



**Southern California Association of
Marine Invertebrate Taxonomists**

3720 Stephen White Drive
San Pedro, California 90731

January 1986

Vol. 4, No. 10

Next Meeting: February 10, 1986

Specimen Exchange Group: Ampeliscidae

Topic Taxonomic Group: Cumacea

MINUTES FROM: January 13, 1986

Guest Speaker, Dr. Richard Brusca, delivered an excellent introductory lecture on cladistic analysis and its use in the determination of phylogenetic relationships. During this presentation, Dr. Brusca handed out several packets of figures that were useful for understanding cladistics. The annotated bibliography from those handouts is included in this newsletter. SCAMIT has produced a videotape of this lecture; which is available for those who were unable to attend the meeting or wish to review the lecture. If you are interested in using the videotape, or receiving the lecture handouts, please contact the SCAMIT Treasurer, Ann Martin at Hyperion (213) 322-3131 X 317.

The annual meeting of the Southern California Academy of Sciences will be held at California State University, San Bernardino on May 2-3, 1986. A contributed papers session for marine invertebrate taxonomy is being hosted by SCAMIT. SCAMIT members are encouraged to participate in this session. This is a chance for each of you to present your work to the scientific community. Abstracts are due by the first of March. Refer to the enclosed flier for details on how to participate.

SCAMIT nominations for officers during 1986-1987 are to be held in March. Please attend the meeting to make your nominations, or submit them by mail to the SCAMIT Secretary.

Request for Comments. Dave Montagne is looking for ideas for the Systematic Catalogue of Southern California Invertebrates. He has written down several points for consideration that are enclosed in this newsletter. Read it over and send your comments to Dave.

Funds for the publication provided in part by Chevron U.S.A. Inc., Area Foundation, and Texaco, Inc.

SCAMIT Agenda, February 1986 to February 1987

Feb exchange / March topic	Ampeliscidae
March exchange / April topic	Sabellidae
April exchange / May topic	Serpulidae, Spirorbidae
May exchange / June topic	Pectinidae, Cardiidae
June exchange / July topic	Isaeidae (Corophiidae)
July exchange / Aug topic	Oxyrhyncha
Aug exchange / Sept topic	Ascidacea
Sept exchange / Oct topic	Aphroditidae, Sigalionidae
Oct exchange / Nov topic	Polynoidae
Nov exchange / Dec topic	Bryozoa
Dec exchange / Jan topic	Asellota Isopoda
Jan exchange / Feb topic	Porifera

A recent article that will be useful to many members interested in shrimp taxonomy is: The Rock Shrimp Genus *Sicyonia* (Crustacea: Decapoda: Penaeoidea) in the Eastern Pacific. By Isabel Perez Farfante. Fishery Bulletin: Vol. 83, No. 1, 1985.

List of specimens from January 13, 1986

A 31 page hand-out on Oligochaeta was distributed at the meeting. For a copy of this handout please contact Tom Parker at L.A. County Sanitation Districts, 24501 Figueroa St., Carson, CA 90745, (213) 830-2400 X394.

HYP 51	<u>Tectidrilus diversus</u>	Erseus, 1982
LACO 65	<u>Limnodriloides barnardi</u>	Cook, 1974
LACO 66	<u>Tectidrilus diversus</u>	Erseus, 1982
MBC 39	<u>Tectidrilus diversus</u>	Erseus, 1982
MCB 40	<u>Tubificoides coatesae</u>	Brinkhurst and Baker, 1979

(This ID is tentative; the voucher sheet will be issued following confirmation of ID).

TRAVELS WITH OLGA

(A postcard:)
Gustafsson Pensionat
Sveavagen 108, 4re
Stockholm, Sweden

10 Sept '39

Dear Frieda and Chauncey: Sweden is as beautiful as it is reputed to be, and at present its tranquility is a source of real comfort. No predictions can be made as to general European conditions, but I rather expect that unless things clear up within 1½ months, that I may seek passage to U.S.A. by November. Regulations of foreigners in any European country have become very strict since the declaration of open belligerency.

Greetings and best wishes to you both.

(A postcard:)
Gustafsson Pensionat
Stockholm, Sweden

12 Sept '39

Dear Albert: X marks the spot, (on P.C., a picture of the city library and children's wading pool, on one side, a row of apartments), of my two windows that look out on a beautiful park. Your letters have been arriving, for which I thank you warmly. There is no American Express in Stockholm, so use either the Naturhistoriska Riksmuseum, or the above house address. The 4re refers to floor number.

There is so much to learn here, and to see, and time is all too brief. My plans may need revamping before long. The European situation is not too promising, but no one knows.



SCAMIT SYSTEMATIC CATALOGUE OF SOUTHERN CALIFORNIA INVERTEBRATES

A Request For Comments

SCAMIT is considering the production of a systematic catalogue of marine invertebrates from Southern California. It is intended that such a catalogue be of use primarily to biologists carrying out, or interested in, faunal surveys of the region. It is also intended that the catalogue be maintained as a "living" document after its initial publication so that subsequent editions can be published at appropriate intervals.

Beyond these statements there are many decisions that must be made regarding the catalogue. Members are requested to provide comments on the following issues and make any suggestions that are not considered here. The resulting comments will aid in the development of the scope and format of the catalogue. Once that is accomplished, a plan of action can be drawn up for compilation and production.

Remember when considering these issues and what you would like to see in the catalogue that the real work of compiling the information will fall on the shoulders of individual SCAMIT members, perhaps including yourself; it is important that the catalogue be both useful in its scope and content, and be within our organization's ability to produce.

1. What should be the geographic and bathymetric limits of coverage? Straughan & Klink 1980 covered Pt. Conception to the Mexican Border and excluded "deep water species"; the actual limits were determined by the individual contributors. It would be perhaps more useful to strictly delimit the scope so that all groups are treated equally in this regard.
2. Should the catalogue be limited to benthic and epibenthic species, or should planktonic species be included? Should intertidal organisms be included?
3. What shall constitute a valid record of the occurrence of a species? Shall published records be the only acceptable source? Do the unpublished reports from various monitoring studies constitute valid records?
4. What groups, if any should be excluded from consideration? Should groups comprised of usually small animals, such as the Nematoda or Oligochaeta be excluded. What about obscure taxa (e.g. Kinorhyncha)
5. It has been suggested that the entire systematic composition of a phyla on a worldwide basis be listed down to a suprageneric level (perhaps the familial level) with those groups (families?) without

local representatives being noted as extra-limital, freshwater, terrestrial, etc.

6. How extensive should the synonymy be? Should the list be confined to the most common synonyms or should an attempt be made to be exhaustive?
7. How should provisional species be treated? It would seem valuable for the user of this catalogue to be aware that a considerable portion of the S. Calif fauna is undescribed. It has been suggested that for each group in the catalogue an addendum be provided that lists by genus (or appropriate taxon) the number of provisional species recognized in the region.
8. Should the listing be annotated? If so, what kind of information should be considered for inclusion in the annotations?
9. Should an index be provided? If so, should it be an index to all taxa, genera only, genera and above, etc.?
10. Should a bibliography be included? If so, how extensive should it be? How should it be limited?
11. What format should be used for the systematic listing? It has been suggested that an indented format with all suprageneric taxa explicitly identified (similar to Keen & Coan 1974) be adopted.
12. Are you willing to participate in the compilation of the catalogue?

Please forward your response to:

Dave Montagne
Marine Biology Laboratory
County Sanitation Districts
of Los Angeles County
24501 S. Figueroa St.
Carson, CA 90745
(213) 775-2353 EXT. 396

SOUTHERN CALIFORNIA ACADEMY OF SCIENCES



ANNUAL MEETING

May 2 - 3, 1986

at

**CALIFORNIA STATE UNIVERSITY
SAN BERNARDINO
in cooperation with**

- DESERT STUDIES CONSORTIUM, CALIFORNIA STATE UNIVERSITIES •
- SOUTHERN CALIFORNIA BOTANISTS • AMERICAN CETACEAN SOCIETY •
- SOUTHERN CALIFORNIA OCEAN STUDIES CONSORTIUM •
- UNIVERSIDAD AUTONOMA de BAJA, CALIFORNIA SUR •

TWO FULL DAYS of symposia and contributed-paper sessions! Professional and student papers, in all branches of the natural and social sciences, are solicited for presentation. Abstracts of the papers to be presented are due to the Program Chairman by March 1.

AWARDS OF \$100.00 EACH FOR THE BEST STUDENT PAPERS IN THE SUBJECT AREAS OF: PLANT ECOLOGY • DESERT ECOLOGY • BOTANY • ENVIRONMENTAL SCIENCE • VERTEBRATE ZOOLOGY • AND SCAS OPEN CATEGORIES TO BE DETERMINED.

(Note: Student papers qualifying for the awards must have only one author. Co-authored papers are welcomed for presentation on the program, but only single-authored papers will be judged.)

ABSTRACTS – DUE MARCH 1, 1986

For the format of your abstract, see other side. Some sections have earlier deadlines, but all are due by March 1 to the Program Chairman, Southern California Academy of Sciences, 900 Exposition Blvd., Los Angeles, CA 90007. Tel: (213) 744-3384.

(over)

S A M P L E A B S T R A C T

So that your abstract can be reproduced photographically exactly as you send it in, please follow this form: typing within 6" x 4" space on white bond paper. (You may outline the form in light blue pencil or nonreproducible ink, or simply measure the space on another sheet and use that as backing.) Use a good typewriter, 12-pitch type, with carbon ribbon in good condition.

Title of Your Paper (Capital and lower case letters, except where capitals are standard. Underscore the title.)

J. S. AUTHOR, Affiliation, City, State, Zip. (Your name in caps, affiliation and address in caps and lower case.)

SECOND AUTHOR (if any), follow same style.

Drop down two lines (from whatever is your last line above) and type your abstract, keeping it to 150 words if possible, but no more than the maximum length indicated below.* If needed, neatly drawn-in symbols or Greek letters are acceptable, but use India ink. Remember that your abstract is to be reproduced photographically from the copy that you send in, so be sure it is both accurate and neat. And when you have finished, mail it flat to the address indicated below for your section. As you see, some sections will be putting their programs together as units and require an earlier deadline. These and all others are, for program-printing purposes, due ~~by~~ MARCH 15 to SCAS.

*(If needed, abstract may run to this line but please, no further!)

Along with your abstract, please submit--on a 3" x 5" file card--the following:

1. Your name, affiliation, mailing address, and your telephone number.
2. Whether student or professional.
3. Title of your paper.
4. The section in which you wish to present it (the subject field).
5. The time required (maximally, 20 minutes).
6. Audio-visual equipment needed, if any.

PLEASE SUBMIT AS FOLLOWS:

BY FEBRUARY 21

SCOSC -- to Southern California Ocean Studies Consortium, PH1-217, California State University, Long Beach, CA 90840. Attn: Dee Dee Rypka.

ACS ---- to Diana McIntyre, American Cetacean Society, PO Box 2639, San Pedro, CA 90731.

SCAS Folklore Section -- to Robin Evanchuk, Folklore & Mythology Program, 1041 GSM, University of California, Los Angeles, CA 90024.

BY MARCH 1 -- THESE AND ALL OTHERS DIRECTLY TO: Program Chairman, Southern California Academy of Sciences, 900 Exposition Blvd., Los Angeles, CA 90007.

SOME IMPORTANT REFERENCES ON
CLADISTIC PHILOSOPHY AND METHODOLOGY

General Texts

Brooks, D.R., J.N. Cairns, T.R. Platt, & M.R. Pritchard. 1984. Principles and Methods of Phylogenetic Systematics: A Cladistics Workbook. Mus. Nat. Hist., Univ. Kansas. 92 pp. [one hesitates to list this little book because of all the errors it contains, but when used with caution it can be instructive]

de Beer, G. 1958. Embryos and Ancestors. Clarendon Press, Oxford. 197 pp.

Duncan, T. & T. Stuessy (Eds.). 1984. Perspectives on the Reconstruction of Evolutionary History. Columbia Univ. Press, N.Y. 312 pp.

Eldredge, N. & J. Cracraft. 1989. Phylogenetic Patterns and the Evolutionary Process. Method and Theory in Comparative Biology. Columbia Univ. Press, N.Y. 349 pp. [a good treatise on the philosophy behind cladistics; very little on methodology]

Funk, V.A. & D.R. Brooks (Eds.). 1981. Advances in Cladistics. Proceedings of the First Meeting of the Willi Hennig Society. N.Y. Botanical Garden, Bronx, N.Y. 250 pp.

Could, S.J. 1977. Ontogeny and Phylogeny. Harvard Univ. Press, Cambridge, MA 501 pp.

Hennig, W. 1979. Phylogenetic Systematics. Univ. Illinois Press, Urbana. 263 pp. [this is the "3rd Edition" of Hennig's original 1950 text on phylogenetic classification theory; good background reading, but dated and largely superseded by Wiley's text]

Nelson, G. & N. Platnick. 1981. Systematics and Biogeography. Cladistics and Vicariance. Columbia Univ. Press, N.Y. 567 pp. [recommended reading]

Platnick, N. & V. Funk (Eds.). 1983. Advances in Cladistics. Proceedings of the Second Meeting of the Willi Hennig Society. Columbia Univ. Press, N.Y. 218 pp.

Raff, R.A. & T.C. Kaufman. 1983. Embryos, Genes and Evolution. The Developmental-Genetic Basis of Evolutionary Change. Macmillan, N.Y. 395 pp. [current views on embryos and ancestors]

Wiley, E.O. 1981. Phylogenetics. The Theory and Practice of Phylogenetic Systematics. John Wiley & Sons, N.Y. 439 pp. [widely regarded as the cladistics "cookbook"; well-written]

Important Papers

Over the past 10 years the primary literature has produced hundreds of original studies on cladistic methodology. This is a list of some that I personally feel are of broad general significance. The main sources are *Syst. Zool.*, *Taxon*, *Ann. Rev. Ecol. System.*, *Cladistics* [a new journal that began in 1985], *Evolution*, *Z. Zool. Syst. Evolutionsforsch* (*J. Syst. Zool. & Evol. Res.*), and *Evol. Biol.*

Adams, E. 1972. Consensus techniques and the comparison of phylogenetic trees. *Syst. Zool.*, 21: 390-397.

Alberch, P. 1982. Developmental constraints in evolutionary processes. In J.T. Ponder (Ed.), *Evolution and Development*, pp. 3-3-332. Springer-Verlag, N.Y.

Alberch, P. 1985. Problems with the interpretation of developmental sequences. *Syst. Zool.*, 34: 46-58.

Alberch, P., S.J. Gould, G.F. Oster, D.B. Wake. 1979. Size and shape in ontogeny and phylogeny. *Paleobiology*, 5: 296-317.

Baverstock, P.R., S.R. Cole, B.J. Richardson & C.H.S. Watts. 1979. Electrophoresis and cladistics. *Syst. Zool.*, 28: 214-219.

Brooks, D.R. & E.O. Wiley. 1985. Theories and methods in different approaches to phylogenetic systematics. *Cladistics*, 1: 1-11.

Cohen, D.M. 1934. Ontogeny, systematics and phylogeny. In H.G. Moser et al. (Eds), *Ontogeny and systematics of Fishes*, pp. 7-11. Am. Soc. Ichthyol. Herpetol., Spec. Publ. 1, Lawrence, KA.

deJong, R. 1980. Some tools for evolutionary and phylogenetic studies. *J. Syst. Zool. & Evol. Res.*, 18: 1-23.

Farris, J.S. 1970. Methods for computing Wagner trees. *Syst. Zool.* 19: 83-92.

Farris, J.S. 1972. Estimating phylogenetic trees from distance matrices. *Amer. Natural.*, 106: 645-668.

Farris, J.S. 1977. Phylogenetic analysis under Dollo's Law. *Syst. Zool.*, 26: 77-88.

Farris, J.S., A.G. Kluge & M.J. Eckardt. 1970. A numerical approach to phylogenetic systematics. *Syst. Zool.*, 19: 172-189.

Felsenstein, J. 1982. Numerical methods for inferring evolutionary trees. *Q. Rev. Biol.*, 57: 379-404.

Felsenstein, J. 1983. Parsimony in systematics: biological and statistical issues. *Ann. Rev. Syst. Ecol.*, 14: 313-333.

Fink, W.L. 1982. The conceptual relationship between ontogeny and phylogeny. *Paleobiol.*, 8: 254-264.

Fitch, W.M. 1977. On the problem of discovering the most parsimonious tree. *Am. Nat.*, 111: 223-257.

Fitch, W.M. & E. Margoliash. 1967. Construction of phylogenetic trees. *Science*, 155: 279-284.

Hennig, W. 1977. Phylogenetic systematics. *Ann. Rev. Entomol.*, 10: 97-116.

Hills, D.M. 1985. Evolutionary genetics of the Andean lizard genus *Pholidobolus* (Sauria: Gymnophthalmidae): phylogeny, biogeography, and a comparison of tree construction techniques. *Syst. Zool.*, 34: 109-126.

Kluge, A.G. & R.E. Strauss. 1985. Ontogeny and Systematics. *Ann. Rev. Ecol. Syst.*, 16: 247-268.

Kluge, A.G. & J.S. Farris. 1969. Quantitative phyletics and the evolution of anurans. *Syst. Zool.*, 18: 1-32.

Lundberg, J.G. 1972. Wagner networks and ancestors. *Syst. Zool.*, 18: 1-32.

Marx, H. & G. Rabb. 1970. Character analysis: an empirical approach to advanced snakes. *J. Zool.*, London, 161:525-548.

Maddison, W., M. Donoghue & D. Maddison. 1984. Outgroup analysis and parsimony. *Syst. Zool.*, 33: 83-103. [possibly the single most important paper to appear on out-group analysis]

Maslin, T.P. 1952. Morphological criteria of phyletic relationships. *Syst. Zool.*, 1: 49-70.

Meacham, C. The role of hypothesized direction of characters in the estimation of evolutionary history. *Taxon*, 33: 26-38.

Meacham, C.A. & G.F. Estabrook. 1985. Compatibility methods in systematics. *Ann. Rev. Ecol. Syst.*, 16: 431-446. [a recent review]

Miyamoto, M.M. 1983. Frogs of the Eleutherolactylus rugulosus group: a cladistic study of allozyme, morphological and karyological data. *Syst. Zool.*, 32: 109-124.

Mickevich, M.F. 1978. Taxonomic congruence. *Syst. Zool.*, 27: 143-152.

Mickevich, M.F. 1982. Transformation series analysis. Syst. Zool., 31: 461-478.

Nelson, G. 1973. The higher-level phylogeny of vertebrates. Syst. Zool., 22: 87-91.

Nelson, G. 1978. Ontogeny, phylogeny and the biogenetic law. Syst. Zool., 27: 324-345.

Patterson, C. 1978. Verifiability in systematics. Syst. Zool., 27: 218-221.

Platnick, N.I. 1979. Philosophy and the transformation of cladistics. Syst. Zool., 28: 537-546.

Stevens, P.F. 1980. Evolutionary polarity of character states. Ann. Rev. Ecol. Syst., 11: 333-358.

Watrous, L. & Q. Wheeler. 1981. The out-group comparison method of character analysis. Syst. Zool., 30: 1-11.

Wiley, E.O. 1975. Karl R. Popper, systematics and classification: a reply to Walter Bock and other evolutionary taxonomists. Syst. Zool., 24: 233-242.

Yates, T.L., R.J. Baker & R.K. Barnett. 1979. Phylogenetic analysis of karyological variation in three genera of peromyscine rodents. Syst. Zool., 28: 40-48.

SCAMIT Code: HYP50
SCCWRP64

Date Examined: Dec. 5, 1985
Voucher by: Bruce Thompson, SCCWRP

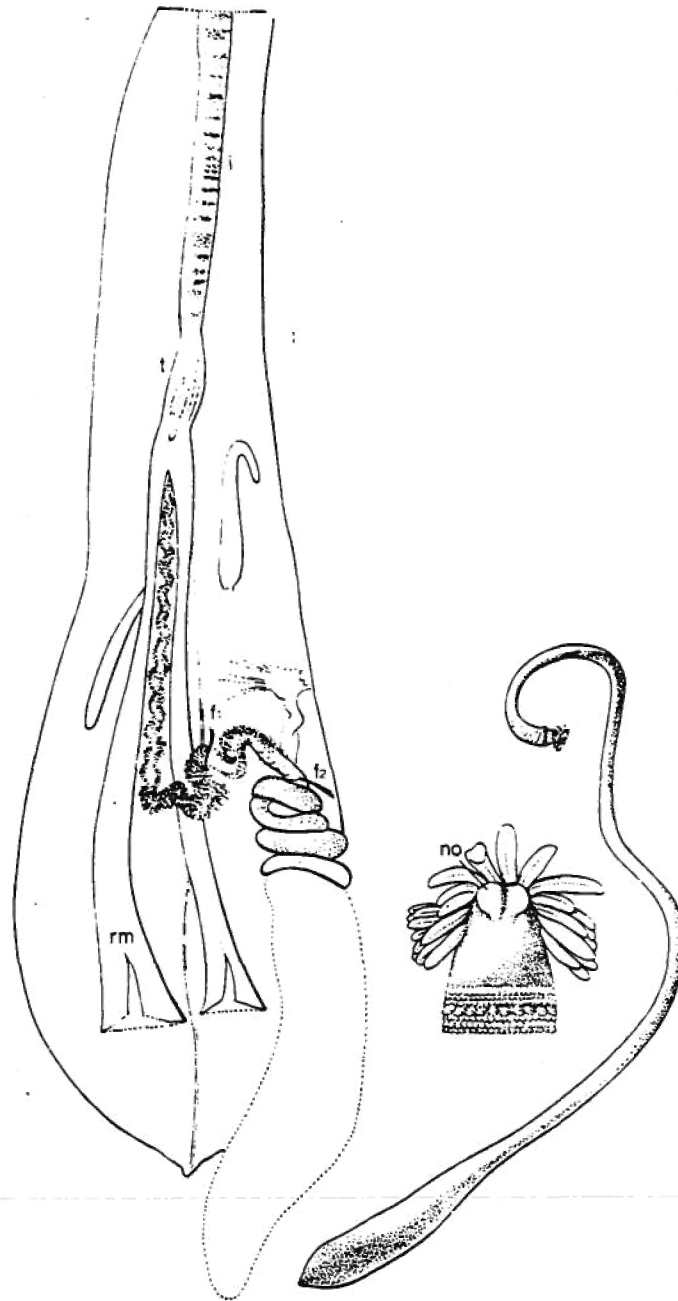
SYNONYMY: Phascolosoma nigrum Ikeda, 1904
P. onagawa Sato, 1937
P. pavlenkoi Ostroumov, 1909
Golfingia pugettensis Fisher, 1952
P. zenibakense Ikeda, 1924
P. hozawai Sato, 1937
G. macginitiei Fisher, 1952
P. hyugensis Sato, 1934

LITERATURE: See Gibbs, Cutler, Cutler, 1983 for complete
synonymy and additional references.

DIAGNOSTIC CHARACTERS:

1. 1 pair of nephridia.
2. 2 retractor muscles, spindle muscle not attached posteriorly.
3. Introvert larger than trunk, without hooks.
4. Tentacles arranged in longitudinal rows (festooned).
5. Contractile vessel with short villi.

DISTRIBUTION: North Pacific, Philippines to California; Singapore;
In southern California; soft bottom habitats, 30-150 m.



2. Thysanocardia nigra internal anatomy; tentacular region; and whole organism. i=introvert, t=tentacular region, f, f₂=fastening muscles, rm=retractor muscles; note contractile tubules on oesophagus (from Stephen and Edmonds, 1972).

Listriolobus pelodes (Fisher, 1946)
Echiuridae

Vol. 4, No. 10

SCAMIT Code: SCCWRP 66

Date Examined: Dec. 4, 1985

Voucher by: Bruce Thompson, SCCWRP

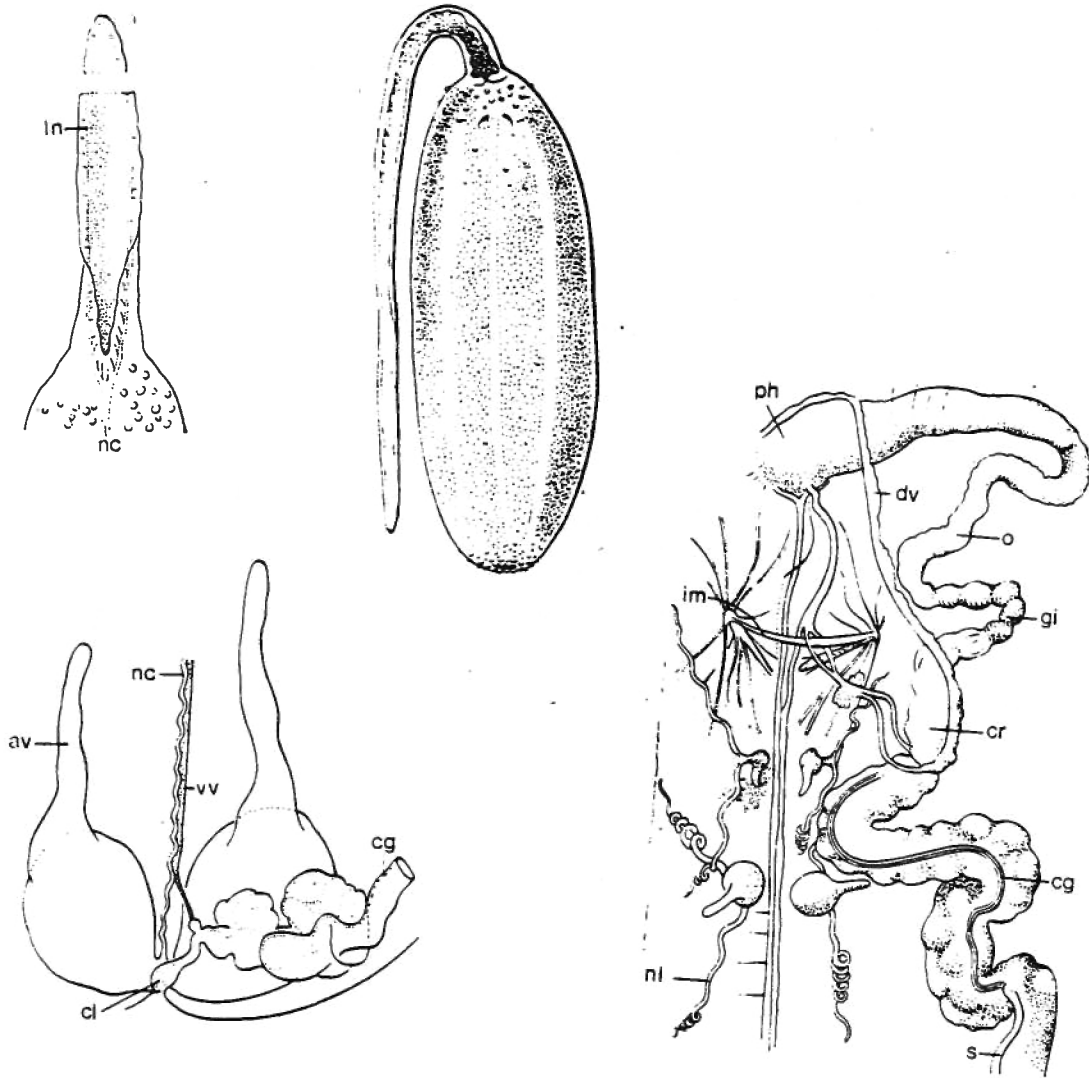
SYNOMONY: None

LITERATURE: Fisher, 1946
Stephen and Edmonds, 1972.

DIAGNOSTIC CHARACTERS:

1. 8 longitudinal muscle bands in body wall (may be absent in juveniles); oblique muscles not grouped into fascicles.
2. 2 pairs of nephridia with spirally coiled lips.

DISTRIBUTION: California to Baja, California; 30-200 m.



4. Listriolobus pelodes, anal vesicles and rectum, internal view of nephridial region, proboscis and whole organism. ph=pharynx, dv=dorsal vessel, o=oesophagus, gi=gizzard, im=interbasal muscle, cr=crop, s=siphon of intestine, nl=nephrostomal lips, av=anal vessels, nc=ventral nerve cord, vv=ventral vessel, cg=ciliated groove, cl=cloaca, ln=longitudinal nerve (from Stephen and Edmonds, 1972).

Golfingia misakiana (Ikeda, 1904)
Golfingiidae

Vol. 4, No. 10

SCAMIT Code: LACO 64
SCCWRP65

Date Examined: Dec. 5, 1985
Voucher by: Bruce Thompson, SCCWRP

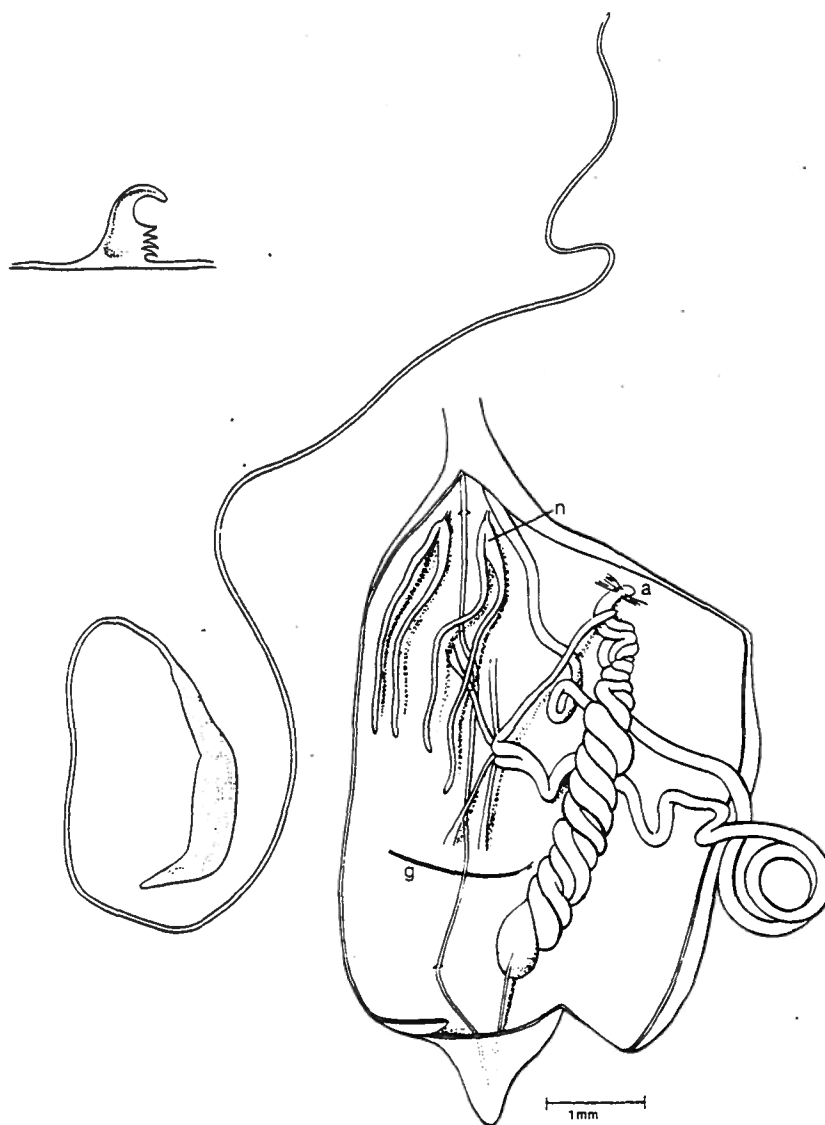
SYNONYMY: Phascolosoma hespera Chamberlain, 1920
Golfingia hespera Fisher, 1952

LITERATURE: Cutler, 1979.
Cutler, 1973.

DIAGNOSTIC CHARACTERS:

1. 2 pairs of retractors.
2. 2 bilobed nephridia.
3. Introvert 10-12 times trunk length.
4. Tentacles, hooks and papillae present on introvert.

DISTRIBUTION: Cosmopolitan



1. Golfingia misakiana; introvert hook, whole organism and internal anatomy. n=nephridia, a=anus, g=gut fastening muscle (from Stephen and Edmonds, 1972).

Onchnesoma sp. A
Golfingiidae

Provisional, B. Thompson
SCCWRP

Vol. 4, No. 10

SCAMIT Code: PL63

Date Examined: Dec. 4, 1985
Voucher by: Bruce Thompson, SCCWRP

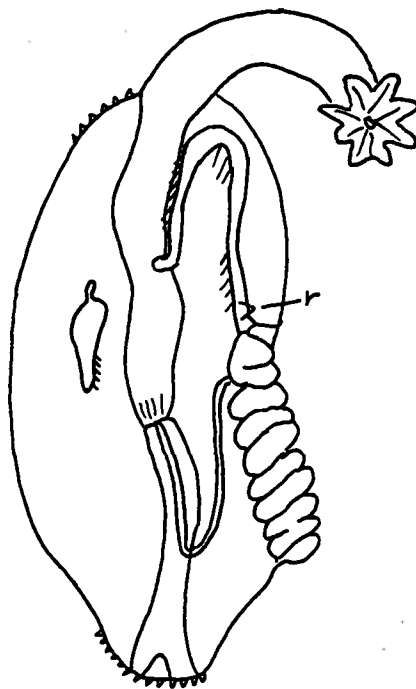
SYNONYMY: None

LITERATURE: Cutler and Cutler, 1985.

DIAGNOSTIC CHARACTERS:

1. Single retractor muscle originates at posterior end.
2. Single nephridium.
3. Anus terminates on introvert.
4. Often found in empty Gastropod shells.

DISTRIBUTION: Central and southern California, 50-500 m.



3. Onchnesoma sp A. Whole organism showing internal anatomy.
r=rectal caecum.

ECHIURA

by

BRUCE E. THOMPSON

SCCWRP

646 W. P.C.H.

Long Beach, CA 90806

This small phylum of marine protostomes is well represented in southern California waters. The only previous reports of the echiurans of this area are those of Fisher (1946, 1948, 1949); he recorded 7 species. Recent large scale surveys of the benthos of the entire southern California borderland have collected many additional taxa. The following is a complete listing of all echiurans previously reported in the literature or seen in collections examined from southern California. It includes species from benthic habitats ranging from intertidal to bathyal depths.

Collections examined include those from the Allan Hancock Foundation, Scripps Institution of Oceanography, and the Santa Barbara Museum of Natural History. The list is probably still incomplete. Several single "specimens of interest" have been examined and may represent 1 to 3 additional genera.

The classification used is the one proposed by Fisher (1946) and adopted by Stephen and Edmonds (1972).

Echiura Stephen, 1965
Echiuroidea Newby, 1940

Echiuroinea Bock, 1942

Bonelliidae Baird, 1868
Nellobia Fisher, 1946
Nellobia eusoma Fisher, 1946

Promator Fisher, 1948
Promator benthophila Hartman & Barnard, 1960
Promator pocula Fisher, 1948

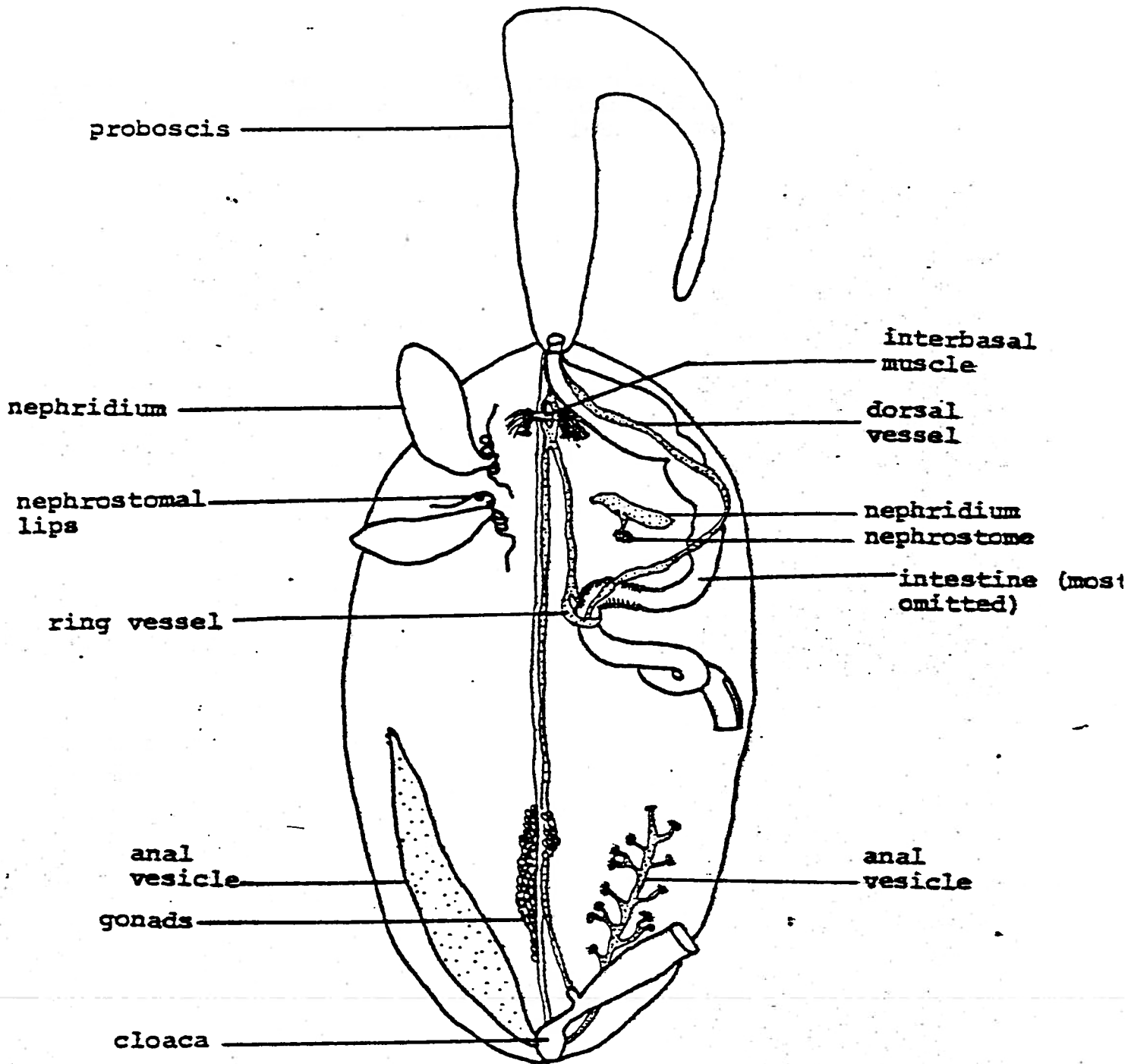
Echiuridae de Blainville, 1827
Arhynchite Sato, 1937
Arhynchite californicus Fisher, 1949
Listriolobus Spengel, 1912
Listriolobus hexamyotus Fisher, 1949
Listriolobus pelodes Fisher, 1946
Ochetostoma Leuckart & Ruppell, 1828
Ochetostoma octomyotum Fisher, 1946

Xenopneusta Fisher, 1946

Urechidae Fisher & MacGinitie, 1928
Urechis Seitz, 1907
Urechis caupo Fisher & MacGinitie, 1928

REFERENCES

- Bock, S. 1942. On the structure and affinities of *Thalassema lankesteri* Herdman and the classification of the Group Echiuroidea. Goteborgs. Vetensk. O. Vitterh Samh. Handl. Ser. B, 2(6): 1-94.
- Fisher, W.K. 1946. Echiuroid worms of the north Pacific Ocean. Proc. U.S. Natl. Mus. 96: 215-292.
- _____. 1948. A review of the Bonelliidae. Ann. Mag. Nat. Hist. ser. 11, 14: 857-860.
- _____. 1949. Additions to the echiuroid fauna of the north Pacific Ocean. Proc. U.S. Natl. Mus. 99: 479-497.
- Fisher, W.K., & MacGinitie, G.E. 1928. A new echiuroid worm from California. Ann. Mag. Nat. Hist. ser. 10, 1: 199-204.
- Hartman, O., & Barnard, J.L. 1960. The benthic fauna of the deep basins of southern California. Allan Hancock Pacific Expeditions. 22: 217-297.
- Newby, W.W. 1940. The embryology of the echiuroid worm *Urechis caupo*. Mem. Am. Phil. Soc. 16: 1-213.
- Stephen, A.C. 1965. A revision of the phylum Sipuncula. Ann. Mag. Nat. Hist. Ser. 13, 7: 457-462.



Generalized diagram of echiuran anatomy, dorsal view (after Stephen and Edmonds, 1972). Characters typical of Bonelliidae are on the right side, those typical of Echiuridae on the left side.

REFERENCES (Cont'd.)

- Stephen, A.C. & Edmonds, S.J. 1972. The phyla Sipuncula and Echiura. London: Trustees Brit. Mus. (Nat. Hist.), publ. 717, 528 pp.

A KEY TO THE ECHIURA
OF SOUTHERN CALIFORNIA

1. Circlet of setae on the posterior end of body; open vascular system.....Order Xenopneusta, Urechis caupo
- No posterior setae; closed vascular system. Order Echiuroinea..2

2. Proboscis bifid, cylindrical, or triangular; sexually dimorphic, males parasitic on females; nephridia 1 or 2; ventral setae may be absent; anal vessicles branched. Family Bonellidae.....3
- Proboscis furrowed; no sexual dimorphism; nephridia paired; ventral setae present; anal vessicles sac-like. Family Echiuridae.....9

3. Posterior end expanded into a mushroom shape.....4
- Posterior end without such an expansion.....5

4. Anus terminal; tongue-like structure surrounds anus and is directed along the ventral line to the end of the expansion. Bonellidae, Genus D
- Anus situated near posterior end on the mid-ventral line: no tongue-like structure surrounding anus.....Bonellidae, Genus C

5. Proboscis bifid; no ventral setae; single external nephridiopore. Nellobia eusoma
- Proboscis cylindrical or triangular; paired ventral setae and nephridia.....6

6. Collar surrounding the base of the proboscis; anal vessicles sac like with numerous ciliated funnels inset.....7
- No collar at base of proboscis; anal vessicles with bud-like branches from main sac..... Bonellidae, Genus E

7. Collar with 14 lobes; nephrostomes distal.....Bonellidae, Genus A
- Collar cup-like; nephrostomes basal.....Prometor sp......8

8. Proboscis triangular; tips of setae spatulate; nephridia oval sacs.....Prometor pocula
- Proboscis cylindrical; tips of setae tapering; nephridia elongate.....Prometor benthophila

9. Longitudinal musculature of body wall grouped into distinct bands; nephrostome lips elongate.....10
- No longitudinal muscle bands; nephrostomal lips expanded into a leaf-like structure with sculptured border.
Arhynchite californicus
10. Inner oblique muscle layer fasciculated between longitudinal muscle bands; interbasal muscle absent.....Ochetostoma octomyotum
- Oblique muscle layer not fasciculated; interbasal muscle present.....Listriolobus sp......11
11. 6 longitudinal muscle bands; 2 nephridia...Listriolobus hexamyotus
- 8 longitudinal muscle bands; 4 nephridia.....Listriolobus pelodes

SIPUNCULA

by

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The sipunculan fauna of southern California is poorly known. The first report was that of Chamberlain (1918). Fisher's (1950a,b, 1952) work provides the only major reference for this group. He erected subgenera for the genus *Golfingia* and described nearly all of the intertidal sipunculans, but only a few of the species from offshore. Recently however, several large scale surveys of the intertidal and benthic habitats of the entire southern California borderland have collected many species not reported from this area, including several apparently new taxa. This listing includes all previously reported sipunculans and also includes species seen in collections from southern California. It includes species from intertidal to bathyal habitats.

The classification used is based upon the families of Stephen and Edmonds (1972), and the subgenera of Fisher (1952), as revised by Stephen and Edmonds (1972), Cutler and Murina (1977), and Cutler (1979).

Sipuncula Stephen, 1965
Sipunculoidea Sedgwick, 1898
Sipunculida Pickford, 1947

Sipunculidae Baird, 1868
Siphonosoma Spengel, 1912
Siphonosoma (*Siphonosoma*) Fisher, 1950
Siphonosoma (*Siphonosoma*) *ingens* Fisher, 1950
Sipunculus Linnaeus, 1766
Sipunculus nudus Linnaeus, 1766

Golfingiidae Stephen & Edmonds, 1972

- Golfingia* Lankester, 1885
Golfingia (*Apionsoma*) Sluiter, 1902, sensu Cutler
Golfingia (*Apionsoma*) *capitata* (Gerould, 1913)
 Fisherana capitata (Gerould), 1913
Golfingia (*Apionsoma*) *misakiana* (Ikeda, 1904)
 Golfingia hespera (Chamberlain, 1919)
Golfingia (*Apionsoma*) *trichocephala* (Sluiter, 1902)
Golfingia (*Golfingia*) Fisher, 1950
Golfingia (*Golfingia*) *margaritacea* (Sars, 1851)
Golfingia (*Nephasoma*) Pergament, 1940
Golfingia (*Nephasoma*) *eremita* (Sars, 1851)
Golfingia (*Nephasoma*) *laetmophilia* Fisher, 1952
Golfingia (*Nephasoma*) *minuta* (Keferstein, 1863)
Golfingia (*Nephasoma*) *nicolasi* Thompson (1980)
Golfingia (*Nephasoma*) *pellucida* (Keferstein, 1865)
Golfingia (*Thysanocardia*) Fisher, 1950
T. nigra { *Golfingia* (*Thysanocardia*) *catharinae* (Grube, 1868)
 Golfingia procera (Möbius, 1875)
 Golfingia (*Thysanocardia*) *macginitiei* Fisher, 1952
Onchnesoma Koren and Danielssen, 1875
Themiste Gray, 1828
Themiste dyscrita (Fisher, 1952)
Themiste perimeces (Fisher, 1928)
Themiste pyroides (Chamberlain, 1919)
Themiste zostericola (Chamberlain, 1919)

Phascolosomatidae Stephen & Edmonds, 1972

- Phascolosoma* Leuckart, 1828
Phascolosoma (*Phascolosoma*) Stephen & Edmonds, 1972
Phascolosoma (*Phascolosoma*) *agassizii* Keferstein, 1867

9. Introvert slightly longer than trunk; tentacles reduced to small lobes.....Golfingia minuta
- Introvert shorter than trunk; tentacles digitate.....10
10. Double circle of tentacles around mouth; introvert hooks slightly bent and awl like; yellow, wart-like papillae.....Golfingia pellucida
- Single circle of tentacles around mouth, introvert hooks and papilla not as above.....11
11. Retractors insert in posterior 1/2 of trunk, rectal caecum present; posterior end of trunk dark brownGolfingia sp. 2
- Retractors, insert in middle 1/3 of trunk; no rectal caecum.....Golfingia laetmophilia
12. Introvert shorter than trunk; posterior end of trunk extended to form a short "tail".....Golfingia sp. 1
- Introvert longer than trunk; no posterior tail.....13
13. Introvert up to 9x longer than trunk; a 4-6 digitate tentacles.....G. nicolasi
- Introvert less than 2x length of trunk; 20 digitate tentacles.....G. eremita
14. Tentacles surround mouth; spindle muscle not attached to posterior end on trunk; paired, single lobed nephridiaG. marginatus
margaritaceu
- Tentacles, if present, do not surround mouth, but are dorsal to it; spindle muscle attached to posterior end of trunk, paired, bilobed nephridia.....15
15. Introvert shorter than trunk; ventral retractors originate from the posterior 1/2 of the trunkG. capitata
- Introvert 5-10 times length of trunk.....16
16. Tentacles, hooks, papilla present.....G. misakiana
- Tentacles, hooks, papilla, absent.....G. trichocephala

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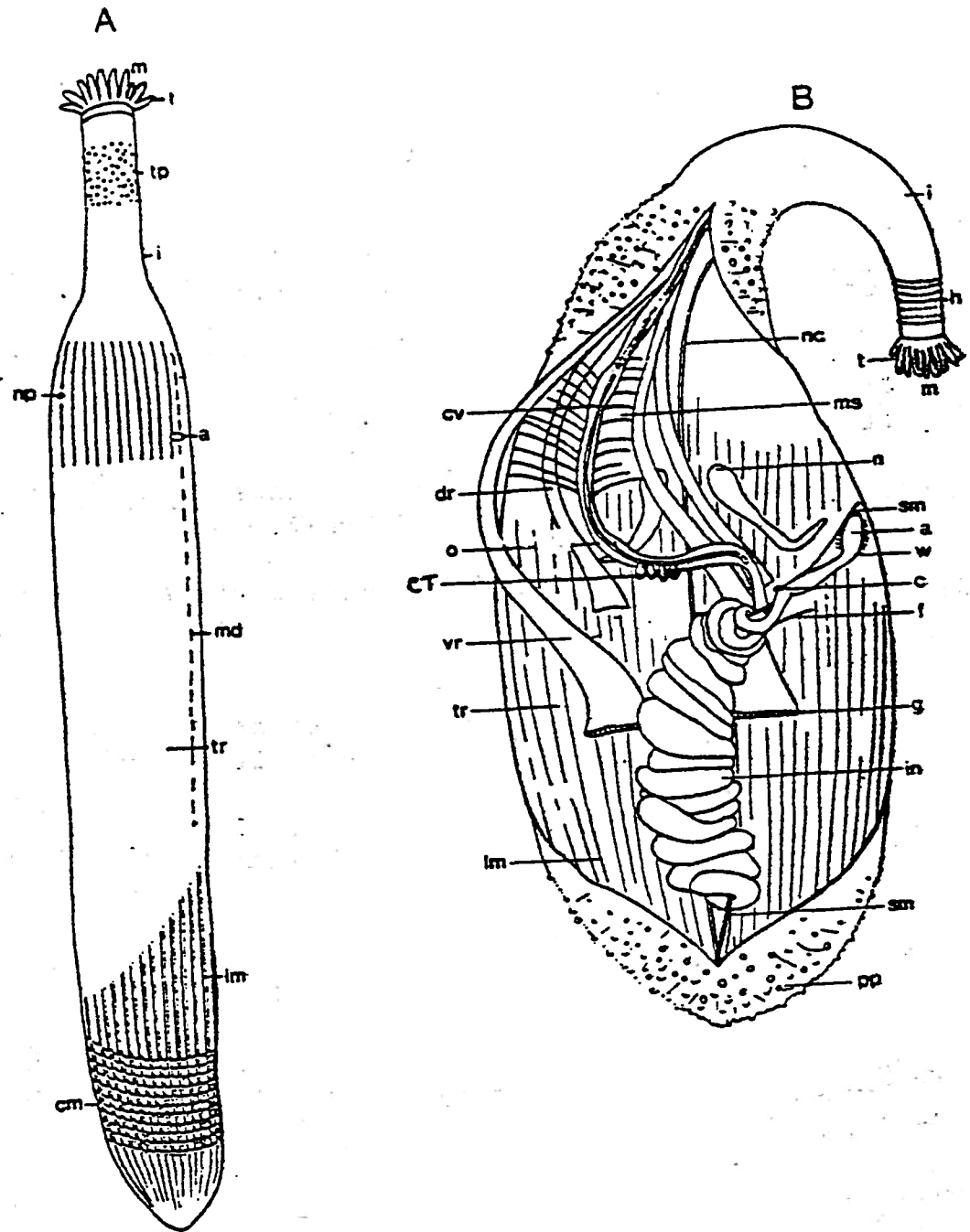
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A Preliminary, Artificial Key to
the Sipunculans of Southern California

by

Bruce Thompson, SCCWRP

1. Musculature of the ~~body~~^{TRUNK} wall organized into longitudinal bands.....2
 - No longitudinal muscle bands.....4
2. Tentacles do not surround mouth but are dorsal to it; introvert hooks present.....Phascolosoma agassizii
 - Tentacles surround mouth; introvert hooks absent.....3
3. Introvert with sub-triangular scale-like papilla; skin on trunk organized into squares; tentacles on flaps of skin surrounding the mouth.....Sipunculus nudus
 - No scale-like papilla on introvert; tentacles are festooned in longitudinal rows.....Siphonosoma ingens
4. Contractile vessel with tubules or villi.....5
 - Contractile vessel without tubules or villi.....6
5. Villi on contractile vessel short; tentacles in longitudinal rows; no hooks.....Thysanocardia nigra
 - Long tubules on contractile vessel; tentacles dichotomously branched.....Themiste sp.
6. Single retractor muscle extends to posterior end of body; single nephridium.....Onchnesoma sp. A.
 - 2 or 4 retractor muscles; paired nephridia.....Golfingia sp....7
7. 2 retractor muscles.....8
 - 4 retractor muscles.....14
8. Hooks present an introvert.....9
 - Hooks absent from introvert.....12



Diagrams of Sipunculan anatomy (after Stephen and Edmonds 1972). A. Entire organism; B. Internal structure. a, anus; as, anal shield; c, caecum; cs, caudal shields; cm, circular muscle; cv, contractile vessel; ct, contractile tubules; dr, dorsal retractor; f, fastening muscle; g, gonad; h, hooks; i, introvert; in, intestine; lm, longitudinal muscle; m, mouth; md, mid-dorsal line; ms, mesentery; n, nephridium; nc, nerve cord; np, nephridiopore; o, oesophagus; pp, papillae; sm, spindle muscle; t, tentacles; tp, triangular papillae; tr, trunk; vr, ventral retractor; w, wing muscle.

SCAMIT Code: LACO 65

Date Examined: January 13, 1986

Voucher By : Thomas Parker (LACSD)

Literature: Cook, D.G. 1974. The systematics and distribution of marine Tubificidae (Annelida, Oligochaeta) in the Bahia de San Quintin, Baja California, with descriptions of five new species. Bull. So. Cal. Acad. Sci. 73 : 126-140.

Erseus, C. 1982. Taxonomic revision of the marine genus Limnodriloides (Oligochaeta: Tubificidae) Verh. Naturwiss Ver. Hamburg. (NF)25: 207-277.

Synonymy: Limnodriloides winkelmanni Michaelsen, 1914 (part)

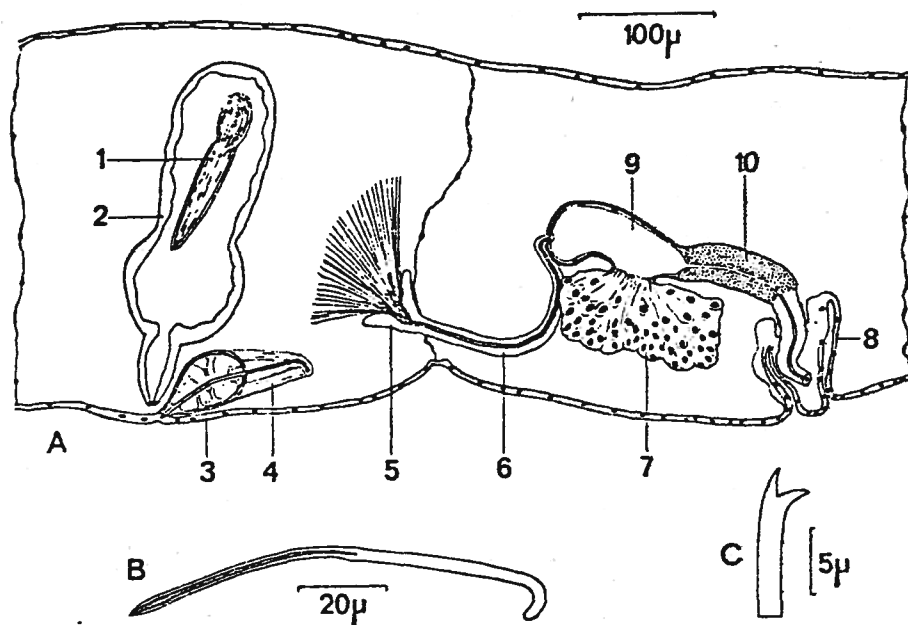
Diagnostic Characters:

1. Esophageal diverticula in segment IX.
2. Clitellum weakly developed on segments XI-XII.
3. Venter of segment X contains a pair of curved, elongate spermathecal setae; with hollow groove from node to distal end.
4. Somatic setae all similar, bifid. 2-4 per bundle in pre-clitellar region, posteriorly 2 setae per bundle.
5. Sperm as narrow bundles in spermathecae.

Related Species and Differences: Limnodriloides scandinavicus Erseus, 1982 and Limnodriloides victoriensis Brinkhurst and Baker, 1979.

1. Differs from L. scandinavicus by having a shorter atrial duct, simpler pseudopenis, and cup shaped rather than oblong prostatic pad.
2. Differs from L. victoriensis by having two rather than one somatic setae per bundle posteriorly.
3. Paired rather than single median genital pores.

Distribution: Subtidal sediments to 150 meters, Atlantic Coast, Pacific Coast of Mexico and Southern California.



Limnodriloides barnardi, Cook, 1974. A. Longitudinal view of genital segments; B. Spermathecal seta; C. Somatic seta. 1, sperm bundle; 2, spermathecal ampulla; 3, vacuolated muscular sac surrounding spermathecal seta; 4, protractor muscles of spermathecal seta; 5, male funnel; 6, vas deferens; 7, prostate gland; 8, penial sac; 9, atrial ampulla; 10, glandular part of atrial ampulla; 10, glandular part of atrial duct. From Cook, 1974.

SCAMIT Code: HYP 51
LACO 66
MBC 39

Date Examined: January 13, 1986
Voucher By : Thomas Parker (LACSD)

Literature: Erseus, C. 1982. Taxonomic revision of the marine genus Limnodriloides (Oligochaeta: Tubificidae) Verh. Naturwiss. Ver. Hamburg (NF)25 207-277.

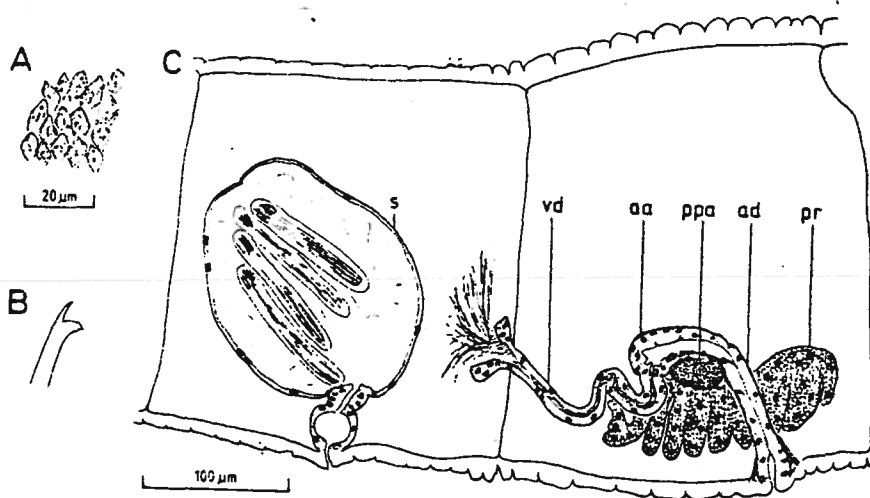
Diagnostic Characters:

1. Body wall densely coated with leaf like protuberances (at least in post clitellar region).
2. Esophageal diverticula absent in segment IX.
3. Setal teeth equally long, but dorsal tooth thinner.
4. Organized bundles of sperm in spermatheca.
5. Prostate gland large and lobed.

Related Species and Differences:

Tectidrilus verrucosus differs by possessing an esophageal diverticula and random sperm arrangement in spermatheca.

Distribution: Subtidal sediments to 305 meters. Only from California.



Tectidrilus diversus Erseus, 1982. A. Body wall papillae. B. Free-hand drawing of seta. C. Lateral view of spermatheca and male genitalia in segments X-XI. From Erseus, 1982.

SCAMIT MEETING
January 1986

Topic: Oligochaeta

by: Thomas Parker
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Los Angeles County Sanitation Districts
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CHECKLIST OF SOME MARINE TUBIFICIDAE OLIGOCHAETES - NOVEMBER 25, 1985

This list contains species names of three important genera in the Tubificidae. Many of these names, as originally erected, were given broad distributional ranges. These ranges and the species descriptions have since been refined and resulted in numerous new species names and combinations with more restricted distributional ranges. Many of the older species (e.g. Pelosclex gabriellae, Marcus 1950) had many polyphyletic characters and have since been eliminated or modified by successive revisions.

<u>NAME</u>		<u>CURRENTLY KNOWN DISTRIBUTION</u>
<u>Limnodriloides</u>		
<u>appendiculatus</u>	Pierantoni, 1903	Gulf of Naples, Corsica, Yugoslavia
<u>monotheucus</u>	Cook, 1974	British Columbia, Washington Baja California, Mexico, Delaware
<u>agnes</u>	Hrabe, 1967	Black Sea, Yugoslavia, Bulgaria
<u>medioporus</u>	Cook, 1969	NW Atlantic, NW Pacific
<u>wincklemanni</u>	Michaelsen, 1914	Africa, Scandinavia, Australia
<u>barnardi</u>	Cook, 1974	Maryland, Virginia, Bahamas California, Pacific, Mexico Bermuda
<u>pierantonii</u>	(Hrabe, 1971)	Adriatic and Black Seas, Yugoslavia, Bosphorus
<u>victoriensis</u>	Brinkhurst & Baker, 1979	British Columbia
<u>fragosus</u>	Finogenova,	Black Sea
<u>vespertinus</u>	Erséus, 1982	SE Florida, Bahamas
<u>atriotumidus</u>	Erséus, 1982	Namibia, SE Atlantic
<u>validus</u>	Erséus, 1982	Argentina, Uruguay, SE Atlantic
<u>claviger</u>	Erséus, 1982	Bermuda, Barbados, NW Atlantic

<u>maslinicensis</u>	(Hrabe, 1971)	Mediterranean, Yugoslavia
<u>sphaerothecus</u>	Erséus, 1982	Surinam, SE Atlantic
<u>rubicundus</u>	Erséus, 1982	Bahamas, Bermuda
<u>australis</u>	Erséus, 1982	Great Barrier Reef
<u>scandinavicus</u>	Erséus, 1982	Norway, West Coast of Sweden, North Coast of Germany, NE Atlantic
<u>armatus</u>	Erséus, 1982	Heron Reef (in Great Barrier Reef)
<u>tenuiductus</u>	Erséus, 1982	Heron Reef (in Great Barrier Reef)
<u>uniampullatus</u>	Erséus, 1982	Heron Reef (in Great Barrier Reef)
<u>baculatus</u>	Erséus, 1982	Florida, North Carolina
<u>hastatus</u>	Erséus, 1982	West Florida, East Gulf of Mexico
<u>ascensionae</u>	Erséus, 1982	Ascension Island
<u>Tectidrilus</u>		
<u>squalidus</u>	Erséus, 1982	West Florida
<u>gabriellae</u>	(Marcus, 1950)	Bermuda, Barbados, Brazil, Caribbean, Atlantic, South America
<u>bori</u>	(Righi & Kanner, 1979)	Bermuda, Florida, Barbados
<u>verrucosus</u>	(Cook, 1974)	Pacific Coast of Canada, USA, Mexico
<u>diversus</u>	Erséus, 1982	Tomales Bay, California
<u>Tubificoides</u>		
<u>wasselli</u>	Brinkhurst & Baker, 1979	Delaware

<u>heterochaetus</u>	Lastockin, 1937	Europe, Virginia
<u>longipenis</u>	(Brinkhurst, 1965)	Maine
<u>diazzi</u>	Brinkhurst & Baker, 1979	New Jersey
<u>brownae</u>	Brinkhurst & Baker, 1979	Delaware
<u>maureri</u>	Brinkhurst & Baker, 1979	Delaware
<u>pseudogaster</u>	(Dahl, 1960)	Massachusetts, Nova Scotia
<u>coatsae</u>	Brinkhurst & Baker	British Columbia, Oregon
<u>benedeni</u>	(Udekem, 1855)	Britain
<u>postcapillatus</u>	(Cook, 1974)	Baja California
<u>dukei</u>	(Cook, 1970)	North Carolina
<u>aculeatus</u>	(Cook, 1970)	Atlantic Ocean
<u>intermedius</u>	(Cook, 1969)	Cape Cod Bay
<u>nerthoides</u>	(Brinkhurst, 1965)	San Francisco Bay, Cape Cod Bay, British Columbia
<u>apectinatus</u>	(Brinkhurst, 1965)	Nova Scotia, Massachusetts
<u>amplivasatus</u>	Erseus, 1975	Scandinavia
<u>euxinicus</u>	(Hrabe, 1966)	Black Sea
<u>swirencowi</u>	(Jarosenko, 1948)	Black Sea
<u>maritimus</u>	Hrabe, 1973	Black Sea
<u>kozloffii</u>	Baker, 1983	Washington
<u>brevicoleus</u>	Baker, 1983	British Columbia
<u>foliatus</u>	Baker, 1983	British Columbia, California
<u>cuspietosus</u>	Baker, 1983	Alaska, Norway
<u>palacoleus</u>	Baker, 1983	NW Canada

<u>crenacoleus</u>	Baker, 1983	Alaska, NW Canada
<u>insularis</u>	(Stephenson, 1922)	North Wales, Scotland, England
<u>pseudopectinatus</u>	Brinkhurst, 1985	Cape Cod
<u>swirencoides</u>	Brinkhurst, 1985	England
<u>scoticus</u>	Brinkhurst, 1985	Firth of Forth
<u>parapectinatus</u>	Brinkhurst, 1985	British Columbia, San Francisco Bay
<u>bakeri</u>	Brinkhurst, 1985	British Columbia, California
<u>imajimai</u>	Brinkhurst, 1985	Japan

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