Southern California Association of Marine Invertebrate Taxonomists

3720 Stephen White Drive
San Pedro, California 90731

May, 1991 Vol. 10, No. 1

NEXT MEETING: Organization of SCAMIT Literature Library

GUEST SPEAKER: NONE

DATE: Monday, June 17, 1991 @9:30AM
Note this is the third Monday of the month.

LOCATION: Cabrillo Marine Museum
San Pedro, CA

At the June 17th meeting we will be cataloging and shelving literature from the SCAMIT reference library. Please plan on attending and help get the library in order. This is a good opportunity for everyone to get involved.

MINUTES FROM MEETING ON May 13 & 14, 1991

Bryozoan Workshop: Dr. Bill Banta of the American University in Washington D.C. hosted a very informative workshop. He began by explaining that Bryozoans have a rich and abundant fossil record with marine deposits have been dating back to the Cenozoic era. Freshwater forms have a more recent fossil history dating back to only the Ordovician period. They are so abundant that, for example, a large part of Florida is built on Bryozoan fossils.

He discussed three major groups of Bryozoans:

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1) **Ctenostomes** are characterized by having a setigerous collar, an uncalacified body wall, and no operculum. Common genera include Alcyonidium, Victorella, and Bowerbankia. This group also includes Clavopora, which is known to occur on soft bottoms.

2) **Stenolaemate** (=Cyclosomata in Osburn, 1953) are identified as having calcified body walls, no operculum, circular zooid (in cross-section), and the solitary zooid's outer surfaces appears perforated (pitted). This group includes the following genera: Stomatopora, Nolella, Flustrellidra, Crisia, Lichenopora, and Tubulipora.

3) **Cheilostomates** have opercula, calcified body walls, and the individual zooid are not circular in cross-section. This group is further subdivided into Anasca (front uncalcified) and Ascophora (front calcified). Anasca genera include Membranipora, Thalamoporella, Scrupocellaria, Bugula, Lyrula, and Pueillina. Ascophora genera include Murconella, Parasmittina, Rhynchozoon, Porella, Costazia, and Lagenipora.

Dr. Banta demonstrated that to best understand Bryozoan taxonomy you must first understand their morphology and colonial growth patterns. To this end he is preparing a packet of information that will be made available upon request to SCAMIT members at a future date. The best reference for identifying Pacific coast Bryzoans is Osburn, 1953 (Bryozoa of the Pacific Coast of America. Alan Hancock Pacific Expeditions. 14(1-3):1-841).

New publication(s): Hans Kuck of LACMNH announces a new publication of interest to SCAMIT members:

Wetzer, R., H. G. Kuck, P. Baez R., R. C. Brusca, And L. M. Jarkevics. 1991. Catalog of the Isopod Crustacea type collection of the Natural History Museum of Los Angeles County. Natural History Museum of Los Angeles County Technical Reports, No. 3, 59 pgs.

For copies contact:
Hans Kuck
Natural History Museum of Los Angeles County
900 Exposition Blvd.
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EXECUTIVE SUMMARY OF SCAMIT ACTIVITIES 1990-1991

SCAMIT had another full year of activities in 1990-1991. Three events which all occurred in December 1990 deserve special mention. Larry Lovell represented SCAMIT at the EPA workshop on Biological Criteria: Research and Regulations, presenting the poster entitled "Regional Standardization of Taxonomy: The Southern California Association of Marine Invertebrate Taxonomists (SCAMIT)". At the amphipod workshop meeting, SCAMIT presented Dr. J.L. Barnard with a plaque in appreciation for his years of help with amphipod taxonomy. And finally, probably the most important event of 1990-1991 was the publication of the first formal description of a SCAMIT provisional species. Jim Roney described Ampelisca brachycladus (Ampelisca sp. A of SCAMIT).

Highlights of 1990-1991

May	Review of groups to look at in 1990-1991 and organization of SCAMIT literature library (CMM)
June	Don Cadien reviewed Nassarius (CMM)
July	John Ljubenkov reviewed Hydrozoa (MEC)
August	John Ljubenkov discussed etymology (CMM) SCAMIT picnic
September	Ross Duggan reviewed scaleworms (AHF)
October	Helen DuShane reviewed Epitoniidae (LACMNH)
November	Ron Velarde reviewed Hesionidae (AHF)
December	Amphipod Workshop with Dr. J.L. Barnard and James Thomas (LACMNH) Larry Lovell attended EPA Workshop Ampelisca brachycladus described by Jim Roney SCAMIT Christmas party with Dr. J.L. Barnard as Santa (CMM)
January	John Ljubenkov and Tony Phillips reviewed flatworms (CMM)
February	Larry Lovell reviewed Spionidae (non-polydorid) Dr. James Blake attended (Larry Lovell's home)
March	Paul Scott reviewed Nuculanidae (SBMNH)
April	Tony Phillips reviewed Tharyx (AHF)

At this time, I want to thank all of the people and institutions listed above who made the 1990-1991 year of SCAMIT activities a success. I especially want to thank my fellow officers, Larry Lovell, Ross Duggan, and Ann Martin, for all of their help. Any organization which relies on volunteer manpower is only as good as the people who volunteer their time and efforts. We are lucky in that we have a core of people who continue to give freely of their time and efforts to make SCAMIT successful. However, SCAMIT can be made even better if even more people would get involved.

The purpose of SCAMIT is to develop standard procedures in systematic practices and taxonomic usage for marine invertebrates in the southern California region. In the early years, this was accomplished by the exchange of specimens between the members to calibrate everyone within SCAMIT of the more common invertebrates found in our programs. We then moved on to the descriptions of provisional species and how they differed from the "known" species occurring in southern California. These descriptions give us a working format to report these new species. However, the next step is to get these species formally described in the published literature. As we begin the 10th year of SCAMIT, I hope that this will become the major emphasis of SCAMIT and its members.

Ronald G. Velarde

President

<u>1990-1991 Treasurer's Report</u>:

Expenses	
Newsletter	$2,112.95
Grants	1,527.50
EPA Conference	862.67
Miscellaneous	380.43
	$4,883.55
Income	
Membership dues	$1,125.00
Interest	402.44
Other	109.00
T-shirts	50.00
	$1,686.44
Account balance (March 31, 1991)	
Savings	$6,221.40
Checking	709.74
	$6,931.14

<u>List of Members:</u> Included in this months newsletter is the current list of members of SCAMIT. Individuals who are interested in doing taxonomic consulting are noted and their specialty listed. If there are any corrections and/or additions to this list please contact:

Ann Martin
Hyperion Treatment Plant
Biology Laboratory
11900 Vista del Mar
Playa del Rey, CA 90293

If you need any other information concerning SCAMIT please feel free to contact any of our officers:

President	Ron Velarde	(619)226-0164
Vice-President	Larry Lovell	(619)945-1608
Secretary	Kelvin Barwick	(619)226-8175
Treasurer	Ann Martin	(213)648-5317

RECORDS OF THE AUSTRALIAN MUSEUM

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The Families and Genera of the Marine Gammaridean Amphipoda (Except Marine Gammaroids)

J. LAURENS BARNARD AND GORDAN S. KARAMAN

Since the publication of Barnard's first handbook in 1969 on the families and genera of marine gammaridean amphipods, the number of families has nearly doubled from 54 to 91, the number of genera has increased from 670 to 1055 and the number of species from 3300 to 5733. The extraordinary growth in amphipod systematics, partly prompted by Barnard's handbook, has led to this new essential two volume set on the same subject by Barnard and Karaman, to be published as Records of the Australian Museum, Supplement 13 (Parts 1 and 2), and issued in August 1991.

The main features of the book are:

* New keys and diagnoses to all families and genera.
* 133 plates of illustrations.
* Lists of all species included for each genus, with their distributions.
* Taxa at all levels arranged in alphabetical order for convenience.

The book forms a companion to the "Freshwater Amphipoda of the World" by Barnard & Barnard, 1983 which treated all freshwater gammarideans and all marine Gammaroidea. None of that material is repeated in this book, but the family keys are constructed to contain all marine components.

THE AUTHORS

J.L. Barnard is a curator of invertebrate zoology at the National Museum of Natural History in Washington, D.C. He has collected amphipods all over the world and written over 200 papers on amphipod taxonomy including major regional monographs on the amphipods of Southern California, Hawaii, New Zealand and Australia.

G.S. Karaman is a senior scientist at the Institute of Freshwater Research in Titograd, Yugoslavia. He comes from a long line of scientists and like his father has specialised in freshwater amphipods, publishing several hundred papers on the niphargids of eastern Europe.

See over for order coupon

ORDER COUPON - for pre-publication orders

Quantity	Title	Price	Subtotal
	Barnard, J.L. & G.S. Karaman, 1991. The families and genera of marine gammaridean Amphipoda (except marine gammaroids). Records of the Australian Museum, Supplement 13 (Parts 1 and 2).	$A100 per set ($A120 after August 1, 1991)	
		Postage and handling	$A20
		TOTAL (PLEASE PAY IN AUSTRALIAN DOLLARS)	

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Southern California Association of Marine Invertebrate Taxonomists

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JUNE, 1991 Vol. 10, No. 2

NEXT MEETING: 10:00-12:00am - "A New Approach for Analyzing Trophic Composition of Marine Benthic Communities"
1:00-3:00pm - "Everything You Wanted to Know About Isopods... But Were Afraid to Ask."

GUEST SPEAKER: 10:00-12:00am - Karen Green, Private Consultant
1:00-3:00pm - Dr. Rick Brusca, SDNHM

DATE: July 15, 1991
Note this is the third Monday of the month.

LOCATION: San Diego Natural History Museum
San Diego, CA

MINUTES FROM SCAMIT EXECUTIVE BOARD MEETING ON May 24, 1991

Attending were Ron Velarde, Larry Lovell, Ann Martin, Kelvin Barwick, and Don Cadien.

The first item on the agenda was the schedule for the coming year. Larry Lovell has prepared the following tentative agenda.

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SCAMIT newsletter is not deemed to be a valid publication for formal taxonomic purposes.

SCAMIT MONTHLY AGENDA 1991-92

May 13-14	Bryozoan Workshop by Dr. Bill Banta, American University, Washington, D. C. at Cabrillo Marine Museum, San Pedro, CA.
June 17[†]	Organization of SCAMIT literature library at Cabrillo Marine Museum, San Pedro, CA.
July 15[†]	10:00-12:00am - "A New Approach for Analyzing Trophic Composition of Marine Benthic Communities" by Karen Green, private consultant. 1:00-3:00pm - "Everything You Wanted to Known About Isopods... But Were Afraid to Ask." by Dr. Rick Brusca, San Diego Natural History Museum. Both at the SDNHM in San Diego, CA.
August 12	Sabellid Poychaetes by Dr. Kirk Fitzhugh, Los Angles County Museum of Natural History at Allan Hancock Foundation of the University of Southern California, Los Angeles, CA.
September 23[*]	Phoronids by Dr. Russ Zimmer, University of Southern California at Cabrillo Marine Museum, San Pedro, CA.
October 28-29[*]	Amphipod Workshop by Dr. J. L. Barnard, Smithsonian Institution at the Los Angles County Museum of Natural History, Los Angles, CA.
November 18[†]	Sea Pens by Dr. Eric Hochberg at the Santa Barbara Museum of Natural History, Santa Barbara, CA.
December 9	Sponges by Karen Green, private consultant at Cabrillo Marine Museum, San Pedro, CA.
January 6[‡]	Mysidacea by Ron Velarde, City of San Diego at the SDNHM, San Diego, CA.
February 10	Ophiuroidea workshop by Dr. Gordon Hendler, LACMNH at the Los Angeles County Museum of Natural History, Los Angeles CA.
March 9	Abranchiate Terebellid Polychaetes by Leslie Harris, LACMNH at the Allan Hancock Foundation, University of Southern California, Los Angeles, CA.

April 13	Thalassinoid shrimp by Don Cadien, Los Angles County Sanitation District at Cabrillo Marine Museum, San Pedro, CA.

‡ Meeting on the first Monday of the month.
† Meeting on the third Monday of the month.
* Meeting on the fourth Monday of the month.

The next item on the agenda was a letter written to the SCAMIT Executive Board by Dean Pasko of the City of San Diego's Marine Biology Laboratory. His letter discussed the following: changing to bimonthly meetings, better use of the scheduled time, more preparation for the meetings by officers and speakers, a more equitable choice of locations, and more involvement in SCAMIT by natural history museum curators in California.

Two of the issues addressed by Dean's letter: more involvement by local museum curators and a more equitable meeting location have been discussed in the past. Larry was aware of these problems and has tried to address these in establishing the 1991-92 agenda. In it he has recruited museum curators to speak and scheduled meetings at a variety of locations.

On the subject of using scheduled time more efficiently, the Board adopted the following timetable for future meetings.

9:00-9:30am	Officers and Speakers arrive
9:30-10:00am	SCAMIT Business
10:00-1200am	Morning Session
12:00-1:00pm	Lunch
1:00-3:00pm	Afternoon Session

This schedule should enable members to derive the most benefit out of a each meeting.

After some debate it was generally agreed that the monthly format would be retained. It was decided that more attention should be paid to the preparation for meetings by officers (i.e. setting up equipment, organizing specimens, etc.). On a suggestion made by former SCAMIT Secretary, Ross Duggan, it was decided that speakers should have an abstract and/or handouts ready before their respective meeting. Any revisions made during the meeting should be completed at that time or, within one week. This is so that it can be published in the next newsletter. In the past it has been incumbent on the secretary to assemble this information based solely on his/her notes.

Vice-President Larry Lovell agreed to draw up a set of guidelines that explain the purpose of the Association and what is expected of guest speakers (i.e. abstracts and handouts) as well as a checklist of equipment they might need.

The next agenda item was how to attract more members representing the local museums and universities. It was decided that Ron Velarde would explore the possibility of publishing a letter, in the form of a note, in the SCAS bulletin that would explain our organization and its function. This was deemed the most effective first step in trying to recruit new members from these groups.

It was decided that a list of members and their specialties should be published annually in the newsletter. Also, a treasurer's report should be included in the newsletter on an annual basis. Both will appear in the first newsletter of the year (May).

The last item on the agenda was to revise the constitution and bylaws. A number of inconsistencies and duplications were identified. A line by line review yielded many changes. These changes better reflect the SCAMIT organization and what it does. Please review the inclosed ballot, vote, and mail it back to Larry Lovell.

MINUTES OF MEETING ON June 17, 1991

The meeting was successful in organizing the remaining literature into major groups and eliminating duplicates. They were then filed alphabetically by author. The next step will be to catalog the collection. Thanks to all the people who attended, the task went quickly and pleasantly.

Cathy Crouch of the Cabrillo Marine Museum asked if there were any SCAMIT members who were interested in organizing a general taxonomic workshop for high school students. It was agreed that it would be something very worthwhile to pursue. Contact Cathy at the museum if you agree and would like to help.

As promised, the Bryozoan workshop notes from Dr. Bill Banta are now available on request. Send request to:

Kelvin Barwick
Marine Biology Laboratory
4077 North Harbor Dr., MS-45A
San Diego, CA 92101

People who attended the meeting will automatically be sent a copy.

TWO GRANTS AWARDED TO MEMBERS:

Dr. Debbie Zmarzly of the City of San Diego's Marine Biology Laboratory was awarded a grant for additional illustration to complete her manuscript entitled: "Review of pea crabs in the genus Pinnixa (Decapod: Brachyura: Pinnotheridae) from California, with description of two new species." Dr. Masahiro Dojiri of the City of Los Angeles' Biology Laboratory and Dr. Jürgen Sieg of the Universität Osnabrück were also awarded a grant. This is to pay reprint cost for "Two new species and a new genus of the suborder Tanaidomorpha (Crustacea: Tanaidacea) from California waters." The officers of SCAMIT felt that these two publications further the aims of the Association and were worthy of support.

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

President	Ron Velarde	(619)226-0164
Vice-President	Larry Lovell	(619)945-1608
Secretary	Kelvin Barwick	(619)226-8175
Treasurer	Ann Martin	(213)648-5317

BALLOT FOR PROPOSED CHANGES TO SCAMIT CONSTITUTION AND BYLAWS

Instructions: Detach front sheet, review proposed changes, enter choices on reverse, and bring to the July meeting or mail by July 31, 1991 to:

Larry Lovell
1036 Buena Vista Dr.
Vista, CA 92083

CHECK THE APPROPRIATE BLANK(S) BELOW

	YES	NO
I **approve all** the changes as shown.	___	___
I **reject all** the changes as shown.	___	___
-OR-		
I **approve only** the changes checked below.		
Article 3: Membership		
Section 1: Membership	___	___
Section 2: Types of Members	___	___
Section 3: Rights of Membership	___	___
Article 4: Dues	___	___
Article 5: Officers		
Section 1: Officers	___	___
Section 2: Term of Officers	___	___
Section 3: Election of Officers	___	___
Article 6: Meetings	___	___
Article 9: Amendments	___	___
Article 10: Bylaws	___	___
Bylaw 1 : Types of Membership		
a) Charter	___	___
b) Participating	___	___
b) Individual	___	___
c) Correspondents	___	___
c) Institutional	___	___
d) Honorary Life	___	___
Bylaw 2: Duties of Officers	___	___
c) Secretary	___	___
d) Treasurer	___	___
Bylaw 3: Committees		
b)	___	___

NOTE: Shaded text are proposed additions.
~~Strikeout text are proposed deletions.~~

SOUTHERN CALIFORNIA ASSOCIATION OF
MARINE INVERTEBRATE TAXONOMISTS (SCAMIT)

CONSTITUTION

Preamble

In view of the diversity of marine invertebrates in the Southern California area and the many organizations studying the ecology of these organisms, the Southern California Association of Marine Invertebrate Taxonomists was organized by scientists who recognized the need to standardize systematic practices and taxonomic usage through a program of intercalibration. On April 21, 1982, the Association was founded and a Constitution Committee was formed to establish a working framework. This Constitution is the result of the Committee's activities.

Article 1: Name

The organization shall be the Southern California Association of Marine Invertebrate Taxonomists (SCAMIT).

Article 2: Purpose

The purpose of the Association shall be to develop standard procedures in systematic practices and taxonomic usage for marine invertebrates in the Southern California region. This will be accomplished primarily through an intercalibration program and the exchange of information among persons interested in marine invertebrate taxonomy. This will include specimen exchange and confirmation, literature exchange, the development of an intercalibrated reference collection housed at a designated institution, and guest lecturers.

Article 3: Membership

Section 1: Membership

Membership in the Association is open to individuals or institutions interested in the systematics and ecology of marine

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~~Strikeout text are proposed deletions.~~

invertebrates. Membership can be obtained upon written application to the ~~Secretary-~~Treasurer with an accompanying payment of dues.

Section 2: Types of Members

Only Charter, ~~Participating, and Correspondent members~~ Individual, Institutional, and Honorary members are recognized. ~~Other classes of membership may be created by affirmative vote of two-thirds (2/3) of membership.~~

Section 3: Rights of Membership

Honorary life members and all other members whose dues have been paid for the current year shall be considered members in good standing and shall be entitled to receive notices of the Association's activities, vote at meetings or by mail, and participate in any activities sponsored by the Association. ~~Other privileges may be designated by a two-thirds (2/3) vote of the membership.~~

Article 4: Dues

Dues shall be fifteen dollars ($15.00) annually for individual members and sixty dollars ($60.00) annually for institutional members. ~~The amount and time period of dues shall be established and approved by a two-thirds (2/3) vote of the members voting on the issue. Dues can be changed by the same procedure.~~

Article 5: Officers

Section 1: Officers

The elected officers of the Association shall be the President, Vice-President, Secretary, and Treasurer~~, and Committee Chairs~~.

NOTE: Shaded text are proposed additions.
~~Strikeout text are proposed deletions.~~

Section 2: Term of Officers

All officers shall be elected by a simple majority vote of the members voting in the election. Officers may hold the same office for an unlimited number of terms. Newly elected officers shall assume the responsibilities of their office in April and continue through March of the following year.

Section 3: Election of Officers

~~An ad-hoc nominating committee~~ Request for nominations will be entertained in the December newsletter and at the January meeting ~~nominations for election from the membership and prepare a slate of candidates~~. Election shall be by means of a mail ballot sent out in the January newsletter ~~February 1~~. Ballots shall be sent to members in good standing. Results of the election will be announced in the March newsletter ~~April~~.

Article 6: Meetings

The Association shall normally meet on the second Monday of every month. The President may change the date, venue, or content of a scheduled meeting if conditions arise to warrant such changes ~~meetings if conditions arise to warrant such changes. Actions of the officers may be amended at any meeting of the Association by a two-thirds (2/3) vote of the members present, assuming the Chair of the Agenda Committee has been contacted in time to insert the item in that month's agenda~~.

Article 7: Limitations

The purpose of the Association is listed in Article 2 of the Constitution. Lobbying, or any activities specifically designed to influence legislation, support political groups, or advance popular, political, scientific, or religious causes are not among the objectives of the Association and neither the Association nor any official group within the Association shall engage in such activity.

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~~Strikeout text are proposed deletions.~~

Article 8: General Prohibitions

Notwithstanding any provision of the Constitution or Bylaws which might be susceptible to a contrary construction:

a) The Association shall be organized exclusively for scientific and educational purposes;

b) The Association shall not participate in, or intervene in political campaigns on behalf of any candidate for public office (including the publishing or distributing of statements);

c) The Association shall not be organized or operated for profit;

d) The property of this Association is irrevocably dedicated to scientific and educational purposes and no part of the net income or assets of this Association shall ever inure to the benefit of any officer or member thereof or to the benefit of any private person. Upon the dissolution or winding up of the Association, its assets remaining after payment, or provision for payment, of all debts and liabilities of this corporation shall be distributed to a nonprofit fund, foundation, or corporation which is organized and operated exclusively for scientific and educational purposes and which has established its tax exempt status under Section 501 (c) (3) of the Internal Revenue Code.

Article 9: Amendments

This Constitution may be amended by a two-thirds (2/3) majority of those voting at any meeting of the Association or in a mail ballot. In either case, notice of the proposed action will be sent to each voting member of the Association by the Secretary~~-Treasurer~~ at least sixty (60) days before the date of the vote.

Article 10: Bylaws

The Association may enact Bylaws for interpretation and implementation of the Constitution. Bylaws may be adopted, amended, or repealed by a two-thirds (2/3) majority of those

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~~Strikeout text are proposed deletions.~~

voting at any meeting of the Association or in a mail ballot. In either case, notice of the proposed action shall be sent to each voting member of the Association by the Secretary~~-Treasurer~~ at least sixty (60) days before the date of the vote.

Article 11: Division

At the discretion of the officers, the Association may establish ad hoc committees to carry out activities under the overall sponsorship of the Association.

BYLAWS

Bylaw 1: Types of Membership

The following types of members are recognized:

a) Charter - ~~Participating~~ members ~~and correspondents~~ who ~~became members in~~ joined the Association between April 1982 and March 31, 1983.

~~b) Participating - Permanent residents of Southern California, participating actively in Association activities~~

b) Individual - Members who wish to be a part of the association and its activities.

~~c) Correspondents - Participants who wish to be apprised of Association activities through newsletters and announcements. Other classes of membership may be created by a two-thirds (2/3) vote of the membership~~

c) Institutional - Organizations or groups who wish to be a part of the association and its activities.

d) Honorary Life - Membership awarded at the discretion of

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~~Strikeout text are proposed deletions.~~

the executive committee in recognition of service to the association.

Bylaw 2: Duties of Officers

a) President - The president shall preside at meetings of the Association, represent the Association's interest in external business affairs, present a written yearly summary of the Association's activities to the membership, and perform such other functions as may be defined in the Constitution and Bylaws.

b) Vice-President - The Vice-President shall chair ad hoc committees, be responsible for tabulating and disseminating results of elections, votes on Bylaws, and Amendments to the Constitution; coordinate specimen exchange; arrange meetings and workshops; coordinate the preparation of voucher sheets, edit voucher sheets and newsletters; and perform duties of the President during any period(s) when the President is unable to fulfill his or her duties as President of the Association.

c) Secretary - The Secretary shall keep minutes for all meetings, produce the newsletter, issue notices for meetings, conduct the correspondence of the Association, and be responsible for ~~mailing~~ ballot~~s~~ preparation.

d) Treasurer - The Treasurer shall keep the accounts of the association and monitor compliance with applicable federal and state laws and regulations.

Bylaw 3: Committees

a) An executive committee shall be formed, composed of each elected officer and a single member from each ~~standing~~ committee and the liaison for the hosting organization. The function is to advise the officers on fund raising, expenditures of funds, and to insure the association's purpose is furthered. This executive committee will meet once each year with additional meetings scheduled as necessary by the president.

b) The officers shall create ~~standings and~~ ad hoc committees as needed to further the purpose of the association.

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~~Strikeout text are proposed deletions.~~

Southern California Association of
Marine Invertebrate Taxonomists

3720 Stephen White Drive
San Pedro, California 90731

July, 1991 Vol. 10, No. 3

NEXT MEETING: Sabellid Polychaetes

GUEST SPEAKER: Dr. Kirk Fitzhugh of the Los Angeles County Museum of Natural History

DATE: August 12, 1991

LOCATION: Alan Hancock Foundation
University of Southern California
Los Angeles, CA

MINUTES FROM SCAMIT MEETING ON July 15, 1991

Ron Velarde announced that Dr. Jim Thomas has been asked to testify before federal regulators concerning the standardization of environmental monitoring on the east coast. SCAMIT will prepare a packet of information about our own efforts along the coast of southern California.

Tony Phillips of the Hyperion Treatment Plant said that Robert Smith and Brock Bernstein of Eco Analysis and the City of Los Angeles are developing a computer program to standardize their taxonomic data base. The software package will be able to coordinate present and historical benthic data. It is hoped that eventually all the agencies in the Southern California bight will be integrated into this system. A meeting will be planned sometime in the future to get other agencies involved.

FUNDS FOR THIS PUBLICATION PROVIDED IN PART BY THE ARCO FOUNDATION, CHEVRON USA, AND TEXACO INC.
SCAMIT newsletter is not deemed to be a valid publication for formal taxonomic purposes.

Don Cadien announced the following name changes for Axiid shrimps:

Previous binomen	New binomen
Axiopsis spinulicauda	Acanthaxius spinulicaudus (Rathbun, 1902)
Calastacus quinqueseriatus	Calocarides quinqueseriatus (Rathbun, 1902)
Calastacus investigatoris	Calocaris investigatoris (Anderson, 1896)

Reference:

Sasaki, K. and M. de Saint Laurent. 1989. A checklist of Axiidae (Decapoda, Crustacea, Thalassinidae, Anomura), with remarks and in addition descriptions of one new subfamily eleven new genera and two new species. Naturalists 3: 104 pp. (Tokushima Biological Laboratory, Shikoku Women's University)

Thanks to Janet Haig for calling this paper to SCAMIT attention and providing a copy.

Also Terebra danai Berry, 1985 has been synononomized with Terebra hemphilli Vanatta, 1924. Reference:

Bratcer, Twila and W.O. Cernohorsky. 1987. Living Terebras of the World: Monograph of the Recent Terebridae of the World. 240 pp. American Malacologists, Melbourne, Florida.

The SCAMIT Christmas party has been tentatively scheduled for Dec 7 at Cabrillo Marine Museum.

Karen Green spoke at the morning session on "A New Approach for Analyzing Trophic Composition of Benthic Communities." Dr. Rick Brusca presented "Evolutionary and Ecological Insights Gained from Studies on Marine Isopods Crustaceans" followed by Regina Wetzer who gave a brief history of the museum's invertebrate collections along with a tour. Both sessions were well attended and highly informative. Abstract have been included in this newsletter.

Thanks again to the speakers. A special thanks to Dr. Rick Brusca and Regina Wetzer of the San Diego Natural History Museum for hosting the meeting.

For the August 12th meeting bring your difficult specimens of Sabellids. Also bring representative specimens of phoronids to Larry Lovell and he will forward them to Dr. Zimmer. Or you can mail them to:

Dr. Russ Zimmer
Department of Biology
University of Southern California
Los Angeles, CA 90089-0371.

The venue for the September 23rd meeting has been tentatively change to the Alan Hancock Foundation on the campus of the University of Southern California.

SCAMIT PICNIC:

The annual SCAMIT Picnic has been scheduled for September 14th at San Clemente State Beach Park from 10 am to 3 pm. There will not be a specific site reserved, but Kelvin Barwick will arrive early to stake out an area. It will be a $6.00 per car day use fee to be paid as you enter the park. As usual SCAMIT will be provide the main dish, drinks, and eating utensils. Members are requested to bring a side dish. We will need a head count in order to plan for the food and drinks so let the secretary know as soon as possible.

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

President	Ron Velarde	(619)226-0164
Vice-President	Larry Lovell	(619)945-1608
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A New Approach for Analyzing Trophic Composition of Marine Benthic communities

Karen D. Green, Consultant, Research Associate of Natural History Museum of Los Angeles (619) 724-1819

Community structure changes in response to natural and man-induced gradients. Most benthic studies assess the community by documenting changes in species composition with multivariate techniques. Describing why species abundance and distribution patterns change is more difficult.

Analysis of trophic composition, which organizes community structure, has the potential to provide insight to species patterns. To date no study has shown a good parallel between trophic composition and community structure. This lack of correspondence suggests limitations associated with existing trophic classification schemes.

Although trophic analyses have a long history, there is no standard for analysis. Studies at the community level generally assign taxa to a few feeding modes (e.g., suspension, deposit, carnivore, herbivore), which are treated as exclusive categories. Studies of community subsets (e.g., amphipods, polychaetes) often recognize multiple feeding modes (consisting of combinations of primary feeding modes; e.g., suspension-deposit feeders). In addition, community subset analyses more commonly consider other features of the feeding system such as feeding site, motility or life style, and morphology.

Research directed studies of food resources and organism feeding provide support for approaches that consider multiple aspects of the feeding system. However, the relative importance of the aspects, alone or in combination, in describing trophic composition remain unanswered.

My approach concerns evaluating trophic composition of marine benthic invertebrate communities. The approach is the first to apply multiple aspects of the feeding system (mode, site, motility, tube dwelling, organism size) and multiple feeding modes to a community analysis. The approach is unique in incorporating a method for evaluating the information content associated with different feeding modes and their feeding-system subsets. In addition, the approach incorporates a method for reducing complexity by collapsing uninformative trophic subsets within larger functional groups. These method techniques give a flexibility to the approach that should increase its performance when applied to different environmental conditions.

Application of the new approach to ocean outfall monitoring data yielded promising results. Trophic data patterns showed correspondence with trends identified with multivariate classification analysis. Further, the results were suggestive of mechanisms (e.g., biotic, disturbance, physical) associated with environmental and outfall related gradients.

Selected reading: prepared by Karen Green July 12, 1991

Biernbaum, C.K. 1979. Influence of sedimentary factors on the distribution of benthic amphipods of Fishers Island Sound, Connecticut. J. Exp. Mar. Biol. Ecol. 38:201-223.

Commito, J.A. and W.G. Ambrose Jr. 1985. Multiple trophic levels in soft-bottom communities. Mar. Ecol. Prog. Ser. 26:289-293.

Fauchald, K. and P.A. Jumars. 1979. The diet of worms: a study of polychaete feeding guilds. Oceangr. Mar. Biol. Ann. Rev. 17:193-284.

Lopez, G.R. and J.S. Levinton. 1987. Ecology of deposit-feeding animals in marine sediments. Q. Rev. Biology. 62(3):235-260.

Muschenheim, D.K. 1987. The dynamics of near-bed seston flux and suspension-feeding benthos. J. Mar. Res. 45:473-496.

Penry, D.L. and P.A. Jumars. 1990. Gut architecture, digestive constraints and feeding ecology of deposit-feeding and carnivorous polychaetes. Oecologia. 82:1-11.

Sanders, H.L. 1960. Benthic studies in Buzzards Bay. III. The structure of the soft-bottom community. Limn. Oceanogr. 5:138-158.

Self, R.F. and P.A. Jumars. 1988. Cross-phylectic patterns of particle selection by deposit feeders. J. Mar. Res. 46:119-143.

Taghon, G.L. 1982. Optimal foraging by deposit-feeding invertebrates: roles of particle size and organic coating. Oecologia (Berl.) 52:295-304.

Walker, K.R. and R.K. Bambach. 1974. Feeding by benthic invertebrates: classification and terminology for paleoecological analysis. Lethaia 7:67-78.

Whitlatch, R.B. 1980. Patterns of resource utilization and coexistence in marine intertidal deposit-feeding communities. J. Mar. Res. 38(4):743-765.

Yonge, C.M. 1928. Feeding mechanisms in the invertebrates. Biol. Rev. 3:21-76.

Young, D.K. and D.C. Rhoads. 1971. Animal-sediment relations in Cape Cod Bay, Massachusetts. I. A transect study. Mar. Biol. 11:242-254.

EVOLUTIONARY AND ECOLOGICAL INSIGHTS GAINED FROM STUDIES ON MARINE ISOPOD CRUSTACEANS

Richard C. Brusca
Curator and Chair, Invertebrate Zoology Department
San Diego Natural History Museum

Various research programs on warm temperate and tropical marine isopod crustaceans have demonstrated the usefulness of this group in ecological, evolutionary, and phylogenetic studies. Marine isopods play important ecological roles as beach scavengers, kelp and seaweed grazers, mangrove borers, fish parasites and predators, as links between primary producers and carnivores, and as food for near-shore fishes. Because isopods have direct development, brood their young, and have limited dispersal capabilities, they are useful for historical biogeographic analyses and studies of ecological regulation of geographic distribution. Predatory fishes have probably directly influenced the evolution of isopod morphology and behavior, and carnivorous isopods may have directly influenced the evolution of epibenthic fish behaviors. The phylogeny of the order Isopoda has recently been analyzed by use of computer-assisted numerical phylogenetic programs. The analysis suggests that the first isopods that evolved were herbivores and scavengers, with crushing/grinding mandibles and limited swimming capacity (e.g. phreatoicideans, asellotans, oniscids, calabazoids, valviferans, and sphaeromatids). These "short-tailed" isopods possess little or no swimming ability, have cylindrical terminal uropods, and lack a distinct tailfan. The more highly derived isopods (i.e., the "long-tailed" isopods; anthurideans, epicarideans, gnathiids, and non-sphaeromatid flabelliferans) are carnivores, predators, and parasites. They possess piercing/slicing mandibles and have a body morphology specifically adapted for swimming (e.g. streamlined body, coxal plates, broad tailfan). The evolution of the more highly derived body form in isopods (the "long-tailed" isopod morphology) was probably influenced by confrontation with predatory fishes as isopods emerged from benthic habitats and adopted free-swimming, epibenthic, carnivorous lifestyles.

The Marine Invertebrates Department at the San Diego Natural History Museum opened in 1930's and was initially staffed by Miss [illegible]a Bristol (paid) and Mr. Steve Glassell (volunteer). In 1964 Dr. Ed Wilson, the Department's first professional scientist, was appointed Curator. Dr. Wilson specializes in fossil crustaceans and corals and presently heads the Invertebrate Paleontology Department at the LACM. In 1968 George Radwin was appointed Curator and was the first professional malacologist to head the Department. He died in 1977. From 1978 to 1980 Hans Bertsch, an opisthobranch specialist, served as Curator. Between 1980 to 1987 the department had no professional curatorial or collections care staff and it languished.

In the fall of 1987 Dr. Rick Brusca was appointed to the newly created Joshua L. Baily, Jr. Curatorial Chair. He had previously been at U.S.C. and the Allan Hancock Foundation for 12 years and served as Chairman of the Invertebrates Section at the LACM for 3 years. The Department also added a Collections Manager, Regina Wetzer, in 1987. Since Sept. 1987 the Department has added: 27,000 lots of molluscs (~1.3 million specimens), and 60,000 lots of non-molluscan invertebrates (~2.9 million specimens). All this material is expeditionary collected, wet-preserved, and bears accurate data. It comes from Central and South America, the Caribbean, the West Pacific, temperate and tropical Eastern Pacific, and the southeastern United States.

Since our arrival we have instituted the Department's first Accessions Catalog, and have begun developing the Department's first policy manual on Departmental Associates, collections care, deposition of type material, and data requirements for research material, etc. We have computer inventoried the type collection and all non-isopod Crustacea, and are presently working on inventorying the mollusc collections.

Our total research collections contain approximately 4.8 million specimens (215,000 lots) of which 1.8 million are mollusc specimens (150,000 lots), and the remaining 3.0 million are non-mollusc (mostly Crustacea) specimens (65,000 lots). Our type collections contain roughly 1500 specimens, 500 of which are mollusc species, and the remaining 50 are Crustacea species.

The strengths of our collections lie in its large mollusc and Crustacea holdings. Both the mollusc and Crustacea collections are very strong in Southern California and tropical eastern Pacific holdings, and have material dating back to the turn of the century. The collections are also strong in Caribbean and Indo-West Pacific material, due to research and collecting efforts of former staff, associates, and donors.

Notable among our mollusc holdings are the donated private collections of Joshua L. Baily, Herbert N. Lowe, and Fred Baker, and types of over 500 species of molluscs. Also present are collections from Charles Russell Orcutt, Donald Shasky, Joyce Gemmell, Hans Bertsch, and others.

Notable among the crustacean holdings are the donated personal collections of E. W. Iverson, R. C. Brusca, much of the Steve Glassell material, the Brusca-Wetzer Central and South America and South Pacific collections, the former Burke Museum (University of Washington) invertebrate collections, and the entire 10-year quantitative benthic collections of the California Coastal Commission's mandated MRC San Onofre offshore survey (~86,750 lots).

As a result of our research interests, we have a fairly complete collection of the marine isopods of California. At the present we are finishing a monograph on the tropical Eastern Pacific flabelliferan isopods of the family Cirolanidae; Rick Brusca and Scott France have recently submitted a monograph on the Eastern Pacific genus Rocinela for publication; and Rick and Regina continue to work on a handbook of the California marine isopods.

7/18/91rw

THE CITY OF SAN DIEGO

EMPLOYMENT
OPPORTUNITY

BIOLOGIST I (MICROBIOLOGY)

*SALARY: $2280 - $2748, Monthly
*$27,360 - $32,976, Annually

*FIRST DATE TO APPLY: July 5, 1991 LAST DATE TO APPLY: Open. Apply promptly. May close with 5 days notice.

REQUIREMENTS: You may qualify by meeting one of the following:

1) Bachelor's degree in a biological science (Microbiology, Biology, Marine Biology, Botany, Zoology).

2) Bachelor's degree in a closely related life science field (Environmental Science/Toxicology, Medical Technology, Medicine, Nursing, Pharmacy) and a minimum of one course in basic microbiology and one upper-division course and lab in invertebrate biology, fresh water biology, bio-oceanography, oceanography, bacteriology, microbiology, biology, botany or zoology.

NOTES:

1) Graduating seniors in their last semester or quarter of college may apply and will be considered for employment. If hired, final college transcripts showing degree awarded must be submitted within two months of graduation.

*2) Completed coursework or experience in wastewater microbiology, environmental microbiology, parasitology, virology, public health, or medical technology is highly desirable..

3) If you do not meet the educational requirements, you may substitute any combination of full or part-time experience which equals one year of full-time experience performing laboratory analysis for each year of education lacked. Qualifying experience must include conducting laboratory analyses, including any of the following: conducting marine and aquatic studies; testing and analyzing water or waste water samples for the presence of bacteria; identifying marine and fresh water microscopic organisms; examining marine organisms using the microscope; or analyzing biological samples.

License: A valid California Class C (Class 3) driver's license, which permits you to drive an automobile, may be required for some positions at the time of hire.

DUTIES:

*This is the entry-level professional position into the City's Biologist series. Biologists I analyze ocean or lake water samples aboard an ocean monitoring vessel or pontoon boat; examine and perform bacteriological, parasitological and virological tests on ocean water, waste water and sewage sludge samples; examine and perform biological and bacteriological tests and analysis of marine and aquatic organisms, pond and lake samples; design and implement scientific tests; collect, statistically analyze and interpret data; write technical reports; explain biological and microbiological studies and programs to scientific and lay groups; and perform related work as assigned.
*Career Opportunities may include Biologist II, $3178 a month maximum.

APPLICATION/SCREENING PROCESS:

Applicants must submit a Special Application for this position.

The screening process will consist of a review of the application for minimum requirements. All qualified applicants will be placed on the eligible list, which will be in effect for one year. The eligible list will consist of one category. All candidates will receive written notice of their eligibility expiration date. The hiring department will contact and interview candidates as needed to fill vacancies.

#T0062 Biologist I (Recruiting Title: Biologist I (Microbiology))
October 27, 1989
*Rev. 4, (7-5-91)

Pamela Hightower, Assigned Analyst
DOC. 1121

FOR ADDITIONAL INFORMATION SEE REVERSE SIDE

The City has an active Equal Opportunity Program for employment of women, minorities, and persons with disabilities. Disabled applicants who require special testing arrangements may call 236-6358.

Applicant Information

APPLY: EMPLOYMENT INFORMATION CENTER
CITY ADMINISTRATION BUILDING
LOBBY 202 "C" STREET, SAN DIEGO, CALIFORNIA
24-hour job information: (619) 236-6463
Hearing Impaired For TTY Call (619) 236-6950

APPLICATION INFORMATION

Application materials must be received at the Employment Information Center NO LATER THAN 5:00 P.M. ON THE FINAL FILING DATE. Postmarks as proof of meeting the final filing date are not accepted.

1. Starting salaries will be determined by the hiring department.
2. Relevant part-time work will be evaluated towards meeting the required experience.
3. Unless otherwise stated, relevant experience may be substituted for education.
4. Eligible lists may be extended by the Civil Service Commission.
5. Examination requirements and processes may be revised.
6. Experience, education, and all other information provided by an applicant orally or in writing are subject to verification. Any misrepresentations or false statements may be cause for disqualification or dismissal from employment.

GENERAL REQUIREMENTS

Requirements must be met at time of application unless otherwise stated.

The minimum age for most full-time employment is 18, unless you are 17 and a high school graduate. You must have the legal right to work in the U.S. or have U.S. citizenship. Persons hired must present acceptable proof of identity and the legal right to work in the United States and the authenticity of the documents must be verified before starting work. After hire, you will be required to sign a loyalty oath and may be required to live in San Diego County.

A CITY MEDICAL EXAMINATION which may include a drug screen and/or completion of a medical history questionnaire may be required before hire or promotion.

The City of San Diego is committed to a drug and alcohol free workplace.

A CONVICTION RECORD FORM must be submitted before hire.

VETERANS PREFERENCE: Only those persons who have not worked since being discharged from the military and who have served in a period of military draft may be eligible for veterans points. Military retirees are not eligible for veterans points.

EMPLOYEE BENEFITS

Salaried City Employees are eligible to participate in a benefit program including holidays, vacations, savings and retirement plans, health programs, and other benefits.
Benefits may change due to employer-employee contract negotiations.

CAREER OPPORTUNITIES are available after six months of service. Employees may qualify to apply for promotional examinations not available to the public.

The provisions of this bulletin do not constitute an expressed or implied contract.

DIVERSITY BRINGS US ALL TOGETHER

THE CITY OF SAN DIEGO
PERSONNEL
DEPARTMENT

MAILING ADDRESS
JOBS
CITY OF SAN DIEGO
PERSONNEL DEPARTMENT
202 "C" STREET
SAN DIEGO, CA 92101-3861

ADDRESS CORRECTION REQUESTED

Southern California Association of Marine Invertebrate Taxonomists

3720 Stephen White Drive
San Pedro, California 90731

August, 1991 | Vol. 10, No. 4

NEXT MEETING:	9:30-10:00am SCAMIT Business 10:00-12:00am - Phoronida 1:00-3:00pm - <u>Chone</u>(Polycaeta: Sabellidae)
GUEST SPEAKERS:	10:00-12:00am - Dr. Russ Zimmer of the University of Southern California 1:00-3:00pm - Dr. Kirk Fitzhugh of the Los Angeles County Museum of Natural History
DATE:	September 23, 1991 **Note this is the fourth Monday of the month.**
LOCATION:	Alan Hancock Foundation Rm. B-55 (In the south end of the basement.)

It is with great sadness that SCAMIT announces the passing of a friend and colleague. Dr. J. L. Barnard died of a heart attack at the home of Jim Thomas in Big Pine, Florida on August 16. His body was cremated during a private ceremony on August 22. A public memorial service will be held in a few months. An announcement will be made at that time.

MINUTES FROM SCAMIT MEETING ON AUGUST 12, 1991

Ron Velarde announced that Dr. Raymond Manning of the Smithsonian

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FUNDS FOR THIS PUBLICATION PROVIDED IN PART BY THE ARCO FOUNDATION, CHEVRON USA, AND TEXACO INC.

Institution also suffered a heart attack recently. He is doing well and was scheduled to return to work soon according to Dr. Kristian Fauchald.

Larry Lovell released the results of the balloting on the proposed changes to the constitution. It was unanimous, although voter turn out was low. Only 15 out of a total of about 86 ballots sent out were returned. Those wishing a copy of the revised constitution should contact the secretary. His address is:

Kelvin Barwick
Marine Biology Laboratory
4077 North Harbor Dr. M.S. 45-A
San Diego, CA 92101.

Sabellid Workshop: Dr Kurt Fitzhugh of the LACMNH gave a very informative workshop on the Sabellids encountered in near shore waters off southern California. All the common genera were discussed except Chone. This was delayed until the second half of the September meeting. This will allow more time to discuss this difficult group. Dr. Fitzhugh has prepared an abstract, descriptions, and a key which are included in the newsletter.

SOUTHERN CALIFORNIA ACADEMY OF SCIENCES MEETING:

The Southern California Academy of Sciences' annual meeting will be held at Occidental College in Los Angeles on May 1 & 2, 1992. The title will be "Interface Between Ecology and Land Development in California." The opening plenary address will be by Dr. Peter Raven. Symposia topics will be Biodiversity and Habitat Loss, Mitigation of Development, Restoration of Damaged Communities, and Wildlife Corridors. For more information contact:

Dr. John Keeley
Department of Biology
Occidental College
Los Angeles, CA 90041
(213)259-2958(fax).

SCAMIT PICNIC SEPTEMBER 14:

Don't forget the annual SCAMIT picnic. This year it will be at San Clemente State Beach Park from 10am to 3pm. To get there take Interstate 5 to San Clemente. If you are coming from the **north** take the Avenida Calafia exit and go west. If you are coming from the **south** take you must take the exit at Cristianitos Drive turn left and follow the road north (Presidente) till it intersects Avenida Calafia then turn left (west). Once in the park follow the signs to the picnic area. Lunch will be ready between 12:30 and

1:00. The main dish will be a Honey Baked Ham. Several kinds of bread and condiments will also be provided along with soft drinks. Please bring a side-dish and/or dessert. Please contact the secretary and let him know how many are coming.

SCAMIT OFFICERS:

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

President	Ron Velarde	(619)226-0164
Vice-President	Larry Lovell	(619)945-1608
Secretary	Kelvin Barwick	(619)226-8175
Treasurer	Ann Martin	(213)648-5317

UPDATE ON MEMBERS SPECIALTIES LIST

The following is an update of the Members Specialties List distributed earlier this year. This list includes address and telephone number corrections as well as some members that were accidentally ommitted from the initial list. The next update will be distributed in spring 1992.

Y James A Blake
SAIC
89 Water Street
Woods Hole MA 02543
(617)585-5822
Polychaetes

Y Sheila C Byers
Department of Invertebrate Zoology
Royal Ontario Museum
100 Queen's Park
Toronto Ontario M5S 2C6
CANADA
(416)586-8041
Polychaetes, marine invertebrates

N Faith Cole
Environmental Protection Agency
2111 SE Marine Science Drive
Newport OR 97365-5260
(503) 867-4023
Polychaetes

Y Tom Gerlinger
2861 Corvo Place
Costa Mesa CA 92626
H(714)241-7737 W(714)540-2910
Polychaetes, SCUBA, 24 ft boat

Y Sandy J Lipovsky
PO Box 1001
Royston BC V0R 2V0 Canada
(604)335-0714
Benthic invertebrate taxonomy, general

Y Tim Mikel
Aquatic Bioassay & Consulting Labs
29 N Olive Street
Ventura CA 93001
(805)643-5621
Misc invertebrates, bioassay, field work

Y Pete Striplin
5520 78th Ave NW
Olympia WA 98502
H(206)866-8343 W(206)753-2835
Polychaeta, mollusca, ophiuriodea

Y Regina Wetzer
Natural History Museum
PO Box 1390
San Diego CA 92112
(619)232-3821
Technical translation: German to English
Invertebrates with emphasis on Crustacea

Y Susan Williams
392 S Catalina St
Ventura CA 93001
Polychaete taxonomy/deep-sea biology
(805)648-2628

Southern California Association of Marine Invertebrate Taxonomists

3720 Stephen White Drive
San Pedro, California 90731

September, 1991 Vol. 10, No. 5

NEXT MEETING:	Amphipod Workshop
GUEST SPEAKERS:	Elizabeth Harrison-Nelson of the Smithsonian Institition, Division of Crustacea in Washington, D.C. Dr. Jim Thomas of the New Found Harbor Marine Institution in Big Pine Key, Florida.
DATE:	October 28 & 29, 1991 **Note this is the fourth Monday of the month.**
LOCATION:	Times Mirror Room Los Angeles Museum of Natural History Los Angeles, California

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AMPHIPOD WORKSHOP:

We will be reviewing Barnard and Karaman's new publication "The Families and Genera of the Marine Gammaridean Amphipods" and its affects on the taxonomy of the local fauna. We will also be examining the local Stenothoides. Plan on attending what promises to be a lively and informative workshop. Bring any unknown specimens of Stenothoides as well as any other mystery amphipods you might have.

FUNDS FOR THIS PUBLICATION PROVIDED IN PART BY THE ARCO FOUNDATION, CHEVRON USA, AND TEXACO INC.

NOVEMBER MEETING:

The November 18 SCAMIT meeting will be on sea pens. It will be hosted by the Santa Barbara Museum of Natural History in Santa Barbara, California. The guest speaker will be Dr. Eric Hochberg of the Santa Barbara Museum of Natural History. This will be on the third Monday of the month. If possible please send your problem sea pens to Dr. Hochberg before the meeting. If not, bring them with you to the meeting. Accommodations are available at the Mountain View and Vagabond Inns. These are both on or near State Street close to the museum and moderately priced. See the attached map for directions to the museum.

MINUTES FROM SCAMIT MEETING ON SEPTEMBER 23, 1991:

Ron Velarde announced that Dr. Donald Reish has proposed publishing a Barnard memorial volume of amphipod papers. Dr. Reish has volunteered to edit such a publication. All the members present agreed that SCAMIT should be involved. One thing mentioned was the possibility of hosting such a conference under SCAMIT auspices. A final public memorial for Dr. Barnard will be held in the spring; cherry blossom season in Washington D.C.

Ron encouraged all SCAMIT members to write the Chairman of the National Museum and request that Barnard's position be filled with someone with similar interests. Mail your request to:

Dr. Brian Kensley
Invertebrate Zoology Division, M.S. NHB 163
National Museum of Natural History
Washington, D.C. 20560.

Don't forget the SCAMIT Christmas party on December 7 at the Cabrillo Marine Museum from 6:00 to 9:00 pm. Jacqueline Lovell has volunteered to organize the festivities with the help of the "SCAMIT Auxiliary." Call Jacqueline at (619)945-1608 if you would like to help. The food will be Italian. The museum will be open for SCAMIT members and their families.

Phoronid Workshop: Dr. Russ Zimmer, after a brief review of phoroind morphology, pointed out the difficulty in identifying members of this group. To accomplish this a thin cross-section must be made at about mid-body. The number and placement of longitudinal muscles is diagnostic. A formula is generated consisting of four numbers that corresponds to the number of muscle bands in each of four quadrants created by the mesenteries (Figure 1). In

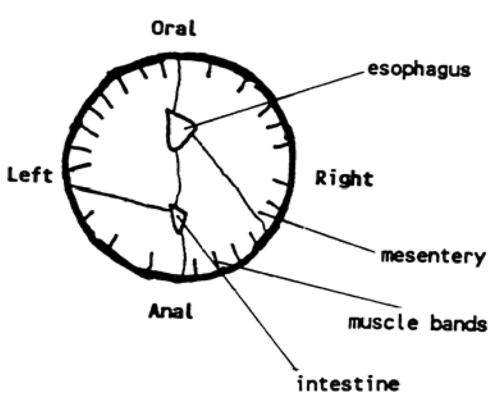

Figure 1 (x-sec.)

the example, the formula would be written as: $\frac{8 \mid 7}{3 \mid 4}$.

Dr. Zimmer has not had sufficient time to positively identify the specimens he was given. He will continue to work on them. A list of known west coast species with a brief description of each has been included in the newsletter.

Chone Review: During the afternoon Dr. Kirk Fitzhugh of the Los Angeles County Museum of Natural History continued his review of the Sabellidae. He established that *Chone* sp. C of Harris (*C*. nr. *duneri* of Point Loma) is not *C*. *duneri* according to the illustrations in Malmgren. He also identified two separate staining forms of *Chone mollis*. There is a light and dark form. They all have the same pattern but some take up the stain differently. Dr. Fitzhugh review of *Chone* and other Sabellides is continuing.

Publication of Interest to SCAMIT Members: "Databases In Systematics" edited by R. Allkin and F. A. Bisby of the Biology Department, The University, Southhampton, England. Published for the Systematics Association by Academic Press. A copy of the table of contents has been included in the newsletter.

National Institutes for the Environment Update: Tom Parker of the Los Angeles County Sanitation District recently received a letter and questionnaire from the executive director for the Committee for the National Institutes for the Environment. A copy has been enclosed in this newsletter for those members who are interested.

SCAMIT OFFICERS:

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

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Secretary	Kelvin Barwick	(619)226-8175
Treasurer	Ann Martin	(213)648-5317

WEST COAST SPECIES OF THE PHYLUM PHORONIDA

The following seven species of phoronid adults are known from southern and central California:

Phoronis architecta
Phoronis muelleri
Phoronis pallida
Phoronis psammophila
Phoronis vancouverensis
Phoronopsis californica
Phoronopsis harmeri

With the exception of *Phoronis muelleri* the larvae of the above are also well known here.

An additional nearly cosmopolitan species *Phoronis ovalis* occurs in Washington and two additional widely distributed species *Phoronis australis* and *Phoronis hippocrepia* are reported from our east coast.

Two further "larval species" occur in southern California, a third such form is known from Hawaii, and there may be at least two additional unidentified larvae from east coast waters. There are no described adults to match with these larval forms, so additional adult forms await discovery and description.

Two additional species names may be familiar to California workers: *Phoronopsis viridis* is now considered a synonym of *Phoronopsis harmeri* and *Phoronis pacifica* has never been identified since the inadequate type description

The Genus *Phoronis*

Members of this genus lack the epidermal fold known as the collar which is located at the base of the lophophore in members of the only other genus *Phoronopsis*. Although inconsequential and sometimes inconspicuous, the collar is the only morphological feature separating the genera. Adults of the genus *Phoronis* are usually smaller than those of *Phoronopsis*

Phoronis ovalis: Not yet described from southern California, but probably here. Positive identification is easy since species is **diminutive** (usually less than 1 cm in length), with only about **24 tentacles** which are arranged **in a slightly indented circle**. **Burrows within calcareous substrates** (limestone, mollusc shells, barnacles) in which it forms aggregations by asexual budding.

(gonochoristic?; no spermatophoral or nidamental glands; 125 µm eggs brooded in tube; composite muscle formula 7-21|7-19, **mean muscle formula 29 = 15|14)**

Phoronis pallida Another species that can be identified with great confidence, this is the second smallest species, usually **about 1 cm in length** (not 15 cm as reported by Emig!) with tubes usually less than 2 cm in length. Three obvious **constrictions caused by sphincter muscles subdivide the muscular region of the trunk into distinctive zones**; such zonation is found in no other phoronid. The tube is densely sand-encrusted except for a short distal portion that is largely sediment-free. A third diagnostic feature is that this species is always (to the best of my knowledge) a **commensal within the burrow walls of thalassinid "ghost" shrimps**. In southern California the host is usually Upogebia spp. so this species is usually collected only in shallow water from muddy or sandy embayments.

(gonochoristic; large spermatophoral glands with fleshy lips, no nidamental glands; 60 µm eggs freely spawned; composite muscle formula 17-19 = $\frac{5\text{-}6}{4} \Big| \frac{5}{3\text{-}4}$, **mean muscle formula 18** = $\frac{5}{4} \Big| \frac{5}{4}$)

The four following species -- *Phoronis architecta*, *P. muelleri*, *P. psammophila* and *P. vancouverensis* -- all occur in southern California and are difficult to separate when alive, much less when preserved. All are of intermediate size (about 5-10 cm long when extended), with tentacle numbers around 100 plus. Some of the most critical taxonomic features involve reproductive features and/or internal details so positive identification is always difficult and sometimes impossible. I'll take them in reverse alphabetical order, in part because *Phoronis vancouverensis* has a distinctive habitat and is the only one of the four to occur in clumps, rather than more or less singly.

Phoronis vancouverensis is the only local species which regularly has **tubes made only of chitin** without attached sand grains (*Phoronis australis*, *P. hippocrepia*, and *P. ovalis* are others). This lack of sand grains is associated with their habit of growing **embedded within or attached to limestone outcroppings in shallow, muddy embayments or suspended either from the undersides of logs in bays or floats in marinas**. The individuals commonly occur in **dense tangles**. During the reproductive season (spring and summer), this hermaphroditic species retains its early developmental stages in a **pair of conspicuous embryo masses** within the lophophore, but **lacks conspicuous spermatophoral glands**.

(gonochoristic; small spermatophoral glands, nidamental glands inconspicuous; 100 µm eggs retained in paired egg masses; composite muscle formula 42-59 = \F(12-19 5-10,18-26 5-10), **mean muscle formula 51 =** $\frac{16 \mid 22}{7 \mid 6}$)

Phoronis psammophila:: This species, *Phoronis architecta* and *P. muelleri* are gonochoristic and mature males have a **paired, large, fleshy spermatophoral glands** within their lophophore during the spring and summer breeding seasons. The latter two species spawn their eggs freely, but *P. psammophila* is a brooder like *P. vancouverensis*, but , but in contrast to it, the **embryos are all of one stage** rather than a full sequence of stages from zygotes to early actinotrochs and are **brooded in one mass;** the nidamental glands that hold the embryos are formed by the **fusion of almost all members of the inner ring of tentacles**. In living specimens, the lophophore has white flecks and **may have yellow, red or green pigmentation.** The species is found from the **intertidal to about 20 m**, usually occuring as single isolated tubes, but sometimes attached with others to shells or rocks.

(gonochoristic; large spermatophoral glands with fleshy lips, nidamental glands involving most of inner tentacles; 60 µm eggs retained in single mass all at same stage; composite muscle formula 25-53 = \F(7-9 7-17,4-11 4-11), **mean muscle formula 34 =** $\frac{11 \mid 11}{6 \mid 6}$)

Phoronis architecta : This species is so similar to the previous species that it has been synonymized with it, but in fact is more closely related to *Phoronis muelleri* with which it shares numerous similarities (both are gonochoristic with females that shed their eggs freely, and with males that have large fleshy spermatophoral glands during the breeding season; the larvae of the two are nearly identical, both possessing an otherwise unknown second set of tentacles; the lophophore of the juvenile and of both species and of the adults of P. *muelleri* (and of regenerating individuals of these and many other species) produces new tentacles on both sides of the mouth (ventral and dorsal not left and right) , resulting in an unusual "oral" notch opposite the indentation of the lophophore on the anal side; as a consequence of this pattern of tentacle formation, the tentacles near the anus are significantly longer that those near the mouth so that the lophophore of fully formed adults appears trapezoidal in side view). In *P. architecta* the translucent lophophore has white flecks in a characteristic pattern, but is otherwise unpigmented. *P. architecta* occurs in shallow water in sandy sediment so that the tubes are usually encrusted with closely fitted sand grains (hence the name *architecta*).

(gonochoristic; large spermatophoral glands with fleshy lips, no nidamental glands; 60 µm eggs freely spawned; composite muscle formula 17-19 = $\frac{5\text{-}6}{4} \Big| \frac{5}{3\text{-}4}$, **mean muscle formula 18 = $\frac{5}{4} \Big| \frac{5}{4}$**)

Phoronis muelleri: As noted above this species shares many features with *P.architecta*. The lophophore, **which may be red to violet**, usually **has only 50-100 tentacles of which those on the oral side are very short.** The species is usually **much more slender** and is found much deeper **(10-50 m)** than either *P. architecta* or *P. psammophila*. Because it it normally occurs deeper and therefore in finer sediment than *P. architecta* or *P. psammophila*, the **tubes** usually are more **poorly encrusted with sand grains**.

(gonochoristic; large spermatophoral glands with fleshy lips, no nidamental glands; 60 µm eggs freely spawned; composite muscle formula 18-30 = $\frac{5\text{-}13}{2\text{-}6} \Big| \frac{5\text{-}11}{3\text{-}6}$, **mean muscle formula 24 = $\frac{9}{3} \Big| \frac{9}{3}$**)

The Genus *Phoronopsis*

As indicated above, phoronids provided with an epidermal collar at the distal end of the trunk region are placed in the genus *Phoronopsis.*

Phoronopsis californica: Originally described from the intertidal at Newport Bay, this spectacular species is locally common from about 5-35 meters off a number of the Channel Islands. Although the tubes are highly variable, depending on the substrate, specimens can be identified with great confidence: 1. the lophophore (and body) is (are) usually a bright **tangerine or orange color**, varying from red to pale peach, with some white flecks (especially the anal papilla) and 2. the lophophore consists of some **1500 tentacles** that are arranged **in a complex double helix of 4-9 coils**. The body is reported to be up to 5 mm in diameter, which is true, and to reach nearly a half meter in length which is an exaggeration, although the tubes may be that long. The tube may have a distinctive nipple at the proximal end and often contains abundant mucoid material.

(gonochoristic; large spermatophoral glands with membranous lips, no nidamental glands; 60 µm eggs freely spawned; composite muscle formula 180-243 = $\frac{53\text{-}81}{35\text{-}54} \Big| \frac{56\text{-}79}{29\text{-}40}$, **mean muscle formula 211 = $\frac{66}{44} \Big| \frac{66}{35}$**)

Phoronopsis harmeri (Phoronopsis viridis): This species forms dense aggregations at Morro and Bodega Bays (in these regions, the lophophore is often greenish, hence the original trivial name), but is commonly found locally either intertidally or subtidally. All "collared" phoronids which don't key out as *P. californica* are now assigned to this species, but the considerable variation in form, especially between specimens from different localities, may reflect greater taxonomic complexity.

(gonochoristic; large spermatophoral glands with membranous lips, no nidamental glands; 60 μm eggs freely spawned; composite muscle formula

$75\text{-}145 = \frac{14\text{-}33}{7\text{-}20} \left| \frac{15\text{-}33}{7\text{-}16} \right.$, **mean muscle formula**

$\mathbf{72 = \frac{23}{14} \left| \frac{23}{12} \right.}$)

Potential Problems for the Would-be Taxonomist:

- need for sections
- morphological variability in muscle formulae, tentacle numbers, tubes, etc.
- autotomy and possible confusion with segmentation or body regionation
- regeneration with loss of important parts
- seasonal reproduction with evanescent accessory sex organs
- undescribed species

Bibliography

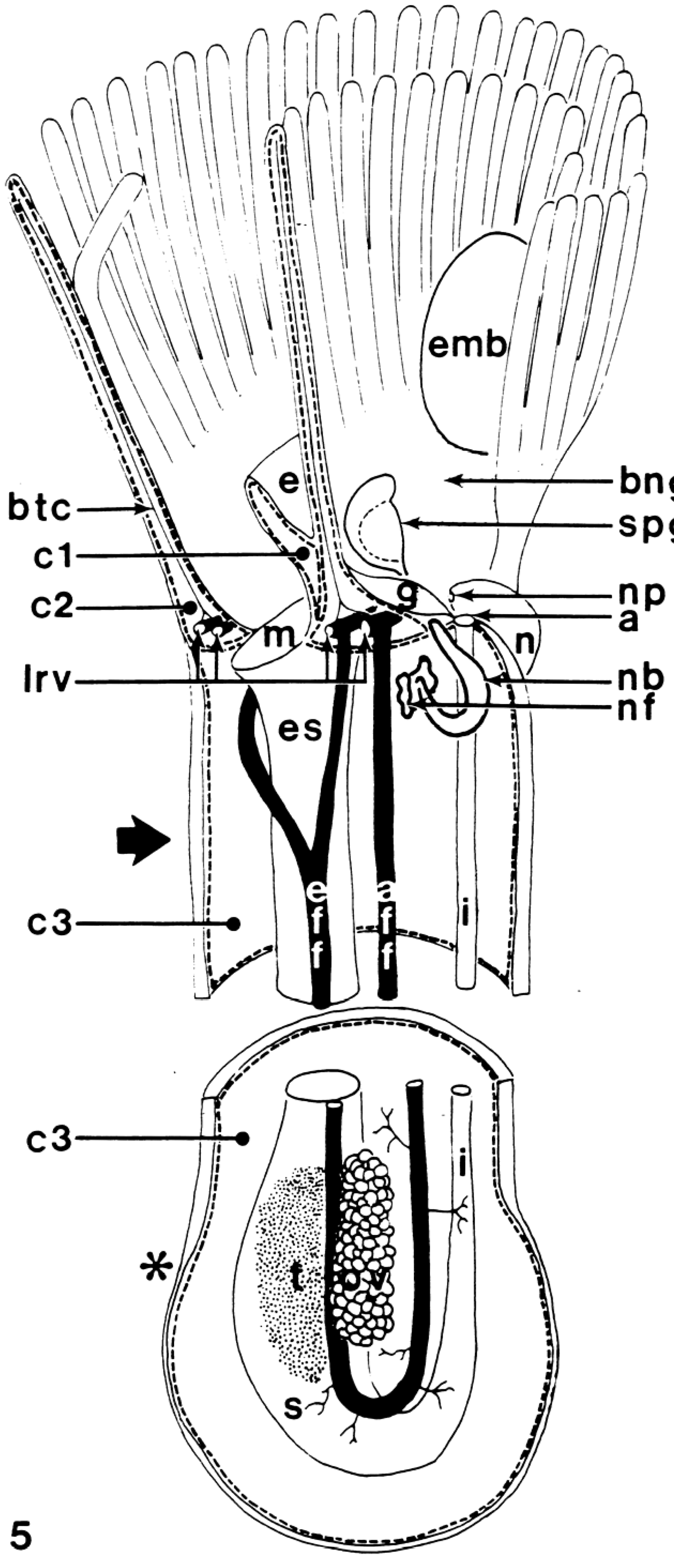
Emig, C.C. 1974. The systematics and evolution of the phylum Phornida. Z. zool. System. Evol.-Forsch. **12**: 128-151.

Emig, C.C. 1979. British and other phoronids. No 13 Synopses of the British Fauna (D.M. Kermack and R.S.K. Barnes, eds.). Academic Press, London, 57 pp.

Marsden, J. C. 1959. Phoronidea from the Pacific coast of North America. Can j. Zool. **37**: 87-111.

Emig placed *Phoronis architecta* in synonymy with *Phoronis psammophila* on the basis of tentacle number, muscle formulae, and other morphological congruences, but the latter species broods its young and the former does not.

Marsden placed *Phoronis vancouverensis* in synonymy with *Phoronis hippocrepia* , but Emig argued against this and placed *P. vancouverensis* in synonymy with a Japanese form *P. ijimai*, retaining *P. hippocrepia* as a valid species I consider both interpretations incorrect and recognize all three species as valid.



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DATABASES IN SYSTEMATICS
Allkin & Bisby
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NIE
COMMITTEE FOR THE
NATIONAL INSTITUTES FOR THE ENVIRONMENT

730 11th Street NW • Washington, DC 20001-4521
202-628-4303 • FAX 202-628-4311

September 9, 1991

Dr. Thomas Parker
Marine Biology Laboratory
LACSD
24501 S. Figueroa Street
Carson, CA 90745

Dear Dr. Parker,

Thank you for inquiring about the upcoming CNIE National Conference. We will be pleased to add your name to our distribution list and appreciate your offer. Please circulate our questionairre (enclosed among SCAMIT members so that they can help shape the conference.

Plans are well underway for an event that will allow us to broaden our effort and reevaluate the agenda for the proposed NIE. In particular, we need to ensure that our proposal adequately considers the broad disciplines that will be necessary to understand and solve our environmental problems. We expect that the conference will result in working groups to provide more details in our NIE needs statement.

We have teamed up with Resolve, Inc. an environmental mediation group associated with The Conservation Foundation. They will be facilitating the conference and helping us with the planning. We have formed a planning committee, which is headed by Dr. A. Karim Ahmed. The originators of the NIE proposal, Dr. Steve Hubbell and Dr. Henry Howe will co-chair the conference.

Due to the magnitude of the effort and a need for substantial funding for the conference, we have decided to postpone the event until early Spring, 1992. We will let you know the exact date as soon as it is finalized.

Although attendance at the conference will be limited, we encourage you to participate by filling out the enclosed questionnaire. This will help us to form the basis for a revised, improved needs statement and plan for the NIE.

Thank you for your interest. We will keep you updated on additional developments.

Sincerely,

David E. Blockstein, Ph.D.
Executive Director

NIE Questionnaire

Committee for the National Institutes for the Environment • Washington, D. C. July 1991

Name: ______________________ Title: ______________________

Address: ____

Telephone: ______________ Fax: ______________ BITNET: ______________

Field: ______________________ Specialty within field: ______________________

Note: May we quote you (are your remarks "on the record")? Yes ☐ No ☐

Your response to this questionnaire will be very helpful to the Committee for the NIE to make the case for the NIE, so please do send it back so that we can benefit from your insights and experience. Short answers in phrases are fine; use additional space if needed. Thanks very much. Steve Hubbell

1. What federal agencies, if any, are the primary source of funding for your field or problem area?

2. What are the high-priority environmental research problems in your field or area?

3. What existing federal agencies or programs now fund, or are likely to fund, research on these problems?

4. What could a new agency such as the NIE do in your field or environmental problem area that existing agencies have not done, or seem unlikely or unable to do? Be as specific as possible.

5. If existing agencies are not or cannot fill the needs in your field or problem area, what are the reasons in your estimation why these agencies can't do what is required?

6. How could an NIE potentially help existing federal agencies do a better job of meeting your field's needs?

7. Briefly cite one or two of the best examples you know in which environmental research in your field or area led to solutions or amelioration of environmental problems and/or saved money. Citations of published accounts would help.

8. Briefly cite one or two good examples in which a *lack* of environmental research in your field or area has hindered progress toward solving environmental problems, and which cost more money to solve later. Citations would again be helpful.

9. Is there a shortage of environmental scientists in your field? If so, how serious is it?

10. Do you like the NIH as a model for the NIE? Have you any suggestions for NIE structure and function?

Please return to: The Committee for the NIE, 730 11th St. NW, Washington, DC 20001-4521

THE CITY OF SAN DIEGO
EMPLOYMENT
OPPORTUNITY

MARINE BIOLOGIST I

SALARY: $2280 - $2748, Monthly; $27,360 - $32,976, Annually
$2371 - $2858, Monthly; $28,452 - $46,296, Annually, effective 1/4/92.

FIRST DATE TO APPLY: August 23, 1991 LAST DATE TO APPLY: Open. Apply promptly. May close with 5 days notice.

REQUIREMENTS: You may qualify by meeting one of the following:

1) Bachelor's degree in Marine Biology or Oceanography.
2) Bachelor's degree in a closely related life science field (Biology, Ecology, Environmental Science, Zoology) and a minimum of one upper-division course and lab in Marine Biology or Oceanography and one upper-division course and lab in Invertebrate Zoology or Invertebrate Ecology.
3) If you do not meet the educational requirement, you may substitute any combination of full or part-time experience working in an ocean monitoring laboratory for each year of education lacked. **Qualifying experience must include performing ocean monitoring biological studies, including any of the following: collecting and analyzing ocean water, benthic, and fish samples in the field; performing taxonomic identifications of marine invertebrate organisms and fish; or performing statistical analysis of oceanographic data.**

NOTES:

1) College transcripts showing degree awarded must be submitted **with your application**. Transcripts will be made available to the hiring department.
2) Graduating seniors in their final semester or quarter of college may apply but will be placed inactive on the eligible list until submitting proof of completing the educational requirement, within the effective life of the list. Graduating seniors must submit transcripts covering courses up to their current term and must indicate their anticipated date of graduation.

License: A valid California Class C (Class 3) driver's license, which permits you to drive an automobile, may be required at the time of hire.

DUTIES: This is the entry-level professional position into the City's Marine Biologist series. Marine Biologists I work from a 30' - 42' ocean monitoring boat to collect and analyze ocean water, benthic, and fish samples; perform taxonomic identifications of invertebrate marine animals and fish; statistically analyze and interpret oceanographic data; write technical reports; and perform related work as assigned. Career Opportunities may include Marine Biologist II, $3178 a month maximum.

APPLICATION/ SCREENING PROCESS: Complete and submit the City's application and **Supplemental Application.**

All application materials will be made available to the hiring department for use during the selection process. The screening process will consist of a review of the application materials for minimum requirements. All qualified applicants will be placed on the eligible list, which will be in effect for six months. The eligible list will consist of One Category. All candidates will receive written notice of their eligibility expiration date. The hiring department will contact and interview candidates as needed to fill vacancies.

#T1176 Marine Biologist I
August 23, 1991

Pamela Hightower, Assigned Analyst
DOC. 1314

FOR ADDITIONAL INFORMATION SEE REVERSE SIDE

The City has an active Equal Opportunity Program for employment of women, minorities, and persons with disabilities. Disabled applicants who require special testing arrangements may call 236-6358.

Applicant Information

APPLY: EMPLOYMENT INFORMATION CENTER
CITY ADMINISTRATION BUILDING
LOBBY 202 "C" STREET, SAN DIEGO, CALIFORNIA
24-hour job information: (619) 236-6463
Hearing Impaired For TTY Call (619) 236-6950

APPLICATION INFORMATION

Application materials must be received at the Employment Information Center NO LATER THAN 5:00 P.M. ON THE FINAL FILING DATE. Postmarks as proof of meeting the final filing date are not accepted.

1. Starting salaries will be determined by the hiring department.
2. Relevant part-time work will be evaluated towards meeting the required experience.
3. Unless otherwise stated, relevant experience may be substituted for education.
4. Eligible lists may be extended by the Civil Service Commission.
5. Examination requirements and processes may be revised.
6. Experience, education, and all other information provided by an applicant orally or in writing are subject to verification. Any misrepresentations or false statements may be cause for disqualification or dismissal from employment.

GENERAL REQUIREMENTS

Requirements must be met at time of application unless otherwise stated.

The minimum age for most full-time employment is 18, unless you are 17 and a high school graduate. You must have the legal right to work in the U.S. or have U.S. citizenship. Persons hired must present acceptable proof of identity and the legal right to work in the United States and the authenticity of the documents must be verified before starting work. After hire, you will be required to sign a loyalty oath and may be required to live in San Diego County.

A CITY MEDICAL EXAMINATION which may include a drug screen and/or completion of a medical history questionnaire may be required before hire or promotion.

The City of San Diego is committed to a drug and alcohol free workplace.

A CONVICTION RECORD FORM must be submitted before hire.

VETERANS PREFERENCE: Only those persons who have not worked since being discharged from the military and who have served in a period of military draft may be eligible for veterans points. Military retirees are not eligible for veterans points.

EMPLOYEE BENEFITS

Salaried City Employees are eligible to participate in a benefit program including holidays, vacations, savings and retirement plans, health programs, and other benefits.
Benefits may change due to employer-employee contract negotiations.

CAREER OPPORTUNITIES are available after six months of service. Employees may qualify to apply for promotional examinations not available to the public.

The provisions of this bulletin do not constitute an expressed or implied contract.

DIVERSITY BRINGS US ALL TOGETHER

THE CITY OF SAN DIEGO
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202 "C" STREET
SAN DIEGO, CA 92101-3861

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Southern California Association of Marine Invertebrate Taxonomists

3720 Stephen White Drive
San Pedro, California 90731

October, 1991 Vol. 10, No. 6

NEXT MEETING:	Sea Pens
GUEST SPEAKER:	Dr. Eric Hochberg of the Santa Barbara Museum of Natural History
DATE:	November 18, 1991 **Note this is the third Monday of the month.**
LOCATION:	The Santa Barbara Museum of Natural History Santa Barbara, California

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MINUTES FROM MEETING ON OCTOBER 28 & 29:

Dr. Jim Thomas began the meeting by responding to questions from a correspondence from Don Cadien. He described his relationship with the EPA regarding the development of appropriate biocriteria for the assessment of marine environmental quality. Dr. Thomas' role has been to advise the EPA on the importance of taxonomy in the selection of species as indicators. Indicator species must satisfy the following requirements in order to function as a biocriteria species. They must be ecologically significant, numerically abundant, and sensitive to a wide range of pollutants. His work with Dr. Barnard among the coral reefs of New Guinea suggests that Amphipods may be an appropriate group to use for biocriteria. A committee has been set up to work on east coast species. A similar panel should be set up for the west coast. Dr. Thomas suggested that SCAMIT should get involved.

FUNDS FOR THIS PUBLICATION PROVIDED IN PART BY THE ARCO FOUNDATION, CHEVRON USA, AND TEXACO INC.
SCAMIT newsletter is not deemed to be a valid publication for formal taxonomic purposes.

He also proposed that SCAMIT apply for money from UNESCO to get taxonomist from other countries to host a workshop at a future meeting. This is especially encouraged for scientist from both eastern block and underdeveloped countries. UNESCO has visiting scientist funds available for this kind of project.

Amphipod Workshop: Ron Velarde, Don Cadien, Tony Phillips, and myself will be preparing the notes from the workshop. This will include a complete list of the specimens examined as well as their ultimate resolution. An address for requesting copies should appear in the November newsletter. All those in attendance will automatically receive a copy.

Dr. Elizabeth Harrison-Nelson of the Smithsonian Institution was also in attendance. A copy of her "Notes on Stenothoidae of Southern California" has been included in the newsletter. A list of the specimens looked at will be included in the workshop notes.

Other Information of Interest to SCAMIT Members: A draft of Don Cadien's "List of the Marine Amphipod fauna of the Temperate and Boreal Northeastern Pacific Ocean..." has been included with the newsletter for review and comment. A copy of Senate bill 58 establishing a national policy for the conservation of biodiversity has also been included.

FOURTH INTERNATIONAL POLYCHAETE CONFERENCE:

It will be held in Angers, France, July 27 through August 2, 1992. The following subjects will be covered:

- Taxonomy and comparative morphology.
- Biogeography and population genetics.
- Biology of populations.
- Culture, exploitation, and valorization.
- Reproduction and larval biology.
- Cytophysiology, cytotoxicology, and endocrinology.

A tentative schedule and registration form have been included in the newsletter.

CHRISTMAS PARTY DECEMBER 7:

Don't forget the Christmas party at the Cabrillo Marine Museum. It will be from 6 to 9 pm on December 7. Mark you calendars and bring the kids.

FUTURE MEETINGS:

On December 9 Karen Green will be leading a meeting on Sponges. It will be held at the Cabrillo Marine Museum. Please send any problem animals to:

Karen Green
1537 Camino Corto
Fallbrook, CA 92028.

The January meeting is on the sixth. Ron Velarde will be leading the meeting on Mysids. It will be held at the San Diego Museum of Natural History. Send your problem specimens to:

Ron Velarde
4918 North Harbor Dr. #101
San Diego, CA 92106.

Note this is the **first** monday of the month.

SCAMIT OFFICERS:

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

President	Ron Velarde	(619)226-0164
Vice-President	Larry Lovell	(619)945-1608
Secretary	Kelvin Barwick	(619)226-8175
Treasurer	Ann Martin	(213)648-5317

Dates :

Monday July 27	Scientific session. Arrangement of posters. "Reception at the University".
Tuesday July 28	Scientific session. First poster session.
Wednesday July 29	Mid-conference excursions to the Bourgneuf Bay and the Châteaux d'Anjou.
Thursday Julay 30	Scientific session. Second poster session. After dinner meeting : Exploitation and valorisation of polychaetes.
Friday July 31	Scientific session. Conference banquet.
Saturday August 1	Scientific session in the morning. Coaches leave Angers at about 2 pm for excursions.
Sunday August 2	Excursions to the Mont St Michel Bay.

4 TH INTERNATIONAL POLYCHAETE CONFEREI
ANGERS, 1992
(Prelipinary Registration form)

NAME ....

ADDRESS...

....

TITLE OF PAPER (Provisional) ....

....

TITLE OF POSTER (Provisional) ....

....

- Registration 800 FF
- Lunch Center of Congress 100 FF

• Dormitory "Centre du Lac de Maine"

☐ single 97 FF
☐ double 69 FF
☐ four persons 56 FF
Do you accept to be with another person in your room : ☐ yes ☐ no

• Hotels :

Anjou *** (Ancient style)
☐ single 350 FF
☐ double 495 FF

Mercure *** (Modern style)
☐ single
☐ double

Boule d'Or **
☐ single 205 FF
☐ double 240 FF

• Excursions :

Mid Conference
☐ Bourgneuf Bay 300 FF
☐ Guérande 300 FF
☐ Châteaux and Troglodyte Sites : 300 FF

Post Conference
☐ Mont St Michel 750 FF

Return to : Patrick GILLET
Laboratoire d'Ecologie Animale - I.R.F.A.
3 Place A. Leroy
49008 ANGERS CEDEX 01 - FRANCE (Fax : 41.81.66.09)

List of the Marine Amphipod fauna of the Temperate and Boreal Northeastern Pacific Ocean
including literature records of occurrence between Bahia San Quintin, Baja California and the south side of the Aleutian Islands
incorporating nomenclatural changes listed in Barnard and Karaman 1991 (comments keyed to Klink 1980)
Donald B. Cadien, Marine Biology Laboratory -JWPCP, September 1991

Ampeliscidae Bate, 1857
- *Ampelisca* Krøyer, 1842
  - *Ampelisca agassizi* (Judd, 1896)
    - Ampelisca compressa Holmes, 1903
    - Ampelisca vera J. L. Barnard, 1954
  - *Ampelisca amblyopsoides* J. L. Barnard, 1960
  - [1]***Ampelisca brachycladus*** Roney, 1990 C
  - *Ampelisca brevisimulata* J. L. Barnard, 1954
  - [1]***Ampelisca careyi*** Dickinson, 1982
  - *Ampelisca coeca* Holmes, 1908 C
  - *Ampelisca cristata* Holmes, 1908
    - Ampelisca cristata microdentata J. L. Barmard, 1954
  - *Ampelisca eoa* Gurjanova, 1951
    - Ampelisca catalinensis J. L. Barnard, 1954
  - *Ampelisca eschrichti* Krøyer, 1842 B
    - Ampelisca pelagicus Stimpson, 1853
    - Ampelisca ingens Bate, 1862
    - Ampelisca dubia Boeck, 1871
    - Ampelisca propinqua Boeck, 1871
    - Ampelisca pacificus Gurjanova, 1955
  - [1]***Ampelisca fageri*** Dickinson, 1982
    - Ampelisca schellenbergi Shoemaker, 1933 of J. L. Barnard, 1954
  - *Ampelisca furcigera* Bulycheva, 1936
  - *Ampelisca hancocki* J. L. Barnard, 1954
  - [2]***Ampelisca hessleri*** Dickinson, 1982 B
  - *Ampelisca indentata* J. L. Barnard, 1954 C
  - *Ampelisca lobata* Holmes, 1908
    - Ampelisca articulata Stout, 1913
  - *Ampelisca macrocephala* Liljeborg, 1852
    - Ampelisca latipes Stephensen, 1928
  - *Ampelisca milleri* J. L. Barnard, 1954
  - *Ampelisca pacifica* Holmes, 1908 C
  - *Ampelisca plumosa* Holmes, 1908 C
  - *Ampelisca pugetica* Stimpson, 1864
    - Ampelisca californica Holmes, 1908
    - Ampelisca gnathia J. L. Barnard, 1954
    - Ampelisca macrodonta J. L. Barnard, 1954
    - Ampelisca mora J. L. Barnard, 1967
  - *Ampelisca romigi* J. L. Barnard, 1954 C
    - Ampelisca isocornea J. L. Barnard, 1954
  - *Ampelisca romigi ciego* J. L. Barnard, 1966
  - [4]***Ampelisca unsocalae*** J. L. Barnard, 1960

Byblis Boeck, 1871
Byblis barbarensis J. L. Barnard, 1960
Byblis bathyalis J. L. Barnard, 1966
[1]***Byblis brevirama*** Dickinson, 1983
[1]***Byblis longispina*** Dickinson, 1983
[1]***Byblis millsi*** Dickinson, 1983
[1]***Byblis mulleni*** Dickinson, 1983
Byblis tannerensis J. L. Barnard, 1966
Byblis thyabilis J. L. Barnard, 1971
Byblis veleronis J. L. Barnard, 1954
Haploops Liljeborg, 1856
[1]***Haploops lodo*** J. L. Barnard, 1961
Haploops tubicola Liljeborg, 1856
Haploops carinata Liljeborg, 1856
Haploops spinosa Shoemaker, 1931
Amphilochidae Boeck, 1871
Amphilochus Bate, 1862
Amphilochus litoralis Stout, 1912
Amphilochus "neapolitanus" Della Valle, 1893 of J. L. Barnard, 1962
Amphilochus picadurus J. L. Barnard, 1962 C
Gitana Boeck, 1871
Gitana calitemplado J. L. Barnard, 1962 C
Gitanopsis Sars, 1895
Gitanopsis vilordes J. L. Barnard, 1962 C
Ampithoidae Stebbing, 1899
Ampithoe Leach, 1814
Pleonexes Bate, 1857
Ampithoe aptos (J. L. Barnard, 1969) C
Pleonexes aptos J. L. Barnard, 1969
[1]***Ampithoe kussakini*** Gurjanova, 1955 **B**
Ampithoe lacertosa Bate, 1858
Ampithoe longimana Smith, 1873
Ampithoe plumulosa Shoemaker, 1938
Ampithoe ramondi Audouin, 1826 C
[2]***Ampithoe sectimanus*** **Conlan and Bousfield, 1982 B**
Ampithoe pollex Kunkel, 1910 of J. L. Barnard, 1954
Ampithoe simulans Alderman, 1936
[4]***Ampithoe dalli*** **Shoemaker, 1938 B**
Ampithoe simulans Alderman 1936 of J. L. Barnard, 1965
Ampithoe valida Smith, 1873
Ampithoe shimijuensis Stephensen, 1944
Cymadusa Savigny, 1816
Cymadusa uncinata (Stout, 1912)
Acanthogrubia uncinata Stout, 1912
Paragrubia uncinata Shoemaker, 1941

Key - 1. = not included 2.= new name 3. = family changed 4. = status changed 5. = new orthography
B = boreal occurrance only C= Californian occurrance only

Peramphithoe Conlan and Bousfield, 1982
Peramphithoe humeralis (Stimpson, 1864)
Peramphithoe lindbergi (Gurjanova, 1938)
Ampithoe lindbergi Gurjanova, 1938
Ampithoe femorata Krøyer, 1845 of J. L. Barnard, 1952
[1]***Peramphithoe mea*** (Gurjanova, 1938) **B**
Ampithoe mea Gurjanova, 1938
[2]***Peramphithoe plea*** (J. L. Barnard, 1965)
Amphithoe plea J. L. Barnard, 1965
[2]***Peramphithoe tea*** (J. L. Barnard, 1965)
Amphithoe tea J. L. Barnard, 1965
Anamixidae Stebbing, 1897
Anamixis Stebbing, 1897
Leucothoides Shoemaker, 1933
[2]***Anamixis pacifica*** (J. L. Barnard, 1955) **C**
Leucothoides pacifica J. L. Barnard, 1955
[4]Anamixis linsleyi J. L. Barnard, 1955
Anisogammaridae Bousfield, 1977
Anisogammarus Derzhavin, 1927
[1]***Anisogammarus pugettensis*** (Dana, 1853)
Carineogammarus Bousfield, 1979
≠Carinogammarus Stebbing, 1899 [baikalian]
[1]***Carineogammarus makarovi*** (Bulyscheva, 1952)**B**
Anisogammarus schmitti Shoemaker, 1964
Eogammarus Birstein, 1933
[3]***Eogammarus confervicolus*** (Stimpson, 1856)
[1]***Eogammarus oclairi*** Bousfield, 1979 **B**
[1]***Eogammarus psammophilus*** Bousfield, 1979 **B**
Locustogammarus Bousfield, 1979
[1]***Locustogammarus levingsi*** Bousfield, 1979 **B**
[1]***Locustogammarus locustoides*** (Brandt, 1851) **B**
Spinulogammarus Tzvetkova, 1972
[1]***Spinulogammarus subcarinatus*** (Bate, 1862) **B**
Aoridae Stebbing, 1899
Acuminodeutopus J. L. Barnard, 1959
Acuminodeutopus heteruropus J. L. Barnard, 1959 **C**
Aoroides Walker, 1898
Aoroides columbiae Walker, 1898
Aoroides californica Alderman, 1936
[1]***Aoroides exilis*** Conlan and Bousfield, 1982
[1]***Aoroides inermis*** Conlan and Bousfield, 1982
[1]***Aoroides intermedia*** Conlan and Bousfield, 1982
[1]***Aoroides spinosa*** Conlan and Bousfield, 1982
Aoroides columbiae Walker, 1898 of J. L. Barnard, 1954
Arctolembos Myers, 1979
[1]***Arctolembos arcticus*** (Hansen, 1887) **B**
Lembos arcticus (Hansen, 1887)

Key - 1. = not included 2.= new name 3. = family changed 4. = status changed 5. = new orthography
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Bemlos Shoemaker, 1925

[2]***Bemlos audbettius*** (J. L. Barnard, 1962) C

Lembos audbettius J. L. Barnard, 1962

[2]***Bemlos concavus*** (Stout, 1913) C

Lembos concavus Stout, 1913

[2]***Bemlos macromanus*** Shoemaker, 1925 C

Columbaora Conlan and Bousfield 1982

[1]***Columbaora cyclocoxa*** Conlan and Bousfield, 1982

Grandidierella Coutiére, 1904

[1]***Grandidierella japonica*** Stephensen, 1938

Paramicrodeutopus Myers, 1988

[2]***Paramicrodeutopus schmitti*** (Shoemaker, 1942) C

Microdeutopus schmitti Shoemaker, 1942

Neohela Smith, 1881

[1]***Neohela intermedia*** Coyle and Mueller, 1981 B

[1]***Neohela pacifica*** Gurjanova, 1953 B

Neomegamphopus Shoemaker, 1942

Neomegamphopus roosevelti Shoemaker, 1942 C

Rudilemboides J. L. Barnard, 1962

Rudilemboides stenopropodus J. L. Barnard, 1959 C

Argissidae Walker, 1904

Argissa Boeck, 1871

Argissa hamatipes (Norman, 1869)

Bateidae Stebbing, 1906

Batea Müller, 1865

Batea lobata Shoemaker, 1926

Batea transversa Shoemaker, 1926

Cheluridae Allman, 1847

Chelura Philippi, 1839

Chelura terebrans Philippi, 1839

Colomastigidae Stebbing, 1899

Colomastix Grube, 1861

Colomastix pusilla Grube 1864 of J.L. Barnard 1969

Corophiidae Dana, 1849

Corophium Latreille, 1806

Corophium acherusicum Costa, 1857

Corophium baconi Shoemaker, 1934

[1]***Corophium brevis*** Shoemaker, 1949 B

Corophium californianum Shoemaker, 1934 C

[1]***Corophium crassicorne*** Bruzelius, 1859 B

Corophium insidiosum Crawford, 1937

[1]***Corophium salmonis*** Stimpson, 1857 B

[1]***Corophium spinicorne*** Stimpson, 1857 B

Corophium uenoi Stephensen, 1932

Key - 1. = not included 2.= new name 3. = family changed 4. = status changed 5. = new orthography
B = boreal occurrance only C= Californian occurrance only

Dexaminidae Stebbing, 1888
Atylidae Liljeborg, 1865
Anatylidae Bulycheva, 1955
Lepechinellidae Schellenberg, 1925
Atylus Leach, 1815
[1]***Atylus brüggeni*** (Gurjanova, 1938) **B**
[1]***Atylus collingi*** (Gurjanova, 1938) **B**
[1]***Atylus laevidensus*** J. L. Barnard, 1956
Atylus tridens (Alderman, 1936) **C**
Nototropis tridens Alderman, 1936
Guernea Chevreux, 1887
Dexamonica J. L. Barnard, 1957
[1]***Guernea nordenskioldi*** (Hansen, 1888) **B**
Guernea reduncans (J. L. Barnard, 1957)
Dexamonica reduncans J. L. Barnard, 1957
Lepechinella Stebbing, 1908
[3]***Lepechinella bierii*** J. L. Barnard, 1957
Polycheria Haswell, 1880
Polycheria osborni Calman, 1898
Dogielinotidae Gurjanova, 1953
Proboscinotus Bousfield in Bousfield & Tzvetkova, 1982
[2]***Proboscinotus loquax*** (J.L. Barnard, 1966)
Dogielinotus loquax J. L. Barnard, 1966
Eophliantidae J. L. Barnard, 1964
Lignophliantis J. L. Barnard, 1969
Lignophliantis pyrifera J. L. Barnard, 1969 **C**
Eusiridae Stebbing, 1888
Calliopiidae Sars, 1893
Pontogeneidae Stebbing, 1906
Accedomoera J. L. Barnard, 1964
Accedomoera vagor J. L. Barnard, 1969
[1]***Accedomoera sp. A*** of Paquette [1990] **B**
Eusiroides Stebbing, 1888
Eusiroides monoculoides (Haswell, 1880)
Eusirus Krøyer, 1845
Eusirus longipes Boeck, 1871
Oligochinus J. L. Barnard, 1969
Oligochinus lighti J. L. Barnard, 1969
Oradarea Walker, 1903
[1]***Oradarea longimana*** (Boeck, 1871)
Paracalliopiella Tzvetkova & Kudryashov, 1975
Callaska J. L. Barnard, 1978
[1]***Paracalliopiella bungei*** (Gurjanova, 1951) **B**
Haliragès bungei Gurjanova, 1951
Paracalliopiella pratti (J.L. Barnard, 1954)
Calliopiella pratti J. L. Barnard, 1954
Callaska pratti (J. L. Barnard, 1954)

Key - 1. = not included 2.= new name 3. = family changed 4. = status changed 5. = new orthography
B = boreal occurrance only C= Californian occurrance only

Paramoera Miers, 1875

[1]***Paramoera bousfieldi*** Staude, 1987 (nomen nudum) **B**

[1]***Paramoera bucki*** Staude, 1987 (nomen nudum) **B**

[1]***Paramoera carlottensis*** Bousfield, 1958 **B**

[1]***Paramoera columbiana*** Bousfield, 1958 **B**

[1]***Paramoera leucophthalma*** Staude, 1987 (nomen nudum) **B**

Paramoera mohri J. L. Barnard, 1952

[1]***Paramoera serrata*** Staude, 1987 (nomen nudum) **B**

[1]***Paramoera suchaneki*** Staude, 1987 (nomen nudum) **B**

Pontogeneia Boeck, 1871

[1]***Pontogeneia inermis*** (Krøyer, 1838)

Pontogeneia intermedia Gurjanova, 1938

[1]***Pontogeneia ivanovi*** Gurjanova, 1951 **B**

Pontogeneia opata J. L. Barnard, 1979

Pontogeneia minuta J. L. Barnard, 1959

Pontogeneia rostrata Gurjanova, 1938

Rhachotropis Smith, 1883

Rhachotropis cervus J. L. Barnard, 1957

Rhachotropis clemens J. L. Barnard, 1967

Rhachotropis distincta (Holmes, 1908)

Rhachotropis inflata (Sars, 1882)

Rhachotropis natator (Holmes, 1908)

Rhachotropis oculata (Hansen, 1887)

[1]***Rhachotropis sp. A*** SCAMIT, 1987

Gammaridae Leach, 1813

Gammarus Fabricius, 1775

Lagunogammarus Sket, 1971

[1]***Gammarus setosus*** Dementieva, 1931 **B**

Lagunogammarus setosus (Dementieva, 1931)

Gammaroporeiidae Bousfield, 1979

Gammaroporeia Bousfield, 1979

[1]***Gammaroporeia alaskensis*** (Bousfield and Hubbard 1968) **B**

Micruropus alaskensis Bousfield and Hubbard 1968

Haustoriidae Sars, 1882

Eohaustorius J. L. Barnard, 1957

[1]***Eohaustorius brevicuspis*** Bosworth, 1973 **B**

[1]***Eohaustorius estuarinus*** Bosworth, 1973 **B**

[1]***Eohaustorius sawyeri*** Bosworth, 1973

Eohaustorius sencillus J. L. Barnard, 1962 **C**

Eohaustorius washingtonianus (Thorsteinson, 1941)

Hyalidae Bulycheva, 1957

Allorchestes Dana, 1849

Allorchestes angusta Dana, 1856

[1]***Allorchestes bellabella*** J. L. Barnard, 1974 **B**

[1]***Allorchestes carinata*** Iwasa, 1939 **B**

[1]***Allorchestes sp. A*** of Cadien [1991] **B**

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B = boreal occurrance only C= Californian occurrance only

Hyale Rathke, 1837

Hyale anceps (J.L. Barnard, 1969)

Allorchestes anceps J. L. Barnard, 1969

Hyale californica J. L. Barnard, 1969

Hyale grandicornis californica J. L. Barnard, 1969

Hyale canalina J. L. Barnard, 1979 C

Hyale rubra rubra Thomson, 1879 of J. L. Barnard 1969

Hyale frequens (Stout, 1913)

Allorchestes frequens Stout, 1913

Hyale rubra frequens (Stout 1913)

Hyale nigra Haswell, 1880 of J. L. Barnard 1962

Hyale plumulosa (Stimpson, 1857)

[1]***Hyale pugettensis*** (Dana, 1853)

Parallorchestes Shoemaker, 1941

Parallorchestes ochotensis (Brandt, 1851)

Iphimediidae Boeck, 1871

Acanthonotozomatidae Stebbing, 1906

Coboldus Krapp-Schickel, 1974

[2]***Coboldus hedgpethi*** (J.L. Barnard, 1969)

Iphimedia hedgpethi (J. L. Barnard, 1969)

Panoploea hedgpethi J. L. Barnard, 1969

Epimeria Costa, 1851

[1]***Epimeria cora*** J. L. Barnard, 1971

[1]***Epimeria yaquinae*** McCain, 1971

Iphimedia Rathke, 1843

Panoploea Thomson, 1880

Iphimedia rickettsi (Shoemaker, 1931)

Panoploea rickettsi Shoemaker, 1931

Odius Liljeborg, 1865

[1]***Odius kelleri*** Brüggen, 1907

Isaeidae Dana, 1853

Ampelisciphotis Pirlot, 1938

Gaviota J. L. Barnard, 1958

Ampelisciphotis podophthalma (J.L. Barnard, 1958) C

Gaviota podophthalma J.L. Barnard, 1958

Amphideutopus J. L. Barnard, 1959

Amphideutopus oculatus J. L. Barnard, 1959

Cheirimedeia J. L. Barnard, 1962

[1]***Cheirimedeia macrocarpa americana*** Conlan, 1983 B

[1]***Cheirimedeia macrodactyla*** Conlan 1983 B

[1]***Cheirimedeia similicarpa*** Conlan 1983 B

[1]***Cheirimedeia zotea*** J. L. Barnard 1962 C

Cheiriphotis Walker, 1904

[4]***Cheiriphotis "megacheles"*** (Giles, 1885) of J. L. Barnard, 1962

Chevalia Walker, 1904

[4]***Chevalia inaequalis*** (Stout, 1913) C

Chevalia aviculae Walker, 1904 of J. L. Barnard, 1962

Gammaropsis Liljeborg, 1855
Eurystheus Bate, 1857
Gammaropsis (s.s.) Liljeborg, 1855
[5]***Gammaropsis effrena*** (J.L. Barnard, 1964) **C**
Megamphopus effrenus J. L. Barnard, 1964
[1]***Gammaropsis ellisi*** Conlan, 1983 **B**
Gammaropsis martesia (J. L. Barnard, 1964)C
Megamphopus martesia J. L. Barnard, 1964
[1]***Gammaropsis shoemakeri*** Conlan, 1983 **B**
Gammaropsis lobata Shoemaker, 1942
≠ Gammaropsis lobata (Chevreux, 1920)
Gammaropsis thompsoni (Walker, 1898)
Maeroides thompsoni Walker, 1898
Eurystheus thompsoni (Walker, 1898)
Gammaropsis tenuicornis Holmes, 1904
Gammaropsis (Megamphopus) Norman, 1869
[5]***Gammaropsis mamola*** (J. L. Barnard, 1962) **C**
Megamphopus mamolus J. L. Barnard, 1962
Gammaropsis (Podoceropsis) Boeck, 1861
[1]***Gammaropsis amchitkensis*** Conlan, 1983 **B**
[1]***Gammaropsis angustimana*** Conlan, 1983 **B**
[1]***Gammaropsis barnardi*** Kudryashov and Tzvetkova, 1975
[1]***Gammaropsis chionoecetophila*** Conlan, 1983 **B**
Gammaropsis ociosa (J. L. Barnard, 1962)C
Kermystheus ociosa J. L. Barnard, 1962
[1]***Gammaropsis setosa*** Conlan, 1983 **B**
Pareurystheus Tzvetkova, 1977
Paraeurystheus Tzvetkova, 1977 of Conlan, 1983
[1,2]***Pareurystheus alaskensis*** (Stebbing, 1910) **B**
Eurystheus dentatus Holmes, 1908
≠ Eurystheus dentatus Chevreux, 1900
Cheirimedia alaskensis (Stebbing, 1910) of J. L. Barnard and Karaman, 1991
Paraeurystheus dentatus (Holmes, 1908) of Conlan 1983
[1]***Pareurystheus tzvetkovae*** Conlan 1983 **B**
Photis Krøyer, 1842
Photis bifurcata J. L. Barnard, 1962
Photis brevipes Shoemaker, 1942
Photis californica Stout, 1913 of J. L. Barnard, 1954
Photis californica Stout, 1913
[1]***Photis chiconola*** J. L. Barnard, 1962
Photis conchicola Alderman, 1936
Photis elephantis J. L. Barnard, 1962
[1]***Photis fishmanni*** Gurjanova, 1938 **B**
Photis lacia J. L. Barnard, 1962
[1]***Photis macinerneyi*** Conlan 1983
Photis macrotica J. L. Barnard, 1962
[1]***Photis oligochaeta*** Conlan, 1983 **B**
[1]***Photis pachydactyla*** Conlan, 1983 **B**
[1]***Photis parvidons*** Conlan, 1983
[1]***Photis reinhardi*** Krøyer, 1842 **B**

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Photis Kroyer, 1842 [continued]

[1]***Photis spinicarpa*** Shoemaker, 1942

[1]***Photis sp. A*** of MBC [1976] C

[1]***Photis sp. B*** of Paquette [1987] C

[1]***Photis sp. C*** of Diener [1988] C

Photis viuda J. L. Barnard, 1962

Protomedeia Krøyer, 1842

Protomedeia articulata J. L. Barnard, 1962

[1]***Protomedeia fasciata*** Krøyer, 1842 B

[1]***Protomedeia grandimana*** Brüggen, 1905 B

[1]***Protomedeia penates*** J. L. Barnard, 1966

[1]***Protomedeia prudens*** J. L. Barnard, 1966

[1]***Protomedeia stephenseni*** Shoemaker, 1955 B

Ischyroceridae Stebbing, 1899

Bonnierella Chevreux, 1900

Bonnierella linearis californica J. L. Barnard, 1966

Cerapus Say, 1817

[4]***Cerapus "tubularis"*** Say, 1817 [at least two new species in California]

Ericthonius Milne-Edwards, 1830

Ericthonius brasiliensis (Dana, 1853)

[2]***Ericthonius rubricornis*** (Stimpson, 1853)

Ericthonius difformis Milne-Edwards, 1830 of NEP authors

Ericthonius hunteri (Bate, 1862) of NEP authors

Ischyrocerus Krøyer, 1838

Ischyrocerus anguipes Krøyer, 1838

[2]***Ischyrocerus claustris*** (J. L. Barnard, 1969)

Microjassa claustris J. L. Barnard, 1969

[2]***Ischyrocerus litotes*** (J. L. Barnard, 1954)

Microjassa litotes J. L. Barnard, 1954

Ischyrocerus pelagops J. L. Barnard, 1962

[1]***Ischyrocerus serratus*** Gurjanova, 1938 B

[1]***Ischyrocerus sp. A*** J. L. Barnard, 1969

[1]***Ischyrocerus sp. B*** J. L. Barnard, 1969

Jassa Leach, 1814

[1]***Jassa borowskyae*** Conlan, 1990 B

[1]***"Jassa "californica*** Boeck 1871 [to as yet undescribed new genus]

[1]***Jassa carltoni*** Conlan, 1990 B

[2,4]***Jassa marmorata*** Holmes, 1903

Jassa falcata (Montagu, 1808) of J. L. Barnard, 1958 [in part]; J. L. Barnard, 1969 [in part]

[2,4]***Jassa morinoi*** Conlan, 1990

Jassa falcata (Montagu, 1808) of J. L. Barnard, 1958 [in part]; J. L. Barnard, 1969 (thick form from stations other than 38-D-3)

[2,4]***Jassa myersi*** Conlan, 1990

Jassa falcata (Montagu, 1808) of J. L. Barnard, 1969 (thin form)

[1]***Jassa oclairi*** Conlan, 1990 B

[1]***Jassa shawi*** Conlan, 1990 B

[2,4]***Jassa slatteryi*** Conlan, 1990

Jassa falcata (Montagu, 1808) of J. L. Barnard, 1958 [in part]; J. L. Barnard and Reish, 1959; J. L. Barnard, 1960; J. L. Barnard, 1969 (thick form from Station 38-D-3)

[1]***Jassa staudei*** Conlan, 1990 B

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Parajassa Stebbing, 1899
Parajassa angularis Shoemaker, 1942
Ventojassa J. L. Barnard, 1970
Ventojassa ventosa (J. L. Barnard, 1962)
Eurystheus ventosa J. L. Barnard, 1962
Leucothoidae Dana, 1852
Leucothoe Leach, 1814
Leucothoe alata J. L. Barnard, 1959
Leucothoe spinicarpa (Abildgaard, 1789)
Liljeborgiidae Stebbing, 1899
Liljeborgia Bate, 1862
[2]***Liljeborgia pallida*** **Bate, 1857**
Liljeborgia brevicornis (Bruzelius, 1859)
Liljeborgia cota J. L. Barnard, 1962
Liljeborgia geminata J. L. Barnard, 1969
Liljeborgia kinahani Bate, 1862 of J. L. Barnard 1962
Listriella J. L. Barnard, 1959
Listriella albina J. L. Barnard, 1959
Listriella diffusa J. L. Barnard, 1959
Listriella eriopisa J. L. Barnard, 1959
Listriella goleta J. L. Barnard, 1959
Listriella melanica J. L. Barnard, 1959
[1]***Listriella sp. A*** **SCAMIT, 1987**
Lysianassidae Dana, 1849
Acidostoma Liljeborg, 1865
Acidostoma hancocki Hurley, 1963
Allogaussia Schellenberg, 1926
Allogaussia recondita Stasek, 1958
Anonyx Krøyer, 1838
Lakota Holmes, 1908
Anonyx adoxus Hurley, 1963
[1]***Anonyx comecrudus*** **J. L. Barnard, 1971**
[1]***Anonyx laticoxae*** **Gurjanova, 1962 B**
[5]***Anonyx lilljeborgi*** **Boeck, 1871**
Lakota carinata Holmes, 1908
Aristias Boeck, 1871
[1]***Aristias veleronis*** **Hurley, 1963**
[1]***Aristias*** **sp. A SCAMIT, 1985**
Aruga Holmes, 1908
[4]***Aruga holmesi*** **(J.L. Barnard, 1955)**
[4]***Aruga oculata*** **Holmes, 1908**
Centromedon Sars 1895
[1]***Centromedon pavor*** **J.L. Barnard, 1966**
Cyclocaris Stebbing, 1888
[1]***Cyclocaris guilelmi*** **Chevreux, 1899**
Cyphocaris Stebbing, 1888
[1]***Cyphocaris anonyx*** **Boeck, 1871**
[1]***Cyphocaris challengeri*** **Stebbing 1880**
[1]***Cyphocaris faurei*** **K. H. Barnard, 1916**
[1]***Cyphocaris richardi*** **Chevreux, 1905**

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Dissiminassa J. L. Barnard and Karaman, 1991

[2]***Dissiminassa dissimilis*** (Stout, 1913)

Lysianassa dissimilis (Stout, 1913)

Eurythenes S.I. Smith, 1882

Katius Chevreux, 1905

[1]***Eurythenes obesus*** (Chevreux, 1905)

Katius obesus Chevreux, 1905

Hippomedon Boeck, 1871

Hippomedon coecus (Holmes, 1908)

[1]***Hippomedon columbianus*** Jarrett & Bousfield, 1982

[1]***Hippomedon subrobustus*** Hurley, 1963

Hippomedon tenax J. L. Barnard 1966

[1]***Hippomedon sp.*** *A* of Diener [1990]

[1]***Hippomedon tricatrix*** J. L. Barnard, 1971

Hippomedon zetesimus Hurley, 1963

Hirondellea Chevreux, 1889

Hirondellea fidenter J.L. Barnard 1966

Koroga Holmes, 1908

[1]***Koroga megalops*** Holmes, 1908

Lepidepecreella Schellenberg, 1926

Lepidepecreella charno J.L. Barnard, 1966

Lepidepecreoides K. H. Barnard, 1931

[1]***Lepidepecreoides nubifer*** J. L. Barnard, 1971

Lepidepecreum Bate & Westwood, 1868

Lepidepecreum garthi Hurley, 1963

Lepidepecreum gurjanovae Hurley, 1963

[1]***Lepidepecreum kasatka*** Gurjanova, 1962

[1]***Lepidepecreum*** sp. A of SCAMIT, 1985 C

Macronassa J. L. Barnard and Karaman, 1991

[2]***Macronassa macromera*** (Shoemaker, 1916)

Lysianassa macromera (Shoemaker, 1916)

[2]***Macronassa pariter*** (J. L. Barnard, 1969)

Lysianassa pariter J.L. Barnard, 1969

Metacyphocaris Tattersall, 1906

[1]***Metacyphocaris helgae*** Tattersall, 1906

Ocosingo J.L. Barnard, 1964

Fresnillo J.L. Barnard, 1969

Ocosingo borlus J.L. Barnard, 1964

[4]**Fresnillo fimbriatus** J.L. Barnard, 1969

Opisa Boeck, 1876

[1]***Opisa eschrichti*** **(Krøyer, 1842) B**

Opisa tridentata Hurley, 1963

Orchomene Boeck, 1871

Tryphosa Boeck, 1871

[1]***Orchomene abyssorum*** (Stebbing, 1888)

[5]***Orchomene anaquelus*** J.L. Barnard, 1964

Orchomene decipiens (Hurley, 1963)

Orchomene holmesi (Hurley, 1963)

[1]***Orchomene limodes*** Meador & Present, 1985

Orchomene magdalenensis (Shoemaker, 1942)

[1]***Orchomene minutus*** (Krøyer, 1846) **B**

[1]***Orchomene nugax*** (Holmes, 1904) **B**

Orchomene obtusus (Sars, 1895)

Orchomenella affinis Holmes, 1908

[5]***Orchomene pacificus*** (Gurjanova, 1938)

Orchomene pinguis (Boeck, 1861)

Pachynus Bulycheva, 1955

Pachynus barnardi Hurley, 1963

Paracallisoma Chevreux, 1903

[1]***Paracallisoma coecum*** (Holmes, 1908)

Scopelocheirus coecus Holmes, 1908

Prachynella J.L. Barnard, 1964

Prachynella lodo J.L. Barnard, 1964

Psammonyx Bousfield, 1973

[1]***Psammonyx longimerus*** Jarrett and Bousfield, 1982 **B**

Rimakoroga Barnard & Karaman, 1987

[2]***Rimakoroga rima*** (J.L. Barnard, 1964) **C**

Pseudokoroga rima J.L. Barnard 1964

Schisturella Norman, 1900

Thrombasia J.L. Barnard, 1966

Schisturella cocula J.L. Barnard, 1966

Schisturella dorotheae (Hurley, 1963)

Anonyx dorotheae Hurley, 1963

Schisturella tracalero (J.L. Barnard, 1966)

Thrombasia tracalero J.L. Barnard, 1966

[1]***Schisturella totorami*** J.L. Barnard, 1967

Schisturella zopa J.L. Barnard, 1966

Socarnes Boeck, 1871

Socarnes hartmani Hurley, 1963

Socarnoides Stebbing, 1888

Socarnoides illudens Hurley, 1963

Sophrosyne Stebbing 1888

[1]***Sophrosyne robertsoni*** Stebbing & Robertson, 1891

Tryphosella Bonnier, 1893

[2]***Tryphosella index*** (J.L. Barnard, 1966)

Tryphosa index J.L. Barnard, 1966

Uristes Dana, 1849

Uristes californicus Hurley, 1963 **C**

[1]***Uristes dawsoni*** Hurley, 1963 **C**

Uristes entalladurus J.L. Barnard, 1963 **C**

[1]***Uristes perspinus*** J. L. Barnard, 1971

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Valettiopsis Holmes, 1908

[5]***Valettiopsis dentata*** Holmes, 1908

Wecomedon Jarrett and Bousfield, 1982

[1]***Wecomedon similis*** Jarrett and Bousfield, 1982 **B**

[1]***Wecomedon wecomus*** (J. L. Barnard, 1971)

Hippomedon wecomus J. L. Barnard, 1971

Megaluropidae Thomas and Barnard, 1986

Gibberosus Thomas and Barnard, 1986

[2,3]***Gibberosus devaneyi*** Thomas and Barnard, 1986 C

Megaluropus longimerus Schellenberg 1925 of NEP authors [part]

[2,3]***Gibberosus myersi*** (McKinney, 1980)

Megaluropus myersi McKinney, 1980

Megaluropus longimerus Schellenberg 1925 of NEP authors [part]

Resupinus Thomas and Barnard, 1986

[1]***Resupinus coloni*** Thomas and Barnard, 1986 **C**

n. gen. of SCAMIT, 1987

[1]**n.gen. n. sp.** of SCAMIT, 1987 **C**

Megaluropus agilis Hoek, 1889 of J. L. Barnard, 1963

Melitidae Bousfield, 1973

Ceradocus Costa, 1853

[3]***Ceradocus spinicaudus*** (Holmes, 1908)

Dulichiella Stout, 1912

[3]***Dulichiella appendiculata*** (Say, 1818)

Melita appendiculata (Say, 1818)

Dulzura J. L. Barnard, 1969

[3]***Dulzura sal*** J. L. Barnard, 1969 **C**

Elasmopus Costa, 1853

[3]***Elasmopus antennatus*** (Stout, 1913) **C**

[3]***Elasmopus bampo*** J. L. Barnard, 1979 **C**

Elasmopus rapax Costa 1853 of J. L Barnard, 1962 in part

[3]***Elasmopus holgurus*** J. L. Barnard, 1962 **C**

[3]***Elasmopus mutatus*** J. L. Barnard, 1962 **C**

Elasmopus rapax mutatus J. L. Barnard 1962

[3]***Elasmopus serricatus*** J. L. Barnard, 1969 **C**

Elasmopus rapax serricatus J. L. Barnard 1969

Eriopisa Stebbing, 1890

[1]***Eriopisa elongata*** (Bruzelius, 1859)

Hornellia Walker, 1904

[2,3]***Hornellia occidentalis*** (J. L. Barnard, 1959) **C**

Metaceradocus occidentalis J. L. Barnard, 1959

Lupimaera Barnard and Karaman 1982

[2,3]***Lupimaera lupana*** (J. L. Barnard, 1969)

Maera lupana J. L. Barnard, 1969 C

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Maera Leach, 1814

[3]***Maera danae*** (Stimpson, 1853)

Maera loveni Bruzelius, 1859 of J. L. Barnard, 1962

[1]***Maera grossimana*** (Montagu, 1808) **B**

[1]***Maera prionochira*** Brüggen 1907 **B**

[3]***Maera reishi*** J. L. Barnard, 1979

Maera inaequipes Costa, 1851 of J. L. Barnard, 1959

[3]***Maera simile*** Stout, 1913

Maera inaequipes Costa, 1851 of J. L. Barnard, 1954

[1]***Maera vigota*** J. L. Barnard, 1969 **C**

Melita Leach, 1814

[1]***Melita californica*** Alderman, 1936

[3]***Melita dentata*** (Krøyer, 1842)

[3]***Melita desdichada*** J. L. Barnard, 1962

[1]***Melita kodiakensis*** J. L. Barnard, 1964 **B**

[1]***Melita obtusata*** (Montagu, 1813) **B**

[3]***Melita oregonensis*** J. L. Barnard, 1954

[3]***Melita sulca*** (Stout, 1913)

Netamelita J. L. Barnard, 1962

[3]***Netamelita cortada*** J. L. Barnard, 1962

Melphidippidae Stebbing, 1899

Melphidippa Boeck, 1871

Melphidippa amorita J. L. Barnard, 1966

Melphisana J. L. Barnard, 1962

Melphisana bola J. L. Barnard, 1962 **C**

Mesogammaridae Bousfield, 1977

Paramesogammarus Bousfield, 1979

[1]***Paramesogammarus americanus*** Bousfield, 1979 **B**

Najnidae J. L. Barnard, 1972

Najna Derzhavin, 1937

Najna kitamati J. L. Barnard, 1962

Najna ?consiliorum Derzhavin, 1937 of J. L. Barnard, 1962

Oedicerotidae Liljeborg, 1865

Aceroides Sars, 1895

[1]***Aceroides latipes*** (Sars, 1882) **B**

[1]***Aceroides sp.*** *A* of MBC, 1984

Arrhis Stebbing, 1906

[1]***Arrhis luthkei*** Gurjanova, 1936 **B**

Bathymedon Sars, 1895

Bathymedon covilhani J. L. Barnard, 1961

[1]***Bathymedon flebilis*** J. L. Barnard, 1967

Bathymedon kassites J. L. Barnard, 1966

Bathymedon pumilus J. L. Barnard, 1962

Bathymedon roquedo J. L. Barnard, 1962

Bathymedon vulpeculus J. L. Barnard, 1971

Finoculodes J. L. Barnard, 1971

[1]***Finoculodes omnifera*** J. L. Barnard, 1971

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Monoculodes Stimpson, 1853
[1]***Monoculodes carinatus*** (Bate, 1856) **B**
[1]***Monoculodes crassirostris*** Hansen, 1888 **B**
Monoculodes emarginatus J. L. Barnard, 1962
Monoculodes glyconica J. L. Barnard, 1962
Monoculodes hartmanae J. L. Barnard, 1962
Monoculodes latissimânus Stephensen, 1931
Monoculodes murrius J. L. Barnard, 1962
Monoculodes necopinus J. L. Barnard, 1967
Monoculodes norvegicus (Boeck, 1861)
Monoculodes perditus J. L. Barnard, 1966
[1]***Monoculodes recandesco*** J. L. Barnard, 1967
Monoculodes spinipes Mills, 1962
Oediceroides Stebbing, 1888
[2]***Oediceroides morosa*** (J. L. Barnard, 1966)
Oediceropsis morosa J. L. Barnard, 1966
[2]***Oediceroides trepadora*** (J. L. Barnard, 1961)
Oediceropsis trepadora J. L. Barnard, 1961
Oediceropsis Liljeborg, 1865
Oediceropsis elsula J. L. Barnard, 1966
Synchelidium Sars, 1895
Synchelidium micropleon J. L. Barnard, 1977 **C**
Synchelidium rectipalmum Mills, 1962
Synchelidium shoemakeri Mills, 1962
Westwoodilla Bate, 1862
Westwoodilla caecula (Bate, 1857)
[4]**Westwoodilla acutifrons** (Sars, 1895)
Pardaliscidae Sars, 1882
Caleidoscopsis Karaman, 1974
[1]***Caleidoscopsis tikal*** (J. L. Barnard, 1963)
Pardaliscopsis tikal J. L. Barnard, 1963
Halice Boeck, 1871
[1]***Halice ulcisor*** J. L. Barnard, 1971
Halicoides Walker, 1896
[1]***Halicoides lolo*** (J. L. Barnard, 1971)
Pardisynopia lolo J. L. Barnard, 1971
[2]***Halicoides synopiae*** (J. L. Barnard, 1962)
Pardisynopia synopiae J. L. Barnard, 1962
Halice synopiae (J. L. Barnard, 1962)
Nicippe Bruzelius, 1859
Nicippe tumida Bruzelius, 1859
Pardalisca Krøyer, 1842
[1]***Pardalisca cuspidata*** Krøyer, 1842
[1]***Pardalisca tenuipes*** Sars, 1895
Pardaliscella Sars, 1895
Pardaliscella symmetrica J. L. Barnard, 1959
[1]***Pardaliscella yaquina*** J. L. Barnard, 1971
Pardaliscoides Stebbing, 1888
Pardaliscoides fictotelson J. L. Barnard, 1966

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Rhynohalicella Karaman, 1974
[1]***Rhynohalicella halona*** (J. L. Barnard, 1971)
Halicella halona J. L. Barnard, 1971
Tosilus J. L. Barnard, 1966
Tosilus arroyo J. L. Barnard, 1966
Phliantidae Stebbing, 1906
Pariphinotus Kunkel, 1910
Heterophlias Shoemaker, 1933
[2,4,5]*Pariphinotus escabrosus* (J. L. Barnard, 1962) **C**
Heterophlias seclusus escabrosa J. L. Barnard, 1962
Phoxocephalidae Sars, 1891
Coxophoxus J. L. Barnard, 1966
Coxophoxus hidalgo J. L. Barnard, 1966 **C**
Eobrolgus J. L. Barnard, 1979
[1]***Eobrolgus chumashi*** J. L. Barnard and C. M. Barnard, 1981
[1]***Eobrolgus pontarpioides*** (Gurjanova, 1953) **B**
Eobrolgus spinosus (Holmes, 1903)
Paraphoxus spinosus Holmes, 1903
Eyakia J. L. Barnard, 1979
[5]***Eyakia calcarata*** (Gurjanova, 1938) **B**
Paraphoxus calcaratus (Gurjanova, 1938)
[5]***Eyakia robusta*** (Holmes, 1908)
Paraphoxus robustus Holmes, 1908
Foxiphalus J. L. Barnard, 1979
[1]***Foxiphalus aleuti*** J. L. Barnard and C. M. Barnard, 1982
[1]***Foxiphalus apache*** J. L. Barnard and C. M. Barnard, 1982
Foxiphalus cognatus (J.L. Barnard, 1960)
Paraphoxus cognatus J. L. Barnard, 1960
[1]***Foxiphalus golfensis*** J. L. Barnard and C. M. Barnard, 1982
Foxiphalus major (J. L. Barnard, 1960)
Paraphoxus obtusidens major J. L. Barnard, 1960
Foxiphalus obtusidens (Alderman, 1936)
Paraphoxus obtusidens (Alderman, 1936)
Foxiphalus similis (J. L. Barnard, 1960)
Paraphoxus similis (J. L. Barnard, 1960)
[1]***Foxiphalus xiximeus*** J. L. Barnard and C. M. Barnard, 1982 **C**
Grandifoxus J. L. Barnard, 1979
[1]***Grandifoxus acanthinus*** Coyle, 1982 **B**
[1]***Grandifoxus aciculatus*** Coyle, 1982 **B**
[1]***Grandifoxus grandis*** (Stimpson, 1856) **B**
Paraphoxus milleri Thorsteinson, 1941
[1]***Grandifoxus lindbergi*** (Gurjanova, 1953) **B**
[1]***Grandifoxus longirostris*** (Gurjanova, 1953) **B**
[1]***Grandifoxus vulpinus*** Coyle 1982 **B**

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Harpiniopsis Stephensen, 1925
Harpiniopsis emeryi J. L. Barnard, 1960
Harpiniopsis epistomata J. L. Barnard, 1960
Harpiniopsis fulgens J. L. Barnard, 1960
Harpiniopsis galera J. L. Barnard, 1960
Harpiniopsis naiadis J. L. Barnard, 1960
[1]***Harpiniopsis percellaris*** J. L. Barnard, 1971
Harpiniopsis petulans J. L. Barnard, 1966
Harpiniopsis profundis J. L. Barnard, 1960
[1]***Harpiniopsis triplex*** J. L. Barnard, 1971
Heterophoxus Shoemaker, 1925
Heterophoxus oculatus (Holmes, 1908)
Leptophoxus Sars, 1895
Leptophoxus falcatus icelus J. L. Barnard, 1960
Mandibulophoxus J. L. Barnard, 1957
Mandibulophoxus gilesi J. L. Barnard, 1957 C
Metaphoxus Bonnier, 1896
Metaphoxus frequens J. L. Barnard, 1960
Metharpinia Schellenberg, 1931
[1]***Metharpinia coronadoi*** J. L. Barnard, 1980 C
Metharpinia floridana (Shoemaker, 1933)
Paraphoxus floridanus (Shoemaker, 1933)
Metharpinia jonesi (J. L. Barnard, 1963)
Paraphoxus jonesi J. L. Barnard, 1963 C
Parametaphoxus Gurjanova, 1977
[2]***Parametaphoxus fultoni*** (Scott, 1890)
Metaphoxus fultoni (Scott, 1890)
[2]***Parametaphoxus homilis*** (J. L. Barnard, 1960)
Phoxocephalus homilis J. L. Barnard, 1960
Paraphoxus Sars, 1895
Paraphoxus oculatus (Sars, 1879)
Pseudharpinia Schellenberg, 1931
Pseudharpinia excavata (Chevreux, 1887)
Harpiniopsis excavata (Chevreux, 1887)
Harpiniopsis sanpedroensis J. L. Barnard, 1960
Rhepoxynius J. L. Barnard, 1979
Rhepoxynius abronius (J. L. Barnard, 1960)
Paraphoxus abronius J. L. Barnard, 1960
Rhepoxynius bicuspidatus (J. L. Barnard, 1960)
Paraphoxus bicuspidatus J. L. Barnard, 1960
Rhepoxynius daboius (J. L. Barnard, 1960)
Paraphoxus daboius J. L. Barnard, 1960
Rhepoxynius fatigans (J. L. Barnard, 1960)
Paraphoxus fatigans J. L. Barnard, 1960
Rhepoxynius heterocuspidatus (J.L. Barnard, 1960)
Paraphoxus heterocuspidatus J. L. Barnard, 1960
[1]***Rhepoxynius homocuspidatus*** J. L. Barnard and C. M. Barnard, 1982
Rhepoxynius lucubrans (J. L. Barnard, 1960)
Paraphoxus lucubrans J. L. Barnard, 1960

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Rhepoxynius J. L. Barnard, 1979 [continued]

[2]***Rhepoxynius menziesi*** J. L. Barnard and C. M. Barnard, 1982

[4]**Rhepoxynius epistomus** (Shoemaker, 1938)

Paraphoxus epistomus (Shoemaker, 1938) of J. L. Barnard, 1960

Trichophoxus epistomus (Shoemaker, 1938)

Rhepoxynius stenodes (J. L. Barnard, 1960)

Paraphoxus stenodes J. L. Barnard, 1960

[1]***Rhepoxynius sp. A*** SCAMIT, 1987 **C**

Rhepoxynius tridentatus (J. L. Barnard, 1954)

Paraphoxus tridentatus (J. L. Barnard, 1954)

[1]***Rhepoxynius tridentatus pallidus*** (J. L. Barnard, 1960)

Rhepoxynius variatus (J. L. Barnard, 1960)

Paraphoxus variatus J. L. Barnard, 1960

[1]***Rhepoxynius vigitegus*** (J. L. Barnard, 1971)

Paraphoxus vigitegus J. L. Barnard, 1971

Platyischnopidae Barnard and Drummond, 1979

Eudevenopus Thomas and Barnard, 1983

[1]***Eudevenopus metagracilis*** (J. L. Barnard, 1964) **C**

Platyischnopus metagracilis J. L. Barnard, 1964

Tiburonella Thomas and Barnard, 1983

[1]***Tiburonella viscana*** (J. L. Barnard, 1969) **C**

Platyischnopus viscana J. L. Barnard, 1969

Pleustidae Stebbing, 1888

Dactylopleustes Karaman and J. L. Barnard, 1979

[1]***Dactylopleustes echinoicus*** (Tzvetkova, 1975) **B**

[1]***Dactylopleustes sp. A*** of Paquette, 1986 **C**

Parapleustes Buchholz, 1874

Incisocalliope J. L. Barnard 1959

[2]***Parapleustes behningi*** (Gurjanova, 1938)

[4]**Parapleustes nautilus** J. L. Barnard, 1969

Parapleustes commensalis Shoemaker, 1952 C

Parapleustes den J. L. Barnard, 1969

[1]***Parapleustes gracilis*** Buchholtz, 1874 **B**

Parapleustes oculatus (Holmes, 1908)

Neopleustes oculatus Holmes, 1908

Parapleustes pugettensis (Dana, 1853)

Incisocalliope newportensis J. L. Barnard, 1959

Parapleustes bairdi Boeck, 1871

Pleusirus J. L. Barnard, 1969

Pleusirus secorrus J. L. Barnard 1969

Pleustes Bate, 1858

[1]***Pleustes cataphractus obtusirostris*** Gurjanova, 1938 **B**

[1]***Pleustes cataphractus typicus*** Gurjanova, 1951 **B**

[5]***Pleustes depressus*** Alderman, 1936

[1]***Pleustes panoplus*** (Krøyer, 1838) **B**

Pleustes platypa J. L. Barnard & Given, 1960

Pleusymtes J. L. Barnard, 1969

Pleusymtes coquilla J. L. Barnard, 1971

Pleusymtes subglaber (J. L. Barnard & Given, 1960)

Sympleustes subglaber J. L. Barnard & Given, 1960

Key - 1. = not included 2.= new name 3. = family changed 4. = status changed 5. = new orthography
B = boreal occurrance only C= Californian occurrance only

Stenopleustes Sars, 1895

Stenopleustes monocuspis J. L. Barnard & Given, 1960

Podoceridae Dana, 1849

Dulichia Krøyer, 1843

1***Dulichia rhabdoplastis*** McCloskey, 1970 **B**

1***Dulichia tuberculata*** Boeck, 1871 **B**

Dulichiopsis Laubitz, 1977

1***Dulichiopsis remis*** (J. L. Barnard, 1964) **B**

Dulichia remis J. L. Barnard, 1964

Dyopedos Bate, 1857

1***Dyopedos arcticus*** (Murdoch, 1885)

1***Dyopedos bispinus*** (Gurjanova, 1930) **B**

1***Dyopedos monacanthus*** (Metzger, 1875)

Dulichia monacantha Metzger, 1875

Paradulichia Boeck, 1871

1***Paradulichia typica*** Boeck, 1871 **B**

Podocerus Leach, 1814

Podocerus brasiliensis (Dana, 1853)

Podocerus cristatus (Thomson, 1879)

Podocerus fulanus J. L. Barnard, 1962 C

1***Podocerus spongicolus*** Alderman, 1936

Pontoporeiidae Dana, 1855

Pontoporeia Krøyer, 1842

1***Pontoporeia femorata*** Krøyer, 1842 **B**

Stegocephalidae Dana, 1855

Stegocephalus Krøyer, 1842

1***Stegocephalus hancocki*** Hurley, 1956 **C**

Stenothoidae Boeck, 1871

Mesometopa Gurjanova, 1938

1***Mesometopa esmarki*** (Boeck, 1871)

Mesometopa neglecta roya J. L. Barnard, 1966 C

1***Mesometopa sinuata*** Shoemaker, 1964

Metopa Boeck, 1871

1***Metopa cistella*** J. L. Barnard, 1969

Metopa dawsoni J. L. Barnard, 1962

1***Metopa glacialis*** (Krøyer, 1842) **B**

Metopa samsiluna J. L. Barnard, 1962

1***Metopa sp. A*** of Cadien [1988] **C**

Metopella Sars, 1895

Metopella aporpis J. L. Barnard, 1962

1***Metopella sp. A*** of Cadien [1989] **B**

Parametopella Gurjanova, 1938

Parametopella ninis J. L. Barnard, 1962

Proboloides Della Valle, 1893

1***Proboloides pacifica*** (Holmes, 1908) **B**

Proboloides tunda J. L. Barnard, 1962 C

Stenothoe Dana, 1852

Stenothoe estacola J. L. Barnard, 1962

Stenothoe frecanda J. L. Barnard, 1962

1***Stenothoe marina*** Bate, 1857

Stenothoe valida Dana, 1852

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Stenothoides Chevreux, 1900
Stenothoides bicoma J. L. Barnard, 1962
[1]***Stenothoides burbanki*** J. L. Barnard, 1969
Stenula J. L. Barnard, 1962
[1]***Stenula incola*** J. L. Barnard, 1969
Stenula modosa J. L. Barnard, 1962
Zaikometopa J. L. Barnard and Karaman, 1987
[1]***Zaikometopa erythrophthalmus*** (Coyle and Mueller, 1981) **B**
Metopelloides erythrophthalmus Coyle and Mueller, 1981
Stilipedidae Holmes, 1908
Astyridae Pirlot, 1934
Astyra Boeck, 1871
[1]***Astyra abyssi*** Boeck, 1871
Stilipes Holmes, 1908
[1]***Stilipes distincta*** Holmes, 1908
Synopiidae Dana, 1853
Tironidae Boeck, 1871
Bruzelia Boeck, 1871
Bruzelia ascua J. L. Barnard, 1966
Bruzelia tuberculata Sars, 1883
Garosyrrhoe J. L. Barnard, 1964
Garosyrrhoe bigarra (J. L. Barnard, 1962)
Syrrhoites bigarra J. L. Barnard, 1962
Syrrhoe Goës, 1866
Syrrhoe crenulata Goës, 1866
Syrrhoe longifrons Shoemaker, 1964
[1]***Syrrhoe oluta*** J. L. Barnard, 1972
[1]***Syrrhoe sp. A*** SCAMIT, 1987 **C**
Syrrhoites Sars, 1895
[1]***Syrrhoites columbiae*** J. L. Barnard, 1972
[1]***Syrrhoites sp. B*** of Cadien [1986] **C**
Tiron Liljeborg, 1865
Tiron biocellata J. L. Barnard, 1962
Tiron tropakis J. L. Barnard, 1972
Talitridae Leach, 1813
Megalorchestia Bousfield, 1982
[2]***Megalorchestia benedicti*** (Shoemaker, 1930)
Orchestoidea benedicti Shoemaker, 1930
[2]***Megalorchestia californiana*** (Brandt, 1851)
Orchestoidea californiana (Brandt, 1851)
[2]***Megalorchestia columbiana*** (Bousfield, 1958)
Orchestoidea columbiana Bousfield, 1958
[2]***Megalorchestia corniculata*** (Stout, 1913)
Orchestoidea corniculata Stout, 1913
[2]***Megalorchestia minor*** (Bousfield, 1958)
Orchestoidea minor Bousfield, 1958
[2]***Megalorchestia pugettensis*** (Dana, 1853)
Orchestoidea pugettensis (Dana, 1853)

Key - 1. = not included 2.= new name 3. = family changed 4. = status changed 5. = new orthography
B = boreal occurrance only C= Californian occurrance only

Paciforchestia Bousfield, 1982

[1]***Paciforchestia klawei*** (Bousfield, 1961) **C**

Parorchestia klawei Bousfield, 1961

Platorchestia Bousfield, 1982

[1]***Platorchestia chathamensis*** Bousfield, 1982 **B**

Transorchestia Bousfield, 1982

[1]***Transorchestia enigmatica*** (Bousfield and Carlton, 1967)

Orchestia enigmatica Bousfield and Carlton, 1967

Orchestia chilensis Milne-Edwards, 1840 of Bousfield, 1975

Traskorchestia Bousfield, 1982

[2]***Traskorchestia georgiana*** (Bousfield, 1958)

Orchestia georgiana Bousfield, 1958

[1]***Traskorchestia ochotensis*** (Brandt, 1851) **B**

Orchestia ochotensis Brandt, 1851

[2]***Traskorchestia traskiana*** (Stimpson, 1857)

Orchestia traskiana Stimpson, 1857

Urothoidae Bousfield, 1978

Urothoe Dana, 1852

[1]***Urothoe denticulata*** Gurjanova, 1951 **B**

[1]***Urothoe rotundifrons*** J. L. Barnard, 1962

[3]***Urothoe varvarini*** Gurjanova, 1953

102D CONGRESS
1ST SESSION

S. 58

To establish a national policy for the conservation of biological diversity; to support environmental research and training necessary for conservation and sustainable use of biotic natural resources; to establish mechanisms for carrying out the national policy and for coordinating related activities; and to facilitate the collection, synthesis, and dissemination of information necessary for these purposes.

IN THE SENATE OF THE UNITED STATES

JANUARY 14 (legislative day, JANUARY 3), 1991

Mr. MOYNIHAN introduced the following bill; which was read twice and referred to the Committee on Environment and Public Works

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A BILL

To establish a national policy for the conservation of biological diversity; to support environmental research and training necessary for conservation and sustainable use of biotic natural resources; to establish mechanisms for carrying out the national policy and for coordinating related activities; and to facilitate the collection, synthesis, and dissemination of information necessary for these purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "National Biological Diversity Conservation and Environmental Research Act".

SEC. 2. FINDINGS.

The Congress finds that—

(1) the Earth's biological diversity is being reduced at a rate without precedent in human history;

(2) most losses of biological diversity caused by human activity are unintended and largely avoidable;

(3) while the most rapid loss of biological diversity is occurring outside the United States, it is also a serious problem within this country;

(4) reduced biological diversity may have serious consequences for human welfare as resources for research and agricultural, medicinal, and industrial development are irretrievably lost;

(5) reduced biological diversity may also endanger the functioning of ecosystems and critical ecosystem processes that moderate climate, govern nutrient cycles and soil conservation and production, control pests and diseases, and degrade wastes and pollutants;

(6) reduced biological diversity will diminish the raw materials available for scientific and technical advancement, including the development of improved varieties of cultivated plants and domesticated animals;

(7) existing information regarding the abundance and distribution of biological diversity is inadequate, often inaccessible, and frequently inapplicable to con-

servation management, thus hampering the efficiency of resource policy and management decisions;

(8) existing conservation laws focus on the protection of individual species that have already suffered declines, rather than emphasizing ecosystem management to sustain diversity across a range of species;

(9) existing laws and programs relevant to the loss of biological diversity in the United States are largely uncoordinated and inadequate, and sometimes result in duplication of efforts, conflicts in goals, and gaps in geographic and taxonomic coverage;

(10) a comprehensive and coordinated Federal strategy is needed to arrest the loss of biological diversity and also, where possible, to restore biological diversity both through natural recovery and active management;

(11) increased biological and ecological research is needed to provide the knowledge to maintain biological diversity, to protect and manage ecosystems, and to ensure the sustainable use of natural resources; and

(12) maintaining biological diversity through habitat preservation is often less costly and more effective than efforts to save species once they become endangered.

SEC. 3. DEFINITIONS.

For purposes of this Act—

(1) the term "biological diversity" means the full range of variety and variability within and among living organisms and the ecological complexes in which they occur, and encompasses ecosystem or community diversity, species diversity and genetic diversity;

(2) the terms "conserve", "conserving", and "conservation" refer to protective measures for maintaining existing biological diversity and active measures for restoring diversity through management efforts, in order to protect, restore, and enhance as much of the variety of native species and communities as possible in abundances and distributions that provide for their continued existence and functioning, including, at a minimum, the viability of existing populations;

(3) the term "ecosystem or community diversity" means the distinctive assemblages of species and ecological processes that occur in different physical settings of the biosphere and distinct parts of the world;

(4) the term "genetic diversity" means the differences in genetic composition within and among populations of a given species;

(5) the term "regional ecosystem" means an area which is sufficiently large that it is capable of sustain-

ing multiple biological communities and associated species;

(6) the term "species diversity" means the richness and variety of native species in a particular location of the world; and

(7) the term "State" means each of the several States, the District of Columbia, the Commonwealth of Puerto Rico, the United States Virgin Islands, Guam, the Commonwealth of the Northern Mariana Islands, American Samoa, and any other commonwealth, territory, or possession of the United States.

SEC. 4. PURPOSES.

It is the purpose of this Act—

(1) to conserve biological diversity;

(2) to require explicit assessment of effects on biological diversity in all environmental impact statements required to be prepared pursuant to the National Environmental Policy Act of 1969;

(3) to establish a Federal strategy for the conservation of biological diversity;

(4) to establish mechanisms for encouraging and coordinating Federal, State, and private efforts to conserve biological diversity and natural environments;

(5) to undertake a nationally coordinated effort to collect, synthesize, and disseminate adequate data and information for—

(A) the understanding of biological diversity;

(B) assessing the rate and scale of the depletion of biological diversity; and

(C) identifying elements of biological diversity that are in significant decline or otherwise warrant special attention;

(6) to support basic and applied research necessary for the conservation of biological diversity; and

(7) to promote better understanding of the importance of biological diversity and foster actions that prevent biological impoverishment and conserve biological diversity and natural resources.

SEC. 5. NATIONAL BIOLOGICAL DIVERSITY AND ENVIRONMENTAL POLICY.

(a) POLICY.—It is the public policy of the United States that conservation of biological diversity is a national goal, and conservation efforts are a national priority.

(b) CONSISTENCY OF FEDERAL ACTION.—The actions, policies, and programs of all Federal agencies shall be consistent with the goal of conservation of biological diversity, to the maximum extent practicable.

(c) CONSERVATION OF BIOLOGICAL DIVERSITY ON FEDERAL LANDS AND WATERS.—All Federal lands and waters shall be managed to conserve biological diversity within the context of the purposes for which those areas w established.

(d) ENVIRONMENTAL IMPACT STATEMENTS.—

(1) REGULATIONS.—Not later than one year after the date of the enactment of this Act, the Council on Environmental Quality shall issue regulations which establish requirements for agencies to assess the impacts of Federal agency actions on biological diversity in preparing environmental impact statements under section 102 of the National Environmental Policy Act of 1969.

(2) IDENTIFICATION OF COMMUNITIES, SPECIES, AND POPULATIONS IN SIGNIFICANT DECLINE.—In preparing the regulations required under paragraph (1), the Council on Environmental Quality shall identify, in consultation with the National Center for Biological Diversity and Conservation Research established under section 9 (hereafter in this Act referred to as the "Center") those biotic communities, species, and populations that appear to be in significant decline or in imminent danger of loss of viability, or are otherwise of special concern.

(e) AGENCY REVIEW PROCESS.—Each Federal department or agency shall, with the advice and assistance of the Council on Environmental Quality, within 1 year after the date of the enactment of this Act—

(1) review its programs, both individually and cumulatively, for consistency with the conservation of biological diversity in accordance with this Act, paying particular attention to biotic communities, species, and populations identified under subsection (d)(2); and

(2) report the results of such review to the President, the Council on Environmental Quality, and the Congress.

(f) REVIEW OF ENVIRONMENTAL IMPACT STATEMENT BY EPA.—In reviewing environmental impact statements under the National Environmental Policy Act of 1969, the Administrator of the Environmental Protection Agency shall take into account the impacts of the proposed action on biological diversity.

SEC. 6. EFFECT ON OTHER LAWS.

Nothing in this Act shall be construed to amend or otherwise alter any requirement to maintain biological diversity under any other Act.

SEC. 7. INTERAGENCY WORKING COMMITTEE ON BIOLOGICAL DIVERSITY.

(a) ESTABLISHMENT.—There is established an Interagency Working Committee on Biological Diversity (hereafter in this Act referred to as the "Interagency Committee").

(b) MEMBERSHIP.—The Interagency Committee shall consist of 1 representative each from—

(1) the Bureau of Land Management;

(2) the National Park Service;

(3) the Fish and Wildlife Service;

(4) the Forest Service;

(5) the Department of Defense;

(6) the National Oceanic and Atmospheric Administration;

(7) the Environmental Protection Agency;

(8) the Department of Energy;

(9) the Center;

(10) the Council on Environmental Quality; and

(11) any other agency or department of the United States that the President, or the Chairman of the Interagency Committee, considers appropriate.

Each such representative shall be designated by the head of the entity named.

(c) CHAIRMAN.—The member of the Interagency Committee representing the Council on Environmental Quality shall serve as Chairman of the Interagency Committee.

(d) FUNCTION.—The function of the Interagency Committee shall be to prepare a coordinated Federal strategy for conservation of biological diversity described in section 8.

(e) DISSOLUTION.—The Interagency Committee shall be dissolved after the submission to the Congress of the Federal strategy required under section 8.

SEC. 8. FEDERAL BIOLOGICAL DIVERSITY STRATEGY.

(a) DEVELOPMENT.—The Interagency Committee shall develop a coordinated Federal strategy for the conservation of biological diversity (hereafter in this Act referred to as the "Strategy").

(b) CONTENTS.—The Strategy shall contain—

(1) a coordinated interagency plan for conserving biological diversity in the United States, particularly on federally-managed lands, including a specific description of the roles and responsibilities of each agency represented on the Interagency Committee for implementing the plan;

(2) the identification of regional ecosystems within the United States, and an interagency plan for coordinating Federal management of such ecosystems for the purpose of conserving biological diversity;

(3) a comprehensive set of criteria (including time frames and objective measures) for evaluating the

progress of the agencies represented on the Interagency Committee in implementing the Strategy;

(4) specific management measures to be taken by each agency represented on the Interagency Committee pursuant to plans and criteria developed under paragraphs (1), (2), and (3) with respect to—

(A) conservation through protective measures to maintain existing biological diversity, and through active measures to restore biological diversity;

(B) provisions for the long-term viability of ecosystems and ecosystem processes;

(C) maintenance of gene pools through a combination of in situ and ex situ techniques;

(D) use of demonstration areas, such as biosphere reserves;

(E) consistency of policies in international actions of Federal agencies;

(F) the identification of priorities for conservation;

(G) economic incentives to encourage the conservation of biological diversity;

(H) the development of broad-based education programs on the importance of biological diversity and the necessity of conservation;

(I) cooperation and coordination with non-Federal sectors; and

(J) training and education of agency personnel in ecological reserach, monitoring, and systematics; and

(5) an interagency plan for conducting research on biological diversity, identifying the roles and responsibilities of each agency represented on the Interagency Committee, other Federal agencies, and the Center, including—

(A) the identification of research priorities which affect more than one agency;

(B) the development of coordinated research programs for the conservation and restoration of biological diversity;

(C) enhancement of scientific knowledge through improved biological surveys;

(D) research to identify factors limiting population viability or persistence;

(E) improvements of management techniques based on scientific knowledge; and

(F) the identification of habitats of special concern, and the development of plans to protect those areas.

(c) PUBLIC PARTICIPATION.—The public shall be provided with opportunities to participate in the preparation of, and to comment on, the Strategy and any regional ecosystem management plans.

(d) REPORTS.—(1) Within two years the date of the enactment of this Act, the Secretary shall be submitted to the President and the Congress by the Chairman of the Interagency Committee.

(2) At least once every two years after the submission of a report under paragraph (1), the head of each agency represented on the Interagency Committee shall submit to the Congress a report detailing progress in the implementation of the Strategy, including written comments by the public.

SEC. 9. NATIONAL CENTER FOR BIOLOGICAL DIVERSITY AND CONSERVATION RESEARCH.

(a) ESTABLISHMENT AND PURPOSE.—There is established within the Smithsonian Institution, in cooperation with the Environmental Protection Agency, a National Center for Biological Diversity and Conservation Research (the Center), whose purpose shall be to set research priorities, to provide leadership and coordination for the understanding and promotion of knowledge of the biota and the effect of human activities on the biota, and to make this knowledge accessible to the people of the United States and others working to conserve biological diversity throughout the world. The Center shall be administered by a Director.

(b) FUNCTIONS.—The functions of the Center shall be—

(1) to summarize and enhance the knowledge of the distribution, status, and characteristics of the biota in a manner that can be used in conservation and management;

(2) to prepare, with the assistance of agencies and other sources, lists and, where appropriate, maps of—

(A) biotic communities, species, and populations that appear to be in significant decline or in imminent danger of loss of viability, or are otherwise of special concern;

(B) areas of outstanding ecological or biotic importance; and

(C) factors, including ownership status and applicable laws, affecting the protection of such communities, species, and populations;

(3) to publish information, such as floral and faunal treaties, resource inventories, vegetation maps, atlases, and guides for practical use of biological information, and especially publications that synthesize information relevant to national goals of understanding and conserving biological diversity;

(4) to identify taxonomic groups, ecological communities, and geographical areas in need of study, and to develop a strategic plan for, initiate, and provide financial support toward an ongoing survey of the biota;

(5) to provide for the conducting of research, through grants, contracts, or otherwise, by Federal, State, and private agencies, institutions, organizations, and individuals;

(6) to provide information useful to the Interagency Committee in the preparation of the Strategy;

(7) to make recommendations to Federal agencies and others on the technical management of data collection, storage, and retrieval;

(8) to provide training and technical assistance to Federal agencies and others regarding collection and interpretation of biological data; and

(9) to raise additional funds as necessary to support the activities of the Center.

(c) STRUCTURE AND MEMBERSHIP.—

(1) ADVISORY BOARD.—The Center shall have an advisory board, which shall independently assist in setting the policies for and directing the Center.

(2) MEMBERSHIP.—(A) the advisory board shall consist of 17 members, including—

(i) 1 representative of the Smithsonian Institution;

(ii) 1 representative of the Fish and Wildlife Service;

(iii) 1 representative of the National Oceanic and Atmospheric Administration;

(iv) 1 representative of the National Park Service;

(v) 1 representative of the Department of Energy;

(vi) 1 representative of the National Science Foundation;

(vii) 1 representative of the Agricultural Research Service;

(viii) 1 representative of the Environmental Protection Agency;

(ix) 1 representative of the Forest Service;

(x) 1 representative of the Bureau of Land Management;

(xi) 1 representative of the Army Corps of Engineers;

(xii) 1 representative of the State biological surveys;

(xiii) 1 representative of private organizations that maintain large data bases oriented toward biological conservation;

(xiv) 2 scientists from nonprofit research institutions or universities; and

(xv) 2 representatives from institutions with collections of biological specimens.

(B) Members listed under clauses (xii) through (xv) of subparagraph (A) shall be appointed by the President from a list of nominees recommended by the National Academy of Sciences.

(3) TERMS.—Members of the advisory board shall serve for terms of 5 years, and may serve more than one term.

(4) COMPENSATION OF MEMBERS.—

(A) NONGOVERNMENT MEMBERS.—Each member of the advisory board that is not otherwise in the service of the Federal Government shall, to the extent provided for in advance in appropriations Acts, be paid actual travel expenses and per diem in lieu of subsistence expenses in accordance with section 5703 of title 5, United States Code, when such member is away from the member's usual place of residence.

(B) GOVERNMENT MEMBERS.—Each member of the advisory board that is otherwise in the service of the Federal Government shall serve without compensation in addition to that received for such other service, but while engaged in the work of the Advisory Board, such member shall, to the extent provided for in advance in appropriations Acts, be paid actual travel expenses, and per diem in lieu of subsistence expenses in accordance with subchapter I of chapter 57 of title 5, United States Code, when away from the member's usual place of residence.

(5) CHAIRMAN.—The members of the advisory board shall select 1 member to serve as chairman.

(6) FUNDING ARRANGEMENTS.—The Director of the Center shall make appropriate arrangements for necessary administrative and clerical support of the advisory board, in consultation with the chairman of the advisory board.

(7) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out this section $10,000,000 for fiscal year 1991, $10,000,000 for fiscal year 1992, and $10,000,000 for fiscal year 1993, to be derived from funds otherwise authorized for the Federal agencies represented on the

advisory board, and to remain available until expended as specified in appropriations Acts.

SEC. 10. NATIONAL ACADEMY OF SCIENCES.

The Council on Environmental Quality shall retain the National Academy of Sciences—

(1) to provide scientific and technical advice and counsel in the preparation of the Strategy to ensure that the best possible scientific information is used in developing the Strategy; and

(2) to provide a general reference and scientific and technical advisory resource for the Nation in matters relating to conservation and biological diversity.

SEC. 11. BUY-AMERICAN REQUIREMENT.

(a) DETERMINATION BY ADMINISTRATOR.—If the Administrator, with the concurrence of the Secretary of Commerce and the United States Trade Representative, determines that the public interest so requires, the Administrator is authorized to award to a domestic firm a contract made pursuant to the issuance of any grant made under this Act that, under the use of competitive procedures, would be awarded to a foreign firm, if—

(1) the final product of the domestic firm will be completely assembled in the United States;

(2) when completely assembled, not less than 51 percent of the final product of the domestic firm will be domestically produced; and

(3) the difference between the bids submitted by the foreign and domestic firms is not more than 6 percent.

In determining under this subsection whether the public interest so requires, the Administrator shall take into account United States international obligations and trade relations.

(b) LIMITED APPLICATION.—This section shall not apply to the extent to which—

(1) such applicability would not be in the public interest;

(2) compelling national security considerations require otherwise; or

(3) the United States Trade Representative determines that such an award would be in violation of the General Agreement on Tariffs and Trade or an international agreement to which the United States is a party.

(c) LIMITATION.—This section shall apply only to contracts made related to the issuance of any grant made under this Act for which—

(1) amounts are authorized by this Act to be made available; and

(2) solicitations for bids are issued after the date of the enactment of this Act.

(d) REPORT TO CONGRESS.—The Administrator shall report to the Congress on contracts covered under this section and entered into with foreign entities in fiscal years 1990 and 1991 and shall report to the Congress on the number of contracts that meet the requirements of subsection (a) but which are determined by the United States Trade Representative to be in violation of the General Agreement on Tariffs and Trade or an international agreement to which the United States is a party. The Administrator shall also report to the Congress on the number of contracts covered under this Act and awarded based upon the parameters of this section.

(e) DEFINITIONS.—For purposes of this section—

(1) the term "Administrator" means the Administrator of the Environmental Protection Agency;

(2) the term "domestic firm" means a business entity that is incorporated in the United States and that conducts business operations in the United States; and

(3) the term "foreign firm" means a business entity not described in paragraph (2).

SEC. 12. INTERNATIONAL CONSERVATION ACTIVITIES.

(a) The Agency for International Development, Department of State, Fish and Wildlife Service, National Park

Service, National Marine Fisheries Service, Environmental Protection Agency, Forest Service, and Department of Agriculture are directed to encourage conservation of biological diversity globally through—

(1) fully supporting and coordinating implementation of existing obligations and programs that contribute to the conservation of biological diversity globally, including—

(A) Convention on Trade in Endangered Species (CITES);

(B) World Heritage Convention;

(C) Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere;

(D) Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (Ramsar); and

(E) Man and the Biosphere Program—United States;

(2) supporting basic and applied research towards understanding ecological systems and applying that knowledge for sustainable development and the conservation of biological diversity internationally, including cooperative research and scientific exchange with governmental, educational and research institutions;

(3) increasing training, education, and technical assistance related to conservation of biological diversity and sustainable development;

(4) providing assistance that promotes sustainable development and global environmental stability including research on and implementation of—

(A) alternative land use practices in areas adjacent to natural areas of significant ecological value;

(B) measures to increase productivity of degraded and altered lands and waters in order to relieve the pressures on natural ecosystems; and

(5) cooperating with one another and with appropriate international organizations and governments in developing and in implementing these obligations, research, and conservation programs.

(b) The Agency for International Development is directed to hire, as opportunity permits through attrition or otherwise, United States direct-hire technical staff in environmental and natural resources with extensive formal training in conservation of biological diversity and sustainable development.

(c) The Congress finds that sections 118 and 119 of the Foreign Assistance Act provide a significant basis for addressing the problems of tropical deforestation and loss of biological diversity. The Congress reaffirms its support for these provisions and directs that AID give high priority to their implementation.

○

NOTES ON STENOTHOIDAE OF SOUTHERN CALIFORNIA

Paula Rothman and Elizabeth Harrison-Nelson

The writers searched Barnard and Barnard, 1990, for Stenothoid amphipods reported from the study area and reviewed the pertinent literature. They have provided a key to the genera listed for southern California and included copies of selected articles with figures.

A list of genera of Stenothoids found along the western North American coast from Alaska to Baja California is provided, however detailed information is not given for this expanded list.

Stenothoids from the southern California coast (Pt. Concepcion to Mexican Border):

Mesometopa neglecta roya
Metopa dawsoni
Metopa (Prometopa) samsiluna
Metopa sp.
Metopella aporpis
Parametopella ninis
Proboloides tundra
Stenothoe estacola
  S. frecanda
  S. valida
Stenothoides bicoma

Stenothoids from North American coast from Alaska to Baja California:

Mesometopa esmarki
Metopella aporpis
Proboloides pacifica
Stenothoe adhaerans
  S. aequicornis
  S. alinga
Stenothoides bicoma
  S. burbanki
Stenula incola
  S. nodosa

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______. 1962b. Benthic Benthic Marine Amphipoda of Southern California: Families Amphilochidae, Leucothoidae, Stenothoidae, Argissidae, Hyalidae, Pacific Naturalist, 3:116-163, 23 figures.

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Key to the Genera of Stenothoidae
reported from Southern California

(Abbreviated from Barnard and Karaman, 1991)

*Not reported from study area.

1. Article 2 of pereopod 7 rectolinear 2
   Article 2 of pereopod 7 expanded 8

2. Telson thickened and fleshy . . . .*
   Telson flat and laminar 3

3. Article 2 of pereopods 5-7 weakly expanded, not fully rectolinear . . . . *Goratelson
   Article 2 of pereopods 5-7 fully rectolinear 4

4. Pleonite 4 with dorsal process. . . . . *
   Pleonite 4 lacking dorsal process. 5

5. Palp of maxilla 1 biarticulate. . . . . Probolisca
   Palp of maxilla 1 uniarticulate 6

6. Mandibular palp absent . . . . .Parametopella
   Mandibular palp present 7

7. Mandibular palp 2-3 articulate . . . . .Metopella
   Mandibular palp 1-articulate. . . . . *

8. Article 2 of pereopod 6 not expanded or expanded less than on pereopod 7. 9
   Article 2 of pereopod 6 expanded as widely as on pereopod 7. 13

9. Article 2 of pereopods 5-7 evenly but weakly expanded. . . . . .Goratelson
   Article 2 of pereopods 5-7 diversely expanded 10

10. Pleonite 3 with dorsal process . . . . Mesoproboloides
    Pleonite 3 smooth 11

11. Mandibular palp 0-1 articulate. . . . . Stenothoides
    Mandibular palp 2-3 articulate. 12

12. Article 2 of pereopod 7 tapering, basally expanded. . . . . Mesometopa
    Article 2 of pereopod 7 evenly expanded . . . . Mesoproboloides excavata, Metopella

13. Palp of maxilla 1 uniarticulate. .14
    Palp of maxilla 1 biarticulate 16

14. Mandibular palp absent. . . . . *
    Mandibular palp present. 15

15. Mandibular palp 2-3 articulate. . . . . Metopa
    Mandibular palp 1-articulate. .Stenula

16. Mandibular palp absent. 17
Mandibular palp present. 18

17. Antenna 2 as long as antenna 1, coxa 2
beveled anteroventrally. . . . .*Stenothoe*
Antenna 2 half as long as antenna 1, coxa 2
subquadrate and protrusive anteroventrally. . . . . *Knysmetopa

18. Mandibular palp 1-articulate . . . .*Prostenothoe
Mandibular palp 2-3 articulate .19

19. Accessory flagellum 2-articulate. . . . . *Metopoides*
Accessory flagellum 0-1 articulate 20

20. Carpus of gnathopod 1 relatively short and lobate, propodus
elongate and expanded . . . .*Aurometopa
Carpus of gnathopod 1 relatively long, not lobate, propodus
short and barely expanded . . . . *Proboloides*

Mesometopa neglecta roya, new subspecies

(Fig. 41)

References to typical subspecies:

[*Metopa neglecta* Hansen.—Sars 1895: 274-275, pl. 97, fig. 2.
Metopella neglecta (Hansen).—Gurjanova 1951: 473-474, fig. 310.
Mesometopa neglecta (Hansen).—Shoemaker 1955a: 24, figs. 8a-f.]

Description: Lateral cephalic lobe sharp as in *Mesometopa neglecta* Hansen (Sars. 1895: pl. 97, fig. 2), eye small, composed of 8 to 10 large ommatidia loosely arranged; antennae reaching to end of fifth pereonite; mandibular palp 2-articulate, appearing to be absent on one mandible and present on other; palp of maxilla 1 uniarticulate; gnathopod 1 simple, article 7 not setose; gnathopod 2 small, article 6 trapezoidal, expanded distally, palm oblique, sharply defined by a small cusp, bearing two large defining spines; article 2 of pereopods 3-4 very slender; article 2 of pereopod 5 broad proximally, suddenly constricted on distal half; articles 4 and 5 of pereopods 3-5 very slender, not produced distally; third pleonal epimeron projecting strongly posteriorly; telson with 2 marginal spines on each side.

Holotype: AHF No. 5920, female, 3.0 mm.

Type locality: Station 6806, Santa Cruz Canyon, California, 33°-56'-06" N, 118°-52'-17" W, 221 m, December 22, 1959.

Material: Four specimens from the type locality.

Remarks: Mesometopa gibbosa Shoemaker (1955a) should be removed to the genus *Metopella* Sars because the second article of pereopod 5 is slender. The remaining 3 species, *Mesometopa esmarki* (Boeck), *M. extensa* Gurjanova and *M. neglecta* (Hansen), differ among themselves more than the present material differs from *M. neglecta*, so these specimens are relegated to subspecific status. The larger, fewer, and more loosely compacted ommatidia of the new subspecies differ from the more numerous, smaller, more compacted ommatidia of the stem species and the proximal and distal portions of article 2 on pereopod 5 are more sharply differentiated. The palm of gnathopod 2 has a small medial cusp, not reported for *M. neglecta neglecta.* Probably the eye differences are a reflection of the greater depth recorded for the new subspecies.

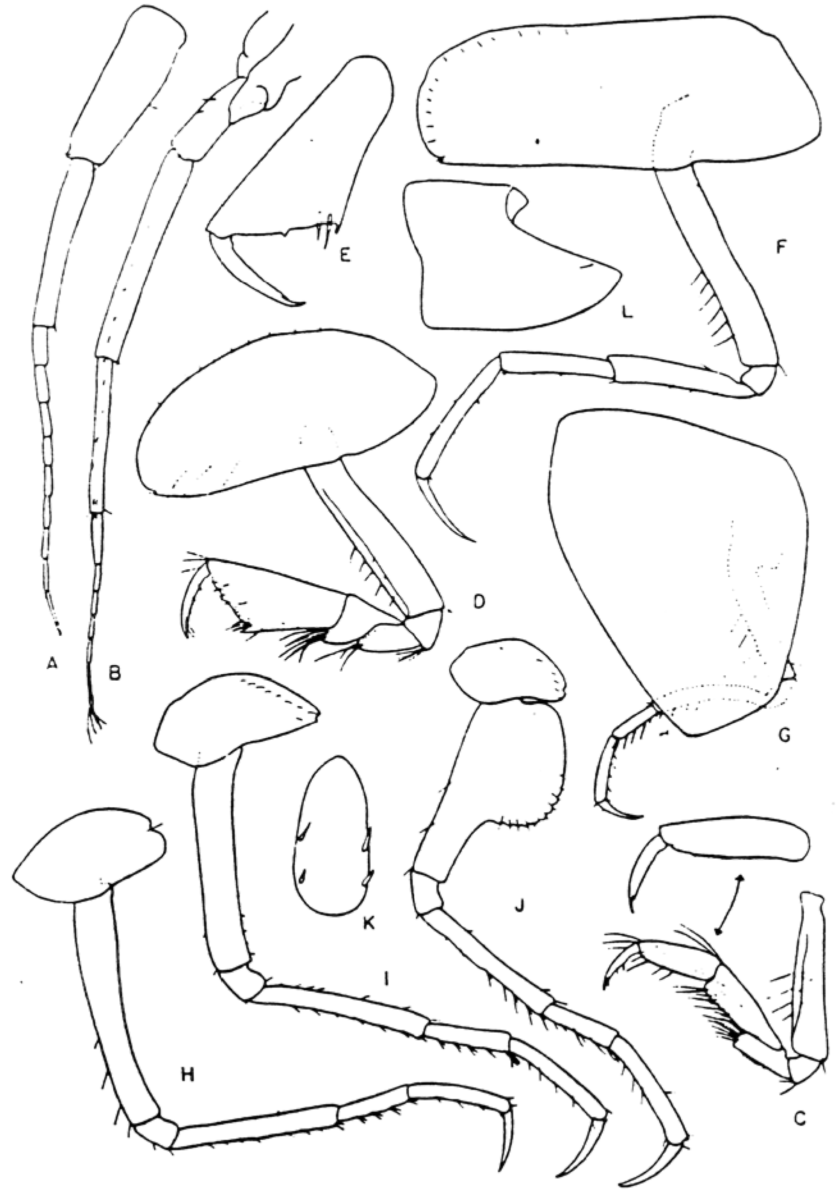

Figure 41

Mesometopa neglecta roya, new subspecies. Holotype, female, 3.0 mm, sta. 6806: A,B, antennae 1, 2; C, gnathopod 1; D,E, gnathopod 2; F,G,H,I,J, pereopods 1, 2, 3, 4, 5, pereopod 2 *reduced in size;* K, telson; L, third pleonal epimeron.

Genus Metopa Boeck

Metopa dawsoni, new species
Figs. 10, 11

DIAGNOSIS OF MALE: Gnathopod 1 with article 6 about half as long as article 5 and both articles with their edges parallel, its article 7 short, about a third as long as article 6, bearing 4-5 setules along inner margin, its article 2 slender, its article 4 not strongly produced behind; gnathopod 2 with nearly transverse palm defined by a large deflexed tooth which points medially when not flattened on the microscopic slide, its palm with a large excavation and a multitoothed process near finger hinge, its article 7 failing to reach the defining tooth, its article 3 produced anteriorly, its article 4 unusual in forming a thin, transparent process on the medial side of article 5 and bearing an anterior spine, its article 5 bearing minute denticulation along anterior edge; antenna 1 slightly longer than antenna 2; accessory flagellum forming a minute bump; coxa 4 not sinuate along lower margin; third pleonal epimeron slightly attenuated and quadrate at lower corner; telson with 3 lateral spines on each side; fourth article of peraeopods 4-5 stout.

FEMALE: Article 6 of gnathopod 2 longer than in the male, about two thirds as long as article 5; gnathopod 2 like that of male but principal palmar excavation much smaller, the defining tooth much smaller and not deflexed so that the palm is largely formed of the toothed portion seen in the male, the finger nearly reaching end of palm, its article 3 more strongly produced than in male.

HOLOTYPE: AHF No. 598, male, 3.0 mm.

TYPE LOCALITY: Station 6098, off Pt. Fermin, 33-38-45 N, 118-14-45 W, 24 fms, February 19, 1959.

MATERIAL: 36 specimens from 12 stations.

RELATIONSHIP: The genus *Metopa* is large, with 46 species. A key to

Distribución: Pt. Argüello, de California a Bahía de San Cristóbal, Baja California, 12-160 metros.

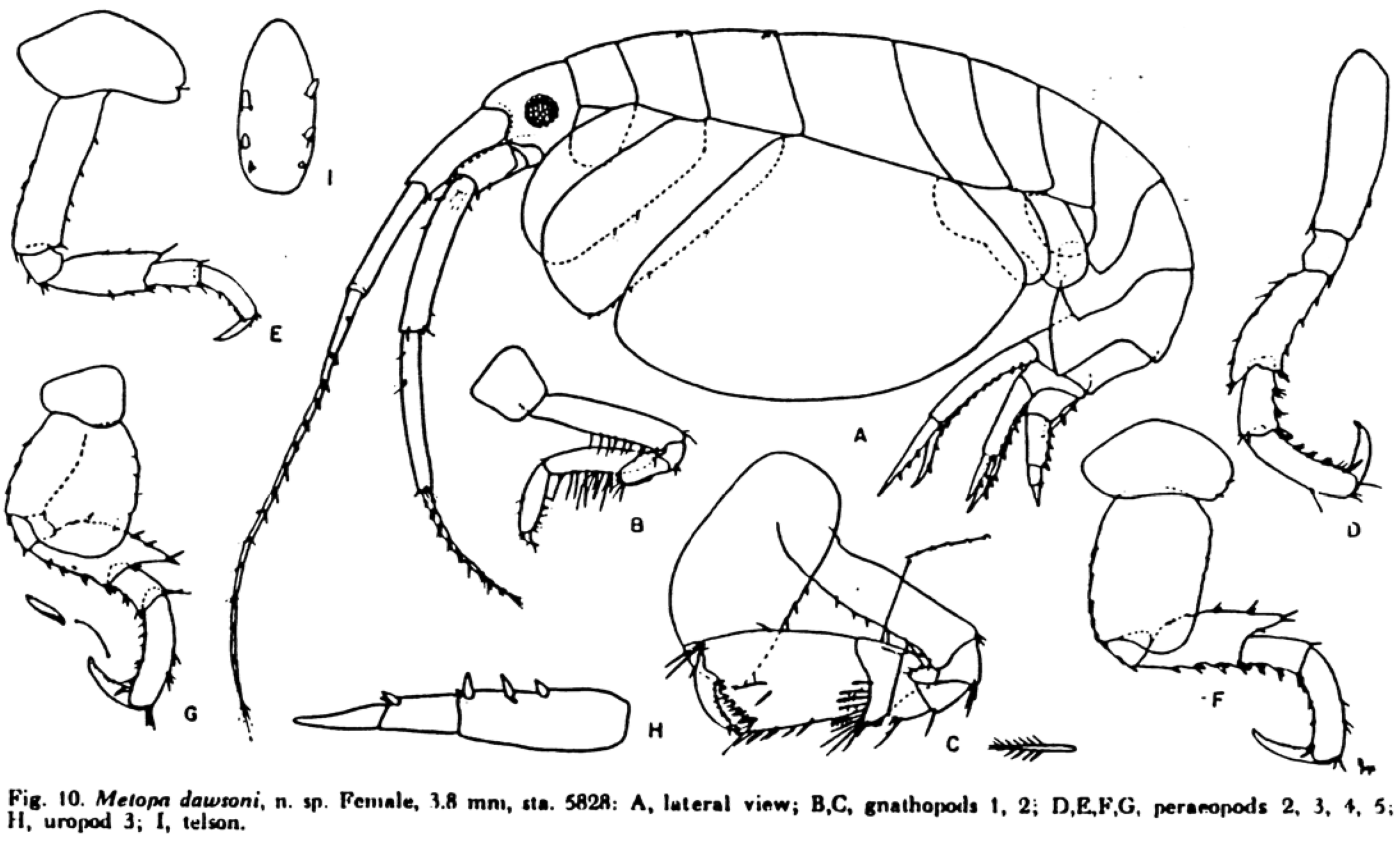

Fig. 10. *Metopa dawsoni*, n. sp. Female, 3.8 mm, sta. 5828: A, lateral view; B,C, gnathopods 1, 2; D,E,F,G, peraeopods 2, 3, 4, 5; H, uropod 3; I, telson.

the species was published by Gurjanova (1951). The genus *Prometopa* Schellenberg (1926) is referred to *Metopa* by Gurjanova (1948) but separated in her generic key again in 1951. *Prometopa* differs from *Metopa* by the presence of an indistinctly biarticulate accessory flagellum. The new species herein has a minute, 1-jointed accessory flagellum. By retaining the genus *Prometopa*, it is possible to state that the genus *Metopa* is confined to the northern hemisphere.

Metopa dawsoni differs from several other species in the genus by minor characteristics as follows: From its closest relative, *Metopa wiesei* Gurjanova (see 1951), it differs by the different angle of projection of the last tooth on the finger-hinge process of male gnathopod 2, (in *M. wiesei* it projects posteriorly whereas in *M. dawsoni* it projects distally) and by the much more elongated fifth article of gnathopod 1 and shorter article 7. From *Metopa alderi* (Bate) (see Sars 1895: pl. 86) it differs by the much more elongated fifth article of gnathopod 1, with more slender sixth article, the shorter seventh article, and the presence of telsonic spines. In gnathopod 1, *M. dawsoni* differs in like respect from *M. spectabilis* (see Sars 1895: pl. 87) and *M. boeckii* (see Sars 1895: pl. 88). The female of *M. dawsoni* resembles closely the female of *M. robusta* Sars (1895: pl. 96, fig. 1) but differs by the stouter first gnathopod and less strongly produced fourth articles of peraeopods 4-5.

ECOLOGY: This species has an overall density of 0.9 animals per square meter on the coastal shelf. It ranges in depth from 31 to 100 fathoms.

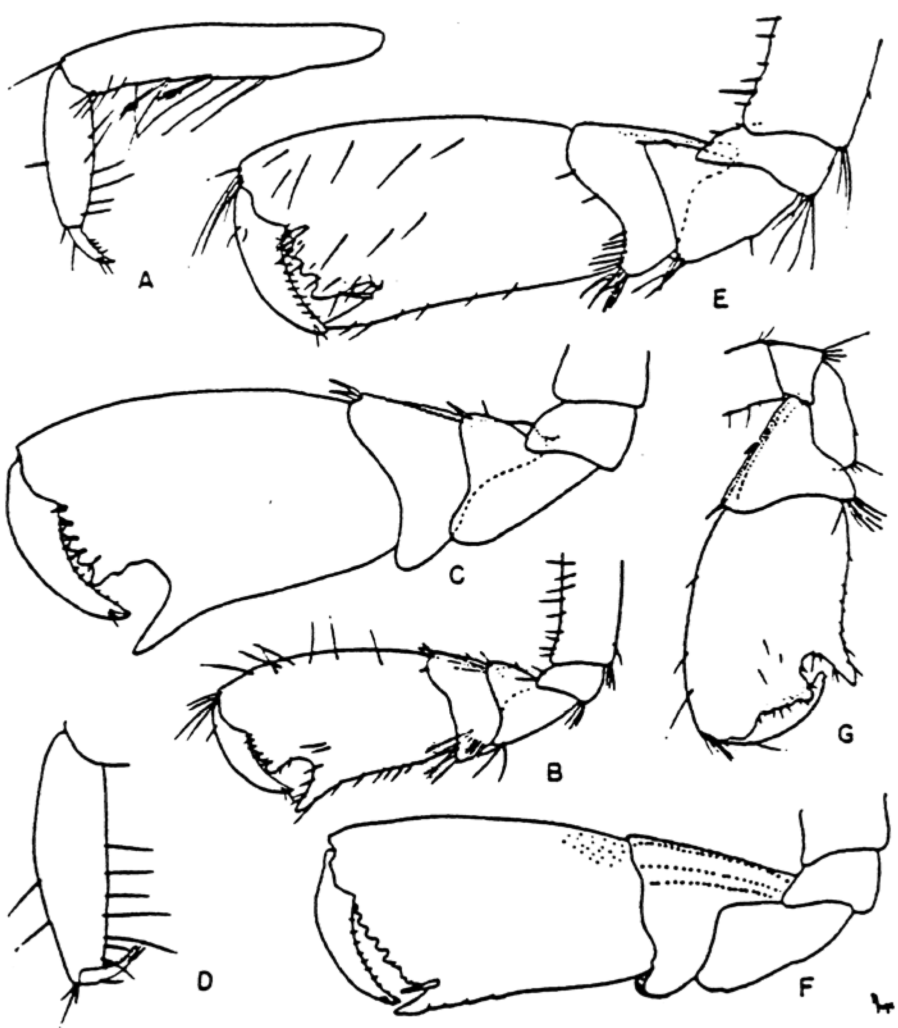

Fig. 11. *Metopa dawsoni*, n. sp. Male, 4.3 mm, sta. 6105: A,B,C, gnathopods 1, 2, 2. Female, 3.8 mm, sta. 5828: D,F, gnathopods 1, 2. Female, 5.0 mm, sta. 6132: E, gnathopod 2. Male, holotype, 3.0 mm, sta. 6098: G, gnathopod 2.

Metopa (Prometopa) samsiluna, new species

(Fig. 42)

Diagnosis: Assigned to the subgenus *Prometopa* Schellenberg by possession of a vestigial accessory flagellum; mandibular palp 3-articulate, first maxillary palp uniarticulate; eyes absent; antennae very long, subequal, peduncular articles of both antennae elongated, article 2 of antenna 1 longer than article 1; coxa 2 very broad; gnathopod 1 short, with distinct palm, article 6 expanded, article 7 short, fitting palm, not setose, article 4 strongly projecting posteriorly along article 5, article 2 strongly setose anteriorly; palm of gnathopod 2 with a large medial tooth, defining corner with large tooth; lobe on article 2 of pereopods 4 and 5 narrowing posterodistally, article 4 narrow, scarcely decurrent, telson spinose.

Holotype: AHF No. 6013, female, 4.5 mm. Unique.

Type locality: Station 6840, San Clemente Rift Valley, California, 32°-44'-35" N, 118°-12'-45" W, 1620 m, January 30, 1960.

Relationship: This species differs from *M. boeckii* Sars (1895: pl. 88) in the presence of the medial palmar tooth on the second gnathopodal palm, the narrower distoposterior lobes on article 2 of pereopods 4-5, the broader second coxa and the shorter first gnathopod with a more projecting fourth article and more distinct palm.

From *M. spectabilis* Sars (1895: pl. 87) this species differs in the equal antennae.

Metopa alderi (Spence Bate) (Sars 1895: pl. 86) is closely related and *M. samsiluna* may be a form of *M. alderi* but it differs in the lack of eyes, the spinose telson, the longer antennae, the better developed medial palmar tooth of gnathopod 2 and the narrower distoposterior lobes on article 2 of pereopods 4-5.

The new species resembles *M. aequicornis* Sars (1885), especially in the long, equal antennae and large coxa 2, but differs in the narrow, scarcely decurrent fourth articles of pereopods 4 and 5 and the spinose telson.

Metopa layi Gurjanova (see 1951) has short articles 1 and 2 of antenna 1.

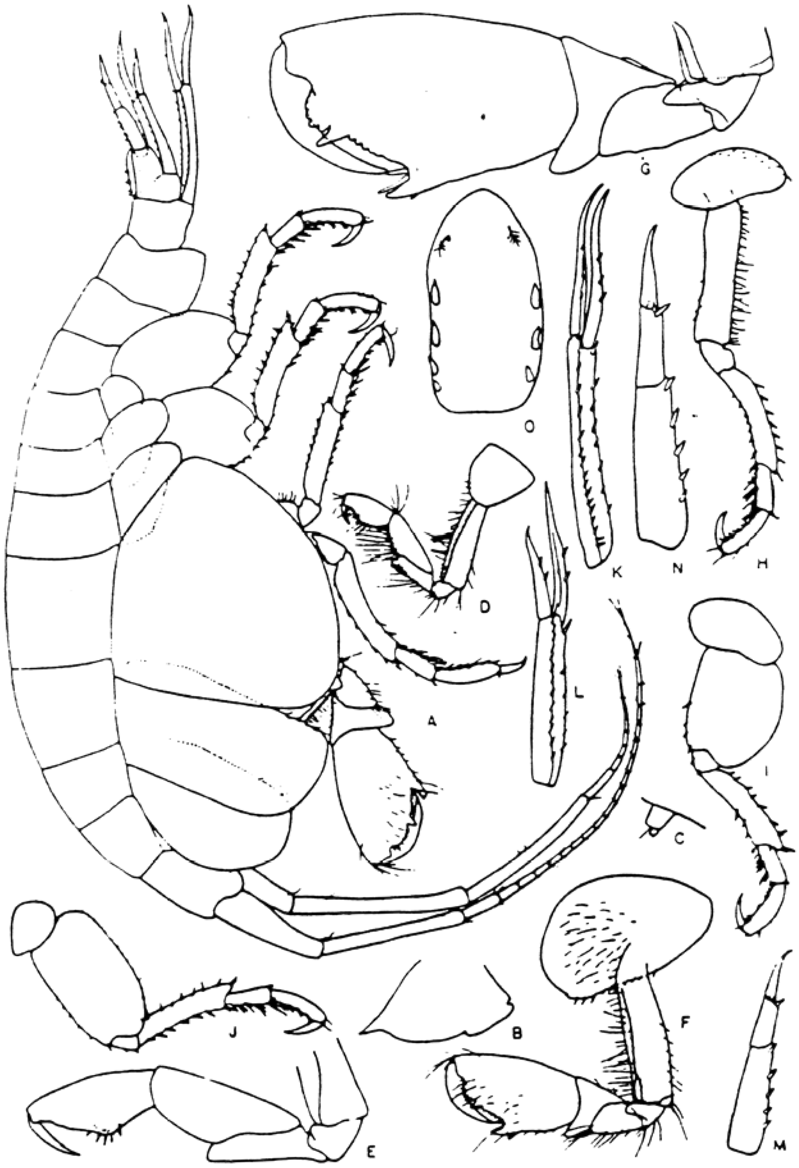

Figure 42

Metopa samsiluna, new species. Holotype, female, 4.5 mm, sta. 6840: A, lateral view; B, epistome; C, accessory flagellum; D,E, gnathopod 1; F,G, gnathopod 2; H,I,J, pereopods 3, 4, 5; K,L,M,N, uropods 1, 2, 3, 3; O, telson.

Metopa sp.

(Fig. 43)

Material: One female, 2.2 mm, from Station 6499, Monterey Canyon.

Relationship: **This specimen has affinities with *Metopa pusilla* Sars (1895: pl. 90, fig. 1) and may be identified with it although minor differences are noted as follows: the first gnathopod is slightly stouter and article 4 does not project posteriorly as much; coxa 4 is more elongated antero-posteriorly.**

From *M. longicornis* Sars (1895: pl. 90, fig. 2) this species differs in the strongly projecting posterodistal corner of article 4 on pereopod 5. The female gnathopod 2 of *M. tenuimana* Sars (1895: pl. 91, fig. 1) is more slender and the palm more oblique than in the present material, but the figures of that species in Stephensen (1931) are close to the material at hand. Article 2 of pereopod 4 is stouter in *M. bruzelii* Goës (Sars 1895: pl. 92, fig. 1) then in the present specimen. The posterior lobe of article 5 on female gnathopod 2 is much stouter and longer in *M. invalida* Sars (1895: pl. 94, fig. 2). Article 4 of pereopod 5 is much stouter in *M. aequicornis* Sars (1885: pl. 15, fig. 5). Article 6 of gnathopod 1 is less tumid medially than in *M. boeckii* Sars (1895: pl. 88).

The specimen also bears comparison to *M. layi* Gurjanova (see 1951) but article 6 of gnathopod 1 in that species is slightly stouter.

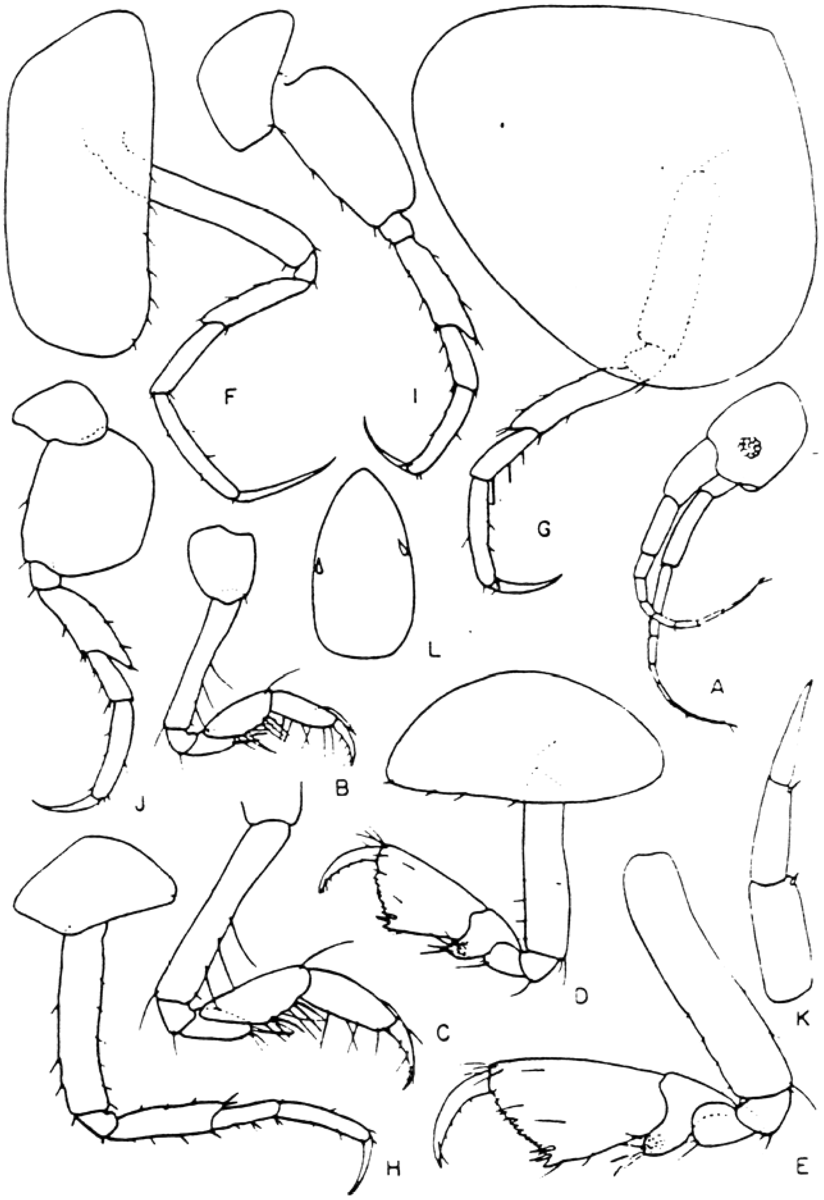

Figure 43

Metopa sp. Female, 2.2 mm, sta. 6499: A, head; B,C, gnathopod 1; D,E, gnathopod 2; F,G,H,I,J, pereopods 1, 2, 3, 4, 5; K, uropod 3; L, telson.

Metopella aporpis, new species
Figs. 12, 13

DIAGNOSIS OF MALE: Articles of antenna 1 not produced; article 6 of gnathopod 1 shorter than article 5, simple, its edges parallel, its posterior edge with 4-5 long setae; article 7 of gnathopod 1 half as long as article 6, with 3-4 setae on posterior edge; palm of gnathopod 2 oblique, formed of a shallow quadrate excavation bounded on both sides by a long, sharp tooth, the posterior one forming the defining tooth, the anterior tooth being an extension from a minutely toothed process near the finger hinge; gnathopod 2 with article 7 nearly reaching end of palm, its article 4 forming a medial translucent lobe projecting anteriorly and appressed to the side of article 5. the anterior edge of article 5 with rows of minute denticles; peraeopod 1 much longer than peraeopod 2 and poorly spinose, peraeopod 2 having numerous stout posterior spines on article 5 and 6; telson with 2 lateral spines on each side near base.

Mandibular palp long, apparently biarticulate; first maxillary palp uniarticulate.

FEMALE: Gnathopod 2 with palm oblique, irregularly toothed, with one large medial tooth and a large defining tooth, the finger failing to reach end of palm; telson with 4 spines on each side near base.

HOLOTYPE: AHF No. 5729, male, 2.4 mm.

TYPE LOCALITY: Station 4834, near Pt. Mugu, 34-00-20 N, 119-01-45 W, 77 fms, rock bottom, February 6, 1957.

RELATIONSHIP: This species is closely related to *Metopella pacifica* (Holmes 1908), from Monterey, California, but differs by the simple, not subchelate, first gnathopod. The resemblance of second gnathopods is amazing, and one wonders if the configuration of gnathopod 1 as drawn for *M. pacifica* were correct.

The new species differs from *M. buynitzkii* Gurjanova (see 1951), *M. macrochira* Gurjanova (see 1951) and *M. carinata* (Hansen) (Gurjanova 1951) by the elongated fifth article of gnathopod 1 and by the quite different configuration of male gnathopod 2. It differs from *M. nasuta* (Boeck) (in Sars 1895) by the unproduced first article of antenna 1; from *M. neglecta* (Hansen) (see Sars 1895) by the parallel edges of article 2 on peraeopod 5; from *M. longimana* (Boeck) (see Sars 1895) by the second male gnathopod, which in *M. longimana* has a nearly transverse palm; and from *M. angusta* Shoemaker (1949) by the palmar processes on male gnathopod 2.

MATERIAL: 5 specimens from 3 stations.

ECOLOGY: Known from 2 stations in southern California at depths of 46 and 77 fms and from Monterey Bay at 14 fms.

Distribution: Monterey Bay to San Cristobal Bay, Baja California, 24–140 m, south of Point Conception not shallower than 84 m.

Metopella (?) aporpis J. L. Barnard

Metopella aporpis J. L. Barnard 1962c: 142-145, figs. 12, 13.

Canyon material: 6805(3).

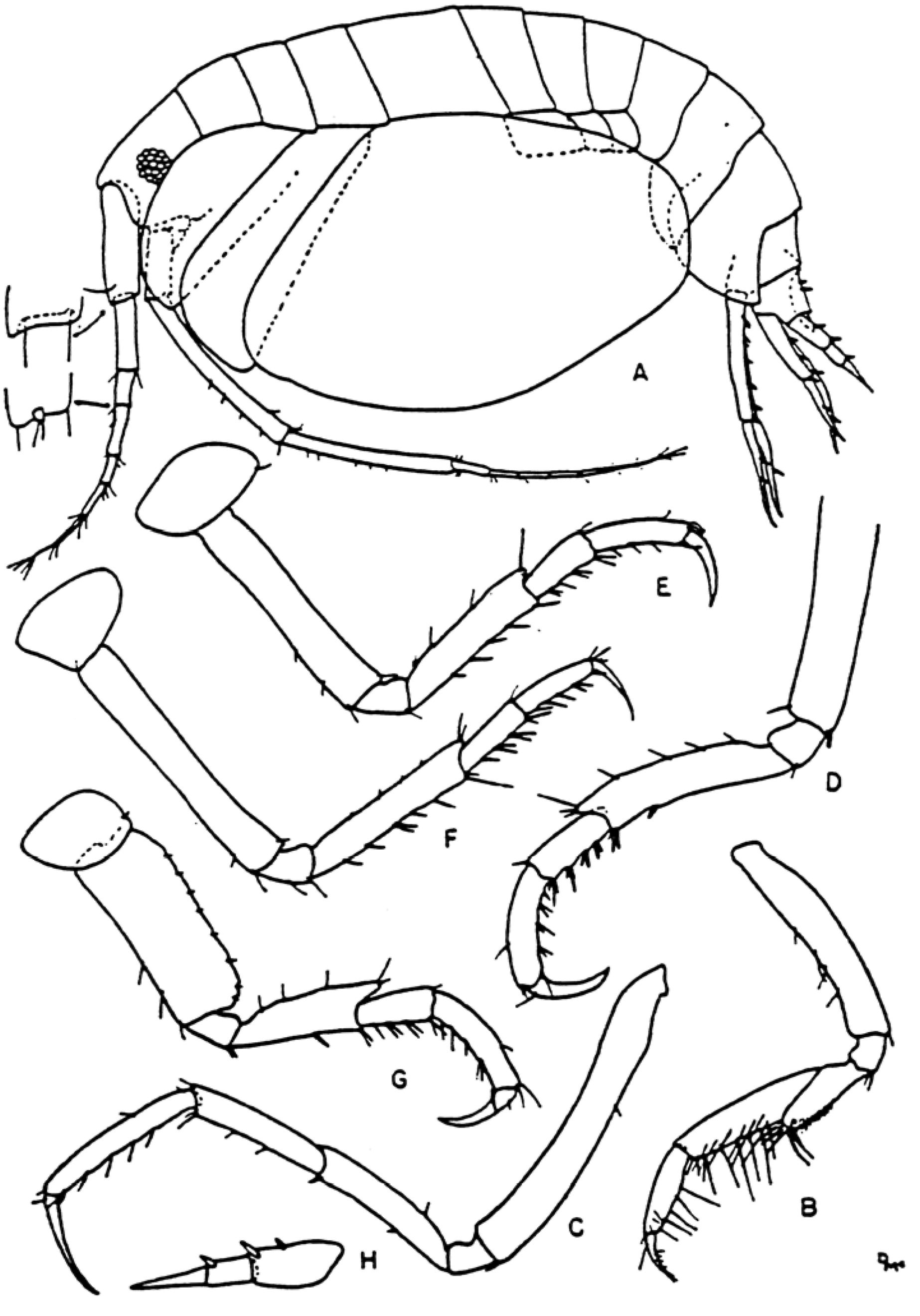

Fig. 12. *Metopella aporpis*, n. sp. Male, holotype, 2.4 mm, sta. 4834: A, lateral view; B, gnathopod 1; C,D,E,F,G, peraeopods 1, 2, 3, 4, 5; H, uropod 3.

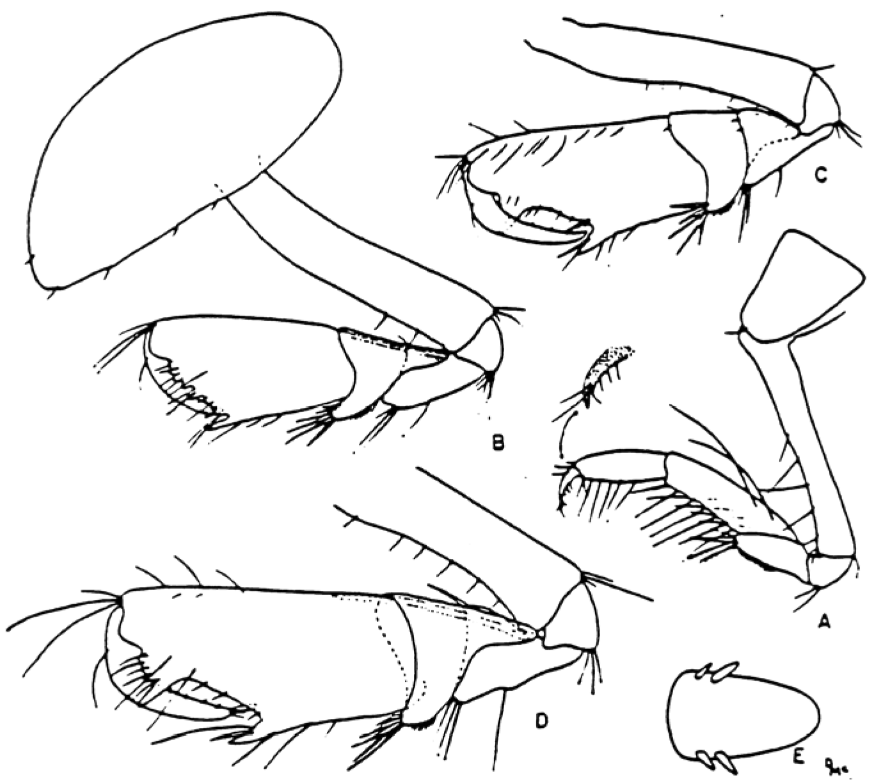

Fig. 13. *Metopella aporpis*, n. sp. Female, 2.5 mm, sta. 4834: A,B, gnathopods 1, 2. Male, holotype, 2.4 mm: C,D, medial and lateral view of gnathopod 2; E, telson.

Parametopella ninis, new species

Figs. 14, 15

DIAGNOSIS OF FEMALE: Gnathopod 1 slender, simple, its articles 5 and 6 equal in length, the hind margin of article 6 with 4 slender setae, the hind margin of article 7 with 3 slender setae; gnathopod 2 small, slender, its article 5 nearly two thirds as long as article 6, with broad hind lobe, becoming subacute at apex, the palm oblique, straight, defined by 2 spines; articles of antennae simple, not produced; telson with 2 lateral spines on each side.

MALE: Unknown.

HOLOTYPE: AHF No. 586, female, 1.9 mm.

TYPE LOCALITY: Station 5711, Santa Monica Bay, 33-55-54 N, 118-31-16 W, 31 fms, April 18, 1958.

RELATIONSHIP: This species differs from *P. stelleri* (see Gurjanova 1951) by the more slender first gnathopod, the slimness of the posterior setae of article 6, and the unproduced articles of the antennae as well as the second gnathopods which are known for the male in *P. stelleri*. It differs from *P. cypris* (Holmes 1905: 484) by the slightly longer fifth article of gnathopod 2 which has a broad hind lobe, not a slender, apically rounded, slightly constricted lobe as seen in *P. cypris*.

The writer cannot clearly discern the line separating urosome segments 5 and 6. Despite the large number of specimens no male was found; all specimens have brood plates.

MATERIAL: 37 specimens from 24 stations.

ECOLOGY: This species has an overall density of 0.5 animals per square meter on the coastal shelf. It is restricted to depths between 31 and 100 fathoms.

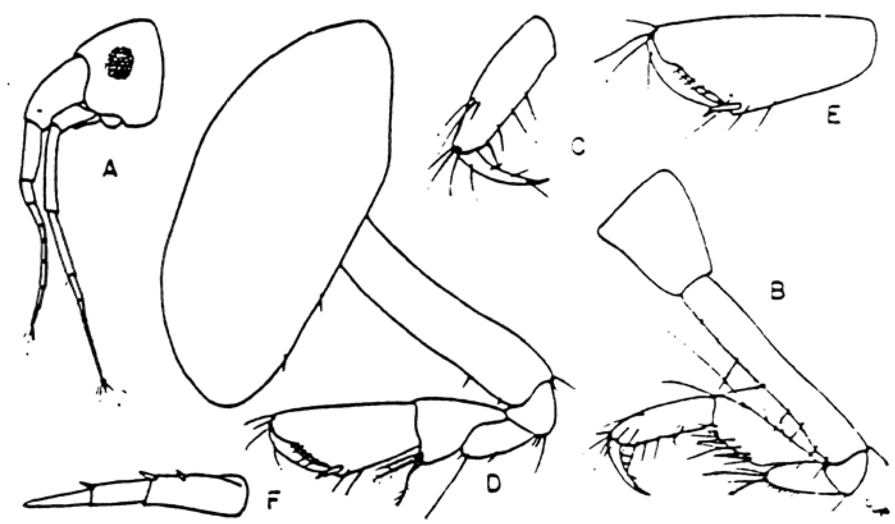

Fig. 15. ***Parametopella ninis*, n. sp. Female,** 2.3 mm, sta. 5163: A, head; B,C, gnathopod 1; D,E, gnathopod 2; F, uropod 3.

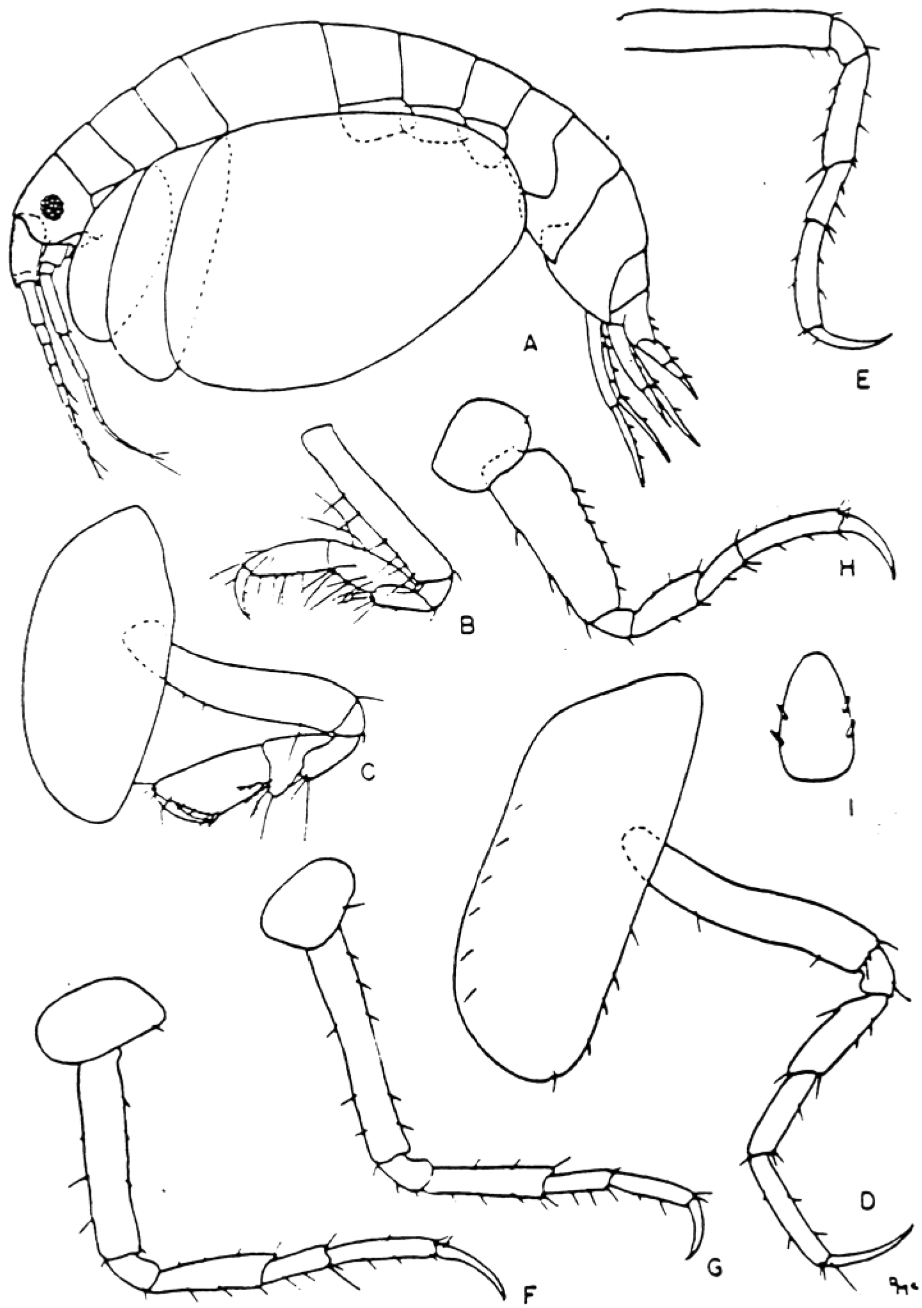

Fig. 14. *Parametopella ninis*. n. sp. Female, holotype, 1.9 mm, sta. 5711: A, lateral view; B,C, gnathopods 1, 2; D,E,F,G,H, peraeopods 1, 2, 3, 4, 5; I, telson.

Genus Proboloides Della Valle

Proboloides runda, new species

Fig. 16

DIAGNOSIS: Eyes absent; antennae quite long; article 2 of first antenna 1.6 times as long as article 1; accessory flagellum absent; first gnathopod with article 6 three fourths as long as article 5, bearing a distinct palm which is defined by a group of 5 stout dispersed spines, its article 4 not strongly produced; gnathopod 2 with medial side of article 3 sharply produced forward, its article 4 with a sharp distally produced tooth, its article 6 of intermediate slenderness, its palm quite distinct, oblique, shorter than hind margin of article 6, with a flat-bottomed excavation for half its length, the entire length sculptured into bead-like processes, defined by a slight process bearing 2 spines; fourth articles of peraeopods 3-5 narrow, scarcely produced; telson with 3 lateral spines on each side.

Palp of mandible triarticulate, palp of maxilla 1 biarticulate.

HOLOTYPE: AHF No. 5910, male, 5 mm; no brood plates, no penial projections.

TYPE LOCALITY: Station 6809, off Santa Cruz Island, 33-54-39 N, 119-46-24 W, 302 fathoms, December 22, 1959, bottom of shale, mud, sand.

MATERIAL: Station 6809, (3 specimens; the two besides the holotype are in fragments).

RELATIONSHIP: Most species of *Proboloides* are distributed in the southern Hemisphere and most of them belong to the subgenus *Metopoides* which has a small accessory flagellum. In the northern Hemisphere apparently the only other species to have the narrow, unproduced fourth article of peraeopod 3 is *P. grandimanus* (Bonnier 1896, Bay of Biscay, 950 m) another deep water species like the present one. Bonnier has drawn that species with an eye on one drawing and none on the other, and mentions small round eyes in his description, but one wonders whether this might be part of the brain which resembles an eye on the present specimens. The second gnathopods of the new species differ considerably from those of *P. grandimanus*, and the latter is aberrant for its large first coxa and small second one.

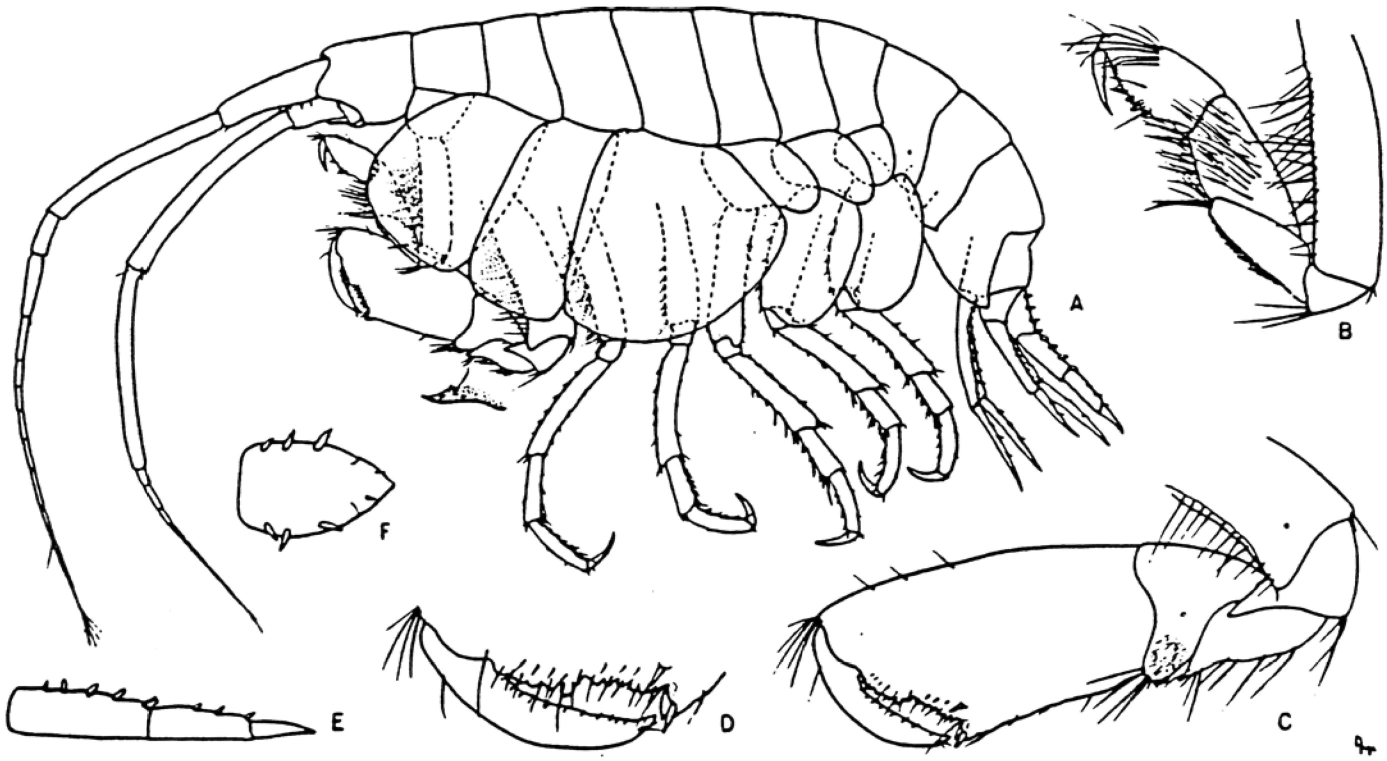

Fig. 16. *Proboloides tunda*, n. sp. ?Male, holotype, 5.0 mm, sta. 68 09: A, lateral view; B,C,D, gnathopods 1, 2, 2; E, uropod 3; F, telson.

Proboloides tunda J. L. Barnard

(Fig. 44)

Proboloides tunda J. L. Barnard 1962c: 147-149, fig. 16.

Canyon material: 7041 (2), 7290 (3).

Remarks: The second gnathopod illustrated here is more fully developed than that shown by Barnard (1962b).

Figure 44

Proboloides tunda J. L. Barnard. Male, 3.5 mm, sta. 7290: gnathopod 2 and enlargement of palm.

Stenothoe estacola, new species

Fig. 17

Diagnosis of male: Gnathopod 1 with article 4 scarcely projecting behind, with article 6 almost twice as long as article 5, the palm quite oblique but well defined by 3 spines; gnathopod 2 rather small, stout, its article 6 not elongated, the palm oblique but well defined by a large shallow bump and with 3 small blunt cusps; telson with 3 lateral spines on each side; back not carinate; peduncle of uropod 3 shorter than ramus, the second article of ramus straight, armed with rows of minute serrations; fourth articles of peraeopods 3-5 of intermediate expansion.

Female: Gnathopod 1 like that of male; gnathopod 2 smaller and more slender than in male, the palm lacking ornamentation, longer than hind margin of article 6 but well defined by several spines.

Holotype: AHF No. 556, male, 3.0 mm.

Type locality: Barnard sta. 6, Corona del Mar, California, February 6, 1955, intertidal wash of crustaceans from reef-like beds built by the polychaete worm, *Phragmatopoma* sp.

Material: Barnard stas. 4 (29), 6 (22), 23 (1).

Relationship: This species differs from *Stenothoe monoculoides* (Montagu) (see Sars 1895: pl. 82, fig. 1, and Chevreux and Fage 1925: fig. 132) by the stouter male second gnathopod, its palm being armed with short cusps and by the multispinose telson; the female differs by its longer palm of gnathopod 2; from *S. brevicornis* Sars (1895: pl. 82, fig. 2) it differs by the shorter peduncle of uropod 3 and the less produced fourth article of gnathopod 1. From *S. barrowensis* Shoemaker (1955) it differs by the relatively elongated sixth article of gnathopod 1 and the stouter second gnathopod with larger and fewer palmar cusps. From *S. adhaerans* Stebbing (1888: pl. 39) it differs by the defining spines on the palm of female gnathopod 2 and the much shorter peduncle of uropod 3.

Ecology: An intertidal species recovered from Corona del Mar and Pt. Fermin in formalin washings of 3 kinds of materials, sponge (*Sphecio-spongia* sp.), beds of arenaceous encrusting polychaete, *Phragmatopoma* sp., and in calcareous algae.

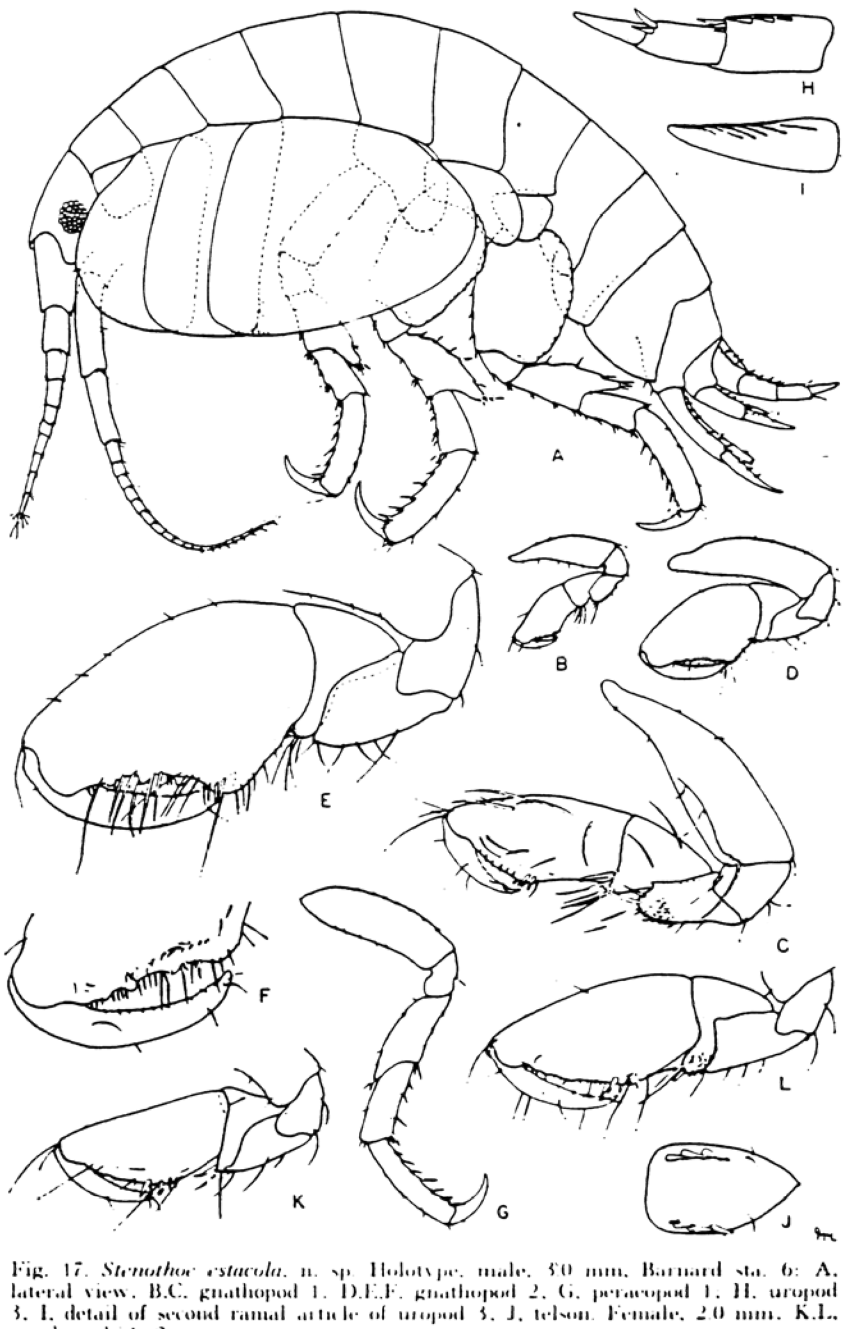

Fig. 17. *Stenothoe estacola*, n. sp. Holotype, male, 3.0 mm, Barnard sta. 6: A, lateral view. B,C, gnathopod 1. D,E,F, gnathopod 2. G, peraeopod 1. H, uropod 3. I, detail of second ramal article of uropod 3. J, telson. Female, 2.0 mm. K,L, gnathopods 1, 2.

Stenothoe ?estacola J. L. Barnard

FIGURE 61

?*Stenothoe estacola* J. L. Barnard, 1962c, p. 149, fig. 17.

No adults as fully developed as the male shown by Barnard (1962c) have been collected in the present survey. The original material was obtained at Pt. Fermin and Corona del Mar in mass washes of sponges, phragmatopomids, and corallines. Presumably the specimens assigned herein belong with that species, subadult males having gnathopod 2 in a youthful stage, showing minutely a single middle palmar hump, two of which occur in the adult originally described. All of the subadult specimens have antenna 1 very slightly longer than antenna 2 (by the length of 2 flagellar articles), and all members of the type series (reexamined), except the figured holotype, correspond. None of the present specimens, subadult females and males, has the pectinal rows on article 2 of the third uropodal ramus but faint indications of their presence are seen. Gnathopods of both sexes differ in their medial and lateral aspects rather strongly and several views contrasted to those drawn by Barnard (1962c) are included herein. The second maxilla has the inner and outer plates attached in tandem; the outer plate of maxilla 1 has only 6 spines, the size and arrangement of which seem unusual but which are duplicated in other species of stenothoids; the outer plate of the maxilliped is obsolete, the slight projection that is present being hidden by a spine, the inner plates being strongly fused at their bases but separated for about half their theoretical lengths.

MATERIAL.—GOLETA: *Phyllospadix*-pelvetiid grid, scarce (10 per sq. m.). PT. DUME: short brown algae, abundant (176 per sq. m.); coralline algae, abundant (330 per sq. m.); green-brown algae, rare; *Egregia*, rare. PT. FERMIN: Barnard station 23, October 21, 1949, abundant in calcareous algae. CORONA DEL MAR: *Phyllospadix*-coralline grid, rare (4 per sq. m.); calcareous worm tubes, rare; tunicate colonies at base of *Phyllospadix* leaves, rare; tunicates and polychaete tubes, rare. LA JOLLA: sample 45-K-1 (1). CATALINA ISLAND: "Velero" station 1370, shore, 4 specimens.

DISTRIBUTION.—Goleta to La Jolla, California, intertidal.

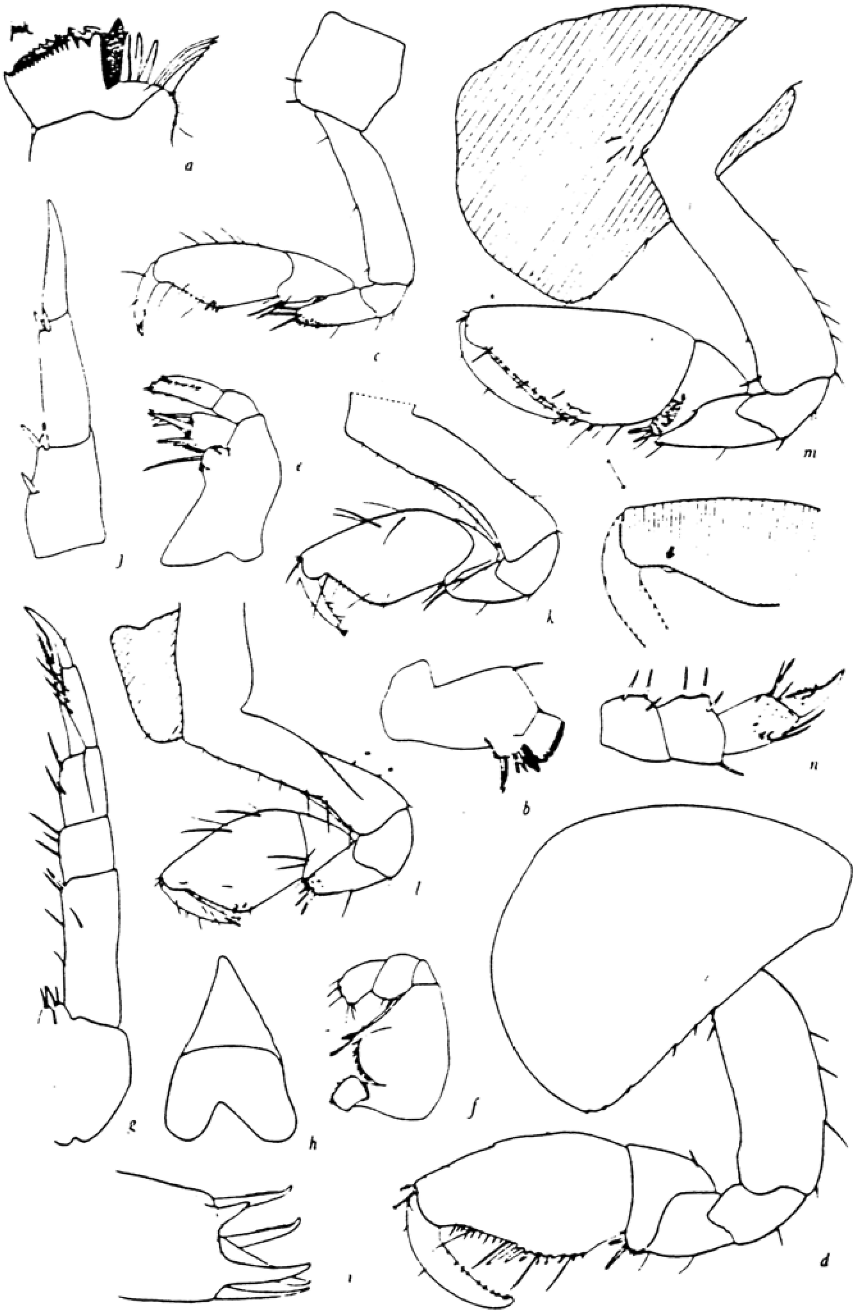

FIGURE 61.—*Stenothoe estacola* J. L. Barnard, male, 2.5 mm., station 46–G–10: *a,b*, mandible; *c,d*, gnathopods 1, 2; *e,f*, maxillae 1, 2; *g*, maxilliped, palp terminally unflattened; *h*, upper lip; *i*, outer lobe of maxilla 1. Female, 2.4 mm., station 47–B–3: *j*, uropod 3; *k,l*, gnathopod 1, lateral and medial views; *m*, gnathopod 2; *n*, maxillipedal palp, flattened.

Stenothoe frecanda, new species

Fig. 18

DIAGNOSIS: Article 4 of gnathopod 1 strongly projecting distally and behind: gnathopod 2 with palm and hind margin contiguous, bearing near finger hinge a small tent-shaped process with 2 small ones distal to it (these less well developed in female), the palm lined with short setae, not denticulate, with article 7 as long as article 6, stout, lined on inner edge with short setae; telson with 3 lateral spines on each side; back not carinate; second article of ramus on uropod 3 straight, not geniculate, the peduncle slightly longer than ramus; fourth articles of peraeopods 3-5 of intermediate expansion.

HOLOTYPE: AHF No. 587, male, 3.6 mm.

TYPE LOCALITY: Station 5632, off San Mateo Pt., 33-22-50 N. 117-39-00 W, 36 fms, February 22, 1958.

MATERIAL: 23 specimens from 6 stations.

ECOLOGY: This species has an overall density of 0.3 animals per square meter on the coastal shelf, but is confined to depths of 35-50 fathoms where its frequency is 0.8 animals per square meter.

RELATIONSHIP: This species is related to *Stenothoe valida* Dana (see J. L. Barnard 1953) but differs by the distal palmar teeth of gnathopod 2 projecting perpendicularly to the palmar axis rather than obliquely from it. It differs from *S. marina* (Bate) (see Sars 1895: pl. 80) by the terminally stout finger of the gnathopods and by the greater similarity between male and female second gnathopods, as well as the non-denticulate condition of the palms.

Distribution: Monterey Bay to southern California shelf, 64–92 m.

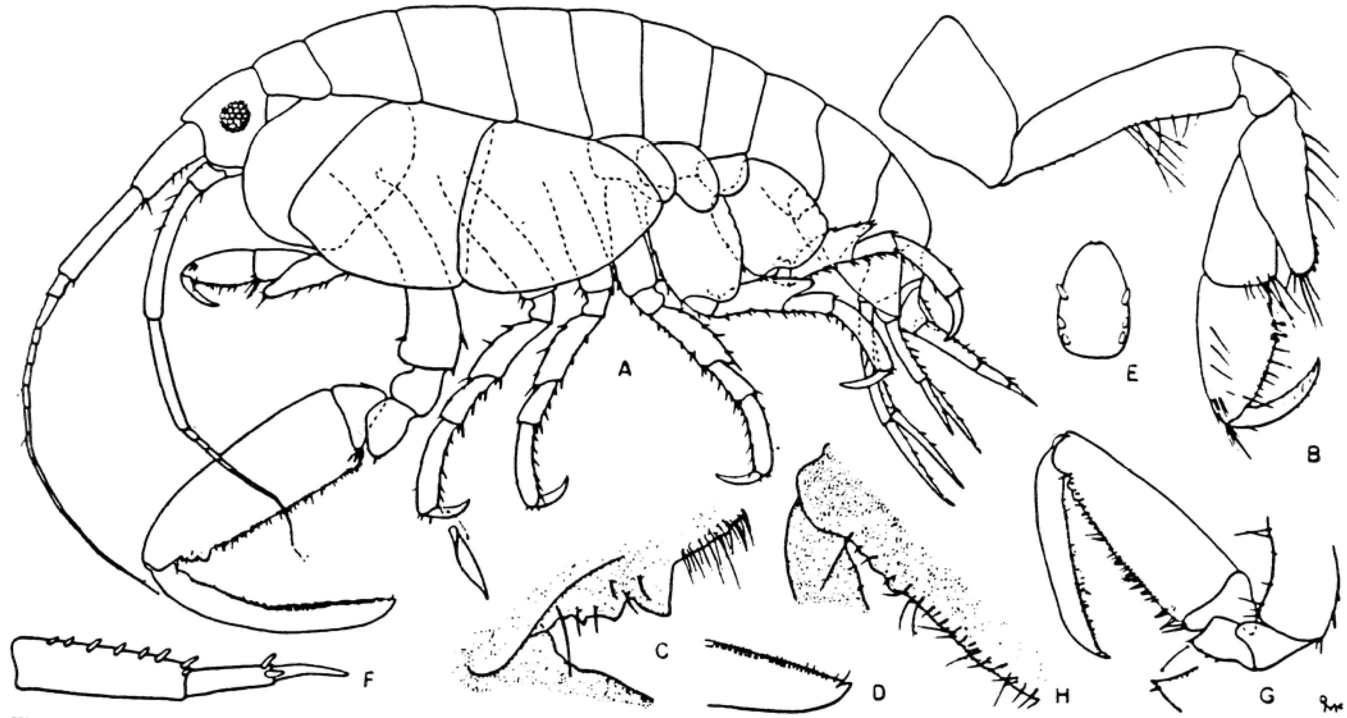

Fig. 18. *Stenothoe frecanda*, n. sp. Male, 4.0 mm, sta. 6001: A, lateral view; B, gnathopod 1; C, palmar teeth of gnathopod 2. D, apex of article 7 of gnathopod 2; E, telson; F, uropod 3. Female, 4.0 mm, sta. 4935: G, gnathopod 2. H, palmar teeth of gnathopod 2.

Stenothoe valida Dana
(Plate 15)

Stenothoe validus Dana (1852), Amer. Jour. Sci., ser. 2, vol. 14, p. 311; Dana (1853), U.S. Expl. Exped., vol. 14 II, pp. 924-925, pl. 63, figs. 1a-o; Bate (1862), Catalogue Amphipodous Crustacea, Brit. Mus., pp. 60-61, pl. 9, fig. 6.

Probolium polyprion Costa (1853), Rend. Real. Acad. Sci. Soc. Reale Borbonica, n.s., vol. 2, p. 173; Costa (1857), Amfip. Napoli, p. 199, pl. 2, fig. 3 (not seen).

Probolium megacheles Heller (1866), Denk. Akad. Wiss. Wien, vol. 26, pp. 13-14, pl. 2, figs. 1-2.

Montagua Miersii Haswell (1880), Proc. Linn. Soc. N.S.W., vol. 4, p. 323, pl. 24, fig. 4; Haswell (1882), Catalogue Austral........ Crustacea. Austral. Mus., p. 226.

Montagua longicornis Haswell (1880), Proc. Linn. Soc. N.S.W., vol. 4, pp. 323-324, pl. 24, fig. 5; Haswell (1882), Catalogue Austral..... Crustacea. Austral. Mus., p. 226.

Probolium miersii, Chilton (1885), Proc. Linn. Soc. N.S.W., vol. 9, pt. 4, p. 1043.

Stenothoe adhaerans, Chilton (1891), Trans. N.Z. Inst., vol. 24, pp. 259-260 (not Stebbing, 1888, Rep. Sci. Res. HMS Challenger, vol. 29, p. 199).

Stenothoe ornata K. H. Barnard (1930) was distinguished by the denticulate ornamentation of coxae 3 and 4. Specimens at hand show a series of submarginal coxal ridges running at right angles to the margins plus minute, submarginal setules. These ridges compare favorably with those figured by Barnard for *Proboloides perlatus* (to which he makes reference, fig. 15). Barnard also refers to *S. ornata* as a possible synonym of *Stenothoe miersii* (Haswell) which Chilton (1923) considered a synonym of *S. valida*.

Chilton (1923) pointed out that Kunkel's (1910) female of *Stenothoe marina* (Bate) showed gnathopod 2 identical to some of his specimens of *S. valida* and this is true of the material at hand.

Kunkel's *Stenothoe valida* is considered dubious by the writer and should be reexamined for other affinities because of the shape of the second article of the ramus of uropod 3 and the teeth on the palm of gnathopod 2.

Stenothoe aucklandicus Stephensen (1927, Vid. Medd. Dansk Nat. Foren., vol. 83, p. 311) was based on female specimens but differs from females of material at hand by the shorter palm of gnathopod 2, plus defining spines; the cusp is situated at the middle of the palm rather than near the finger hinge. The writer considers *S. aucklandicus* to be a valid species.

As Chilton (1923) suggested, *S. dollfusi* Chevreux (1891, Bull. Soc. Zool. France, vol. 16, pp. 260-262, figs. 6-10) may be a form of *S. valida* although intergradations of the teeth of the male gnathopod 2 have not been described. The palm of the female gnathopod 2 is rather strongly excavated just proximal to the finger hinge and the ramus of uropod 2 is longer than the peduncle (see Chevreux and Fage, 1925, Faune de France, vol. 9, p. 135.)

Stenothoe valida as noted by Schellenberg (1938) appears to be *S. cattai* Stebbing (1906). This fact was ascertained when the writer examined more than twenty lots of *Stenothoe* from the Hawaiian Islands (lent through the courtesy of Dr. C. H. Edmondson, Bernice P. Bishop Museum) and found all of them to be *S. cattai*, a closely related species.

The males of the two species may be distinguished in the following ways: (1) the geniculate and ridged second article of the third uropodal ramus in *S. cattai*: in *S. valida* this article is straight and styliform; (2) the shape of the teeth on the palms of the second gnathopod differs slightly; (3) the third coxa of *S. valida* is very broad, while in *S. cattai* it is narrow, the sides being nearly parallel.

The female of *S. cattai* differs from the male by the straight, stylus-like second article of uropod 3, similar to both males and females of *S. valida*, a factor which may have led to confusion between the two species.

The females of *S. cattai* and *S. valida* may be distinguished by the following characters: (1) presence of a small, distal palmar tooth on gnathopod 2 of *S. valida*; (2) the lack of palmar defining spines on gnathopod 2 of *S. valida*; (3) the broader coxa 3 of *S. valida*. The latter character difference is not so pronounced in the females of the two species as in the males, the third coxal plate in the female of *S. valida* being intermediate in size between the male of *S. valida* and both sexes of *S. cattai*.

Stenothoe valida, Della Valle (1893), Fauna Flora Golfes Neapel, vol. 20, pp. 566-568, pl. 58, figs. 74-78 (in part); Stebbing (1906), Das Tierreich, vol. 21, p. 194; Chevreux (1913), Bull. Inst. Oceanog., Monaco, no. 262, pp. 2-3; Chilton (1923), Rec. Austral. Mus., vol. 14, no. 2, pp. 95-100, fig. 5; Chevreux and Fage (1925), Faune de France, vol. 9, pp. 137-138, fig. 137 Hale (1927), Trans. Roy. Soc. So. Austral., vol. 51, p. 314, fig. 3; Schellenberg (1928), Trans. Zool. Soc. London, vol. 22, pt. 35, p. 641.

Stenothoë valida, Graeffe (1902), Arb. Zool. Inst. Univ. Wien, vol. 13, p. 22.

Stenothoe miersii, Stebbing (1906), Das Tierreich, vol. 21, p. 200; Stebbing (1910), Austral. Mus., Mem. 4, vol. 2, pt. 12, p. 637.

Stenothoe assimilis Chevreux (1908), Bull. Inst. Oceanog., no. 113, pp. 4-8, figs. 4-6; Barnard (1925), Ann. So. African Mus., vol. 20, pt. 5, pp. 345-346.

Stenothoë assimilis, Walker (1910), Proc. U.S. Nat. Mus., vol. 38, no. 1767, pp. 621-622, fig. 1.

Stenothoë validus, Walker (1910), Ann. Mag. Nat. Hist., ser. 8, vol. 6, pp. 31-32.

Stenothoe ornata Barnard (1930), Brit.-Antarctic Exped. 1910, Nat. Hist. Repts., Zool., vol. 8, p. 341, fig. 16.

Stenothoe valida, Chevreux (1935), Res. Camp. Sci. Monaco, fasc. 90, p. 81.

Not *Stenothoe valida*, Kunkel (1910), Trans. Conn. Acad. Arts Sci., vol. 16, pp. 16-19, fig. 5.

Not *Stenothoe valida*, Schellenberg (1938), Kungl. Svensk. Vetensapakad. Handl., ser. 3, vol. 16, no. 6, p. 21 (=*S. cattai* Stebbing).

Material examined. — Los Angeles-Long Beach Harbor, 28 lots on the hydroid *Tubularia crocea* (Agassiz), collected between April, 1950 and September, 1951.

Remarks. — The large synonymy of this species has been due in part to the statement by Dana (1853) that the second article of the third peraeopod was as broad as those of peraeopods 4 and 5, thus leading Chevreux (1908) to describe *Stenothoe assimilis*. Walker (1910) and Chevreux (1913) pointed out the error made by Dana, the second article of peraeopod 3 being very slender.

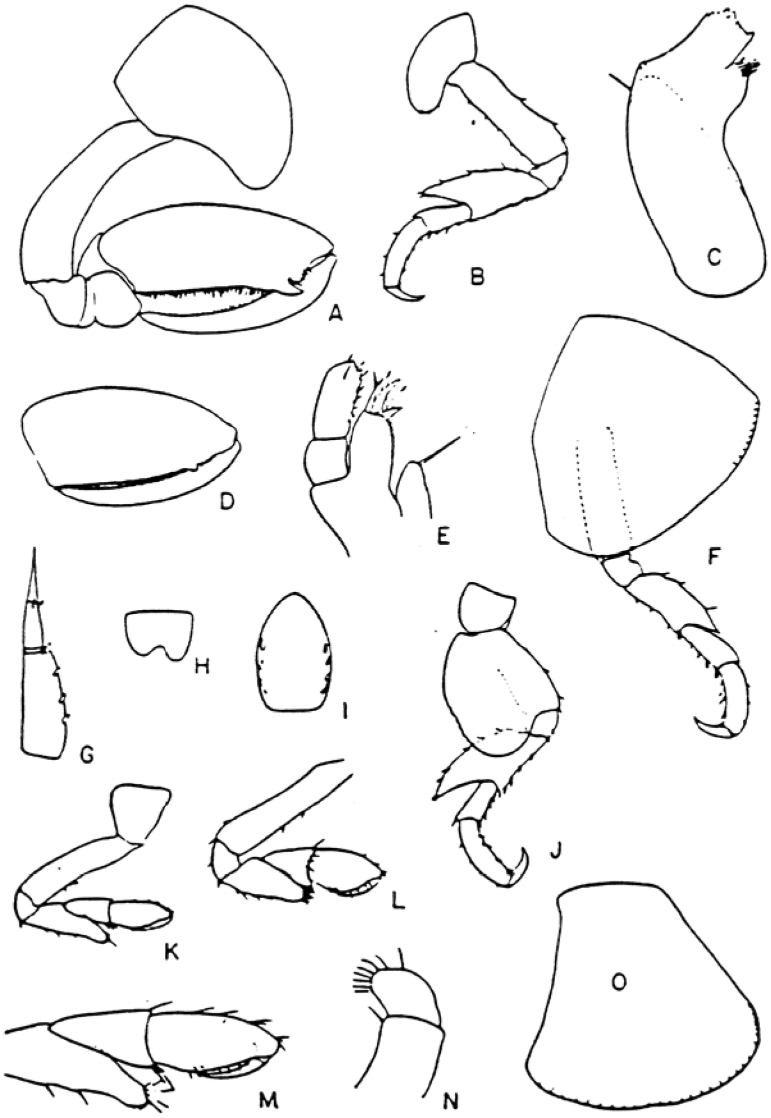

PLATE 15

Stenothoe valida Dana

Male, 6 mm. Fig. a, gnathopod 2; b, peræopod 3; c, mandible; e, maxilla 1; f, peræopod 2; g, uropod 3; h, upper lip; i, telson; j, peræopod 5; k, gnathopod 1; m, end of gnathopod 1, enlarged; n, maxilla 2; o, coxa 3.

Female, 4 mm. Fig. d, end of gnathopod 2, enlarged; l, gnathopod 1.

Stenothoides Chevreux, new synonymy

Stenothoides Chevreux 1900: 55.
Mesostenothoides Gurjanova 1938: 280.

DIAGNOSIS: Article 2 of peraeopods 3-4 slender; article 2 of peraeopod 5 broad; palp of mandible uniarticulate or absent; palp of maxilla 1 uniarticulate.

TYPE SPECIES: *Stenothoides perrieri* Chevreux (1900).

LIST OF SPECIES:

Stenothoides (?) *bicoma*, n. sp.
Stenothoides perrieri Chevreux
Mesostenothoides pirloti Gurjanova
Mesostenothoides slastnikovi Gurjanova
Mesostenothoides smirnovi Gurjanova
Mesostenothoides uenoi Gurjanova

Stenothoides (?) bicoma, new species

Fig. 8

DIAGNOSIS OF MALE: Last two urosomal segments fused but pleon not otherwise aberrant as in some species assigned to Thaumatelsonidae (see previous discussion); telson bearing three lateral spines on each side; gnathopod 1 with article 5 longer than article 6, its article 7 simple, not setose, its article 4 scarcely produced; palm of gnathopod 2 oblique, bearing a large multitoothed process near finger hinge and a large, acute defining process, with the excavation between them being quadrate; antennae subequal in length; mandible lacking palp; palp of maxilla 1 uniarticulate.

FEMALE: Palm of gnathopod 2 slightly oblique, defined by a distinct tooth at hind corner and bearing along the palmar margin well-developed teeth, one of which is larger than the others.

HOLOTYPE: AHF No. 5616, male, 3.0 mm.

TYPE LOCALITY: Station 4785, near Pt. Conception, 34-27-00 N, 120-08-30 W, 30 fms, December 18, 1956, bottom of green silt.

MATERIAL: 90 specimens from 29 stations.

RELATIONSHIP: This species is distinguished among members of the genus *Stenothoides* by the elongated fifth article of the first gnathopod, but is otherwise particularly related to *S. slastnikovi* Gurjanova (see 1951) by the male second gnathopod.

ECOLOGY: This species has an overall density of 2.2 animals per square meter on the coastal shelf. It is distributed principally between the depths of 21 and 40 fms, but is found as shallow as 6 fathoms and as deep as 60 fathoms.

Stenothoides bicoma J. L. Barnard

Stenothoides (?) *bicoma* J. L. Barnard 1962c: 135-137, fig. 8.
Canyon material: 4852(1), 6805(1).

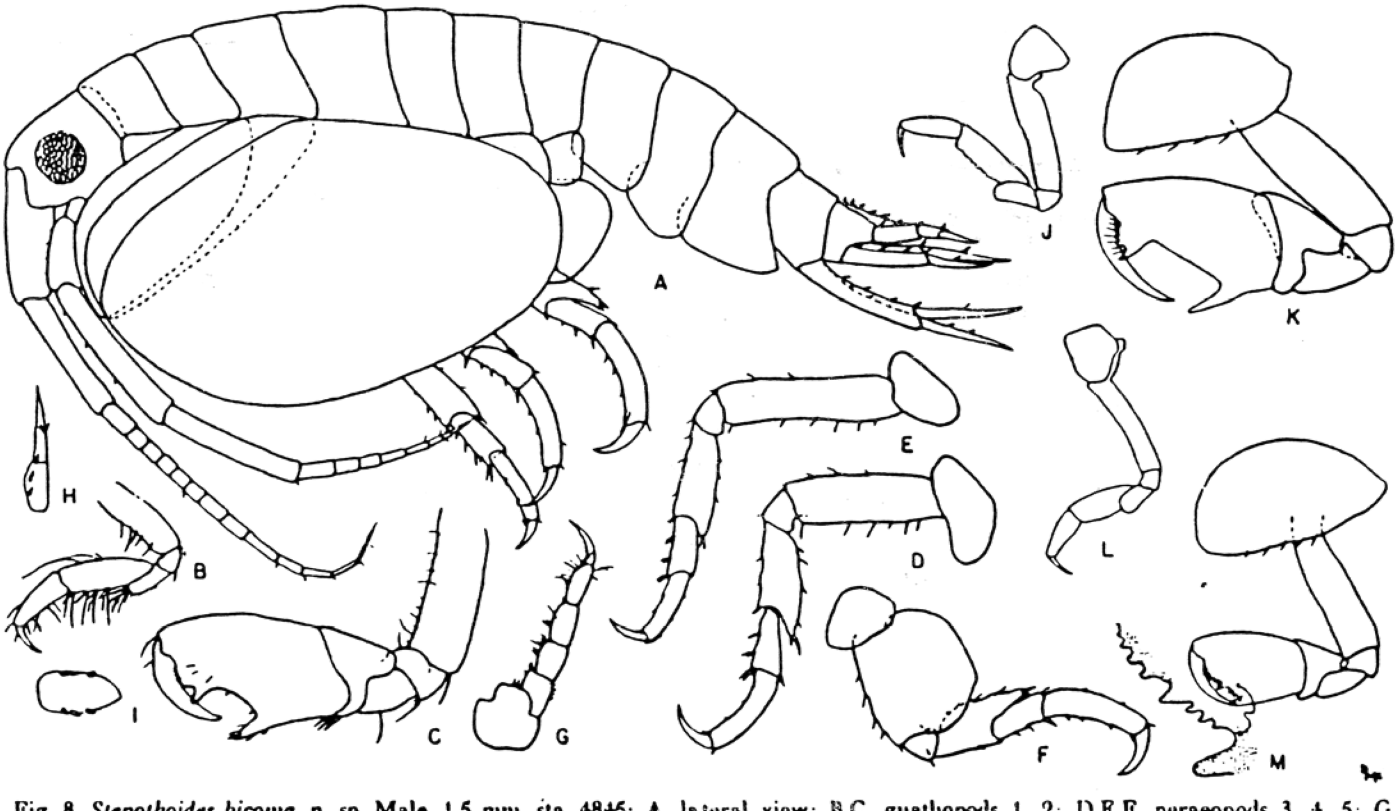

Fig. 8. *Stenothoides bicoma*, n. sp. Male, 1.5 mm, sta. 4845: A, lateral view; B,C, gnathopods 1, 2; D,E,F, peraeopods 3, 4, 5; G, maxilliped; H, uropod 3; I, telson. Male, 4 mm, sta. 5202: J,K, gnathopods 1, 2, minus setae. Female, 3.5 mm, sta. 5202: L,M, gnathopods 1, 2, minus setae.

Southern California Association of Marine Invertebrate Taxonomists

3720 Stephen White Drive
San Pedro, California 90731

November, 1991 Vol. 10, No. 7

NEXT MEETING: Sponges

GUEST SPEAKER: Karen Green
Private Consultant

DATE: December 9, 1991
Note this is the second Monday of the month.

LOCATION: Cabrillo Marine Museum
San Pedro, California

MINUTES FROM MEETING ON NOVEMBER 18:

Ron Velarde announced the addition of a new symposia to the Water Environment Federation's annual conference in New Orleans, Louisiana on September 20-24, 1992. It will be entitled "Surface Water Quality and Ecology." A copy of the announcement and a abstract submittal form have been included in the newsletter.

Sea Pen Meeting: Dr. Hochberg of the Santa Barbara Museum of Natural History lead the meeting on sea pens. He reviewed the terminology used for their morphology and gave brief descriptions of some of the species encountered off the coast of southern California. The following is a synopsis of what was discussed during the meeting.

The typical sea pen is divided into two distinct regions. The subsurface **peduncle** with a **terminal bulb** (a swelling used to anchor the animal in the sediment) and the portion above the surface of the sediment called the **rachis**. The latter part includes all the

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reproductive and feeding structures.

A number of different types of zooids are found on the rachis. The primary zooid is called the **ozooid.** It is the zooid from which the entire animal is derived. It is a single, non-feeding polyp located on the distal tip of the animal.

The feeding polyps, **autozooids,** can originate from the rachis directly or emerge from fleshy limbs called **leaves** (pinna). Their arrangement and number is diagnostic. The autozooids are composed of feeding tentacles or **anthocodium.** The base is called the **calyx.** which can contain spicules.

Two other zooids are involved in maintaining turgor. The **siphonozooids** and **mesozooids** are both non-feeding and non-reproductive. Siphonozooids have well developed siphonoglyphs and usually lack tentacles. They function in maintaining water pressure. The larger mesozooids have poorly developed siphonoglyphs and function in the release of water pressure. They are typically arranged in rows on the rachis between leaves.

In stalked forms of the animal it is arranged so that the autozooids are lateral, whether attached directly to the rachis or on leaves. Dorsal and ventral are considered to be the barren sides. In flattened forms such as Renilla spp. the dorsal surface is considered to be the surface that is facing up and contains the autozooids.

An internal stiffening rod called the **axis** can be present. The cross-section of which can be taxonomically significant (e. g. round or square).

Spicules are typically smooth in appearance and can take a variety of shapes. There location within the animal is considered more diagnostic than their individual shape. All color in sea pens is derived from the color of the underlying spicules.

Dr. Hochberg has prepared a checklist of known west coast species of Pennatulacea. Bold type refers to species commonly encountered in Southern California. It has been include in the newsletter.

In his discussion, Dr. Hochberg gave a brief description of a select number of species.

Family Umbellulidae

Umbellula huxleyi - 4-7 terminal polyps; 10-20 cm. high.

U. lindahli - 10-11 terminal polyps; 60 cm. high.

Family Pennatulidae

Penatuala spp. - Small dark red leaves; triangular; 3-10 polyps per leaf; calyx with 8 teeth.

Ptilosarcus gurneyi - 50+ polyps; rachis fleshy; calyx with 2 teeth on the calyx; small siphonoglyphs.

P. undulatus - 50+ polyps; rachis fleshy; 1 tooth on the calyx; large siphonoglyphs.

Family Virgulariidae

Subfamily Virgulariinae

Acanthiptilum spp. - See Table 1.

Stylatula elongata - There are two different morphs. They are both characterized by having a separate calyx.

Morph 1 - 20-24 polyps per leaf; 10-15 leaves per inch.
Morph 2 - 40 polyps per leaf; 8 leaves per inch.

S. gracilis - Calyx fused at base; 13-18 polyps per leaf; 30 leaves per inch.

Virgualria bromleyi - 3-5 polyps per leaf.

V. galapensis - 25-35 polyps per leaf.

Subfamily Balticininae

Halipteris californica - 100 rows of leaves; 2-5 polyps per leaf; 2 teeth on calyx; with spicules.

Balticina willemoesi - 200+ rows of leaves; 8-15 polyps per leaf; no teeth on calyx; no spicules.

FUTURE MEETINGS:

The January meeting is on the **sixth**. Ron Velarde will be leading the meeting on Mysids. It will be held at the San Diego Museum of Natural History. As in the past it will be in the basement education room. Bring or send your problem specimens to:

Ron Velarde
4918 North Harbor Dr. #101
San Diego, CA 92106.

Note this is the **first** monday of the month.

The February 10, meeting will be on ophiuroids lead by Dr. Gordon Hendler of the Los Angeles Museum of Natural History. It will be at the museum in the Times Mirror Room. As always send or bring any problem ophiuroids to Dr. Hendler.

92-93 Schedule: Larry Lovell is looking for input for possible speakers and subjects for the next year. He would appreciate any input you might have. You can write him at:

Larry Lovell
1036 Buena Vista
Vista, CA 92083

CHRISTMAS PARTY DECEMBER 7:

Don't forget the Christmas party at the Cabrillo Marine Museum. It will be from 6 to 9 pm on December 7. Mark you calendars and bring the kids.

SCAMIT OFFICERS:

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

President	Ron Velarde	(619)226-0164
Vice-President	Larry Lovell	(619)945-1608
Secretary	Kelvin Barwick	(619)226-8175
Treasurer	Ann Martin	(213)648-5317

Table 1. Table of some taxonomic characters for selected species of the genus *Acanthoptilum*.

character	*album*	*annulatum*	*gracile*	*scalpellifolium*
pairs of leaves	≈75	≈170	?	?
Number of polyps per leaf	4-5	5-6	7-9 or >	7-9
siphonozooids	3/single rows	3-8/single or double rows	6-12	8 (white)
spicule color	none	pink	none	purple/pink
ratio of stalk/rachis	1/2	1/1	1/4	1/3

ORDER PENNATULACEA

Colonial octocorals unbranched, not firmly attached, consisting of a primary polyp (oozooid) that elongates to produce a barren, proximal stalk which anchors colony in soft substrate, and a polypiferous distal rachis from which secondary polyps arize, either directly or from ridgelike or broadly expanded polyp leaves. Gastric cavity of primary polyp divided into 2 primary and 2 secondary longitudinal canals by fleshy partitions at cent of which a more or less calcified horny axis usually is produced. Secondary polyps invariably of at least 2 kinds. Spicules smooth, 3-flanged rods or needles, rarely tuberculated; or small scales or plates. Axes of pennatulids formed of irregular, prismatic columns of calcareous material radiating outwrd from axis core, which seems to contain a higher proportion of organic matter.

SUBORDER SESSILIFLORAE

Sea pens with polyps standing separately and arising directly from rachis without being united near their bases by ridgelike or leaflike structures.

1. ANTHOPTILIDAE - Bilateral sea pens with polyps in transverse or somewhat diagonal rows on 2 sides of rachis. Sclerites absent except for minute oval bodies in interior of stalk. Axis round or quadrangular with rounded angles.

2. Chunellidae

3. Echinoptilidae

4. FUNICULINIDAE - Colonies elongated, slender; autozooids rather small, arranged laterally and ventrally on rachis, producing distinct calyces with 8 marginal teeth; siphonozooids infrequent. Spicules are prismatic needles. Axis quadrangular.

5. KOPHOBELEMNONIDAE - Sea pens with polyps bilaterally oriented on rachis but with some tendency toward radial symmetry; colonies clavate with axis.

6. PROTOPTILIDAE - Bilateral sea pens with autozoids longitudinally arranged in orne or more lateral rows. Spicules 3-flanged. Axis stout, rounded.

7. RENILLIDAE - Sea pens with slender stalk and oval or reniform foliate rachis bearing polyps on upper surface only. Axis absent. Spicules 3-flanged rods with may be more or less platelike.

8. SCLEROPTILIDAE - Rachis elongate, bearing autozooids closely arranged in indistinct whorls; dorsal track free of autozooids; siphonozooids scattered between autozooids.

9. STACHYPTILIDAE - Bilateral colonies with autozooids arranged laterally in transverse rows but not in longitudinal rows. Autozooids and siphonozooids with well developed, scalelike calyces. Spicules 3-flanged needles.

10. UMBELLULIDAE - Rachis is slender, elongate, bearing at its apex an umbelliform tuft of large autozooids; siphonzooids situated among autozooids and in groups or rows on barren parts of rachis. Spicules 3-flanged needles in polyp walls, rachis and stalk rind, and small oval bodies in deep layers of stalk. Axis round or quadrangular.

11. VERETILLIDAE - Stout, commonly clavate colonies without trace of bilaterality; polyps fully retractile, no calyces. Spicules of various types, none 3-flanged.

SUBORDER SUBSELLIFLORAE

Polyps united by their bases, situated in rows on lateral swellings or foliate polyp leaves.

1. PENNATULIDAE - Bilateral sea pens with well developed polyp leaves bearing one or more marginal rows of autozooids. which have calyces with marginal teeth formed by spicules; siphonozooids on rachis, not on leaves. Spicules minute oval bodies, plates, rods and prismatic needles.

2. Pteroeididae

3. VIRGULARIIDAE - Bilateral, with slender rachis; autozooids situated in transverse rows and united together by their bases, rachis beneath them raised into lateral swellings or small leaves. Spicules prismatic needles, small biscuit-shaped plates or entirely absent. Axis stout.

(from Bayer, 1956)

CHECKLIST OF WEST COAST SEA PENS

ORDER PENNATULACEA

Suborder Sessiliflorae

Family Anthoptilidae

Anthoptilum grandiflorum (Verrill, 1879)
[In Nutting = A. murrayi Kolliker, 1880]

Family Funiculinidae

Funiculina parkeri Kukenthal, 1913
[In Nutting = F. armata Verrill, 1879]

Family Kophobelemnonidae

Kophobelemnon affine Studer, 1894

K. biflorum Pasternak, 1960

K. hispidum Nutting, 1912

Family Protoptilidae

Distichoptilum gracile Verrill, 1882
[In Nutting = D. verrillii Studer, 1894]

Helicoptilum rigidum Nutting, 1912

Family Renillidae

Renilla amethystina Verrill, 1864

R. inermis Pfeffer, 1886

R. kollikeri Pfeffer, 1886

R. k. var. tigrina Deichmann, 1941

R. mulleri Kolliker, 1872

Family Stachyptilidae

Stachyptilum quadridentatum Nutting, 1909

S. superbum Studer, 1894

Family Scleroptilidae

Scleroptilum grandiflorum Kolliker, 1880

Scleroptilum sp.

Family Umbellulidae

Umbellula geniculata studer, 1894

U. huxleyi Kolliker, 1880

U. lindahli Kolliker, 1880

[In Nutting = U. loma Nutting, 1909]

[In Nutting = U. magniflora Kolliker, 1880]

Family Veretillidae

Cavernulina darwini Hickson, 1921
[= Veretillum binghami Deichmann, 1936

Suborder Subselliflorae

Family Pennatulidae

Pennatula distorta var. pacifica Studer, 1894

P. kollikeri Studer, 1894

P. phosphorea var. californica Kukenthal, 1913
[In Nutting = P. aculeata Danielsson, 1858]

Ptilosarcus gurneyi (Gray, 1860)
[= Leioptilus quadrangularis (Moroff, 1902)]
[= Pennatula tenua Gabb, 1862]

P. undulatus (Verrill, 1865)
[= Lioptilum Verrillii Pfeffer, 1886]
[In Kukenthal = L. sinuosum Kolliker, 1872]

Family Virgulariidae
Subfamily Virgulariinae

Acanthoptilum album Nutting, 1909

A. annulatum Nutting, 1909

A. gracile (Gabb, 1864)
[= Virgularia gracilis Gabb, 1864 - March]

A. scalpellifolium Moroff, 1902

Stylatula columbiana Verrill, 1922

S. elongata (Gabb, 1862)
[= S. elongata Verrill, 1864]
[= S. Ringei Pfeffer, 1886]

S. gracilis Verrill, 1864 [January]

Virgularia bromleyi Kolliker, 1880
[= V. californica Pfeffer, 1886]
[= V. reinwardti Herklots, 1858]
[= Halisceptrum cystiferum Nutting, 1909]

V. galapagensis Hickson, 1930

V. agassizii Studer, 1894
[= Cladiscus]

Subfamily Balticininae

Halipteris californica (Moroff, 1902)
[= Balticina, Pavonaria]
[= H. contorta Nutting, 1909]
[= B. pacifica Nutting, 1909]

B. willemoesi Kolliker, 1870
[In Nutting = Balticina finmarchia (Sars, 1856)]
[In Nutting = B. septentrionalis (Gray, 1872)]
[= Pavonaria (Verrillia) blakei Stearns, 1873]
[= P. dofleini (Moroff, 1902)]

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CALL FOR ABSTRACTS

The Water Environment Federation (WEF) Program Committee has approved a new symposium entitled "Surface Water Quality and Ecology" for the 1992 Annual Conference in New Orleans, Louisiana, September 20-24, 1992. The chairman of the Symposium is Harvey Olem of Olem Associates.

Individuals are encouraged to submit abstracts to address this important and expanding focus of the Federation. Papers covering the following topics are especially encouraged:

* Urban & Agricultural Nonpoint Sources
* Stormwater Managment
* Nutrient Problems and Eutrophication
* River and Lake Management
* Water Quality Monitoring
* Water Quality Modeling
* Waste Disposal Effects on Estuaries and Coastal Areas
* Toxicity Testing
* Water Quality Impacts of Air Emissions
* Assessment of Sediments
* Ecological Risk Assessment
* Evaluation of Cumulative Impacts
* Regional Planning
* Criteria and Standards for Water Quality
* Freshwater & Marine Water Quality and Ecosystem Issues
    - -Biomonitoring
    - -Effects Assessment
    - -Management Strategies

The deadline for submission of abstracts is **January 15, 1992.** Authors will be notified of tentative selection of abstracts by May 1; final acceptance of papers is contingent on submission of a full manuscript of the selected abstract by July 15, 1992.

Submit abstracts to :

Water Environment Federation
Attn: Conference Program
601 Wythe Street
Alexandria, VA 22314-1994

For additional information and submittal forms, call Maureen Novotne, WEF Technical Services, at (703)684-2400 x7450 or Rhoda Miller, WEF Research Journal, at (703)684-2400 x7530.

WPCF Control No. ______

Water Pollution Control Federation

65th Annual Conference

New Orleans, Louisiana • September 20-24, 1992

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Title of paper: ______________________________

____

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Will this paper be presented elsewhere before September 1, 1992? ☐ Yes ☐ No

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submit 15 copies of the abstract;

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EDITORIAL

How Much is a Worm Worth?

The word "worm" elicits a negative response from most people. Worms are usually considered as creepy, crawly, slimy, and dirty creatures that should be avoided or stepped on. However, there are good worms, such as the common earthworm; pretty ones, such as the colorful Christmas tree worm of the tropical seas; and bad ones, such as tapeworms and blood-sucking leeches.

In fact, there are many different types of worms in the animal kingdom—round worms, flatworms, and segmented worms, as well as insect larvae (caterpillars) and others. The most important for our purposes are the segmented worms that live in the soil and in the sediments of fresh and marine waters.

It has been over 110 years since Charles Darwin called attention to the importance of earthworms to the terrestrial environment in his classic work, "The formation of vegetable mould through the action of worms." He emphasized that the mixing of the soil with organic matter and the mucus secretions from the digestive tract of the earthworm plays an important role in humus formation. In addition, the extensive burrowing habits of worms improve soil drainage and aeration.

Earlier in this century, Kolkwitz and Marsson in Germany developed the saprobic system of zones of organically polluted rivers. Similar studies were conducted by Forbes and Richardson on the Illinois River. These pioneers of the biological effects of aquatic pollution used the presence and absence of different species of plants and animals to indicate different degrees of pollution caused by the discharge of domestic wastewater into rivers.

From these studies evolved the concept of biological indicators of pollution. The presence of a particular species or group of species, especially bottom-dwelling ones, indicates the biological condition of the site. Gauafin and Tarzwell, among others who published in this *Journal*, refined the indicator concept for fresh water in the post-World-War-II period.

Worms play an important role in the indicator organism concept. The oligochaete, *Tubifex tubifex*, or sludge worm, along with a few associated species, flourishes immediately downstream from a domestic sewer discharge. So does the polychaete *Capitella capitata*, near an oceanic domestic sewer discharge. As with earthworms, these indicators of organic pollution burrow into the enriched sediment, ingest the material, mix it with their mucus secretions, and defecate onto the surface of the sediment.

Presumably the chemical nature of the sediments is changed as the material passes through the gut, but the nature of these changes has not been investigated. The burrowing activity by thousands of these worms per square meter allows the penetration of dissolved oxygen beneath the surface layer of sediments, facilitating the oxidative process in an otherwise dissolved-oxygen-poor environment. These worms have short life histories, which perpetuates the population in the environment.

Because of the harsh nature of the organically enriched sediments, these opportunistic worms are able to flourish in the absence of competing species. Whenever the characteristics of the discharge change, such as by improved waste treatment, these pollution-indicator species gradually disappear and are replaced by a more diverse assemblage of benthic species belonging to many different animal phyla.

The concept of indicator organisms, which was established nearly one hundred years ago, is just as valid today as it was then. A knowledge of what species are present at a particular site forms the basis of today's biological monitoring of streams, rivers, lakes, estuaries, and oceans. The ability to identify these organisms, a field not looked upon with favor in these days of molecular biology, is imperative. Steps must be taken to ensure a continual supply of personnel who are able to distinguish between, say, a worm and a clam.

The question posed at the outset remains: How much is a worm worth? To a fisherman a worm costs a few cents; to a supplier of worms for toxicity testing, a few cents to over a dollar; to a tropical aquarist, a Christmas tree worm costs $5.00 and up; but to the environment, the worm is priceless!

Donald J. Reish
Editor, Board of Editorial Review

Southern California Association of
Marine Invertebrate Taxonomists

3720 Stephen White Drive
San Pedro, California 90731

December, 1991 Vol. 10, No. 8

NEXT MEETING: Mysids

GUEST SPEAKER: Ron Velarde
City of San Diego

DATE: January 6, 1991
Note this is the first Monday of the month.

LOCATION: San Diego Natural History Museum
San Diego, California

JANUARY 6 MEETING: Remember to bring any problem Mysids with you to meeting. It will be held in the basement education room. Enter the building on the west side of the building.

MINUTES FROM MEETING ON DECEMBER 9:

Ron Velarde announced a couple of papers of interest to SCAMIT members.

Harrison, K. and J. P. Ellis. 1991. The Genera of the Sphaeromatidae (Crustacea:Isopoda): a Key and Distribution List. - Invertebrate Taxonomy. 5: 915-952.

Watling, L. 1991. Revision of the Cumacean Family Leuconidae. - Journal of Crustacean Biology. 11(4): 596-582.

Sponge Workshop: Karen Green, a private consultant, chaired the meeting on sea sponges. She presented a brief description of sponge morphology and the terminology used to identify them. She

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also included a key to the Demnospongia. These have been included in the newsletter. She said that a more complete workup will be published by her as part of the MMS/Santa Maria Taxomomic Atlas Project.

FUTURE MEETINGS:

The February 10, meeting will be on ophiuroids lead by Dr. Gordon Hendler of the Los Angeles Museum of Natural History. It will be at the museum in the Times Mirror Room. As always send or bring any problem ophiuroids to Dr. Hendler.

The meeting on March 9, 1992 will be chaired by Leslie Harris of the Allan Hancock Foundation. The subject will be abranchiate Terebellids. It will be held in room 20, the "worm lab," at the Allan Hancock Foundation building, University of Southern California, Los Angeles, California. Send any specimens to Leslie at the lab.

1992-93 Schedule: Larry Lovell is looking for input for possible speakers and subjects for the next year. He would **appreciate** any input you might have. You can write him at:

Larry Lovell
1036 Buena Vista
Vista, CA 92083

SCAMIT OFFICERS:

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

President	Ron Velarde	(619)226-0164
Vice-President	Larry Lovell	(619)945-1608
Secretary	Kelvin Barwick	(619)226-8175
Treasurer	Ann Martin	(213)648-5317

Marine Sponges

Karen D. Green, Consultant, Research Associate LACMNH

Sponges constitute the phylum Porifera, which includes nearly 5000 species classified among 4 classes (Bergquist, 1978). Two families occur in fresh water, but most sponges are marine. Sponges are distributed world-wide and occur from the intertidal to the deep sea. They exhibit a variety of shapes, textures, and morphologies. Sponges range in size from microscopic to 2 m; the largest occur in the Antarctic and the Caribbean (Bakus, 1985).

Sponges are unique animals. They lack organs, specialized cells perform body functions, and they derive nourishment by continually pumping water through their perforated bodies and canal system.

Many sponges, particularly tropical species, contain a variety of antibiotic substances, sterols, and toxins. Natural product research suggests that sponges have considerable medical, antifouling, and repellant potential.

Sponges are identified on the basis of several features of morphology including the composition and structure of their skeleton, measurements of skeletal elements (e.g., spicules, fibers), color, shape, and texture.

The taxonomic identity of sponges, however, is not always easily resolved. This is because many species are unidentified, taxonomic literature is limited for many geographic regions, and there is a long history of taxonomic problems associated with the group (refer to Bergquist, 1978).

Sponges presently are divided into four classes, as follows (from Hartman, 1975; Bergquist, 1978; Bakus, 1985):

Class **Calcarea** - skeleton of calcium carbonate spicules; spongin absent. Spicules monaxonid and/or 3- or 4-rayed. About 400 species. Common intertidal and subtidal marine habitats.

Class **Demospongia** - skeleton lacking or of silica spicules, spongin, or both. About 4000 species. Common all habitats.

Class **Hexactinellida** - skeleton consists of complex silica spicules, with basic pattern of 5-6 rays. About 600 species. Common in deep waters of continental shelf and slope.

Class **Sclerospongiae** - skeleton with calcareous base and entrapped silica spicules and organic fibers. About 15 species. Restricted to shallow, tropical reef habitats.

Three of the classes, Calcarea, Demospongiae, and Hexactinellida are represented in California. Demospongiae is the subject of the SCAMIT workshop. Features useful for their identification are summarized in the handout, and a general key that incorporates the features is presented.

Demospongiae

Notes for SCAMIT, by Karen Green, December, 1991

Body Regions:
- choanosome- area where choanocyte chambers found;
- endosome- inner portion of sponge;
- ectosome- superficial region of sponge;
  - cortex- relatively thick external cover;
  - dermis- skin-like external covering.

Types of Skeletons (after Bergquist, 1978):

<u>fiber</u>- of spongin fiber:

anastomosing- fibers form network with cross-connections (characteristic of the order Dictyoceratida);

dentritic- fibers branch without anastomoses (characteristic of order Dendroceratida);

reduced- fiber skeleton reduced (characteristic of order Verongida).

<u>mineral</u>- of spicules and spongin:

axial- often rigid with a condensed axis of spicules and spongin fibers from which diverges a softer, plumose or plumoreticulate extra-axial skeleton (characteristic of the order Axinellida);

desma- hard skeleton of interlocked desma spicules;

halichondrid- refers to lack of skeletal organization except at the surface (characteristic of the order Halichondrida);

hymedesmoid- spiny with spicules oriented vertically from spongin fiber mat (of the order Poecilosclerida);

plumose- spicules arranged in tracts or columns (of the order Poecilosclerida);

plumoreticulate- similar to plumose, except some cross-connections between spiculo-fiber tracts (of the order Poecilosclerida);

radial- often rigid with spicule tracts arranged in a radial pattern (characterizes the orders Choristida, Hadromerida, Spirophorida);

reticulate- skeleton with network of spicules attached by spongin or a network of fibers cored with spicules (of the orders Haplosclerida and Poecilosclerida);

unorganized- flexible sponge without organized skeleton (found in order Homosclerophorida);

<u>none</u>: only fibrillar collagen as support (found in order Homosclerophorida and Dendroceratida).

Spicules:

<u>General Terms</u>

- act, actine or -actinal: Suffix to indicate the number of rays of a spicule.

- axon: Suffix to indicate the number of axes (growth directions); rays grow from different axes.

acantho-: prefix that denotes that a spicule is rough (from spines or hooks).

centrotylote: refers to a knob-like swelling near the middle of a monactine or diactine spicule.

polytylote: refers to two or more knob-like swellings along the shaft of a monactine or diactine spicule.

<u>Megascleres</u>

monactinal monaxons:
style- one end rounded (not knob-like), one end pointed;
subtylostyle- one end rounded with slight knob, one end pointed;
tylostyle- one end rounded with enlarged knob, one end pointed.

diactinal monaxons:
oxea- both ends gradually pointed;
strongyle- both ends rounded;
tornotes- both ends abruptly pointed;
tylote- both ends with enlarged knobs;
cladotylote- recurved clads (= rays) at one or both ends.

tetraxons:

calthrops- rays of equal or near equal length;
lopho- prefix associated with triactin or tetractin to indicate that one or more rays branched or with heavy spines;
tetract- one ray shorter than other rays;
triact- tetract modified with loss of one ray;
triaenes- one ray long (rhabdome) and three rays short (clads);
anatriaene- clads are pointed in same direction as rhabdome;
dichotriaene- clads are forked;
diaene- triaene modified with one clad lost;
mesoprotriaene- like protriaene except with additional epirhabd;
monaene- triaene modified with loss of two clads;
orthotriaene- clads make an angle of about 90^0 with the rhabdome;
plagiotriaene- like protriaene except clads make an angle of about 45^0 with axis of rhabdome;
protriaene- clads point in opposite direction as rhabdome, make an angle of less than 45^0 with the axis of the rhabdome.

<u>Microscleres</u>

asters:

euasters- multiple rays from small central point;
oxyasters- ends of rays pointed;
strongylasters- ends of rays rounded;
tylasters- ends of rays knobed.
spheraster- multiple rays from a large central sphere;
oxy-, strongylo-, tylo- prefixes used as above for euasters;
sterraster- sphere covered with minute multiple rays;
streptaster- rays proceed from an axis rather than from the center;
amphiaster- short rods with aster-like branches or spines at both ends;
discaster- rod with heavy spines at both ends and near middle of spicule;
sanidaster- straight, spiny rod.
spiraster- curved, spiny rod.

chela:

anisochelas- ends of shaft unequal in size;

isochelas- ends of shaft equal in size;

anchorae- shaft slightly curved to straight, both ends with three or more teeth that are free from shaft for most of their length, teeth thin (not as wide as shaft);

arcuate- shaft curved, both ends with three teeth, central tooth not wider than shaft, lateral teeth attached to shaft for most of their length except at the tip;

bipocilli- curved shaft, ends with flattened cap of reduced teeth or ends clad-like;

birotulate (= unguiferate, brevidentate)- shaft curved, both ends with short multi-dentate cap;

palmate- shaft slighty curved or straight, ends with three palm-like teeth, central tooth broadly wider than shaft, lateral teeth attached to shaft for their entire length;

rosette- group of chela forming a ring-like pattern.

diactines:

acanthoxea- spines along shaft;

microstrongyles- both ends rounded, may be curved at both ends (= bicurvate);

onychaete- spiny, raphide-like spicule;

raphide- straight, hair-like oxea;

trichodragma- bundle of raphides.

diancistras: shaft nearly straight, ends strongly recurved and hook-like.

forceps: u-shaped, ends may be straight, curve inward, or curve outward.

sigmas: c- or s-shaped.

toxas: bow-shaped.

Figure 1. Demospongiae macroscleres

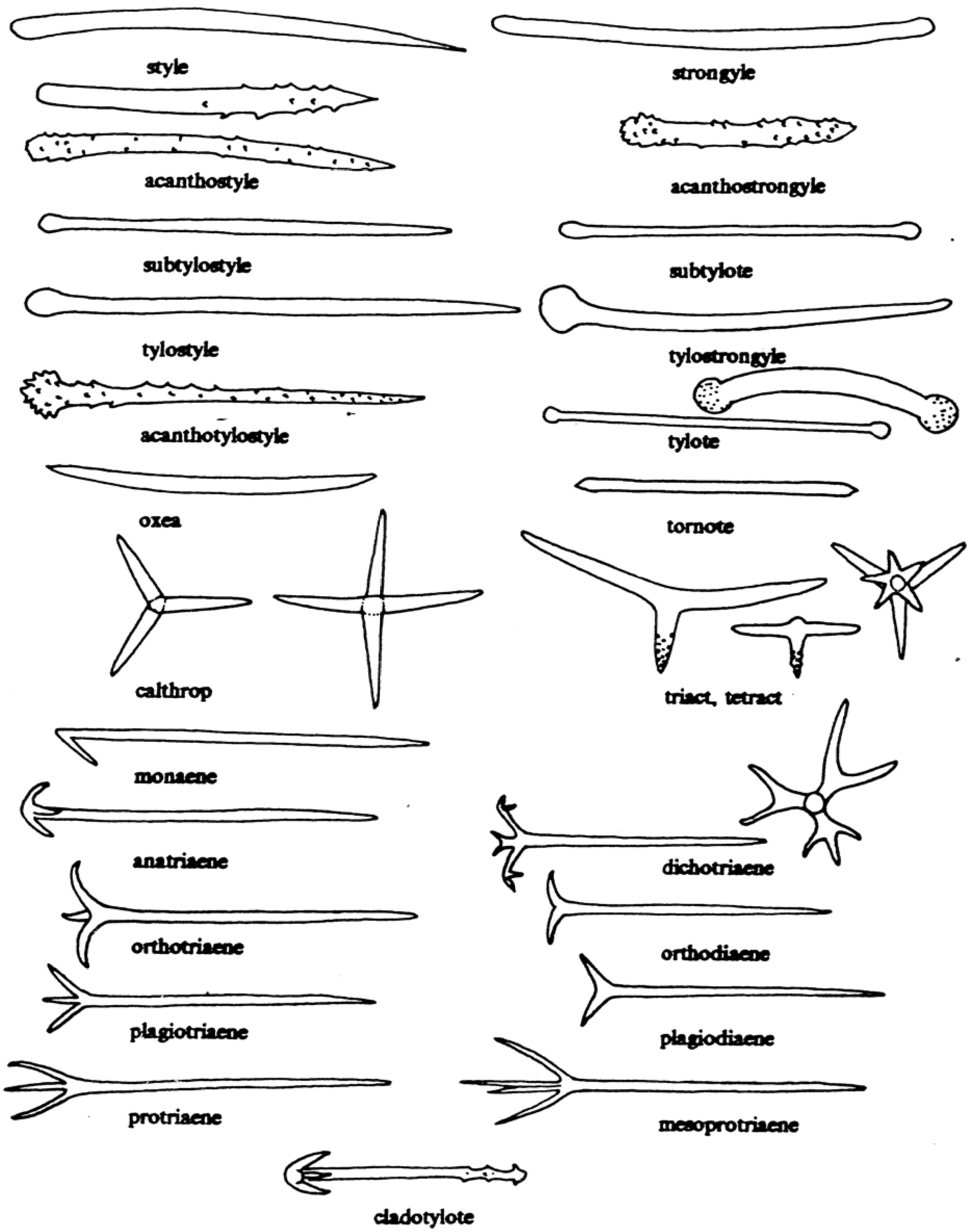
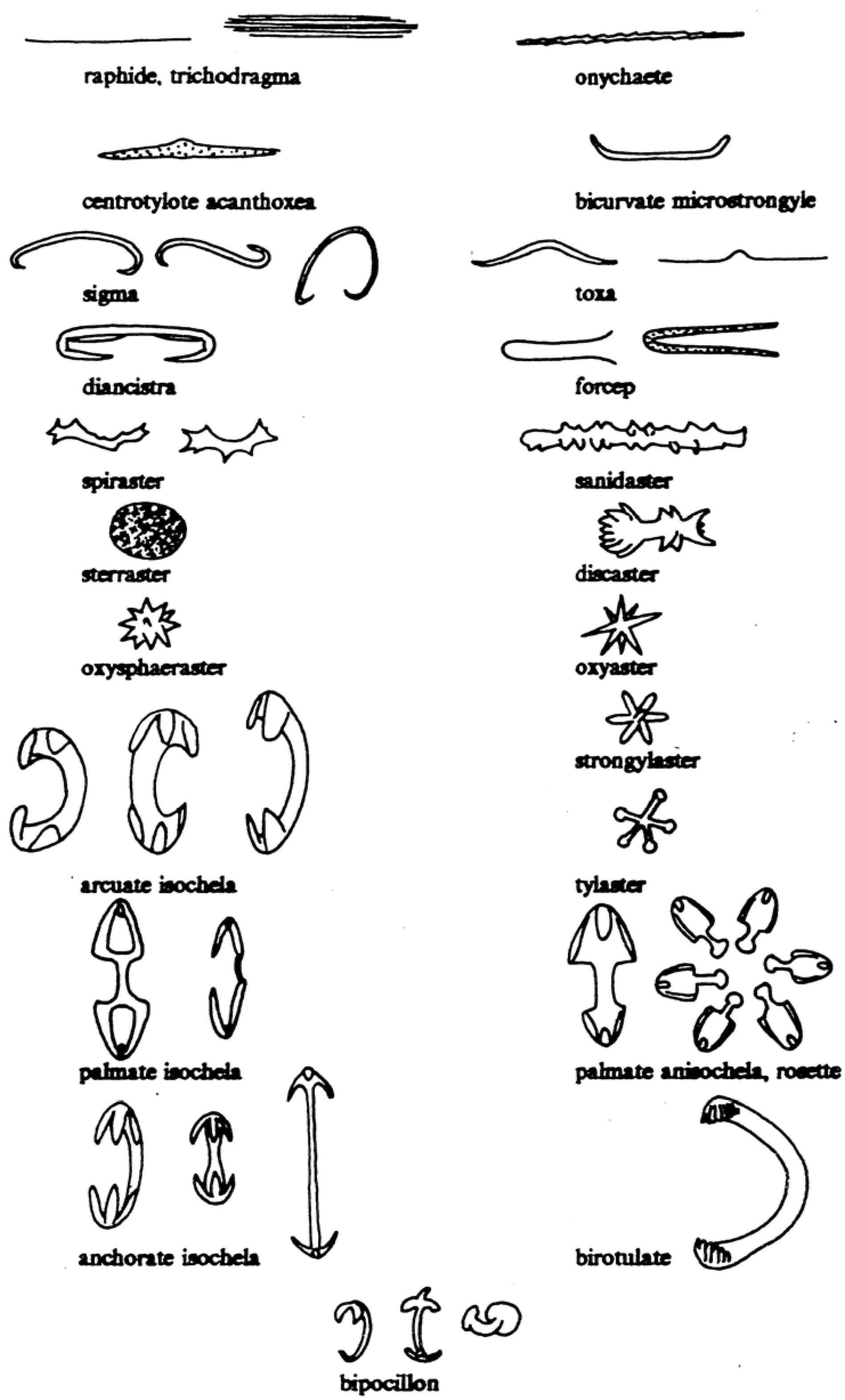


Figure 2. Demospongiae microscleres



General Key to California Demospongiae

Prepared for SCAMIT by Karen Green December, 1991

1a. No skeleton..................Dendroceratida (e.g., Halisarca)

1b. Skeleton present.......................................2

2a. Spongin fiber skeleton.................................3

2b. Spiculo-fiber skeleton.................................4

3a. Primary and secondary fibers form branching network...........
..............................Dictyoceratida (e.g., Dysidea)

3b. Fibers arranged on a dendritic pattern, but without cross-connections (anastomoses).....Dendroceratida (e.g., Aplysilla)

3c. Fibers reduced, dense collagenous matrix......................
..................................Verongida (e.g., Verongia)

4a. Spicules include three or four rayed megascleres.............5

4b. No multi-rayed megascleres...............................8

5a. One ray (rhabdome) much longer than other rays (clads), radial skeleton...6

5b. Triacts or tetracts with near equal rays, various skeletons..7

6a. Microscleres asters..
.................Choristida (e.g., Geodia, Penares, Stelletta)

6b. Microscleres sigmoid.............Spirophorida (e.g., Tetilla)

7a. With asterose microscleres, radial skeleton..................
..............................Choristida (e.g., Poecillastra)

7b. Without microscleres, with lophate multi-rayed spicules, unorganized skeleton.......Homosclerophorida (e.g., Plakina)

7c. Without microscleres, triacts with spines on one ray, axial skeleton.....................Axinellida (e.g., Cyamon)

8a. Skeleton without organization, or organized only at surface, megascleres monactinal (styles) or diactinal of various sizes, no microscleres..Halichondrida (e.g., Halichondria, Hymeniacidon)

8b. Skeleton organized..9

9a. Radial skeleton of monactinal spicules (tylostyles, substylostyles), microscleres absent or asters................ .....Hadromerida (e.g., Cliona, Polymastia, Suberites, Tethya)

9b. Axial skeleton of monactinal (styles) and/or diactinal (oxeas, strongyles) spicules, microscleres absent, microxeas, raphides, or asters.....Axinellida (e.g., Axínella, Hemectyon)

9c. Skeleton reticulate, plumose, or plumoreticulate............10

10a. Microscleres absent, sigmas, toxas, and/or microxeas........11

10b. Microscleres include chela or diancistras and additionally may include other types..12

11a. Skeleton reticulate, megascleres diactinal (oxeas or strongyles) and uniform in size, microscleres absent, sigmas, or toxas ....Haplosclerida (e.g., Haliclona, Sigmadocia)

11b. Skeleton plumoreticulate, megascleres monactinal (styles, subtylostyles), microscleres- sigmas, toxas, or microxeas..... ....Poecilosclerida (e.g. Biemna)

11c. Skeleton plumoreticulate, megascleres include diacts (tylotes), microscleres- onychaetes.......................... ....Poecilosclerida (e.g., Tedania)

12a. With diancistras..............Poecilosclerida (e.g., Zygherpe)

12b. With anisochelas.. ....Poecilosclerida (e.g., Asbestopluma, Mycale, Iophon)

12c. With isochelas.. ...Poecilosclerida (e.g., Acarnus, Hymedesmia, Lissodendoryx, ...Microciona, Myxilla, Ophlitaspongia, Plocamia)

Useful References

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POSITION ANNOUNCEMENT

POSITION:	CURATORIAL ASSISTANT Section of Invertebrates, Malacology
START DATE:	January 1992
SALARY:	Full time, 40 hours per week. Annual salary $23,675 plus benefits. Temporary position for 24 months funded by NSF grant.
DESCRIPTION:	Computer cataloging of mollusk reference collection and other curatorial tasks.
REQUIREMENTS:	Bachelors degree in biology plus museum or equivalent experience with scientific collections of mollusks or other marine invertebrates. Knowledge of molluscan classification desired. Applicant should be able to sort specimens and identify them to species with the help of reference sources. Computer and typing skills essential. Applicant should be able to work both independently with minimal supervision and in a team effort.
APPLICATION PROCEDURE:	Letter of application, curriculum vitae with names of three references to: Dr. James H. McLean (213) 744-3377 Los Angeles County Museum of Natural History 900 Exposition Blvd. Los Angeles, CA 90007
APPLICATION DEADLINE:	31 December 1991

AN EQUAL OPPORTUNITY EMPLOYER

ANNOUNCEMENT

A JOURNAL FOR INVERTEBRATE TAXONOMY

The journal *Invertebrate Taxonomy* came into being in 1987, elevated from the *Australian Journal of Zoology* Supplement series. It is an international journal for publication of original contributions on taxonomy, biogeography, and phylogeny of invertebrates of the Indo-Pacific region.

There are 6 bimonthly issues totaling about 1300 pages annually. Page charges are not levied, and there is no page limit on papers published. Turn-around time for shorter papers is between 6 months and 1 year. The Journal is published by CSIRO Editorial Services and exhibits the same excellence in editing and production found in the other internationally recognized journals from this source. The advisory committee is composed of leading Australian scientists and is further supported by a committee of eminent international scientists.

In the past The Journal has been perceived as primarily entomological in content, as a venue for monographic papers and slow to publish. The Journal will continue to publish monographic papers, but is actively striving to broaden the diversity of copy. Currently half of the Advisory Committee members are marine biologists. The Journal would welcome papers on taxa other than terrestrial arthropods, as well as papers dealing with phylogeny, biogeography, and methodology.

Taxonomists seeking a venue for fast, high quality publication of their research should contact: Dr. Niel L. Bruce—Editor, PO Box 89, East Melbourne, Victoria 3002, Australia, or one of the Regional Advisers:

> **R. A. Bray**—The Natural History Museum, Longon; **R. C. Brusca**—Natural History Museum, San Diego; **J. P. Duffels**—Institute of Taxonomic Zoology, Amsterdam; **D. L. Pawson**—National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Reprinted from the Journal of Crustacean Biology 11(4): 539

TEXAS A&M UNIVERSITY
DEPARTMENT OF BIOLOGY
COLLEGE STATION, TEXAS 77843-3258
OFFICE: 409-845-7747 FAX: 409-845-2891

6 December 1991

SCAMIT
3720 Stephen White Drive
San Pedro, California
90731

Ladies and Gentlemen:

Would you please include the following news item in a forthcoming bulletin?

Deep-sea lysianassid amphipod specimens available. Dr. Gilbert Rowe, Department of Oceanography, Texas A&M University, College Station, TX 77843 has accumulated an extensive series of amphipods from baited traps, including at least ten species taken off Greenland. Extensive physical and geographic data accompany these specimens. It is likely that many belong to undescribed species. There are sufficient specimens to permit numerical analyses of within- and between-species variation, ecological distribution, or other other subjects. Interested biologists should contact Dr. Rowe for more information or requests to obtain specimens.

Yours truly,

Mary K. Wicksten

Mary K. Wicksten

Southern California Association of
Marine Invertebrate Taxonomists

3720 Stephen White Drive
San Pedro, California 90731

January, 1992 Vol. 10, No. 9

NEXT MEETING:	Ophiuroids
GUEST SPEAKER:	Dr. Gordon Hendler Los Angeles County Museum of Natural History
DATE:	February 10, 1992 9:30am - 3:00pm
LOCATION:	Times Mirror Room of the Los Angeles County Museum of Natural History Los Angeles, California

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FEBRUARY 10 MEETING: Remember to bring any problem Ophiuroids with you to meeting. Don't forget to bring examples of what you are calling *Amphiodia urtica* and *A. digitata*, as well as other species that you report.

MINUTES FROM MEETING ON JANUARY 6:

Ron Velarde discussed a note he received from Tom Parker on a possible unknown/new species of *Rhamphobranchium* (Onuphidae: Polychaeta). It has been included in the newsletter.

Included in the newsletter is a letter to AAZN members received by Tom and forwarded to Ron.

Ron also announced a number of articles of interest to SCAMIT members.

FUNDS FOR THIS PUBLICATION PROVIDED IN PART BY THE ARCO FOUNDATION, CHEVRON USA, AND TEXACO INC.

Dojiri, M & R. A. Brantley. 1991. Lepeophtheirus spatha, A New Species of Copepod (Siphonostomatoida: Caligidae) Parasitic on the California Halibut from Santa Monica Bay, California. Proceedings of the Biological Society of Washington. 104(4): 727-735.

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Manning, R. B. & D. L. Felder. 1991 Revision of the American Callianassidae (Crustacea: Decopoda: Thalassinidae). Proceedings of the Biological Society of Washington. 104(4): 764-792.

Wicksten, M. K. 1991 Pandalus gurneyi Stimpson Synonymized With Pandalus danae Stimpson (Decapoda: Pandalidae). Proceedings of the Biological Society of Washington. 104(4): 812-815.

Larry Lovell announced the publication of the proceedings of the EPA Symposium, "Biological Criteria: Research and Regulation." Larry represented SCAMIT at the Symposia in December, 1990 were he presented a poster entitled "Regional Standardization of Taxonomy." Copies of the proceedings are available from:

George R. Gibson Jr.
Biological Criteria Program (WH-586)
U.S. EPA, Office of Water
401 M Street sw
Washington, D.C. 20460
(202)260-7580

Reprints of SCAMIT contribution No. 5, "Regional Standardization of Taxonomy." Published in the Proceedings by the EPA are available from the secretary. The address is:

Kelvin Barwick
4077 N. Harbor Dr. MS - 45A
San Diego, CA 92101

Mysid Workshop: Ron has prepared a list of Mysids reported from California. Illustrations of the southern California species has also been assembled. These have been included in the newsletter. A key to southern California species is being prepared and will be available in the near future.

December 30, 1991

A short worm note for the newsletter:

Only a few specimens of *Rhamphobranchium* (Onuphidae : Polychaeta) have been collected by LACSD in benthic samples. Some have been listed as *sp.*, others as *R. longisetosum* . Close examination of the parapodia of these specimens revealed three acicular conditions unaccounted for in the published literature. In the anterior pre-branchial setigers, a single stout aciculum emerges from the body wall and quickly tapers to a slightly twisted and bent sharp point (sketch #1). Just posterior to this region, where branchial are single filaments, the single aciculum is seen barely emerging from the body wall and possesses a distinct and long flagellum like tip (sketch #2). In mid-body regions where the branchia have many filaments there are at least two stout acicula. One of these is twisted and bent at the tip much like the one in the pre-branchial segment, while the other is distinctively more prolonged into a fine filament (sketch #3).

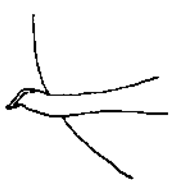
Photographs and a brief description were sent to Dr. Hannelore Paxton for possible clarification. The following was recently received from her:

"I do not remember seeing a bulbous acicular tip in this genus as in you prebranchial parapodium. New aciculae usually have a distal filiform extension (referred to by you as flagella). This structure may help the acicula to penetrate the cuticle. As they wear, they become shorter, as in your multiple branchial segment, and disappear usually completely, leaving a rounded tip.

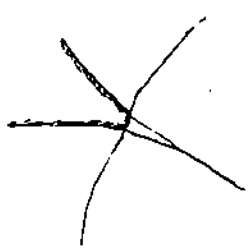
The bulbous anterior setiger aciculae may have some diagnostic value, but the others are similar to most *Rhamphobranchium* species."

The most current published record for this groups appears to be:

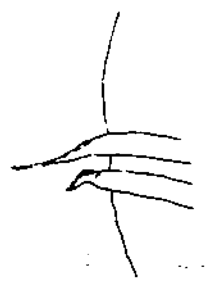
Paxton, H. 1986. Revision of the Rhamphobranchium Complex (Polychaeta: Onuphidae). Records of the Australian Museum. (38) 75-104.



sketch #1



sketch #2



sketch#3

SCAMIT OFFICERS ELECTIONS:

Nominations are now open for SCAMIT officers for the 1992-93 year. Nominations will be entertained from now up to and including the February meeting. Send your nominations to the Vice President, Larry Lovell. Ballots will be mailed out with the February newsletter.

1992-93 Schedule: Larry is still "looking for a few good topics" for the upcoming year. He would appreciate **ANY** input you might have. You can write him at:

Larry Lovell
1036 Buena Vista
Vista, CA 92083

FUTURE MEETINGS:

The meeting on March 9, 1992 will be chaired by Leslie Harris of the Allan Hancock Foundation. The subject will be abranchiate-Amphitritinae-Terebellids. It will be held in room 30, the "worm lab," at the Allan Hancock Foundation building, University of Southern California, Los Angeles, California. Send any specimens to Leslie at the lab.

The April 13 meeting will be lead by Don Cadien of the Los Angeles County Sanitation District. The subject will be Thalassinoid shrimp. It will be held at the Cabrillo Marine Museum, San Pedro, California.

SCAMIT OFFICERS:

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

President	Ron Velarde	(619)226-0164
Vice-President	Larry Lovell	(619)945-1608
Secretary	Kelvin Barwick	(619)226-8175
Treasurer	Ann Martin	(213)648-5317

American Association for Zoological Nomenclature
c/o National Museum of Natural History - MRC 543
Smithsonian Institution
Washington, DC 20560

December 17, 1991

Dear Member of AAZN,

This abbreviated newsletter is to introduce to you the current officers of AAZN, to inform you of some recent developments related to nomenclature, and to request comments or contributions from the membership for inclusion in a newsletter to be mailed out February 15th.

You may already be aware that Ray Manning resigned as Secretary/Treasurer of the AAZN. Its principal mover and shaker since AAZN's inception, he earned and received high praise for his efforts from the AAZN membership and the International Trust for Zoological Nomenclature. I naively accepted the "honor" of replacing him and have finally found the starting gate. We need to make up some lost ground in the next two months and I hope that you will help me by at least getting dues paid. N.B.: The enclosed dues notice denotes your dues status; your 1992 contribution is now due (before May 1, 1992 please). If you are a "90" or earlier please do not shirk on your Past Dues - it is vital that we maintain our level of support to the ICZN. Of course, a contribution of a more philanthropic nature gives great personal satisfaction and will be welcomed warmly.

The current officers of AAZN are: President, Austin B. Williams; President-Elect, Storrs L. Olson; Secretary/Treasurer, Jon L. Norenburg; Councilors, Douglas Erwin, Wayne N. Mathis, and Michael Vecchione.

The AAZN contributed $10,000 this year to the International Trust for Zoological Nomenclature to support work of the International Commission on Zoological Nomenclature. This was accompanied by a strong letter expressing concern about the way the secretariat of the Trust has been functioning. One concern is the length of time to publication of Applications to the Commission. The Secretary, PK Tubbs, responded at the Annual Meeting of the Trust. He noted that the number of Applications published in the last four volumes of BZN had dropped, due in part to a temporary reduction in staffing and in part to the time-consuming processing of major and long-delayed cases; the number of Opinions and total number of pages had not decreased. We would like to hear about continuing problems.

A second, more controversial concern is the Commission's role in proposed changes in the Code of Zoological Nomenclature - particularly the concept and application of priority (see: JM Savage - 1990, *Syst. Zool.* 39: 424-425; PKL Ng - 1991, *Bull. zool. Nomencl.* 48: 87-91). This generated spirited debate and some pungent commentary at our last general meeting of the AAZN. Can we and how do we, the AAZN, debate this issue so that the opinions of the AAZN membership are fairly conveyed to the Commission? The AAZN Newsletter is one mechanism for developing the debate - a response to Savage's view by Storrs Olson is enclosed with this missive. If you wish to submit a commentary of a different outlook please do so - but, try to restrict it to one, single-spaced printed page. One or two commentaries, if they are significantly different from each other, can be included in the next newsletter. If members are aware of position statements produced within their own specialist societies, we would appreciate the opportunity to share them with the AAZN membership. In the meantime the AAZN executive committee will attempt to develop an unbiased questionnaire to sample the membership's opinions or suggestions on the proposed changes. Feel free to offer suggestions for constructing this questionnaire.

Bulletin of Zoological Nomenclature

The ITZN, at its Annual General Meeting, discussed an AAZN proposition to introduce a greatly reduced subscription to the BZN for individual subscribers. There was strong concern that this would result in cancellations of institutional subscriptions. The proposal was tabled because there does not seem to be a groundswell of demand for such a reduced rate. For instance, only a handful of subscribers are currently taking advantage of a trial program whereby one may receive (for a fee) offprints of all Applications, Comments and Opinions in the BZN related to either the Crustacea or Mollusca (see front pages of recent BZN).

From The ASC Washington Initiative [Nov. 1991, 5(10)]:
Systematics Agenda 2000

The Association of Systematics Collections is attempting "to produce a consensus document on future directions for systematics research as well as the importance of systematics." This effort is supported in part by NSF and is well in progress; the steering committee and advisory committee members met Nov. 9-10, 1991. *Systematics Agenda 2000* "is charged with (1) identifying important research trends and questions and with establishing priorities among them, (2) assessing the status of current infrastructures supporting systematics research and evaluating future needs, (3) documenting the broad role that systematics plays in human affairs and evaluating its future contributions and needs in those endeavors" (ASC Newsletter, Oct. 1991, 19: 57). For additional details contact the ASC office (202-347-2850) or Joel Cracraft (312-996-4955).

I would be glad to hear from you by any of the following mechanisms:

Jon L. Norenburg
Secretary-Treasurer, AAZN
National Museum of Natural History
MRC 534
Smithsonian Institution
Washington, DC 20560

Tel: 301-238-3508
Fax: 301-238-3667
Bitnet: sossc001@sivm

PLEASE -
RECRUIT A NEW MEMBER
and
ENCOURAGE YOUR PROFESSIONAL SOCIETY TO BECOME AN INSTITUTIONAL MEMBER

HAPPY HOLIDAYS AND BEST WISHES FOR THE NEW YEAR!

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Tel: 301-238-3508
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HAPPY HOLIDAYS AND BEST WISHES FOR THE NEW YEAR!

The Executive Secretary
International Commission on
Zoological Nomenclature
c/o The Natural History Museum
Cromwell Road
London SW7 5BD, ENGLAND

Sir,

The rapturous announcement by commissioner Jay M. Savage (1990, *Systematic Zoology*, 39: 424-425) of proposed unprecedented changes in the Code of Zoological Nômenclature, deserves a concerted negative response from all thoughtful and knowledgeable systematists. Because the more drastic of these proposals are so obviously unworkable, and will doubtless elicit much other comment, I would prefer to raise some related issues, rather than addressing the lack of merit of individual suggested reforms.

First of all, because these proposed changes emanate from a meeting consisting of fewer (12) than half of the members of the International Commission of Zoological Nomenclature, it should be asked to what extent this minority, which I would hope was not unanimous, represents the views of the entire Commission. More importantly, however, it must further be asked to what extent the Commission itself really represents the viewpoints of practicing systematists (not the "user community" involved in developing "stable biodiversity data bases," but genuine taxonomists who are familiar with, and use, the Code itself, rather than just the names generated through the Code).

Historically there have long been two factions at the heart of nomenclatural controversy---one advocating priority and the other "current usage." It is my perception, and that of many of my colleagues, that the Commission, which is composed in part of non-systematists, has for quite some time been "stacked" in favor of advocates of current usage. The major result of this so far has been the creation of a tremendous and unnecessary literature dealing almost exclusively with circumventing the Commission's own stated rules. Regardless, the Commission has the appearance of a closed, self-perpetuating body purposely organized to exclude, or at least to mute, contrary views within its ranks. If this perception has any validity, then it is high time to challenge the legitimacy of the International Commission to represent the needs of the systematic community as a whole.

As I have already taken pains to show, there continues to be great inherent instability in the nomenclature of North American birds, one of the best-known groups of organisms on the planet, but priority and other purely nomenclatural procedures play an insignificant role in this instability (Olson, 1987, *Auk* 104: 538-542). Although my analysis was sent to all members then on the Commission, it seemingly had no influence on a cabal foreordained to abolish its ancient nemesis. Instead, like a dog returning to its vomit, the Commission now wants to go back to the loathsome "50 year rule." Yet at no time has the Commission ever shown that such reforms as it is now propounding are actually necessary, or are in fact capable of achieving their desired effect. Until truly cogent and well documented arguments for such sweeping changes are forthcoming, the subject will hardly merit the verbiage that it is certain to engender.

Universal stability in zoological nomenclature is an impossible, Utopian ideal. Procrustean efforts to force an artificial semblance of stability into nomenclature can only have a deleterious effect on the advancement of new information and on the assimilation and appreciation of past knowledge, from which latter Savage wishes to be freed. (Because we are all born with no knowledge of the past, liberation from it should involve no more than the perpetuation of ignorance).

The third edition of the Code, except for those parts necessitating decisions by the Commission, is a sound, scholarly document that has evolved over many years through painstaking thought and compromise. In attempting to overthrow this document, the present

Commission is not only proposing a drastically modified fourth edition, but is also attempting to establish itself in an entirely new role---that of providing lists of "approved" taxa. Such activity far exceeds the mandate of the Commission.

The situation has now gone beyond the point of argumentation. The changes proposed in Savage's notice are simply not acceptable. If the Commission succeeds in executing these changes, I, for one, will reject them unequivocally and continue to use the basic framework provided by the third edition of the Code. I will not be alone. It is my privilege to work as a member of one the largest surviving aggregations of zoological systematists in the world. The reactions I have heard from my colleagues to the Commission's new proposals range mostly from disgust to profound antipathy, with the latter being more typical. The Commission should therefore ponder the effects on nomenclature of having two codes operating simultaneously, for that will surely be the result of its proposed actions.

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1992 MEMBERSHIP RENEWAL

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TAXONOMIC LIST OF MYSIDS REPORTED FROM CALIFORNIA

Ronald G. Velarde, Marine Biology Laboratory, City of San Diego
4077 N. Harbor Dr. MS 45A, San Diego, CA 92101
January 1992

Order Mysidacea

Suborder Lophogastrida

Family Lophogastridae
- _Gnathophausia_ Willemoes-Suhm, 1873
  - *_Gnathophausia gigas_ Willemoes-Suhm, 1875
  - *_Gnathophausia ingens_ (Dohrn, 1870)

Family Eucopiidae
- _Eucopia_ Dana, 1852
  - *_Eucopia australis_ Dana, 1852
  - *_Eucopia grimaldii_ Nouvel, 1942
  - *_Eucopia sculpticauda_ Faxon, 1873
  - *_Eucopia unguiculata_ (Willemoes-Suhm, 1875)

Suborder Mysida

Family Petalophthalmidae
- _Petalophthalmus_ Willemoes-Suhm, 1875
  - *_Petalophthalmus armiger_ Willemoes-Suhm, 1875

Family Mysidae

Subfamily Boreomysinae
- _Boreomysis_ G.O. Sars, 1869
  - *_Boreomysis californica_ Ortmann, 1894
  - *_Boreomysis inermis_ (Willemoes-Suhm, 1874)

Subfamily Siriellinae
- _Siriellla_ Dana, 1850
  - _Siriella pacifica_ Holmes, 1900

Subfamily Gastrosaccinae
- _Archaeomysis_ Czerniavsky, 1882
  - _Archaeomysis grebnitzkii_ Czerniavsky, 1882
    - [=_Archaeomysis maculata_ (Holmes, 1894)]
- _Bowmaniella_ Bacescu, 1968
  - _Bowmaniella banneri_ Bacescu, 1968
    - [?=_Archaeomysis maculata_ W.M. Tattersall, 1932,1951]

* These species are found in the open ocean and are omitted from the key. Information on these species can be found in Kathman et al., 1986.

Family Mysidae (cont.)
  Subfamily Mysinae
    Tribe Erythropini
      Amathimysis Brattegard, 1969
        Amathimysis trigibba Murano and Chess, 1987

      Caesaromysis Ortmann, 1893
        *Caesaromysis hispida Ortmann, 1893
          [=Caesaromysis vanclevei Banner, 1947]

      Holmesiella Ortmann, 1908
        Holmesiella anomala Ortmann, 1908

      Pseudomma G.O. Sars, 1870
        Pseudomma berkeleyi W.M. Tattersall, 1933
        Pseudomma californica Bacescu and Gleye, 1979

    Tribe Leptomysini
      Cubanomysis Bacescu, 1968
        Cubanomysis mysteriosa Gleye, 1982

      Metamysidopsis W.M. Tattersall, 1951
        Metamysidopsis elongata (Holmes, 1900)

      Mysidopsis G.O. Sars, 1864
        Mysidopsis brattegardi Bacescu and Gleye, 1979
        Mysidopsis californica W.M. Tattersall, 1932
        Mysidopsis cathengelae Gleye, 1982
        Mysidopsis intii Holmquist, 1957
        Mysidopsis onofrensis Bacescu and Gleye, 1979
        ?Mysidopsis sp. A of Phillips

    Tribe Mysini
      Acanthomysis Czerniavsky, 1882
        Acanthomysis brunnea Murano and Chess, 1987
        Acanthomysis californica Murano and Chess, 1987
        "Acanthomysis" columbiae (W.M. Tattersall, 1933)

      Alienacanthomysis Holmquist, 1981
        Alienacanthomysis macropsis (W.M. Tattersall, 1932)

      Exacanthomysis Holmquist, 1981
        Exacanthomysis davisi (Banner, 1948)
          [=Acanthomysis costata of W.M Tattersall, 1932,1951]

      Hippacanthomysis Murano and Chess, 1987
        Hippacanthomysis platypoda Murano and Chess, 1987

      Holmesimysis Holmquist, 1979
        Holmesimysis costata (Holmes, 1900)
          [=Acanthomysis sculpta W.M. Tattersall, 1951 part]

Tribe Mysini (cont.)

Inusitatomysis Ii, 1940

Inusitatomysis californica Bacescu and Gleye, 1979

Neomysis Czerniavsky, 1882

Neomysis kadiakensis Ortmann, 1908

Neomysis mercedis Holmes, 1897

Neomysis rayi (Murdock, 1885)

Pacifacanthomysis Holmquist, 1981

Pacifacanthomysis nephrophthalma (Banner,1948)

Proneomysis W.M. Tattersall, 1933

Proneomysis wailesi W.M. Tattersall, 1933

Tribe Heteromysini

Heteromysis S.I. Smith, 1873

Heteromysis odontops Walker, 1898

Subfamily Mysidellinae

Mysidella G.O. Sars, 1872

Mysidella americana Banner, 1948

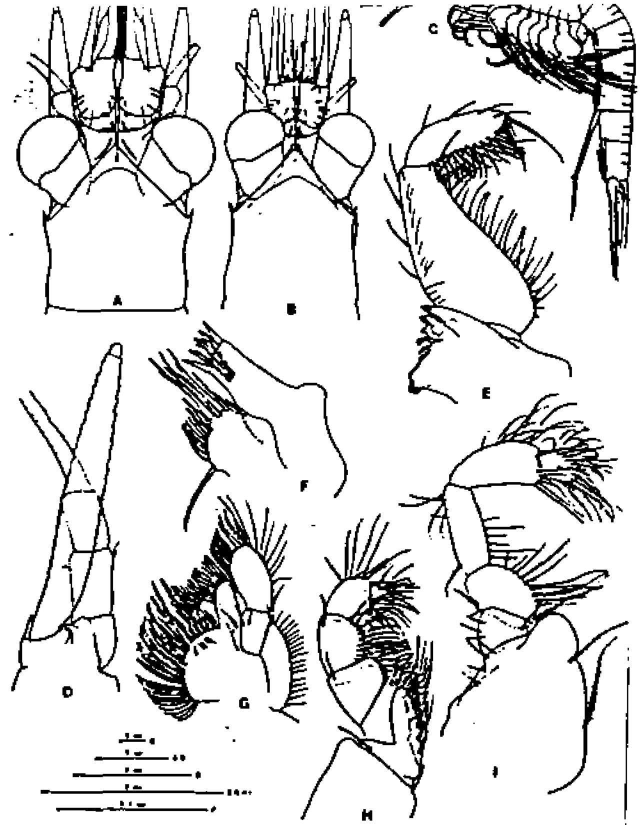


Fig. 5. *Acanthomysis brunnea*, new species. A, anterior end of adult male; B, anterior end of adult female; C, adult male (16.1 mm) in lateral view; D, antenna (♂); E, mandible (♂); F, maxillule (♂); G, maxilla (♂); H, endopod of first thoracic limb (♂); I, endopod of second thoracic limb (♂).

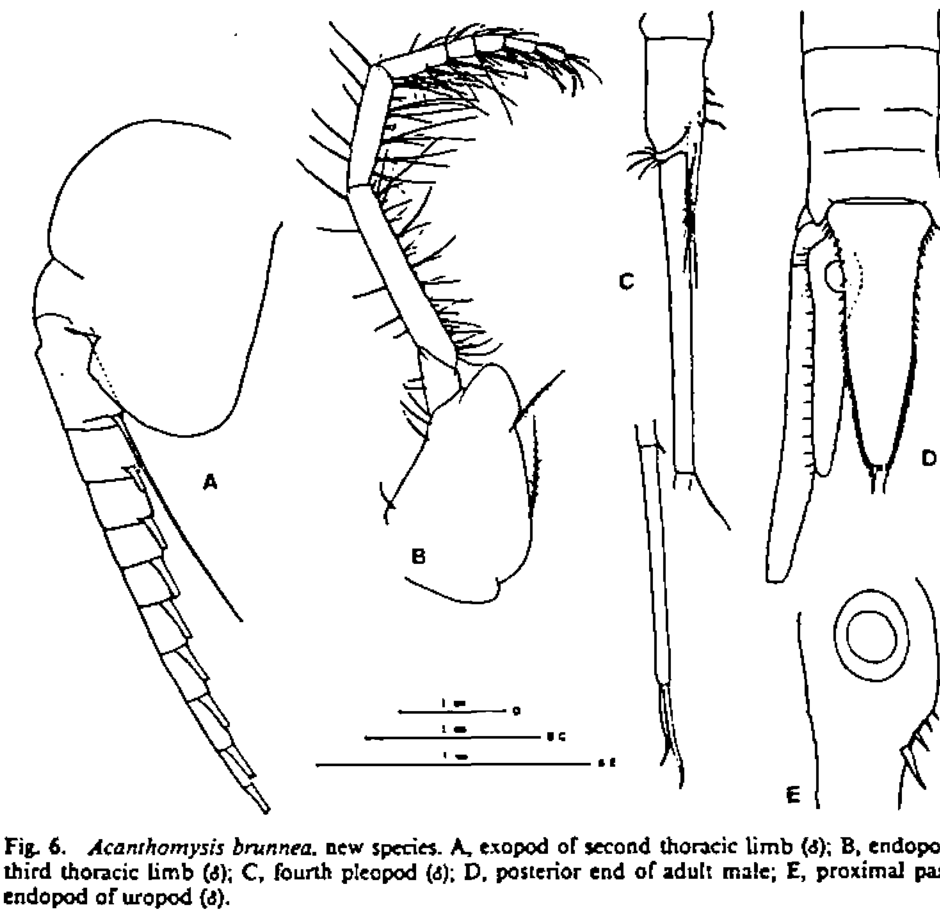


Fig. 6. *Acanthomysis brunnea*, new species. A, exopod of second thoracic limb (♂); B, endopod of third thoracic limb (♂); C, fourth pleopod (♂); D, posterior end of adult male; E, proximal part of endopod of uropod (♂).

Figure 1. Acanthomysis brunnea Murano and Chess, 1987

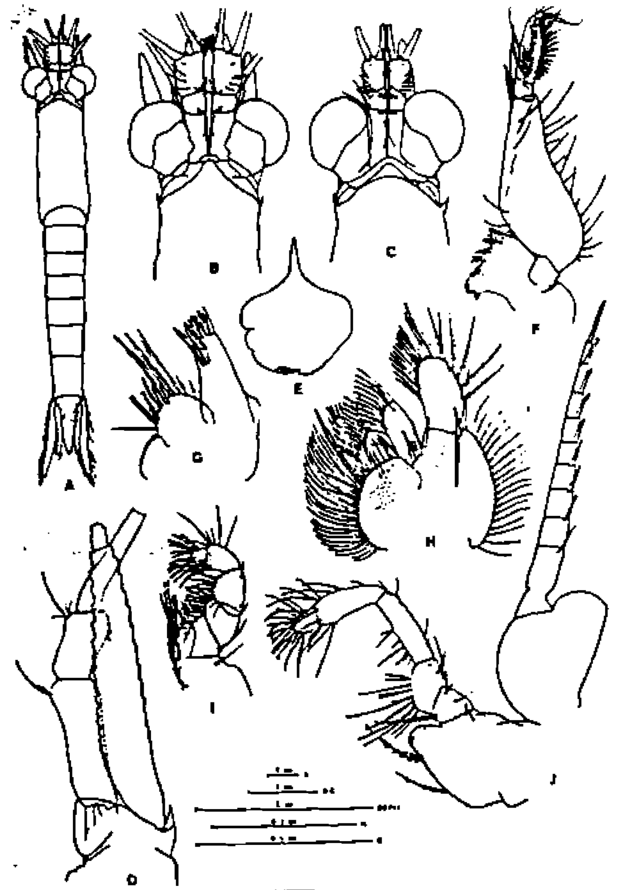


Fig. 3. *Acanthomysis californica,* new species. A, adult male (11.3 mm) in dorsal view; B, anterior end of adult male; C, anterior end of adult female; D, antenna (♂); E, labrum (♀); F, mandible (♂); G, maxillule (♂); H, maxilla (♂); I, endopod of first thoracic limb (♂); J, second thoracic limb (♂).

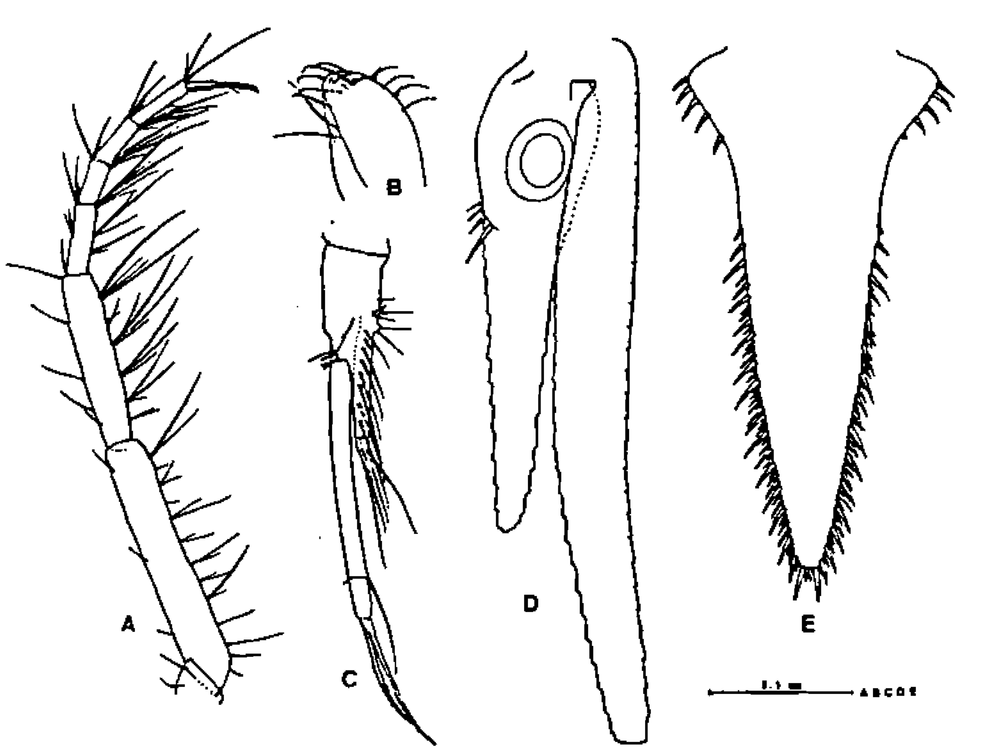
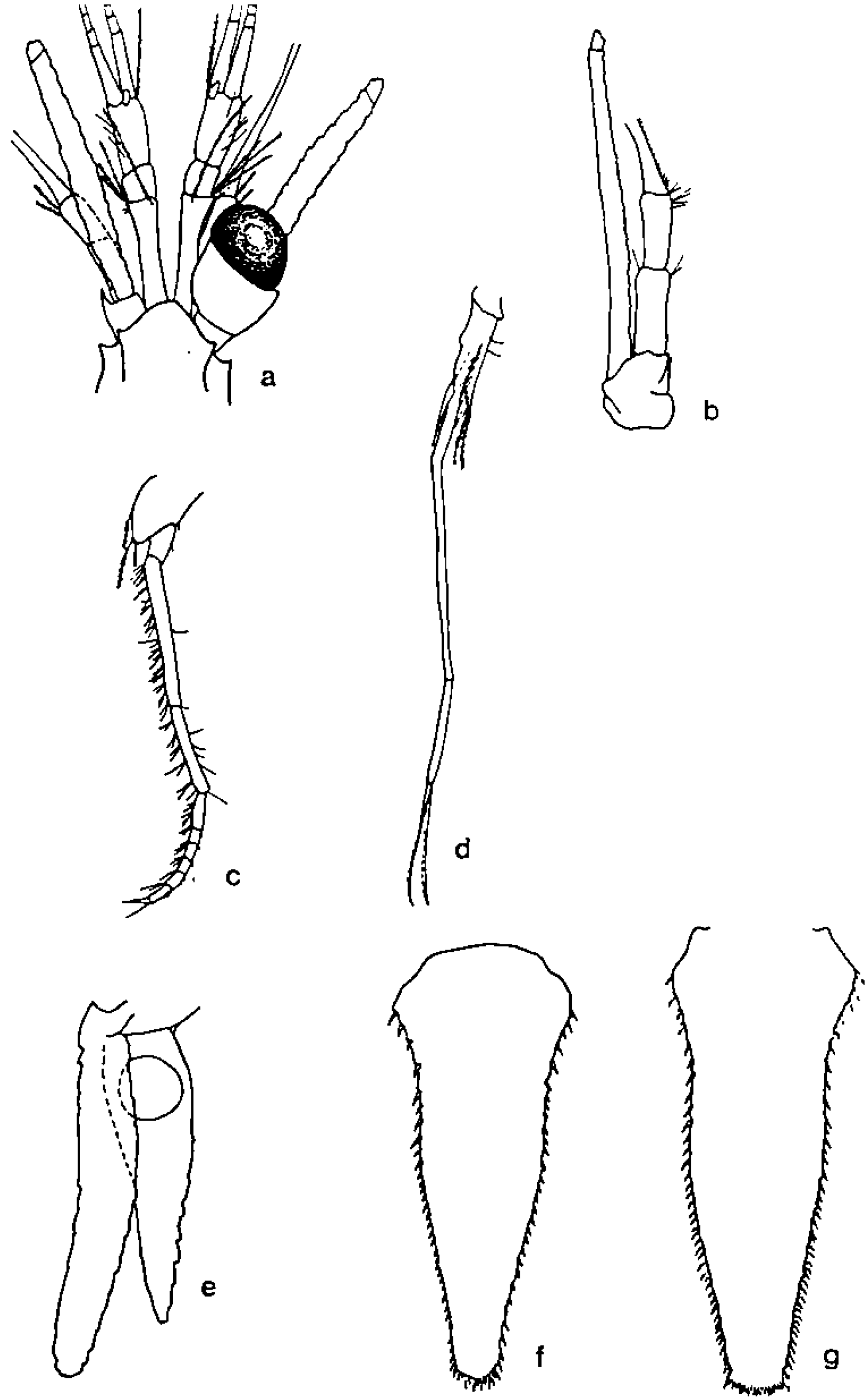


Fig. 4. *Acanthomysis californica,* new species. A, one of anterior thoracic endopods (♂); B, penis; C, fourth pleopod (♂); D, uropod (♂); E, telson (♂).

Figure 2. Acanthomysis californica Murano and Chess, 1987



"Acanthomysis" columbiae

Figure. a. dorsal view anterior end, male (3); b. antennal scale (1); c. 5th thoracopod (3); d. 4th pleopod, male (3); e. uropod (4); f. telson, California specimen (3); g. telson, British Columbia specimen (1).

Figure 3. "Acanthomysis" columbiae (W.M. Tattersall, 1933)
(from Kathman et al., 1986)

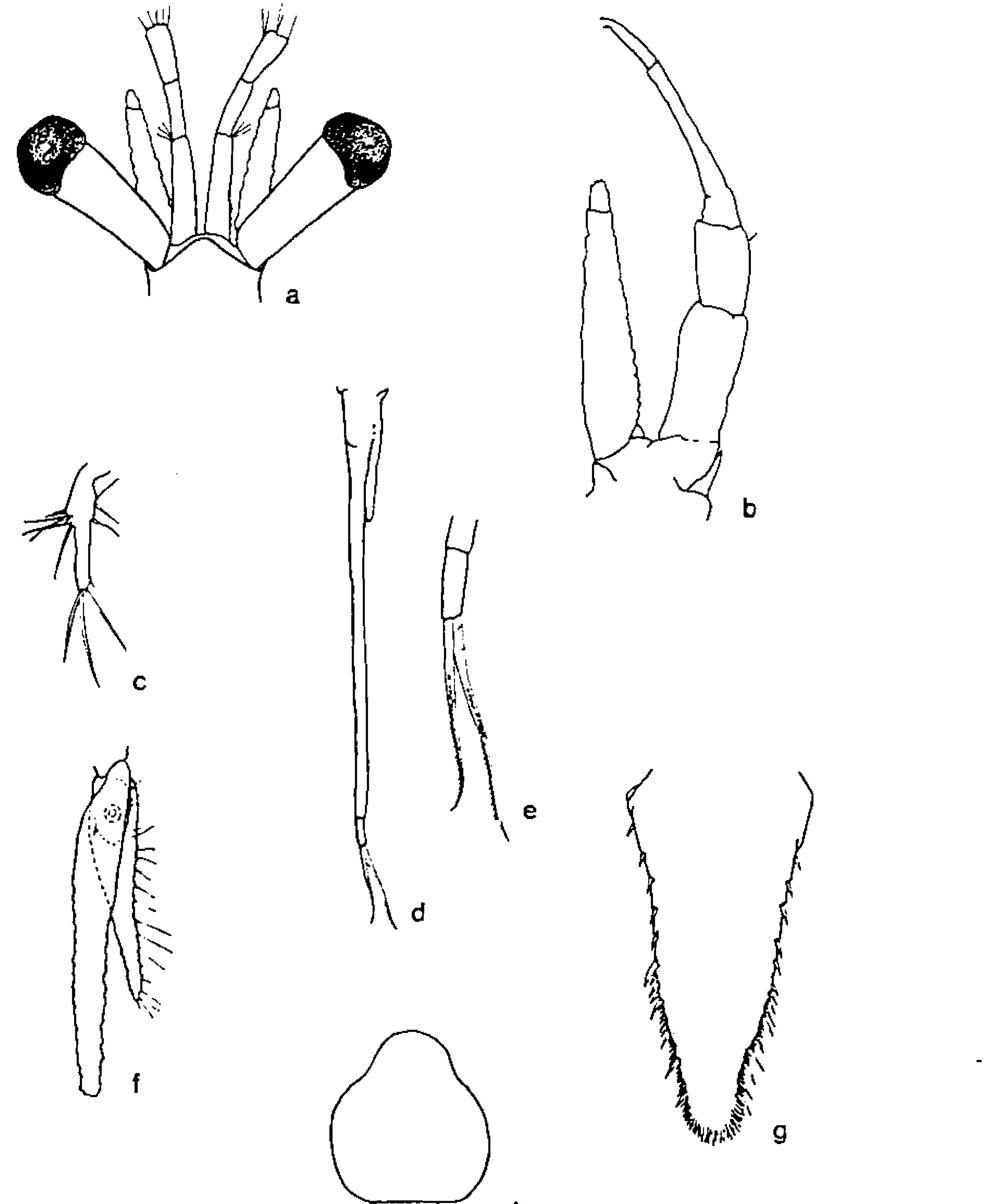


Figure. a. dorsal view, anterior end (I); b. antenna (7); c. 3rd male pleopod (I); d. 4th male pleopod (7); e. 4th male pleopod, distal end (7); f. uropod (I); g. telson (7); h. labrum (original).

Alienacanthomysis macropsis

Figure 4. Alienacanthomysis macropsis (W.M. Tattersall, 1932)
(from Kathman et al., 1986)

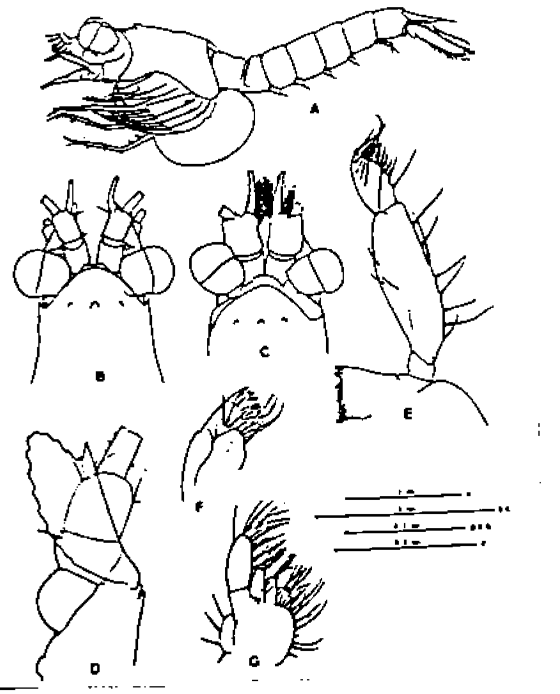


Fig. 1. *Amathimysis trigibba*, new species. A, adult female (2.9 mm) in lateral view; B, anterior end of adult female; C, anterior end of adult male; D, antenna (♀); E, mandible (♀); F, maxillule (♀); G, maxilla (♀).

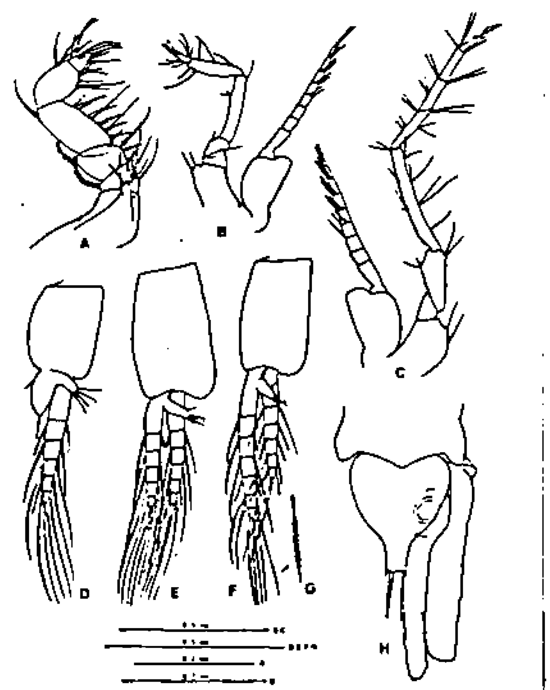
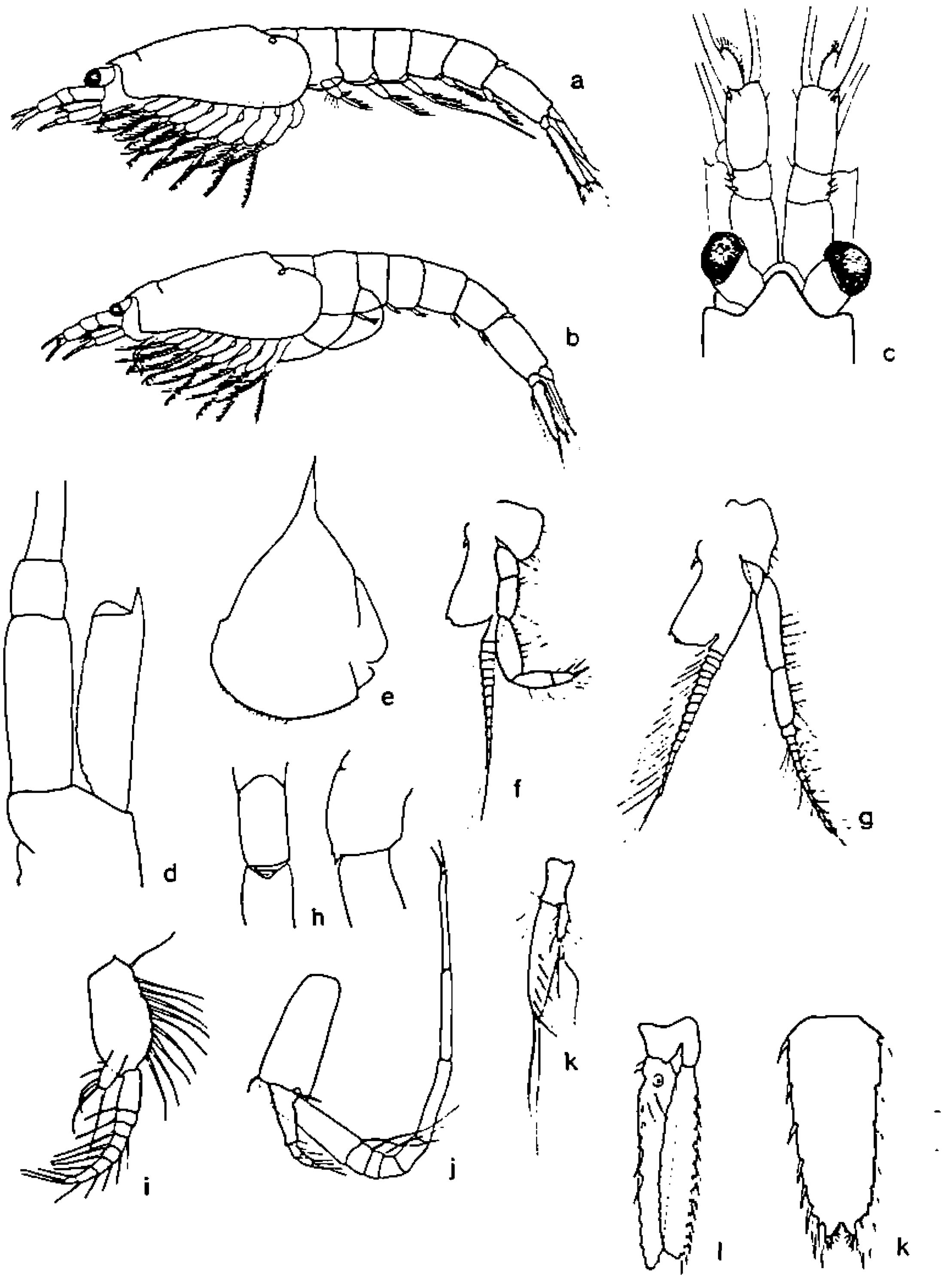


Fig. 2. *Amathimysis trigibba*, new species. A, endopod of first thoracic limb (♀); B, second thoracic limb (♀); C, fifth thoracic limb (♀); D, first pleopod (♂); E, fourth pleopod (♂); F, fifth pleopod (♂); G, distal part of modified seta on fifth segment of endopod of fifth pleopod (♂); H, telson and uropod (♀).

Figure 5. Amathimysis trigibba Murano and Chess, 1987



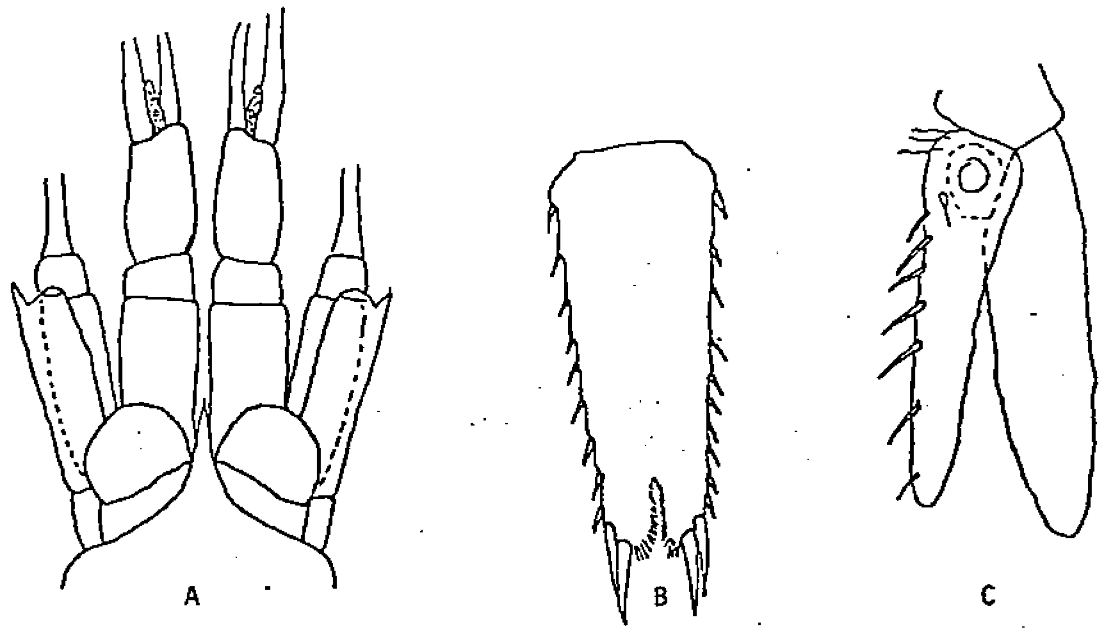
Archaeomysis grebnitzkii

Figure. a. lateral view, male (5); b. lateral view, female (5); c. dorsal view, anterior end (5); d. antenna (5); e. labrum (3); f. 2nd thoracopod (5); g. 7th thoracopod (5); h. dorsal and lateral views, 5th abdominal segment (3); i. 1st male pleopod (9); j. 3rd male pleopod (9); k. 3rd female pleopod (9); l. uropod (9); m. telson (9).

Figure 6. Archaeomysis grebnitzkii Czerniavsky, 1882

(from Kathman et al., 1986)

(5)



<u>Archaeomysis</u> <u>maculata</u> (Holmes). Fig A. Anterior end of young male showing rostral plate, eyes, antennal scale and peduncle, and antennular peduncle with developing masculine lobe (x78); B. Telson (x78); C. Uropod (x78). (Fig A-C after Tattersall.)

Diagnosis: Large (12mm) stocky "tanklike", on first glance it is hard to believe this animal is a mysid. Eyes dark, medium sized outer margin of antennal scale naked, terminating in a heavy spine. Male with well developed abdominal pleopods. Abdomen narrows noticeably distally. Telson cleft, cleft armed with serrations, lateral margins armed with 9 or 10 spines, each lobe of the apex with 2 heavy, long spines.

SQUARISH ABDOMEN w/ SEGMENTAL MELANOPHORES

Note: All the specimens I have seen are <u>A.</u> <u>maculata</u>, <u>A.</u> <u>grebnitzkii</u> is also reported from California and is similar in appearance. <u>A. grebnitzkii</u> has 6+2 spines on thelateral margin of the telson.

Occurrence: Found in samples taken very close to shore, it is considered a surf zone species.

Reference: Tattersall, 1951.

Figure 7. <u>Bowmaniella</u> <u>banneri</u> Bacescu, 1968

[= <u>Archaeomysis</u> <u>maculata</u> W.M. Tattersall 1932, 1951]

(from Gleye, unpub.)

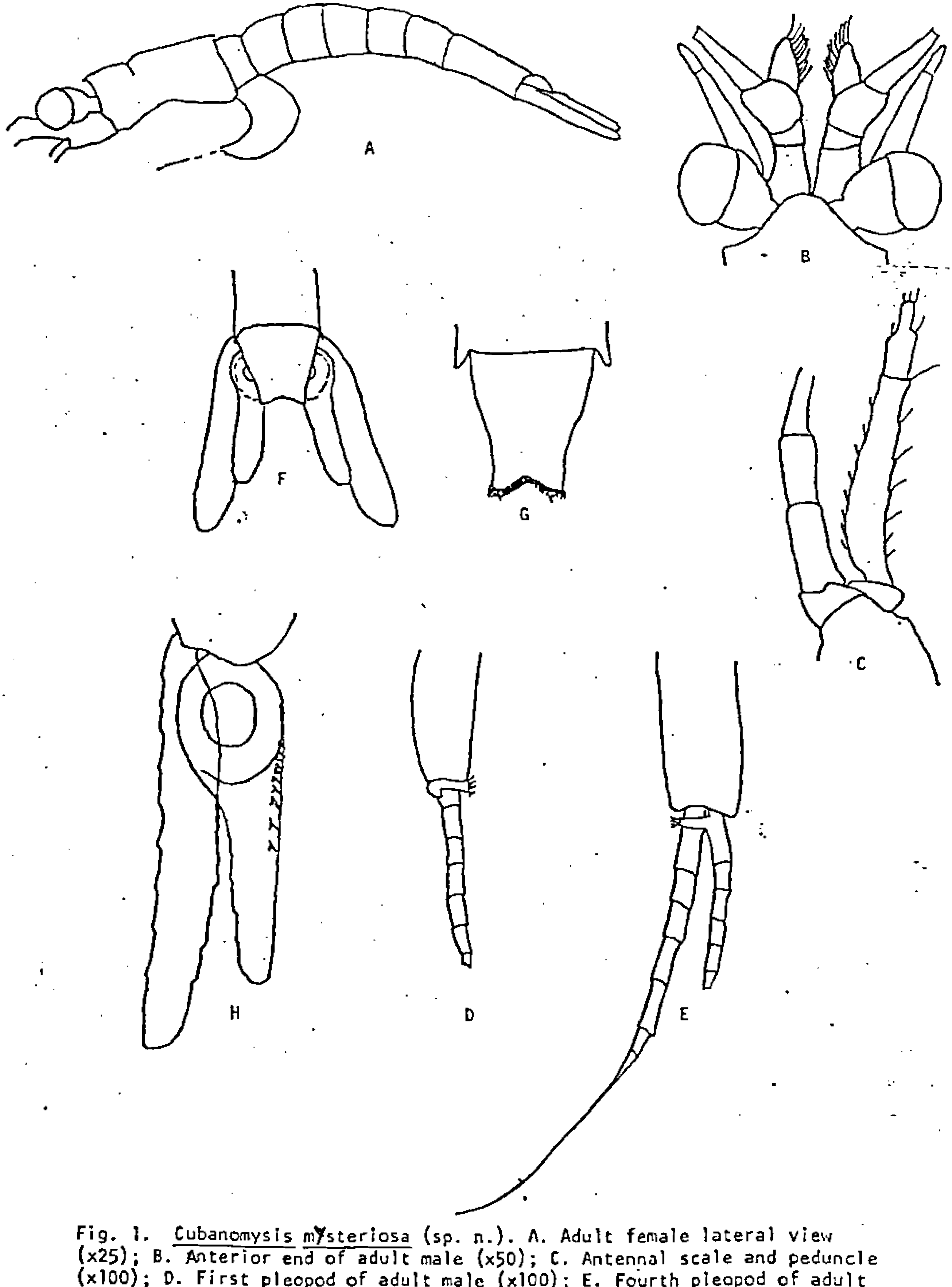


Fig. 1. Cubanomysis mysteriosa (sp. n.). A. Adult female lateral view (x25); B. Anterior end of adult male (x50); C. Antennal scale and peduncle (x100); D. First pleopod of adult male (x100); E. Fourth pleopod of adult male (x100); F. Posterior end of adult (x50); G. Telson (x100); H. Uropod (x100).

Figure 8. Cubanomysis mysteriosa Gleye, 1982

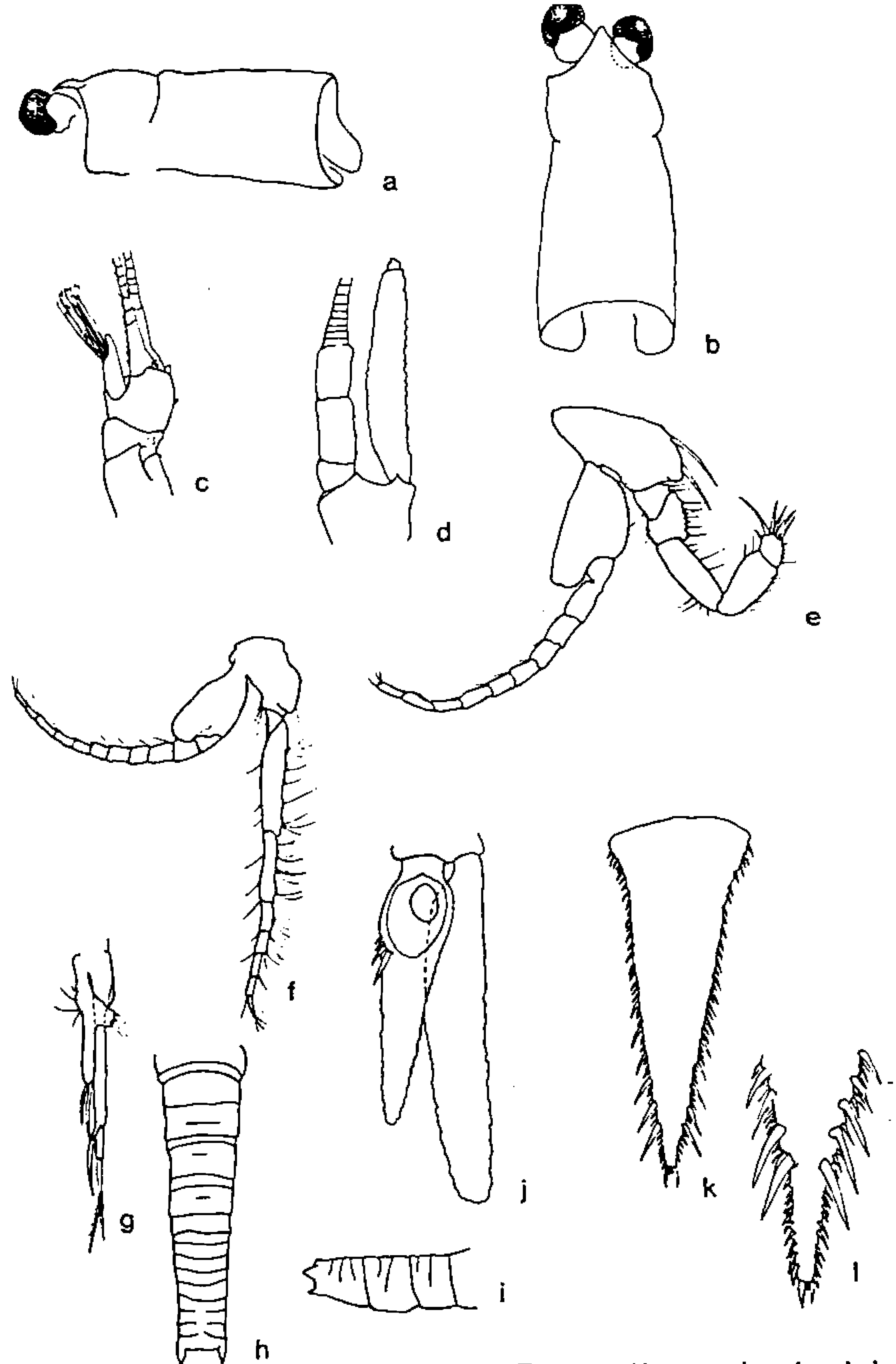
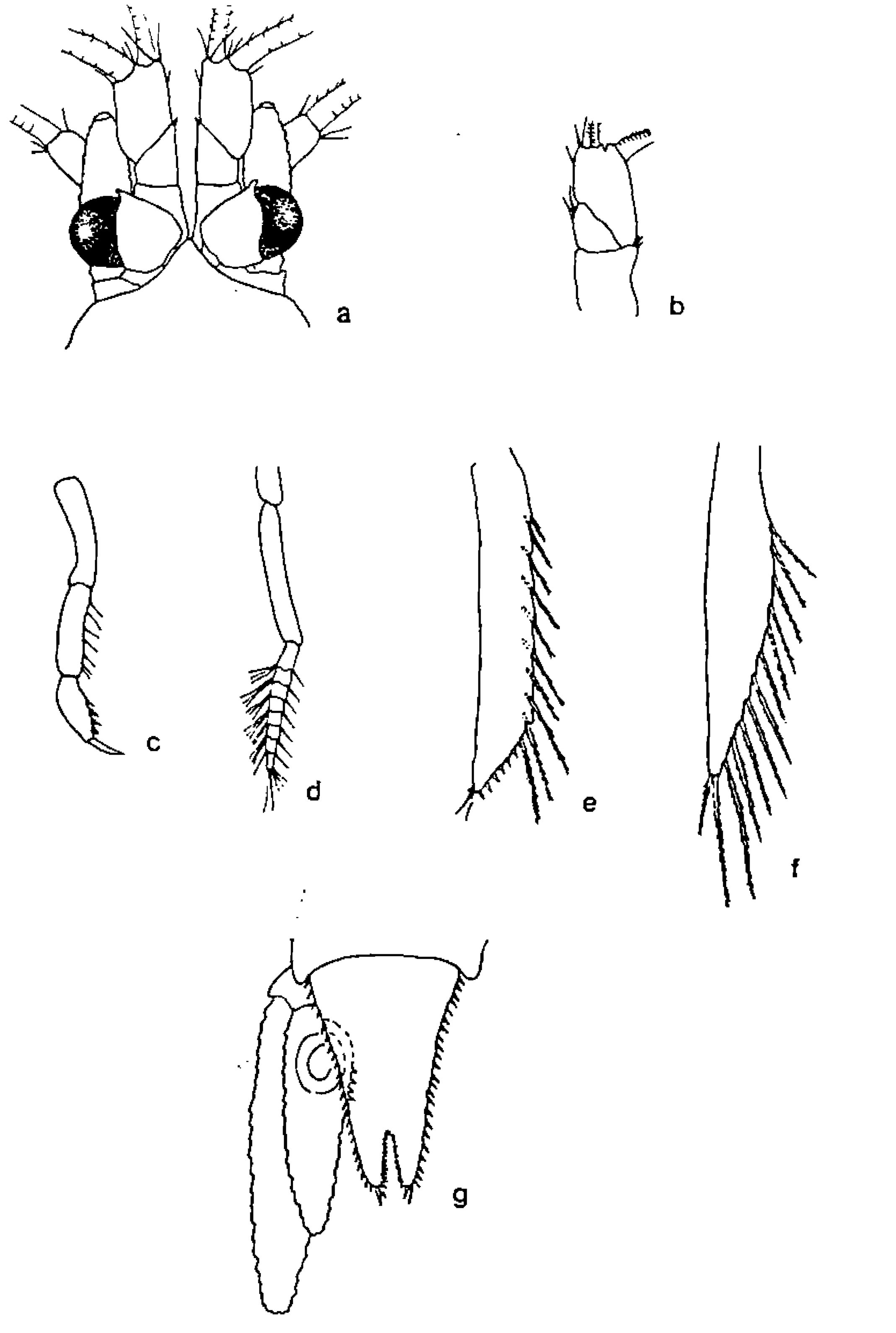


Figure. a. lateral view, anterior end (3); b. dorsal view, anterior end (3); c. lateral view, antennular peduncle (1); d. antenna (1); e. 2nd thoracopod (7); f. 3rd thoracopod (7); g. 4th male pleopod (7) ; h. dorsal view, abdomen (4); i. lateral view, abdomen (4); j. uropod (7); k. telson (7); l. telson apex (4).

Figure 9. Exacanthomysis davisi (Banner, 1948)
(from Kathman et al., 1986)



Heteromysis odontops

Figure. a. dorsal view, anterior end (3); b. antennular peduncle (1); c. endopod of 3rd thoracopod (1); d. endopod of 8th thoracopod (1); e. 3rd male pleopod (3); f. 5th male pleopod (3); g. uropod and telson (3).

Figure 10. <u>Heteromysis</u> <u>odontops</u> Walker, 1898

(from Kathman et al., 1986)

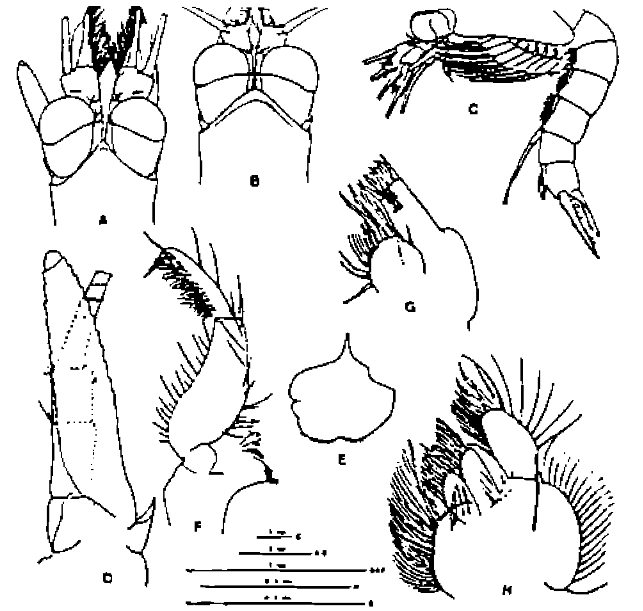
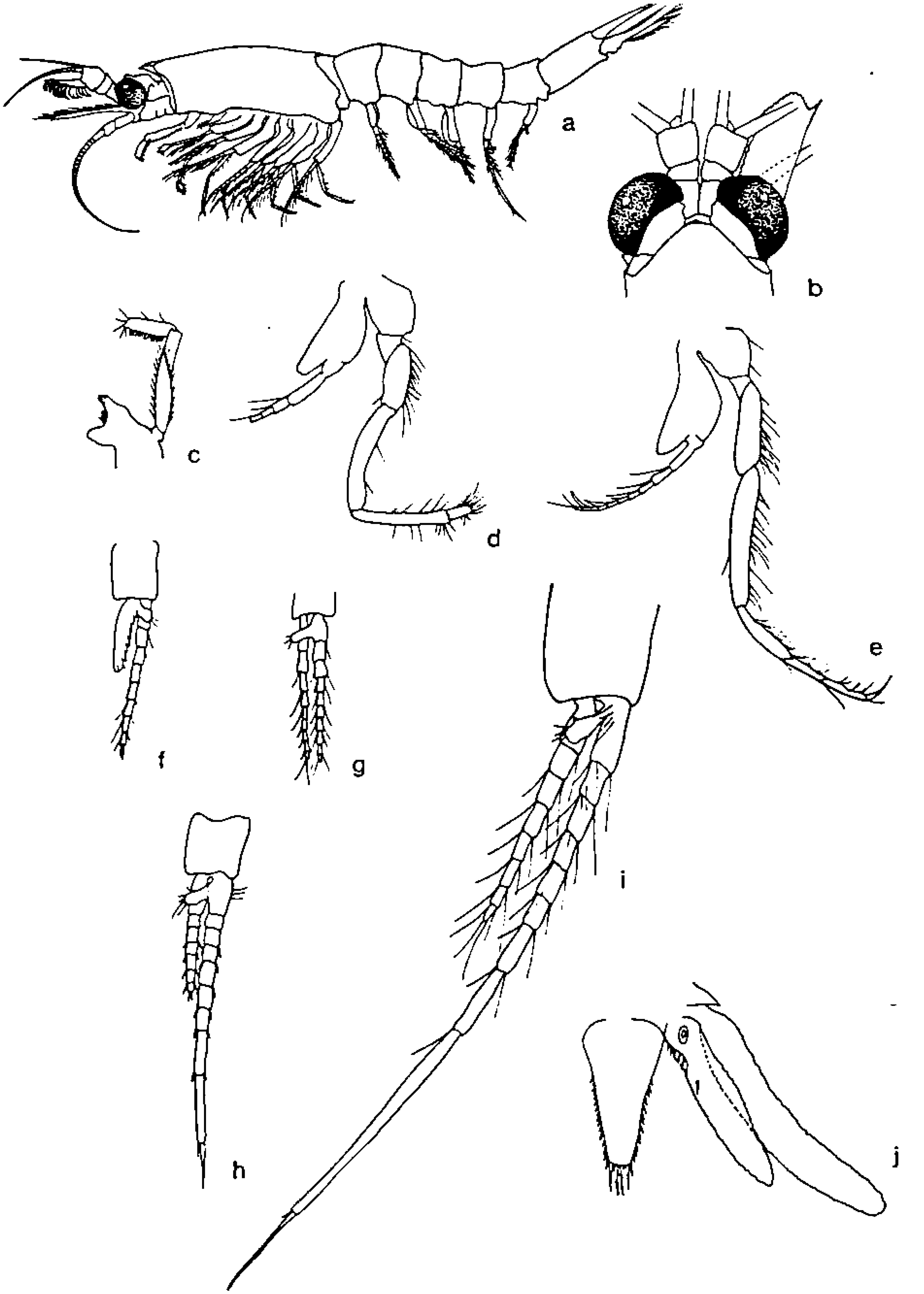


Fig. 7. *Hippacanthomysis platypoda*, new genus, new species. A, anterior end of adult male; B, anterior end of adult female; C, adult male (10.6 mm) in lateral view; D, antenna (♂); E, labrum (♂); F, mandible (♂); G, maxillule (♂); H, maxilla (♂).

Fig. 8 *Hippacanthomysis platypoda*, new genus, new species. A, penis; B, first thoracic limb (♂); C, second thoracic limb (♂); D, eighth thoracic limb (♂); E, fourth pleopod (♂); F, uropod (♀); G, telson (♂).

Figure 11. Hippacanthomysis platypoda Murano and Chess, 1987

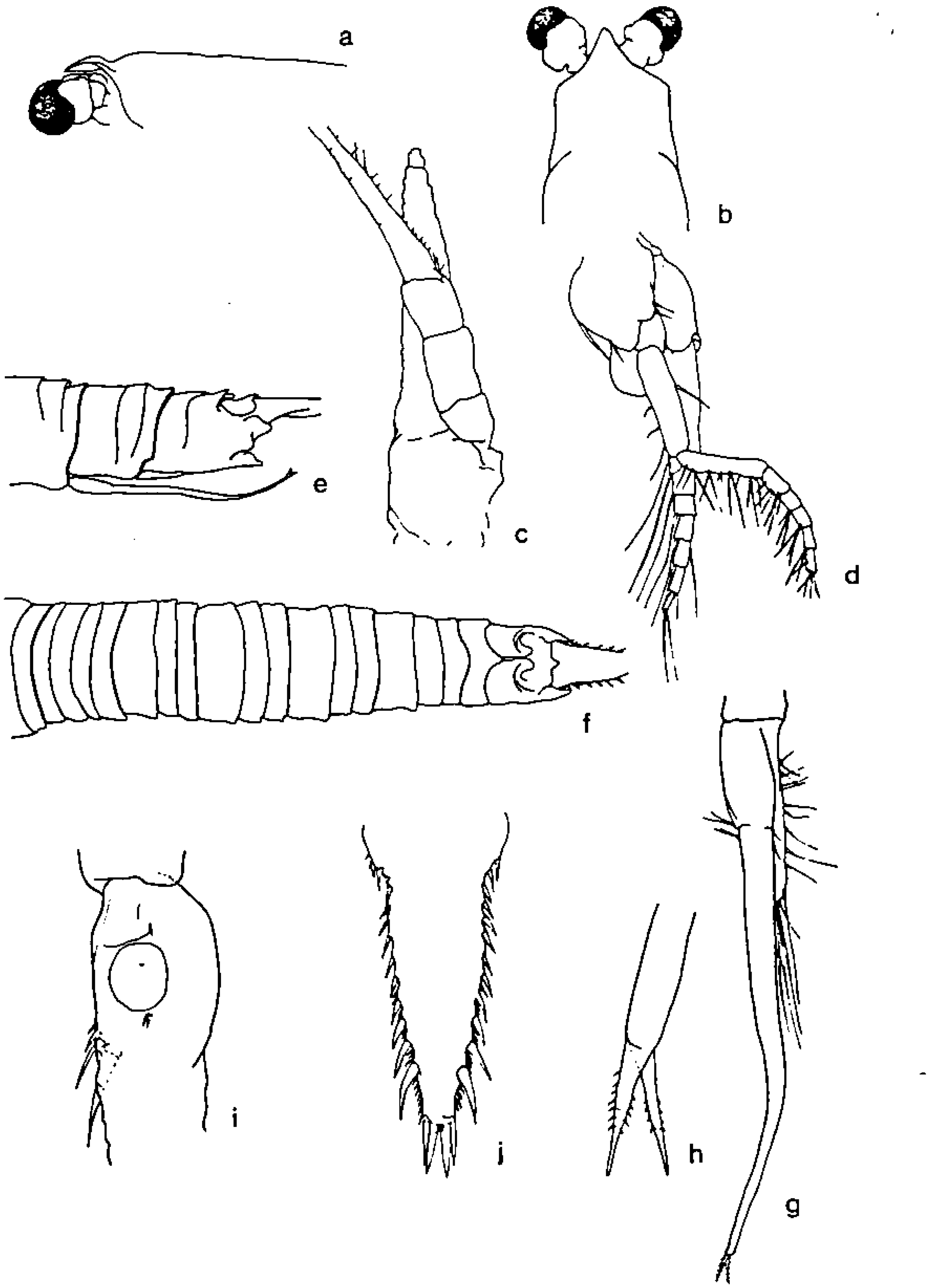


Holmesiella anomala

Figure. a. lateral view, female (original); b. dorsal view, anterior end, young male (7); c. mandible (1); d. 2nd thoracopod (1); e. 4th thoracopod (1); f. 1st male plepod (1); g. 3rd male pleopod (1); h. 4th immature male pleopod (9); i. 4th mature male pleopod (9); j. uropod and telson (original + 1, 7).

Figure 12. Holmesiella anomala Ortmann, 1908

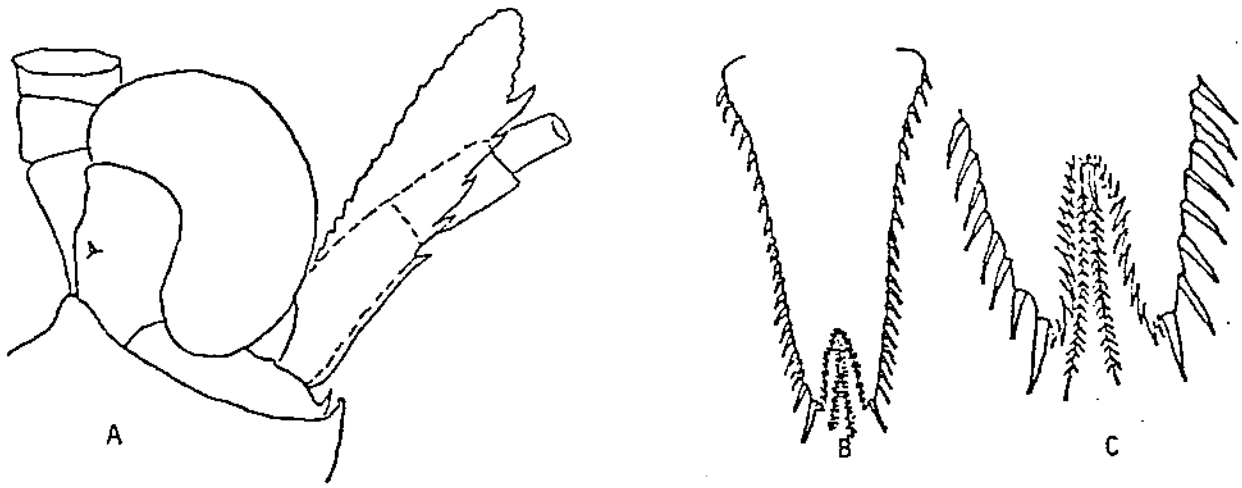
(from Kathman et al., 1986)



Holmesimysis costata

Figure. a. lateral view, anterior end (l); b. dorsal view, anterior end (l); c. antenna (2); d. 7th thoracopod (l); e. lateral view, abdomen (l); f. dorsal view, abdomen (l); g. 4th male pleopod (l); h. 4th male pleopod, terminal segment (l); i. uropod (l); j. telson (l).

Figure 13. <u>Holmesimysis</u> <u>costata</u> (Holmes, 1900)
(from Kathman et al., 1986)



Inusitatomysis californica (Bacescu & Gleye). Fig. A. Anterior end to show rostral plate, eye, antennal scale and peduncle, x 35; B. Telson x 35; C. Its tip, magnified x 70. (After Bacescu & Gleye).

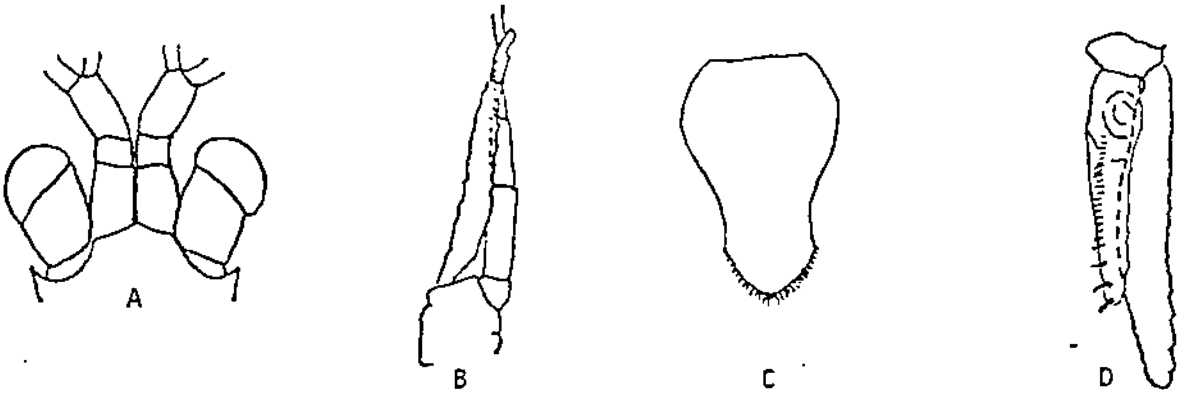
Diagnosis: Medium sized (7-8.5 mm ♂, 8-11 mm ♀) mysid with short eyes, very large cornea. Antennal scale narrow with 5 (rarely 6) teeth on the outer margin. Fourth pleopod of adult male extends beyond the statocyst. Telson triangular with deep cleft. Lateral margins bearing 18-21 (21-23 in ♂) large spines. Cleft with 12-15 teeth on each side, two pennate setae inserted at the base of the cleft. Single spine on the statocyst.

Note: The pennate setae in the cleft are quite delicate, easily lost in capture and difficult to see when present.

Occurrence: Southern California - Oceanside to Dana Point 75-100 meters.

Reference: Bacescu & Gleye. 1979

Figure 14. Inusitatomysis californica Bacescu and Gleye, 1979
(from Gleye, unpub.)



Metamysidopsis elongata (Holmes). Fig. A. Anterior end to show rostral plate, eye, and antennular peduncle, x 25; B. antennal scale and peduncle, x 78; C. Telson, x 100; D. Uropod, x78. (Fig. B-D after Tattersall).

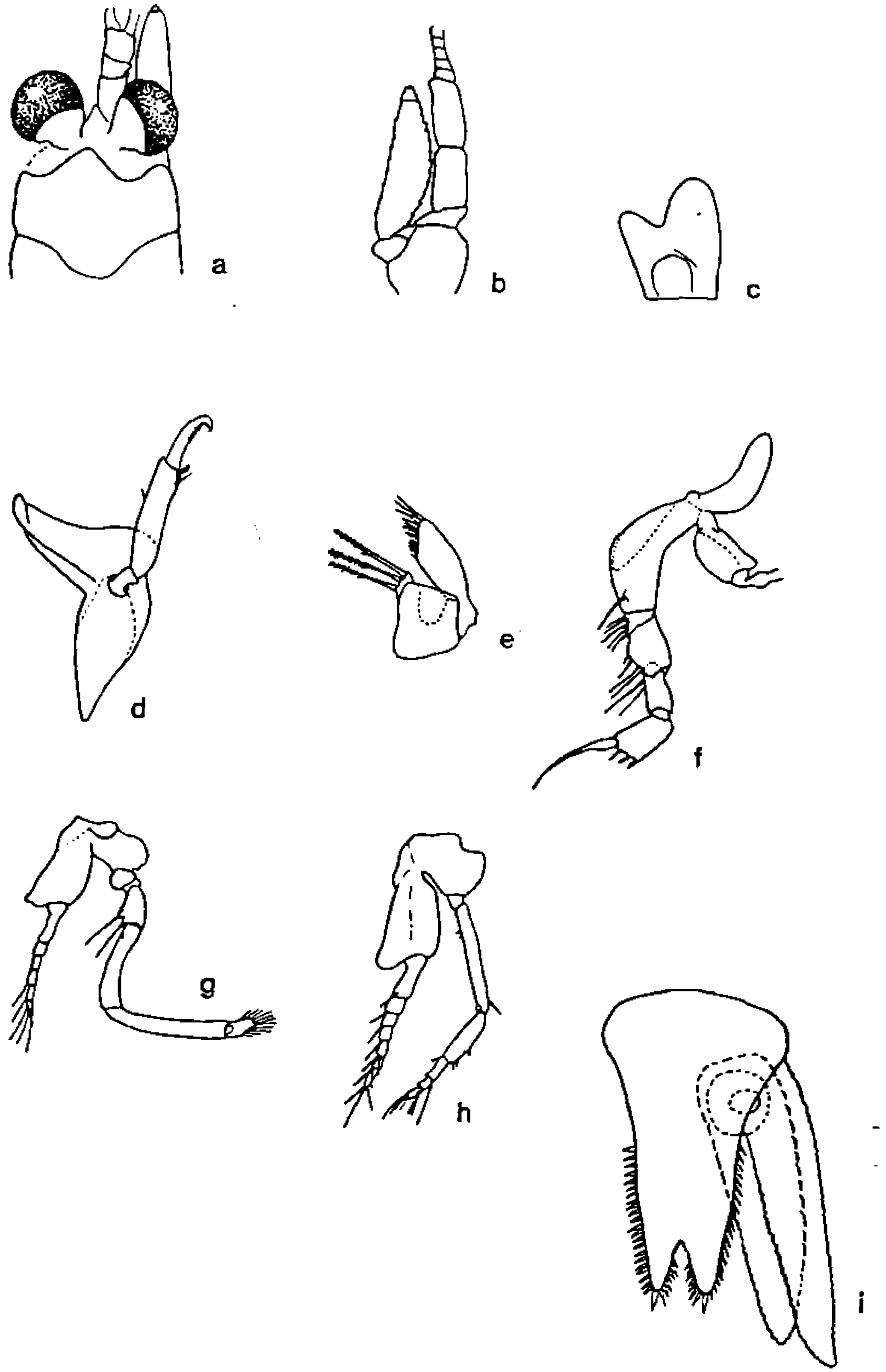
Diagnosis: Small (6-7 mm) slender mysid with large eyes, cornea occupying less than half of the whole eye. Antennal scale medium length, slender, with a distal suture. Male pleopods well developed. Telson short, linguiform with the distal half much narrower than the proximal half; apex rounded, armed with many short spines, lateral margins terminating in a spine but otherwise unarmed. Inner uropod with a row of spines from the statocyst to the tip; distal three spines large and widely separated.

Occurrence: Southern California - Imperial Beach to Dana Point to 37 meters depth. Los Angeles - L. A. Harbor (12 meters), Alamitos Bay (4 meters), Long Beach Harbor (22 meters).

Reference: Tattersall.

8-2⑦ 7-12-83 (0)
8-2③ 12-4-83 (2)

Figure 15. Metamysidopsis elongata (Holmes, 1900)
(from Gleye, unpub.)

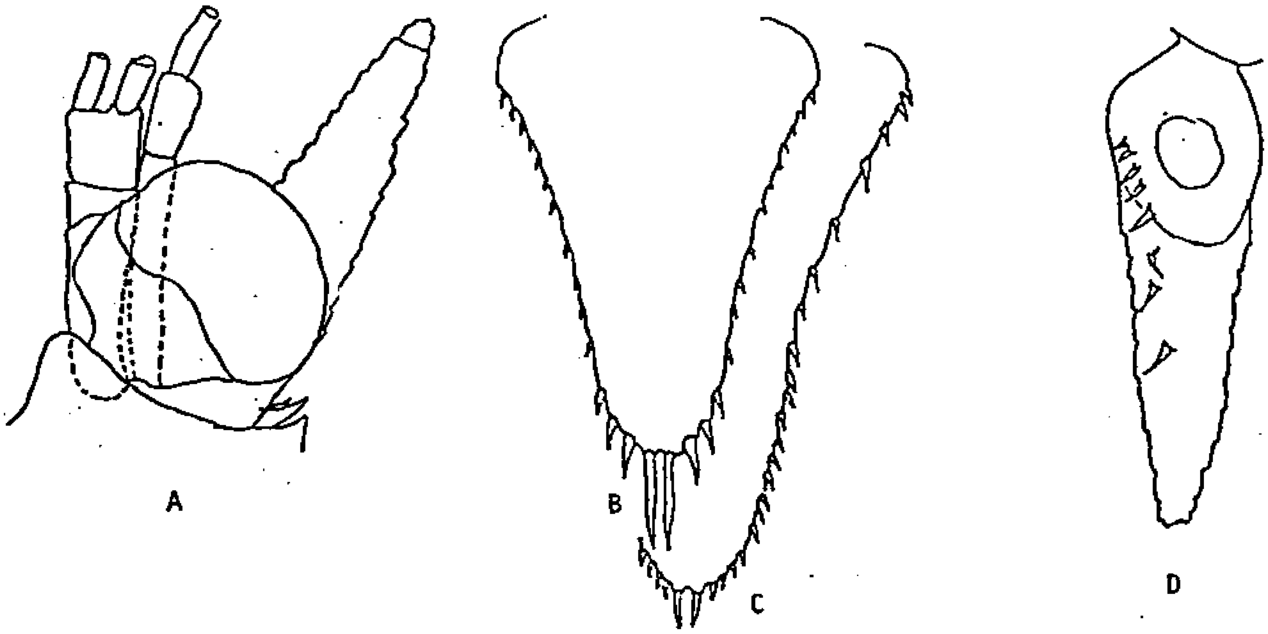


Mysidella americana

Figure. a. dorsal view, anterior end; b. antenna (2); c. labrum (1); d. mandible and palp (1); e. maxillule (1); f. 1st thoracopod (1); g. 2nd thoracopod (1); h. 6th thoracopod; i. uropod and telson (2).

Figure 16. <u>Mysidella</u> <u>americana</u> Banner,1948

(from Kathman et al., 1986)



Mysidopsis brattegardi (Bacescu & Gleye). Fig. A. Anterior end to show rostral plate, eye, antenular peduncle, and antennal scale and peduncle (x44); B. Telson (x80); C. Margin of another telson (x90); D. Endopod of uropod (x90). (Fig A-D after Bacescu & Gleye).

Diagnosis: Small (6-6.5 mm) mysids. Eyes large, cornea oval in lateral view. Antennal scale short, setose all around with a distal suture. Pleopods of adult male well developed. Telson linguiform, usually with 13-14 minute lateral spines and 2 strong apical spines. Seven to eight spines on the inner uropod, 4-5 on the statocyst the remaining ones occurring distally. Uropods fine, twice as long as the telson.

Note: Some specimens with abberrant telson spination have occurred.

Occurrence: Oceanside to Dana Point 75-100 meters.

Reference: Bacescu & Gleye.

Figure 17. Mysidopsis brattegardi Bacescu and Gleye, 1979
(from Gleye, unpub.)

(71)

Species: Mysidopsis californica

Museum Number:

Describer: Tattersall Date: 1932 Family: Mysidae

Tattersall, 1951. A review of the mysidacea of the U.S.N.M.

Source:

Synonomy: Location:

Distinguishing Characteristics:

1. Plepods of male well developed
2. Antennal scale extending one third length beyond the antennular peduncle
3. Telson one and three quarters as long as broad at the base, laterial margins armed with about 25 spines extending throughout margin

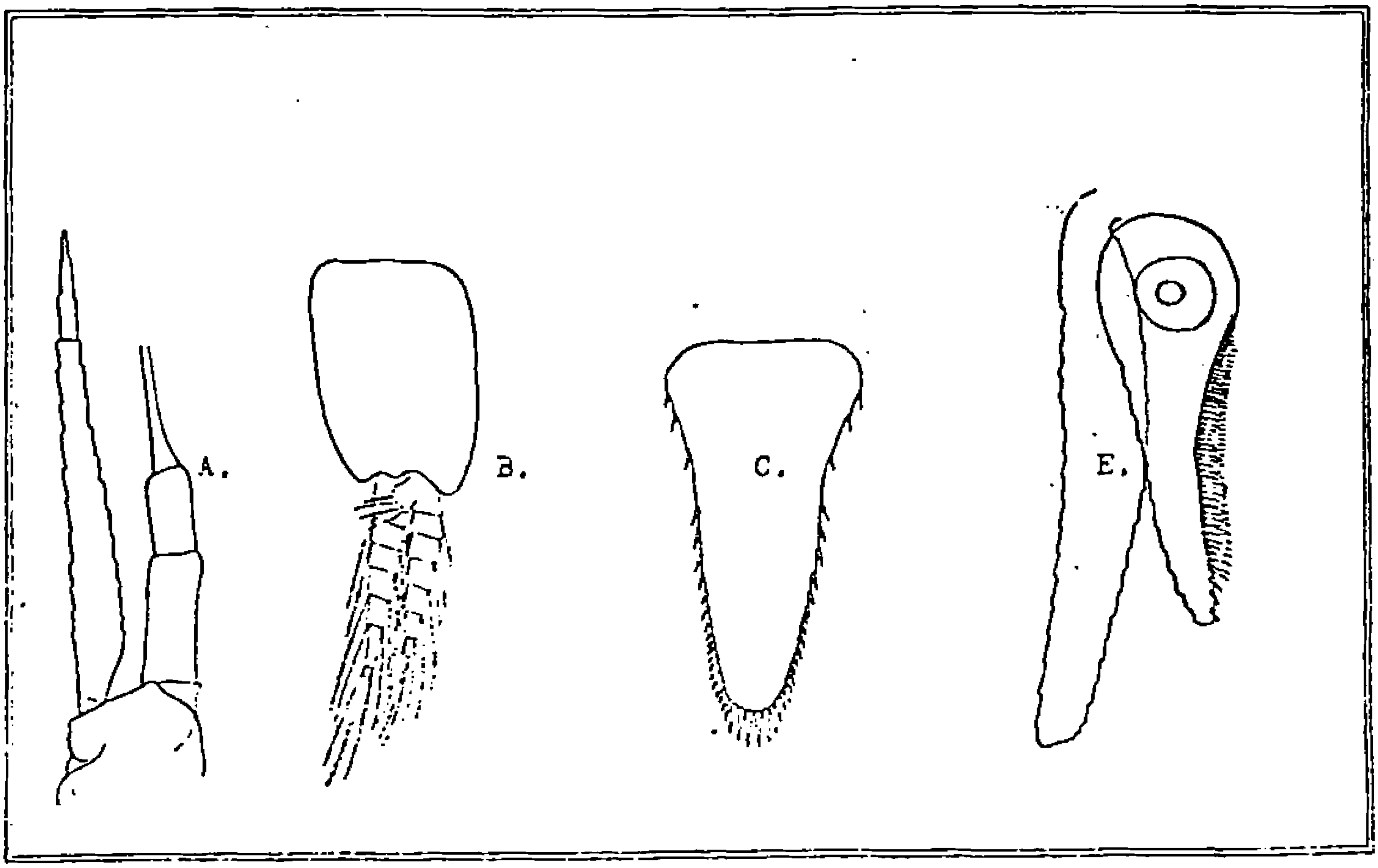


Figure 18. Mysidopsis californica W.M. Tattersall, 1932
(from MBC, unpub.)

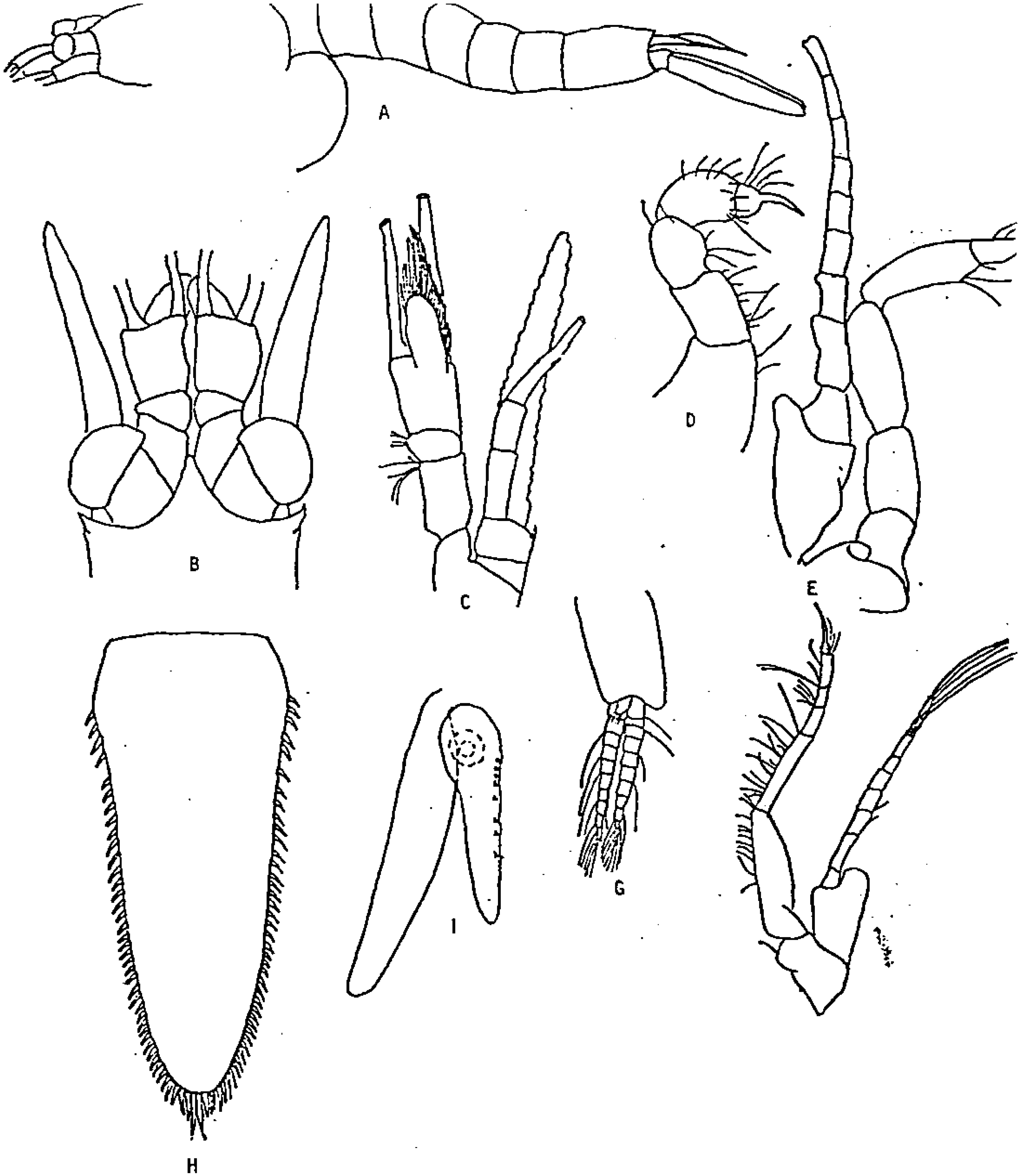
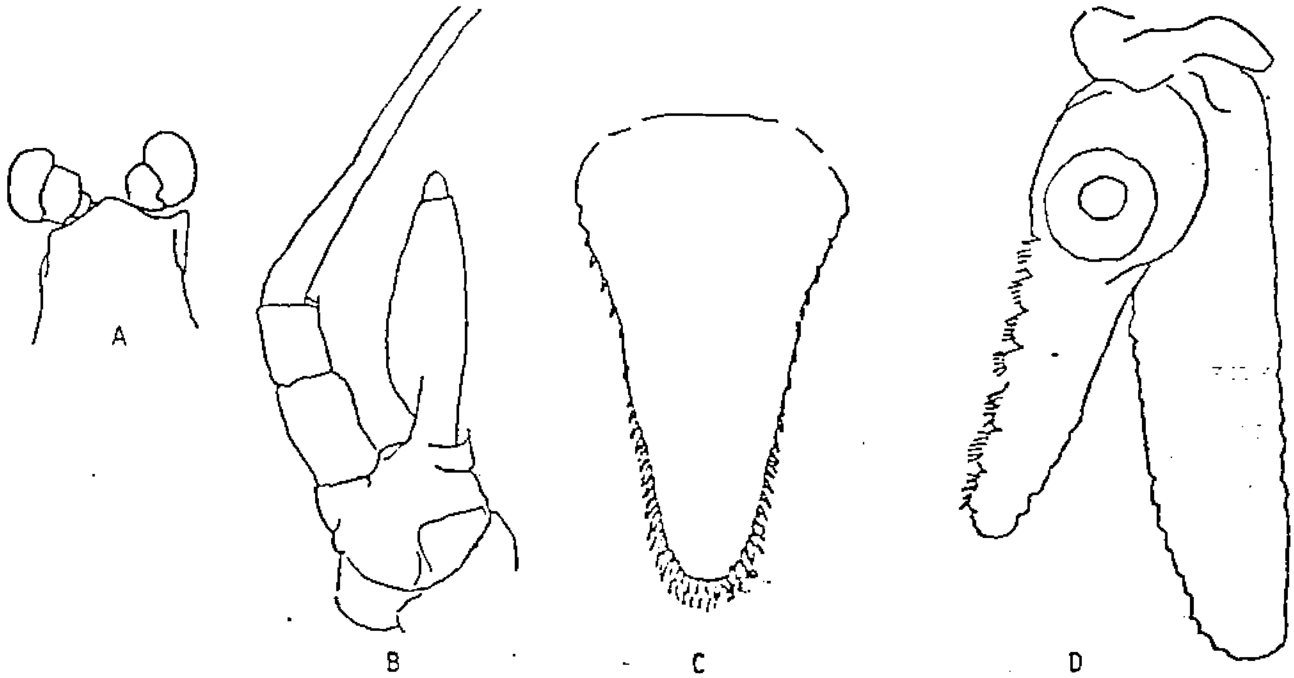


Fig. 2. *Mysidopsis cathengelae*(sp. n). A. Adult female lateral view (x12); B. Anterior end of adult male (25); C. Antennal scale and peduncle and antennular scale with masculine lobe of adult male (x25); D. Endopod of first thoracic limb (x50); E. Endopod of second thoracic limb (x50); F. Endopod of third thoracic limb (x25); G. Fourth pleopod of adult male (x25); H. Telson (x50); I. Uropod (x25).

Figure 19. *Mysidopsis cathengelae* Gleye, 1982



Mysidopsis intii (Holmquist). Fig. A. Anterior end to show rostral plate and eyes; B. Antennal scale and peduncle; C. Telson; D. Uropod. (Fig. A-D after Holmquist, no magnification scale offered).

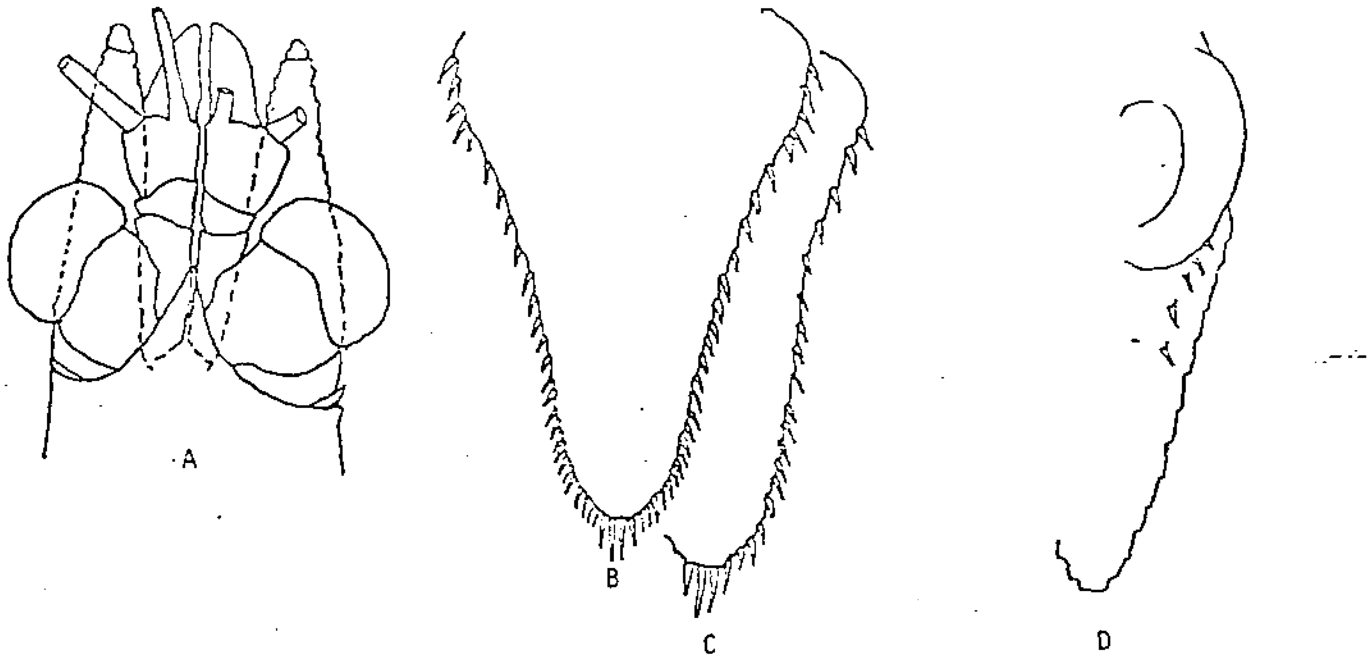
Diagnosis: Small (5 mm) stocky mysid. Eyes large, kidney shaped. Antennal scale short; setose all around, with a distal suture. Male abdominal pleopods well developed. Telson linguiform with small, sparsely spaced spines proximally. Spines increase in size and become close set distally. Apex densely armed with short heavy spines equal in length. Spines on inner uropod grouped in scallops extending from statocyst to tip.

Note: This species was originally described from samples taken along the Peruvian coast. Its appearance off Southern California brings up some interesting biogeographical questions.

Occurrence: Southern California between La Jolla and Dana Point out to 28 meters depth. Also reported in Los Angeles Harbor and Alamitos Bay.

Reference: Holmquist (1957)

Figure 20. Mysidopsis intii Holmquist, 1957
(from Gleye, unpub.)



Mysidopsis onofrensis (Bacescu & Gleye). Fig. A. Anterior end of adult male to show rostral plate, eyes, antennal scale and antennular peduncle (x35); B. Telson (♀) (x87); C. Right margin of telson (♂) (x87). D. Endopod of uropod, inside margin (x87). (Fig. A-D after Bacescu & Gleye.)

Diagnosis: Small (5.5-6.4 mm ♂♂, 4.6-6 mm ♀♀) compact mysid. Eyes cylindrical. Antennal scale short, setose all around with a distal suture. Male abdominal pleopods well developed. Uropods short, rounded; inner uropod broad with 5 spines, the first 2-3 on the stratocyst. Outer uropod only slightly longer than the inner. Telson linguiform, with small spines, slightly increasing in size distally; on the apex, 2 spines twice as large as the 2 sub apicalspines (which are twice the length of the preceding lateral spines.) The number of spines on the telson differs with sex and age.

Note: The relatively short broad inner uropod is an easy clue to the identification of this species.

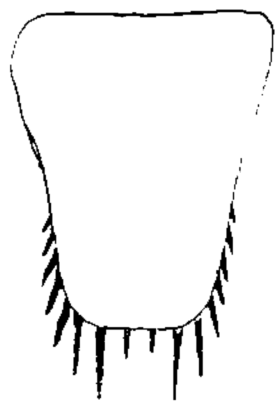
Occurrence: Oceanside to Dana Point 15 meters depth. Occurrence sporatic.

Reference: Bacescu & Gleye.

Figure 21. Mysidopsis onofrensis Bacescu and Gleye, 1979 (from Gleye, unpub.)

?*Mysidopsis* sp. A Phillips

Family Mysidae



telson

1. Telson short, broadly linguiform, armed with three pair apical spines, median pair short, two outer pairs about twice as long as median pair, lateral margins with 5-6 spines on the distal third of telson, length of lateral spines increases distally along margin.

2. Antennal scale with setae on both margins.

3. Eyes with well developed ommatidia.

4. Both rami of uropods with long setae along both margins.

Figure 22. ?*Mysidopsis* sp. A Phillips

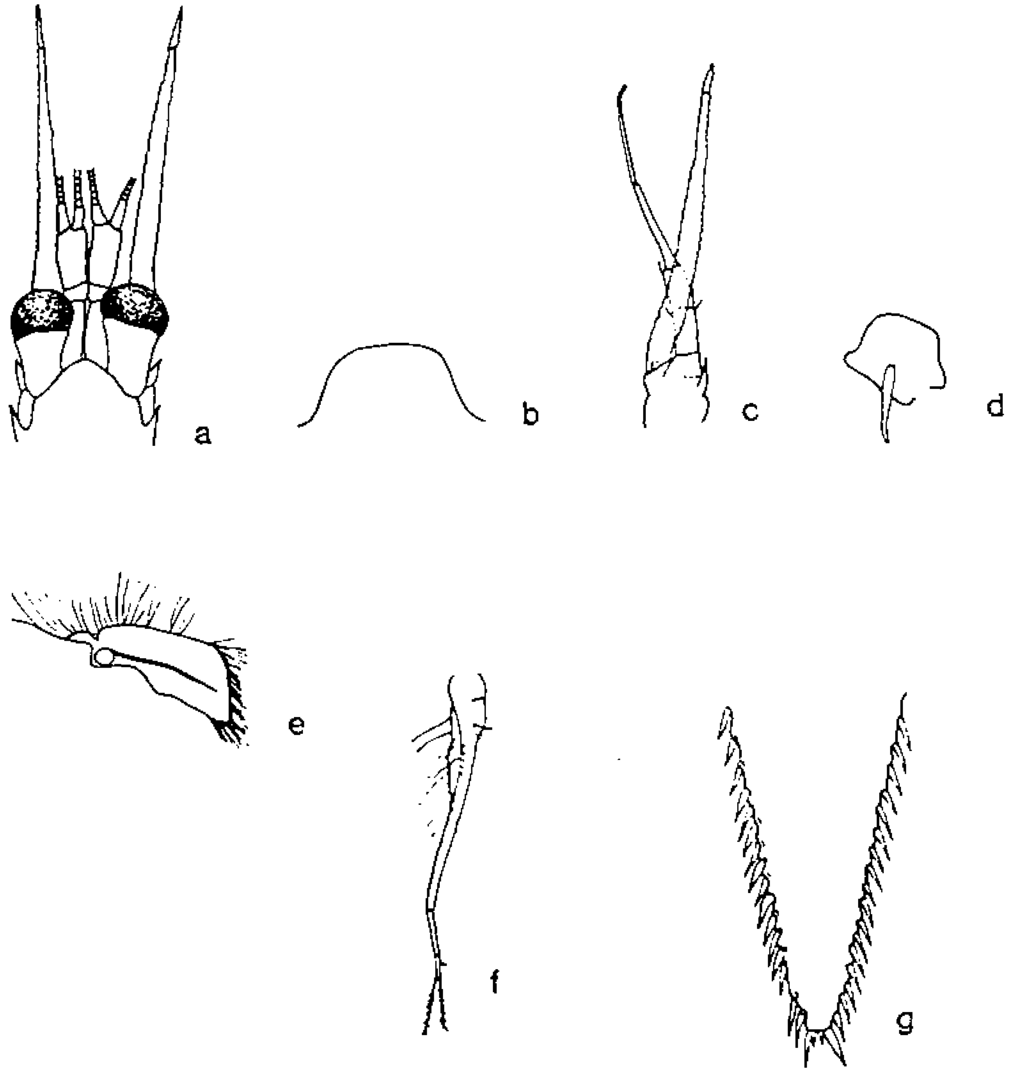


Figure. a. dorsal view, anterior end (2); b. rostrum (5); c. antenna (5); d. fingerlike process on thoracic sternum (5); e. anterior oostegite with baler (posterior lobe) (5); f. 4th male pleopod (5); g. distal half of telson (4).

Neomysis kadiakensis

Figure 23. <u>Neomysis</u> <u>kadiakensis</u> Ortmann, 1908
(from Kathman et al., 1986)

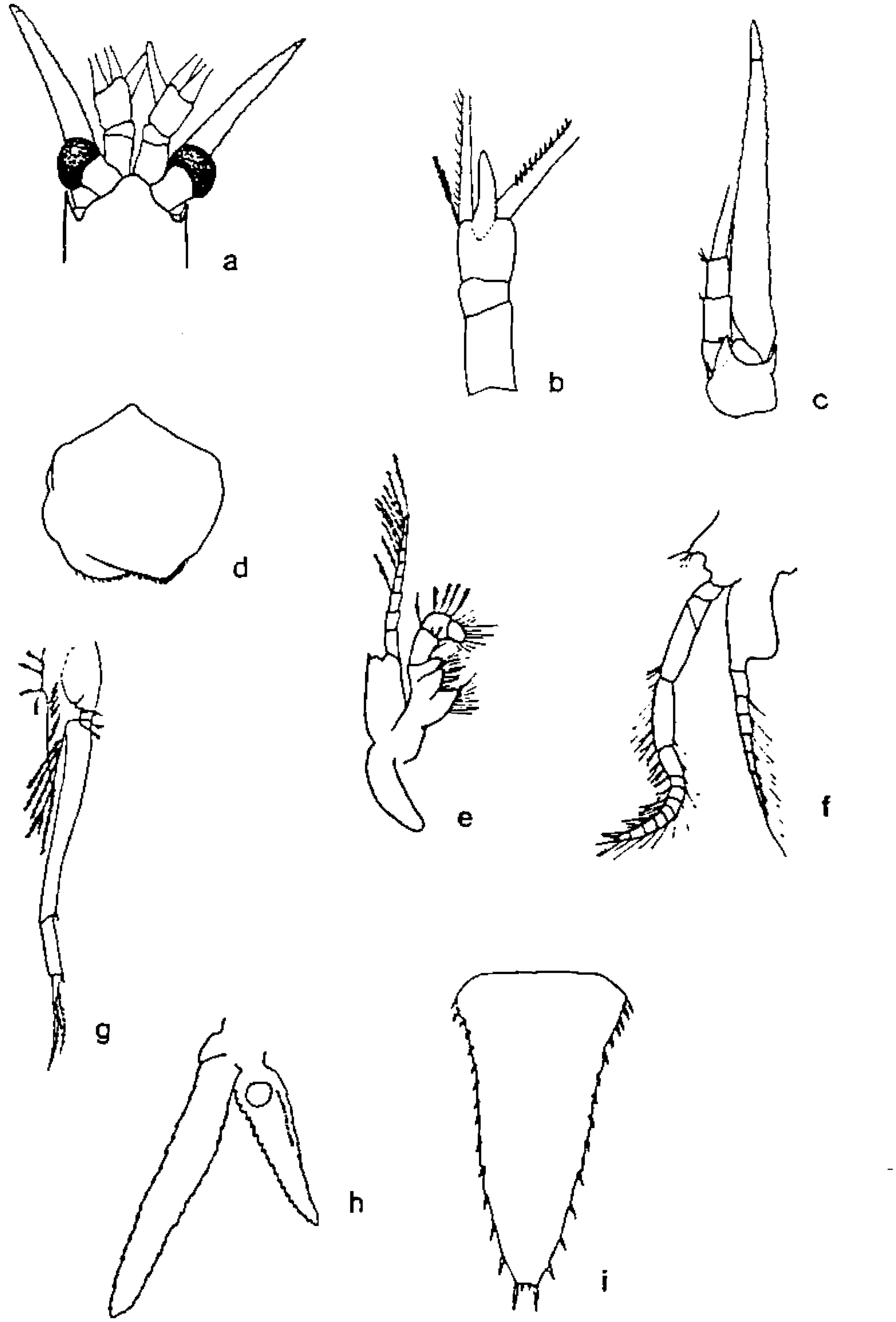
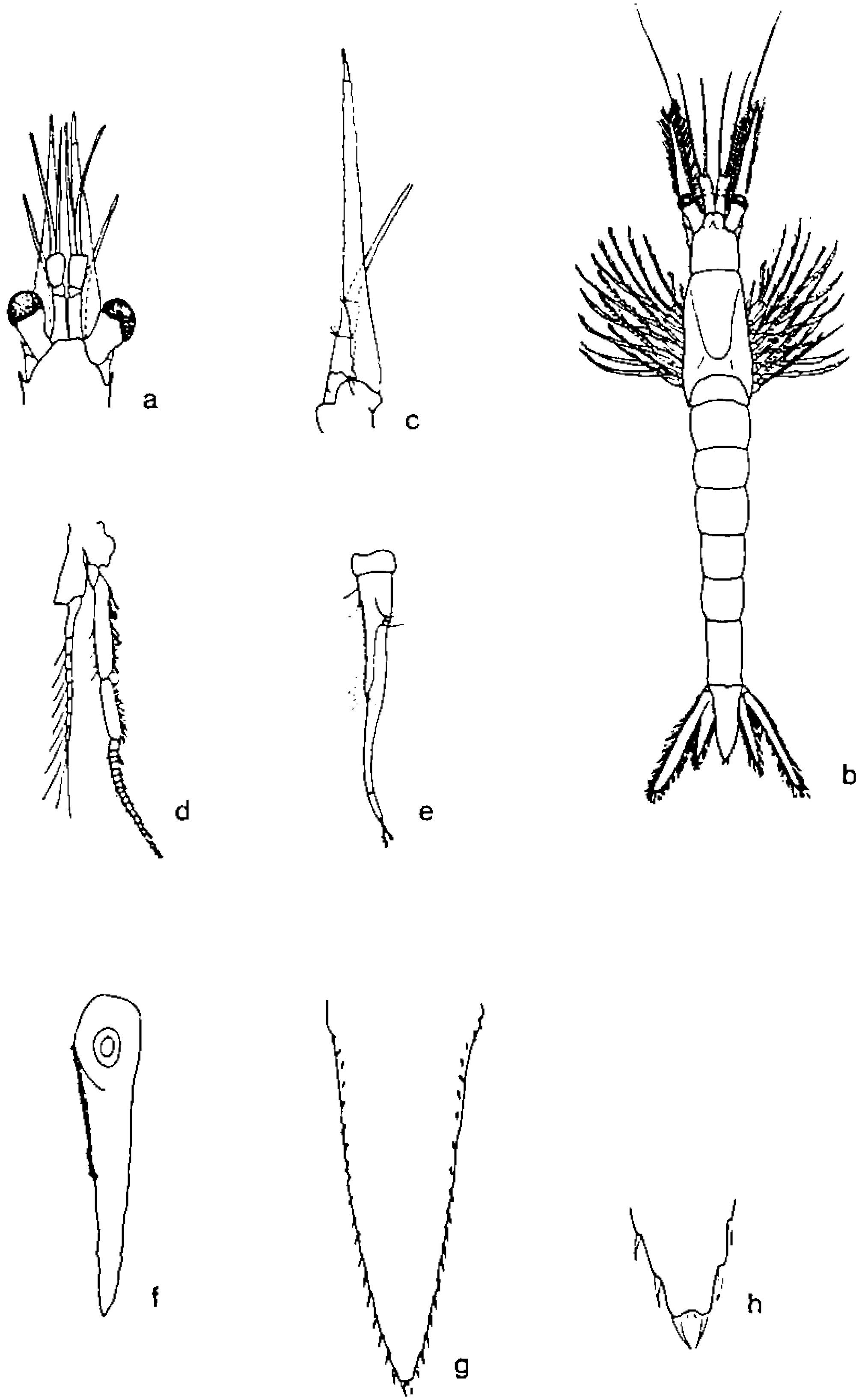


Figure. a. dorsal view, anterior end (2); b. antennular peduncle (1); c. antenna (9); d. *labrum* (3); e. 1st *thoracopod* (2); f. 4th thoracopod (2); g. 4th male pleopod (9); h. uropod (2); i. telson (9).

Neomysis mercedis

Figure 24. Neomysis mercedis Holmes,1897
(from Kathman et al., 1986)



Neomysis rayi

Figure. a. dorsal view, anterior end, female (4); b. dorsal view (1); c. antenna (7); d. posterior thoracopod (4); e. 4th male pleopod (7); f. endopod of uropod (4); g. telson (7); h. telson apex (4).

Figure 25. Neomysis rayi (Murdock,1885)
(from Kathman et al., 1986)

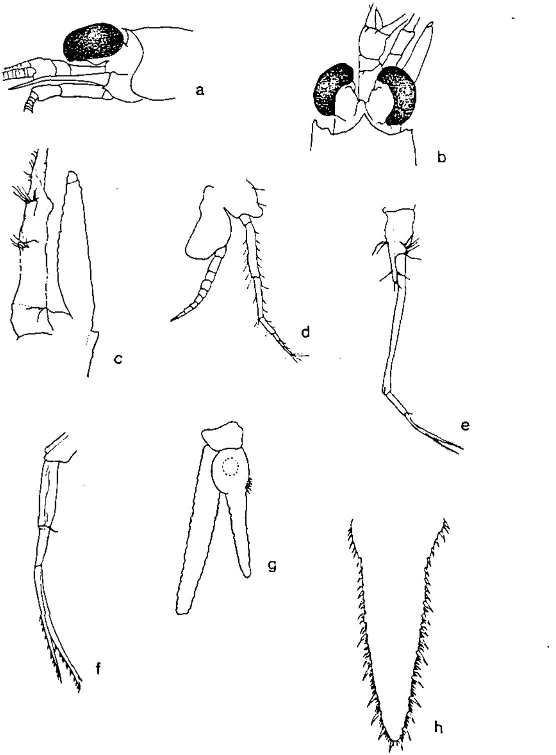


Figure. a. lateral view, anterior end (1); b. dorsal view, anterior end (1); c. antenna (3); d. 4th thoracopod (1); e. 4th male pleopod (3); f. 4th male *pleopod, distal portion* (3); *g. uropod* (1); *h. telson* (3).

Pacifacanthomysis nephrophthalma

Figure 26. Pacifacanthomysis nephrophthalma (Banner, 1948)

(from Kathman et al., 1986)

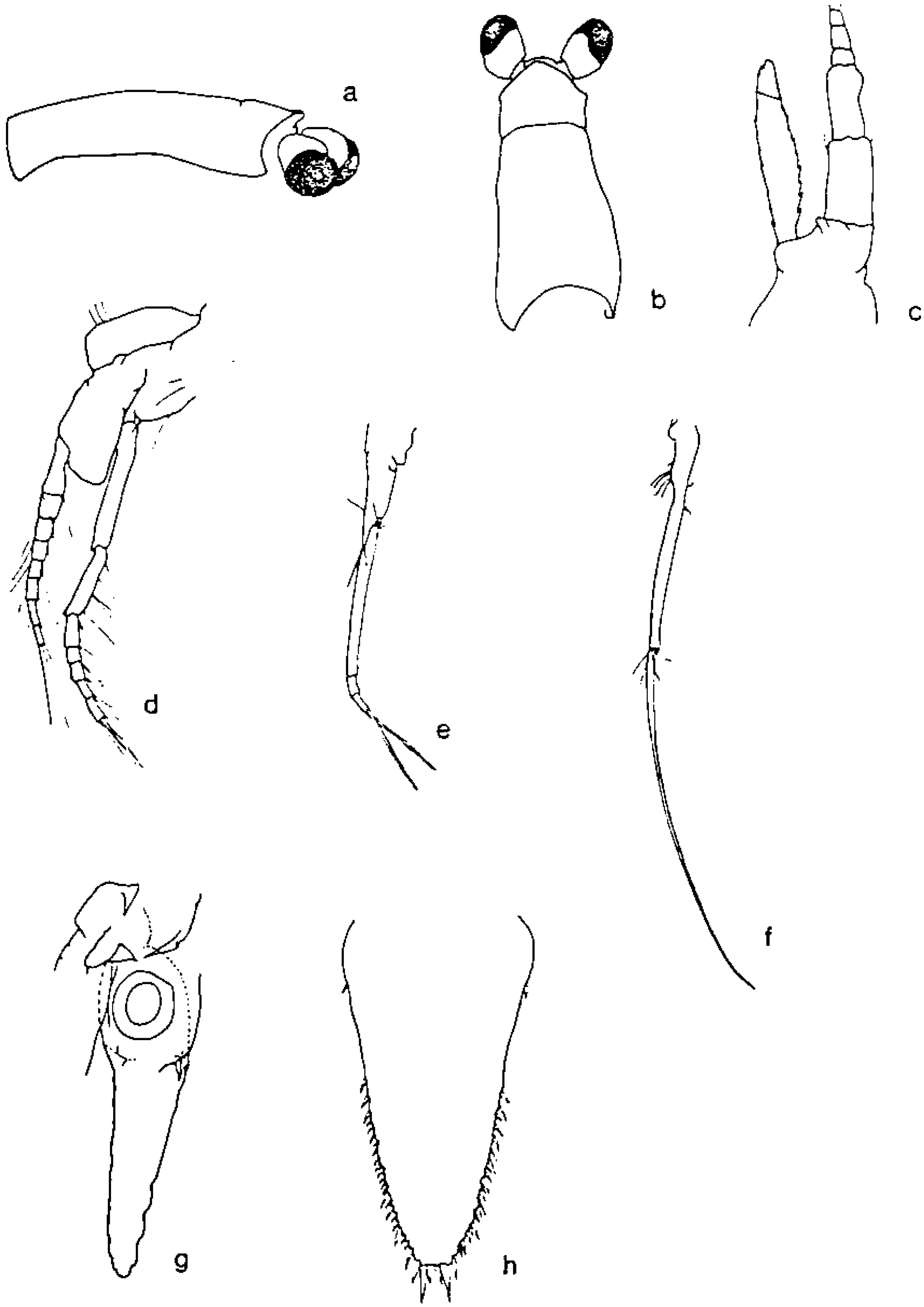
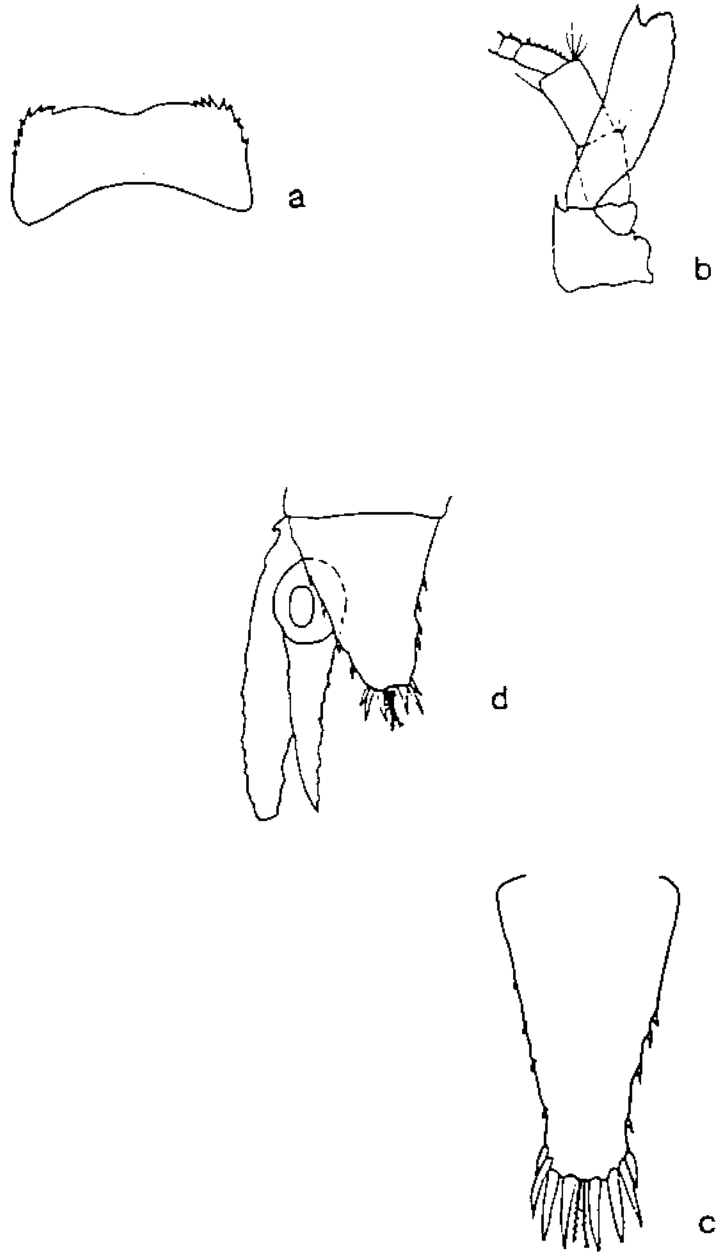


Figure. a. lateral view, anterior end (3); b. dorsal view, anterior end (3); c. antenna (1); d. 8th thoracopod (3); e. 4th male pleopod (1); f. 5th male pleopod (1); g. uropod (3); h. telson (3).

Proneomysis wailesi

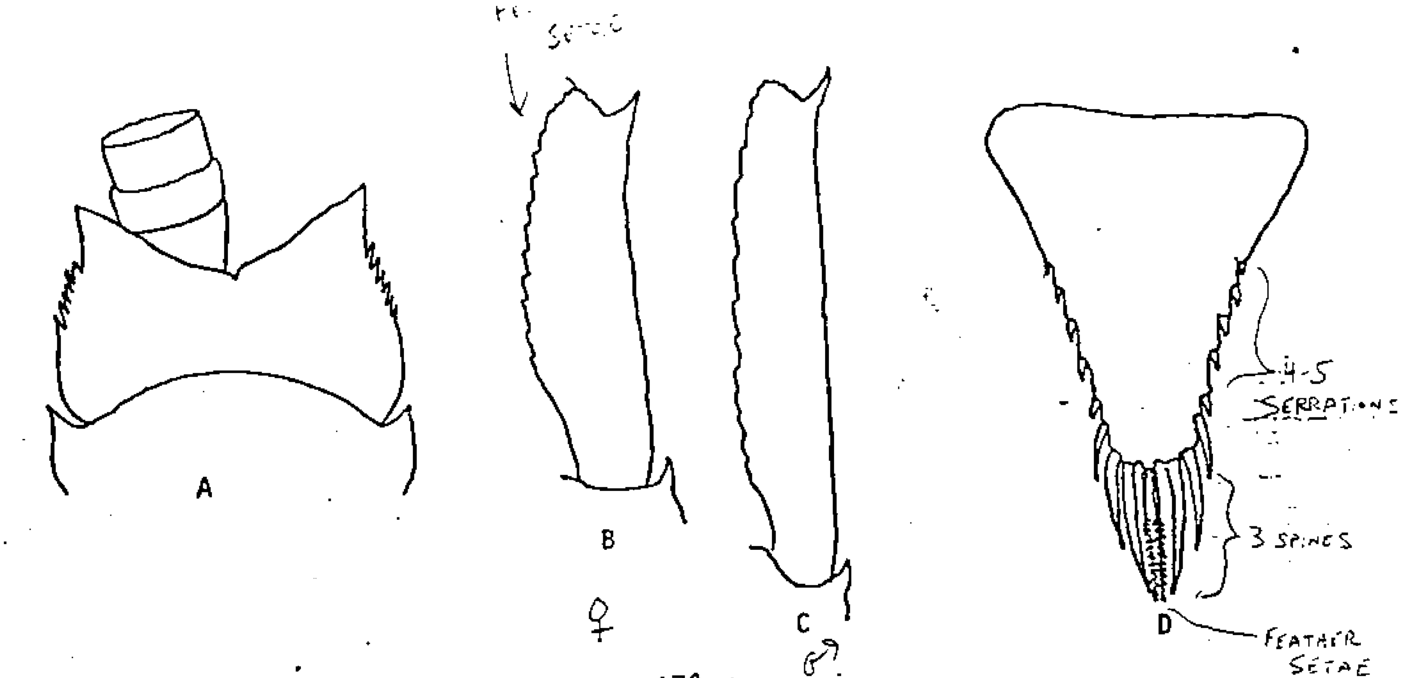
Figure 27. Proneomysis wailesi W.M. Tattersall, 1933
(from Kathman et al., 1986)



Pseudomma berkeleyi

Figure. a. ocular plate (1); b. antenna (1); c. telson (1); d. uropod and telson (original, but possibly not P. berkeleyi).

Figure 28. Pseudomma berkeleyi W.M. Tattersall, 1933
(from Kathman et al., 1986)



1979

Pseudomma californica (Bacescu & Gleye). Fig. A. Anterior end to show rostral plate and ocular plate (x90); B. Antennal scale (♀)(x90); C. Antennal scale (♂)(x90); D. Telson (x45). (Fig A-D after Bacescu & Gleye).

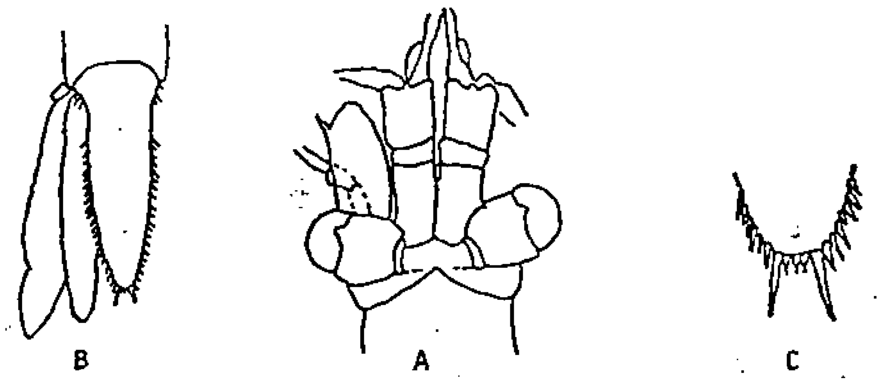
Diagnosis: Small (4-5 mm) "eyeless" mysid. Occular plate large, with strongly serrated outer margins. Antennal scales sexually demorphic, male scale longer and proportionately thinner. Male with well developed abdominal pleopods. Telson triangular with a pair of long apical spines and another two, shorter subapical spines. Six lateral spines increasing in length distally.

Occurrence: Southern California between Oceanside and Dana Point 75-100 meter depth.

Reference: Bacescu & Gleye.

F-2 10-4-83 LA PL VOUCHER C-117

Figure 29. Pseudomma californica Bacescu and Gleye, 1979
(from Gleye, unpub.)



Siriella pacifica (Holmes). Fig. A. Anterior end of adult male showing rostral plate, eyes, antennal scale and peduncle and antennular peduncle (x22); B. End of abdomen with telson and left uropod of male (x20); C. Distal portion of telson (x67). (Fig A-C after Tattersall).

Diagnosis: Delicate, medium sized (9mm) mysid. Eyes relatively small. Outer margin of antennal scale naked, terminating in a spine, terminal lobe broader than long. Male with well developed abdominal pleopods. Telson long and narrow, terminating in 3 small spines placed between a pair of long strong spines. Lateral margins armed with long and short spines with a bare area proximally.

Note: The telson spination of younger specimens may sometimes be confused with that of Neomysis, the antennal scale should be used as the #2 key characteristic.

Occurrence: Found in bottom nearshore samples containing kelp detritus, is considered a member of the kelp (Macrocystis) community.

Reference: Tattersall, 1951.

Figure 30. Siriella pacifica Holmes, 1900 (from Gleye, unpub.)

Southern California Association of
Marine Invertebrate Taxonomists

3720 Stephen White Drive
San Pedro, California 90731

February, 1992 Vol. 10, No. 10

NEXT MEETING:	Abranchiate Terebellids (Amphitritinae)
GUEST SPEAKER:	Leslie Harris Allan Hancock Foundation University of Southern California
DATE:	March 9, 1992 9:30am - 3:00pm
LOCATION:	Alan Hancock Foundation Building, Room 30 University of Southern California Los Angeles, California

MARCH 9 MEETING:

The genera that will be covered are Lanassa, Proclea, and Leaena. Remember to bring any problem specimens with you to the meeting.

MINUTES FROM MEETING ON FEBRUARY 10, 1992:

Ron Velarde began the meeting by disclosing a new record of Nymphon sp. (Pycnogonida-Nymphonidae) collected in an otter trawl off Point Loma in ≈300 ft. of water. He also passed on the following announcement from Eric Marshall of the Smithsonian, dated January 9, 1992.

> The Smithsonian Institution has recently prepared a CD-ROM which contains three bibliographies:

FUNDS FOR THIS PUBLICATION PROVIDED IN PART BY THE ARCO FOUNDATION, CHEVRON USA, AND TEXACO INC.

Literature on the Polychaeta - by L. A. Ware and K. Fauchald;
Interdisciplinary bibliography of freshwater crayfishes... through 1988 - by J. Clark and C. W. Hart Jr.;
Cephalopod computerized bibliographic system (CCBS) - by C. F. R. Roper.

This is marked as Smithsonian Institution CD-ROM No. 1. The CD runs on ROMWARE which is on the CD and does not have to be down loaded on to the your hard drive. Copies are available free of charge. Write to:

C. W. Hart, Jr.
NHB 163
Smithsonian Institution
Washington, DC 20560.

Thanks to Dave Vilas for the information.

Nominations for 1992-93 SCAMIT officers were taken at the meeting and were left open for rest of the week. The following names were entered for nomination:

Ron Velarde - President
Larry lovell - Vice President
Ann Martin - Treasurer
Don Cadien - Secretary
Diane O'Donohue - Secretary

Short biographies of all the nominees along with a ballot have been included with the newsletter. Ballots are due by March 16. They can be either mailed to Larry Lovell or bring them to the March meeting. See ballot for the mailing address.

Ophiuroidea Workshop: Dr. Gordon Hendler began the workshop with a brief review of the families of Ophiuroidea. He then discussed some work being done at SCCWRP on aboral disk regeneration. It seems that the pattern of scales depends on whether the disk has been regenerated or not. A regular pattern of scales is lost after regeneration.

On the subject of *Amphiodia urtica* verses *A. digitata* Dr. Hendler explained the *A. digitata* has scales with spines along the entire outer margin of the disk. *A. urtica* spines are clustered near the radial shields. A more complete explanation along with keys and illustrations have been included in the newsletter.

Dr. Hendler has ask all SCAMIT members to report to him any large populations of *A. digitata* that you may find.

FUTURE MEETINGS:

The April 13 meeting will be lead by Don Cadien of the Los Angeles County Sanitation District. The subject will be Thalassinoid shrimp. It will be held at the Cabrillo Marine Museum, San Pedro, California.

Amphipod workshop: Hard working Larry Lovell has confirmed Dr. E. L. Bousfield for the 1992 Amphipod Workshop tentatively scheduled for December 7 and 8.

SCAMIT OFFICERS:

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

President	Ron Velarde	(619)692-4903*
Vice-President	Larry Lovell	(619)945-1608
Secretary	Kelvin Barwick	(619)692-4900*
Treasurer	Ann Martin	(213)648-5317

* **Please make a note that these are new numbers.**

CANDIDATE BIOGRAPHIES

PRESIDENT

Ron Velarde

Ron is the current SCAMIT President and past Vice-President; he is a marine biologist with the Point Loma Wastewater Treatment Facility (City of Sand Diego) where he has worked since 1983. His taxonomic interests include poychaetes, particularly syllids, and nudibranch mollusks. He earned his B.S. degree in Marine Biology from California State University, Long Beach, in 1976, and did post-graduate research on the systematics and ecology of autolytid polychaetes.

VICE-PRESIDENT

Larry Lovell

Larry is currently a private consultant and Vice-President of SCAMIT. Prior to his independent status, he was employed at Point Loma Wastewater Treatment Facility (City of San Diego). He also worked MEC Analytical Systems for 12 years. Prior to that he worked under the guidance of Dr. Kristian Fauchald in the Worm Room at the Allan Hancock Foundation in 1975 and 1976 on the BLM project. He earned his B.S. in Biology from the University of South Carolina in 1973. His primary taxonomic interest is polychaetes.

SECRETARY

Diane O'Donohue

Diane is employed by the city of San Diego. Previously, from 1987 to 1991, she worked for the Southern California Coastal Water Research Project (SCCWRP) specializing in polychaete identification and data management. She did her post graduate work Long Beach State. Diane has been a member of SCAMIT since 1988 and received a B.S. in Biology from Old Dominion University in Norfolk, Va. in 1986. During her undergraduate training she worked as a student intern sorting samples from the Chesapeake Bay and Atlantic Ocean and she also participated in field sampling. Since 1986 Diane has maintained an interest in the study of marine invertebrates, particularly polychaetes.

Don Cadien

Don graduated with a B.S. in Zoology from California State University at Long Beach. He is presently employed by the County of Los Angeles Sanitation District as a Marine Biologist. From 1975-1989 he was Project Manager/Principal Investigator for MBC Applied Environmental Sciences. His

Fell, H.B. 1960 Synoptic Keys to the Genera of Ophiuroidea. Zoology Publications from Victoria University of Wellington No. 26, 44 pp.

Order OPHIURIDA Mueller & Troschel, 1840

syn. Myophiuroida Matsumoto, 1915

KEY TO THE SUBORDERS, FAMILIES AND SUBFAMILIES

1 (8) Disc and arms covered by thick skin which may contain a mosaic of granules but does not overlie a layer of plates or scales. Arm-spines point downwards. Arms roll into vertical coils. Vertebrae articulate by broad, hourglass-shaped surfaces . . . Suborder EURYALAE M. & T. p. 7.) ← C/SC Phrynophiurida (includes ophiomyxina and Euryalina)

2 (7) Vertebrae with a ventral furrow, so that the radial canal and nerve are not imbedded in stereom, distal arm-joints not long and slender.

3 (4) Hooks on dorsal side of arms; the hooks have no lamina and lack regularly arranged perforations; gonads restricted to disc. . . (Family GORGONOCEPHALIDAE Ljungman, 1867, emend. Mortensen, 1933. p. 7.)

4 (3) No hooks on dorsal side of arms; but at distal end of arm the lateral arm-spines are transformed into hooks which lack a lamina and lack perforations.

5 (6) Gonads restricted to disc. (Fam. ASTERONYCHIDAE Verrill, 1899, emend. Mortensen, 1933, p. 11.)

6 (5) Gonads extending to at least midway along the arms. . . (Fam. ASTEROSCHEMATIDAE Verrill, 1899, restr. Mrtsn., 1933; non Matsumoto, 1915. p. 11.)

7 (2) Vertebrae with ventral furrow closed over, so that radial canal and nerve lie within the vertebrae; distal arm-joints long and slender; no hooks on dorsal side of arms, but at distal end of arm the lateral arm-spines are transformed into hooklets with a lamina perforated by serially arranged holes (Fam. EURYALIDAE Gray, 1840, emend. Mortensen, 1933, p. 10.)

8 (1) Disc and arms covered by scales or plates (sometimes invested by skin or granules). Arm-spines placed laterally on arms. Arms usually move horizontally (but in Fam. Hemieuryalidae they roll vertically). . . . (Suborder OPHIURAE Mueller & Troschel, p. 12.) ← C/SC ophiurida (includes: Chilophiurina — ophiuridae, Ophioleucidae, Ophiocomidae, ophionereididae, ophiodermatida; Laemophiurina — Hemieuryalida, ophiacanthid; Gnathophiurina — Amphiuridae, (Amphilepidida, ophiactidae, ophiotrichidae)

9 (10) Arms rolling vertically into tight coils. Vertebrae with broad, saddle-shaped articulations, like those of the Order Euryalae. Usually epizoic upon gorgonian corals. . . (Fam. HEMIEURYALIDAE Verrill, 1899. p. 12.)

10 (9) Arms bending only sideways, in the horizontal plane. Vertebrae with ball-and-socket joints, or with interlocking processes. Usually free-living, only very rarely epizoic.

11 (12) Disc without ventral interradial areas. Gonads arranged serially along the arms on either side, bulging visibly below the skin. Stomach sending a dorsal radial diverticulum into each arm. . . (Fam. OPHIOCANOPIDAE Mortensen, 1933. p. 15.)

12 (11) Disc with conspicuous ventral interradial areas. Gonads and stomach confined to disc.

13 (16) Thick soft skin covers the plates of disc and arms, but the underlying plates and scales become visible after drying. Arm-spines erect. . . . (Fam. OPHIOMYXIDAE Ljungman, 1866. p. 13.)

14 (15) Oral shields small. Adoral plates long and slender, lying between the oral shield and the first lateral arm-plates. Vertebrae long and slender, the articular peg well-developed. . . . (Subfam. OPHIOMYXINAE Ljungman, 1866, restr. Matsumoto, 1915, p. 13.)

15 (14) Oral shields and adoral plates fused together, massive. Adoral plates proximal to oral shield. Vertebrae short, thick, the articular peg rudimentary or lacking. . . . (Subfam. OPHIOBYRSINAE Matsumoto, 1915, p. 15.)

16 (13) Disc and arms not covered by thick skin. Scales and plates easily visible, though they may carry spines or granules more or less concealing them on the disc.

17 (20) Spiniform tooth-papillae forming a cluster at the apex of each jaw.

18 (19) Oral papillae border each jaw. (Fam. OPHIOCOMIDAE Ljungman, 1867. p. 25.)

19 (18) No oral papillae. (Fam. OPHIOTHRICIDAE Ljungman, 1867. p. 23.)

20 (17) No tooth-papillae.

21 (22) Paired infradental papillae at the apex of each jaw. . . . (Fam. AMPHIURIDAE Ljungman, 1867, p. 20.)

22 (21) An unpaired infradental papilla at the apex of each jaw.

23 (28) Arms inserted laterally into the disc and firmly fused to it.

24 (25) Granulation covers over the disc-scales of both upper and lower surfaces, often also covering the jaws. . . . (Fam. OPHIODERMATIDAE Ljungman, 1867. p. 26.)

25 (24) No granulation. . . . (Fam. OPHIURIDAE Lyman, 1865. p. 28.)

26 (27) Second oral tentacle-pore opens more or less entirely outside the oral slit. . . . (Subfam. OPHIURINAE Lyman, 1865, restr. Matsumoto, 1915, p. 28.)

27 (26) Second oral tentacle-pore opens entirely within the oral slit. (Subfam. OPHIOLEPIDINAE Matsumoto, 1915, p. 32.)

28 (23) Arms inserted ventrally below the disc and partly overlain by the disc, the arms and disc not firmly fused together.

29 (36) Free margins of jaw bear a continuous series of uniform oral papillae.

30 (33) No granulation or spinules on disc.

31 (32) Arms robust, not constricted at the nodes. A ventral keel on the midline of each ventral arm-plate, often also a similar keel on the dorsal arm-plates. Disc large, flat. . . . (Fam. OPHIOCHITONIDAE Matsumoto, 1915, p. 26.)

32 (31) Arms slender, elongate, with no ventral or dorsal keels. Vertebrae long, slender, often divided longitudinally by a series of pores. . . . (Fam. AMPHILEPIDIDAE Matsumoto, 1915. p. 23.)

33 (30) Granules or spinules present on disc. Arms slender, often constricted at the nodes. Mainly abyssal forms.

34 (35) Arm-spines numerous, long, conspicuous, erect. . . . (Fam. OPHIACANTHIDAE Perrier, 1891. p. 15.)

35 (34) Arm-spines few, small, inconspicuous, adpressed. . . . (Fam. OPHIOLEUCIDAE Matsumoto, 1915. p. 19.)

36 (29) Free margins of jaw do not bear a continuous series of uniform papillae; instead, there is a diastema separating the lateral oral papillae from the dissimilar infradental papillae at the apex of the jaw. . . . (Fam. OPHIACTIDAE Matsumoto, 1915. p. 23.)

For higher order classification see: Treatise on Invertebrate Paleontology Part U Echinodermata 3 Volume 1 ed. R.C. Moore

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Manuscripts for the LOS ANGELES COUNTY MUSEUM CONTRIBUTIONS IN SCIENCE may be in any field of Life or Earth Sciences. Acceptance of papers will be determined by the amount and character of new information and the form in which it is presented. Priority will be given to manuscripts by staff members, or to papers dealing largely with specimens in the Museum's collections. Manuscripts must conform to CONTRIBUTIONS style and will be examined for suitability by an Editorial Committee. They may also be subject to critical review by competent specialists.

MANUSCRIPT FORM.—(1) The 1960 AIBS Style Manual for Biological Journals is highly recommended as a guide. (2) Typewrite material, using double spacing throughout and leaving ample margins, on only one side of 8½ x 11 inch standard weight paper. (3) Place tables on separate pages. (4) footnotes should be avoided if possible. (5) Legends for figures and unavoidable footnotes should be typed on separate sheets. Several of one kind may be placed on a sheet. (6) Method of literature citation *must* conform to CONTRIBUTIONS style—see number 90 and later issues. Spell out in full the title of non-English serials and places of publication. (7) A factual summary is recommended for longer papers. (8) A brief abstract must be included for *all* papers. This will be published at the head of each paper.

ILLUSTRATIONS.—All illustrations, including maps and photographs, should be referred to as "figures." All illustrations should be of sufficient clarity and in the proper proportions for reduction to CONTRIBUTIONS page size. Permanent ink should be used in making line drawings and in lettering (do not type on drawings); photographs should be glossy prints of good contrast. Original illustrations will not be returned unless specifically requested when the manuscript is first submitted.

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DAVID K. CALDWELL
Editor

A KEY TO THE SPECIES OF OPHIUROIDEA (BRITTLE STARS) OF THE SANTA MONICA BAY AND ADJACENT AREAS[1] *

By RICHARD A. BOOLOOTIAN[2] AND DAVID LEIGHTON[3]

ABSTRACT: Thirty ophiuroid species occur off the coast of Southern California. The bathymetric range, color in life, habitat, and meristic characteristics are considered. A *dichotomous* key is presented.

Southern California ophiuroids are now well catalogued, although no key to the species existing in any geographically distinct region of the California shore and the continental shelf between La Jolla and Monterey has been previously published.

The pioneer work in the field of Pacific North American ophiuroids was done by Lyman (1861), who listed ten species and later increased the figure to sixteen. Nine species were added to the list by Clark (1911). Neilsen's (1932) résumé of the material collected during the Mortensen Pacific Expedition of 1914-1916 has been invaluable in the composition of this key.

Excellent work has been done on the Japanese ophiuroids by Matsumoto (1917); species occurring in the Nanaimo district were listed by Berkeley (1927); those found in the Philippine seas were presented by Koehler (1922). For those species occurring along the North American coast, Neilsen (1932) prepared a key considering the entire area from the Strait of Georgia to the Gulf of Panama, and Bush (1918, 1921) a key to the ophiuroids of Friday Harbor, Washington. Barnard and Ziesenhenne (1961) discussed the ophiuroid communities of Southern California coastal bottoms. The only works which are locally applicable are the keys of McClendon (1909) for the San Diego region and May (1924) for Monterey Bay. McClendon's key is the only one useful to investigators in Southern California.

Through the work of the investigators noted above, there are now 40 recognized species of ophiuroids from the North American Pacific coast. Thirty species of ophiuroids are included in this key, ten of which may be collected intertidally.

Materials used in this study were obtained by employing SCUBA for the subtidal forms. Some of the intertidal species were collected by the authors; others were provided by Fred Ziesenhenne of the Allan Hancock Foundation, University of Southern California.

In this key an attempt has been made to utilize ophiuroid characters which are least subject to variation and which can be observed externally with a hand

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[3]Scripps Institution of Oceanography, La Jolla, California.

Contributions in Science Natural History Museum of L.A. County No. 93 (1966)

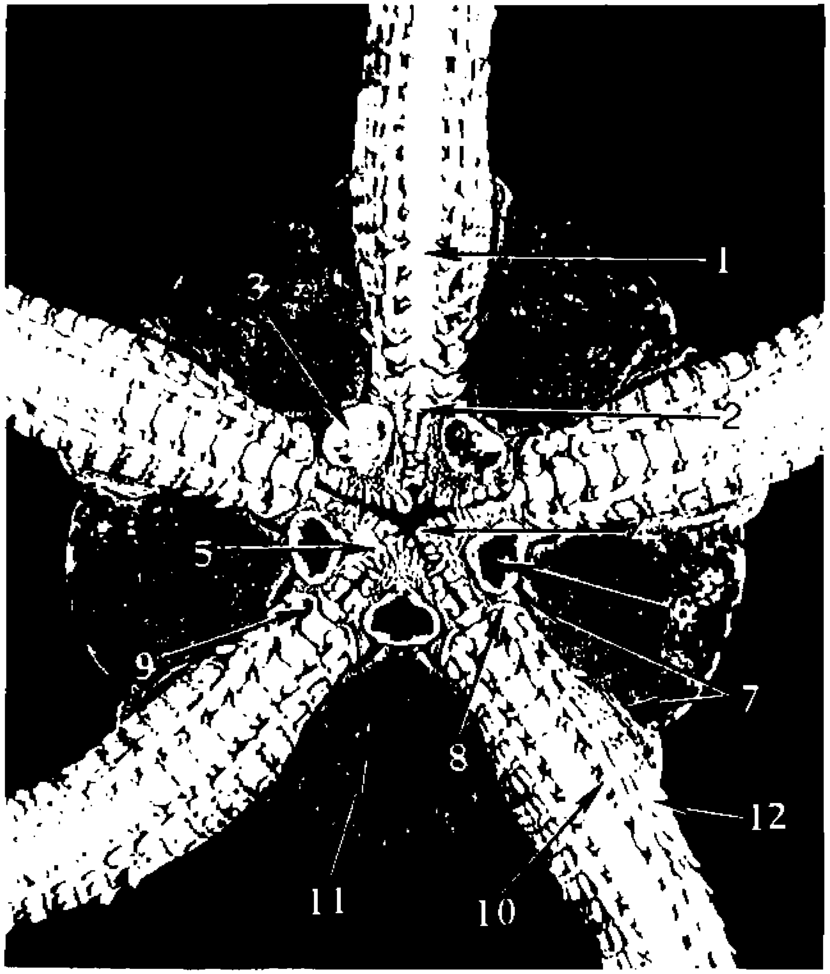

Figure 1. *Ophioderma panamense*, diagnostic parts

1. oral arm plate Ventral arm plate
2. angle of mouth 1st ventral arm plate
3. madreporite
4. apex of jaw Tip of jaw
5. oral papilla
6. oral shield
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

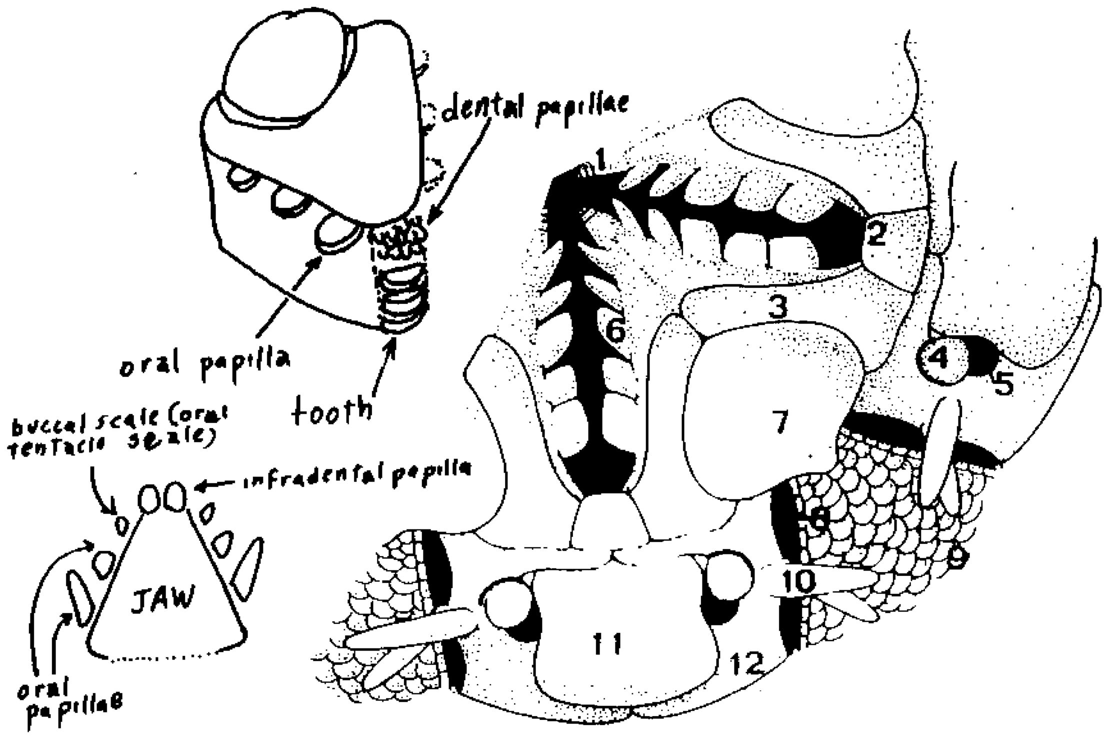

Figure 2. Two-fifths of oral aspect of a diagrammatic disc to show diagnostic parts

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

lens, requiring no dissection of material. Disc-arm ratios, general shape, color, and other potentially ambiguous characters have been avoided.

Oral papillation is a fundamental key character, but whether enlarged oral tentacle scales should be included in the number of oral papillae per jaw in all cases is questionable. Where these structures are obvious, they have been included (see *Ophionereis annulata*). Together with the key we include a table indicating where the specimens may be found (Table 1), as well as a photograph (Fig. 1) and a diagram showing general diagnostic features (Fig. 2). An illustration showing the details of the oral papillae is included for each species.

The key is in no way a natural one, though for the most part, related genera fall closely together.

KEY

I. Both disc and arms covered by a leathery skin; aboral arm plates absent or rudimentary; arms branched (Fig. 3). . . . . *Gorgonocephalus eucnemis*

II. Arms never covered by a thickened skin; aboral arm plates present; arms never branched.

A. Aboral disc scaled, though scales may be discontinuous.

1. Oral papillae six or less than six per jaw.

a. Oral papillae two to four (rarely five) per jaw.

(1). Individuals often six-rayed; oral papillae blunt.

(a). Radial shields small, never joining with mate; four smooth spines on each side arm plate; two oral papillae per jaw (Fig. 4). . . . . *Ophiactis simplex**

(b). Radial shields large; mates joining distally; five (rarely six) spines with fine serration on each side arm plate; four or five oral papillae per jaw (Fig. 5). . . . . *Ophiactis savignyi**

(2). Individuals never six-rayed; oral papillae sharp, numbering two or three per jaw; one apical or subapical and two (occasionally three) distal oral papillae.

(a). One tentacle scale; disc strongly scaled (Fig. 6). . . . . *Amphiura diastata* = Amphiura diomedeae Lütken & Mtsn.

(b). Two tentacle scales; disc occasionally not scaled centrally (Fig. 7). . . . . *Amphiura arcystata*

b. Oral papillae six per jaw; three or occasionally four spines per side arm plate.

(1). Two proximal pairs of oral papillae small; distal pair broad and elongate.

(a). Interbrachial areas granular; radial shields separate or meeting only distally (Fig. 8). . . . *Amphichondrius granulosus*

(b). Interbrachial areas scaled; radial shields in solid contact.

i. Longest arm spines about 1½ times length of arm joint; arms markedly long and narrow (Fig. 9). . . . . *Amphipholis pugetana**

ii. Longest arm spines about 1 arm joint in length; arms relatively short (about four times the disc) (Fig. 10). . . . . *Amphipholis squamata**

(2). Oral papillae all subequal in size and shape.

(a). Some of the disc scales with free ends prolonged into fine points.

i. Scales of aboral disc few and large (Fig. 11). . . . . *Amphiodia (Amphispina) digitata*

ii. Scales of aboral disc numerous and small (Fig. 12). . . . . *Amphiodia (Amphispina) urtica*

(b). Disc scales never prolonged into fine points.

i. Disc with a rosette of large scales aborally; tentacle scales (2) unequal in size; plates about mouth inflated (Fig. 13) . . . . *Amphiodia psara*

ii. Disc with fine scales; tentacle scales (2) equal in size; plates about mouth not inflated (Fig. 14). . . . . *Amphiodia occidentalis*

2. Oral papillae more than six per jaw.

a. Eight oral papillae per jaw (rarely nine).

(1). Spines on disc partially covering scales; oral papillae spinose and globose (Fig. 15). . . . . *Amphiacantha amphacantha* = Dougaloplus amphacantha

(2). No spines present on disc; most oral papillae heavy though a few are terete. Two tentacle scales in angle of mouth often considered to be oral papillae (10).

(a). Tentacle scales in angle of mouth separate from true oral papillae row; proximal oral papillae heavy and globose; other oral papillae heavy but tapered (Fig. 16). . . . . *Amphioplus strongyloplax*

(b). Tentacle scales in angle of mouth closely adjacent to row of true oral papillae; oral papillae tapered and not heavy (Fig. 17). . . . . *Amphioplus hexacanthus*

b. Nine or more than nine oral papillae per jaw.

(1). Oral papillae nine to ten; those in angle of mouth curved and pointed (actually tentacle scales). Tentacle scales large and saucer shaped; three arm spines on each side arm plate.

(a). Aboral arm plate large; accessory plates very small. Disc with scattered large scales of lighter pigmentation; arms mottled brown and cream (Fig. 18). . *Ophionereis eurybrachyplax* (b). Aboral arm plates equaled in size by accessory plates; light spots scattered on disc incorporating several small scales; arms banded (Fig. 19) .... *Ophionereis annulata**

(2). Oral papillae more than ten per jaw; tentacle scales often more than one, neither large nor saucer shaped.

(a). Arm spines sharp, about one arm joint in length; small notches in disc above arm base edged with small papillae; symmetrical scale situated centrally on aboral disc (Fig. 20). .... *Ophiura lutkeni*

(b). Arm spines not sharp and considerably less than one arm joint in length; disc notches and symmetrical scale absent; oral papillae in even rows.

i. Oral papillae partially fused; tentacle pores only on first three oral arm plates; aboral arm plates not divided (Fig. 21). .... *Ophiomusium jolliensis*

ii. Oral papillae not fused; aboral arm plates divided into many smaller plates; arms flattened (Fig. 22). .... *Ophioplocus esmarki**

B. Scales or plates of aboral disc covered or partially obscured by superficial structures.

1. Disc covered by a thickened epidermis. ?

a. Velvet-like epidermis covering disc; oral papillae and arm spines small and numerous; adults often over twelve inches in diameter (Fig. 23) .... *Ophioderma panamense** ← dorsal surface of disc granule-covered

b. Smooth or parchment-like epidermis covering disc in interradial areas; arm spines long, flattened, narrower at base than at end; tentacle scales similar to arm spines and usually held in crossed position on oral surface of arm (Fig. 24). .... *Ophiopsila californica*

2. Disc covered with spines or short stumps.

a. Spines of arms held normally to arm axis (unless improperly preserved).

(1). Arm spines heavy and flattened; low rounded stumps cover disc; dorsal-most arm spine very short; dental papillae numerous (Fig. 25). .... *Ophiopteris papillosa**

(2). Arm spines rather light and delicate; no oral papillae; disc covered by short spines.

(a). Arm and disc spines serrated; seven arm spines on each side arm plate (Fig. 26). .... *Ophiothrix spiculata**

(b). Arm and disc spines rather smooth; five or six arm spines on each side arm plate (Fig. 27). .... *Ophiothrix rudis**

b. Arm spines form small angles with arm axis.

(1). Arm spines short and blunt; disc fairly heavily covered with branched spines; small supplementary plates partially surround aboral arm plates (Fig. 28). .... *Ophiopholis bakeri*

(2). Arm spines rather long and tapered; side arm plates nearly or completely meeting above and below; granules cover most of disc.

(a). Oral papillae twelve to fourteen per jaw; some fine scales in evidence on disc.

i. Spines of considerable size scattered on aboral disc; shorter stumps and granules cover most of balance of disc; oral arm plates well separated by side arm plates; longest arm spine about three arm joints in length (Fig. 29). .... *Ophiacantha phragma*

ii. Small granules almost completely hiding scales of disc; oral arm plates not widely separated by side arm plates; longest arm spines about five arm joints in length (Fig. 30). .... *Ophiacantha diplasia*

(b). Oral papillae seven to nine per jaw; short spines with fine points cover disc.

i. Longest arm spines about two arm joints in length; stumps on disc drawn out to fine (single) points; tentacle scales conical (few scales may show on disc) (Fig. 31). .... *Ophiacantha normani*

ii. Longest arm spines about four arm joints in length; disc with short multi-fid spines; tentacle scales not conical; arm spines serrated (Fig. 32). . *Ophiacantha rhachophora*

*Specimens collected intertidally

TABLE 1

Various Ecological Aspects of Ophiuroids Discussed in this Paper

Species	*Bathymetric Range*	*Sample Location*	*Type of Bottom*	*Reference*	*Maximum disc diameter*	*Color*
Gorgonocephalus eucnemis	28-93 fathoms	Monterey Bay, California	Gray sand, shells, blue mud, sand (coarse), rock.	May	90 mm.	Reddish tones with brown markings.
Ophiothrix spiculata	lowtide—42 fathoms	Monterey Bay, California & Santa Monica Bay, California	Gray sand, shells, mud, and rock. Holdfasts of *Macrocystis*.	May & this paper	15 mm.	Variable: blue, green or tan with reddish bands on arms.
Ophiothrix rudis	lowtide—5 fathoms	Palos Verdes, California	Rock and coarse sand.	this paper	11 mm.	Variable: green or tan with reddish bands on arms.
Ophiacantha diplasia	46-80 fathoms	Monterey Bay, California	Coarse sand, green mud, and rock.	May	25 mm.	Disc brown, arms whiter, as dried from alcohol.
Ophiopholis bakeri	26-265 fathoms	Monterey Bay, California	Mud, rock, and sand.	May	10 mm.	Pink or white, dried from alcohol.
Amphiura arcystata	56-156 fathoms	Monterey Bay, California	Mud, rock, and sand.	May	8 mm.	Light orange, brown with white scales, dried from alcohol.
Amphiura diastata	244-253 fathoms	*	Sand and mud.	Clark	*	*
Amphiodia occidentalis	lowtide—15 fathoms	Monterey Bay, California	Sand.	May	11 mm.	Variable, but disc often gray with red markings. Arms yellowish or whitish and spines pink.
Amphiodia urtica	10-100 fathoms	La Jolla, California	Sand or mud.	Nielsen	9 mm.	Disc gray, arms white or straw colored.
Amphiodia digitata	10-100 fathoms	La Jolla, California	Packed sand to "coarse mud."	Nielsen	7 mm.	Whitish yellow, dried from alcohol.
Species	*Bathymetric Range*	*Sample Location*	*Type of Bottom*	*Reference*	*Maximum disc diameter*	*Color*
Amphipholis squamata	lowtide—20 fathoms	La Jolla, California & Departure Bay, Nanaimo	Coralline algae and holdfasts.	Nielsen	8 mm.	*
Amphipholis pugetana	lowtide—44 fathoms	Monterey Bay, California	Mud, and sand or rock.	Clark	*	*
Ophiura lütkeni	11-357 fathoms	Monterey Bay, California	Soft or hard mud, sand or rock, and sandy areas.	Nielsen	7.5 mm.	Yellowish in alcohol.
Ophioplocus esmarki	*	Monterey Bay, California, Santa Monica Bay, California & La Jolla, California	Sand and rock.	Nielsen	9 mm.	White, dried from alcohol.
Ophionereis eurybrachyplax	54-80 fathoms	Monterey Bay, California	Sand and mud or rock.	Nielsen	34 mm.	Dark brown with lighter yellow or white mottlings; annulations on arms.
Ophionereis annulata	lowtide—5 fathoms	California & Panama	Sand and mud or rock.	Clark	21 mm.	*
Ophiopteris papillosa	lowtide—40 fathoms	Monterey Bay, California	Sand and rock.	Ziesenhenne	*	*
Ophiactis savignyi	lowtide—5 fathoms	Panama	Among coralline algae and holdfasts of rock kelp, especially where sand has begun to accumulate.	Ziesenhenne	*	*
Ophiactis simplex	lowtide—5 fathoms	Panama & San Diego, California	Holdfasts of rock kelp.	Clark	*	*
Amphioplus strongyloplax	2-200 fathoms	La Jolla, California & Str. of Georgia	*	Clark	*	*

Species	*Bathymetric Range*	*Sample Location*	*Type of Bottom*	*Reference*	*Maximum disc diameter*	*Color*
Amphioplus hexacanthus	50-88 fathoms	•	Mud, sand, and broken shell.	Ziesenhenne	•	•
Amphicantha amphacantha	90-100 fathoms	La Jolla, California	•	Nielsen	•	Whitish, dried from alcohol.
Amphichondrius granulosus	10-25 fathoms	La Jolla, California	•	May	4 mm.	Variable: disc reddish brown, pink, or gray; arms white with gray or blackish mottling.
Ophioderma panamense	lowtide—15 fathoms	La Jolla, California & Panama	•	May	22 mm.	Salmon red with darker markings.
Ophiomusium jolliensis	167-505 fathoms	La Jolla, California	Clay, mud, and sand.	this paper	30 mm.	Dark brown aborally; tan or yellow orally.
Ophiopsila californica	•	•	•	May	23 mm.	Light brown, arms with whitish or purplish markings.
Ophiacantha phragma	•	•	•	Nielsen	18 mm.	Tan or gray, dark annulation on arms.
Ophiacantha normani	40-987 fathoms	•	Green and brown mud and sand.	May	30 mm.	Light to dark brown. Young with darker annulations on arms.
Ophiacantha rhachophora	63-584 fathoms	•	Sand and broken shell.	Nielsen	7 mm.	Greenish with darker cross bands on arms; oral side yellow.
Amphiodia psara	•	•	•	Nielsen	5.5 mm.	Greenish or yellow with darker annulations on arms.

***No information available**

DEFINITIONS OF TERMS

Aboral: side opposite the mouth; the dorsal aspect of the animal.

Aboral arm plates: superficial plates covering the dorsal portion of each arm joint.

Aboral plates: shields or plates situated on either side of an oral shield.

Angle of mouth: the distal portion of the slit formed by approximation of any two adjacent jaws.

Disc: the central body of an ophiuroid which is sharply marked off from the arms.

Distal: occupying a position away from the mouth or away from the center of the disc.

Genital scales: scales, usually in orderly rows, bordering the genital slits.

Genital slits: slits located interbrachially and orally on the disc (on either side of each arm base) indicating the position of the genital bursae.

Interbrachial areas: the oral disc lying between adjacent arms.

Jaws: five (or rarely six) triangular structures surrounding the mouth and usually bearing a number of oral papillae laterally and a vertical row of teeth apically.

Oral: the ventral surface as opposed to the aboral or dorsal surface; implying direction toward the mouth or on the same surface as the mouth.

Oral arm plates: those plates situated on the ventral surface of the arm joint through which pass the podia.

Oral papillae: modified spines usually found on the sides of each jaw and bordering the angle of the mouth.

Oral shield: a plate, usually comparatively large, situated on the mid-interbrachial line at the base of each jaw.

Podia: tube feet projecting through the tentacle pores of the oral arm plates.

Proximal: toward the oral-aboral axis; opposed to distal.

Radial shields: plates, often large, existing in pairs and located on or approaching the radius of the aboral disc.

Radius: an imaginary line drawn from the center of the disc to any arm tip.

Side arm plates: those plates covering the lateral aspect of each arm joint and supporting the arm spines.

Tentacle pores: a pair of openings in the oral arm plate through which pass the podia or tentacles.

Tentacle scales: scales found bordering the tentacle pores which, in some species, completely close the tentacle pore.

Tooth papillae: small papillae lying ventrally and about the teeth on the axis of the jaw. (Found in relatively few of the species considered in this key.)

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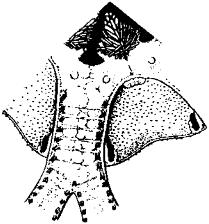


Figure 3. Gorgonocephalus eucnemis.

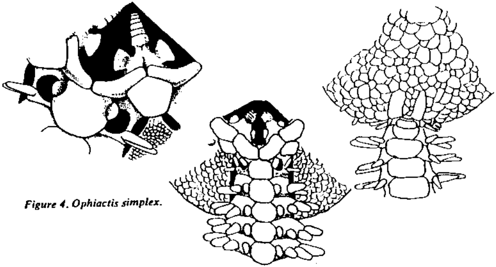


Figure 4. Ophiactis simplex.

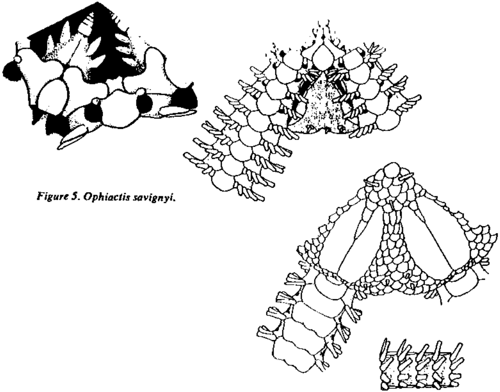


Figure 5. Ophiactis savignyi.

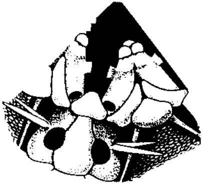


Figure 6. Amphiura diastata.

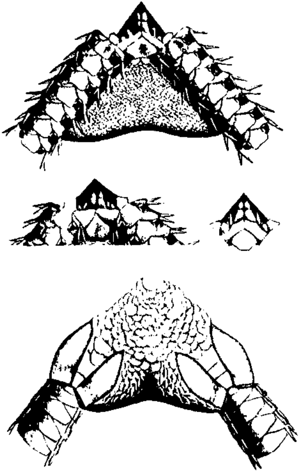
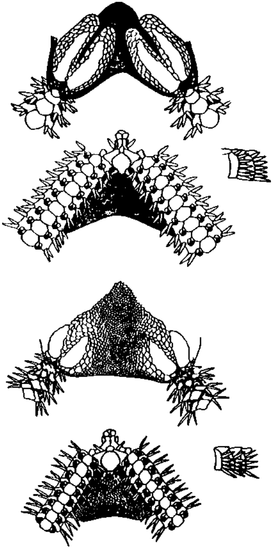


Figure 7. Amphiura arcystata.



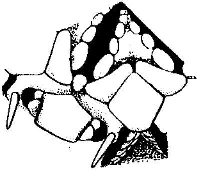
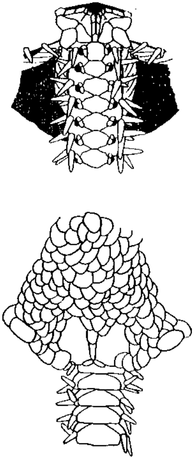


Figure 8. Amphichondrius granulosus.



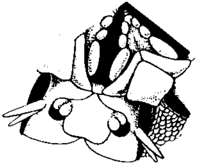
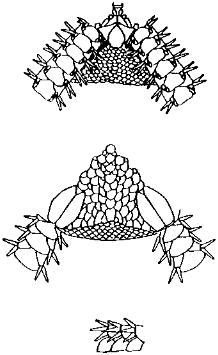


Figure 9. Amphipholis pugetana.



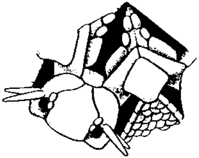
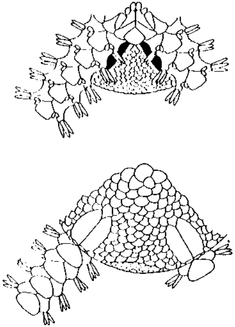


Figure 10. Amphipholis squamata.



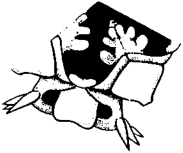
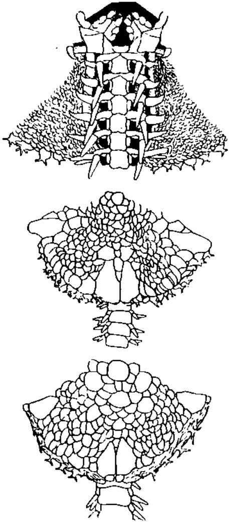


Figure 11. Amphiodia digitata.



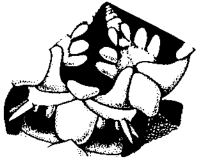
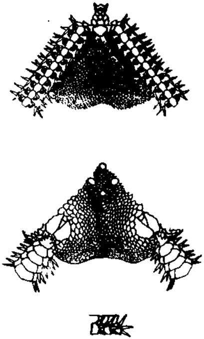


Figure 12. Amphiodia urtica.



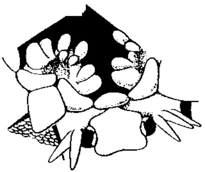
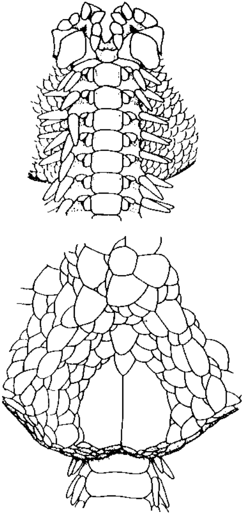


Figure 13. Amphiodia psara.



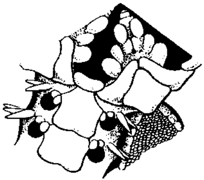
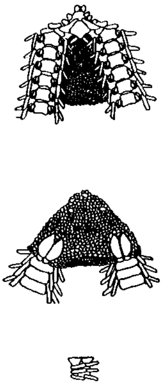


Figure 14. Amphiodia occidentalis.



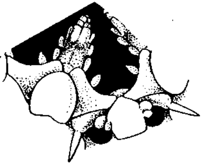
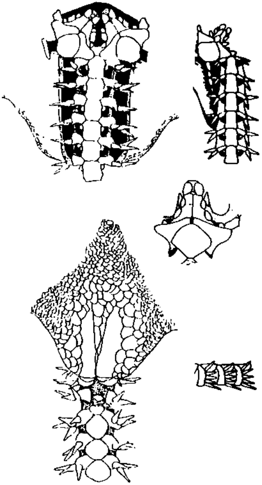


Figure 16. Amphioplus strongyloplax.



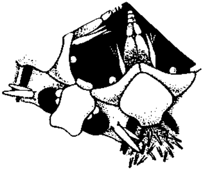


Figure 15. Amphiacantha amphacantha.

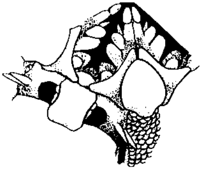


Figure 17. *Amphioplus hexacanthus.*

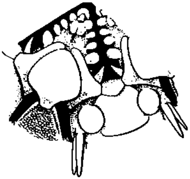


Figure 18. *Ophionereis eurybrachyplax.*

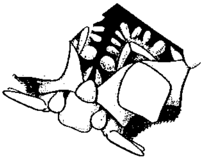


Figure 19. *Ophionereis annulata.*

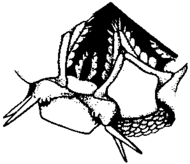
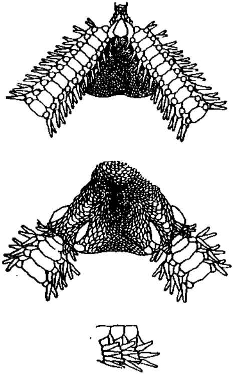
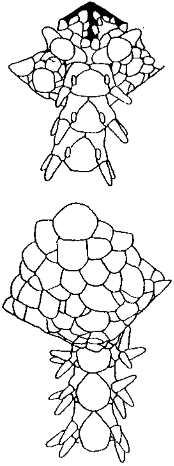


Figure 20. *Ophiura lutkeni.*

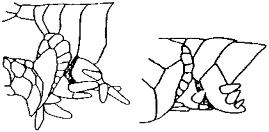
AMPHIOPLUS HEXACANTHUS, new species.

Disk lacking. Upper arm plates broadly hexagonal, with rounded corners, twice as wide as long. Arm spines six, about equal to joint; middle ones shortest and one or more terminated by a minute, glassy crossbar. Oral shields oval, longer than wide. Adoral plates large, meeting broadly within. Oral papillæ, four on a side, subequal or apical one largest. Under arm plates squarish or slightly pentagonal, rather wider than long. Tentacle scales, two.





juvenile



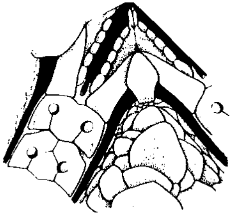
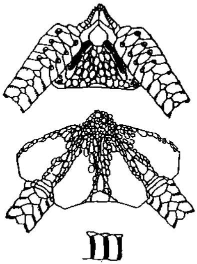
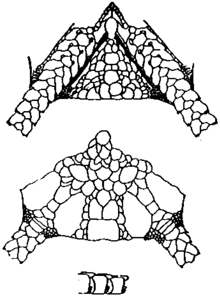


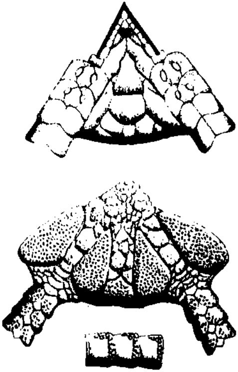
Figure 21. Ophiomusium jolliensis.

ophiosphalma glabrum



(=ophiomusium mutispinum)





Ophiomusium lymani

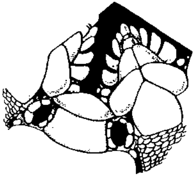
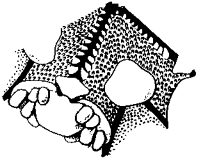


Figure 22. Ophioplocus esmarki.



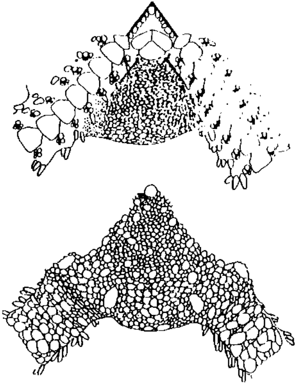


Figure 23. Ophioderma panamense.

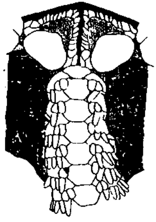


Figure 24. Ophiopsila californica.

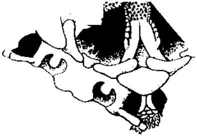


Figure 25. Ophiopteris papillosa.

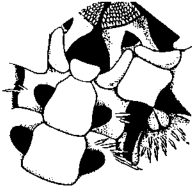


Figure 26. Ophiothrix spiculata.

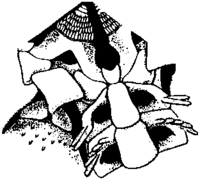


Figure 27. Ophiothrix rudis.

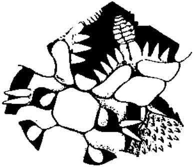
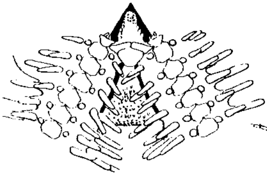
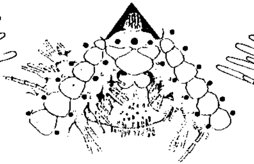
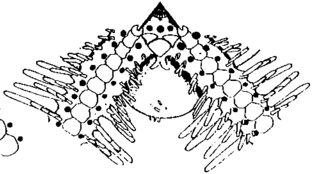
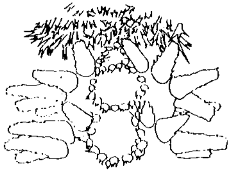


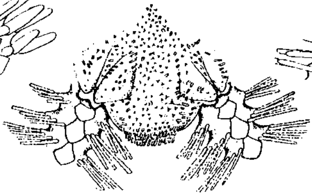
Figure 28. Ophiopholis bakeri.

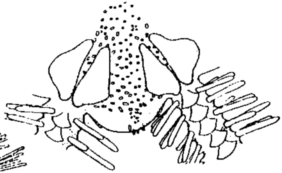












See key in
H.L. Clark (1911)
North Pacific Ophiurans
p. 116

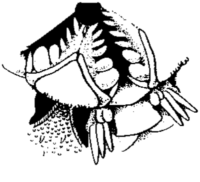


Figure 29. Ophiacantha phrogma.

Figure 30. Ophiacantha diplasia.

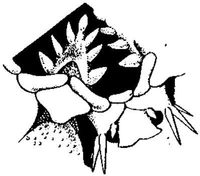


Figure 31. Ophiacantha normani.

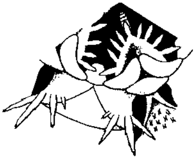
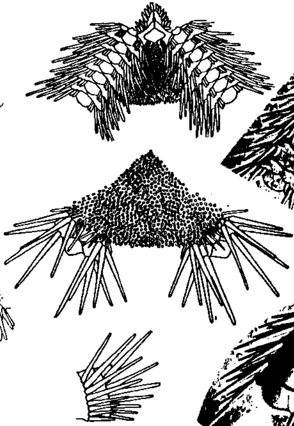
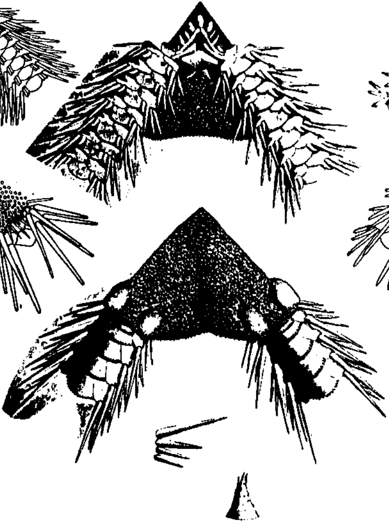
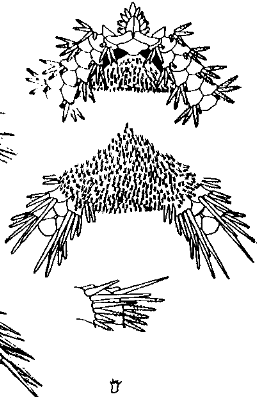


Figure 32. Ophiacantha rhachophora.







No.	Taxon	Distribution	Depth (m)	Substrate
	Class Ophiuroidea Order Phrynophiurida FAMILY OPHIOMYXIDAE 3001–3002			
3001	Ophiomyxa panamensis	N Midriff Is–G Guayaquil	19–293	Mud/sft gr;She
3002	Ophioscolex corynetes	Washington–Sn Diego	55–1234	Mud:Clay
	FAMILY ASTERONYCHIDAE 3003–3006			
3003	Asteronyx longifissus	Oregon–Sn Diego	265–1800	Md/gr,yl gy;Sd/gy
3004	A. loveni	Alaska–Galapagos Is;IWP, N At	152–1963	Cnidaria Md;Sd;Oz Rhab,Crv
3005	Astrodia excavata	Catalina I?,Cedros I–Mancora Bk	267–1273	Gorg Sand/gy Ooze/glb
3006	A. plana	G Panama–Galapagos Is	716–3200	Sd/gr,bk fn;O/glb
	FAMILY ASTEROSCHEMATIDAE 3007			
3007	Asteroschema sublaeve	Monterey–Galapagos Is	605–1681	Mud/gr Ooze/glb
	FAMILY GORGONOCEPHALIDAE 3008–3012			
3008	Astrocaneum spinosum	Pto Peñasco–Panama;Jp	4–183	Gorg;She Null;Mud Sd/fn,gy
3009	Astrodendrum galapagense	Galapagos Is	718	-
3010	Astrodictyum panamense	La Paz?,Panama–Peru;Jp	14–64	Gorg;She
3011	Gorgonocephalus diomedeae	Mariato Pt	1271	Mud/gr
3012	G. eucnemis	Bering Sea–Sn Diego;Jp,N At	10–3000	Md;Sd/gr rd,bk;Rk
	Order Ophiurida FAMILY OPHIACANTHIDAE 3013–3043			
3013	Ophiacantha abnormis	S Calif Cns;C Pac,W Pac	548–1280	Mud
3014	O. adiaphora	Pto St Tomás	518–2444	-
3015	O. bathybia	Bering Sea–Pto St Tomás	421–3611	Oz/bl;Md gr,gy;Cl
3016	O. contigua	N Malpelo I	1063–1644	Mud/gr Wall;Sd
3017	O. cosmica	Humboldt B–Valparaiso;IP,N At,Ant	415–4840	Sd/fn,dk gy;Md/gr She
3018	O. costata	N Channel Is–G Panama	768–1271	Md/gr;Sd Ooze/glb
3019	O. cyrena	Galapagos Is	717	-
3020	O. diplasia	Oregon–Clarion I	9–1408	She;Cor Mud;Sand

Distribution zones: S,B & G Cal · Mex · C Am · Pan-G-Ec · Peru. Depth zones: shallow · shelf · slope · abyss.

From: Maluf, L.Y. (1988) Composition and Distribution of the Central Eastern Pacific Echinoderms

Central Eastern Pacific	68 genera	188 species (Pt. Conception to Peru)
World	188	2000

No.	Taxon	Range	Depth	Substrate
[illegible]	[illegible]	Alaska-N Baja Calif	1041-2471	[illegible]
3022	O. eurythyra	Newport	13-27	Sand
3023	O. hirta	Mazatlán-Tres Marías Is	1244-1558	Sand/bk Mud/gr
3024	O. inconspicua	G Panama-[illegible]pagos Is	37 1869	Sd/gr;Md gr;O/glb
3025	O. moniliformis	SW Sn Cristóbal B-Acapulco	519-1244	Md/gr;Sd Ooze/glb
3026	O. pacifica	S Calif Cns-off Ecuador	362 2877	Ooze/gr Mud;Sand
3027	O. parasema	St Cruz I	?	-
3028	O. phragma	N Channel Is-La Plata I	13 644	Grv;Corr Sand
3029	O. pyriformis	Clarion I	37	Coral
3030	O. quadrispina	G Tepoca-Galapagos Is	183-549	Ooze/glb She/brk
3031	O. rhacophora	Bering Sea-C Sn Lucas;Jp	115 1152	Md/gr,gy Sand;She Peb
3032	O. sentosa	N Baja Calif-off Valparaiso	2067-5203	Md/fn,dk O/red;Cl
3033	O. similis	Galapagos Is	717	-
3034	O. spinifera	G Panama	998-1865	Md/bl,gr sft
3035	O. valenciennesi	Pto Escondido?,Galapagos Is;Car	236-549	Mud;Ooze glb;She brk
3036	Ophiolebes mortenseni	Galapagos Is	717	-
3037	Ophiolimna bairdi	Bering Sea-P Guiones;NW At	578 2549	Md/gr;Sd fn,gy;Oz glb;Rock
3038	Ophiomyces multispinus	Galapagos Is	134 717	-
3039	Ophiopthalmus normani	Bering Sea-Farallón Bs;Jp	51 2600	Md/gr,bl Sd/bk;Rk Ooze/glb
3040	Ophioplinthaca granifera	Pto Sn Tomás-Tres Marías Is	267 2086	Ooze/glb Sd/gy;Rk
3041	O. partida	S Calif Bs-Tres Marías Is	1263-1866	Sand/gy Ooze/glb
3042	Ophiothamnus laevis	Galapagos Is	1008	-
3043	Ophiotoma paucispina	Guatemala Bs-N Peru	2149-4082	O/glb,gr M/gr;S;R
	FAMILY HEMIEURYALIDAE 3044-3045			
3044	Sigsbeia laevis	B Honda	55-91	Cor/rd
3045	S. lineata	Hannibal Bk-Galapagos Is	46 183	Cor;Alg She
	FAMILY AMPHIURIDAE 3046-3100,3186			
3046	Amphichondrius granulosus	Pds Blancas Pt-La Plata I	0 186 (730)	Mud;Silt Sand;Cl Rock
		S,B & G Cal · Mex · C Am · Pan-G-Ec · Peru	shallow · shelf · slope · abyss	

No.	Taxon	Range	Depth (m)	Substrate
3047	A. laevis	Sn Pedro-Ecuador	4–280	Mud;Silt
3048	A. unamexici	Teacapan	70	S/sft,fn stky;She
3049	Amphitontus minutus	Galapagos Is-Independencia B	9–22	-
3050	Amphilepis patens	S Alaska-Valparaiso	385–4087	Md/gr,gy
3051	Amphiodia grisea	G Guayaquil	?	-
3052	A. occidentalis	Kodiak-G Dulce	IT–367	Sand;Mud Silt;Alg Rk;Pool
3060	A. periercta	Alaska-Clarion I	9–315 (1800)	Sand;Mud Clay
3053	A. platyspina	Pearl Is	7-9	-
3054	A. psara	Sn Pedro-Acapulco	12–161	Sand;Alg
3055	A. sculptilis	Tenacatita B-La Plata I	0–101	Mangrove
3056	A. tabogae	Pto Angel-La Plata I	IT–110	Sand
3057	A. urtica	Alaska-Pto Angel	IT–1624	Mud/sdy She;Grv Silt
3058	A. vicina	G Nicoya	64–82	Mud
3059	A. violacea	Coronados I-Cocos I	4–91	-
3064	Amphioplus daleus	Pto St Tomás-S Peru;W At	1170–5869	Md/fn,gr gy;Oz/gr
3062	A. hexacanthus	N California-S Calif Cns	16–366 (1800)	Md/gr;Sd bk;She
3061	A. philohelminthius	Independencia B-Sn Juan B	15–73	Mud/sft
3063	A. strongyloplax	Vancouver I-Midriff Is	4–1408	Mud;Silt Sand/gy
3065	Amphipholis elevata	Tijuana-Panama B	IT–73	Sand
3066	A. geminata	R Consag-C Sn Francisco	IT–82	Mud;Sand Rock
3067	A. granulata	G Mar[illegible]	333–384	Mud/gr
3068	A. perplexa	Pto Refugio-La Plata I	0–143	Sand;Mud Cor;Null Grv
3069	A. platydisca	N Channel Is-Galapagos Is	IT–137	Mud;Sand Rock
3070	A. pugetana	Alaska-Callao	4–1620	Sd/gy,bk M;She;Mg
3071	A. puntarenae	Sn Clemente-Galapagos Is	0–508	-
3072	A. squamata	Alaska-Sn Juan B;Cosmo	0–823	Md;R/crv She;Corr Grv;Alg

S, B & G Cal | Mex | C Am | Pan-G-Ec | Peru — shallow | shelf | slope | abyss

No.	Taxon	Distribution	Depth (m)	Substrate
[illegible]	[illegible]	Monterev-Galapagos Is;Jp	6–849	[illegible]; S/bk;She Silt;Grv
[illegible]	A. [illegible]	Tres Marías Is-SW Malpelo I	2996–9482	Ooze/gr
3075	A. brevipes	Pt Galera	3182	Ooze/gr
3076	A. carchara	Bering Sea-N Baja Calif	110–3611	Mud/gr Sd;Clay
3077	A. diomedeae	Humboldt B-Pt Aguja;Jp	44–3017	Md/gr;Sd O/glb,gr Rhab;She
3078	A. gymnogastra	G Panama-S Galapagos Is	549–2323	Rhab;She Ooze/glb
3079	A. gymnopora	Sn Diego-G Panama	333–844	Mud/gr Sand
3085	A. hexacantha	Pearl Is	IT	Sand
3080	A. polyacantha	G Mala-Galapagos Is	1271	Mud/gr
3186	Amphiodia oerstedii	Panama-Puntarenas	IT	Sand Rock
3081	A. seminuda	Humboldt B-P Guiones;Pmt	9–4096	Sd/bk;Md gr;Mang Grv
3082	A. serpentina	Monterey-Galapagos Is	770–1865	Sd/gr,gy Mud/gr Ooze/glb
3083	A. trachydisca	S Channel Is	420	–
3084	A. verticillata	Galapagos Is	40–64	–
3086	Dougaloplus amphacanthus	Monterey-Agua Verde B	9–1646	Mud;Sand Clay;Grv
3087	D. gastracanthus	off Acapulco	1207	Sand
3088	D. notacanthus	S Calif Bs-G Panama	1397–1865	Md;Sd/gy Ooze/glb
3089	Ophiocnida californica	S Midriff Is-Gorda Bk	6–302	–
3090	O. hispida	Sn Pedro-Independencia B	0–(794)	Cor,Alg She;Spng
3091	Ophiophragmus disacanthus	Galapagos Is	4–37	–
3092	O. lonchophorus	Tenacatita B	4–15	–
3093	O. marginatus	Pto Peñasco-Peru	IT–134	Sand
3094	O. ophiactoides	Salinas B-Pt St Elena	IT–82	Rk;Pool Alg;Spng
3095	O. papillatus	Pto Angel	IT	–
3096	O. paucispinus	I Angel Guarda?,Gorda Bk-Galapagos I	IT–143	Sand
3097	O. stellatus	Independencia B-Sn Juan B	18–73	–
3098	O. tabogensis	I Angel Guarda-Galapagos Is	IT–128	Sand

S,B & G Cal · Mex · C Am · Pan-G-Ec · Peru — shallow · shelf · slope · abyss

No.	Taxon	Distribution	Depth (m)	Substrate
[illegible]	[illegible] tenue	Pto Refugio-La Plata I	4–101	-
[illegible]	[illegible]	Cocos P8	1790	-
	FAMILY OPHIACTIDAE 3101-3109			
3101	Hemipholis gracilis	Pto Peñasco-G Guayaquil	6–39	Mud
3102	Histampica duplicata	C Sn Lucas-S Galapagos Is;G Mx,Car	134–1966	O/glb,gy She/brk Rk;Wall
3103	Ophiactis kroeyeri	Colombia?,Paita-N Chile	0–73	Mud;She Cor;Alg
3104	O. plana	SE Malpelo I-Galapagos Is;Jp,IWP,At	(48) 183–1918	Rk;Wall
3105	O. savignyi	Sn Pedro-Independencia B;Tropol	IT–128	Cor;Gorg Spng;Rk Mangrove
3106	O. simplex	St Cruz I-Independencia B	IT–302	Cor;Gorg Alg;Muss Spng;Rk
3107	Ophiopholis aculeata var. kennerlyi	Georgia Sts-Clarion I;N At,Arc	IT–732 (1417)	Rk;Pool Grv;She
3108	O. bakeri	Br Columbia-Clarion I;N At?	9–1006	Rk;She Peb;Sha Cor/bk
3109	O. longispina	Washington-B Asunción	51–1746	Mud/gr Clay
	FAMILY OPHIOTRICHIDAE 3110-3115			
3110	Ophiothela gracilis	Uvita B-Pearl Is	IT-11	Gorg
3111	O. mirabilis	La Paz-Malpelo I	6	Gorg Spng
3112	Ophiothrix galapagensis	I Angel Guarda-Galapagos Is	IT–549	Sand;Mud Rk;She Alg;Cor
3113	O. magnifica	Cen America-Callao	IT-11	-
3114	O. rudis	Monterey-Pto Angel	IT–64	Sand;Cor Rock
3115	O. spiculata	Bering Sea-Lobos Afuera Is	IT–2059	Rk;Reef Cor;Spng Sd;M;Mgr
	FAMILY OPHIOCOMIDAE 3116-3122			
3116	Ophiocoma aethiops	Pto Peñasco-Lobos Afuera Is	IT–30	Reef;Rk bld;Pool Cor;Sand
3117	O. alexandri	Catalina I-Galapagos Is	IT–70	Reef;Rk bld;Pool Cor;Sand
3118	O. erinaceus	Clipperton I;IP	0–27	Rock
3119	Ophiocomella schmitti	Galapagos Is	0	Rock
3120	O. sexradia	I Espíritu Sto-Cocos I;IWP	0–91	Rock;Cor

S, B & G Cal | Mex | C Am | Pan-G-Ec | Peru — shallow | shelf | slope | abyss

No.	Taxon	48°N 32°N 26°N 20°N 14°N 8°N 2°N 4°S 10°S 16°S	0 10 50 100 200 1000 2000 4000 6000 (m)	Substrate
3121	*Ophiopsila californica*	**_*_ _ _ / **_ _*_ Sn Pedro-Gorda Bk	33 201	-
3122	*Ophiopteris papiliosa*	****_* Vancouver I-Thurloe B	IT 170	Rk;Pool Algae
	FAMILY OPHIOCHITONIDAE 3123-3124			
3123	"*Amphioplus*" *papillatus*	* Galapagos Is	704	Algae
3124	*Ophiochiton carinatus*	----------* / * off Pt Piaxtla-C Mala	589-1385	Mud/sft bl,gr
	FAMILY OPHIONEREIDAE 3125-3130			
3125	*Ophionereis albomaculata*	* Galapagos Is	IT	-
3126	*O. amphilogus*	**_* N Channel Is-Cedros I	18 183	-
3127	*O. annulata*	**_ _***_**_**_*_****_ _** / ******* Sn Pedro-B St Elena	IT 229	Reef;Rk Alg;Spng Cor;Sand
3128	*O. eurybrachiplax*	****_*_ _ _ _ _ _ _ _ _ _*_* / *_ _ _ N California-Cocos I;Jp	IT 457	Mud/vol Sand;She
3129	*O. nuda*	*---------**----* I Isabel-Galapagos Is	73 155	Mud/stf Cor;She
3130	*O. perplexa*	--------?*?----** / ***_** R Consag-Manta	0 73	-
	FAMILY OPHIODERMATIDAE 3131-3140			
3131	*Diopederma danianum*	*_*_***_**_*_ _* / *_*_ _* C Lobos-C Sn Francisco	7 137	Md;Sd;Rk Cor;She
3132	*Ophiocryptus maculosus*	* Newport	0 18	Algae
3133	*Ophioderma elaps*	* Galapagos Is;WI	134 549	-
3134	*O. panamense*	**_ _**_ _*_*_*_ _*****_ _**_ _* / ******* Sn Pedro-Paita	IT 20 (73)	Reef;Rk bld;Pool Cor;Alg
3135	*O. pentacanthum*	---------------* / ? * B Concepción?,C Sn Lucas-Galapagos Is	0 183	She/brk Ooze/glb
3136	*O. teres*	*_ _*_ _ _**_**_ _***_*_ _ _** / ******_ Newport-La Plata I	IT 46	Rock/bld Cob;Grv Cor;Sand
3137	*O. variegatum*	*_ _*_*_*****_ _*****_ _ _* / *****_ Sn Diego-Galapagos Is	0 110	Rk;Pool Grv;She Mud;Sand
3138	*Ophioncus granulosus*	?**_* Monterey?,Pt Conception-B Sn Quintin	IT 79	Rock;Alg
3139	*Ophiopsepale diplax*	*------*--*** / ***** Pto Refugio-P Utria	IT 230 (730)	Mud;Sand She
3140	*Ophiuroconis bispinosa*	***_ _ _ _ _ _ _*_*_ _ _*_ _ _ _ _ _* / **_ _* Monterey-Galapagos Is	4 143	Sand
	FAMILY OPHIURIDAE 3141-3183, 3187-3188			
3141	*Amphiophiura abcisa*	*-----------** Cocos Rg-E Pacific Rs	245 3714	Ooze/glb Sand;Rk
3142	*A. irregularis*	* Galapagos Is	106 288	-
3143	*A. obtecta*	* off Galapagos	2196-2487	Ooze/glb gr,gy
		S,B & G Cal / Mex / C Am / Pan·G·Ec / Peru	shallow / shelf / slope / abyss	

No.	Taxon	Range	Depth (m)	Substrate
3144	A. oligopora	C Sn Lucas	1152	-
3145	A. paucisquama	Galapagos Is	549-717	-
3146	Stegophiura ponderosa	Alaska-G Tehuantepec;Jp	137 1189	Sd/bk;Md Grv;Peb
3147	Amphiophiura superba	Br Columbia-SW Acapulco	51 1820	Mud/gr Ooze/glb
3148	Astrophiura marionae	S Channel Is	399-1620	Mang
3149	Gymnophiura mollis	Tres Marías Is-Galapagos Is	2487-2999	Ooze/glb Rhab
3150	Ophiura nana	Cocos Rg	1650	Ooze/glb yl
3151	O. scutellata	Tres Marías Is	1244	Mud/gr; Sand
3152	Ophiocten culveri	Monterey-S California	?	-
3153	O. hastatum	Washington-Galapagos Is;Jp,SO,E At	824 4700	O/glb;Md gr;Rhab
3154	Ophiolepis crassa	N I Angel Guarda-B St Elena	6 230	Mud;Sand Rock
3155	O. fulva	Pto Angel	15	Sand
3156	O. grisea	G Fonesca-G Nicoya	4 27	Mud Mangrove
3157	O. plateia	Tenacatita-Salinas B	4 27	-
3158	O. variegata	Pto Peñasco-Ecuador	IT 110	Mud;Sand She
3159	Ophiomisidium leurum	G Tehuantepec-Galapagos Is	82-137	-
3160	Ophiomusium diomedeae	Galapagos Is	704	Algae
3161	O. jolliensis	Sn Pedro-Galapagos Is;Jp	17 1230	O/glb,gy S/bk;She Md/gr;Cl
3162	O. lymani	Br Columbia-Chile;IWP,N At	51 2906	O/glb,yl Mud/gr Sd;Rhab
3163	O. variabile	Tres Marías Is-Acapulco	267-902	Mud/gr Rock
3164	Ophiophyllum marginatum	Galapagos Is	717	-
3165	Ophioplocus esmarki	Monterey-S I Espíritu Sto	IT 74	Rk/crv Algae
3166	O. hancocki	Galapagos Is	IT	-
3167	Ophiosphalma glabrum	S Calif Bs-off S Chile	878 5203	Mg;O/glb rad;M/gr Rhab;Sd
3168	Ophiosteira koehleri	off Ecuador	734	-
3169	Ophiotypa simplex	E Pacific Rs;E At,IO	3652-3811	Ooze/glb
3170	Ophiolepis pacifica	Pt Arenas-Panama B	IT 18	Coral

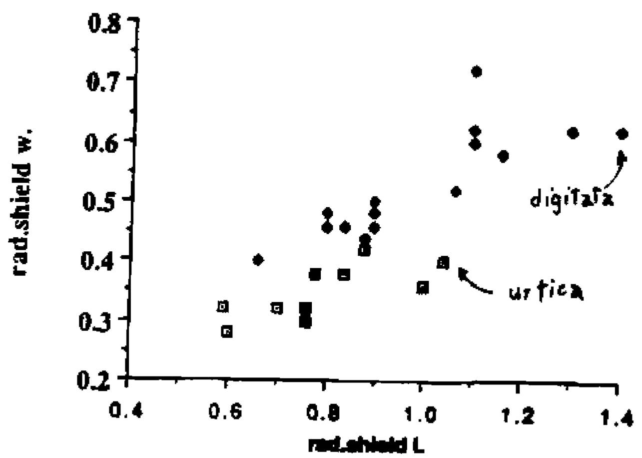
S,B & G Cal | Mex | C Am | Pan-G-Ec | Peru — shallow | shelf | slope | abyss

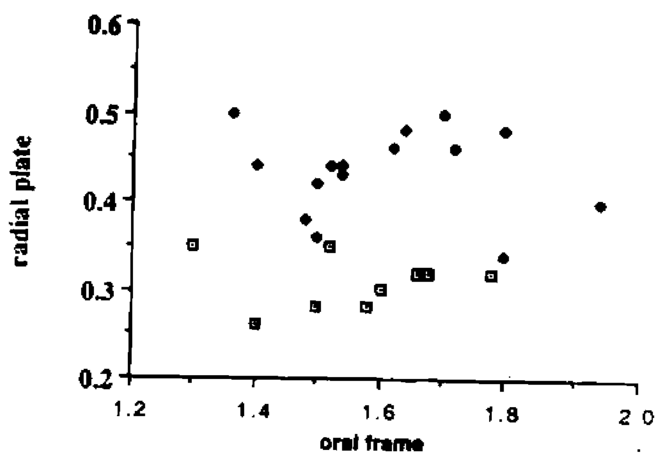
No.	Taxon	Distribution	Depth (m)	Substrate
3171	Ophiozonella alba	Cocos I-Galapagos Is	1408-2487	O/glb;Md gr;Sd;Rk
3172	O. clypeata	S Galapagos:Car	161-549	Ooze/glb She/brk
3173	O. contigua	Galapagos Is	2418-2487	Ooze/glb gy.gr
3174	Ophiura bathybia	Bering Sea-Cedros Tr	2869-4425	Oz/bl.gy Clay/bl
3175	O. flagellata	Aleutian Is-Galapagos Is;W Pac,N Pac	128 2014	M/gr.sdy Ooze/glb
3176	O. irrorata	Bering Sea-S Peru;IP,At	405 5869	O/glb.gr M/gr;Sd Mg.Rhab
3177	O. kofoidi	Channel Is	146 1350	Mud/gr Sand
3178	O. leptoctenia	Bering Sea-S Calif Cns;Jp	27 3239	Md/gr.bk Sd;O/glb
3179	O. luetkeni	Alaska-Gorda Pt	0 1097	Sd/gr.gy fn;M;Grv She/brk
3180	O. plana	Guatemala Bs-E Galapagos	1430 4082	Md/gr;Sd fn;O/glb
3181	O. sarsi	Alaska-Cortez Bk	100 1898	-
3182	O. stenobrachia	off N Peru	3667	Ooze/glb
3183	Ophiurolepis inornata	Galapagos Is;W Pac	240 3385	Ooze/glb yl.gr
3187	Amphiophiura vemae	Peru-Chile	3739-4124	-
3188	Homophiura nexila	Costa Rica-Panama	1749 5690	-
	FAMILY OPHIOLEUCIDAE 3184-3185			
3184	Ophiernus adspersus annectens	Sn Juanico B-S Galapagos	770-1245	Md/bl.gr sft;Sand Ooze/glb
3185	O. seminudus	G Tehuantepec-Cen Peru	840 4082	Sd/fn;Oz glb;Clay Mud/gr

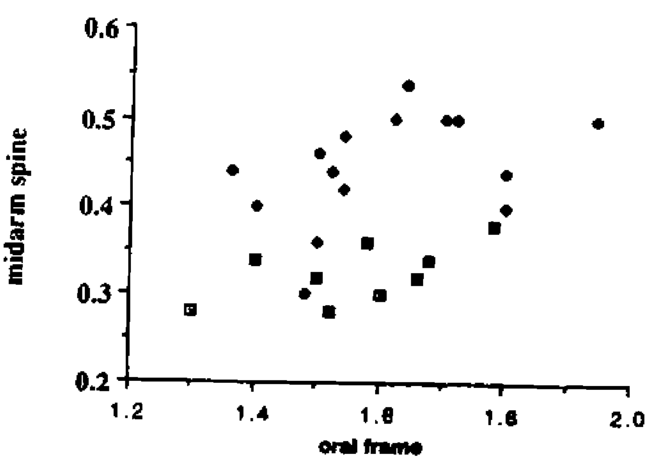
S, B & G Cal	Mex	C Am	Pan G Ec	Peru	shallow	shelf	slope	abyss

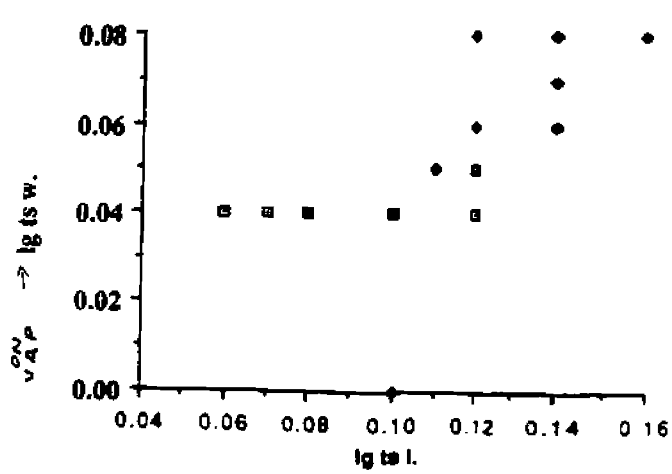
Differences between *Amphiodia urtica* and *A. digitata* — based on preliminary results of Gordon Hendler and Lulu Wang.

	Amphiodia digitata	*Amphiodia urtica*
Angles of dorsal arm plates equal?		
Gap between dorsal arm plate and lateral arm plate?	 No	 Yes
Marginal spined scales continuous in interradii?	yes	sometimes
Number of marginal scale from middle interradial scale to Radial shield	3 - 5	7 - 9
gap between tentacle scales on first five arm segments?	No	Yes









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A new isopod crustacean from Pacific Panama, Excirolana chamensis new species (Isopoda: Flabellifera: Cirolanidae), by Richard C. Brusca and James .. Weinberg. 17 pages, 4 figures.

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Chorocaris vandoverae, a new genus and species of hydrothermal vent shrimp (Crustacea, Decapoda, Bresiliidae) from the Western Pacific, by Joel W. Martin and Robert R. Hessler. 11 pages, 4 figures. 4 April 1990.

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208 pp., 99 color plates, 128 b/w illus., index, bibliog.
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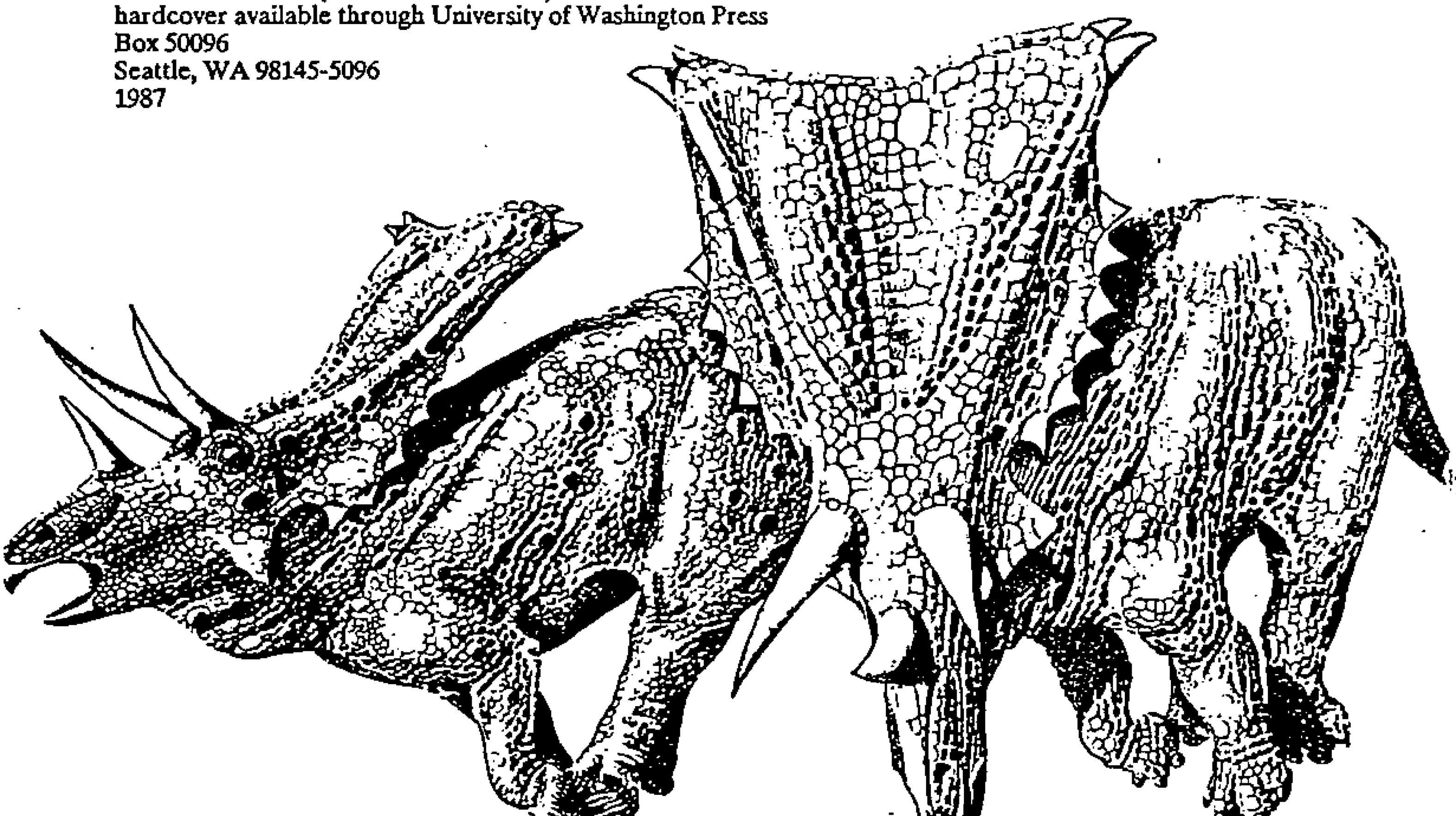

Chasmosaurus belli, by Robert Bakker, from *Dinosaurs Past & Present,* vol. I.

Rancho La Brea: Treasures of the Tar Pits, edited by John M. Harris and George T. Jefferson
96 pp., 79 illus., 56 in color (Science Series 31)
Catalog to the Treasures of the Tar Pits exhibition
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The 1769 Transit of Venus: The Baja California Observations of Jean-Baptiste Chappe d'-Auteroche, Vicente de Doz, and Joaquin Velazquez Cardenas de Leon, by Doyce B. Nunis, Jr.
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Marine Shells of Southern California, by James H. McLean
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1978 SS 24

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Publication Announcement

Marine Algae and Seagrasses of San Diego County

A Handbook of Benthic Marine Plants from Intertidal and Subtidal Sites Between the U.S.-Mexican Border and Orange County, California

by Dr. Joan G. Stewart, Associate Research Biologist, Scripps Institution of Oceanography, University of California, San Diego

197 pages 14 figures

Price: $10, check payable to "UC Regents"

San Diego County (California) is marked by a remarkable diversity in its marine plants, a result of the fact that its coastal habitats are so diverse. Although there have been some studies of the flora, the marine seaweeds and seagrasses of the area have never before been extensively surveyed.

This handbook provides an introduction to these important resources and includes the first systematic, intensive sampling of the subtidal flora. It provides a means of recognizing and naming over three hundred taxa and suggests where and when individual species can be found. Descriptions depend mostly on features that can be observed in the field with little or no magnification.

The publication will be especially useful to field biologists and graduate students interested in either intertidal or deep-water species of marine plants.

- -

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Copies of this publication are available from: Communications Department, California Sea Grant College, University of California, 9500 Gilman Drive, La Jolla, CA 92093-0232. Price: $10. Make check payable to "UC Regents."

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Job Announcement

The Department of Invertebrate Zoology, National Museum of Natural History, seeks candidates for a *Zoologist*, GS-11/12/13 ($32,423–$60,071 per annum). This may be a term position not to exceed four years' duration. The position entails performing collection-oriented research in the systematics and evolutionary biology of the Crustacea and professional curating of the pertinent collections.

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Southern California Association of Marine Invertebrate Taxonomists

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March, 1992 Vol. 10, No. 11

NEXT MEETING:	Thalassinoid shrimp
GUEST SPEAKER:	Don Cadien Los Angeles County Sanitation District Los Angeles, California
DATE:	April ~~18~~ 20, 1992 9:30am - 3:00pm
LOCATION:	Cabrillo Marine Museum San Pedro, California

MINUTES FROM MEETING ON MARCH 9, 1992:

Ron Velarde announced that the proceedings from the Third Polychaete Conference are available. To obtain a copy send $17.00 to:

Dr. Donald J. Reish
Department of Biology
California State University Long Beach
1250 Bellflower Blvd.
Long Beach, CA 90840.

Abranchiate Amphitrinae Terbellid Workshop: Leslie Harris reviewed the commonly encountered abranchiate Amphitrinae Terebellids of southern California. A key and description of the species occurring in southern California have been included in the newsletter.

FUNDS FOR THIS PUBLICATION PROVIDED IN PART BY THE ARCO FOUNDATION, CHEVRON USA, AND TEXACO INC.

SCAMIT OFFICER ELECTIONS RESULTS:

The SCAMIT officers for 1992-93 are:

President - Ron Velarde
Vice President - Larry Lovell
Secretary - Diane O'Donohue
Treasurer - Ann Martin

Congratulations to all!

NEW PUBLICATIONS OF INTEREST TO SCAMIT MEMBERS:

Hsieh, H., et al. 1991. Habitat characteristics and occurrence of the spionid Pseudopolydora species on the tube-caps of the onuphid Diopatra bilobata Bull. Inst. Academia Sincia. (30) 331-319.

Doyle, S. 1991. Setal type and distribution in two Australian species of Scyphoproctus and three other capitellidae, with a description of Scyphoproctus towraiensis n. sp. Zool. Scripta (20) 263-275.

Grehan, A. 1991. Demography and reproductive biology if Melinna palmata in inner Galway Bay on the west coast of Ireland. Mar Biol. (109) 459-467.

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Thanks to Tom Parker of the Los Angles County Sanitation District.

FUTURE MEETINGS:

The May 11 meeting will be a discussion on how to best organize committees for publishing on SCAMIT provisional species. Decisions will be made as to which species would be the quickest to publish, who has priority, if any, and what level of funding can be made available through SCAMIT. We will also begin cataloging SCAMIT literature. Those members with an interest are urged to attend. We will be meeting at the Cabrillo Marine Museum in San Pedro, California.

Anybody planning to present a paper at the Polycheate conference in France is invited to present it at an upcoming SCAMIT meeting. If you are interested contact Larry Lovell.

SCAMIT OFFICERS:

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

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* **Please make a note that these are new numbers.**

ABRANCHIATE AMPHITRITINAE (POLYCHAETA, TEREBELLIDAE) FROM SOUTHERN CALIFORNIA

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The abranchiate genera of the subfamily Amphitritinae present considerable problems because of poor original descriptions, and in many cases, inadequate material for revision. Generic placement depends on the presence or absence of lateral lobes, relative placement of the first notopodia and neuropodia, plus the number of segments bearing notosetae and neurosetae, the start of double rows of uncini, structure of the notosetae, and the presence or absence of a transverse dorsal ridge on segment 2. Original descriptions often lack detailed accounts of these characters, particularly of the setal structures. Type material is missing for many species, or represents the only specimens ever collected of certain species.

The loss of branchiae is an independent development in several different lines of evolution (Holthe 1986b). Annenkova (1924, 1926) showed that the branchiae were secondarily lost in *Baffinia hesslei* (Annenkova 1924), first described as an abranchiate member of *Terebella*, by showing through dissection the presence of blood vessels leading to the lost branchiae. Branchial loss is most common in the Polycirrinae, and found in the Amphitritinae "in otherwise unrelated genera" (Holthe 1986b).

Arrangement of the double rows of uncini along the body is an important character at the species level. The last double row is usually concurrent with the occurence of the last notopodia, in the posteriormost thoracic segment. However, it is not uncommon for the double rows of uncini to extend onto the first few abdominal segments, especially in the genus *Lanassa*. In *Pseudoproclea* Hutchings & Glasby 1988, the double rows extend to within the last 8-10 segments before the pygidium. The uncini usually switch from single to double rows on the 11th segment (setiger 8), but there are exceptions. The uncini of all local genera are in double rows beginning on segment 11. Uncini in the double rows are usually arranged in two distinct lines, face-to-face (beak-to-beak), but in a few genera, such as *Laphania*, the two rows may be fused into an interlocking line (resembling a closed zipper) and the uncini alternate back-to-back. All genera except *Proclea* and *Laphania* have the first neuropodia on segment 5 (setiger 3); *Proclea*'s uncini begin on segment 6 (setiger 3), *Laphania*'s begin on segment 9 (setiger 7).

Structure of the notosetae is important at both generic and species levels. Genera may have setae that are all smooth, all serrate, or a combination of both. In some genera, the setae are supposed to remain the same in all fascicles, while in others such as *Proclea* and *Pseudoproclea* the setae change in shape and/or degree of denticulation from anterior to posterior thoracic setigers. Personal observations have shown that even in species described as having a single type of notosetae, two types may occur, as may changes in structure relative to position. *Spinosphaera oculata* Hartman is a good example of this (Harris, ms).

Five abranchiate genera occur in southern California, predominantly in soft sediments: *Lanassa* Malmgren 1866, *Laphania* Malmgren 1866, *Leaena* Malmgren 1866, *Proclea* Saint-Joseph 1894, and *Spinosphaera* Hessle 1917. Several common species are undescribed and even those taxa listed as described species need to be compared to original or topotype material. Following are brief descriptions of the above genera and their local representatives. Generic information is taken primarily from three sources: Fauchald 1977, Hutchings & Glasby 1988, and Holthe 1986a, b.

Lanassa Malmgren 1866: Lateral lobes present or absent; notopodia begin on segment 4, present on 11-15 (27 ?) segments; neuropodia begin on segment 5 (setiger 2), uncini in double rows on segment 11 (setiger 8) which end on either segment 18 (same segment as the last notopodia) or up to five segments past the end of the notosetae; two types of notosetae, both denticulate to some degree.

Lanassa gracilis (Moore 1923): Lateral lobes on segments 2 & 3; notosetae 15 pairs, on segments 4 to 18; uncini in single rows on segments 5 to 10, double on segments 11 to 18; short setae, limbate, denticulate along edge, and larger setae, bilimbate, denticulate on tip only; ventral shields on approximately 6 segments; nephridial papillae on segment 3. Present but uncommon in soft sediments, shelf depths.

References: Moore 1923, Hartman 1969

Lanassa venusta venusta (Malm 1874): Lateral lobes on segments 2 & 3, not well developed; notosetae 11 pairs, on segments 4 to 14; uncini in single rows on segments 5 to 10, double rows on segments 11 to 18, extend 4 segments past end of notopodia; two types of setae - limbate, denticulate along edges, and thinner ones, denticulate, taper to very fine tips; ventral shields on about 10 segments; nephridial papillae on segments 3, 6-9. Common in soft sediments, shelf depths.
Reference: Holthe 1986a

Lanassa sp. D Harris: Lateral lobes on segments 2 & 3; notopodia 15 pairs, on segments 4 to 18; uncini in single rows on segments 5 to 10, double rows on segments 11 to 19, extend 1 segment past end of notopodia; two types of setae - 1) bilimbate denticulate and 2) shorter, geniculate and denticulate; ventral shields on up to 10 segments; nephridial papillae on segment 3. In soft sediments, shelf depths; most abundant of the local *Lanassa* species. All three species can occur in the same sample.
Reference: Harris, ms.

Laphania Malmgren 1866: Lateral lobes present; narrow, ring-like collar on segment 2, most conspicuous on dorsum; notopodia begin on segment 3 (Holthe 1986a, b), 17 pairs; uncini begin on segment 9 (setiger 7), switch to double rows on segment 11 (setiger 9), continue to segment 19, arranged back to back; notosetae all smooth, both long & short, with brimmed, undulate tips; ventral shields on 12 segments; nephridial papillae on segments 5 to 8.

Laphania cf. *boecki* Malmgren 1866: Characters as for genus. Locally occurs in southern California in rocky, subtidal areas, in the Santa Barbara Channel and Santa Maria Basin.
References: Banse 1980, Holthe 1986a

Leaena Malmgren 1866: Lateral lobes present; notopodia begin on segment 4 (? 3), present on 10 to 17 (? 31) segments; uncini begin on segment 5 (? 4), double on segment 11 (? 12 in one species), present on 10 to 13 (? 16) segments as double rows, then single rows again; all setae smooth. This genus contains the most character variation, and is in greatest need of revision.

Leaena caeca Hartman 1960: Lateral lobes present, poorly developed, on 2 segments; notosetae begin on segment 3, occur on 16 segments; uncini begin as single rows on segment 4, switch to double rows on segment 10 (setiger 8), continue to end of thorax, then single; ventral shields on 11 segments; all setae distally smooth, broadly bilimbate, both long & short. Rare, from the Santa Catalina Basin, 620 fm.
References: Hartman 1960, 1969

Leaena videns Chamberlin 1919: Incompletely known: 31 pairs of notosetae, uncini described as having exceptionally long beaks, notosetae long, with geniculate shafts & prolonged slender tips. Rare, rocky intertidal, Laguna Beach.
References: Chamberlin 1919, Hartman 1969

Proclea Saint-Joseph 1894: Lateral lobes present; notopodia begin on segment 4, 16-23 pairs; uncini begin on segment 6 (setiger 3), double on segment 11 (setiger 8), continue as double rows to end of thorax or first 1-4 abdominal segments; notosetae both serrated and smooth, change from anterior to posterior thorax.

Proclea cf. *graffi* (Langerhans 1884): Lateral lobes distinct on segments 2 & 3, less so on 4; notosetae 16 pairs, on segments 4 to 19; uncini begin on segment 6 (setiger 3), double on segment 11 (setiger 8), continue to end of thorax, then in single rows; notosetae in first 8 setigers both long & short, smooth (local taxa with very fine denticulations visible at 1000X: Harris, ms); long setae of posterior 8 setigers finely denticulate with broad edges, short setae geniculate, almost pectinate; ventral shields on about 10 segments; nephridial papillae on segments 3 & 8. This is represented in southern California by a relatively large species (40 mm, ovigerous) found in rocky, subtidal habitats. There is another, much smaller (2 mm, ovigerous) species from the same type of area which also fits this description (*Proclea* sp. B Harris, ms).
Reference: Holthe 1986a, Harris, ms.

Proclea sp. A Harris: Characters as for *P.* cf. *graffi*, but much smaller (5-7 mm, ovigerous) and with a different staining pattern. Found only in soft sediments, slope depths, in southern and central California.
Reference: Harris, ms.

Proclea sp. C Harris: Characters as for *P.* cf. *graffi*, except the notosetae

occur on segments 4 to 18 (15 setigers), so that the double rows of uncini which occur on segments 11 to 19 extend 1 segment past the end of the notosetae. Found only in soft sediments, slope depths. Both species A & C have been found in the same samples, along with *Lanassa gracilis*, *L. venusta venusta* & *L.* sp. D.
Reference: Harris, ms.

Spinosphaera Hessle 1917: Lateral lobes absent; notosetae begin on segment 4, occur on 23 to 40+ segments; neurosetae begin on segment 5 (setiger 2), switch to double rows on segment 11, extend over large part of body before changing back to single rows; notosetae both smooth & serrate, both long & short with subdistal hispid swellings.

Spinosphaera oculata Hartman 1944: No lateral lobes; notosetae on varying number of segments, from 31 to 41 pairs; uncini in single rows from segment 5 to 10, double rows from segment 11 to near end of body, single for last 12 or fewer segments; notosetae change along body - in anterior 7 setigers setae are both long & short, bilimbate, smooth with elongate tips, at setiger 8 the setae, both long & short, are still bilimbate, but denticulate along one edge, by setiger 13 both long & short setae are geniculate, have oblique denticulate tips, and have subdistal inflated hispid regions with narrow, obscure wings below swellings; ventral shields through setiger 13; nephridial papillae from segment 5 onward. Central and southern California (rare), rocky intertidal.
References: Hartman 1944, 1969, Harris, ms.

Spinosphaera cf. *pacifica* Hessle 1917: No lateral lobes; notosetae on 20-23 segments; uncini begin on segment 5, switch to double rows on segment 11; notosetae alternate between long & short, both types with narrowly flaring pectinate ends, only long setae have inflated spinose subdistal parts, followed by pronounced bilimate regions; nephridial papillae on segments 3, 6-20. Southern and central California.
References: Hessle 1917, Imajima & Hartman 1964

KEY TO SOUTHERN CALIFORNIA ABRANCHIATE AMPHITRITINAE

1. Uncini begin on segment 5 (setiger 2).......................................2
- Uncini begin on segment 6 (setiger 3)...............................*Proclea*........4
- Uncini begin on segment 9 (setiger 7)..........................*Laphania* cf. *boecki*

2. Notosetae all smooth (may appear finely denticulate at 1000X)......................................*Leaena*......6
- Some notosetae clearly denticulate (< 400X) after segment 1.......................................3

3. Notosetae occur on 11 to 15 segments; setalshaftsnotmodified.................................. *Lanassa*........7
- Notosetae on 20+ segments; setal shafts with subdistal hispid swellings...................................*Spinosphaera*.......9

4. Notosetae on 16 segments; last double row of uncini on same segment as last notopodia.......................................5
- Notosetae on 16 segments; last double row of uncini on segment following last notopodia ....*Lanassa gracilis*

5. Found in soft sediments, shallow to shelf depths; ovigerous specimens 5-7 mm maximum length ....*Proclea* sp. A
- Found in rocky habitats, shallow to shelf depths; ovigerous specimens 40-50 mm length ....*Proclea* sp. C

6. Notosetae on 16 segments; deep water.................................*Leaena caeca*
- Notosetae on 31 segments; rocky intertidal...........................*Leaena videns*

7. Notosetae on 11 segments; uncini in double rows on 8 segments...*Lanassa venusta venusta*
- Notosetae on 15 segments...8

8. Uncini in double rows on 8 segments; last double row on same segment as last notopodia..............................*Lanassa gracilis*
- Uncini in double rows on 9 segments; last double

KEY TO ABRANCHIATE AMPHITRITINAE WORLD-WIDE*

1. Uncini begin on segment 5 (setiger 2)..2
- Uncini begin on segment 6 (setiger 3)...................................*Proclea*
- Uncini begin on segment 9 (setiger 7)...................................*Laphania*

2. All setae in posterior 8 thoracic setigers smooth 3
- At least some notosetae clearly denticulate...4

3. Third segment with transverse ridge across dorsum...*Leaena*
- Third segment without transverse ridge across dorsum...*Stschapovella*

4. Uncini in double rows for more than 20 segments 5
- Uncini in double rows for less than 20 segments 7

5. 16 segments with notosetae...*Pseudoproclea*
- Notopodia on more than 20 segments...6

6. Notopodia continue to near end of body; notosetae with unmodified shafts...*Baffinia*
- Notopodia on 23 to 40+ segments; notosetae after setiger 13 with subdistal hispid swellings on shafts...*Spinosphaera*

7. All notosetae equal in size...8
- Notosetae on setiger 12 similar to others but much thicker...*Arranooba*

8. Notosetae finely denticulate...*Lanassa*
- Some notosetae distinctly pectinate.......................................*Phisidia*

* *Bathya* is too incompletely known to be included.

row on segment following last notopodia ....*Lanassa* sp. D

9. Notosetae on 20-23 segments; subdistal hispid regions short, somewhat rounded; geniculate setae with narrow, flaring distal portions........................*Spinosphaera cf. pacifica*
- Notosetae on 31-40+ segments; subdistal hispid regions elongate, only slightly swollen; geniculate setae with broadly flaring distal portion ....*Spinosphaera oculata*

GENERA OF ABRANCHIATE AMPHITRITINAE WORLD-WIDE

Arranooba Hutchings & Glasby 1988: 1 species

Baffinia Wesenberg-Lund 1950: 2 species

Bathya Saint-Joseph 1894: 3 species

Lanassa Malmgren 1866: 10 species

Leaena Malmgren 1866: 12 species

Laphania Malmgren 1866: 1 species

Phisidia Saint-Joseph 1894: 6 species

Proclea Saint-Joseph 1894: 4 species

Pseudoproclea Hutchings & Glasby 1990: 1 species

Spinosphaera Hessle 1917: 2 species

Stschapovella Levenstejn 1957: 1 species

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Setiger Pattern for Selected Terebellids[1]

setiger#	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	→
<u>Lanassa</u> <u>venusta</u> <u>venusta</u>	D	D	D	D	D	D	D	D	D	D	D									
		1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	→
<u>Lanassa</u> <u>venusta</u> <u>pacifica</u>	D	D	D	D	D	D	D	D	D	D	D	D								
		1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	→
<u>Lanassa</u> <u>gracilis</u>	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D					
		1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	→
<u>Lanassa</u> sp. D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D					
		1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	→
<u>Proclea</u> <u>graffi</u>	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D				
			1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	→
<u>Proclea</u> <u>malmgreni</u>	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D				
			1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	→
<u>Proclea</u> sp. A	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D				
			1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	→
<u>Proclea</u> sp. C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D				
			1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	1	1	→
<u>Leaena</u> <u>caeca</u>	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S				
		1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	→
<u>Leaena</u> <u>videns</u>	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	→ 31
	?	→																		

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[1] The upper row represents whether the notopodial setae are smooth (S) or denticulate (D) for each species. The lower row represents the neuropodial uncingers in being either in single (1) or double (2) rows. The arrow (→) indicates that the last entry is repeated to the posterior or at least to the setiger indicated by the number.

setiger#	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	→	
<u>Laphania</u> <u>boecki</u>	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S				
							1	1	2	2	2	2	2	2	2	2	2	1	1	→	
<u>Laphania</u> sp. A	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S				
							1	1	2	2	2	2	2	2	2	2	2	1	1	→	
<u>Spinosphaera</u> <u>oculata</u>	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	→	40
		1	1	1	1	1	1	2													

ANNUAL MEETING OF THE WESTERN SOCIETY OF MALACOLOGISTS

30 JUNE - 3 JULY 1992, ASILOMAR, PACIFIC GROVE, CALIFORNIA

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COMPARATIVE ANATOMY OF MYCETOPODA AND ANODONTITES (MYCETOPODIDAE) FROM CENTRAL AMERICA WITH MUTELA (MUTELIDAE) FROM EAST AFRICA.

CONEY, C. Clifton, Malacology Section, Los Angeles County Museum of Natural History, 900 Exposition Blvd., Los Angeles, CA 90007 and LOPEZ, A. University of Central America, Managua, Nicaragua.

Scanning and transmission electron microscopy and histology were employed to investigate the external and internal anatomy of the ctenidia, the external structure of the oral and aboral surfaces of the labial palps and the ciliation of the incurrent and excurrent siphons of Mycetopoda siliquosa (Spix, 1827), Anodontites nicaraguae (Philippi, 1848), and A. montezuma (Lea, 1841) of the Central American Mycetopodidae and Mutela nilotica (Cailliaud, 1823) of the East African Mutelidae. The unique circulatory system of the mycetopodid ctenidia and ctenidial ciliation are described in detail. The bizarre.......

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The twenty-fifth annual meeting of the Western Society of Malacologists will be held at Asilomar, Pacific Grove, California from June 30 to July 3, 1992.

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Send shell donations to:

Dr. Henry W. Chaney
Curator
Department of Invertebrate Zoology
Santa Barbara Museum of Natural History
2559 Puesta del Sol Road
Santa Barbara, CA 93105

APPLICATION FOR PRESENTING CONTRIBUTED TALK OR POSTER
1992 WESTERN SOCIETY OF MALACOLOGISTS MEETING

NAME: ______________________________

ADDRESS: ______________________________

____

______________________________ ZIP: __________

PHONE (office): ______________________(home): __________

TITLE OF TALK (CHECK_____) OR POSTER (_____) : __________

____

____

TIME NEED FOR TALK (20 minutes maximum) : __________

EQUIPMENT NEEDED: _____35 mm slide projector ______________Other

INDICATE IN WHICH SESSION YOU WISH YOUR CONTRIBUTED PAPER PLACED:

_______Marine _______Fossil

_______Fresh water _______Terrestrial

_______Cephalopod _______Other

DO YOU WANT YOUR ABSTRACT TO BE PUBLISHED IN THE W.S.M. ANNUAL REPORT? (You will have the opportunity to revise it after the meeting.)________

BEST STUDENT PAPER COMPETITION: ______ (Requires note or signature from professor asserting current student status. Single authored papers only; limited to one designated paper).

PROFESSOR'S SIGNATURE: ______________________________

RETURN THIS FORM TO: David K. Mulliner
5283 Vickie Drive
(BEFORE 15 MAY 1992) San Diego, CA 92109

APPLICATION FOR PRESENTING AN EXHIBIT
1992 WESTERN SOCIETY OF MALACOLOGISTS MEETING

Call for Exhibits:

Lighted, lockable display cabinets are available. The cabinets are approximately four feet long, by two feet wide, by two feet high.

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PHONE (office): ____________________ **(home):** __________

TITLE OF EXHIBIT : ____________________

____

____

SPACE NEED FOR EXHIBIT : ____________________

DO YOU WANT A DESCRIPTION OF YOUR EXHIBIT TO BE PUBLISHED IN THE W.S.M. ANNUAL REPORT?
(You will have the opportunity to submit it after the meeting.) __________

RETURN THIS FORM TO: George Metz
W.S.M. Exhibit Chairman
(BEFORE 30 MAY 1992) 121 Wild Horse Valley
Novato, CA 94947

Southern California Association of
Marine Invertebrate Taxonomists

3720 Stephen White Drive
San Pedro, California 90731

April, 1992 Vol. 10, No. 12

NEXT MEETING: Provisional Species Review

GUEST SPEAKER: None

DATE: May 11, 1992
9:30am - 3:00pm

LOCATION: Cabrillo Marine Museum
San Pedro, California

The May 11 meeting will be a discussion on how to best organize committees for publishing on SCAMIT provisional species. Decisions will be made as to which species would be the quickest to publish, who has priority, if any, and what level of funding can be made available through SCAMIT. Please bring current species list from project(s) you are working on to the meeting. We will also begin cataloging SCAMIT literature. Those members with an interest are urged to attend. We will be meeting at the Cabrillo Marine Museum in San Pedro, California.

MINUTES FROM MEETING ON MARCH 9, 1992:

Don Cadien represented SCAMIT at the memorial service/amphipod workshop for J. L. Barnard in Washington, D.C. A full report from Don has been included in the newsletter.

Included in the newsletter is an open letter from SCAMIT to Dr. Brian Kensley asking that Dr. Barnard post be filled with another amphipod specialist.

Hans Kuck of LACMNH provided attending members with some information on stomatopods. Included were a list of type specimens

FUNDS FOR THIS PUBLICATION PROVIDED IN PART BY THE ARCO FOUNDATION, CHEVRON USA, AND TEXACO INC.

at LACMNH and notes on four species reported from southern California. These have been included in the newsletter. He also recommended two publications:

Basch, L. V. and J. M. Engle, 1989. Aspects of the Ecology and Behavior of the Stomatopod Hemisquilla ensigera californiensis (Gonodactyloidea: Hemisquillidae). in: E. A. Ferrero (ed.), Biology of Stomatopoda, Selected Symposia and Monographs U.Z.I., 3 ,Mucchi, Modena. 199-212

McLaughlin, P. A., 1980. Comparative Morphology of Recent Crustacea, W. H. Freeman and Co., San Francisco. 177 pp.

Thalassinidea Workshop: Handouts from Don Cadien review of Thalassinidea of the Northeast Pacific has been included in the newsletter. Many thanks to Don for leading the meeting.

FUTURE MEETINGS:

Anybody planning to present a paper at the Polycheate conference in France is invited to present it at an upcoming SCAMIT meeting. If you are interested contact Larry Lovell.

The June 8 meeting will be on the Polychaetes Chaetopterids and Onuphids. Included in the newsletter are working copies of the Key to the Chaetopteridae of Point Loma and Key to the Onuphidae of Point Loma produced by Ron Velarde and Dean Pasko. These keys, which were designed for the general taxonomist, not the polychaete specialist, will be evaluated at the June 8 SCAMIT meeting at the Alan Hancock Foundation building. Please use them to identify your chaetopterid and onuphid specimens prior to this meeting , so that any changes and/or improvements can be made at that time. Note from the authors: Both keys were constructed based on species known to occur between 45 m and 115 m off Point Loma, California. We would like to make the keys useful to the general SCAMIT membership working in southern California, so bring your comments, suggestions, and specimens to the June meeting. As you use the keys, keep in mind that they were created using regional specimens (no type material was used) and various species descriptions. In the onuphid key, for example, you will notice that we do not distinguish between the three possible species of Diopatra. The reason for this is simple: Diopatra ornata and D. splendidissima have not occurred in our samples to date. Consequently, although Diopatra species may be easily distinguished by pigment or methyl-green staining patterns, at the time of this writing, no specimens were available to examine. We hope to rectify this inadequacy by examining AHF specimens, as well as specimens supplied by you. Thanks for your help! RV & DP

SPECIMEN REQUEST:

Don Cadien has forwarded the following request from Dr. Charles D'Asaro of the University of West Florida. He is interested in getting specimens of egg capsules of California *Nassarius*. Specific targets are *N. fossatus*, *N. mendicus*, and *N. perpingus*, but other California species would also be welcome. He has recently reported on the Thorson Collection of gastropod egg-capsules, and is attempting to confirm questionable earlier data. Where possible the adults should be retained and sent along as vouchers of the identity for the egg-capsules. Drawings of the egg-capsules are included in the newsletter, as is a sheet with adult illustrations. Fix the egg-capsules in formalin, then transfer to alcohol for preservation. Specimens can either be forwarded to Don Cadien at the L. A. County Sanitation District Marine Lab, or sent directly to Dr. D'Asaro at the following address:

Dr. Charles D'Asaro
Biology - University of West Florida
11000 University Parkway
Pensacola, Florida 32514-5771

A NAME CHANGE:

Due to her recent marriage treasurer Ann Martin will now be known as Ann Dalkey. This change has been approved by the ICZN. Congratulations Ann!

SCAMIT OFFICERS:

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

President	Ron Velarde	(619)692-4903
Vice-President	Larry Lovell	(619)945-1608
Secretary	Diane O'Donohue	(619)692-4900
Treasurer	Ann Dalkey	(213)648-5317

J.L.Barnard Memorial and Symposium, Washington D.C.

Through the good offices of both SCAMIT and L.A. County Sanitation Districts I was able to participate in the J. Laurens Barnard Memorial Service and Symposium, April 9-10 1992. I went to present a SCAMIT poster at the Symposium, to pay respects to the memory of a man who aided SCAMIT generously and frequently, to lobby for the continuation of his position with the selection committee, and to pursue some research questions with the staff and collections of the Smithsonian Institution. Others from the west coast attending were Dr. Donald J. Reish, Dr. Rick Brusca, and Regina Wetzer (San Diego Society of Natural History). All will probably enjoy talking to you about the proceedings should you see them.

I took the RED EYE flight back on the morning of the 7th, took the Metro to the museum, and began meeting and talking with the staff there. During the first afternoon I was given a tour of the Crustacea stacks by Alan Child: rather impressive considering that in the Crustacea collection alone there are 6.5 miles of shelving - little of it empty. During this first day I met and talked with Jim Thomas (Reef Foundation, Florida), Les Watling (University of Maine), Al Child (Smithsonian Support Center), Brian Kensley (Invertebrate Zoology Dept. Chairman), Marilynn Schotte (SI - isopods), Elizabeth Harrison-Nelson (J.L.B.'s assistant), and Rae Germon (SI - mollusks). I had called ahead to make arrangements for a place to work, and was put into Roger Cressey's office.

On the 8th I was able to meet with Ray Manning (SI - stomatopods, ghost shrimp), Fenner Chace (SI - alpheid shrimp), Austin Williams (SI - decapods in general, *Upogebia*), Brian Kensley (SI - axiid shrimp, anthurid isopods) about taxonomic problems in their area of expertise (and lobby them on the continuation of service in amphipods). Some of the fruits of these meetings were incorporated into the group summary on the thalassinoid shrimps given at the 20th of April meeting. I took advantage of the breaks between these meetings to take materials from the collection to examine over the weekend after the memorial and symposium.

I also managed to steal across to the East Wing (Crustacea are in the West Wing) to examine molluscan types. The type of *Philine bakeri* was nearly identical to one of the specimens I had from Long Beach Harbor. Examination of the holotype confirmed this species is as described on the *Philine sp. A* voucher sheet. Since Dall never illustrated *P. bakeri*, I was a little uneasy about my earlier conclusions based on the narrative description alone. The species which R.T. Abbott (in American Seashells) and Dave Behrens (in Pacific Coast Nudibranchs) call *Philine bakeri* is really *Philine alba* of Mattox, a very different species.

Everyone had finally arrived by the morning of the 9th, and the Memorial Service got underway promptly at 10 AM in the Waldo Schmitt Room. The place was standing room only, with about 50 in attendance (see participants from outside the Smithsonian on the attached list). The proceedings were very affectionate, despite J.L.B.'s propensity for raising administrative hackles during life. I put up the SCAMIT poster and watched the premises during lunch. The afternoon session was heavy on reminiscences of the period before I knew him, and before he began his workshops for SCAMIT. During each break the participants would mix and talk; raising such a din that restarting the proceedings after a break was tough. J.L.B. would have enjoyed this gathering.

At the end of the scheduled program a number of people got up to pass on reflections on how J.L.B. had affected their lives (uniformly to the good), and Tom Bowman gave a posthumous award of the Order of the Lobster to J.L.B. for his innovative use of the English language (Bowman was an editor of the Proceedings of the Biological Society of Washington during a period in which J.L.B. published numerous articles in that journal). In the late afternoon we were treated to wine and beer courtesy of the Director. Both J.L.B.'s collaborator and widow Charline and his son Robert were in attendance. The proceedings were videotaped by Al Child, and SCAMIT is purchasing a copy of the video for our archives. Those of you who want to experience the Memorial can do so by borrowing and viewing this tape.

The contributed paper session on the 10th began at 0830, as scheduled, and continued through the day. All were rather interesting, and several produced a number of questions. Les Watling's talk, in particular, started a lively discussion of the pro's and con's of the use of characters of questionable independence in phylogenetic analyses. The meeting drew in visiting investigators, and graduate students from Washington's many universities. Many members of the Smithsonian staff were in and out all day long. Kristian Fauchald, for instance, sat in for Jim Lowry's morning talk on the use of DELTA, and noted in passing that his recent massive *Eunice* monograph was produced using the DELTA program. The proceedings are to be published next year as an issue of the Journal of Natural History, of which P.G. Moore (an attendee) is editor. Les Watling is to serve as editor of the symposium papers.

I was fortunate enough to be invited to accompany Al Child, Jan Stock, Rick Brusca, and Regina Wetzer for luncheon in the "Castle"- the old Smithsonian building- as a guest of Al Child. The place was beautifully and elegantly restored, and packed with guests.

The number and size of the posters taxed available space severely. Our poster board was soon exhausted, despite the SCAMIT poster being downsized from 4x8 to 2x4 feet. Interaction between attendees was so strong during breaks that the posters did not get the attention they deserved. The conversations were animated and ever-shifting. In the afternoon we played the videotape of the first (1985) J.L.B./SCAMIT Amphipod Workshop, and those temporarily not in conversations paused to watch. The Meeting officially ended at 5PM since we had to vacate the room to accommodate the traditional Friday evening staff beer tasting/TGIF get together.

Despite the end of the official meetings, they continued with a slightly reduced group at the home of Elizabeth Harrison-Nelson on Saturday evening. The conversational exchange, which had been vigorous at the Smithsonian, became deafening at Elizabeth's - and could be heard (so I'm told) from two blocks away. Elizabeth, her husband Fred, and several friends provided bluegrass music during the evening, but were hard pressed to compete with the social interchange. A number of persons took advantage of their backyard to relax and talk, play horseshoes (Manning and Williams), and do a J.L.B. memorial bird watch in the freshly leaved trees (Stock and Vader, with occasional help from others). The gathering itself was a J.L.B. memorial taco party, with Charline Barnard providing the special taco innards.

A few diehards also gathered for brunch on Sunday at Paula Rothman's (also an assistant of J.L.B.'s instrumental in the memorial meeting arrangements). Jim Thomas, Trudi Krapp-Schickel, Gloria Alonso, Charline Barnard, Elva Briones, Les Watling, Jörg Köhn, Elizabeth Harrison-Nelson and I met for a last talk session before departing to our various destinations.

On both Saturday and Sunday I went in to the Smithsonian in the mornings to work on materials from the collections before breaking off to resume the unofficial meetings. I was able to examine a series of munnid and anthurid isopods, pleustid amphipods, and a few stenothoid amphipods during my stay. Types were as accessible as any other specimens in the collections, and I examined quite a few.

SCAMIT got favorably mentioned by several of the speakers in their presentations (Jim Thomas, Don Reish, Ed Bousfield). Positive comments were also received from several attendees on the basic concept of regional standardization, and on our approach. The results of the lobbying efforts will not be known for some time, although in theory a selection will be made before the end of May. The short list for the position has been announced, and there is one amphipod person on it. I hope that my attendance at the meeting to represent the position of SCAMIT to the search committee members and administration will prove fruitful. At least our poster was well received. Ron Velarde, Larry Lovell and I will put together a short paper for the symposium volume to represent the poster. My thanks to SCAMIT for sending me back as an agent. It was a truly memorable experience from which I benefited greatly.

Don Cadien - County Sanitation Districts of Los Angeles County

J. Laurens Barnard Memorial Service

1000 Welcome and Introductions. Brian F. Kensley, Chairman, Department of Invertebrate Zoology

Remarks. Frank H. Talbot, Director, National Museum of Natural History

Closing Remarks. James D. Thomas, The Reef Foundation

1130 Lunch

A Tribute to J. Laurens Barnard

Reflections and Remembrances by Friends and Colleagues

1300 Welcome and Introductions. J.D. Thomas

The Career and Professional Achievements of J. Laurens Barnard

The Early Years (California) 1928-1967. D. Reish

The Arizona Years, 1970-1974. R. Brusca

The Washington Years, 1975-1991. J. Thomas

1400 Contributions of J.L. Barnard to Southern Hemisphere Taxonomy. J. Lowry

1430 Impact of J.L. Barnard, past, present, and furute on North American Pacific Amphipod Research. E.L. Bousfield

1500 J. Laurens Barnard: Remembrances, Reflections, Humorous Anecdotes.

A Symposium in Honor of J. Laurens Barnard
April 10, 1992

0830 ***Thomas, J. D.*** Welcome and introductory remarks.

0840 ***Bousfield, E. & C. P. Staude.*** Anatomy of a proposed illustrated guide to amphipods of the North American Pacific Coast, Alaska to California.

0900 ***Lowry, J. K.*** The use of the computer program DELTA in amphipod systematics.

0930 ***Takeuchi, I.*** Are the Caprellidea a monophyletic group?

0950 Coffee

1030 ***Watling, L.*** Importance of functional morphology to phylogenetic studies.

1050 ***Myers, A. A.*** Amphipods as biogeographic models.

1110 ***Stock, J.*** Remarkable amphi-Atlantic distribution patterns in stygobiont Amphipoda.

1130 ***Holsinger, J.*** Biodiversity of subterranean amphipod crustaceans: global patterns and zoogeographic implications.

1150 Lunch

1320 ***Thomas, J. D.*** Using amphipods to assess and monitor biodiversity in tropical marine systems.

1340 ***Reish, D. J.*** Use of amphipods in marine environmental studies (Bioassay): past, present, and future.

1400 ***Conlan, K.*** Response of amphipods to environmental disturbance

1420 Coffee

1500 ***Köhn, J.*** Methods in amphipod population studies. Amphipods as indicators of soft-bottom community structure.

1520 ***Duffy, E.*** Amphipod herbivory in the organization of natural marine communities.

POSTERS

Alonso, G., J. L. Barnard & M. Mickevich. Cladistic analysis of haustorioid and phoxocephaloid Amphipoda.

Bellan-Santini, D. & J. C. Dauvin. Cladistic and biogeographic relationships in amphipods: example of the *Byblis* genus.

Cadien, D.(SCAMIT). Regional standardization of taxonomy.

Hirayama, A. An evolutionary scenario of the new subfamily Corophiinae in time and space.

Krapp-Schickel, T. Effects of water pollution on algal dwelling amphipods in Sicily.

Laubitz, D. Caprellidea: towards a new synthesis.

Steele, D. Mandible structure in *Anonyx*.

Vader, Wim History of the Amphipod Newsletter.

Watling, L. A proposed global amphipod database.

M E M O R A N D U M

DATE: April 1, 1992

TO: Brian F. Kensley, Chairman, IZ

FROM: J. D. Thomas

RE: List of J.L. Barnard Symposium Participants

Dra. Gloria M. Alonso
Museo Argentino de Ciencias Naturales
"Bernardino Rivadavia" - Invertebrados
Buenos Aires, **ARGENTINA**

Dr. Denise. Bellan-Santini
Centre d'Oceanologie de Marseille
Station Marine d'Endoume
Marseille, **FRANCE**

Dr. Penelope Berents
The Australian Museum
Sydney South, NSW, **AUSTRALIA**

Dr. E.L. Bousfield
Royal British Columbia Museum
Victoria, British Columbia, **CANADA**

Dr. Rick C. Brusca
Natural History Museum
Balboa Park
San Diego, CA

Mr. Donald B. Cadien
LA County Sanitation Districts
Carson, CA

Dr. Kathy Conlan
Canadian Museum of Nature
Ottawa, Ontario, **CANADA**

Dr. Jean Claude Dauvin
Museum National d'Histoire Nat.
Paris, **FRANCE**

Dr. Emmett Duffy
Marine Sciences
University of North Carolina
Chapel Hill, NC

Dra. Elva Escobar Briones
Universidad Nacional Autonoma de Mexico
Mexico, D.F., **MEXICO**

Dr. John Holsinger
Old Dominion University
Norfolk, VA

Dr. Akirai Hirayama
Asia University Biology Lab
Tokyo, **JAPAN**

Dr. Jorg Kohn
Wilhelm-Pieck-Universitat
Rostock, **GERMANY**

Dr. Gertraud Krapp-Schickel
Wachtberg - Adendorf
GERMANY

Dr. Diana R. Laubitz
Canadian Museum of Nature
Ottawa, Ontario, **CANADA**

Dr. James K. Lowry
The Australian Museum
Sydney South, NSW, **AUSTRALIA**

Dr. Mary Mickevitch
MCSE, University of Maryland
College Park, MD

P.G. Moore
University Marine Biological
Station Millport
Isle of Cumbrae, **SCOTLAND**

Dr. Alan A. Myers
University College
Cork, **IRELAND**

Dr. D.J. Reish
California State College
Long Beach, CA

Dr. Mark Shih
Canadian Museum of Nature
Ottawa, Ontario, **CANADA**

Dr. Craig P. Staude
Friday Harbor Laboratories
University of Washington
Friday Harbor, WA

Dr. J.H. Stock
Institute of Taxonomic Zoology
University of Amsterdam
Amsterdam, **THE NETHERLANDS**

Dr. Ichiro Takeuchi
University of Tokyo
Tokyo, **JAPAN**

Dr. James D. Thomas
The Reef Foundation
Big Pine Key, FL

Dr. Michael H. Thurston
Institute of Oceanographic Sciences
Surrey, **ENGLAND**

Dr. W.J.M. Vader
Universitetet I Tromso
Museumsvirksomhet
Tromso, **NORWAY**

Dr. Les Watling
Ira C. Darling Center
University of Maine
Walpole, **ME**

Southern California Association of
Marine Invertebrate Taxonomists

3720 Stephen White Drive
San Pedro, California 90731

3 April 1992

Dr. Brian Kensley
Division of Crustacea
NHB 163
Smithsonian Institution
National Museum of Natural History
Washington, D. C. 20560

Dear Dr. Kensley:

It was with deep regret that the Southern California Association of Marine Invertebrate Taxonomists (SCAMIT) learned of Dr. J. L. Barnard's death in the fall of last year. He will be missed by colleagues in invertebrate systematics worldwide. Our condolences are extended to his co-workers in the Invertebrate Zoology Department at the Smithsonian.

Dr. Barnard was a member of SCAMIT and actively supported its goals to promote the study of the marine invertebrate fauna of southern California and to develop a regionally standardized taxonomy. His attendance and leadership at our annual Amphipod Workshop was of benefit to all concerned. He was an excellent taxonomic resource, having described much of the amphipod fauna of the west coast. We would observe in awe as he would show us how to deftly pluck out miniscule mouthparts. He was always interested in the taxonomic research of local members and encouraged them to publish their findings. Dr. Barnard, himself, found these workshops to be of great value. Local SCAMIT members were able to provide him with valuable amphipod specimens and ecological information, which Dr. Barnard incorporated into Smithsonian collections and information files.

SCAMIT needs the continued support and participation of amphipod researchers if we are to achieve our goals. Amphipods are being selected by national and local envioronmental monitoring agencies as toxicity and bioassay indicators, and will remain of major interest to researchers and taxonomists in the future. It is imperitive to SCAMIT and to others involved in amphipod research that another amphipod researcher replace Dr. Barnard. We feel it is crucial that amphipod systematics and research receive continued support nationally and internationally by the Smithsonian. It would be tragic for the amphipod collections and resources established by Dr. Barnard to become inactive through lack of commitment to them by the Smithsonian.

As the chairperson of the selection committee to fill Dr.

Barnard's post, we ask that you strongly consider our request and present this information to the other committee members. If you or others should have any questions concerning this letter or SCAMIT please call Ron Velarde (City of San Diego), President, at (619) 692-4903 or Larry Lovell (Consultant), Vice-President, at (619) 945-1608. Don Cadian (Los Angeles County Sanitation Districts) will be representing SCAMIT at the Barnard Memorial Service and can answer any questions.

Sincerely,

Ronald G. Velarde

Ronald G. Velarde, President and

Lawrence L. Lovell

Lawrence L. Lovell, Vice-President

J. Paleont., 66(1), 1992, pp. 157–158

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CRISIS IN SYSTEMATIC BIOLOGY IN THE "AGE OF BIODIVERSITY"

RODNEY M. FELDMANN AND RAYMOND B. MANNING

Department of Geology, Kent State University, Kent, Ohio 44242 and
Department of Invertebrate Zoology, National Museum of Natural History,
Smithsonian Institution, Washington, D.C. 20560

IT IS TIME to address the long-term consequences of the obvious contradiction between the decline in the study of systematics in the life sciences and the international cry for the study of biodiversity. Several diverse topics in neontology and paleontology, all of which are centered upon the questions of present and past perturbations in the world's biota, have dominated recent science news. The ozone layer that envelopes (protects) our planet might well be showing signs of man's adverse influence. Wanton harvesting and destruction of the rain forests of the world may be placing an unnatural stress on the recycling of atmospheric gases. Taken together, these two processes may very well result in global warming, which could have profound consequences on the biosphere. On a longer ranging scale, questions of periodic mass extinctions have piqued the imaginations of scientists and provide an interesting backdrop for considering cyclical changes in fauna and flora. These questions, among others, have resulted in the recognition that knowledge and understanding of biodiversity have reached a higher level of importance than at any other time in the history of systematics.

Questions of biodiversity are so important, in fact, that the Systematic Biology Division of the U.S. National Science Foundation has developed a program to encourage the submission of proposals in this area and the NSF's Division of Polar Programs has noted, "The study of polar paleobiology plays an important role in defining the influence of the polar regions in the evolution of Earth's biosphere. Two current areas of interest are the history of mass extinctions as they pertain to polar regions and the history of anoxia in the basins and surrounding shelf areas" (Divisional Advisory Committee for Polar Programs, 1990, p. 16). We find it ironic that, at the same time, training of systematists and development of systematic collections are being threatened at a higher level than has ever been the case in the past. Therefore, it is important for us to recognize the magnitude of the problems facing the field of systematic biology and for all life scientists to respond to the crisis.

Systematics or taxonomy is the study of natural diversity, better known today by the catchword biodiversity, thanks to the efforts of E. O. Wilson and others (Wilson, 1985, 1988; Black et al., 1989), and it is the kind of research characteristic of museums. Systematic research is basic to any other kind of biological study involving species, whether it be fisheries or molecular biology, ecology, behavior, or paleozoogeography.

In the 1990's we seem to have reached the point where both individuals and organizations outside the systematic community, including environmentalists, legislators, and sources of research funding, recognize the fundamental importance of knowledge of species diversity, museum collections that represent baseline data over time, and traditional systematic work, and appear to be beginning to appreciate the need for museum collections and systematics more than at any time in the history of systematic research, a time period spanning almost 300 years. Museums and the systematic profession in general, instead of being prepared for such a momentous change, are facing a crisis: we are losing systematists and systematic organizations, including museums.

Part of the problem is that the science of systematics has never been accorded the stature it deserves among all sciences. "Strange as it may seem, there is less attention and regard paid to systematic work at the present time than ever before." This is not a quote from an editorial published in 1990 in *Science* or *Nature*. It was published by Waldo Schmitt in 1930, and it is just as valid today, 60 years later.

Further, even though museums are primary sources of information on species and even though we are in the "information age," automation of museums' major sources of information on species, their collections, and their libraries, lags a generation or more behind current technology. Any major grocery store chain has in its data inventory specific information, including inventory, retail cost, and cost per unit of measure, on most food items in the store. This volume of information on species of shrimps, even commercial shrimps, is generally unavailable from any museum collection, large or small, in machine retrievable form. Grocery stores routinely use bar code technology to check out groceries and prepare bills (invoices). Museums prepare invoices the old fashioned way, by hand. The technology needed by museums has existed for years. The funding and the expertise needed to implement the technology is not yet available to most museums, which in consequence are unable to manage the vast amounts of information on species available to them.

In the past 30 years we have seen a dramatic increase in numbers of recognized living and fossil species. Within the study of crustaceans this is the result of the work of a generation of specialists. In geryonid crabs, deep-sea crabs of enormous commercial potential, for example, specimens identified with *Geryon affinis* Milne Edwards and Bouvier and *Geryon quinquedens* Smith now have been assigned to at least 18 different species. Although this may not be true for other crustacean groups, we are about to lose a generation of world-class specialists in decapod crustacean systematics. Concomitant with that loss will be a decline in our ability to examine and respond to questions of biodiversity.

At the National Museum of Natural History in Washington, an internal study for the Department of Invertebrate Zoology shows that seven of the eight crustacean taxonomists now on the staff potentially will be retired by the turn of the century. Worse, there are virtually no students in critical groups now enrolled in American universities. Potentially more than half of the staff of the department will retire by the turn of the century and the operative planning buzz-word within the museum is "downsizing," a direct result of increasingly limited funding.

Furthermore, hiring practices in universities as well as in museums have been such that there has not been an orderly replacement of specialists as they retire. Thus, the crucial process of mentoring has been truncated. Vacant offices in museums the world over attest to the fact that we are in a weak, even untenable, position to tackle the questions of biodiversity. There are few replacements for the generation of systematists now in or approaching retirement, many of whom worked at the national or international level. The tragedy is that even if funding for systematics increased immediately by an order of magnitude, it would take a generation to attract and train replacements for existing systematists now nearing the ends of their careers.

Hiring practices in both universities and museums either have not addressed the problem of replacement of specialists in systematic disciplines or have replaced systematists with scientists specializing in other areas, e.g., ecology, cell or molecular biology, or, worse yet, administration. At the same time university biology and geology departments have de-emphasized courses and programs in systematics as a response to the job market—the loop must be broken. In a recent editorial in *Bioscience*, W. H. Davis (1991) lamented the decision of his university to establish a program in molecular biology, and he commented: "As the public is beginning to recognize the importance of the great diversity of organisms on Earth and the need for systematic, behavioral, physiological, and ecological studies of organisms, the enormous tragedy of the overemphasis on molecular biology during the 1980's will become evident."

Not only are we losing people, including many invertebrate systematists, we are losing institutions. The Allan Hancock Foundation, one of the large, active museums in the United States with a long tradition of research, is in the process of transferring its crustacean collections to the Los Angeles County Museum. The Natural History Museum of San Diego is changing its directions, resulting in the termination of its paleontology program and the loss of all positions for research paleontologists. The Natural History Museum in London is de-emphasizing monographic work and work on local faunas, even though one of its stated areas of emphasis is biodiversity. The government of New Zealand has disestablished the biosystematics program of the New Zealand Oceanographic Institute, leaving systematists without jobs, and both of these latter organizations appear to have reverted to a strict "pay as you go" basis.

A wide variety of reports on the needs in and importance of systematics, prepared for a variety of organizations over the past four decades (Anonymous, 1953, 1968; Mayr and Goodwin, 1956; Michener et al., 1956; Steere, 1971a, 1971b; Stuessy and Thompson, 1981; see also Brusca, 1990), all have common themes. Systematics is important, there are not enough trained systematists, systematics as a discipline ranks somewhere under flatworms in importance, and museum collections need more support. Yet the situation is much worse today than ever.

Even in the 1990's, the Decade of Biodiversity, it will take an herculean effort to raise the level of understanding of the fundamental importance of systematics, a much higher level of funding than is now available for systematics and collections, the development of national and international forms of recognition for systematic work, a cooperative effort by those in academia and museums to interest people in systematic fields and to train them, and some long-range planning by museums, planning that includes training and jobs for future generations of systematists. Unless the effort includes creating permanent jobs in systematics, including many more support positions, the situation will not improve. Karl Schmidt (*in* Anonymous, 1953) made many of the same points in an article published in 1952, and noted that E. Ray Lankester had made them in the 1880's.

More specifically, it is important that each of us exert time and effort to educating the general public and our fellow scientists in the importance of their continued maintenance of systematics, the foundation of life science. The importance of writing articles for "popular" science outlets, stressing the application of systematics to all studies in the life sciences, cannot be overstated. It is these articles that influence the nonscientific public and, in turn, may have an influence on legislators. Carefully written, interesting articles dealing with the importance and the interest and excitement of working in systematic biology and paleontology should also have the effect of drawing in young people as the core for future generations of systematists. An aggressive approach must be taken to develop the recognition in legislators and administrators of scientific institutions and funding agencies, including private foundations, that only if fundamental areas within science are nurtured will we be able to progress.

Finally, we must develop in our co-workers in biology and geology the recognition that systematics is not only a classical foundation for these subjects but that it forms the fundamental core discipline which is essential to the continued success of all others. If the foundations of our study are neglected, we will be forced to endlessly re-massage previously gathered data.

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Accepted 22 March 1991

WESTERN SOCIETY OF MALACOLOGISTS

1992 Annual Meeting

The 25th annual meeting of the Western Society of Malacologists will be held this year at the Asilomar Conference Center in Pacific Grove, California. The conference will commence on Tuesday afternoon, 30 June with registration and a reception and end on Friday morning, 3 July with an optional field trip. The Asilomar center was the site of the first formal meeting of the Society after its formation and also several subsequent gatherings during the 1970's.

Recently the accommodations at Asilomar have been extensively remodeled and upgraded making it a very comfortable facility both for our conference and for housing. Enclosed are details about Asilomar, its location on the Monterey peninsula and a detailed map of the conference grounds. Please note that registration upon your arrival will be at the administration building (which is also labeled "registration" on the map). Housing and our meeting area will be in Sea Galaxy nearby. However you must check-in at Administration first.

SCHEDULE

This year's program will include two symposia, contributed papers, a reception, the annual auction, a closing banquet and a field trip to the Monterey Bay Aquarium. The tentative schedule is as follows (timing may vary):

Tuesday, 30 June:	3:00 - 6:00	Registration
	6:00 - 7:00	Dinner
	7:30 -	Wine/Cheese Reception Evening slide shows
Wednesday, 1 July:	9:00 - 12:00	Cocos Island Symposium
	1:00	Group Photo
	1:30 - 5:00	Cocos Island Symposium
	7:30 -	Auction/Reprint Sale
Thursday, 2 July:	9:00 - 12:00	Opisthobranch Symp.
	1:30 - 3:00	Contributed Papers
	4:00 - 5:00	Business Meeting
	6:30 -	Reception/Banquet

This year the banquet speaker with be Dr. Charles Baxter from the Hopkins Marine Station who will be discussing his studies of the Monterey Bay marine canyon system and showing deepwater videos of the terrain and marine life.

EXPENSES

Costs for this year's meeting are based on the assumption that you will also be staying at Asilomar for three nights. Both housing and meals are included under a single charge for the duration of the conference. If you are planning only on attending for a single day, you must make other arrangements using nearby hotels. The registration fee applies to all those in attendance. There is no reduced rate for a single day. Individuals staying off the Asilomar campus can purchase meals as needed at the dining hall. .

Accomodations consist of rooms which hold up to four studio beds. Each room has a private bathroom. The double occupancy rate is $60 per day/per person, equaling $180 for the conference. If you are not registering jointly on the enclosed form, please indicate your roommate preference if known. Single occupancy is $98 per day/per person/per room, meaning that you get the whole thing to yourself for only $295.

Additional charges due with your registration and housing reservation include the banquet and the group photograph. The end of conference banquet will be a special meal that differs from the other dinners. For residents of Asilomar there will be an added cost of $14.00. If you are not staying at Asilomar, but wish to attend the banquet the cost is $25.00.

This year the group photograph will be available for an additional $8.00. Since each year we invariably end up with dozens of spare photographs, their availability is now going to be limited to those who really want one, so please indicate your preference.

AUCTION and REPRINT SALES

The annual auction of choice shells and books will be held on Wednesday, 1 July at 8PM. As the auction is a principal source of funding for the Society's activities it is an important event which deserves you support. If you have quality specimens, with data, or books which you wish to donate please send them to Henry Chaney (address below). If you are attending the meeting you can bring your donation with you, but please forward a list so that the auction can be organized.

Journals and reprints will also be available for sale under the auspices of George Kennedy. Please donate any publications or notify George at the County Museum of Natural History, 900 Exposition Blvd., Los Angeles, CA 90007.

FIELD TRIP

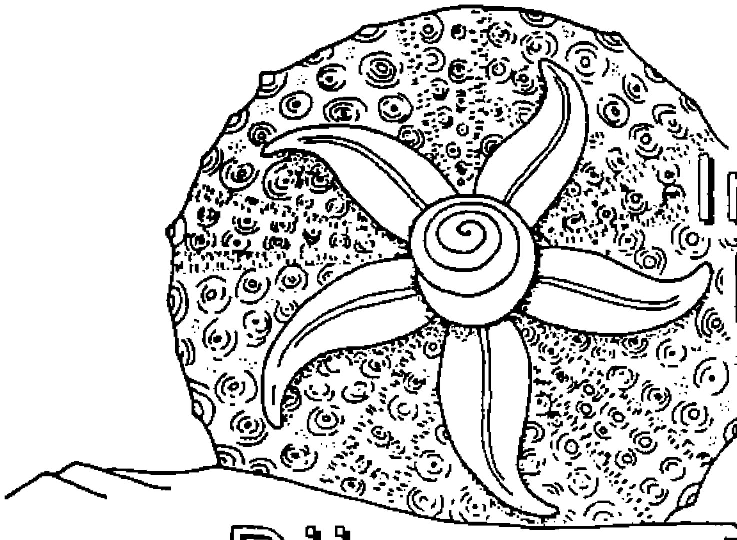
The field trip will be an excursion to the Monterey Bay Aquarium on Friday morning. A sign-up for this event will be available at the meeting and transportation will be arranged as needed.

DEADLINE

The deadline for housing reservations is **22 May 1992** after which accommodations at Asilomar cannot be guaranteed.

ADDITIONAL INFORMATION or QUESTIONS

If you have additional questions about the meeting please contact Society President Dave Mulliner (619)488-2701 or Henry Chaney (805)682-4711 x344 (day) or (805) 963-2382. A FAX number (805) 963-9679 is also available for inquiries.



8th International Echinoderm Conference

Dijon 1993

The Organizing Committee invites you to participate in the 8th I.E.C. to be held at the University of Burgundy, Dijon, on September 6 to 10, 1993.

People who are interested in receiving registration information are requested to complete and return the attached form before **September 30, 1992** to:

8th I.E.C. - Bruno DAVID
Centre des Sciences de la Terre
6, Bd. Gabriel F - 21000 DIJON

☎ 80-39-63-71 T. Fax: 80-39-50-66

✂ ....

Pre-registration form (please type or print)

Name .... Firstname ....

Institution ....

Street ....

City ....

Postal code .... Country ....

Job Announcement

Baker Environmental, Inc. (formerly Baker/TSA, Inc.), located near the Greater Pittsburgh International Airport, continues to expand, creating excellent growth opportunities for environmental assessment, design and management professionals. An Environmental Scientist position is available to a person who wants a career with one of the world's fastest growing environmental consulting companies. The position requires an M.S. in biology, ecology or ecotoxicology or strong environmental science academic credentials and 0-5 years experience in ecological assessment performance. Familiarity with CERCLA, RCRA corrective action, CWA and State regulatory programs, as they relate to ecological assessment procedures, is essential.

Knowledge/experience in field sampling, taxonomy, ecological endpoints and ecotoxicology with terrestrial and/or aquatic systems is important. Strong communication, analytical and computer skills are also necessary. Previous consulting experience is desirable.

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Filename: MANTIS
Updated: 03.JAN.92.hgk

Natural History Museum of Los Angeles County
Stomatopoda Collection

This file lists number of lots, species name, and localities represented by each species of stomatopod in the collection. It includes both the original LACMNH and the transferred AHF stomatopod collections. A large collection of stomatopods from the 1984 LACM cruise to the Galapagos Ids. are still with Dr. Raymond B. Manning at the USNM, and are not represented here.

# of lots	Specimens	Locality
1	*Acanthosquilla diqueti*	Mexico
1	*Cloridopsis dubia*	Ecuador
7	*Coronida schmitti* (6 + 16 PARATYPES)	Galapagos Ids.; Mexico
3	*Eurysquilla veleronis*	Mexico; Barbados
11	*Gonodactylus bahiahondensis*	Costa Rica; Columbia; Panama
6	*Gonodactylus festae*	Ecuador; Costa Rica; Colombia
93	*Gonodactylus oerstedii*	West Indies; Mexico; Panama; Columbia; Galapagos Ids.; Ecuador; Venezuela; Puerto Rico
1	*Gonodactylus spinulosus*	West Indies
9	*Gonodactylus stanschi*	Mexico
3	*Gonodactylus zacae*	Mexico; Galapagos Ids.
18	*Hemisquilla ensigera*	Mexico; California
1	*Lysiosquilla antillensis* (HOLOTYPE) (=*Nannosquilla*)	Venezuela
1	*Lysiosquilla hancocki* (HOLOTYPE)	Venezuela
1	*Lysiosquilla mccullochae* (HOLOTYPE) (=*Heterosquilloides*)	Mexico
3	*Lysiosquilla maculata*	Guatemala; Galapagos Ids.; Ecuador
3	*Meiosquilla polita*	Mexico; California
1	*Mesacturus dicrurus* (PARATYPES; 2 females)	Guam

7	stomatopod larva	California, central Pacific
59	unidentified Stomatopoda	Ecuador; Mexico; California; Galapagos Ids.; Bahamas; Florida; Jamaica; Guam

Total Lots: 324 (03.JAN.92.hgk)

NOTE: Per Janet Haig (AHF), this collection has never been updated as to synonomies and generic reassignments-6/89.

Hemisquilla ensigera californiensis Stephenson, 1967.
Crustacea: Hoplocarida: Stomatopoda

PL Code C-134

Date examined 22 July, 1988
Voucher by: Larry Basch

Synonomy: Hemisquilla ensigera (Owen, 1832) fide Manning, 1963
Gonodactylus ensiger, Owen, 1832
Gonodactylus styliferus H. Milne-Edwards, 1837
Hemisquilla stylifera Schmitt, 1940
Pseudosquilla bigelowi Rathbun, 1910

Literature: See the following in Stomatopod Bibliography (attached).
Basch and Engle, in press - a & b.
Basch and Engle, in press 1988 in Am.Zool.
Haderlie, et al., 1980
Manning, 1963
Manning, 1980
Schmitt, 1940
Stephenson, 1967

Diagnostic Characters:

1. Rostrum shaped like a triangle with rounded angles.

2. Eyes weakly bilobed, with distinct wide band of ommatidia six cells across, separating dorsal and ventral corneal lobes.

3. Dactylus of maxilliped 2 (thoracopod 2) without spines on inner margin. Heel of dactylus slightly inflated proximally.

4. Telson as figured in Schmitt, 1940, p. 183, and attached table.

5. Body coloration yellow-brown to tan. Distal parts of some limbs yellow. Distal of antennules, maxillipeds, pereo- and pleo-pods blue. Uropods deep blue, fringed with dark red setae.

Comments: This is the largest of the California stomatopods. It extends from Santa Barbara Co., CA, south to the Golfo di Chiriqui, Panama. Besides its large size, it is the most numerically abundant species in the region, and may occur locally in very dense populations ($1/m^2$). Recent work by Basch and Basch and Engle has provided some information on biogeography and local population distribution patterns, seasonal patterns in life history and reproductive ecology, foraging, diel and seasonal activity and other areas. Habitats range from shallow (5m or less) inshore areas commonly down to 70-100m, and to near abyssal depths, where they burrow in stable mud-sand bottom.

Nannosquilla anomala Manning, 1967.
Crustacea: Hoplocarida: Stomatopoda.

No voucher available, known only from type material. Date examined: See Manning, 1
Voucher by: See Manning, 1967

Synonomy: None.

Literature: See the following in Stomatopod Bibliography (attached).
Haderlie, et al., 1980
Manning, 1967

Diagnostic Characters:

1. Rostrum of an unusual (anomalous) shape for this taxon, rectangular, with longest axis across body and short rounded point extending anteriorally. Rostrum shape may be variable.

2. Eyes somewhat bilobed.

3. Dactylus of maxilliped 2 (thoracopod 2) armed with from 10-14 spines, including distal one, on inner margin. Outer margin rounded with proximal basal notch flanked proximally and distally by small lobe.

4. Telson and uropod as figured in Manning, 1967 and attached table. Note posteriorally projecting lateral spines on 6th abdominal segment (pleotelson).

5. Body covered with dark-brown chromatophores, clustered on midline in some specimens. Black pigmentation on anterior of carapace, anterior limbs, 6th abdominal somite and telson.

Comments: Besides the original species description, virtually nothing is known about this species. Any information or specimens of this, and other California species would be applied to a work in progress concerning ecology and distribution of the local stomatopods.

Larry Basch

Pseudosquillopsis marmorata (Lockington, 1877)
Crustacea: Hoplocarida: Stomatopoda.

Personel collection: LVB

Date examined: 22 July, 1988
Voucher by: Larry Basch

Synonomy: Squilla marmorata Lockington, 1877

Literature: See the following in Stomatopod Bibliography (attached).
Manning, 1969
Schmitt, 1940

Diagnostic Characters:

1. Rostrum tapers to a sharp point anterio-distally. Broad proximally.

2. Eyes strongly bilobed, with narrow median band of ommatidia separating corneal lobes.

3. Dactylus of maxilliped 2 (thoracopod 2) armed with 3 distinct spines, including distal one. Outer margin smooth, curving from distal tip to past the most proximal tooth.

4. Telson as figured in Manning, 1969 and attached table. Note spination and carination on telson and pleotelson (6th abdominal somite).

5. Body coloration golden-brown overall, with mottled darker brown pigmentation in places. Uropods a lighter brown background color after preservation, fringed with red-purple setae.

Comments: There is little known of this species, save for descriptions of postlarvae and juveniles (Manning, 1969). They are moderate in size of the California species, and occur in relatively shallow waters (6-18m) in sand or mixed sand-rubble habitats. They are sympatric with Hemisquilla ensigera californiensis at one station north of Santa Catalina Island, and are probably uncommon at several other sites in the Southern California Bight. They, and close relatives occur south of California.

Schmittius politus (Bigelow, 1891) fide Manning, 1972
Crustacea: Hoplocarida: Stomatopoda.

PL Code: C-212

Date examined 22 July, 198
Voucher by: Larry Basch

Synonmy: Squilla polita Bigelow, 1891
Meiosquilla polita (Bigelow, 1891)

Literature: Schmitt, W.L., 1940. The Stomatopods of the West coast of America, based on collections made by the Allan Hancock expeditions, 1933-38. Allan Hancock Pacific Expeditions, 5(4): 129-225. See p. 146 for Squilla polita Bigelow and included references. Refer also to Stomatopod Bibliography.

Diagnostic Characters:

1. Rostrum spade-shaped, posterior margin indented with small lobes extending posterio-laterally.

2. Eyes strongly bilobed, with distinct, narrow median band of ommatidia seperating lobes.

3. Dactylus of maxilliped 2 (thoracopod 2) armed with 4 distinct spines, including distal one. Outer margin smooth, curving from distal tip to past the most proximal tooth, followed by a small shoulder before the proximal heel, the latter used for hammering or crushing prey.

4. Telson as figured in Schmitt, 1940 and attached table. Note spination pattern on 6th abdominal segment (pleotelson).

5. Body coloration overall light golden brown, with darker brown pigmented chromatophores scattered randomly throughout body. Some specimens have darker pigments concentrated at the margins of thoracic and abdominal segments. Rostrum and other anterior body regions have dark brown clustered chromatophores.

Comments: This animal is not easily confused with other mantis shrimps in the California region, but has close relatives to the south. It is recorded as far north as Monterey Bay where, if this record is substantiated, it must be very rare. The southern range limit is recorded as off Punta Abreojos, Baja California, Sur, but is likely even further south. It is probably the second most abundant stomatopod in California (after Hemisquilla ensigera californiensis). Habitats range from shallow coastal lagoons in Southern California, to back bay and deep (150m) open ocean soft bottom

KEY TO THE ONUPHIDAE OF POINT LOMA
revised[1] by Dean Pasko, 11/91

1. Tentacular cirri absent; outer lateral occipital antennae clavate (club-shaped) (Fig. 1) . . . . *Hyalinoecia juvenalis*

   Tentacular cirri present; outer lateral occipital antennae cirriform (Figs. 2 & 3) 2

2. One to three anterior parapodia prolonged and directed forward (Fig. 2) 3

   Anterior parapodia not prolonged and directed forward (Fig. 3) 5

3. Setiger 1 with prolonged parapodia and auricular presetal lobes - parapodia ~2x the size of the other parapodia (Fig. 4); cirriform ventral cirri on setigers 1 & 2; eyes present . . . . *Nothria occidentalis*

   Two or three setigers with prolonged parapodia and long, distally crooked composite setae (Fig. 2); auricular presetal lobes absent; eyes absent 4

4. Setigers 1 and 2 with prolonged parapodia and cirriform ventral cirri; branchiae present from setiger 4 . . . . *Rhamphobrachium cristobalensis*

   Setigers 1-3 with prolonged parapodia and cirriform ventral cirri; branchiae present from setiger 8 . . . . *Rhamphobrachium longisetosum*

5. Branchiae large, spiral - numerous filaments arranged spirally around a central axis - and beginning on setigers 4 or 5 (Fig. 5c) . . . . *Diopatra* sp.[2]

   Branchiae simple, cirriform or pectinate, beginning on various setigers (Fig. 5a & b) 6

6. Pseudocompound hooks of setigers 1-3 with prolonged, pointed hoods (Fig. 6a); body white, lacking any pigment pattern . . . . *Paradiopatra parva*

   Pseudocompound hooks with blunt hoods (Fig. 6b & c); body usually pigmented 7

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[1] Revised from 12/84 key by D. Ituarte.

[2] This group includes *Diopatra tridentata*, *D. ornata* and *D. splendidissima*, which are not readily distinguishable except by their tubes or ecology. *D. tridentata* has a smooth, silty and annulated tube. *D. ornata* has a chitinized, parchment-like tube covered with shell and other debris. *D. splendidissima* is found in shallow waters to 20 m. The genus is presently under revision by Hannelore Paxton, at the Western Australian Museum, NSW, Australia.

7. Branchiae present after setiger 6; ceratophores with 5 or fewer rings (see Fig. 1); compound spinigers present in some anterior setigers (see below; "joint" frequently located within parapodia, mount several parapods on compound microscope) 8

Branchiae present from setiger 1; ceratophores with 10 or more rings (Fig. 3); compound spinigers absent 9

8. Branchiae present from setiger 6 or 7; dorsum generally pale with paired black spots on anterior segments; compound spinigers from setigers 7-19 . . . . . Mooreonuphis nebulosa

Branchiae present from setiger 19; dorsum generally pale transverse bands on anterior segments; compound spinigers from setigers 4-16 . . . . Mooreonuphis stigmata

9. Branchiae at least bifid, usually pectinate after setiger 18-20; ceratophores with up to 21 distinct rings; subacicular hooks first present from setiger 8 (Fig. 7) . . . . Onuphis eremita parva

Branchiae simple throughout; ceratophores with 15 or fewer rings that may be indistinct; subacicular hooks first present after to setiger 8 10

10. With bi- and tridentate pseudocompound hooks (Fig. 5b & c); cirriform ventral cirrus in first 5 setigers; first 5 setigers elongate. . . . . Onuphis elegans

All pseudocompound hooks tridentate; cirriform ventral cirrus in first 6-7 setigers; first 6-7 setigers elongate; anterior setigers iridescent 11

11. Subacicular hooks first present from setiger 9; anterior setigers with distinct transverse pigment band across the posterior half of each segment . . . . Onuphis sp. 1 (= O. "intermediates" of Pt. Loma)

Subacicular hooks first present from setiger 12 (occasionally setiger 10 in juveniles and sub-adults); pigment pattern does not include a distinct transverse pigment band across the segments, though a diffuse or light band may be present, especially in juveniles . . . . Onuphis iridescens

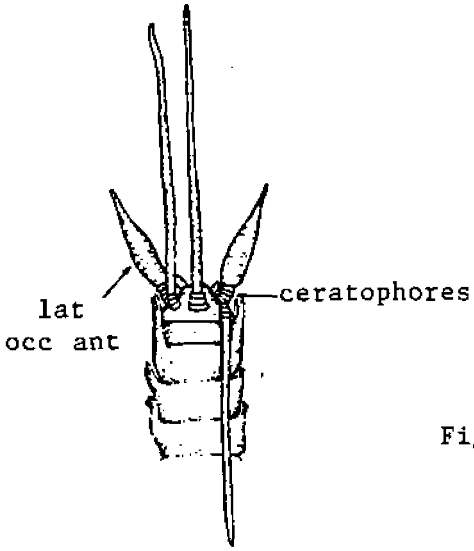


Fig. 1. Hyalinoecia juvenalis, anterior end.

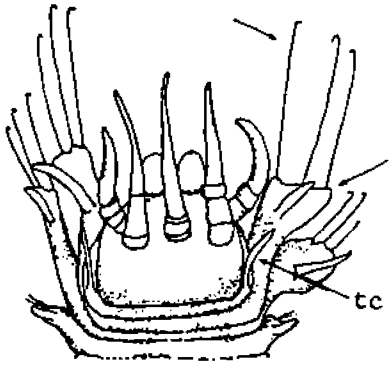


Fig. 2. Rhamphobrachium cristobalensis, anterior end.

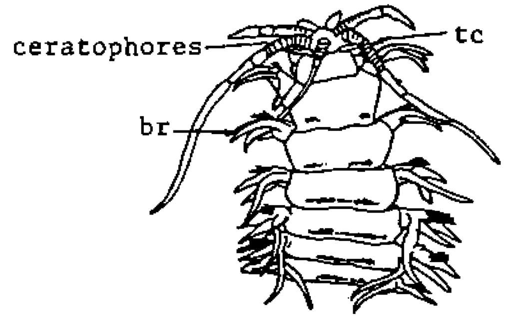


Fig. 3. Onuphis sp., anterior end.

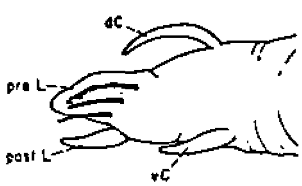
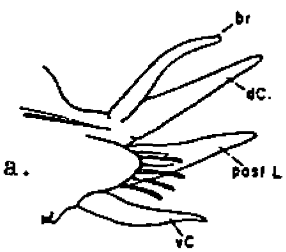


Fig. 4. Nothria occidentalis, parapod 1.



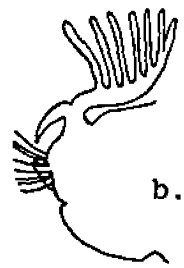


Fig. 5. Branchiae:
a) simple;
b) pectinate;
c) spiral.

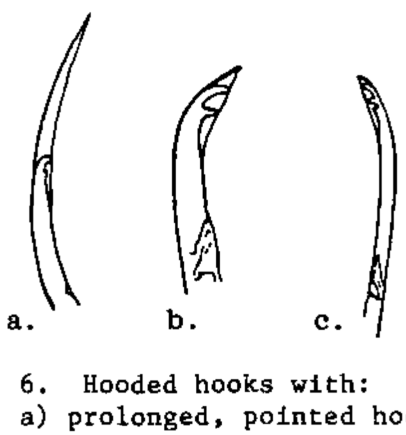
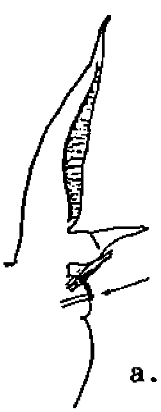


Fig. 6. Hooded hooks with:
a) prolonged, pointed hood;
b) short, blunt hood and bidentate hook;
c) short, blunt hood and tridentate hook.



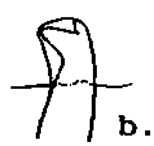


Fig. 7. a) Parapod from mid-body showing sub-acicular hook; b) sub-acicular hook.

KEY TO THE CHAETOPTERIDAE OF POINT LOMA

by Dean Pasko/Ron Velarde
2/3/92

1. Ventrum without color pattern; setigers 1-9 short, of equal length (Fig. 1); setiger 4 with several major spines . . . . _Mesochaetopterus_ sp.

   Ventrum with a combination of light or dark brown and chalky white color pattern (Fig. 2); at least setiger 4 somewhat elongate; setiger 4 with one major spine 2

2. Ventrum with dark brown band on setigers 6 & 7; setigers 7-11 chalky white; peristomial flaps prominent (Fig. 2a); eyes present . . . . _Spiochaetopterus costarum_

   Ventrum with light brown band beginning on setiger 5; setigers 6-9 (occasionally 6-11) chalky white; peristomial flaps absent (Figs. 3a & 4a); eyes absent or present 3

3. Eyes present; setiger 5 light brown and setigers 6-9 (occasionally 6-11) chalky white (Fig. 3) . . . . _Phyllochaetopterus prolifica_

   Eyes absent; setigers 5 & 6 light brown and setigers 6-8 chalky white (Fig. 4) . . . . . _Phyllochaetopterus limicola_

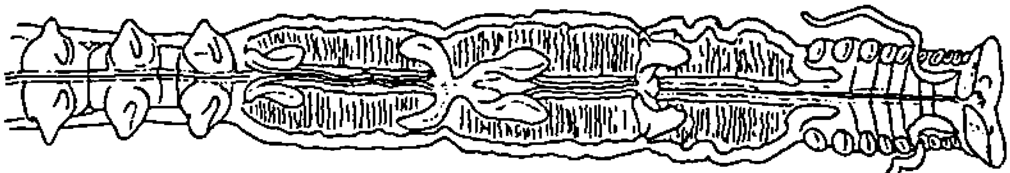


Figure 1. _Mesochaetopterus taylori_

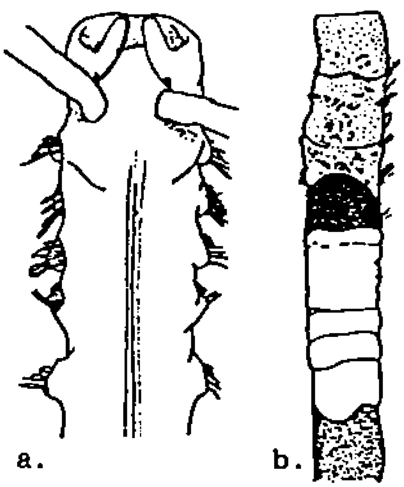


Figure 2. _Spiochaetopterus costarum_: a) anterior end, dorsal view; b) anterior end, ventral view showing color pattern.

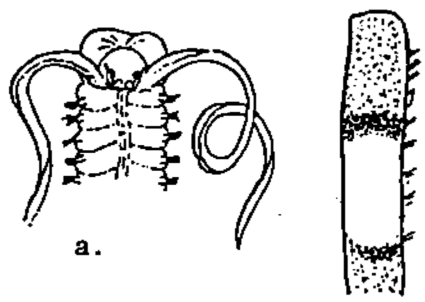
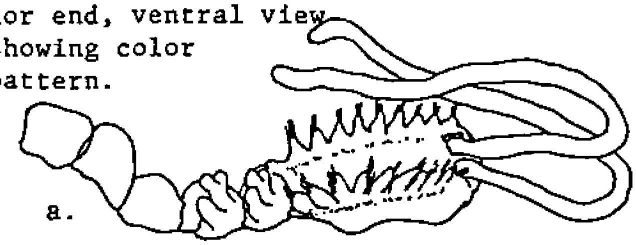
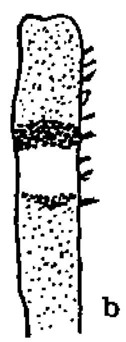


Figure 3. _Phyllochaetopterus prolifica_: a) anterior end dorsal view; b) anterior end, ventral view showing color pattern.

Figure 4. _Phyllochaetopterus limicola_: a) anterior end, dorsal view; b) anterior end, ventral view showing color pattern.





REFERENCES FOR ACCOMPANYING FIGURES

Figures 1, 3a and 4a	Hartman, O. 1969. Atlas of Sedentariate Polychaetous Annelids from California. Allen Hancock Foundation, University of Southern California, Los Angeles: pp. 207-220.
Figure 2	Uebelacher, J. M., and P. G. Johnson (Editors). 1984. Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico. Final Report to the Minerals Management Service, contract 14-12-001-29-91. Barry A. Vittor & Associates, Inc. Mobile, Alabama. Vol. II: p. 11-7. (modified from)

THALASSINIDEA OF THE TEMPERATE NORTHEAST PACIFIC

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Thalassinoid "shrimps" have received considerable attention in the last 15 years. The group has undergone significant taxonomic revision at generic and family levels, and its ecological importance has become better recognized. The mud (or ghost) shrimps that make up this group all burrow. Estimates made over 50 years ago suggested thalassinoid bioturbation rates were high (MacGinitie 1934). The actual magnitude of their impact on benthic communities has now been experimentally established (Posey 1986, Branch & Pringle 1987, Dobbs & Guckert 1988), and is truly dramatic in many instances.

The thalassinoid families are distributed in overlapping series along a bathymetric gradient. The callianassids are primarily intertidal-shallow subtidal, but may extend to depths of more than 100m. Upogebiids and laomediids are usually found at shallow-subtidal to mid-shelf depths, with the Ctenochelidae and the closely related Axiidae and Calocarididae containing species which occur from mid-shelf to bathyal depths.

Although all thalassinoids burrow, axiids seem to construct the deepest burrows (Pemberton et al 1976), while callianassids appear to have the greatest community impact (ie. Suchanek 1983). Burrowing generally occurs in sediments although there are several species which burrow only into sponges (Williams 1987) or corals (Sakai 1970). Such specialized burrowers are all in the family Upogebiidae. Some species may not form complete burrows, opting instead for excavation of cavities under or between rocks.

Burrow structure is related to nutritive mode of the species (Griffis & Suchanek 1991), with species which filter feed, deposit feed, and detritus feed all forming distinctive burrow types. Deposit feeders may perhaps be further subdivided into those that only process sediments, and those which also intentionally groom the burrow walls to facilitate bacterial or meiofaunal growth (Dobbs & Guckert 1988).

The necessity of respiring in burrow water which may be isolated by tidal flux for long enough to become hypoxic or anoxic has led to great physiologic tolerance of low oxygen conditions in intertidal species. This same ability allows subtidal species to burrow deeply below the redox potential discontinuity layer. Despite their tolerance of low oxygen tensions, thalassinids routinely ventilate their burrows through pleopod beating. Burrow water exchange during ventilation oxygenates subsurface sediment pore water and aids elemental diagenesis in benthic sediments.

Schram (1986) indicated seven families in the Infraorder Thalassinidea: Thalassinidae, Axiidae, Laomediidae, Callianassidae, Callianideidae, Upogebiidae, and Axianassidae. This arrangement has been modified by resurrection of the family Calocarididae (Kensley 1989), by submergence of the Axianassidae within the Laomediidae (Kensley and Heard 1990), and by elevation of the callianassid subfamily Ctenochelinae to family rank (Manning and Felder 1991). All follow the basic decapod body plan, and are grossly similar. With the exception of the Axiidae (and some callianideids), they are united by possession of **linea thalassinica,** two grooves which run between the anterior and posterior carapace margins. These lines are usually most easily seen in lightly calcified forms such as callianassids. In some species they may be undetectable on the posterior portions of the carapace.

Although elongate, "shrimp-like", and popularly called shrimp, thalassinoids are "reptant" decapods rather than caridean or dendrobranchiate shrimp. Their placement among other groups within the decapods has varied over time. They have usually been included in the Anomura (and will be found there in most texts). Recent phylogenetic analyses tend to show the inclusion of the thalassinoids in the Anomura as no longer tenable (Saint Laurent, 1979; Burkenroad, 1981; McLaughlin, 1983; Schram, 1986). Their removal from the Anomura yields a more cohesive residual group for which McLaughlin (1983) suggests resurrecting the Anomala of de Haan. Brusca and Brusca (1990) place thalassinoids at the infraordinal level - on a par with Brachyura and Caridea. General structural features of the group are indicated in Figures 1 and 2.

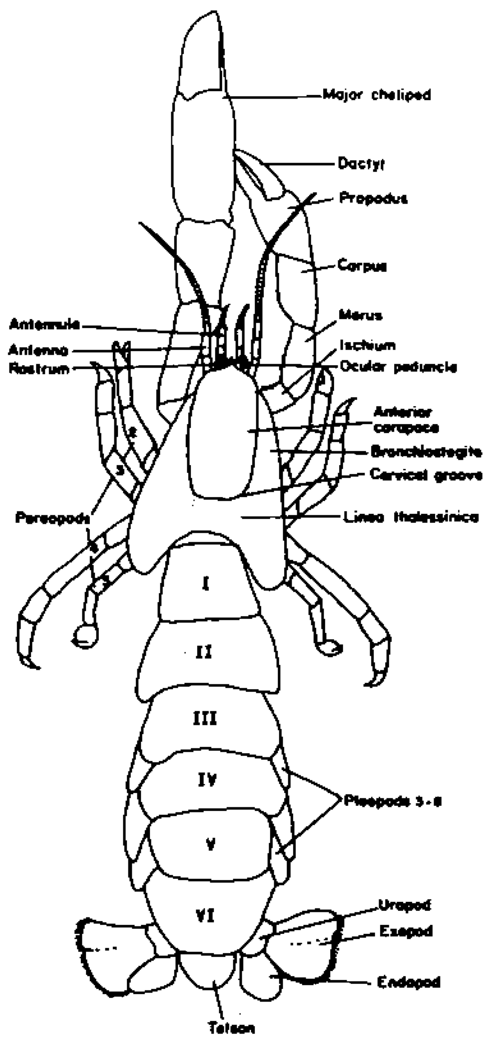
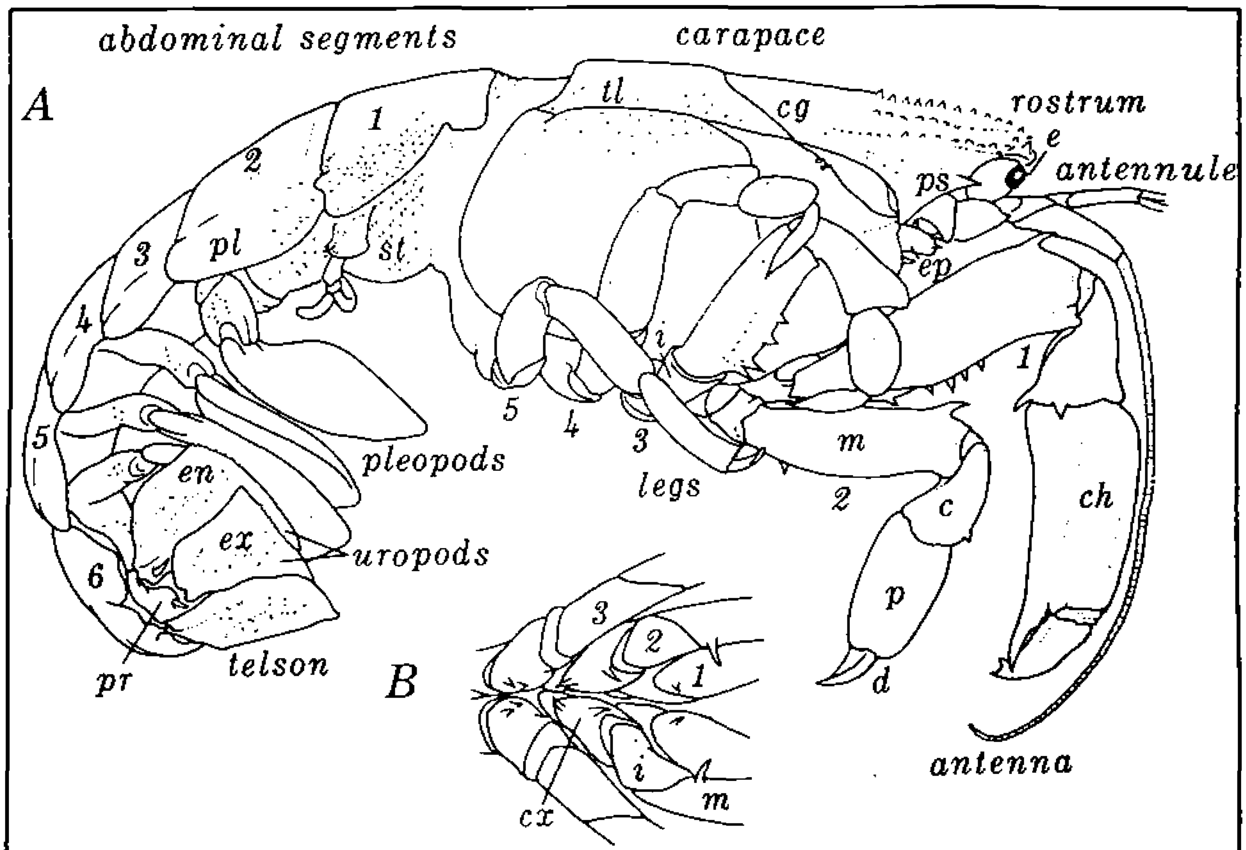


Figure 1. General anatomy of *Callianassa* in dorsal view (from McLaughlin, 1980 Comparative Morphology of Recent Crustacea)

Structures important in separation of the various thalassinoids found in our area reside primarily on the rostrum and anterior margin of the carapace; the chelae; the other four pairs of legs; the telson and uropods; the pleopods; and the antennae and antennulae. Since animals recovered in environmental monitoring samples are often without attached appendages, substitute characters have been sought which allow identification in their absence.

Species of Axiidae, Laomediidae, Calocarididae, Callianassidae, Ctenochelidae and Upogebiidae are present in the temperate to boreal waters of the Northeast Pacific. The remaining two families are more tropical in distribution. Schmitt (1921) reported nine species of thalassinoids from our area. The list of Wicksten (1980) mirrored that of Schmitt, but excluded *Calastacus investigatoris* (now *Lophaxius rathbunae*). Both lists indicated that *Callianassa longimana* of Stimpson 1857 was still a valid species. It was, however, placed in the synonymy of *Callianassa gigas* (now *Neotrypaea gigas*) by Biffar in his 1972 thesis.



Schematic drawing of *Upogebia*. *A*. Animal in lateral view; *B*. Coxa and associated articles of legs 1–3 in ventral view: *c*. Carpus; *cg*. Cervical groove; *ch*. Cheliped; *cx*. Coxa (sometimes spined); *d*. Dactyl; *e*. Eye; *en*. Endopodite; *ex*. Exopodite; *i*. Ischium; *m*. Merus (sometimes spined proximally); *p*. Propodus; *pl*. Pleuron (sometimes bearing spinules); *pr*. Protopodite; *ps*. Postorbital spine; *st*. Sternite (sometimes bearing spinules); *tl*. Thalassinidean line.

Figure 2. General anatomy of *Upogebia* in lateral/ventral views (from Williams, 1986)

Neither list included *Naushonia macginitiei* (Glassell 1938), the only member of the Laomediidae known locally. Aside from the original collection at La Jolla , I know of only two additional specimens. Both were taken during the aftermath of the strong 1982-83 El Niño event; one in San Diego Bay, and one in Long Beach Harbor. The distinctive larvae of *Naushonia* (Thompson 1903) were noted occasionally between 1969 and 1984 (Sowby, personal communication) in Alamitos Bay, Long Beach Harbor, and nearshore on the open coast as far north as Ventura; so the dearth of adult specimens probably reflects difficulty of sampling rather than the rarity or intermittent occurrence of the species. George MacGinitie's collection of the types "under stones in a small pool at extreme low water" indicates that these animals probably frequent the rock/sand ecotone, and may be most effectively sampled by divers using bait.

This species was originally described as *Homoriscus macginitiei*, but *Homoriscus* was synonymized with *Naushonia* by Chace (1939). The genus was reviewed by Goy and Provenzano (1979) whose key was modified by Martin and Abele (1982) to include an additional species from Panama.

Williams (1986) examined the genus *Upogebia* in the Northeast Pacific and recognized three new species previously confused with *Upogebia pugettensis*. Inclusion of his three new species and *Naushonia* raises the number of thalassinoids known from our area to twelve. The record of *Calastacus stilirostris* Faxon 1893 (described from off Acapulco) in waters off Washington and western Canada (Kozloff 1987), if accurate, adds a 13th thalassinoid to the temperate Northeast Pacific fauna.

Revisions of the Axiidae by Sakai and de Saint Laurent (1989), and of the Callianassidae by Saint Laurent (1974) and Manning and Felder (1991) have modified the generic placement of several of our species. These changes are reflected in the list below. Status of some species remains in flux. *Acanthaxius spinulicaudus* should apparently be transferred yet again to *Calocarides* an action to take place in a forthcoming monograph on the Axiidae (Kensley, personal communication). Unfortunately just after the revision of the American callianassids by Manning and Felder, Holthuis found *Neotrypaea affinis* was a homonym, and erected the replacement name *Neotrypaea biffari* (Manning, personal communication).

Additional changes will occur when the west coast callianassids are reexamined monographically. The necessity of this project has long been apparent. Biffar (1972) noted a number of provisional *Callianassa* species in his thesis work, but has not since published either the thesis, or papers describing his provisional forms further. Biffar's descriptions and illustrations are not referable to individual specimens, and since several of his provisional taxa were based on mixed lots (Manning, personal communication), determination of his taxa will prove difficult. Dr. Ray Manning of the Smithsonian Institution is considering such a revision, seeing it as a natural outgrowth of his recent revision of the existing American species (Manning and Felder 1991). This revision, if ultimately undertaken, is at least several years off.

Several people assisted in the gathering of the information presented here. I wish to thank Dr. Brian Kensley, Dr. Ray Manning, and Dr. Austin Williams of the Smithsonian Institution; Dr. Jody Martin of the Los Angeles County Museum; and Dr. Tom Suchanek of the University of California, Davis. Special thanks are to to Austin Williams for constructive comments on an earlier version of this article.

List of Temperate Northeast Pacific Thalassinoids
and their primary synonyms

Family Axiidae Huxley 1879

Acanthaxius spinulicaudus (Rathbun 1902)
Axiopsis spinulicauda [= *Acanthaxius spinulicaudus*]
Calastacus quinqueseriatus [= *Calocarides quinqueseriatus*]
Calocarides quinqueseriatus (Rathbun 1902)

Family Calocarididae Ortmann, 1891

Calastacus investigatoris of Rathbun 1904 and Schmitt 1921 [= *Lophaxius rathbunae*]
Calastacus stilirostris Faxon 1893
Calocaris investigatoris of Sakai and Saint Laurent, pars[=*Lophaxius rathbunae*]
Lophaxius rathbunae Kensley 1989

Family Laomediidae Borradaile, 1903

Homoriscus macginitiei [= *Naushonia macginitiei*]
Naushonia macginitiei (Glassell 1938)

Family Callianassidae Dana 1852

Callianassa affinis [= *Neotrypaea biffari*]
Callianassa californiensis [= *Neotrypaea californiensis*]
Callianassa gigas [= *Neotrypaea gigas*]
Callianassa longimana [= *Neotrypaea gigas*]
Neotrypaea affinis [=*Neotrypaea biffari*]
Neotrypaea biffari Holthuis 1991
Neotrypaea californiensis (Dana 1854)
Neotrypaea gigas (Dana 1852)

Family Ctenochelidae Manning and Felder 1991

Callianassa goniophthalma [= *Callianopsis goniophthalma*]
Callianopsis goniophthalma (Rathbun 1901)

Family Upogebiidae Borradaile 1903

Upogebia lepta Williams 1986
Upogebia macginitieorum Williams 1986
Upogebia onychion Williams 1986
Upogebia pugettensis (Dana 1852)

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KEY TO THE THALASSINIDEA OF THE TEMPERATE NORTHEAST PACIFIC

based on keys in Schmitt (1921), Williams (1986), Sakai and de Saint Laurent (1989), and Kensley (1989)

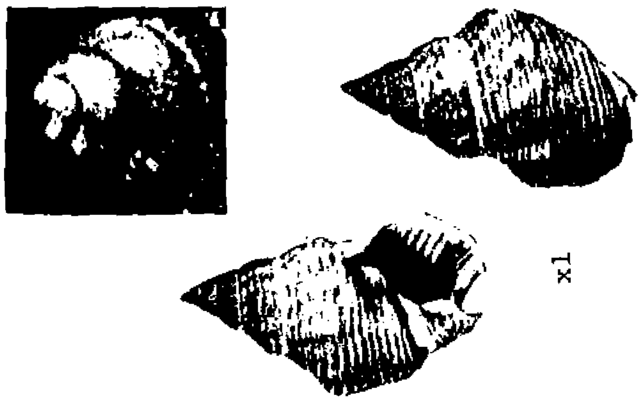
D.B.Cadien, LACSD - April 1992

1. Abdominal pleurae large, extending well below sternites (Axiidae, Calocarididae and Laomediidae) 2
   Abdominal pleurae small, not covering or barely covering sides of sternites (Callianassidae, Ctenochelidae and Upogebiidae) 6
2. Rostrum acute, longer than broad (Axiidae & Calocarididae) 3
   Rostrum as broad as long, spatulate, with serrated anterior border (Laomediidae) . . . . *Naushonia macginitiei*
3. Hermaphroditic; pleopod 1 present in all specimens, spatulate 4
   Pleopod 1 absent in ♂, present and slender in ♀ 5
4. Carapace with anterolateral tooth and with post-cervical carina or ridge. Pleurobranchs present on pleopods 2-4 . . . . *Lophaxius rathbunae*
   Anterolateral margin of carapace unarmed, and post-cervical carina or ridge absent. No pleurobranchs present on pleopods . . . . *Calastacus stilirostris*
5. Rostral carina in sections continuing to gastric region; carapace lateral ridges lacking spines . . . . *Acanthaxius spinulicaudus*
   Rostral carina unbroken to gastric region; carapace lateral ridges strongly spined . . . . *Calocarides quinqueseriatus*
6. Rostrum large, tridentate, rough and hairy. First pereopods subequal, with very small pollex (fixed finger), tending to become subchelate; other pereopods not chelate. External maxillipeds pediform . . . . (Upogebiidae)7
   Rostrum reduced or absent. First pereopods unequal, chelae well developed; pereopod 2 chelate. External maxillipeds operculiform . . . . (Callianassidae & Ctenochelidae)10
7. Postocular spine absent or at most obsolescent (tiny) . . . . *Upogebia macginitieorum*
   Postocular spine present and well developed 8
8. Pereopod 3 with inconspicuous proximoventral spines on merus; articles 1 and 2 of antennular peduncle bearing large distoventral spines . . . . *Upogebia lepta*
   Pereopod 3 lacking meral spines; article 2 of antennular peduncle lacking large distoventral spine (small spine may be present on article 1) 9
9. Pollex (fixed finger) of chelae with slender laterally compressed tip; small spine distoventrally on article 1 of antennule . . . . *Upogebia pugettensis*
   Pollex (fixed finger) of chelae with broad tip flattened on prehensile edge and corneous; antennular peduncle spineless . . . . *Upogebia onychion*
10. Uropodal endopod carinate dorsally (Ctenochelidae) . . . . *Callianopsis goniophthalma*
    Uropodal endopod lacking dorsal carina (Callianassidae) 11
11. Eyestalks with acute and divergent tips 12
    Eyestalks with tips tuberculiform and parallel . . . . *Neotrypaea biffari*
12. Anterior carapace margin rounded medially: cornea emergent (surface above cornea definitely convex) . . . . *Neotrypaea californiensis*
    Anterior carapace margin subacute to acute medially: cornea immersed (surface above cornea almost flat) . . . . *Neotrypaea gigas*

This key includes thalassinid species reported from the temperate North Eastern Pacific region. Their cryptic habits make it likely other species will be taken, even in well investigated areas. Since these species may key to an existing species, use the best available description of the named species to verify the key identification.

Nassarius fossatus (Gould)

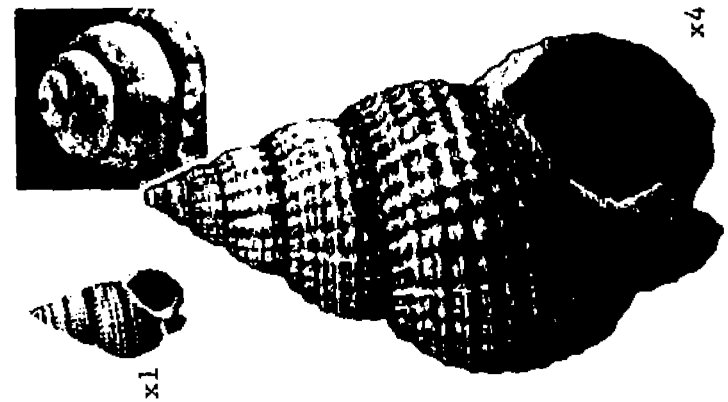
BRITISH COLOMBIA-BAJA CALIFORNIA



Thin shelled; light to deep orange-brown; columella brownish orange; outer lip thin; to approx. 50 mm. Inter-tidally on mud substrate.

Nassarius perpinguis (Hinds)

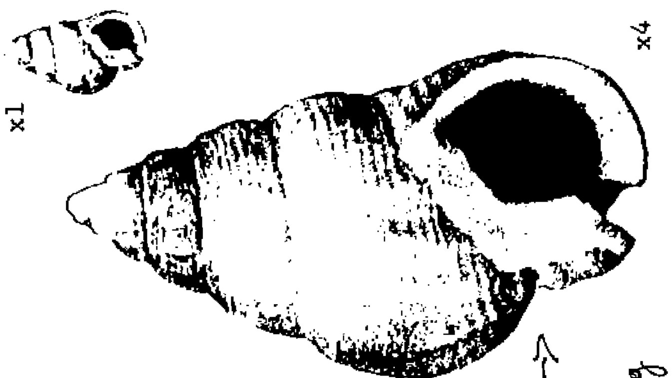
WASHINGTON-BAJA CALIFORNIA



White with 2-3 orange-brown spiral bands; to approx. 25 mm. Intertidally and offshore.

Nassarius insculptus (Carpenter)

off So.CALIFORNIA; GULF OF CALIFORNIA

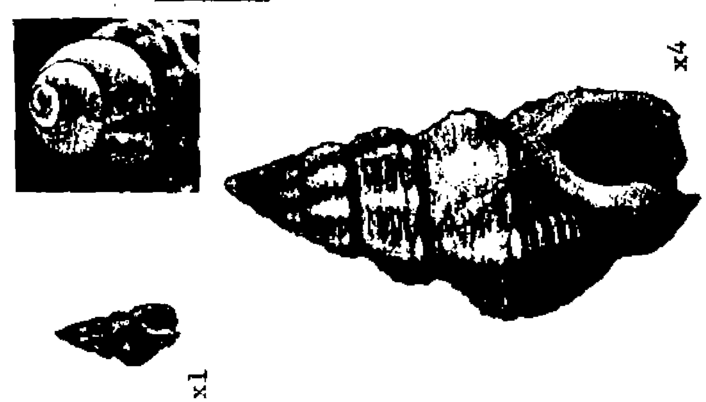


Light tan; with few, evenly spaced spiral cords and low, somewhat sinuous axial ribs; to 22 mm. In shallow water and offshore.

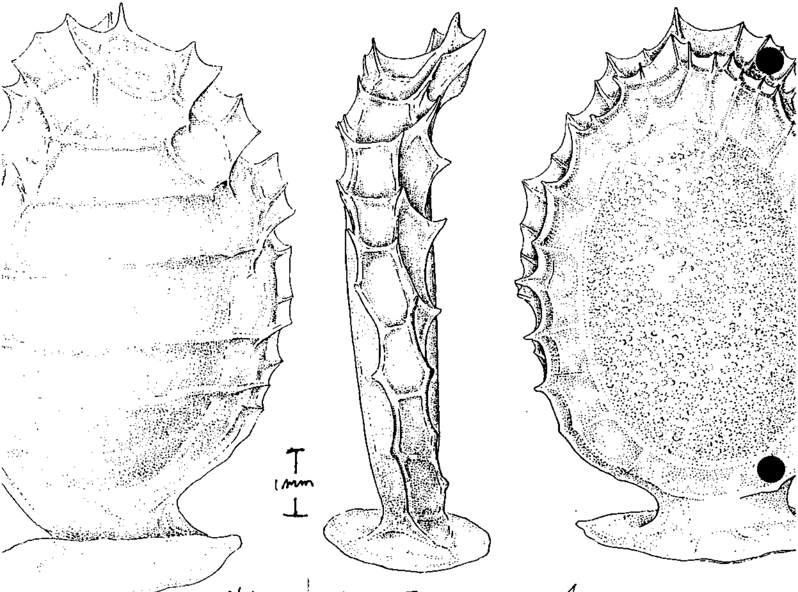
shape of egg capsule — unknown.

Nassarius mendicus (Gould) form cooperi (Forbes)

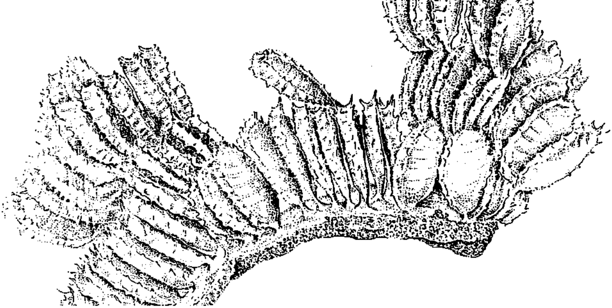
CALIFORNIA-BAJA CALIFORNIA

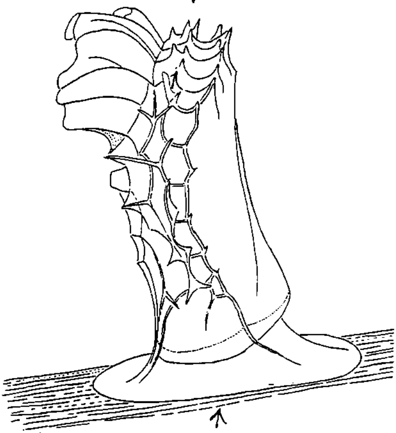


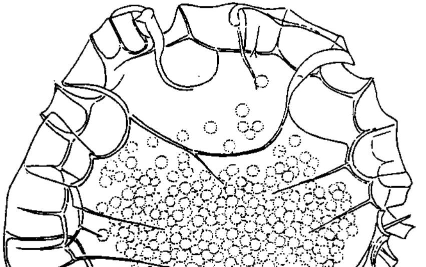
Specimens from southern California are generally more angular in out-line and frequently are light banded above the periphery.

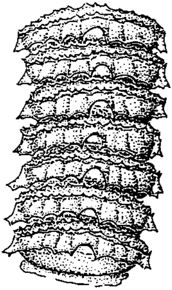


NASSARIUS FOSSATUS
egg capsules

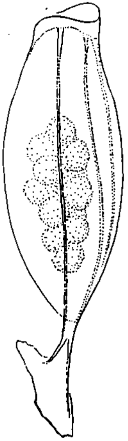






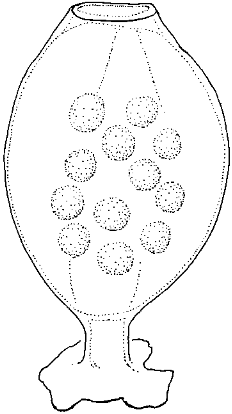


NASSARIUS PERPINGUIS ✓
egg capsules

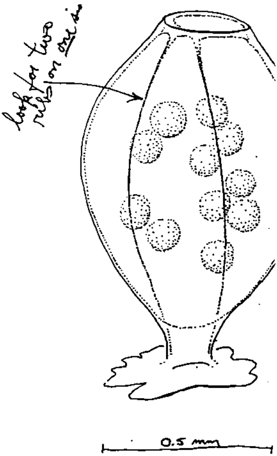


0.5mm

Nassarius mendicus



Nassarius mendicus



Nassarius mendicus

N. mendicus egg capsules probably resemble these illustrations. They are only a little more than 1mm in length and will occur singly or in small clusters.

NOTES ON THE STOMATOPOD CRUSTACEA (MANTIS SHRIMP) OF CALIFORNIA

L.V. Basch 25VII88

Four species of stomatopod crustaceans have been reported from the Southern California Bight. They are all usually uncommon or rare in benthic trawl and grab samples. However, dense populations of some species may occur locally. Numbers of some species appear to have increased dramatically since 1983, following the latest large El Niño. Individuals have been caught on hook and line, and all should be handled with extreme caution to avoid serious injury. When held out of water with two fingers behind the carapace and two holding the telson, they should pose little threat, and may be observed and measured if held on a flat surface.

Ranging in size from small to large: Nannosquilla anomala Manning, 1967 is known only from the type specimens taken at San Clemente Island in 5-21m depths on sand bottom over 20 years ago. No additional records are known. Schmittius politus (Bigelow, 1891) has been recorded from shallow bay depths to about 150m depth in mud to coarse sand bottom. Pseudosquillopsis marmorata Lockington, 1877 occurs from shallow (about 7m) to 110m depths on sand and mixed sand-rock substrate Specimens have been taken from impingements of electric generating stations. Hemisquilla ensigera californiensis Stephenson, 1967 have be recorded from less than 5m to a maximum of 1800m, but are more often collected from silty-sand habitats at depths shallower than 70m.

All small specimens, including postlarvae, may be easily confused. The four Californian species may be easily distinguished from one another by six characters: telson, dentition of the dactylus of the enlarged second maxilliped or thoracopod, rostrum shape, eye shape, body coloration and size (Total length). Refer to the attached table for further information on these traits. The only larval descriptions presently available are for Pseudosquillopsis (see Manning 1969). Any information and specimens of all species would be appreciate

The systematics of mantis shrimps is beginning to approach stability due mainly to the efforts of Raymond B. Manning and Frederick R. Schram. The Order Stomatopoda is contained within the Class Malacostraca and Subclass Hoplocarida. It is comprised of about 400 species in four Superfamilies, three of which are known from California: Gonodactyloidea; Lysiosquilloidea, and Squilloidea.

Morphological characters distinguishing the Stomatopods are: stalked compound eyes; well developed, laterally expanded carapace covering cephalon and anterior half of thorax; antennules with three segmented peduncle and three flagella; antennae with two segments and exopod with segment expanded as scaphocerite (= antennal scale); thoracic appendages: 8 pair, first 5 subchelate, second modified as an enlarged, powerful raptorial claw (= 2nd maxilliped), all used in feeding, thoracopods 6-8 biramous, used in locomotion; abdominal appendages: 5 pair of biramous, laminar pleopods, often with gills, sixth somite with uropods; telson: well developed, occasionally fused with 6th abdominal somite (pleotelson). usually well armored with spines somites: head with 5, excluding acron; thorax with 8; abdomen with 6, excluding telson; sexual characters: gonopores on 6th thoracic somite of female, 8th of male, male with penes median to 8th thoracopods.

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25 July, 1988

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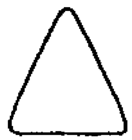
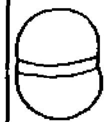
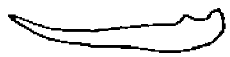
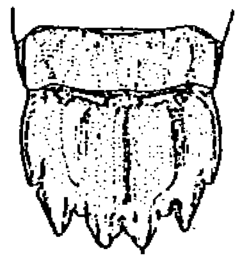
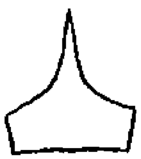
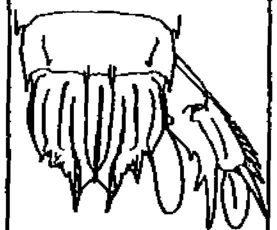
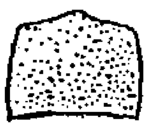
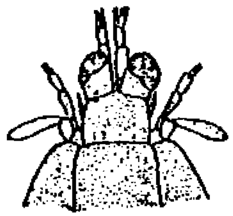
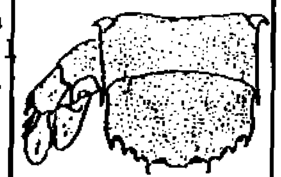
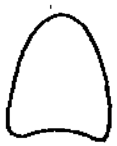
DISTINGUISHING CHARACTERISTICS OF STOMATOPOD CRUSTACEANS FROM CALIFORNIA

CHARACTER (none to scale) L.V. Basch

SPECIES	ROSTRUM SHAPE	EYE SHAPE	DACTYLUS OF MAXILLIPED 2	TELSON	BODY COLORATION	BODY SIZE (TOTAL LENGTH)
<u>Hemisquilla ensigera californiensis</u> Stevenson, 1967		 Frontal  Lateral			Overall color yellow-brown to tan. Distal parts of some limbs yellow. Distal of antennules, max-illipeds, pereo- & pleo-pods blue. Uropods deep blue with red setae.	Adults to 300mm; Post-larvae to 40mm.
<u>Pseudosquillopsis marmorata</u> Lockington, 1877		 Frontal  Dorsal	 3 Spines		Overall color light golden brown w/ mottled darker brown. Uropods light with red-purple fringing setae.	Adults to 120mm; Juveniles to 50mm; Post-larvae from 25 to 33mm.
<u>Nannosquilla anomala</u> Manning, 1967		 Dorsal	10-14 spines; Outer margin rounded, with proximal basal notch flanked proximally & distally by small lobe.		Body covered w/ dark chromato-phores, clustered on midline in some spms. Black pigmentation on anterior of cara-pace, anterior limbs, 6th abdm. segment & telson.	Adults from 34 to 41.2mm.
<u>Schmittius politus</u> (Bigelow, 1891)		 Frontal  Median	 4 Spin		Overall color is light golden brown with dark brown pigments scattered through whole body & some dark brown clustered chrom-atophores	Adults to 60mm; Post-larvae from 16 to 23mm.

May 11 - SCAMIT Meeting

Next month meeting June 8th - Allan Hancock.
Chaetopterids + Onuphids
Check keys before meetings for any additions

Agency
Groups make a list of different species common to S Calif. (intertidal → shelf break) Mas Dagni already has a compilation he will distribute.
Was decided that we would each distribute our own species list to other agencies. Include all names from past synonymies etc.

Mas will send us a copy of his list compiled from several agencies. We will add to this list and discuss this list at possibly July meeting.

Next step will be to divide up the provisional species and get them published.
* Problem - some of the provisionals do not have official SCAMIT voucher sheets (example - Tharyx sp. A, B, C.) These need to be done first.

This will be done in this format

Species name (SCAMIT provisional name)	SCAMIT Voucher (vol. no.)	Authority	Publish (date + name author)

It was suggested that each agency should adopt a different method of designating in-house provisional species from SCAMIT provisional species