wrinkled dorsal. It differs from *Filisparsa rugosa* and from *Filisparsa elegans* in the absence of salient peristomes.

Occurrence.—

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.; 13° C.

Cotypes.—Cat. No. 8329, U.S.N.M.

Genus TUBIGERINA Canu, 1911

TUBIGERINA RUGOSA, new species

Plate 77, figs. 1–3

Description.—The zoarium encrusts shells, and bryozoa (*Adeonella*). The branches are narrow, ramified, divergent, and formed of 3 or 4 longitudinal rows of tubes. The fascicles are salient and formed of 2 or 3 tubes arranged transversally. The tubes are little distinct, separated by a furrow of little depth; their surface is much wrinkled transversally. The orifices are elliptical, transverse, with thick peristome.

Measurements.—Diameter of peristome, 0.24–0.30 mm.; distance of fascicles, 0.80–1.00; and width of branches, 0.30–0.80.

Affinities.—This species is very probably a *Tubulipora* but we have not yet discovered the ovicell. The branches are quite variable and sometimes uniserial in the vicinity of the protoecium. The transverse arrangement of certain fascicles causes us to classify this species in the genus *Tubigerina* Canu, 1911, discovered in the Rocanian of Argentina, but this is not a natural genus. On one specimen one of the fascicles contained eight tubes in two rows. The extremity of another colony is free.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

Cotypes.—Cat. Nos. 8330, 8331, U.S.N.M.

Forma ENTALOPHORA Lamouroux, 1821

ENTALOPHORA MAJOR, new species

Plate 77, fig. 8

Description.—The zoarium is free, cylindrical, bifurcated. The tubes are distinct, convex, separated by a shallow furrow, very *large*, wrinkled transversally; the orifice is orbicular; the peristome is thin; the peristomie is oblique and salient.

Measurements.—Diameter of peristome, 0.30–0.34 mm.; distance of orifices, 1.60; and diameter of branches, 1.50.

Affinities.—We believe that this species is the same as *Entalophora australis* Busk, 1875, but in Busk's figure the diameter of the peristome is 0.20 mm. and in MacGillivray's figure it is 0.36 mm. Under these conditions we preferred to regard the present species as new until we know more about the specimens described by Busk and by MacGillivray. Depth has no influence on the vigor of the colonies.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Holotype.—Cat. No. 8332, U.S.N.M.

ENTALOPHORA ARCUATA, new species

Plate 77, figs. 9–11

Description.—The zoarium is free, cylindrical, thin, rectilinear, bifurcated. The tubes are distinct, separated by a little salient thread, little convex, quite porous; the peristomie is long, oblique, arched; the orifice is orbicular; the peristome is thin.

Measurements.—Diameter of peristome, 0.16–0.18 mm.; distance of orifices, 2.00–2.24; and diameter of branches, 0.48.

Affinities.—The distance of the orifices is quite variable and on one of our figures it becomes as great as 2.80 mm. This is a charming and elegant species; it is more slender and more regular than *Entalophora proboscidea* Milne Edwards, 1838. Unfortunately not a single one of our 25 specimens was oviceIled. Depth has no influence on the vigor of the specimens.

Occurrence.—

D. 5219. Mompog Island, Marinduque; 13° 21′ N.; 122° 18′ 45″ E.; 530 fathoms; gn. M.; 10.4° C.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh. (common).

Cotypes.—Cat. No. 8333, U.S.N.M.

ENTALOPHORA DELICATULA Busk, 1875

Plate 77, figs. 6, 7

1875. *Pustulopora delicatula* Busk, Catalogue of the Cyclostomatous Polyzoa in the British Museum, p. 21, pl. 6B. fig. 3.

Measurements.—Diameter of orifice, 0.10 mm.; diameter of peristome, 0.14; diameter of tubes, 0.16–0.18; distance of orifices, 1-10 to 2.00; and diameters of branches, 0.50.

Affinities.—Our photograph differs from Busk's figure only in the slightly less length of the peristomie. All the remaining features are identical. Harmer, 1915, has introduced into synonymy with this species *Entalophora deflexa* Smitt, 1872, and *Entalophora wasinensis* Waters, 1914. This is quite possible, but we have not enough material to discuss the subject. However, the measurements indicated by Harmer are smaller than ours and we can not compare our figures with his.

Ortmann [17] gave a figure of a specimen from the Sea of Japan which is very different from ours and from those of Busk; it is, moreover, very difficult to understand on account of the slight enlargement (×5) employed by this author.

Occurrence.—D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

Plesiotypes.—Cat. No. 8334, U.S.N.M.

Family THEONOIDAE Busk

Genus ACTINOPORA D'Orbigny, 1853

ACTINOPORA JAPONICA, new species

Plate 77, fig. 4

Description.—The zoarium is free and discoid or bilamellar and flabelliform. The tubes are arranged in radiating fascicles, little salient, to the number of thirty. The interfascicular spaces are wide and wrinkled concentrically.

Measurements.—Width of fascicles, 0.12 mm., and diameter of zoarium, 4.

Affinities.—The free specimens of *Actinopora* are sometimes flabelliform and bilamellar; the colony appears as folded upon itself. This phenomenon oftentimes observed in the fossils has still not been studied and explained.

This species is very well characterized by its wide and wrinkled interfascicular spaces.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Holotype.—Cat. No. 8335, U.S.N.M.

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[17] 1889, *Entalophora delicatula* Ortmann, Die japanische Bryozoen-Fauna, Archiv für Naturgeschichte vol. 50, p. 61, pl. 4, fig. 28.

ACTINOPORA PHILIPPINENSIS, new species

Plate 77, fig. 5

Description.—The zoarium encrusts shells; it is discoidal and surrounded by a wide basal lamella. The radiating fascicles are numerous, crowded, salient, and as wide as the interfascicular spaces.

Measurements.—Width of fascicles, 0.15 mm.; zoarial diameter, 4.5; and number of fascicles, 48.

Affinities.—This species has the aspect of *Actinopora gaudryana* D'Orbigny, 1852, of the European Cretaceous, but it differs in its large peripheral basal lamella and in its very irregular center.

Up to the present the ovicelled species of *Actinopora* have been classed in the genus *Desmeplagioecia* Canu and Bassler, 1920. It may be therefore that the present species also belongs to this genus, but we have not yet discovered the ovicell.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 4′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Holotype.—Cat. No. 8336, U.S.N.M.

Family FRONDIPORIDAE Busk, 1875

Genus FILIFASCIGERA D'Orbigny, 1852

The colonies are creeping, narrow, linear, or curved. The tubes are grouped in salient, orbicular, or elliptical fascicles, regularly spaced. The orifices are polygonal. The ovicell is a vesicle placed between the fascicles and perforated by closed tubes.

Genotype.—*Filifascigera dichotoma* D'Orbigny, 1852. Cretaceous—Recent.

The known species of the genus are:

Filigascigera robusta Canu and Bassler, 1927	Hawaii (142–406 m.).
Filifascigera parvipora, new species	Philippines (34 m.).
Filifascigera pluripora, new species	Philippines (192 m.).
Filifascigera miocenica Canu MSS	Miocene (Helvetian).
Filifascigera bulbosa Levinsen, 1925	Cretaceous (Danian).
Filifascigera (*Tubulipora*) *megaera* Lonsdale, 1845	Cretaceous (Vincentown.)
Filifascigera dichotoma D'Orbigny, 1852	Cretaceous (Senonian).

This genus until recently was known as fossil only in the Cretaceous. We have had the good fortune to discover a species in the Helvetian of Touraine and three recent species in the equatorial zone. The living species have varying depths, but water from 17° to 20° is absolutely necessary. The ovicell is that of the Frondiporidae, which permits the exact classification. We have given a special study of this genus in our work on the Bryozoa of Hawaii.

FILIFASCIGERA PLURIPORA, new species

Plate 78, fig. 7

Description.—The zoarium creeps over shells in sinuous branches. The tubes are indistinct on the zoarial surface and striated transversely. They are grouped in orbicular fascicles containing many polygonal *orifices* (8 to 12).

Measurements.—Diameter of fascicles, 0.5 mm; distance of fascicles, 2.00; diameter of orifice, 0.12; width of branches, 0.80.

Occurrence.—D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.; 17.2° C.

Holotype.—Cat. No. 8337, U.S.N.M.

FILIFASCIGERA PARVIPORA, new species

Plate 78, fig. 8

Description.—The zoarium encrusts shells; it is formed of short ramified branches. The tubes are very little visible on the zoarial surface. They are grouped in *small* orbicular fascicles, very salient, oblique or erect. The orifices (4 to 8) are small and polygonal.

Measurements.—Diameter of fascicles, 0.34 mm.; distance of fascicles, 1.20; diameter of orifices, 0.06; and width of branches, 0.80.

Affinities.—This is the smallest known species and is therefore easy to determine.

Biology.—The two species of *Filifascigera* known in the Philippines, live in localities where the waters are very calm. The development of the peristomies as well as the grouping of the tubes in fascicles are therefore a biological necessity in connection with the pursuit and capture of the plankton.

Occurrence.—D. 5144. Jolo Light, Jolo; 6° 05′ 50″ N.; 121° 02′ 15″ E.; 19 fathoms; co. S.

Holotype.—Cat. No. 8338, U.S.N.M.

Family CRISIIDAE Johnston, 1847

Genus CRISIDIA Milne Edwards, 1838

The sterile segments always consist only of one zoid; the gonozoid is the only member of its own segment; the membranous sac in the gonozoid is constricted off into two parts; 9 tentacles. (Borg. 1924.)

Genotype.—*Crisidia* (*Sertularia*) *cornuta* Linnaeus, 1758. Recent.

Genus BICRISIA D'Orbigny, 1852

The sterile segments, when branchless, consist of two zoids; the fertile segments are composed of 3–5 zoids; the gonozoid is free for the greatest part of its length and with the tube on its dorsal side; the membranous sac in the gonozoid is constricted off into two parts; 8 tentacles. (Borg, 1924.)

Genotype.—*Bicrisia* (*Crisidia*) *edwardsiana* D'Orbigny, 1839. Recent.

Genus FILICRISIA D'Orbigny, 1852

The sterile segments consist of 1–3 zoids; the fertile segments are composed of 3–5 zoids; the gonozoid is adnate; its tube is terminal; the membranous sac in the gonozoid is probably constricted off into two parts; 8 tentacles.

Genotype.—Filicrisia (*Crisidia*) *geniculata* Milne Edwards, 1838.

Genus CRISIELLA Borg, 1924

The sterile segments, except in the basal parts of the colonies, consist of 3–7 zoids; the fertile segments are composed of many, often

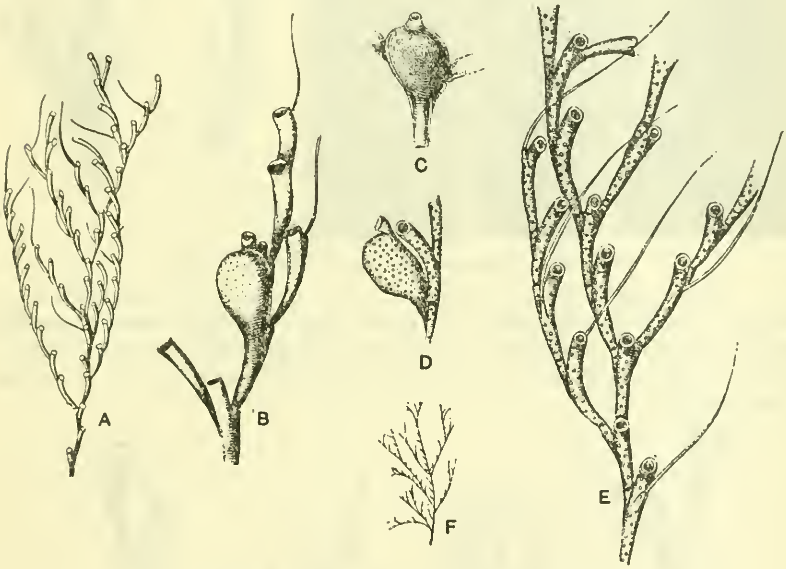

Fig. 216.—Genus *Crisidia* Milne Edwards, 1838

A–F. *Crisidia cornuta* Linnaeus 1758 (Ellis 1755). A. Articulated branches showing the gemmation and the method of ramification, ×15. B. Portion of ovicelled colony, ×48. (A, B. After Milne Edwards, 1838.) C. An ovicell viewed from the front. (After Harmer, 1891.) D. An ovicell seen in profile. E. Portion of nonovicelled colony, ×26. F. Colony, natural size. (D–F. After Hincks, 1880.)

more than 20 zoids, divided without joints in a varying number of partial segments that surround the gonozoid; this together with the surrounding partial segments is more or less twisted round its axis; the membranous sac of the gonozoid is not constricted off into two parts; 8 tentacles. (Borg, 1924.)

Genotype.—Crisiella (*Crisia*) *producta* Smitt, 1866. Recent.

Genus CRISIA Lamouroux, 1812

The sterile segments, except in the basal part of the colonies, consist of 3 to many zoids; the fertile segments are composed of 5 to many

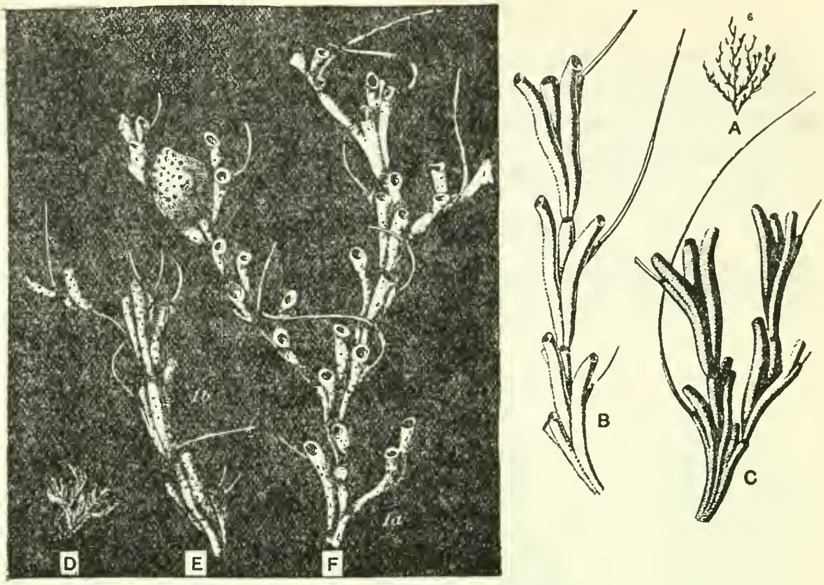

FIG. 217.—Genus *Bicrisia* D'Orbigny, 1852

A–F. *Bicrisia edwardsiana* D'Orbigny, 1839. A. Colony, natural size. B. Frontal view of several segments. C. Dorsal view showing the mode of ramification. (A–C. After D'Orbigny, 1839.) D. Another colony, natural size. E. Dorsal view of several segments. F. Frontal view of segments with one ovicell. (After MacGillivray.)

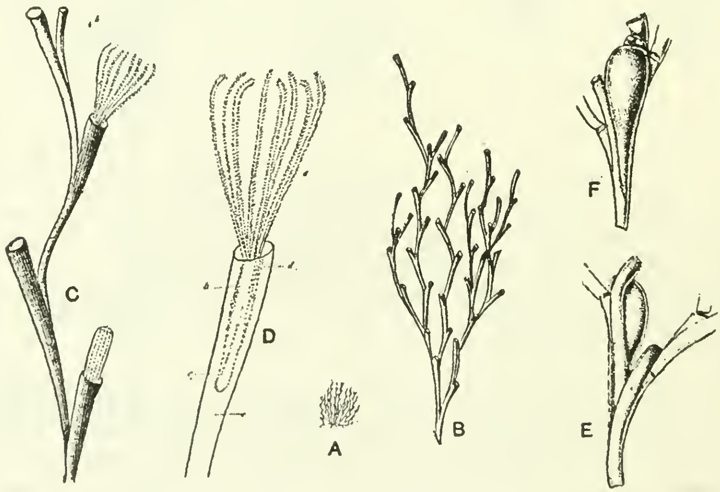

FIG. 218.—Genus *Filicrisia* D'Orbigny, 1852

A–F. *Filicrisia geniculata* Milne Edwards, 1838. A. Bush-like colony, natural size. B. Portion of colony, ×16. C. Tubes, ×48, showing gemmation. D. A tube viewed by transparency, showing the eight ciliated tentacles and the principal anatomical features; *a*, tentacles furnished with vibratile cilia; *b*, stomach; *c*, intestine, *d*, anus; *e*, retractor muscles of the polypide. (A–D. After Milne Edwards, 1838). E. F. Ovicell viewed from the dorsal and frontal (After Harmer, 1891.)

zoids; the membranous sac in the gonozoid is not constricted off into two parts; 8 tentacles. (Borg, 1924.)

Genotype.—*Crisia* (*Sertularia*) *eburnea* Linnaeus, 1758.

Range.—Eocene (Lutetian)—Recent.

CRISIA DELICATULA, new species

Plate 78 fig. 9.

Description.—The segments are long, *very thin*, rectilinear, narrowing at the base and formed by 20 tubes. The lateral peristomes are thin, alternate, little salient, little visible on the zoarial dorsal, more distant than the zoarial width. The basis ramae is wide and placed at a zoarial bend.

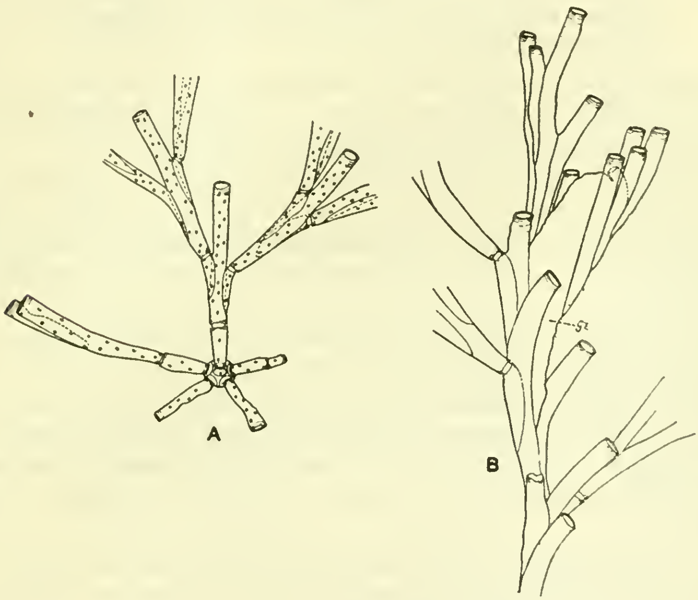

Fig. 219.—Genus *Crisiella* Borg, 1924

A, B. *Crisiella producta* Smitt, 1866. A. Basal part of zoarium, ×30 showing primary disk, rhizoids, basal tubulus and dichotomous mode of branching. B. Fertile internode, ×20, with full grown gonozoid (G_s) twisted almost 180°.

Measurements.—Diameter of peristome, 0.08 mm.; distance of orifices, 0.30–0.34.; and width of segments, 0.24.

Affinities.—In its great fragility and in its numerous tubes to the segments, this species can be compared only with *Crisia elongata* Milne Edwards, 1838, of Australia, but it differs from the latter in a slightly greater distance between the tubes (0.30–0.34 mm., in place of 0.28–0.32 mm.). Species of *Crisia* live in small bushes attached to floating algae; they have therefore never lived where they are dredged in the condition of detached segments.

Occurrence.—

D. 5235. Nagubat Island, east coast of Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M. (common).

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Cotypes.—Cat. No. 8339, U.S.N.M.

CRISIA HÖRNESI Reuss, 1847

Plate 78, figs. 10–13.

1920. *Crisia hörnesi* Canu and Bassler, North American Early Tertiary Bryozoa, Bull. 106, U. S. National Museum, p. 704, pl. 141, figs. 1–4. (Bibliography, geologic distribution.)

Measurements.—Diameter of peristome, 0.08–0.10 mm.; distance between apertures, 0.32–0.36.; width of segments, 0.32–0.36.; number of tubes to segments, 16; and ovicell, 0.48 by 0.48.

Affinities.—The micrometric measurements are identical with those of *Crisia denticulata* Milne Edwards, 1838, but *C. hörnesi* differs in the presence of 16 tubes to the segments (instead of 11 as figured by Milne-Edwards) and in the longitudinal keel ornamenting the segments.

The figure of Reuss, 1847, indicates 16 tubes to the segment; that of Reuss, 1866 (incomplete), indicates 14 of them; those of Canu and Bassler, 1920, indicate 17 or 18. Our present photographs indicate 16. This constancy is remarkable and should be taken into consideration. The figure of Manzoni, 1877, does not show the keel and gives 21 tubes to the segment; it indicates certainly a distinct variety.

In *Crisia denticulata* Milne Edwards, 1838, there are only 11 tubes to the segment although Harmer counted as many as 15. The determination of *Crisia* from isolated segments presents great difficulties. The illustration of the different variations on a living colony is still to be made.

Biology.—According to Harmer the full development of *Crisia* on the English shores is in April and May. Our ovicelled specimens were collected in September.

Occurrence.—

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 6′ 45″ E.; 162 fathoms; br. S., co.; 11.2° C.

Plesiotypes.—Cat. Nos. 8340, 8341, U.S.N.M.

Family PLAGIOECIIDAE Canu, 1918

Genus PLAGIOECIA Canu, 1918

PLAGIOECIA RETICULOIDES, new species

Plate 78, figs. 1–6

Description.—The zoarium has the Reticulipora form of growth; the basal lamella is visible only on the terminal branches. The tubes are visible, oblique, separated by a little developed furrow very little convex. The apertures are arranged in transverse rows; the peristomes are thin, little salient, adjacent to each other. The ovicell is an ovoid sac in which the large axis is parallel to the zoarial border.

Measurements.—Diameter of peristomes, 0.10 mm.; distance of rows, 0.40.; and width of branches, 1.50.

Affinities.—This species is characterized by its dorsal which presents two longtiudinal rows of tubes terminated by a very irregular fistular orifice. The Cretaceous Reticuliporas form magnificent colonies with polygonal meshes. The Tertiary species are smaller and often incomplete. The present species is absolutely dwarfed in comparison with the fossil species. This zoarial form is in complete decadence.

Only the figured examples have been found. They were ovicelled on September 25, 1909.

Occurrence.—D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 9′ 52″ E.; 175 fathoms; fine S., Co.

Cotypes.—Cat. No. 8342, U.S.N.M.

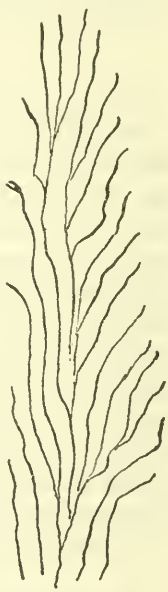

FIG. 220.—*Plagioecia reticuloides*, new species. Longitudinal thin section, ×25

Family MECYNOECIIDAE Canu, 1918

Genus MECYNOECIA Canu, 1918

MECYNOECIA OBESA Canu and Bassler, 1922

Plate 79, figs. 1, 2

1922. *Mecynoecia obesa* CANU and BASSLER, Studies on the Cyclostomatous Bryozoa, Proceedings of the National Museum, vol. 61, p. 12, pl. 1, pl. 1, fig. 6–8.

Measurements.—Diameter of peristome, 0.10–0.12 mm.; diameter of tubes, 0.14; distance between orifices, 0.58–1.00; separation of peristomes, 0.66; dimensions of ovicell, 1.30 by 0.70; oeciostome, 0.06 mm. (length), 0.12–0.14 mm. (width); and width of branches, 0.80.

The oeciostome is larger than an aperture, transverse, orthogonal and concentric. The ovicelled specimens were dredged in February, 1908.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

Cotypes.—Cat. No. 7373, U.S.N.M.

MECYNOECIA UNIFASCIATA, new species

Plate 79, figs. 7, 8

Description.—The zoarium has the Filisparsa growth form. The tubes of the cellular face are distinct, convex; the peristomie is very long, curved; the peristome is thin and sharp. The ovicell is a long, very convex sac wrinkled transversally; the oeciostome is large, transverse orthogonal.

Measurements.—Diameter of peristome, 0.14–0.16 mm.; length of peristomie, 0.50; width of branches, 0.50; dimensions of ovicell, 1.28 by 0.46; and oeciostome, 0.11 mm. (length) by 0.20 mm. (width).

Affinities.—The tubes are arranged on a single face of the colony. They are very salient and quite fragile. This zoarial form is rather rare in the recent seas and it is the first time that it has been discovered with an ovicell of the Mecynoeciidae.

Occurrence.—

D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

Holotype.—Cat. No. 8344, U.S.N.M.

MECYNOECIA RECTANGULATA, new species

Plate 79, figs. 3–6

Description.—The zoarium is free, cylindrical, filiform, ramose, the branches are bifurcated at *right angles*. The tubes are little visible, separated by a very small furrow, convex, wrinkled transversely but irregularly; the peristomie is long, somewhat oblique or perpendicular to the zoarial surface; the peristome is thin and orbicular. The ovicell is an elongated, very convex sac.

Measurements.—Diameter of peristome, 0.12 mm.; length of peristomie, 0.20; and width of branches, 0.50.

Affinities.—The visible length of the tubes is very irregular; it varies from 0.50 mm. to 1.20 mm. The general aspect is as a result very inconstant. The peristomes are often arranged in oblique verticells and at other times in irregular quincunx.

This species differs from *Mecynoecia longipora* in its smaller micrometric measurements, its great irregularity, in the sporadic presence of false verticells and in the ramification at right angles of its branches. The tubes are often invisible when the transverse ridges are thick and close together.

Occurrence.—

D. 4807. Cape Tsiuka, Sea of Japan; 40° 36′ 12″ N.; 140° 36′ E.

D. 5137. Jolo Light, Jolo; 6° 4′ 25″ N.; 120° 58′ 30″ E.; 30 fathoms; S. Sh. (common).

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh. (common).

Cotypes.—Cat. Nos. 8345–8348, U.S.N.M.

MECYNOECIA LONGIPORA MacGillivray, 1895

Plate 80, fig. 10

1895. *Entalophora longipora* MacGillivray, A Monograph of the Tertiary Polyzoa of Victoria, Transactions of the Royal Society of Victoria, vol. 4, p. 140, pl. 20, fig. 14.

1922. *Mecynoecia longipora* Canu and Bassler, Studies on the Cyclostomatous Bryozoa, Proceedings of the U. S. National Museum, vol. 61, p. 13 pl. 1, fig. 9–11.

This species differs from *Mecynoecia rectangulata* in its visible tubes, in its larger peristomial diameter (0.16 mm. and not 0.12 mm.) and in its branches diverging at a smaller angle. The figured ovicelled specimens were found in April, 1908. The species is especially common in the Sulu Sea.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 9′ N.; 120° 58′ E.; 29 fathoms; co. S. (common).

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh. (common).

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.

D. 5219. Mompog Island, Marinduque; 13° 21′ N.; 122° 18′ 45″ E.; 530 fathoms; gn. M.; 10.4° C.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

Plesiotype.—Cat. No. 7374, U.S.N.M.

MECYNOECIA PROBOSCIDEA Milne Edwards, 1838

Plate 80, figs. 7–9

1838. *Pustulopora proboscidea* Milne Edwards, Memoire sur les Crisies, Annales Sciences naturelles, ser. 2, vol. 9, p. 219, pl. 12, fig. 2.

1915. *Entalophora proboscidea* Harmer, The Polyzoa of the Siboga Expedition; pt. 1, p. 108, pl. 10, fig. 12 (ovicells).

1920. *Mecynoecia proboscidea* Canu and Bassler, Monograph Early Tertiary Bryozoa North America, Bull. 106, U. S. National Museum, p. 726, pl. 108, figs. 1–15.

The base has the Proboscina growth form and not an expanded foot. The ovicell on our specimen is similar to that figured by Harmer in 1915 from a Malasian example.

The peristome measures 0.20 mm. in diameter on the average. Some variations are possible according to the diameter of the branches; on the more robust it can measure 0.24 mm. although this is rare.

Biology.—According to former observations made on specimens from the temperate zone this species seemed characteristic of the rather deep bottoms. In the equatorial zone it appears on the contrary to live at less depth. Harmer, 1915, cites 36 to 73 meters for specimens from Malasia. In the Philippines we have observed it from 34 to 47 meters and its geographic extension is much reduced. In the Sulu Archipelago, very rich in diatoms, the peristomes are little salient but as other species with long peristomies live in this same locality it must be concluded that the great saliency of the tubes has no relationship to the richness of the plankton.

Occurrence.—

D. 5141. Jolo Light, Jolo; 60° 9′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh. (common).

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh. (common).

Plesiotypes.—Cat. Nos. 8350–8352, U.S.N.M.

MECYNOECIA GEMINATA, new species

Plate 79, figs. 9, 11

Description.—The zoarium is free, cylindrical, robust, bifurcated borne on an orbicular, little expanded foot. The tubes are visible only because of their convexity; they are striated transversely, isolated, or paired; the peristomie is salient, somewhat oblique or almost perpendicular to the zoarial surface; the peristome is orbicular and very thick. The ovicell is a long, very convex sac terminated by a large crescentic oeciopore.

Measurements.—Diameter of orifice, 0.10–0.12 mm; diameter of peristome, 0.20; diameter of tubes, 0.24–0.26; distance of apertures, 1.00; width of branches, 1.00.

Affinities.—The paired tubes characterize this species very well. Fascicles of three tubes are very rare. The transverse section indicates the club-shaped tubes.

Our ovicelled specimens are not in a perfect state of preservation as one is incomplete and the other is partially altered. The specimens were ovicelled February, 1908.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 9′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5145. Jolo, Sulu Archipelago; 6° 4′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, north of Tawi Tawi Group; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

Cotypes.—Cat. No. 8353, U.S.N.M.

MECYNOECIA BREVICULA, new species

Plate 80, figs. 5, 6

Description.—The zoarium encrusts shells; it is flabelliform and surrounded by a very wide basal lamella. The tubes are thin, very long, isolated, indistinct at their base. The ovicell is small, convex, *very short*, wide; the oeciostome is orthogonal and smaller than the aperture of a tube

Measurements.—Diameter of peristome, 0.12 mm.; diameter of oeciostome, 0.08; dimensions of ovicell, 0.36 mm. (length); 0.40 mm. (width).

Affinities.—Without the presence of the ovicell, it is absolutely impossible to determine this charming little species. It has the *Berenicea* growth form with very long tubes. Our specimens were living and in reproduction on February 7, 1908.

Occurrence.—D. 5135. Jolo Light, Jolo; 6° 11′ 50″ N.; 121° 08′ 20″ E.; 161 fathoms; fine co. S.

Cotypes.—Cat. No. 5135, U.S.N.M.

Genus MICROECIA Canu, 1918

MICROECIA SINUOSA, new species

Plate 80, figs. 3, 4

Description.—The zoarium encrusts shells and nullipores; the branches are *sinuous* with undulations more or less close together. The tubes are little distinct, convex; the peristomie is short, oblique or quite erect; the peristome is thin and orbicular. The apertures are arranged in quincunx and very close together. The ovicell is very small, convex, arranged between 5 or 6 tubes.

Measurements.—Diameter of peristome, 0.15 mm.; distance of apertures, 0.48; separation of apertures, 0.48; diameter of branches, 0.80–1.20.

Affinities.—*Proboscina ziczac* D'Orbigny, 1851, has an analogous zoarial form but the peristomes are much more scattered from each other. According to Gregory, 1899, this is a variety of *Proboscina fasciculata* Reuss, 1846, a fossil species widely distributed in the European Cretaceous.

Occurrence.—

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15 E.; 24 fathoms; co. S., Sh.

D. 5179. Romblon Light, Romblon; 12° 38′ 15″ N.; 122° 12′ 30″ E.; 37 fathoms; hrd. S.

Cotypes.—Cat. Nos. 8355, 8356, U.S.N.M.

Family DIAPEROECIIDAE Canu, 1918

Genus DIAPEROECIA Canu, 1918

The distinction between *Diaperoecia* and *Tubulipora* without fascicles and with subsymmetric (nondigitate) ovicells is often made with great difficulty. In *Diaperoecia*, the oeciostome is isolated, orthogonal (opening in a different direction from the tubes), submedian or sublateral, never terminal; the tubes which pierce the ovicell are always isolated even if the colony is fasciculated. In *Tubulipora* the oeciostome is more or less long opening in the same direction as the other peristomes, always adjacent to a tube; in the fasciculate *Tubuliporas* the fascicles persist in traversing the ovicell.

DIAPEROECIA INTRICARIA Busk, 1875

Plate 80, figs. 1, 2

1875. *Pustulopora intricaria* Busk, Catalogue Marine Polyzoa, vol. 3, p. 22 pl. 10, figs. 1–4.

1879. *Pustulopora intricaria* Haswell, Cyclostomatous Polyzoa of Port Jackson, Proc. Linnean Society New South Wales, vol. 4, p. 352.

1914. *Entalophora intricaria* Waters, Marine fauna British East Africa, Proc. Zoological Society London, p. 842.

1915. *Entalophora intricaria* Harmer, The Polyzoa of the Siboga Expedition, pt. 1, p. 112, pl. 10, figs. 13, 14.

Measurements.—Diameter of peristome, 0.14–0.16 mm.; distance of peristomes, 0.70–0.90; separation of peristomes, 0.56–0.70.

Variations.—Our specimens are similar to those of the *Siboga* expedition figured by Harmer, 1915. Some branches seemingly have their summit enlarged as on Busk's figure but they are more slender and less robust. The ovicell which we figure is not as beautiful as the one illustrated by Harmer, but it is sufficient to show that we are not mistaken in our determination.

Occurrence.—

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Harmer in his *Siboga* report cites it from Station 164–1° 42′ S.; 130° 47′ E.; 32 M. and Station 282–N. E. of Timor—27–54 meters, Torres Strait. Busk indicates South Australia.

Plesiotypes.—Cat. No. 8357, U.S.N.M.

DIAPEROECIA INDISTINCTA, new species

Plate 81, figs. 8, 9

Description.—The zoarium encrusts nullipores, bryozoa, and shells; it is of a beautiful clear violet color. The branches are irregular, convex, sublinear or quite expanded. The tubes are *indistinct*; the peristomes are orbicular, thin, somewhat salient; they are arranged in rather regular quincunx. The ovicell is suborbicular, quite convex, traversed by 5 or 6 tubes; the oeciostome is very small, isolated, orthogonal.

Measurements.—Diameter of peristome, 0.12–0.14 mm.; distance of peristomes 0.34–40; separation of peristomes, 0.40–0.50.

Affinities.—The basal lamella is not visible at the extremity of the branches. Sometimes the zoarial surface is wrinkled transversely. One of our specimens creeps over both sides of a shell.

In the widened form of a lobe of a figured colony, this species resembles *Tubulipora clavata* MacGillivray, 1884, from Australia but differs in its larger peristome (0.12–0.14 mm. and not 0.08–0.10 mm.) and in the rarity of the club shaped branches. On one of our specimens the tubes are slightly visible.

Occurrence.—

D. 5137. Jolo Light, Jolo; 60° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Cotypes.—Cat. Nos. 8358, 8359, U.S.N.M.

DIAPEROECIA ROSEA, new species

Plate 82, figs. 9–13

Description.—The zoarium is free, bifurcated with the tubes on a single side (*Filisparsa* growth form); the dorsal face is convex, wrinkled concentrically and bears small columns of support (rooting columns). The tubes are short, convex, distinct; the peristomie is slightly curved and terminated by an orbicular, thin peristome; the peristomes are arranged in rather regular quincunx. The ovicell is elliptical, very convex, pierced by 5 to 8 tubes; the oeciostome is small, sublateral, somewhat recurved.

Measurements.—Diameter of peristome, 0.20 mm.; width of branches, 0.8.

Variations.—We group under the name of *Diaperoecia rosea* a number of specimens coming from different localities, but we are not positively certain that they belong to the same species. The specimens from Sibutu (China Sea) especially, appear to us somewhat divergent in their ensemble. Moreover the incrusting specimen from Sulade, in spite of the identity of the micrometric measurements, is perhaps a *Tubulipora*; its ovicell is incomplete.

As Harmer, 1915, has already demonstrated, the determination of Cyclostomata from different localities is always difficult when the material is not very abundant.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh.

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S., Co.

Cotypes.—Cat. Nos. 8360–8363, U.S.N.M.

DIAPEROECIA TRANSVERSALIS, new species

Plate 81, figs. 1, 2

Description.—The zoarium is free and unilamellar or encrusting bryozoa; the branches are long and sinuous. The tubes are little distinct, wrinkled transversely, convex; the peristomies are long, very erect, terminated by a thin peristome; they are arranged in fascicles of 2 to 4 tubes and disposed transversely. The ovicell is large, elliptical, pierced by a dozen isolated peristomies; the oeciostome is small, transverse, orthogonal, sublateral.

Measurements.—Diameter of peristome, 0.24–0.26 mm.; diameter of oeciostome, 0.09; width of branches, 1.00; and distance of fascicles (without peristome), 0.40–0.60.

Affinities.—The fascicles occupy all the zoarial width; when they are formed of two tubes they are arranged in lateral opposite groups as in *Idmonea*.

A remarkable characteristic of this species is that the tubes which traverse the ovicell are isolated and not grouped in fascicles. If our ovicelled specimen had not borne some transverse facscicles we would not have been able to refer it to the present species. The zoarial aspect is remarkable. It is neither a *Tubigerina*, a *Tubulipora*, nor an *Idmonea* although presenting a union of these three ancient genera. In the old zoarial classification a special genus for this species would have been necessary. This species shows moreover that the grouping of tubes in fascicles is not a characteristic peculiar to *Tubulipora* and that it does not seem to be even a generic essential. Why then are the characters which are constant in other species so mingled here? This is one of the biologic mysteries which the bryozoa reveal to us, the existence and discovery of which requires us to change our classification constantly.

Affinities.—The species differs from *Tubigerina rugosa* in its larger peristome and in it more closely connected fascicles one with the other.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Cotypes.—Cat. Nos. 8364, 8365, U.S.N.M.

DIAPEROECIA SCALARIA Canu and Bassler, 1922

Plate 81, figs. 3–7

1880. *Idmonea milneana* MacGillivray, Prodromus Zoology Victoria, pl. 68, fig. 1.

1922. *Platonea scalaria* Canu and Bassler, Studies on the cyclostomatous Bryozoa, Proc. U. S. National Museum, vol. 61, p. 49, pl. 11, figs. 1–5.

Measurements.—Zooecial diameter, 0.20 mm.; width of fascicles, 0.25; distance between fascicles, 0.40; dimensions of oeciostome, 0.26 by 0.14; and zoarial width, 1.20.

History.—MacGillivray, 1880, discovered *Idmonea milneana* in his material from Port Phillips Head; he identified it correctly but he said that he figured the largest specimen without remarking that it was not similar to the others; his figure is exactly the reproduction of our *Diaperoecia scalaria.* We arranged this species in *Platonea* in our studies of 1922 because of the form of the oeciostome but since then we have found several ovicells of the same species in which the oeciostome, completely isolated, is always orthogonal. It is therefore necessary to arrange this species in *Diaperoecia.*

Variations.—The tubes are arranged in true salient fascicles, alternating on each side of the longitudinal median axis. There are two to four tubes in each fascicle according to the sinuousities of the branches. The branches are sinuous, never rectilinear, ramified, often quite narrow at their base. The base has the Proboscina growth form creeping over shells; the first free branches are supported by columns for the zoarium is expanded and never erect.

On well preserved, little calcified specimens the tubes are visible and separated by a salient thread.

The ovicell is generally placed at the bifurcations of the branches, and is convex and finely porous. It is pierced by a variable number of tubes always isolated from each other. The oeciostome is small orthogonal, subcentral. Small incomplete ovicells without oeciostome are frequent.

Affinities.—This species differs from *Idmonea milneana* Smitt, 1872, and from *Diaperoecia radicata* Kirkpatrick, 1888 in its tubes arranged in alternate fascicles (true *Idmonea*) and in the large micrometric dimensions (P = 0.26 mm. and not 0.20 mm.). This is a large and vigorous species easily determined with the lens. It differs from *Diaperoecia transversalis* in which the dimensions are almost as large, in its greater zoarial width and in the alternate arrangement of its fascicles. The colonies are sometimes rose color or red.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 58′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S. Sh. (common).

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh. (common).

D. 5547. Noble Point, Tulayan Island, vicinity of Jolo; 6° 04′ 45″ N.; 121° 20′ 20″ E.; 114 fathoms.

D. 5577. Mount Dromedario, north of Tawi Tawi Group; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., Co.; 13° C.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S., Co.; 13.2° C.

Cotypes and plesiotypes.—Cat. Nos. 7375, 8367–8369, U.S.N.M.

DIAPEROECIA RADICATA Kirkpatrick, 1888

Plate 82, figs. 1–8

1888. *Idmonea radicata* Kirkpatrick, Polyzoa of Mauritius, Annals and Magazine of Natural History, ser. 6, vol. 1, p. 83, pl. 9, fig. 2.

Measurements.—Diameter of peristome, 0.20 mm.; width of branches, 0.75–0.85; diameter of oeciostome, 0.16.

Variations.—Our specimens are identical with the figure of Kirkpatrick; they are characterized by the expanded form of the peristomies, by the oval and accuminate peristome and by the absence of characteristic fascicles.

The ovicell is elliptical on the branches and flabellate at the bifurcations; it is pierced by a number of variable but always isolated tubes, distant from each other. The oeciostome is small, transverse, orthogonal; it opens perpendicularly to the zoarial plane and often it is visible only in inclining the specimen.

The tubes are almost always visible on the dorsal and separated by slight longitudinal furrows. They are wrinkled transversely. Although the calcification is somewhat accentuated, when the light is very strong, the transverse wrinkles are alone visible and decorate the zoarial surface.

The base is a *Proboscina* creeping on a shell; the free branches are supported by small columns and spread out horizontally; they are never erect. Figure 2*a* of Kirkpatrick illustrates perfectly the colonial ensemble and the utility of the small columns. The branches are very rarely united by transverse trabeculae (= cross connections of Harmer). The peristomes are grouped in oblique series but never in true fascicles; very rarely the peristomes are adjacent. We have found, however, a superb ovicelled specimen of beautiful clear rose color in which the tubes are grouped in fascicles. We classify it as the type of the new variety *fasciculata*, for we are not able to discover other distinctive characters. (Pl. 82, fig. 6.)

The micrometric measurements are rather constant. We have, however, found always in the same locality Tacbuc specimens with smaller dimensions which we have separated a new variety *minor*. (Pl. 82, figs. 7, 8.)

Affinities.—Kirkpatrick, 1890, described from the China Sea. *Idmonea pulcherrima* with characters very close to the present species, which, however, differs in its expanded and not cylindrical peristomies, in its oval and not circular peristome, in its orthogonal oeciostomes and not in urn-shaped structure, and in the absence of numerous trabeculae between the zoarial branches. Harmer, 1915, has rediscovered numerous specimens of *Idmonea pulcherrima* in the materials from Siboga in the province of Malasia, to the south of the Philippines; he has been able to study the variations and to prove that the trabeculae are not constant, that the oeciostome can be orthogonal, that the peristomies are sometimes expanded and that the peristomes are not always orbicular. From these comparisons it results that *Diaperoecia radicata* is very probably identical with *D. pulcherrima*. Although our specimens are very numerous, we have never observed trabeculae or oeciostomes in urn-shaped structure. We believe that the two species can be maintained provisionally. Harmer indicates in the synonymy of *Diaperoecia pulcherrima*, *Idmonea interjuncta* Waters 1887 and 1914 (not MacGillivray, 1886) and *Idmonea milneana* Thornely, 1905.

Another species very close but not identical is *Idmonea milneana*, Smitt, 1872 (not D'Orbigny, 1838) from the Gulf of Mexico. According to the figures of Smitt the identity is almost complete; only the peristomies do not always expand and the number of tubes is greater. Our specimens from the Gulf of Mexico are not in a good state of preservation and do not permit of close comparison.

The species of Smitt has been rediscovered frequently in the European Tertiary. We found it in the Jacksonian and in the Vicksburgian of the United States (North Carolina and Mississippi) and we gave in 1920 the complete bibliography.[18] All these fossil specimens differ from *Diaperoecia radicata* and from *D. pulcherrima* in the wide branches bearing a larger number of tubes to the series; the dorsal (our basal lamella) is identical.

All of our specimens were dead; the ovicells are rather frequent. The species is usually quite rare and it is abundant only at the western extremity of Suriagao Strait.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5145. Jolo Light, Jolo, Sulu Archipelago; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5235. Nagubat Island, east coast of Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh. (common).

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

Indian Ocean: Mauritius (Kirkpatrick).

Plesiotypes.—Cat. No. 8370, 8371, U.S.N.M.

Cotypes.—Cat. No. 8372, U.S.N.M. (var. *minor*).

Holotype.—Cat. No. 8373, U.S.N.M. (var. *fasciculata*).

Family TUBULIPORIDAE Johnston, 1838

Genus TUBULIPORA Lamarck, 1816

In 1920 we considered the grouping of the tubes in fascicles as a generic feature and used the prefix Desme to indicate this character. We were much influenced by the old classification and by the ideas of Waters. We are now less positive because in comparing the fasciculated species with the nonfasciculated species we find the ovicells are perfectly identical.

However, if the grouping in fascicles is an important and generic character it will be perhaps useful to separate the nonfasciculated Tubuliporas and to resurrect the old genus *Criserpia* which Milne Edwards in 1838 had created for them.

TUBULIPORA COERULEA, new species

Plate 83, figs. 5–7

Description.—The zoarium, of a more or less deep *blue* color, creeps over shells, algae, corals, bryozoa and fragments of echinoids. It is formed of wide branches, long and sinuous or short, flabellated

[18] Bull. 106, U. S. National Museum p. 773, pl. 136, figs. 1–12).

and lobed, in which the ensemble is quite irregular. The tubes are sometimes isolated and arranged in quincunx, and often grouped in uniserial opposite or alternate fascicles. The tubes are little distinct and very short; the peristome is thin and orbicular. The ovicell is small, irregular, convex, perforated by the fascicles; the oeciostome is small, little salient, adjacent to a tube.

Measurements.—Diameter of peristome, 0.10 mm. (salient), 0.12 mm. (little salient); distance of fascicles, 0.10–0.16 mm.; number of tubes to fascicle, 2 to 4; and width of large lobes, 1.5–2.

Variations.—The zoarial form is quite variable and impossible to describe; several plates would be insufficient for the illustration of the principal variations and the greatest caprice occurs into the development of the branches. The arrangement of the peristomes is more constant; they are isolated (*Proboscina*) or grouped in idmoneiform fascicles without any reason for the cause of these transformations.

Biology.—This superb species has some very strange habits. The larva always chooses a small substratum as irregular as possible. The colony develops here in a most fantastic fashion, scaling the rough places, creeping in equilibrium over the thinnest crests and then developing fully in the most unexpected places. Even on large plane surfaces it chooses the most inconvenient places where it forms irregular and capricious meandering colonies. It often twists round its host covering it on both sides and sometimes entirely surrounding it. This is a true parasite for it can live only on the débris of other animals. It seems that it tries to hide their deformities under its superb cerulean branches.

Like all the beautifully colored species, this one lived in waters of little depth; at 28 meters its beautiful color is already diminished. Sea bottoms covered with organic débris and rich in diatoms were necessary for its life.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 4′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 9′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5144. Jolo Light, Jolo; 6° 5′ 50″ N.; 121° 2′ 15″ E.; 19 fathoms; co. S.

D. 5147. Sulade Islands, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Cotypes.—Cat. Nos. 8374, 8375, U.S.N.M.

TUBULIPORA (?) RADICATA, new species

Plate 83, figs. 3, 4

Description.—The zoarium is free, horizontal, supported by *colonnettes* or rooting columns. The tubes are large, distinct, quite convex, arched longitudinally; the peristomie is long and very salient; the peristome is thin and oval. The tubes are sometimes united in small fascicles of 2 to 4 cells.

Measurements.—Diameter of peristome, 0.24; zooecial diameter at base of peristomie, 0.36; distance of peristomes 0.80; and diameter of zoarium, 1.40.

Affinities.—The fascicles are rare; there is one with four tubes on one of the specimens, unfortunately too difficult to photograph.

This is a very vigorous species which is easy to distinguish from the irregular specimens of *Diaperoecia radicata* Kirkpatrick, 1888, by the great length of its peristomies. We have not found the ovicell.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 4′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 9′ 52″ E.; 175 fathoms; fine, S. co.; 13° C.

Cotypes.—Cat. No. 8376, U.S.N.M.

TUBULIPORA VARIANS, new species

Plate 84, figs. 7–12

Description.—The zoarium is generally free, it creeps over shells or on the débris of marine algae. The tubes are distinct, very convex; the peristomie is oblique, salient, the peristomes are orbicular, very convex, perforated by 3 or 4 tubes; the oeciostome is small, tubular, salient, adjacent to a tube and opens in the same plane as the other tubes.

Measurements.—Diameter of peristome, 0.18–0.20 mm.; zoarial dimensions, variable.

Affinities.—Under the name of *Tubulipora varians* we group a number of colonies quite variable in form which we have discovered in the same locality, all having the same zoarial dimensions and the same ovicell. Perhaps the specimens shown in Figures 8 and 11 in which the peristomies are a little longer belong to a different species or variety. The dorsal or basal lamella is flat; it is very easily detached from its substratum.

In its exterior aspect and its micrometric dimensions this species is very close to *Diaperoecia rosea*, but it differs in its flat dorsal (and not convex), lack of dorsal striations, and in its oeciostome, which is not orthogonal and adjacent to a tube. If these two species lived together their separation would be very difficult.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

Cotypes.—Cat. No. 8377, U.S.N.M.

TUBULIPORA (?) GRANDIPORA, new species

Plate 83, figs. 1, 2

Description.—The zoarium encrusts bryozoa. The tubes are *large*, distinct, isolated or united in irregular fascicles; the peristomie is very long, quite erect, rectilinear or curved.

Measurements.—Diameter of peristome, 0.30 mm., and length of peristomie, 0.60 mm.

Affinities.—The form of the colony depends on the substratum; it is elongated on flat and large surfaces (fig. 2); it is contracted on small surfaces and almost entirely surrounds them (fig. 1).

This species differs from *Diaperoecia transversalis* in the large dimensions of its peristomie. It differs from *Tubulipora phalangea* Busk, 1875, in its peristomial dimensions, which are twice as great.

We have not discovered the ovicell and it is by analogy only that we class it in *Tubulipora.*

Occurrence.—

D. 5147. Sulade Islands, Sulu Archipelago; 5° 41′ 40″ N.; 120° 48′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, north of Tawi Tawi Group; 5° 20′ 35″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

Cotypes.—Cat. No. 8378, U.S.N.M.

Genus IDMONEA Lamouroux, 1821

IDMONEA AUSTRALIS MacGillivray, 1884

Plate 84, figs. 4–6

1884. *Idmonea australis* MacGillivray, Prodromus Zoology Victoria, dec. 7, p. 30, pl. 68, fig. 2.

Measurements.—Diameter of peristomes, 0.14–0.16 mm.; distance of fascicles, 0.30; width of branches, 1.00; and number of tubes to fascicle, 4.

Affinities.—Our specimens are striated longitudinally, but this character is little visible, for the transverse wrinkles are quite visible and numerous; the latter are much curved. The fascicles project beyond the zoarial margins.

Our specimens are very long and narrow. Some of them are colored a brick red. We have not found the ovicell. It is a species of shallow water.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5147. Sulade Islands, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

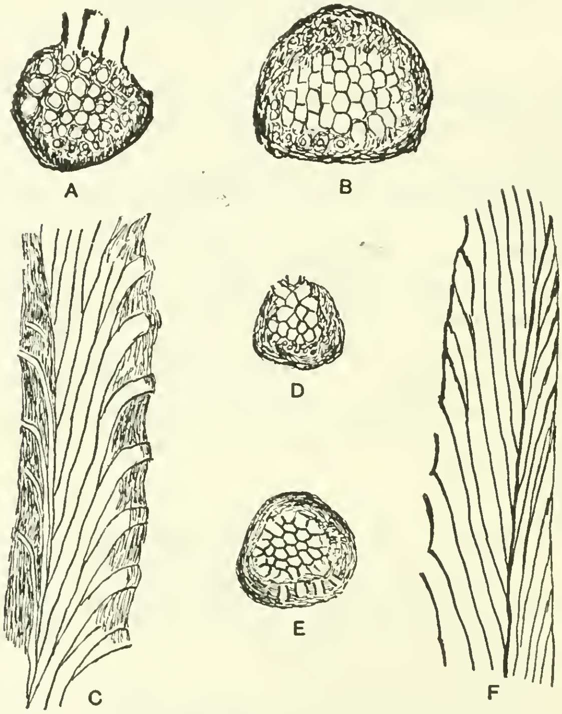

Fig. 221.—Family Tubuliporidae Johnston, 1838

A, B. *Idmonea australis* MacGillivray, 1884. A transverse section at the base of a fascicle and a second between the fascicles, ×25. C, D. *Mesonea simplex*, new species. C. Longitudinal section ×25 showing the great thickness of the peripheral epitheca, the triparietal gemmation and the length of the vacuolar tubes. D. Transverse section ×25, between the fascicles. E, F. *Pleuronea striata*, new species. E. Transverse section ×25. F. Longitudinal section ×25, illustrating the long thin tergopores.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5219. Mompog Island, between Marinduque and Luzon; 13° 21′ N.; 122° 18′ 45″ E.; 530 fathoms; gn. M.

Geographic distribution.—Port Philipps Heads at 10–15 fathoms (MacGillivray).

Plesiotypes.—Cat. Nos. 8379, 8380, U.S.N.M.

IDMONEA PAUPER, new species

Plate 84, figs. 13, 14

Description.—The zoarium is free, compressed, bifurcated; the branches are short, rectilinear, very divergent. The fascicles alternate on each side of the median crest and are oblique and salient; they are formed of two tubes, convex and little distinct, reaching the zoarial margin without passing beyond it. The ovicell is small, very globular, arranged between three fascicles only; the oeciostome is large, oblique, adjacent to the first peristome of a fascicle. The dorsal is slightly striated transversely.

Measurements.—Diameter of peristomes, 0.08–0.10 mm.; distance of fascicles, 0.30–0.40; diameter of branches, 0.50; number of tubes to fascicle, 2.

Affinities.—This species is very well characterized by the great divergence of the branches and by the poverty in number of tubes to the fascicles. It appears to be a deep water species.

Occurrence.—

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Cotypes.—Cat. No. 8397, U.S.N.M.

IDMONEA CRASSIMARGO, new species

Plate 85, figs. 2, 3

Description.—The zoarium is free, bifurcated, thick, supported by a little expanded base The fascicles are arranged alternately on each side of the median crest; they are formed of three distinct tubes, separated by a salient thread; the peristomes are thin and polygonal. The fascicles are short and the branches are surrounded by a thick margin without tubes. The dorsal is large, very convex, striated transversely.

Measurements.—Width of peristomes, 0.12 mm.; separation of fascicles, 0.40; diameter of first zooecium, 0.18; number of tubes to fascicle, 3; and zoarial width, 0.70.

Affinities.—In its zoarial margin, this species resemble very much *Idmonea tumida* Smitt, 1871, from Spitzberg, but differs from it in its larger micrometric measurements. Only the figured specimen has been found. We have photographed it because of its great affinity with a boreal species and its very distinctive characters.

Occurrence.—D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S. Co., 13° C.

Holotype.—Cat. No. 8398, U.S.N.M.

IDMONEA, FILIFORMIS, new species

Plate 84, figs. 1–3

The zoarium is free, delicate, filiform, sinuous, bifurcated almost always at a right angle. The fascicles are little salient, divergent toward the zoarial margin, alternate on each side of the median line, not projecting. The tubes are distinct, separated by a slight furrow in groups of two to the fascicle, with rectangular peristome. The dorsal is ornamented with large curved, transverse wrinkles.

Measurements.—Diameter of peristome, 0.08 mm.; distance between fascicles, 0.50–0.58 mm.; number of tubes to fascicle, 2; width of branches, 0.50 mm.

Affinities.—The general aspect is that of *Idmonea gracillima* Busk, 1875, but the present species differs in the presence of two tubes to the fascicle. Moreover, Busk's species belongs to the genus *Crisiona* Canu and Bassler, 1927.

Occurrence.—D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms, Sh.

Cotypes.—Cat. No. 8399, U.S.N.M.

IDMONEA PARVULA, new species

Plate 85, fig. 1

Description.—The zoarium is free, small, filiform, bifurcated, with triangular section, borne on a little expanded, circular base. The fascicles are salient, diverging toward the zoarial margins, alternating on each side of the median crest. The tubes are distinct, separated by a little visible thread, grouped in 2 or 3 to a fascicle, with thin square peristome. The ovicell is a long narrow sack arranged on the zoarial crest. The dorsal is striated longitudinally and transversely.

Measurements.—Diameter of peristome, 0.09 mm.; distance of fascicles, 0.28; number of tubes to fascicle, 2 or 3; and width of branches 0.40.

Variations.—The dorsal is superbly marked. The longitudinal striae are little visible but the transverse striae are curved and grouped in distinct zones.

Affinities.—This species differs from *Idmonea filiformis*, new species, in its much smaller branches and its less scattered fascicles.

Occurrence.—D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Cotypes.—Cat. No. 8400, U.S.N.M.

Genus PLEURONEA Canu and Bassler, 1920

PLEURONEA (?) DECORATA, new species

Plate 85, figs. 6–9

Description.—The zoarium is free, bifurcated, borne on a little expanded base, and little adherent to the substratum; the dorsal is plane, ornamented with ascending tergopores; the latter are closed by a concentrically wrinkled epitheca. The tubes are distinct, separated by a little salient thread, convex longitudinally. The fascicles are salient not projecting beyond the zoarial margin, formed of 3, 4, or 5 tubes, alternating on each side of the median axis.

Measurements.—Diameter of peristomes, 0.10 mm.; distance of fascicles, 0.24–0.30; number of zooecia to fascicle, 3, 4, or 5; and zoarial width, 0.60–1.00.

Affinities.—This species is splendidly *decorated* by its beautiful, very convex and regular dorsal wrinkles which sufficiently characterize it. They are analogous to the well-marked wrinkles which we have noted in *Diaperoecia radicata* Kirkpatrick, 1888. Here the colony is erect and does not bear colonnettes.

The figured specimens are of young colonies, but on the more complete examples the branches are wider and more vigorous. The tergopores are always covered in the inferior part. The ovicell is not known.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5145. Jolo, Sulu Archipelago; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

Cotypes.—Cat. No. 8401, U.S.N.M.

PLEURONEA (?) STRIATA, new species

Plate 85, figs. 10–13

Description.—The zoarium is free, subcylindrical, bifurcated with short, straight, or curved branches; the dorsal is quite convex, *striated* longitudinally by the walls of the tergopores. The tubes are distinct, separated by a salient thread, small; the fascicles are salient, do not project beyond the zoarial margins, and are formed of 5 tubes with orbicular peristomes.

Measurements.—Diameter of peristomes, 0.08 mm.; distance of fascicles, 0.32–0.36; number of tubes to fascicle, 5; and zoarial width, 0.70.

Structure.—In longitudinal section the tubes are conical, with triparietal gemmation. The tergopores are numerous, very long, cylindrical; their form is very close to that of nematopores, but the latter are always short with the terminal walls often thickened. The size of the tergopores appears quite variable in the genus *Pleuronea* according to the different sections which we published (Canu and Bassler 1920, pl. 114). The narrowest pertain to the type and to the present species. The ovicell has not been discovered. (See text fig. 221.)

Affinities.—This species differs from *Pleuronea decorata* in its very convex dorsal ornamented by longitudinal striations.

Occurrence.—

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5219. Mompog Island, between Marinduque and Luzon; 13° 21′ N.; 122° 18′ 45″ E.; 530 fathoms; gn. M.; 10.4° C.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

Cotypes.—Cat. No. 8402, U.S.N.M.

Genus PLATONEA Canu and Bassler, 1920.

PLATONEA PHILIPPSAE Harmer, 1915

Plate 85, figs. 4, 5

1915. *Reptotubigera philippsae* Harmer, Polyzoa of Siboga Expedition, Mon. 28, Results Explorations Siboga, p. 120, pl. 10, fig. 9.

Measurements.—Diameter of peristome, 0.08 mm.; diameter of tubes, 0.12; distance of fascicles, 0.16–0.20 mm.; and number of tubes to fascicle, 3.

Our specimens correspond well to the measurements and the figure of Harmer; they are a little shorter than those from *Siboga.* They encrust shells.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

Siboga Station 310; 8° 30′ S.; 119° 07′ E.; 73 meters (Harmer); Sifu, Loyalty Islands (Harmer).

Plesiotype.—Cat. No. 8416, U.S.N.M.

PLATONEA HIRSUTA Canu and Bassler, 1922

Plate 85, fig. 14

1922. *Platonea hirsuta* Canu and Bassler, Studies on Cyclostomatous Bryozoa, Proc. U. S. National Museum, vol. 61, p. 49, pl. 11, figs. 6, 7.

Description.—The zoarium has the Idmonea form of growth, somewhat enlarged at the bifurcations. The fascicles are salient, close together, alternate or opposite, formed of 3 or 4 tubes. The tubes are little distinct, hardly convex; the peristome is thin, orbicular, or rectangular. The ovicell is large, convex, wide spread between the fascicles over the whole zoarial width; the oeciostome is elliptical, transverse, provided distally with a sort of raised lip, less wide than a tube, hardly salient, and orthogonal.

Measurements.—Zooecial diameter, 0.20; width of fascicles, 0.25; distance between fascicles, 0.40; dimensions of oeciostome, 0.26 by 0.14, and zoarial width, 1.20 millimeters.

Variations.—This species is well characterized by its fascicles regularly arranged according to scale and quite close together, and also by the form of its ovicell. We have been rather fortunate in finding many ovicells and to recognize among them some variations. They are enlarged at the bifurcations. The oeciostome is absent or isolated or adjacent to a tube. In the last case the oeciostome is turned toward the bottom, although the orifice placed at the base of the peristomie must be in the habitual position. The form bent back toward the base of the oeciostome appears therefore to be due to the closeness of the distal tube.

Occurrence.—D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Holotype.—Cat. No. 7376, U.S.N.M.

Genus MESONEA Canu and Bassler, 1920

MESONEA SIMPLEX, new species

Plate 86, figs. 11, 12

Description.—The zoarium is free, subcylindrical, bifurcated, with short branches; the dorsal is convex, ornamented by numerous oblique sulci of little depth and containing irregularly spaced vacuoles. The tubes are little distinct, very short, not developed up to the zoarial margin, with peristomie almost transverse; the peristome is orbicular and thick. The fascicles are formed by only a single tube.

Measurements.—Diameter of peristome, 0.10 mm.; distance of fascicles, 0.16; number of tubes to fascicle, 1; width of branches, 0.56–0.60.

Structure.—The general aspect of this species is very characteristic. It is a thick, smooth band arranged on a cylinder and bearing the peristomes laterally. In longitudinal section the frontal band is very thick; the tubes are cylindrical, polygonal a little curved at their extremity with triparictal gemmation; the dorsal is much thickened and pierced by long and recurved vacuoles. (See text fig. 221.)

We were in error in 1920 when we indicated tergopores on the dorsal of the genotype *Mesonea radians* Lamarck, 1812. The figures published are moreover clearly affirmative in this respect. This consideration in addition to the very porous nature of the ovicell seems to indicate that the genus would perhaps be better classed in the Horneridae. We have not discovered the ovicell of the present species.

We have observed a very special case of ramification. The branch is attached exteriorily to the zoarium as if another colony had become affixed there. The base of the branch is formed entirely of epitheca with vacuoles. The physiological reason for this arrangement is unknown; we have already noted it in the fossil species.

Affinities.—This species differs from *Mesonea radians* Lamarck, 1812, in the presence of a single tube to the fascicle, in the short tubes with transverse and not long peristomies, in the ascending and oblique peristomie and in its undulated shallow dorsal sulci.

Occurrence.—

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; Sh.

Cotypes.—Cat. No. 8404, U.S.N.M.

Family HORNERIDAE Gregory, 1899

Genus HORNERA Lamouroux, 1821

HORNERA PINNATA, new species

Plate 86, figs. 1–10

Description.—The zoarium is free, affixed to stones, bryozoa, serpulae and rarely to algae, by a more or less expanded base; the branches are irregular, dichotomous and bear laterally short pinnules very dissimilar to each other. The tubes are distinct, separated by a furrow, little convex, concave longitudinally, ornamented with 2 sulci and with 3, 4 or 5 vacuoles; the peristomie is salient and oblique; the peristome is thin, entire or denticulated. The peristomes are always grouped in series of two arranged alternately on each side of the median longitudinal axis. The posterior face of the zoarium is convex and ornamented with a dozen longitudinal sulci at the bottom of which are numerous vacuoles. The ovicell is a large dorsal, very porous sac in which the oeciostome opens on the cellular face.

Measurements.—Diameter of peristome, 0.10 mm.; distance of peristomes, 0.40; diameter of large branches, 0.90.

Variations.—The larva affixes itself on very small fragments not in the least connected with the great development of the colony. The base is little expanded and surrounds more or less the substratum. The discoid base is very large when it is fixed to an alga. (Fig. 2.) This base is always identical with the dorsal and is formed of calcareous skeleton marked by deep sulci radiating from the center, at the bottom of which are large and scattered vacuoles. (Fig. 2.)

The pinnules are unequally developed and bear 3 to 6 peristomes. Generally there are only two series of tubes between the pinnules but on certain branches and without apparent reason the distance becomes much greater and there may be 10 series of tubes between two successive pinnules.

The peristomes of the same transverse series are never adjacent save at the extremity of certain branches when they are not entirely developed. The peristomes are all equally salient; the lateral peristomes are no longer than the others.

The general aspect of the dorsal is rather constant. The nervules separating the sulci are little salient and their number depends evidently on the size of the branches. On the terminal branches of the large colonies the nervules are more apparent, more salient, smooth, and their ovicells bear a large longitudinal keel. Harmer, 1915, discovered an analogous arrangement on *Hornera spinigera* Kirkpatrick, 1888. (Figs. 3, 4.)

The ovicells are arranged obliquely and laterally on the dorsal. They are supported on a pinnule and their oeciostome opens on the cellullar face between the pinnule and the colony. The pores are generally larger than the vacuoles. Their dimensions are quite variable although rather constant on the ovicell itself. The dimensions and the form of the ovicell are so variable that no two are alike.

The very irregular arrangement of the branches does not permit the preparation of good longitudinal sections but those that we have made revealed the ordinary structure of *Hornera*. The entire colony is surrounded by a very thick epitheca traversed by the thin and recurved vacuolar tubes.

Affinities.—This species differs from *Hornera spinigera* Kirkpatrick, 1888, in the equality of the peristomes (the lateral peristomes not being longer), in the absence of long peristomial spines, in the regular arrangement of the alternate series and in the presence of shorter pinnules.

Biology.—This species lived in the localities richest in bryozoa. It is entirely equatorial and does not pass beyond the 10th parallel. It occurs in the China Sea and we have found it on the west coast of Borneo. Its bathymetric range (32–388 meters) is rather great, but it is between 40 and 97 meters that it is best developed.

The number of larvae emitted by a single ovicell in the cyclostomata is considerable, but the larva of *Hornera* swims about but a short time. It affixes itself rapidly and in this species as in other orders it is not rare to find numerous colonies with their base on a very small surface. These colonies attain large dimensions only rarely. Their life must then be very precarious but we have not yet discovered the causes of the sudden arrest in their development.

There is one feature, however, to which it is necessary to call the attention, namely, the difficulty of zoarial equilibrium. Our photographs of the bases show the extreme small size of the substratum which is always a dead body without a single hydrostatic faculty and in consequence abandoned laws of gravity; in the water it weighs almost nothing. The colony must then assure its own equilibrium by the arrangement of its branches and the rapidity of its development. Although the zoarium is thick, much calcified and relatively heavy, it is very difficult to assure its equilibrium a long time on the bottoms traversed by even feeble currents. Species of *Hornera* appear to escape destruction only by their great fecundity.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 09′ N.; 120° 58′ E.; 29 fathoms; co. S.

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh. (common).

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh. (common).

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 53″ E.; 175 fathoms; fine S., Co.; 13° C.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S., co.; 13.2° C.

Cotypes.—Cat. Nos. 8405–8407, U.S.N.M.

Family ASCOSOECIIDAE Canu, 1919

Genus **POLYASCOSOECIA** Canu and Bassler, 1920

POLYASCOSOECIA FUNICULA, new species

Plate 87, figs. 1–7

Description.—The zoarium is free, triangular in cross section, affixed to Serpulae or to shells by a small base; the branches are dichotomous and ramified at a very acute angle. The dorsal is broader than the frontal. It is quite convex and ornamented longitudinally with shallow sulci at the bottom of which are numerous, very closely arranged vacuoles. All the branches bear a wide, longitudinal, smooth median crest in the form of a cord (or *funiculus*). The tubes are indistinct and quite porous; the peristomes are thin, somewhat salient, grouped in series of three tubes, transverse and alternate on each side of the funiculus. The ovicell is a very salient globular sac, quite porous, located on the funiculus and perforated laterally by the peristomes.

Measurements.—Diameter of peristome, 0.08 mm.; separation of lines (without peristomes), 0.24; and width of large branches, 1.00.

Variations.—This species is very constant in the ensemble of its characters. Only the size of the pores varies from one ovicell to another. With three peristomes to a line, the outermost is often isolated, the two others remaining adjacent.

In longitudinal section the thickness of the funiculus is exhibited by a very thick epitheca. It is therefore not possible to study the nature of the frontal pores and to learn if they are mesopores or vacuoles.

Affinities.—The ovicell appears to have the structure of *Hornera*, but as it is perforated by lateral tubes it belongs more to the genus *Polyascosoecia*, in which the ovicell is always frontal.

This species differs from *Hornera hochstetteriana* Stoliczka in its frontal and not dorsal ovicell, in the presence of a longitudinal funiculus in the shorter peristomes never projecting beyond the dorsal, and in the presence of three tubes to the line and not 4 or 5.

Biology.—This is a species very easily determined. Its certain presence in the vicinity of the Pacific and in the China Sea seems to indicate a greater geographic distribution. Its bathymetric distribution is rather great but it is always very rare. We have found only a dozen fragments in the dredgings made in the vicinity of the Jolo Islands. The ovicells are frequent, and it is therefore a prolific species. The rarity of specimens can be explained only by a great fragility of the larvae. The larvae of other species of this genus must be more vigorous, since the genus has existed since the Cretaceous.

The presence of *Polyascosoecia* in the fossils seems always to indicate warm waters.

Occurrence.—

D. 5141. Jolo Light, Jolo; 6° 9′ N.; 120° 58′ E.; 29 fathoms; co. S. (common).

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S., Co.; 13.2° C.

Cotypes.—Cat. No. 8413, U.S.N.M.

Genus CRISINA D'Orbigny, 1850

CRISINA CANARIENSIS D'Orbigny, 1851

Plate 87, figs. 8–18

1851. *Idmonea canariensis* D'Orbigny, Paléontologie francaise, Terrains crétacés, vol. 5, p. 732.

1872. *Idmonea hochstetteriana* Smitt, Floridan Bryozoa Kongl. Svenska Vetenskaps-Akademiens Handlingar, vol. 10, p. 6, pl. 11, figs. 11–13.

1905. *Idmonea canariensis* WATERS, Notes on some Recent Bryozoa in D'Orbigny's collection, Annals and Magazine of Natural History, ser. 7, vol. 15, p. 13. ("Fragments of what Smitt described as *Crisina hochstetteriana* Stoliczka.")

History.—Idmonea hochstetteriana Smitt, 1872, is not at all the species of Stoliczka, 1864; Waters in 1884 noted this and MacGillivray, 1895, confirmed it. It does not belong even to the same genus. We might therefore adopt Smitt's specific name but, in order to avoid all confusion in synonymy, we prefer to employ D'Orbigny's name even though the French paleontologist did not figure his species.

Structure.—The colonies are very delicate, quite elegant and of a beautiful clear violet color. They must be quite large and fragile

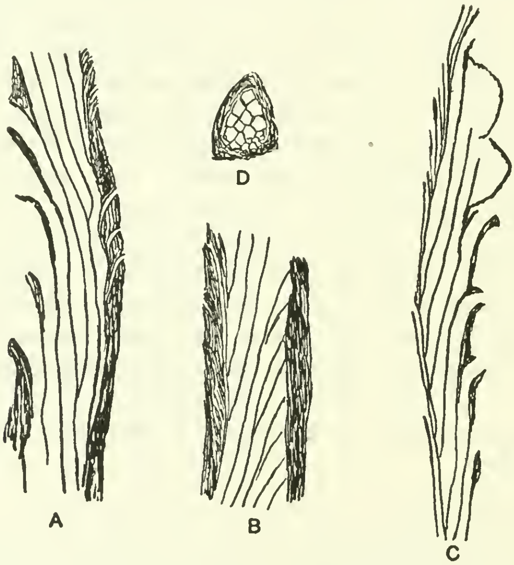

FIG. 222.—*Crisina canariensis* D'Orbigny, 1851

A. Longitudinal thin section ×25, made a little in front of the median plane to show the orifice of the tubes. The vacuoles are visible. B. Portion of longitudinal section ×25, showing the great thickness of the frontal and dorsal epitheca. C. Longitudinal section ×25 of an ovicelled specimen showing the long capillary tubes of the dorsal. D. Transverse section, ×25, between two peristomes.

for among our numerous specimens we have discovered only two bases. The one which we figure is quite unusual as it is formed of 4 branches united to a small fragment of bryozoan. Another base fixed to a fragment of alga is likewise composed of many tubulose stems formed by an epitheca with vacuoles.

This is the first time in our long experience with bryozoa that we have discovered a base of this character. Only one time also have we found a little column of support which proved that the colony is not always perfectly erect.

The ovicell is of the *Ascosoecia* type; it is a long elliptical sac, smooth, globular, a little broader than the branch, perforated by tubes generally closed. The oeciostome is terminal, small and semicircular. We have discovered only 7 ovicells and have figured the two best but they are not perfect. On the ovicells of fossil Ascosoeciidae we have never seen the oeciostome, so that the present discovery is important as it permits a better understanding of the biology of the specimens of this interesting family which appears to be special to warm zones.

The discovery in the equatorial zone of a large number of Cretaceous genera permits us to verify that the general morphology of the bryozoa was already well fixed in the Mesozoic era and that it is useless to resort to the transcendant hypothesis in order to restore and understand the structure of specimens found in the Upper Cretaceous.

The alternate lines are uniquely formed of two tubes one of which has a salient peristome and the other, the more exterior, is deprived of it. Our photographs in this feature absolutely conform to Smitt's illustration.

The dorsal is almost flat; the sulci are very shallow and the vacuoles are long, quite visible, narrowed above.

The specimens are very small and fragile and difficult to section. We have succeeded in preparing some sections which conform completely to the structure which we have given for the fossil species.[19] The tubes are cylindrical, slightly club-shaped, with triparietal gemmation. The vacuolar canals are long, recurved only at their extremity; they are so fine that they are difficult to see in the thick epitheca and opaque from the dorsal.

The transverse section is triangular, surrounded by a very thick epitheca. The tubes are polygonal and nearly of the same size.

Biology.—This species does not extend into the interior of the Philippine Archipelago but it is restricted to the Pacific or its immediate vicinity and in localities where a marine current exists. However its geographic distribution is very great because we have found it in the Atlantic and in the Gulf of Mexico. It lives between the ninth and thirtieth parallels, not extending to the Equator and has not yet been observed in the Southern Hemisphere.

Our remarks on *Hornera pinnata* apply also to *Crisina canariensis.* We can hardly understand how a well developed dendroid ensemble can keep in equilibrium on a small fragment especially in moving waters. The physiologic rôle of the vacuoles must be essential to the establishment of this equilibrium, but how? On the other hand, it is more reasonable to think that the small capillary tubes are more in rapport with the formation of the zoarial epitheca.

Regarding the much calcified species there is another mystery, namely that of oxygenation. How does this indispensable function

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[19] 1922. Canu and Bassler, Studies on Cyclostomatous Bryozoa, Proc. U. S. National Museum, vol. 61, p. 117, pl. 20, figs. 9–21.

operate for we can not see the multitude of small pores which perforate the thin test of the tubuliporoid species. The difficulty of oxygenation is very probably the cause of the decadence of all the Cyclostomata with thick carapace.

Occurrence.—

D. 5235. Nagubat Island, east coast of Mindanao; 9° 43′ N.; 125° 48′ 15″ E.; 44 fathoms; sft. M.

D. 5478. Tacbuc Point, Leyte; 10° 46′ 24″ N.; 125° 16′ 30″ E.; 57 fathoms; Sh.

Atlantic: Teneriffe, Canary Islands, 30° N. (D'Orbigny).

Gulf of Mexico, Havana, 270 fathoms, 23° N. (Smitt).

Plesiotypes.—Cat. Nos. 8408, 8409, U.S.N.M.

Family LICHENOPORIDAE Smitt, 1866

Genus LICHENOPORA Defrance, 1823

LICHENOPORA RADIATA Savigny-Audouin, 1826

Plate 88, figs. 1–6

1826. *Melobesia radiata* Audouin, Explication sommaire des planches de polypes de Savigny, Description de l'Egypte, vol. 1, p. 235, pl. 6, fig. 3 (ovicell).

1847. *Defrancia prolifera* Reuss, Die fossilen Polyparien des Wiener Tertiarbeckens, Haidinger's Naturwissenschaftliche Abhandlungen, vol. 4, p. 37, pl. 6, fig. 1.

1877. *Defrancia prolifera* Manzoni, Briozoi fossile del Miocene d'Austria ed Ungheria, Denkschriften der k. Akademie der Wissenshaften, Wien, vol. 38, p. 17, pl. 15, fig. 58.

1895. *Lichenopora prolifera* Neviani, Briozoi fossili della Farnesina, Paleontographica Italica, vol. 1, p. 135.

1896. *Lichenopora prolifera* Neviani, Briozoi Postpliocenici di Spilinga (Calabria), Atti Accademia Gioenia di Scienze Naturali in Catania, ser. 4, vol. 9, p. 65.

1898. *Lichenopora prolifera* Neviani, Briozoi neozoici d'alcune località d'Italia, Bull. della Società Romona pu gli Studi Zoologici, vol. 4, p. 49.

1898. *Lichenopora prolifera* Neviani, Briozoi della formazione plioceniche di Palo, Anzio e Nettuno. Boll. Soc. Geol. Ital., vol. 17, p. 331.

1900. *Lichenopora prolifera* Neviani, Briozoi neogenici delle Calabrie, p. 24.

1912. *Lichenopora radiata* Barroso, Briozoos de la estación de Biologia maritima de Santander, Trabajos del museo de cisncias naturales, No. 5, p. 60.

1917. *Lichenopora radiata* Okada, A report on the Cyclostomatous Bryozoa of Japan, Annotationes zoologicae Japonensis, vol. 9, p. 335.

Variations.—This beautiful species is very easily recognized, as it is bordered by a wide basal lamella radiately striated but very fragile, which disappears rapidly after the death of the colony. The fascicles are salient, very regular, they measure most often 0.10 mm. in width, but on the large specimens this width can be from 0.15 mm. to 0.17 mm. The size and aspect of the central cancelli vary with the locality. They are covered by a porous ovicell. The specimens are generally free but we have observed some fixed to small stones or to fragments of shells. There are nine tentacles according to Waters.

Biology.—This is a very vigorous and common species with a geological range which is remarkable since it appears in the Helvetian. It would be interesting to learn the causes of this great vitality.

Its bathymetric extension is also great since it has been dredged from 10 to 388 meters. The greatest depths for the species have been observed in the Philippines. It accommodates itself to temperatures from 11° to 25° C. It does not pass the 40th parallel north and south but it is widespread in the northern hemisphere. Harmer has not discovered it to the south of the Philippines. It has not yet been found in the China Sea. We have been fortunate enough to discover it in the dredgings of the *Albatross.*

How can this species cover the enormous distance which separates Japan from California? Its larva, like that of all Lichenoporas,

FIG. 223.—*Lichenopora radiata* Savigny-Audouin, 1826. Meridian section, ×25

must be very mobile and swim about a long time before it fixes itself.

It does not surround any of the continents and its dispersion in all the oceans is evidence of communications between the ancient seas of geological times.

Occurrence.—

D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E. (common).

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S., Sh.

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5147. Sulade Islands, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5162. Tinagta Island; 5° 10′ N.; 119° 47′ 39″ E.; 230 fathoms; S. brk, Sh. crs.; 11.6° C.

D. 5217. Anima Sola Island, between Burias and Luzon; 13° 20′ N.; 123° 14′ 15″ E.; 105 fathoms; crs. gy. S.

D. 5311. China Sea, vicinity of Hong Kong, 21° 33′ N.; 116° 15′ E.; 88 fathoms; crs. S., Sh.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S., co.; 13° C.

D. 5580. Sibutu Island, Darvel Bay, Borneo; 4° 52′ 45″ N.; 119° 06′ 45″ E.; 162 fathoms; br. S., co.; 13.2° C.

Geographic distribution.—Atlantic: English Channel; Gulf of Gascony, 135 m.; Madeira. Mediterranean: Corse (coast); Naples; Adriatic, 32–89 m.; Majorca. Pacific: Samoa; Australia; Japan; California. Red Sea: Suez. Japan: Yodome, 100–126 m.; coast of Misaki (shallow water); Bay of Tokyo, 27–52 m.; Kagoshima, 113 m.; Sagamibai, 81–243 m., Sado Islands.

Geologic distribution.—Helvetian of Italy (Neviani); Tortonian of Austria Hungary (Reuss); Zanclean of Italy (Seguenza); Miocene of Australia and of New Zealand (Waters); Astian of Italy (Neviani); Sicilian of Italy (Neviani, Seguenza), of Rhodes (Pergens). Pleistocene of California (Canu and Bassler). Quaternary of Italy (Seguenza, Waters, Neviani).

Plesiotypes.—Cat. Nos. 8381–8384, U.S.N.M.

LICHENOPORA BUSKI Harmer, 1915

Plate 88, figs. 7–10

1875. *Discoporella ciliata* Busk, Catalogue of Marine Polyzoa, Cyclostomata, p. 31, pl. 30, fig. 6; pl. 33, fig. 4.

1879. *Discoporella ciliata* Haswell, Cyclostomatous Polyzoa of Port Jackson, Proc. Linnean Society New South Wales, vol. 4, p. 354.

1887. *Lichenopora ciliata* Waters, Bryozoa from New South Wales, Annals and Magazine Natural History, ser. 5, vol. 20, p. 263 pl. 7, fig. 5 (ovicell).

1899. *Lichenopora ciliata* Philipps, Report on Polyzoa collected by DeWilley, Willey's Zoological Results, vol. 4, p. 441.

1915. *Lichenopora buski* Harmer, Polyzoa, Report of Siboga expedition, vol. 28, p. 161, pl. 12, fig. 4, 5.

1917. *Lichenopora buski* Okada, a report on the Cyclostomatous Bryozoa of Japan, Annotationes Zoologicae Japonensis, vol. 9, p. 354.

This species is very well characterized by its salient visors and by the great width of its marginal lamina. The ovicell figured by Waters is marginal and not central. The central reticulations noted by Harmer do not indicate at all the traces of the ovicell and we have found them in other species. Perhaps it would be convenient to form a special genus for this kind of ovicells if they were observed on other species, notably in *Lichenopora wilsoni* MacGillivray, 1886.

The visor of the tubes bears 2 or 3 long denticles, but we have not observed visors as long as those figured by Busk in 1875. The tubes are arranged in radial lines and not in fascicles.

The species is free or incrusting. It exists only in the Pacific, but it is found as far as Japan. Specimens are always rare.

Occurrence.—

D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.

D. 5147. Sulade Islands, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5148. Sirun Island, Sulu Archipelago; 5° 35′ 40″ N.; 120° 47′ 30″ E.; 17 fathoms; co. S., Sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Geographic distribution.—Loyalty Islands, Torres Straits. Malasia; Salomakie (Damar) Island 45 m. station 275 of the Siboga expedition, 275 m. Japan: Yodomi, 100–115 mm., Aburatsubo.

Plesiotypes.—Cat. Nos. 8385, 8386, U.S.N.M.

LICHENOPORA WILSONI MacGillivray, 1886

Plate 89, fig. 7

1886. *Lichenopora wilsoni* MacGillivray, Descriptions of new or little known Polyzoa, Pt. 12, Trans. and Proc. Royal Society of Victoria, vol. 23, p. 4, pl. 1, fig. 5.

1895. *Lichenopora wilsoni* MacGillivray, Monograph Tertiary Polyzoa of Victoria, Trans. Royal Society Victoria, vol. 4, p. 142, pl. 11, figs. 10–11.

Affinities.—This species differs from *Lichenopora novaezelandiae* Busk, 1875, in the larger size of its zoarium, in its small central cancelli and in the presence of central reticulations. It is a very pretty species with its innumerable, little salient fascicles and its numerous cancelli of the same size as the apertures.

According to MacGillivray the ovicell is central, smooth, not digitate. The zoarium must have been surrounded with a marginal lamina for our specimen bears evident traces of it.

The occurrence of this species in the Australian Miocene seems to indicate a greater distribution than we know but its differentiation from *Lichenopora novaezelandiae* is very difficult for observers are little used to the study of *Lichenopora*.

Occurrence.—

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

Australia: Port Philip Heads.

Plesiotype.—Cat. No. 8387, U.S.N.M.

LICHENOPORA HOLDWORTHII Busk, 1875

Plate 88, fig. 11

1875. *Discoporella holdsworthii* Busk, Catalogue Marine Polyzoa, vol. 3, Cyclostomata, p. 33, pl. 301, fig. 4.

1887. *Lichenopora holdsworthii* Waters, Bryozoa from New South Wales, Annals and Magazine Natural History, ser. 5, vol. 20, p. 261.

1887. *Lichenopora holdsworthii* Waters, On Tertiary Cyclostomatous Bryozoa from New Zealand, Quarterly Journal Geological Society London, vol. 48, p. 347.
1888. *Lichenopora holdsworthii* Waters, On the ovicells of some Lichenopora. Linnean Society Journal, Zoology, vol. 20, p. 285, pl. 15, figs. 7, 8 (ovicell).
1904. *Lichenopora holdsworthii* Waters, Resultats Voyage Belgica, Zoologie, Bryozoa, p. 97.
1915. *Lichenopora novae zelandiae* Harmer, Polyzoa of the Siboga Expedition, Mem. 28, Results Exploration Siboga, p. 155, pl. 211, figs. 6–11.
1918. *Lichenopora holdsworthii* Waters, Bryozoa of the Cape Verde Islands. Linnean Society's Journal, Zoology, vol. 34, p. 34.

Affinities.—Waters, 1887, for the fossils from New Zealand gives the dimensions of the tubes as 0.07 mm. and 0.08–0.09 mm. for the cancelli; for a recent specimen from Australia he gives 0.07 mm. for the cancelli. Our own measurements are much larger.

Our specimen differs from the figure of Busk, 1875, in the closer arrangement of the central cancelli. It resembles Figures 9 and 10 of Harmer, 1910, in the size of the marginal lamina and the aspect of the central cancelli; it differs a great deal from the other figures. Our determination is therefore somewhat doubtful. Moreover, the divergence of interpretation between Harmer and Waters does not permit a greater exactness.

Occurrence.—D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

Geographic distribution.—Pacific: Australia in Torres Strait, Victoria, New South Wales; South Africa, Tahiti. Indian Ocean: Ceylon, Malasia from 9 to 73 M. (Harmer), Japan (Harmer).

Plesiotypes.—Cat. No. 8388, U.S.N.M.

LICHENOPORA QUINCUNCIALIS, new species

Plate 89, figs. 1–4

Description.—The zoarium is free, suborbicular, convex, bordered by a narrow marginal lamina. The tubes are arranged in *quincunx*, the more central being the larger; the peristome is thin, somewhat salient, oval. The cancelli are small and irregular; they are crowded between the peristomes and much scattered at the center. The ovicell covers all the central cavity and it is covered by small cancelli; the oeciostome is large and semicircular.

Measurements.—Diameter of large colonies, 3.5 mm.; diameter of large tubes, 0.16; diameter of large cancelli, 0.12; diameter of oeciostome, 0.24.

Affinities.—This splendid species is absolutely deprived of visors. It resembles *Lichenopora fimbriata* Busk, 1875, somewhat but it has no peristomial denticles and moreover its ovicell is more porous.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E. (common).

Cotypes.—Cat. No. 8389, U.S.N.M.

LICHENOPORA LAMELLOSA, new species

Plate 89, figs. 5, 6

Description.—The zoarium is free, orbicular, much elevated and almost as high as broad; the base is concave. The fascicles are formed of salient *lamellae* and are radial, uniserial. The cancelli are irregular, polygonal, as large as the apertures.

Measurements.—Diameter of colony, 3 mm.; width of lamella and of tubes, 0.10 mm.

Affinities.—The figured specimen only has been found. It resembles certain fossil species from the Cretaceous and the Tertiary which the paleontologists have called *Defrancia.* The great zoarial height depends probably on the form of the substratum and in order to determine the true character of this species it would be necessary to have many specimens. We have figured it, however, in order to prove again the absolute necessity for paleontologists to know the recent tropical fauna.

Occurrence.—D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 9′ 52″ E.; 175 fathoms; fine S. Co.; 13° C.

Holotype.—Cat. No. 8390, U.S.N.M.

LICHENOPORA (DOMOPORA) STRICTOLAMELLOSA, new species

Plate 89, figs. 8, 9

Description.—The zoarium is free, formed of superposed subcolonies which are high and surrounded by a narrow marginal lamina; the fascicles are salient, *narrow*, much scattered, biserial. The peristomes are thin, nonsalient. The cancelli are rather large, polygonal, with little thickened walls. The ovicell is large, central.

Measurements.—Diameter of zoarium, 2.5 mm.; height of zoarium, 3.5 mm.

Affinities.—The figured specimen only has been found and it is incomplete. This species differs from *Lichenopora stellata* Reuss, 1847, a fossil species assigned also to *Domopora*, in its much narrower and scattered fascicles. The nature of the tubes does not appear to be that of *Lichenopora*, but we have not been able to make the necessary thin sections.

Occurrence.—D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; S. brk., Sh. crs.; 11.6° C.

Holotype.—Cat. No. 8391, U.S.N.M.

LICHENOPORA MEDITERRANEA Blainville, 1834

Plate 90, figs. 1–3

1834. *Lichenopora mediterranea* BLAINVILLE, Manuel d'Actinologie, p. 407.

1847. *Lichenopora mediterranea* MICHELIN, Iconographie zoophytologique, p. 68, pl. 14, fig. 5.

1847. *Lichenopora cumulata* MICHELIN, Iconographie zoophytologique, p. 319, pl. 77, fig. 1.

1847. *Lichenopora tuberosa* Michelin, Iconographie zoophytologique, p. 64, pl. 14, fig. 6.

1875. *Discoporella mediterranea* Busk, Catalogue marine polyzoa, Part 3, Cyclostomata, p. 33, pl. 24, fig. 4.

1877. *Defrancia* sp. Manzoni, Bryozoaires du Pliocene superieur de l'ile de Rhodes, Memoires Société Geologique de France, ser. 3, vol. 1, p. 71, pl. 3, fig. 25.

1878. *Discoporella mediterranea* Waters, Bryozoa from the Pliocene of Bruccoli (Sicily), Transactions Manchester Geological Society, vol. 14, p. 18, fig. 1.

1880. *Discoporella mediterranea* Seguenza, Le formazioni terziarie nella Provincia di Reggio (Calabria), Reale Accademia der Lincei, Memoire della classe di Scienze, pp. 330, 372.

1887. *Lichenopora mediterranea* Pergens, Pliocäne Bryozoen von Rhodos, Annalen des k. k. naturhistorischen Hofmusenms, Wien, vol. 2, p. 11.

1889. *Lichenopora mediterranea* Pergens, Untersuchungen an Seebryozoen, Zoologischer Anzeiger, vol. 12, p. 7.

1889. *Lichenopora mediterranea* Carus, Prodromus faunae mediterraneae, vol. 2, p. 46.

1891. *Lichenopora mediterranea* Pergens, Bryozoaires du Miocene du Gard, Bulletin Société Belge de Geologie, vol. 5, p. 50.

1895, 1898, 1900. *Lichenopora mediterranea* Neviani, Briozoi neozoici di alcune località d'Italia, Bolletino Società Romana per gli Studi Zoologici vol. 4, pp. 117, 120 (1895); vol. 5, p. 15 (1898); ser. 2, vol. 1, pp. 61, 66 (1900).

1895. *Lichenopora mediterranea* Neviani, Briozoi fossili della Farnesina, Paleontographica Italica, vol. 1, p. 135 (59).

1901. *Lichenopora mediterranea* Neviani, Briozoi neogenici delle Calabrie, Paleontographica Italica, vol. 6, p. 247 (local bibliography).

1905. *Lichenopora mediterranea* Neviani, Briozoi fossili di Carrubare, Bollettino Società Geologica Italiana, vol. 23, p. 554.

1915. *Lichenopora mediterranea* Harmer, Polyzoa of the *Siboga* Expedition, Pt. 1, Mem. 28, Results Explorations *Siboga*, p. 164, pl. 12, fig. 2, 3.

1917. *Lichenopora mediterranea* Okada, A report on the Cyclostomatous Bryozoa of Japan, Annotationes Zoologicae Japonenses, vol. 9, p. 354.

Affinities.—Our figures are close to those of Harmer, 1915. They approach closely fossil specimens from the French faluns with which we have been able to compare them.

This species is very well characterized by its very salient and biserial fascicles and by the large polygonal cancelli with thin walls. The colonies increase in size and become superimposed rather easily. The illustration of the recent specimens is still inadequate and its ovicell is unknown. There is then some uncertainty of identification of the recent species with the fossil, the latter being better known. The specimens are free, but more often encrusting.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5162. Tinagta Island, Tawi Tawi Group; 5° 10′ N.; 119° 47′ 30″ E.; 230 fathoms; crs. S., brk. Sh.

D. 5574. Simaluc Island, north of Tawi Tawi Group; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12. 4° C.

Geographic distribution.—Mediterranean (Busk), Naples (Waters). Malasia: Sian Islands, (27 m.); Station 105, 6° 08′ N.; 121° 19′ E., 275 m. (Harmer). Japan: Jogashima (Okada).

Geologic distribution.—Burdigalian of Southeastern France (Pergens); Helvetian of Touraine, France (Michelin); Tortonian of Austria-Hungary (Canu collection); Astian of Italy (Michelin); Sicilian of Rhodes (Pergens, Manzoni), of Italy (Waters, Seguenza, Neviani); Quaternary of Italy (Seguenza, Neviani).

Plesiotypes.—Cat. Nos. 8392, 8393, U.S.N.M.

Genus TROCHILIOPORA Gregory, 1909

TROCHILIOPORA (?) BARTSCHI, new species

Plate 90, figs. 4–9

Description.—The zoarium is free, conical, orbicular, or cordiform. The tubes are large, arranged in very irregular radial series; the peristome is thin, orbicular. The concave center, the interlinear spaces and the peduncle are covered with polygonal mesopores (?) closed by a calcareous pellicle. There are some tubes disseminated on the peduncle.

Measurements.—Height of zoarium, 3.00 mm.; diameter of zoarium, 3.00 mm.; diameter of peristome, 0.20 mm.

Affinities.—This curious species approaches the species of the Cretaceous genus *Trochiliopora* Gregory, 1909, from which it differs only in the presence of the tubes on the peduncle. Without thin sections we cannot classify the species properly but it is interesting to note the persistence of the fossil forms in the tropical zone. The specific name is in honor of Dr. Paul Bartsch.

Occurrence.—

D. 5145. Jolo Light, Jolo; 6° 04′ 30″ N.; 120° 59′ 30″ E.; 23 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

Cotypes.—Cat. No. 8394, U.S.N.M.

Family TRETOCYCLOECIIDAE Canu, 1919

Genus TRETOCYCLOECIA Canu, 1919

TRETOCYCLOECIA PARVULA, new species

Plate 90, figs. 10–13

Description.—The zoarium is free, simple and turbinate or composite and formed of superposed, independent subcolonies forming an ensemble more or less branched and *small.* The tubes are polygonal, without peristome and with little thickened walls. The ovicell is elliptical, flat, smooth, perforated by a small number of tubes.

Affinities.—This is a very curious species. The penduncle of the simple zoaria is very long; sometimes it is bifurcated and two colonies remain attached to the same base. The celluliferous tops (or capitula) do not touch. In the composite colonies each subcolony grows laterally from the top or head of the inferior subcolony. The tops do not have a well determined form and are irregularly orbicular or elliptical. The new branches arise from the bifurcation of a peduncle.

This species is much smaller than *Tretocycloecia flabellaris* in which the method of gemmation is identical. In the zoarial classification of Gregory this species could be classed in the genus *Discofascigera* D'Orbigny, 1852, considering only the simple colonies, but there are no genera recent or fossil for the reception of composite dendroid colonies. In our classification it is naturally placed in the family of Tretocycloeciidae. If thin sections reveal the absence of mesopores which appears possible from the exterior it would be necessary to create a new genus. Unfortunately we have not been able to make such sections.

Occurrence.—

D. 5574. Simaluc Island, north of Tawi Tawi; 5° 30′ 45″ N.; 120° 07′ 57″ E.; 340 fathoms.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S. co.; 13° C.

Cotypes.—Cat. No. 8395, U.S.N.M.

TRETOCYCLOECIA FLABELLARIS, new species

Plate 91, figs. 1–6

Description.—The zoarium is free, simple or composite. The simple zoaria are flabelliform with very narrow base; the peduncle is covered by a transversely striated epitheca; the top is long, convex, more or less lobed. The compound colonies arise from the bifurcation of the peduncle which engenders thus an arborescent zoarium. Other branches are formed by the eccentric development of a flabelliform subcolony derived from an inferior subcolony. The tubes are polygonal and intermingled with mesopores. The ovicell is suborbicular, smooth, nonsalient, perforated by tubes adjacent or isolated, placed on the head or capitulum.

Measurements.—Width of larger flabellate colonies, 10 mm.; height of same colonies, 9; diameter of tubes, 0.18–0.20.

Affinities.—This species is much larger than *Tretocycloecia parvula* and its flabellate form is very characteristic but its general structure is identical. The peduncle may ramify and the capitulum engender 1 to 3 colonies.

On our photograph the tubes are little apparent, but on other specimens the mesopores are smaller and the tubes are quite visible; they are arranged as on the ovicell without any regularity. This species belongs therefore in our genus *Tretocycloecia*, the importance of which continues to increase with the more careful search for ovicells.

The capitulum of the subcolony is always obliquely arranged with reference to the initial subcolony.

Under the erroneous name of *Fasciculipora ramosa* D'Orbigny, 1839, MacGillivray, 1888, figures a closely related form of analogous structure which is less flabellate and in which the capitulum is not lobed. *Fasciculipora ramosa* Busk, 1875 (not D'Orbigny 1839), belongs to the same group with mesopores, but the ovicell is unknown and Busk has not noted subcolonies developed eccentrically on the capitulum.

Occurrence.—

D. 5147. Sulade Island, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine. S., co.; 13° C.

Cotypes.—Cat. Nos. 8396, 8410, U.S.N.M.

TRETOCYCLOECIA RAMOSA, new species

Plate 92, figs. 1–8

Description.—The zoarium is free, erect, very *ramose;* the fronds are broad, with elliptical section arranged on the same plane and ornamented with large polygonal pores on the dorsal; the base is flabelliform attached to a fragment of shell or to a Serpula, with a dorsal covered by a concentrically striated epitheca. The tubes are polygonal and differ little from the mesopores. The ovicell is large, with smooth surface, traversed by the tubes which are isolated or in pairs.

Affinities.—All our ovicells were broken but the concave opening left by them is absolutely that of *Tretocycloecia.* On the frontal the tubes are little different from the mesopores; they appear arranged in quincunx or in transverse lines. At the bottom of the ovicells they are clearly distinguished from the mesopores. The arrangement of the dorsal pores is rather variable as can be seen on our figures.

This species differs from *Frondipora palmata* Busk, 1875, the dorsal of which has never been figured, in the absence of pinnules on the branches. The two species certainly belong to the same group. The flabellate form of the base shows the relationship to the preceding in which there are two nodes of ramification. All these zoarial forms which it is impossible moreover to outline exactly appear to us to be true biologic caprices and to have no generic value.

Occurrence.—

D. 5137. Jolo Light, Jolo; 6° 04′ 25″ N.; 120° 58′ 30″ E.; 20 fathoms; S. Sh.

D. 5147. Sulade Islands, Sulu Archipelago; 5° 41′ 40″ N.; 120° 47′ 10″ E.; 21 fathoms; co. S., sh.

D. 5151. Sirun Island, Sulu Archipelago; 5° 24′ 40″ N.; 120° 27′ 15″ E.; 24 fathoms; co. S., Sh.

D. 5577. Mount Dromedario, north of Tawi Tawi; 5° 20′ 36″ N.; 119° 58′ 51″ E.; 240 fathoms; crs. S.; 12.4° C.

D. 5579. Sibutu Island, Darvel Bay, Borneo; 4° 54′ 15″ N.; 119° 09′ 52″ E.; 175 fathoms; fine S. Co.; 13° C.

Cotypes.—Cat. No. 8411, U.S.N.M.

TRETOCYCLOECIA PELLICULATA Waters, 1879

Plate 91, figs. 7–11

1879. *Heteropora pelliculata* WATERS, On the occurrence of recent Heteropora, Journal Royal Microscopical Society, vol. 2, pp. 390-393, pl. 15.

1879. *Heteropora neozelancia* BUSK, On recent species of Heteropora, Journal Linnean Society, Zoology, vol. 14, pp. 724-726, pl. 15.

1882. *Heteropora* species WHITEAVES, On a recent species of Heteropora from the Strait of Juan de Fuca, American Journal Sciences and Arts, ser. 3, vol. 24, pp. 279-280 (according to Robertson).

1884. *Heteropora pelliculata* WATERS, On fossil Cyclostomatous Bryozoa from Australia, Quarterly Journal Geological Society, vol. 40, p. 678, pl. 31, figs. 24 and 28 (New Zealand).

1887. *Heteropora pelliculata* WATERS, On Tertiary Cyclostomatous Bryozoa from New Zealand, Quarterly Journal Geological Society, vol. 43, p. 348 (Napier).

1890. *Heteropora pelliculata* ORTMAN, Die japanische Bryozoen-Fauna, Archiv. fur Naturgeschichte, vol. 50, p. 66.

1910. *Heteropora pelliculata* ROBERTSON, The Cyclostomatous Bryozoa of the west coast of North America, University of California publications in Zoology, vol. 6, p. 258, pl. 25, fig. 51-55 (Alaska, Puget Sound, California).

1920. *Heteropora pelliculata* CANU and BASSLER, North American Early Tertiary Bryozoa, Bull. 106, U. S. National Museum, p. 681, fig. 222 J. K. L. p. 676, fig. 219, fig. E-P.

1922. *Tretocycloecia pelliculata* CANU and BASSLER, Studies on the Cyclostomatous Bryozoa, Proceedings U. S. National Museum, vol. 61, p. 110, pl. 13, figs. 9, 10 (ovicell).

Measurements.—Diameter of large branches, 3.00 mm.; diameter of apertures, 0.10–0.12.

Variations.—The peristome is thick and slightly salient. The zoarium is sometimes hollow in the inferior part. Other branches have adventitious pellicles forming a partial superposed lamella. The mesopores are small, numerous in certain places, rare at others.

The sections which we figured in 1920 were made from American specimens (California) of which we are not certain of the determina-

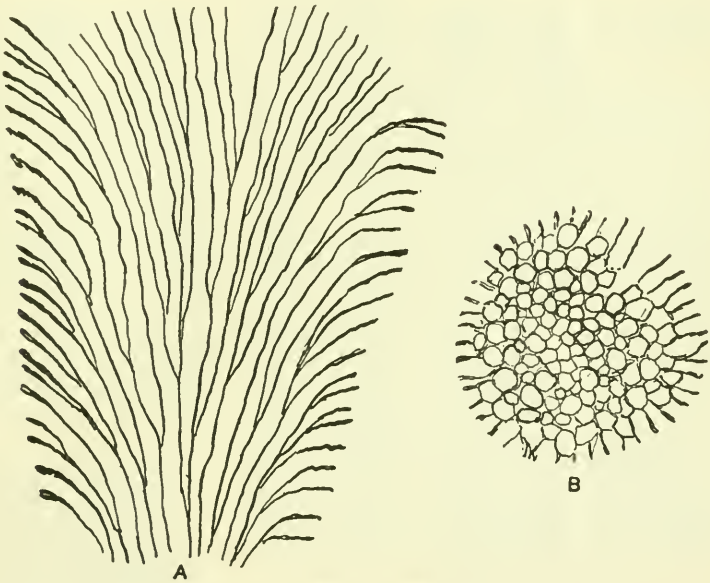


FIG. 224.—*Tretocycloecia pelliculata* Waters, 1879. Longitudinal and transverse thin sections, ×25

tions made after Miss Robertson. We have now studied new sections made from Japanese specimens in which the structure is the same. Under the name of *Heteropora pelliculata* there are certainly various species confounded.

Occurrence.—D. 4807. Cape Tsiuka, Sea of Japan; 41° 36′ 12″ N.; 140° 36′ E.; Sagami Bay (Ortmann); Tatar Gulf (13-37 fathoms.) (Waters).

Geographic distribution.—Pacific. Shores of Alaska, Vancouver and California (Robertson); Australia (Waters); New Zealand (Busk). Fossil in the Miocene of New Zealand (Waters).

Plesiotypes.—Cat. No. 8412, U.S.N.M.

EXPLANATION OF PLATES

PLATE 1

FIGS. 1–5. *Acanthodesia savarti* Savigny-Audouin, 1826 (p. 66).

1. Fragments of bilamellar zoaria, natural size.
2. A unilamellar specimen, ×20, in which the zooecia have the serrate denticle very much developed.
3. A bilamellar specimen with short zooecia, ×20.
4. Bilamellar specimen, ×20, showing the mode of branching by widening of the zooecia.
5. Another bilamellar specimen, ×20, in which intercalated zooecia and those giving rise to new rows are developed at the place of branching.

D. 5145. Jolo Light, Jolo.

6–8. *Acanthodesia quadrata*, new species (p. 69).

6. Fragment of a branch, ×20, showing the cruciform arrangement of the zooecial series.

D. 5478. Tacbuc Point, Leyte.

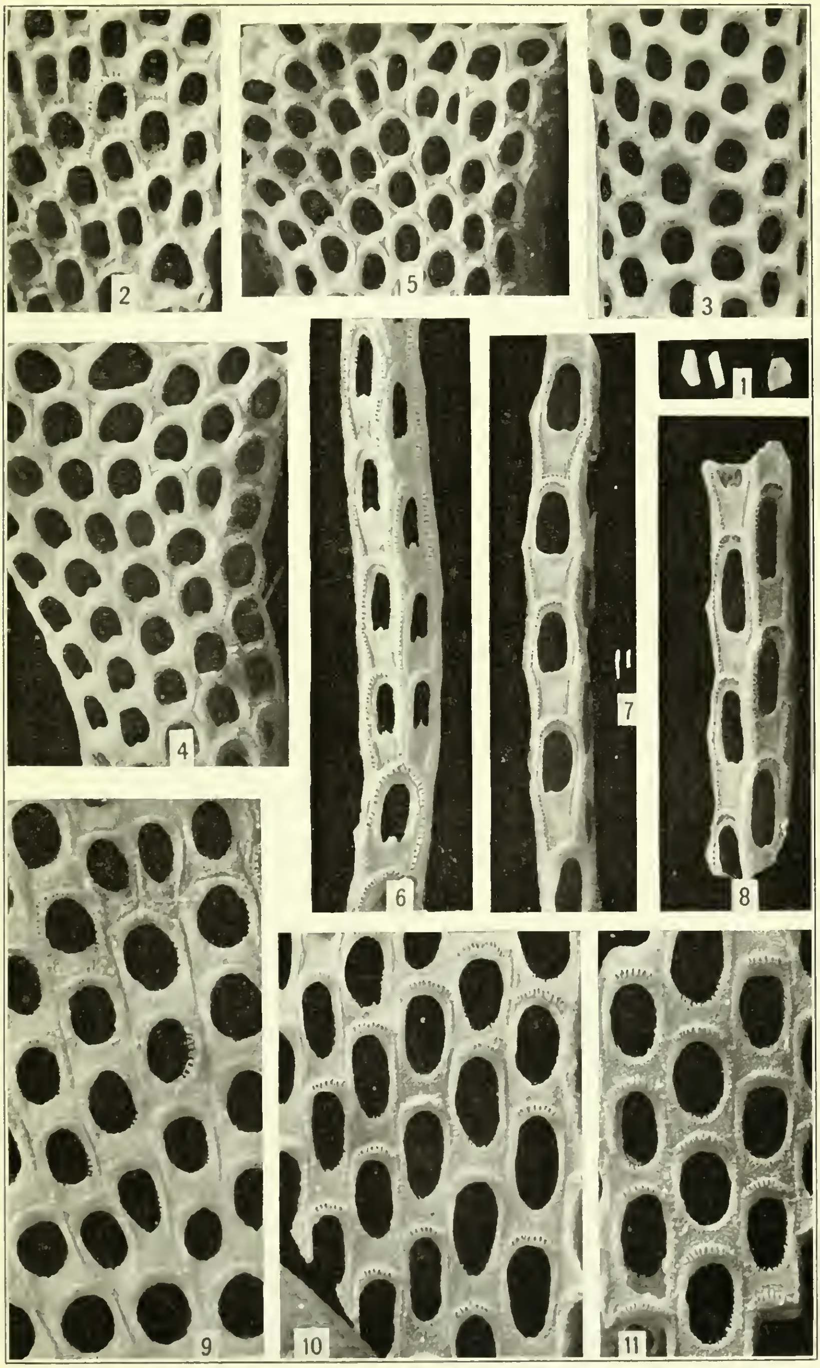
7. Fragments natural size, and view of zooecia without opesial denticles, ×20.
8. View of narrow zooecia without opesial denticles, ×20.

D. 5235. Nagubat Island.

9–11. *Acanthodesia grandicella*, new species (p. 68).

9. Portion of the bilamellar zoarium, ×20, containing two large series producing zooecia.
10. Narrow zooecia of a unilamellar zoarium, ×20.
11. Broad zooecia of a similar zoarium, ×20.

D. 5311. China Sea, vicinity of Hong Kong.



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 566

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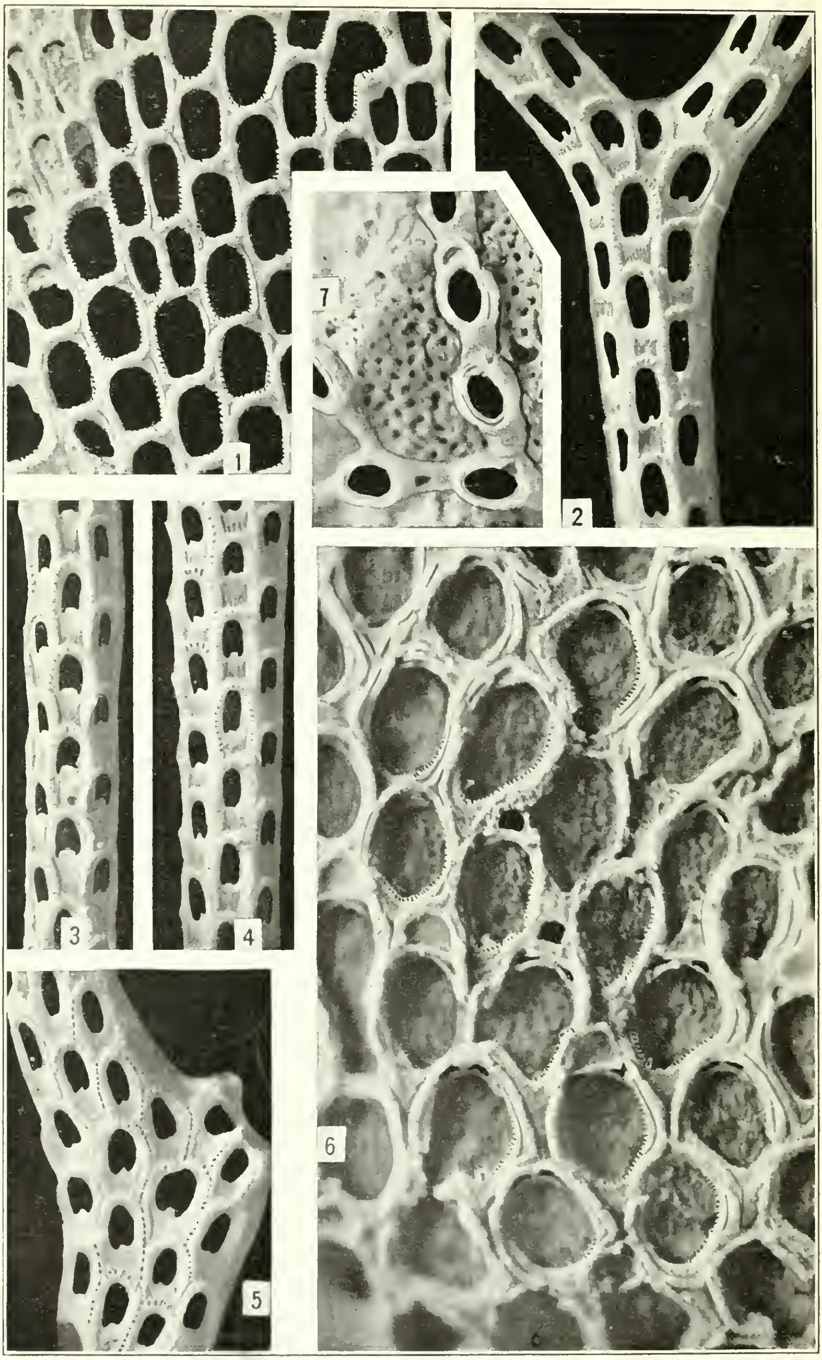


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 569

Plate 2

Fig. 1. *Acanthodesia lamellosa*, new species (p. 68).

Portion of bilamellar frond, ×20, the zooecia to the left preserve their ectocyst.

Bottom of ship, Cavite.

2-5. *Acanthodesia virgata*, new species (p. 69).

2. Ramified colony, ×20, engendering quadrangular branches.
3. A branch, ×20, on which the serrate denticle is much developed.
4. Cylindrical branch with small zooecia, ×20, the opesium is longer than the cryptocyst.
5. Colony, ×20, with broad compressed branches and with short zooecia.

D. 5478. Tacbuc Point, Leyte.

6. *Membranipora arcifera*, new species (p. 64).

Encrusting specimen, ×20. A special membrane closes the interopesial cavity (ovicell?) and the distal arch of the zooecia is visible.

D. 5217. Anima Solo Island.

7. *Allantopora curta*, new species (p. 107).

The incrusting type specimen, ×20.

D. 5217. Anima Solo Island.

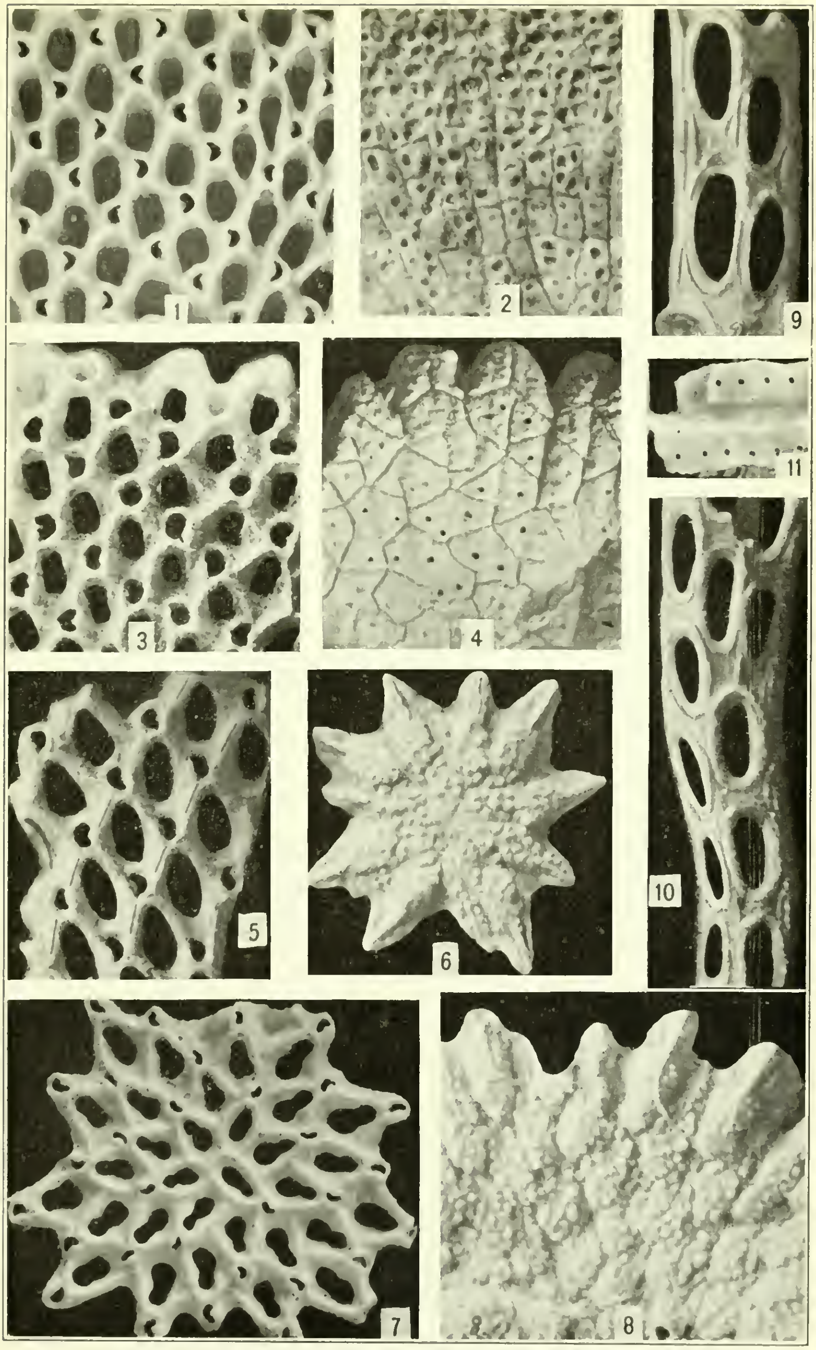
Plate 3

Figs. 1, 2. *Cupuladria canariensis* Busk, 1859 (p. 73).
  1. Exterior (cellular) side, ×20.
  2. Inner (basal) side, ×20.
    D. 2826. Gulf of California.

3, 4. *Cupuladria transversata*, new species (p. 75).
  3. Portion of outer surface, ×20.
  4. The inner side, ×20. The transverse lozenge-shaped compartments are arranged on two radial costules.
    D. 5579. Darvel Bay, Borneo.

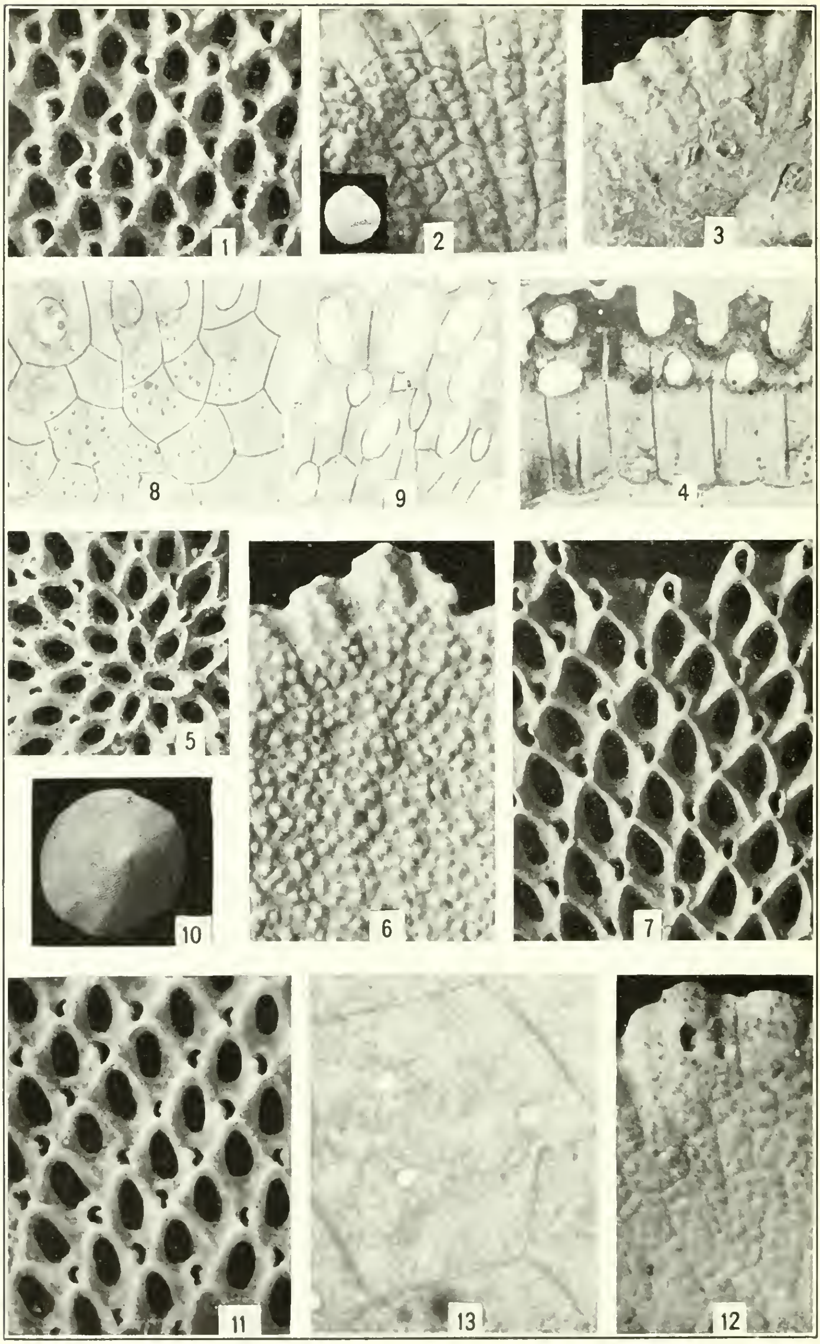
5–8. *Cupuladria dentifera*, new species (p. 75).
  5. Large marginal zooecia, ×20.
  6. Inner side of young zoarium showing the peripheral denticles, ×20.
  7. Outer side of a young zoarium exhibiting the central zooecium, ×20.
  8. Portion of inner side of a large zoarium, ×20.
    D. 5230. Limasaua Island.

9–11. *Membranipora bartschi*, new species (p. 66).
  9. Fragment of a branch with large zooecia, ×20.
  10. An example, ×20, showing the mode of branching.
  11. Lateral view of zooecial wall showing the five septules, ×20.
    D. 5230. Limasaua Island.



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 570



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 571

Plate 4

Figs. 1–4. *Cupuladria tuberosa*, new species (p. 76).

1. Outer (cellular) face, ×20.
2. Zoarium, natural size, and portion of the inner face, ×20, showing the large tuberosities decorating the radial costules.
3. Portion of the inner face of a young zoarium, ×20.
4. Meridian section, ×20, showing the arrangement of the zoarial prisms forming the inner face.

D. 5134. Balukbaluk Island, Sulu Archipelago.

5–9. *Cupuladria granulosa*, new species (p. 78).

5. Center of the outer side of a zoarium, ×20, showing the primitive zooecium.
6. Portion of the inner face, ×20, exhibiting the nonadjacent granules.
7. Outer face, ×20.
8. Tangential thin section, ×20, through the inner side, showing the characteristic curvilinear compartments of the species, perforated by small pores.
9. Thin section through the marginal zooecia, ×20, indicating the special mode of gemmation.

D. 5358. Sandakan Light, Jolo Sea.

10–13. *Cupuladria grandis*, new species (p. 77).

10. Zoarium, natural size.
11. Portion of the outer side of zoarium, ×20.
12. Inner side, ×20, with the little convex tuberosities.
13. Tangential thin section, ×85, through the inner face of a specimen almost without tuberosities, showing traces of the jaxtaposed prisms (compartments) and the small pores.

D. 5161. Tinagta Island, Sulu Archipelago.

Plate 5

Figs. 1–4. *Cupuladria hexagonalis*, new species (p. 79).

1. Two zoaria, natural size.
2. Portion of outer surface, ×20.
3. Inner side, ×20, showing the hexagonal compartments (base of the prisms) covered by adjacent granules.
4. Tangential thin section, ×85, through the inner face.

D. 5147. Sulade Island, Sulu Archipelago.

5. *Electra devinensis* Robertson, 1921 (p. 81).

Zooecia, ×20, rather well preserved.

D. 5235. Nagubat Island, east coast of Mindanao.

6. *Nitscheina tuberculata* Bosc, 1802 (p. 80).

Zoarial surface, ×20, covered by the ectocyst.

D. 5212. Panalangan Point, east of Masbate Island.

7–9. *Pyripora uncifera*, new species (p. 82).

7. Fragment of a branch without ectocyst, ×20. The middle zooecium is regenerated.

8, 9. Zoarial branches, ×20, showing the great variation in the number and arrangement of the areal clawlike spines. The ectocyst covers the opesia.

D. 5211. Anima Sola Island.

10. *Pyripora tenuicaudata*, new species (p. 83).

Branches of the incrusting colony, ×20. The ramifications occur either at the caudal portion or the opesial part of the zooecia.

D. 5217. Anima Sola Island.

11. *Pyrulella pyrula* Hincks, 1881 (p. 100).

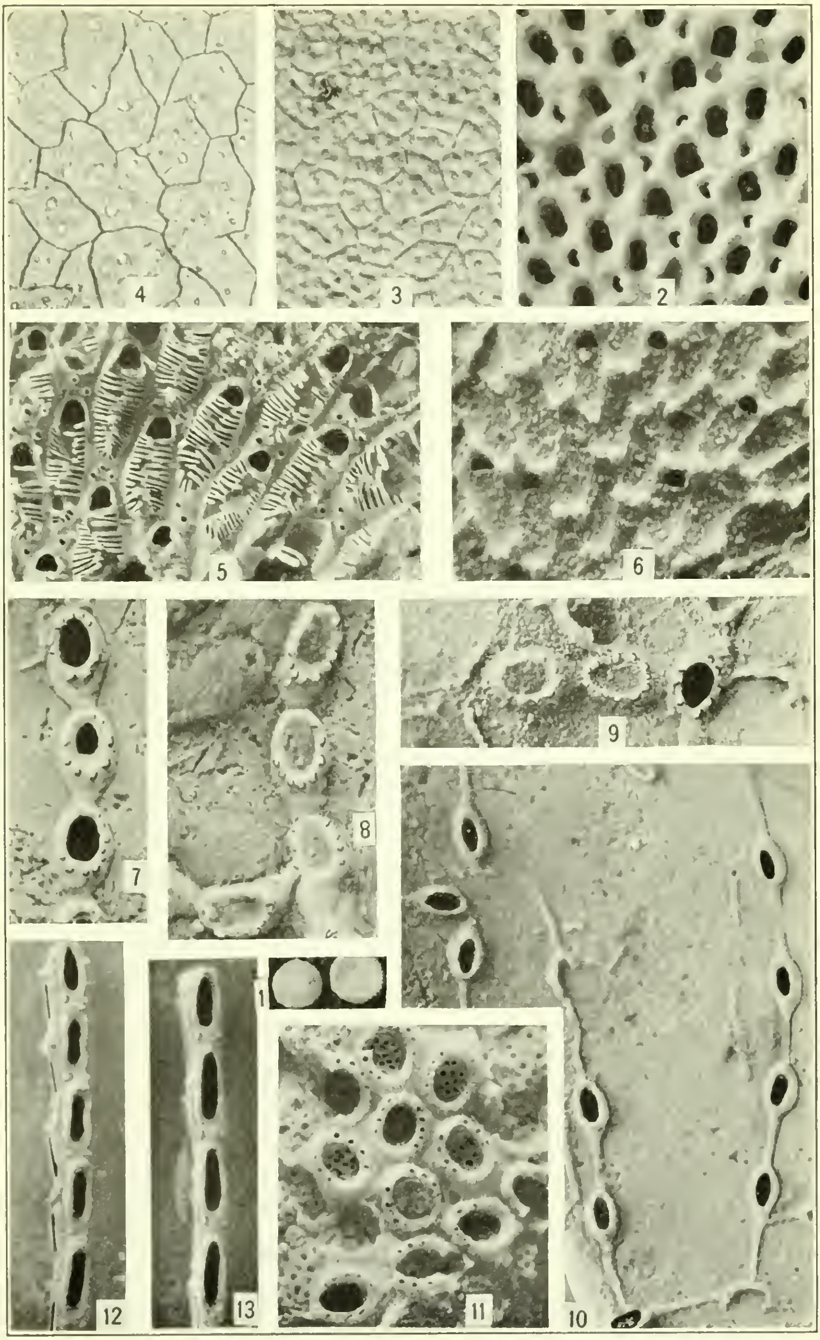
Zooecia, ×20, of a small incrusting zoarium.

D. 5579. Sibutu Island, Darvel Bay, Borneo.

12, 13. *Nellia oculata* Busk, 1852 (p. 185).

Two segments, ×20, showing variations.

D. 5235. Nagubat Island, east coast of Mindanao.



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 572

Plate 7

Figs. 1, 2. *Vibracellina viator*, new species (p. 97).

1. Ancestrular region of incrusting zoarium, ×20.
2. Superior side, ×20, of a zoarium incrusting a small grain of sand. The mural rim is thin.

D. 5135. Jolo Light, Jolo.

3, 4. *Vibracellina crassatina*, new species (p. 98).

3. Superior side, ×20, of a zoarium entirely covering a grain of sand.
4. Inferior face of same, ×20, where the zooecia are regenerated or closed.

D. 5144. Jolo Light, Jolo.

5. *Callopora subalbida*, new name (p. 101).
Incrusting specimen, ×20.

D. 5179. Romblon Light, Romblon.

6. *Callopora tenuirostris* Hincks, 1880 (p. 102).
Portion of the incrusting zoarium, ×20.

D. 5137. Jolo Light, Jolo.

7. *Callopora horrida* Hincks, 1880 (p. 103).
Zooecia, ×20.

D. 4807. Cape Tsiuka, Sea of Japan.

8. *Amphiblestrum papillatum* Busk, 1885 (p. 104).
Incrusting zoarium, ×20, with ovicelled zooecia.

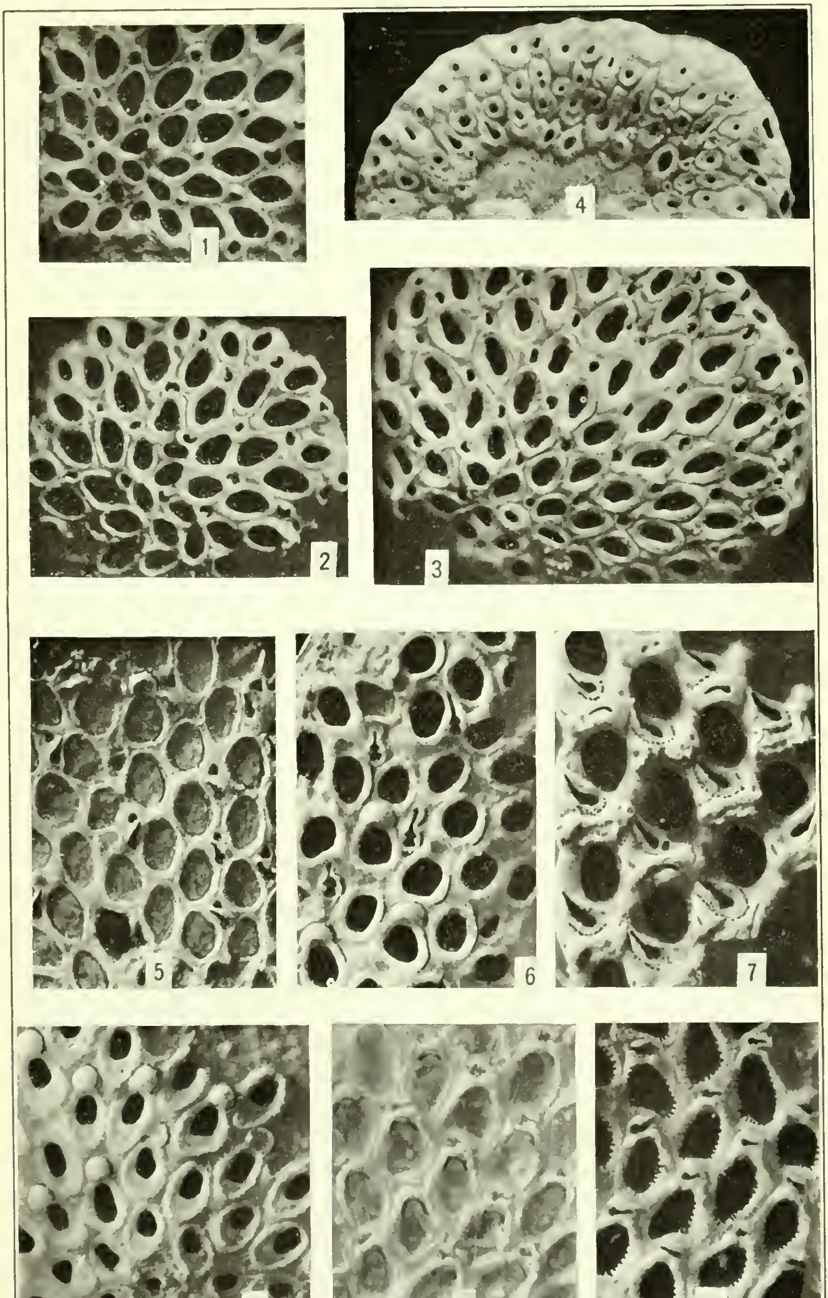
D. 5179. Romblon Light, Romblon.

9, 10. *Ellisina coronata* Hincks, 1881 (p. 104).

9. Incrusting ovicelled example, ×20. Some zooecia have preserved their ectocyst and opercular valve.

D. 5141. Jolo Light, Jolo.

10. Zooecia, ×20, with well developed avicularia.
Unknown Philippine locality.



BRYOZOA OF THE PHILIPPINE REGION

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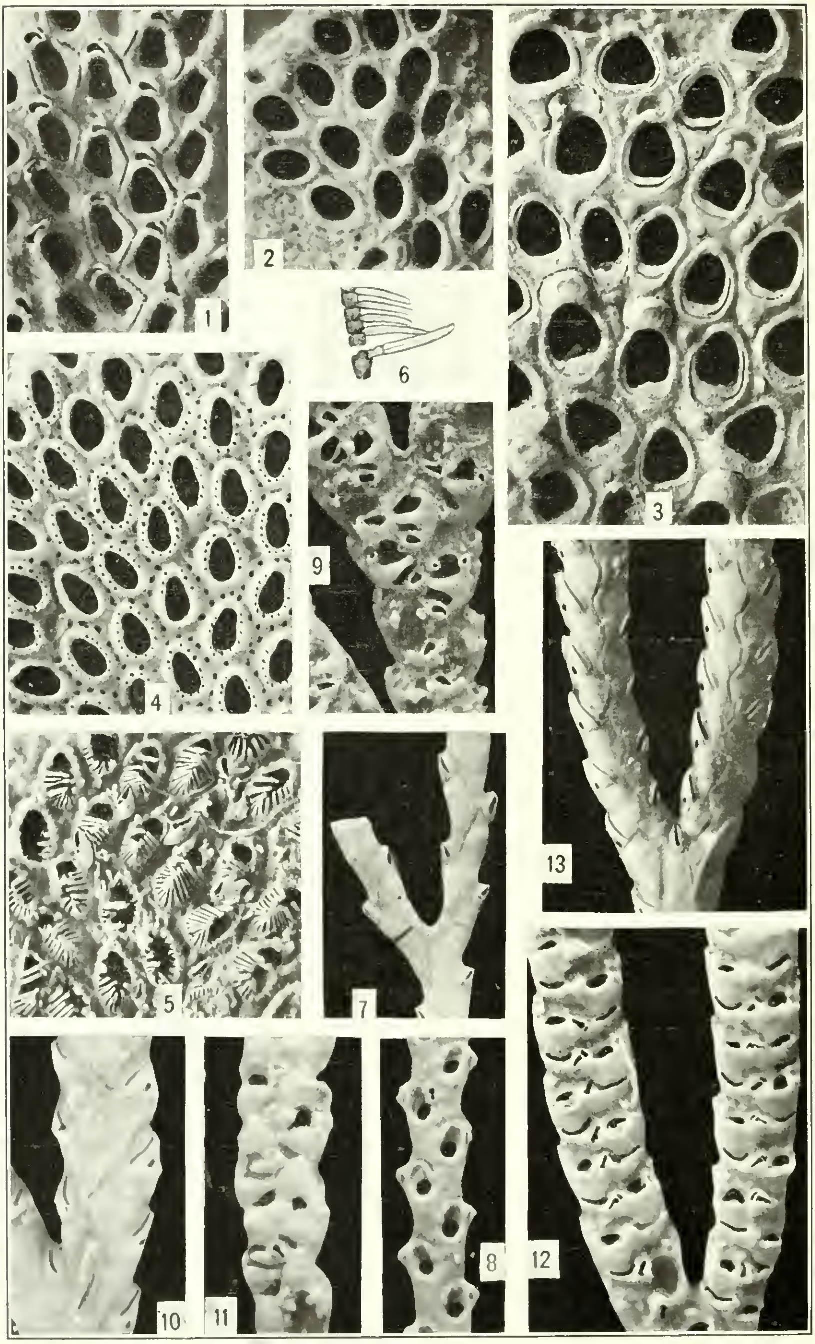


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 575

Plate 8

Fig. 1. *Ellisina philippinensis*, new species (p. 106).
Incrusting zoarium, ×20, with zooecia showing the mural rim enlarged at the base.
D. 5137. Jolo Light, Jolo.

2. *Alderina imbellis* Hincks, 1860 (p. 108).
A Philippine specimen referred to this species, ×20.
D. 5137. Jolo Light, Jolo.

3. *Membraniporidra tuberosa*, new species (p. 107).
The incrusting type, ×20, with ovicelled zooecia.
D. 5179. Romblon Light, Romblon.

4–6. *Cauloramphus disjunctus*, new species (p. 109).
4. Incrusting zoarium, ×20, with zooecia deprived of spines.
5. Zoarium, ×20, with pedunculate avicularia and spicules preserved.
6. Fragment of a zooecium viewed by transparency, ×85. The opesial spines are inserted between the parietal dietellae.
D. 4807. Cape Tsiuka, Sea of Japan.

7, 8. *Scrupocellaria scrupea* Busk, 1848 (p. 208).
7. Posterior side of several segments, ×20, showing the incomplete articulation.
8. Anterior side of a segment, ×25.
D. 5178. Taclue Point, Leyte.

9–11. *Scrupocellaria securifera* Busk, 1884 (p. 205).
9. Anterior side of zoarium, ×25, showing the scutum and the axial avicularia.
10. Posterior side (dorsal) of the same specimen, ×25.
11. Ovicelled specimen, ×20.
D. 5151. Sirun Island, Sulu Archipelago.

12, 13. *Scrupocellaria curvata* Harmer, 1926 (p. 207).
12. Anterior side of two segments, ×25, showing the large striated scutum protecting the opesium.
13. Posterior side of the same specimen showing the erect vibracula.
D. 5478. Taclue Point, Leyte.

Plate 9

Figs. 1–3. *Scrupocellaria ulrichi*, new species (p. 208).

1. Posterior side of a segment, ×25, showing the granulations.
2. Anterior side of an ordinary segment, ×25, exhibiting the oval external opesia.

   D. 5147. Sulade Island, Sulu Archipelago.

3. Anterior side of an ovicelled segment, ×25.

   D. 5178. Tacbuc Point, Leyte.

4, 5. *Scrupocellaria diadema* Busk, 1852 (p. 211).

4. Nonovicelled segment, ×25.
5. Anterior side of an ovicelled segment, ×25.

   D. 5478. Tacbuc Point, Leyte.

6, 7. *Scrupocellaria ferox* Busk, 1852 (p. 210).

6. Anterior (cellular) side, ×25, showing the external and internal opesium.
7. Posterior (dorsal) side, ×25.

   D. 5235. Nagubat Island.

8–10. *Canda philippinensis*, new species (p. 213).

Lateral, dorsal and cellular sides of a fragment, ×25.

D. 5235. Nagubat Island.

11, 12. *Canda retiformis* Pourtales, 1867 (p. 212).

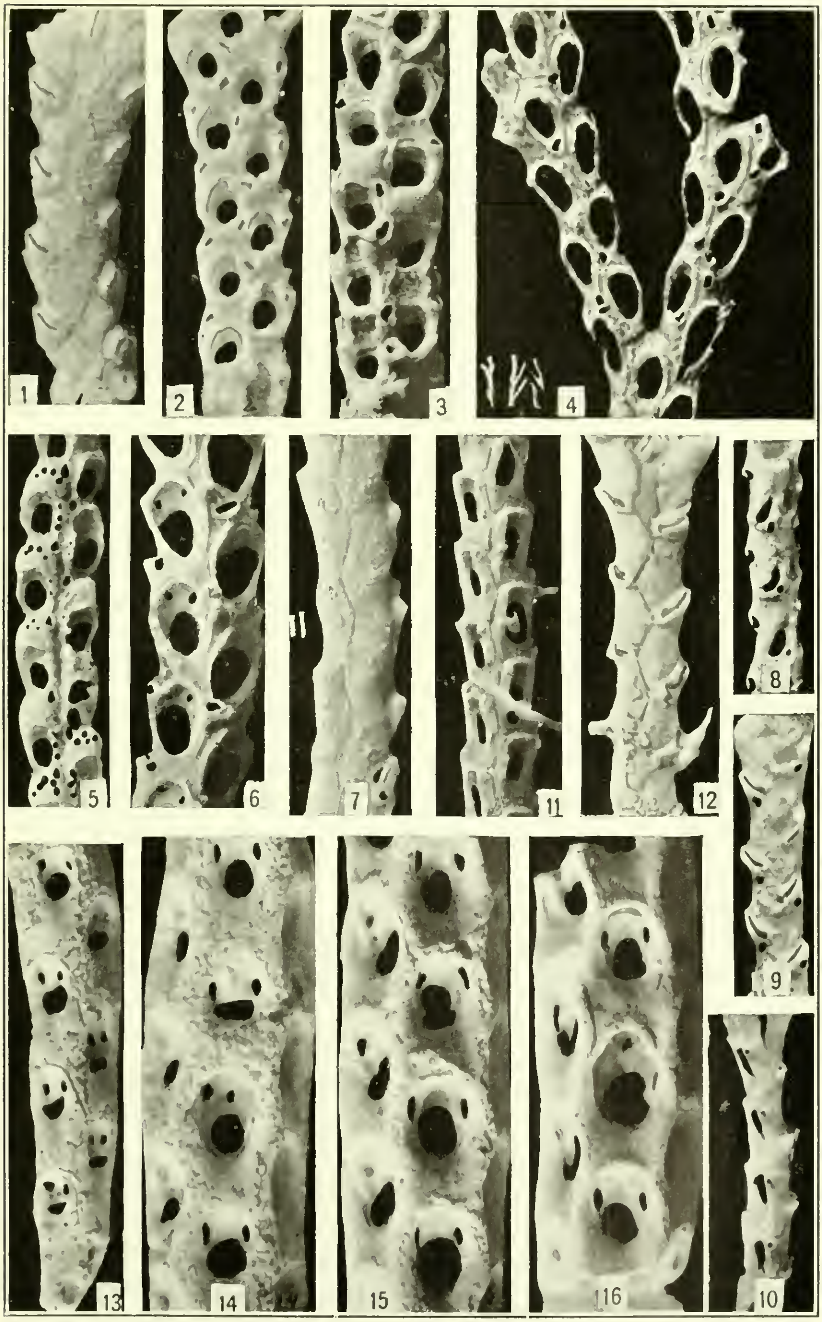
11. Anterior side of a segment, ×25, preserving one scutum and transverse fibers.
12. Posterior side of the same segment, ×25. The radicular pores are not visible.

    D. 5147. Sulade Island, Sulu Archipelago.

13–16. *Heterocella pentagona*, new species (p. 111).

13. Base of segment, ×20, showing smaller zooecia and the mode of articulation.
14. Median portion of a segment, ×20, with a deformed opesium and a special zooecium (ovarian?).
15. Median portion of a segment, ×20, showing 2 longitudinal series. Certain opesiules are linear.
16. Small portion of a segment, ×20, with a special zooecium (ovarian?) with its three opesiules.

    D. 5574. Simaluc Island, north of Tawi Tawi.



BRYOZOA OF THE PHILIPPINE REGION

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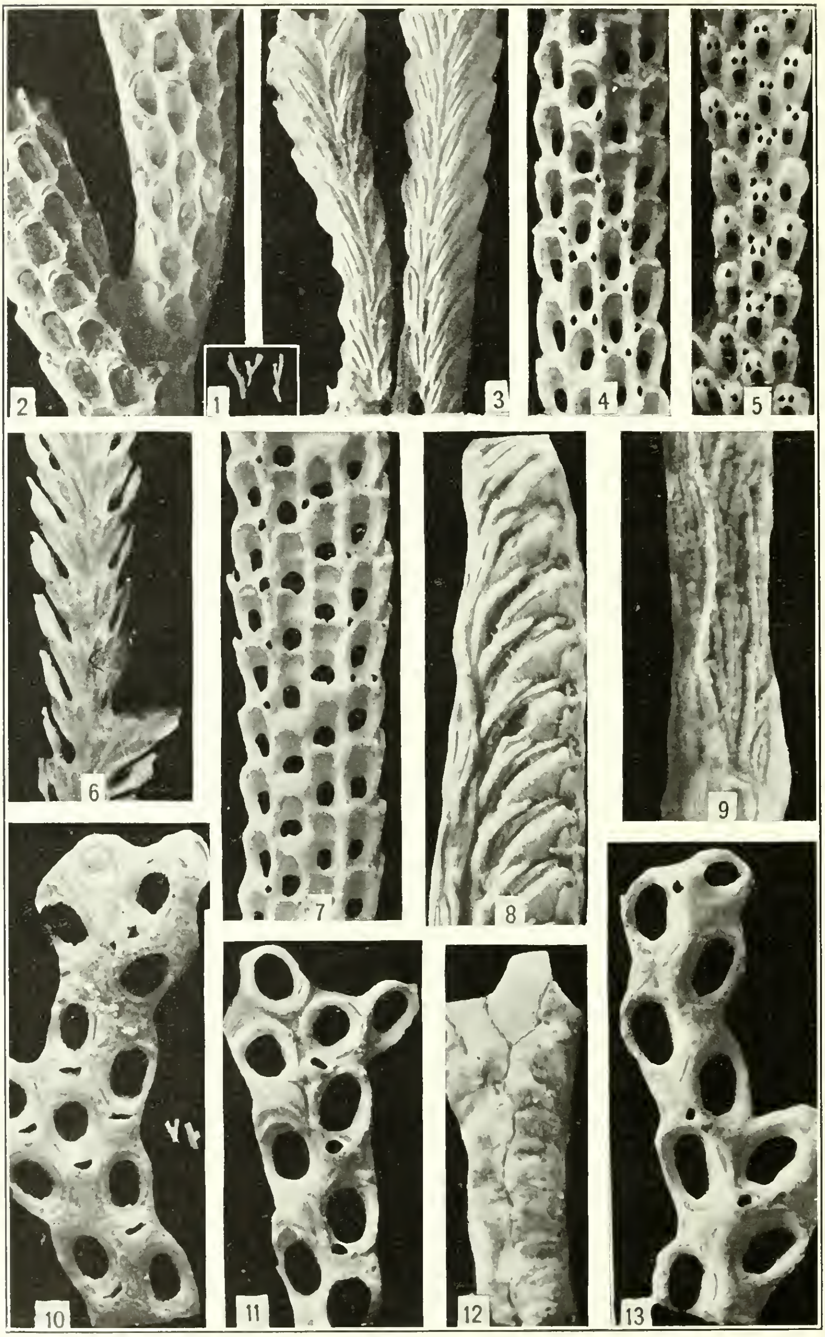


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 577

Plate 10

Figs. 1–9. *Caberea brevigaleata*, new species (p. 214).

1. Fragments, natural size.
2. Ovicelled specimen, ×20, with ectocyst, showing the mode of articulation. The internal opesium is visible by transparency through the very thin ectocyst. The ovicell opens between the two opesia.
3. Specimen with ectocyst, ×20, showing the seta of the vibracula and the radicells grouping themselves in the zoarial axis.

   D. 5147. Sulade Island.
4. Ovicelled segment, ×20, without ectocyst, showing the form of the opesia and avicularia.

   D. 5141. Jolo Light, Jolo.
5. Segment with submedian interior opesium, ×20, lighted from the base so as to show the septulae.
6. Dorsal side of the same specimen as Figure 6, ×20, showing the arrangement of the vibracular grooves.

   D. 5151. Sirun Island.
7. Portion of somewhat worn ovicelled segment, ×20, showing the disappearance of the avicularia.
8. Lateral side of Figure 7, ×20, showing the direction followed by the radicular fibers in order to group themselves longitudinally at the middle of the segment.
9. Portion of the radicular axial bundle of Figures 7, 8, ×20.

   D. 5147. Sulade Island.

10–13. *Flabellaris crassum*, new species (p. 221).

10. Anterior face of a bifurcated segment, ×20, showing the thick mural rim.

    D. 5579. Darvel Bay, Borneo.
11. Ovicelled specimen, ×20, exhibiting also the bifurcation.
12. Dorsal of the same specimen as Figure 11, ×20, showing the mode of bifurcation.

    D. 5580. Darvel Bay, Borneo.
13. Anterior face of a segment, ×20, with zooecia in which the gymnocyst is developed.

    D. 5574. Simalue Island.

PLATE 11

FIG. 1. *Tremopora intermedia* Kirkpatrick, 1890 (p. 111).
An example, ×20, with large ramified spines and very salient avicularia.
D. 5580. Darvel Bay, Borneo.

2–6. *Tremopora radicifera* Hincks, 1881 (p. 112).

2. Inferior face of unilamellar zoarium, ×20, showing the radicells attached to small hollow tuberosities.
D. 5157. Sirun Island.

3. Unilamellar specimen, ×20, exhibiting the more frequent aspect.
D. 5145. Jolo Light, Jolo.

4. Portion of zoarium, ×20, with short bifurcated spines which are united at the base at the avicularia.
D. 5579. Darvel Bay, Borneo.

5. Superior face of unilamellar zoarium, ×20, distinguished as var. *separata* new variety.

6. Inferior face of the specimen shown in Figure 5, showing the separating pores and the connecting tubes (var. *separata*).
D. 5580. Darvel Bay, Borneo.

7, 8. *Tremopora ovalis*, new species (p. 114).

7. The encrusting zoarium, ×20, with large ramified spines.
D. 5144. Jolo Light, Jolo.

8. An example, ×20, illustrating the usual condition.
D. 5151. Sirun Island, Sulu Archipelago.

9–11. *Hiantopora bidenticulata*, new species (p. 115).

9. Zooecia of incrusting zoarium, ×20. The orifice of the avicularia is visible and parallel to the zoarial plane.
D. 5137. Jolo Light, Jolo.

10. Specimen without ectocyst, ×20. The surface of two oral avicularia is perpendicular to the zoarial plane and invisible.

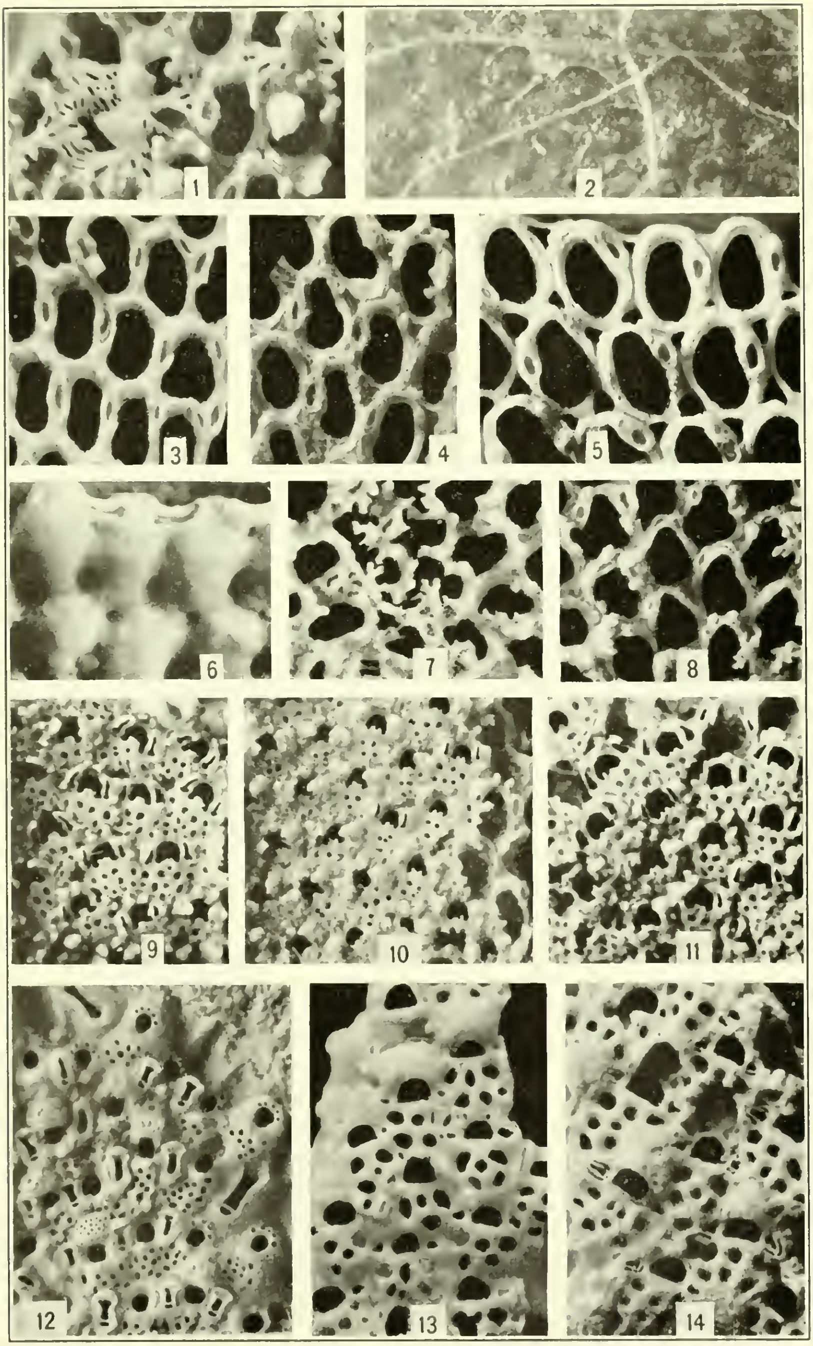
11. Zooecia, ×20, with the broken avicularia showing their primitive form.
D. 5151. Sirun Island.

12. *Hiantopora spathulata*, new species (p. 116).
The encrusting zoarium, ×20, with the characteristic spathulate avicularia.
D. 5179. Romblon Light, Romblon.

13, 14. *Hiantopora laticella*, new species (p. 116).

13. Superior face of a unilamellar ovicelled specimen, ×20.
D. 5579. Darvel Bay, Borneo.

14. Another example, ×20, showing the structure of the ovicell.
D. 5577. Mount Dromedario, Tawi Tawi Group.



BRYOZOA OF THE PHILIPPINE REGION

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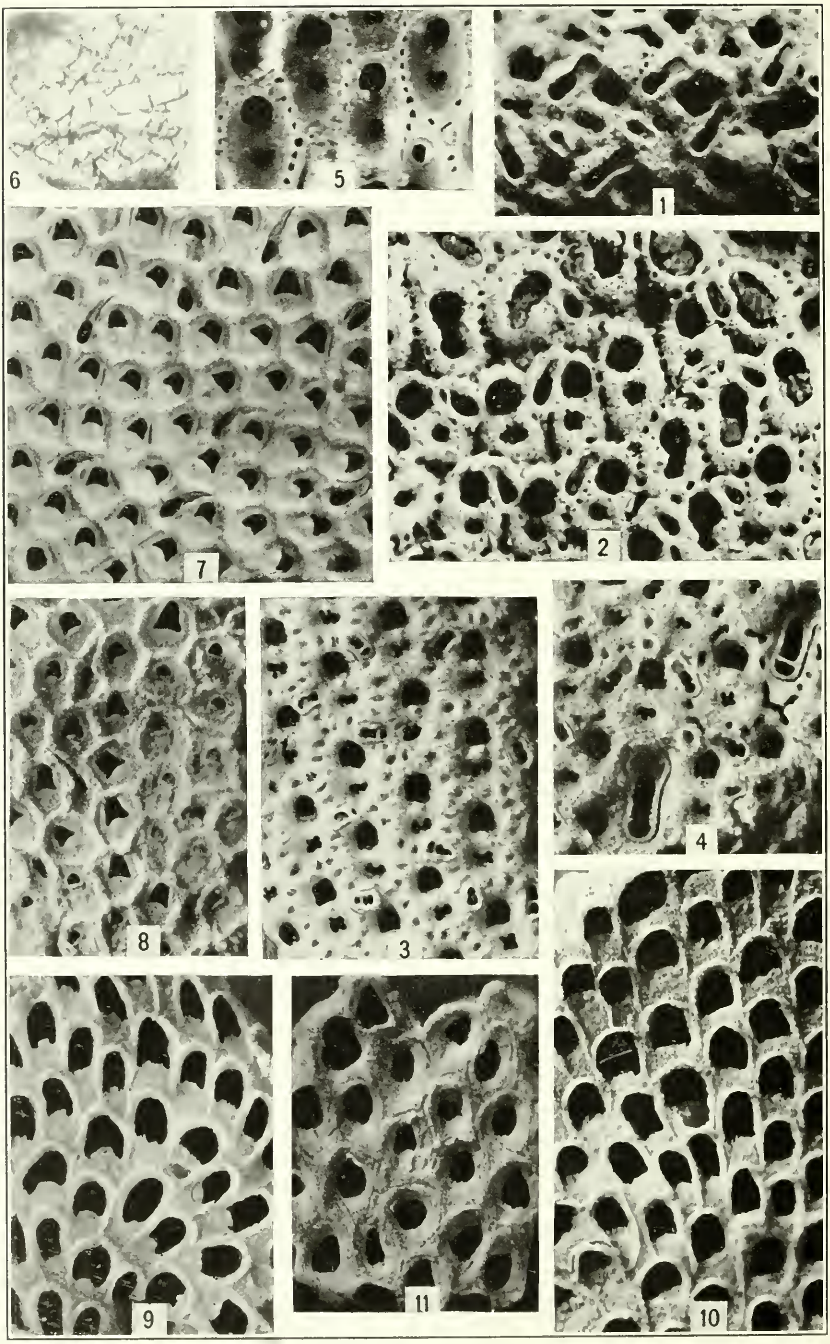


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 579

Plate 12

Figs. 1–6. *Tremogasterina celleporoides* Busk, 1884 (p. 118).

1. Ovicelled specimen, ×20. The ovicell is deeply buried in the distal zooecium.
   D. 5192. Jilantaguan Island, off northern Cebu Island.
2. Much calcified and altered example, ×20.
   D. 5579. Darvel Bay, Borneo.
3. Bilamellar zoarium, ×20, with well-preserved zooecia.
4. Another bilamellar specimen, ×20, provided with large interzooecial avicularia.
   D. 5141. Jolo Light, Jolo.
5. Interior, ×20.
6. Structure of the zooecial walls, ×85.
   D. 5147. Sulade Island.

7, 8. *Onychocella subsymmetrica*, new species (p. 124).

7. Zoarium incrusting a shell, ×20. The opesiular indentations are almost symmetrical.
8. Another example, ×20. Some zooecia have preserved their ectocyst.
   D. 5145. Jolo Light, Jolo.

9, 10. *Onychocella* (?) *inarmata*, new species (p. 125).

9. Zoarium, ×20, incrusting an *Adeonellopsis*. Some zooecia bear a serrate denticle in the opesium.
10. An example, ×20, showing great micrometric variations. The opesia do not have a serrate denticle. There are two ovicelled zooecia in the lower left-hand corner.
    D. 5478. Tacbuc Point, Leyte.

11. *Rectonychocella ovalis*, new species (p. 127).
    Portion of the bilamellar zoarium, ×20. The opesium is oval.
    D. 5580. Darvel Bay, Borneo.

Plate 13

Figs. 1–4. *Velumella philippinensis*, new species (p. 129).

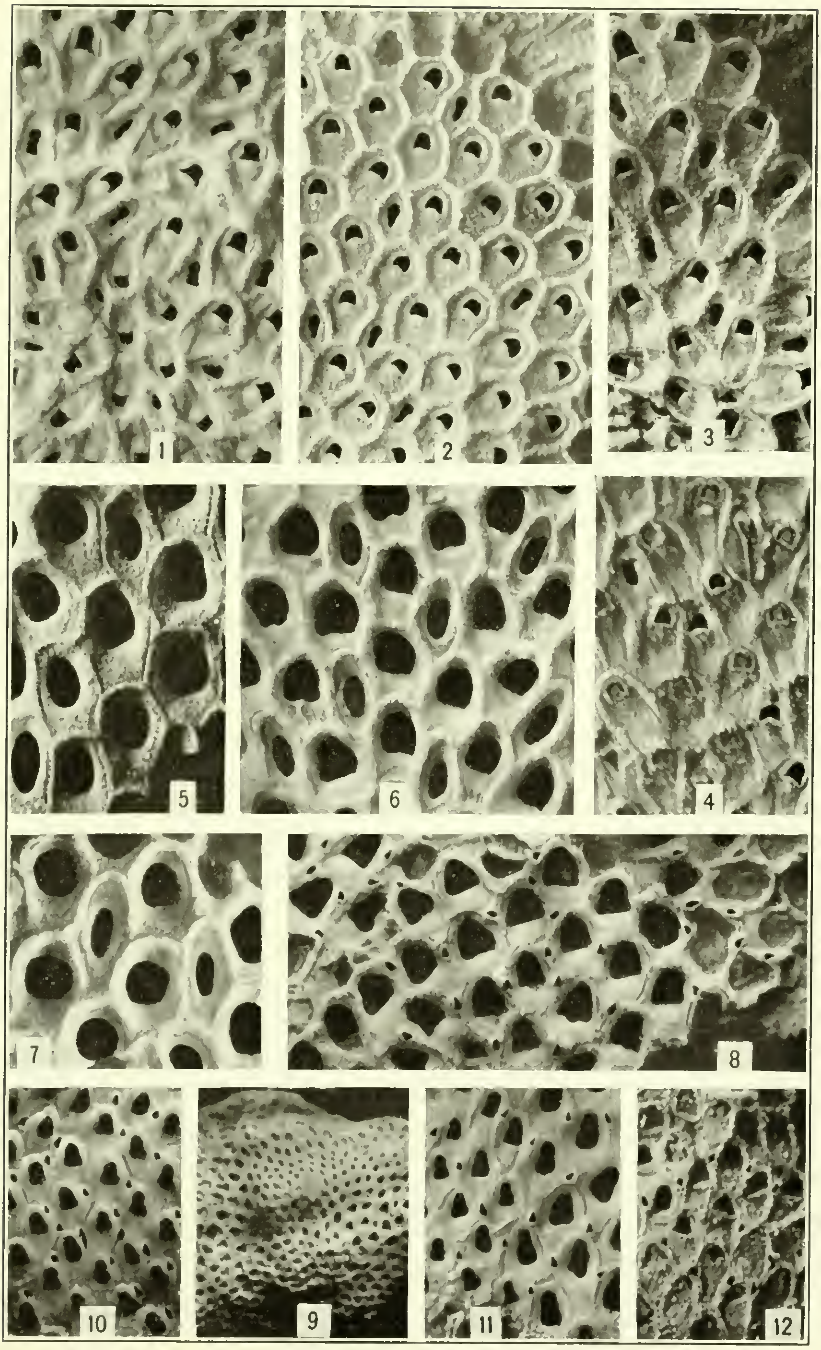
1. Zoarium incrusting a shell, ×20, showing the false dimorphism. The ancestrula is an ordinary zooecium.
   D. 5147. Sulade Island.
2. An example, ×20, with small regular zooecia, showing the zoarial margins.
   D. 5141. Jolo Light, Jolo.
3. A specimen, ×20, in which the ancestrula is an onychocellarium.
   D. 5179. Romblon Light, Romblon.
4. Specimen, ×20, with ectocyst, opercula, and onychocellarian mandibles.
   D. 5147. Sulade Island.

5–7. *Rectonychocella grandipora*, new species (p. 127).

5. Surface of the bilamellar zoarium, ×20. The zooecia have a granulated cryptocyst.
6. Another example, ×20, in which some opesia have a convex proximal border.
   D. 5579. Darvel Bay, Borneo.
7. Fragment, ×20, with zooecia having an orbicular opesium.
   D. 5574. Simalue Island.
8. *Dacryonella ogivalina*, new species (p. 132).
   The type specimen incrusting a shell fragment, ×20.
   D. 5147. Sulade Island.

9–12. *Dacryonella minor* Hincks, 1885 (p. 131).

9. Specimen, ×6, incrusting a gastropod and showing the influence of the substratum on the size of the zooecia.
10. An example, ×20, with small zooecia.
11. A portion of Figure 9, ×20.
12. Zooecia, ×20, preserving their ectocyst and opercular valve.
    D. 5145. Jolo Light, Jolo.



BRYOZOA OF THE PHILIPPINE REGION

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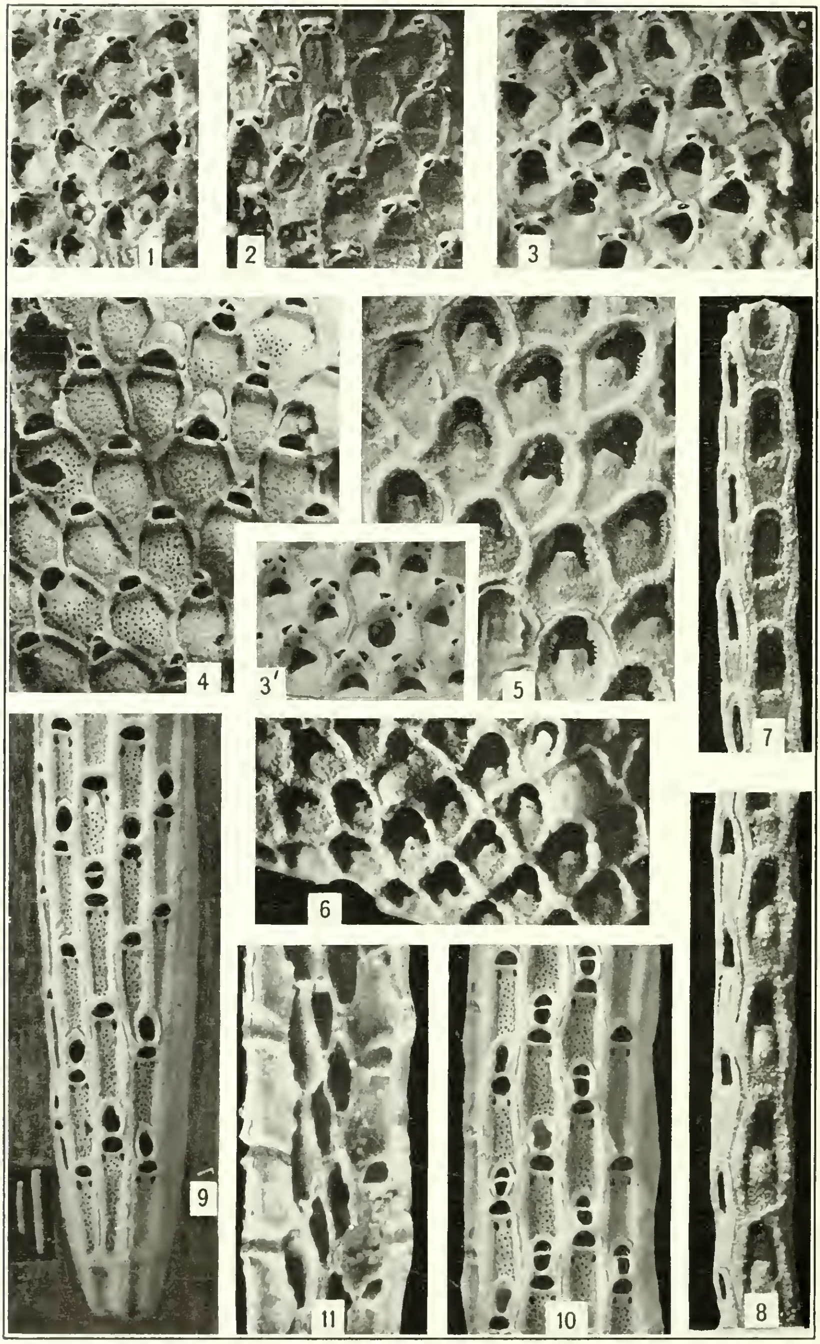


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 581

Plate 14

Fig. 1. *Dacryonella subvespertilio*, new species (p. 131).
The type specimen, ×20, incrusting an orbitoid foraminifer.
D. 5179. Romblon Light, Romblon.

2, 3. *Dacryonella trapezoides*, new species (p. 133).
2. Zoarium, ×20, incrusting a nullipore. The zooecia preserve the ectocyst which is very transparent and shows the opesium.
3. Another example, ×20, in which some of the zooecia (with double mural rim) are regenerated.
3′. Specimen, ×20, showing the inner structure of the opesium.
The distal impressions are placed a little lower than the hinge of the opercular valve.
D. 5151. Sirun Island.

4. *Micropora rimulata*, new species (p. 137).
The type specimen incrusting a pebble, ×20.
D. 5217. Anima Sola Island.

5, 6. *Caleschara laxa*, new species (p. 136).
5. Zoarium, ×20, incrusting a pebble, with some zooecia preserving their ectocyst.
D. 5217. Anima Sola Island.
6. Unilamellar specimen, ×20, showing the large endozooecial ovicells.
D. 5137. Jolo Light, Jolo.

7, 8. *Caleschara junctifera*, new species (p. 136).
7. The free rod like zoarium, ×20, showing zooecia without polypidian lamella.
8. Another example, ×20, in which the polypidian lamella is developed.
D. 5235. Nagabut Island.

9 11. *Microporina japonica*, new species (p. 139).
9. Segments, natural size, and one, ×20, showing the narrow base. Some of the zooecia have no avicularia.
10. Middle portion of a segment, ×20, with an avicularium to each zooecium.
11. Longitudinal section, ×20. The avicularium is not related to the distal zooecium, on which it, however, reposes.
D. 4807. Cape Tsiuka, Sea of Japan.

PLATE 15

FIGS. 1, 2. *Steganoporella magnilabris* Busk, 1854 (p. 144).

1. Surface of a bilamellar example, ×20.

D. 5145. Jolo Light, Jolo.

2. A specimen, ×20, containing a large calcified cell.

D. 5580. Darvel Bay, Borneo.

3, 4. *Steganoporella mandibulata* Harmer, 1926 (p. 145).

3. Unilamellar specimen, ×20, showing the ectocyst and avicularian mandibles. The thick ectocyst hides all the details of the frontal.

4. The same specimen, ×20, after boiling in Javelle water and deprived of the chitinous appendages. The polypidian tube is visible especially if the specimen is inclined 45 degrees.

D. 5174. Jolo Light, Jolo.

5-11. *Cupularia umbellata* Defrance, 1823 (p. 142).

5. Central part of small colony, ×20, where the zooecia are not calcified.

6. Center of large colony with calcified zooecia, ×20.

7. Marginal zooecia of a large colony, ×20.

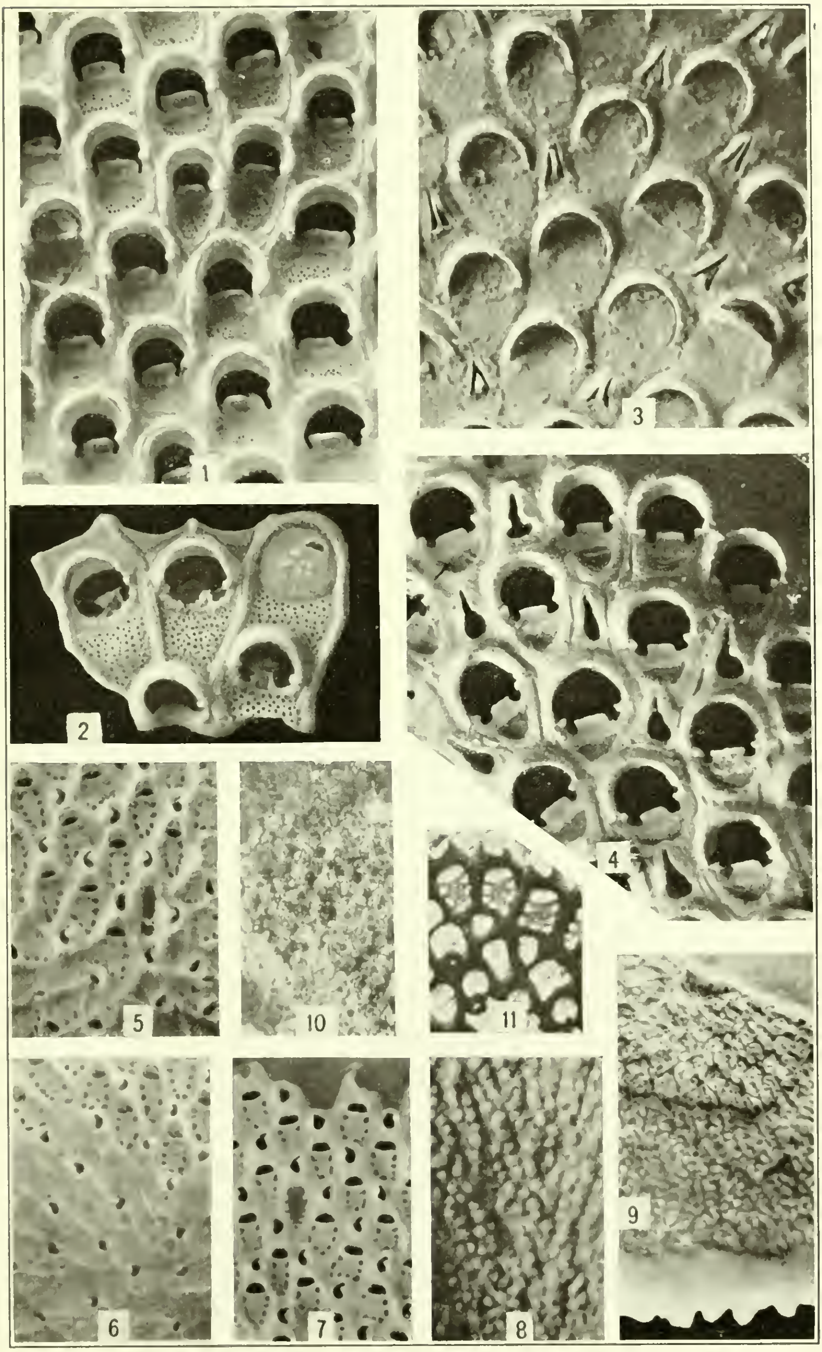
8. Granulations of the inner side, ×20.

9. Inner side of a zoarium, ×20 showing three kinds of calcareous deposits.

10. Tangential thin section through the inner side, ×25. The pores serving for the passage of the hydrostatic muscles are visible.

11. Tangential thin section through the outer side, ×25, showing the arrangement and structure of the spicules.

D. 2826. Pacific, between California and Hawaii.



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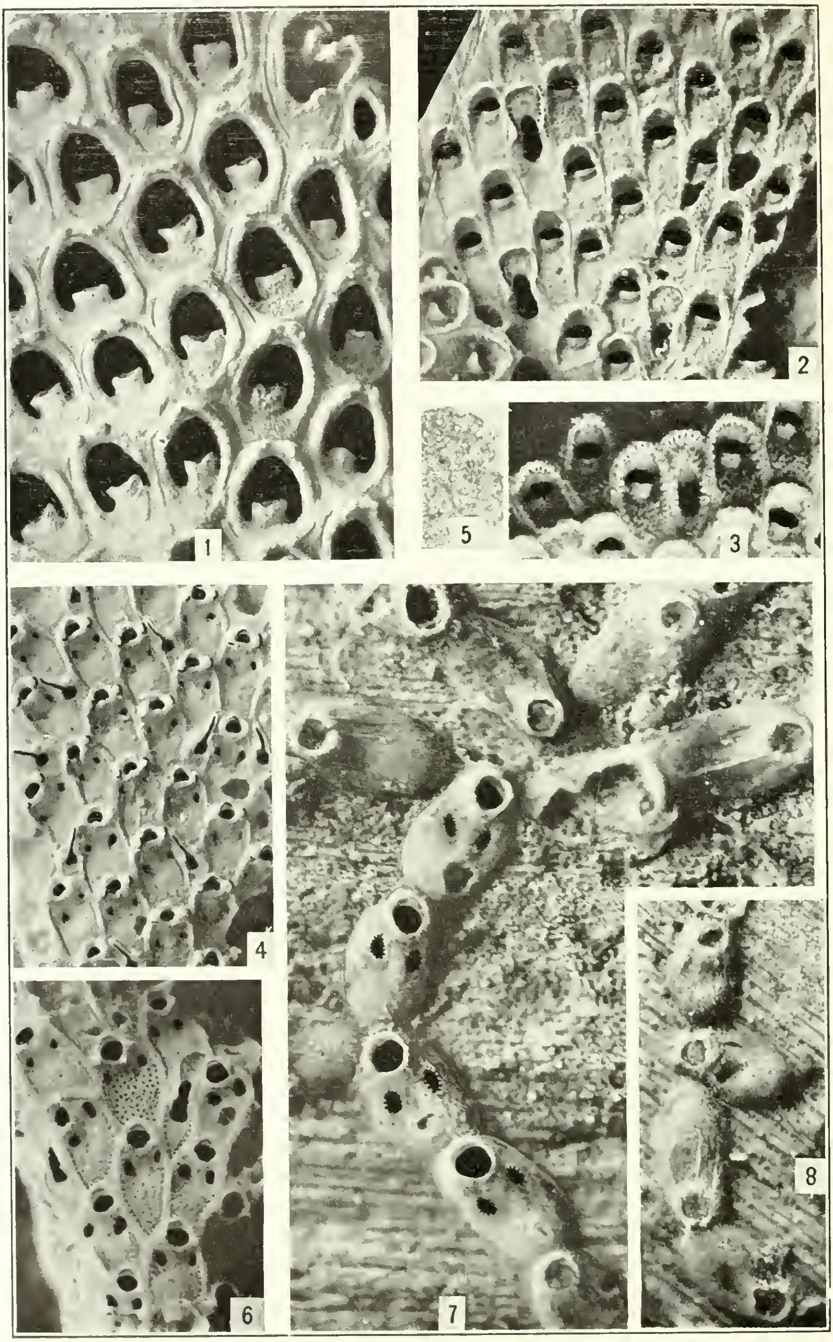


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 583

PLATE 16

FIG. 1. *Siphonoporella ovalis*, new species (p. 149).
The type specimen, ×20, incrusting a Nullipore.
D. 5151. Sirun Island.

2, 3. *Labioporella crenulata* Levinsen, 1909 (p. 148).
2. Zoarium, ×20, incrusting a shell.
D. 5147. Sulade Island.
3. Another example, ×20, showing the crenulations of the mural rim.
D. 5162. Tinagta Island.

4, 5. *Thalamoporella hamata* Harmer, 1926 (p. 151).
4. Zoarium, ×20, incrusting an *Adeonellopsis*.
5. Structure of the cryptocyst, ×85.
D. 5151. Sirun Island.

6. *Thalamoporella granulata* Levinsen, 1909 (p. 150).
The incrusting zoarium, ×20.
D. 5179. Romblon Light, Romblon.

7, 8. *Thalamoporella linearis*, new species (p. 152).
7. The linear branching zoarium, ×20, with zooecia above preserving their ectocyst.
8. Several zooecia, ×20, including the ancestrula.
D. 5311. China Sea, vicinity of Hong Kong.

Plate 17

Figs. 1, 2. *Thalamoporella lioticha* Ortman, 1890 (p. 150).

1. Cylindrical, ovicelled zoarium, ×20.
2. Unilamellar fragment, ×20.

D. 5151. Sirun Island.

3. *Thalamoporella granulata* Levinsen, 1909 (p. 150).

An incrusting specimen, ×20, referred to this species. (See also pl. 16, fig. 6.)

D. 5151. Sirun Island.

4. *Thalamoporella? insolita*, new species (p. 154).

The free, cylindrical zoarium, ×20.

D. 5574. Simalac Island.

5. *Thalamoporella expansa* Levinsen, 1909 (p. 153).

Zooecia, ×20, of example incrusting a Nullipore.

D. 5137. Jolo Light, Jolo.

6–9. *Monoporella fimbriata* Canu and Bassler, 1927 (p. 156).

6. Zooecia, ×20, incrusting a shell fragment. The ancestrula and the ancestrular zooecia are surrounded by a calcareous epitheca.
7. A group of ovicelled zooecia, ×20. The ovicell is buried in the distal zooecium and its edges are costulated and fringed.

D. 5151. Sirun Island.

8. Ovicelled zoarium, ×20, provided with ectocyst and operculum. The gray spots indicate the attachment of the opercular muscles. Spines are rare.
9. Fragment of the ectocyst, ×85.

D. 5147. Sulade Island.

10. *Monoporella fimbriata crassa*, new variety (p. 157).

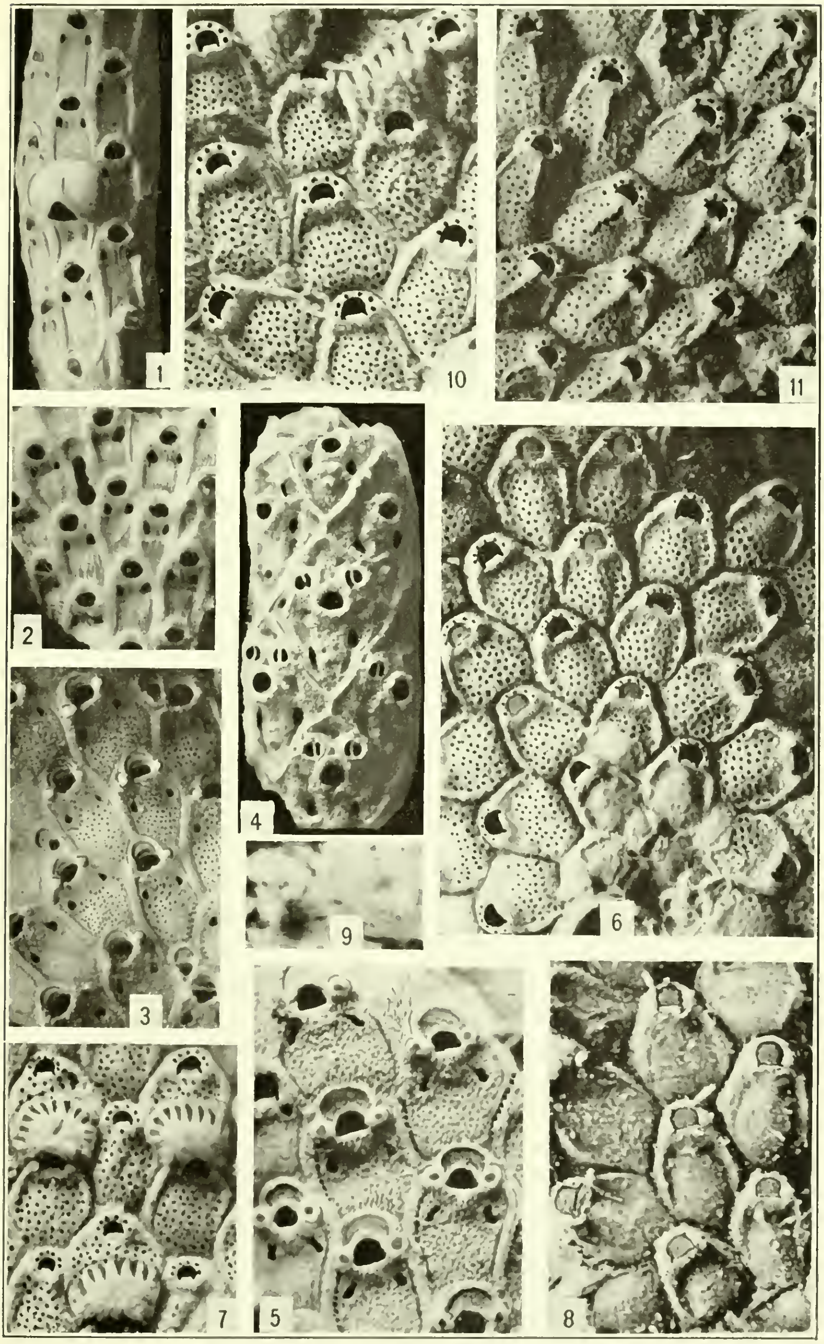
Incrusting, ovicelled zooecia, ×20.

D. 5137. Jolo Light, Jolo.

11. *Monoporella fimbriata carinifera*, new variety (p. 157).

Zooecia, ×20, showing the prominent carina.

D. 4137. Jolo Light, Jolo.



BRYOZOA OF THE PHILIPPINE REGION

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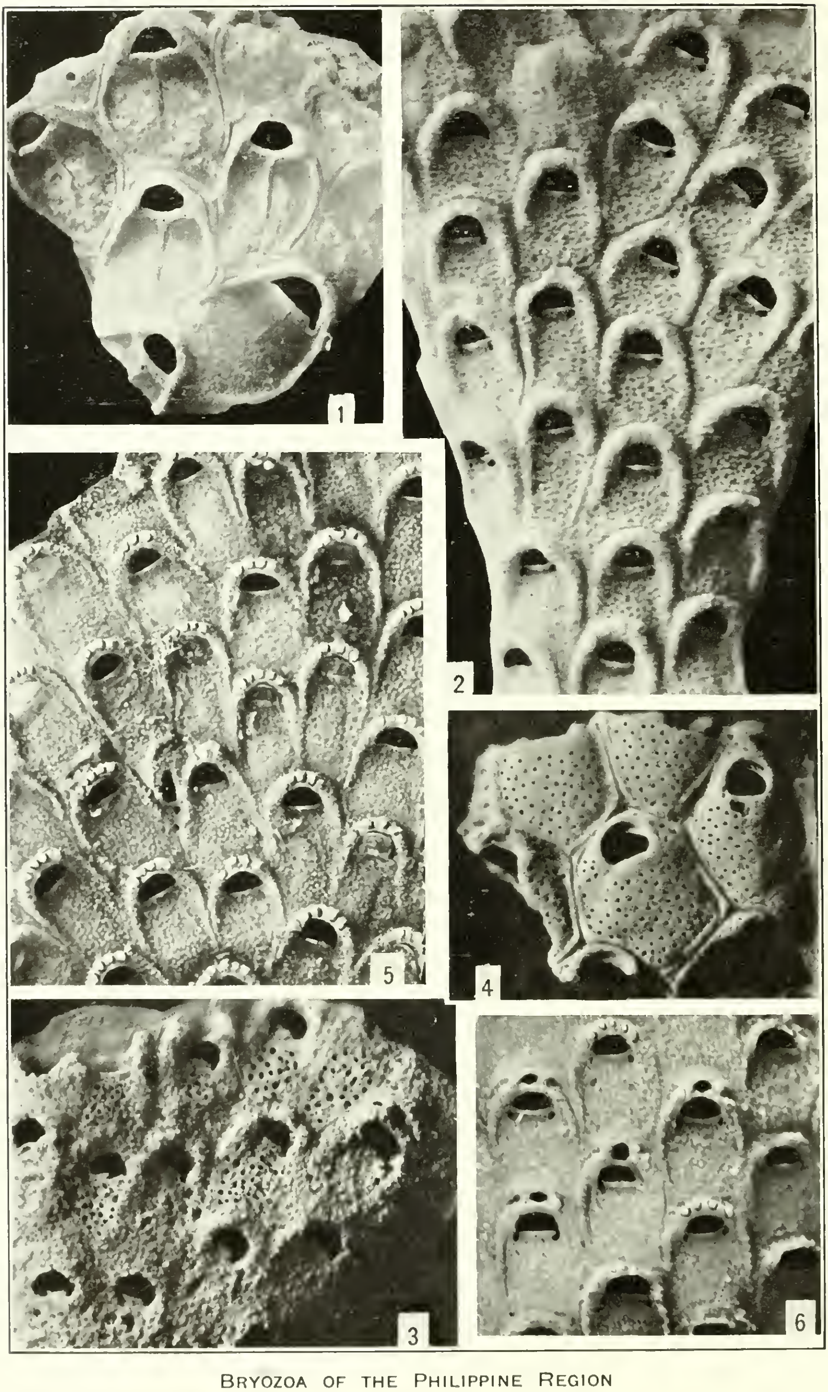


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 585

Plate 18

Fig. 1. *Monoporella tenuimargo,* new species (p. 158).
The unilamellar zoarium, ×20, of large zooecia with thin mural rims.
D. 5574. Simalue Island.

2, 3. *Crateropora expansa* Harmer, 1926 (p. 162).
2. The free bilamellar zoarium, ×20.
3. An example, ×20, with ovicelled zooecia.
D. 5577. Mount Dromedario.

4. *Macropora centralis* MacGillivray, 1895 (p. 161).
Unilamellar fragment, ×20.
D. 5574. Simalue Island.

5, 6. *Entomaria coronata,* new species (p. 164).
5. Zooecia, ×20, provided with a reticulocellarium.
6. Ovicelled zooecia, ×20.
D. 5151. Sirun Island.

Plate 19

Figs. 1–4. *Exechonella magna* MacGillivray, 1895 (p. 121).

1. Surface of the incrusting zoarium, ×10.
2. Several zooecia of the same, ×30.
3. Edge view of zooecia, ×20, showing their great depth.
4. Microstructure of the frontal, ×85, which is very different from the ordinary tremocyst. The pores do not serve for passage by the mesenchymatous fibers.

D. 5137. Jolo Light, Jolo.

5–8. *Coleopora erinacea*, new species (p. 268).

5. Zooecia, ×20, incrusting a Nullipore and showing the spinose frontal. Two zooecia show the primitive internal peristome.
6. A similar fragment, ×10, showing the ancestrula.

D. 5137. Jolo Light, Jolo.

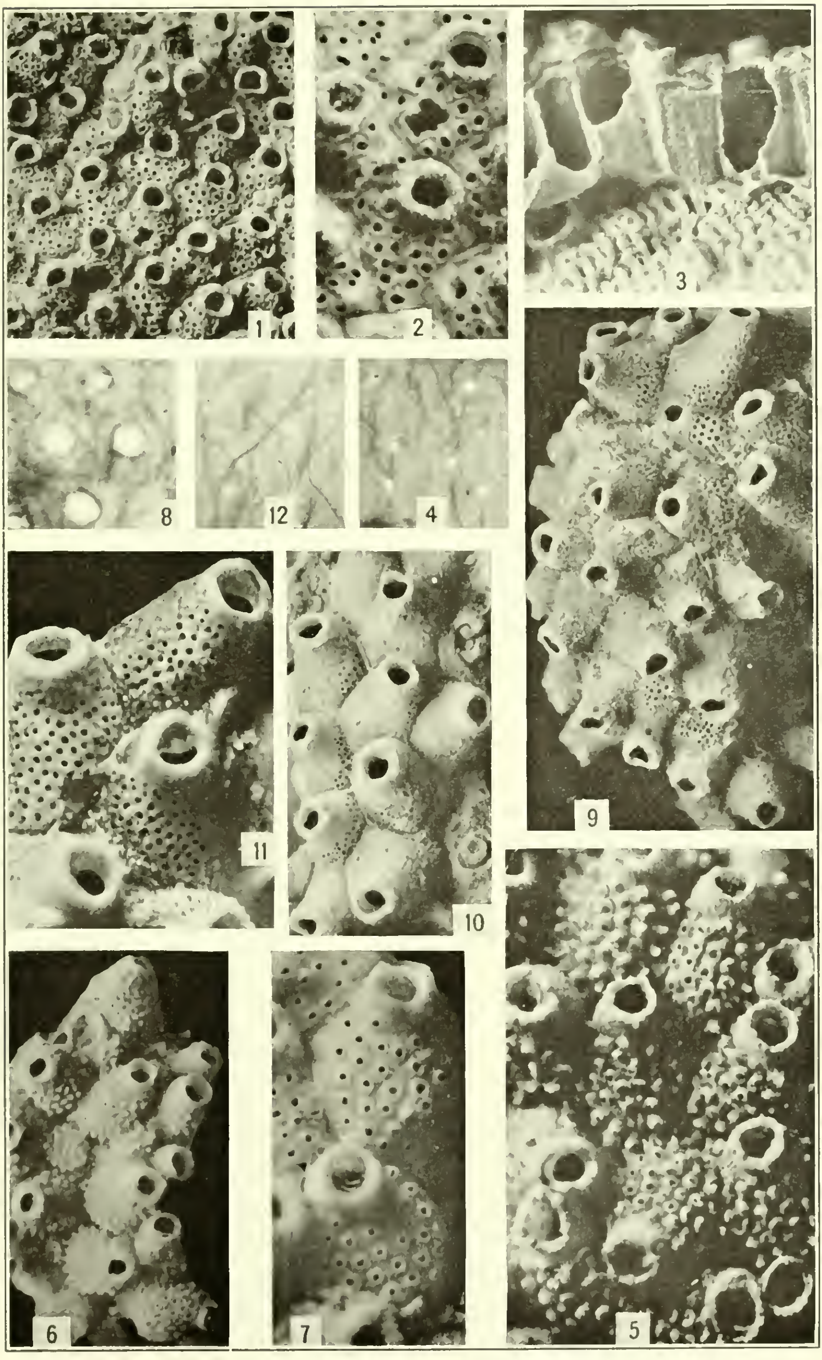
7. Several zooecia, ×20 of a dead specimen without frontal spicules on the tremopores.
8. Microscopic structure of the frontal, ×85.

D. 5147. Sulade Island.

9–12. *Coleopora seriata*, new species (p. 270).

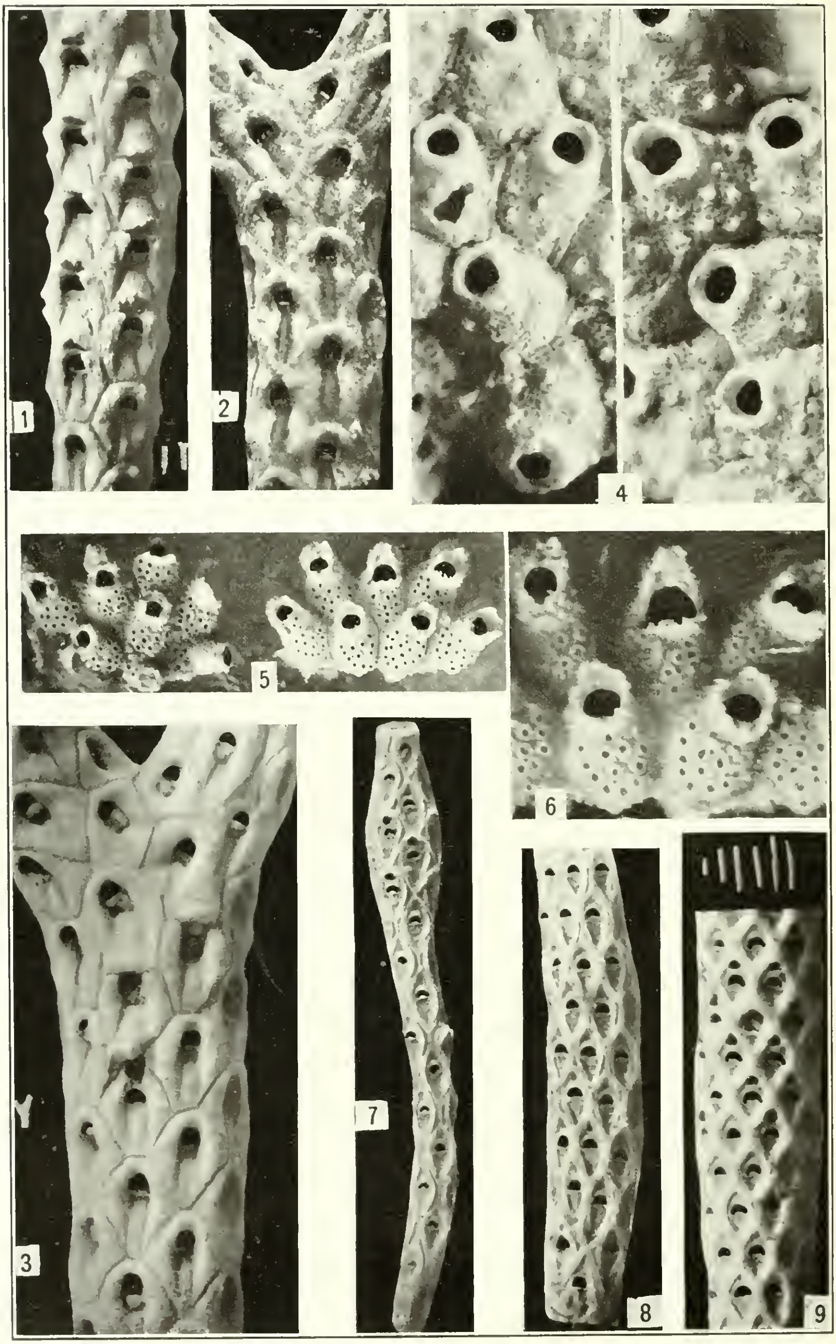
9. Zoarium, ×10, incrusting a Nullipore. The zooecial peristomes are very long.
10. Triserial specimen with short peristomes, ×10.
11. A biserial branch, ×20. Variation with small lacunae in the form of tremopores.
12. Microstructure of the frontal, ×85.

D. 5137. Jolo Light, Jolo.



Bryozoa of the Philippine Region

For explanation of plate see page 586



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 587

Plate 20

Fig. 1. *Stomhypsclosaria condylata* Canu and Bassler, 1927 (p. 174).
The free cylindrical zoarium, ×20, with ovicelled zooecia.
D. 5574. Simaluc Island.

2, 3. *Cryptostomaria crassatina* Canu and Bassler, 1927 (p. 173).

2. Ovicelled specimen, ×20, with zooecia having a narrow cryptocyst.
D. 5579. Darvel Bay, Borneo.

3. Fragment of the free cylindrical zoarium natural size and ×20, with ovicelled zooecia near the center.
D. 5577. Mount Dromedario.

4. *Coleopora verrucosa*, new species (p. 267). (See also pl. 26, fig. 9.)
Two portions of the incrusting zoarium, ×20, exhibiting the helmetlike crest on only certain pores.
D. 5137. Jolo Light, Jolo.

5, 6. *Exechonella discoidea*, new species (p. 123).

5. Portion of two unilamellar discoid examples, ×10.

6. Several zooecia, ×20, illustrating the tubular peristomie.
D. 5235. Nagubat Island, east coast of Mindanao.

7. *Cellaria gracilis* Busk, 1852 (p. 168).
An ovicelled segment, ×20.
D. 5235. Nagubat Island, east coast of Mindanao.

8. *Cellaria divaricata* MacGillivray, 1895 (p. 168.)
Base of a segment, ×20.
D. 4807. Cape Tsiuka, Sea of Japan.

9. *Cellaria japonica*, new species (p. 171).
Examples natural size and segment, ×20.
D. 4807. Cape Tsiuka, Sea of Japan.

Plate 21

Figs. 1–3. *Stomhypselosaria dupliforma*, new species (p. 175).

1. Free bifurcated zoarium, ×20, bearing ovicells.
2. Ovicelled zooecia, ×20.
3. Branched fragment, ×20, with ordinary zooecia.

D. 5580. Darvel Bay, Borneo.

4–6. *Cellaria granulata*, new species (p. 172).

4. Part of large segment, ×20, bearing a broken ovicell.

D. 5579. Darvel Bay, Borneo.

5. Segments, natural size and inferior part of one, ×20, deprived of avicularia.
6. Segment, ×20, bearing an ovicell and an avicularium.

D. 5574. Simaluc Island.

7–9. *Mesostomaria strictoramae* Canu and Bassler, 1927 (p. 176).

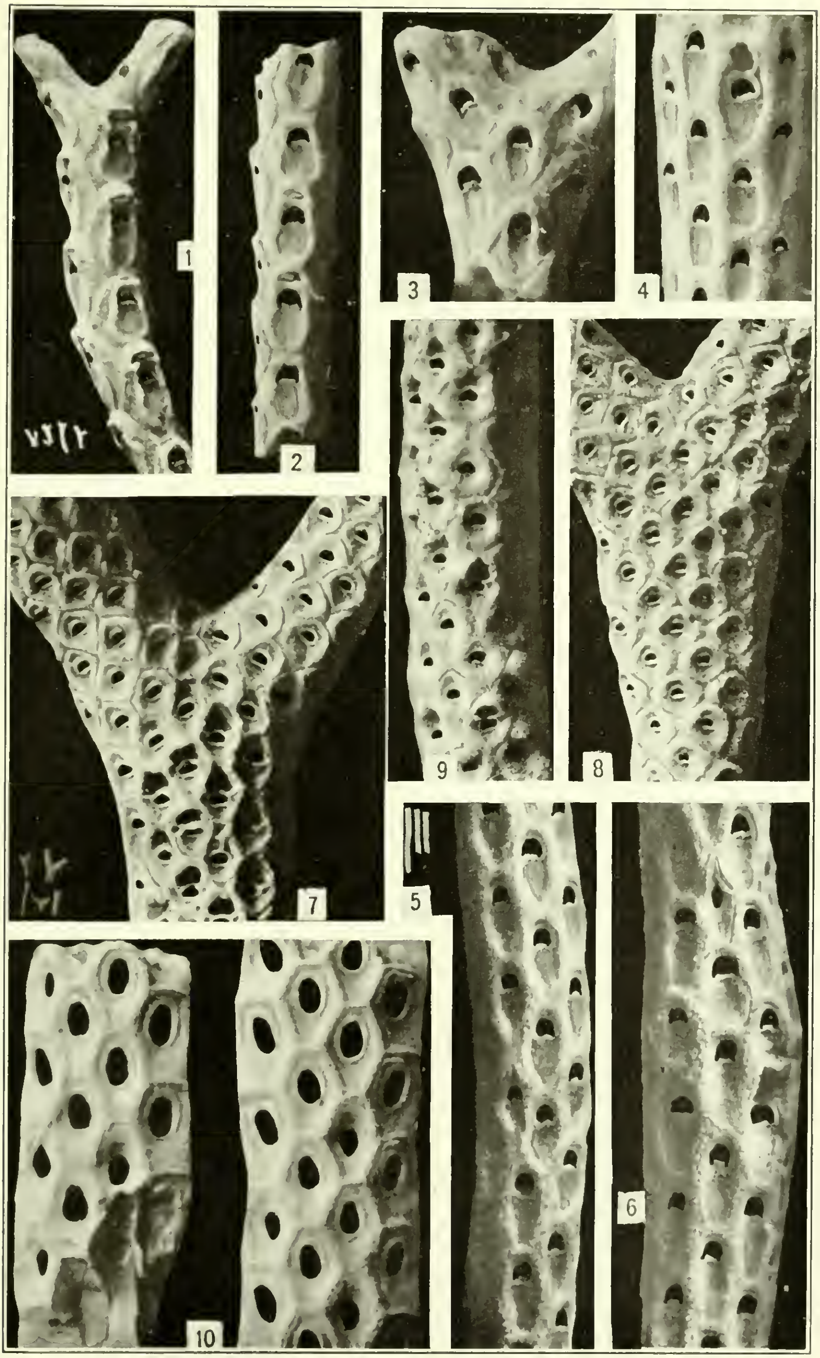
7. Fragments of the free compressed zoarium, natural size and a branched example, ×20.
8. Bifurcated specimen, ×20, with unovicelled zooecia.
9. Portion of a segment, ×20, containing several well-preserved ovicells.

D. 5162. Tinagta Island.

10. *Omoiosia maorica* Stoliczka, 1864 (p. 180).

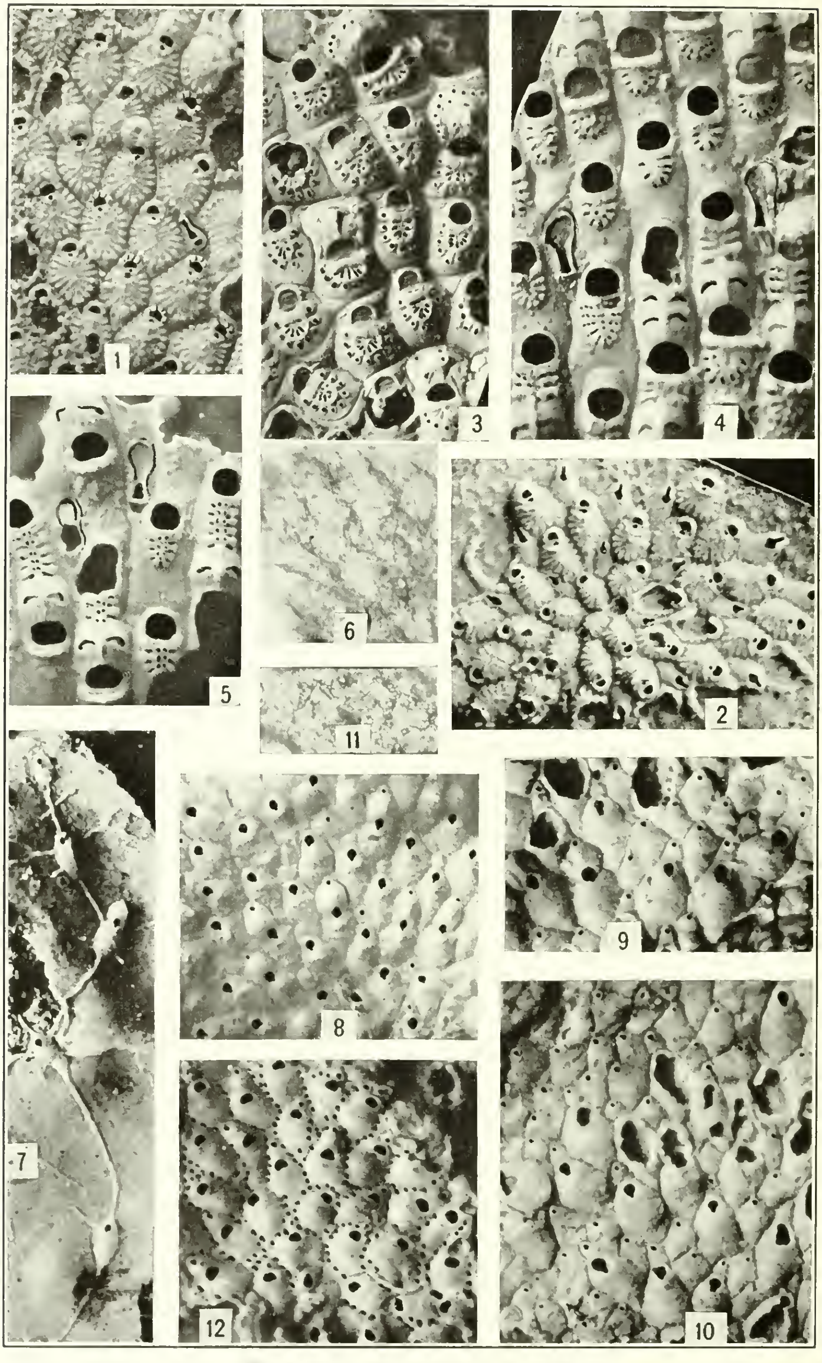
Two of the bilamellar fronds, ×20.

D. 5574. Simaluc Island.



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 588



BRYOZOA OF THE PHILIPPINE REGION

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Plate 22

Fig. 1. *Puellina radiata* Moll, 1830 (p. 238).
Incrusting specimen, ×20.
D. 5179. Romblon Light, Romblon.

2. *Puellina radiata flabellifera* Kirkpatrick, 1888 (p. 239).
Incrusting zoarium, ×20. The avicularia are zooeciules with very small mandibles.
D. 5179. Romblon Light, Romblon.

3. *Figularia jucunda*, new species (p. 241).
The unilamellar zoarium, ×20, with some zooecia preserving the operculum.
D. 5141. Jolo Light, Jolo.

4-6. *Figularia fissurata*, new species (p. 239).
4. An example with ovicells, ×20, attached to a sponge. The ectocyst is visible under the slits of the frontal and of the ovicell.
5. An example, ×20, showing variability in size of the frontal area.
6. Fragment of the frontal surface, ×85.
D. 5478. Taebuc Point, Leyte.

7. *Hippothoa flagellum* Manzoni, 1870 (p. 247).
A zoarium, ×20, with ovicelled and nonovicelled zooecia.
D. 5137. Jolo Light, Jolo.

8. *Trypostega pusilla*, new species (p. 248).
The incrusting zoarium, ×20, illustrating the small dimensions.
D. 5137. Jolo Light, Jolo.

9-11. *Trypostega venusta* Norman, 1864 (p. 248).
9. Incrusting zooecia, ×20, showing the mitriform ovicells.
10. Portion of zoarium, ×20, with groups of zooeciules.
11. Microstructure of the frontal, ×85.
D. 5217. Anima Sola Island.

12. *Chorizopora ventricosa*, new species (p. 249).
Incrusting zoarium, ×20, with ventricose zooecia bound together by connecting tubes.
Unknown Philippine locality.

PLATE 23

FIGS. 1–3. *Petralia japonica* Busk, 1884 (p. 254).

1. Surface of unilamellar zoarium, $\times 20$, with ovicelled and ordinary zooecia.
2. Interior of zooecia, $\times 20$. The two lateral condyles are visible and an operculum is in place.
3. Inferior side of zoarium, $\times 20$, showing the perforated area and the numerous radicular pores.

D. 5311. China Sea, vicinity of Hong Kong.

4–9. *Petraliella crassocirca*, new species (p. 257).

4. Unilamellar specimen, $\times 20$, showing the avicularia and the details of the bipartite shield.

D. 5579. Darvel Bay, Borneo.

5. Interior, $\times 20$, exhibiting the two condyles and the form of the tremopores.
6. Zooecial surface, $\times 20$, showing the ovicell and its structure.

D. 5147. Sulade Island.

7. Inferior side of specimen shown by Figure 4.

D. 5579. Darvel Bay, Borneo.

8. Inferior side, $\times 20$, of a specimen showing the perforated area closed by a chitinous membrane.
9. Microstructure of the frontal, $\times 85$.

D. 5162. Tinagta Island.

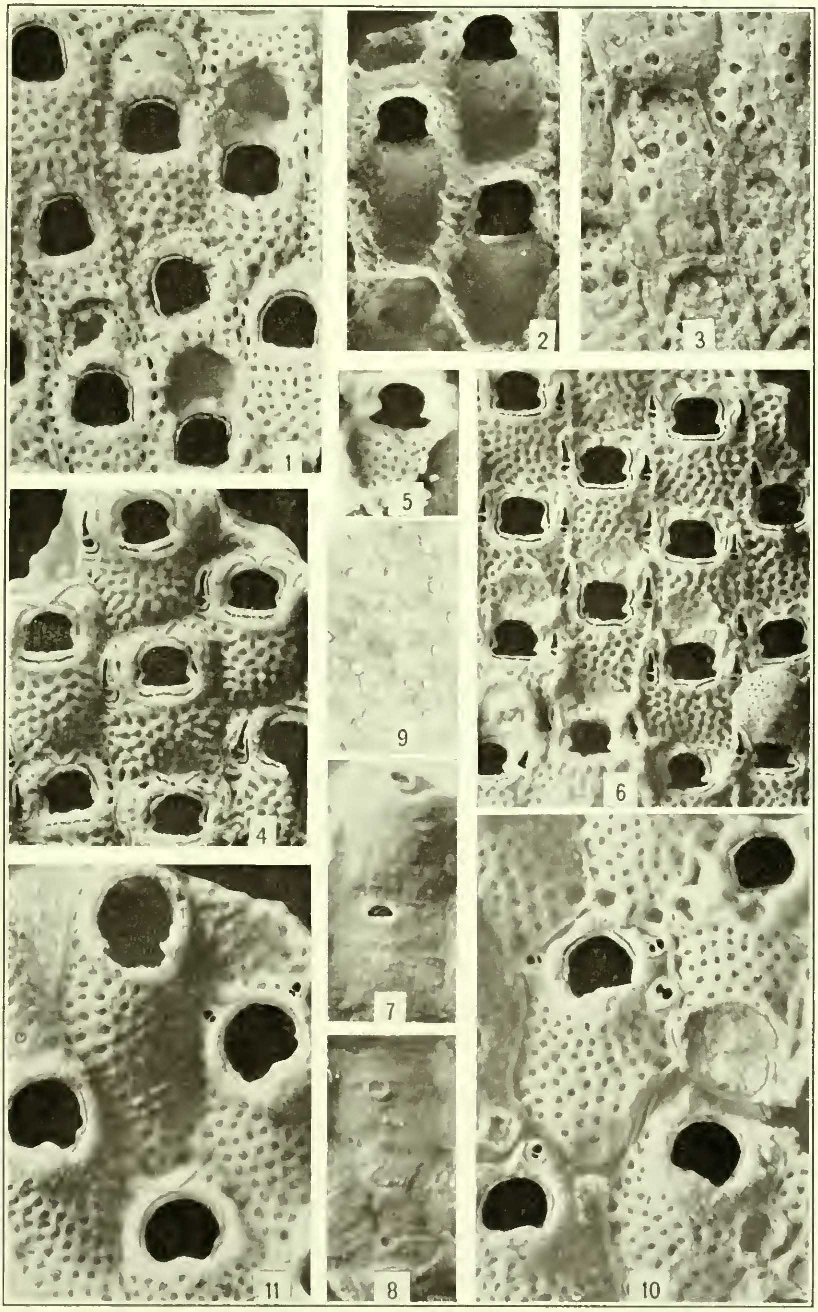
10, 11. *Petraliella gigantea*, new species (p. 258).

10. Unilamellar zoarium, $\times 20$, with zooecia bearing trace of an ovicell and the salient avicularia.

D. 5162. Tinagta Island.

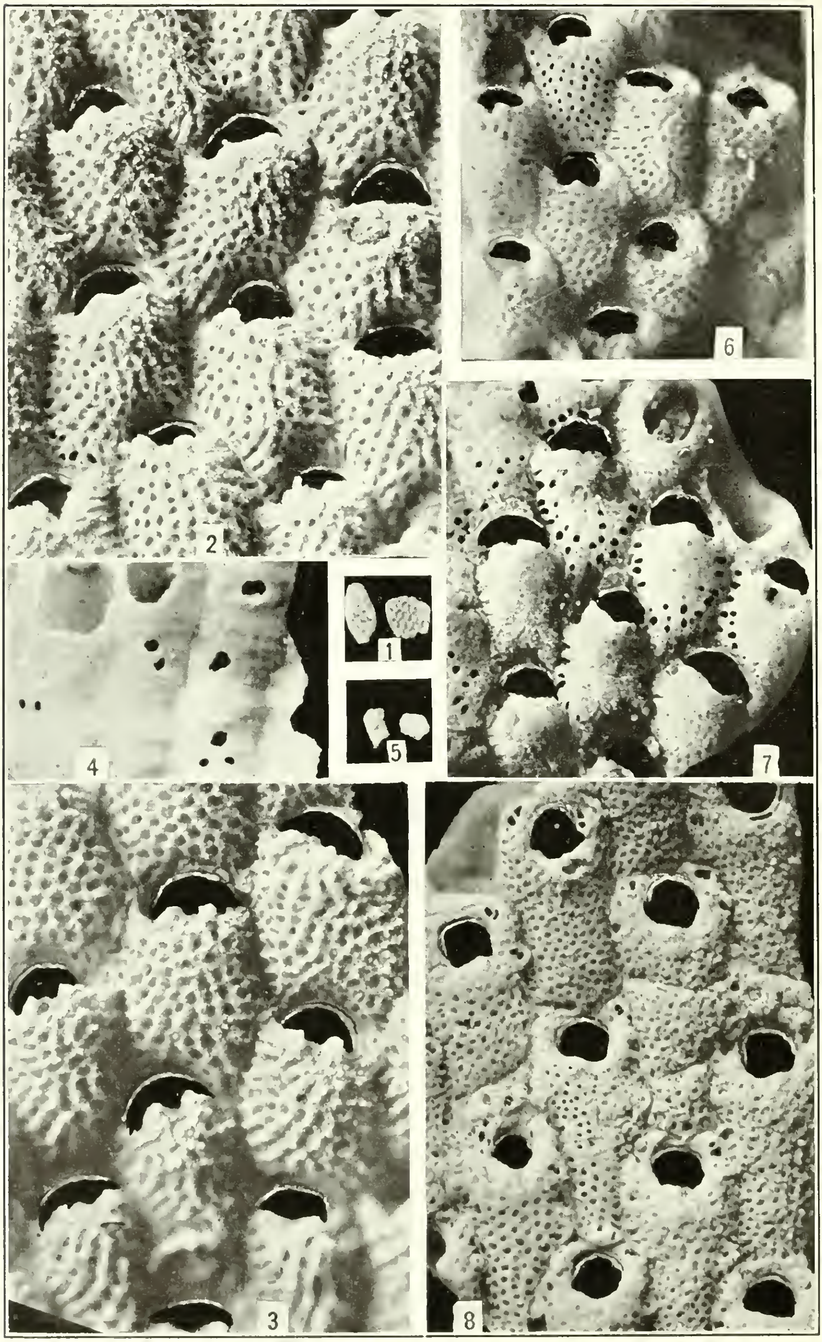
11. Zooecia, $\times 20$, with small avicularia.

D. 5579. Darvel Bay, Borneo.



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 590



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 591

Plate 24

Figs. 1–4. *Petraliella grandicella,* new species (p. 258).

1. Fragments of the unilamellar zoarium, natural size.
2. Surface, ×20, with ordinary zooecia.
3. An ovicelled specimen, ×20, showing also the bifid avicularian umbo.
4. Inferior side, ×20.

D. 5579. Sibutu Island, Darvel Bay, Borneo.

5–7. *Petraliella trita,* new species (p. 259).

5. Unilamellar zoarial fragments, natural size.
6. Zooecial surface, ×20, showing the broad smooth spaces between the tremopores.
7. Another example, ×20.

D. 5579. Darvel Bay, Borneo.

8. *Petraliella elongata,* new species (p. 259).

The unilamellar zoarium, ×20, illustrating the much-elongated zooecia.

D. 5579. Darvel Bay, Borneo.

Plate 25

Figs. 1, 2. *Petraliella armata* Waters, 1913 (p. 260).

1. Zooecia, $\times 20$, of the unilamellar zoarium.
2. Inferior side, $\times 20$, with radicular pores.

D. 5149. Sirun Island.

3–11. *Petraliella philippinensis*, new species (p. 261).

3. The unilamellar zoarium, $\times 20$, with zooecia ornamented by large avicularia and small avicularian umbo.
4. Broad zooecia, $\times 20$, showing the proximal border of the aperture.

D. 5162. Tinagta Island.

5. Zooecia, $\times 20$, with large oblique avicularium.

D. 5147. Sulade Island.

6. Zooecia, $\times 20$, with large avicularian umbo.
7. An example, $\times 20$, showing the hollow structure of the avicularian umbo.

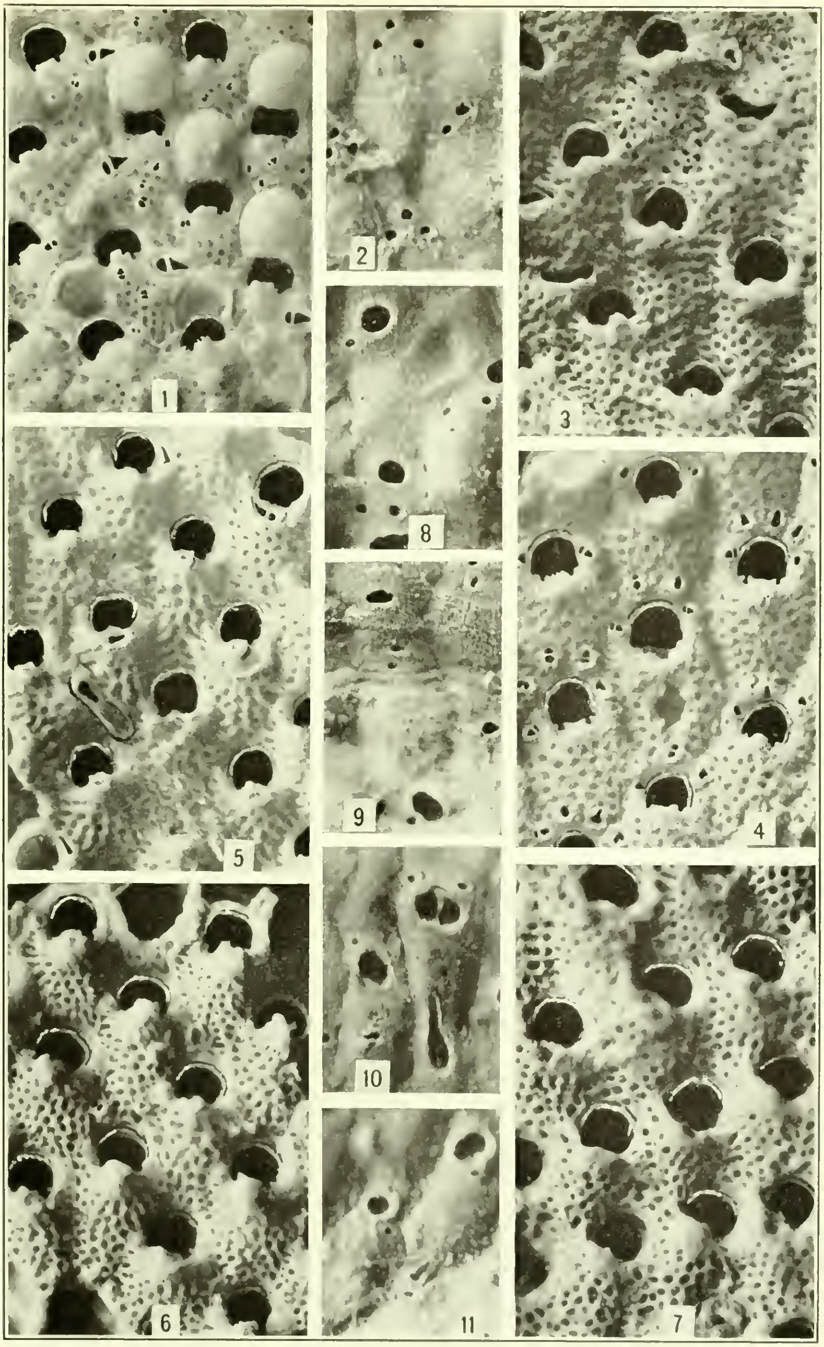
D. 5144. Jolo Light, Jolo.

8. Inferior side of Figure 3, $\times 20$.
9. Inferior side of Figure 4, $\times 20$.

D. 5162. Tinagta Island.

10. Inferior side of Figure 6, $\times 20$.
11. Inferior side of Figure 7, $\times 20$.

D. 5144. Jolo Light, Jolo.



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 592

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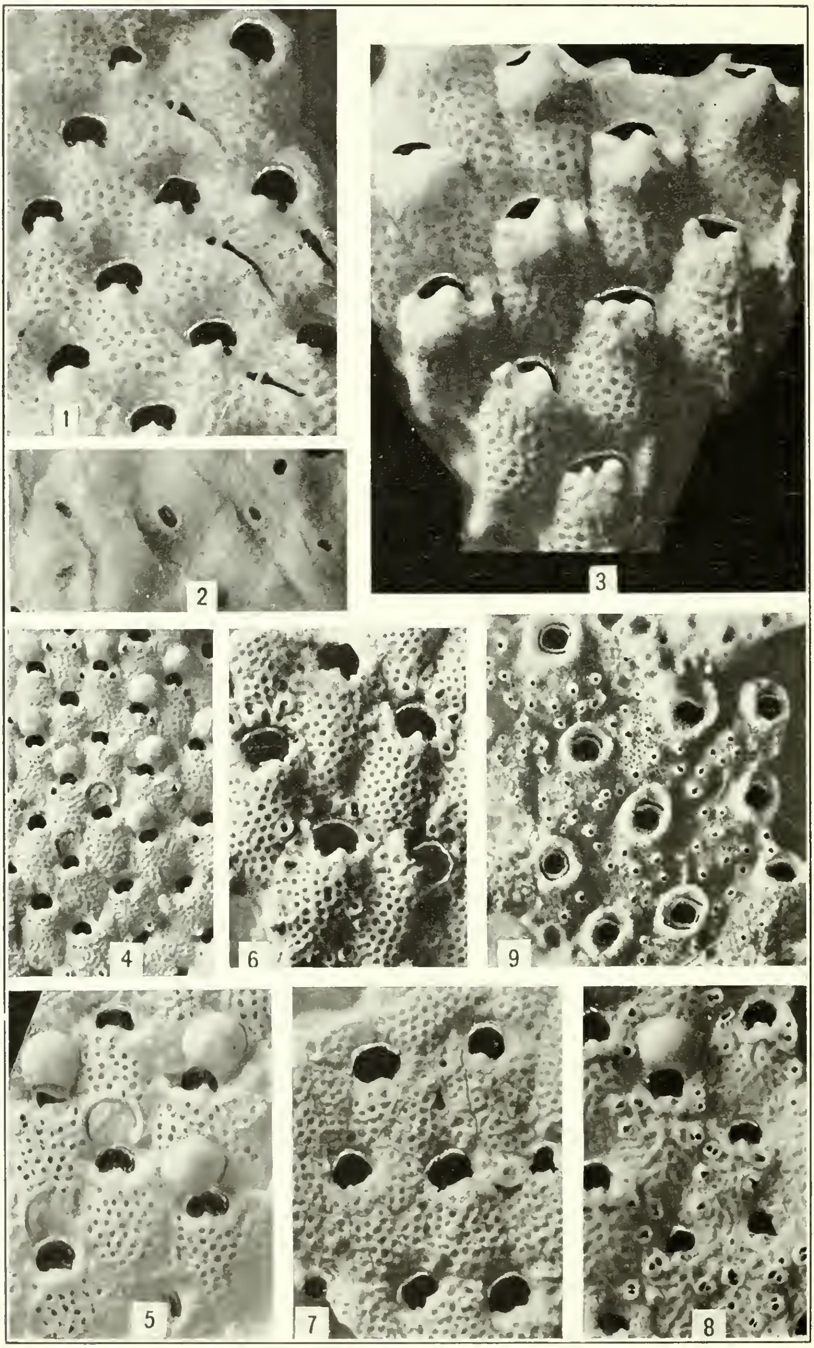


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 593

Plate 26

Figs. 1, 2. *Petraliella falcifera*, new species (p. 263).

1. Zooecia, ×20, with the characteristic falciform avicularium.
2. Inferior side of the same, ×20. The perforated areas are closed by a membranous pellicle; their size is variable.

D. 5151. Sirun Island.

3. *Petraliella robusta*, new species (p. 260).

Zooecia, ×20, exhibiting the bifid robust avicularian umbo.

D. 5162. Tinagta Island.

4-8. *Petraliella verrucosa*, new species (p. 263).

4. Surface of ovicelled specimen, ×10.
5. Zooecia of Figure 4, ×20.

D. 5162. Tinagta Island.

6. More common aspect of the zooecia, ×20.
7. An example, ×20, with avicularia little salient.

D. 5574. Simalue Island.

8. An ovicelled specimen, ×20, with salient avicularia.

D. 5478. Tacbuc Point, Leyte.

9. *Coleopora verrucosa* Canu and Bassler, 1927 (p. 267). (See also pl. 20, fig. 4.)

Zooecia, ×20, incrusting a shell.

D. 5137. Jolo Light, Jolo.

Plate 27

Figs. 1–6. *Petraliella echinata*, new species (p. 265).

1. Zoarium, $\times 10$, incrusting a Nullipore, with oviccll and ancestrula and showing the arrangement of the spines.
2. Same specimen, $\times 20$. The oral spines are broken away and the aperture is visible.
3. Another part of Figure 1, $\times 20$, with avicularian umbo much developed.

4, 4′. Two portions of another specimen, $\times 20$, with ovicell, avicularian umbo and frontal spines.

5. Zooecia, $\times 10$.
6. Microstructure of the frontal, $\times 85$.

D. 5141. Jolo Light, Jolo.

7–12. *Petraliella tubulifera*, new species (p. 264).

7. Incrusting specimen, $\times 10$.
8. The same specimen, $\times 20$, exhibiting young zooecia without avicularian umbo. The lyrule and cardelles at the proximal border of the aperture are visible.

D. 5137. Jolo Light, Jolo.

9. Unilamellar specimen, $\times 20$, in which the avicularian umbo is very salient.

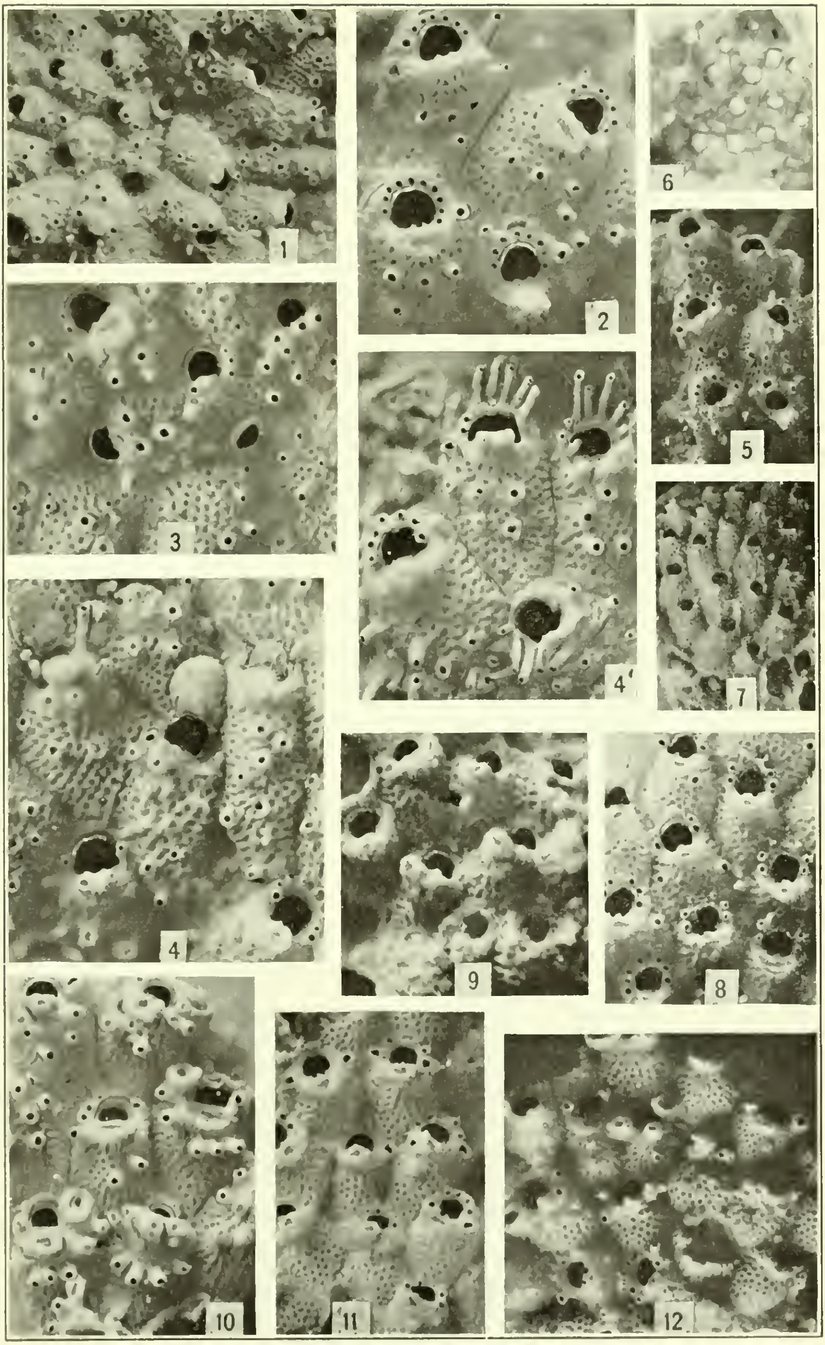
D. 5162. Tinagta Island.

10. Zooecia of well-preserved unilamellar zoarium, $\times 20$. All of the frontal ornamentation is well developed.

D. 5574. Simaluc Island.

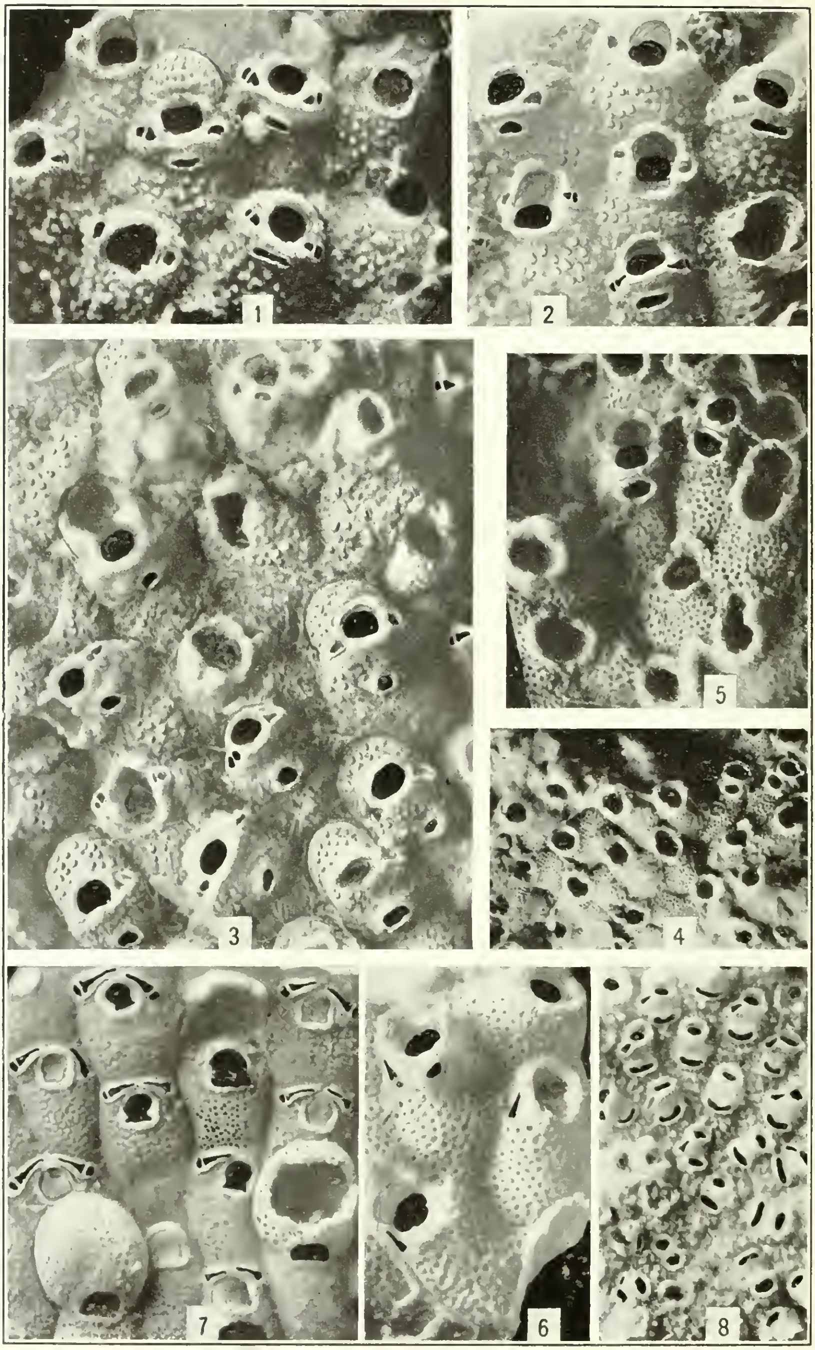
11. Zooecia, $\times 20$, in which the avicularian umbo is in process of formation.
12. Unilamellar zoarium, $\times 20$, with ancestrular zooecia.

D. 5179. Romblon Point, Romblon.



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 694



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 595

Plate 28

Figs. 1, 2. *Galeopsis pupa* Jullien, 1903 (p. 272).

1. Incrusting zoarium, ×20. The superior zooecium to the right is operculated and has no spiramen. Two other zooecia lack the spiramen.
2. Zooecia, ×20. Only those with spiramen have transverse avicularia. On three zooecia, the spiramen is united with the aperture.
   D. 5179. Romblon Light, Romblon.
3. *Galeopsis brevicapitata*, new species (p. 273).
   Type specimen, ×20, incrusting a Nullipore.
   D. 5325. Hermanos Island, off northern Luzon.

4–6. *Galeopsis mutabilis*, new species (p. 273).

4. Zoarium ×10, incrusting a Nullipore. Two zooecia have the spiramen while several are ovicelled.
   D. 5144. Jolo Light, Jolo.
5. The same specimen as Figure 4, ×20, with spiramen and ovicell more visible.
6. Specimen, ×20, showing the two cardelles of the aperture and a zooecium with small spiramen.
   D. 5141. Jolo Light, Jolo.
7. *Cosciniopsis fallax*, new species (p. 276).
   The encrusting zoarium, ×20.
   D. 5151. Sirun Island.
8. *Gigantopora unirostris*, new species (p. 285).
   The type zoarium, ×20, incrusting a shell fragment.
   D. 5137. Jolo Light, Jolo.

PLATE 29

FIGS. 1–3. *Cosciniopsis coelatus* Canu and Bassler, 1927 (p. 275).

1. The incrusting type zoarium, ×20, an ovicelled specimen in which several of the zooecia have preserved their operculum.
2. Another part of the type, ×20, with zooecia showing the cardelles of the aperture.
3. Interior of zooecia, ×20. The two cardelles and the perforating tremopores are visible.

    D. 5141. Jolo Light, Jolo.

4, 5. *Smittina ophidiana marginata* Waters, 1878 (p. 339).

4. An incrusting ovicelled specimen, ×20.

    D. 5147. Sulade Island.

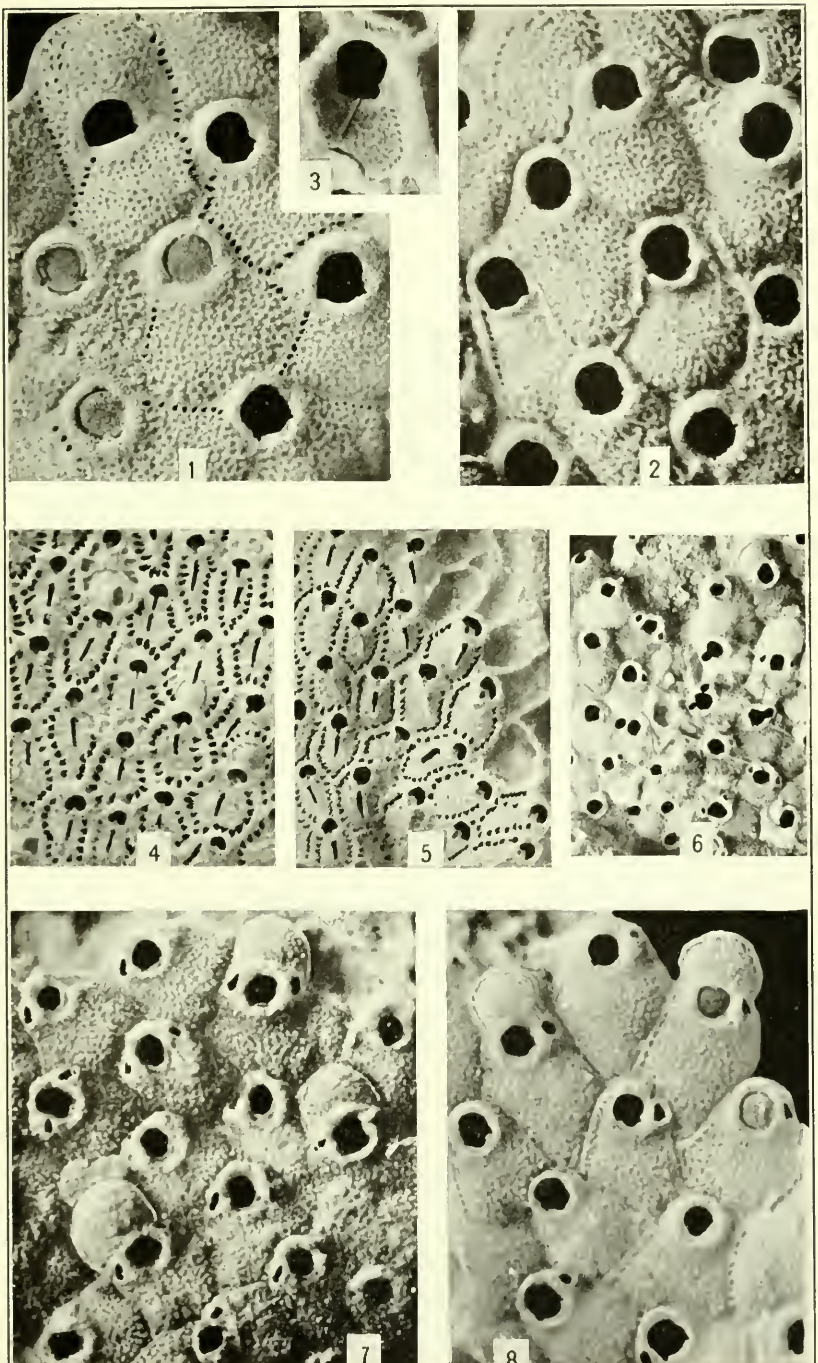
5. Aspect of the zooecia little removed from the ancestrula, ×20.

    D. 5151. Sirun Island.

6–8. *Gephyrophora rostrigera* Waters, 1885 (p. 278).

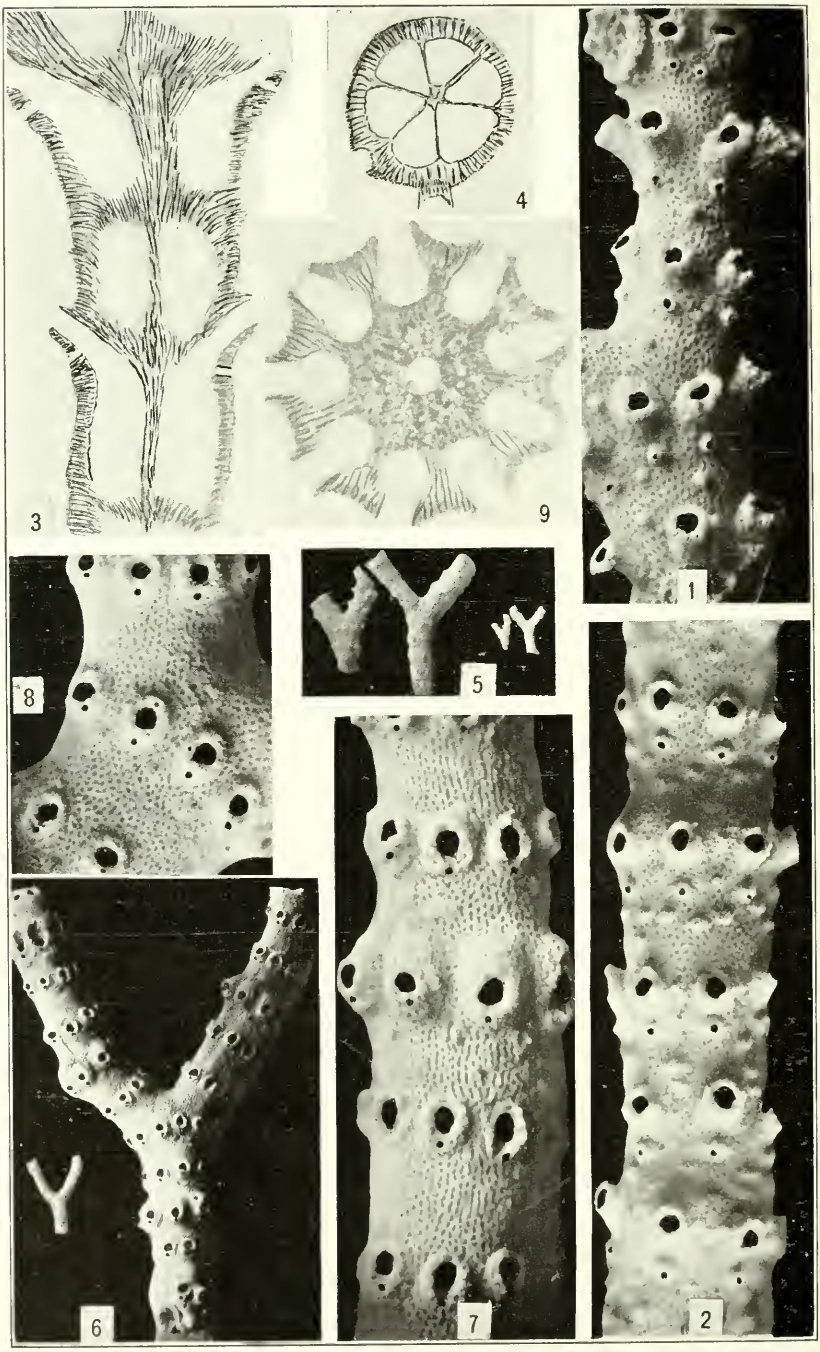
6. Specimen, ×10, showing some opercula in place.
7. Portion of the same, ×20; the zooecia are short and nonmarginated.
8. Ovicelled zoarium, ×20, with long marginated zooecia.

    D. 5147. Jolo Light, Jolo.



Bryozoa of the Philippine Region

For explanation of plate see page 598



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 597

Plate 30

FIGS. 1–5. *Haswellia longicollis*, new species (p. 282).

1. Zoarium, ×20, with long peristomes.
2. Ovicelled specimen, ×20, showing the spiramen much removed from the peristomice.
3. Longitudinal thin section, ×25, illustrating position of spiramen.
4. Transverse thin section, ×25, between two verticells.
5. Two fragments, natural size and ×3.

D. 5151. Sirun Island.

6–9. *Haswellia australiensis* Haswell, 1880 (p. 281).

6. Ovicelled fragments, natural size and ×6.
7. Portion of branch, ×20, showing spiramen close to the peristomice.
8. Nonovicelled zooecium, ×20.
9. Transverse thin section, ×25, through the middle of a verticell.

D. 5151. Sirun Island.

Plate 31

Figs. 1, 2. *Posterula sarsi* Smitt, 1867 (p. 288).

1. Surface of a bilamellar zoarium, ×20.
2. Interior of zooecia, ×20.

D. 4807. Cape Tsiuka, Sea of Japan.

3-10. *Cigclisula occlusa* Busk, 1884 (p. 291).

3. Fragment of the bilamellar zoarium, natural size.
4. Zooecia, ×20, bearing spathulated interzooecial avicularia.
5. A group of abnormal zooecia, ×20, and a large spathulate avicularium.

D. 5137. Jolo Light, Jolo.

6. Surface, ×20, with ovicelled zooecium. The frontal of the ovicell is broken. Some erect opercula are visible in the apertures.

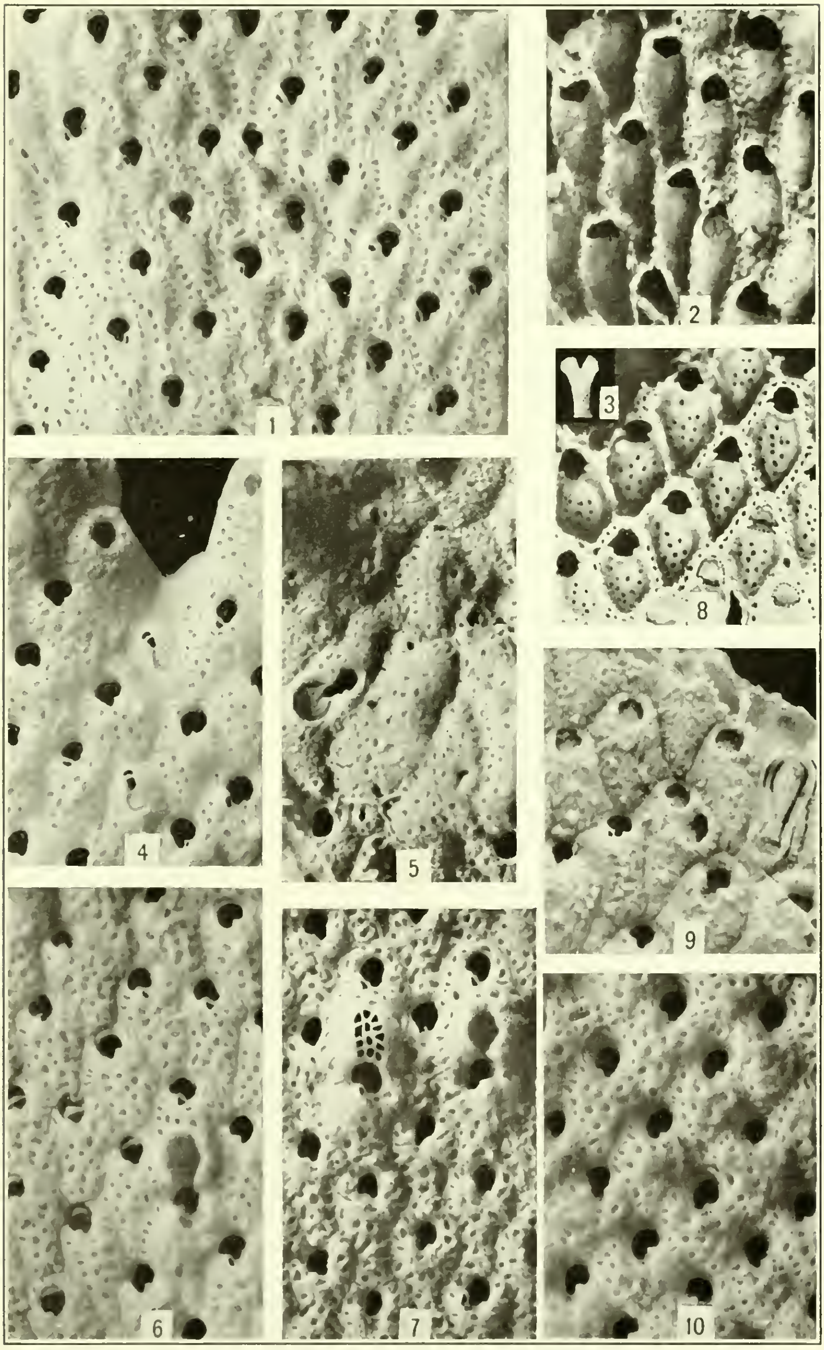
D. 5150. Sirun Island.

7. Surface, ×20, with a complete ovicell bearing its frontal grating.
8. Interior of zooecia, ×10, showing two condyles on which the operculum articulates. Some apertures still have their operculum.

D. 5478. Taebuc Point.

9. Surface, ×20, with ectocyst preserved and some of the opercula in place. There is a large interzooecial avicularium.
10. Zoarium, ×20, in which the frontal is very thick and the zooecia are indistinct. The peristomial avicularium opens into the peristomie.

D. 5137. Jolo Light, Jolo.



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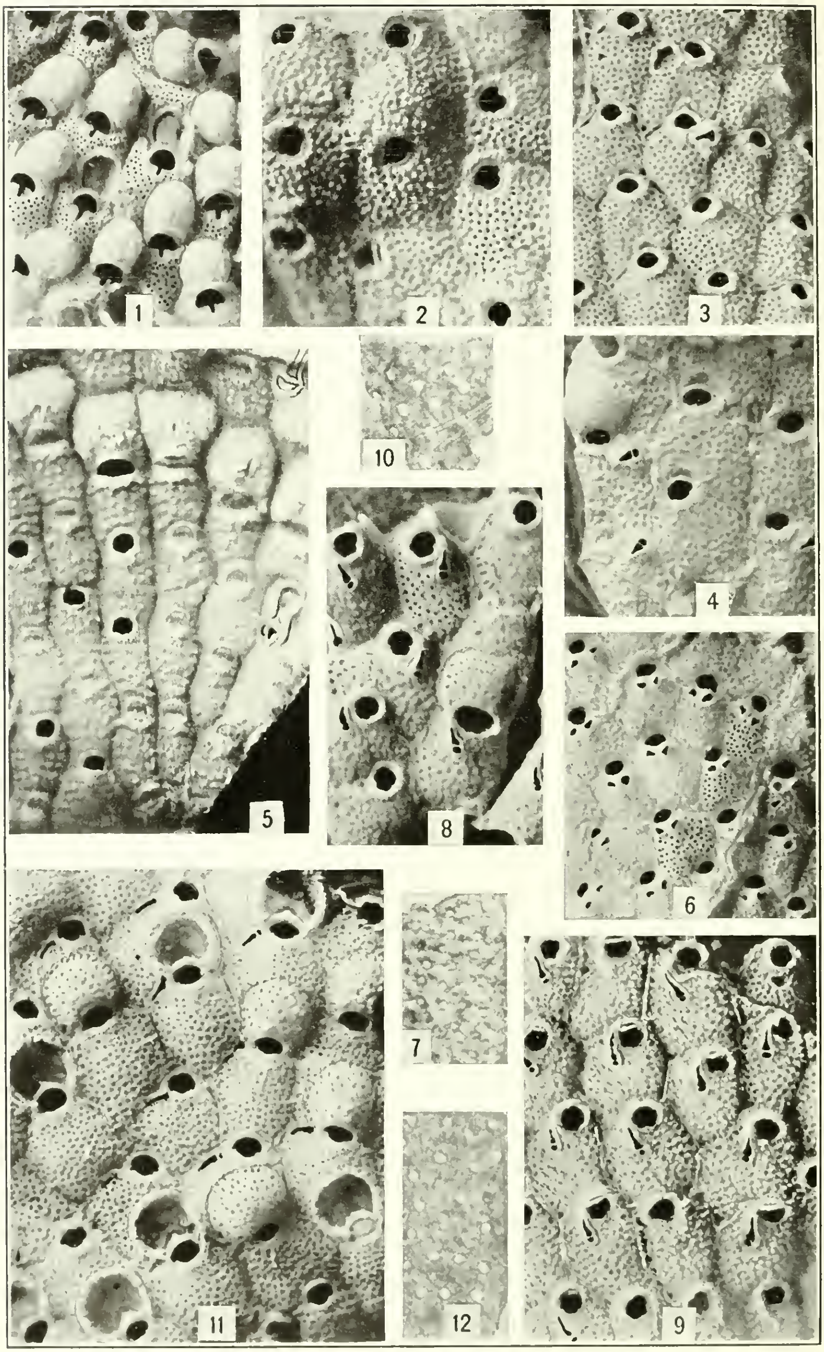
FOR EXPLANATION OF PLATE SEE PAGE 698



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 599

Plate 32

Fig. 1. *Arthropoma cecili* Savigny-Audouin, 1826 (p. 296).
Incrusting zoarium, ×20, in which the zooecia are badly oriented.
D. 5137. Jolo Light, Jolo.

2. *Dakaria granulata*, new species (p. 297).
Surface of the unilamellar zoarium, ×20. The distinctly granulated zooecial frontal is evident.
D. 5141. Jolo Light, Jolo.

3, 4. *Emballotheca impar* MacGillivray, 1890 (p. 297).
3. An incrusting specimen, ×20, with unovicelled zooecia.
4. Unilamellar ovicelled zoarium, ×20.
D. 5178. Tacbuc Point, Leyte.

5. *Emballotheca capitifera*, new species (p. 300).
Incrusting ovicelled specimen, ×20. Most of the zooecia are operculated. The ectocyst hides the tremopores.
D. 5137. Jolo Light, Jolo.

6, 7. *Emballotheca biavicularia*, new species (p. 300).
6. The type specimen, ×20, incrusting an *Adeonellopsis* and showing the frontal avicularia.
7. Microstructure of the frontal, ×85.
D. 5151. Sirun Island.

8–10. *Emballotheca acutirostris*, new species (p. 298).
8. Unilamellar specimen, ×20, exhibiting the long, narrow, oblique frontal avicularium.
D. 5178. Tacbuc Point, Leyte.
9. Nonovicelled specimen, ×20.
10. Microstructure of the frontal, ×85.
D. 5145. Jolo Light, Jolo.

11, 12. *Emballotheca subsinuata* Hincks, 1884 (p. 298).
11. Incrusting ovicelled specimen, ×20, with thin oblique avicularia having the beak directed toward the base.
12. Microstructure of the frontal, ×85.
D. 5217. Anima Sola Island.

Plate 33

Fig. 1. *Emballotheca ingens*, new species (p. 302).

The incrusting zoarium, $\times 20$, illustrating particularly the large ovicell and the elliptical transverse avicularium.

D. 5311. China Sea, vicinity of Hong Kong.

2–4. *Emballotheca imperfecta*, new species (p. 301).

2. Zoarium, $\times 20$, incrusting an Orbitoid foraminifer. The large, incompletely calcified ovicell and its unusual position and the median transverse avicularium are shown.
3. Thin section of the frontal with reticulated structure, $\times 85$.
4. Dorsal with rectangular structure, $\times 85$.

D. 5179. Romblon Point, Romblon.

5. *Emballotheca latisinuata*, new species (p. 302).

Incrusting ovicelled specimen, $\times 20$, showing the distinct hexagonal zooecia and the triangular, submedian avicularium, as well as the globular ovicell surrounding the peristome.

D. 5145. Jolo Light, Jolo.

6–8. *Schizomavella (Metroperiella) ovoidea*, new species (p. 305).

6. Incrusting specimen, $\times 20$, showing the ancestrula.

D. 5151. Sirun Island.

7. Incrusting specimen, $\times 20$, with ovicells and avicularian zooecia.

D. 5137. Jolo Light, Jolo.

8. Unilamellar nonovicelled specimen, $\times 20$. The median avicularium is replaced by a small umbo, $\times 20$.

D. 5151. Sirun Island.

9. *Schizomavella (Metroperiella) lepralioides* Calvet, 1903 (p. 307).

Incrusting ovicelled specimen, $\times 20$.

D. 5179. Romblon Point, Romblon.

10. *Schizomavella ambita granulata*, new variety (p. 303).

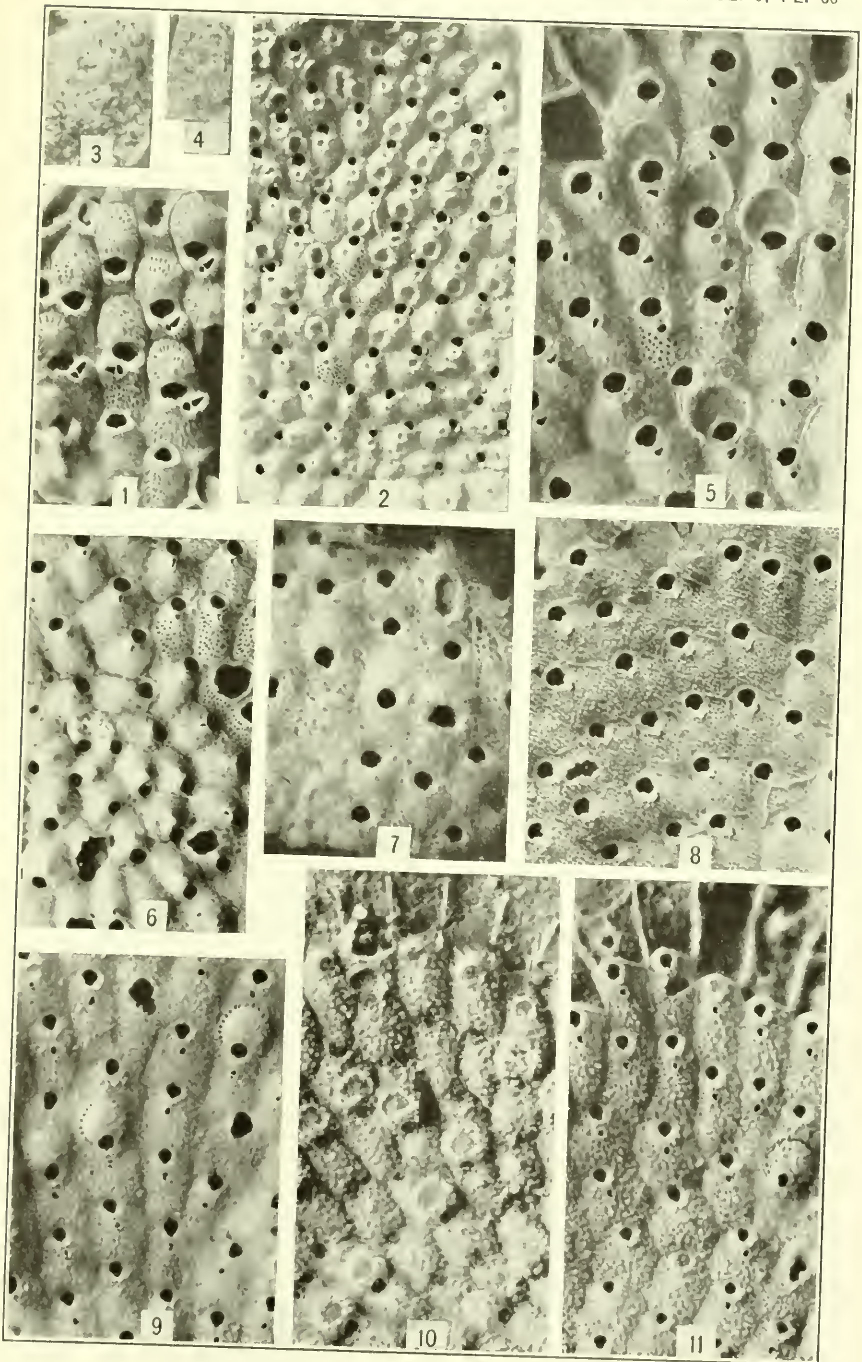
The incrusting zoarium, $\times 20$, with marginal zooecia covered by the ectocyst.

D. 4807. Cape Tsiuka, Sea of Japan.

11. *Schizomavella ambita granulosa*, new variety (p. 303).

Incrusting specimen, $\times 20$, showing the nonovicelled marginal zooecia with granulations close together.

D. 5217. Anima Sola Island.



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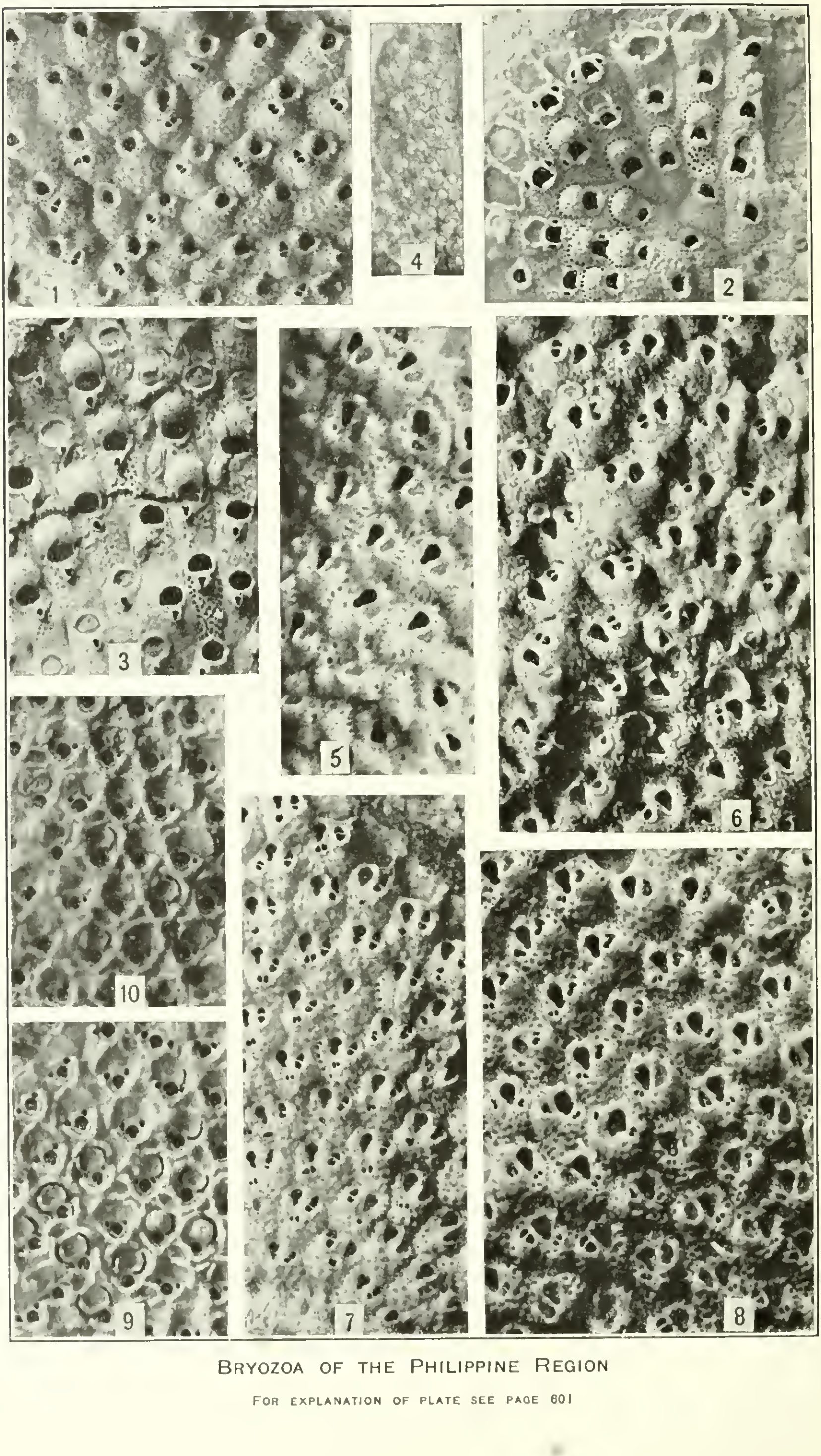


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 601

PLATE 34

FIG. 1. *Gemellipora peristomaria*, new species (p. 310).
The incrusting zoarium, ×20, illustrating the much-developed peristome and the transverse frontal avicularia.
D. 5151. Sirun Island.

2. *Schizomavella simplex*, new species (p. 305).
Incrusting ovicelled specimen, ×20, incrusting a Nullipore.
D. 5219. Mompog Island.

3, 4. *Schizomavella cornuta* new species (p. 304).
3. The type specimen, ×20, growing over a sponge and preserving some opercula.
4. Microstructure of the tremocyst, ×85.
D. 5141. Jolo Light, Jolo.

5, 6. *Gemelliporella areolata*, new species (p. 309).
5. Specimen incrusting a shell, ×20. The zooecia have interareolar costules and very large oral avicularia.
D. 5579. Darvel Bay, Borneo.
6. Another example, ×20, in which the areolar pores are hidden by the pleurocyst.
D. 5217. Anima Sola Island.

7. *Gemellipora biavicularia*, new species (p. 312).
The type specimen, ×20, an incrusting zoarium showing the characteristic large oral avicularium and the small median transverse one.
D. 5179. Romblon Light, Romblon.

8. *Gemellipora punctata*, new species (p. 311).
Fragment of the incrusting zoarium, ×20, showing the large tremopores and the large lateral and small transverse avicularium.
D. 5145. Jolo Light, Jolo.

9, 10. *Buffonellaria loculifera*, new species (p. 308).
9. Portion of the type zoarium, ×20, incrusting an orbitoid foraminifer. Two semicircular ridges on the frontal divide it into two areas. The ovicell is lodged in the larger area and the aperture in the smaller.
10. Another portion of the same zoarium, ×20, showing the form of the young marginal zooecia.
D. 5179. Romblon Light, Romblon.

Plate 35

Figs. 1, 2. *Gemellipora minutipora*, new species (p. 312).

1. One of the type zoaria, ×20, incrusting a shell fragment. The very small tremopores and large areolar pores are visible.
2. Another example, ×20, exhibiting a few broken ovicells.

D. 5392. Tubig Point, Destacado Island.

3, 4. *Gemellipora obesa*, new species (p. 313).

3. Specimen incrusting a shell, ×20, illustrating the obese zooecia and frontal with minute tremopores and large granules.
4. Interior of zooecia, ×20.

D. 5579. Sibutu Island, Darvel Bay, Borneo.

5. *Schizopodrella cucullata*, new species (p. 317).

The type zoarium, ×20, incrusting a shell fragment. The hoodlike ovicell and the spathulate avicularium between the zooecia are characteristic.

D. 5144. Jolo Light, Jolo.

6. *Schizoporella proditor*, new species (p. 319).

Small fragment of the unilamellar zoarium, ×20. The characteristic long slender oral avicularium with frontal beak directed to the base is shown.

D. 5145. Jolo Light, Jolo.

7, 8. *Stephanosella indistincta*, new species (p. 314).

7. Surface of a small bilamellar undulated frond, ×20, showing the dorsal of the second lamella and the structure of the ovicell.
8. Nonovicelled specimen, ×20, illustrating indistinct zooecia.

D. 4807. Cape Tsiuka, Sea of Japan.

9. *Schizoporella perforata*, new species (p. 318).

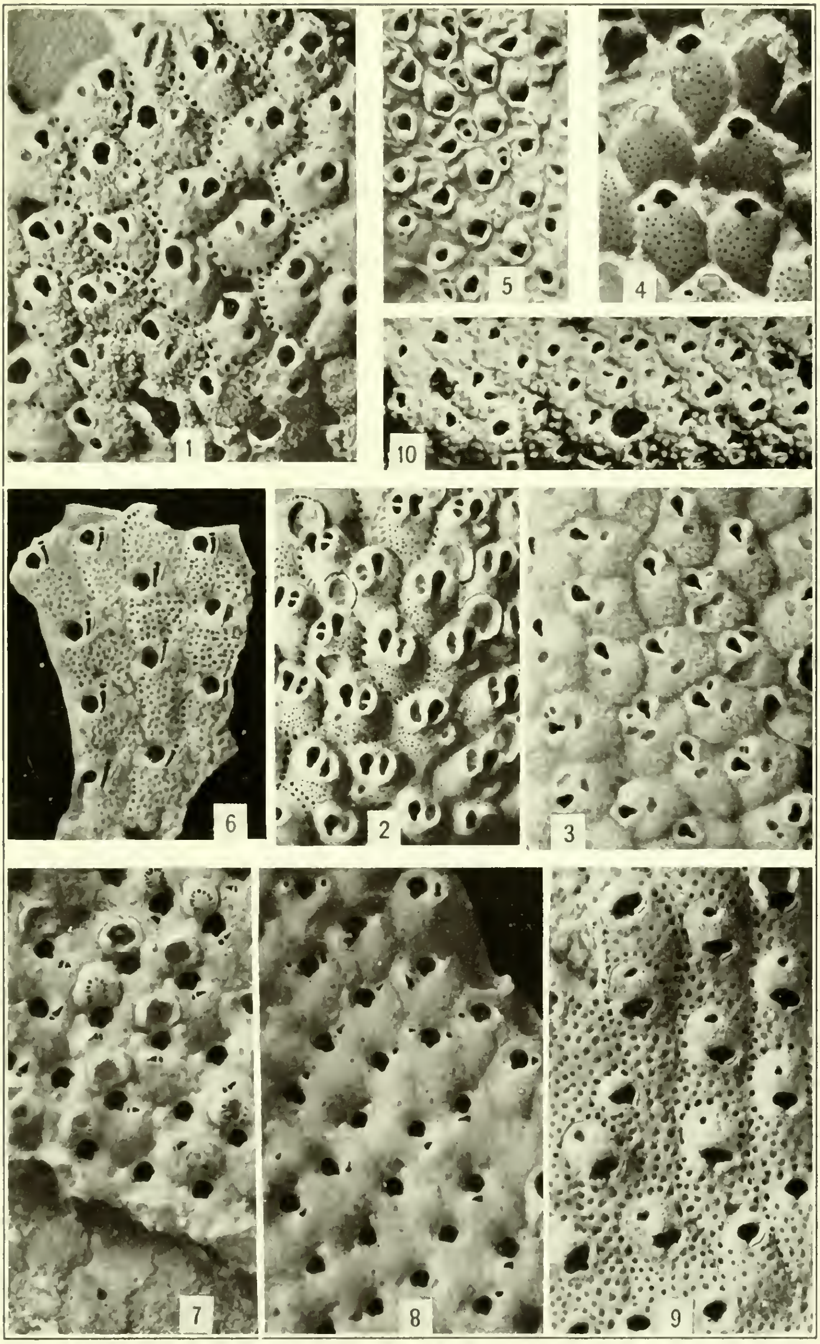
Type specimen, ×20, incrusting a shell. The deeply buried ovicell perforated by a large frontal pore is visible.

D. 4807. Cape Tsiuka, Sea of Japan.

10. *Hippoporina granifera*, new species (p. 319).

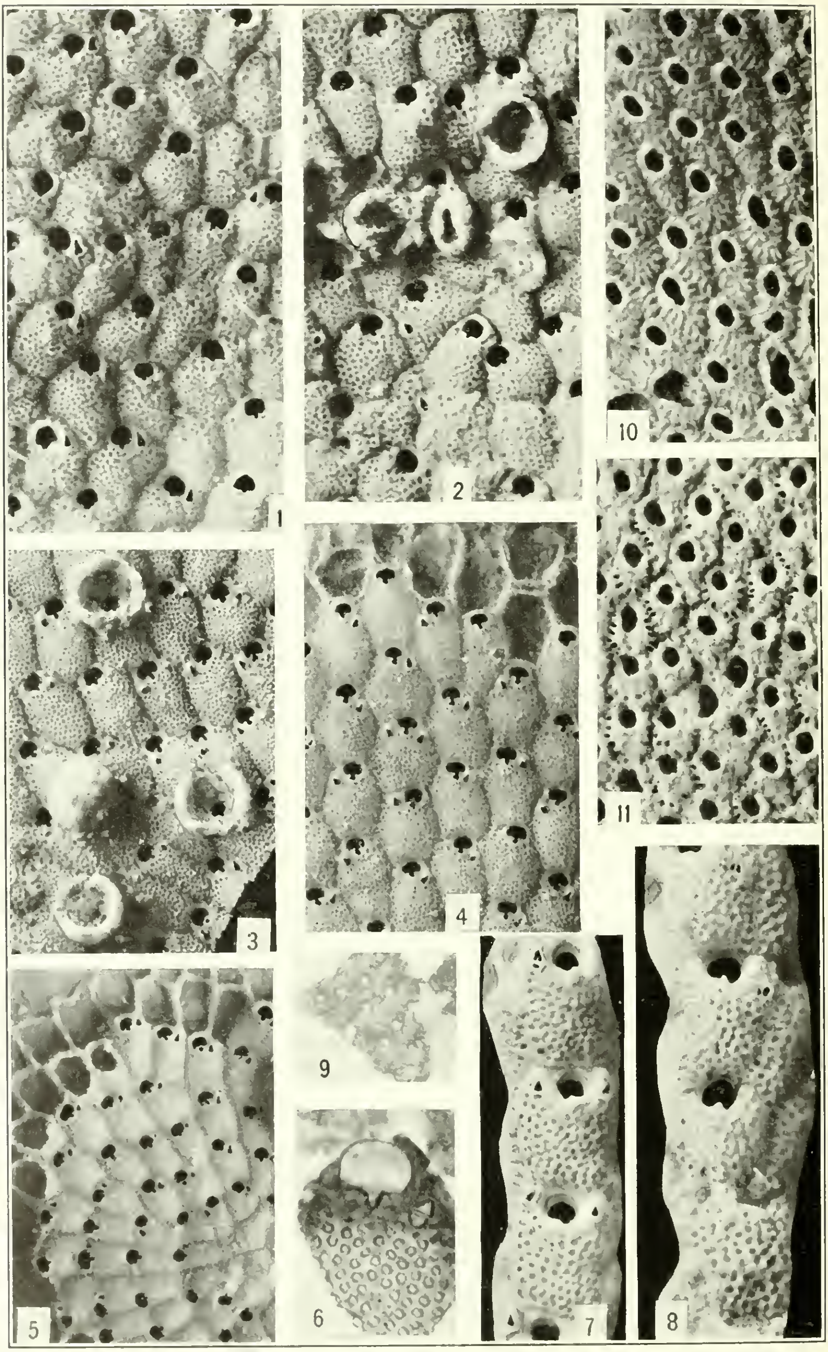
Surface of type, ×20, growing around a shell. The convex zooecia with large frontal granulations are characteristic.

D. 5162. Tinagta Island.



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 602



Bryozoa of the Philippine Region

For explanation of plate see page 603

Plate 36

Figs. 1, 2. *Stylopoma distorta*, new species (p. 314).

1. Surface of the multilamellar incrusting zoarium, × 20.
2. Zooecia, × 20, illustrating the nature of the ovicell.

    D. 5151. Sirun Island.

3–6. *Stylopoma parviporosa*, new species (p. 315).

3. Zoarium, × 20, incrusting a shell and showing ovicelled zooecia.

    D. 5179. Romblon Light, Romblon.

4. Another specimen with marginal zooecia, × 20. There is a large distal dietella.

    D. 5137. Jolo Light, Jolo.

5. Ancestrula and ancestrular zooecia, × 20.

    D. 5147. Sulade Island.

6. Tangential thin section, × 85, showing the form of the aperture and the small tremopores.

    D. 5141. Jolo Light, Jolo.

7, 8. *Hippodiplosia? baculina*, new species (p. 324).

7. The small rodlike zoarium, × 20, consisting of four rows of zooecia.

    D. 5147. Sulade Island.

8. Extremity of a colony, × 20.

    D. 5137. Jolo Light, Jolo.

9. *Hippodiplosia pertusa* Esper.

    Structure of the frontal, × 85. The size of the tremopores is quite variable.

10, 11. *Schizoporella costulata*, new species (p. 317).

10. The incrusting zoarium, × 20, showing elongated zooecia with salient costules.

    D. 5179. Romblon Light, Romblon.

11. Another zoarium, × 20, with short zooecia and little salient costules.

    D. 5137. Jolo Light, Jolo.

PLATE 37

FIGS. 1–3. *Stylopoma grandis*, new species (p. 316).

1. Surface of the multilamellar incrusting zoarium, ×20, with some zooecia transformed into avicularia.
2. Transverse section, ×6, showing the numerous superposed lamellae.
3. Another portion of the type, ×20, with ovicelled zooecia.

From an unknown Philippine locality.

4, 5. *Hippoporina fallax*, new species (p. 320).

4. Portion of the incrusting zoarium, ×20. The zooecia are deformed by the large lateral avicularium.

D. 5151. Sirun Island.

5. Marginal part of zoarium, ×20, with some ovicelled zooecia.

D. 5179. Romblon Light, Romblon.

6. *Hippoporina planulata*, new species (p. 321).

An incrusting ovicelled zoarium, ×20, showing the small zooecia with plain frontal.

D. 5147. Sulade Island.

7. *Hippoporina* (?) *verrucosa*, new species (p. 322).

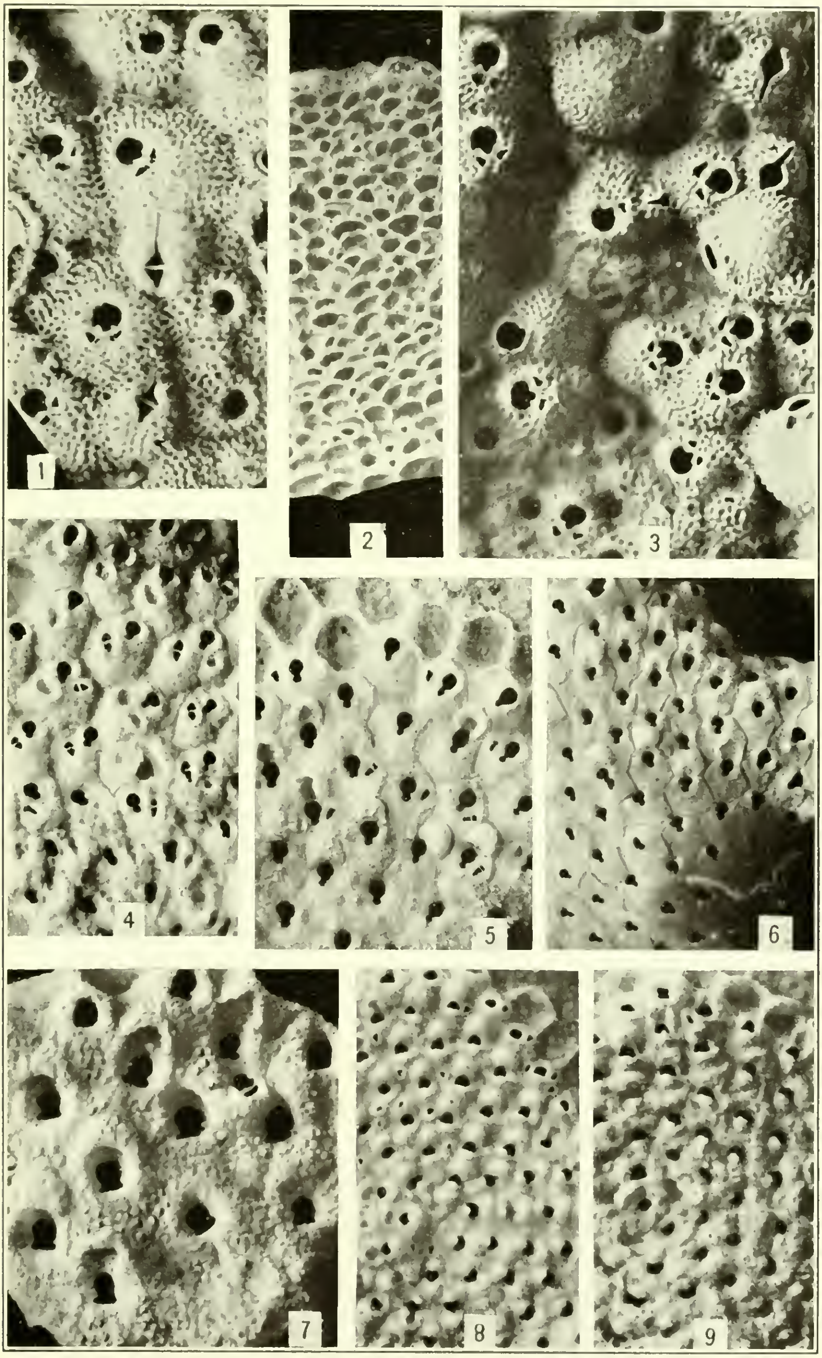
Fragmentary unilamellar zoarium, ×20. The large zooecia with verrucose frontal and the short convex ovicell are characteristic.

D. 5574. Simaluc Island.

8, 9. *Hippoporina squamosa*, new species (p. 322).

8. An ovicelled specimen, ×20, incrusting an orbitoid foraminifer. The small zooecia with smooth frontal, small, oral avicularia, and oral mucro hiding the poster are characteristic.
9. Another specimen, ×20, showing the usual aspect. The labial mucro gives to each zooecium the aspect of a small scale.

D. 5179. Romblon Light, Romblon.



BRYOZOA OF THE PHILIPPINE REGION

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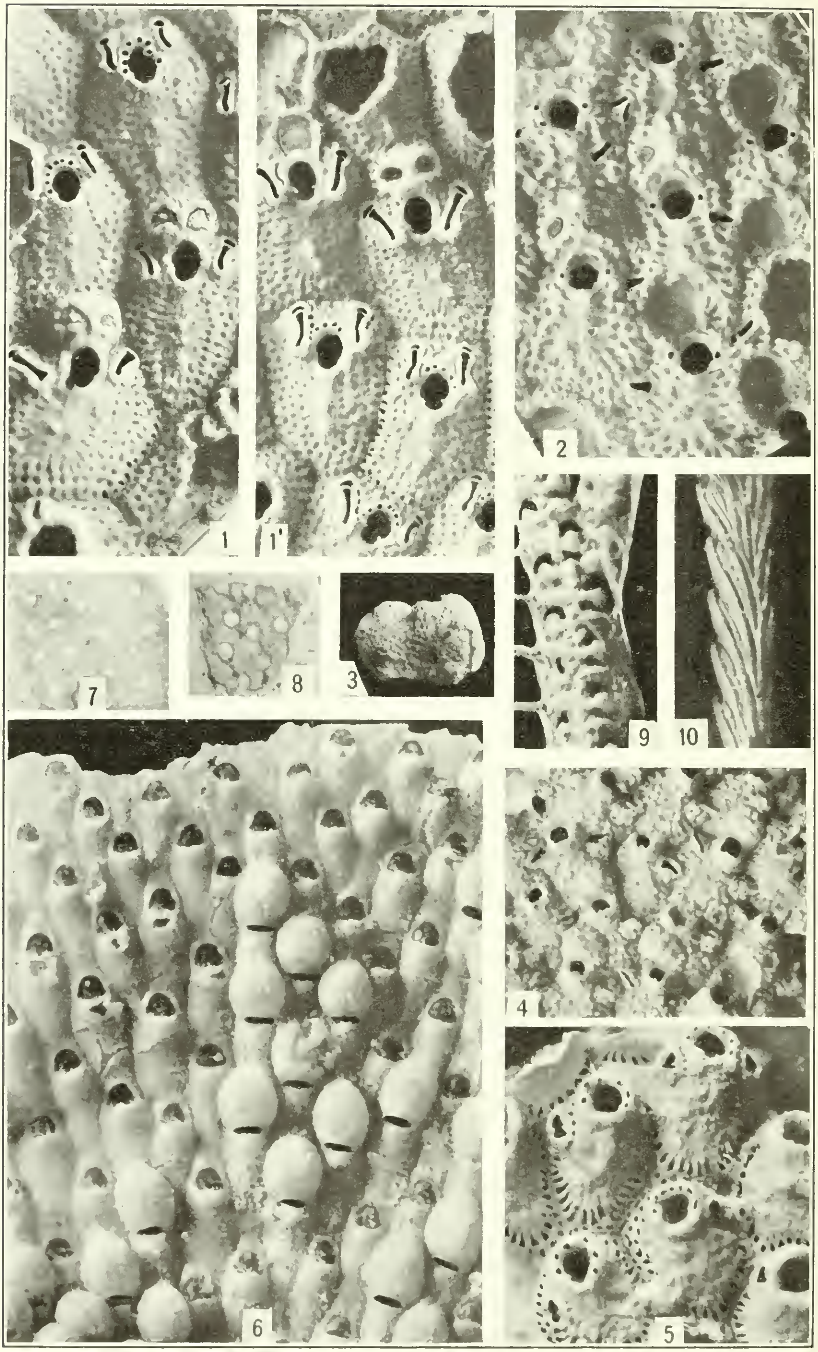


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 605

Plate 38

Figs. 1, 1′. *Hippomenella repugnans*, new species (p. 323).

Two portions of the incrusting type specimen, ×20, showing the characters of both types of zooecia.

From an unknown Philippine locality.

2, 3. *Hippomenella porosa*, new species (p. 324).

Incrusting type zoarium, natural size and surface, ×20. The difference from *H. repugnans* is particularly shown by the avicularium.

D. 5577. Mount Dromedario.

4. *Peristomella coccinea* Abildgard, 1805 (p. 327).

Incrusting zoarium, ×20, referred to this widespread species.

D. 5151. Sirun Island.

5. *Hippopleurifera* (?) *philippinensis*, new species (p. 326).

Incrusting zooecia, ×20, showing pleurocystal frontal and avicularia with beak directed to top.

D. 5577. Mount Dromedario.

6–8. *Monoporella? waipukurensis* Waters, 1887 (p. 158).

6. Surface of bilamellar zoarium, ×20. The specimen has the ectocyst so the tremopores are hidden and the opercula are in place.

7, 8. Two fragments of the tremocyst, ×85.

D. 1807. Cape Tsiuka, Sea of Japan.

9, 10. *Caberea transversa* Harmer, 1926 (p. 211).

Frontal and dorsal ×20.

D. 5151. Sirun Island.

PLATE 39

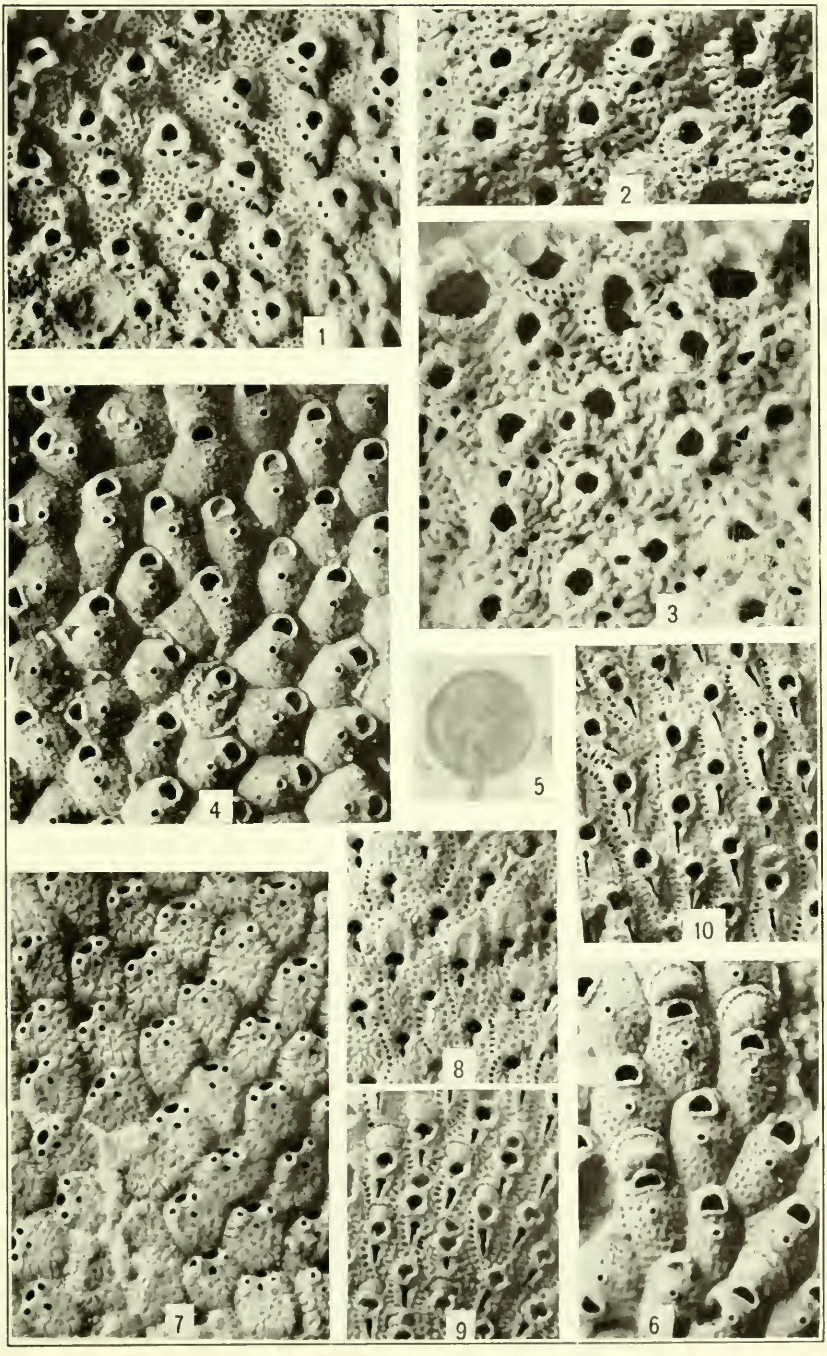
FIG. 1. *Didymosella parvipora*, new species (p. 327).
The type specimen, ×20, incrusting a shell. The two small special pores, the thick peristome, and the lateral avicularium are special features.
D. 5137. Jolo Light, Jolo.

2, 3. *Didymosella costulata*, new species (p. 328).
2. Surface of unilamellar zoarium, ×20, exhibiting the two special pores and the costulated tremocyst of the frontal.
D. 5162. Tinagta Island.
3. Another unilamellar zoarium, ×20, showing slightly different aspect.
D. 5145. Jolo Light, Jolo.

4–6. *Fenestrulina infundibulipora*, new species (p. 329).
4. Incrusting, ovicelled specimen, ×20, covered by thin ectocyst and pigmented.
5. Diatom (?) found in a cell, ×100.
D. 5137. Jolo Light, Jolo.
6. Ovicelled specimen, ×20. The aperture of the ovicells is very broad.
D. 5478. Tacbuc Point, Leyte.

7. *Inversiula inversa* Waters, 1887 (p. 330).
Incrusting zoarium, ×20, with ordinary zooecia.
D. 5151. Sirun Island.

8–10. *Smittina reticulata* MacGillivray, 1842 (p. 337).
8. Much calcified incrusting specimen, ×20, showing embedded avicularia.
9. Ovicelled zooecia, ×20.
D. 5151. Sirun Island.
10. Another incrusting zoarium, × 20, with salient median avicularia.
D. 5179. Romblon Light, Romblon.



BRYOZOA OF THE PHILIPPINE REGION

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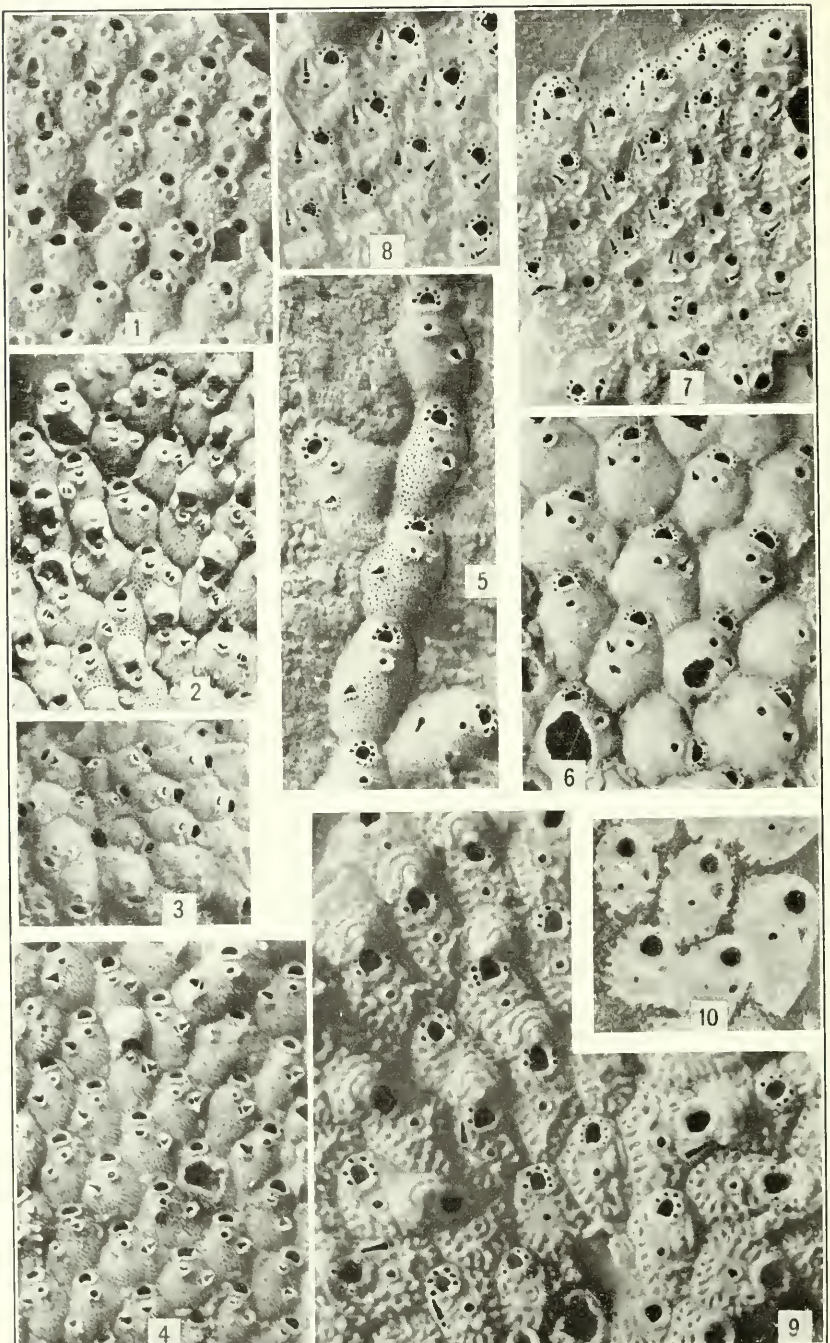


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 607

Plate 40

Fig. 1. *Microporella coronata* Savigny-Audouin, 1826 (p. 332).
Incrusting ovicelled zoarium, ×20.
D. 5478. Tacbuc Point, Leyte.

2–4. *Microporella ciliata* Linnaeus, 1759 (p. 331).
2. Incrusting zooecia, ×20. The ascopore is placed on a very salient lip.
D. 5137. Jolo Light, Jolo.
3. Zooecia, ×20, showing ancestrula.
D. 5147. Sulade Island.
4. Zoarium, ×20, with zooecia showing very salient ascopore.
D. 5179. Romblon Light, Romblon.

5. *Microporella lineata*, new species (p. 332).
The linear zoarium, ×20, incrusting a pebble.
D. 5217, Anima Sola Island.

6. *Microporella ventricosa*, new species (p. 333).
Type specimen, ×20, incrusting a pebble, showing the distinct swollen zooecia.
D. 5217. Anima Sola Island.

7, 8. *Calloporina sculpta*, new species (p. 334).
Type specimen incrusting a shell fragment, ×20, and a portion, ×25. The small distinct zooecia with highly sculptured surface, although difficult to illustrate, are exceptionally well marked.
D. 5151. Sirun Island.

9, 10. *Calloporina sigillata*, new species (p. 333).
9. Incrusting ovicelled specimen, ×20. The distinctive sculpturing of the frontal and large zooecial proportions make this species easily recognizable.
10. Interior of zooecia, ×20, showing the olocyst perforated by a very small ascopore.
D. 5137. Jolo Light, Jolo.

Plate 41

Figs. 1–3. *Smittina trispinosa* Johnston, 1838 (p. 340).

1. Zooecia of the incrusting zoarium, ×20, with two giant cells.
   D. 5311. China Sea, vicinity of Hong Kong.
2. Ovicelled zooecia, ×20, of the typical form.
   D. 5145. Jolo Light, Jolo.
3. Ancestrular zooecia, ×20. The avicularium is not developed.
   D. 5311. China Sea, vicinity of Hong Kong.

4, 5. *Smittina trispinosa munita* Hincks, 1884 (p. 341).

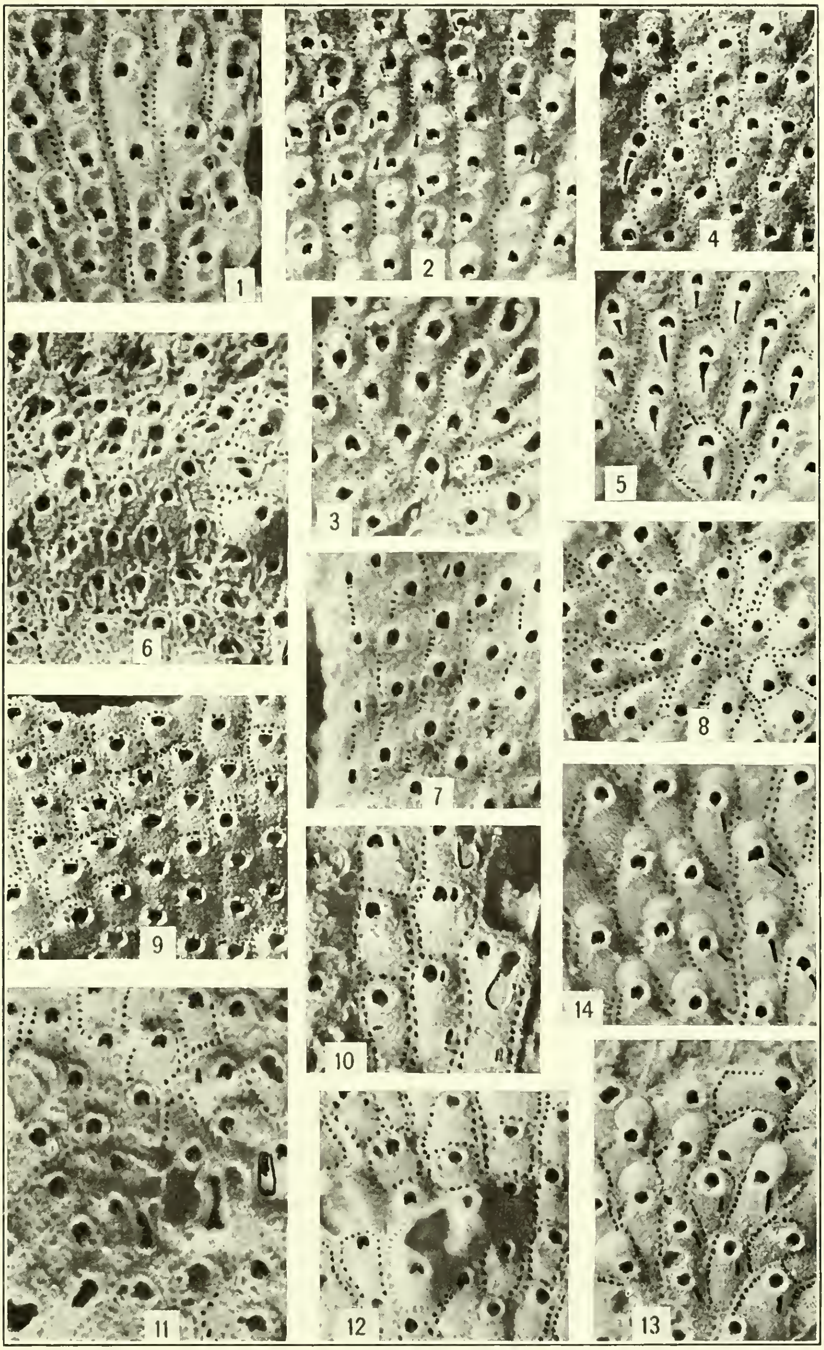
4. Incrusting ovicelled specimen, ×20.
5. Group of zooecia, ×20, exhibiting the avicularia, a rare occurrence.
   D. 5179. Romblon Light, Romblon.

6–12. *Smittina trispinosa nitida* Hincks, 1881 (p. 343).

6. Much calcified specimen, ×20 ,with large areolar pores.
   D. 5145. Jolo Light, Jolo.
7. Unilamellar, cylindrical specimen, ×20. The avicularia are rare.
8. Ancestrula and ancestrular zooecia, ×20.
   D. 5151. Sirun Island.
9. Group of short zooecia, ×20, with two or three spines.
   D. 5147. Sulade Island.
10. Incrusting specimen, ×20. Variation with giant cells.
    D. 5179. Romblon Light, Romblon.
11. Group of zooecia, ×20, showing the usual irregularity of the species.
    D. 5137. Jolo Light, Jolo.
12. Normal zooecia with superposed aberrant zooecia, ×20.
    D. 5577. Mount Dromedario.

13, 14. *Smittina trispinosa acuta*, new variety (p. 344).

13. Marginal zooecia, ×20, of the incrusting zoarium with the thin avicularium attached to the proximal border of the peristome.
14. Group of ovicelled zooecia, ×20.
    D. 5217. Anima Sola Island.



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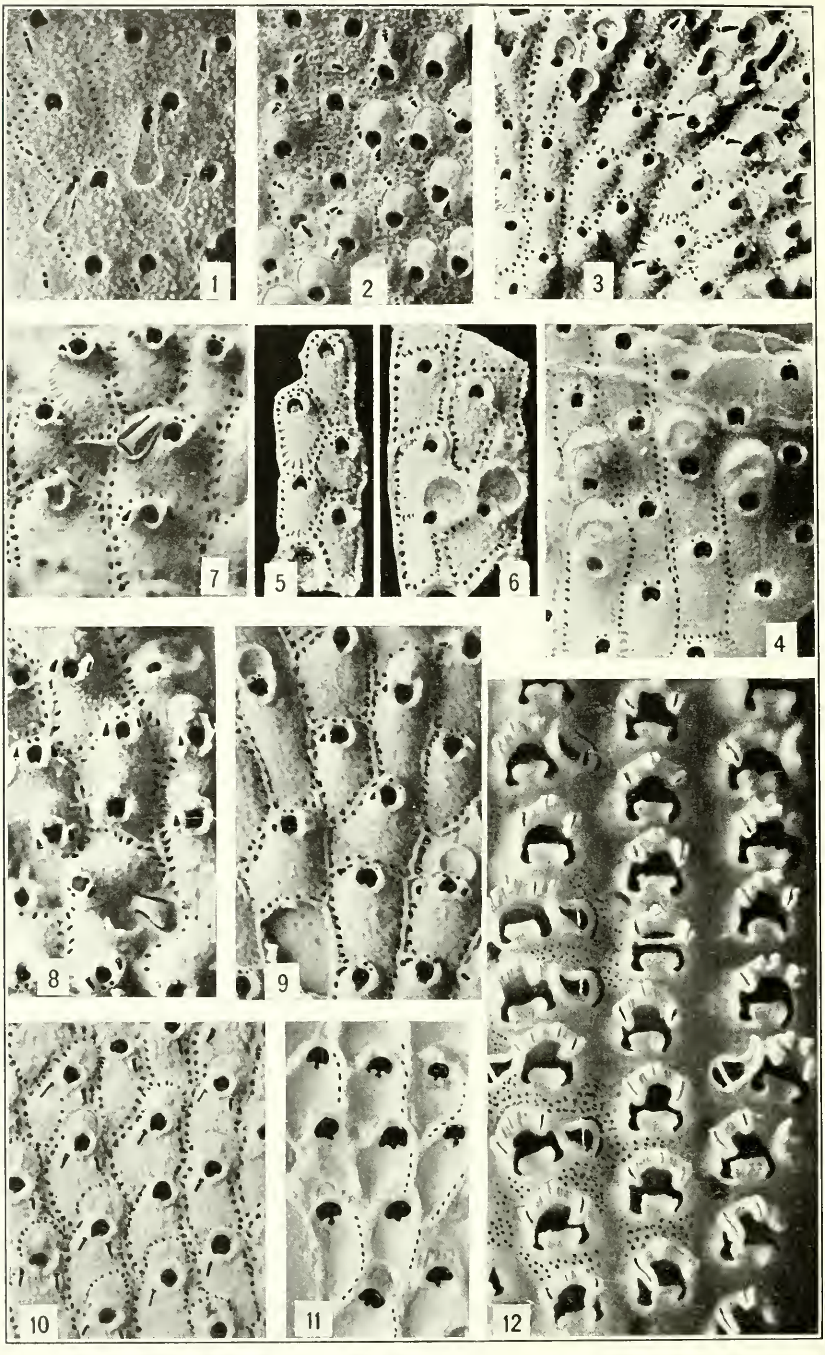


Bryozoa of the Philippine Region

For explanation of plate see page 609

Plate 42

Figs. 1, 2. *Smittina trispinosa granosa*, new variety (p. 345).

1. Unilamellar specimen, ×20. Some zooecia are ornamented with large spathulate avicularia.
2. Ovicelled zooecia, ×20.

D. 5478. Taebuc Point, Leyte.

3. *Smittina trispinosa applicata*, new variety (p. 345).

Type specimen, ×20, incrusting a shell fragment.

D. 4807. Cape Tsiuka, Sea of Japan.

4. *Smittina nitida* Waters, 1909 (p. 349).

Unilamellar specimen, ×20. The ovicell is large and broad.

D. 5478. Taebuc Point, Leyte.

5, 6. *Smittina nitida delicatula* Busk, 1883 (p. 350).

5. Unilamellar specimen, ×20, with narrow zooecia.
6. Ovicelled specimen, ×20. The ovicells are broad and measure 0.35 mm. in diameter.

D. 5235. Nagubat Island.

7–9. *Smittina tripora*, new species (p. 350).

7. Surface of unilamellar specimen, ×20, containing zooecia with broad spathulate avicularia.
8. Ovicelled and inverted zooecia, ×20.
9. Incrusting specimen, ×20, showing the great irregularity in the micrometric measurements. The sporadic avicularia are placed in the neighborhood of the apertures of adjacent zooecia.

D. 5135. Jolo Light, Jolo.

10, 11. *Lacerna signata* Waters, 1889 (p. 308).

10. Unilamellar specimen, ×20.
11. Interior of zooecia, ×20. The two condyles which limit the orifice of the compensatrix are very large. The ovicell is buried in the distal zooecium and closed by the operculum.

D. 5173. Jolo Light, Jolo.

12. *Mucronella* (?) *uncifera*, new species (p. 352).

Incrusting zoarium, ×20, showing the complex spines of the peristome.

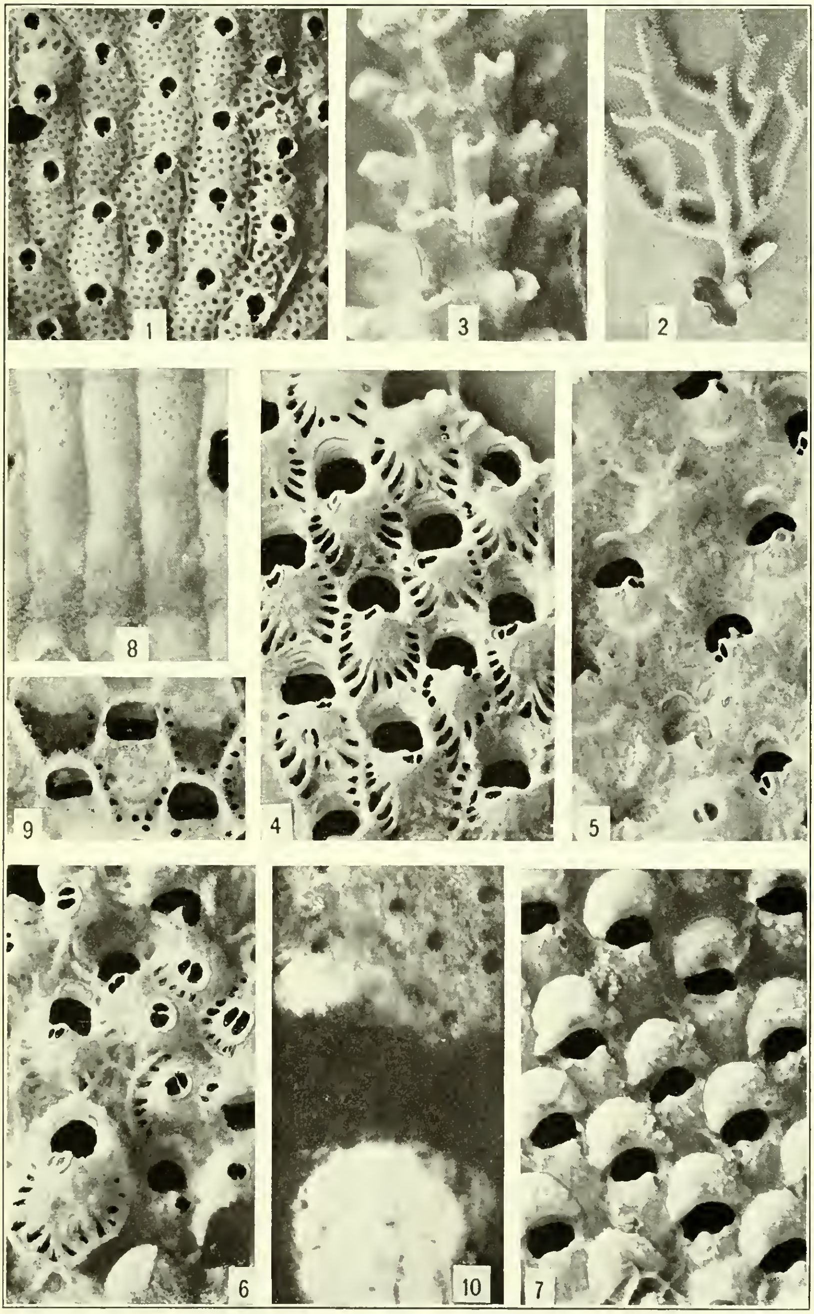
D. 5355. Balabac Light.

Plate 43

Fig. 1. *Porella purpurea* Jullien, 1888 (p. 352).
Incrusting zoarium, ×20, referred to this species.
D. 5217. Anima Sola Island.

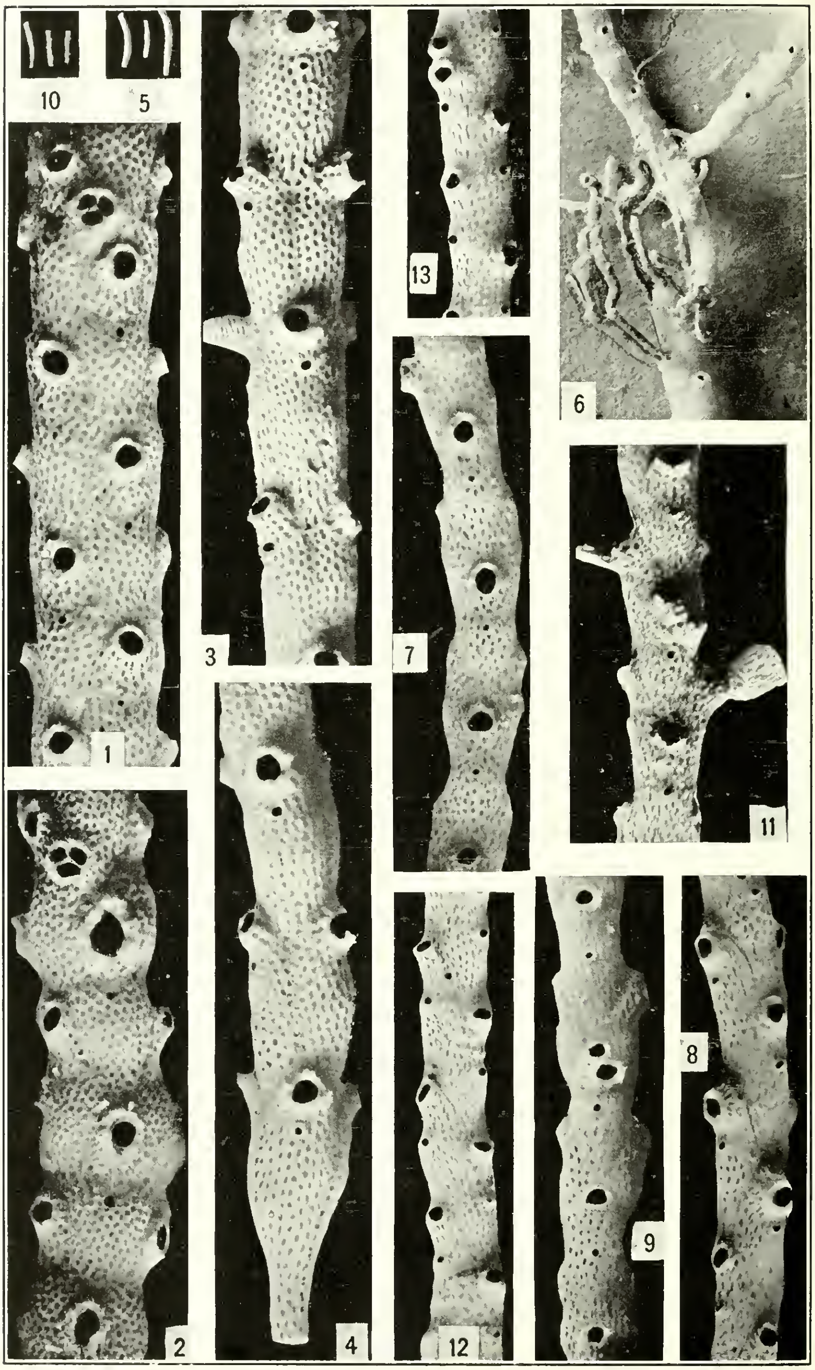
2, 3. *Palmicellaria? coronopus*, new species (p. 353).
2. The solid, cylindrical, branching zoarium, natural size.
3. Surface, ×20, illustrating the very salient peristomes.
D. 5634. Gornomo Island.

4–10. *Rhamphostomella sollers*, new species (p. 353).
4. Zooecia without ectocyst of the flat unilamellar zoarium, ×20, showing the interareolar costules. The oyicell is beginning to develop in some zooecia.
5. Fragment, ×20, in which the zooecia are covered by the ectocyst. Here also the ovicell is commencing to develop.
6. Zooecia, ×20, partially covered by the large frontal avicularium.
7. Specimen, ×20, with ectocyst and well developed ovicells.
8. Dorsal of frontal, ×20; the small granules and the suture lines are visible.
9. Interior of zooecia, ×20.
10. View of dorsal by transparency, ×100, showing the median suture line and the widely separated granules.
D. 4807. Cape Tsiuka, Sea of Japan.



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 610



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FOR EXPLANATION OF PLATE SEE PAGE 611

Plate 44

Figs. 1, 2. *Tubucellaria cereoides gracilis*, new variety (p. 355).

1. Segment with elongated zooecia, ×20, showing a basis ramae.
2. A similar segment, ×20, but with broad zooecia.

D. 5151. Sirun Island.

3, 4. *Tubucellaria fusiformis* D'Orbigny, 1848 (p. 357).

3. Segment with a very salient peristome, ×20.
4. Base of a segment, ×20.

D. 5147. Sulade Island.

5–9. *Tubucellaria exilis*, new species (p. 358).

5. Segments of the jointed zoarium, natural size.
6. Specimen with radicells, ×20, and showing the mode of articulation of the segments.

7, 8. Two aspects of the segments, ×20.

D. 5151. Sirun Island.

9. Specimen, ×20, bearing a basis ramae.

D. 5147. Sulade Island.

10–13. *Tubucellaria filiformis*, new species (p. 359).

10. The threadlike segments, natural size.
11. Segment, ×20, showing the chitinous joint on the left and base of a new segment with its basis ramae on the right.
12. Another aspect of a segment, ×20.
13. View, ×20, illustrating basis ramae.

D. 5151. Sirun Island.

PLATE 45

FIGS. 1–12. *Retepora* (*Reteporella*) *laxipes*, new species (p. 361).

1, 2. The free dendroid zoarium natural size and portion, ×3.

3. Young branch, ×20. The peristome is incised by large spines and the ovicell is ornamented with a canalicule.

4. Anterior side of an adult branch, ×20. There are porelike avicularia on the frontal.

5. Posterior side of a basal trunk, ×20.

6. Dorsal of an adult branch, ×20. The vibices are hollow.

7. Dorsal of a young branch, ×20.

8. Basal portion of zoarium, ×20, showing vibices on the anterior side.

9. Interior of zooecia, ×20, showing a median peristomial canal.

10, 11. Two views of the upper surface of the base, ×20. The polygons contain large and small pores and sometimes tuberosities.

12. Interior of basal lamella, ×20.

D. 5511. Camp Overton, northern Mindanao. (Figs. 1–3, 7, 9–12.)

D. 5202. Limasaua Island. (Figs. 4–6, 8.)

13–17. *Retepora tenuitelifera*, new species (p. 363).

13. Branch, ×6. The base is small, concave, attached to a small solid body.

14. Branch, ×20, with a large avicularium on each zooecium.

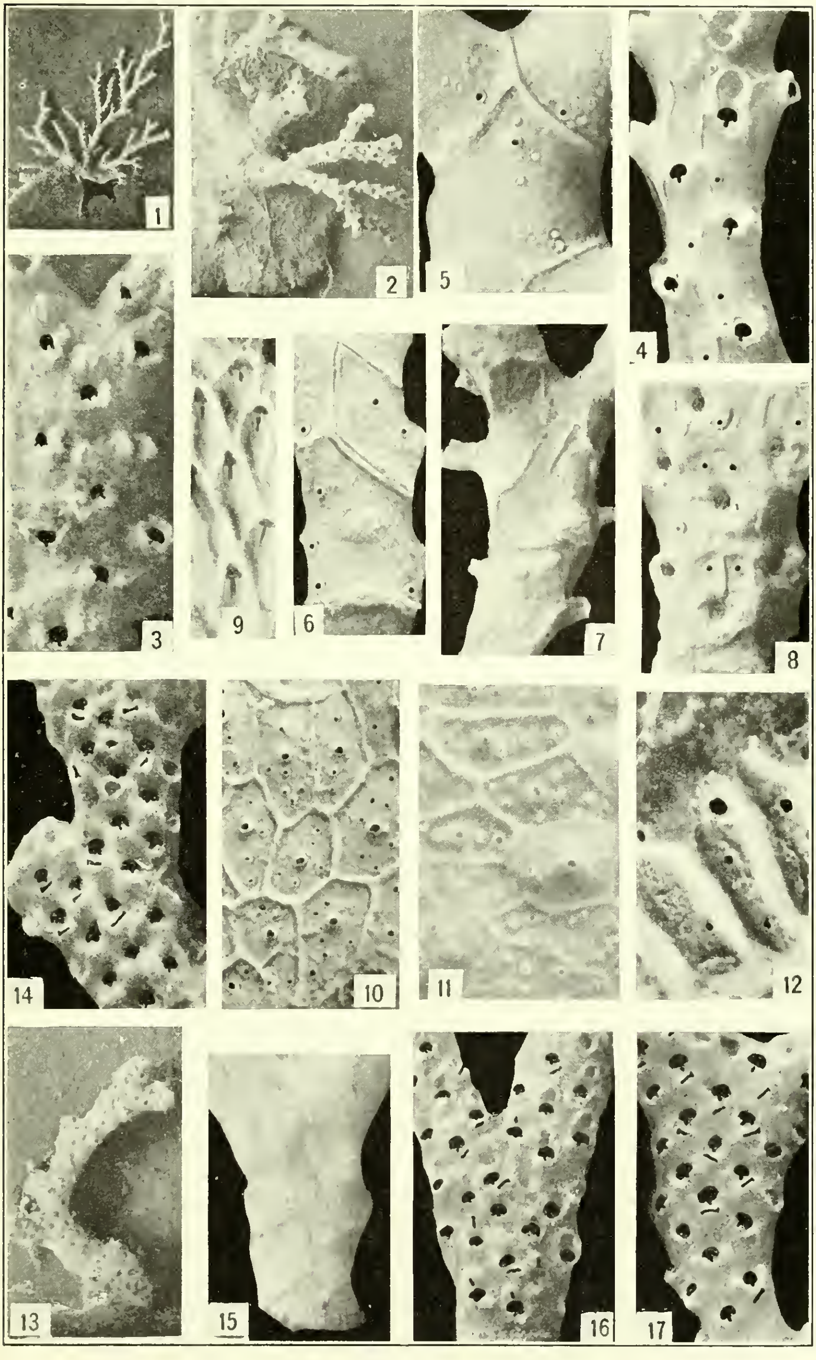
15. Dorsal, ×20, showing the vibices.

16. Ovicelled branch, ×20.

D. 5151. Sirun Island.

17. Branch, ×20, with small oral avicularium.

D. 5137. Jolo Light, Jolo.



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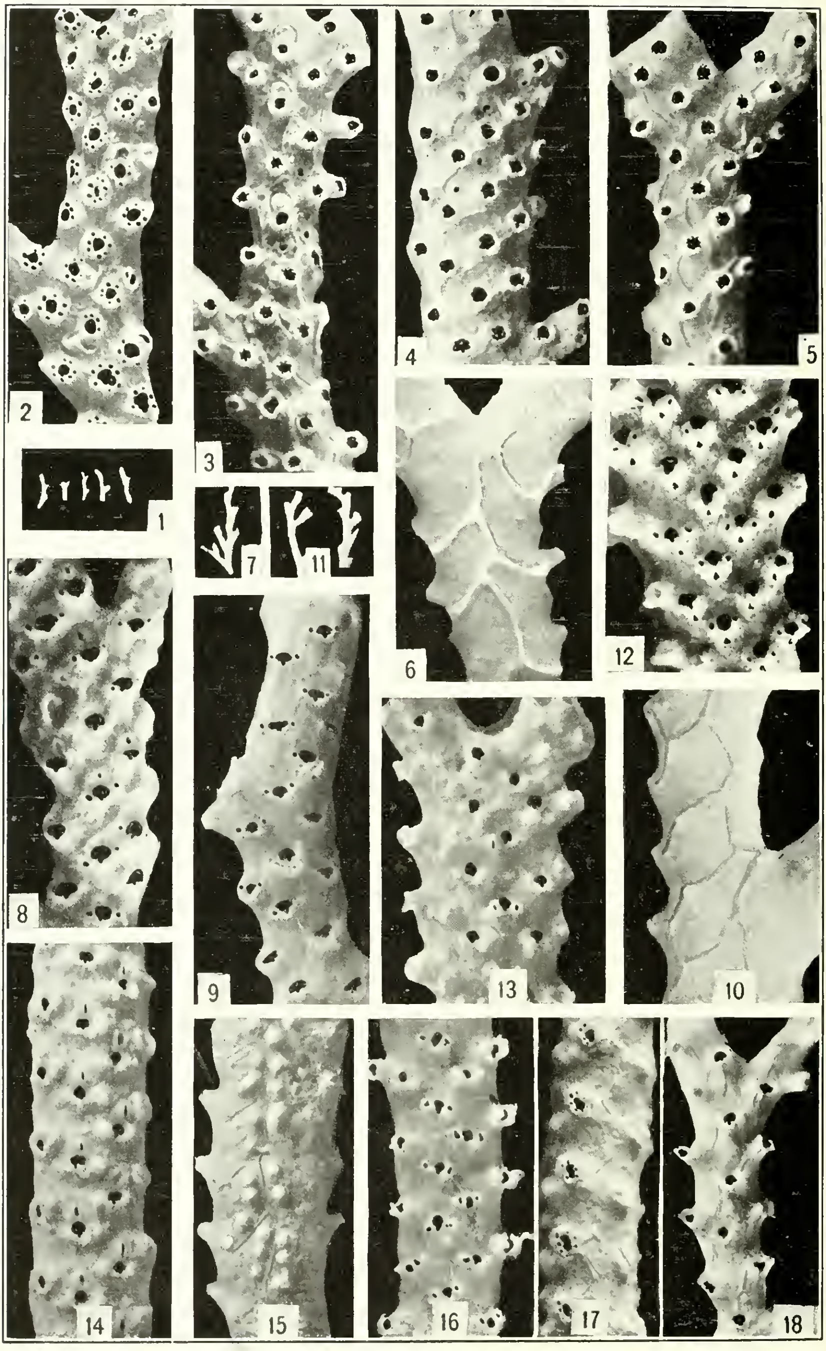


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 613

Plate 46

Figs. 1–6. *Retepora* (*Reteporella*) *spinosissima*, new species (p. 364).

1. Zoarial fragments, natural size.
2. Branch, $\times 20$, in which there are large spines with the small ones.
   D. 5574. Simaluc Island.
3. Adult ovicelled branch, $\times 20$.
4. Adult branch with salient peristomes, $\times 20$.
5. Young branch, $\times 20$, with very salient peristomes.
6. Dorsal, $\times 20$, exhibiting the vibices.
   D. 5179. Romblon Light, Romblon.

7–10. *Retepora* (*Reteporella*) *clypeata*, new species (p. 365).

7. The dendroid zoarium, natural size.
8. Adult branch, $\times 20$, lighted from the base to show the structure of the ovicell.
9. Young branch, $\times 20$, also lighted from the base to show the saliency of the peristome.
10. Dorsal, $\times 20$, exhibiting vibices.
    D. 5179. Romblon Light, Romblon.

11–18. *Retepora* (*Reteporella*) *longicollis*, new species (p. 365).

11. Zoarial fragments, natural size.
12. Wide branch, $\times 20$, lighted from the base to show the great saliency of the peristome.
13. Young branch, $\times 20$, showing the frontal avicularia and the long lateral peristomes.
    D. 5577. Mount Dromedario.
14. Ovicelled branch, $\times 20$, illustrating the median avicularia and the fissure of the ovicell.
    D. 5135. Jolo Light, Jolo.
15. Dorsal, $\times 20$, showing tuberosities in lozenge-shaped areas.
16. Young branch, $\times 20$, exhibiting the two large spines on the axial peristomes.
17. Side view of specimen, $\times 20$, showing the arrangement of the vibices with respect to the marginal zooecia.
18. Branch of a very young zoarium, $\times 20$.
    D. 5593. Sibuko Bay, Borneo.

Plate 47

Figs. 1–11. *Retepora* (*Reteporella*) *millespinae*, new species (p. 367).

1. Two basal portions of the free dendroid zoarium, natural size.
2. Very young branch, ×20; the zooecia are marginated.
3. Dorsal of very young branch, ×20.
4. Young branch, ×20, showing formation of the spiramen and the frontal avicularium with pivot.
5. Adult branch, ×20, the spiramen and the avicularia are placed in a longitudinal furrow.
6. Dorsal of an adult branch, ×20, the tuberosities are small.
7. Dorsal of an old branch, ×20, showing the appearance of large pores.
8. Dorsal of a branch without tuberosities, ×20.
9. Ovicelled branch, ×20. The ovicell is very small, little visible and ornamented with a fissure.
10. Specimen provided with its ectocyst, ×20. The spines are in place.
11. Interior of zooecia, ×20. The frontal is not perforated by the spiramen.

D. 5137. Jolo Light, Jolo.

12–14. *Retepora pseudofinis*, new species (p. 368).

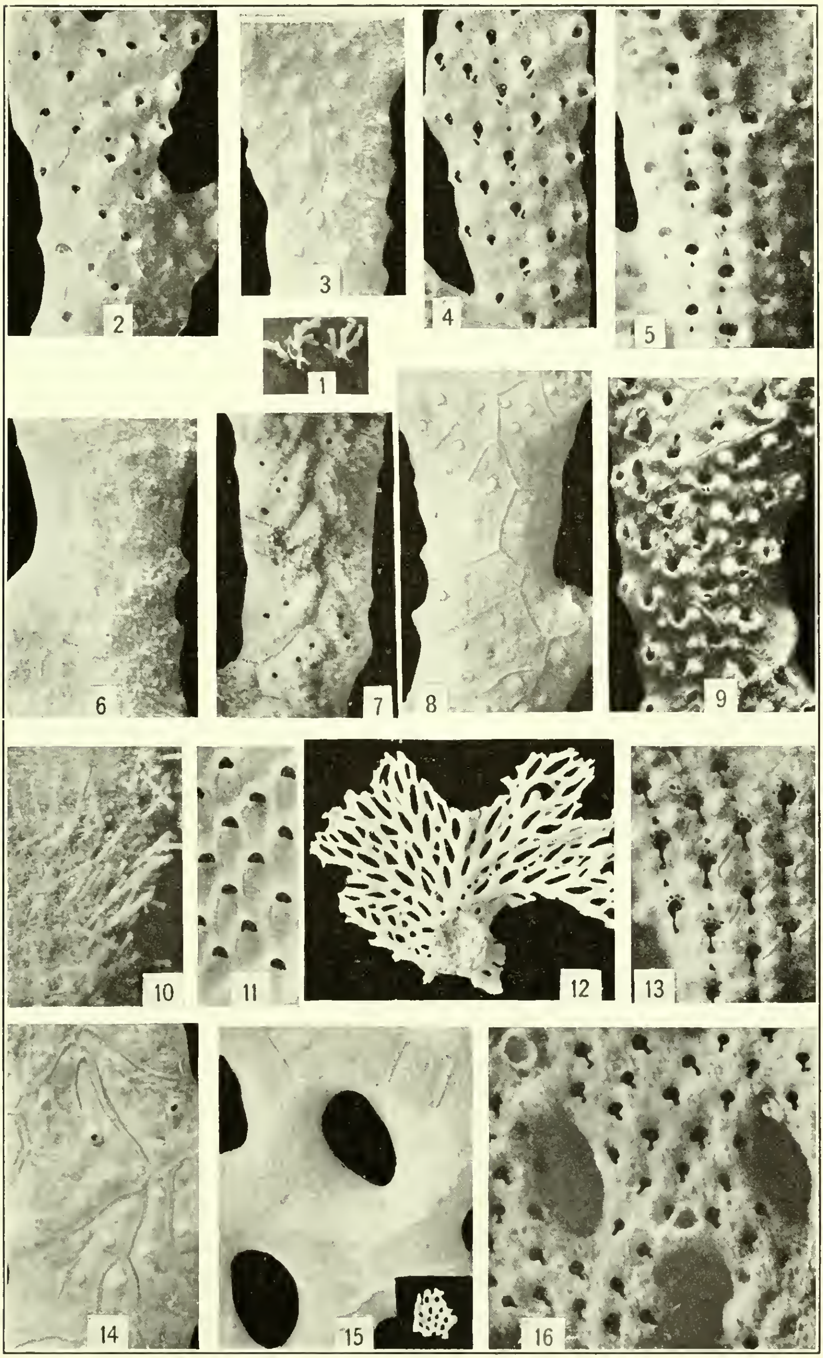
12. The large flabelliform zoarium, natural size.
13. Adult branch, ×20.
14. Dorsal of branch, ×20.

D. 5159. Tinagta Island.

15, 16. *Retepora fissa* MacGillivray, 1869 (p. 369).

15. Noncellular side, ×20, and the zoarium, natural size.
16. Cellular side, ×20.

D. 5577. Mount Dromedario.



BRYOZOA OF THE PHILIPPINE REGION

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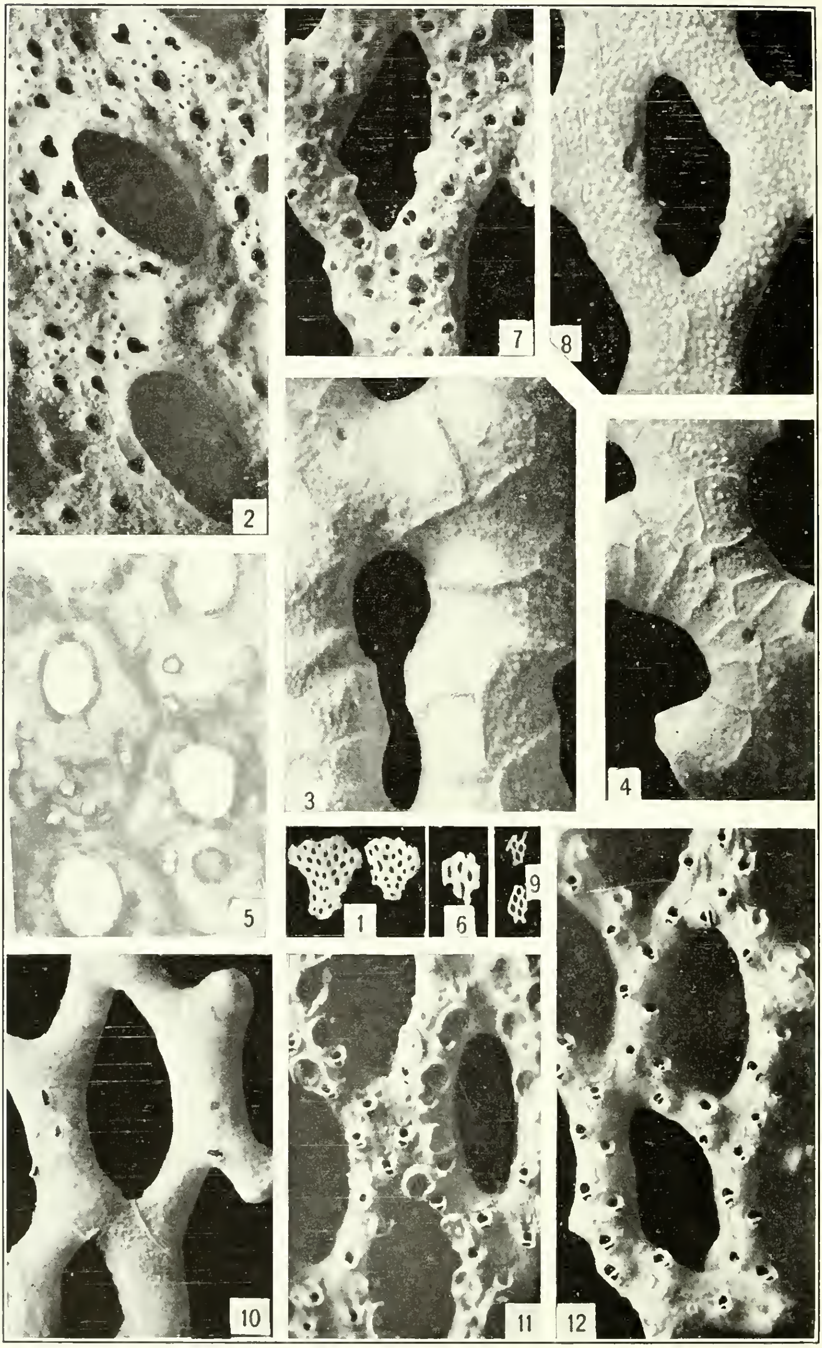


Bryozoa of the Philippine Region

For explanation of plate see page 616

PLATE 48

FIGS. 1–5. *Schizellozoon pheniceum* Busk, 1852 (p. 370).

1. Zoarial fragments, natural size.
2. Ovicelled fragment, ×20.
3. Dorsal of a thick branch, ×20.
4. Dorsal of a young branch, ×20.
5. Tangential thin section of the frontal, ×85.

D. 5141. Jolo Light, Jolo.

6–8. *Retepora granulata* MacGillivray, 1869 (p. 370).

6. Zoarial fragment, natural size.
7. Cellular side, ×20.
8. Dorsal of zooecia, ×20, showing numerous granules.

D. 5577. Mount Dromedario.

9–12. *Triphyllozoon biseriatum*, new species (p. 372).

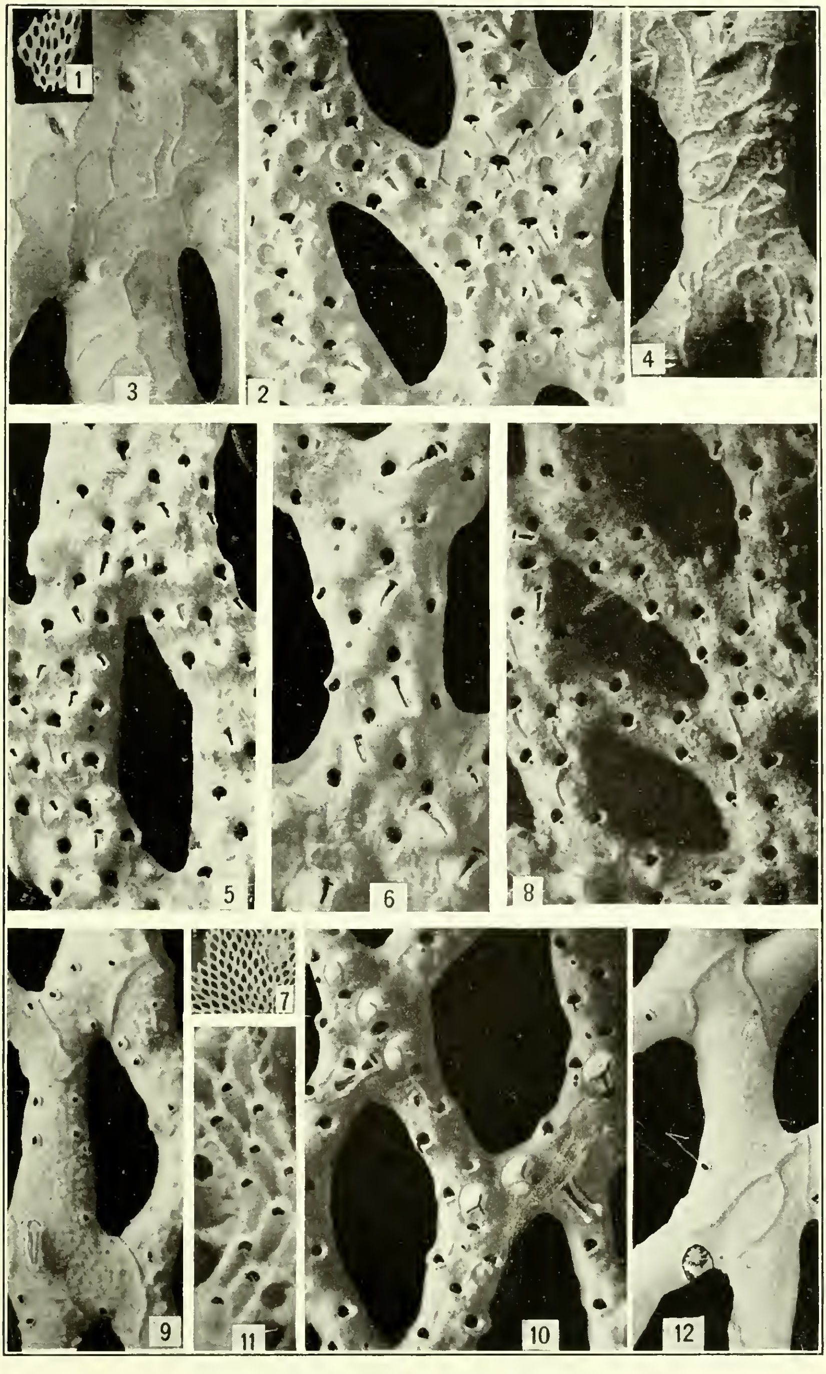
9. Fragments, natural size.
10. Granulose dorsal, ×20, with small avicularia.
11. Fragment, ×20, showing frontal side with broken ovicells.
12. Another fragment, ×20, in which the avicularian umbo is very salient.

D. 5578. Tacbuc Point, Leyte.

Plate 49

Figs. 1–6. *Schizellozoon luteum*, new species (p. 371).
1. Portion of the free reticulated zoarium, natural size.
2. Ovicelled fragment, ×20. The width of the trabeculae is variable.
3. Fragment with smooth dorsal, ×20.
4. Specimen, ×20, with granulated dorsal.
5. Fragment with short zooecia, ×20.
6. An example, ×20, with small peristomice and long zooecia.
D. 4807. Cape Tsiuka, Sea of Japan.

7–12. *Triphyllozoon magniscutulatum*, new species (p. 373).
7. Portion of zoarium, natural size.
8. Example with triserial trabeculae, ×20.
9. Granulated dorsal, ×20, with numerous fenestrular avicularia.
10. Ovicelled fragment, ×20, with large fenestrular avicularia.
11. Interior of zooecia, ×20, showing the thick frontal olocyst.
12. Dorsal, ×20, with very rare fenestrular avicularia.
D. 5356. Balabac Light.



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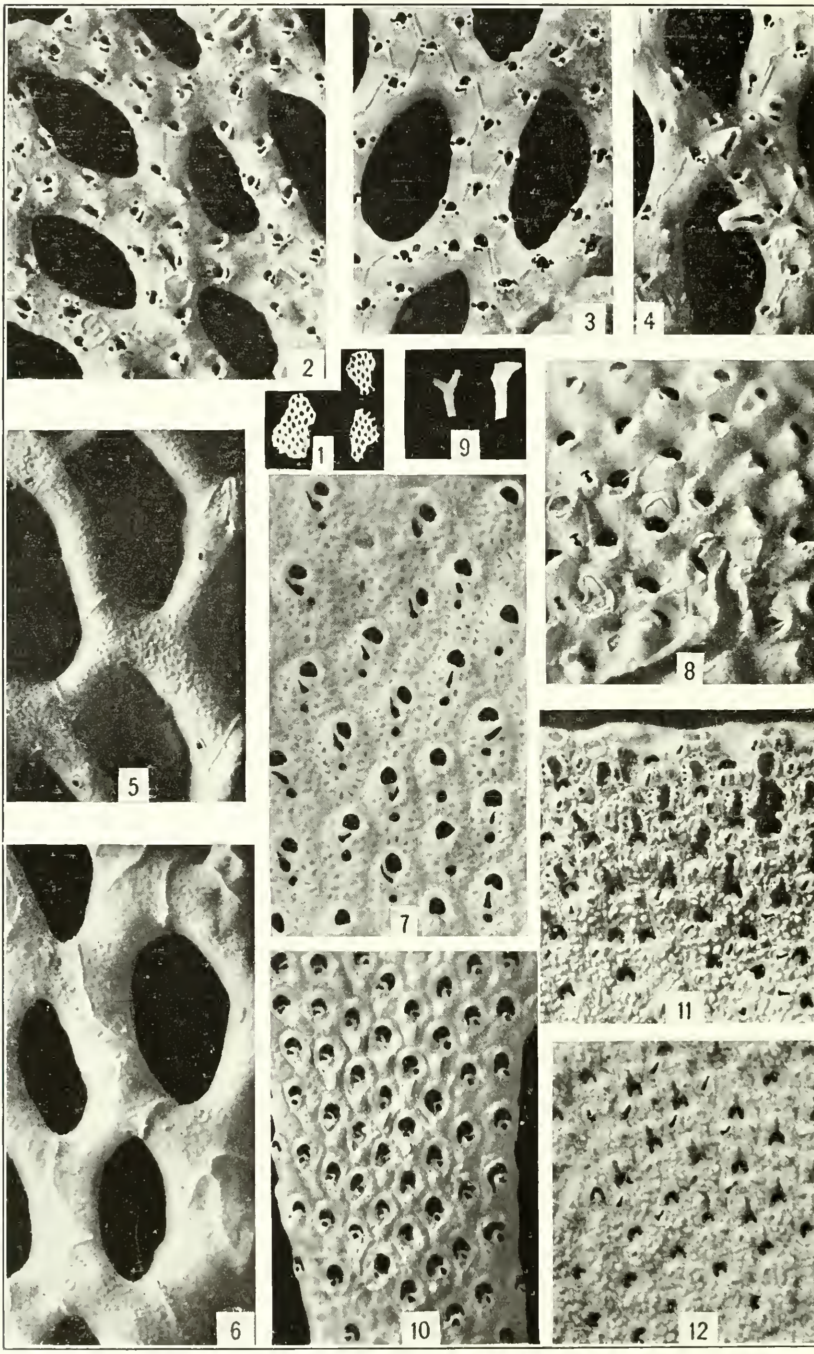

BRYOZOA OF THE PHILIPPINE REGION

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Plate 50

Figs. 1–6. *Triphyllozoon moniliferum* MacGillivray, 1860 (p. 374).

1. Three fragments, natural size.
2. Part of zoarium, ×20, bearing traces of an ovicell and a large frontal avicularium.
3. Fragments, ×20, showing the trace of two large antenniform spines.
4. Fragment, ×20, bearing fenestrular avicularia.
5. Dorsal, ×20, ornamented with long thin avicularia.
6. Another dorsal, ×20, with small poriform avicularia and showing the differences in the dimensions of the fenestrules.

D. 5478. Taclue Point, Leyte.

7. *Adeona porosa*, new species (p. 376).

The type specimen incrusting a Nullipore, ×20.

D. 5141. Jolo Light, Jolo.

8. *Rhynchozoon angulatum* Levinsen, 1909 (p. 374).

Incrusting oviceelled specimen, ×20.

D. 5147. Sulade Island.

9, 10. *Bracebridgia fissifera*, new species (p. 384).

9. The free bilamellar fronds, natural size.
10. The parietal dietellae are closed by the ectocyst, ×20.

D. 5147. Sulade Island.

11, 12. *Lepraliella granulata*, new species (p. 374).

11. The incrusting zoarium, ×20, showing marginal zooecia.
12. Incrusting central zooecia, ×20.

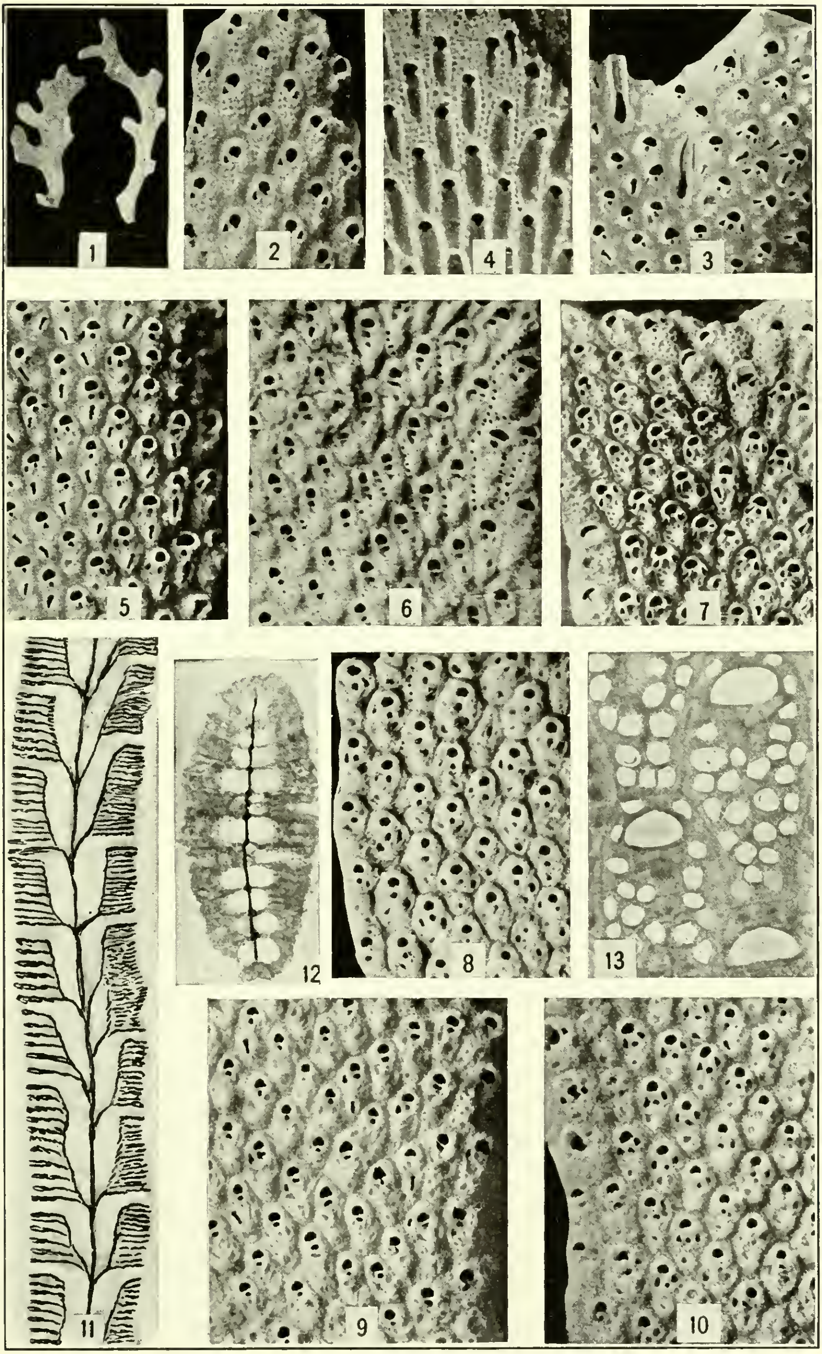
D. 5151. Sirun Island.

Plate 51

Figs. 1–13. *Adeonella minutipora*, new species (p. 379).

1. The free bilamellar fronds, natural size.
2. Terminal zooecia of a young frond, ×20, showing the union of the aperture and the spiramen.
3. Branching part of frond, ×20, showing the large zoarial avicularia.
4. Interior of a very young frond, ×20, showing the union of the aperture and the spiramen.
5. Superior portion of a frond, ×20, exhibiting both descending and ascending frontal avicularia.
6. Marginal zooecia, ×20.
7. Zooecia at a bifurcation, ×20, illustrating similarity to the marginal zooecia.
8. Frond, ×20, bearing much calcified zooecia without salient avicularia.
9. Zooecia, ×20, bearing three or four irregularly placed avicularia.
10. Zooecia, ×20 with two oral subsymmetrical avicularia.
11. Longitudinal section, ×20, showing the position of the spiramen and the great thickness of the frontal.
12. Transverse section, ×20.
13. Tangential thin section, ×85.

D. 5151. Sirun Island (fig. 1); D. 5579. Darvel Bay, Borneo (figs. 6, 8); D. 5137. Jolo Light, Jolo (figs. 2–5, 7, 9, 13).



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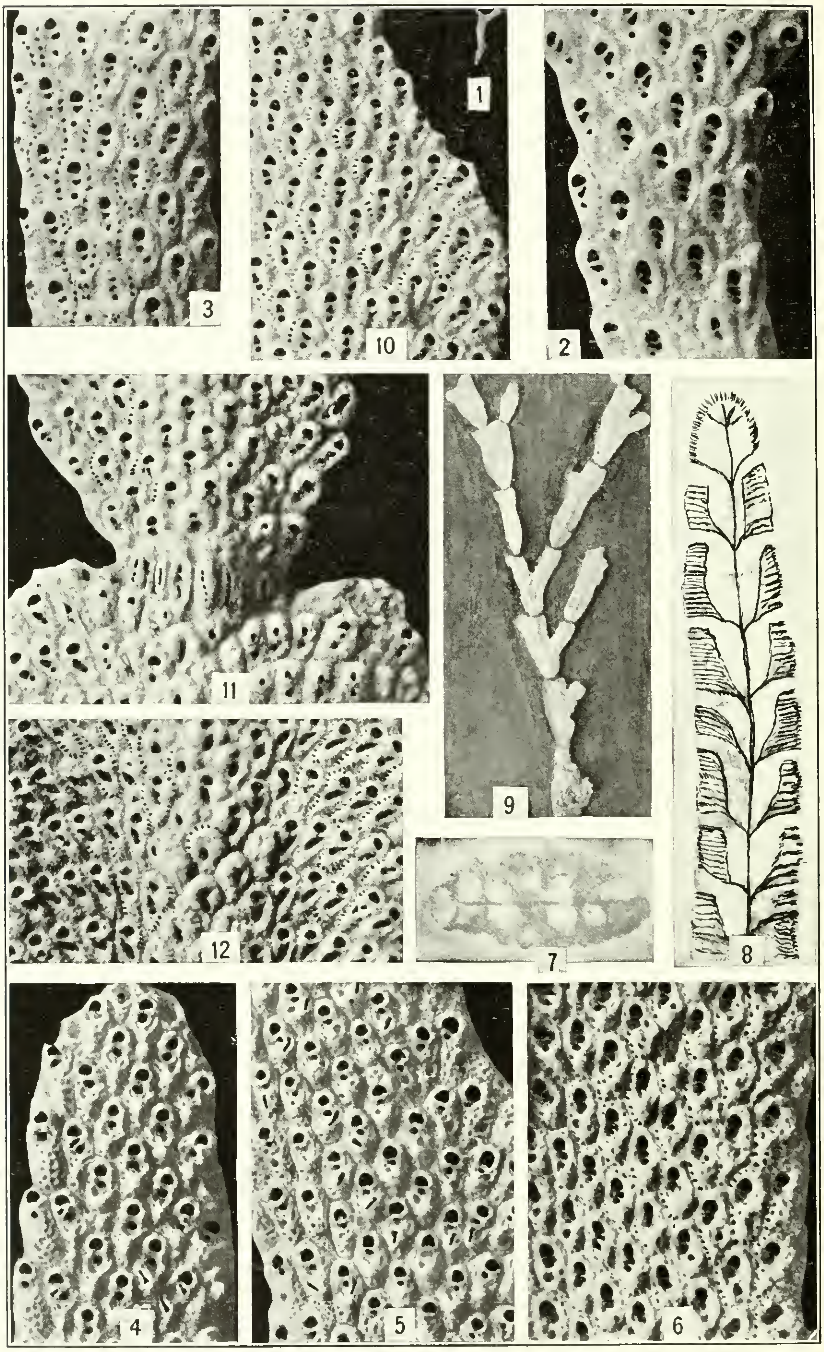

BRYOZOA OF THE PHILIPPINE REGION

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Plate 52

Figs. 1, 2. *Adeona arculifera*, new species (p. 377).

1. The narrow bilamellar zoarium, natural size.
2. Surface, ×20, showing the ascopore in the middle of the frontal.
   D. 5147. Sulade Island.

3–8. *Adeonella gibbera*, new species (p. 381).

3. The narrow bilamellar young frond, ×20, on which the aperture, the spiramen, and the avicularium are placed in the same depression.
   D. 5162. Tinagta Island.
4. Another young frond, ×20, where the marginal zooecia show a regular tremocyst.
   D. 5179. Romblon Light, Romblon.
5. Adult zooecium of a frond, ×20. The zooecia are somewhat calcified.
6. Much calcified zooecia, ×20, near the base of a frond.
7. Transverse section, ×20.
8. Longitudinal section, ×20, through a young complete branch.
   D. 5162. Tinagta Island.

9–12. *Adeona articulata*, new species (p. 377).

9. Restoration of an articulated colony, natural size.
10. Portion of young segment, ×20. The axial zooecia are similar to the lateral ones.
11. Articulation, ×20, showing the chitinous bundles joining two segments.
12. Middle portion of a segment, ×20, showing the gradual thickening of the frontal along the zooecial axis.
    D. 5151. Sirun Island.

Plate 53

Figs. 1–5. *Adeonellopsis pentapora*, new species (p. 382).

1. The bilamellar fronds, natural size.
2. Basal part of a much-calcified frond, ×20.
   D. 5162. Tinagta Island.
3. Zooecia, ×20, showing the two oral avicularia separated.
4. Narrow base of frond, ×6.
   D. 4807. Cape Tsiuka, Sea of Japan.
5. Portion of a zoarium, ×20, showing the two oral avicularia adjacent.
   D. 5137. Jolo Light, Jolo.

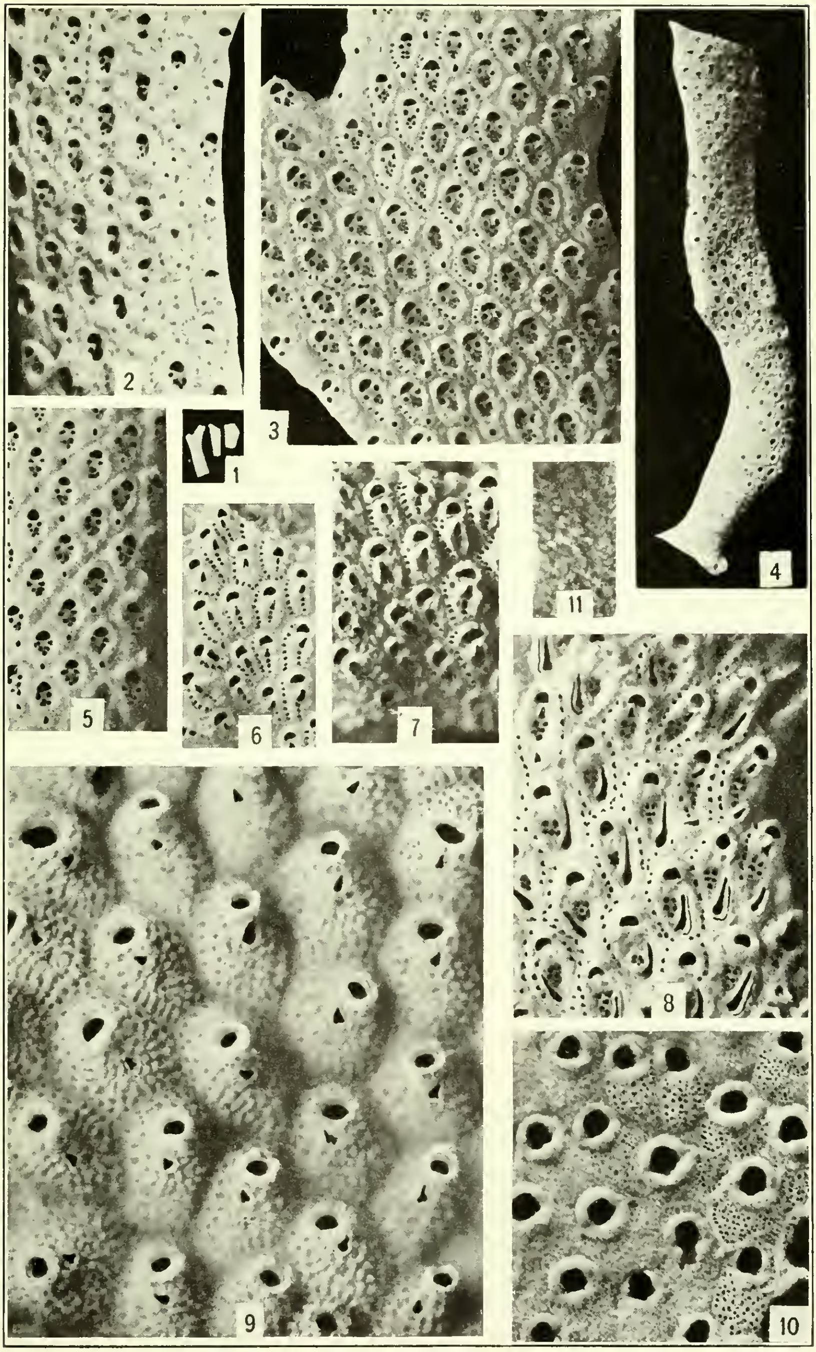
6, 7. *Adeonellopsis unilamellosa*, new species (p. 383).
The unilamellar type specimen, ×20 and ×25, showing the narrow cleft forming the cribriform area.
D. 5178. Taebuc Point.

8. *Adeonellopsis falcifera*, new species (p. 383).
Surface of the bilamellar zoarium, ×20, illustrating the large falciform frontal avicularium.
D. 5217. Anima Sola Island.

9. *Cheilopora? grandis*, new species (p. 386).
The incrusting zoarium, ×20.
Unknown Philippine locality.

10, 11. *Cheiloporina flava*, new species (p. 387).

10. Surface of the incrusting zoarium, ×20, exhibiting the transverse aperture and the two notches in the peristome.
11. Structure of the frontal, ×85.
    D. 5151. Sirun Island.



BRYOZOA OF THE PHILIPPINE REGION

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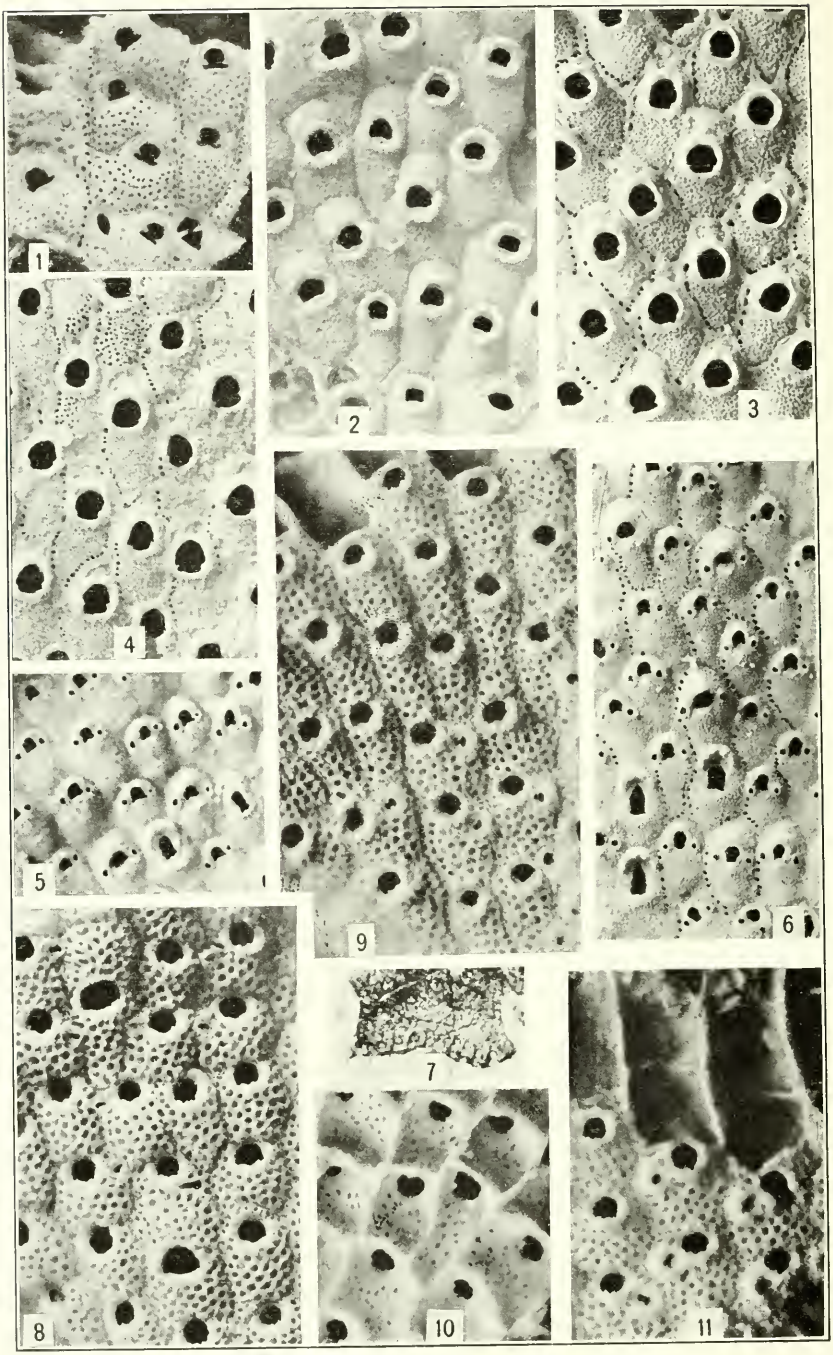

BRYOZOA OF THE PHILIPPINE REGION

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Plate 54

Fig. 1. *Cheiloporina irregularis*, new species (p. 389).
The unilamellar zoarium, ×20, illustrating the irregularly arranged zooecia.
D. 5145. Jolo Light, Jolo.

2–4. *Cheiloporina caerulea*, new species (p. 388).

2. The incrusting zoarium, ×20. The ovicell has the same structure as the frontal.
D. 5162. Tinagta Island.

3. Zooecia, ×20, in which the ovicell bears a frontal area.
D. 5147. Sulade Island.

4. Nonovicelled zooecia, ×20, with finely granulose frontal and minute tremopores.
D. 5151. Sirun Island.

5–7. *Hippaliosina triforma*, new species (p. 392).

5. Incrusting zooecia, ×20, showing the small ovicells. The special zooecia are regenerated in ordinary zooecia.

6. An example, ×20, showing the ordinary, ovicelled, and special zooecia.

7. Microscopic structure of the frontal, ×85.
D. 5147. Sulade Island.

8–11. *Tremoschizodina crassa*, new species (p. 389).

8. Unilamellar ovicelled specimen, ×20. The zooecia have very small avicularia.
D. 5579. Sibutu Island.

9. Group of small zooecia, ×20, ornamented with avicularia.

10. Interior of zooecia, ×20.

11. Marginal zooecia, and view of the zoarial border, ×20.
D. 5151. Sirun Island.

Plate 55

Figs. 1–4. *Hippaliosina acutirostris*, new species (p. 391).

1. Ovicelled portion of the incrusting zoarium, ×20.
   D. 5147. Sulade Island.
2. Ordinary zooecia, ×20, showing the sharp-pointed avicularia.
3. Transverse section of a trilamellar zoarium, ×20.
4. Microscopic structure of the frontal, ×85. The granulations of the pleurocyst are hollow and appear white in tangential section.
   D. 5145. Jolo Light, Jolo.

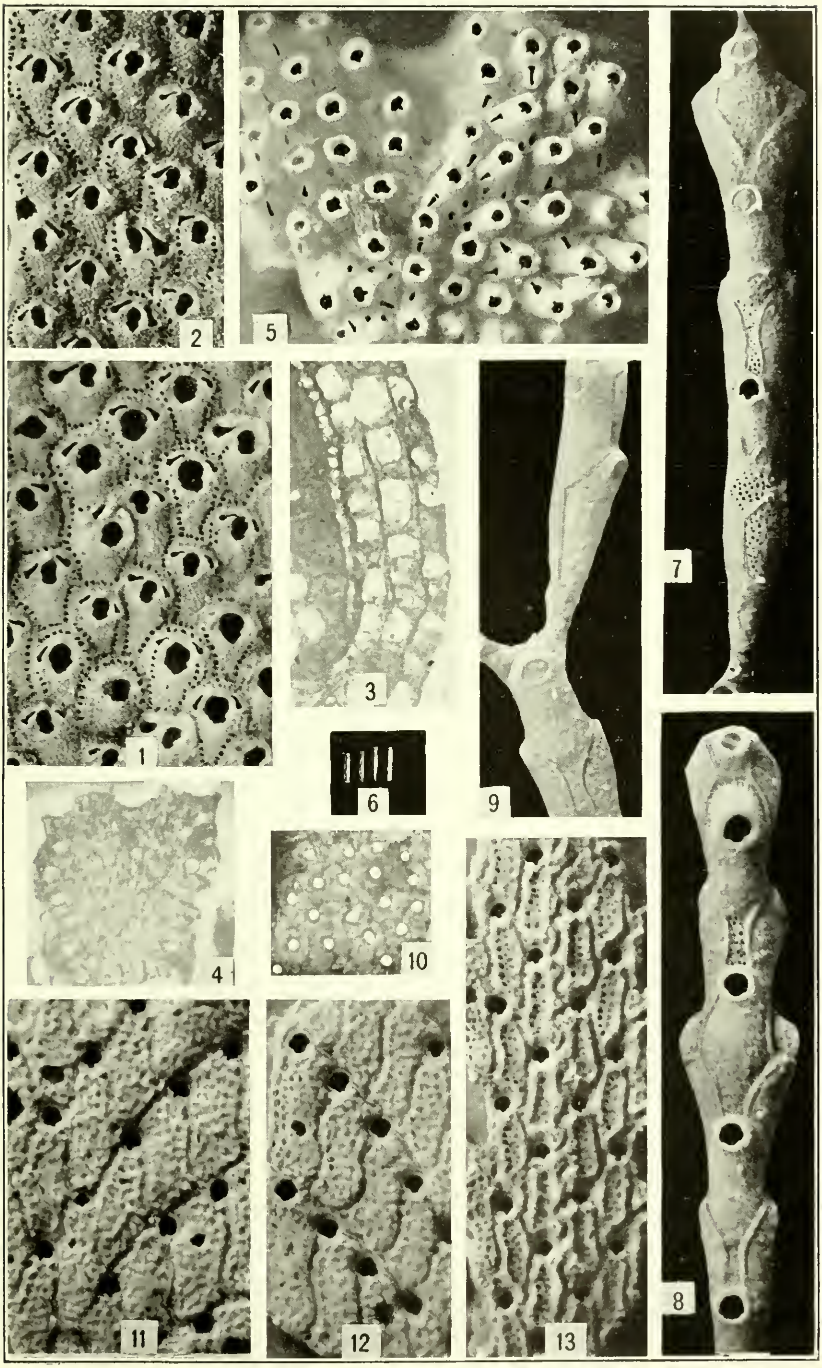
5. *Lagenipora perforata*, new species (p. 406).
   Surface of unilamellar specimen, ×20.
   D. 5579. Darvel Bay, Borneo.

6–10. *Tetraplaria gryllus*, new species (p. 395).

6. Segments of the articulated zoarium, natural size.
7. Small segment with very narrow base, ×20.
8. Ovicelled segment, ×20.
9. An example, ×20, showing the articulation of two segments covered by the ectocyst.
10. Microscopic structure of the frontal, ×85.
    D. 5178. Tacbuc Point, Leyte.

11, 12. *Parmularia elongata*, new species (p. 402).
   Two views of the surface, ×20, of the irregularly lobed bilamellar segment showing the elongate zooecia.
   D. 5162. Tinagta Island.

13. *Parmularia depressa*, new species (p. 402).
   Axial portion of the bilamellar zoarial segment, ×20, exhibiting the depressed frontal.
   D. 5574. Simaluc Island.



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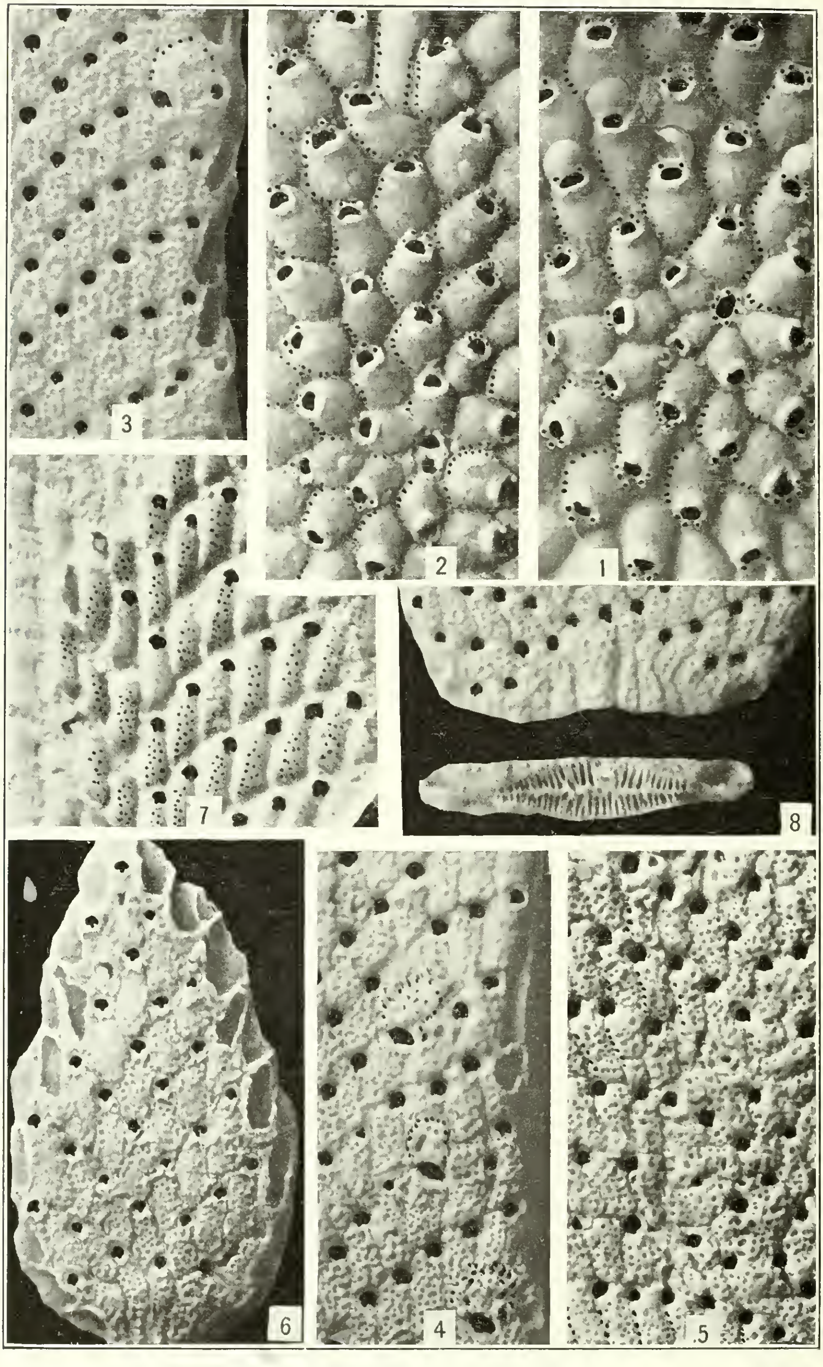

Bryozoa of the Philippine Region

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Plate 56

Figs. 1, 2. *Perigastrella ovalis*, new species (p. 403).

1. Oviceled zoarium incrusting a pebble, $\times 20$, showing an ancestrula without aperture.
2. Another example, $\times 20$, in which the ancestrula shows an aperture.
   D. 4807. Cape Tsiuka, Sea of Japan.

3–8. *Parmularia cylindrica*, new species (p. 401).

3. Portion of the bilamellar zoarial segment, $\times 20$, showing a tripartite ovicell.
   D. 5141. Jolo Light, Jolo.
4. Lateral portion of another segment, $\times 20$, exhibiting the endozooecial ovicell.
   D. 5137. Jolo Light, Jolo.
5. General arrangement of zooecia, $\times 20$, on a lobed segment. The tremopores are little expanded.
   D. 5145. Jolo Light, Jolo.
6. A lanceolate segment, $\times 20$, exhibiting general position of the zooecia.
   D. 5580. Darvel Bay, Borneo.
7. Median section showing the interior of the curved zooecia, $\times 20$. The median axis of the colony, the two longitudinal median rows of zooecia and the septulae on the basal lamella are evident.
   D. 5144. Jolo Light, Jolo.
8. Base of a segment and its branch, edge view, $\times 20$. The basal cells are cylindrical and divided into small longitudinal partitions.
   D. 5151. Sirun Island.

Plate 57

Figs. 1–3. *Psilopsella uniseriata* Canu and Bassler, 1927 (p. 405).

1. Colony, ×10, showing the irregular budding and the presence of parietal dietellae as well as the row of areolar pores around the smooth frontal.
2. Zooecium of the same incrusting uniserial zoarium, ×20.
3. Interior of zooecium, ×20, showing the orbicular aperture.

D. 5217. Anima Sola Island.

4–7. *Crepidacantha grandis*, new species (p. 411).

4. Incrusting ovicelled specimen, ×20, The setiform spines are broken.
5. An example, ×20, showing the parietal dietellae.
6. Zoarium, ×20, in which the zooecia are ornamented with their setiform spines and with the long flagellum of the vibracula.
7. Microscopic structure of the frontal, ×85.

D. 5217. Anima Sola Island.

8. *Crepidacantha papulifera*, new species (p. 410).

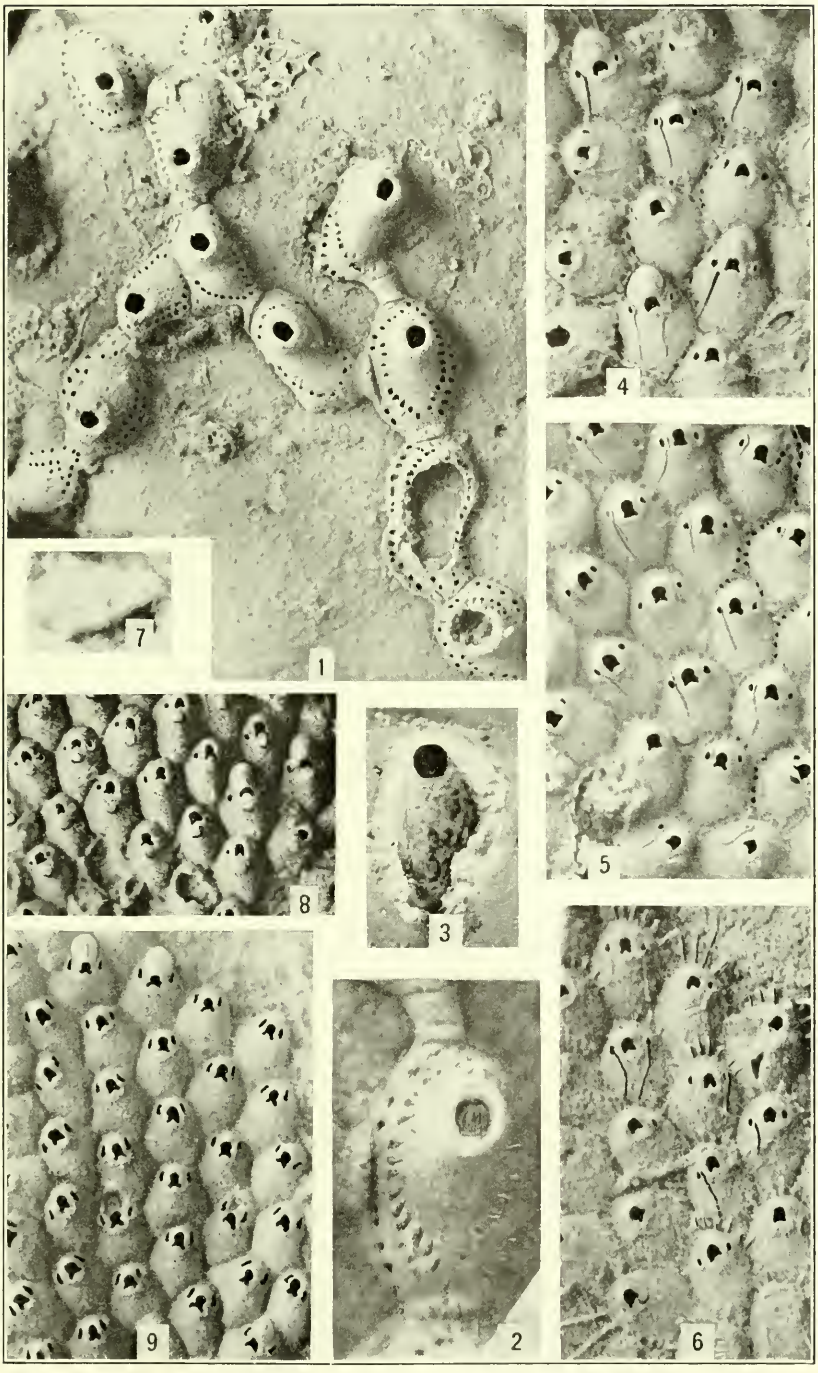
Zooecia, ×20, of the incrusting zoarium showing the characteristic frontal pustule.

D. 5145. Jolo Light, Jolo.

9. *Crepidacantha altirostris*, new species (p. 411).

Ovicelled and ordinary zooecia, ×20. The high position of the avicularia is evident.

D. 5179. Romblon Light, Romblon.



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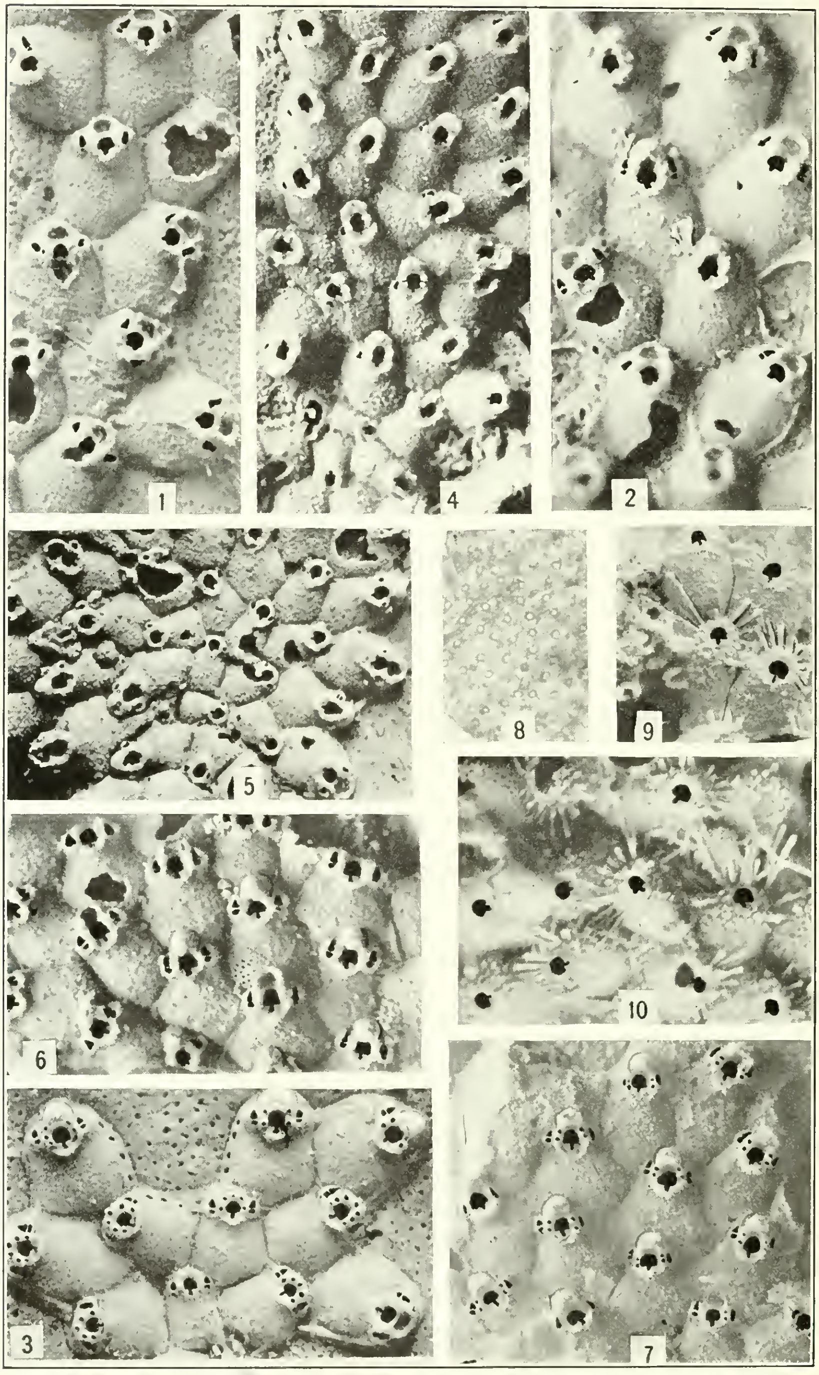

BRYOZOA OF THE PHILIPPINE REGION

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PLATE 58

FIGS. 1–3. *Mastigophora grandicella*, new species (p. 414).

1. Incrusting biserial zoarium, × 20, showing the curious mode of branching.
2. Ovicelled zooecia, ×20.
3. Ancestrular zooecia, ×20.

D. 5217. Anima Sola Island.

4–8. *Mastigophora pesanseris* Smitt, 1873 (p. 412).

4. Portion of zoarium, with ancestrula, ×20. The frontal is very granular and the peristomial lip is quite salient.
5. Another zoarium with ancestrula, ×20. The zooecia are almost smooth and the avicularia are poriform.

D. 5137. Jolo Light, Jolo.

6. Marginal zooecia, ×20.

D. 5235. Nagubat Island.

7. Normal zooecia, ×20.
8. Microscopic structure of the frontal, ×85.

D. 5147. Sulade Island.

9, 10. *Mastigophora baculifera*, new species (p. 415).

9. Incrusting zoarium, ×20, with zooecia ornamented with their setiform spines.

D. 5137. Jolo Light, Jolo.

10. Another example, ×20, with well-developed spines.

D. 5144. Jolo Light, Jolo.

Plate 59

Figs. 1–5. *Holoporella turrita* Smitt, 1873 (p. 420).

1. Surface of an incrusting cylindrical zoarium, ×20, showing the distinct avicularian chambers and the large interzooecial avicularia.
2. Another part of the same specimen, ×20, exhibiting little salient avicularian chambers.
3. Ovicelled specimen, ×20.

   D. 5141. Jolo Light, Jolo.

4. Smooth portion of zoarium, ×20, between the elevations formed by the large zooecia.
5. Another area of the same zoarium, ×20, showing the large salient, superficial zooecia.

   D. 5137. Jolo Light, Jolo.

6–9. *Holoporella inflata*, new species (p. 419).

6. Portion of a cylindrical zoarium, ×20.

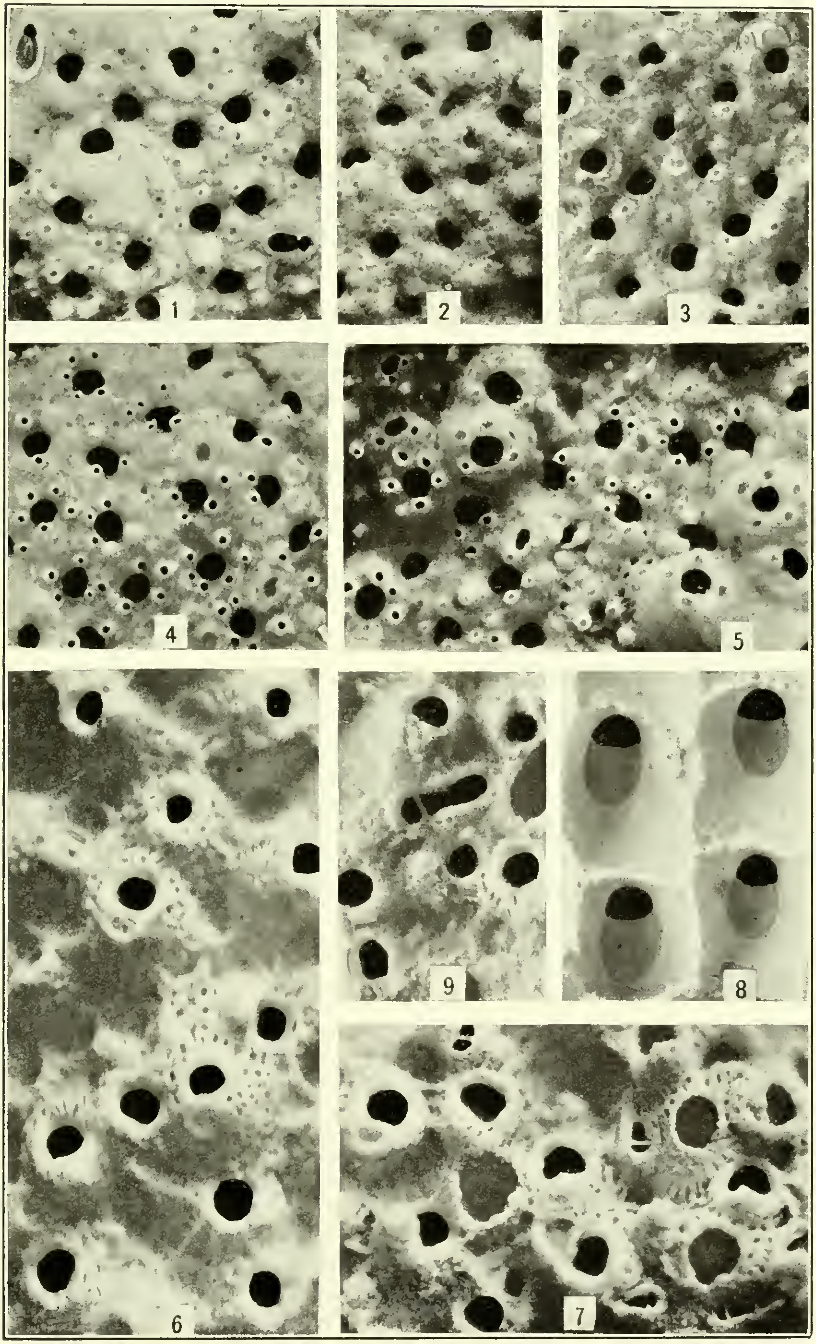
   D. 5151. Sirun Island.

7. Lamellar zoarium, ×20, with interzooecial avicularia developed.

   D. 5577. Mount Dromedario.

8. Interior of zooecia, ×20, showing a concave area in each cell.
9. Zoarial surface, ×20, bearing a large interzooecial avicularium.

   D. 5192. Jilantaguan Island.



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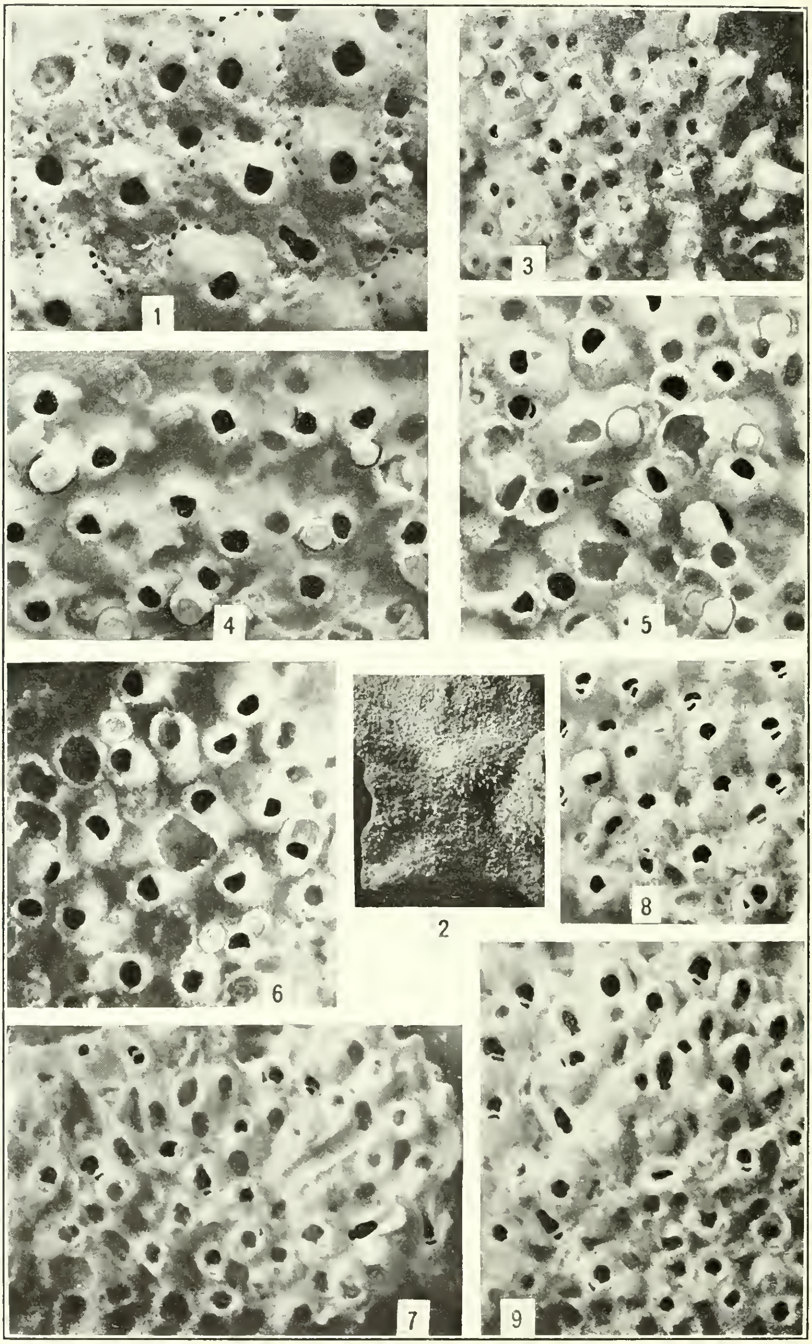

BRYOZOA OF THE PHILIPPINE REGION

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Plate 60

Fig. 1. *Holoporella convexa*, new species (p. 421).
Surface of free unilamellar type, $\times 20$, illustrating the large, salient, convex zooecia with areolar pores and smooth frontal.
D. 5217. Anima Sola Island.

2–6. *Holoporella pilaefera*, new species (p. 422).

2. Portion of the large, thick unilamellar zoarium, natural size, with the numerous pillarlike beaks quite visible.
3. Surface of the same zoarium, $\times 10$, with the long beaks shown.
4. Another portion of same, $\times 20$, illustrating the deep zooecia and the vertical pillars.
D. 5149. Sirun Island.
5. Another specimen, $\times 20$, exhibiting the globular granulated ovicell and vertical pillars.
6. Another portion of the surface, $\times 20$, showing the ovicell, incomplete zooecia and vertical pillars.
D. 5137. Jolo Light, Jolo.

7–9. *Holoporella discoidea* Busk, 1884 (p. 426).

7. Surface of discoid unilamellar zoarium, $\times 20$, with erect zooecia.
8. Ovicelled portion of zoarium, $\times 20$.
9. Marginal zooecia, $\times 20$, with large interzooecial avicularia.
D. 5134. Balukbaluk Island.

Plate 61

Figs. 1–6. *Holoporella erectorostris*, new species (p. 425).

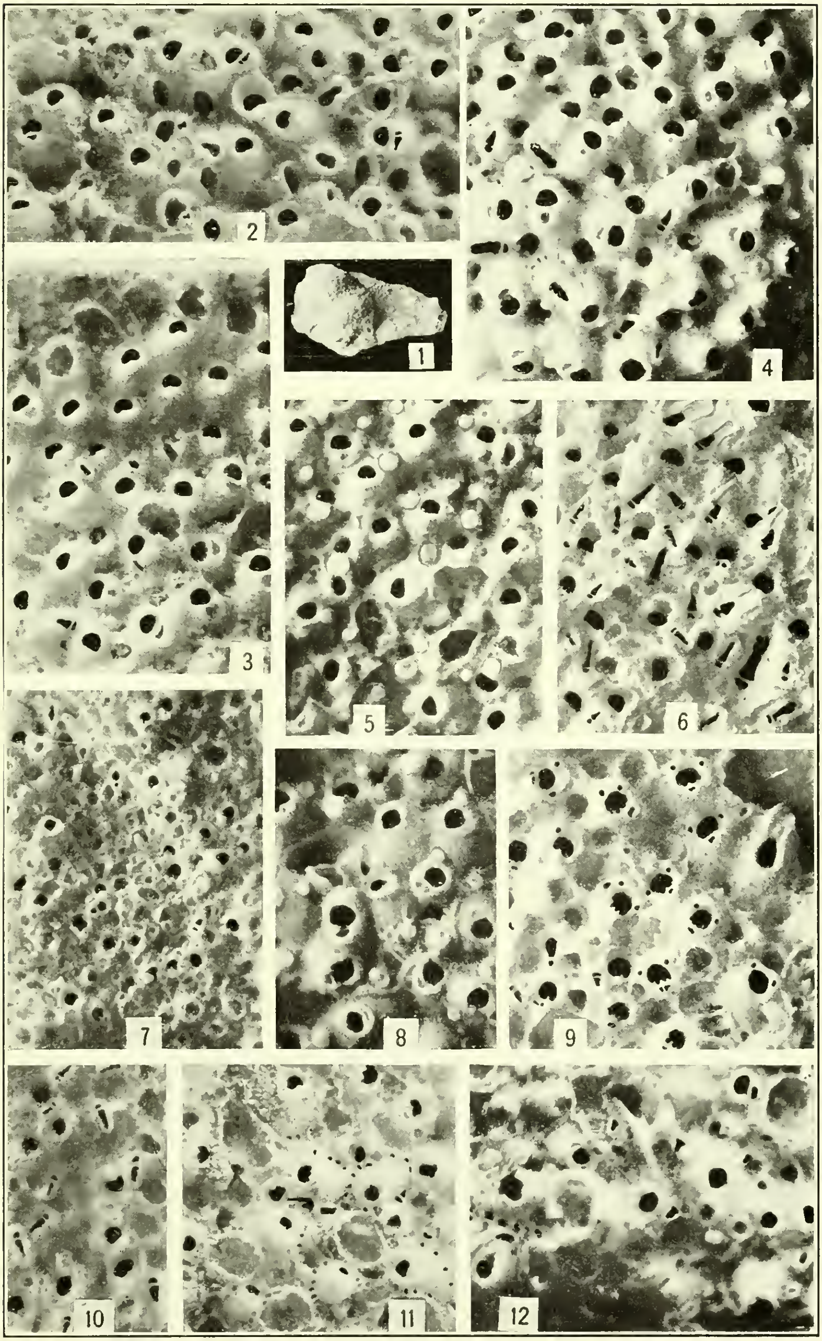
1. Globular zoarium, natural size, growing about a shell fragment.
2. Surface of same, ×20, showing the incomplete zooecia and the formation of the ovicell. Lyrule and cardelles are broken.
   D. 5478. Tacbuc Point, Leyte.
3. Another example, ×20, with marginal zooecia deep and granulated.
4. Zooecia of a small fragment, ×20, showing the great saliency of the beak of the interzooecial avicularia.
5. Another specimen, ×20, on which certain frontal avicularia are transformed into cylindrical pillars. Lyrule and cardelles are not visible.
   D. 5179. Romblon Light, Romblon.
6. Portion of an incrusting zoarium, ×20, with numerous interzooecial avicularia with salient beaks.
   D. 5141. Jolo Light, Jolo.

7–10. *Holoporella serratirostris* MacGillivray, 1884 (p. 423).

7. Surface of a free lamellar specimen, ×10, showing the elongation of the avicularian rostra in the concave portion of the colony.
   D. 5145. Jolo Light, Jolo.
8. Deep zooecia, ×20, with salient avicularian rostra.
9. Surface, ×20. The avicularian rostrum is small in the vicinity of the large zoarial avicularia.
   D. 5179. Romblon Light, Romblon.
10. Surface, ×20, with group of zoarial avicularia.
   D. 5141. Jolo Light, Jolo.

11, 12. *Holoporella subflava*, new species (p. 427).

11. Surface of the free, orbicular, unilamellar zoarium, ×20. One deep zooecium is ovicelled.
12. Zoarial surface, ×20, with very irregular zooecia. The avicularian rostrum is broken.
   D. 5137. Jolo Light, Jolo.



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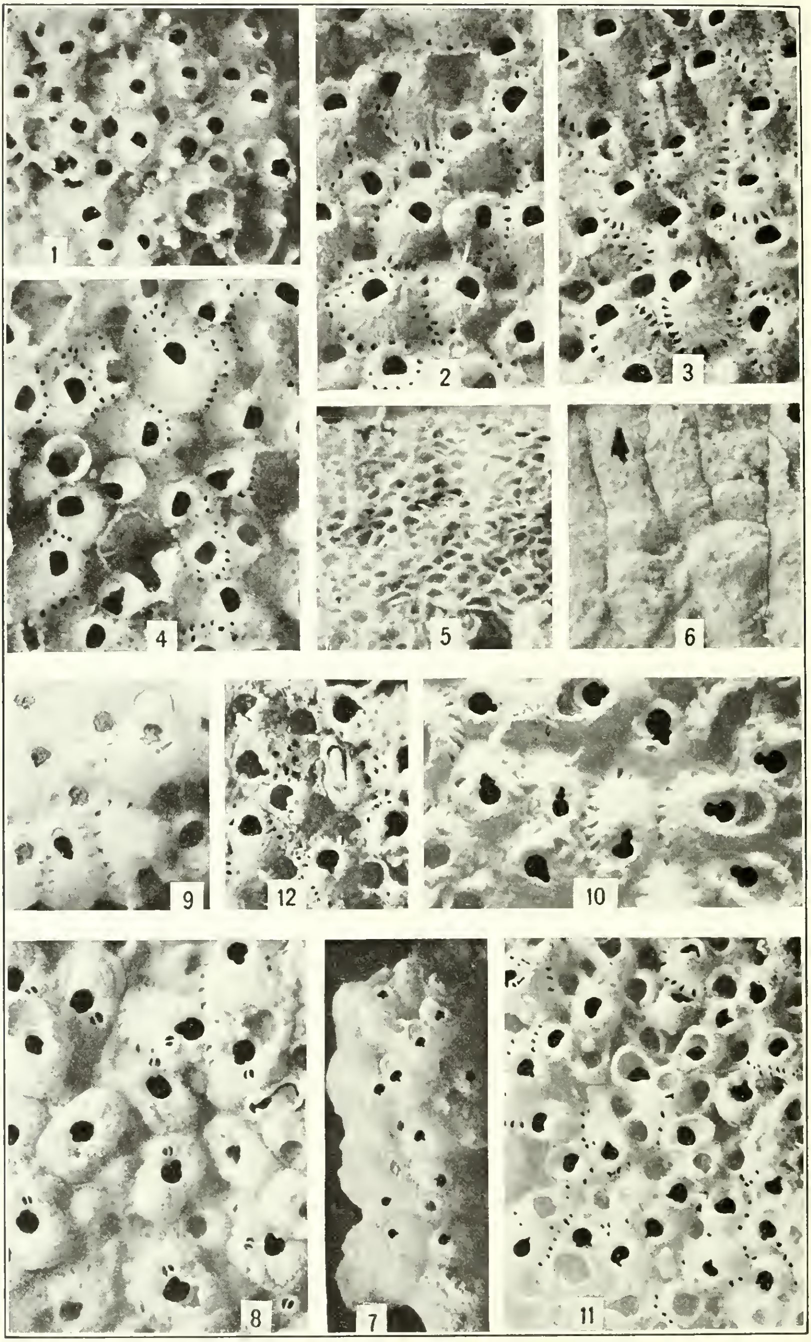

BRYOZOA OF THE PHILIPPINE REGION

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PLATE 62

FIG. 1. *Holoporella pygmea*, new species (p. 428). Surface of the small globular zoarium, ×20. The zooecia are likewise small and globular.

D. 5145. Jolo Light, Jolo.

2–6. *Holoporella repens*, new species (p. 427).

2. Zooecial surface, ×20, of the large lamellar zoarium. Some rostra are transformed into pillars.

3. Another portion of the surface, ×20, showing the deep zooecia rather regularly arranged.

4. Portion of the type, ×20, in which the deep zooecia are ovicelled.

5. Transverse section, ×6, showing the rather regular arrangement of the superposed lamellae.

6. Inferior side of the colony, ×20.

Unknown Philippine locality.

7–10. *Osthimosia simonensis* Busk, 1884 (p. 429).

7. A small zoarium, ×6, growing on a coral.

D. 5147. Sulade Island.

8. Large salient zooecia, ×20, of the mamillate portion of an ovicelled zoarium.

D. 5179. Romblon Light, Romblon.

9, 10. Two portions of an ovicelled specimen with deep zooecia, ×20.

D. 5137. Jolo Light, Jolo.

11, 12. *Schismopora chrysalis*, new species (p. 430).

11. Ovicelled portion, ×20, of the large hollow incrusting zoarium.

12. Surface of same, ×20, showing an interzooecial avicularium.

D. 5174. Jolo Light, Jolo.

Plate 63

Figs. 1, 2. *Costazia spathulata* MacGillivray, 1887 (p. 431).
1. Ovicelled zoarium, $\times 20$, with deep zooecia.
2. Another ovicelled zoarium, $\times 20$, with erect zooecia.
D. 5478. Tacbuc Point, Leyte.

3. *Costazia rota* MacGillivray, 1885 (p. 431).
Surface of specimen, $\times 20$, attached to a *Serpula*.
D. 5137. Jolo Light, Jolo.

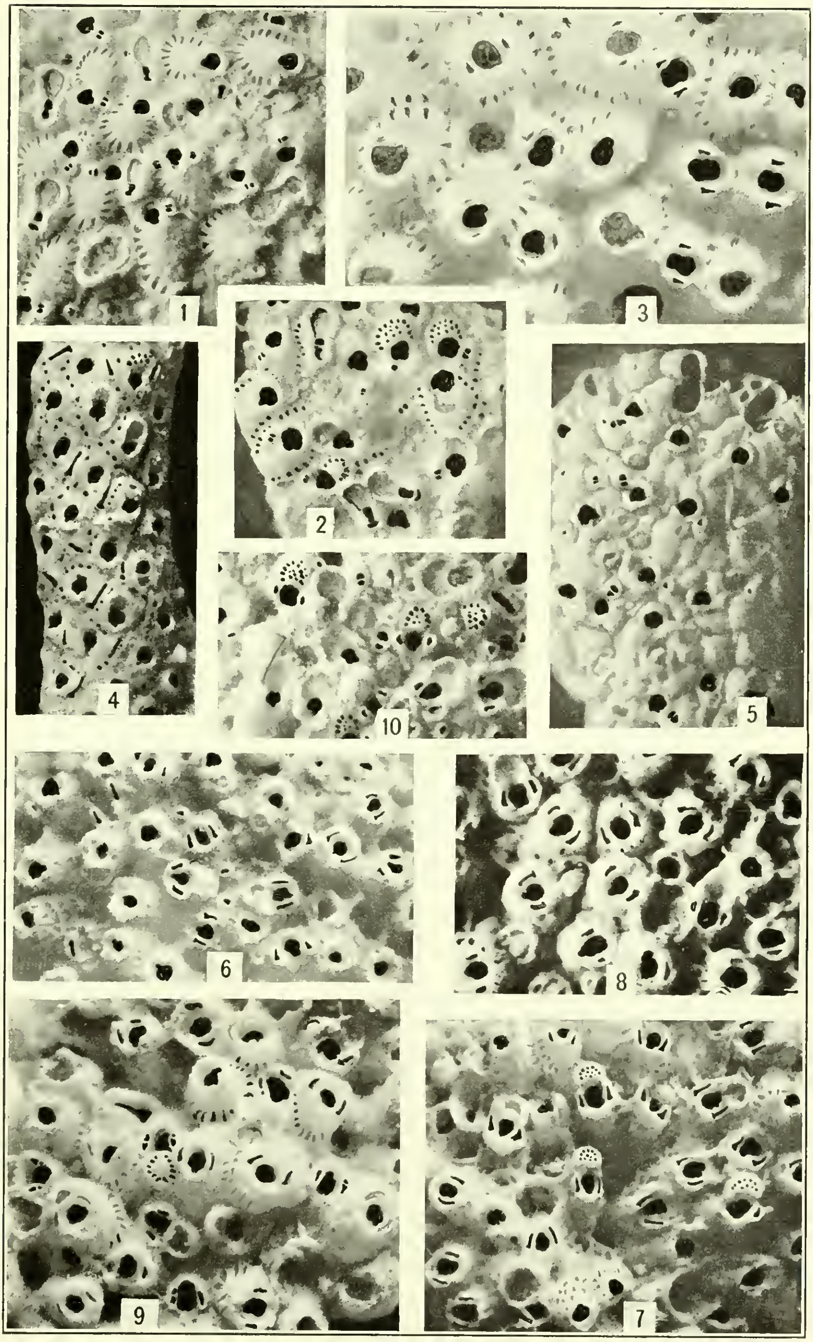
4. *Costazia aculeate*, new species (p. 434).
Free cylindrical zoarium, $\times 20$.
D. 5179. Romblon Light, Romblon.

5. *Cellepora sinensis*, new species (p. 435).
Extremity of a free colony, $\times 20$. The interzooecial avicularia are small.
D. 5311. China Sea, vicinity of Hong Kong.

6, 7. *Costazia pisiformis*, new species (p. 433).
6. Ovicelled portion of a small spherical colony, $\times 20$, with erect zooecia.
7. Little erect zooecia of an ovicelled colony, $\times 20$.
D. 4807. Cape Tsiuka, Sea of Japan.

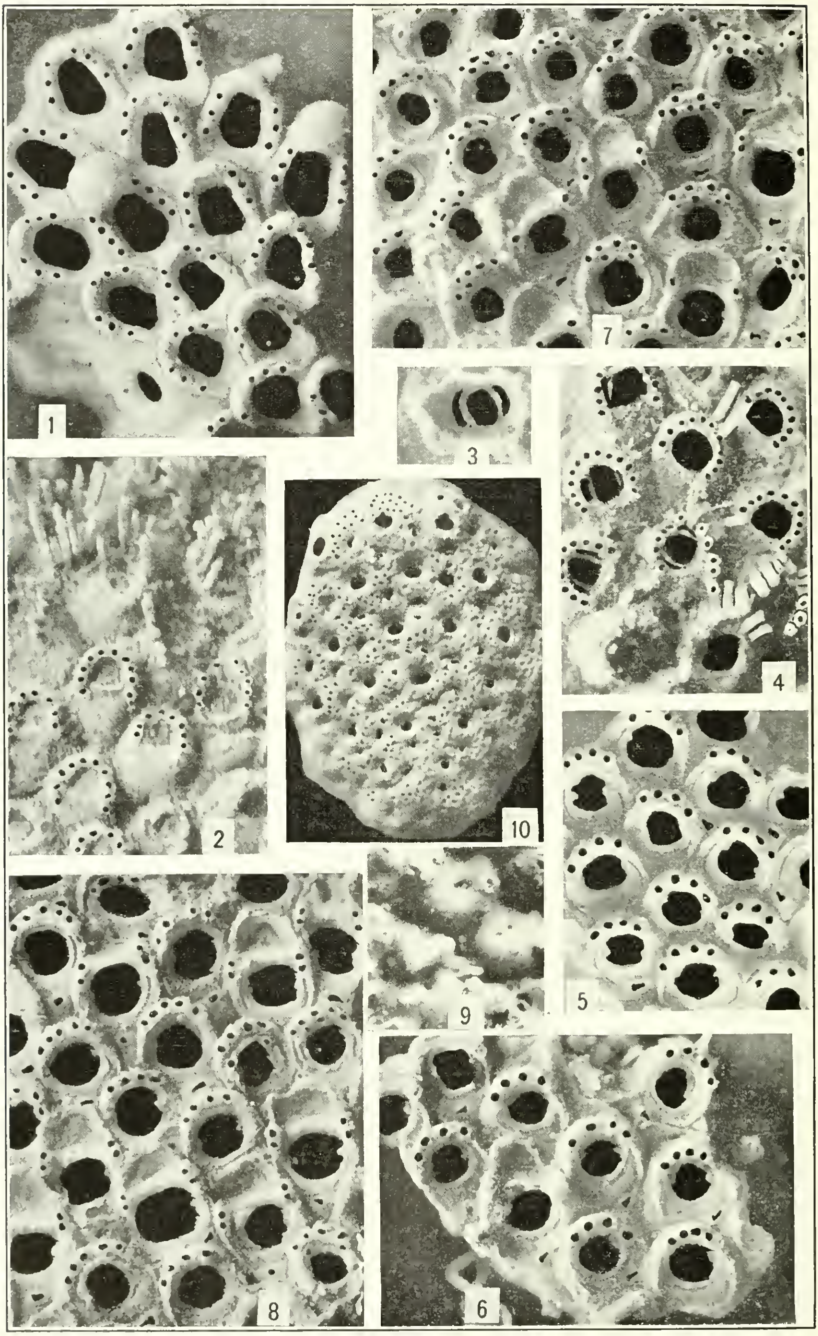
8, 9. *Costazia radiata* Ortmann, 1890 (p. 432).
8. Small massive zoarium, $\times 20$. The zooecia are erect and the apertures are visible.
9. Another colony, $\times 20$, in which the zooecia are somewhat buried.
D. 5141. Jolo Light, Jolo.

10. *Costazia pisiformis sinensis*, new variety (p. 433).
Incrusting zoarium, $\times 20$, with larger, more elongated ovicell and numerous zoarial avicularia.
D. 5311. China Sea, vicinity of Hong Kong.



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 630



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FOR EXPLANATION OF PLATE SEE PAGE 631

Plate 64

Fig. 1. *Chaperia pyriformis,* new species (p. 471).
The unilamellar zoarium, ×20, showing pyriform zooecia with similarly shaped apertures.
D. 5577. Mount Dromedario.

2–4. *Chaperia judex* Kirkpatrick, 1888 (p. 469).

2. Zooecia, ×20, preserving their large articulated spines and their operculum.
D. 5251. Gulf of Davao.
3. Interior of a zooecium, ×20. The two trabeculae are visible.
4. Ancestrula surrounded by the six ancestrular zooecia, ×20.
D. 5137. Jolo Light, Jolo.

5–9. *Chaperia transversalis,* new species (p. 473).

5. The unilamellar zoarium, ×20. The zooecia are lighted from the base to show the different aspects. The false cardelles are the extremities of the horseshoe-shaped armature.
D. 5574. Simaluc Island.
6. Zooecia, ×20. The interior horseshoe-shaped armature for muscular insertion is visible.
D. 5162. Tinagta Island.
7. Specimen, ×20, in which several of the cells are regenerated (double peristome).
D. 4807. Cape Tsiuka, Sea of Japan.
8. Portion of another example, ×20.
9. Inner side, ×20. The basal tuberosities are very irregular.
D. 5147. Sulade Island.

10. *Flabellopora pisiformis,* new species (p. 509).
The small, thick zoarium, ×20.
D. 5574. Simaluc Island.

Plate 65

Figs. 1–4. *Anoteropora magnicapitata* Canu and Bassler, 1927 (p. 476).

1. Surface of the free discoidal, convex, zoarium, ×20. Marginal zooecia with one bearing a very large ovicell.
2. Inner side of a colony, ×20. The pores are only shallow pits.
3. Portion of a zoarium with small avicularia, ×20.
4. Marginal portion of a zoarium, ×20, showing the large ovicells and the operculum in place.

D. 5145. Jolo Light, Jolo.

5–8. *Conescharellina delicatula*, new species (p. 487).

5. Portion of a colony with little salient avicularia, ×20.
6. Another colony, ×20, with salient and oblique avicularia.
7. Base, ×20, with small pores and scattered avicularia.
8. Apex of zoarium, ×20.

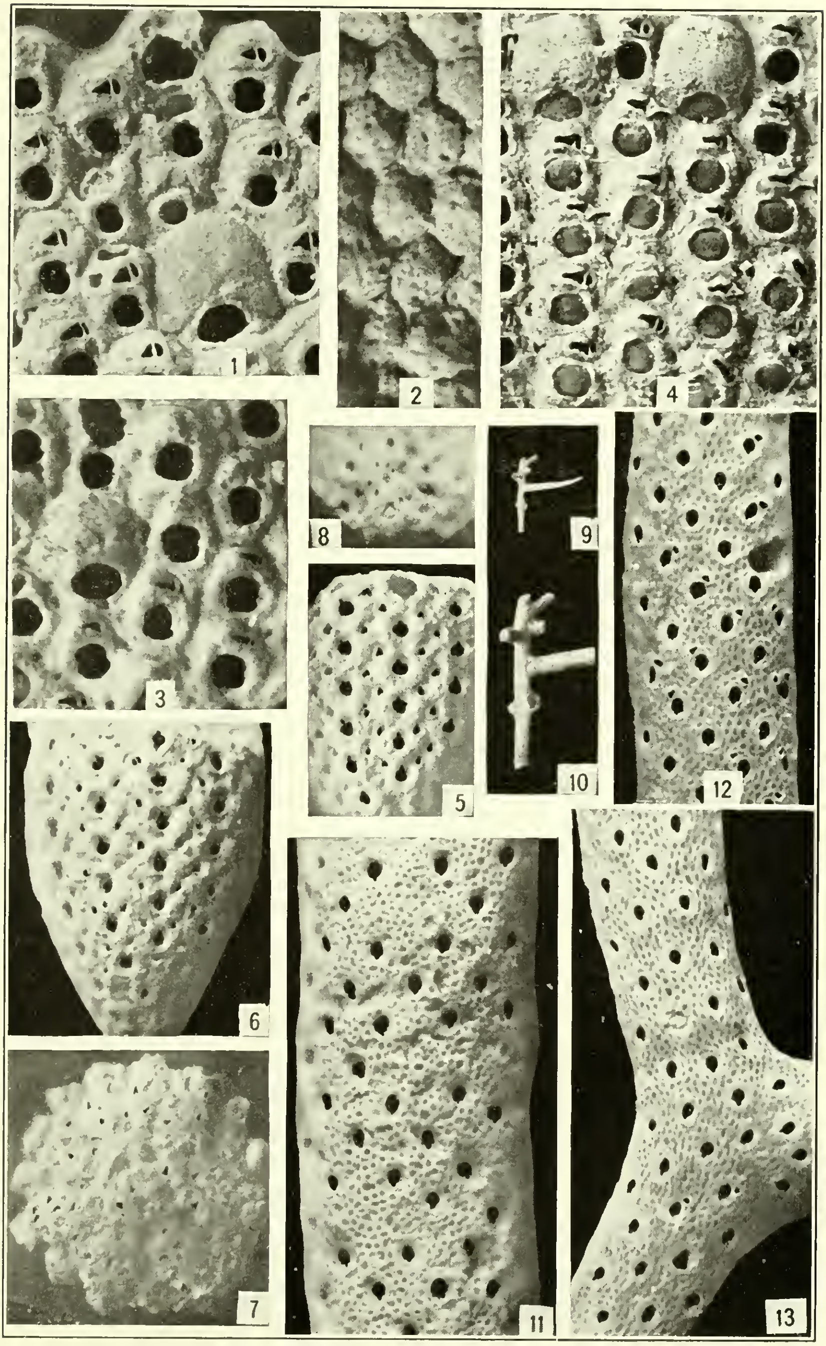
D. 5135. Jolo Light, Jolo.

9–13. *Myriozoum subgracile* D'Orbigny, 1852 (p. 512.)

9, 10. Zoarial fragments, natural size and ×3.

11. Surface of old branch, ×20. The rimule of the aperture is little visible.
12. Young branch, ×20, with the rimule of the aperture quite visible and the avicularia constant.
13. Branch containing ovicelled zooecia, ×20. The avicularia are inconstant.

D. 4807. Cape Tsiuka, Sea of Japan.



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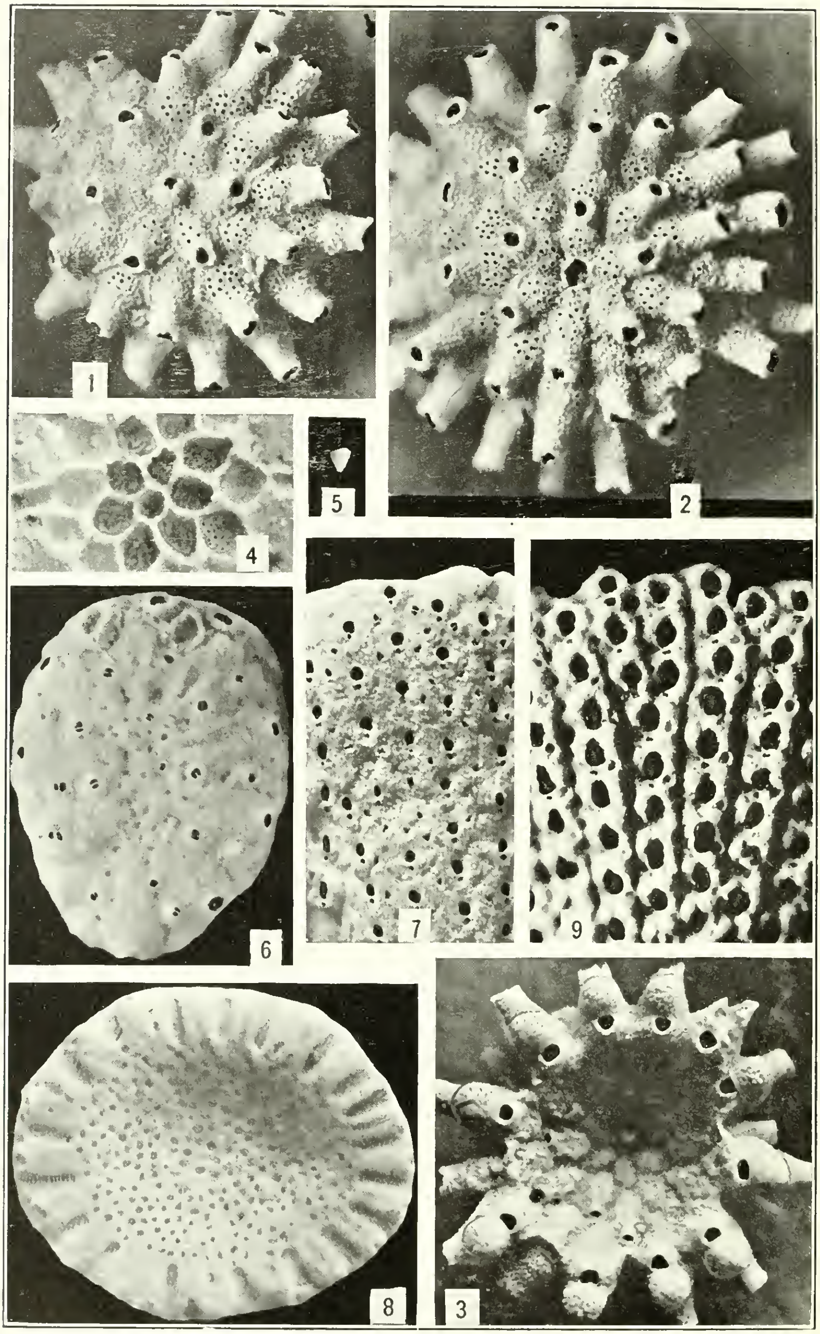


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 633

Plate 66

Figs. 1–4. *Actisecos regularis* Canu and Bassler, 1927 (p. 517).
1. Outer side of the convex orbicular zoarium, ×20.
2. Zoarium, ×20, showing the regular arrangement of the long tubular zooecia around the ancestrula.
3. Inner side of a colony. ×20, exhibiting the peripheral row of zooecia without peristomie and the peristomial ovicells.
4. Interior view of zooecia, ×20, showing the ancestrula, the six ancestrular zooecia and the peristomie of the peripheral zooecia.

D. 5335. Observatory Island, Linapacan Strait.

5–7. *Conescharellina parviporosa*, new species (p. 487).
5. The conical zoarium, natural size.
6. Convex base, ×20, with avicularia bearing pivot.
7. Zooecia, ×20, with small apertures and small avicularia alternating in the radial rows.

D. 4807. Cape Tsiuka, Sea of Japan.

8, 9. *Conescharellina concava*, new species (p. 488).
8. The concave base of the large conical zoarium, ×20.
9. Zooecial surface, ×20, with closely arranged apertures.

D. 5311. China Sea, vicinity of Hong Kong.

Plate 67

Figs. 1–3. *Conescharellina radiata*, new species (p. 483).

1. The convex, crenulated zoarial base, ×20.
2. View of a colony from the apical side, ×20.
3. Lateral view of a colony, ×20, showing its slight height.

D. 5574 Simalue Island.

4–11. *Conescharellina milleporacea*, new species (p. 484).

4. The habitual porous aspect of the complete base, ×10.
5. Incompletely developed specimen, ×20, with small avicularia; the radial costules are salient.
6. Portion of a base, ×20, showing the large number of avicularia and pores.
7. Specimen, ×20, with little prominent radial costules and salient avicularia.

D. 5213. Destacado Island.

8. An example, ×20, with very salient radial costules.
9. Specimen, ×20, containing a row of special zooecia with large orbicular apertures.

D. 5151. Sirun Island.

10. Base of specimen, ×20, with granular wall shown.
11. Variety on which the avicularia are less numerous, ×20.

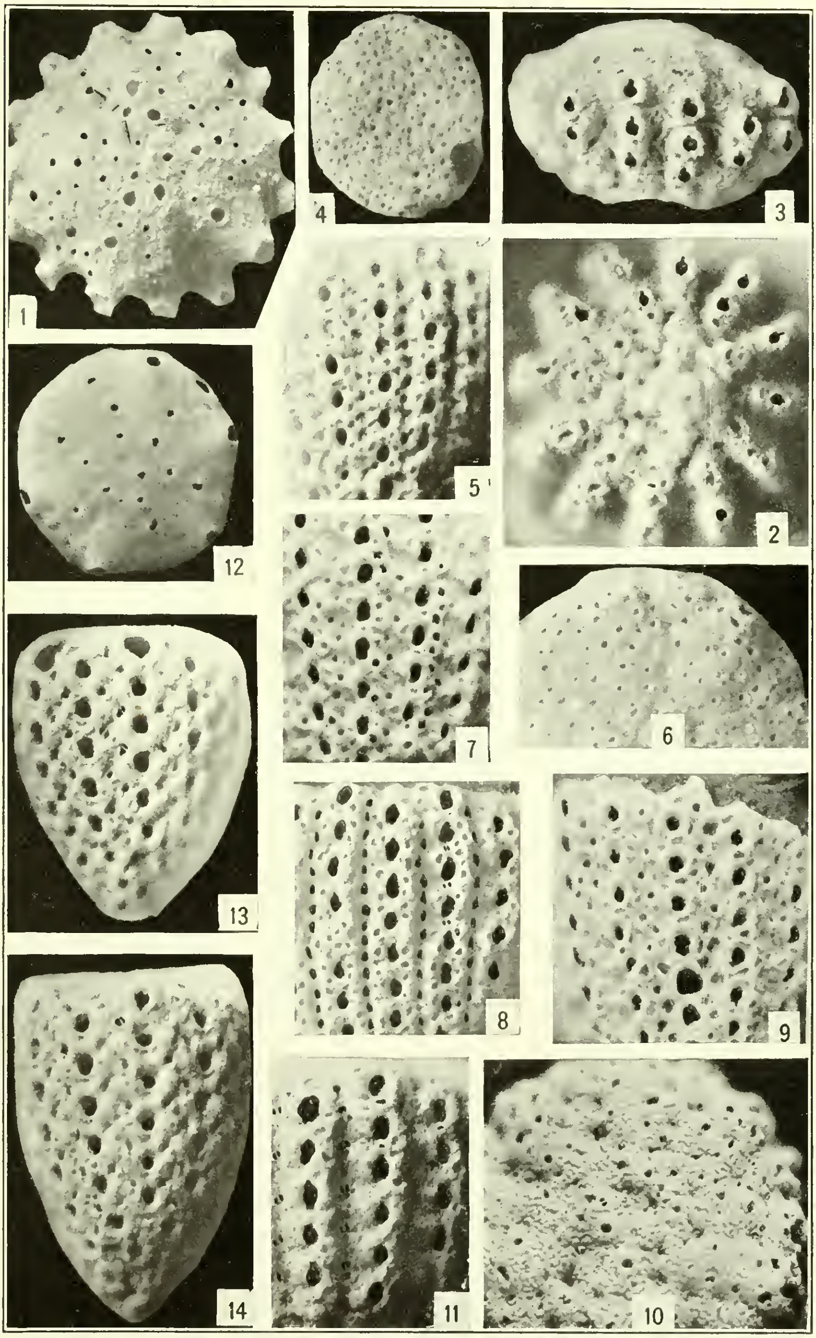
D. 5577. Mount Dromedario.

12–14. *Conescharellina jucunda*, new species (p. 483).

12. Base of the small conical zoarium, ×10.

13, 14. Views, ×20, of a short and an elongated colony.

D. 5135. Jolo Light, Jolo.



BRYOZOA OF THE PHILIPPINE REGION

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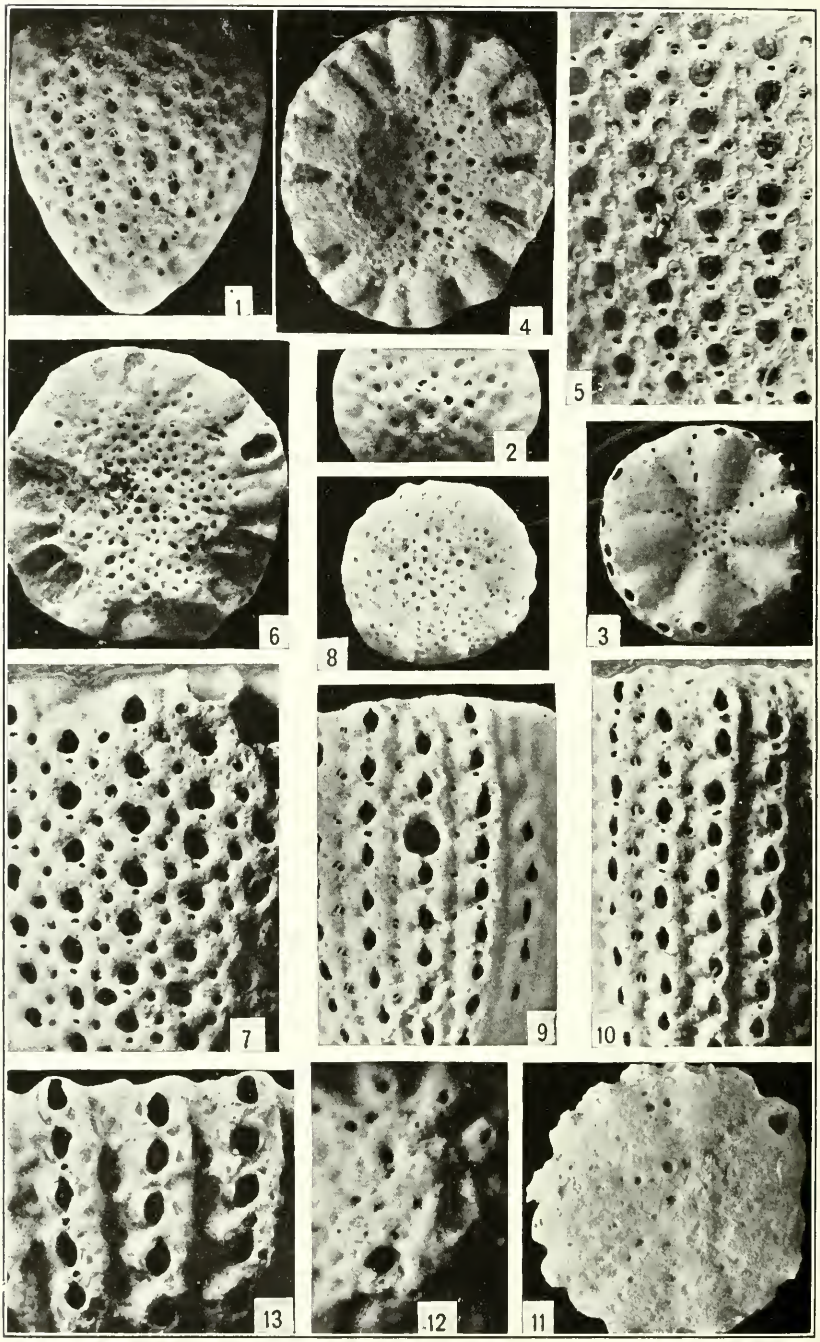

BRYOZOA OF THE PHILIPPINE REGION

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PLATE 68

FIGS. 1–3. *Conescharellina obliqua*, new species (p. 490).

1. The small conical zoarium, ×20, showing the arrangement of the apertures in oblique rows.
2. View of the apex, ×20.
3. Zoarial base, ×10, with radially arranged costules.

   D. 5134. Balukbaluk Island.

4, 5. *Conescharellina lunata*, new species (p. 488).

4. Base of the zoarium, ×10.
5. Portion of a colony, ×20, preserving the opercula and mandibles.

   D. 5147. Sulade Island.

6, 7. *Conescharellina grandiporosa*, new species (p. 489).

6. Base of the conical zoarium, ×10.
7. Zooecial surface, ×20, exhibiting apertures in regular radial rows separated by rows of alternately arranged avicularia.

   D. 5144. Jolo Light, Jolo.

8–10. *Conescharellina catella*, new species. (p. 485).

8. Base of the conical zoarium, ×10.

   D. 4807. Cape Tsiuka, Sea of Japan.

9. Lateral view of a colony, ×20, showing a special zooecium.

   D. 5162. Tinagta Island.

10. Lateral view of another colony, ×20.

    D. 4807. Cape Tsiuka, Sea of Japan.

11–13. *Conescharellina transversa*, new species (p. 486).

11. Zoarial base of the transverse colony, ×10, with avicularia preserving pivot.
12. Apical portion of a colony, ×20.
13. Lateral view, ×20, exhibiting features of zooecia.

    D. 5670. Chenoki Point, Macassar Strait.

Plate 69

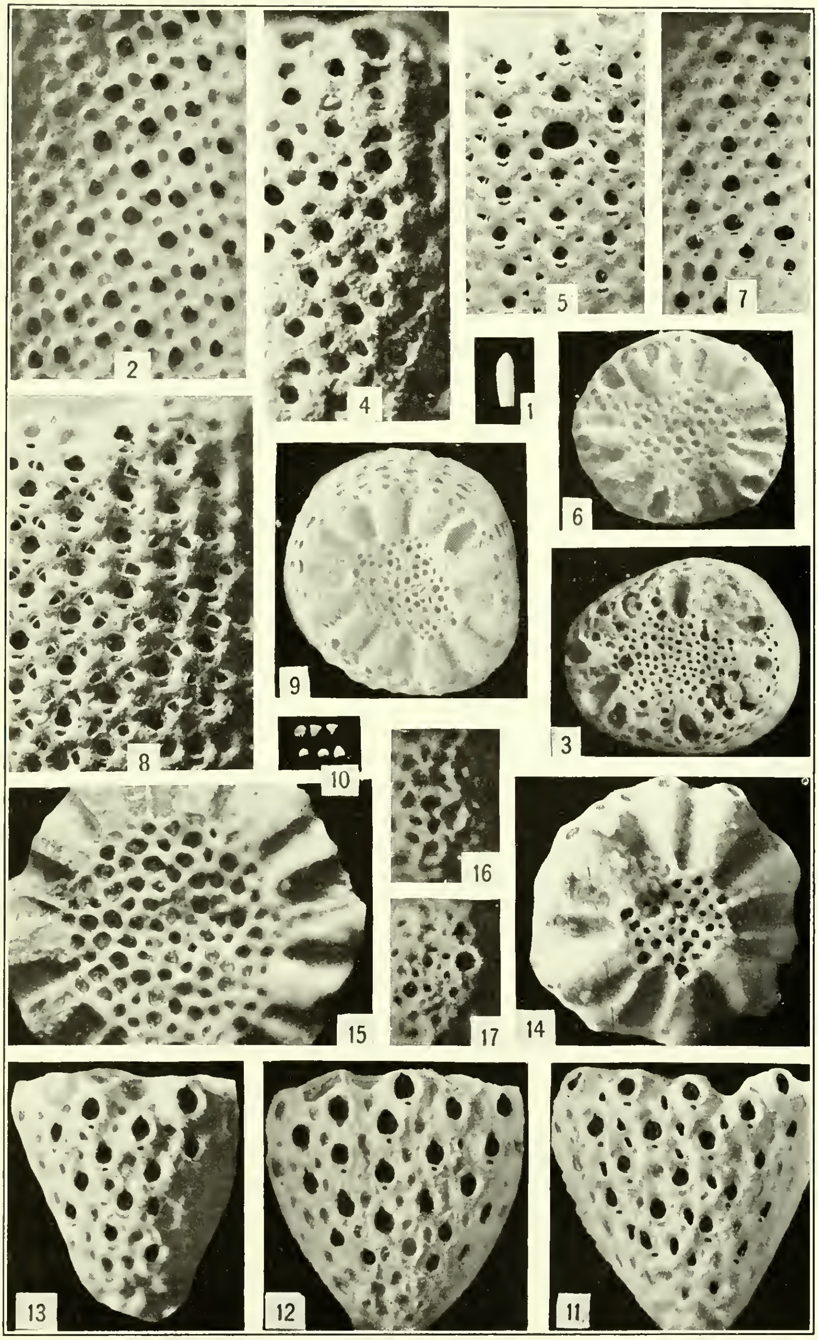
Figs. 1–9. *Conescharellina elongata*, new species (p. 489).

1. The long conical zoarium, natural size.
   D. 5162. Tinagta Island.
2. View of somewhat worn mediumsized zoarium, $\times 20$.
3. Base of zoarium, $\times 10$.
   D. 5151. Sirun Island.
4. View of a long, worn zoarium, $\times 20$. The proximal sinus results from the union of the aperture and the proximal pore.
   D. 5141. Jolo Light, Jolo.
5. Zoarium, $\times 20$, with a special zooecium with large orbicular aperture.
6. Base of the same specimen, $\times 10$.
   D. 5162. Tinagta Island.
7. Young zoarium, $\times 20$.
8. Short specimen, $\times 20$, showing the true character of the species.
9. Base, $\times 10$, corresponding to well preserved specimen, shown in Figure 8.
   D. 5144. Jolo Light, Jolo.

10–17. *Conescharellina breviconica*, new species (p. 491).

10. Zoaria of small, short cones, natural size.
11. Specimen with small marginal zooecia, $\times 20$.
12. Specimen with large marginal zooecia, $\times 20$.
13. Zoarium with large avicularia, $\times 20$.
14. Base of a small zoarium, $\times 20$. The central cells are few in number.
15. Base of a large colony, $\times 20$, where the central cells are very numerous and the septules are visible.

16, 17. Two views of apex, $\times 20$.
   D. 5230. Limasaua Island, Leyte.



BRYOZOA OF THE PHILIPPINE REGION

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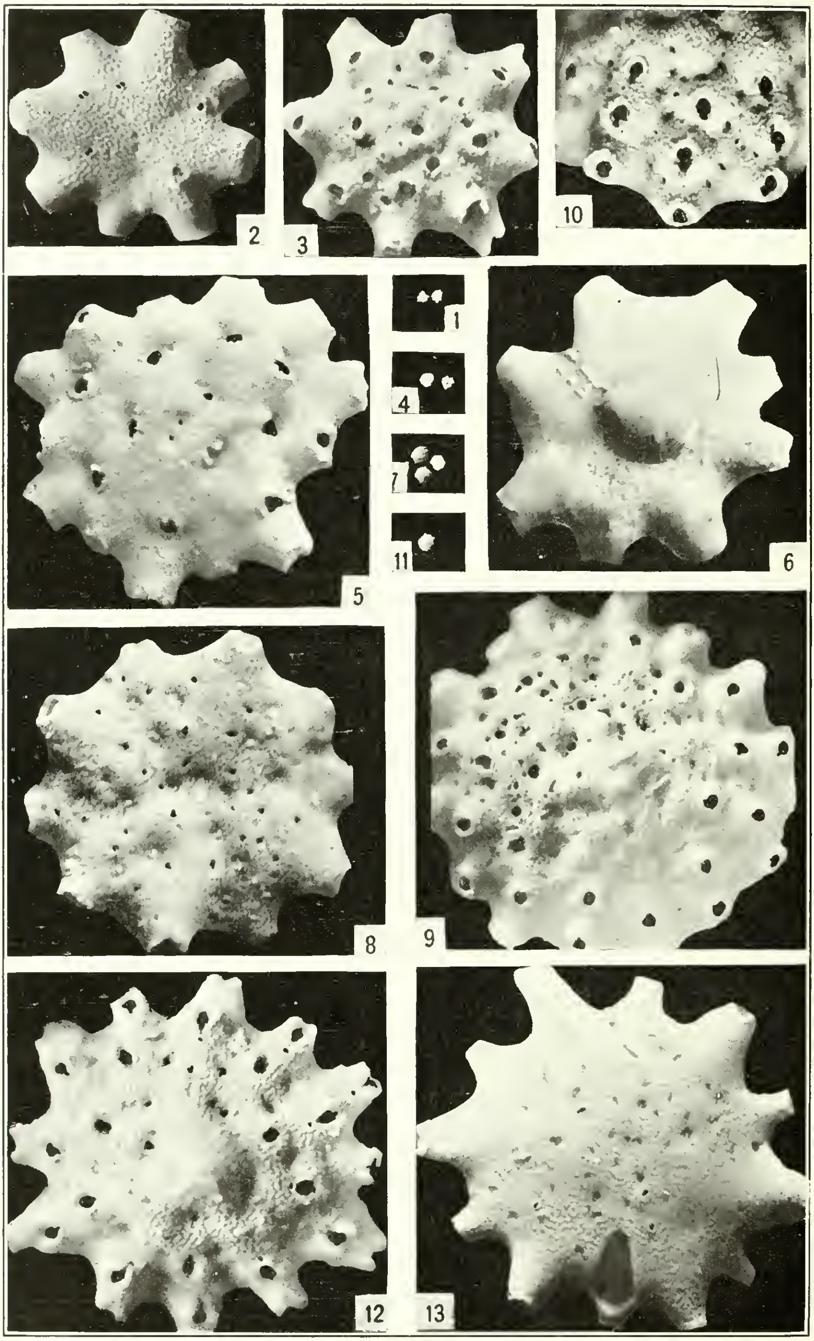


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 637

PLATE 70

FIGS. 1–3. *Trochosodon parvulum*, new species (p. 494).

1. The very small orbicular zoarium, natural size.
2. Base, ×20, with the delicate granulations.
3. Cellular surface and apex, ×20.

D. 5237. Sanco Point, east of Mindanao.

4–6. *Trochosodon porcellanum*, new species (p. 494).

4. Two zoaria, natural size.
5. Zooecial surface, ×20, showing indistinct zooecia arranged in quincunx.
6. Base, ×20, with eight convexities corresponding to the zooecia.

D. 5237. Sanco Point, east of Mindanao.

7–10. *Trochosodon quincuncialis*, new species (p. 494).

7. Three examples of the orbicular zoarium, natural size.
8. Base, ×20, with irregular convexities and pore s arranged in quincunx.
9. Cellular face and apex, ×20, showing apertures in three rows in quincuncial arrangement.
10. Lateral view, ×20, illustrating granulation of surface.

D. 5586. Sibuko Bay, Borneo.

11–13. *Trochosodon linearis* Canu and Bassler, 1927. (p. 493).

11. The convex zoarium, natural size.
12. Cellular face and apex, ×20, exhibiting linear arrangement of zooecia.
13. The convex, finely granulated base, ×20.

D. 5586. Sibuko Bay, Borneo.

Plate 71

Figs. 1–6. *Flabellopora elegans* D'Orbigny, 1852 (p. 499).

1. Small zoarium, ×20.

   D. 5137. Jolo Light, Jolo.

2. Medium sized colony, ×20. The aperture is surrounded by a thin peristome.
3. Large, much calcified zoarium, ×20.
4. Edge view of the terminal portion of zoarium, ×20, showing the formation of zooecia.

   D. 5145. Jolo Light, Jolo.

5. View of interior of zooecia, ×20, illustrating the eccentric position of the aperture.

   D. 5137. Jolo Light, Jolo.

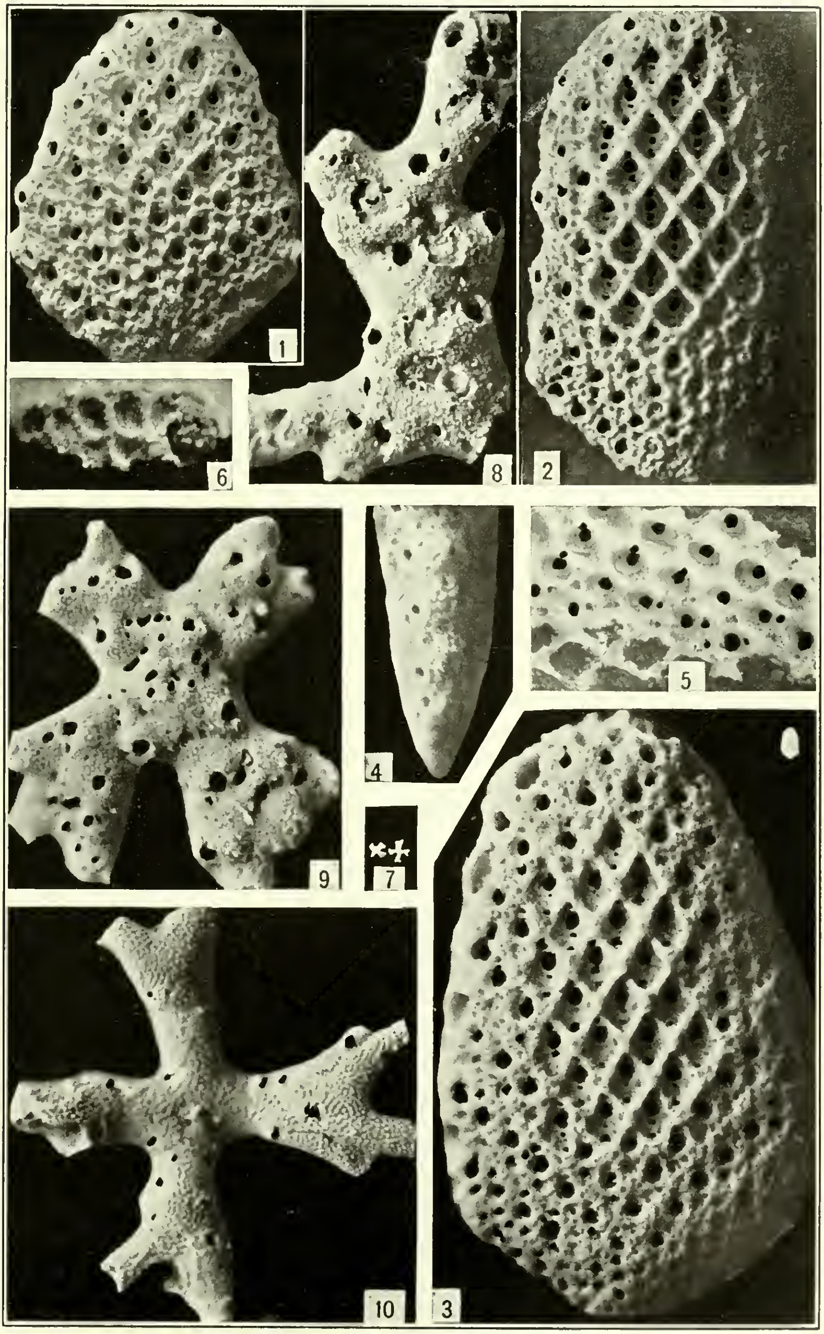
6. View of the zooecia at the terminal angle of zoarium, ×20.

   D. 5144. Jolo Light, Jolo.

7–10. *Trochosodon decussis*, new species (p. 495).

7. The cruciform zoarium, natural size.
8. Zooecial surface of an irregular zoarium, ×20, with semilunar slits visible.
9. Cellular face of more regular colony, ×20.
10. View, ×20, of the finely granulose convex base.

    D. 5237. Sanco Point, east of Mindanao.



BRYOZOA OF THE PHILIPPINE REGION

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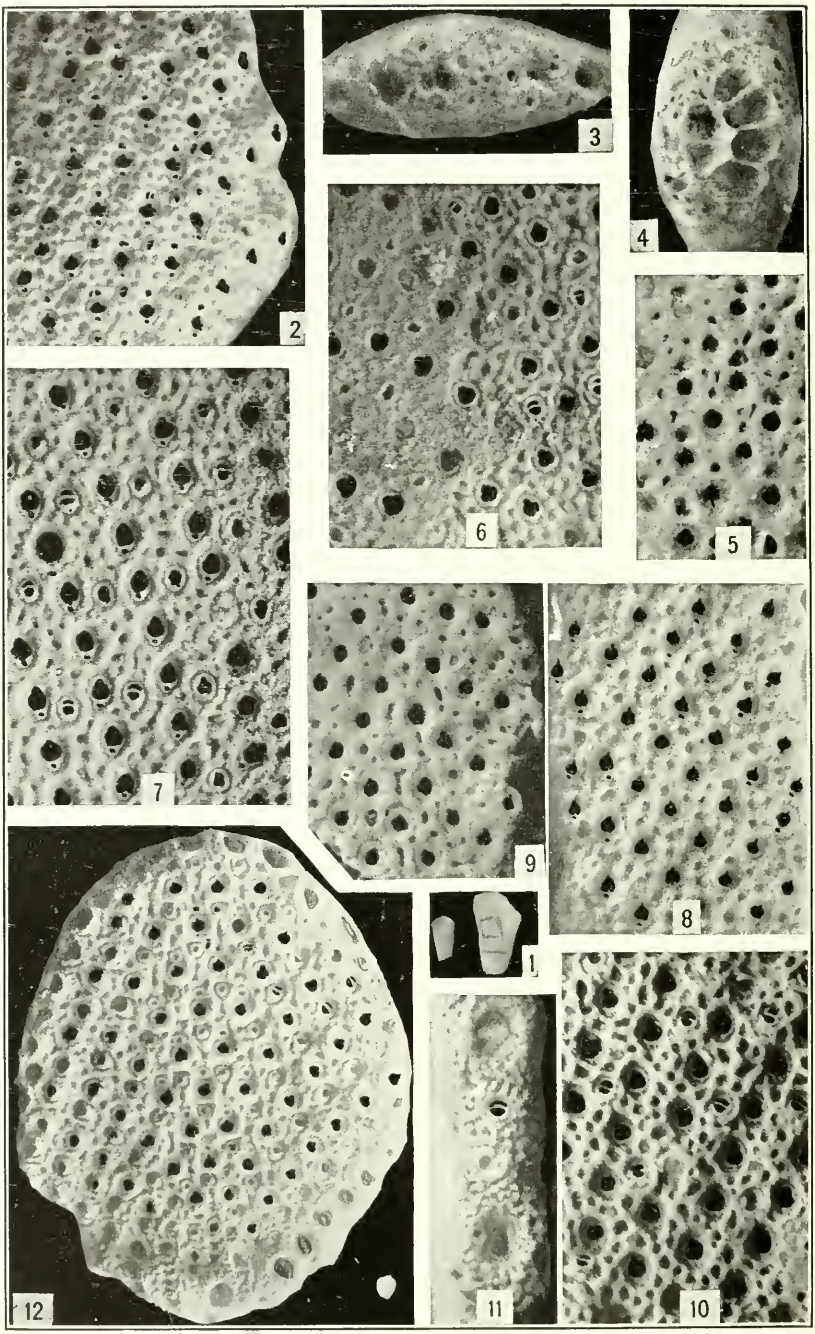


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 639

Plate 72

Figs. 1–11. *Flabellopora irregularis*, new species (p. 502).

1. Two examples, natural size, of the irregular zoaria.
2. Surface, ×20, of a regular amygdaloidal specimen.
3. Inferior angle of initial base of the same zoarium, ×20.
4. Terminal angle of the same zoarium, ×20.
5. Interior of zooecia, ×20. The exterior pores penetrate obliquely in the thick calcareous frontal and are always interzooecial. At the base the aperture is visible at the bottom of the cells and there are no interzooecial pores; the latter are visible only at the top where the section is made in the vicinity of the aperture. These exterior pores have then little depth.

   D. 5144. Jolo Light, Jolo.
6. Surface of an irregular zoarium, ×20. Some zoöecia are covered by their ectocyst.
7. Zooecia of another zoarium, ×20. The apertures and the avicularia are placed in a hexagon. There is a large special aperture.

   D. 5311. China Sea, vicinity of Hong Kong.
8. Portion of a small narrow lamellar colony, ×20. The avicularia have lost their pivots.
9. An irregular small zoarial lamella, ×20, showing the arrangement of pores between the zooecia.

   D. 5579. Darvel Bay, Borneo.
10. Portion of a large, irregular, much-calcified frond, ×20, showing the immersed apertures.

    D. 5311. China Sea, vicinity of Hong Kong.
11. Lateral view of an irregular lamellar specimen, ×20.

    D. 5144. Jolo Light, Jolo.
12. *Flabellopora arculifera*, new species (p. 501).

    The free lamellar zoarium, natural size and ×20.

    D. 5579. Darvel Bay, Borneo.

Plate 73

Figs. 1–5. *Flabellopora acuta*, new species (p. 504).

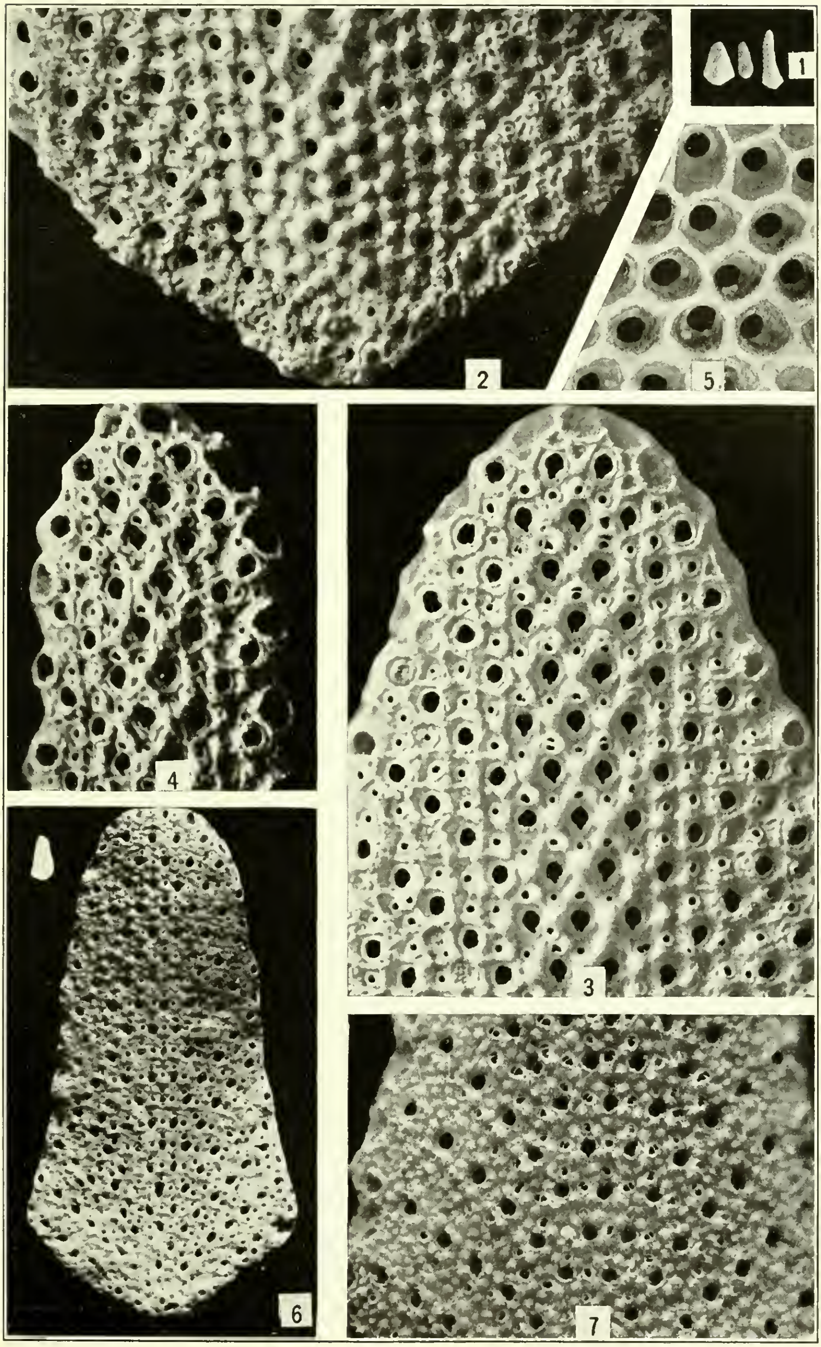
1. Example of the arrow-shaped zoaria, natural size.
2. Base of the broad example figured, ×20.
3. Upper portion of same, ×20.
4. Another specimen, ×20, showing the acute distal extremity.
5. Interior of zooecia, ×20.

D. 5392. Tubig Point, Destacado Island.

6, 7. *Flabellopora tubifera*, new species (p. 505).

6. Small zoarium, natural size and, ×10, with opaque walls and somewhat worn.
7. Median portion of well-preserved zoarium, ×20.

D. 5137. Jolo Light, Jolo.



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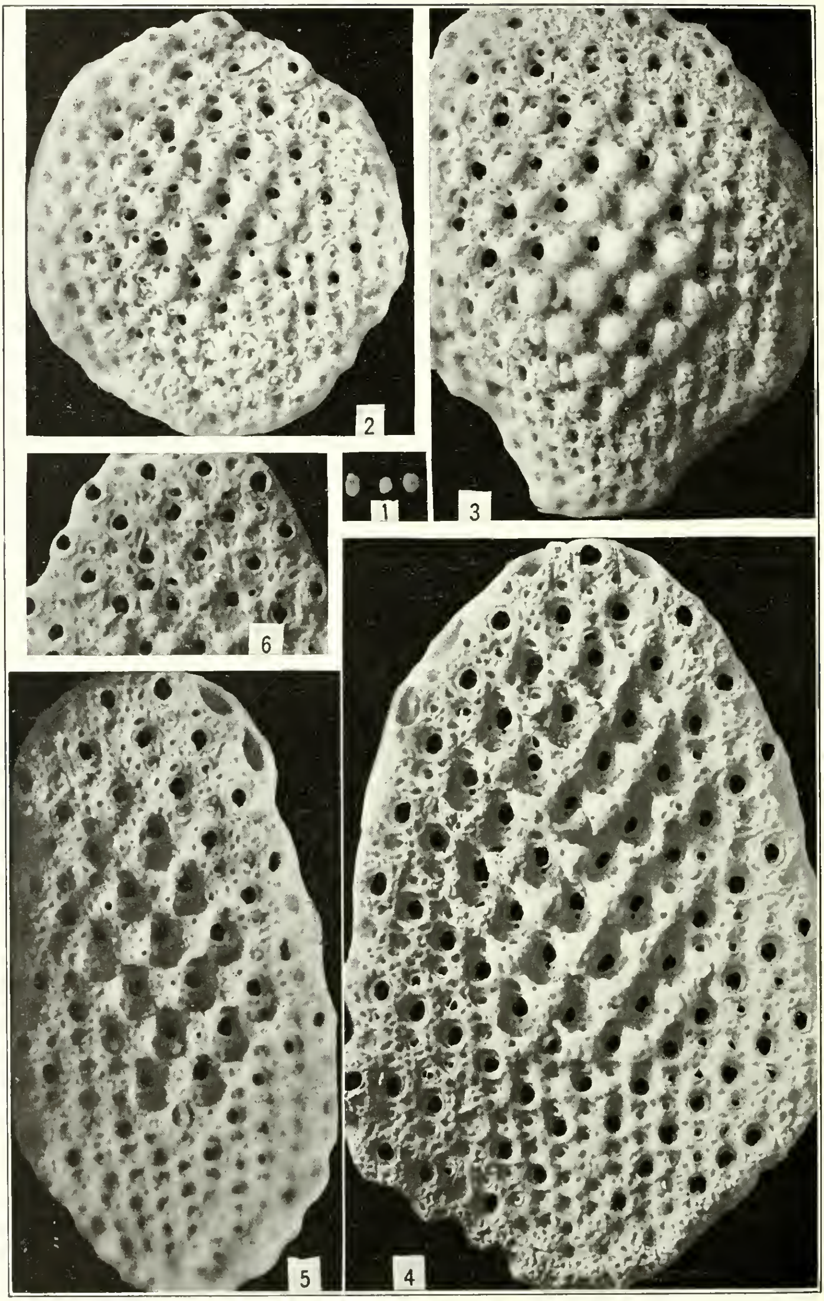

BRYOZOA OF THE PHILIPPINE REGION

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Plate 74

Figs. 1–3. *Flabellopora lenticularis*, new species (p. 503).

1, 2. Small orbicular zoaria, natural size and an example, $\times 20$.

3. Somewhat elongated specimen, $\times 20$, with large tuberosities.

D. 5579. Darvel Bay, Borneo.

4–6. *Flabellopora tuberosa*, new species (p. 501).

4. A sagittate colony, natural size, and $\times 20$, with large porous tuberosities.

D. 5147. Sulade Island.

5. Amygdaloid zoarium, $\times 20$. The areas are deep.

6. Upper part of specimen, $\times 20$, with small tuberosities.

D. 5217. Anima Sola Island.

Plate 75

Fig. 1. *Flabellopora asper,* new species (p. 508).

The small orbicular zoaria natural size and an example, ×20. The proximal pore is often united to the aperture.

D. 5162. Tinagta Island.

2. *Flabellopora acutirostris,* new species (p. 506).

Type specimen natural size and ×20.

D. 5574. Simaluc Island.

3. *Flabellopora transversa,* new species (p. 507).

Portion of the transverse zoarium, ×20, with granulated zooecial walls.

D. 4807. Cape Tsiuka, Sea of Japan.

4. *Flabellopora pusilla,* new species (p. 509).

The small discoid zoarium, natural size and ×20.

D. 5135. Jolo Light, Jolo.

5. *Flabellopora planata,* new species (p. 507).

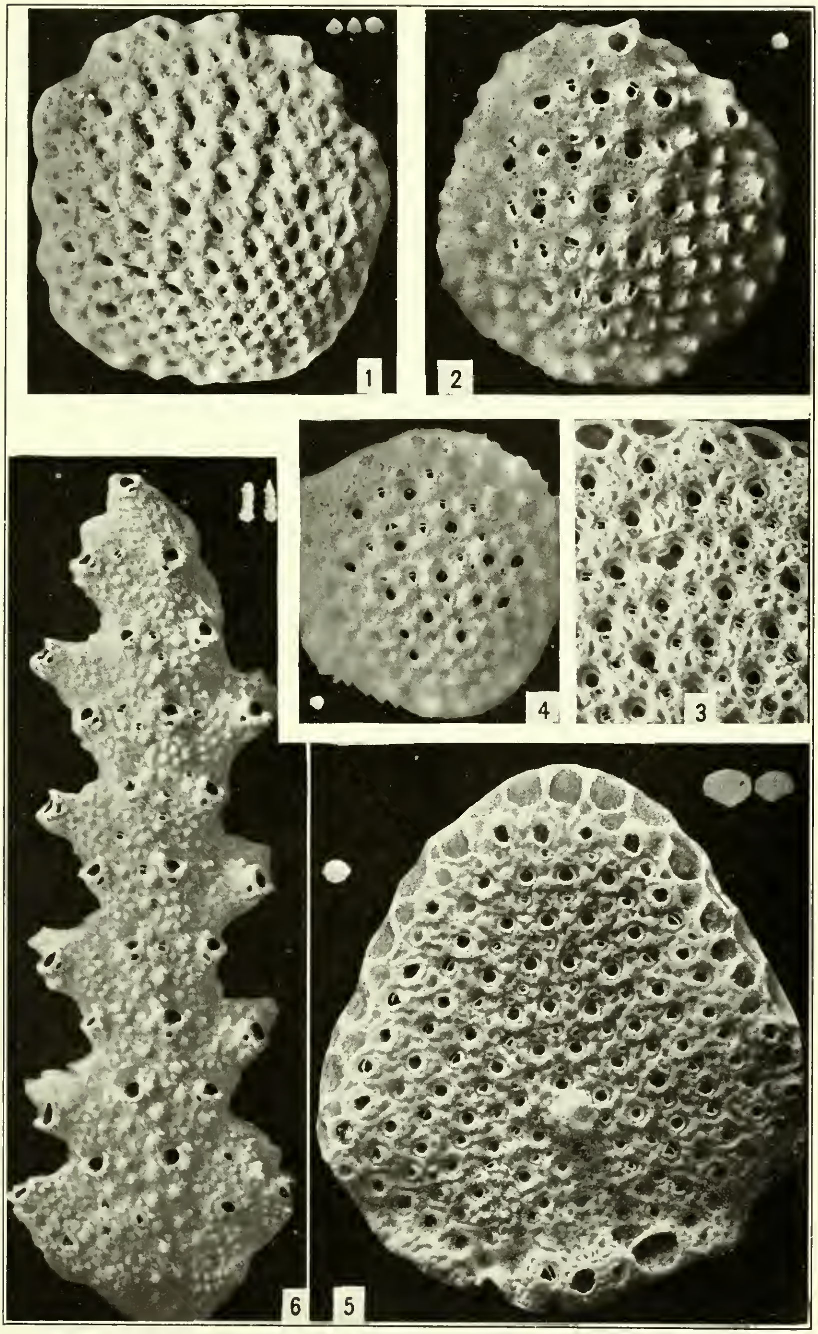
Three zoaria natural size and an example, ×20.

D. 5579. Darvel Bay, Borneo.

6. *Zeuglopora lanceolata* Maplestone, 1909 (p. 511).

Two complete colonies, natural size and one, ×20.

D. 5574. Simaluc Island.



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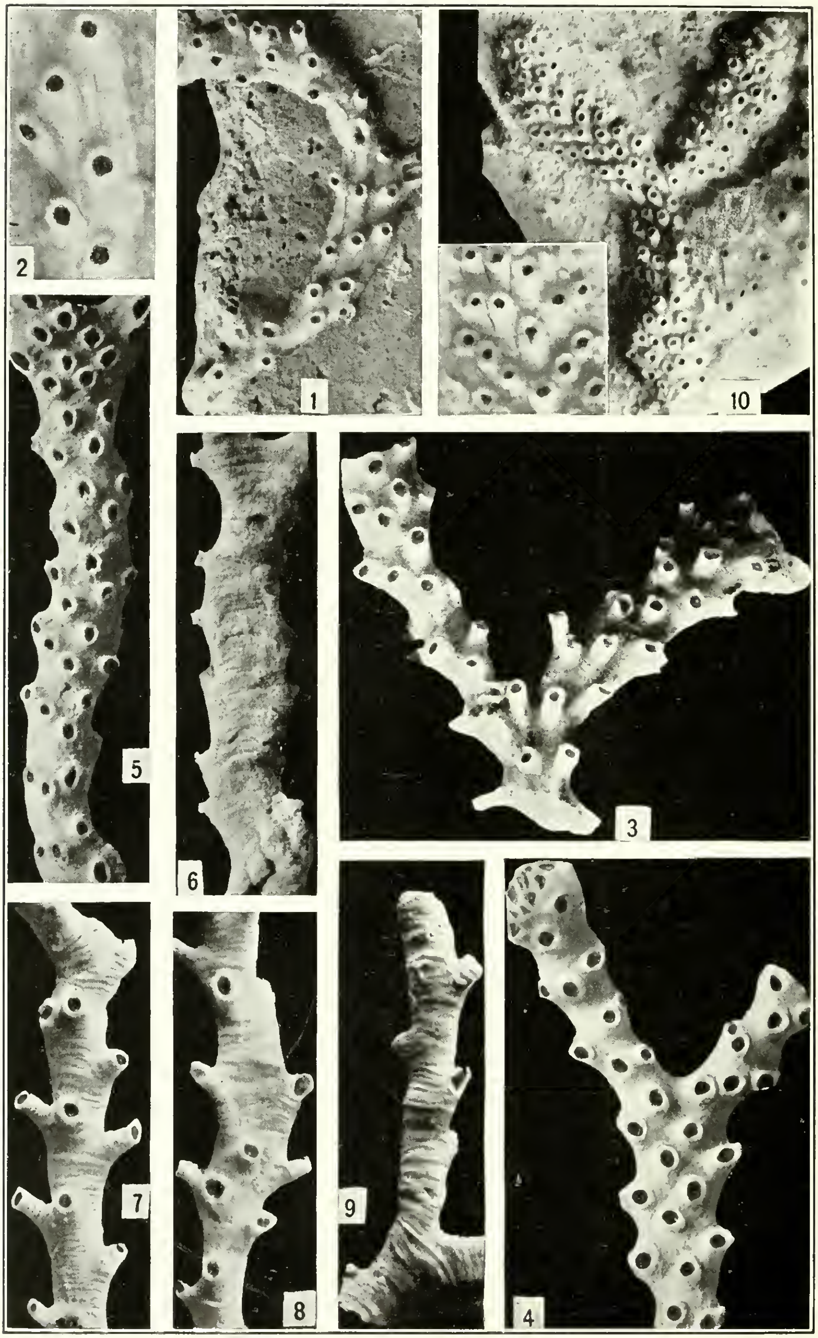

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Plate 76

Figs. 1, 2. *Proboscina dichotoma* D'Orbigny, 1839 (p. 518).
The incrusting zoarium, $\times 12$, and a portion, $\times 25$.
D. 5311. China Sea, vicinity of Hong Kong.

3. *Filisparsa elegans*, new species (p. 519).
D. 4807. Cape Tsiuka, Sea of Japan.

4–6. *Filisparsa sinuosa*, new species (p. 520).
4. The free, compressed, bifurcating zoarium, $\times 12$, showing the extremity of a young branch.
5. Specimen, $\times 12$, showing a sinuous branch.
6. Dorsal of a similar sinuous branch, $\times 12$.
D. 5579. Sibutu Island, Darvel Bay, Borneo.

7–9. *Filisparsa rugosa*, new species (p. 519).
7, 8. Two specimens of the free zoarium, composed of three rows of tubes, $\times 12$, the first with short tubes and the second with long ones.
9. Dorsal of another branch, $\times 12$.
D. 5478. Tacbuc Point, Leyte.

10. *Proboscina coapta*, new species (p. 518).
The incrusting zoarium, of wide branches with closely arranged tubes, $\times 12$.
D. 5137. Jolo Light, Jolo.

Plate 77

Figs. 1–3. *Tubigerina rugosa*, new species (p. 520).

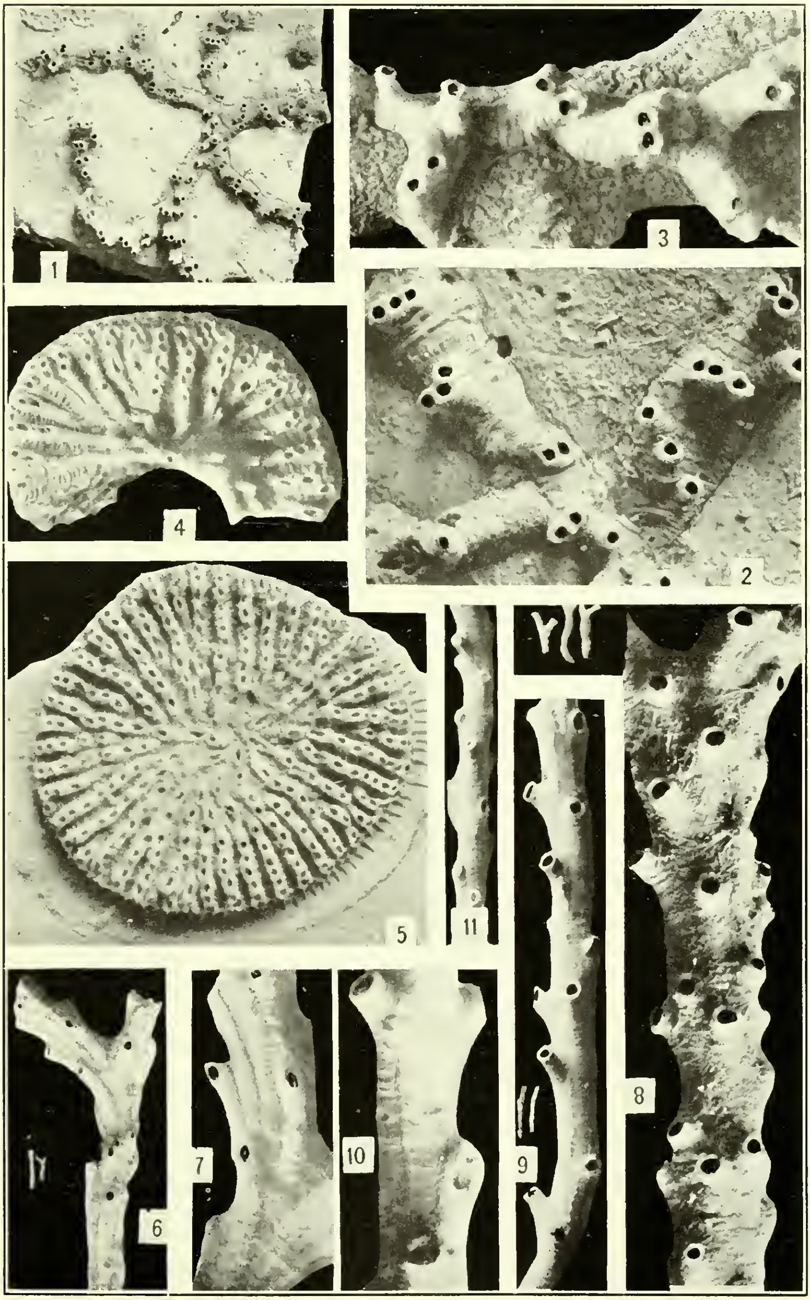
1. The incrusting zoarium, ×3, illustrating the ramification of the branches.
2. Surface of the same, ×12, exhibiting occurrence of three or four tubes to a fascicle.
   D. 5141. Jolo Light, Jolo.
3. A specimen with monoserial or biserial branches, ×12.
   D. 5147. Sulade Island.
4. *Actinopora japonica*, new species (p. 522).
   The free bilamellar zoarium, ×12.
   D. 4807. Cape Tsiuka, Sea of Japan.
5. *Actinopora philippinensis*, new species (p. 523).
   View of the discoidal incrusting zoarium, ×12, with wide basal margin.
   D. 5137. Jolo Light, Jolo.

6, 7. *Entalophora delicatula* Busk, 1875 (p. 522).
   Fragments, natural size, one of them, ×12, and a portion of the same, ×25.
   D. 5137. Jolo Light, Jolo.

8. *Entalophora major*, new species (p. 521).
   The free cylindrical bifurcated zoarium, natural size and ×12, showing the large tubes.
   D. 5147. Sulade Island.

9–11. *Entalophora arcuata*, new species (p. 521).

9. Branches natural size and ×12, illustrating specimen with long tubes.
10. Portion of the same, ×25.
11. A very slender example, ×12.
   D. 5478. Tacbuc Point, Leyte.



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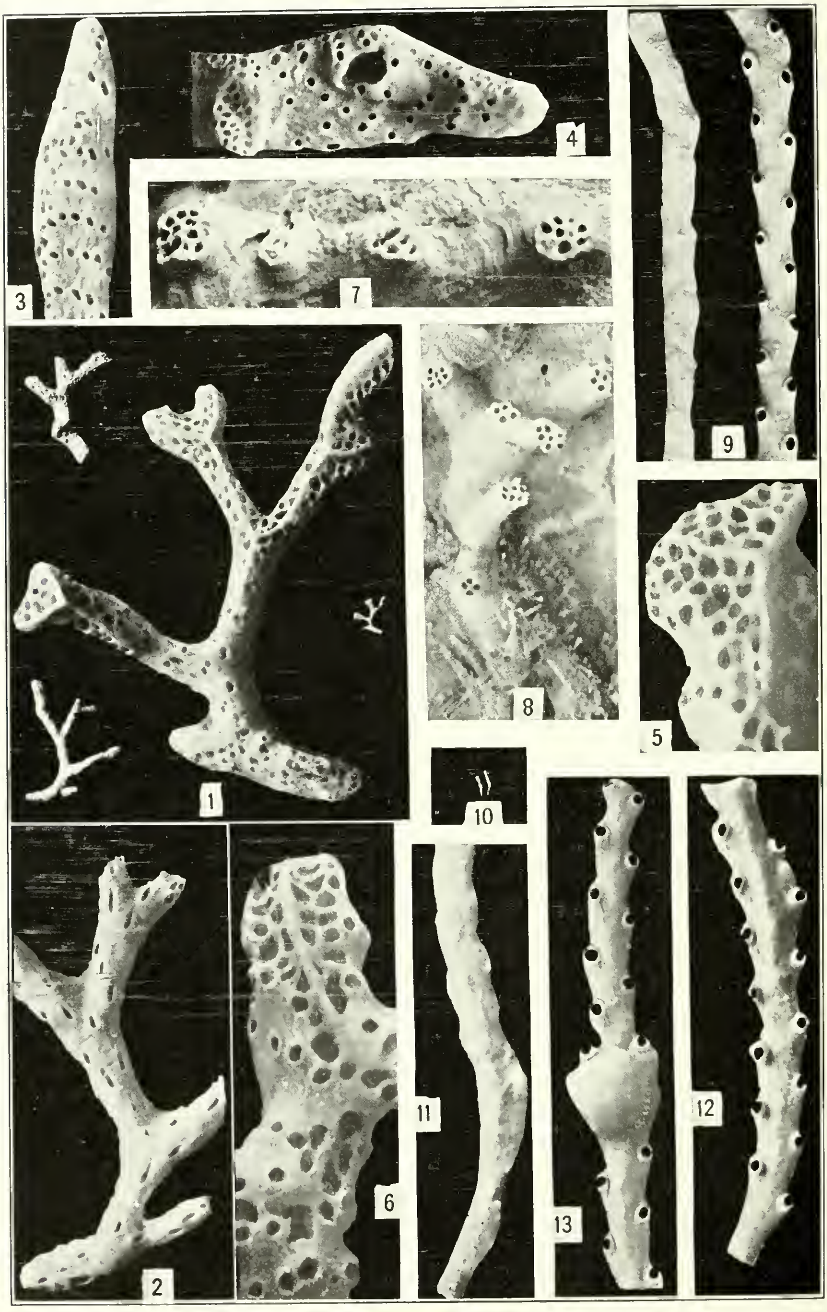

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Plate 78

Figs. 1–6. *Plagioecia reticuloides*, new species (p. 529).

1. Fragment of a branched colony, natural size, ×3 and ×12, and another colony (upper left-hand corner) ×3.
2. Dorsal of specimen, ×12.
3. Side view of branch, ×12, showing arrangement of apertures.
4. An ovicelled branch, ×12, showing ovicell parallel to zoarial margin.

5, 6. Frontal, ×25, showing two aspects of the basal lamella at the extremity of the branches.

D. 5579. Sibutu Island, Darvel Bay, Borneo.

7. *Filifascigera pluripora*, new species (p. 524).

The incrusting zoarium of sinuous branches, ×12, exhibiting the numerous orifices to each fascicle.

D. 5217. Anima Sola Island.

8. *Filifascigera parvipora*, new species (p. 524).

The short ramified incrusting zoarium, ×12, with small fascicles.

D. 5144. Jolo Light, Jolo.

9. *Crisia delicatula*, new species (p. 527).

Frontal and dorsal side of the delicate zoarial segments, ×25.

D. 5235. Nagabut Island.

10–13. *Crisia hörnesi* Reuss, 1847 (p. 528).

10, 11. Fragments natural size and dorsal, ×25.

12. Frontal of segment, ×25.

D. 5478. Tacbuc Point, Leyte.

13. Ovicelled specimen, ×25.

D. 5580. Sibutu Island, Darvel Bay, Borneo.

PLATE 79

FIGS. 1, 2. *Mecynoecia obesa* Canu and Bassler, 1922 (p. 529).

1. Young ovicelled colony, $\times 12$, showing the very narrow base.

2. Fragment, $\times 25$, exhibiting the structure of the ovicell.

D. 5147. Sulade Island.

3–6. *Mecynoecia rectangulata*, new species (p. 530).

3. Ovicelled fragment, $\times 12$.

D. 5478. Tacbuc Point, Leyte.

4, 5. Examples, $\times 12$ and portion, $\times 25$, illustrating subverticellate arrangement of the tubes.

6. Second example, natural size, and one $\times 12$, showing rectangular arrangement of branches.

D. 5151. Sirun Island.

7, 8. *Mecynoecia unifasciata*, new species (p. 530).

7. Zoarium with Filisparsa form of growth, $\times 12$, but showing the ovicell.

8. Ovicelled portion, $\times 25$.

D. 4807. Cape Tsiuka, Sea of Japan.

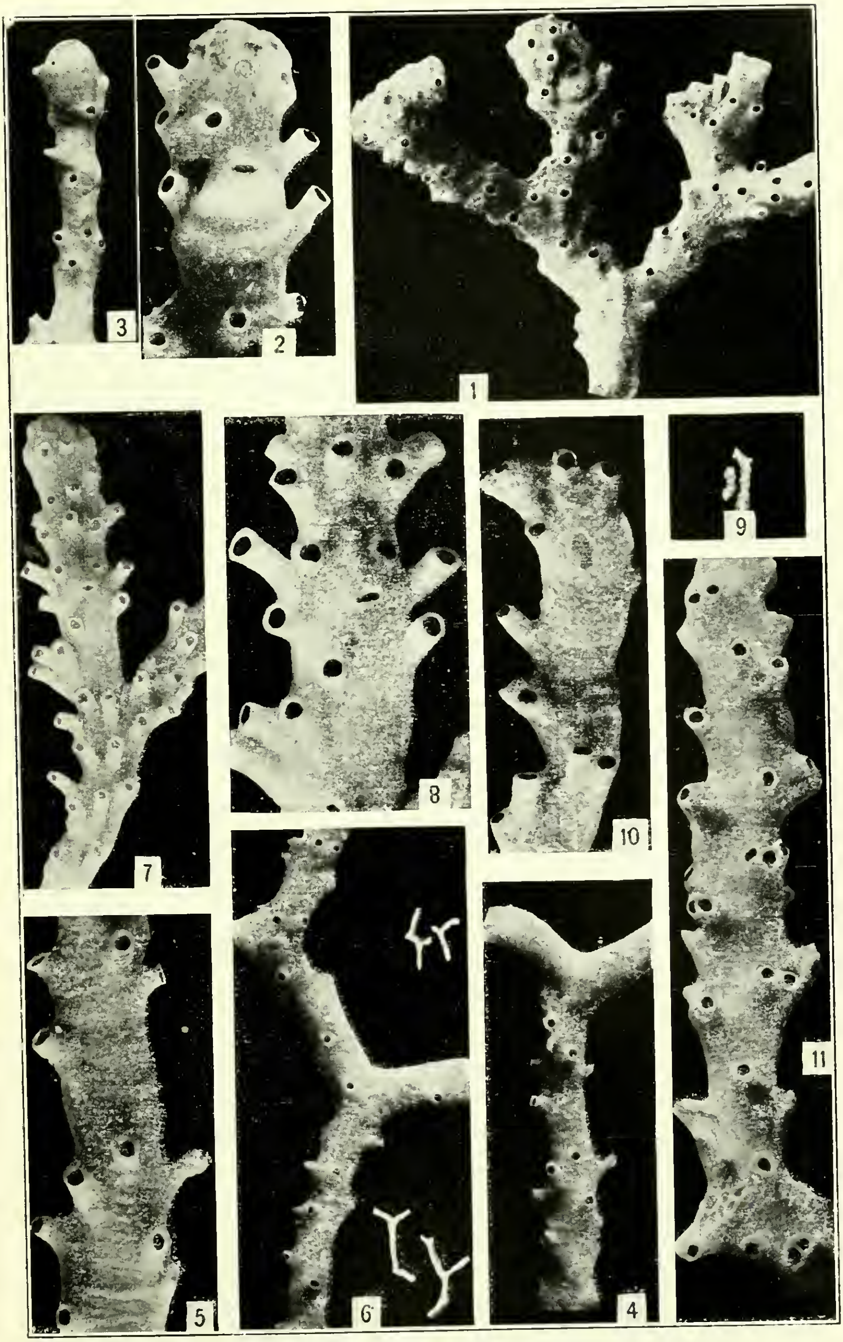
9–11. *Mecynoecia geminata*, new species (p. 532).

9. Two specimens, natural size.

10. Ovicelled branch, $\times 12$.

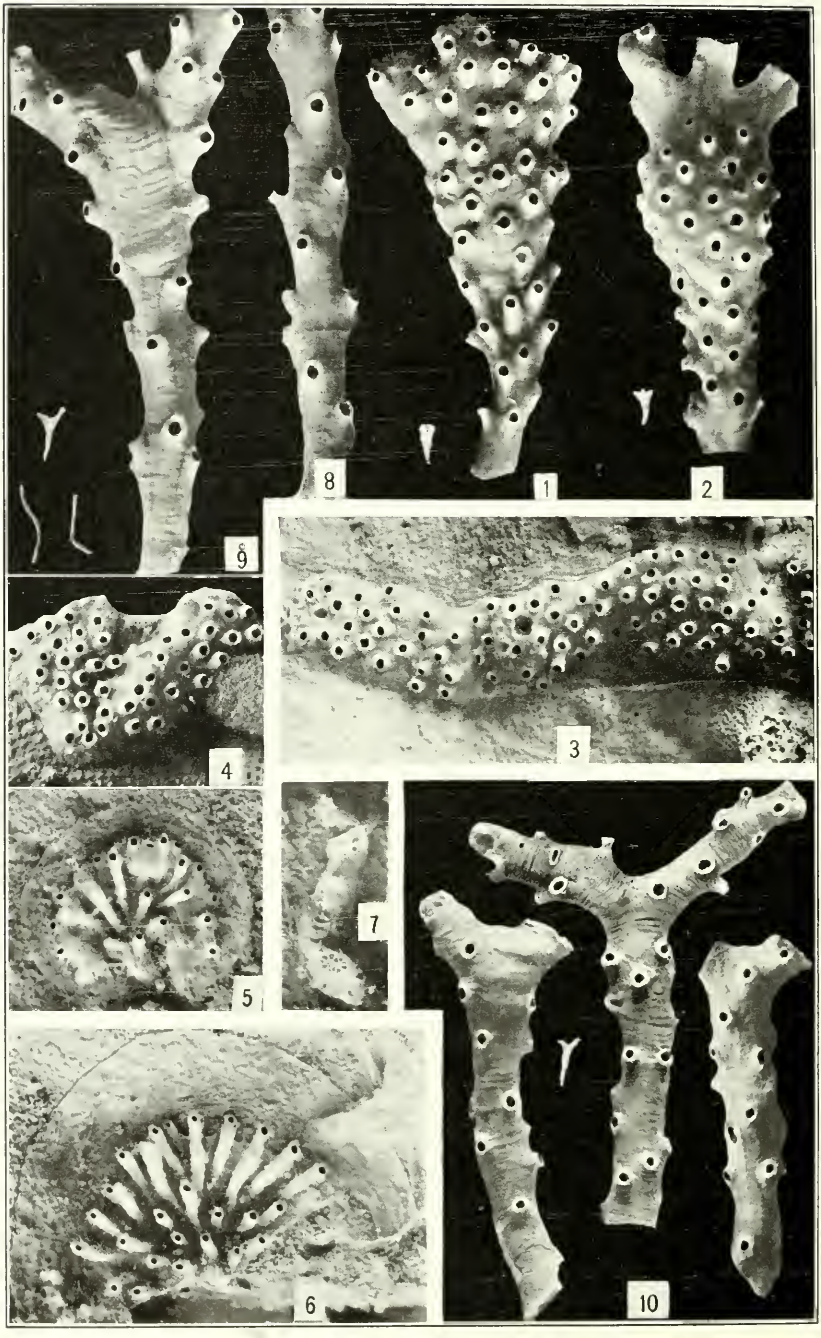
11. Large branch, $\times 12$, showing the usual aspect.

D. 5141. Jolo Light, Jolo.



Bryozoa of the Philippine Region

For explanation of plate see page 646



BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 647

Plate 80

Figs. 1, 2. *Diaperoecia intricaria* Busk, 1875 (p. 534).
Two ovicelled examples natural size and ×12.
D. 5147. Sulade Island.

3, 4. *Microeccia sinuosa*, new species (p. 533).
3. The sinuous incrusting zoarium, ×12, bearing the small ovicell.
4. A very sinuous colony, ×12, growing on the edge of an orbitoid foraminifer.
D. 5179. Sibutu Island, Darvel Bay, Borneo.

5, 6. *Mecynoecia brevicula*, new species (p. 533).
5. Young ovicelled zoarium, ×12, with its broad basal lamella.
6. Nonovicelled specimen, ×12.
D. 5135. Jolo Light, Jolo.

7–9. *Mecynoecia proboscidea* Milne-Edwards, 1838 (p. 531).
7. Base of zoarium, ×12, in Proboscina growth.
D. 4807. Cape Tsiuka, Sea of Japan.
8. Young branch, ×12, showing the more frequent aspect of the colony.
D. 5151. Sirun Island.
9. An ovicelled specimen, ×12.
D. 5147. Sulade Island.

10. *Mecynoecia longipora* MacGillivray, 1895 (p. 531).
Three branches, two of them ovicelled, ×12, and a specimen, natural size.
D. 5217. Anima Sola Island.

Plate 81

Figs. 1, 2. *Diaperoecia transversalis*, new species (p. 536).

1. Free ovicelled branch, $\times 12$.
2. A creeping branch, $\times 12$, with tubes in fascicles.

D. 5141. Jolo Light, Jolo.

3–7. *Diaperoecia scalaria* Canu and Bassler, 1922 (p. 537).

3. Base of zoarium, $\times 6$, and portion, $\times 12$, showing it is a creeping branch.
4. Somewhat worn example, $\times 12$, showing alteration of the peristomes.
5. Ovicelled specimen, natural size and $\times 12$, illustrating separating threads of the tubes.

D. 5580. Sibutu Island, Darvel Bay, Borneo.

6. Ramified branch with ovicell, $\times 12$, showing oeciostome isolated and orthogonal.

D. 5547. Noble Point, Tulayan Island.

7. Rectilinear ovicelled branch with salient fascicles, $\times 12$.

D. 5151. Sirun Island.

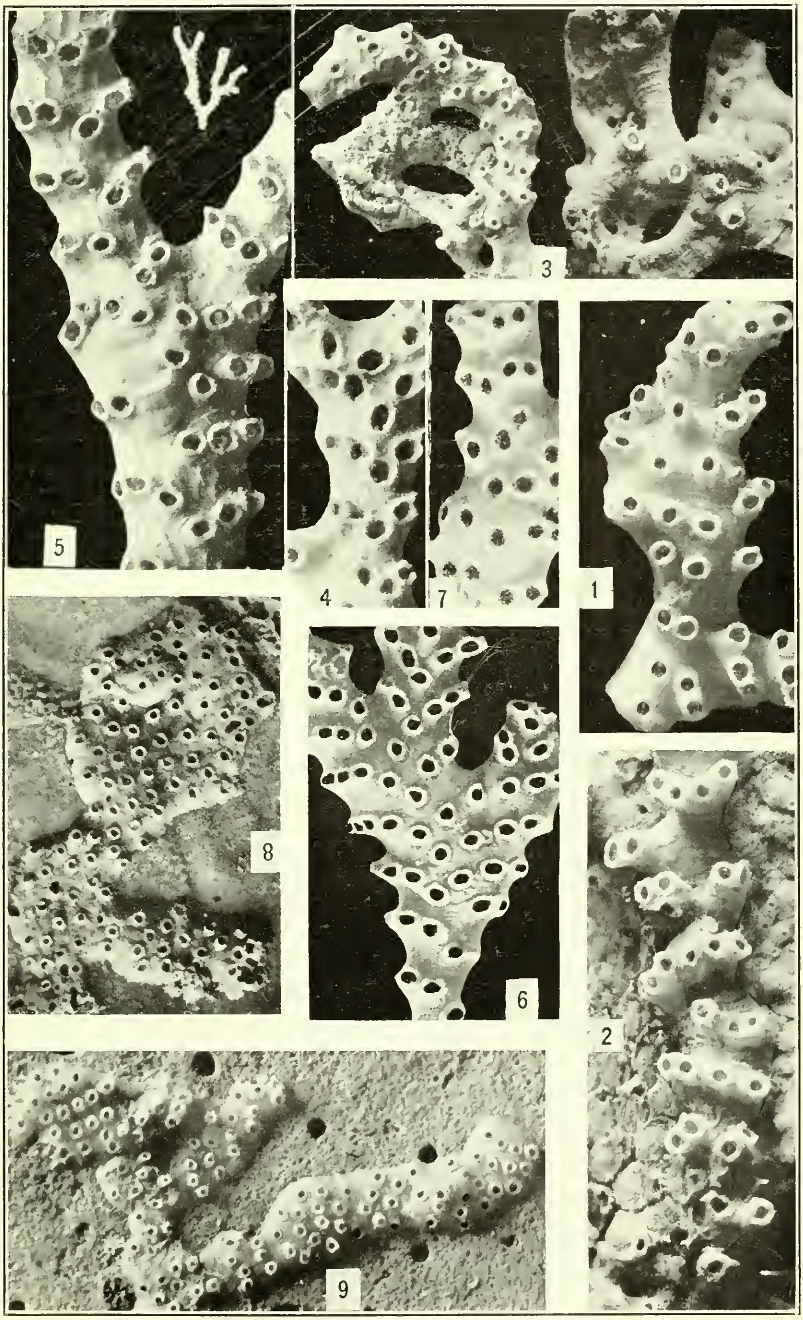
8, 9. *Diaperoecia indistincta*, new species (p. 535).

8. Ovicelled colony with wide branches, $\times 12$.

D. 5151. Sirun Island.

9. An ovicelled zoarium with narrow branches, $\times 12$.

D. 5147. Jolo Light, Jolo.



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For explanation of plate see page 648

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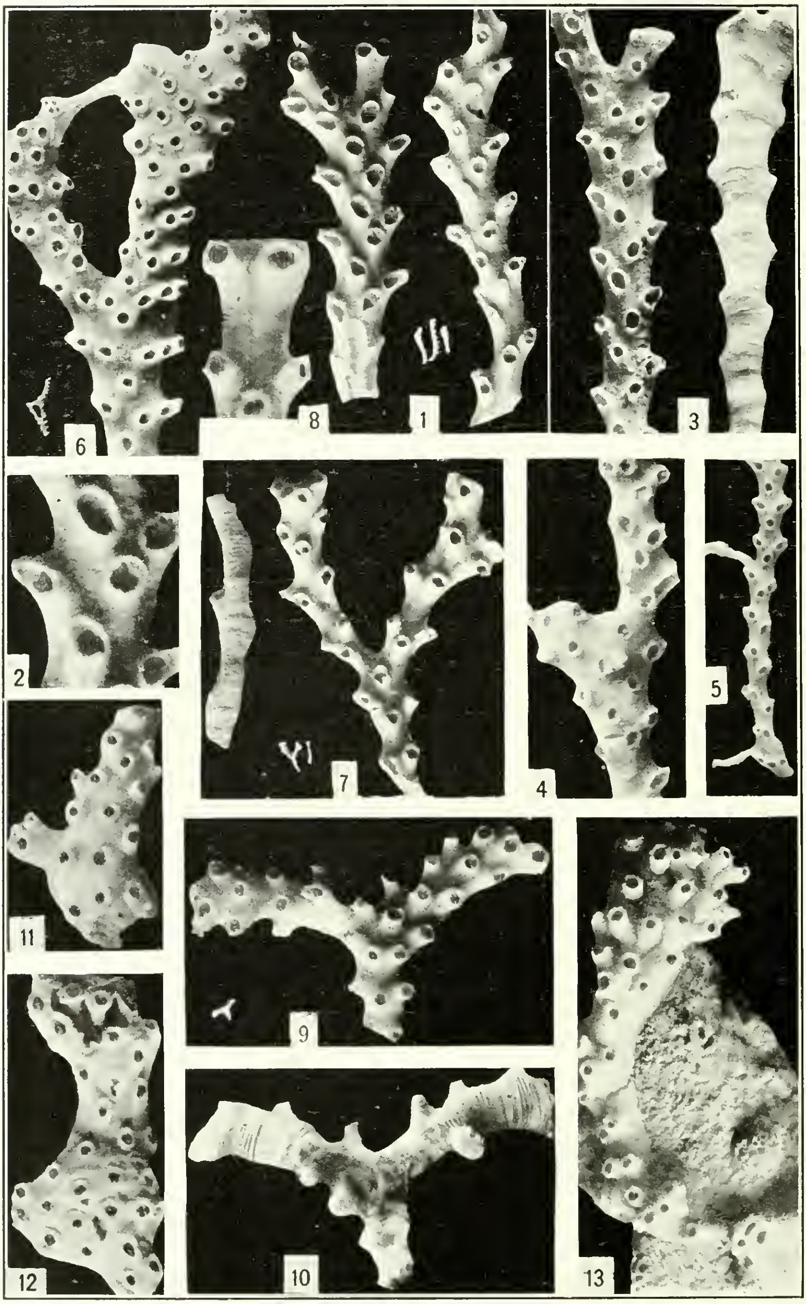


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 649

Plate 82

Figs. 1–5. *Diaperoecia radicata* Kirkpatrick, 1888 (p. 538).

1. Ordinary branches, natural size and ×12. The peristome is broad and oval.
2. Tubes, ×25.
3. The two sides of a specimen with delicately marked dorsal, ×12.
4. An ovicelled example, ×12, showing the orthogonal oeciostome.
5. Branch, ×6, with small trabeculae.

D. 5478. Taebue Point, Leyte.

6. *Diaperoecia radicata fasciculata*, new variety (p. 539).

Ovicelled example, natural size and ×12, showing connecting trabecula.

D. 5145. Jolo Light, Jolo.

7, 8. *Diaperoecia radicata minor*, new variety (p. 539).

7. An example, natural size and ×12, illustrating the smaller dimensions.
8. Portion, ×25.

D. 5478. Taebue Point, Leyte.

9–13. *Diaperoecia rosea*, new species (p. 535).

9, 10. Cellular and noncellular sides of the same zoarium, ×12, the latter showing the rooting columns.

11, 12. Two fragments, ×12, showing ovicells of the free colonies.

D. 5137. Jolo Light, Jolo.

13. Creeping base of a zoarium, ×12. The oeciostome and the ovicell are incompletely developed.

D. 5147. Sulade Island.

Plate 83

Figs. 1, 2. *Tubulipora* (?) *grandipora,* new species (p. 543).

1. A fasciculated branch, $\times 12$, creeping over a frond of *Adeonellopsis.*
2. An entire colony, $\times 12$, attached to a small fragment of bryozoan.

D. 5147. Sulade Island.

3, 4. *Tubulipora* (?) *radicata,* new species (p. 542).

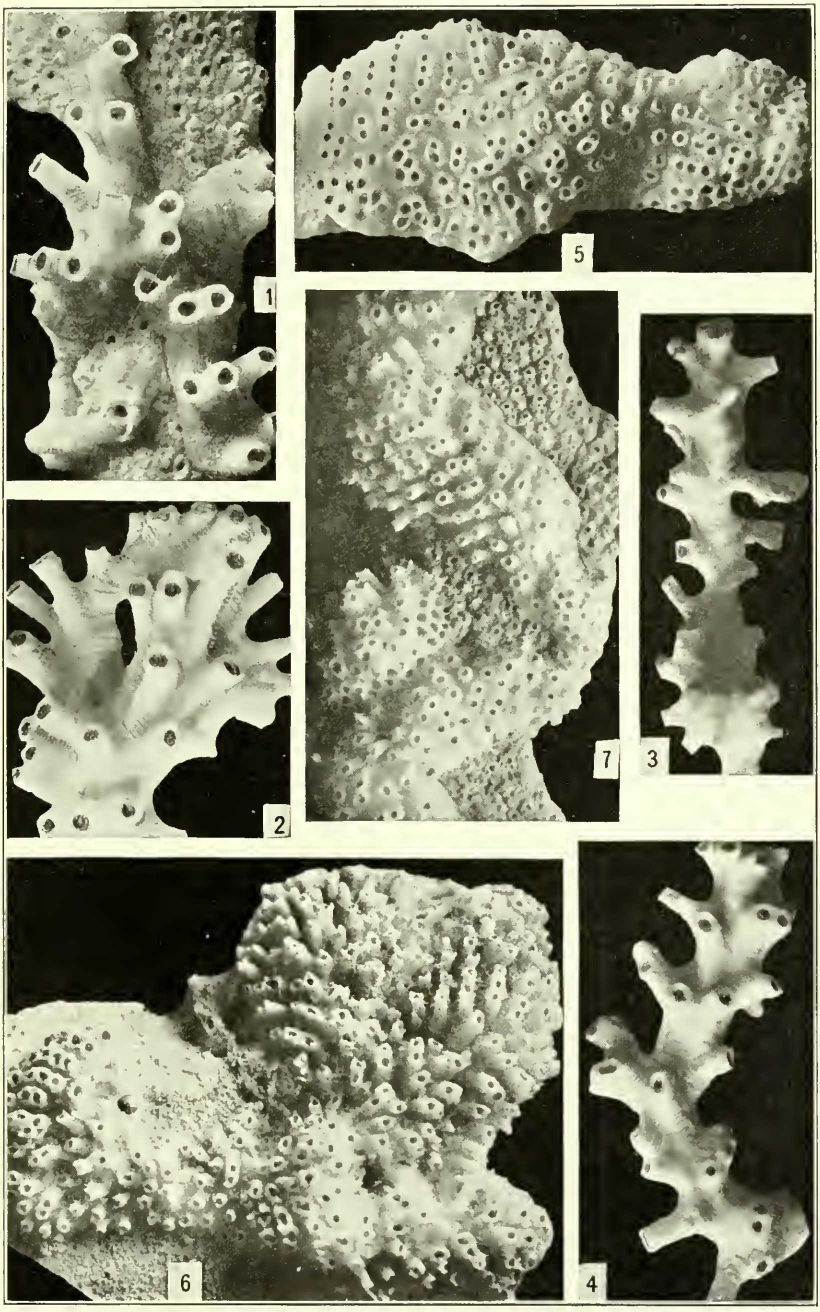
The two sides of a colony, $\times 12$, provided with small colonettes.

D. 5137. Jolo Light, Jolo.

5–7. *Tubulipora coerulea,* new species (p. 540).

5. An ovicelled colony, $\times 12$, covering the two sides of a small bryozoan.
6. An example, $\times 12$, with flabellate branches.
7. Sinuous nonfasciculate colony, $\times 12$, growing on the two sides of *Adeonellopsis.*

D. 5151. Sirun Island.



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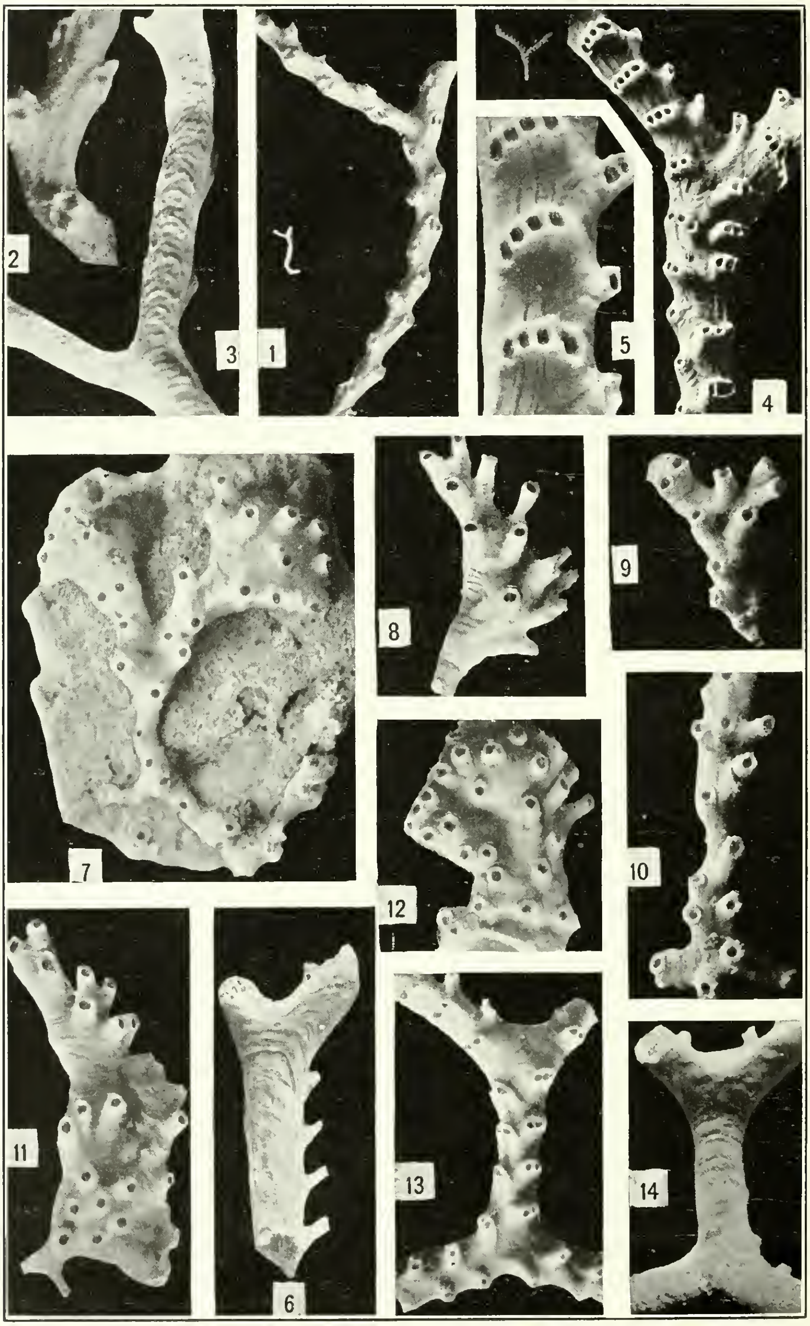


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 651

Plate 84

Figs. 1–3. *Idmonea filiformis*, new species (p. 546).

1, 2. Anterior side of a sinuous specimen, natural size, ×12 and a portion, ×25.

3. Posterior side, ×12.

D. 5478. Tacbuc Point, Leyte.

4–6. *Idmonea australis* MacGillivray, 1884 (p. 543).

4. Anterior side of a bifurcated specimen, natural size and ×12.

D. 5147. Sulade Island.

5. Lateral side of branch, ×25.

6. The more frequent aspect of the dorsal, ×12.

D. 5137. Jolo Light, Jolo.

7–12. *Tubulipora varians*, new species (p. 542).

7. Ovicelled specimen, ×12, growing over the two sides of a shell fragment.

8–10. Young free specimen, ×12, probably detached from their substratum.

11. Young free specimen with long peristomes, ×12.

12. Ovicelled specimen encrusting a Serpula, ×12.

D. 4807. Cape Tsiuka, Sea of Japan.

13, 14. *Idmonea pauper*, new species (p. 545).

Anterior and posterior sides of an ovicelled specimen, ×12, the first illustrating the few tubes to a fascicle.

D. 5217. Anima Sola Island.

Plate 85

Fig. 1. *Idmonea parvula*, new species (p. 546).
Fragments of the filiform zoarium, natural size and ×12.
D. 5478. Taebuc Point, Leyte.

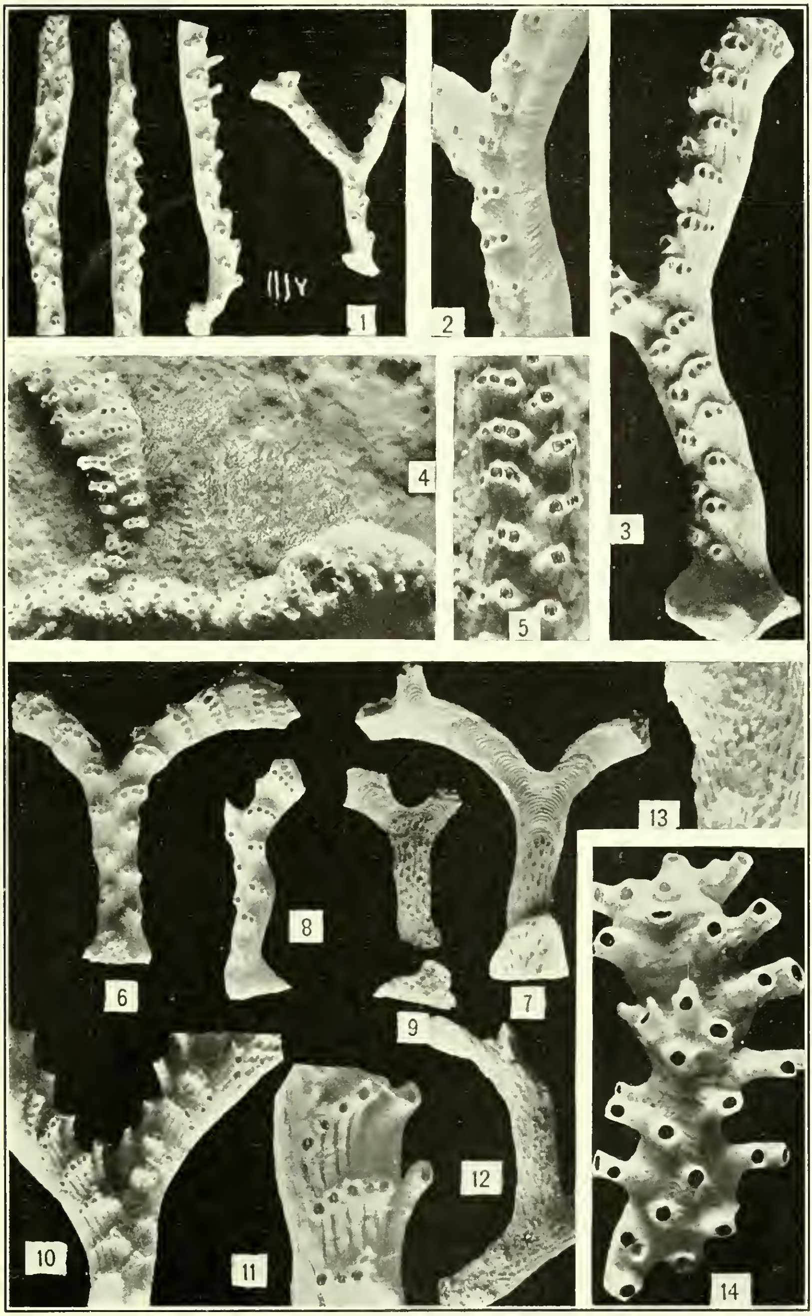
2, 3. *Idmonea crassimargo*, new species (p. 545).
Lateral and front views of a colony, ×12, illustrating the thickness of the dorsal side.
D. 5579. Sibutu Island, Darvel Bay, Borneo.

4, 5. *Platonea philippsae* Harmer, 1915 (p. 548).
4. Incrusting colony with two branches, ×12.
5. Incrusting branch with salient fascicles, ×25.
D. 5137. Jolo Light, Jolo.

6–9. *Pleuronea decorata*, new species (p. 547).
6, 7. The two sides of a small zoarium, ×12, with little expanded base. The tergopores are visible at the base.
8, 9. Base of a small zoarium, ×12. Opposite sides showing tergopores visible only at the base of the latter figure.
D. 5137. Jolo Light, Jolo.

10–13. *Pleuronea striata*, new species (p. 547).
10, 11. Anterior side of a specimen with salient fascicles, ×12 and portion, ×25.
12, 13. Posterior side of specimen, ×12 and ×25, showing the separating threads of the tergopores.
D. 5151. Sirun Island.

14. *Platonea hirsuta* Canu and Bassler, 1922 (p. 548).
An ovicelled zoarium, ×12, with the Idmonea form of growth.
D. 5151. Sirun Island.



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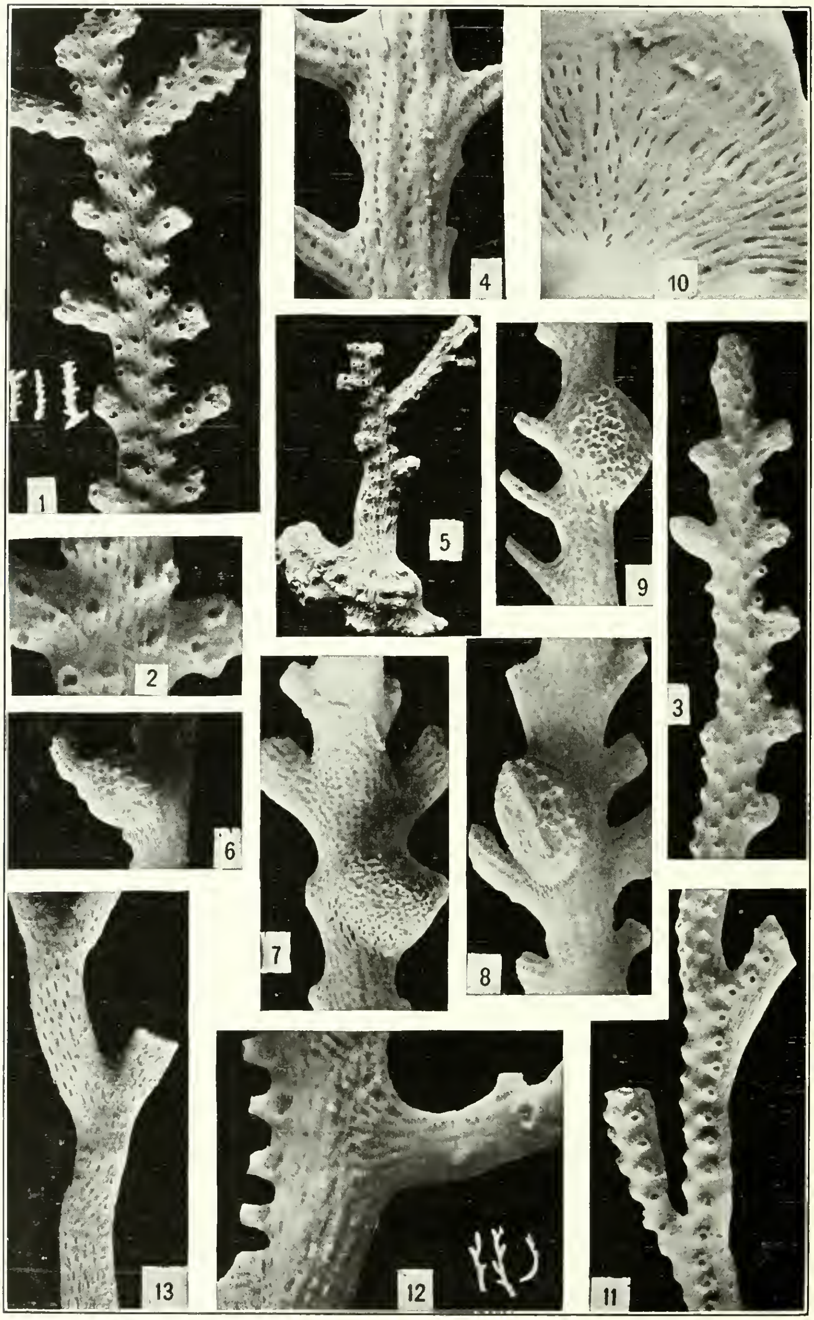


BRYOZOA OF THE PHILIPPINE REGION

FOR EXPLANATION OF PLATE SEE PAGE 663

PLATE 86

FIGS. 1–10. *Hornera pinnata*, new species (p. 550).

1. Zoarial fragments, natural size and branch, ×12, with equally spaced pinnules.
2. Portion of the same, ×25.
3. Extremity of a branch, ×12, with pinnules unequally spaced.
   D. 5151. Sirun Island.
4. View of the dorsal of young branch of a large colony, ×25. Longitudinal ridges limit the sulci.
   D. 5579. Sibutu Island, Darvel Bay, Borneo.
5. Base of a colony, ×6, showing mode of attachment to the substratum.

6–9. Different views of the ovicell, ×12. In Figure 8, the ovicell is carinated and the vacuoles are separated by strong ridges.

10. Portion of the base, ×25, showing its epitheeal structure with sulci and nervules.
    D. 5151. Sirun Island.

11–13. *Mesonea simplex*, new species (p. 549).

11. Anterior side of the bifurcated zoarium, ×12, showing the fascicles formed by a single tube.
12. Zoarial fragment natural size and an adventitious branch, ×25, reinforced exteriorily.
13. Dorsal, ×12, showing the oblique arrangement of the sulci and the small vacuoles.
    D. 5151. Sirun Island.

PLATE 87

FIGS. 1–7. *Polyascosoecia funicula*, new species (p. 552).

1. Small colony, natural size, and ×6 with a narrow base.
2. Frontal side of the same zoarium, ×12, showing the large smooth longitudinal median crest.

3, 4. Dorsal side of the same, ×12 and portion, ×25.

5, 6. Two aspects of the ovicell, ×12. The tubes perforate the ovicell.

7. Lateral side of a branch, ×12, of the same specimen showing the vacuoles on the zooecial tubes.

D. 5141. Jolo Light, Jolo.

8–18. *Crisina canariensis* D'Orbigny, 1851 (p. 553).

8. Zoarial fragments, natural size.

9. Base, natural size, and ×6, with four radicular branches formed by the epitheca with vacuoles.

10, 11. Two ovicells, ×12, with their terminal oeciostome.

12. Branch with a colonette, ×12.

13. Lateral view of branch, ×25.

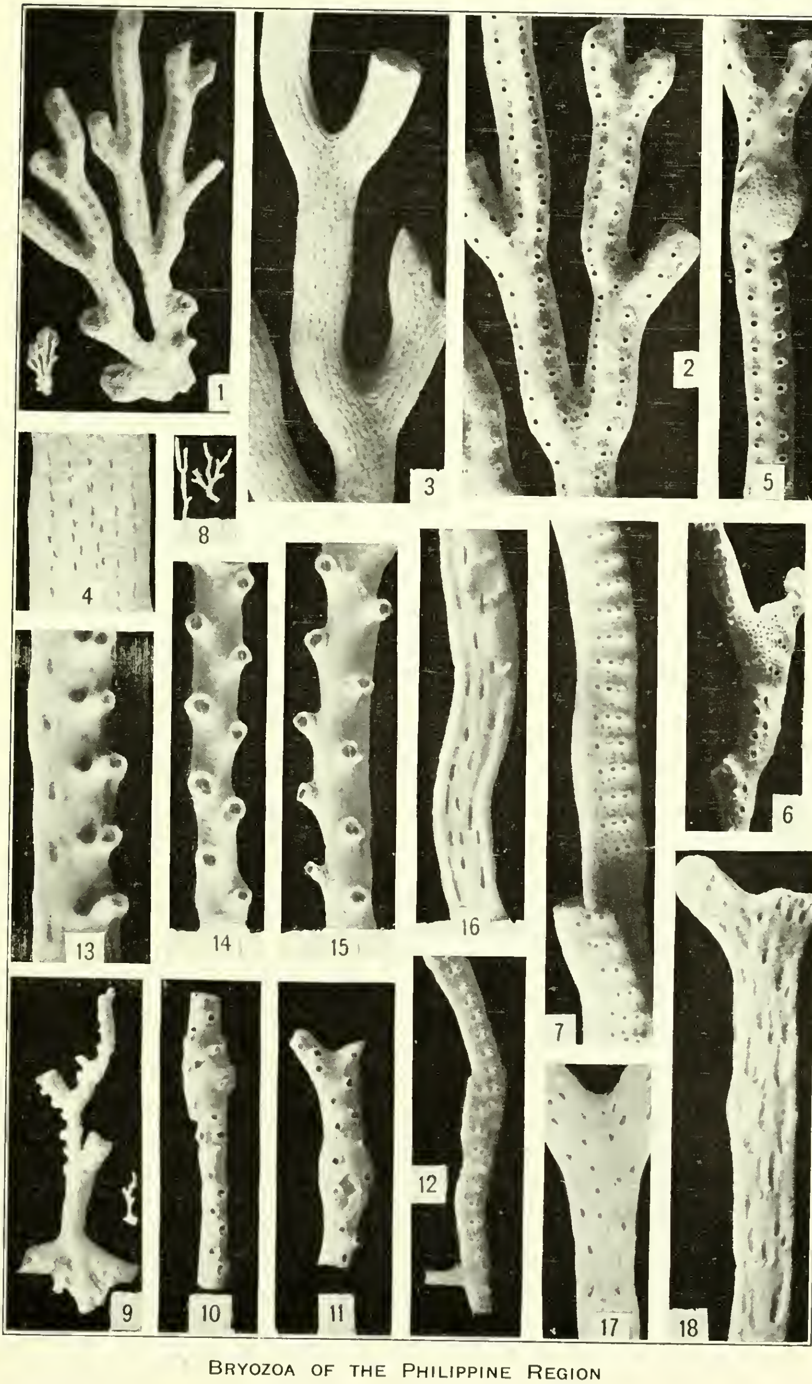
14, 15. Two branches, ×25, the first with little salient and the second with salient peristomes.

16. Branch with concave dorsal, ×25.

17. Another specimen, ×25, with convex dorsal and sulci of little depth.

18. A branch with flat dorsal and large vacuoles, ×25.

D. 5478. Tacbuc Point, Leyte.



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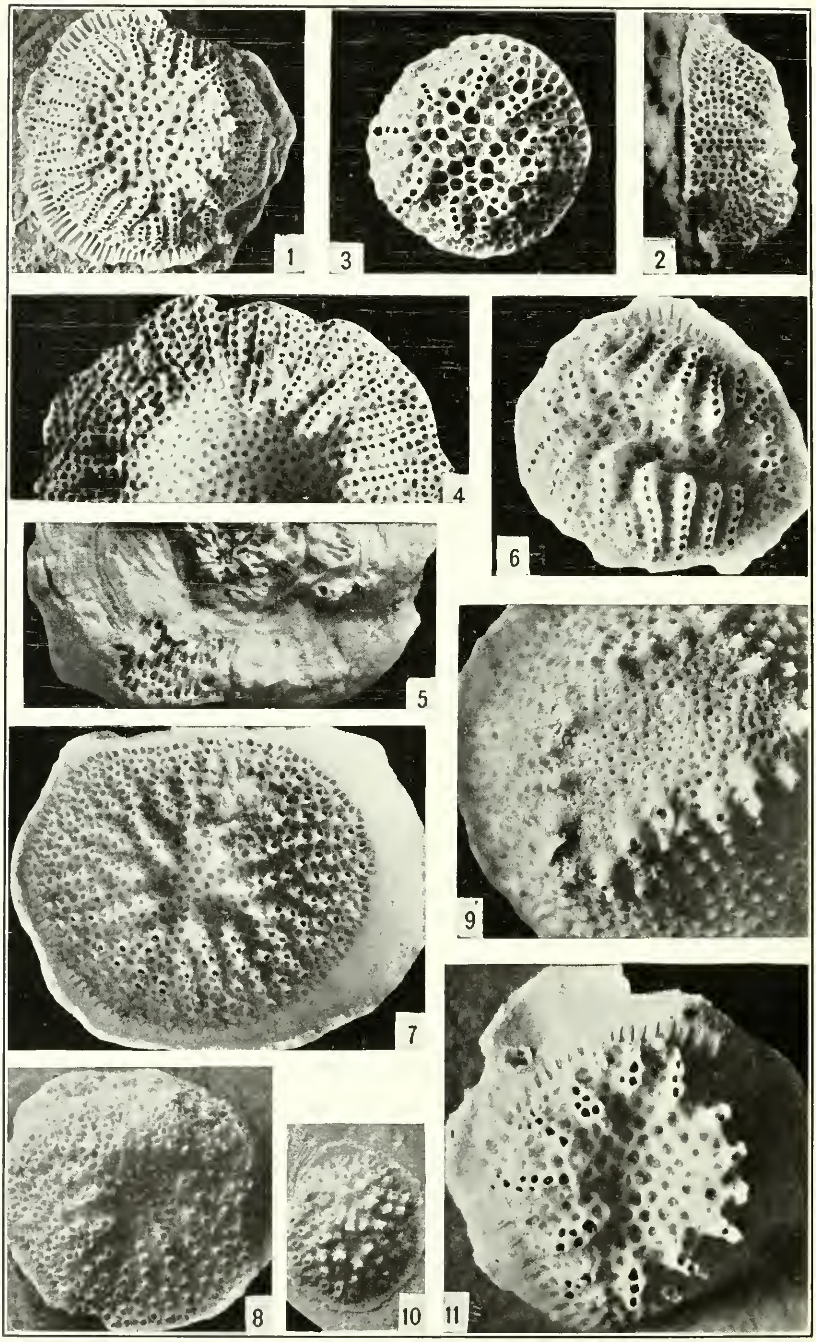

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Plate 88

Figs. 1–6. *Lichenopora radiata* Savigny-Audouin, 1826 (p. 556).
1. Small, very thick, incrusting colony, ×12.
2. Side view of same specimen, ×12.
D. 5137. Jolo Light, Jolo.
3. Young colony, ×12, in which the cancelli are larger than the apertures.
4. Part of a large free specimen, ×12.
5. Part of inferior side of a free zoarium, ×12.
D. 5145. Jolo Light, Jolo.
6. Deformed colony, ×12.
D. 5579. Sibutu Island, Darvel Bay, Borneo.

7–10. *Lichenopora buski* Harmer, 1915 (p. 558).
7. Free specimen, ×12, with a large marginal lamina.
8. An example, ×12, showing the visors of the tubes.
9. A free thick zoarium, ×12.
10. Young incrusting zoarium, ×12.
D. 4807. Cape Tsiuka, Sea of Japan.

11. *Lichenopora holdsworthii* Busk, 1875 (p. 559).
Free colony, ×12, with its thick marginal lamina.
D. 5574. Simulac Island.

Plate 89

Figs. 1–4. *Lichenopora quincuncialis*, new species (p. 560).

1, 2. Two specimens, ×12, showing the structure of the ovicell.

3. Free zoaria, natural size and one, ×12, without marginal lamina.

4. Free zoarium with its marginal lamina preserved, ×12.

D. 4807. Cape Tsiuka, Sea of Japan.

5, 6. *Lichenopora lamellosa*, new species (p. 561).

Free zoarium with lamellate fascicles, ×12, and lateral view of same.

D. 5579. Sibutu Islands, Darvel Bay, Borneo.

7. *Lichenopora wilsoni* MacGillivray, 1886 (p. 559).

Free colony, ×12.

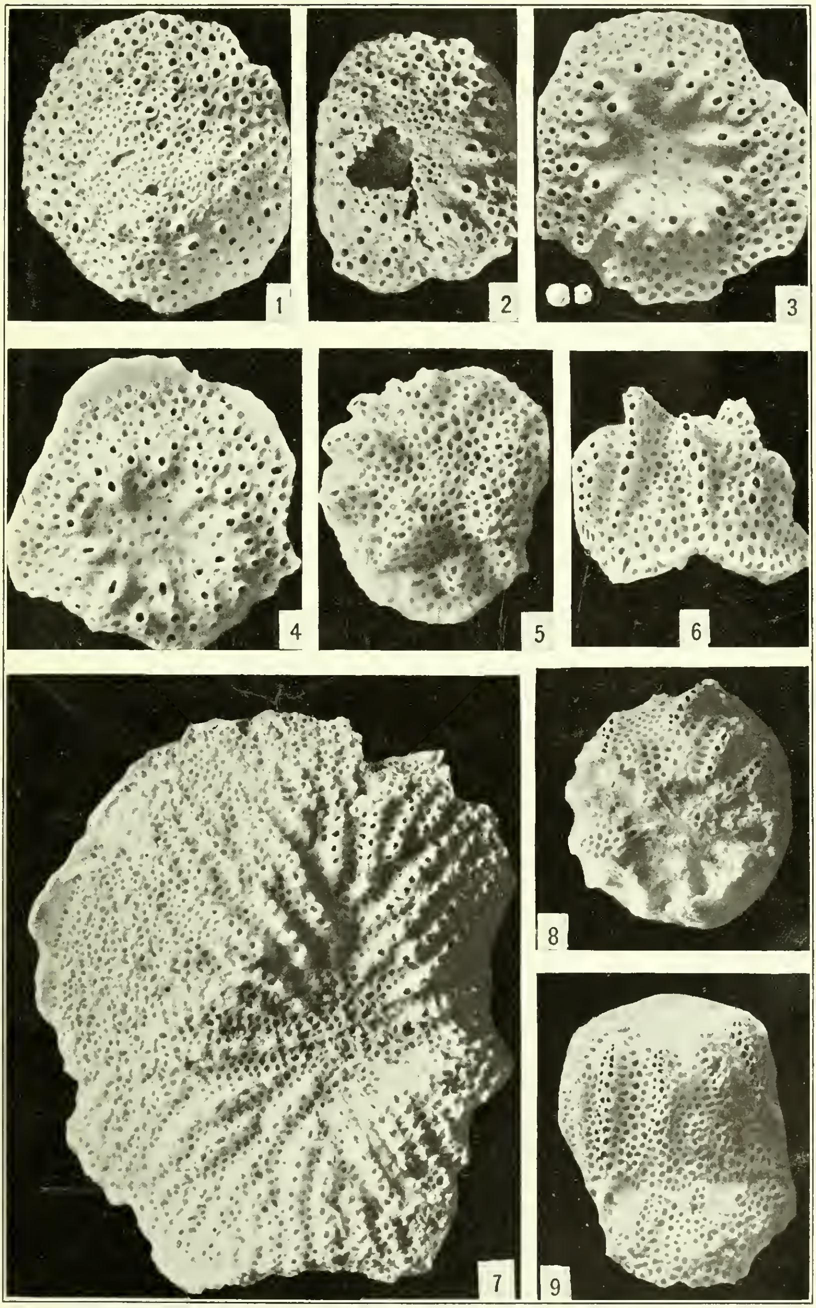
D. 5151. Sirun Island, Tawi Tawi Group.

8, 9. *Lichenopora* (*Domopora*) *strictolamellosa*, new species (p. 561).

8. Superior face of an ovicelled specimen, ×12. The ovicell is broken.

9. Lateral view of same showing two superposed colonies; ×12.

D. 5162. Tinagta Island, Tawi Tawi Group.



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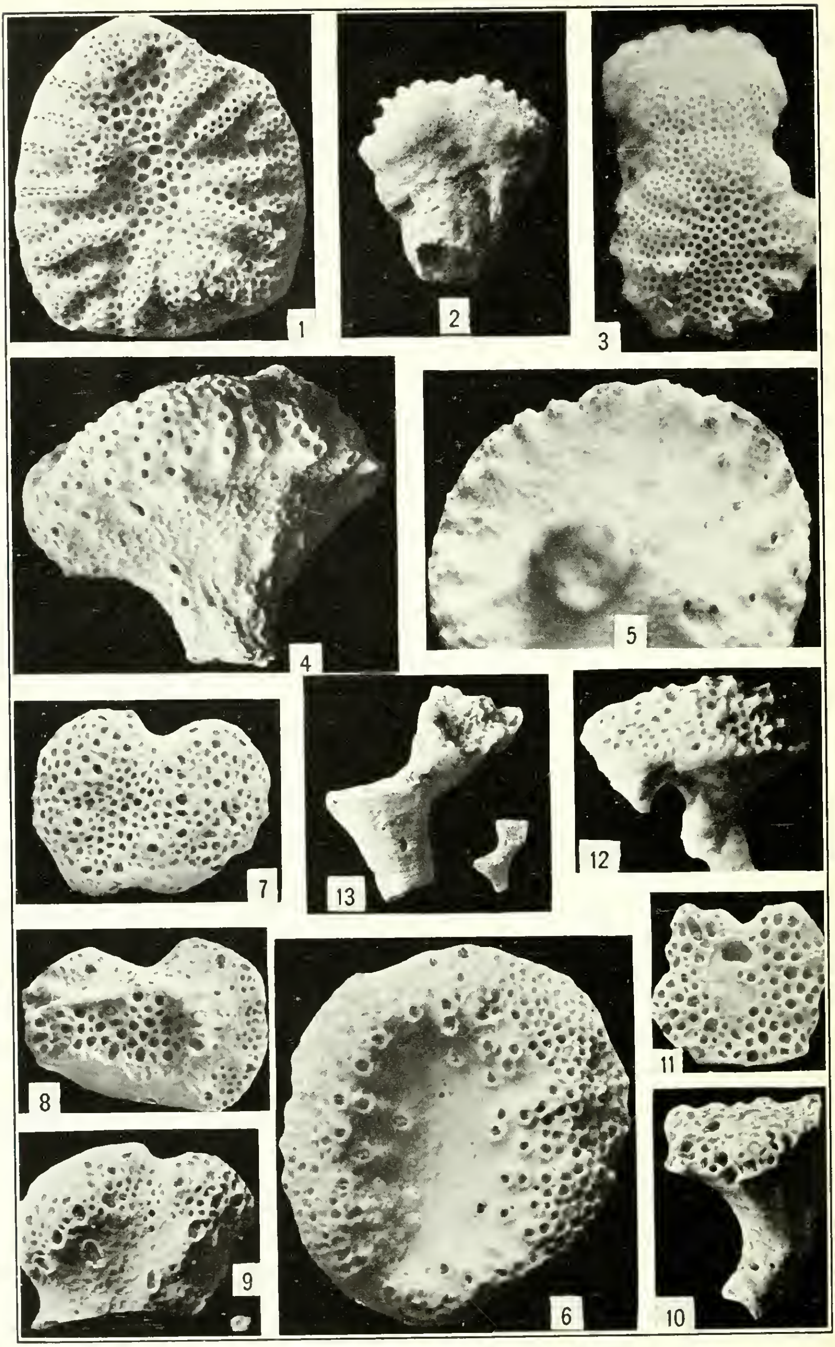

BRYOZOA OF THE PHILIPPINE REGION

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Plate 90

Figs. 1–3. *Lichenopora mediterranea* Blainville, 1834 (p. 561).

1. Lateral view of a composite colony, ×6, attached to a Serpula.
2. Top view of the same specimen, ×12.
   D. 5137. Jolo Light, Jolo.
3. Free simple, multiserial colony, ×12.
   D. 5162. Tinagta Island, Tawi Tawi Group.

4–9. *Trochiliopora* (?) *bartschi*, new species (p. 563).

4. Lateral view of the free conical zoarium, ×12, showing the porous peduncle.
5. Basal view, ×12.
6. Superior side, ×12.

7, 8, 9. Superior, basal and lateral views, ×12 of example with short peduncle and cordiform capitulum. The basal view shows the tubes are cylindrical.
   D. 5577. Mount Dromedario.

10–13. *Tretocycloecia parvula*, new species (p. 564).

10. A composite colony, ×12.

11, 12. A simple colony with long peduncle, and capitulum of same with oviccll, ×12.
   D. 5579. Sibutu Island, Darvel Bay, Borneo.

13. Simple colony with short peduncle, ×12.
   D. 5574. Simalue Island, north of Tawi Tawi.

Plate 91

Figs. 1–6. *Tretocycloecia flabellaris*, new species (p. 564).

1. Zoarium, ×2 and ×6, composed of several flabellate subcolonies.
2. Lateral view of an ovicelled specimen, ×6, with lobed capitulum.
3. Capitulum of the same specimen, ×6.
4. Portion of the same capitulum, ×12, showing the ovicell typical of the family.

D. 5147. Sulade Island, Sulu Archipelago.

5. Specimen with bifurcated peduncle, ×6.
6. Large flabellate but little lobed subcolony, ×6.

D. 5579. Sibutu Island, Darvel Bay, Borneo.

7–11. *Tretocycloecia pelliculata* Waters, 1879 (p. 566).

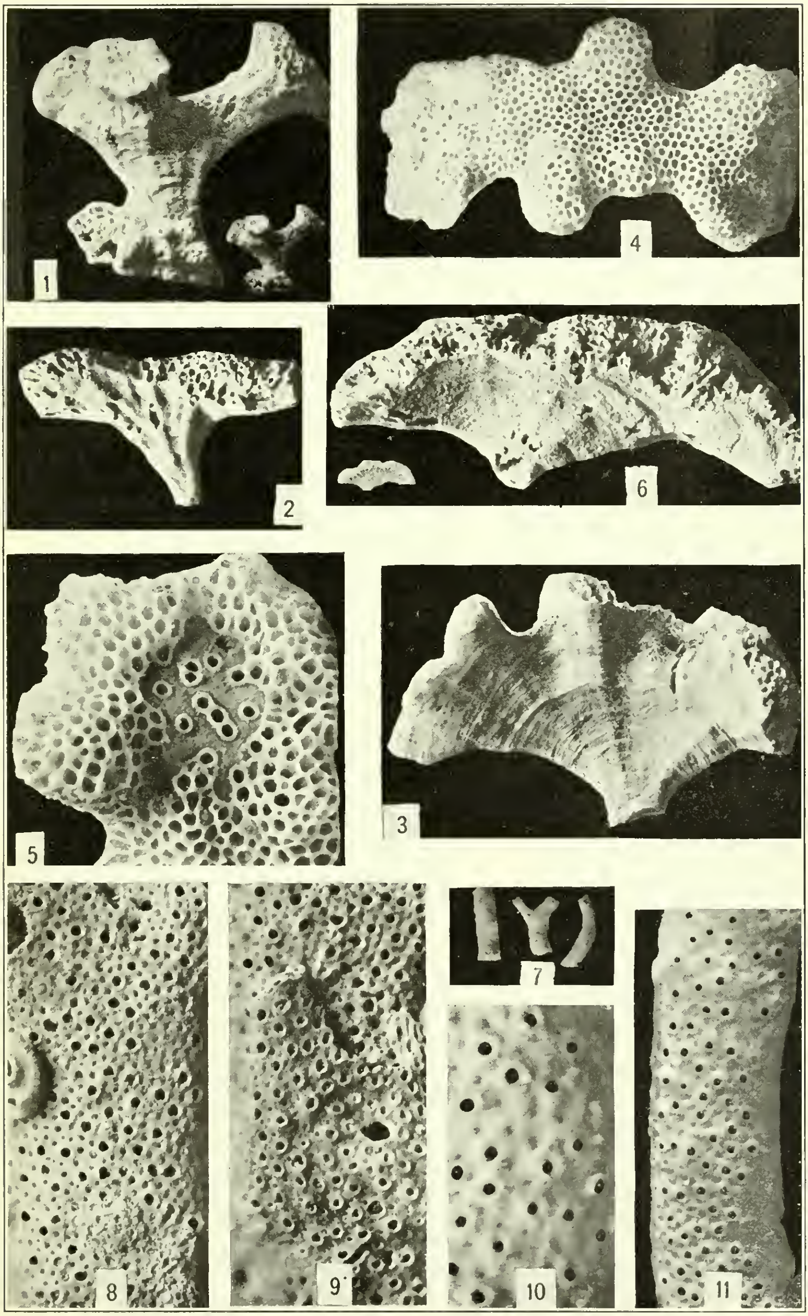
7. Fragments of the ramose zoarium, natural size.

8, 10. Portion of a zoarium with numerous mesopores, ×12 and ×25.

9. Portion of a zoarium, ×12, showing the arrangement of the pellicules.

11. Zoarium, ×12, with salient peristomes and a small number of mesopores.

D. 4807. Cape Tsiuka, Sea of Japan.



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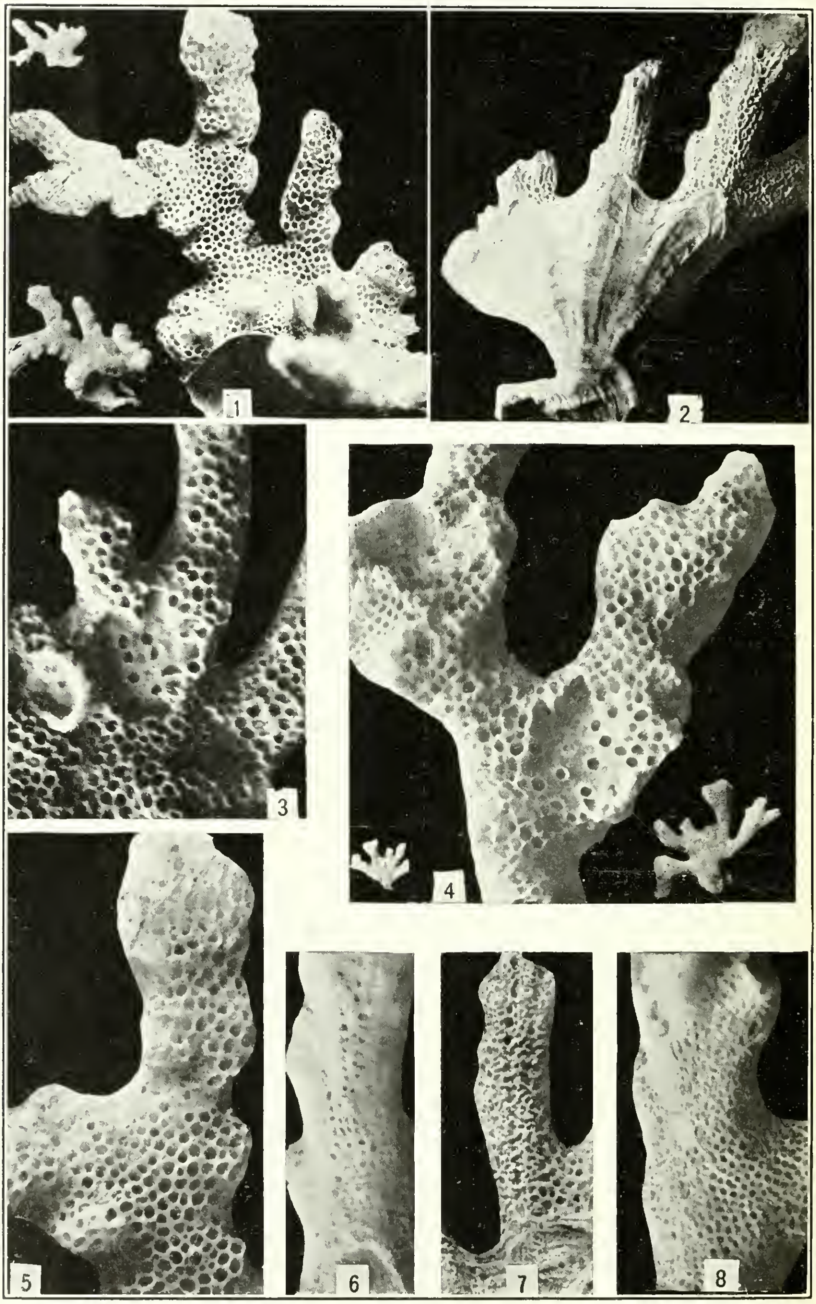

BRYOZOA OF THE PHILIPPINE REGION

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Plate 92

Figs. 1–8. *Tretocycloecia ramosa*, new species (p. 565).

1. The free ramose zoarium, natural size and $\times 2$ and the frontal, $\times 6$.
2. Dorsal of the same, $\times 6$.
3. Base of a digitate oviceelled specimen showing the frontal with apertures little distinct, $\times 12$.
4. Another specimen, $\times 2$ and portion $\times 12$, showing broken oviecll with tubes distinct from mesopores.
5. Branch, $\times 12$, in which the apertures are little distinct from the mesopores.

6, 7. Enlarged portions, $\times 12$ of Figure 2. Large mesopores sometimes occur.

8. Dorsal, $\times 12$, of the specimen (fig. 4.) with small mesopores.

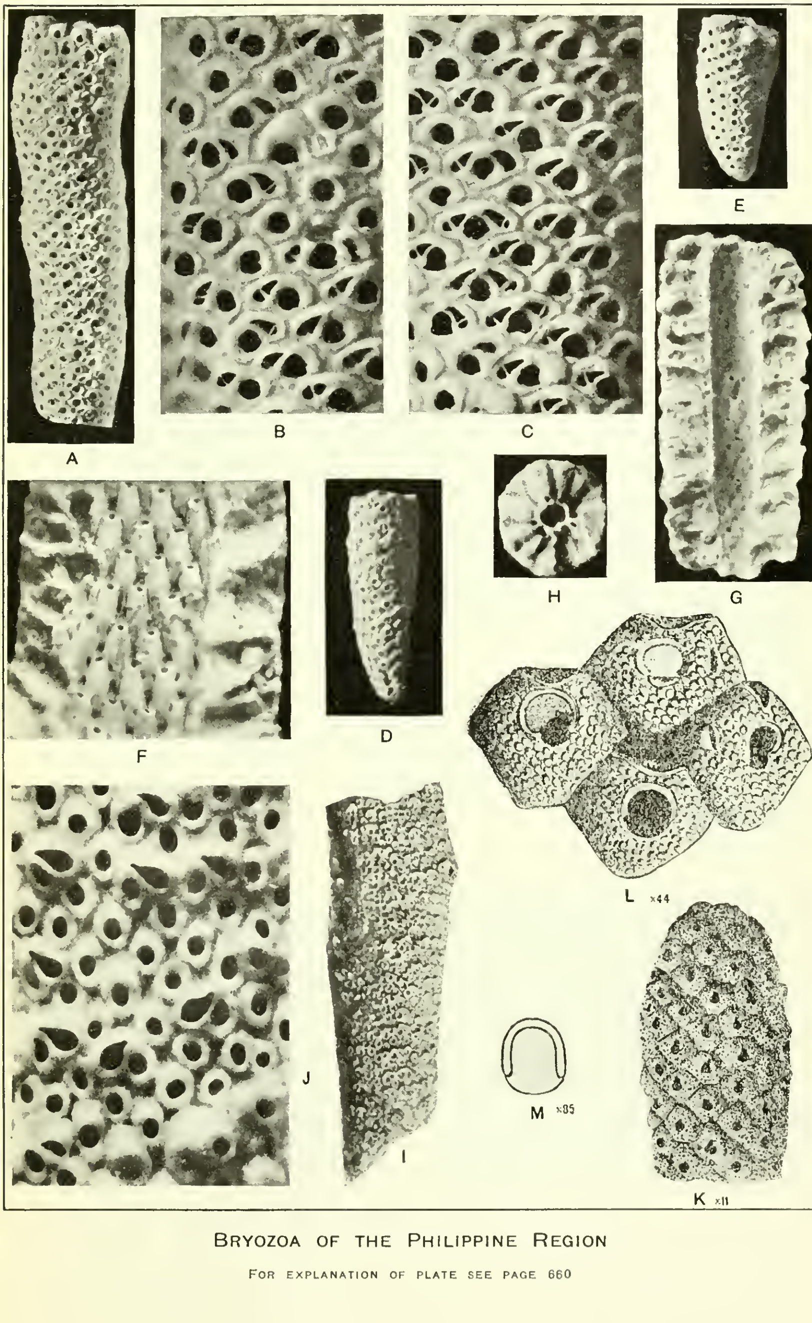
D. 5151. Sirun Island, Sulu Archipelago.

PLATE 93

A–H. *Discoflustrellaria dactylus* D'Orbigny, 1850. A. A long colony in its normal position, ×6. B. Portion of a colony with ovicelled zooecia, ×20. C. Group of zooecia, ×20, with pivot-bearing avicularia. D, E. Extremity of two colonies, ×6, showing ancestrular zooecia at the base. F. Interior face of a colony, ×20, showing the fusiform zooeciules. G. Longitudinal section, ×10, showing the basal zooeciules and the septules. H. Superior face of a zoarium, ×10.

I, J. *Prattia glandulosa* D'Archiac, 1847. I. Colony, ×3. J. Surface, ×12 (after Canu, 1910).

K–M. *Fedora dactylus* Jullien, 1882. K. Zoarium, ×11. L. Zooecia, ×44. (K, L, after Jullien, 1882.) M. Operculum, ×85 (after Waters, 1891).



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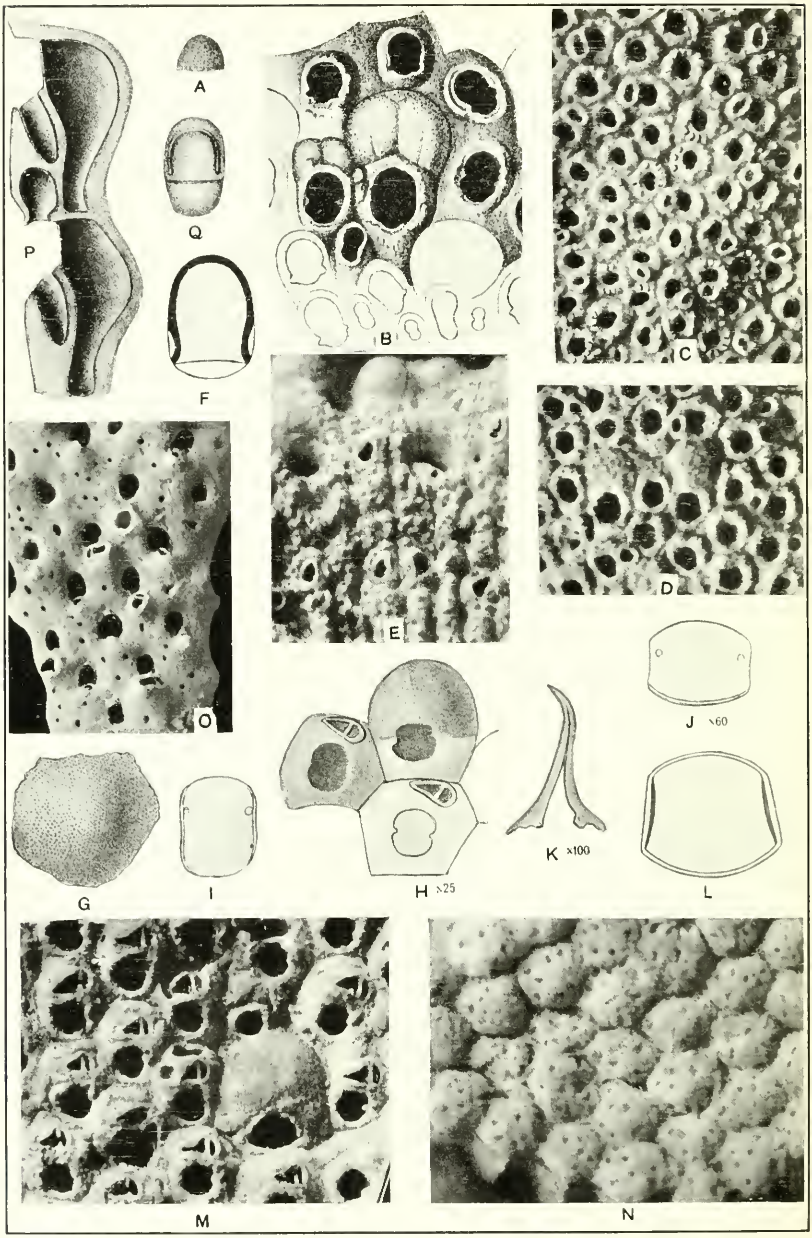

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PLATE 94

A–F. *Mamillopora cupula* Smitt, 1873. A. Zoarium, natural size. B. Ordinary and ovicelled zooecia and avicularia. (A, B, after Smitt, 1873.) C. Portion of a zoarium, ×20, showing the central zooecia. D. Group of ovicelled zooecia, ×20. E. Inferior face, ×20, with sporadic avicularia. F. Operculum, ×85.

G–K. *Anoteropora simplex* Kirkpatrick, 1890. G. Zoarium, natural size. H. Ordinary and ovicelled zooecia, ×25. I. Operculum of an ordinary zooecium, ×60. J. Operculum of ovicelled zooecium, ×60. K. Avicularian mandible, ×100. (A–E, after Kirkpatrick, 1890.)

L–N. *Anoteropora magnicapitata* Canu and Bassler, 1927. L. Operculum, ×85. M. Portion of a discoid colony showing some large ovicells, ×20. N. Inner side of zoarium, ×20.

O. *Frurionella parvipora* Canu and Bassler, 1927. Surface of the bilamellar zoarium, ×20. Cretaceous of Tennessee.

P, Q. *Foveolaria elliptica* Busk. P. Longitudinal section showing an ovicell and an avicularium. Q. An articulated operculum (after Levinsen, 1909).

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[The names treated as valid are printed in roman type, while the synonyms are in italics]

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