



**Southern California Association of
Marine Invertebrate Taxonomists**

3720 Stephen White Drive
San Pedro, California 90731

October, 1994

Vol. 13, No.6

NEXT MEETING: 2nd Half of *Polydora* Complex of Polychaetes

GUEST SPEAKER: Larry Lovell

DATE: November 21, 1994

TIME: 9:30am - 3:30pm

LOCATION: Larry's Home
1036 Buena Vista Dr.
Vista, CA (see enclosed map)



(from Light, 1978)

NOVEMBER 21 MEETING

The November meeting will be the second half of the *Polydora-Boccardia* complex given by Larry Lovell in September. This meeting will focus on the genus *Polydora* since the other genera of this complex were covered in the first meeting. Please bring specimens of this complex as well as any problem polychaetes which have turned up in the SCBPP benthic samples.

CHRISTMAS PARTY

It's THAT TIME AGAIN. Please reserve a space on your busy Yuletide calendar for a

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gathering at the Cabrillo Marine Aquarium on Saturday, December 10th from 6 to 9 pm (or so) to celebrate the season, renew old friendships, make new ones, and generally have a good time with good folks. Of course there will be food and drink, and the facilities at our disposal. Please bring the family; what is a Christmas Party without children! SCAMIT will provide the refreshments, please plan to bring a pot-luck dish of some kind (coordinate with either Don Cadien or Cheryl Brantley). Hope we can all be there!!!

GOOD-BYE

SCAMIT member and private consultant, Gene Ruff is currently relocating to Tacoma, Washington. We thank him greatly for all of his participation at SCAMIT meetings during his brief stay in southern California.

NEW PUBLICATIONS

Included in this newsletter are order forms for 2 new publications. One is on sipunculids and the other is on sabellarid polychaetes.

Members should also be aware that another installment of the Taxonomic Atlas of the Benthic Fauna of the Santa Maria Basin and Western Santa Barbara Channel has been released. Volume 2 - The Porifera, has just come out. It is available for \$15.00 plus tax and handling from The Department of Invertebrate Zoology, Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road, Santa Barbara, California 93105.

MORE ON SHRIMP

In the last newsletter it was reported by Mary Wicksten that the processid shrimp *Ambidexter panamensis* ranged into our area, and should be checked for. This reminder proved most

timely. I am happy to report that 15 of these rarely reported shrimp were recently taken in environmental monitoring samples from San Diego Bay. Attempts are underway to obtain these samples for the Crustacea Section of the Los Angeles County Museum of Natural History.

MINUTES FROM OCTOBER 17TH

The SCBPP trawl invertebrate voucher list generated by Mary Bergen of SCCWRP was reviewed by the members present. This list is a compilation of the trawl invertebrates vouchered from all the agencies involved in the Bight Project. Corrections, additions, and deletions were made to the list and those animals needing further taxonomic review were noted. There was some discussion over which animals to exclude from this list. It was decided that the criteria outlined in the SCBPP Field Manual were appropriate and would be followed. The Manual states "...organisms that are greater than 1 cm in any dimension will be identified. Colonial and pelagic organisms will be noted but not enumerated. Infaunal organisms will not be documented." While some agencies reported everything that was encountered in a trawl, other agencies followed the procedure from the field manual, and didn't record or make note of the presence of an organism not fitting the criteria outlined in the manual. Because of this, many exclusions needed to be made to standardize the list for future analysis of the data.

An announcement was made that SCBPP provisional species need to have their voucher sheets distributed to all agencies for review as soon as possible. This may be done thru Internet, by fax, or as a handout distributed at a SCAMIT meeting. One such handout on chitons was distributed at this meeting. Timothy Stebbins from the City of San Diego has put together a list of chitons reported from

has put together a list of chitons reported from Southern California Bight monitoring programs and given a description of a provisional species collected by San Diego during their SCBPP trawls. He notes that a voucher sheet will be forthcoming. A copy of this handout is included in the newsletter.

A bryozoan taxonomic name change was reported at the meeting. *Victorella argilla* is now *Cryptoarachnidium argilla*. We are still looking for the citation of this change (which happened a number of years ago), and will report it in a future newsletter.

John Ljubenkov of MEC brought 4 very different forms of the gorgonian *Adelogorgia* to the meeting. This provided SCAMIT members with a good example of the variation in colony morphology in this type of gorgonian. John made the comment that *Adelogorgia* has often been misidentified as *Muricea* when the identifications were made from photographs, and occasionally when they were made from specimens in hand. This confusion resulted from the assumption that the shallow-water rusty-red gorgonian with golden yellow zooids was a *Muricea*, and that *Adelogorgia* occurred only offshore. He also confirmed that *Adelogorgia* sp. A is only a form of *Adelogorgia phyllosclera*. The only sure way of correctly identifying these gorgonians is by examination of the sclerites.

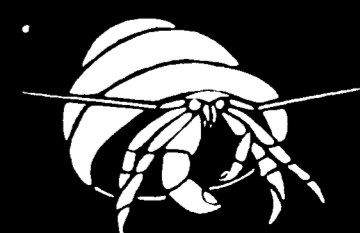
Another provisional species that MEC vouchered as part of the SCBPP trawls for Orange County Sanitation was a very small anemone identified as *Amphianthus* sp. OC1, following the naming procedure in the SCBPP manual for infauna. It was found wrapped around the stem of *Adelogorgia* from deep water and was translucent pink in color.

The afternoon was spent examining specimens from the trawl invertebrate voucher list that needed resolution of their taxonomic identities.

IDENTIFICATION OF OPHIUROIDS Don Cadien

Of the several thousand benthic invertebrate taxa living in the Southern California Bight, none has greater impact on data analysis than *Amphiodia urtica*. Yet this species remains difficult to separate, in many cases, from its congener *A. digitata*, and difficult to identify when juvenile. Production of comparable data on this species by a number of different laboratories requires not only strict intercalibration, but the establishment of reporting conventions to pre-standardize data input with data collected for the Southern California Bight Pilot Project (SCBPP). It was with such an aim that a special meeting was convened at SCCWRP on 12 October 1994. Representatives of each of the four major dischargers involved in the SCBPP were present, as were several SCCWRP staff members.

Dr. Gordon Hendler of the Los Angeles County Museum of Natural History provided us with tools for separation of *A. urtica* and *A. digitata* during a workshop on ophiuroids held at the museum in 1988. His method used characters not involving the degree of spination of the marginal disk scales. Since many ophiuroids have regenerated disk caps which may differ from the originals in scale shape, size, and placement, use of non-cap characters should allow identification of more individuals to species. Shape of dorsal arm plates seemed the most useful of the characters Hendler presented. The shape of the dorsal arm plates is expressed by Hendler as distal edge of dorsal arm plate nearly straight across arm (*digitata*), or distal edge of arm plate angled towards disc at sides of arm (*urtica*). Another interrelated character is presence of a gap between dorsal and lateral arm plates (*urtica*), vs. no gap between dorsal and lateral arm plates (*digitata*). Both of these are representations of the same basic shape difference.



In the cases where I have examined ophiuroids which have not regenerated their disks, these arm characters have corresponded to the more traditional disk cap spination characters. Dean Pasko (City of San Diego) mentioned at the meeting that when he has examined *A. digitata* with regenerated caps he has often found that they exhibit the typical arrangement of scales bearing hyaline points. Since it is not clear if this is always the case, the keys avoid reference to hyaline points on scales in specimens with regenerated caps.

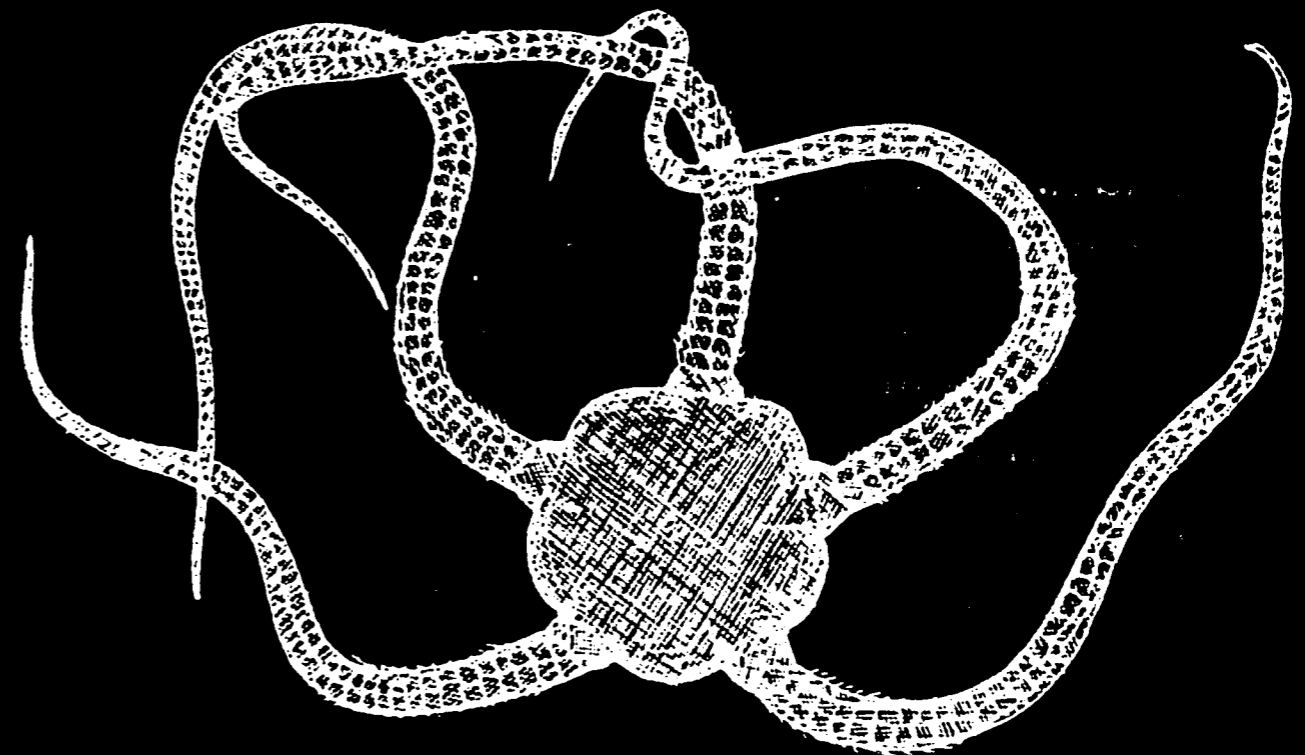
After considerable discussion of the terminology of oral papillae, and the nature of the keys put forward, we examined a variety of specimens. A SCBPP sample from the northern Santa Barbara Channel was used to test the various keys. Unfortunately, it did not contain any *A. digitata*. The generic key was tested with *Amphiura arcystata*, *Amphioplus strongyloplax*, and *Amphipholis squamata* as well as with *Amphiodia urtica*. The only specimen in the sample which could test the family key was an *Ophiuroconis bispinosa*.

This pointed out a weakness in the Ophiocomidae portion of the key, since *Ophiuroconis*, while an ophiocomid, does not have lateral arm insertion as the key stipulates. Other samples were examined from northern Santa Monica Bay, and from off Pt. Loma.

The SMB sample contained seven different species, including both *A. urtica* and *A. digitata*. The Pt. Loma sample also had both of these *Amphiodia* species, and with both regenerated and un-regenerated disk caps.

This was a particularly useful sample in that it was not dried. Attempting to apply the key characters based on shape of dorsal arm plates to these wet specimens proved impossible. Once dried, however, the structure of the dorsal arm plates was much clearer.

After adjustments to the wording of the keys the participants were in agreement that they could be applied within their laboratories and the meeting disbanded. Copies of the modified keys and the discussion of oral papillae terminology distributed at the meeting are attached.



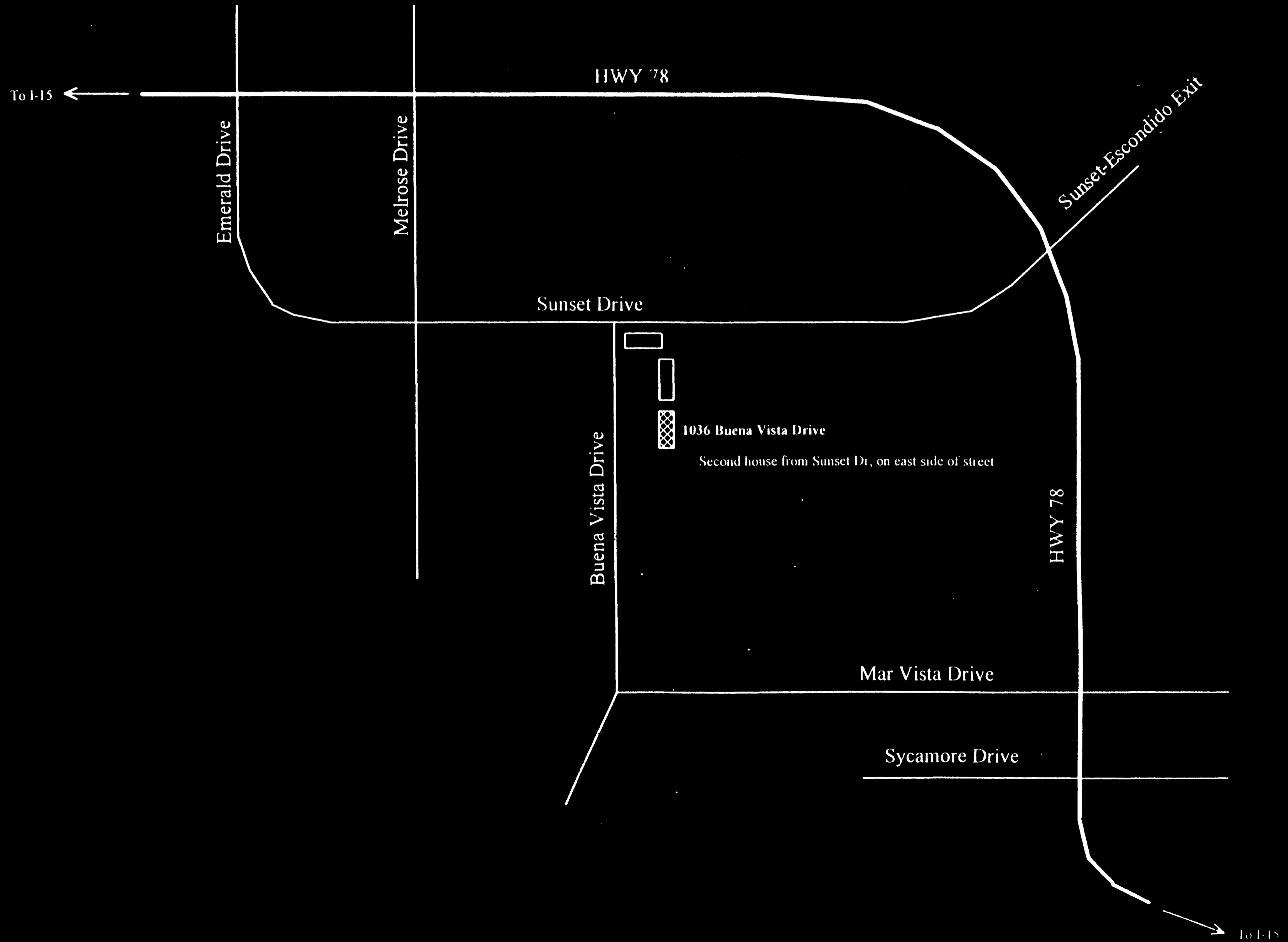
Ophioderma panamense
(from Brusca, 1980)

SCAMIT OFFICERS:

If you need any other information concerning SCAMIT please feel free to contact any of the officers.

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Vice-President	Don Cadien	(310)830-2400 ext. 403
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Larry Lovell
1036 Buena Vista Drive
Vista CA 92083
(619)945-1608



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ANNOUNCING A NEW PUBLICATION FROM SABECON PRESS:

A REVIEW AND TAXONOMIC REVISION OF THE FAMILY SABELLARIIDAE Johnston, 1865 (ANNELIDA; POLYCHAETA)

By David W. Kirtley, Ph. D.

ABSTRACT

Kirtley, David W. *A Review and Taxonomic Revision of the Family Sabellaridae Johnston, 1865 (Annelida; Polychaeta)*. Vero Beach, Florida, Sabecon Press, v + 223 pages, 1 plate, 212 figures, 1994. --The Family Sabellaridae is reviewed and revised, based on examination of type material, previously published reports, and original studies of new material. A chronological synopsis of the genera, a summary of general characteristics of the family, taxonomic keys, and brief descriptions of the characteristics of the various genera and species, along with their zoogeographic distribution as inferred from collection localities, are included. These sand-tube building annelids are recorded from a wide range of marine zoogeographic provinces and are particularly abundant in the surf zone along shorelines with mobile, sand size particles in recurrent turbulent suspension. Species are also recorded from the floors of continental shelves and slopes and from great depths in the ocean. According to the present analysis, interpretation, and account the family Sabellaridae contains 2 newly defined subfamilies, 12 genera, including 4 new genera, and 111 species, including 27 new combinations and 43 new species.

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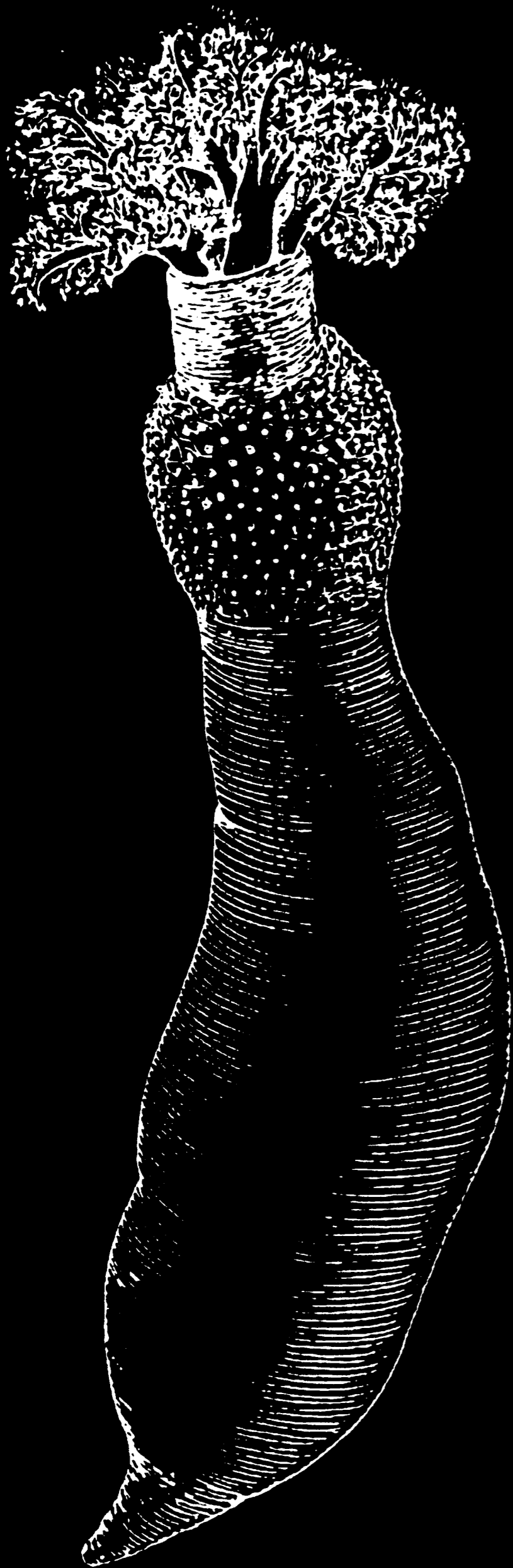
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NEW FROM CORNELL

The Sipuncula

Their Systematics, Biology, and Evolution

EDWARD B. CUTLER



The Sipuncula, a group of ocean-dwelling worms related to annelids and mollusks, play a significant role in the bioerosion of coral reefs and are useful indicators of environmental conditions. The 155 species live in a wide variety of marine habitats at all depths, in sand and mud, in burrows in soft rock and dead coral, and inside such protective shelters as mollusk shells. Important food items for fish and invertebrate predators, they also recycle organic wastes and function as bioassay tools for human diseases such as cystic fibrosis and acute cholera. Edward B. Cutler brings together in this volume everything that is known about the entire phylum.

An introduction, with practical information about collecting and handling the animals, is followed by Part One, which incorporates new systematic analyses made during the past twenty years and offers illustrated keys to all taxa, replacing the work of A. C. Stephen and S. J. Edmonds. Part Two reviews the past thirty years' work in such areas as ecology, muscular systems, blood chemistry, respiration, reproduction, and excretion. Part Three provides a new, synthetic perspective on the phylum's zoogeography and evolutionary relationships, both to other phyla and within the phylum. It utilizes information from the fossil record, paleo-oceanographic data, and comparative studies of immunology, physiology, embryology, and anatomy.

Edward B. Cutler is Professor of Biology at Utica College of Syracuse University, now on long-term leave at the Museum of Comparative Zoology, Harvard University.

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Their Systematics, Biology, and Evolution

EDWARD B. CUTLER



A Preliminary List of the Chitons (Mollusca: Polyplacophora) from Benthic Monitoring Programs in the Southern California Bight

Timothy D. Stebbins

City of San Diego
Marine Biology Laboratory
(October 1994)

Following is a list of the chiton fauna currently known from benthic monitoring programs in the Southern California Bight. Included are all species listed in SCAMIT (1994) plus additional species or provisional species collected by the City of San Diego (CSD) during regular NPDES monitoring or as part of the Southern California Bight Pilot Project (SCBPP).

	CSD Stations	SCAMIT (1994)	I ^r Reference
Family Lepidopleuridae			
<i>Hanleyella oldroydi</i> (Dall 1919)	NPDES		Ferreira, 1979b
<i>Leptochiton rugatus</i> (Pilsbry 1892)	NPDES	X	Ferreira, 1979b
Family Ischnochitonidae			
<i>Ischnochiton</i> sp	--	X	SCAMIT, 1994
<i>Lepidozonia mertensii</i> (Middendorff 1847)	SCBPP		Ferreira, 1978
<i>Lepidozonia retiporosa</i> (Carpenter 1864)	NPDES	X	Ferreira, 1978
<i>Lepidozonia sinudentata</i> (Carpenter in Pilsbry 1892)	SCBPP	X	Ferreira, 1978
Family Callistoplacidae			
<i>Callistochiton palmulatus</i> Dall 1879	SCBPP		Ferreira, 1979a
Family Mopaliidae			
<i>Placiphorella</i> sp SD1	SCBPP		Clark, 1994

Notes on *Placiphorella* sp SD1:

The genus *Placiphorella* Dall, 1879, ex Carpenter MS has been recently revised and reviewed by Saito and Okutani (1989) and Clark (1994). Nine species are currently recognized: five from the eastern Pacific Ocean (*P. blainvillei*, *P. hanselmani*, *P. mirabilis*, *P. rufa*, *P. velata*), three from the western Pacific Ocean (*P. borealijaponica*, *P. borealis*, *P. stimpsoni*), and one cosmopolitan species (*P. atlantica*). Saito and Okutani (1989) treat the western Pacific species in detail, while Clark (1994) concentrates on species occurring in the eastern Pacific. Clark also provides a key to all nine species.

Four specimens of a *Placiphorella* species were collected off San Diego during trawls conducted as part of the SCBPP (1 specimen at Stn. 2001, 43 m; 3 specimens at Stn. 1774, 104 m). Based on my preliminary examination, this species could not be reliably aligned with recognized members

of the genus. Of the three species known from southern California waters (*P. atlantica*, *P. mirabilis*, *P. velata*), the SCBPP species differed in terms of valve characteristics (e.g., coloration, sculpturing) and/or girdle features (e.g., bristles, setae, scales). If one uses the key in Clark (1994), the SCBPP species keys out as *P. blainvillei* and appears to closely resemble this species in many details. However, a few discrepancies remain that will require comparison with actual specimens of *P. blainvillei*. In addition, *P. blainvillei* is known only off Peru and Costa Rica. Thus, the SCBPP species has been given the provisional name of *Placiphorella* sp SD1 according to SCBPP conventions. A voucher sheet is in preparation.

REFERENCES:

- Clark, R.N. (1994). Review of the genus *Placiphorella* Dall, 1879, *ex* Carpenter MS (Polyplacophora: Mopaliidae) with descriptions of two new species. *Veliger*, 37: 290-311
- Ferreira, A.J. (1974). The genus *Lepidozona* in the Panamic Province, with the description of two new species. *Veliger*, 17: 162-180
- Ferreira, A.J. (1978). The genus *Lepidozona* (Mollusca: Polyplacophora) in the temperate eastern Pacific, Baja California to Alaska, with the description of a new species. *Veliger*, 21: 19-44
- Ferreira, A.J. (1979a). The genus *Callistochiton* Dall, 1879 (Mollusca: Polyplacophora) in the eastern Pacific, with the description of a new species. *Veliger*, 21: 444-466
- Ferreira, A.J. (1979b). The family Lepidopleuridae (Mollusca: Polyplacophora) in the eastern Pacific. *Veliger*, 22: 145-165
- Ferreira, A.J. (1985). Three new species of *Lepidozona* (Mollusca: Polyplacophora) from the Gulf of California. *Veliger*, 27: 423-429
- Pilsbry, H.A. (1892-1893). Polyplacophora, (Chitons) Lepidopleuridae, Ischnochitonidae, Chitonidae, Mopaliidae. In: G.W. Tryon, *Manual of Conchology*, 14: 1-350, pls. 1-68. Academy of Natural Sciences, Philadelphia.
- Pilsbry, H.A. (1893). Polyplacophora, (Chitons) Acanthochitonidae, Cryptoplacidae and Appendix. In: G.W. Tryon, *Manual of Conchology*, 15: 5-133, pls. 1-17. Academy of Natural Sciences, Philadelphia.
- Putman, B.F. (1980). Taxonomic identification key to the described species of polyplacophoran mollusks of the west coast of North America (north of Mexico). Pacific Gas and Electric Company Department of Engineering Research. Report No. 411-79.342. 165 pp.
- Saito, H., and T. Okutani. (1989). Revision of the shallow-water species of the genus *Placiphorella* (Polyplacophora: Mopaliidae) from Japan. *Veliger*, 32: 209-227
- SCAMIT. (1994). A taxonomic listing of soft bottom macroinvertebrates from infaunal monitoring programs in the Southern California Bight. Edition 1, 4 March 1994. Prepared for the Southern California Coastal Water Research Project and the U.S. Environmental Protection Agency, Region IX. Southern California Association of Marine Invertebrate Taxonomists, San Pedro, CA. 72 pp.

KEY FOR HIGHER LEVEL IDENTIFICATION OF SUBTIDAL
BENTHIC OPHIUROIDS FROM SCBPP SAMPLES

(modified from Fell 1960)

D. B. Cadien, Marine Biology Lab, CSDLAC

15 Oct 1994

- 1a. plates of oral field not differentiated Ophiuroidea, unid.
- b. plates of oral field differentiated 2

- 2a. spiniform tooth-papillae forming a cluster at the apex of each jaw 3
- b. single or paired infradental papillae at the apex of each jaw 4

- 3a. with oral papillae Ophiocomidae
- b. without oral papillae Ophiotrichidae

- 4a. infradental papillae paired Amphiuridae
- b. infradental papillae single 5

- 5a. disk cap present 6
- b. disk cap absent Ophiuroidea, unid.

- 6a. arms inserted laterally into the disk cap and firmly fused to it 7
- b. arms inserted ventrally below the disk cap and partly covered by it 8

- 7a. disk cap granulated dorsally and ventrally - often also on jaws Ophiodermatidae
- b. disk cap scales not granulated Ophiuridae

- 8a. free margins of jaw bear a continuous series of oral papillae 9
- b. oral papillae not continuous Ophiactidae

- 9a. dorsal scales bearing spines, granules, or spiny tubercles Ophiacanthidae
- b. dorsal scales without ornamentation Ophionereidae

Note: this key is intended to standardize separatory characters used in processing of SCBPP benthic samples. It can not be reliably applied outside the Southern California Bight, or in other than benthic soft sediment habitats (ie. intertidal collections). If a specimen cannot be definitely placed in one of the family level taxa because of it's condition **IT SHOULD BE IDENTIFIED ONLY TO CLASS LEVEL**. Individual taxonomists may be able to identify such specimens to a lower taxon based on their experience or presence of a series of comparative specimens. Even if this is possible the reported identification should be based only on the above key. This restrictive procedure will serve the purpose of standardizing treatment between laboratories for the SCBPP.

GENERIC LEVEL ID KEY FOR SCBPP AMPHIURIDS

D. B. Cadien, Marine Biology Lab, CSDLAC, Oct 1994

- 1a. disk present 2
- b. disk absent 7

- 2a. disk scales ornamented either dorsally, ventrally, or both 3
- b. disk scales unornamented, not bearing spines or granules 4

- 3a. disk scales granulated ventrally *Amphichondrius*
- b. disk scales bearing spines both dorsally and ventrally *Dougaloplus*

- 4a. buccal scale between oral plate and infradental papillae *Amphioplus*
- b. no buccal scale present on jaws 5

- 5a. jaws with 4 oral papillae *Amphiura*
- b. jaws with 6 or more oral papillae 6

- 6a. oral papillae subequal in size *Amphiodia*
- b. adoral shield spine much larger than other oral papillae *Amphipholis*

- 7a. 4 oral papillae per jaw *Amphiura*
- b. 6 or more oral papillae per jaw 8

- 8a. jaws with buccal scale 9
- b. jaws lacking buccal scale 10

- 9a. adoral shield spine tapering, acute, much longer than oral plate papilla *Dougaloplus*
- b. adoral shield spine quadrangular, blunt, subequal to oral plate papilla *Amphioplus*

- 10a. adoral shield spine larger than oral plate papilla 11
- b. adoral shield spine subequal to oral plate papilla *Amphiodia*

- 11a. distal tentacle scale \leq to proximal on first few arm segments *Amphipholis**
- b. distal tentacle scale much larger than proximal on first few segments ... *Amphichondrius**

* = This will not work with *Amphichondrius laevis*, a southern species occurring as far north as Catalina Isl. If a specimen keys to *Amphipholis*, but has the distal oral papilla less than 2x the width of the oral plate papilla, you have *Amphichondrius laevis* and not *Amphipholis* sp.

Note: this key is intended to standardize separatory characters used in processing of SCBPP benthic samples. It can not be reliably applied outside the Southern California Bight, or in other than benthic soft sediment habitats (ie. intertidal collections). If a specimen cannot be definitely placed in one of the generic level taxa because of it's condition **IT SHOULD BE IDENTIFIED ONLY TO FAMILY LEVEL**. Individual taxonomists may be able to identify such specimens to genus or species level based on their experience or presence of a series of comparative specimens. Even if this is possible the reported identification should be based only on the above key.

KEY TO IDENTIFICATION OF AMPHIODIA SPP IN SCBPP SAMPLES

(partially based on Pascoe 1984)

D. B. Cadien - Marine Biology Lab CSDLAC, Oct 1994

- 1a. disk absent 2
- b. disk present 5
- 2a. arm spines cylindrical, blunt, flattened *A. occidentalis*
- b. arm spines tapered, round or oval in cross-section 3
- 3a. arm spines bluntly pointed, lacking hyaline tips *A. psara*
- b. arm spines acute, often with hyaline tips 4
- 4a. distal margin of dorsal arm plates straight; no gap between lateral and dorsal arm plates *A. digitata*
- b. distal margin of dorsal arm plates angled up at the sides, producing a gap between the dorsal and lateral arm plates through which tissue is visible *A. urtica*
- 5a. primary and mid-marginal scales little or not different in size from other disk scales (disk regenerated) ... 6
- b. primary and mid-marginal scales larger than other scales (original disk) 10
- 6a. some scales on disk produced into hyaline points *Amphiodia* sp
- b. no scales on disk produced into hyaline points 7
- 7a. disk less than 2mm in diameter OR disk consists of primary scales and few other small scales, OR # of marginal scales 2 or less on either side of the mid-marginal scale, OR # of marginal scales indeterminate *Amphiodia* sp
- b. disk greater than 2 mm diameter 8
- 8a. arm spines cylindrical, blunt, flattened *A. occidentalis*
- b. arm spines tapering, oval or round in cross-section 9
- 9a. arm spines bluntly pointed *A. psara*
- b. arm spines acutely pointed, often with hyaline tips *A. urtica*
- 10a. some scales on disk produced into hyaline points 11
- b. no scales on disk produced into hyaline points 14
- 11a. scales with hyaline points continuous in, and restricted to, marginal row *A. digitata*
- b. scales with hyaline points either not continuous in or not restricted to marginal row 12
- 12a. numerous rows of hyaline tipped scales present on disk, one of which may be marginal *A. urtica*
- b. no continuous rows of hyaline tipped scales on disk 13
- 13a. hyaline tipped scales restricted to margin of genital (bursal) slits *A. urtica*
- b. hyaline tipped scales present around bases of arms & scattered elsewhere on disk *A. urtica*
- 14a. disk less than 2mm in diameter OR disk consists of primary scales and few other small scales, OR # of marginal scales 2 or less on either side of the mid-marginal scale, OR # of marginal scales indeterminate *Amphiodia* sp
- b. disk greater than 2 mm diameter 15
- 15a. arm spines cylindrical, blunt, flattened *A. occidentalis*
- b. arm spines bluntly pointed, oval or round in cross-section *A. psara*

PLEASE NOTE - any specimen which fails to clearly fall into one of the choices in any couplet should be reported as *Amphiodia* sp. An undescribed species of *Amphiodia* occurs in this area according to Dr. Gordon Hendler. The species is from relatively coarse substrates in shallow water, and has probably been reported as *A. occidentalis* or *A. psara* in the past. It would probably key to one or the other of those species in the present key. Dr. Hendler has not seen southern California specimens of *A. occidentalis*, and believes the species does not occur here.

OPHIUROIDS REPORTED FROM THE SCBPP SAMPLING AREA
(based on data in Maluf 1988)

Family Asteronychidae

Asteronyx loveni Müller & Troschel, 1842

Family Gorgonocephalidae

Gorgonocephalus eucnemis (Müller & Troschel, 1842)

Family Ophiacanthidae

Ophiacantha diplasia H. L. Clark 1911*[@]

Ophiacantha eurythyra H. L. Clark 1935

Ophiacantha phragma Ziesenhene, 1940

Ophiacantha rhachophora H. L. Clark 1911

Ophiophthalmus normani (Lyman, 1879)

Family Amphiuridae

Amphichondrius granulatus Nielsen, 1932*

Amphichondrius laevis Ziesenhene, 1940

Amphiodia digitata Nielsen, 1932*

Amphiodia occidentalis (Lyman, 1860)*

Amphiodia psara H. L. Clark 1935*

Amphiodia sp A of Hendler

Amphiodia urtica (Lyman, 1860)*

Amphioplus hexacanthus H. L. Clark 1911*

Amphioplus strongyloplax (H. L. Clark, 1911)*

Amphioplus sp A MBC 1985*

Amphipholis platydisca Nielsen, 1932

Amphipholis pugetana (Lyman, 1860)*

Amphipholis puntarenae (Lütken, 1856)

Amphipholis squamata (Delle Chiaje, 1828)*

Amphiura arcystata H. L. Clark, 1911*

Amphiura carchara H. L. Clark, 1911

Amphiura diomedae Lütken & Mortensen, 1899*

Amphiura seminuda Lütken & Mortensen, 1899

Dougaloplus amphacanthus (McClendon, 1909)*

Dougaloplus sp 1 Pt. Loma 1992*

Ophiocnida hispida (Le Conte, 1851)

Family Ophiactidae

Ophiactis savignyi (Müller & Troschel, 1842)()

Ophiactis simplex (Le Conte, 1851)()

Ophiopholis aculeata var. *kennerlyi* Lyman, 1860

Ophiopholis bakeri McClendon, 1909*

Ophiopholis longispina H. L. Clark, 1911

Family Ophiotrichidae

Ophiotrix rudis Lyman, 1874

Ophiotrix spiculata Le Conte, 1851*

Family Ophiocomidae

Ophiocoma alexandri Lyman, 1860

Ophiopsila californica A. H. Clark, 1921*

Ophiopteris papillosa (Lyman, 1875)

Family Ophioneridae

Ophionereis amphilogus (Ziesenhene, 1940)

Ophionereis annulata (Le Conte, 1851)*

Ophionereis eurybrachiplax H. L. Clark, 1911*

Family Ophi Dermatidae

Ophiocryptus maculosus H. L. Clark, 1915

Ophioderma panamense Lütken, 1859

Ophioderma teres (Lyman, 1860)

Ophioderma variegatum Lütken, 1856

Ophioncus granulatus Ives, 1889

Ophiuroconis bispinosa Ziesenhene, 1937*

Family Ophiuridae

Amphiophiura superba (Lütken & Mortensen, 1899)

Ophiomusium jolliensis McClendon, 1909*

Ophiomusium lymani Thomson, 1873

Ophioplocus esmarki Lyman, 1874

Ophiura flagellata (Lyman, 1878)

Ophiura kofoidi McClendon, 1909

Ophiura leptoctenia H. L. Clark, 1911*

Ophiura luetkeni (Lyman, 1860)*

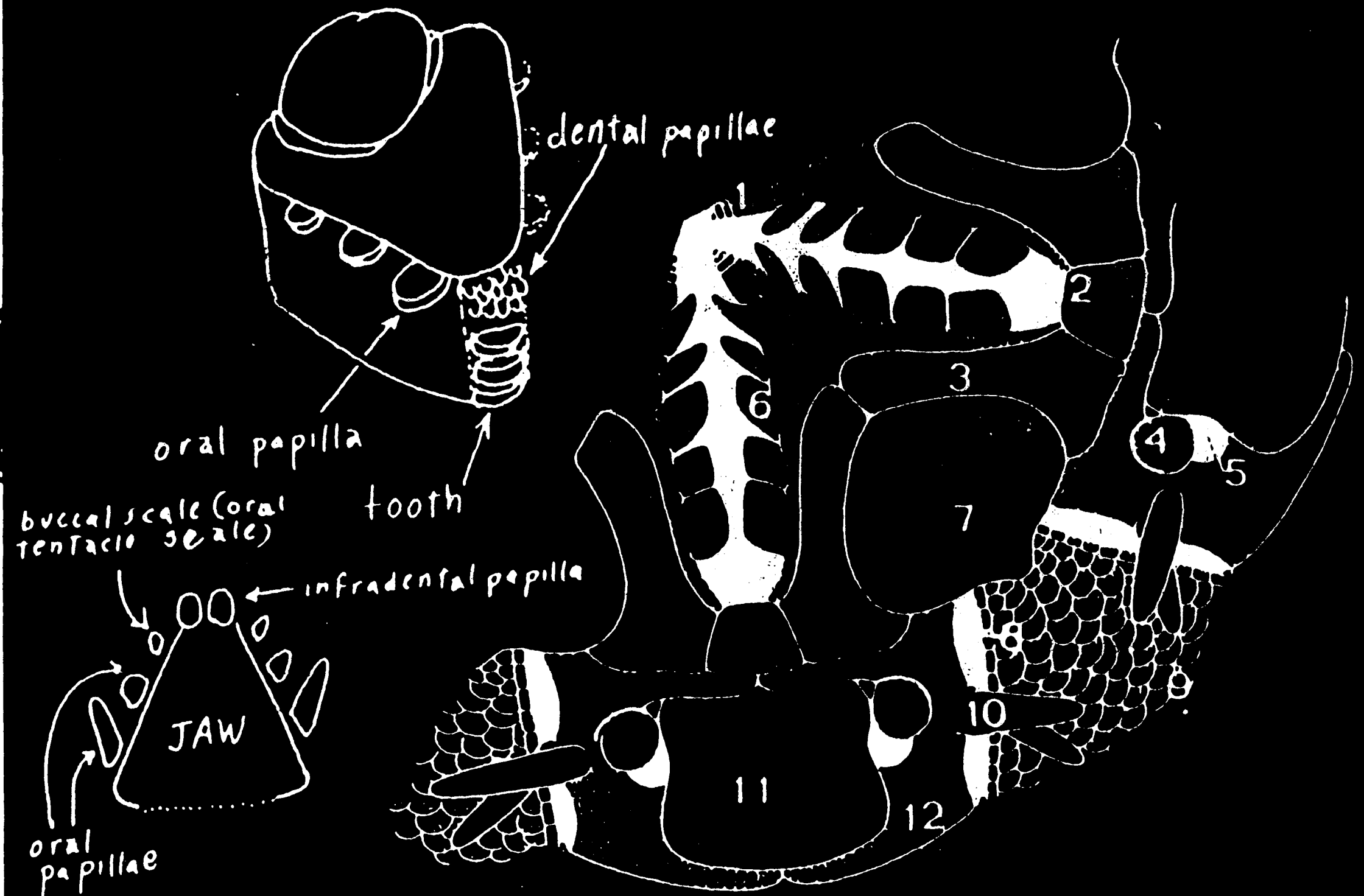
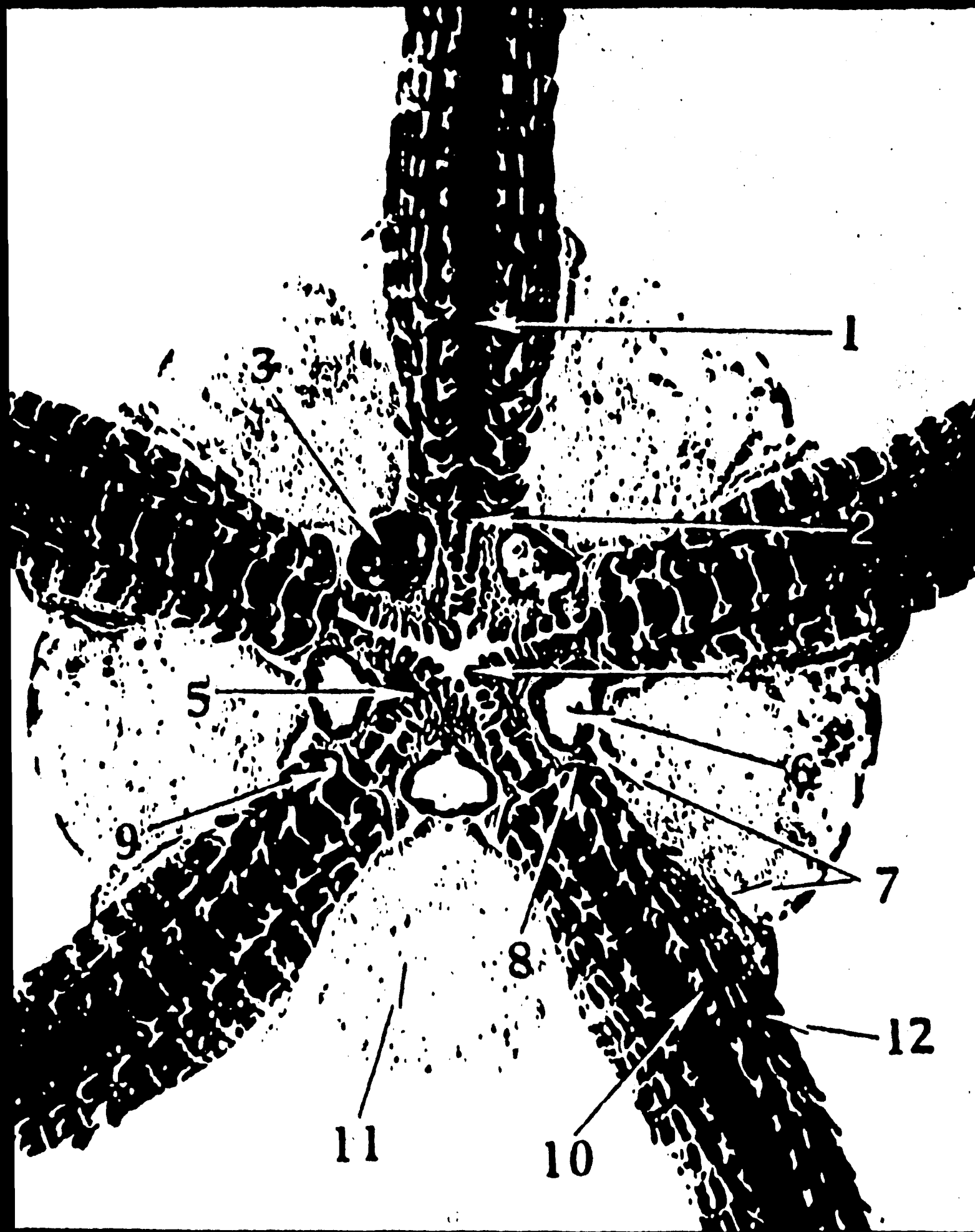
Ophiura sarsi Lütken, 1855

Stegophiura ponderosa (Lyman, 1878)

* = on the SCAMIT list

@ = Kyte (1982) suggests this properly belongs in *Ophiophthalmus*

() = genus on the SCAMIT list



- 1. *Ophioderma panamense*, diagnostic parts
- 2. dorsal arm plate **ventral arm plate**
- 3. angle of mouth **1st ventral arm plate**
- 4. interporite
- 5. tip of jaw **tip of jaw**
- 6. oral papilla
- 7. genital slit
- 8. side arm plate **lateral arm plate**
- 9. tentacle pore
- 10. tentacle scale
- 11. interbrachial area of disc **ventral interradius**
- 12. arm spine

Figure 2. Two-fifths of oral aspect of a diagrammatic disc to show diagnostic parts

- 1. teeth
- 2. angle of mouth **1st ventral arm pl.**
- 3. adoral plate **adoral shield**
- 4. tentacle scale
- 5. tentacular pit **Tentacle pore**
- 6. oral papilla
- 7. oral shield
- 8. genital slit
- 9. interradial portion of disc
- 10. arm spine
- 11. 1st oral arm plate **2nd ventral arm pl.**
- 12. side arm plate **lateral arm plate**