Some Demospongiae from the Solomon Islands with Descriptive Notes on the Major Sponge Habitats

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Introduction

During a survey of intertidal ecology and zonation patterns in the Solomon Islands, the 1965 Royal Society of London Expedition made a small collection of sponges.

In this paper we report on the collection with respect to identity, zoogeographic affinities, and the occurrence in the reef habitat of the more physiognomically important species. In addition we include a short account of sponges as a component of the intertidal community pattern. For a general account of Solomon Island intertidal ecology, reference should be made to Morton and Challis (1969).

Up to the present time there have been no records of Demospongiae from the Solomon Islands, but there are recent, reliable publications on collections from surrounding areas. These are De Laubenfels (1954) on the Palau, Marshall, Caroline, and Mariana groups, (1949) on Yap, (1955) on Onotoa; Levi (1961) on the Phillipines, (1967) on New Caledonia; Bergquist (1965) on the Palau Islands, (1969) on Heron Island. All provide records with which the Solomon Islands fauna may be compared.

Unfortunately, the New Guinea, north eastern Australian fauna is poorly known. Most records stem from the work of Ridley (1884) and Burton (1934) and as synonomies in these publications are much in need of revision, faunistic comparisons based upon them are largely meaningless at the present time.

There are thirty-one species of Demospongiae in the present collection. Of these, only one is new, *Dactylia infundibuliformis*, and one, *Liosina paradoxa*, is of particular interest because it affords an opportunity to re-appraise the correct systematic position of the genus *Liosina*. Two damaged specimens are identified to genus only.

The fauna is predominantly Indo-Pacific. Nineteen species are common in shallow water throughout the Indo-Pacific region; nine species are known only from central west Pacific locations; one is known also from S. E. Australia. The geographic affinities of individual species are indicated by abbreviations in the following list.

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Micronesica 7 (1-2):99-121. 1971 (July).

Systematic Synopsis of Species Collected with Habitat Notes

Order Dendroceratida Minchin

Family Aplysillidae Vosmaer

Genus *Aplysilla* Schulze

Aplysilla violacea Lendenfeld, I.P.

Honiara, Guadalcanal—on concrete piles of Shell Oil Wharf, lower eulittoral zone.

Order Dictyoceratida Minchin

Family Spongiidae Gray

Genus *Hippospongia* Schulze

Hippospongia metachromia de Laubenfels, C.W.P.

Tetel Island, Florida group—deep parts of lagoon and subtidal channels

Genus *Heteronema* Keller

Heteronema erecta Keller, I.P. [Pl. 1b]

Tetel Island, Florida group—widely distributed, attached to hard patches in silty moats of sheltered reefs; Matiu Island, New Georgia—beneath *Porites lobata* micro-atolls on the outer coast; Banika Island, Russells group—on low water loose, exposed coral boulders fringing the reef.

Genus *Phyllospongia* Ehlers

Phyllospongia foliascens (Pallas), I.P. [Pl. 1a]

Tetel Island, Florida group—hard bottom of a shallow reef lagoon.

Phyllospongia papyracea (Esper), I.P.

Tetel Island, Florida group—on sandy or silty bottoms with *Thalassia*, *Halimeda*, and soft corals.

Genus *Hyatella* Lendenfeld

Hyatella intestinalis Lamarck, I.P.

Tetel Island, Florida group—on shaded bases of dead *Porites* and under igneous low tidal boulders in moderate shelter.

Genus *Psammaplysilla* Keller

Psammaplysilla purpurea (Carter), I.P.

Tetel Island, Florida group—on bases and other shaded parts of dead *Porites* and attached to hard patches in silty moats of the sheltered reef.

Family Dysideidae Gray

Genus *Dysidea* Johnston

Dysidea herbacea (Keller), I.P.

Tetel Island, Florida group—in shallow, silty lagoons of the sheltered reef.

Dysidea chlorea de Laubenfels, C.W.P.

Tetel Island, Florida group—in dark interspaces of dead *Porites* in the sheltered reef moat.

Order Haplosclerida Topsent

Family Callyspongiidae de Laubenfels

Genus *Callyspongia* Duchassaing and Michelotti

Callyspongia diffusa Ridley, I.P.

Cape Esperance, N.W. Guadalcanal in sublittoral fringe of living coral in conditions of moderate exposure and strong wave surge.

Genus *Dactylia* Carter

Dactylia infundibuliformis nov. sp. [Pl. 2c, 4a, 4b]

Tetel Island, Florida group—attached to hard bases in shallow reef lagoons; Matiu Island, New Georgia—sandy bottom of rubble-strewn, shallow reef flat.

Family Agelasidae Verrill

Genus *Agelas* Duchassaing and Michelotti

Agelas mauritiana (Carter), I.P.

Tetel Island, Florida group—with loose coral boulders near low water fringing reef in moderate shelter; Komimbo Bay, West Guadalcanal in sublittoral fringes sheltered from light under the bases of coral heads; Matiu Island, New Georgia under *Porites* micro-atolls on the outer coast.

Family Haliclonidae de Laubenfels

Genus *Xestospongia* de Laubenfels

Xestospongia exigua (Kirkpatrick), I.P.

Tetel Island, Florida group—on bases of dead coral in shallow, sheltered lagoons near low tide mark; Pirikale Island, Maroco lagoon, New Georgia—under low tidal coral boulders in areas of moderate shelter; Komimbo Bay, East Guadalcanal on the sheltered part of the fringing reef among dead coral rubble.

Order Poecilosclerida Topsent

Family Adociidae de Laubenfels

Genus *Adocia* Gray

Adocia sp.

Mauraunibina Island, Marau Sound; East Guadalcanal under low tidal boulders and dead *Acropora* tables.

Family Desmacidonidae Gray

Genus *Gelliodes* Ridley

Gelliodes callista de Laubenfels, C.W.P.

Komimbo Bay, West Guadalcanal—under bases of coral heads in the sublittoral fringe.

Genus *Liosina* Thiele

Liosina paradoxa Thiele, C.W.P. [Pl. 3a]

Tetel Island, Florida group—on a subtidal coral face, east reef.

Family Ophlitaspongiidae de Laubenfels

Genus *Neofolitspa* Bergquist

Neofolitspa dianchora (de Laubenfels), C.W.P.

Tetel Island, Florida group—on shallow channels of a sheltered reef near low water mark.

Family Microcionidae Hentschel

Genus *Clathria* Schmidt

Clathria reinwardti Vosmaer, I.P.

Matiu Island, New Georgia—under *Porites* micro-atolls on the outer coast.

Order Halichondrida Topsent

Family Halichondriidae Gray

Genus *Halichondria* Fleming

Halichondria sp.

Matiu Island, Marovo lagoon, New Georgia—sublittoral fringe of a moderately exposed shore with strong water movement.

Family Hymeniacidonidae de Laubenfels

Genus *Hymeniacidon* Bowerbank

Hymeniacidon aldis de Laubenfels, C.W.P.

Tetel Island, Florida group—in sheltered reef lagoons.

Order Axinellida Bergquist

Family Desmoxyidae Hallmann

Genus *Myrmekioderma* Ehlers

Myrmekioderma granulata (Esper), I.P. [Pl. 2a]

Tetel Island, Florida group—on hard patches in shallow silty lagoons; Matiu Island, New Georgia—under micro-atolls at low water.

Order Hadromerida Topsent

Family Placospongiidae Gray

Genus *Placospongia* Gray

Placospongia melobesioides Gray, I.P.

Komimbo Bay, West Guadalcanal—under coral bases in sublittoral fringe.

Family Spirastrellidae Hentschel

Genus *Spirastrella* Schmidt

Spirastrella vagabunda Ridley, I.P.

Komimbo Bay, West Guadalcanal on subtidal coral rubble in sheltered inner part of reef flat.

Spirastrella coccinea Duchassaing and Michelotti, I.P.

Tetel Island, Florida group—on shaded parts of dead *Porites*.

Family Tethyiidae Gray

Genus *Tethya* Lamarck

Tethya robusta Bowerbank, I.P.

Paruru reef, Marau Sound, East Guadalcanal—under low tidal coral boulders.

Tethya seychellensis (Wright), I.P.

Komimbo Bay, West Guadalcanal—from coral rubble on sheltered reef flat.

Order Epipolasida Sollas

Family Jaspidae de Laubenfels

Genus *Jaspis* Gray

Jaspis coriacea Carter, C.W.P./A.

Tetel Island, Florida group—under movable igneous boulders in moderate shelter.

Genus *Asteropus* Sollas

Asteropus sarasinorum (Thiele), C.W.P. [Pl. 2b]

Tetel Island, Florida group—attached to coral rocks in shallow, sheltered reef moats.

Order Choristida Sollas

Family Ancorinidae de Laubenfels

Genus *Ancorina* Schmidt

Ancorina acervus (Bowerbank), I.P. [Pl. 3b]

Matiu Island, New Georgia—outer side under *Porites* micro-atolls.

Family Stellettidae Sollas

Genus *Stelletta* Schmidt

Stelletta durissima Bergquist, C.W.P.

Komimbo Bay, West Guadalcanal—from seaward edge of reef flat under coral boulders in moderate wave action.

Order Spirophorida Bergquist

Family Tetillidae Sollas

Genus *Cinachyra* Sollas

Cinachyra australiensis (Carter), I.P.

Kira Kira, San Cristobel—encrusting the bottom of high-tidal erosion pools; Cape Esperance, N.W. Guadalcanal—from sublittoral, vertical igneous rock face behind the fringing reef in region of moderate exposure.

Abbreviations: I.P.=Indo-Pacific
C.W.P.=Central West Pacific
C.W.P./A.=Central West Pacific/Australia

Systematic Notes

For most species, descriptive details and distribution data are available in Bergquist (1965). We will comment here only on species which are of particular systematic interest or of ecological importance, or which are not discussed in either the above paper or in de Laubenfels (1954).

Color notations are according to Munsell (1942). Means quoted in brackets after measurements are based on ten measurements unless otherwise stated.

Order Dendroceratida

Genus *Aplysilla*

Aplysilla violacea Lendenfeld

Aplysilla violacea Lendenfeld, 1883, p. 237, pl. 10, pl. 11, pl. 12.

Remarks: This sponge is easily distinguished by its dark purple color (PR 2/4) which is unchanged by alcohol fixation. It is always a thin crust on the substrate and the surface is marked by isolated conulose projections up to 3.0 mm high. In the Australian region the sponge can produce upright lamellae as described by Lendenfeld (1889). This growth form is never found in interidal specimens.

Previous Distribution: Australia (Lendenfeld), New Zealand, Fiji, Hawaii (Bergquist).

Order Dictyoceratida
Genus *Phyllospongia*
Phyllospongia papyracea (Esper)

Spongia papyracea Esper, 1794, p. 38.

Remarks: This species is variable in growth form and surface characteristics throughout the Indo-Pacific area. It always has areas of smooth surface and a tendancy to produce many upright lobes. In these respects it can be distinguished from *Phyllospongia foliascens* (Pl. 1a). Records of *P. papyracea* from New Zealand by Lendenfeld (1889) are erroneous.

Previous Distribution: Indo-Pacific

Genus *Hyattella*
Hyattella intestinalis Lamarck

Spongia intestinalis Lamarck, 1814, p. 439.

Remarks: This species has been well illustrated and described by Topsent (1931). The shallow water specimens in the present collection have not developed the full tubular form characteristic of large specimens, but all fragments are typically clathrous. The surface of the living sponge is very fine, covered with conules except where the dermal membrane is streteched tight across the enlarged sub-dermal cavities.

Order Haplosclerida
Genus *Dactylia*
Dactylia infundibuliformis nov. sp.
(Pl. 2 c; Pl. 4a, b)

Holotype Australian Museum Reg. No. Z.3568

Description: A funnel-shaped sponge 20 cm high, 20 cm wide across the mouth of the funnel, 3.0 cm wide at the point of attachment. The texture is tough and pliable, even the attachment region remains compressible. The lamella is 1.5–3.0 mm thick.

Color: Alive and in spirit pale gold (rY 7/4).

Surface: The external poral surface is smooth. The internal oscular surface has weakly developed concentric ridges. Oscules are small, 0.1–0.5 mm in diameter and scattered over the entire surface of the sponge.

Skeleton: The skeleton is made up of a regular spongin B mesh organised into a tangential dermal skeleton arranged in hexagonal units, overlying a system of primary ascending fibers which are connected by secondary transverse fibers. In the rectangular meshes of this skeleton a system of fine ramifying tertiary fibers is developed. (Pl. 4 a, b). All fibers are free of inclusions.

Dimensions of the fibers are variable within wide limits, approximate measurements in microns are tabulated below:

Meshes of dermal skeleton	670–1050	(860)
Diameter of primary dermal fibers	20–55	(38)
Diameter of secondary dermal fibers	6–14	(9.5)
Diameter of primary endosomal fibers	40–130	(70)
Diameter of secondary endosomal fibres	20–32	(27)
Diameter of tertiary fibers	5.0–9.5	(7.0)

Discussion: Within the genus *Dactylia, D. infundibuliformis* is closest to *D. tuba* Lendenfeld from Torres Strait, only these two species have an approximate tubular form. The two sponges differ in details of habit, *D. tuba* has several shallow oscular tubes arising from a solid base, *D. infundibuliformis* is a single, greatly expanded funnel diverging from a weakly compacted base. The dermal skeleton in *D. tuba* has very fine secondary fibers and is a substantially more compact reticulum than that in *D. infundibuliformis*. The latter species also has a well marked tertiary fiber reticulation in the endosome (Pl. 4 b.). Color in life further distinguishes the species, greyish purple for *D. tuba* and pale gold for *D. infundibuliformis*.

In reviewing species of *Dactylia*, the genus has been construed broadly and species assigned to *Chalinopsilla* Lendenfeld which seems clearly to be a synonym of *Dactylia* have also been considered. The important characteristics for generic definition are the presence of a tangential dermal skeleton similar to that of *Callyspongia* in conjunction with the absence of a spicule skeleton. There is need for a revision of the genus *Dactylia* in order to remove species like *Chalinopsilla arborea* Lendenfeld which show strong affinities with the Haliclonidae.

Order Poecilosclerida

Genus *Liosina*

Liosina paradoxa Thiele

(Pl. 3 a)

Liosina paradoxa Thiele, 1899, p. 17, pl. 2, fig. 5, pl. 4, fig. 4, pl. 5, fig. 9.

Remarks: As Thiele's (1899) specific name for this sponge implies, he was to some extent uncertain of its affinities at the time of description. In the discussion accompanying the type description he equivocates between the Haliclonidae, Desmacidonidae, and the Ectyoninae (*Echinodictyum*) for the nearest relatives of *Liosina*. De Laubenfels (1936) considered the sponge to belong to the Desmacidonidae because a fleshy texture is more typical of this group than of the Haliclonidae. While this is undoubtedly true, the de Laubenfels concept of Desmacidonidae was too wide to be useful, including for example myxillids (*Iotrochota*) and coelosphaerids

(*Cornulum*). Furthermore, he grouped the entire family within the Haplosclerida, an assignment which cannot be supported even on the basis of de Laubenfels own arguments. We are left then with no clear idea of where *Liosina* belongs.

Burton (1937) recorded a second specimen of *L. paradoxa* from Krusadai Island in the Gulf of Manaar. He gives very few descriptive details but assigned the genus to the Axinellidae and thus removed it to a different subclass in terms of present classification.

The occurrence of *L. paradoxa* in the present collection affords an opportunity to resolve the question of its systematic position.

On the basis of our observations we consider that *Liosina* belongs in the Desmacidonidae which we construe as a family of Poecilosclerida containing genera with diactinal or monactinal megascleres, various microscleres, and reticulate skeleton with little spongin. A characteristic feature is the occurrence of a single megasclere type throughout the sponge. Genera close to *Liosina* are *Strongylacidon* (Lendenfeld), *Guitarra* (Carter), and *Desmacidon* (Bowerbank).

The single specimen in the Solomon Islands collection is a thick spreading mat, 2.0–5.0 cm deep; with short lobes 1.0–2.0 cm high extending from the upper surface, these have no doubt been emphasized by fixation which has caused the fleshy matrix to contract around the rather sparse spicule skeleton. The texture of the sponge is rubbery, color in life and spirit pale brown (Y–R–Y 6/2).

The spicule tracts form a very weakly developed reticulum and are widely separated in the sponge. At points where tracts reach the surface they are bundles of 20–30 spicules, 200–250 μ in diameter. Between spicule tracts at the surface, small groups of megascleres are orientated tangentially. Two conspicuous features of *Liosina*, also mentioned by Thiele are the presence, particularly along canal linings and at the surface, of dense concentrations of pigment granules, and the presence of polychaetes throughout the sponge matrix. The latter belong to a species now known to be a specific commensal of *Liosina paradoxa* (Gibbs, P., personal communication). The megascleres are all diactinal, strongyles mainly, occasionally oxeas 640–800 $\times$ 5–12 μ (700 $\times$ 9.0 μ) and have been well figured by Thiele.

Previous Distribution: Celebes, Krusadai Island.

Genus *Clathria*

Clathria reinwardti Vosmaer

Clathria reinwardti Vosmaer, 1880, p. 152.

Remarks: This sponge was well described and figured by Bergquist and Tizard (1967) who recorded it from Darwin. Recent field work by one of us [Bergquist] in New Guinea has revealed *Clathria reinwardti* to be extremely common along the south coast. It occurs in shallow water branching out from under coral boulders to form large tangled masses. The brick red color (rY–R 5/10) and irregular lumpy surface are quite characteristic.

Previous Distribution: Moluccas, Torres Strait, Darwin.

Ecological Notes

Intertidal sponges in the Solomon Islands occur in greatest numbers and variety on shores of moderate shelter where wave action and water movement are not extreme. In such places, a fringing reef is typically several hundred meters across, with the greater part of its width a shallow moat, sometimes no more than a few inches deep at low water. (See profile in Figs. 1–A and 2–A). The moat is generally floored by a rubble of loose coral fragments; in its seaward part, there may be a thicket of living or dead long-branched *Acropora, Montipora*, or branched *Porites*, generally cemented and often roofed over distally by a canopy of calcareous Rhodophyceae or *Halimeda*. Most living coral is on the seaward rampart, with *Porites* microatolls, heads of *Symphyllia, Goniatrea*, and *Platygyra*, and tables of *Acropora surculosa*.

Within the reef moat the major sponge habitats are as follows:

1. Reef flats with sandy or rubble-strewn moat bottom.

In these sheltered stretches which are tepid at a mid-day low tide, the bottom is often covered by sea grass *Thalassia hemprichii*. Two species of the green alga *Halimeda* are also frequent. Several large and conspicuous sponges are found in this habitat. *Phyllospongia papyracea* is a brown funnel-shaped, many lobed sponge, attached by a narrow base to hard objects below the surface (Fig. 1–B4). *Phyllospongia foliacens* has a more regular funnel form and finely crenulated surface (Pl. 1a and Fig. 1–B3). Another common upright funnel shaped species is *Dacylia infundibuliformis* (Pl. 2c) which is distinguished by its rubbery texture and multiple internal oscular papillae. It is sometimes rolled into an incomplete funnel, as diagrammed in Fig. 1–B6. *Dysidea herbacea* may be either funnel-like or have its compressible branches arranged in a flexible, digitate lamella (Fig. 1–B1), as illustrated by Bergquist (1965, Fig. 7).

Where the lagoon deepens, the largest of the funnel-shaped sponges is found. This is *Hippospongia metachromia*, black over its concave external surface, pale yellow (Y–R–Y 6/16) internally with large oscules up to 2.0 cm in diameter opening from wide exhalant canals (Fig. 1–B8). These canals are often crowded with axiid shrimps.

Xestospongia exigua is also abundant in this habitat. It shows consistant coloration; dark brown externally (YR 4/6), pale brown internally (Y–R–Y 6/4) but highly variable growth form, most commonly forming upright branches or thick crusts investing the bases of live and dead coral (Fig. 1–B9). A range of growth forms is illustrated by Bergquist (1965, Fig. 14).

Where the moat is silted the massive, digitate *Myrmekioderma granulata* occurs, it is characterised by the roughly hexagonal pattern of the superficial exhalent canals (Pl. 2a and Fig. 1–B7) and by an orange brown external color (YR 6/8) over a lemon yellow endosome (Y 7/8). *Neofilitispa dianchora* is often associated with *M. granulata*. It is characterised by bright red color (YR 4/10) lumpy irregular surface and by exuding a scarlet mucus when pressed.

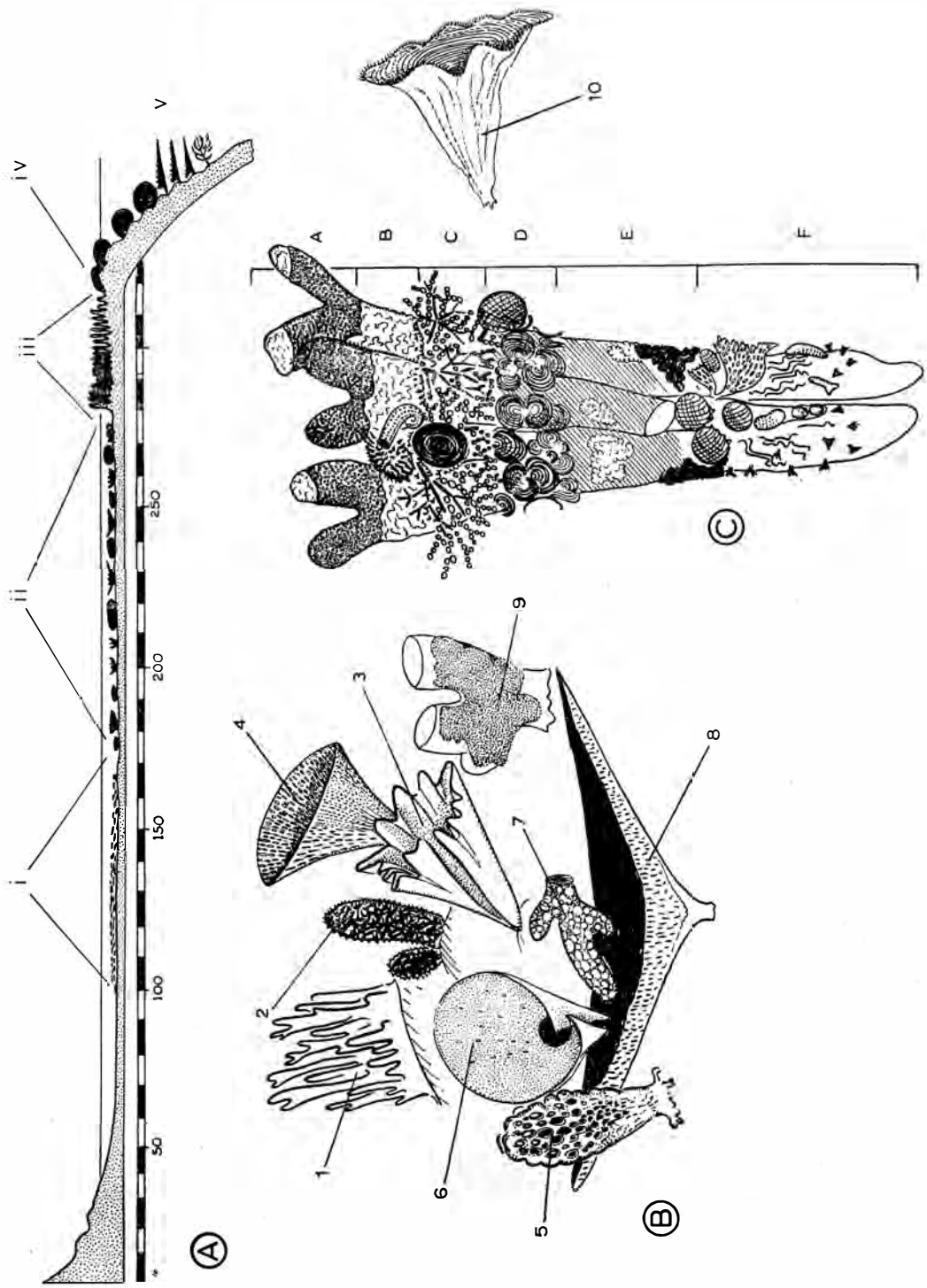
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Fig. 1. Gaskell Island, Florida Group.

A. Profile of a fringing reef in moderate shelter, showing the following zones: i. inshore shallow water reef-flat with coral finger rubble ii. zone of *Fungia, Porites*, and small *Acropora* heads. iii. emergent zone of dead upright columns of *Porites* (c.f. *compressa*). iv. wave-break zone (low tide) of micro-atolls of *Porites* (c.f. *lobata*). v. shallow subtidal zone of *Porites, Symphyllia, Goniastraea, Acropora, Stylophora*, and *Pocillopora*.

B. A group of characteristic sponges to show growth forms from the shallow reef lagoon: 1. *Dysidea herbacea*. 2. *Heteronema erecta*. 3. *Phyllospongia foliascens*. 4. *Phyllospongia papyracea*. 5. *Asteropus sarasinorum*. 6. *Dactylia infundibuliformis*. 7. *Myrmekioderma granulata*. 8. *Hippospongia metachromia* 9. *Xestospongia exigua*. 10. *Callyspongia* sp. (found in shaded crevices).

C. Columns of *Porites* (c.f. *compressa*) showing the zones mentioned in the text: a. living coral tips. b. bleached *Neogoniolithon* sp. c. *Halimeda, Hypnea*, and *Valonia* spp. d. *Peyssonnelia* spp., with small specimens of *Tethya*. e. shaded zone with encrusting aplysillid sponge and thin crust of pink *Lithophyllum* f. general hypobion of unlighted zones.

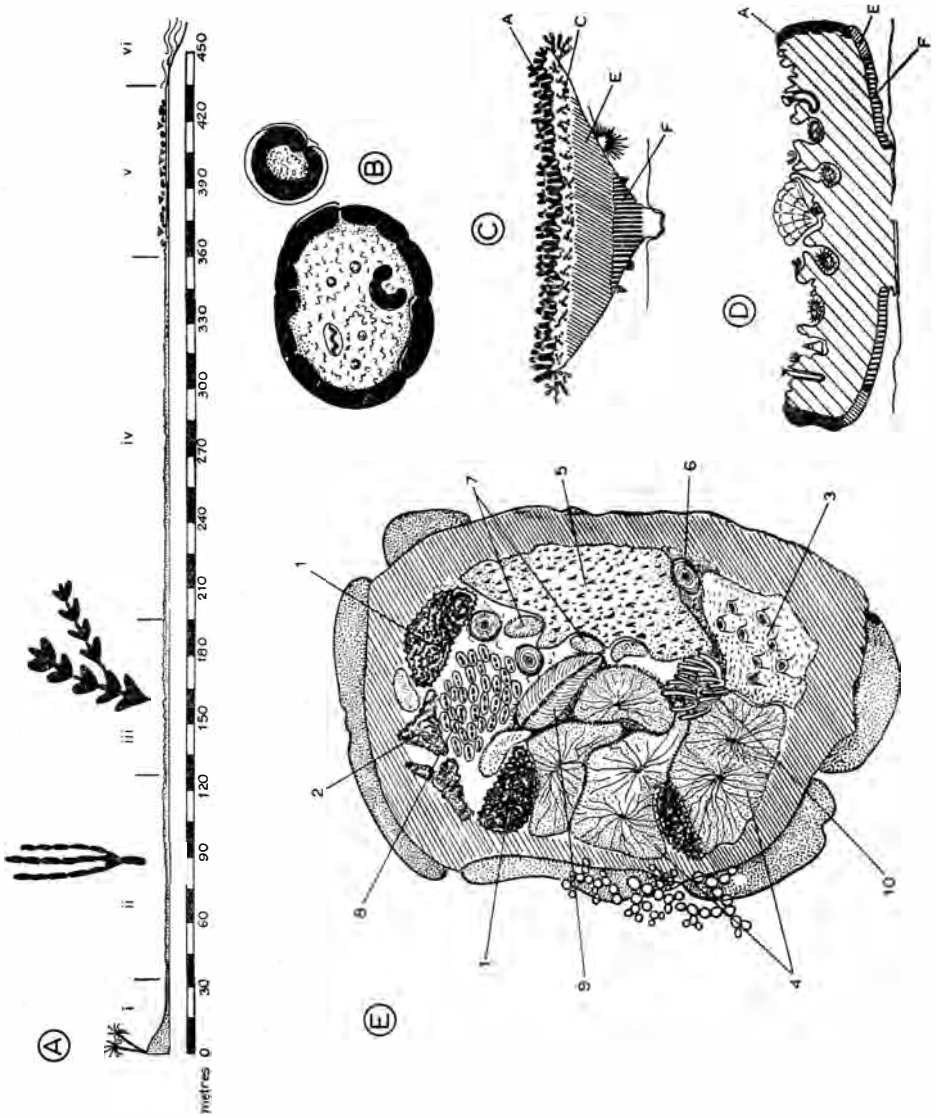
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Fig. 2. Maraunbina Island, East Guadalcanal.

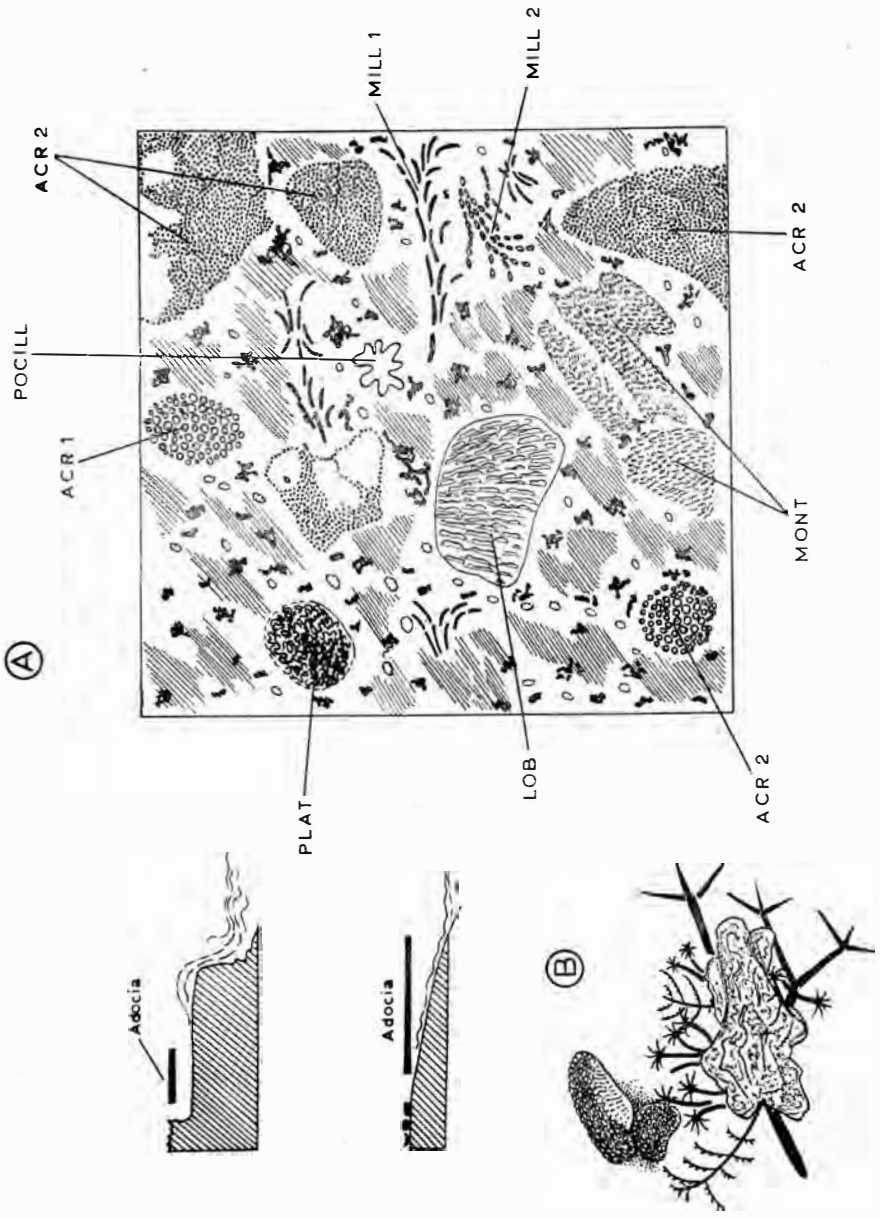
A. Section of a fringing reef with wave attack at its margin, and with the following zones: i. upper and middle shore of beach-rock. ii. shallow low-tidal reef flat with *Halimeda cylindracea*. iii. shallow low-tidal reef flat with *Halimeda opuntia*. iv. zone of coral rubble. v. zone with movable cover of *Acropora* tables, and symphylliid and faviid heads, emersed at low water. vi. smooth off shore slope at surf-break level (see quadrat in Fig. 3).

B. *Porites* micro-atolls viewed from above, living coral in black.

C. *Acropora suroulosa* table side view, with shaded zones corresponding to those in Fig. 1–C.

D. *Symphyllia* micro-atoll with similar zonation.

E. Under surface of a small *Porites* micro-atoll, showing the composition of the rich sponge community, and other hypobion. The stippled areas at the periphery are living coral, and the cross-hatched zone is of shaded pink lithophyllum, with *Halimeda*, at left. 1. *Heteronema erecta*. 2. rich blue keratose sponge, *Psammaplysilla*, n. sp. 3. orange *Halichondria* sp. with tall tubular oscules. 4. *Spirastrella coccinea* scarlet with white surface canals forming a thin surface crust. 5. spreading sheet of a brown dictyoceratid sponge. 6. *Sycon* sp. 7. small pink colonies of the compound ascidian *Didemnum* sp. (c.f. *candidum*). 8. sheet of a small, simple ascidian, yellowish brown with scarlet siphon tips. 9. the sponge-feeding chiton *Cryptoconchus japonicus*. 10. a white cyclostomatous polyzoan.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MILL 2
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Adocia
Adocia
B

Fig. 3. Maraunibina Island, Marau Sound, East Guadalcanal.

A. A two meter-square quadrat showing the distribution of the blue-grey sponge *Adocia* sp.* (small black clumps) with other encrusting organisms on a low tidal slope swept by light surge.

ACR 1	low heads of *Acropora* fingers.
ACR 2	mauve crust of low relief *Acropora* (c.f. *palmeri*).
LOB	the alcyonarian *Lobophytum expansum*
MILL 1	*Millepora forskal.*
MILL 2	*Millepora murrayi.*
MONT	a grey-brown surface encrusting *Montipora* sp.
PLAT	*Platygyra lamellina.*
POCILL	*Pocillopora* sp.
	Fine cross-hatching is an enamel of a pink *Lithophyllum*

* This species is extremely close to *Adocia coerulea* (Hechtel) from the West Indies, however the disjunct distribution argues against specific identity of the two sponges.

Fig. 3. Inset (left)

A. above: zone of *Adocia* sp. in tidal bench pools behind immediate surf. impact. below: seaward range of *Adocia* (as in quadrat) in lighter surge.

B. A clump of *Adocia* sp. associated with *Xenia* polyps, a pennariid hydroid, and segments of the red alga *Amphiroa*. The green alga *Dictyosphaeria versluysii* is shown alongside.

Attached to firmer coral substrate the conspicuous *Asteropus sarasinorum* is found, orange in color (yY–R 6/10), up to 30 cm high forming irregular or barrel shaped masses (Pl. 2–B). In similar locations large specimens of *Heteronema erecta* are common and unmistakably characterised by jet black color and stellate surface pattern (Pl. 1–B).

2. On loose mobile coral rubble.

On *Acropora* and *Montipora* finger rubble lying within the moats, the common sponges are *Spirastrella vagabunda, Xestospongia exigua,* and *Myrmekioderma granulata. Tethya seychellensis* was found abundantly within the dead scrolls of *Montipora foliosa.*

3. On massive or branched corals, living or dead, in low illumination.

Dimly lighted habitats are provided, first, by closely aggregated vertical columns of *Goniopora* species or *Porites.* The zones of organisms, arranged primarily in response to diminishing light, have a characteristic order (Fig. 1–c). They may be listed as follows:

a. lighted surface zone with exposed living tips of coral branches.
b. short bleached zone, generally with red alga *Neogoniolithon myriocarpon.*
c. canopy of calcareous red algae, mainly *Amphiroa* species, sometimes *Lithophyllum moluccense*, and *Halimeda incrassata*, occasionally *Hypnea nidulans* and *Laurencia* spp. Small specimens of both *Tethya* spp. are common here.
d. zone of fragile, pink and dark-red *Peyssonnelia* spp.
e. zone of dimly lighted mauve or pink *Lithophyllum.*
f. dark zone with no algae but sessile and encrusting filter feeding animals. This is a zone rich in sponges including almost all those shown in Fig. 2–E under micro-atolls. This type of community is characteristic under-boulder cover on almost all temperate and tropical shores. The major components are compound ascidians, especially *Didemnum* species; Polyzoa, especially the sheet-like Cheilostomata and clathrate Retroporidae; serpulid tube-worms, especially *Hydroides* species and *Filograna.* In the tropics we add sessile colonial Foraminifera, including bright red splashes of *Homotrema* and *Miniacina.*

A second arrangement of shaded zones is shown by micro-atolls, *Acropora* tables, and faviid heads, under which there is a comparable series of habitats, illustrated in Fig. 2–A. These are concentric in their arrangement rather than vertically banded. Heavy mounds of *Porites, Symphyllia* and faviids must be levered over to disclose a rich hypofauna, with zone vi covering the whole surface adjacent to the ground. Somewhat more accessible but less rich faunistically are the undersides of shelving *Acropora* tables, in the Solomon Islands chiefly *Acropora surculosa.*

A typical sponge association beneath a *Porites* micro-atoll is shown in Fig. 2–B and 2–E. Small tubular *Sycon* sp. mingle with soft thick crusts of *Halichondria* sp., yellow brown in color (Y–R–Y 7/4) and characterised by high oscular chimneys.

The tomato red (yR 5/10) *Spirastrella coccinea* covers large areas, small lumps of *Heteronema erecta* are common, and the solid spheres of *Tethya robusta* are abundant. Two *Psammaplysilla* species also occur spreading over the substrate, the common *P. purpurea* is yellow, yellow green to black (see Bergquist, 1965) the other is dark blue in color and as yet undescribed. The specimens from the Solomon Islands were poorly preserved and not adequate for complete description.

In the same shaded habitats *Jaspis coriacea, Callyspongia diffusa, Clathria reinwardti, Agelas mauritiana, Placospongia melobesiodes, Gelliodes callista, Ancorina acervus* (Pl. 3 b), and *Stelletta durissima* are also found.

4. Under igneous boulders and on zoned surfaces other than coral, the sponge population is smaller. Higher in the intertidal zone on a sheltered shore at Tetel Island, volcanic boulders had a spread of *Halichondria* spp. accompanied by byssus fixed arcids, *Chama* spp., and a serpulid tubeworm. At Cape Esperance, on a vertical surface in moderate wave exposure *Hymeniacidon aldis* was present amidst *Jania* turf and *Phyllochaetopterus* worm tubes.

5. A sponge habitat very different from the above is on well lighted surfaces on the seaward slope of the reef. In conditions of moderate wave exposure this habitat may occur at the actual seaward reef margin (e.g. Maraumibura Is., E. Guadalcanal). On coasts of greater exposure comparable sites lie behind the surf crest of calcareous algae. One sponge, an *Adocia* species, blue grey in color and with the soft crumbling texture characteristic of adociids, is very prominent in these habitats. It can spread widely over the surface or be concentrated in small tufts, occasionally it forms a complex investing the bases of *Aglaopenia* and the segments of *Amphiroa anastomosans* or mingling with *Xenia* polyps. A two meter square quadrat of a characteristic seaward slope with its encrusting and prostrate biota is illustrated in Fig. 3. Corals which are common here include the sheet like *Acropora palmeri*, a *Montipora*, depressed plaques of *Platygyra lamellina*, and wave resistant flanges of *Millepora*. The soft coral *Lobophytum expansum* forms rubbery sheets and the only important algae are a mauve *Lithophyllum* paint and the green cartilaginous *Dictyosphaeria.*

ACKNOWLEDGEMENTS

We wish to acknowledge the assistance of Mr. G. W. Batt in the preparation of Plates 2, 3, and 4.

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PLATE 1

Two of the larger dictyoceratid sponges common on Solomon Island reefs.

(a) *Phyllospongia foliascens* (Pallas)

(b) *Heteronema erecta* Keller

PLATE 2

Three large sponges from the reef flat and lagoon bottom.

(a) *Myrmekioderma granulata* (Esper)

(b) *Asteropus sarasinorum* (Thiele)

(c) *Dactylia infundibuliformis* nov. sp. HOLOTYPE

PLATE 3

(a) *Liosina paradoxa* Thiele a species fround only on submerged coral faces.

(b) *Ancorina acervus* (Bowerbank) one of the few massive species occurring under coral boulders.

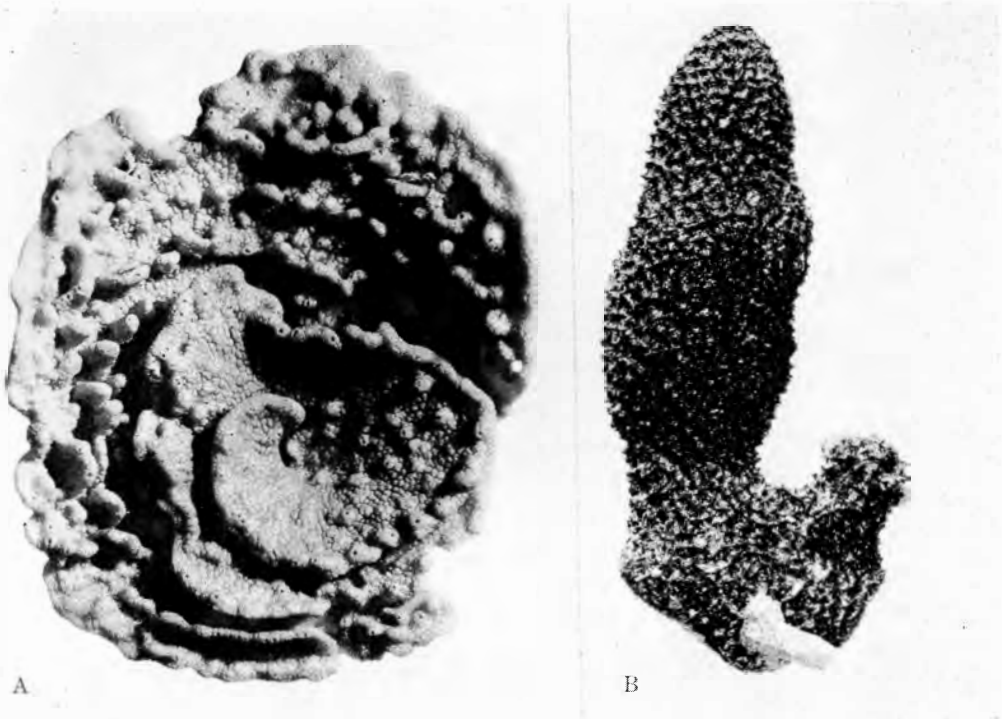
PLATE 4

Skeletal morphology of *Dactylia infundibuliformis* nov. sp.

(a) Surface view of the dermal skeleton showing the six-rayed arrangement of the primary dermal fibers converging upon the primary ascending endosomal fibers (hubs). Secondary dermal fibers ramify between the primaries ($\times 80$)

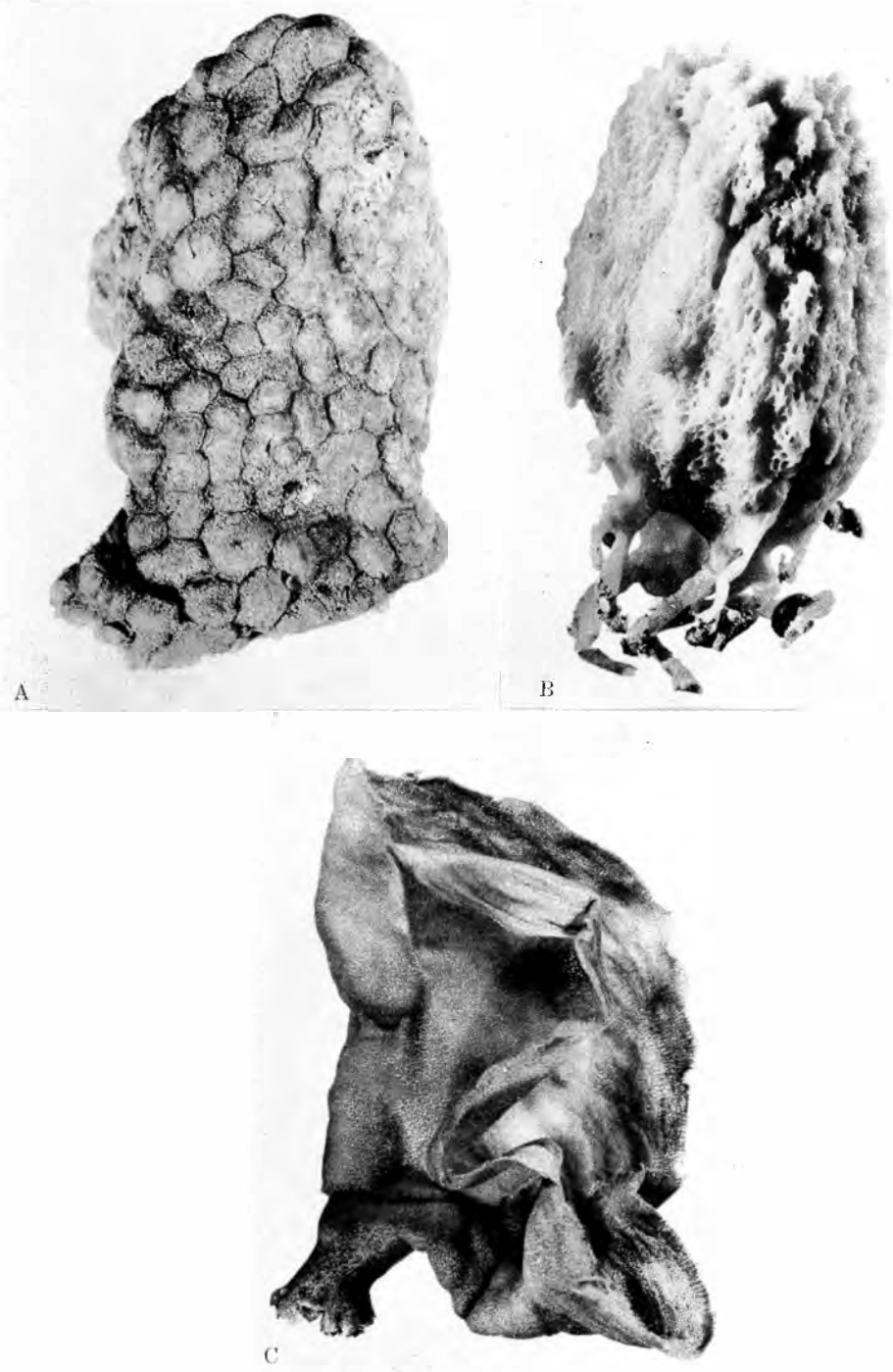
(b) Vertical section of the lamella to show the arrangement of the endosomal skeleton with fasciculate ascending primary fibers, stout, transverse secondary fibers and fine tertiary reticulum. Outer surface uppermost. ($\times 80$)

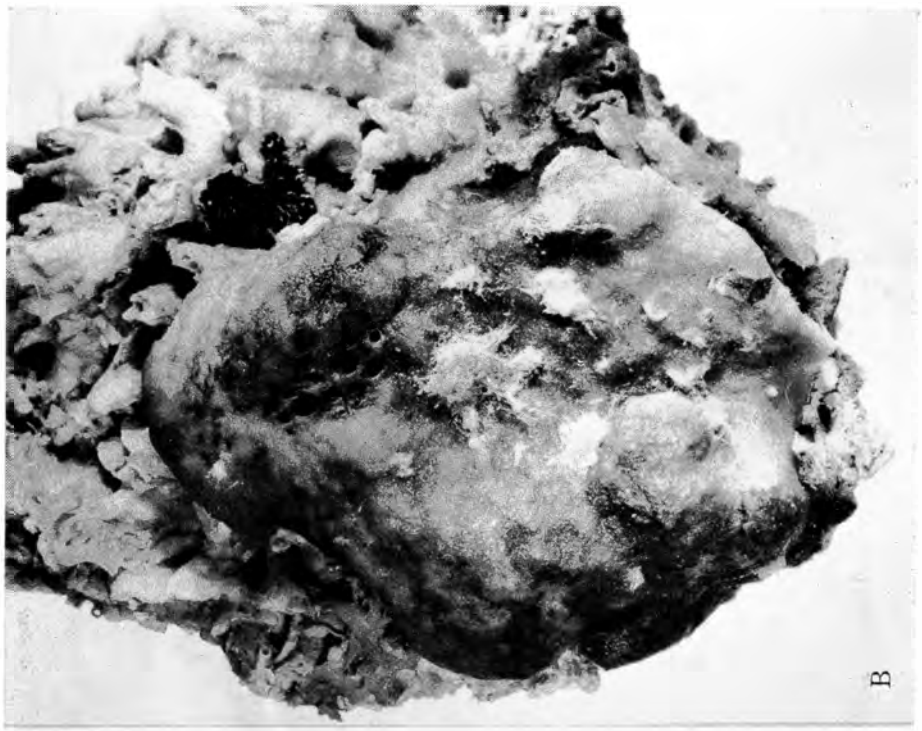
PLATE 1



A B

PLATE 2





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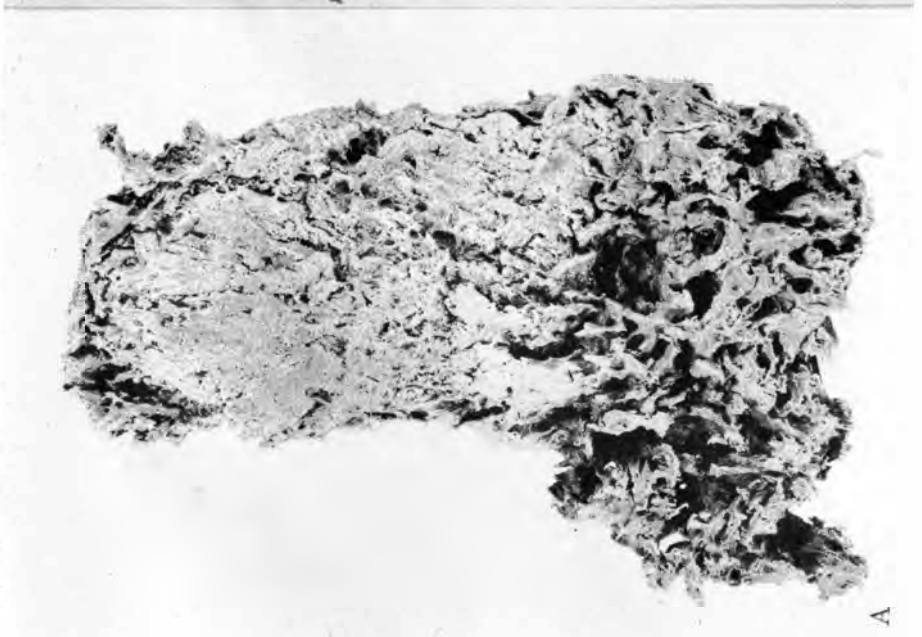

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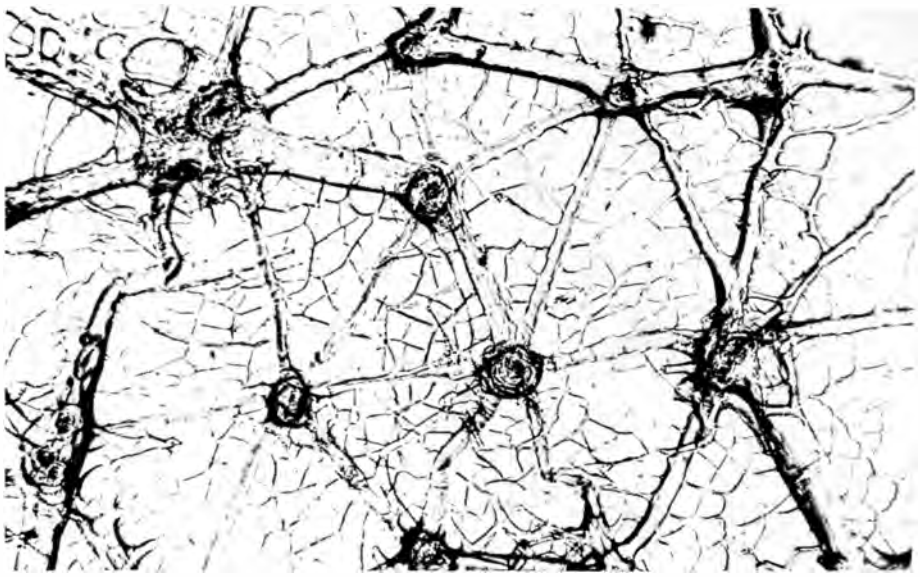
PLATE 3

PLATE 4



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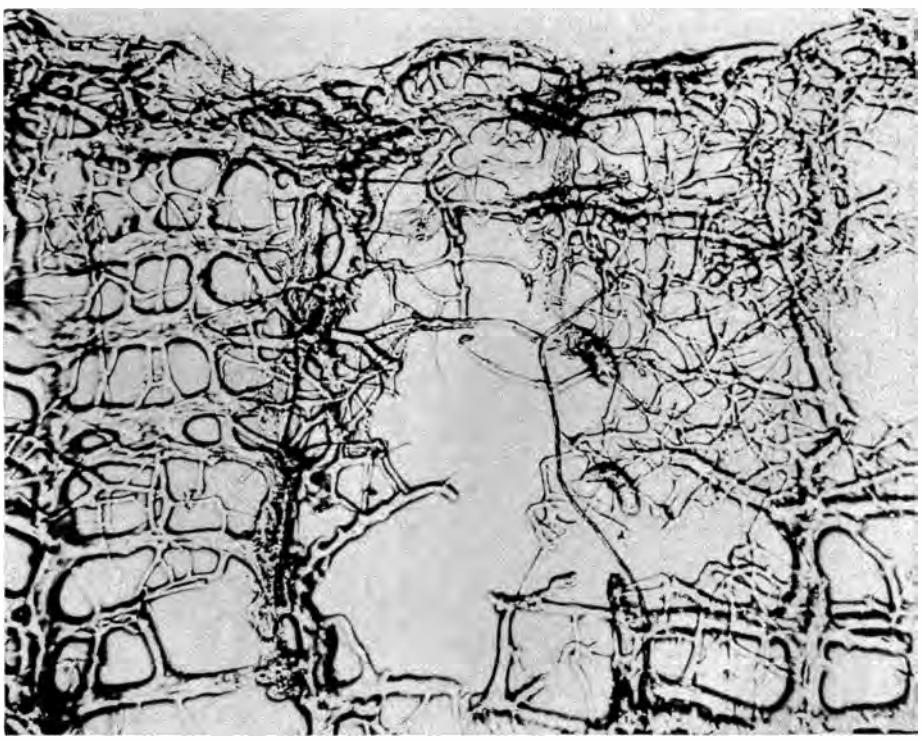

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