THE DESMOSOMATIDAE (ISOPODA, ASELLOTA) OF THE GAY HEAD–BERMUDA TRANSECT

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ABSTRACT

THIS STUDY treats asellote isopods of the family Desmosomatidae from benthic samples taken on, or in the vicinity of, a transect between Woods Hole, Massachusetts, and the islands of Bermuda. Samples came from a depth range of 20-5,100 meters and represent the continental shelf, slope, and rise, the abyssal plain beneath the Sargasso Sea, and the Bermuda Rise.

Thirty-nine species have been found in this region, and all but ten of them are new. Nearly the full range of morphologies known to exist in the family is represented. Study of this material revealed the necessity for a complete revision of the family. Fifteen genera belonging to two subfamilies are recognized. This classification reflects a basic evolutionary pattern within the family. The Desmosomatinae n. subf. includes the most primitive genera and those genera in which the first pereopod has become reduced and attenuated. The Eugerdellatinae n. subf. contains genera whose first pereopod has become robust and raptorial or chelate.

The large number of individuals in single species from some of the samples has allowed close examination of development, sexual dimorphism, and individual variation. *Eugerda tetarta* n. sp. is described in detail from these points of view. In the female there are three manca and three juvenile stages. These are followed by two or three cycles of reproductive maturity in which each brooding stage is preceded by a preparatory one. Molting into the preparatory stage is accompanied by growth, but none is exhibited as the animal achieves brooding condition.

Males are first distinguishable at the third manca stage. This stage is followed by two juvenile and one preparatory stage in which the male looks like the female except for the usual differences in the second antenna and pleopods I and II. Profound metamorphosis accompanies the ecdysis into the copulatory stage, and as a result the mature male bears little resemblance to the female. The adaptive meaning of these changes is discussed.

Analysis of several specimens from one station reveals little individual variation. Differences in the shape of body and limb segments are usually too subtle to be detected in visual inspection. Variation in setal count is slight and tends to be allometric.

Our knowledge of geographic distribution must be regarded as fragmentary because adequate samples are lacking from most oceans. Present information indicates that nearly all the genera are cosmopolitan or will prove to be so. Species, on the other hand, have limited distributions. Only seven have been found in more than one ocean or sea. The limited distribution of species is undoubtedly related to the absence of dispersive stages in development.

The Desmosomatidae is primarily a cold-water group. Typically its members occur in shallow water only at high latitudes. In those rare cases where species have been found in shallow warm water, the annual range of temperature change is slight. On the transect, the distribution of desmosomatids in water shoaler than 200 meters is limited to the outer portion of the shelf, thus avoiding the main effects of the pronounced temperature fluctuations along this part of the coast. All species show some degree of zonation with depth. Only two display depth ranges extending beyond 2,500 meters. A few species exhibit polar emergence.

All species found on the transect are fully described and illustrated. The descriptions of previously known species are based on transect material, not on the original types.

INTRODUCTION

IN 1960 A PROGRAM of study of the deep-sea benthos was instituted by Howard L. Sanders and myself at the Woods Hole Oceanographic Institution. The long-term purpose of this program is a detailed ecological analysis of open-ocean benthic faunas. We felt this purpose could be served best by initially concentrating our efforts on a limited portion of the world's oceans, and the area that was chosen is a line of stations between Woods Hole, Massachusetts, and the islands of Bermuda in the western North Atlantic Ocean. This line of stations was called the Gay Head-Bermuda Transect; Gay Head is a headland on Martha's Vineyard, one of the first pieces of land to be seen on approaching the port of Woods Hole.

The suitability of the Gay Head-Bermuda Transect for such a study stems from several advantages (Sanders, Hessler, and Hampson, 1965). Its proximity to our laboratory at Woods Hole makes possible frequent visits to fill gaps in the data, both seasonally and spatially, and to study new questions as they arise. The area of the transect has been the object of investigation by a variety of different disciplines and is therefore unusally well known. Finally, in extending across the continental shelf, down the continental slope and rise, under the Gulf Stream onto the abyssal plain of the Sargasso Sea and up the Bermuda Rise, it crosses a wide variety of the major soft-bottom environments to be found in the open ocean.

One of the early prerequisites of any ecological study is an analysis of faunal composition. For the deep-sea benthic environment this is an awesome task, not only because so little has yet been done, but because the deep sea is the home of what is proving to be an enormous variety of species. For example, within the isopods alone, an average of thirty-six species per station was collected on five transect stations during "Atlantis II" cruise 12 in 1964. From this and other experiences we have come to feel this abundance of species is a typical condition of deep-sea benthic assemblages. The lower diversities usually obtained reflect the great technical difficulty which plagues deep-sea sampling (Hessler and Sanders, 1967).

The work of identifying the organisms found on the Gay Head-Bermuda Transect has been spread among many specialists. I have chosen to work upon the isopods, one of the most important components of the deep-sea fauna. The task is too large to complete as a single piece, and therefore this work is being published family by family. A short paper on the presence of the Serolidae on the transect is the only work to precede this monograph (Hessler, 1967). The present study of the asellote family Desmosomatidae is the first major contribution in this series.

Because of the enormous number of species living in the deep sea, and because many of these species are proving to be very similar to one another, a brief diagnosis is no longer sufficient. All too many of the descriptions published in the past now prove to be inadequate; often the characters given are significant only at a generic level, or worse, are characteristic of the family as a whole. The present paper attempts to anticipate the problems created by future discoveries by offering detailed descriptions. Furthermore, to bring our understanding of previously described species up to date, all such species found on the transect are redescribed as fully as the transect material allows.

Although the primary concern of this paper is the enumeration and description of desmosomatid species found on or near the transect, several related topics that came into focus during the course of this work are also considered.

Thirty-nine species of Desmosomatidae have been found on the transect, and of these twenty-nine are new. This collection encompasses nearly the entire range of morphologies known to occur within the family and even extends this range in directions heretofore not known to be possible. Of previously known genera, only

Paradesmosoma Kussakin and *Echinopleura* G. O. Sars were not found during this study. Inspection of this material and of material borrowed from a number of collections (see Acknowledgments) convinced me of the necessity of a complete revision of the family. The resulting classification divides the Desmosomatidae into fifteen genera. Two monotypic genera previously included in this family have been deposited elsewhere.

The most difficult problem in subdividing the Desmosomatidae is the fact that there are few sharp morphological discontinuities within the group. While this is an annoyance when attempting to erect distinct genera, it offers unusual opportunities to one attempting to understand the course of evolution within the family. Considerable effort is devoted to relating the genera recognized here to the probable course of this evolution.

The large number of stations on the Gay Head-Bermuda Transect has made it possible to consider the depth range of many of the transect's species. This question of zonation is inextricably entwined with the question of absolute geographic range. Both of these aspects of distribution are considered here, not only at the level of species, but at higher taxonomic levels as well. It is perhaps premature to treat the topic of geographic range in any detail because of the paucity of deep-sea samples in other parts of the world. Nevertheless, it is valuable occasionally to summarize what is known in a field of study.

Samples from the deep sea tend to be small, usually yielding only one or two individuals of any given species. This paucity of material in combination with the large number of closely related species known to live in the deepwater environment creates serious problems for the systematist. He is commonly forced to base a species on a single, often damaged individual, and in doing so he must have concluded without any really solid evidence that the differences from similar species are basic, and not simply the result of developmental changes, individual variation, or the expression of sexual dimorphism. In contrast with this situation, several samples collected with the epibenthic sled (Hessler and Sanders, 1967) were so large that several species were obtained in great numbers, allowing a detailed analysis of development, dimorphism, and individual variation. Such data are not only valuable to the systematist as a set of criteria for judging the uniqueness of a given morphology, but important in their own right in the autecological study of deep-sea animals. The results of the analysis on one desmosomatid species are presented here.

This paper breaks with recent tradition by not providing a key to the species. Because few of the species alive today are known to science, the chances are very good that an individual belonging to the Desmosomatidae captured from a previously unsampled part of the world will be new. This is probably true even of most areas that have been sampled before. Therefore a key is of little value; it will be obsolete before it is published. Furthermore, such a key may do positive damage by encouraging the nonspecialist to lump new species into known groups.

ACKNOWLEDGMENTS

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I am indebted to my colleague at Woods Hole, Dr. Howard L. Sanders, for many hours of stimulating conversation, encouragement, and constructive criticism; to Mr. George R. Hampson for his skill in all aspects of the collection and processing of our deep-sea material; to Mrs. Janet E. Zullo and Miss Susan M. Ewing for their truly exceptional patience and care in the sorting of the collection; and to Mr. Wallace R. Bard, Miss Cecelia M. Simmons, and Miss Geraldine L. Beye for their talent in preparing the illustrations for publication. Dr. Kunigunde Hülsemann advised me on the grammatical correctness of most of the Linnaean binomials.

I would also like to thank Dr. Torben Wolff for much useful advice and for the generous way in which he made the collections of the Zoological Museum of the University of Copenhagen available to me. Dr. H.-E. Gruner of the Zoological Museum of Humboldt University in E. Berlin, Dr. O. G. Kussakin of the Zoological Institute, Academy of Sciences of the U.S.S.R., in Leningrad, Dr. J. Forest of the National Museum of Natural History in Paris, Dr. A. Anderssen of the Swedish State Museum of Natural History in Stockholm, and Dr. W. K. Emerson of the American Museum of Natural History in New York were also kind enough to lend me or allow me to inspect material from their institutions (see also p. 9).

Dr. Andrew G. Carey of Oregon State University has kindly allowed me to mention, in the section on distribution, material collected by him in the Pacific Ocean off the Oregon coast.

This work was supported by grants G4812, G8918, G15638, GB563, GB3356, GB3269, GB6027X, GB861, GA286, GP5319, and GA810 from the National Science Foundation and grant Nonr 1135(02) of the Office of Naval Research. This contribution is number 2255 of the Woods Hole Oceanographic Institution.

MATERIALS

The specimens covered in this report are the product of seven years of collecting in the northwestern Atlantic Ocean and represent 124 stations. Nearly all these stations are directly on the Gay Head-Bermuda Transect. Nine scattered samples do not come from the transect itself, but all of them are from spots within 200 miles of it.

Not all the station numbers are represented by samples because the difficulty of collection in the deep sea results in a high proportion of failures. Actual samples from 11 of the stations are still unsorted. Of the other 113 stations, 39 yielded desmosomatids. At some of the 74 stations at which this family was found, the sampler had come up empty because of technical difficulties (gear failure, weather, and the like). Many resulted in partial samples of the total available fauna, either because the sample was small, as often happened when the anchor dredge was used, or because the sample was winnowed on its way to the surface, causing its light-bodied organisms, including the desmosomatids, to be washed away. A few apparently completely successful samples lack desmosomatids, perhaps because desmosomatids are not present at these localities.

During the summer of 1964 we inaugurated the use of a new sampling device, the epibenthic sled (Hessler and Sanders, 1967). This device is unusually successful in obtaining members of most portions of the fauna in large numbers. It has been particularly successful in obtaining the epifauna, and because most isopods fit into this category, the epibenthic sled samples tend to contain much finer collections of desmosomatids than the earlier anchor dredge samples.

On two occasions our program has collected samples in Equatorial Atlantic waters ("Chain" cruise 35 in April, 1963; "Atlantis II" cruise 31 in February, 1967). The samples from these cruises contain numerous species of desmosomatids, and most of them are new. This material will not be considered, however, except as it relates to the diagnosis and distribution of genera and species also found on the transect.

The stations from which the specimens described in this paper are taken are called Woods Hole Oceanographic Institution Benthic Stations to avoid confusion with stations made by any other program at this institution. For the sake of brevity, this designation is abbreviated to WHOI Benthic Station, WHOI B.S., or even simply "Station." Stations from any other source are fully described as such.

Stations on or near the transect at which desmosomatids were obtained are listed in table 1. The variety of station names used on our transect is admittedly confusing and results from having altered the numbering system too many times. Initially we attempted to use the station numbers of the Atomic Energy Commission hydrographic cruises (stations HH-OO) whose positions we duplicated as our basic sampling scheme. Different letters were used on the continental and Bermuda slopes where our stations and the A.E.C. stations did not coincide. With time more stations were added to the transect, and it became obvious that our system had become too cumbersome. Starting with "Atlantis" cruise 298 we commenced a consecutive numbering system beginning with 55, that having been approximately the fifty-fifth station.

In recent usage the early letter designations may imply a locality instead of a station. Thus "HH3" is a specific station collected on May 21, 1961, but "HH" is a spot in the North Atlantic Ocean whose approximate coordinates are 38°45'N, 70°00'W.

All holotypes of species described here for the first time are deposited in the United States National Museum (USNM) (Accession number 280697, December, 1968). The other material collected by our program remains in my working collection to facilitate continuing studies, but will ultimately be placed in a well-established repository.

METHODS

The techniques used in obtaining the specimens treated here have been described before (Sanders, Hessler, and Hampson, 1965; Hessler and Sanders, 1967) and are touched on only briefly.

The actual collecting was achieved with a modified anchor dredge or an epibenthic sled. The samples were screened with a .42-millimeter sieve. The animals were fixed in a seawater solution of 4 percent formalin and stored in 70 percent ethyl alcohol.

The drawings have been made using a Wild M20 compound microscope equipped with a Wild drawing tube. In most cases limbs were removed from the animal for drawing. The antennae and uropods, however, were usually left in place in order to insure consistency in their orientation. In situations where few specimens were available, pereopods might also have been drawn in place.

TABLE 1

LIST OF W.H.O.I. BENTHIC STATIONS AT WHICH DESMOSOMATIDS WERE OBTAINED

(The numbers in the species column correspond to those in the species list on pages 62-64 and to the maps of figure 12.)

Station	Latitude	Longitude	Depth (in meters)	Date	Species
172	40°11'N	70°44'W	119	XI/27/67	12, 51
173	40°11'N	70°44'W	123	XI/28/67	51
SS2	40°01.8'N	70°42'W	200	VIII/28/62	13, 51
89	40°01.6'N	70°40.7'W	196	VII/6/65	12, 51
SS3	39°58.4'N	70°40.3'W	300	VIII/28/62	51
DI	39°54.5'N	70°35'W	467-509	V/23/62	13
105	39°56.6'N	71°03.6'W	530	V/5/66	13, 14, 28, 33?
E3	39°50.5'N	70°35'W	824	V/25/61	2, 13, 50
87	39°48.7'N	70.40.8'W	1,102	VII/7/65	2, 13, 14, 50
128	39°46.5'N	70°45.2'W	1,336-1,610	XII/16/66	14, 50, 64
F1	39°47'N	70°45'W	1,500	V/24/61	14, 50, 56
73	39°46.5'N	70°43.3'W	1,330-1,470	VIII/25/64	2, 14, 50, 56, 64
G1	39°42'N	70°39'W	2,000	V/24/61	14, 50
G9			2,021	IX/9/62	14, 50
131	39°39'N	70°37'W	2,178	XII/18/66	28
GH1	39°25.5'N	70°35'W	2,500	IX/27/61	2, 16
62	39°26'N	70°33'W	2,496	VIII/21/64	14, 27, 29, 58, 68
HH3	38°47'N	70°08'W	2,900	V/21/61	68
64	38°46'N	70°06'W	2,886	VIII/21/64	39, 40, 49, 58
72	38°16'N	71°47'W	2,864	VIII/24/64	49, 58
II1	37°59'N	69°32'W	3,742	V/22/61	17, 68
85	37°59.2'N	69°26.2'W	3,834	VII/5/65	17, 18, 33, 35, 36, 47, 58, 69
95	38°33'N	68°33'W	3,753	XII/17/65	3, 18, 40, 58, 69, 35?
126	39°37'N	66°47'W	3,806	VIII/24/66	27, 35, 58, 61, 12?
JJ1	37°27'N	68°41'W	4,436	X/2/61	1, 68
JJ3	37°13'N	68°41'W	4,540	V/25/62	54, 58
KK1	36°23.5'N	68°04.5'W	4,850	VIII/10/61	Indeterminate fragment
KK3	36°24.5'N	68°02.5'W	4,758	V/25/62	52
70	36°23'N	67°58'W	4,680	VIII/23/64	1, 4, 52, 53, 58, 62
84	36°24.4'N	67°56'W	4,749	VII/4/65	1, 3, 4, 46, 52, 53, 54, 58
92	36°20'N	67°56'W	4,694	XII/13/65	4, 52
121	35°50'N	65°11'W	4,800	VIII/21/66	15, 17, 35, 37, 43, 53, 54, 58
122	35°51'N	65°58.5'W	4,833	VIII/21/66	4, 18, 43, 46, 54, 58, 68, 69
125	37°25'N	65°53'W	4,825	VIII/23/66	15, 54, 58
120	34°46'N	66°30.5'W	5,100	VIII/20/66	55, 68, 69, 16?
93	34°39'N	66°26'W	4,926	XII/14/65	35?
NN1	33°57'N	65°51.5'W	4,950	V/26/62	Indeterminate fragment
100	33°56.8'N	65°47'W	4,892-4,743	V/1/66	3, 58, 68
OO2	33°07'N	65°03'W	4,667	V/27/62	68
Ber7	32°15'N	64°32.6'W	2,500	XI/4/61	59
119	32°16'N	64°32'W	2,000-2,132	VIII/19/66	18, 59, 68
Alvin 152	32°16'N	64°36'W	1,615-1,785	VII/17/66	59
118	32°19'N	64°34'W	1,150-1,190	VIII/18/66	46, 59

TABLE 1 (*Continued*)

The following stations are not from the vicinity of the transect, but are included because they rerpresent new locality records for the family (see figs. 11, 12).

Station	Latitude	Longitude	Depth (in meters)	Date	Species
142	10°30'N	17°52'W	1,624-1,796	II/5/67	18
155	00°03.5'S	27°48'W	3,730-3,783	II/13/67	18, 58, 61
156	00°45'S	29°26'W	3,459	II/14/67	18, 46, 54, 58, 61
169	08°03'S	34°24'W	587	II/21/67	18
"Chain" 35					
Dredge 12	07°09'S	34°25'W	769-805	IV/6/63	Unidentified, nontransect species
Dredge 19	07°33'N	45°03'W	4,525	IV/19/63	Unidentified, nontransect species
Dredge 33	07°53'N	54°33'W	512-549	IV/25/63	Unidentified, nontransect species
Dredge 34	08°46'N	53°46'W	1,520	IV/25/63	Unidentified, nontransect species
"Verrill" 67-53					
11	43°10.7'N	69°48.9'W	172	VIII/1/67	20

Ratios play an important part in the systematic descriptions. They are usually the result of measurements made from the drawings. In most instances no attempt was made to measure a population of individuals, and therefore usually no range of variation is given. For ratios greater than unity, accuracy was taken to one significant figure; with ratios less than unity, it was carried to two significant figures. Figure 1 demonstrates the way the less obvious measurements were made. For measurements of the body, length is always taken along the midsagittal line, and width is always transverse.

The use of ratios is no real departure from the customary methods; it is merely an attempt to be more precise. Thus instead of saying that the carpus of the first pereopod on *Eugerdella natator* is "not fully twice as long as deep" (Hansen, 1916, p. 115), I prefer to say it is 1.6 times longer than wide, because this statement is more informative. The use of such ratios does have the disadvantage of making them seem more rigid than they are intended to be; they carry the implication that the range of variation is narrow. This is not my intention. The reader of the description in the present paper must take the same allowances for variation that he would make in reading the work of Hansen or any other author.

The same caution must be exercised in interpreting mention of the number of setae. In many instances only one specimen was considered in detail. Even when more than one was available, to have considered every individual in the collection would have delayed the study needlessly. Therefore, the listing of a precise number of setae does not imply lack of variation; it only guarantees that the particular number given is within the range of variation for that character.

In the description of species, when considering pereopods II-VII, usually only pereopods II and V are mentioned. This is because each of the pereopods II-IV and V-VII forms a morphological series within which the limbs are basically similar to one another. In these series pereopods II and V are best developed and were therefore chosen to represent the rest. The present paper follows Wolff (1962) in using Roman numerals to refer to limbs and Arabic numerals for body segments.

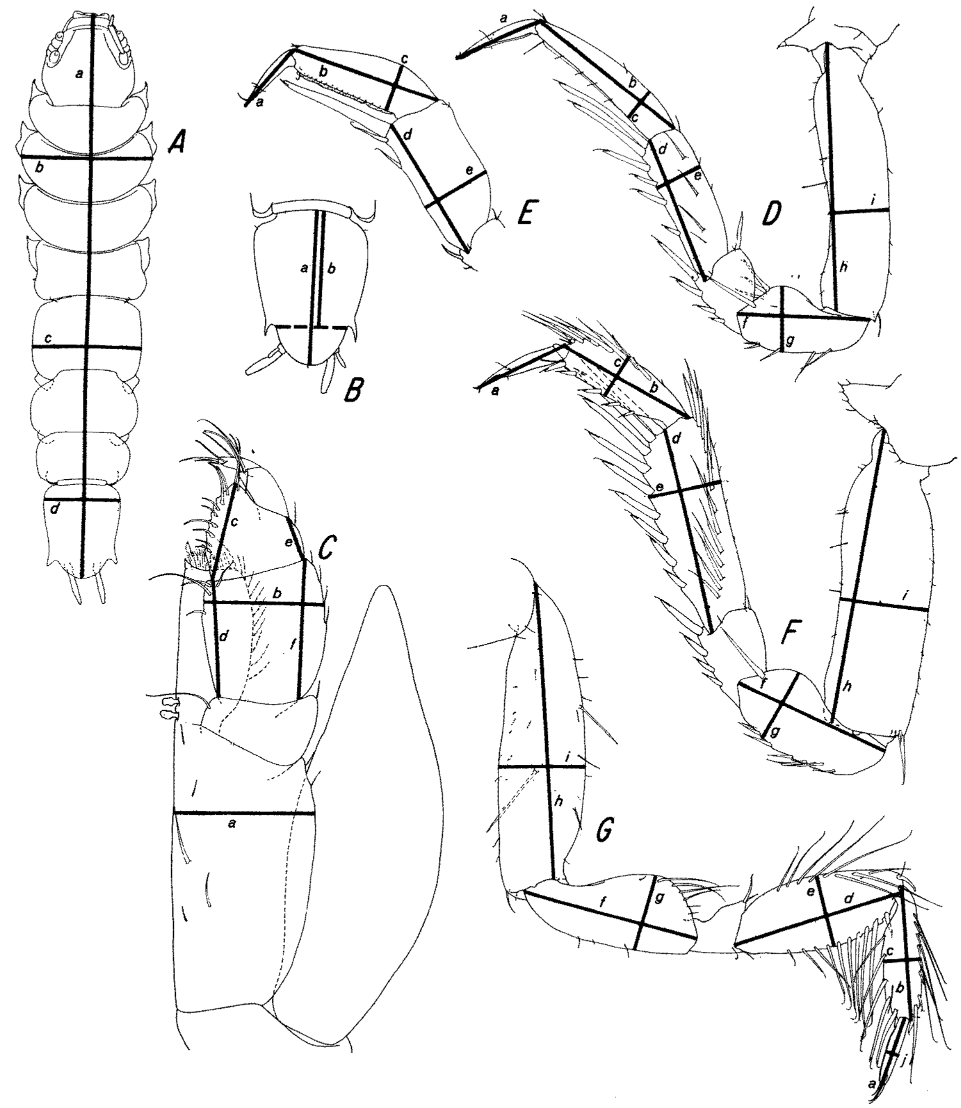


Fig. 1. Procedure for measuring dimensions used in deriving ratios. *A*, body: *a*, body length; *b*, width of pereonite 2; *c*, width of pereonite 5; *d*, width of pleotelson. *B*, pleotelson; *a*, length; *b*, distance of posterolateral spines from anterior end. *C*, maxilliped: *a*, width of basis; *b*, maximum width of palp; *c*, medial length of segment 3; *d*, medial length of segment 2; *e*, lateral length of segment 3; *f*, lateral length of segment 2. *D* and *E*, pereopod I, *F*, pereopod II, *G*, pereopod V: *a*, length of dactylus; *b*, length of propodus; *c*, width of propodus; *d*, length of carpus; *e*, width of carpus; *f*, length of ischium; *g*, width of ischium; *h*, length of basis; *i*, width of basis; *j*, width of dactylus. Note that length of the dactylus (*a*) includes the claw on pereopods I and II, but not on V.

The systematic descriptions often refer to the rough shape of setae. Although setal shape would probably be a useful tool for discriminating taxa, in this paper no attempt has been made to refer consistently to setal type or to mention more than the grossest features. Usually setal detail can be discerned only under the

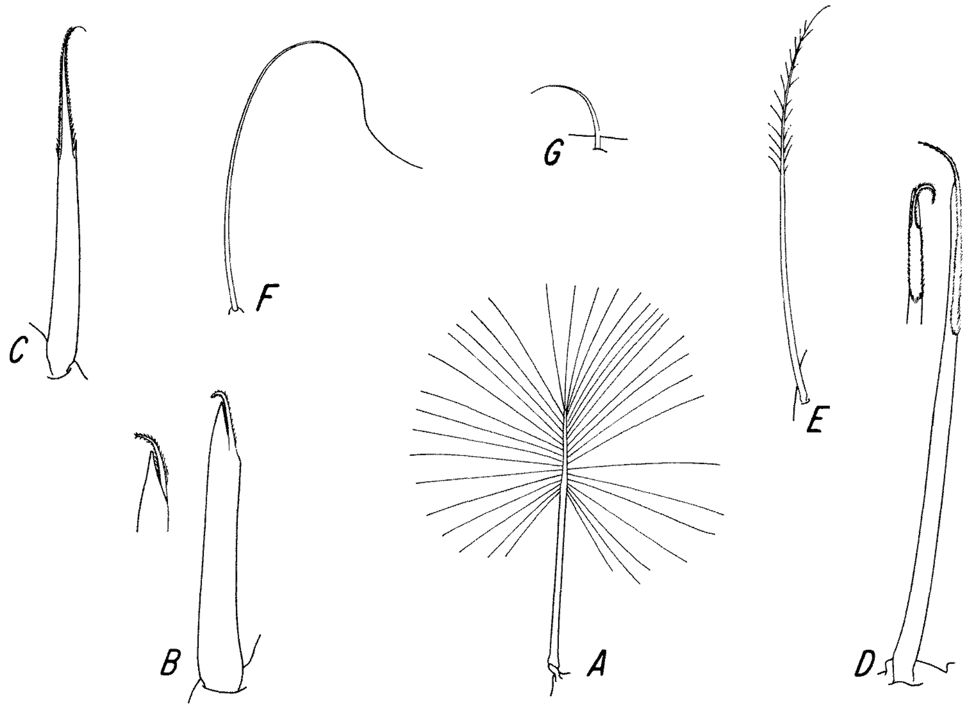


Fig. 2. Some common types of setae. *A*, broom seta; this is a sensory seta commonly found on various parts of the first and second antennae, the pereopods, and the uropods; in subsequent illustrations, the distal setules are usually omitted. *B*, stout or robust, unequally bifid seta; a type usually found on the ventral margin of the ischium, merus, carpus, and propodus of pereopods I-IV. *C*, distally setulate seta; intermediate types form a complete gradation with unequally bifid setae; this type may be found on either margin of pereopods I-IV. *D*, long, distally setulate, unequally bifid seta characteristic of the ventral margin on the carpus and propodus of pereopods V-VII. *E*, long, slender seta found on the dorsal margin of the carpus and propodus of pereopods V-VII. *F*, long, slender seta usually seen on the first and second antennae, and on the uropods. *G*, small, simple seta which may be found any place on the animal.

best optical conditions, and for this reason it would be unwise to allow setal shape to play an important part in systematic descriptions. Figure 2 illustrates some of the major setal types along with the terminology used in this paper.

The systematic descriptions in this paper are based on the previously undescribed material from our program, even when type material of known species was available. Specific mention is made wherever transect material is known to differ from the types. Type material of the following species was inspected for this study:

Zoological Museum, Humboldt University, E. Berlin
Eugerda longimana Vanhöffen, 1914

Swedish State Museum of Natural History, Stockholm
Desmosoma intermedium Hult, 1941

American Museum of Natural History, New York
Desmosoma striata Menzies, 1962

Desmosoma birsteini Menzies, 1962

Zoological Institute, Academy of Sciences of the U.S.S.R., Leningrad
- *Paradesmosoma conforme* Kussakin, 1965
- *Paradesmosoma orientale* Kussakin, 1965

National Museum of Natural History, Paris
- *Dactylostylis acutispinus* Richardson, 1911

Zoological Museum, University of Copenhagen
- *Eugerda coarctata* G. O. Sars, 1899
- *Eugerda globiceps* Meinert, 1890
- *Desmosoma natator* Hansen, 1916
- *Desmosoma simile* Hansen, 1916
- *Desmosoma longispinum* Hansen, 1916
- *Desmosoma insigne* Hansen, 1916
- *Desmosoma latipes* Hansen, 1916
- *Desmosoma plebejum* Hansen, 1916
- *Desmosoma gracilipes* Hansen, 1916
- *Desmosoma chelatum* Stephensen, 1915
- *Desmosoma angustum* G. O. Sars, 1899

SYMBOLS

To save space in the captions of the text figures related to the systematic descriptions, symbols have been used freely. They are as follows: A I, first antenna; A II, second antenna; Md, mandible; Mpd, maxilliped; Per I, Per II, and so on, first pereopod, second pereopod, and so on; P1 I, first pleopod; P1 II, second pleopod (operculum on female); Ur, uropod; lm, lacinia mobilis; ip, incisor process; J ♀, juvenile female; P ♀, perparatory female; B ♀, brooding female; C ♂, copulatory male. The orientation of the body and limbs remains the same throughout the illustrations, except where specifically noted otherwise. The body is shown in dorsal and lateral views. The antennae and pereopods are shown in lateral view. The maxilliped, pleopods, and uropod are illustrated in ventral view. The incisor process and lacinia mobilis are shown in plan view.

HISTORY OF THE FAMILY DESMOSOMATIDAE G. O. SARS, 1897

The genus *Desmosoma* was erected by G. O. Sars in 1864 to include three new species, *D. lineare, D. armatum,* and *D. aculeatum.* In 1868 Sars added a fourth species, *D. tenuimanum.* Meinert (1890) named a second genus with what he considered to be a new species, *Eugerda globiceps.* Sars (1897) claimed that *E. globiceps* was a synonym of *D. tenuimanum,* but at the same time accepted the independence of *Eugerda,* noting the wide difference in the structure of the first pereopods and the uropods. In the same paper Sars put *D. aculeatum* in a separate genus, *Echinopleura*, drawing attention to the serrate ornamentation of this species, its slender fourth and fifth pereonites, its uniramous uropods, and especially its reduced, palpless mandible. In the supplement to his 1897 paper Sars (1899) decided that *E. globiceps* was independent from *E. tenuimanum* after all. He also described *D. angustum, E. coarctata,* and *E. lateralis.*

Hansen first drew attention to the problem of subdividing the Desmosomatidae into meaningful genera. In a personal communication to Sars he suggested that *Eugerda* be suppressed, pointing out that species with heavily built first pereopods and large first pereonites do not invariably have uniramous uropods and vice versa (Sars, 1899). Sars did not follow his advice, but restricted the definition of *Eugerda* to a single character, the possession of a biramous uropod. In his monograph on the isopods from the Ingolf Expedition Hansen (1916, p. 107) replied to Sar's decision as follows:

> The single character between *Desmosoma* and *Eugerda* is drawn from the number of rami in the uropods. But this character cannot be of generic value, as, for instance, *D. armatum* G. O. Sars, which has no exopod on the uropods, is in the structure of the legs, etc., very closely allied to *D. (Eugerda) coarctatum* G. O. Sars or *D. (Eugerda) politum* n. sp., which both have biramous uropods; *D. armatum* is in reality more closely allied to these two species than to such forms with single-branched uropods as *D. lineare* G. O. Sars or *D. insigne* n. sp. Therefore the genus *Eugerda* must be suppressed as not only valueless but misleading.

Furthermore Hansen divided the desmosomatids into two sections on the basis of the morphology of the first pair of pereopods. Clearly he believed that the basic evolutionary lines in this family were best revealed by the nature of the first pereopods and that the presence or absence of a uropodal exopod was unimportant above the level of species. Hansen accepted *Echinopleura*, but gave no reasons.

Hansen's division of the Desmosomatidae (his group Desmosomatini) into only two genera (*Desmosoma* and *Echinopleura*) remained almost unchanged for the next fifty years, except for Richardson's (1911) addition of a new genus and species, *Dactylostylis acutispinus*. At the same time, however, the number of accepted species had risen to thirty-two, of which *Desmosoma* included all but two.

Kussakin (1965) increased the total number of species to forty, but recognized that the genus *Desmosoma* had not only become too cumbersome, but had also been made the receptacle for far too broad a spectrum of morphological types. His solution was to divide the family into nine genera, primarily on the basis of the character of the first and fourth pereopods, the number of uropodal rami, and the presence or absence of a mandibular palp (table 2). In reality his division was into seven genera, because he included the problematic monotypic genera *Dactylostylis* and *Ilychthonos* K. Barnard, 1920, without comment or definition. In this classification, *Echinopleura* still contained only the one species, and a new genus, *Paradesmosoma*, was created to include two new and very different species. The remaining thirty-five species, previously referred to *Desmosoma,* were now divided among five genera, *Desmosoma, Eugerda, Pseudogerda, Eugerdella,* and *Desmosomella*, the last three of which were new.

Ilychthonos and *Dactylostylis* should no longer be considered members of the Desomosomatidae. Study of the type specimen of *Dactylostylis acutispinus* reveals that this genus actually belongs to the Janiridae as defined by Wolff, 1962 (Hessler, 1968). *Ilychthonos* is now considered to be a junior synonym of the eurycopid genus *Syneurycope* Hansen, 1916 (Menzies, 1956; Wolff, 1962).

SUBDIVISION OF THE FAMILY

There is no easy solution to the task of subdividing the Desmosomatidae into meaningful genera. Rarely can one document perfect correlations of diagnostic

TABLE 2

DIVISION OF THE DESMOSOMATIDAE ACCORDING TO KUSSAKIN, 1965

Feature	*Eugerda* Meinert, 1890	*Pseudogerda* Kussakin, 1965	*Desmosoma* G. O. Sars, 1864	*Echinopleura* G. O. Sars, 1897	*Eugerdella* Kussakin, 1965	*Desmosomella* Kussakin, 1965	*Paradesmosoma* Kussakin, 1965
Uropodal exopod	Present	Present	Absent	Absent	Present	Absent	Absent
Mandibular palp	Absent	Present	Present	Absent	Present	Present	Present
First pereopod	Slender; carpus and propodus very thin, long; ventral margin of carpus with only a few setae at most.		Mildly specialized; carpus and propodus neither expanded nor especially attenuated; ventral margin of carpus with several setae, most distal of which is not specialized as claw.	Mildly specialized; carpus and propodus as in *Desmosoma,* but ventral margin of carpus with short, stout setae.	Chelate; carpus and propodus strongly expanded; ventral margin of carpus with single (or two) distal setae specialized as immovable claw and often with setae along whole margin.	Chelate; carpus and propodus strongly expanded; ventral margin of carpus with single distal seta specialized as immovable claw.	
Fourth pereopod	Mildly specialized, similar in structure to pereopods II and III, but less well developed; carpus and propodus lightly expanded, with a few long setae.	Specialized for swimming; carpus and propodus strongly expanded, with tightly spaced swimming setae along ventral margin.					

characters; almost invariably one or two species stand as irritating exceptions. Furthermore, in the evolution of some characters, there still live today species documenting nearly every stage of the change, making it difficult to decide where to draw the line.

Hansen (1916) separated his two sections within *Desmosoma* on the basis of the first pereopod. In Kussakin's classification (1965) characters of the first and fourth pereopods, the mandible, and the uropod were used (table 2). The classification adopted in the present paper uses some of these characters as well as characters not previously employed. I discuss all these criteria below.

The Mandibular Palp

The majority of desmosomatids possess a mandibular palp composed of three distinct segments, the terminal one of which is fringed by several clawlike setae. The palp arises from the base of the mandible and extends dorsally along the face, just medial to the insertion of the antennae. Its position and structure suggest that it does not function in feeding, but rather may serve to groom the face and base of the antennae.

A palp is completely missing in at least twelve species, and five species are known to have a reduced palp. The degree of reduction varies (fig. 3A-D). In the earliest stage of reduction, as displayed by *Prochelator atlanticus, P. lateralis,* or *Paradesmosoma conforme*, the terminal segment is weakly developed and bears only one or two clawlike setae. More advanced reduction occurs in *Desmosoma ochotense* and *Paradesmosoma orientale.* Here the third segment is completely missing. This condition is followed by complete absence of the palp.

The presence or absence of a mandibular palp is of questionable value at a generic level. Of the eleven species here included in *Mirabilicoxa* n. gen., only *M. longispina* and *M. palpata* bear a palp (Kussakin is in error in claiming *M. gracilipes* possesses one). *Mirabilicoxa longispina* conforms to the definition of the genus, but does have a few unusual features. *Mirabilicoxa palpata*, on the other hand, is so closely similar to other members of the genus that it would be senseless to exclude it simply because it has a mandibular palp.

Most of the species in *Eugerda* (as defined here) possess a mandibular palp, but *E. elegans, E. kamtschatica*, and *E. tenuimanum* do not. *Eugerda tenuimanum* is so similar to *E. filipes* that G. O. Sars, not considering the palp, did not distinguish between the two (Hult, 1936, 1941). Considering just those genera of the present classification having several species, only *Eugerdella* and *Chelator* n. gen. show constant correlation of the mandibular palp with other features. Viewing the family as a whole, I conclude that the mandibular palp has been lost more than once, a condition that may separate even closely related species. For this reason the palp is not used here as a major discriminatory character.

The Uropodal Exopod

About half of the desmosomatids lack a uropodal exopod. Among those species possessing one, the exopod is usually large and clearly articulated with the protopod. There are, however, a few species that possess a reduced exopod, and these show how this structure may be lost (fig. 3E-I).

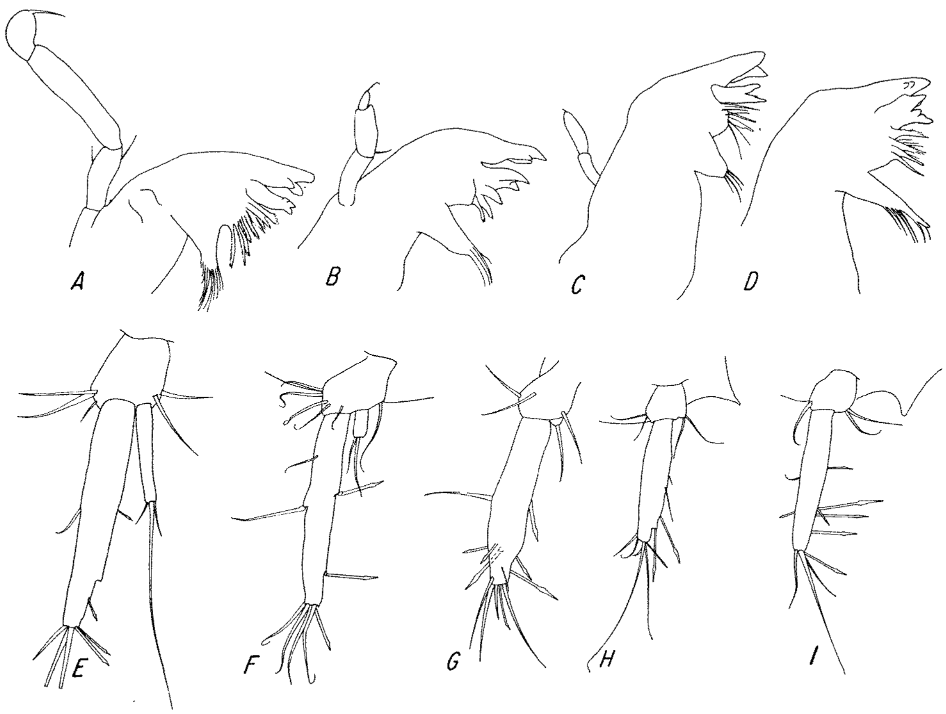


Fig. 3. Loss of structures on the mandible and uropod. *A-D*. The mandibles of five desmosomatid species, showing the gradual loss of the mandibular palp. *A, Balbidocolon atlanticum*, with a well-developed palp. *B, Prochelator lateralis*, on which the distal segment is nearly vestigial. *C, Paradesmosoma orientale*, on which the distal segment is completely lost. *D, Prochelator uncatus*, where the mandibular palp is completely missing. *E-I*. The uropods of seven species, showing steps in the loss of the exopod. *E, Eugerda tetarta*, on which the exopod is fully developed. *F, Eugerda pannosa*, whose exopod is much smaller. *G, Mirabilicoxa exopodata*, having a distinct, but vestigial exopod. *H, Mirabilicoxa plana*, on which the exopod is still a perceptible lobe, but is no longer clearly articulated with the protopod. *I, Mirabilicoxa palpata*, a truly uniramous form, on which not even the lateral protopodal setae are necessarily exopodal remnants. It must be emphasized that the species chosen to illustrate these changes are only examples of grades of evolution. The two linear sequences are not intended to represent an actual evolutionary chain.

Most typically the uropodal exopod is one-half to one-quarter the length of the exopod. From this state, the first stage in reduction is a simple decrease in relative length. This decrease is shown by *Eugerda pannosa, Momedossa profunda*, and *Prochelator longimana*, in which the exopod is only one-seventh the length of the endopod. The next step is displayed by *Mirabilicoxa cf. exopodata* (see section on problematical material), on which the exopod is now only .04 as long as the endopod, but in addition is not clearly articulated with the protopod, although it is still constricted at its base. In *Mirabilicoxa similis, M. exopodata* (the holo-type), *M. plana*, and *Balbidocolon atlanticum* the uropodal exopod is only a rudiment, being little more than a bump broadly joined to the protopod just lateral to the endopod. Even at this advanced stage of reduction, however, it still bears a couple of terminal setae. One individual of *B. atlanticum* is of interest because such an exopod is present on its right side, but is completely absent on the left. The penultimate stage in the reduction of the exopod is seen in a mature male of *Mirabilicoxa gracilipes* from WHOI B.S. 62. Here there is no sign of the exopod itself, but two setae insert into the protopod in the place where the exopod would have been. These might well be the terminal exopodal setae. In the final stage, not even the terminal setae remain.

From such a survey I conclude that the simple presence or absence of a uropodal exopod cannot be relied upon absolutely. *Mirabilicoxa exopodata* with its small but distinct exopod should be classed with species having a biramous uropod if one uses such a standard. Without question this species is very closely related to *M. gracilipes*, which has a uniramous uropod. Thus, species on which the exopod of the biramous uropod is vestigial are more closely related to those on which the uropod is uniramous than to species with a well-developed uropodal exopod. With this reservation, the presence or absence of a uropodal exopod plays an important part in the present generic breakdown, at least within the Desmosomatinae. As with the mandibular palp, the uropodal exopod must have disappeared more than once.

The First Pereopod

The most conspicuous differences to be seen among the species of the Desmosomatidae occur in the structure of the first pereopod. In their most extreme forms, the morphology of this limb falls into five main types.

In the first, illustrated by *Eugerda filipes* or *E. fulcimandibulata* (figs. 4, 39), the limb is remarkably slender, particularly because of the slenderness and to some extent the elongation of the ischium, carpus, and propodus. The limb is nearly devoid of setae, and those setae that are present are feebly developed.

Chelator vulgaris (figs. 4, 67) illustrates another extreme. Here the limb is well built and chelate. The large carpus forms the hand. It bears only one major seta which forms a large immovable claw stemming from the produced distoventral extremity of the segment. The propodus, which is broad proximally and tapers distally, and the much smaller dactylus form the two-segmented movable claw.

The first pereopod of *Torwolia subchelatus* (figs. 4, 77) is subchelate. The dactylus folds ventrally to oppose the much enlarged propodus. In this species the carpus is similar in shape to that of *Prochelator lateralis*, but is much smaller and lacks major setae.

In *Eugerdella pugilator* (figs. 4, 56) the first pereopod is much enlarged. The carpus is massively built and carries a ventral row of large, stout setae. The propodus is also enlarged and bears a ventral row of smaller setae. This latter segment and the dactylus fold down and act in opposition to the ventral setae of the carpus. The result is a condition neither chelate nor subchelate, but somewhere in between.

Finally, in *Balbidocolon atlanticum* (figs. 4, 15), the first pereopod is similar in size and form to the second or third pereopod. The major differences are that the propodus is more slender and bears no major dorsal or ventral setae, and the carpus is shorter.

Except for the condition found on *Torwolia*, the general relationship among all these types is well documented by a series of intermediate types. These show a number of unmistakable trends from a condition in which the first pereopod is essentially similar to the subsequent anterior limbs. That is, in terms of the first

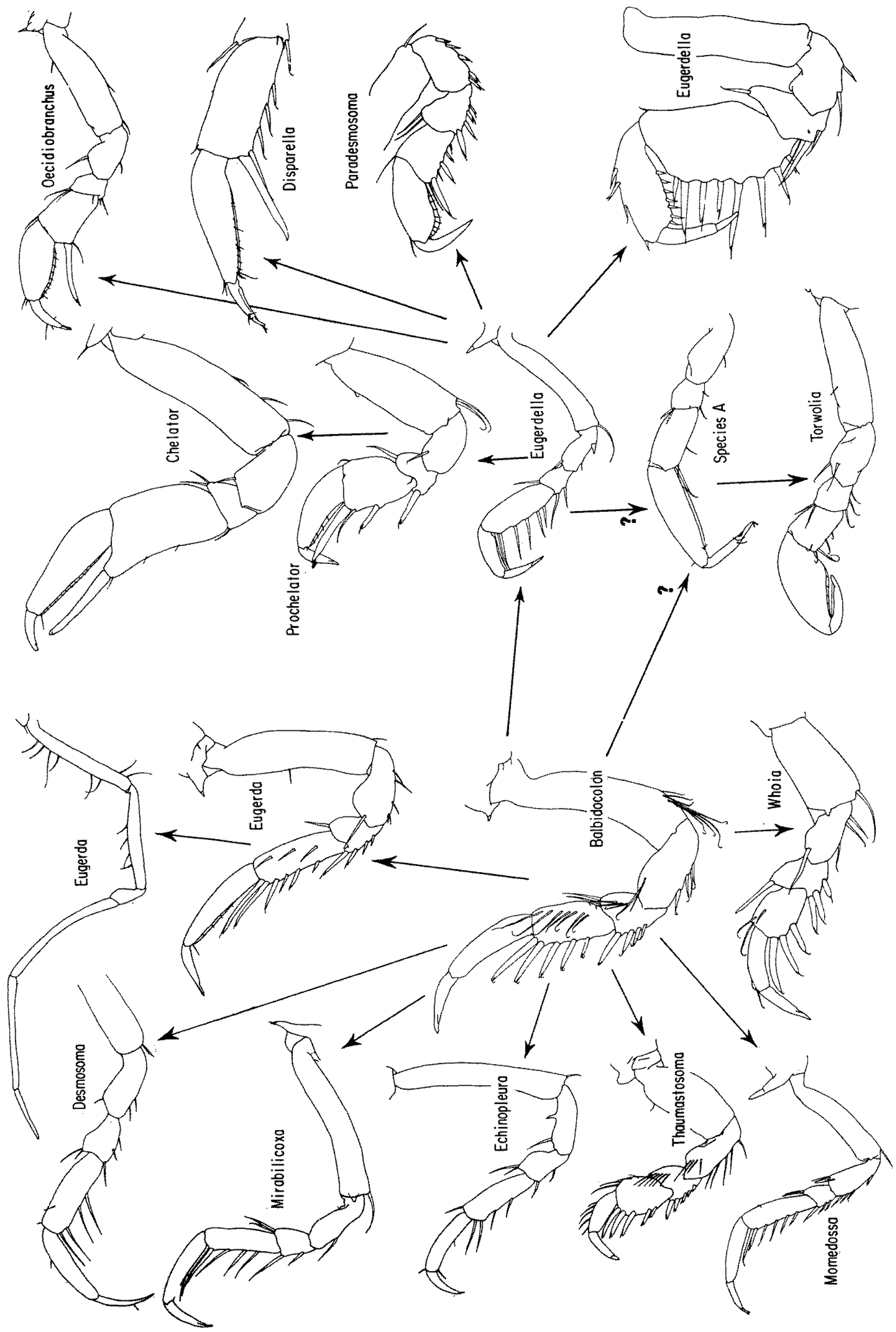


Fig. 4. The phylogeny of the known Desmosomatidae as based on the evolution of the first pereopod.

pereopod, the condition illustrated by *Balbidocolon atlanticum* is most primitive. Because the most unspecialized members of the trends described here all resemble the same primitive condition, they in turn look very much like one another. Therefore, the proper relationship of these unspecialized species is easily confused. This confusion has caused taxonomic difficulties in the past and will undoubtedly continue to do so in the future.

The major operating assumption followed in this paper is that the character of the first pereopod is the most sensitive indicator of phylogenetic affinity found in the Desmosomatidae. In theory this assumption is to a large extent in agreement with Kussakin, although in practice there are wide differences. While it cannot be guaranteed that structures of the first pereopod have not evolved convergently, it seems less likely to have occurred than with any other body region inspected in this study. This does not negate the probability of parallelism within the two subfamilies.

It is on the basis of the first pereopod that the family is here divided into the Desmosomatinae n. subfam. and the Eugerdellatinae n. subfam. Within the latter subfamily, the character of this limb is of prime importance in the separation of the genera. In the Desmosomatinae the first pereopod is also important in generic discrimination, but must be used in conjunction with other structures.

The First Pereonite

The degree of development of the first pereonite in comparison with the second is also useful, but it should be remembered that it is intimately related to the development of its limb. When the pereopod is large, as in the Eugerdellatinae (for example, figs. 53, 57, 74) and in some Desmosomatinae (figs. 14, 19, 24), the pereonite is also large in order to support the limb and house its extrinsic musculature. When the limb is reduced (fig. 39), its pereonite is also reduced. The size of the first pereonite becomes especially valuable when the limb is broken off, because it allows one to deduce the limb's morphology.

The Fourth Pereopod

The morphology of the fourth pereopod is unusual only in *Paradesmosoma*, and therefore this character does not play an important part in the present classification as a whole.

The Pleotelson

A feature not considered by previous investigators, but used routinely here, is the morphology of the pleotelson, particularly the presence or absence of posterolateral spines. The value of this character at a generic level within each subfamily is supported by its close correlation with features of the uropod in the Desmosomatinae and with the first pereopod (and to a lesser extent with the uropod) in the Eugerdellatinae.

Sexual Dimorphism

The degree of sexual dimorphism and the way it is expressed in the male appear to be significant within the Desmosomatinae. The usefulness of this character is limited, however, by the rarity of mature males. For this reason the present classification is based as much as possible on the morphology of adult females.

THE FACE OF THE CEPHALON

The two subfamilies are here defined on the basis of differences in the first pereopod, but the morphology of the face of the cephalon is frequently useful in this dichotomy. In the Desmosomatinae (fig. 5*A*) the surface of the frons ("forehead"), clypeus, and labrum usually forms a smooth curve when viewed in profile.

In most members of the Eugerdellatinae (fig. 5*B*) the frons is developed into a pronounced transverse ridge toward its anterior end. Between this ridge and the base of the clypeus the frons bends precipitously downward, often even angling somewhat posteriorly in its descent. Thus, the contact between frons and clypeus is at the base of a transverse furrow. In connection with this character, the slope of the clypeus is often slight, and it may even be horizontal. Usually the labrum is bent abruptly downward to a vertical orientation. The total result of these modifications is a flattened appearance of the face.

Unfortunately, this character cannot be used as an absolute criterion for separating the subfamilies. In some desmosomatines (such as *Eugerda tetarta*) the frons-clypeal furrow may be modestly present, although the transverse ridge on the frons is never present (fig. 5*C*). Within the most primitive eugerdellatine genus, *Eugerdella*, in some species (*E. natator, E. cornuta*) neither furrow nor ridge is developed. These specializations are also lacking in the more advanced genus *Disparella*. The situation in *Paradesmosoma* is not known.

The features listed above are the major tools for generic differentiation employed here. Useful, but of considerably less value, are the development of coxal projections on pereopods I-IV in the female and the degree of calcification of the body. Sometimes structures that are not ordinarily good generic indicators, such as mouthparts or the branchial region, are sufficiently unique on one or two species to be used as generic criteria.

THE RESULTING CLASSIFICATION

The resulting classification subdivides the family into fifteen genera. Because certain nomenclatorial complexities arise as a result of so extensive a revision, the relationship between the present and past classifications should be treated in more detail.

Desmosoma G. O. Sars, 1864, is restricted to six species, none of which occurs on the transect. Of the six other species that were deposited in this genus by Kussakin (1965), five (*Desmosoma gracilipes* Hansen, *D. simile* Hansen, *D. longispinum* Hansen, *D. magnispinum* Menzies, and *D. coxale* Birstein) form the nucleus of *Mirabilicoxa* n. gen.; the first of these is the type species of the new genus. The sixth species, *D. striata* Menzies, is considered to be a eugerdellatine and is placed in *Chelator* n. gen.

Eugerda Meinert, 1890, is retained, but *Pseudogerda* Kussakin, 1965, is reduced to a junior synonym of it. Two species that Kussakin placed in *Eugerdella (Desmosoma reticulata* Gurjanova and *D. zenkewitschi* Gurjanova) are transferred here.

Echinopleura G. O. Sars, 1897, is unaltered and remains monotypic.

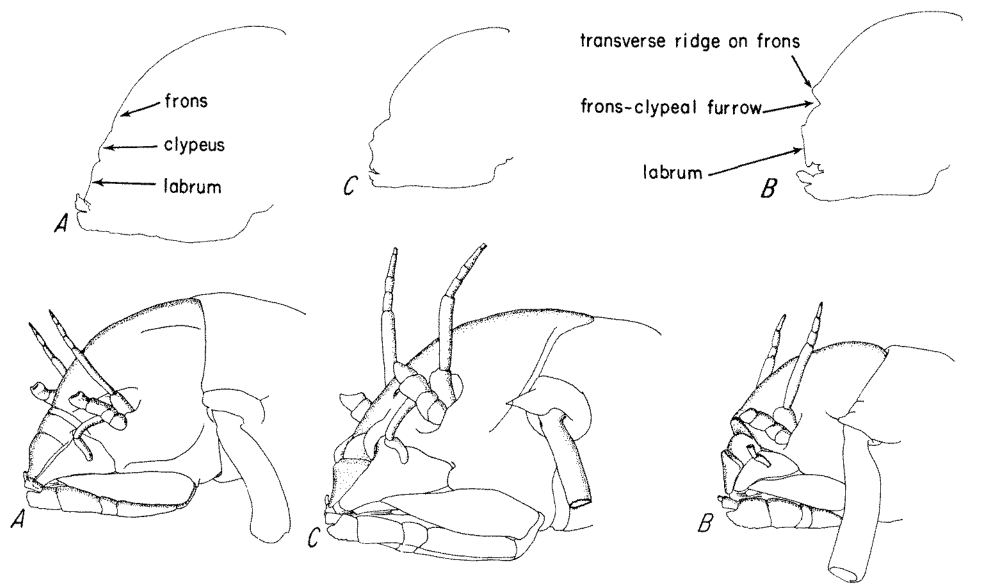


Fig. 5. The desmosomatid cephalon, illustrating the general differences between the two subfamilies. *A, Balbidocolon* sp. (Desmosomatinae) from station 156; in profile the frons, clypeus, and labrum form a smooth curve. *B, Chelator vulgaris* (Eugerdellatinae); here a transverse ridge is well developed on the frons, and the junction of frons and clypeus is set into a strong furrow. *C, Eugerda tetarta* (Desmosomatinae); in this species a frons-clypeal furrow is developed, but there is no transverse ridge on the frons.

These genera plus the new genera *Balbidocolon, Whoia, Momedossa*, and *Thaumastosoma* form the Desmosomatinae. *Desmosoma angustum* G. O. Sars is removed from *Desmosomella* (see below) to become the type species of *Whoia. Desmosoma birsteini* Menzies is also removed from *Desmosomella* and is now included in *Mirabilicoxa. Desmosoma distinctum* Birstein has been taken from *Eugerdella* and placed in *Thaumastosoma.*

Three previously described genera contain species belonging to the Eugerdellatinae. These genera are *Eugerdella, Desmosomella*, and *Paradesmosoma*, all created by Kussakin (1965). *Eugerdella* continues to be used in the present scheme, but as defined here it bears little similarity to Kussakin's conception of the genus. The name is used in conjunction with the present new concept because the type species of *Eugerdella, Eugerda coarctata* G. O. Sars, fits best here. *Desmosoma armatum* G. O. Sars and *D. falklandicum* Nordenstam, placed by Kussakin in *Desmosomella*, are also included here. Because *D. armatum* is the type species of *Desmosomella*, the latter genus automatically becomes a junior synonym of *Eugerdella*, which has page priority in Kussakin's paper.

Of the species Kussakin included in *Eugerdella* and *Desmosomella* the great majority (eleven) are distributed among other genera in the present classification. *Desmosoma reticulata, D. zenkewitschi, D. angustum, D. birsteini*, and *D. distinctum* are placed in desmosomatine genera, as already noted. *Eugerda lateralis* G. O. Sars and *E. longimana* Vanhöffen, once included in *Eugerdella*, now reside in

Prochelator n. gen. and *Disparella* n. gen., repectively. *Desmosoma plebejum* Hansen and *D. polaris* Gurjanova were once part of *Desmosomella*. They now form *Oecidiobranchus* n. gen., with *D. plebejum* acting as type species. *Desmosoma insigne* Hansen and *D. chelatum* Stephensen, also once part of *Desmosomella*, are now included in *Chelator* n. gen., and *D. insigne* is the type species.

Paradesmosoma Kussakin, 1965, remains unchanged in the present classification.

The species of *Torwolia* n. gen. are completely new to the literature.

Since erecting the present genera I have had several opportunities to test the validity of this classification on samples from the Antarctic, Equatorial Atlantic, and South Atlantic oceans. None of these samples contains desmosomatids whose morphology is a serious exception to this scheme. It seems likely that future new genera will be primarily the result of additional splitting of the present ones, or will represent morphologies unknown to us today.

DIAGNOSIS OF THE FAMILY, SUBFAMILIES, AND GENERA

In this and subsequent sections the genera are arranged according to the proposed phylogenetic sequence.

Family Desmosomatidae G. O. Sars, 1897

Diagnosis.—Body slender. Cephalon free from thorax; eyes absent. First antenna short, located dorsally, with two-segmented peduncle and simple three- or four-segmented flagellum. Second antenna also dorsal, long; in male distinctly thicker and flagellum richly supplied with sensory setae. Mandible with well-developed incisor process, lacinia mobilis, and strong row of saw bristles; molar process is a triangular lamella whose distal end is fringed with slender setae; three-segmented palp well developed, reduced, or absent. Palp of maxilliped with second and third segments of same general width as basis; fourth and fifth segments much smaller. All pereonites free; pereon divided into anterior unit of four short somites and posterior unit of three longer, dorsoventrally more depressed somites. Pereopods I-IV anteriorly directed, basically similar, developed for feeding, walking, and digging, usually fringed ventrally with strong, stout setae; pereopod I usually diversely modified from basic pattern; pereopod IV strongly modified in *Para-desmosoma*. Pereopods V-VII directed posteriorly, similar to one another, developed for walking and swimming, with carpus and propodus moderately flattened and provided with fringe of long setae. Coxae of pereopods I-IV easily visible dorsally, of V-VII usually so. Pleonite I very small, but always distinct. Uropods ventral; endopod well developed, consisting of but a single segment; exopod smaller, sometimes lacking.

Remarks.—This definition is taken for the most part from Kussakin (1965), who has given the most recent summary of speculation about the affinities of this family. Much of what he has said is repeated in the following paragraphs.

G. O. Sars erected the family in 1897 and included the genera *Nannoniscus* G. O. Sars, 1869, *Macrostylis* G. O. Sars, 1863, *Ischnosoma* G. O. Sars, 1868 (not 1866 as stated by Sars [1897], Richardson [1909], and Wolff [1962]), *Desmosoma* G. O. Sars, 1864, *Eugerda* Meinert, 1890, and *Echinopleura* G. O. Sars, 1897. Richardson (1909) tacitly accepted this grouping but changed the preoccupied name *Ischnosoma* to *Ischnomesus*, at the same time splitting *Ischnomesus* into three genera. Vanhöffen (1914) somewhat enlarged the concept of the family by adding two genera, *Austroniscus* Vanhöffen and *Austrofilius* Hodgson. Hansen (1916) put *Desmosoma* (= *Eugerda*) and *Echinopleura* into a restricted group Desmosomini and made Sars's other three genera the types of equivalent independent taxa, the Nannoniscini, Ischnomesini, and Macrostylini. Hansen did not mention Vanhöffen's additions. All subsequent authors have followed Hansen's basic scheme.

The inclusion of *Dactylostylis* Richardson, 1911, in the Desmosomatidae in classifications as late as that of Kussakin is an anachronistic holdover from Sars's conception of the family. Hessler (1968) has recently corrected this.

Hansen (1916) and Kussakin (1965) placed the Desmosomatidae in a position approximately between such ambulatory families as the Nannoniscidae and Macro-stylidae, and the natatory families Ilyarachnidae, Eurycopidae, and Munnopsidae. The desmosomatids are like the ilyarachnids, eurycopids, and munnopsids in that pereopods V-VII are modified for swimming. The desmosomatids are, however, obviously less specialized in this respect. The carpi and propodi of the swimming legs are more slender and less setose, especially in the female. The corresponding pereonites are only somewhat bigger than in purely ambulatory groups because the extrinsic muscles of the legs are not much enlarged. Also the last three pereonites are mobile with respect to one another, in contrast with the semifused or completely fused condition of the majority of natatory groups.

Other than this common ability to swim, the desmosomatids show little similarity to the ilyarachnids, munnopsids, or eurycopids. Among the important differences of the latter families from the desmosomatids are the elongation of the second antenna and anterior pereopods and the form of the first antenna and mandible. Thus, although the desmosomatids may be primitive natatory asellotes, they are not closely related to the other natatory groups.

Of the ambulatory families, the Pseudomesidae is most closely related to the desmosomatids. This is best seen by comparing the pseudomesids to the somewhat aberrant *Eugerdella ischnomesoides*. The only major difference is the small size of the pseudomesid uropod. In all other respects (trunk, cephalic appendages, and pereopods) the differences are sufficiently small that one might even include *Pseudomesus* in the Desmosomatidae. The last three pereopods on an undescribed mature male pseudomesid from our transect even proved to be natatory.

The Nannoniscidae must also be related to the Desmosomatidae, although it bears even greater similarity to the Pseudomesidae. The mouthparts are of the same basic morphology. The flagellar segments of the first antenna are often highly specialized in the nannoniscids, but in some it hardly differs from the desmosomatid type. Although pereonites 6 and 7 are often fused in the nannoniscids, in some species they are free.

The Macrostylidae have often been linked with this complex of families (Gurjanova, 1933, for example), but the similarities have probably been overrated. Except for similarity of the mandible, few macrostylid features suggest affinity. An especially profound difference is that in the male macrostylid the proliferation of sensory setae occurs on the first antenna, not on the second as in the other groups.

Nor does the morphology of the Ischnomesidae give much reason for claiming similarity. The similarity in the constricted fourth and fifth pereonites of *Pseudomesus* (Pseudomesidae) and *Heteromesus* (Ischnomesidae), which Hansen (1916) mentioned, is probably fortuitous in view of the complete difference in other respects.

Subfamily Desmosomatinae n. subfam.
(Figs. 14-52, 79)

Diagnosis.—First pereopod similar in size and shape to pereopod II or smaller, more slender, and with reduced setation. Even in relatively unspecialized forms, propodus of pereopod I more slender than that of II, with slightly concave ventral margin and with very few, feeble setae. In most specialized forms, this limb with very slender, elongate ischium, carpus, and propodus, whose setae are almost completely absent. Where well-developed setae are present on ventral margin of carpus, most distal seta is as long as or longer than penultimate one. Pereonite 1 similar in size to pereonite 2 in unspecialized species, but strongly reduced in forms with specialized first pereopods.

Remarks.—The unspecialized or more slender first pereopod easily distinguishes this subfamily from the Eugerdellatinae.

Genus Balbidocolon n. gen.
(Figs. 14, 15)

Type species.—**Balbidocolon atlanticum** n. sp. *Diagnosis*.—Sides of pleotelson diverging somewhat posteriorly so that it is broadest at posterolateral spines; in transverse section axis highly vaulted, distinctly demarcated from flatter lateral fields. Uropod uniramous or with vestigial exopod. Pereonite 1 larger than pereonite 2. Pereopod I as large as II; only propodus slimmer, somewhat attenuated, without major setae; carpus with rows of major setae dorsally and ventrally. Carpus of pereopod II broad, abundantly setose. Coxae of pereopods I-IV only slightly produced. Sexual dimorphism obvious only in pleopods and antennae. Body may or may not be heavily calcified.

Derivation of name.—The Greek words *balbidos*, “starting point,” and *colon*, “limb,” are combined to refer to the fact that the first pereopod in this genus is most primitive. *Balbidocolon* is neuter.

Remarks.—This diagnosis is based not only on the single species found on the transect, but also on two undescribed species from station 156 in the Equatorial Atlantic.

The unusually close similarity of pereopods I and II, with the carpus of the former possessing both dorsal and ventral setal rows, distinguishes this genus from most of the other Desmosomatinae. Only *Whoia, Momedossa*, the most primitive species of *Eugerda*, and species of the aberrant *Thaumastosoma* might be confused with *Balbidocolon* in this respect. The posteriorly diverging sides of the three-lobed pleotelson separate *Balbidocolon* from these other genera.

Genus Whoia n. gen.
(Figs. 16-18)

Type species.—*Whoia* angusta (G. O. Sars, 1899).

Diagnosis.—Pleotelson without posterolateral spines, highly vaulted in transverse section, without lateral fields. Uropodal exopod small or absent; protopod with few setae. Pereonite 1 somewhat inflated, larger than pereonite 2. Pereopods I and II robust. Pereopod I as large as II; only propodus is slimmer; carpus with major dorsal and ventral setae; propodus without major setae. Coxae of pereopods I-IV in female not produced. Sexual dimorphism pronounced; copulatory males highly calcified; coxae of pereopods I-IV somewhat produced, with larger, stouter setae; pereonites 5-7 and pleotelson somewhat broader, with narrow marginal flanges.

Derivation of name.—This genus honors the Woods Hole Oceanographic Institution. *Whoia* is feminine.

Remarks.—Known species of this genus are unusual in the robust development of body and anterior pereopods, but the lack of specialization of pereopod I in this genus is certainly primitive. In *Thaumastosoma*, whose general habitus is similar to that of *Whoia*, pereopod I may be robust, but II is not. The features mentioned above, the reduced or absent uropodal exopod, and the lack of posterolateral spines are uniquely combined in *Whoia*.

Genus Momedossa n. gen.
(Figs. 19, 20)

Type species.—**Momedossa profunda** n. sp.

Diagnosis.—Pleotelson with posterolateral spines, in female widest anteriorly. Uropod biramous. Cuticle of body well sclerotized. Pereonites 1 and 2 subequal in size. Pereopods long. Pereopod I moderately reduced; carpus and propodus somewhat attenuated; propodus without major setae; carpus with row of major setae only ventrally. Coxae of pereopods I-IV in female only moderately produced. Sexual dimorphism modest; in known copulatory male (*M. profunda*) coxae of pereopods I-IV somewhat more strongly produced and pleotelson widest at posterolateral spines.

Derivation of name.—*Momedossa* is an anagram of *Desmosoma* and is feminine.

Remarks.—*Momedossa* could be confused only with *Balbidocolon* or *Mirabilicoxa*. It differs from the former in the shape of the pleotelson and the lack of major dorsal setae on the carpus of pereopod I. It differs from *Mirabilicoxa* in the longer pereopods and the considerably more modest sexual dimorphism.

Genus Eugerda Meinert, 1890
(Figs. 21-40)

Type species.—*Eugerda tenuimana* (G. O. Sars, 1868). According to Hult (1936), the original type species, *Eugerda globiceps* Meinert, 1890, designated by monotypy, is a synonym of *E. tenuimana* as defined by Sars in 1868, but not as defined by Sars in 1897 when he redescribed it (see p. 64 below).

Diagnosis.—Pleotelson without posterolateral spines; in copulatory male posterolateral margin may be angular. Uropod biramous; exopod always well developed; protopod often abundantly setose distally. Pereonite 1 moderately to much smaller than pereonite 2. Pereopod I slightly to strongly reduced and attenuated; propodus without major setae; carpus without major setae except in primitive forms (*E. tetarta*). Carpus of pereopod II broad, often with comb of small spines distoventrally.

Sexual dimorphism pronounced; in copulatory male pereonites 5-7 and pleotelson with broad marginal flanges, and coxae of pereopods I-IV produced moderately anteriorly, with stout terminal setae which are sometimes quite large. Body not heavily calcified in either sex, often very setose.

Remarks.—The lack of posterolateral spines and the pronounced tendency for a reduced pereonite 1 and attenuated first pereopod distinguish *Eugerda* from all the rest of the Desmosomatinae except for *Desmosoma*. In general habitus, *Eugerda* and *Desmosoma* are very similar, but the former differs in its large uropodal exopods.

As conceived here, this genus combines *Pseudogerda* and *Eugerda* as defined by Kussakin (1965), primarily because the condition of the mandibular palp is ignored. An important difference from Kussakin's definitions is that species with relatively unspecialized first pereopods are included (i.e., *E. tetarta*).

The placement of *Desmosoma zenkewitschi* Gurjanova, 1946 in *Eugerda* (see p. 62) is only tentative because the propodus of pereopod I, although conforming to the diagnosis of the latter genus in practically all respects, is unusually robust and uniquely setose. This species could not be placed in any other genus of desmosomatid recognized here. Pereopod I should not be considered chelate, as Kussakin did, because the most distal seta in the ventral margin of the carpus is not truly specialized as a fixed claw; it is merely the longest member of a series of gradually lengthening setae.

Genus Desmosoma G. O. Sars, 1864

Type species.—*Desmosoma lineare* G. O. Sars, 1864, by subsequent designation (G. O. Sars, 1897, p. 126).

Diagnosis.—Pleotelson without posterolateral spines, broadest anteriorly. Uropod uniramous; protopod may or may not be abundantly setose. Pereonite 1 moderately to much smaller than pereonite 2. Pereopod I moderately reduced; carpus and propodus moderately attenuated; propodus devoid of major setae; carpus without major dorsal setae, but usually with ventral row of slender setae. Carpus of pereopod II broad, abundantly setose. Sexual dimorphism moderate to slight; in copulatory males pereonites 5-7 and pleotelson may be broader; coxae of pereopods I-IV may be moderately more strongly produced. In female, coxae of pereopods I-IV only modestly produced.

Remarks.—This genus is not represented in our samples from the transect. The diagnosis is based on inspection of the literature alone. The lack of posterolateral spines, the uniramous uropod, the reduced pereonite 1 with its attenuated pereopod, satisfactorily define this genus within the subfamily. *Echinopleura* shares these characters, but is so aberrant otherwise that no confusion is possible.

Genus Mirabilicoxa n. gen.
(Figs. 41-49)

Type species.—*Mirabilicoxa gracilipes* (Hansen, 1916).

Diagnosis.—Pleotelson widest anteriorly, tapering distinctly posteriorly; sides usually concave in front of posterolateral spines; in transverse section axis not highly vaulted; it and lateral fields present broadly continuous profile. Uropod uniramous or sometimes with rudimentary exopod; protopod with few setae. Pereonite

1 from slightly larger to slightly smaller than pereonite 2. Pereopod I moderately reduced and attenuated; propodus without major setae; carpus with row of major ventral setae, but only rarely with dorsal ones. Carpus of pereopod II slender, often with few setae. Sexual dimorphism pronounced; in known copulatory males coxae of pereopods I-IV enormously produced, but terminal setae not large; pereonites 5-7 and pleotelson with broad marginal flanges. Coxae of pereopods I-IV in female always moderately produced; those of immature male already displaying extra elongation. Body not heavily calcified or abundantly setose in either sex.

Derivation of name.—Mirabilicoxa comes from the Latin words *mirabilis*, “wonderful,” and *coxa*, “hip,” and refers to the strikingly long coxal projections of pereopods I–IV in the copulatory male. The name is feminine.

Remarks.—The pronounced sexual dimorphism, with the enormous projections of the coxae on pereopods I-IV and the conspicuous marginal flanges on pereonites 5-7 and the pleotelson of the copulatory male, is unique to this genus. The female could be confused only with that of *Momedossa*, from which it differs in its shorter pereopods and the more sinuous sides of its pleotelson.

Of the species included here (see pp. 62, 63), only the placement of *M. coxalis* (Birstein) was questionable because Birstein illustrated a large, heavily setose first pereopod and smaller pereopod II with reduced setation. This unique situation is just the reverse of what one would expect, and indeed, Birstein (personal communication) says that the captions have been misplaced. With this correction, *M. coxalis* conforms perfectly to the generic diagnosis.

Genus Echinopleura G. O. Sars, 1897

Type species.—Echinopleura aculeata (G. O. Sars, 1864), designated by monotype.

Diagnosis.—Mandible with reduced molar process and simplified incisor process. Fifth pereonite slender, tapering anteriorly. Pleotelson constricted at base, without posterolateral spines. Margins of body strongly serrate. Pereonites 1 and 2 equal in size. Pereopod I as large as II; propodus slightly attenuated; it and dorsal margin of carpus without major setae. Uropod uniramous. Sexual dimorphism obvious only in pleopods and second antenna.

Remarks.—The independence of this genus is based primarily on the aberrance of its only species in features which are normally conservative: the simplified mandible, the slender fifth pereonite, the constricted pleotelson, and the strongly serrate ornamentation.

Genus Thaumastosoma n. gen.
(Figs. 50-52)

Type species.—**Thaumastosoma** n sp.

Diagnosis.—Mouthparts produced conspicuously forward. Mandible elongate; incisor process bent forward; lacinia mobilis membranous; palp well developed. Maxilliped with unusually elongate coupling hooks; palp segments 2–4 produced forward medially; on segment 3 this results in the medial setae being distributed in an are on the ventral surface of the segment, rather than from the distomedial margin; joint between segments 2 and 3 angling distomedially. Basal endite of second maxilla less than half the length of the other lobes. Pereopod I much like pereopod II, but stouter; carpus much shorter. Pereonite 1 somewhat larger than pereonite 2. Coxa of pereopod I slightly produced, tipped with typical stout seta; coxae of pereopods II-IV not produced and lacking this seta, the seta instead being placed on the acute anterolateral corner of the corresponding tergite. Uropod biramous. Sexual dimorphism modest; in copulatory male pleotelson broader posteriorly, with acute posterolateral angles. Pleotelson without posterolateral spines.

Derivation of name.—The Greek words *thaumastos*, "wonderful," and *soma*, "body," are combined to refer to the many unusual features of the cephalon and to a lesser degree the thorax. *Thaumastosoma* is neuter.

Remarks.—Most of the diagnostic differences of *Thaumastosoma* from other desmosomatid genera are related to the unique oral apparatus. Mouthparts are usually conservative structures, suggesting a very unusual mode of feeding for this genus. The replacement of the single stout seta on the coxae of pereopods II-IV by a seta on the adjacent portion of the tergites is also unique.

Subfamily Eugerdellatinae n. subfam.
(Figs. 53-71, 73-75)

Diagnosis.—Pereopod I nearly always more strongly developed than pereopod II, its distal segments forming a robust grasping structure in all but the most primitive species (i.e., *Eugerdella ischnomesoides*). Peronite 1 as large as or larger than pereonite 2.

Remarks.—This subfamily clearly differs from the Desmosomatinae in possessing a first pereopod which is enlarged and is chelate or raptorial.

Genus Eugerdella Kussakin, 1965
(Figs. 53-56)

Type species.—*Eugerdella coarctata* (G. O. Sars, 1899), by original designation.

Diagnosis.—First pereopod similar in size and shape to pereopod II or much more powerfully developed and raptorial. When relatively unspecialized, dorsal margin of carpus and both margins of propodus with reduced setation. When highly specialized, carpus and propodus enlarged, broad; both margins of propodus with short, stout setae, and both this segment and dactylus fold down to act in opposition to strong ventral setae on carpus. In all cases, most distal stout seta on ventral margin of carpus is noticeably shorter than penultimate one. Pereonite 1 slightly smaller than, as large as, or larger than pereonite 2, depending on relative size of their limbs. Pleotelson with or without posterolateral spines. Transverse ridge on frons and frons-clypeal furrow may or may not be present.

Remarks.—In this diagnosis, strong emphasis is laid on the fact that on the carpus of the first pereopod the most distal ventral seta is shorter than the penultimate one. This character is the only one I have been able to discover which clearly separates the primitive members (*Eugerdella ischnomesoides, E. cornuta*) of a trend culminating in *E. pugilator* from more primitive members of the Desmosomatinae. It also makes this genus unique among the Eugerdellatinae except for *Paradesmosoma*, from which it is easily distinguished because of the latter's over-developed fourth pereopod.

The appropriateness of *Eugerdella coarctata*'s membership in this genus (see p. 131) is not obvious from Sars's (1899) figures, but as Hult (1936) has pointed out, Sars overlooked the most distal carpal seta of the first pereopod (fig. 72*b*, herein), a mistake that considerably alters the subjective shape of the limb. As I have already mentioned, including *E. coarctata*, the type of the genus, with this group of species causes the diagnosis of the genus to be changed greatly from Kussakin's original one.

Eugerdella contains some of the most primitive members of the Eugerdellatinae. Of these, *E. armata* deserves special attention because the form of its first pereopod clearly relates it to the complex of species contained in *Prochelator, Chelator*, and *Oecidiobranchus* (Kussakin made *E. armata* the type species of *Desmosomella*, a genus that was conceptually closest to those genera). *Eugerdella armata* is placed in the present genus because it is like *E. coarctata* in having a very small distal seta on the ventral margin of the carpus of the first pereopod. In reality *E. armata* probably reflects the primitive condition from which *Prochelator, Chelator*, and *Oecidiobranchus* are derived. Of these genera, it is most similar to *Prochelator*, the only genus of the group in which there are additional large, unequally bifid setae on the carpus of the first pereopod. It cannot, however, be included in *Prochelator* because it possesses three such setae, and these do not conform to the strict definition of the accessory setae (p. 28, and below) which play so important a role in the diagnosis of that genus.

By definition, *Prochelator* has no more than two accessory setae, and the most distal one is slender and closely appressed to the distal claw seta. Interestingly, a new species found at station 142, off the west coast of Africa, is much like *E. coarctata* but is even more similar to *Prochelator* in having only two large, unequally bifid setae proximal to the claw. It too must be put in *Eugerdella* because of the small stout seta distal to the claw, and it too could not be included in *Prochelator* because the most distal of the two setae in question is not only distally bifid, but is well separated from the claw. The most modest changes of the ventral setae of this species would transform it from a perfectly consistent member of *Eugerdella* to a well-integrated member of *Prochelator.*

Genus Prochelator n. gen.
(Figs. 57-64)

Type species.—*Prochelator lateralis* (G.O. Sars, 1899).

Diagnosis.—First pereopod large, chelate. Dactylus and enlarged, specialized propodus together comprising movable finger which acts in opposition to immovable claw formed by large seta on distal end of ventral margin of enlarged carpus. Carpus usually not produced at base of claw. Ventral margin of carpus with two accessory setae, that is, a short, stout, unequally bifid seta located midway along margin and a somewhat longer, more slender seta located at base of fixed claw, just proximal to it. Pereonite 1 as large as or larger than pereonite 2. Pleotelson with posterolateral spines that are sometimes obscure. Uropods nearly always biramous. Most dorsal of the four teeth on lacinia mobilis reduced or absent; next tooth in line considerably enlarged. Joints surrounding palp segment 1 of maxilliped nearly straight; segment 3 with long lateral margin. Coxae of pereopods I–IV may be angular anterolaterally, but are not produced. Face of cephalon with transverse ridge on frons and with frons-clypeal furrow.

Derivation of name.—The prefix pro-, "before," is combined with the generic name *Chelator* (see below) and refers to the fact that *Chelator* is probably derived from this genus. The genus is masculine.

Remarks.—An important feature in the separation of *Prochelator, Chelator, Disparella*, and *Oecidiobranchus* is the presence or absence of major ventral setae in addition to the claw on the carpus of the first pereopod. The form and number of these extra setae are so uniform on six of the species comprising *Prochelator* that they have been given the formal designation "accessory setae" and are the primary character in the diagnosis of the genus. As already mentioned in the remarks on *Eugerdella*, I feel this type of first pereopod evolved from the condition found in less specialized members of that genus, with *E. armata* reflecting a likely intermediate condition.

Genus Chelator n. gen.
(Figs. 65-69)

Type species.—*Chelator insignis* (Hansen, 1916).

Diagnosis.—First pereopod large, chelate. Dactylus and enlarged, specialized propodus together forming movable finger which acts in opposition to immovable claw formed by large seta on distal end of ventral margin of carpus. Carpus enlarged, distinctly produced at base of immovable claw; ventral margin with very small setae, none of which can be definitely labeled as the accessory setae. Pereonite 1 slightly smaller than, as large as, or larger than pereonite 2. Pleotelson without posterolateral spines in female, but in males small ones may be present. Uropods uniramous. Lacinia mobilis as in *Prochelator.* Joints surrounding palp segment 1 of maxilliped distinctly bent laterally; lateral margin of segment 3 as in *Prochelator.* Face of cephalon with transverse ridge on frons and with frons-clypeal furrow.

Derivation of name.—The name, which is masculine, comes from the Latin *chela*, "claw," and refers to the form of the first pereopod.

Remarks.—The carpus of the first pereopod of *Chelator* carries further the trend of specialization seen in *Prochelator.* Here, the accessory setae are missing and the carpus has become distinctly elongate at the base of the immovable claw. The lack of posterolateral spines and the uniramous uropod are also very useful diagnostic characters.

Genus Disparella n. gen.
(Figs. 70, 71, 73)

Type species.—**Disparella validа** n. sp.

Diagnosis.—First pereopod large, chelate. Dactylus and enlarged propodus together forming movable finger which acts in opposition to immovable claw formed by large seta on distal end of ventral margin of enlarged carpus. Ventral margin of carpus not produced at base of fixed claw, with row of small setae proximal to fixed claw; most distal of these small setae often enlarged, closely associated with fixed claw, like (perhaps homologous?) distal accessory seta in *Prochelator.* Pereonite 1 as large as or larger than pereonite 2. Pleotelson with posterolateral spines.

Uropoda biramous. On mandible, dorsal tooth of incisor process forming apex of shelf which bends medially at angle to main body of incisor process; lacinia mobilis with four teeth, of which second is enlarged; palp well developed. Joints surrounding palp segment 1 of maxilliped distinctly bent laterally; segment 3 with short lateral margin. Coxae of pereopods I-IV produced anteriorly. Cephalon with pair of anteriorly directed spines lateral to base of antennae; face without transverse ridge on frons and without strong frons-clypeal furrow.

Derivation of name.—The Latin *dispar*, "different," is given a diminutive suffix, referring to the many small differences that make this genus distinct. Its gender is feminine.

Remarks.—The following combination of characters uniquely defines this genus: cephalic spines lateral to antennae; shelflike incisor tooth; carpus of pereopod I not produced at base of fixed claw, lacking well-defined accessory setae, but with a row of small ventral setae; normal pereopod IV (see *Paradesmosoma*); pleotelson with posterolateral spines; uropod uniramous.

In spite of the general resemblance of members of this genus to species of *Prochelator* and *Chelator*, small differences such as the lack of a transverse ridge and a frons-clypeal furrow on the cephalon, and the short lateral margin of palp segment 3 of the maxilliped, suggest independent origin from a *Eugerdella*-like condition.

Genus Oecidiobranchus n. gen.
(Figs. 74, 75)

Type species.—*Oecidiobranchus plebejum* (Hansen, 1916).

Diagnosis.—First pereopod large, chelate. Dactylus and enlarged, specialized propodus together forming movable finger which acts in opposition to immovable claw formed by large seta on distal end of ventral margin of carpus. Carpus enlarged, not produced at base of fixed claw; no small seta distal to base of fixed claw; distal accessory seta well defined; row of ventral setae proximal to this may or may not be developed. First and second pereonites subequal. Pleotelson without posterolateral spines. Branchial chamber and operculum unusually small relative to size of pleotelson. Uropods uniramous. Lacinia mobilis and maxilliped as in *Prochelator.* Face of cephalon with transverse ridge on frons and with frons-clypeal furrow.

Derivation of name.—The Greek words *oecidion*, "little house," and *branchos*, "gill," are combined to refer to the small gill chamber. *Oecidiobranchus* is neuter.

Remarks.—The small branchial chamber and operculum are unique to this genus. As indicated by an undescribed species (from station 159) whose carpus on pereopod I bears a well-developed row of setae proximal to the claw seta, this genus is probably an offshoot of a *Eugerdella*-like ancestor, and its development of a chelate first pereopod probably parallels that of the *Prochelator-Chelator, Disparella*, and *Paradesmosoma* lines.

Genus Paradesmosoma Kussakin, 1965

Type species.—*Paradesmosoma conforme* Kussakin, 1965, by original designation.

Diagnosis.—First pereopod chelate, much as in *Eugerdella*, except carpus is less well developed, and propodus does not taper so much toward distal end. Ventral margin of carpus with row of setae of irregular sizes proximal to immovable claw, and with single very slender seta distal to claw; accessory setae absent or at least not identifiable as such. On pereopod IV ventral margins of ischium, merus, carpus, and propodus with dense row of setae which have sturdy bases and abruptly more slender, flexible tips; carpus and propodus broad. Pereopods II and III normally developed except ischium with setation like that of pereopod IV. Pereonites 1 and 2 subequal. Uropod uniramous. Mandible with reduced palp. Pleotelson without posterolateral spines. Lacinia mobilis as in *Prochelator.*

Remarks.—The enlarged fourth pereopod is unique to this genus. The form of the chela in this genus suggests an origin somewhat separate from that of *Prochelator, Chelator, Disparella*, and *Oecidiobranchus*. This is documented by the irregularity in size of the ventral carpal setae and the presence of a slender seta distal to the immovable claw. Both these features are reminiscent of conditions seen in *Eugerdella*, but are unknown in *Prochelator* and the other chelate genera.

Subfamily Incertae Sedis
Genus Torwolia n. gen.
(Figs. 76-78)

Type species.—**Torwolia subchelatus** n. sp.

Diagnosis.—First pereopod small, subchelate; carpus broad, but short; propodus much enlarged; dactylus reflected downward and opposing ventral margin of propodus; setation weak. First pereonite reduced. Second pereopod enlarged, as is its pereonite.

Derivation of name.—This genus is named in honor of Dr. Torben Wolff of the Zoological Museum of the University of Copenhagen. The name is masculine.

Remarks.—*Torwolia* is the only subchelate genus in the Desmosomatidae. An undescribed species recently collected off the west coast of Africa (station 142) bears a first pereopod (fig. 4, Species *A*) whose form appears to be intermediate between that of the specialized subchelate condition found in *Torwolia* and that of more normal desmosomatids. In this new species the second pereopod and its pereonite are somewhat enlarged, and the first pereopod and pereonite are reduced. The carpus of the first pereopod is short and stout. Its setation consists of a miniscule dorsal seta, a moderate-sized seta at the distal end of the ventral margin, and two smaller setae proximal to it, one closely appressed to it and the other halfway back. The propodus of this limb is well developed, broad proximally, tapering distally, with slightly convex ventral margin. It has no major setae. The dactylus is normal. This condition is exactly what one would expect to find in an animal intermediate between *Torwolia* and some moderately primitive desmosomatine, and I would feel confident in placing this genus in that subfamily were not the ventral carpal setation of the first pereopod reminiscent of that of *Prochelator*, albeit in a reduced state. Because it is not definitely possible to rule out the chance that *Torwolia* could be derived from some eugerdellatine, I prefer to leave its sub-familial affinities open.

KEY TO THE SUBFAMILIES AND GENERA

1a. Pereopod I developed as gnathopod except in the most primitive species of *Eugerdella*; in latter case, most distal ventral seta on carpus of pereopod I always shorter than penultimate one (right half of fig. 4) 2

b. Pereopod I either reduced and with more slender, paucisetose segments, or as large as II and broadly similar to it (left half of fig. 4)	Desmosomatinae, 3
2*a*. Pereopod I as heavily built or more so than II, chelate (fig. 57*f*, 66*b*) or raptorial (fig. 56*d*) except in most primitive species of *Eugerdella*; never subchelate. Pereonite 1 as large or larger than 2	Eugerdellatinae, 10
b. Pereopod I smaller than II, subchelate (fig. 77*a*). Pereonite 1 much smaller than 2 (fig. 76*a*)	*Torwolia*
3*a*. Pereopod I as large as II; carpus with row of dorsolateral setae (fig. 15*a*), Pereonite 1 as large as 2	4
b. Pereopod I less well developed than II; carpus with no dorsolateral setae (fig. 39*m*), or with only a few reduced ones (fig. 20*a*) (Eugerda tetarta, because of its primitiveness, is intermediate with 3*a*). Pereonite 1 smaller than 2	6
4*a*. Sides of pleotelson converge posteriorly; axis not demarked from lateral fields; pleotelson of female without posterolateral spines (fig. 16*b*)	5
b. Sides of pleotelson diverge posteriorly to well-developed posterolateral spines; axis highly vaulted, clearly demarked from lateral fields (fig. 14*a*)	*Balbidocolon*
5*a*. Body somewhat flattened. Small stout seta on anterolateral corners of pereonites 2–4, but none on anterior tip of coxae II-IV (fig. 51*a*). Mouthparts aberrant, produced (fig. 51*a, e, h*). Uropodal exopod large	*Thaumastosoma*
b. Body appears elongate and cylindrical. No small stout seta on anterolateral corners of pereonites 2-4; instead, usual normal seta on anterior tip of coxae II-IV (fig. 16*a*, *b*). Mouthparts normal	*Whoia*
6*a*. Pleotelson without posterolateral spines (fig. 22*a*)	7
b. Pleostelson with posterolateral spines (fig. 41*b*)	9
7*a*. Uropod uniramous. Pereopod I never strongly attenuated	8
b. Uropod biramous. In most species pereopod I markedly attenuated (fig. 39*m*), its body segment reduced (fig. 22*a*)	*Eugerda*
8*a*. Margins of body segments serrate in dorsal view. Pleotelson constricted anteriorly. Molar process of mandible reduced	*Echinopleura*
b. Not as above	*Desmosoma*
9*a*. Sexual dimorphism extreme (fig. 41*b, c*): in copulatory males, coxae of pereopods I-IV produced strongly anteriorly, much longer than tergum of corresponding body segment; lateral margins of pereonites 5-7 and pleotelson spread laterally into conspicuous thin flanges. In both sexes, pereopods I-IV usually paucisetose (fig. 43*h-j*); sides of pleotelson sinuous, being convex at anterior end and concave anterior to posterolateral spines (fig. 41*b*)	*Mirabilicoxa*
b. Sexual dimorphism modest (fig. 19*a*, *c*): in copulatory males, coxae of pereopods I-IV modestly produced; lateral margins of pereonites 5-7 and pleotelson not flangelike. In both sexes, pereopods with numerous marginal setae (fig. 20). Sides of pleotelson evenly convex in female	*Momedossa*
10*a*. Pereopod IV small, unspecialized, paucisetose	11
b. Pereopod IV large, with broad carpus and propodus; ventral margin of ischium, merus, carpus, and propodus with dense row of setae having study bases and abruptly more slender tips. Pereopod I chelate. Uropod uniramous. Pleotelson without posterolateral spines	*Paradesmosoma*
11*a*. Pereopod I chelate; most distal seta on ventral margin of carpus largest (fig. 60*c*)	12
b. Pereopod I broadly similar in size and shape to II (fig. 54*d*) or more powerfully developed and raptorial (fig. 55*e*, 56*d*), only rarely chelate; most distal seta on ventral margin of carpus always smaller than penultimate one (fig. 54*d*, 56*d*')	*Eugerdella*
12*a*. Ventral margin of carpus on pereopod I with full compliment of well-developed accessory setae (p. 27; fig. 58*d*). Pleotelson with posterolateral spines (sometimes obscure). Uropods usually biramous	*Prochelator*
b. Most proximal accessory seta absent; the distal one usually so	13
13*a*. Uropod uniramous. Pleotelson of female without posterolateral spines. No cephalic spines lateral to insertion of antennae. Ventral margin of carpus on pereopod I with only scattered small setae proximal to claw (fig. 66*b*)	14

b. Uropod biramous. Pleotelson with posterolateral spines. A pair of anteriorly directed cephalic spines lateral to insertion of antennae (fig. 70*c*). Ventral margin of carpus on pereopod I with orderly row of small setae proximal to claw (fig. 71*b*). Cuticle well calcified — *Disparella*

14*a.* Branchial chamber and operculum unusually small relative to size of pleotelson (fig. 75*i*, *j*). Large distal accessory seta present on ventral margin of carpus on pereopod I (fig. 74*d*) — *Oecidiobranchus*

b. Pleotelson normal, not as above (fig. 68*b*). On pereopod I, no seta proximal to claw on ventral margin of carpus sufficiently well developed to be considered accessory seta (fig. 67*g*) — *Chelator*

EVOLUTION WITHIN THE FAMILY

Much has already been said about the evolution of desmosomatid genera. I would like to summarize the pattern here.

Balbidocolon is the most primitive known desmosomatid genus by virtue of the similarity of its unspecialized first pereopod to the second. Specialization of this appendage went in two nearly opposite directions (fig. 4).

In the Desmosomatinae the first pereopod became more lightly built and gradually less setose. *Eugerda tetarta* is an early step in this change. *Eugerda fulcimandibulata*, with its naked, filamentous first pereopod shows the ultimate development of this trend. *Echinopleura, Mirabilicoxa, Thaumastosoma*, and *Desmosoma* appear to be offshoots of a *Eugerda*-like ancestor. In contrast with *Eugerda*, whose species display the complete range of reduction of the first pereopod, in these genera the limb is only moderately reduced, and while it has lost setae, it is never completely naked. *Whoia* and *Momedossa* show no really important changes and are probably minor offshoots of a *Balbidocolon*-like ancestor.

The Eugerdellatinae display a trend of enlargement of the first pereopod, usually accompanied by a reduction of the ventral setal row of the carpus to a single major seta. In the most primitive members of *Eugerdella* this change has not yet begun. In *E. ischnomesoides* the first two pereopods differ little more than they do in *Balbidocolon*. *Eugerdella cornuta* shows an early stage in the enlargement of pereopod I. Enlargement is carried to its extreme in *E. pugilator*, where pereopod I is a huge raptorial structure, and its pereonite is correspondingly enlarged.

From the situation seen in the more primitive members of *Eugerdella* there developed the chelate first pereopod found in *Prochelator.* The propodus has enlarged. On the ventral margin of the carpus the distal seta, which was already reduced in *Eugerdella*, has now disappeared, and the penultimate seta is now quite large and acts as an immovable claw. This seta is accompanied by two small accessory setae, the remnants of the more proximal portion of the ventral setal row. In *Chelator* even the accessory setae are lost, and the carpus at the base of the immovable claw has become produced.

The conditions seen in *Paradesmosoma, Disparella*, and *Oecidiobranchus* are probably independent offshoots of a *Eugerdella*-like ancestor, but one cannot rule out the possibility that *Paradesmosoma* is related to the early evolution of *Prochelator.* Its first pereopod is chelate, but there is still a reduced seta distal to the immovable claw and an irregular row of stout setae proximal to it. The truly unique development of the fourth pereopod labels this genus as a specialized offshoot.

The origin of *Torwolia* is still obscure. Its subchelate first pereopod is a result of loss of setation, reduction of the carpus, enlargement of the propodus, and development in the dactylus of the ability to fold back strongly against the preceding segment. Because this limb is reduced, it is most likely that the ancestor belongs to the Desmosomatinae.

In this way, then, a relatively few trends could have resulted in the broad diversity of genera seen today. It is unwise to conclude on the basis of changes in one structure alone that the pattern seen represents the actual evolutionary lines, yet I am convinced that in broad terms it actually does.

POSTMARSUPIAL DEVELOPMENT

Station 73 was an unusually successful sample, yielding a total of more than 25,000 individuals falling into 365 macrofaunal species. Of the five species of Desmosomatidae found in this sample, two, *Eugerda tetarta* and *Chelator insignis*, occurred in very large numbers, approximately 275 individuals in each case. Furthermore, all stages of growth were present, offering an unusual opportunity to study in detail postmarsupial development of members of this family.

Many of the molt stages can be distinguished on morphological grounds, such as degree of development of the seventh pereopod, fifth pereonite, first and second pleopods, and the oostegites. In the female, however, a number of contiguous stages display no discrete differences. In such instances the possible existence of more than one stage may be suggested by an unusually wide size range of individuals having a uniform morphology.

This conclusion is substantiated by size-frequency analysis of *Eugerda tetarta* (fig. 6). The midsagittal length of the fifth pereonal tergite is measured in animals held in profile position. This measurement is preferred to total body length because the latter dimension varies with the condition of the animal. Graphic compilation of the measurements yields a polymodal histogram. In the earliest stages there is no overlap, and size variation is small. With increasing development, size range within a stage increases as does degree of overlap between adjacent stages. In spite of overlap, this technique proves to be sufficiently sensitive that individual stages can be discriminated, even when morphological differences are not apparent. Thus, females of *E. tetarta* having a well-developed seventh pereopod, but still lacking oostegites, belong to three stages, as demonstrated by a trimodal size-frequency curve (stages 4-6). The spread of size for a single stage determined in this fashion is consistent with size ranges of stages isolated on morphological grounds. Similarly, although less clearly, both preparatory and brooding females display bimodal curves, showing that each morphological type contains two stages. The presence of a few unusually large preparatory and brooding females suggests that a third cycle of reproduction may occasionally be achieved.

On the basis of size-frequency analysis and morphological discrimination, *Eugerda tetarta* proves to have seven male stages and at least ten and possibly

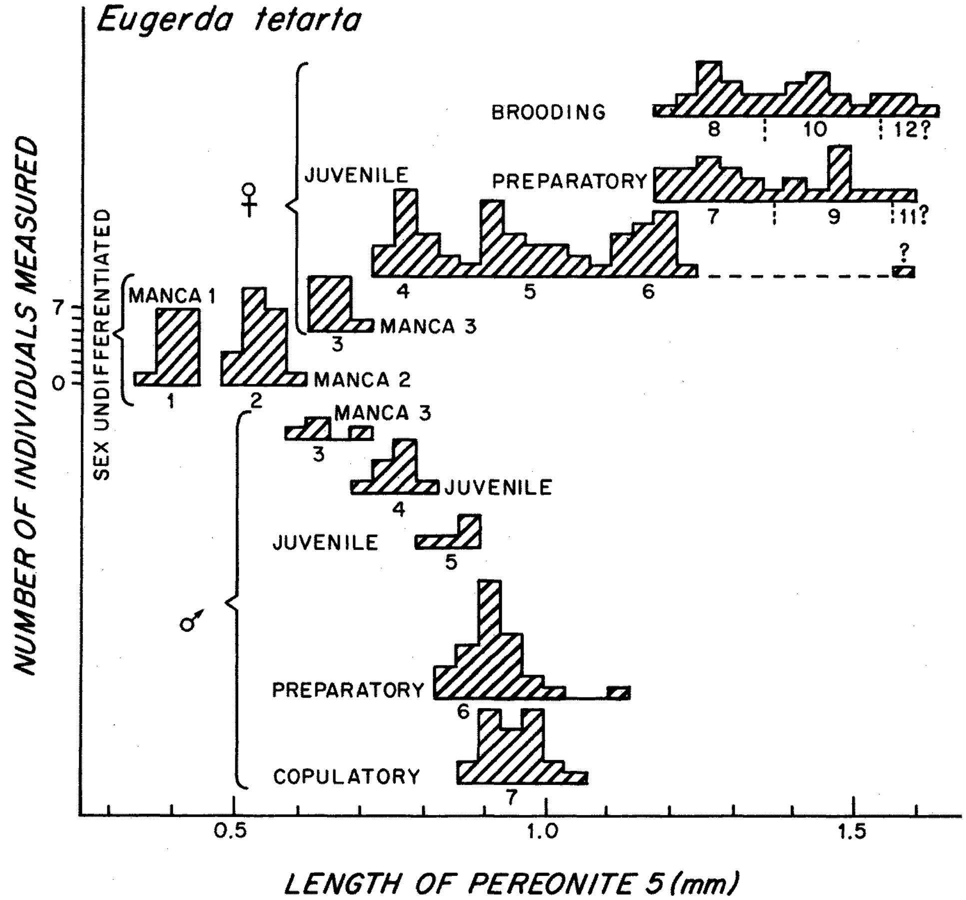


Fig. 6. Development and size-frequency distribution of *Eugerda tetarta*. Each size-frequency histogram represents a single stage which is labeled not only with degree of development (manca 1, juvenile, and so on), but with stage in the succession of molts (the number beneath the histogram). Length of pereonite 5 is used as the index of size.

twelve female stages. In *Chelator insignis* there were fewer stages—five in the male and at least eight in the female, perhaps more rarely ten.

Terminology

In classifying developmental stages, Forsman (1944) used a terminology Zimmer (1926) had introduced for cumacean development. Bocquet (1953) preferred simply to number the instars. Wolff (1962) followed Bocquet's system because he felt there was yet too little information on isopod development to conclude that isopods followed the same pattern found in cumaceans. Nevertheless, Zimmer's terminology can be applied comfortably to all the species considered in Wolff's review as well as to the desmosomatid species described here. In view of the applicability and the convenience of Zimmer's terminology, I feel the use of such terms is not only appropriate but desirable. They are used in conjunction with or instead of the simple chronological numbering of instars wherever clarity demands it. Zimmer's terminology, in loosely translated form (with the original in parentheses), is as follows:

Manca *(Manca)*: Larval stage in which pereopod VII is still absent or rudimentary.

Juvenile *(Jugend)*: Larval stages preceding that of gonadal maturation.

Preparatory *(Vorbereitung)*: Stage preceding reproductive maturity; gonads ripening. A preparatory stage that follows a brooding stage (below) is also called an intermediate *(Zwischen)* stage.

Brooding *(Brutkleid)*: Mature, brooding female with well-developed oostegites.

Copulatory *(Hochzeitskleid)*: Mature, fully differentiated male.

Postmarsupial Development in *Eugerda tetarta*

Stage 1 (manca 1).—Body length 1.5 mm, about .3 that of a stage 10 female (fig. 24). Cephalon relatively quite large. Pereonite 1 broader than 2. Pereonite 4 tapering anteriorly. Pereonite 7 reduced, its limb absent. Pleotelson long, slender. Coxae of pereopods I-IV without anterior projections. Shape of all limbs much as in adult, except that segments of first antenna (fig. 25), uropods (fig. 34), and carpi of first and second pereopods (figs. 29, 30) are visibly stubbier. Also, carpus and propodus of pereopod V (fig. 31) are more slender. All limbs with many fewer setae and spines than in adult, the dorsal and ventral setal rows on the segments of each of the pereopods being composed of no more than one or two major setae. Molar process of mandible (fig. 27) poorly developed. Maxilliped with one pair of coupling hooks (fig. 28). Pleopod II (fig. 33) more evenly rounded. Sexes undifferentiated.

Stage 2 (manca 2).—Posterior segments of body proportionately larger. Pereonite 5 (fig. 24) with nearly parallel sides. Pleotelson broader. Molar process of mandible (fig. 27) with adult proportions. Segments of other limbs developing toward adult proportions and with more setae. Developing rudiments of seventh pereopods (fig. 32) visible through body wall of pereonite.

Stage 3 (manca 3).—Fifth pereonite now broadest anteriorly (fig. 24). Seventh pereopods present, but small, rudimentary (fig. 32). Sexual dimorphism evident for first time: in male, rudimentary buds of first pleopods present, and developing typical male condition of second pleopods visible through wall of female-like operculum (fig. 33).

Stage 4, female (juvenile 1).—Pereopod VII well developed, but still slightly undersized (fig. 32). Coxae of peropods I-IV continuing to become more pointed.

Stage 5, female (juvenile 2).—No abrupt changes. Shape of body (fig. 24) and limbs now almost as in adult. Setal count of limb segments still gradually increasing.

Stage 6, female (juvenile 3).—Lateral convexities now present on pereonite 4, posterior to origin of limbs (fig. 24).

Stage 7, female (preparatory 1).—Rudimentary oostegites present on first four pereopods. Gonads show heavy development of yolk. Animal still growing.

Stage 8, female (brooding 1).—Reproductively mature: oostegites fully developed and eggs discharged into resulting marsupium. No increase in body size over preceding stage.

Stage 9, female (preparatory 2, or intermediate 1).—Oostegites reduced to rudimentary condition. Gonads again active. Increase in body size over preceding stage.

Stage 10, female (brooding 2).—As in stage 8. No increase in size over preceding stage (figs. 24-34).

Stages 11 and 12, female (preparatory 3 and brooding 3).—As already indicated, an occasional female may succeed in going through a third reproductive cycle whose pattern follows that of the preceding two cycles.

Stage 4, male (juvenile 1).—Comments relating to stage 4 female also apply here. Last two peduncular segments of second antenna and base of flagellum stouter (fig. 26). Pleopods I much larger, now active in role as part of operculum, but still well short of adult length (fig. 33). Pleopods II now separate from each other for two-thirds of length; endopodal stylets very rudimentary, with sausage-shaped distal segment.

Stage 5, male (juvenile 2).—No abrupt changes. Shape of body and limbs essentially as in adult female. Setal count of limb segments still gradually increasing. Pleopods I a little longer (fig. 33). Pleopods II yet further separated from each other; distal segment of stylet more tapering.

Stage 6, male (preparatory 1).—Segments of second antenna yet stouter than before, still with few setae (fig. 26). First pleopods now of adult length, showing faint indications of lateral lobes (fig. 33). Second pleopods almost completely separated; endopodal stylet proportionately larger, more tapering, but still distinctly immature (fig. 33). Except for general form of second antenna and first and second pleopods, body and limbs shaped as in females of comparable size (figs. 24, 27, 29-32, 34), with minor differences: carpus and propodus of fifth pereopod perhaps broader; pleotelson with poorly developed, ventrally bent posterolateral angles.

Stage 7, male (copulatory 1).—Reproductively mature, suddenly possessing all the differences listed in the diagnosis of the mature male: Cephalon more truncate (fig. 24). Coxae of pereopods I-IV more elongate. Pereonites 5-7 with straighter sides. Pleotelson quadrate. Flagellum of second antenna densely setose (fig. 26). Last mandibular palp segment larger (fig. 27). Many setae of pereopods I-IV shorter and many unequally bifid for the first time (fig. 30). Carpus and propodus of pereopods V-VII broader, with many setae (figs. 31, 32). Pleopod I with fully developed lateral lobe, and small lateral setae on medial lobe (fig. 33). Stylet of pleopod II slender, with well developed cup and tube (fig. 33). Uropod more angular, and many setae now unequally bifid (fig. 34).

Postmarsupial Development in Chelator insignis

The development of this species is much like that of *Eugerda tetarta,* but it involves fewer stages, probably because of its smaller size (fig. 7).

Stage 1 (manca 1).—Pereopod VII absent. Sexes undifferentiated, pleopod I of male being absent and pleopods II being fused together to form typical female operculum. Corresponds to stage 1 of *E. tetarta.*

Stage 2 (manca 2).—Pereopod VII present as subcuticular *anlage.* Sexes undifferentiated, with male pleopods as in preceding stage. Corresponds to stage 2 of *E. tetarta.*

Stage 3 (manca 3).—Pereopod VII present, but rudimentary. Sexes differentiated;

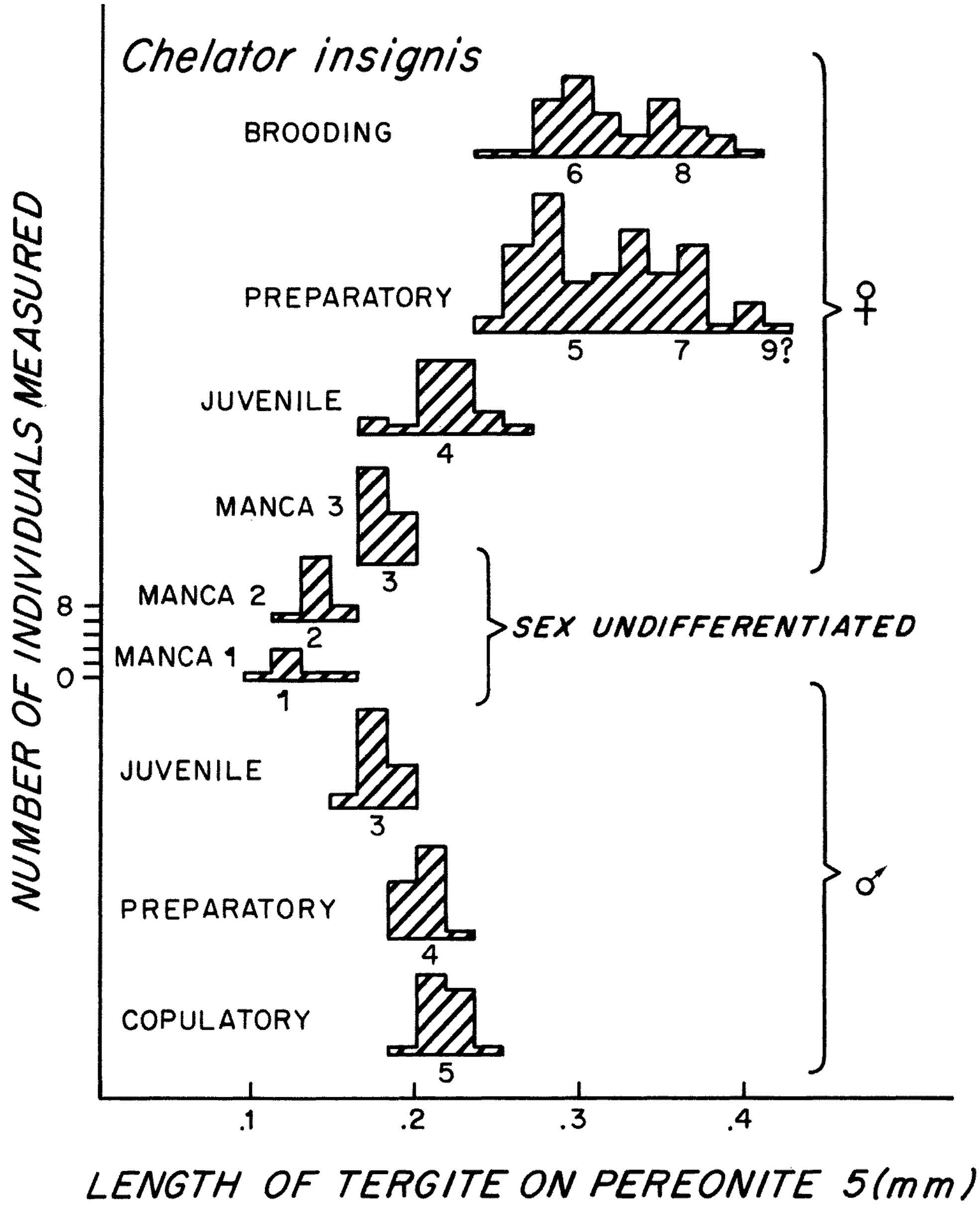


Fig. 7. Development and size frequency distribution of *Chelator insignis*. See caption of figure 6 for explanation of symbols.

pleopod I of male rudimentary, extending back one-half to three-fifths the length of pleopod II; pleopods II of male still completely fused as in female, but subcuticular *anlagen* of separate limbs visible. Corresponds to stage 3 of *E. tetarta*.

Stage 4, female (juvenile 1).—Pereopod VII well developed. No oostegites. Although the size-frequency histogram for pereonite 5 is unimodal, the spread is such that there is a possibility two stages have been lumped in this category. This stage corresponds to stages 4–6 of *E. tetarta*.

Stages 5 and 7 (preparatory 1 and 2).—Rudimentary oostegites present. Corresponds to stages 7 and 9 of *E. tetarta*.

Stages 6 and 8 (brooding 1 and 2).—Reproductively mature, with well-developed oostegites. Slight growth over preceding stage. Corresponds to stages 8 and 10 of *E. tetarta*.

Stages 9 and 10 (preparatory 3 and brooding 3).—As with *E. tetarta*, a few unusually large individuals indicate the possibility of a third reproductive cycle.

Stage 4, male (preparatory 1).—Pereopod VII well developed. Pleopod I full-sized, still immature. Pleopods II separate, still immature. Corresponds to stages 4–6 of *E. tetarta*, thus skipping juvenile stages.

Stage 5, male (copulatory 1).—Reproductively mature, with usual sudden maturation of sexually dimorphic features. Corresponds to stage 7 of *E. tetarta*.

DISCUSSION

The available material suggests that the pattern of postmarsupial development illustrated by *Eugerda tetarta* and *Chelator insignis* is the same for all the desmosomatids in my collection. In summary, the following points can be made.

Development is gradual; only when the male molts from its preparatory to its copulatory stage is there pronounced metamorphic change. Even here, the transition is not totally abrupt. The second antenna and pleopods I and II develop gradually in their general form. In some cases the shape of the pleotelson of the mature male is faintly foretold in the preparatory stage, and in *Mirabilicoxa* the development of the enormous coxal projections of pereopods I-IV is initiated in the preparatory stage.

Degree of setation is allometrically related to size, except for the dimorphic setation of the flagellum of the second antenna and the carpus and propodus of the last three pereopods. The much smaller size of the mature male is a result of a lower growth rate (defined as size increase per molt), as well as being the culmination of fewer stages.

The mature males and females are the same size as or only slightly larger than their preparatory stages. All other molts in both sexes are accompanied by substantial growth. The lack or reduction of growth of sexually maturing preparatory stages probably results from the fact that most of the nutrition of that stage is going into gonadal development and production of yolk. Wolff (1962) noted the reduction of rate of relative growth in *Haploniscus bicuspis bicuspis*. Although his conclusion that the preparatory stage must therefore be relatively short cannot yet be disproven, I find it less compelling than the explanation presented here.

It is obvious from the size range and polymodal size-frequency curves yielded by preparatory and mature females that reproductive maturity is attained at least twice. Using the same criteria, it would seem that males reach maturity only once, although this is by no means certain.

Wolff (1962) has carefully summarized the available literature on postmarsupial development in the Paraselloidea. Only in the janirid genus *Jaera* (Forsman, 1944; Bocquet, 1953) and the haploniscid genus *Haploniscus* (Wolff, 1962) is there good information on the complete developmental series. The pattern of development in the Desmosomatidae is consistent with the basic pattern seen in these other groups. Similarity of the pattern in *Haploniscus* is particularly close in that the first pleopod of the male appears one stage before that in which the second pleopods separate from each other (juvenile stages I and 2, respectively).

Desmosomatid development, particularly that of *Eugerda tetarta*, reveals one principle not previously emphasized. Not all the stages of development can be differentiated on morphological grounds alone. Size must also be carefully considered. Female stages 4–6 of *E. tetarta* present a good example. In this instance not even degree of setation can be used because it is as much a function of size as it is of degree of development.

Jaera albifrons displays a broad variation in the rate of development of males. In contrast, the development of most desmosomatid species appears to be rigidly scheduled, as is apparently also true of *Haploniscus bicuspis*. It is probable that development of deep-sea species would be uniform in view of the constancy of that environment.

While the majority of desmosomatid species display a uniformity of size within a given developmental stage, the condition in *Prochelator vulgaris* constitutes a glaring exception to this rule. Here, comparison of total body length to degree of development reveals a number of anomalies (fig. 8).

Six preparatory males (juvenile stages apparently do not occur in this species) range in size from 1.9 to 3.0 millimeters. The two copulatory males are 1.9 and 2.7 millimeters long. Thus, a number of preparatory males are significantly larger than one of the adults. Furthermore, the size range of the copulatory males is greater than normal.

Within the female series, juvenile stages range from 1.9 to 3.0 millimeters, preparatory stages range from 1.9 to 4.1 millimeters, and brooding females range from 2.7 to 4.1 millimeters in length. Here, several juveniles are noticeably longer than a large fraction of the preparatory and brooding individuals.

Finally, the single manca 3 female is much smaller than all the males of comparable development.

Some of these anomalies can be explained as resulting from the fact that specimens from all stations were lumped together in this comparison (no single station contained enough individuals to enable the comparison to be made within one station alone). Animals from different stations tend to have different size ranges, sometimes significantly so. Individuals from the II localities tend to be small, and individuals from KK localities are usually large. This difference would explain many of the anomalies. The interpopulational variation in size is not part of a geographic cline, however; the order of the stations in any one stage yields no pattern.

The largest preparatory male, from station 122 (an MM locality), may be an aberrant individual. Its morphology is more feminine than that of other, smaller males of the same stage; its body is more highly vaulted, and the flagellum of the second antenna is more slender.

The second largest juvenile female, from station 84 (a KK locality), is unusual in possessing a small pair of rudimentary oostegites on the first pereopods. As

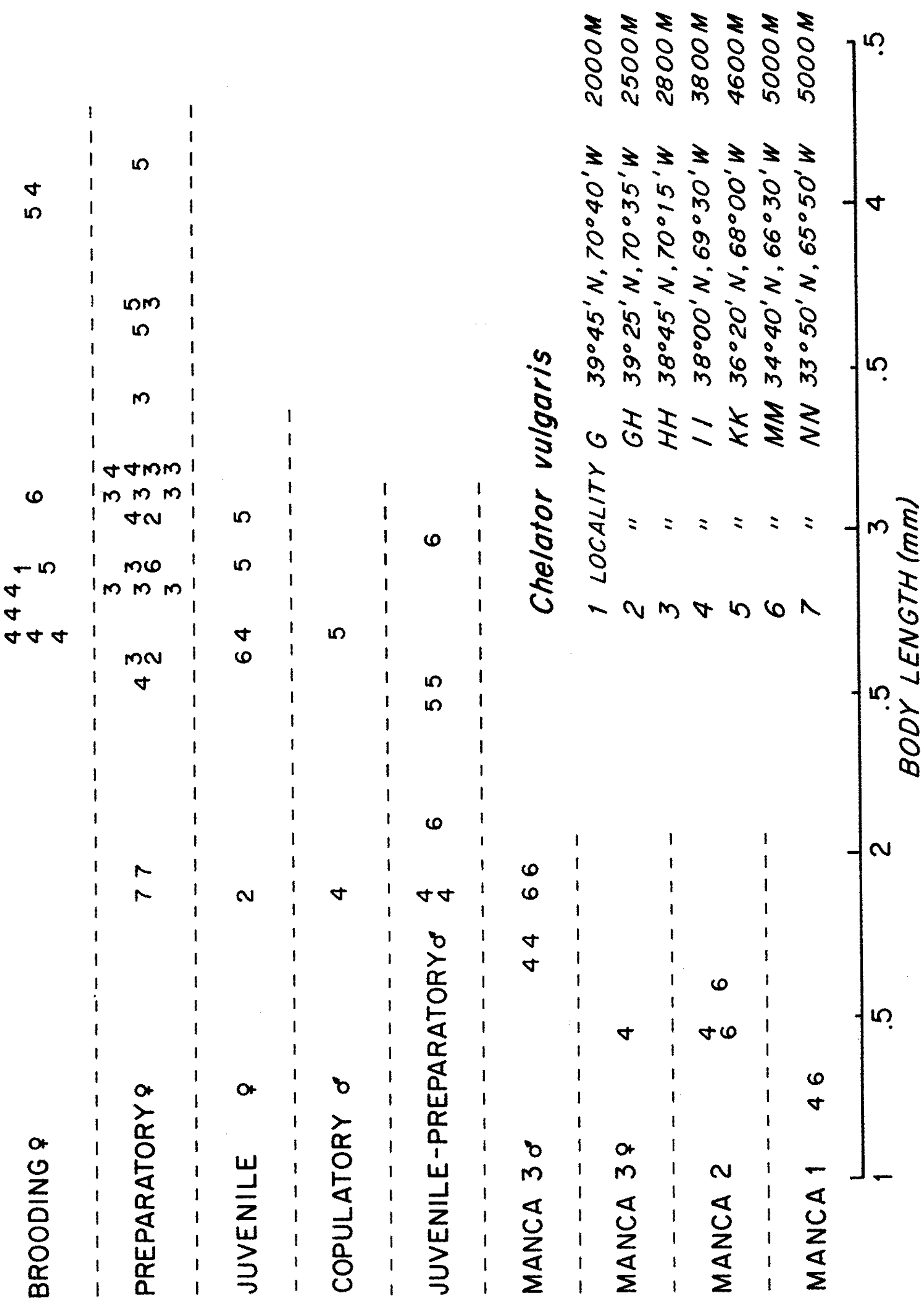


Fig. 8. Size-frequency distribution of *Chelator vulgaris*. The individuals are divided among their morphological stages, and each individual is listed by a number that represents the station from which it came.

such, this individual should perhaps be considered to be in a preparatory stage, but in having only one pair of rudimentary oostegites it is definitely not in the typical condition. This raises the possibility that development in this species is more flexible than is usually the case with desmosomatids, recalling the situation with males of *Jaera albifrons*. The female here in question may be the first of two or more stages with rudimentary oostegites, leading to a first brooding stage which is much larger than one that had been preceded by only one stage with rudimentary oostegites.

An alternative explanation for the large variation in sizes and the anomalous size differences between stages is that two extremely similar species having different size ranges have been lumped together. If this is so, I have not been able to discover any morphological clues that would allow the separation of such species.

Forsman (1944) documents the existence of a long succession of molts in the male of *Jaera albifrons* once sexual maturity has been reached. On the basis of the present data, it is not possible to determine whether mature desmosomatid males continue to molt. The size range of mature males is no greater than that of the preceding stage. This does not eliminate the possibility that molting continues, but is not accompanied by growth.

SEXUAL DIMORPHISM

Several differences of mature males from females and immature males have been discussed in the section on development of *Eugerda tetarta* and are also treated in the systematic descriptions. The differences that may be found in mature desmosomatid males are summarized as follows: Animal smaller. Body more heavily calcified, often distinctly sculptured. Forehead of cephalon more angular, resulting in more steeply sloping face. Pereonites 5–7 and pleotelson with broad marginal flanges, altering considerably their outline in plan view; posterolateral corners more angular. Coxae of pereopods I-IV more strongly produced, with large distal setae. Distal segment of mandibular palp more strongly developed, with more clawlike setae. Second antenna more robust, its flagellum with numerous sensory setae; peduncle with stout, thornlike, unequally bifid setae. Setae of pereopod II often shorter; proportions of coxa and propodus sometimes different; distal spine of dactylus rarely longer. Carpus and propodus of pereopod V broader, with more marginal setae; dactylus and its distal spine rarely longer. Pleopods I well developed, fused; pleopods II separate; pleopods I and II together forming branchial operculum, also specialized for copulation. Many setae of uropod stout, unequally bifid.

These differences are not all necessarily well developed in any one species. In some, dimorphism in the male is nearly limited to the second antennae and first and second pleopods. Some genera typically display greater sexual dimorphism than others. Dimorphism is known to be well developed in at least some species of *Whoia, Eugerda, Mirabilicoxa, Desmosoma, Thaumastosoma, Torwolia, Chelator*, and *Oecidiobranchus*.

What is the functional significance of the metamorphic changes that accompany sexual maturation of the male? The reasons for many of the changes become clear through an understanding of the tasks facing the copulatory male. He must possess sufficient mobility to reach one of the sparsely distributed mature females. (The numerical density of *Eugerda tetarta* is only about 2–10 animals per square meter according to quantitative samples F1, G1, and G9. This figure included individuals of both sexes and all stages; mature females would be much more sparse.) As the male searches, he must also be able to sense the presence of the female so that his search pattern is not simply random. Finally, he must be able to fertilize the female when he finds her.

Hult (1941) described an ability in *Eugerdella armata* to swim backward. The fifth through seventh pereopods were the primary source of motion. There can be no question that most desmosomatids possess this ability. Furthermore, the relatively broader and more setose carpus and propodus of the copulatory male clearly testify to its superior swimming ability compared with females and immature males. The broader lateral flanges on the posterior pereonites and pleotelson would aid swimming by helping to keep the animal up in the water column.

Location of the female is surely the function of the modified second antenna. The shape of the flagellar segments and the pattern of setation are such that when the antenna is extended, its numerous sensory setae are directed downward and thus easily able to test the substratum.

The modifications in the mandibular palp may be related to the changes in the second antenna or cephalon.

The first and second pleopods are modified for copulation.

Thus many of the differences in the copulatory male are easily explained. The function of the other differences, however, is unknown. Why should the shape of the cephalon change? It is perhaps a response to the need for space to house additional nervous tissue related to the highly developed sensory capacity of the second antenna. What is the function of the long coxal processes on pereopods I-IV? Why do so many setae become shorter and/or unequally bifid on the anterior pereopods and uropods?

One further question that suggests itself is: Why do the characteristics of the mature male appear so late in development and so suddenly? There may be two reasons. The first is that many of these differences, while well suited for breeding, interfere to some extent with the more routine somatic aspects of life and are therefore best postponed until they are absolutely necessary. Corollary to this explanation is the conclusion that the external morphology of the female, since it is also that of the immature male, is best adapted for somatic functions. This is not to say that the male's life is curtailed because of inability to maintain himself. That he can still feed is shown by the presence of food in the gut. Yet because of the modifications of the cephalon and anterior pereopods, the method of feeding must differ somewhat.

The second reason for a late and abrupt metamorphosis is that some reproductive structures, such as the stylets of the second pleopods, may be easily damaged and therefore are best left undeveloped until needed. This would certainly be the case with the mature oostegites of the female.

These speculations cannot be applied equally to all asellotes, or even to all desmosomatids, because many other species show only limited dimorphism. Perhaps the degree of dimorphism in desmosomatids is a measure of the extent to which behavior of the mature male differs from that of the female.

Sexual dimorphism may be so pronounced that it is difficult to assign copulatory males to the proper species (assuming, as is usually the case, the species is based on characters of the female or immature male). In the present study, the following structures proved to be sufficiently conservative as to be useful, at least on occasion, in making this decision: shape and setation of pereopod I, shape of pereopod II, dentition of incisor process and lacinia mobilis, and shape and relative size of uropodal segments.

INDIVIDUAL VARIATION

The large samples obtained by using the epibenthic sled made it possible for the first time for us to study large populations of single species. One such study was an analysis of variability in *Eugerda tetarta* collected at station 73. Some of the results of this analysis are included here.

Five specimens were selected from the last female (stage 10) and male (stage 7) stages. Their setation and the proportions of many of their parts were analyzed in detail. Particular attention was devoted to characters of taxonomic significance. Younger stages were also studied, but in less detail.

From these studies I conclude that variability in this species is low. Table 3 lists the results of measurements made of several portions of the body, primarily in the form of proportions. The range, mean, standard deviation, and coefficient of variation are included. In most cases the range of variation is less than the eye's ability to perceive it without benefit of actual measurement; an example is given in figure 9. The cases where differences are obvious tend to be ones in which the coefficient of variation exceeds 5 percent.

Setation is even more conservative (fig. 10). Within a series of setae such as the ventral row on the carpus of the second pereopod or on the basis of the maxilliped, generally the range of variation does not exceed one or two setae. The greatest variation occurred on pleopod II of the female, where the small marginal setae ranged from 26 to 38, a rather unimportant difference. Setal variation in more immature stages was of the same order of magnitude as that of the adult.

The presence of many kinds of setae is so conservative that one must conclude that such setae fulfill a specific critical function and are therefore not subject to individual variation. An example is the minute broom setae (fig. 2*A*) at the distal end of the dorsal margin on the carpus and propodus of pereopod V. Such setae probably serve a unique sensory function for those portions of the body.

Some setae are not only constant for all individuals of this species, but are present in all members of the family. For example, on the distomedial surface of the dactylus of the anterior pereopods, there is always a cluster of three minute setae. Segment 1 of the flagellum of the first antenna always bears a single distomedial seta, and segment 2 carries two distomedial broom setae. Such characters, minute though they may be, could well serve in the diagnosis of the family, unless of course they are constant features of other asellote families as well.

TABLE 3
INDIVIDUAL VARIATION IN *Eugerda tetarta* FROM STATION 73
(The sample size for each measurement is five individuals except where noted.)
BROODING FEMALE, STAGE 10

Structure	Feature	Range		Mean	Standard deviation	Coefficient of variation
		Minimum	Maximum			
Per I	D_L/P_L	.50	.55	.530	.0238	4.49
	P_L/P_W	4.8	5.2	5.00	.141	2.82
	C_L/C_W	2.7	3.0	2.86	.114	3.98
	I_L/I_W	2.0	2.2	2.12	.084	3.96
	B_L/B_W	4.4	4.7	4.52	.112	2.47
Per II	D_L/P_L	.65	.68	.664	.0152	2.28
	P_L/P_W	3.0	3.5	3.18	.192	6.03
	C_L/C_W	2.8	3.0	2.86	.097	3.39
	I_L/I_W	2.1	2.2	2.16	.055	2.54
	B_L/B_W	3.3	3.6	3.40	.122	3.58
Per V	D_L/D_W	4.9	5.9	5.46	.446	8.16
	P_L/P_W	3.5	3.8	3.57	.135	3.78
	P_L/C_L	.78	.82	.794	.0098	1.23
	C_L/C_W	2.3	2.6	2.46	.114	4.63
	I_L/I_W	2.3	2.4	2.34	.055	2.35
	B_L/B_W	3.4	3.9	3.62	.179	4.94
Per 5	W/L	1.5	1.7	1.60	.071	4.43
Body	L (mm)	4.8	5.2	4.98	.205	4.11
Pleotelson	L/W	1.1	1.3	1.18	.084	7.11
Ur	en_L/ex_L	2.1	2.3	2.22	.084	3.78
	en_L/en_W	5.8	7.7	6.52	.823	12.62
A I	Ped2 L/W	6.9	7.8	7.30	.320	4.38
	$F1_L/Ped2_L$	.81	.84	.830	.1225	14.51
	$F13_L/F1_L$	.31	.38	.354	.0270	7.62
Mpd	Pp2 and 3 L/W	1.6	1.8	1.70	.071	4.17
	Pp_W/B_W	.86	.96	.910	.0374	4.10
	$Pp3_{Lm}/Pp2_{Lm}$	.75	.81	.782	.0239	3.05
	$Pp3_{L1}/Pp2_{L1}$	.27	.33	.304	.0261	8.58
P1 II	L/W	1.0	1.1	1.04	.055	5.28

The data gathered in this comparison of individuals suggest that the range of variation of a deep-sea species is low. Such data give a frame of reference for making decisions concerning other species, but certain reservations must be kept in mind. First, there is no guarantee that other species will show the same lack of variation; the variable condition of *Whoia variabilis* (p. 73) is a good example. Second, a species may show a small standard deviation at single localities, but the arithmetic mean might well vary from place to place; the differences in size of *Chelator vulgaris* at different stations (fig. 8) may be an example. Indeed, one would expect this to occur where gene flow is restricted, such as would be the case with species lacking pelagic dispersal. This would be true of nearly all benthic peracaridans. The near identity of specimens of *Whoia angusta* (see p. 73) from Scandinavian waters with those from the transect raises important questions about the rate of gene flow and the stability of species in the deep sea.

COPULATORY MALE, STAGE 7

Structure	Feature	Range Minimum	Range Maximum	Mean	Standard deviation	Coefficient of variation
Per I	D_L/P_L	.45	.51	.476	.0219	4.60
	P_L/P_W	4.4	4.7	4.54	.115	2.53
	C_W/C_W	2.8	2.9	2.84	.055	1.93
	I_L/I_W	2.0	2.1	2.04	.055	2.69
	B_L/B_W	4.8	4.9	4.84	.055	1.13
Per II	D_L/P_L	.50	.55	.538	.0217	4.03
	P_L/P_W	3.7	3.8	3.74	.055	1.47
	C_L/C_W[a]	2.8	3.1	2.98	.126	4.22
	I_L/I_W	2.0	2.2	2.08	.084	4.03
	B_L/B_W	3.7	3.9	3.82	.110	2.87
Per V	D_L/D_W	6.3	7.0	6.56	.404	6.15
	P_L/P_W	3.3	3.5	3.40	.100	2.94
	P_L/C_L	.79	.83	.808	.0148	1.83
	C_L/C_W	2.0	2.1	2.04	.055	2.69
	I_L/I_W	2.2	2.3	2.28	.045	1.97
	B_L/B_W[b]	4.0	4.2	4.10	.141	3.43
Per 5	W/L	1.6	1.8	1.68	.084	5.00
Body	L(mm)	2.9	3.2	3.08	.130	4.22
Pleotelson	L/W	1.1	1.2	1.12	.045	4.01
Ur	en_L/ex_L	2.3	2.8	2.56	.195	7.61
	en_L/en_W	5.6	6.5	6.02	.370	6.14
A I	Ped2 L/W	4.9	5.8	5.28	.342	6.47
	$F1_L/Ped2_L$	.92	.98	.944	.0225	2.38
	$F13_L/F1_L$	.32	.40	.374	.0279	7.45
Mpd	Pp2 and 3 L/W	1.5	1.7	1.62	.084	5.18
	Pp_W/B_W	.81	.91	.862	.0396	4.59
	$Pp3_{Lm}/Pp2_{Lm}$	.78	.87	.816	.0190	2.32
	$PP3_{Lm}/PP2_{Lm}$	.31	.34	.326	.0114	3.49
P1 I	L/W	2.9	3.4	3.10	.187	6.03
	$L/med1_L$	.07	.08	.074	.00551	7.43

[a] Based on 4 individuals.
[b] Based on 2 individuals.
SYMBOLS: D = dactylus, P = propodus, C = carpus, I = ischium, B = basis, en = endopod, ex = exopod, Ped 2 = second peduncular segment, F1 = flagellum, Pp = palp, L and W, independently or as subscript = length and width, respectively (for example, B_L/B_W means length of basis divided by its width), Lm = medial length, L1 = lateral length, med1 = median lobe. A number following a letter indicates a particular segment (for example, F13 mean third flagellar segment).

DISTRIBUTION

GEOGRAPHY

In February of 1967, our program made a transect of epibenthic sled and anchor dredge stations from Dakar, Senegal, to Recife, Brazil ("Atlantis II" cruise 31). Relatively little work on the deep-sea benthos had been done in this area by previous expeditions, and no desmosomatids had ever been recorded.

To date, only two of the samples collected on this cruise have been processed. These are WHOI Benthic Stations 155 and 156 (table 1). Sorting of the desmosomatid material yielded thirteen species in the first sample and twenty-one species in the second. The genera *Balbidocolon, Eugerda, Mirabilicoxa, Thaumastosoma, Eugerdella, Prochelator, Chelator, Disparella*, and *Torwolia* were present at both

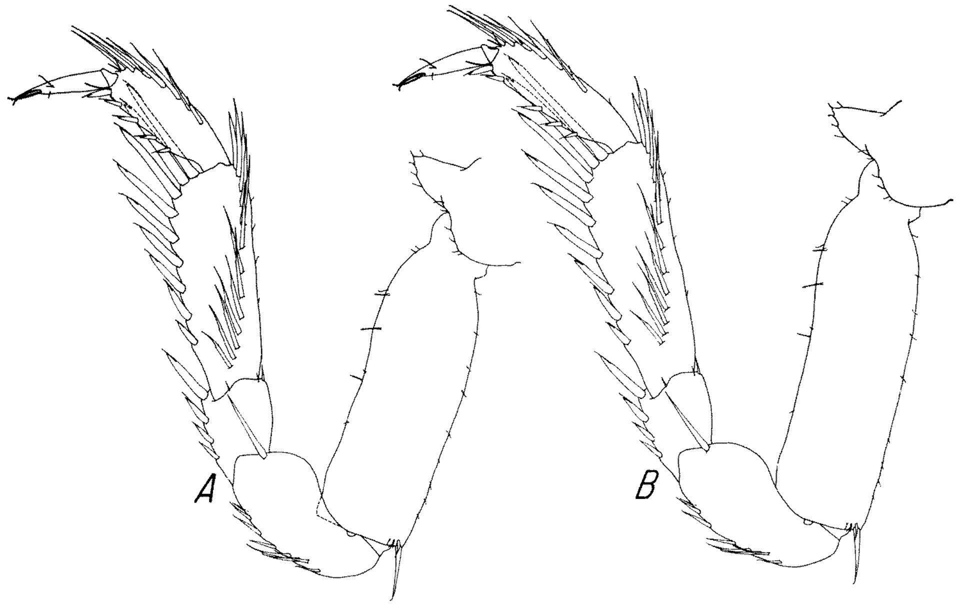


Fig. 9. Range of variability in *Eugerda tetarta*. The second pereopod of the adult female (stage 10) is chosen as a typical example. The two individuals exhibit maximum measured range listed in table 3 for the proportions considered: P_L/P_W, C_L/C_W, I_L/I_W, and B_L/B_W. *A*, pereopod II on which ratios are lowest. *B*, pereopod II on which ratios are highest.

stations. In addition, *Oecidiobranchus* was present at station 156, and *Momedossa* occurred at station 155.

In the course of the present investigation of the Gay Head-Bermuda Transect, thirty-nine species of Desmosomatidae were encountered, and more than two-thirds of these species were previously undescribed. By sampling in detail this relatively small portion of the North Atlantic, the known list of desmosomatids from the world's oceans has been increased by more than half again. This large increase has occurred in spite of the fact that prior to our program the North Atlantic was one of the better-studied parts of the ocean. Considering the number of desmosomatid species from the transect which are known from only one or two specimens, it is reasonable to conclude that further sampling in this area will yield yet further species.

From these two examples one is forced to recognize that the fauna of the deep sea is still very poorly known. We are acquainted with only a small percentage of the species and know little about the distribution of those. Thus, it is premature to attempt more than a superficial evaluation of the geography of the Desmosomatidae.

To date desmosomatids are known from the Arctic, North and South Atlantic, North Pacific, and Antarctic oceans (fig. 11). They have also been found in the Mediterranean, Caribbean, Japan, and Okhotsk seas. Their apparent absence from the South Pacific and Indian oceans is surely a function of lack of work in those areas, and it is reasonable to assume the family will eventually prove to be cosmopolitan.

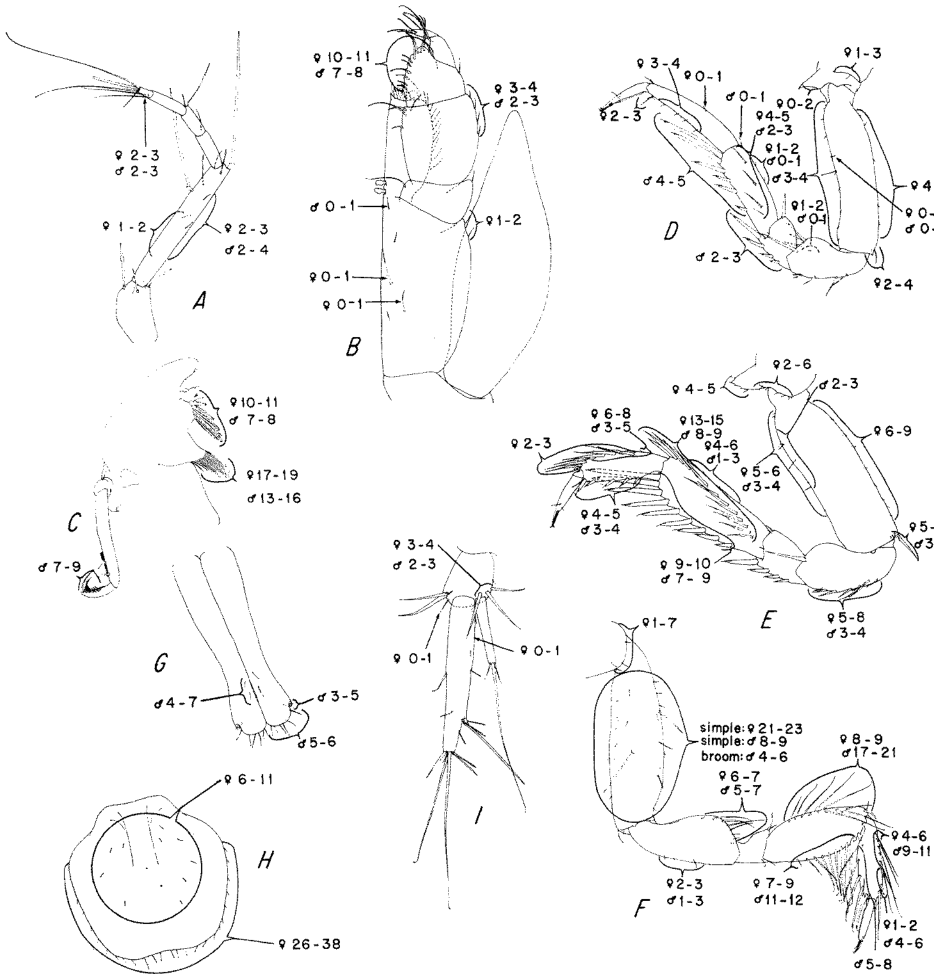


Fig. 10. Setal variation in the brooding female (stage 10) and copulatory male (stage 7) of *Eugerda tetarta*. Five individuals of each were studied, except where noted. Brackets refer to a row of setae; arrows refer to setae at specific positions. Setae unaccompanied by entries showed no variation. *A*, first antenna; *B*, maxilliped; *C*, mandible; *D*, pereopod I; *E*, pereopod II; *F*, pereopod V; *G*, pleopod I; *H*, pleopod II; *I*, uropod.

Of the genera within the Desmosomatinae, only *Eugerda* (fig. 12*D*), *Desmosoma* (fig. 12*E*), and *Mirabilicoxa* (fig. 12*F*) contain a large number of species. All three genera are known from both Atlantic and Pacific oceans. *Eugerda* is found in the Arctic Ocean as well. *Whoia* (fig. 12*B*), *Momedossa* (fig. 12*C*) and *Thaumastosoma* (fig. 12*H*) are few in species, but nevertheless are also known from both Atlantic and Pacific oceans. *Balbidocolon* (fig. 12*A*) is known from one species in the North Atlantic and two still undescribed species from the Equatorial Atlantic. A species collected by Carey in the Pacific off the coast of Oregon probably also belongs to this genus. *Echinopleura* (fig. 12*G*) is limited to the North Atlantic, except for an additional occurrence in the adjacent Mediterranean. Future collections should broaden the range of most of these genera.

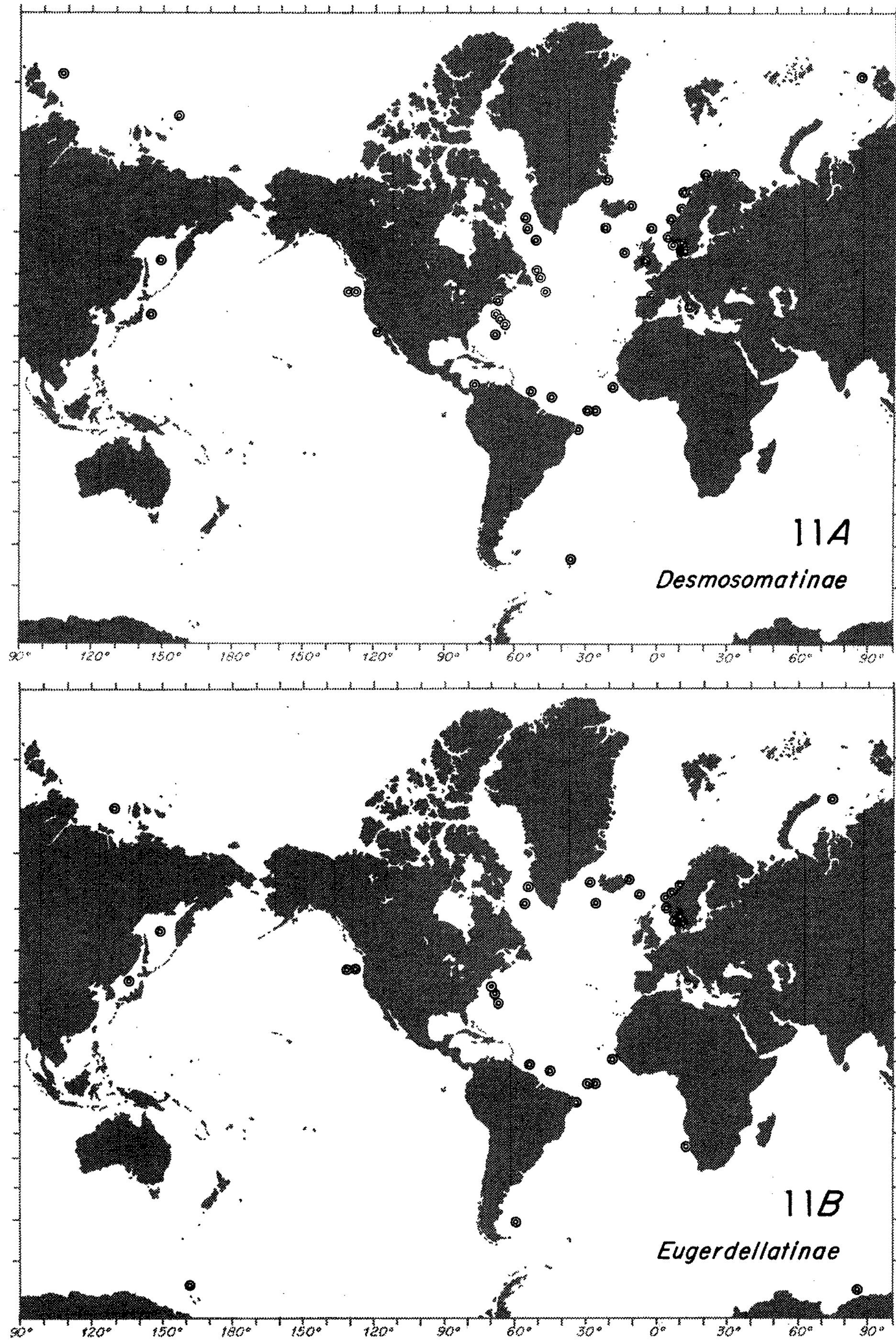
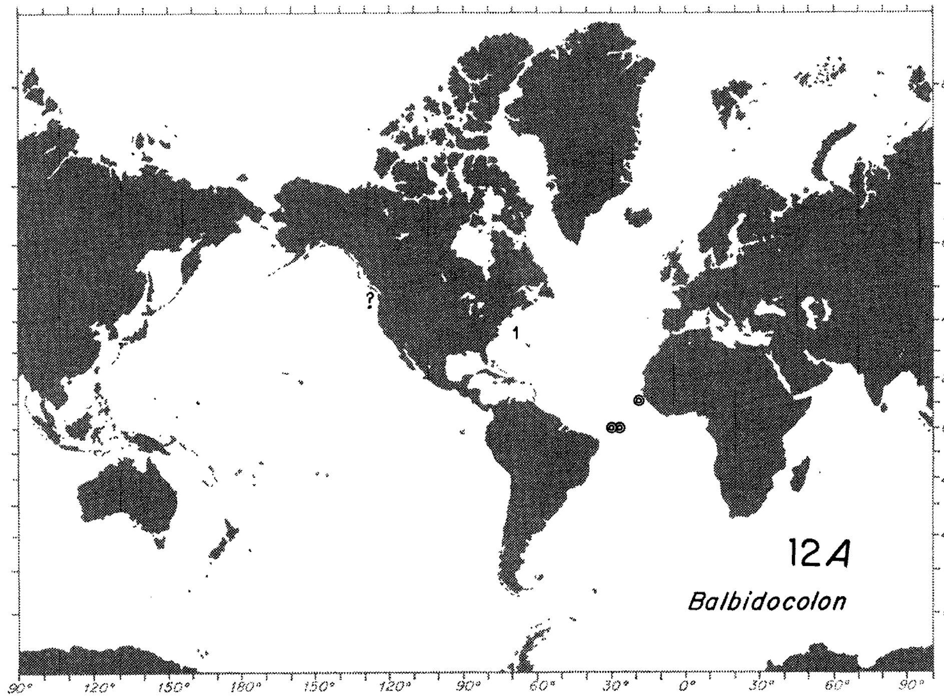
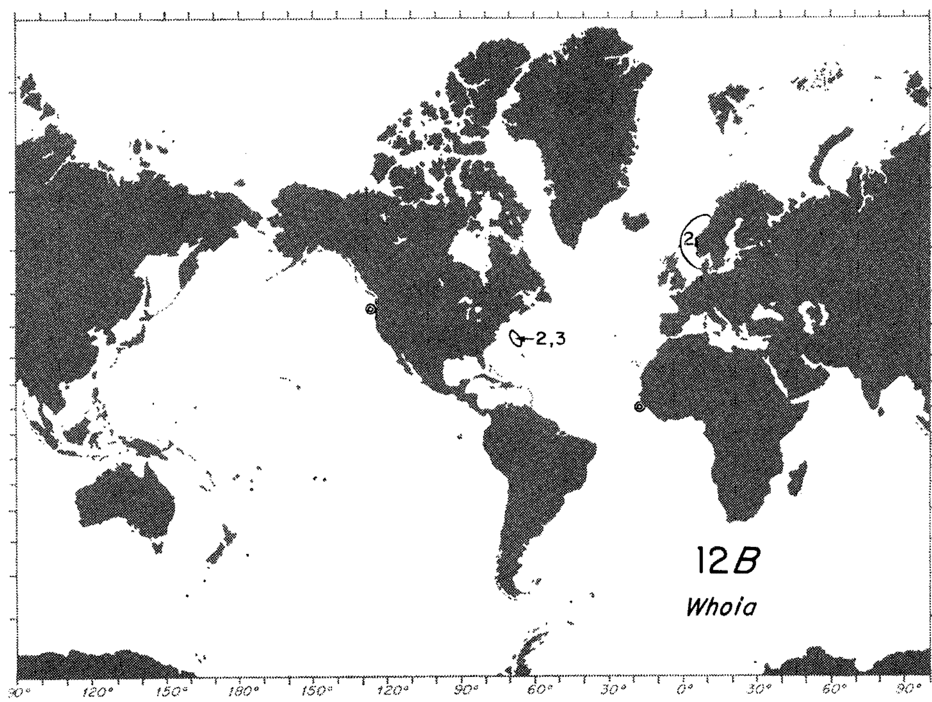
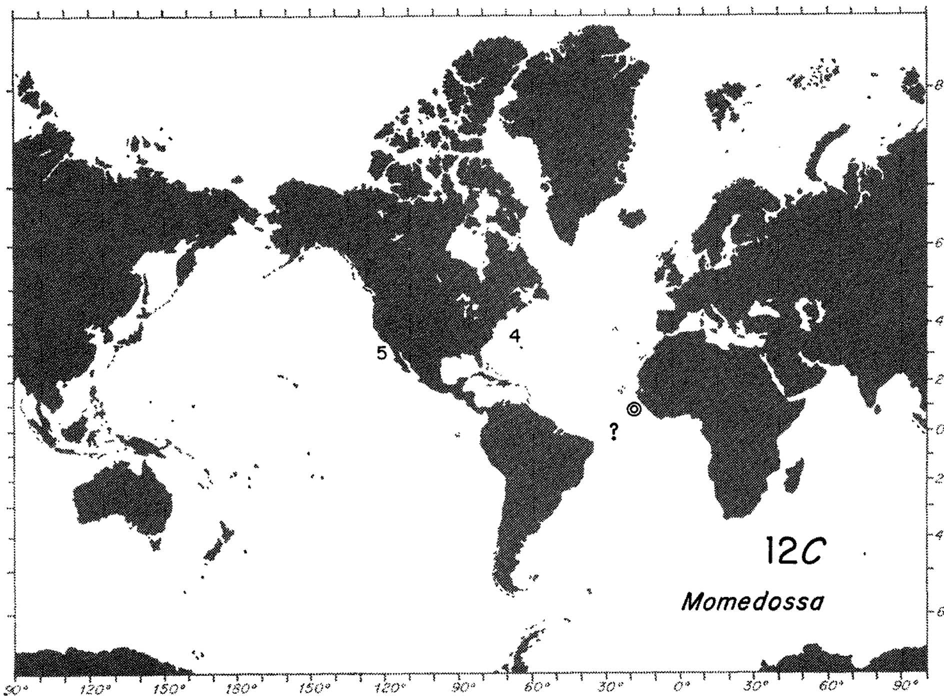


Fig. 11. Known world distribution of the two subfamilies, Desmosomatinae and Eugerdellatinae. Each concentric circle marks a specific spot or general area from which members of the subfamily have been found. *A*, Desmosomatinae; *B*, Eugerdellatinae.





For legend to figure 12*A*-*O*, see page 56 below.


12C
Momedossa
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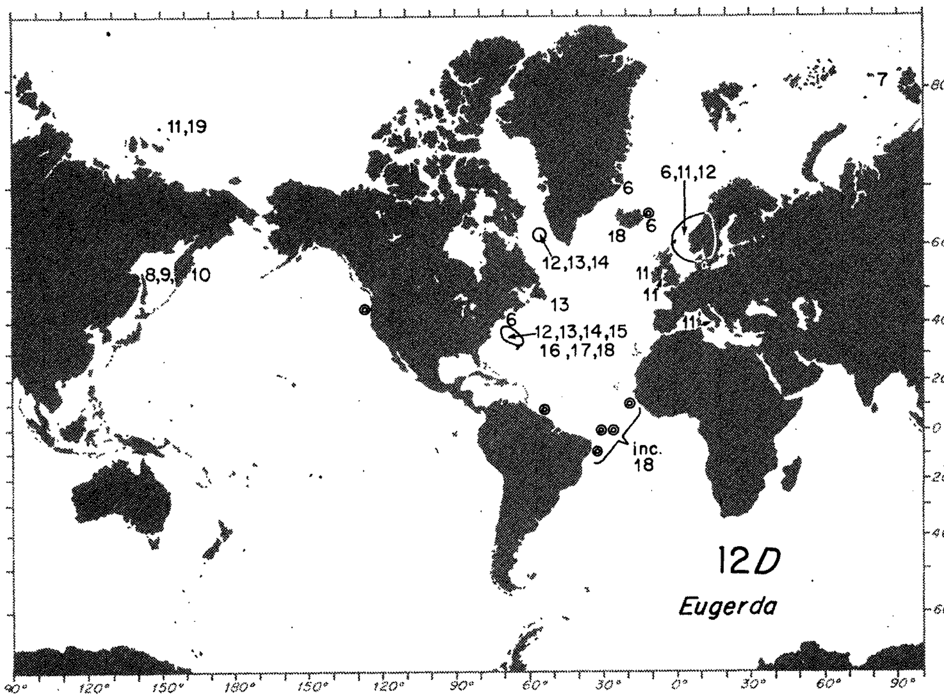
4
?


12D
Eugerda
11,19
8,9, 10
6,11,12
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12,13,14,15
16,17,18
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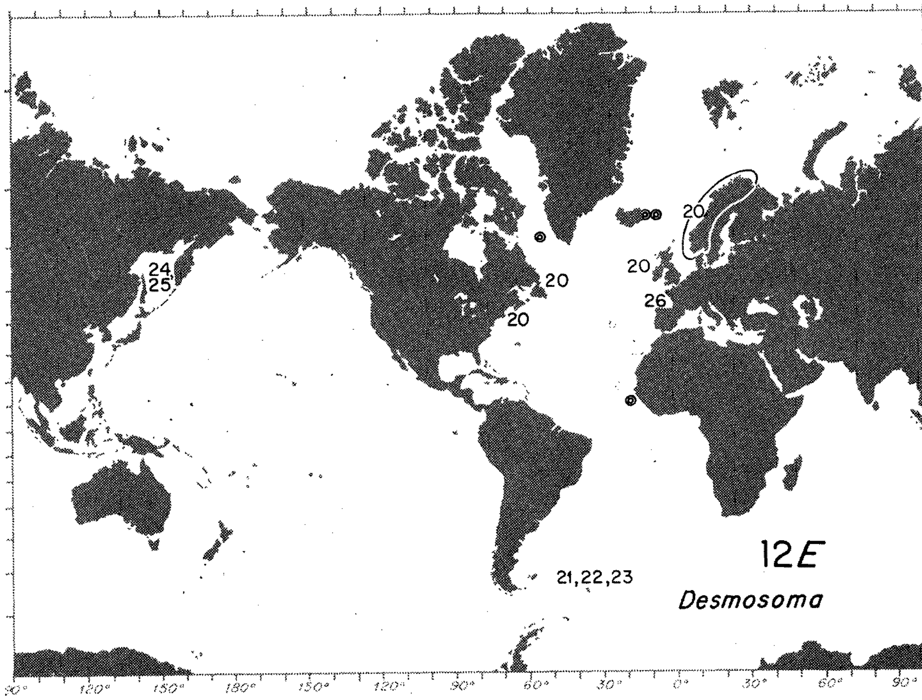
18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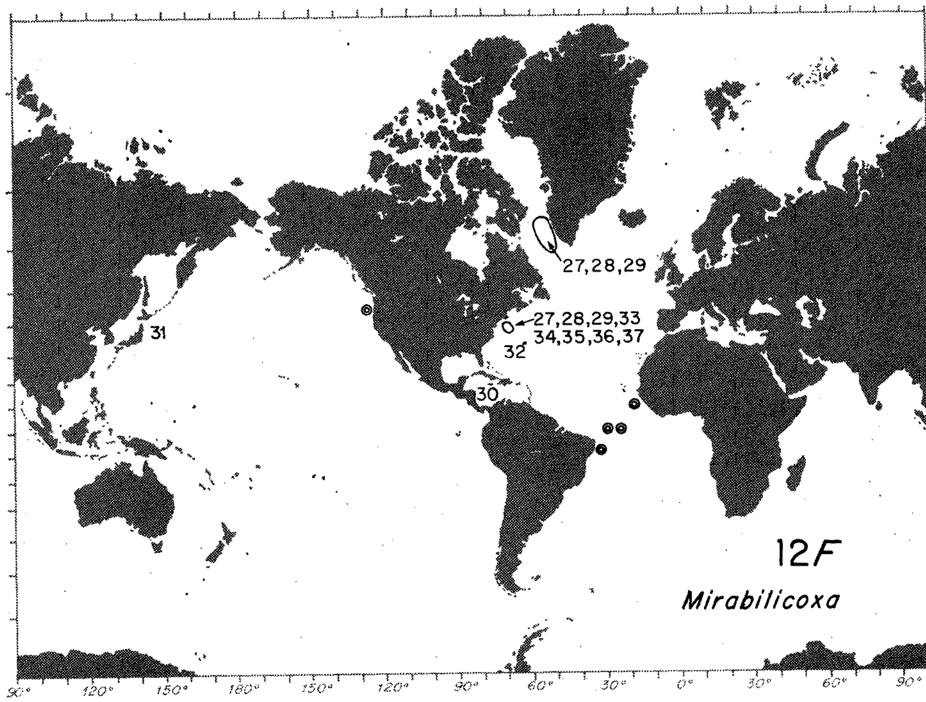
21,22,23
12E
Desmosoma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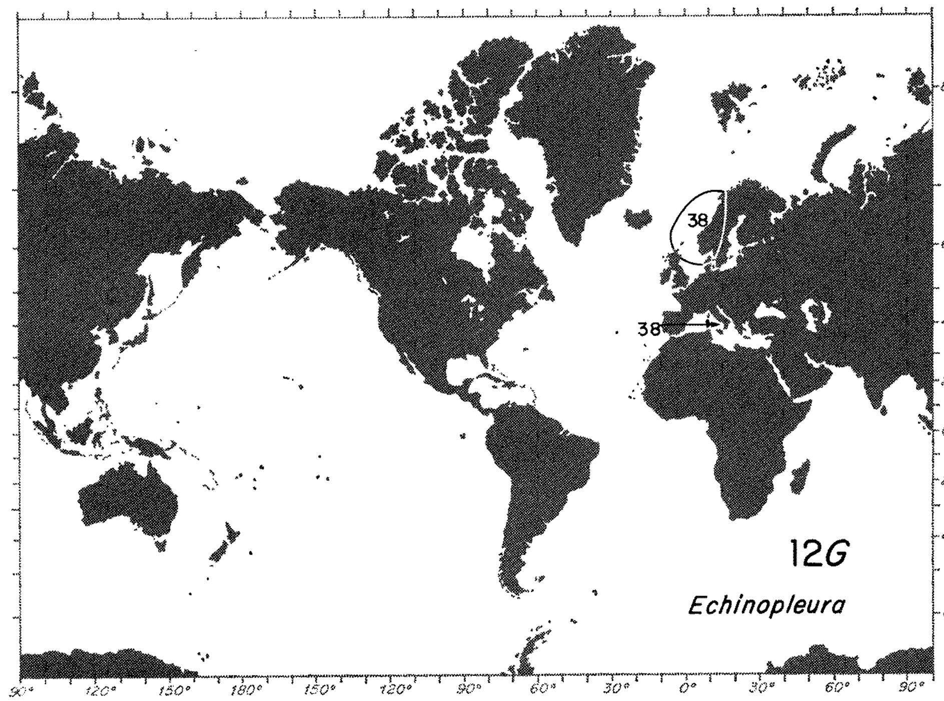
12F
Mirabilicoxa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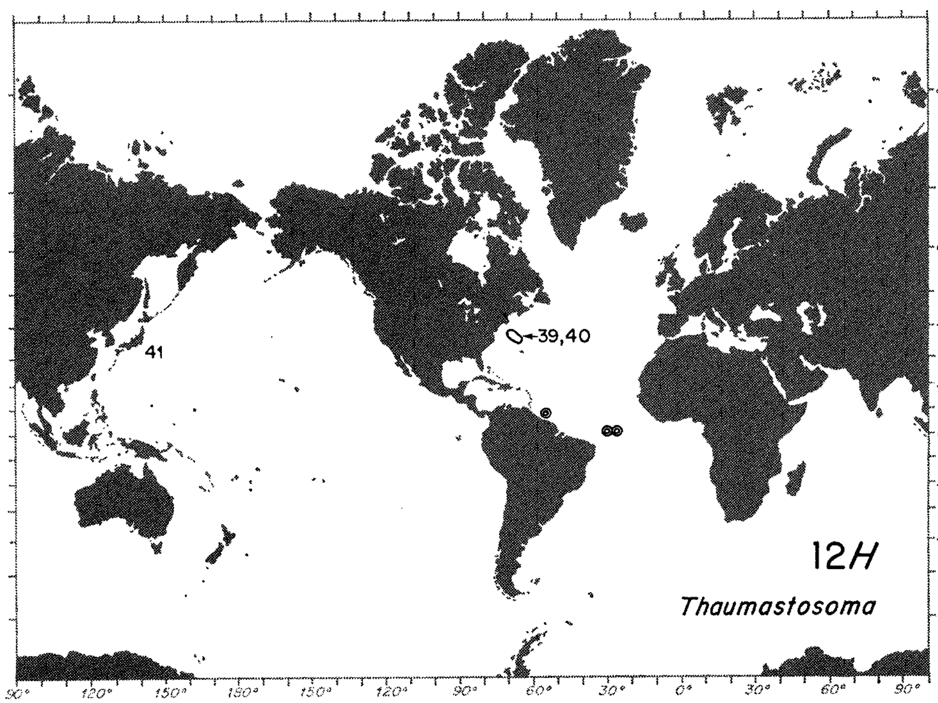
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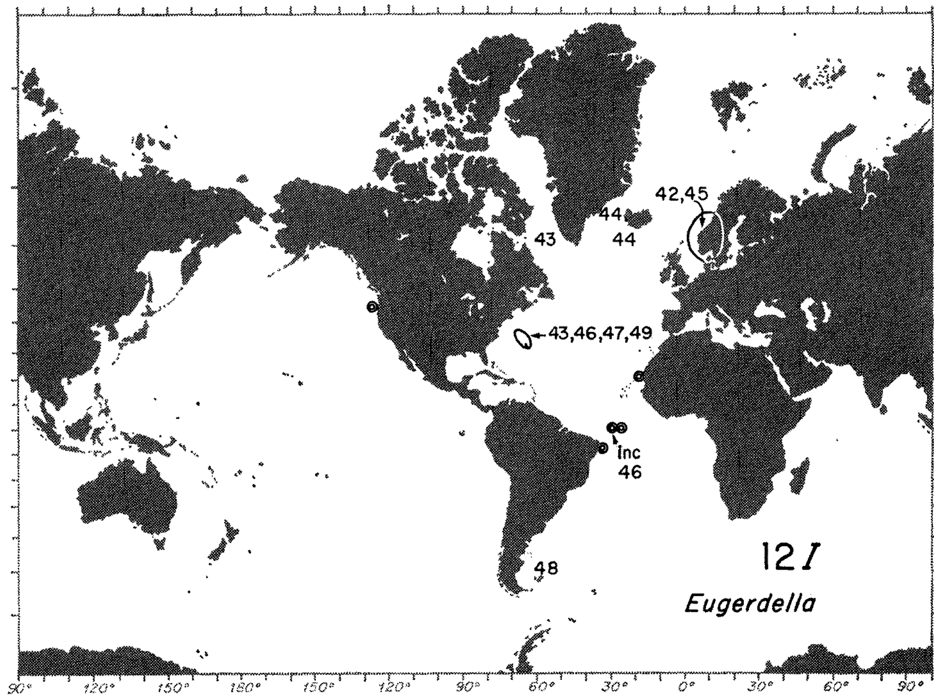
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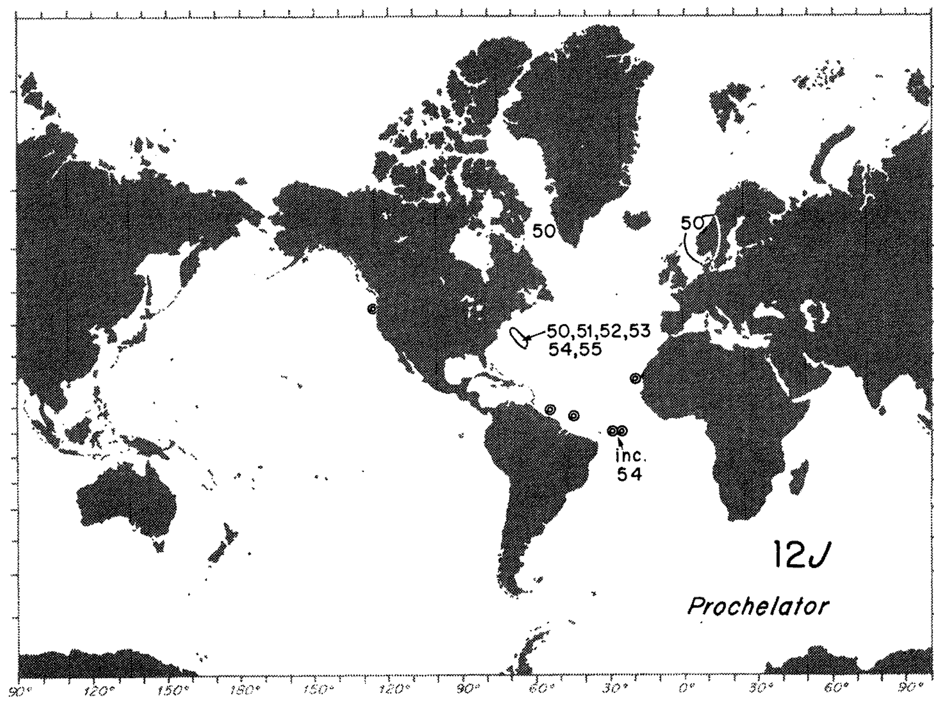
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Prochelator
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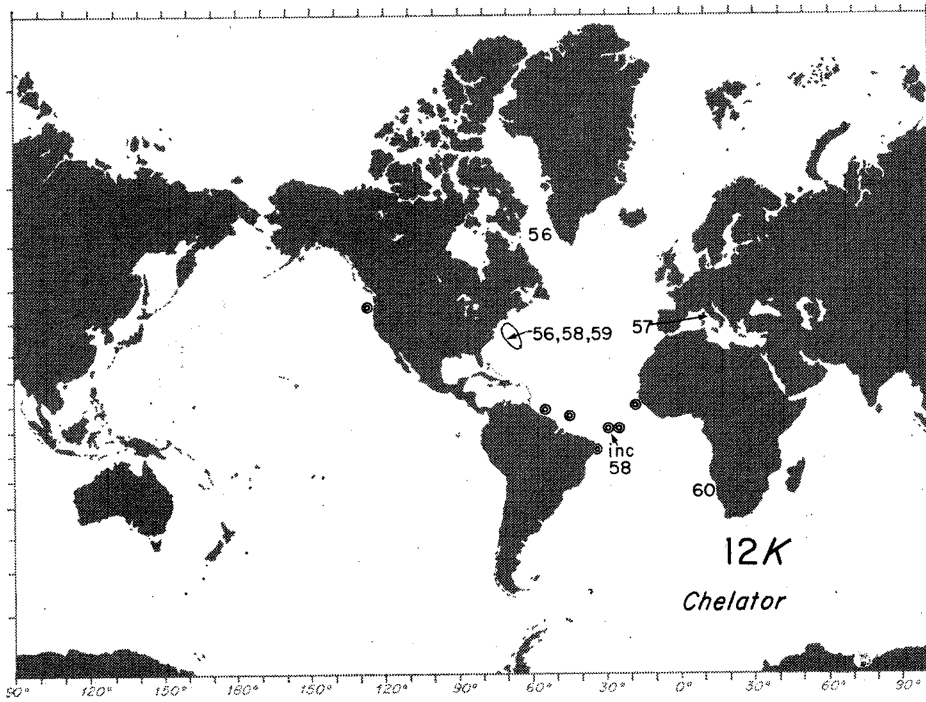
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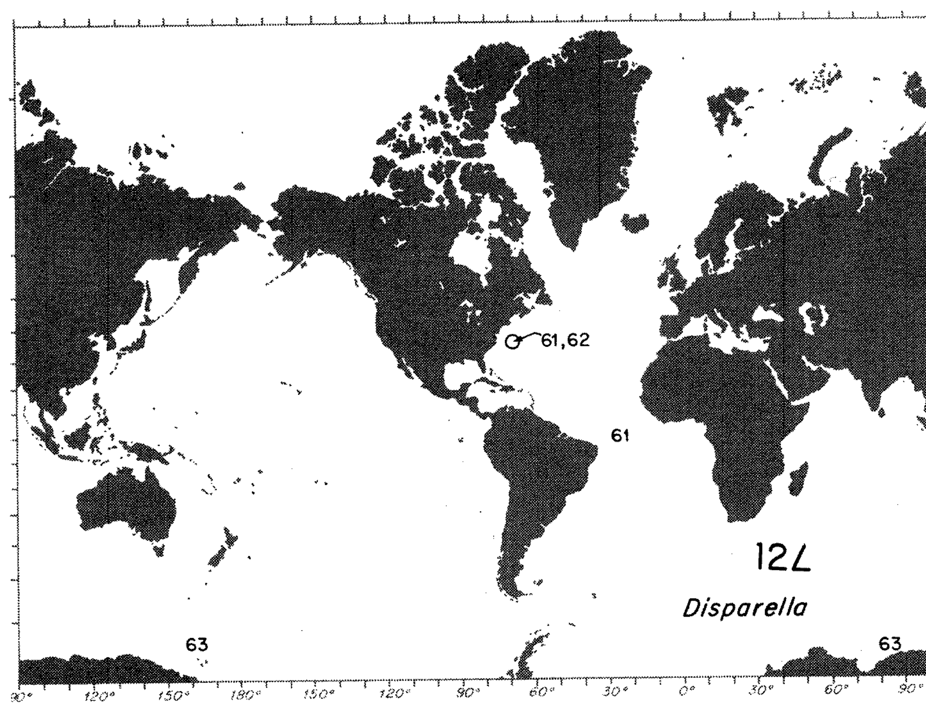
inc
58
60
12K
Chelator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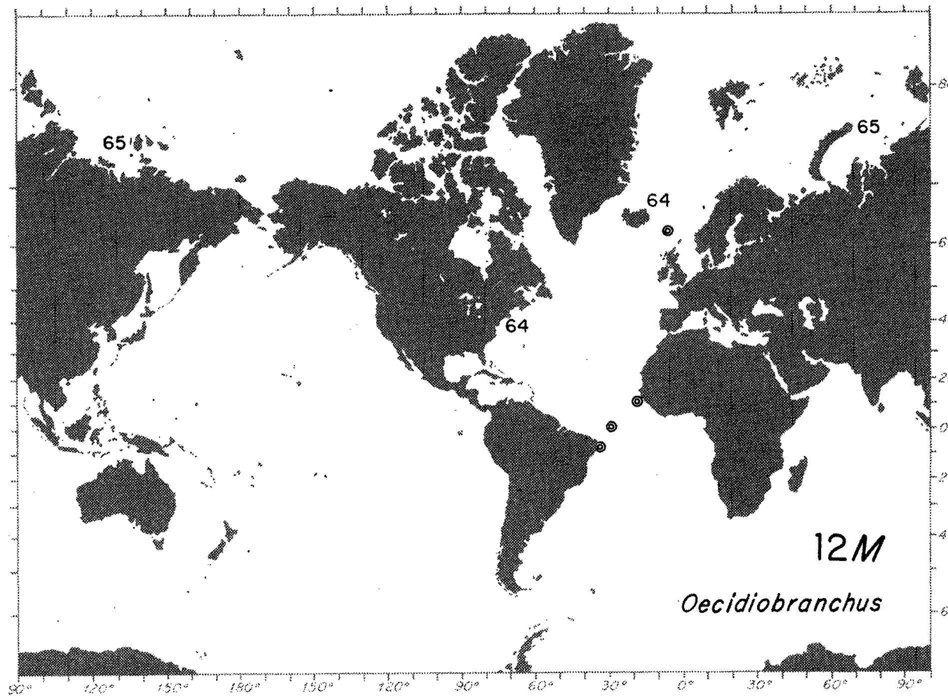
12L
Disparella
63
63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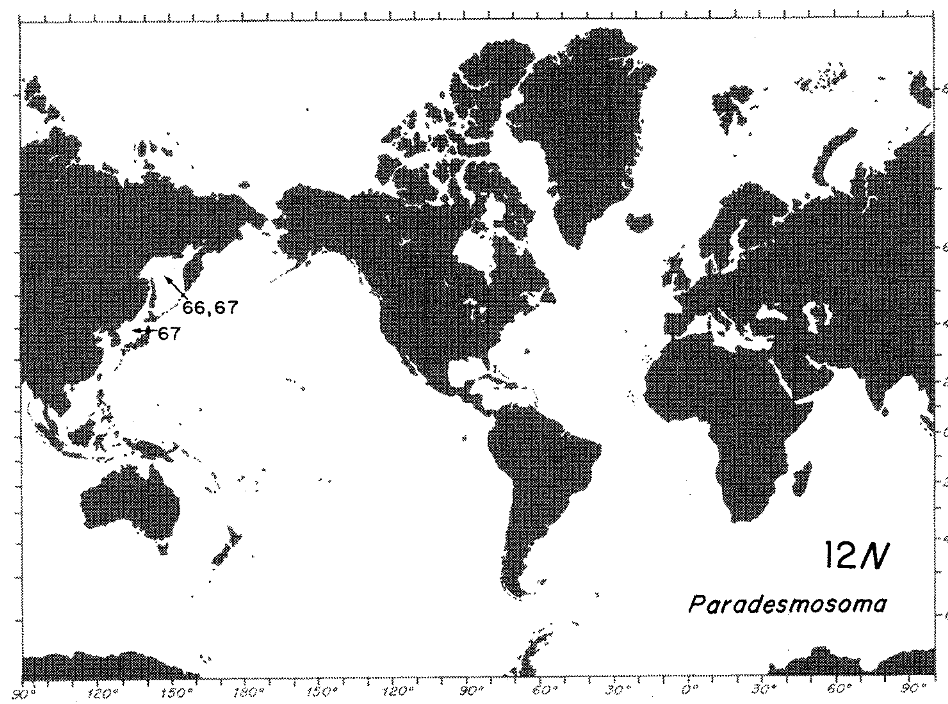
12M
Oecidiobranchus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12N
Paradesmosoma

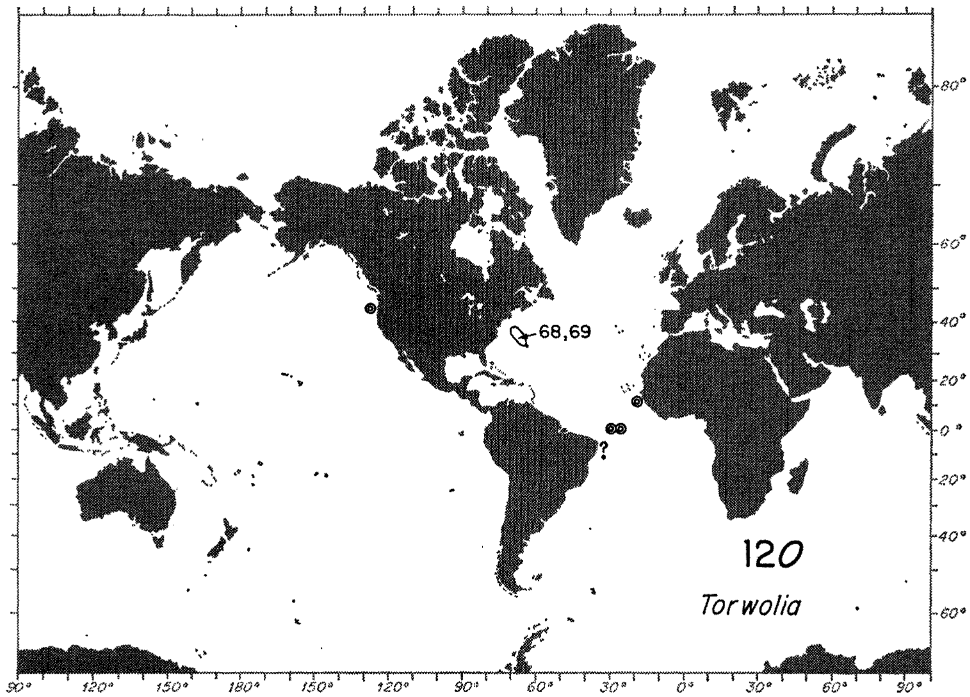

Fig. 12. Known world distribution of the desmosomatid species, grouped by genus. Each number corresponds to those in the list of species on page 62 ff. and marks specific spot or general area where that species has been captured. Concentric circles mark places where the genus is known to exist, but where the material has not been identified to species. A question mark indicates a possible occurrence of the genus. *A, Balbidocolon; B, Whoia; C, Momedossa; D, Eugerda; E, Desmosoma; F, Mirabilicoxa; G, Echinopleura; H, Thaumastosoma; I, Eugerdella; J, Prochelator; K, Chelator; L, Disparella; M, Oecidiobranchus; N, Paradesmosoma; O, Torwolia.*

Within the Eugerdellatinae, *Eugerdella* (fig. 12*I*), *Prochelator* (fig. 12*J*), and *Chelator* (fig. 12*K*) are all quite well represented in the Atlantic Ocean. *Chelator* is also known from the Mediterranean Sea. That these genera actually have a much broader distribution is well proven by their presence in Carey's collections off Oregon. *Disparella* (fig. 12*L*) is probably also widely distributed, being found in the Atlantic Ocean, off Antarctica south of the Indian Ocean, and south of New Zealand. *Oecidiobranchus* (fig. 12*M*) is known primarily from the Atlantic, but is found in the Arctic Ocean as well.

The unusual *Paradesmosoma* (fig. 12*N*) is known only from the western North Pacific. In view of the intensity of collecting in the North Atlantic, it is significant that it has never been found there. Probably this genus has a limited distribution.

Torwolia (fig. 12*O*) is known from the North and Equatorial Atlantic Ocean and from the Pacific Ocean off Oregon. Its absence from collections made by previous expeditions elsewhere in the world may be an artifact of the very small size of individuals belonging to this genus.

Kussakin (1965) has claimed a bipolar distribution for the Desmosomatidae. The abundant representation of most of the genera of this family at the abyssal Equatorial Atlantic stations 155 and 156 clearly shows this conclusion to be in error.

From the data presented here, it would appear that most of the genera of Desmosomatidae will ultimately prove to have a cosmopolitan distribution.

Analysis of the geographic distribution of species is handicapped not only by the sparsity of samples, but by the apparent patchiness of a species within the range of the environment apparently acceptable to it. The fact that a species was found in abundance in one sample from a given locality is no guarantee that it will even be represented in another sample taken at the same locality. Thus, over two hundred individuals each of *Eugerda tetarta* and *Chelator insignis* were retrieved from station 73, but in an equally successful sample from the same locality, station 128, fewer than twenty-five individuals of each were obtained. In such cases it is not possible to decide whether we are dealing with aggregation or whether, from the point of view of the species, the environments represented in the two samples are not actually the same. Nor can we reject with certainty the possibility that the sled was sampling in different ways.

When species occur in low densities or when the sampling device is inefficient and captures only a small fraction of the fauna at best, the absence of a species in a sample is no guarantee of its absence from that area. Thus, *Torwolia subchelatus* occurs along the transect from locality GH to NN, but in those samples where it was found, it occurs in such low numbers that it is no surprise that it is missing from many samples taken from the middle of its range.

From the data available today, it is apparent that for the most part desmosomatid species have limited distribution. Of the sixty-nine species, only seven have been found in more than one ocean or sea. *Eugerda filipes* (fig. 12*D*, no. 11) is known from the Arctic (Kussakin, personal communication), North Atlantic (Hult, 1941), and Mediterranean (*ibid.*). *Prochelator abyssalis* (fig. 12*J*, no. 54), *Disparella valida* (fig. 12*L*, no. 61), *Eugerdella ischnomesoides* (fig. 12*I*, no. 46), and *Chelator vulgaris* (fig. 12*K*, no. 58) are known from both North and Equatorial Atlantic. *Echinopleura aculeata* (fig. 12*G*, no. 38) has been found in the North Atlantic (Hult, 1941) and Mediterranean (*ibid.*). *Paradesmosoma orientale* (fig. 12*N*, no. 67) was collected in both the Sea of Japan and the Okhotsk Sea (Kussakin, 1965).

The only ocean where species limited to one ocean are known to be broadly distributed is the North Atlantic. This is a result of the intensity of collecting in this part of the world. Five species (*Whoia angusta* (fig. 12*B*, no. 2), *Eugerda tenuimana* (fig. 12*D*, no. 6), *E. intermedia* (fig. 12*D*, no. 12), *Desmosoma lineare* (fig. 12*E*, no. 20), and *Prochelator lateralis* (fig. 12*J*, no. 50)) are known to range at least as far as from Scandinavian waters (Hult, 1941) to the northeastern United States (Kussakin, personal communication; present paper). *Eugerda fulcimandibulata* (fig. 12*D*, no. 18) and *Oecidiobranchus plebejum* (fig. 12*M*, no. 64) are found off northeastern United States and in Icelandic waters (Hansen, 1916). Seven species (*Eugerda latipes* (fig. 12*D*, no. 13), *E. tetarta* (fig. 12*D*, no. 14), *Mirabilicoxa gracilipes* (fig. 12*F*, no. 27), *M. similis* (fig. 12*F*, no. 28), *M. longispina* (fig. 12*F*, no. 29), *Eugerdella natator* (fig. 12*I*, no. 43), and *Chelator insignis* (fig. 12*K*, no. 56)) range from northeastern United States to Davis Strait (Hansen, 1916).

The one-ocean distribution of most desmosomatid species may be related to mode of life. As with all peracarids, the young are carried in the marsupium of the female and leave this marsupium essentially as juveniles. From the external morphology and from Hult's (1941) observations of living organisms, we know that desmosomatids are capable of swimming. They are not strong swimmers, however, being primarily crawlers or burrowers. Thus, there are no truly pelagic stages and therefore no well-developed mechanism for dispersal. Under these circumstances gene flow over long distances will be restricted, and relatively minor barriers could be sufficient to block it completely, allowing widely distributed species (if such exist) to split into one or more daughter species.

Zonation

Most desmosomatid species have restricted depth distributions (fig. 13). Within the transect, only two species have depth ranges over 2,500 meters; *Torwolia subchelatus* and *Eugerda fulcimandibulata* both display depth ranges of 3,100 meters. The latter species has a total range, considering all known localities, of 4,500 meters.

On the Gay Head-Bermuda Transect, where the most information is available, desmosomatids first appear on the outer continental shelf at station 172, where the depth is 119 meters. Descending into deeper water, there is a gradual replacement of species, with no pronounced change in the rate of replacement with depth. The slope, rise, and abyssal plain faunas merge smoothly with one another, and to consider them discrete entities would be to create artificial boundaries where none really exist. These findings are in agreement with Wolff's (1962) conclusions on the zonation of deep-sea asellotes in general, and stand in contrast to those of Vinogradova (1962).

At the shallow end of the family's range on the transect, the Desmosomatidae is first represented by only a couple of species (fig. 13). There is a definite, gradual increase in the variety of species with depth, so that some of the deeper stations contain a remarkably large diversity (table 1), suggesting that this family is basically a deep- or cold-water family.

Many authors (Ekman, 1953; Wolff, 1962) have commented on the widespread phenomenon of submergence, that is, the tendency for a taxon with a broad latitudinal distribution to be found in deeper water at lower latitudes. Hult (1941) mentioned this tendency for four species of isopods, including *Eugerdella armata* (fig. 12*I*, no. 45). At the northern end of its range along the Scandinavian coast (Trondheim Fjord) this species was captured in water as shoal as 50 meters. Toward the southern end of its range, in the Skagerrak, however, it was not found in water shallower than 115 meters.

Of those desmosomatid species whose known distribution is broad enough to allow meaningful comparisons of depth range at widely different latitudes, only two show changes in depth with latitude. *Whoia angusta* (fig. 12*B*, no. 2) ranges from about 1,000 to 2,500 meters on the transect, but in Scandinavian waters its range is much shoaler, from 50 to 681 meters (Hult, 1941). Similarly, *Prochelator lateralis* (fig. 12*J*, no. 50) is found from 824 to 2,021 meters on the transect, and from 50 to 460 meters in the Scandinavian region (Hult, 1941). These are true examples of high-latitude emergence, for although future collecting may find

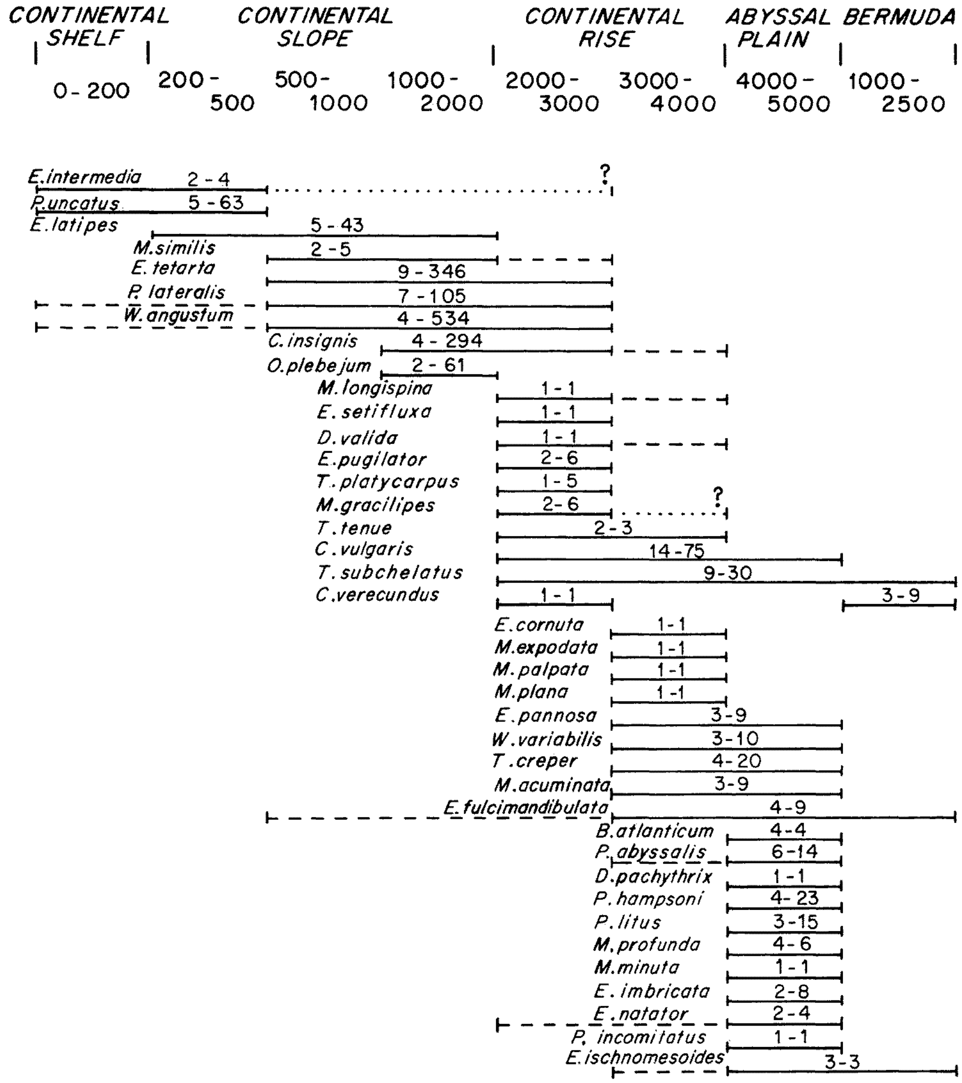

Fig. 13. Depth distribution of species found on the Gay Head-Bermuda Transect. The solid line marks the known depth range on the transect. The dashed line marks extension of the depth range by records from elsewhere in the world. The dotted line indicates possible extension of the depth range on the transect by questionable individuals. In each pair of numbers above the solid line, the first represents the number of stations and the second the number of individuals on which our knowledge of the distribution is based.

these species at somewhat shallower depths in the region of the transect, it is most unlikely that they will be found in water anywhere near as shallow as that of the Scandinavian records. The reason for this conclusion is discussed below.

Just as three species show emergence into shallower waters at the northern end of their ranges, study of the depth distribution of the Desmosomatidae as a whole reveals a general pattern of high-latitude emergence. Most of the records of occurrence in depths of less than 200 meters are from latitudes of 50° or higher

TABLE 4
KNOWN OCCURRENCES OF DESMOSOMATIDS AT DEPTHS SHALLOWER THAN 200 METERS

Genus	Species	Depth (in meters)	Locality	Latitude
Whoia	*angusta*	50-175	Scandinavia	58-63°N
Eugerda	*tenuimana*	25-140	Irish Sea	55-58°N
		18	Faroe Islands	62°N
		16	Iceland	65°N
		16	E. Greenland	69°N
	(= *lobiceps*)	12	Maine	44°N
	fragilis	32	Okhotsk Sea	?
	kamtschatica	68	Okhotsk Sea	?
	elegans	105	Okhotsk Sea	?
	filipes	50-150	Scandinavia	58-63°N
		62	Irish Sea	54°N
	intermedia	116-150	Scandinavia	58-63°N
		119	South of Cape Cod	40°N
	zenkewitschi	65	Arctic	76°N
Desmosoma	*lineare*	5G-140	Scandinavia	58-69°N
		172	Gulf of Maine	43°N
	australe	64	South Georgia Island	66°S
	brevipes	64	South Georgia Island	66°S
	modestum	150	South Georgia Island	66°S
Echinopleura	*aculeata*	27-195	Scandinavia	58-63°N
		100	Capri	40°N
Eugerdella	*coarctata*	116-175	Scandinavia	58°N
	armata	40-193	Scandinavia	58-63°N
	falklandicum	16	Falkland Islands	68°S
Prochelator	*lateralis*	50-175	Scandinavia	58-63°N
	uncatus	119-123	South of Cape Cod	40°N
Chelator	*striata*	116	Walvis Bay	24°S
Oecidiobranchus	*polare*	40	Arctic	76°N
Paradesmosoma	*conforme*	105	Okhotsk Sea	?
	orientale	95	Okhotsk Sea	?

(table 4). The exceptions to this are *Eugerda lobiceps* (= *E. tenuimana* according to Hult, 1936) (fig. 12*D*, no. 6) from 12 meters on the coast of Maine (Procter, 1933), *Echinopleura aculeata* (fig. 12*G*, no. 38) from 100 meters off Capri, Italy (Lo Bianco, 1903-04), *Chelator striatus* (fig. 12*K*, no. 60) from 126 meters off Walvis Bay, South Africa (Menzies, 1962), *Desmosoma lineare* (fig. 12*E*, no. 20) from 172 meters of water in the Gulf of Maine (Verrill station 67-53), and *Prochelator uncatus* (fig. 12*J*, no. 51) and *Eugerda intermedia* (fig. 12*D*, no. 12), both on the continental shelf on the Gay Head-Bermuda Transect at a depth of 120 meters.

An analysis of average yearly temperature cycles helps explain the observed distribution of the family, especially those occurrences in water shallower than 200 meters. The source of the temperature data, unless indicated otherwise, is the Thermohaline Data Collection of the Woods Hole Oceanographic Institution, under the direction of Miss Elizabeth H. Schroeder.

The tendency for members of the Desmosomatidae to come into shallow waters only at high latitudes fits well into a hypothesis that the family is primarily adapted to cold water. At the depths of shallowest occurrence for species in the Atlantic, the temperature is below 10°C for most, if not all, of the year. For those Atlantic species whose shallow-water occurrence is at latitudes of 50° or higher, only a couple of localities experience yearly temperatures higher than 13°C (Skagerrak, 58°N, 11°E, at 30 meters, averaging 14.9°C in August; Irish Sea, 54°N, 04°W, at 46 meters, averaging 14.1°C in September).

The *Eugerda tenuimana* (= *lobiceps*) locality is in the cold waters of the Gulf of Maine and experiences temperatures like those of somewhat higher latitudes. The temperature here ascends to about 11°C at 12 meters in September and October, but is below 10°C for the rest of the year, reaching a minimum of 2.2°C in March and April.

At 172 meters in the Gulf of Maine, the depth at which *Desmosoma lineare* was found, the mean temperature is 5°C and the annual fluctuation is only about 1° (Schopf, 1967).

At 120 meters on the outer continental shelf, where desmosomatids (*Eugerda intermedia* and *Prochelator uncatus*) first appear on the transect, the temperature exceeds 10°C for much of the year (Walford and Wicklund, 1968). It rarely exceeds 12.5°C, though. Thus, the annual range is somewhere between 2.5 and 5.0°. In contrast, at stations 170 and 171 (40°34'N, 70°51'W) in 70 meters of water, where no desmosomatids were recovered in spite of the huge size of the samples, the fluctuation is much higher, with temperatures ranging from 5°C to more than 12.5°C. This is an annual fluctuation of 7.5-10.0°. It should be noted that the warmest temperature is about the same in these two areas, suggesting that the amount of temperature variation is the important difference. Because the temperature range is so great on the middle and inner continental shelf south of Cape Cod, it is unlikely desmosomatids will ever be found there.

The environment at 100 meters off Walvis Bay and Carpi is in sharp contrast to the usual situation. Here the temperature seldom, if ever, descends below 12°C, and may get as high as 15°C. The ability of desmosomatids to live at such high temperatures may be a result of the relatively great thermal stability in those areas. At 100 meters at Walvis Bay, the maximum temperature range is only 3°, and at the same depth off Capri it is only 1.2°. Thus, although the desmosomatids living in these areas experience higher temperatures than those found at high latitudes, the degree of temperature fluctuation is actually lower. For instance, at 76 meters in the Oslo Fjord, the fluctuation is 7°. In Gullmars Fjord at 46 meters, it is 11°, and at 46 meters in the Irish Sea it is 7.4°. Only in the Arctic Ocean and Falkland Island localities is the temperature fluctuation less than 3° at the depths of shallowest occurrence.

In summary, species of the Desmosomatidae are usually limited to deep waters that are cold and whose range of temperature fluctuation is narrow. Greater fluctuations can be tolerated if the absolute temperatures are toward the colder end of the scale, and therefore desmosomatids are commonly found in shallow water at high latitudes. Rarely, desmosomatids occur in shallow water at low latitudes, but in these places the range of temperature fluctuation is very low, in spite of the high temperatures. Thus, the absolute temperature and the degree of temperature fluctuation interact in controlling the distribution of the Desmosomatidae.

CLASSIFICATION OF THE DESMOSOMATIDAE

In the following list an asterisk marks species found on the transect.

Family Desmosomatidae G. O. Sars, 1897

Sub family Desmosomatinae n. subfam.

Genus **Balbidocolon** n. gen.

*1. **B. atlanticum** n. sp.

Genus **Whoia** n. gen.

*2. *W. angusta* (G. O. Sars, 1899)

*3. **W. variabilis** n. sp.

Genus **Momedossa** n. gen.

*4. **M. profunda** n. sp.

5. *M. symmetrica* (Schultz, 1966)

Genus *Eugerda* Meinert, 1890

6. *E. tenuimana* (G. O. Sars, 1868). Includes *E. globiceps* Meinert, 1890, and *E. lobiceps* (Blake, 1929) according to Hult, 1936.

7. *E. reticulata* (Gurjanova, 1946)

8. *E. fragilis* (Kussakin, 1965)

9. *E. kamtschatica* Kussakin, 1965

10. *E. elegans* Kussakin, 1965

11. *E. filipes* (Hult, 1936)

*12. *E. intermedia* (Hult, 1936)

*13. *E. latipes* (Hansen, 1916)

*14. **E. tetarta** n. sp.

*15. **E. imbricata** n. sp.

*16. **E. setifluxa** n. sp.

*17. **E. pannosa** n. sp.

*18. **E. fulcimandibulata** n. sp.

19. *E. zenkewitschi* (Gurjanova, 1946)

Genus *Desmosoma* G. O. Sars, 1864

20. *D. lineare* G. O. Sars, 1864

21. *D. australe* Nordenstam, 1933

22. *D. brevipes* Nordenstam, 1933

23. *D. modestum* Nordenstam, 1933

24. *D. ochotense* Kussakin, 1965

25. *D. lobipes* Kussakin, 1965

26. *D. elongatum* Bonnier, 1896

Genus **Mirabilicoxa** n. gen.

*27. *M. gracilipes* (Hansen, 1916)

*28. *M. similis* (Hansen, 1916)

*29. *M. longispina* (Hansen, 1916)

30. *M. magnispina* (Menzies, 1962)

31. *M. coxalis* (Birstein, 1963)

32. *M. birsteini* (Menzies, 1962)

*33. **M. exopodata** n. sp.

*34. **M. palpata** n. sp.

*35. **M. acuminata** n. sp.

*36. **M. plana** n. sp.

*37. **M. minuta** n. sp.

Genus *Echinopleura* G. O. Sars, 1897

38. *E. aculeata* (G. O. Sars, 1864)

Genus **Thaumastosoma** n. gen.

*39. **T. platycarpus** n. sp.

*40. **T. tenue** n. sp.

41. *T. distinctum* (Birstein, 1963)

Subfamily **Eugerdellatinae** n. subfam.

Genus *Eugerdella* Kussakin, 1965

42. *E. coarctata* (G. O. Sars, 1899)

*43. *E. natator* (Hansen, 1916)

44. *E. polita* (Hansen, 1916)

45. *E. armata* (G. O. Sars, 1864)

*46. **E. ischnomesoides** n. sp.

*47. **E. cornuta** n. sp.

48. *E. falklandica* (Nordenstam, 1933)

*49. **E. pugilator** n. sp.

Genus **Prochelator** n. gen.

*50. *P. lateralis* (G. O. Sars, 1899)

*51. **P. uncatus** n. sp.

*52. **P. hampsoni** n. sp.

*53. **P. litus** n. sp.

*54. **P. abyssalis** n. sp.

*55. **P. incomitatus** n. sp.

Genus **Chelator** n. gen.

*56. *C. insignis* (Hansen, 1916)

57. *C. chelatus* (Stephensen, 1915)

*58. **C. vulgaris** n. sp.

*59. **C. verecundus** n. sp.

60. *C. striatus* (Menzies, 1962)

Genus **Disparella** n. gen.

*61. **D. valida** n. sp.

*62. **D. pachythrix** n. sp.

63. *D. longimana* (Vanhöffen, 1914)

Genus **Oecidiobranchus** n. gen.

*64. *O. plebejum* (Hansen, 1916)

65. *O. polare* (Gurjanova, 1946)

Genus *Paradesmosoma* Kussakin, 1965

66. *P. conforme* Kussakin, 1965

67. *P. orientale* Kussakin, 1965

Subfamily uncertain

Genus **Torwolia** n. gen.

*68. **T. subchelatus** n. sp.

*69. **T. creper** n. sp.

Remarks.—The status of the species *Eugerda tenuimana* (G. O. Sars) and *E. filipes* (Hult) is very confusing (Hult, 1936, 1941). Because *E. tenuimana* is the type species, it is worthwhile to spend a few words here in an effort to clarify the situation.

In 1868 G. O. Sars described *Desmosoma tenuimanum*. The description was brief, unfigured, and partly irrelevant. Meinert described *Eugerda globiceps* in 1890, and because the new genus was monotypic, *E. globiceps* was type species. Sars (1897, p. 128) considered *E. globiceps* to be a synonym of *D. tenuimanum,* but retained Meinert's genus. Thus, the type species of *Eugerda* was *E. tenuimana*. Sars redescribed and refigured the species at that time. In 1899 (p. 252) Sars changed his mind after talking with Hansen. They decided that *E. globiceps* was a distinct species after all, and Sars refigured and redescribed the species using Meinert's material.

Hult (1936, p. 6) compared Sars's 1868 and 1897 descriptions of *D. tenuimanum* (called *E. tenuimana* in 1897) and concluded that they were different species. He renamed the species of Sars's 1897 description *D. filipes* (Hult did not recognize *Eugerda* as a separate genus). In the same paper Hult (p. 7) compares Sars's 1868 description of *D. tenuimanum* and Meinert's description of *E. globiceps* and disagreed with Sars's (and Hansen's) 1899 decision; Hult concluded that the two species *were* synonymous. When Sars and Hansen had made that comparison, they were probably not looking at specimens of *D. tenuimanum* in the restricted sense, but at specimens that Hult was making the basis of his new species *D. filipes*. These specimens would of course have been different from *E. globiceps*.

Seven years before Hult's study, Blake (1929) described *Desmosoma lobiceps*. Hult (1936, p. 8) considered *D. lobiceps* also to be a synonym of *D. tenuimanum*. In the same paper (p. 2) Hult described a new species, *D. intermedium*. Hult (1941) reiterated his statements of 1936, sometimes in greater detail. He also reported having borrowed specimens of *D. lobiceps;* direct comparison confirmed its synonymy with *D. tenuimanum*.

In the present paper, I include all these species in *Eugerda*. Thus, three valid species emerge from this confusion: (1) *Eugerda tenuimana* (Sars, 1868) (= *E. globiceps* Meinert, 1890, and Sars, 1899; = *D. lobiceps* Blake, 1929); (2) *Eugerda filipes* (Hult, 1936) (= *E. tenuimana* Sars, 1897); and (3) *E. intermedia* (Hult, 1936).

DESCRIPTION OF SPECIES

Genus Balbidocolon n. gen.
Balbidocolon atlanticum n. sp.
(Figs. 14, 15)

Holotype.—Station 70: USNM 125088, preparatory female.
Other material.—Station JJ1: 1 individual, paratype.
Distribution.—North Atlantic; 4436-4749 meters.

Diagnosis.—Body (fig. 14*a*, *b*) 4.4 times longer than tergal width of pereonite 2. Pereonite 1 slightly larger than 2. Pereonite 4 trapezoidal, with nearly straight sides converging posteriorly. Tergum of pereonite 5 1.3 times wider than midsagittal length, with rounded anterolateral corners; anterior end slightly wider than posterior; sides slightly concave. Pleotelson. 47 width of pereonite 2, 1.3 times longer than wide, widest at acute posterolateral spines located .75 way back from anterior end. No ventral body spines.

Coxae of pereopods I-IV only faintly produced anteriorly; anterolateral setae small, stout.

First antenna (fig. 14*c*) slender. Second peduncular segment 2.1 times longer than first, 4.6 times longer than wide. Flagellum slender, .9 length of second peduncular segment; 3 flagellar segments, but long distal segment shows faint subdivision into 2.

Flagellum of second antenna (fig. 14*e*) 8-segmented, with first segment almost twice length of second.

Left mandible (fig. 14*d*, *d*'): Incisor process with 3 teeth; medial tooth most distal. Nine saw bristles. Numerous spines on molar process. Palp well developed; distal segment with about 4 major setae.

Maxilliped (fig. 14*f*): Palp .88 width of basis; segment 1 strongly produced laterally; medial length segments 2 and 3 subequal. Three coupling hooks. Basis, coxa, and epipodite with many ventral or marginal setae.

Pereopod I (fig. 15*a*) well developed, much like pereopod II. Propodus 3.9 times longer than wide; ventral margin slightly concave, fringed, with 2 setae midway. Carpus 2.1 times longer than wide; 4-5 stout, unequally bifid ventral setae; dorsal row with 6-7 slender setae. Merus with 4 stout, distally bifid setae and 2 small slender setae ventrally; dorsal margin with 2 setae distally and 2-3 setae more proximally on lateral surface. Ischium with 6 ventral setae; dorsal margin with 2 distal setae and row of 3 setae more proximally; distomedial surface with numerous large setae. Basis 5.2 times longer than medial width; distoposterior margin with numerous large, slender setae.

Pereopod II (fig. 15*b*): Propodus 2.9 times longer than wide; ventral margin fringed, with 2 well-developed distal setae, and 3 along edge. Carpus 2.3 times longer than wide; 7 ventral setae; 11-13 dorsal setae of which most distal is stout and distally bifid. Shape and setal configuration of merus, ischium, and basis much as on pereopod I except that merus lacks small ventral setae and ischium lacks distomedial setae.

Pereopod V (fig. 15*c*): Dactylus slender, distally fringed. Propodus 3.7 times longer than wide; ventral margin with 5 major setae of which the last two are distally bifid; dorsal margin with 7 setae, of which fourth and last are stout and distally bifid. Carpus 3.5 times longer than wide; 6 ventral setae; dorsal margin with 5 slender setae and 1 stouter seta.

Pleopod II (operculum) (fig. 14*h*): 1.1 times longer than wide, widest two-thirds way from proximal end. Distal margin straight or slightly concave. Distal and distolateral margins fringed with many setae.

Uropod (fig. 14*g, g*', *g*") .58 length of pleotelson. Endopod 3.1 times longer than

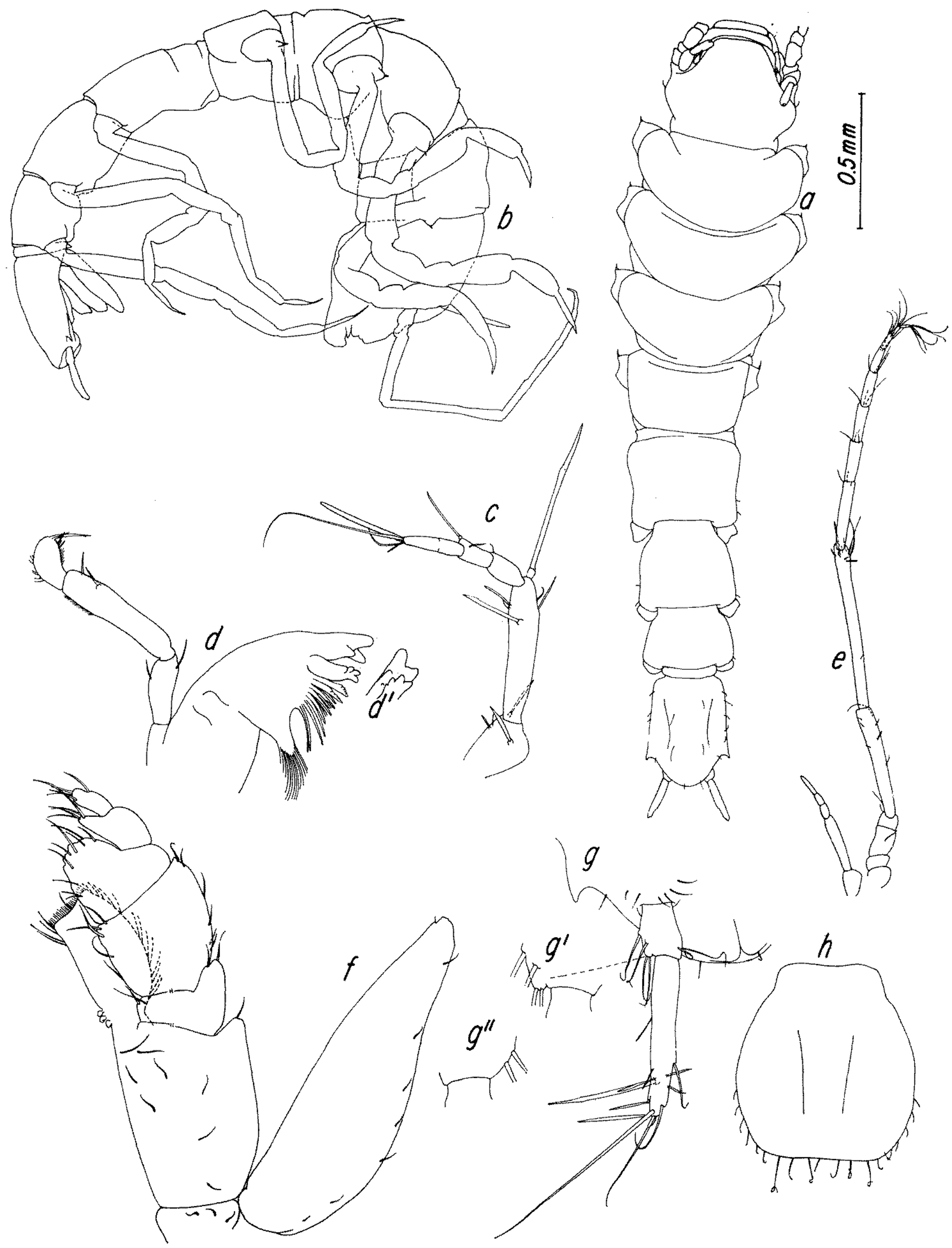

Fig. 14. *Balbidocolon atlanticum* n. sp. *a*, body, B ♀ ; *b*, body, ♀ ; B *c*, A I, B ♀ ; *d*, Md, B ♀ ; *d'*, ip and lm, B ♀ ; *e*, A I, setae on A I omitted, B ♀ ; *f*, Mpd, B ♀ ; *g*, Ur, right, B ♀ ; *g'*, distolateral portion of same protopod with exopod, enlarged, B ♀ ; *g''*, distolateral portion of protopod of left Ur on same individual, showing absence of exopod, B ♀ ; *h*, PI II, B ♀. See section on symbols for explanation of abbreviations.

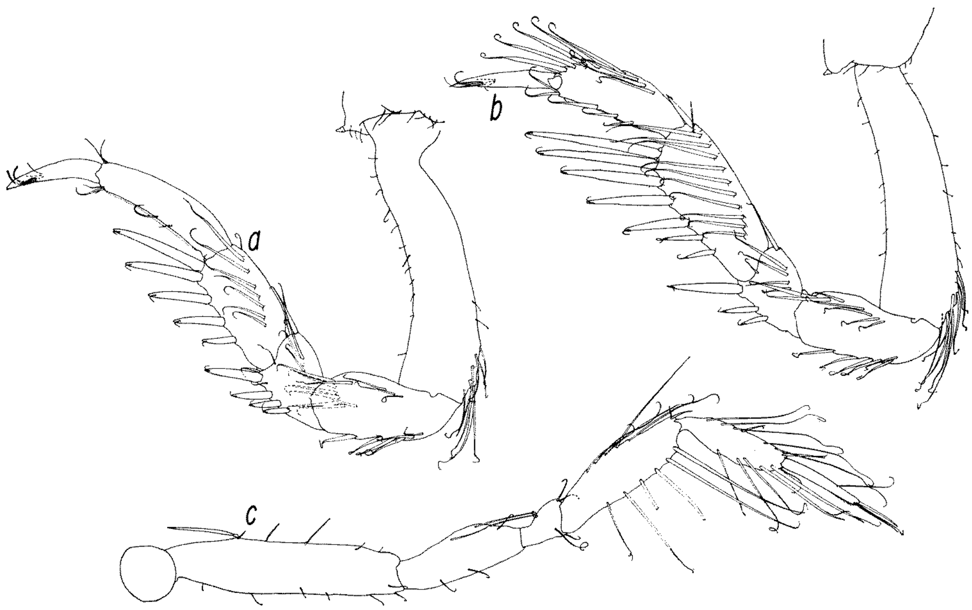

Fig. 15. *Balbidocolon atlanticum* n. sp. *a*, Per I, B ♀ ; *b*, Per II, B ♀ ; *c*, Per V, B ♀. See section on symbols for explanation of abbreviations.

protopod, 6.1 times longer than wide. Rudimentary exopod tipped with 2 setae usually present.

Length of brooding female 2.9 millimeters.

Genus Whoia n. gen.
Whoia angusta (G. O. Sars, 1899)
(Figs. 16, 17)

Desmosoma angustum G. O. Sars, 1899, p. 250, pl. II, fig. 2, pl. IV, fig. 2. Hansen, 1910, p. 215; 1916, p. 109. Hult, 1937, p. 26. Nierstrasz and Schuurmans Stekhoven, 1930, p. 106. Hult, 1941, p. 91, maps 29, 30. Stephensen, 1948, p. 92, fig. 25, nos. 8-10.

Desmosomella angusta: Kussakin, 1965, p. 138.

Lectotype.—Sars mentioned only one locality, Hauch station 460, in his original description. A preparatory female, 1.9 millimeters long, from this station is here designated lectotype.

Material.—Station E3: 4 individuals (including 1 ♂). Station GH1: 1 individual. Station 73: 1 individual. Station 87:533 individuals (including 86 ♂ ♂).

Previous records.—Skagerrak, 116-680 meters; western Norwegian fjords, 50-225 meters.

Distribution.—North Atlantic; 50-2,500 meters.

Diagnosis of female.—Body (figs. 16*a*, *b*) slender, 5.6 times longer than tergal width of pereonite 2. Pereonite 4 long, only 1.4 times wider than long, widest at base of limbs, constricted halfway back, with sides of posterior half parallel or diverging posteriorly. Pereonite 5 long, 1.1 times longer than wide, .75 width of pereonite 2; sides nearly parallel or gently diverging posteriorly; anterolateral corners rounded; anterior margin of tergite hardly defined. Pleotelson 1.3 times longer than wide, widest anteriorly, evenly rounded laterally and posteriorly.

Coxae of pereopods I-IV (fig. 16*b*) bilobed in plan view, without anterior projections, but each with a slender anterior seta.

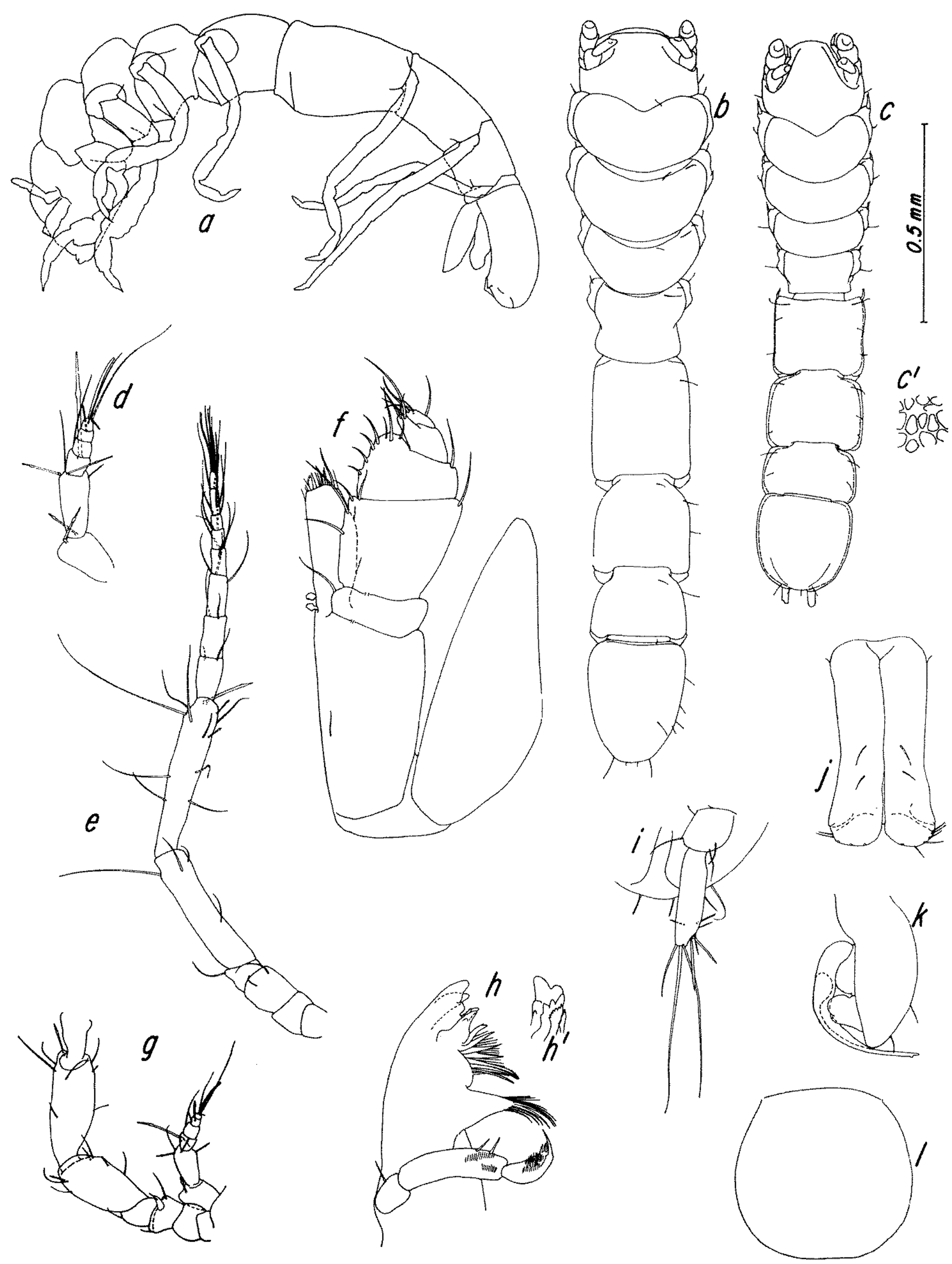

Fig. 16. *Whoia angusta* (G. O. Sars). *a*, body, P ♀ ; *b*, body, B ♀ ; *c*, body, C ♂; *c*' structure of tergal cuticle, pereonite 5, C ♂; *d*, A I, B ♀ ; *e*, A II, P ♀ ; *f*, Mpd, P ♀ ; *g*, A I and base of A II, C ♂; *h*, Md, P ♀ ; *h*', ip, lm, and first two saw bristles, P ♀ ; *i*, Ur, P ♀ ; *j*, PI I, C ♂; *k*, PI II, C ♂; *l*, PI II, P ♀. See section on symbols for explanation of abbreviations.

Fig. 17. *Whoia angusta* (G. O. Sars). *a*, Per I, B ♀; *b*, Per I, C ♂; *c*, Per II, B ♀; *d*, Per II, C ♂; *e*, Per III, B ♀; *f*, Per V, B ♀; *g*, Per V, C ♂. See section on symbols for explanation of abbreviations.

First antenna (fig. 16*d*) stout. Lateral length segment 2 2.0 times maximum width. Flagellum 4-segmented, short, being slightly shorter than second peduncular segment; length of flagellar segments 1-3.85, .85, and .70 that of respective widths.

Second antenna (fig. 16*e*): Peduncular segments 5 and 6 .48 total length of limb, 4.7 and 4.8 times longer than wide, respectively; segment 6 1.1 times longer than segment 5. Flagellum with 9 segments.

Left mandible (figs. 16*h*, *h*'): Incisor process with 4 teeth, the dorsal 2 of which are most proximal. Lacinia mobilis with 4 distinct teeth. About 8 saw bristles. Three-segmented palp well developed; terminal segment with 3-4 major setae.

Maxilliped (fig. 16*f*): Palp as wide as basis; medial length of segment 3.8 that of 2; segments 2, 3, and 5 each with single long lateral seta. Two coupling hooks.

Pereopod I (fig. 17*a*): Dactylus .86 length of propodus. Propodus lacking setae except distally, 3.7 times longer than wide; ventral margin distinctly concave, fringed distally. Carpus 1.4 times longer than wide, .93 length of propodus; ventral margin with 3 large, stout, unequally bifid setae, the most distal of which is curved ventrally; dorsal margin with row of 3-4 slender setae. Merus with 3 large, stout, unequally bifid setae ventrally, 1 large and 1 small seta dorsally. Ischium with row of 3 large, slender setae ventrally and somewhat medially; dorsally, 1 large, slender seta on margin and 1 on medial face. Basis very stout, being only 2.2 times longer than medial width, with 1 large distoposterior seta.

Pereopod II ((fig. 17*c*) much like I in general form. Dactylus .69 length of propodus, ventrally fringed. Propodus 2.5 times longer than wide; ventral margin convex, with single slender seta two-fifths way from base and fringed distal to that; dorsal margin with 5 slender setae. Carpus 1.7 times longer than wide, 1.2 times longer than propodus; ventral margin with 4 large, stout, distally bifid setae; dorsal margin with 6 slender setae. Merus with ventral row of 3 large, stout, distally bifid setae; 1 large and 1 small dorsal seta. Ischium with row of 5 large, slender setae ventrally, extending onto medial face toward distal end; 1 very large dorsal seta. Basis stout, being only 2.4 times longer than wide, with single large distoposterior seta.

Pereopod III (fig. 17*e*) distinctly more slender in general aspect than previous two limbs. Claw of dactylus longer. Propodus 2.5 times longer than wide; single seta midway on ventral margin. Carpus 2.2 times longer than wide, 1.4 times longer than propodus; 4 large, stout, unequally bifid ventral setae; 5 dorsal setae. Ventral setae of carpus and merus more slender than on previous pereopods. Basis 3.8 times longer than wide, with single distoposterior seta.

Pereopod V (fig. 17*f*) sparsely setose. Dactylus stout, only 2.4 times longer than wide. Propodus 2.7 times longer than wide; 3 major setae dorsally and 2 ventrally. Carpus 3.1 times longer than wide; 1 slender seta at distal end of dorsal margin; 2 long, slender, unequally bifid setae ventrally.

Pleopod II (fig. 16*l*) nearly round, without marginal setae.

Uropod (fig. 16*i*) short, .35 length of pleotelson. Protopod almost as wide as long. Endopod 3.7 times longer than wide, 2.0 times longer than protopod.

Length of brooding female 1.6 to 1.9 millimeters.

Differences of copulatory male from female.—Body (fig. 16*c*) much smaller, 1.4 millimeters in length. Cuticle heavily calcified, with reticulate sculpturing. Face more vertically oriented, concave between second antennae. Pereonite 4 shorter, 1.9 times wider than long. Pereonites 5-7 and pleotelson with narrow marginal flange. Tergite of pereonite 5 shorter, only .79 times as long as wide; sides straight, parallel; anterolateral angles subacute, each with small, stout, unequally bifid seta. Pleotelson broader, slightly wider than long, widest anteriorly, broadly rounded, without posterolateral angles or spines; marginal flange does not extend to posterior margin medial to uropods.

Coxae of pereopods I-IV (fig. 16*c*) with stout, unequally bifid setae antero-laterally. Coxae of pereopod I somewhat produced anteriorly, this tendency being progressively less developed on more posterior limbs.

Second antenna (fig. 16*g*) with stout segments. Peduncular segments 3, 5, and 6 each with calcareous flanges of varying development at distal end; segment 3 with stout, unequally bifid seta. Flagellum with 12 segments, tapering evenly distally from basal segment which is only .7 width of fifth peduncular segment.

Pereopod I (fig. 17*b*): Propodus broader, 2.8 times longer than wide; ventral margin only slightly concave, distinctly fringed. Dorsal margin of carpus with only 2 small setae distally. Ischium with 2 small, slender setae ventrally; no medial seta. Basis less robust, 2.6 times longer than medial width, more constricted proximally, Anterior margin of basis, ventral margin of merus, and distolateral margin of carpus with calcareous proliferations of cuticle.

Pereopod II (fig. 17*d*): Claw of dactylus much elongated, longer than dactylus itself. Propodus more slender, 3.7 times longer than wide; ventral seta small; dorsal margin with row of 3 very small, slender setae and distally with single stout, unequally bifid seta. Carpus more slender, 2.0 times longer than wide; ventral setae smaller; dorsal margin with row of 2 very small, slender setae and distally a single small, unequally bifid seta. Setae of merus and ischium smaller; only 2 setae on ventral row of ischium. Basis differing as with preceding limb. Calcareous proliferations on anterior margin of basis, and ventral and distal margins of carpus.

Pereopod V (fig. 17*g*) more strongly developed for swimming. Claw of dactylus very long, 1.4 times longer than dactylus itself; dactylus more slender, 4.1 times longer than wide. Propodus slender, 3.9 times longer than wide; 3 short, slender, unequally bifid setae ventrally; many setae in dorsal row, all long, slender, and simple, except for short unequally bifid seta near middle of row and 1 at end. Carpus 2.8 times longer than wide, widest one-third way from base; 5 slender, unequally bifid setae in ventral row; 5 long, slender, simple setae in dorsal row. Ischium broader. Calcareous proliferation on posterior margin of basis, and distal end of dorsal margin of ischium.

Pleopod I (fig. 16*j*) 1.9 times longer than distal width. Lateral pair of distal lobes hardly evident. Medial lobes broadly rounded, extending .08 length of limbs beyond lateral lobes, with 5-6 marginal setae which decrease in size laterally.

Remarks.—This description of specimens found along our transect agrees in essence with Sars's original description. Sars's figure of the female in dorsal view is misleading in showing the main body of pereonite 5 to be clearly defined anteriorly and in having a more slender pleotelson than is actually the case, even on the type material.

Adult and subadult females from the transect differ from the type material in being generally smaller and more poorly calcified.

Whoia variabilis n. sp.
(Fig. 18)

Holotype.—Station 95: USNM 125116, preparatory female.

Other material.—Station 95: 7 additional individuals (including 3 ♂♂), paratypes. Station 84: 1 individual, anterior half, paratype. Station 100: 1 individual, paratype.

Distribution.—North Atlantic; 3,753-4,892 meters.

Diagnosis of female.—This species is extremely similar to *Whoia angusta*. It differs in the following ways.

Pereonite 4 (fig. 18*a*) shorter, being 1.7-2.1 times wider than long.

Pereopod I (figs. 18*f*, *g*): Seta which is midway along ventral margin of propodus much larger; merus with slender seta distomedial to usual stout setae of ventral margin.

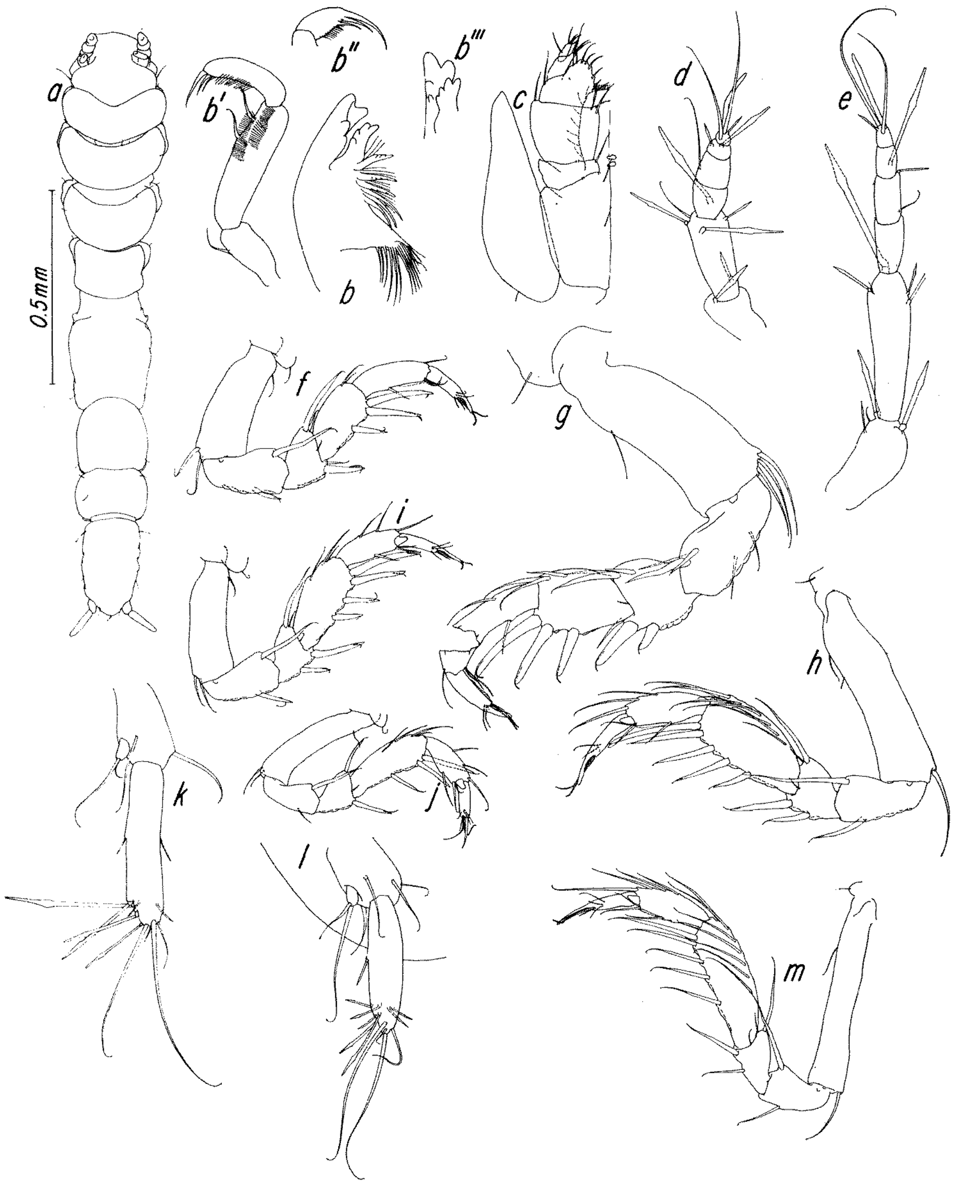

Fig. 18. *Whoia variabilis* n. ap. *a*, body, P ♀; *b*, Md, P ♀; *b'* palp, P ♀; *b"*, distal palp segment, P ♀; *b''*, ip and lm, P ♀; *c*, Mpd, P ♀; *d*, A I, B ♀; *e*, A I, P ♀; *f*, Per I, B ♀; *g*, Per I, P ♀; *h*, Per II, J ♀; *i*, Per II, B ♀; *j*, Per III, B ♀; *k*, Ur, P ♀; *l*, Ur, B ♀; *m*, Per III, J ♀. See section on symbols for explanation of abbreviations.

Pereopods I-III (figs. 18*f-j, m*): One or more of distal setae on ventral margin of propodus usually distinctly larger. Ischium usually with fewer ventral setae, which on the first two limbs are usually stouter. Ventral margin of carpus, merus, and ischium with calcareous proliferations of cuticle developed to varying degrees. Bases of the three limbs more slender, being 2.8-3.9, 2.9-3.9, and 3.6-5.4 times longer than wide, respectively.

Pereopod III (figs. 18*j*, *m*): Carpus more elongate, being 2.5-2.9 times longer than wide.

Uropod (figs. 18 *k, l*) biramous. Exopod inconspicuous, being only about .12 length of endopod.

Length of brooding female 1.2-1.4 millimeters. Length of preparatory male 1.2-1.3 millimeters.

Remarks.—This species displays an unusual degree of individual variation. The first antenna may be quite elongate (fig. 18*e*), with the total length of the last five segments being 7.2 times longer than the width of peduncular segment 2, in contrast with the more usual condition wherein the ratio may be as low as 4.3 (fig. 18*d*). Individuals possessing the elongate first antenna tend to display other differences. The uropod is more elongate (fig. 18*k*). The propodus of the first pereopod may bear a single small seta midway along the dorsal margin (fig. 18*g*). The ventral setae of the ischium of pereopods I-II are more slender (fig. 18*g*). The correlation of these differences is not absolute, but only a tendency. Nevertheless there is an indication of polymorphism.

Some features vary without any correlated changes elsewhere. The bases of pereopods I-III carry 1-3, 1-4, and 1-2 distoposterior setae, respectively. On one specimen (Sta. 84) the ischia of pereopods I-III each bear 2 dorsolateral setae (fig. 18*g*).

All the features mentioned so far are ones that prove to be stable in other species. Characters that do tend to vary under normal circumstances may show extensive variation in this species. The most extreme example is the setation of the dorsal margin of the carpus on pereopods I-III. The number of setae on the three carpi varies from 2-5, 3-8, and 3-8, respectively. In some cases the most distal seta is very small.

It is difficult to assess the significance of these differences because few individuals are available, more than one locality is represented, a variety of developmental stages are present, and three of the specimens are males. Sexual and developmental polymoryphism has been ruled out by concentrating largely on the comparison of juvenile, preparatory, and brooding females. The fact that the sample is drawn from three localities does not detract from the extensiveness of the variation. The two most distant stations (stations 95 and 100) are only 320 miles apart. The range and variability of *W. variabilis* may be compared with the known range and variability of the closely related *W. angusta.* Specimens from the transect are essentially identical with Sars's material from the Skagerrak, over 3,000 miles away. The latter observation also bears on the question of the adequacy of size of the sample of *W. variabilis;* 13 preparatory females of *W. angusta* from stations 87, E3, GH1, and 73 varied hardly at all.

It is unlikely that *W. variabilis* displays unusual variation because of environmental factors. The depth differential is only 1,100 meters. For *W. angusta* the range is much greater, 2,300 meters, and because the latter species lives at shallower depths, environmental parameters not only differ more widely between depths, but vary more within single localities as well (Sanders, Hessler, and Hampson, 1965).

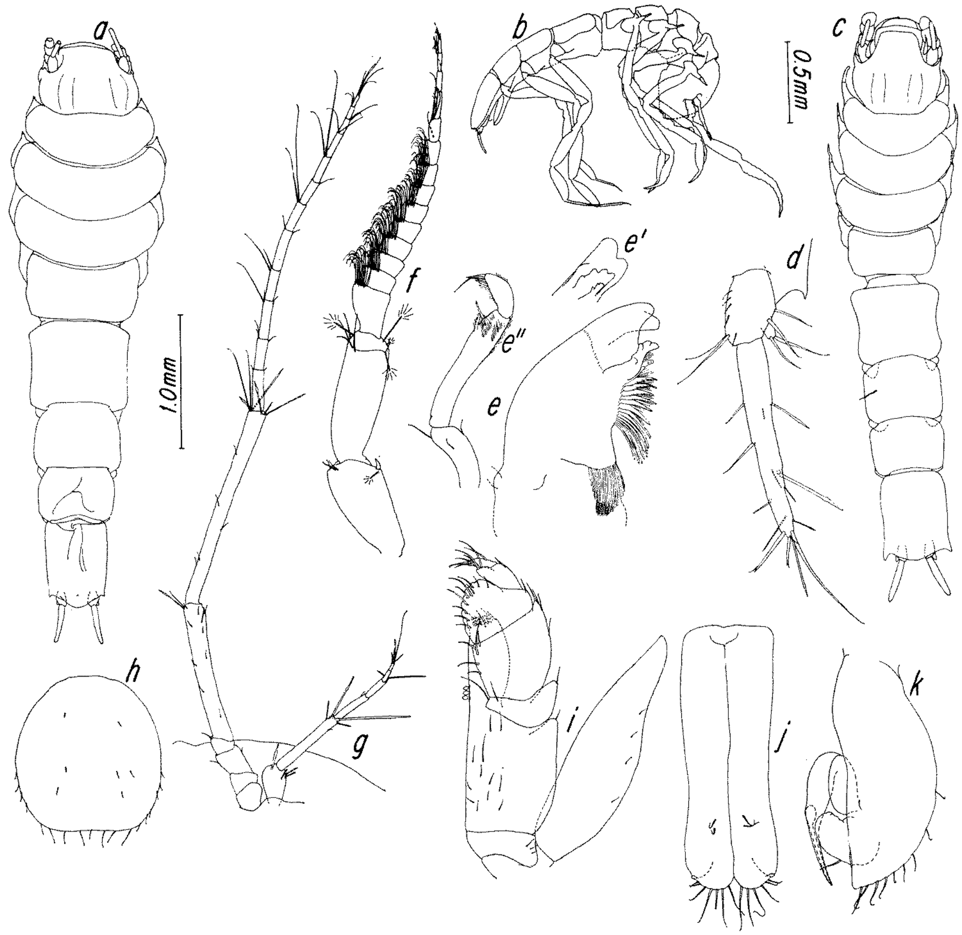

Fig. 19. *Momedossa profunda* n. sp. *a*, body, P ♀ ; *b*, body, C ♂; *a*, body, C ♂; *d*, Ur, P ♀ ; *e*, Md, palp omitted, B ♀ ; *e'*, ip, Im, and first saw bristle, B ♀ ; *e"*, palp, B ♀ ; *f*, A II, C ♂; *g*, A I and A II, P ♀ ; *h*, PI II, P ♀ ; *i*, Mpd, P ♀ ; *j*, PI I, C ♂; *k*, PI II, C ♂. See section on symbols for explanation of abbreviations.

Genus Momedossa n. gen.
Momedossa profunda n. sp.
(Figs. 19, 20)

Holotype.—Station 122: USNM 125106, preparatory female.

Other material.—Station 70: 3 individuals (including 1 ♂), paratypes. Station 84: 1 individual. Station 92: 1 individual.

Distribution.—North Atlantic; 4,680-4,833 meters.

Diagnosis of female.—Body (fig. 19*a*) 3.8 times longer than tergal width of pereonite 2. Cephalon with 2 pairs of shallow longitudinal furrows dorsally, thus defining a pair of rounded longitudinal ridges. Pereonite 1 only slightly less well developed than pereonite 2. Pereonite 4 2.3 times wider than midsagittal length, as wide posteriorly as anteriorly; sides convex, but acutely indented midway. Pereonite 5 1.3 times wider than long, somewhat wider anteriorly than posteriorly;

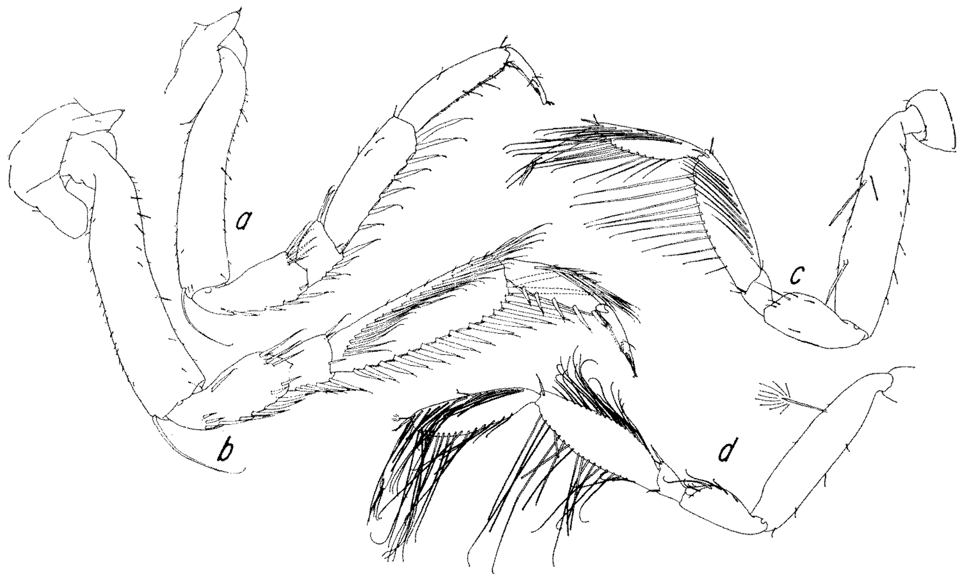

Fig. 20. *Momedossa profunda* n. sp. *a*, Per I, P ♀ ; *b*, Per II, P ♀ ; *c*, Per V, P ♀ ; *d*, Per V, C ♂. See section on symbols for explanation of abbreviations.

sides concave; anterolateral corners not produced, faintly acute. Pleotelson .4 width of pereonite 2, 1.4 times longer than wide; maximum width toward anterior end, but slightly convex sides converge only slightly posteriorly; short, acute, posteriorly directed posterolateral spines located .9 way back from anterior end; posterior margin acutely rounded. No ventral body spines.

Coxae of pereopods I-IV (fig. 19*a*) each with short, acute anterior projection tipped with extremely small, but stout seta.

First antenna (fig. 19*g*) 6-segmented. Second segment a little less than twice as long as first, 8.2 times longer than wide. Flagellum a little longer than second peduncular segment; first segment much larger than others; last two segments smallest, subequal.

Left mandible (figs. 19*e*, *e*, *e"*): Most dorsal of 3 teeth on incisor process more proximal than ventral tooth and forming large, quadrate shelf, as seen in dorsal view. Fifteen saw bristles. Molar process with numerous terminal setae. Palp well developed; segment 3 with 5 major setae.

Maxilliped (fig. 19*i*): Palp .88 width of basis; lateral ends of basis and first two palp segments produced acutely distally; joint between segments 2 and 3 only moderately oblique; medial length segment 3 1.1 times that of 2. Three coupling hooks.

Pereopod I (Fig. 20*a*) distinctly smaller than II, but still quite well developed. Dactylus .53 length of propodus. Propodus 4.1 times longer than wide; dorsal margin with small seta midway; ventral margin fringed, and distal half of margin with several small setae, 2 of which are larger than the rest. Carpus 3.3 times longer than wide; ventral margin fringed, with row of 7 stout, indistinctly ***bifid, distally setulate setae; row of 2 small setae just lateral to dorsal margin (these setae are remnants of main dorsal row), and margin itself with subsidiary row of 3 equally small setae. Merus with 2 large setae at tip of dorsal margin, with row of 4 stout setae ventrally; small seta medial to distal end of ventral row. Ischium with small dorsal seta on lateral surface and transverse row of 4 larger dorsal setae on medial surface; ventral margin with row of 4 stout setae accompanied by very small, stout setae at ends of row. Basis 5.4 times longer than medial width, with single, long distoposterior seta.

Pereopod II (fig. 20*b*): Dactylus .65 length of propodus. Propodus 3.3 times longer than wide; dorsal margin with main row of 10 setae and with a few much smaller setae in subsidiary row medial to this; ventral margin fringed, with row of 5 stout setae. Carpus 3.3 times longer than wide; main dorsal setal row with 20 large, slender setae, and distally with stout clawlike seta; subsidiary row of several small setae medial to dorsal margin; ventral margin fringed, with row of 15 stout setae. Merus with 1 large and 1 small dorsal seta; ventral margin with row of 5 stout setae. Ischium with complex array of setae; transverse row of 3 large dorsal setae on lateral surface at distal end, and 3 small setae in comparable position on medial surface; 1 large dorsal seta toward proximal end of segment; ventral margin with row of 6 stout setae; 2 small stout setae on lateral surface above proximal end of ventral row; distal end of medial and lateral surfaces each with single small, stout seta. Basis 4.7 times longer than medial width, 1.3 times broader than previous limb, with 1 long distoposterior seta.

Pereopod V (fig. 20*c*) with numerous large setae. Dactylus 8.3 times longer than wide. Propodus 4.3 times longer than wide; dorsal margin with row of 7 long, slender setae, with a short, bifid seta in middle and at end of row; 12 ventral setae. Carpus 3.4 times longer than wide; dorsal margin with 10 long, slender setae and with single clawlike seta at distal end of segment; ventral margin with 11 setae. Ischium with several lateral setae of varying size. Basis 4.2 times longer than wide.

Pleopod II (fig. 19*h*) 1.1 times longer than wide, widest midway; articulating margin much shorter than maximum width; posterior margin slightly concave; many marginal setae.

Uropod (fig. 19*d*) .6 length of pleotelson. Protopod with 3 large distal setae and with row of smaller setae along medial edge. Endopod 2.7 times longer than protopod, 6.8 times longer than wide. Exopod about .1 length of endopod, 1.7 times longer than wide.

Length of holotype 4.3 millimeters.

Major differences of copulatory male from female.—Dimorphism not extreme, and therefore general habitus much the same.

Body (figs. 19*b, c*) more slender, 4.7 times longer than wide. Pereonite 4 not indented laterally. Pereonite 5 with more rounded anterolateral corners, with more concave sides. Pereonites 6 and 7 with straighter sides. Pleotelson .6 width of pereonite 2, 1.3 times longer than wide, widest at broader posterolateral spines; sides nearly parallel, slightly concave anterior to spines; posterior margin broadly convex.

Coxae of pereopods I-IV (fig. 19*c*) produced very strongly anteriorly, each process extending about halfway toward base of preceding coxa and tipped with stout seta whose length equals that of the process itself.

Second peduncular segment of first antenna shorter, only 5 times longer than wide.

Second antenna (fig. 19*f*): Peduncular segments 5 and 6.37 total length of limb; distal end of segment 5 with stout dorsal seta. Flagellum .72 width of fifth peduncular segment, 7.7 times longer than wide; 14 segments decreasing gradually in width distally; first 8 segments densely setose ventrally, more distal segments progressively less so.

Terminal segment of mandibular palp much more powerfully developed, with 9 major setae.

Pereopod I with somewhat fewer setae because of smaller size.

Pereopod II with fewer setae. Propodus and carpus a little more slender, being 3.7 and 3.6 times longer than wide, respectively; dorsal setae of these two segments more dorsally directed.

Pereopod V (fig. 20*d*) better adapted for swimming. Propodus and carpus broader, being 3.7 and 3.1 times longer than wide, respectively; carpus broadest near proximal end, distinctly tapering distally. Propodus with 15 long setae dorsally and 16 ventrally; carpus with 18 setae on each margin. Ischium with dorsal row of 6 setae.

Pleopod I (fig. 19*j*) 2.9 times longer than wide. Lateral pair of distal lobes barely evident. Medial lobes extending .05 length of limb beyond lateral lobes; each medial lobe with fringe of 6–7 setae.

Stylus on pleopod II (fig. 19*k*) short.

Body 3.4 millimeters long.

Remarks.—This species can be distinguished easily from *M. symmetrica* on the basis of the following characters: cephalon with 2 pairs of longitudinal furrows; pereonite 5 with concave sides; pleotelson with shorter posterolateral spines; coxae of pereopods I-IV less strongly produced; uropodal exopod much smaller.

Genus *Eugerda* Meinert, 1890

Eugerda intermedia (Hult, 1936)

(Fig. 21)

Desmosoma intermedium Hult, 1936, p. 2, text figs. 1-20; 1937, p. 22, text figs. 9*a-c*; 1941, p. 80, text figs. 23-42, maps 21, 22. Stephensen, 1948, p. 90, fig. 24, nos. 11-13.

Pseudogerda intermedium: Kussakin, 1965, pp. 137, 140.

Material.—Station 89: 3 individuals. Station 172: 1 individual.

Previous records.—Swedish west coast, 116-230 meters; Norwegian west coast, 130-225 meters; possibly also at Ingolf station 24, Davis Strait, 63°06'N, 56°06'W, 2,195 meters (Hult, 1936, 1941); possibly also at Hauch station 500, Kattegat, 30 meters (Hult, 1941).

Distribution.—North Atlantic; possibly 30-2,195 meters, surely 116-230 meters.

Additions and modifications of original diagnosis.—Pereonite 5 (fig. 21*a*) about 8 width of tergum of pereonite 2, 1.2 times wider than long; sides parallel, evenly convex. Pleotelson 1.1 times longer than wide, widest anteriorly, tapering strongly posteriorly; sides evenly convex.

Coxae of pereopod I (fig. 21*a*) directed forward into short, acute process; that

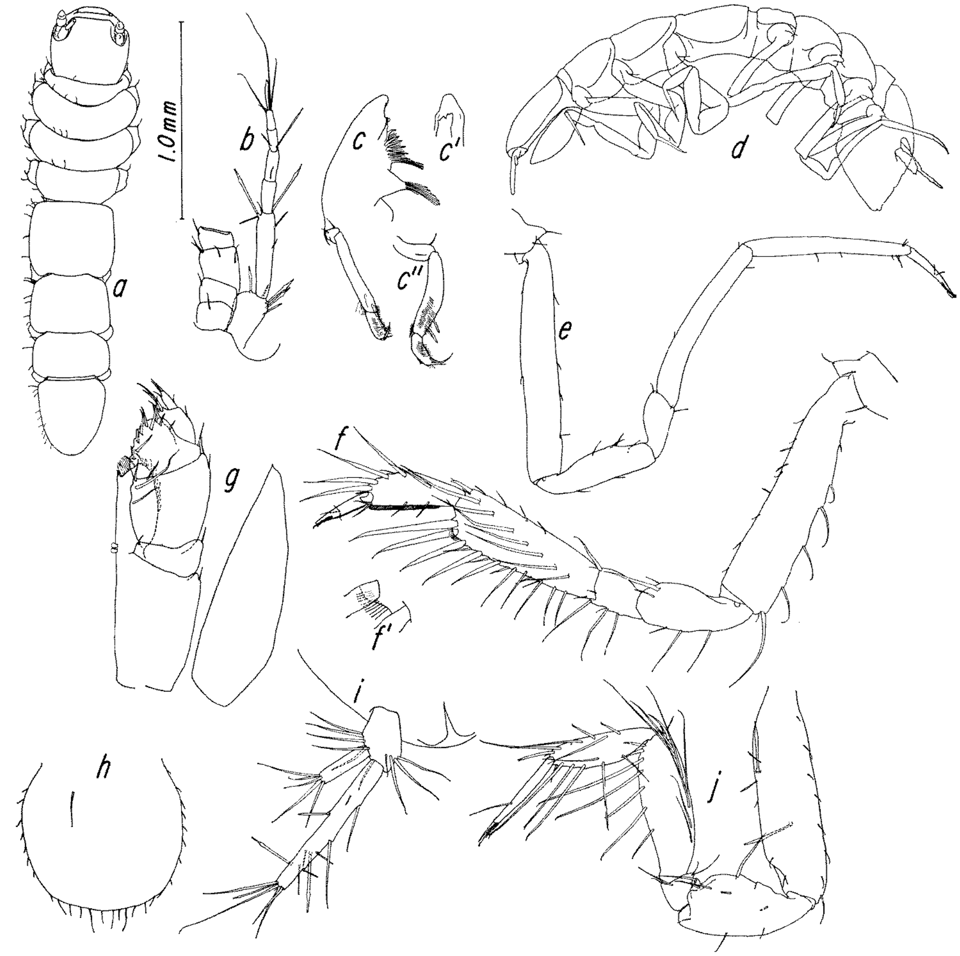

Fig. 21. *Eugerda intermedia* (Hult). *a*, body, J ♀ ; *b*, A I and base of A II, B ♀ ; *c*, Md, P ♀ ; *c'*, ip and lm, B ♀ ; *c"*, palp, B ♀ ; *d*, body, B ♀ ; *e*, Per I, P ♀ ; *f*, Per II, P ♀ ; *f'*, ventral comb on carpus, P ♀ ; *g*, Mpd, P ♀ ; *h*, Pl II, J ♀ ; *i*, Ur, B ♀ ; *j* Per V, P ♀. See section on symbols for explanation of abbreviations.

of pereopods II-IV not produced at all; each coxa tipped with small, slender seta.

Flagellum of first antenna (fig. 21*b*) 1.1 times longer than second peduncular segment; last flagellar segment only slightly shorter than penultimate one.

Left mandible (figs. 21*c*, *c'*, *c"*): Incisor process with 3 teeth; first and third teeth equal distance from distal end. Palp well developed.

Maxilliped (fig. 21*g*): Palp nearly as wide as basis; medial length segment 3 same as that of 2; joint separating segments 2 and 3 strongly oblique. Epipodite not concave distolaterally. Two coupling hooks.

Pereopod I (fig. 21*e*) very slender. Dactylus .4 length of propodus. Propodus 8.9 times longer than wide, almost as long as carpus; no dorsal setae except distally; 2 very small ventral setae midway. Carpus 7.2 times longer than wide, curved; very small seta may be present midway along dorsal or ventral margins. Distal end of merus with small, slender seta both dorsally and ventrally. Ischium 3.8 times longer than wide; ventral margin with 2 small setae; dorsal margin with 4 irregularly placed setae. Basis 6.8 times longer than wide.

Pereopod II (figs. 21*f*, *f′*) much more heavily developed than previous limb. Dactylus .62 length of propodus, with ventral fringe. Propodus 2.9 times longer than wide; dorsal margin strongly convex, with row of 5-7 large setae and medial to that subsidiary row of 2-3 much smaller setae; 2 small setae along line of nearly straight, fringed ventral margin. Carpus 2.9 times longer than wide; main dorsal setal row with 7-8 setae, of which most distal one is stout and unequally bifid; subsidiary row of 4-5 small setae running along crest of dorsal margin; ventral margin with row of 9-10 major setae; subsidiary row of 5 small ventral setae located slightly medial to main setal row; short comblike fringe just medial to penultimate seta of main ventral row. Merus with row of 3-4 large, slender setae and 1-2 smaller setae ventrally; dorsal margin with 2 setae of unequal size. Ischium 2.6 times longer than wide, with 1 large and 2 small dorsal setae, and 2 large and 1-3 small ventral setae. Basis 4.4 times longer than wide; several conspicuous setae along posterior margin; 1 large distoposterior seta.

Pereopod V (fig. 21*j*): Dactylus very long, .8 length of propodus, 9.3 times longer than wide. Propodus and carpus 3.6 and 3.0 times longer than wide, respectively; both well provided with dorsal and unequally bifid ventral setae.

Pleopod II (fig. 21*h*) with fringe of lateral as well as posterior setae; distal margin broadly convex; limb very broadly articulated to pleotelson.

Uropod (fig. 21*i*): Protopod with rows of 4 distolateral and 4 distomedial setae ventrally; 2 distal setae dorsally. Endopod 8.6 times longer than wide, 2.6 times longer than protopod. Exopod 4.1 times longer than wide, .34 length of endopod.

Length of brooding female 2.9 millimeters.

Remarks.—The only serious discrepancy between this diagnosis and Hult's original description concerns the main coxal setae on pereopods I-IV. Hult (p. 2) describes them as being "strong, but short," as opposed to the slender setae of specimens from WHOI Benthic Station 89. Inspection of the female cotype reveals its coxal setae to be the same as on my specimens. It should also be noted that the thornlike spines Hult describes as occurring on the margin of the pleotelson are present only on the male.

Eugerda intermedia resembles *E. filipes, E. fragilis, E. latipes, E. pannosa, E. setifluxa,* and *E. fulcimandibulata* in having a strongly reduced first pereonite and slender pereopod, and in having a well-developed mandibular palp. It may be distinguished from these species on the basis of the following criteria: Segmentation and proportions of the first antenna; degree of slenderness of pereopod I; degree of robustness and setation of pereopod II; setation of uropodal protopod; development of coxal projections of pereopods I-IV. *Eugerda tenuimana* is also very similar, but lacks a mandibular palp.

Eugerda latipes (Hansen, 1916)
(Figs. 22, 23)

Desmosoma latipes Hansen, 1916, p. 110, pl. X, figs, 5*a-f.* Gurjanova, 1933, pp. 417, 466.
Pseudogerda latipes: Kussakin, 1965, pp. 138, 140.

Lectotype.—Of the five cotypes in Hansen's original collection from Ingolf station 25, the

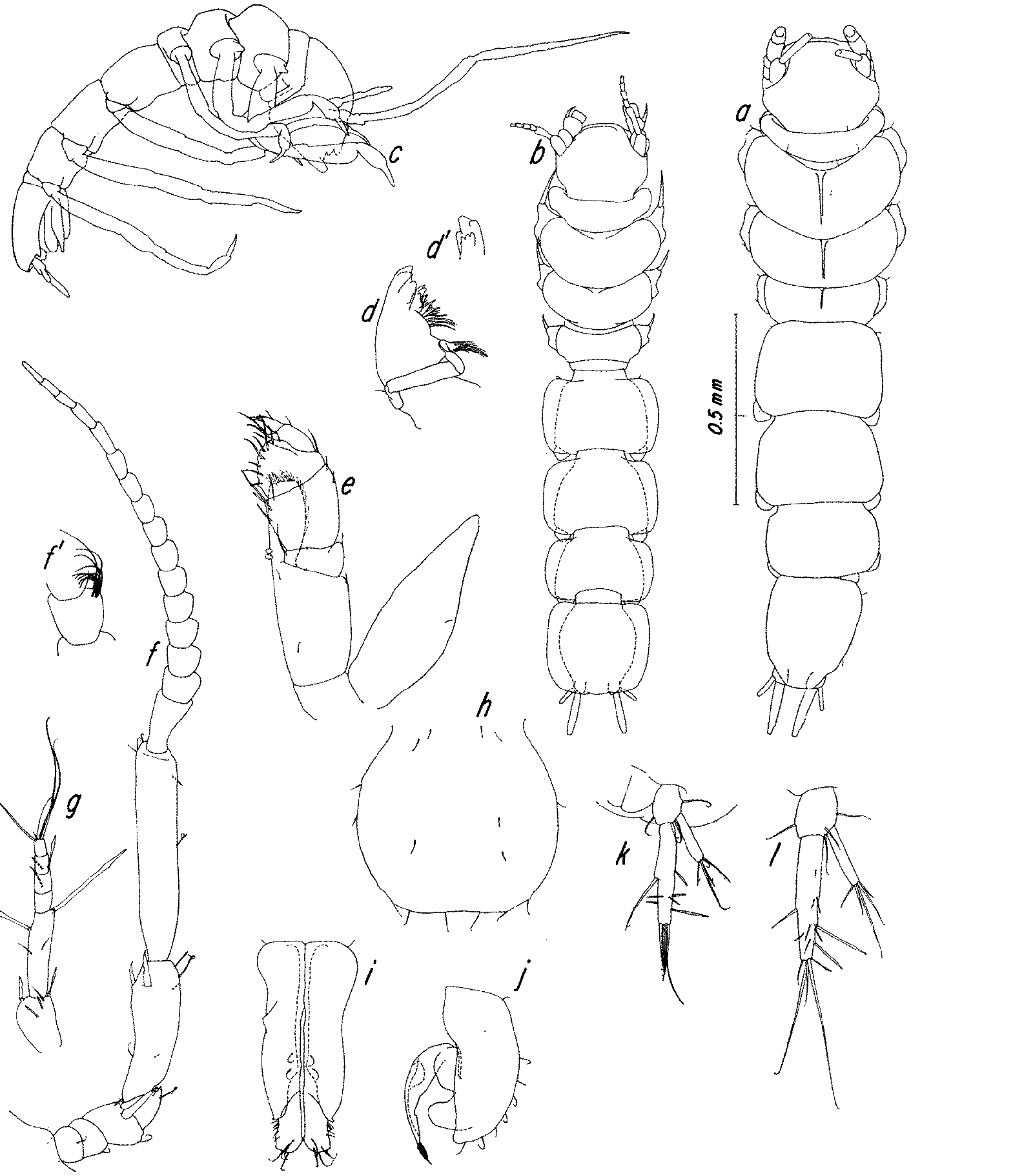

Fig. 22. *Eugerda latipes* (Hansen). *a*, body, B ♀ ; *b*, body, C ♂; *c*, body, J ♂; *d*, Md, B 9; d', ip and lm, B ♀ ; *e*, Mpd, B ♀ ; *f*, A II, setae of flagellum omitted, C ♂; *f'*, flagellar segment with ventral setae, C ♂; *g*, A I, B ♀ ; *h*, Pl II, B ♀ ; *i*, P1 I, C ♂; *j*, Pl II, C ♂; *k*, Ur, C ♂; *l*, Ur, B ♀. See section on symbols for explanation of abbreviations.

single large, nature female retaining the second pereopod (figured in Hansen's fig. 5*c*) is here designated lectotype.

Material.—Station SS2: 2 individuals. Station D1: 2 individuals (♂ ♂). Station 105, subsample B: 10 individuals (including 1 ♂). Station E3: 2 individuals (♂ ♂). Station 87: 26 individuals (including 7 ♂ ♂).

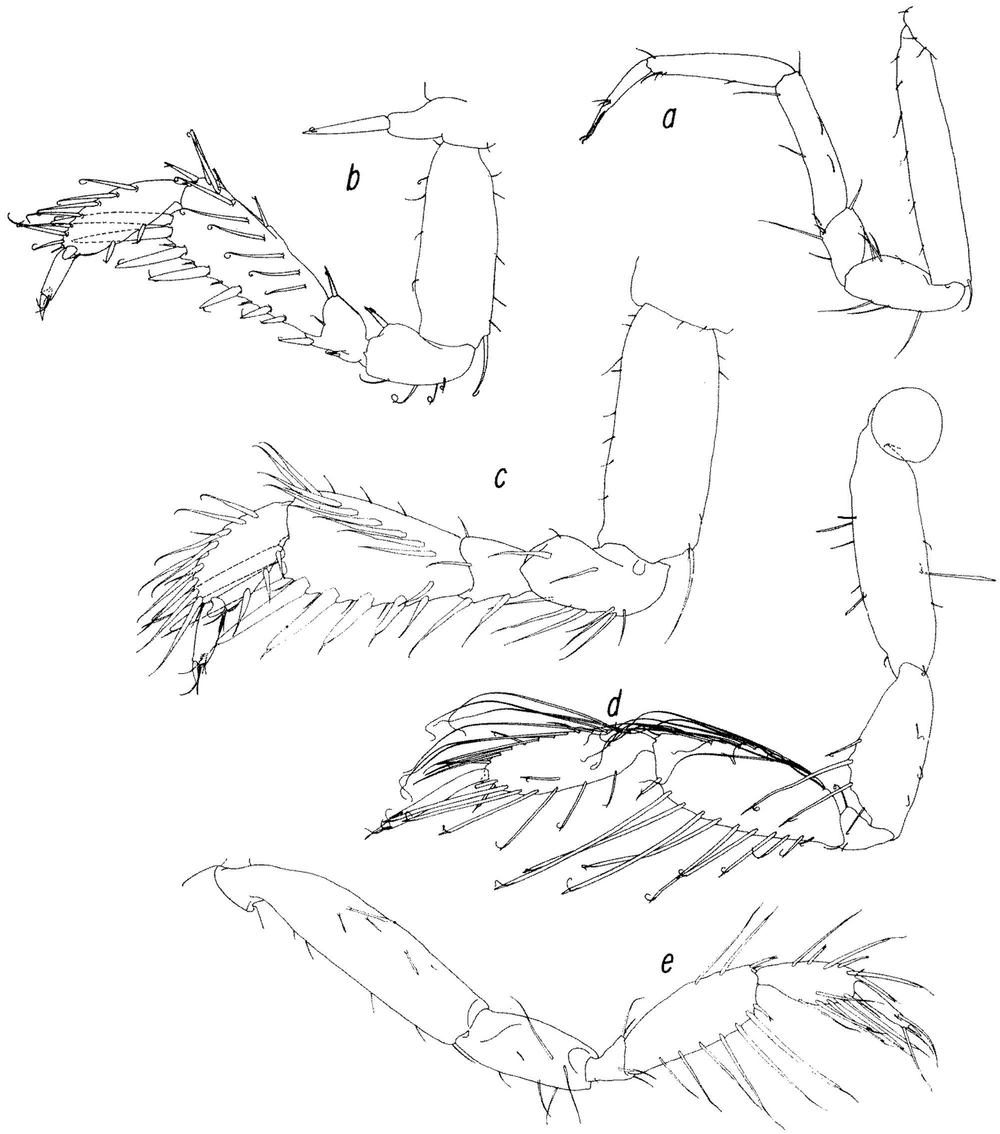

Fig. 23. *Eugerda latipes* (Hansen). *a*, Per I, B ♀; *b*, Per II, C ♂; *c,* Per II, B ♀; *d*, Per V, C ♂; *e*, Per V, B ♀. See section on symbols for explanation of abbreviations.

Previous records.—Ingolf station 25, Davis Strait, 63°30'N, 54°25'W, 1,065 meters. Grand Banks, 44°56.9'N, 48°53.3'W, 850 meters (Kussakin, personal communication).

Distribution.—North Atlantic; 200-1,102 meters.

Diagnosis of female.—Body (fig. 22*a*) 4.2 times longer than tergal width of peronite 2. Peronite 1 strongly reduced, its midsagittal length being only .43 that of pereonite 2. Pereonite 4 short, widest anteriorly, with evenly convex sides. Pereonite 5 1.3—1.5 times wider than long; sides nearly parallel, gently convex; anterolateral corners subangular or broadly rounded. Pleotelson 1.2 times longer than wide, .6 width of pereonite 2, tapering posteriorly, with broadly convex sides.

Coxae of pereonites I-IV (fig. 22*a*) not produced anteriorly, each tipped with small, slender seta.

First antenna (fig. 22*g*): Second peduncular segment 1.5 times longer than first, 3.6 times longer than wide. Flagellum 4-segmented, .89 length of second peduncular segment; all segments subequal in length.

Second antenna long, slender, being .7 length of body. Flagellum with 12-13 segments.

Left mandible (figs. 22*d*, *d*'): Three incisor teeth, of which middle one is most distal. Palp well developed.

Maxilliped (fig. 22*e*): Palp as wide as basis; joint separating segments 2 and 3 only moderately oblique; medial length of segment 3 1.1 times that of 2. Two coupling hooks.

Pereopod I (fig. 23*a*) strongly reduced, slender. Dactylus .64 length of propodus. Propodus 5.2 times longer than wide, widest near base; except for small distal setae, only 1 small seta on ventral margin, and none on dorsal. Carpus 4.8 times longer than wide; ventral margin concave, with single small, slender seta midway and 1 distally; dorsal margin with 2 setae midway and 1 distally. Merus with single dorsal seta; ventral margin with 1 small seta midway and 2 slender setae distally, 1 of which is large. Ischium with 3 large, slender, ventral setae and 4 dorsal setae, 3 of which are somewhat clustered distally. Basis 5.6 times longer than medial width, with single distoposterior seta.

Pereopod II (fig. 23*c*) large, robust, distinctly more heavily developed than subsequent 2 limbs. Dactylus .52 length of propodus. Propodus 2.1 times longer than wide; ventral margin distally fringed, with 3 robust setae; dorsal margin strongly convex, with row of 8-9 large, robust setae, medial to which is row of 3-4 small, slender setae. Carpus bulging distally ventral to base of propodus, 1.9 times longer than wide; ventral margin with 8 large, robust setae, most of which are unequally bifid, and between which are intercalated 4 small, slender setae; dorsal margin with row of 8 large, robust, laterally directed setae, medial to which is row of 4-5 small, slender setae. Merus with 1 small dorsal seta and 2-3 large ventral setae; distolateral seta unusually large. Ischium with irregular row of 7-8 ventral setae; 2 large dorsal setae, and medial to these 1 small seta. Basis 2.9 times longer than wide, with single, large, distoposterior seta.

Pereopod V (fig. 23*e*): Propodus 2.3 times longer than wide; 7 major ventral setae, of which all but proximal are unequally bifid; dorsal margin with 6 major setae, all but first of which are unequally bifid, and of which second, fourth, and last are distinctly shorter. Carpus 2.5 times longer than wide; 7 ventral setae, of which last 2 are unequally bifid and of which last is very short; 3 major dorsal setae, of which last 2 are unequally bifid and the last is short. Basis 4.5 times longer than wide.

Pleopod II (fig. 22*h*) about as long as wide, nearly round or slightly truncate distally; both margin and ventral surface sparsely supplied with setae.

Uropod (fig. 22*l*) .61 length of pleotelson. Endopod 2.7 times longer than protopod, 5.3 times longer than wide. Exopod .48 length of endopod.

Length of brooding female 1.7-2.2 millimeters.

Major differences of copulatory male from female.—Posterior portion of pereonite 4 (fig. 22*b*) constricted. Lateral edges of pereonites 5-7 and pleotelson expanded laterally as thin sheets; tergite of pereonite 5 1.7 times wider than long, not tapering, with evenly convex sides; anterolateral and posterolateral corners equally rounded. Pleotelson 1.1 times wider than long, as wide posteriorly as anteriorly, with gently convex sides and broadly rounded posterolateral corners.

Coxae of pereopods II-IV (fig. 22*b*) acute anteriorly, each tipped with very large, robust, unequally bifid seta; coxae of pereopods II and III moderately produced anteriorly.

Segments of second antenna stouter (figs. 22*f*, *f'*). Sixth peduncular segment 1.6 times longer than fifth; third and fifth peduncular segments with 1 and 2 robust distal setae, respectively. Flagellum with 16 segments, most of which are densely setose ventrally.

Distal segment of mandibular palp more strongly developed.

Pereopod II (fig. 23*b*) with more slender propodus and carpus, their being 2.7 and 2.4 times longer than wide, respectively. Many setae stouter and unequally bifid, including all ventral setae of propodus, carpus, and merus, medial dorsal row of setae on carpus, and dorsal setae of merus and ischium.

Pereopod V (fig. 23*d*) with many more major setae. Propodus 3.1 times longer than wide; 9 ventral, unequally bifid setae; 12 major dorsal setae, of which fifth, ninth, and last are short and unequally bifid. Carpus 2.5 times longer than wide; 11 unequally bifid ventral setae; 11 major dorsal setae. Dorsal setae of ischium all unequally bifid.

Pleopod I (fig. 22*i*) 2.1 times longer than wide, widest at base. Median lobes with angular distolateral corners, long, extending .15 length of limb beyond lateral lobes; lateral margins of medial lobes with 5-6 small setae; distal end with 4-5 abruptly larger setae which are not all limited to margin. Lateral lobes small, distinctly recurved.

Distal end of stylus on pleopod II (fig. 22*j*) inflated, then tapering to fine tip.

Many setae of uropodal rami (fig. 22*k*) unequally bifid.

Length of body 1.5 millimeters.

Remarks.—Of the many characters that distinguish this species, the following are among the most useful: pereonite 1 strongly reduced; in copulatory male anterior and posterior corners of pereonite 5 and pleotelson all rounded; flagellum of first antenna 4-segmented; mandibular palp well developed; pereopod I slender; coxa of pereopod I not produced anteriorly, and in copulatory male, coxae of pereopods II and III only moderately produced, but with very large setae; pereopod II powerfully developed, the ventral margin of its coxa bulging distally and having small setae intercalated between major setae of row; in copulatory male, medial lobe of pleopod I unusually long.

Eugerda tetarta n. sp
(Figs. 24-34)

Holotype.—Station 73: USNM 125097, brooding female.

Other material.—Station 73: 282 additional individuals (including 83 ♂ ♂), paratypes. Station 105, subsample B: 5 individuals. Station 87: 1 individual. Station F1: 6 individuals (including

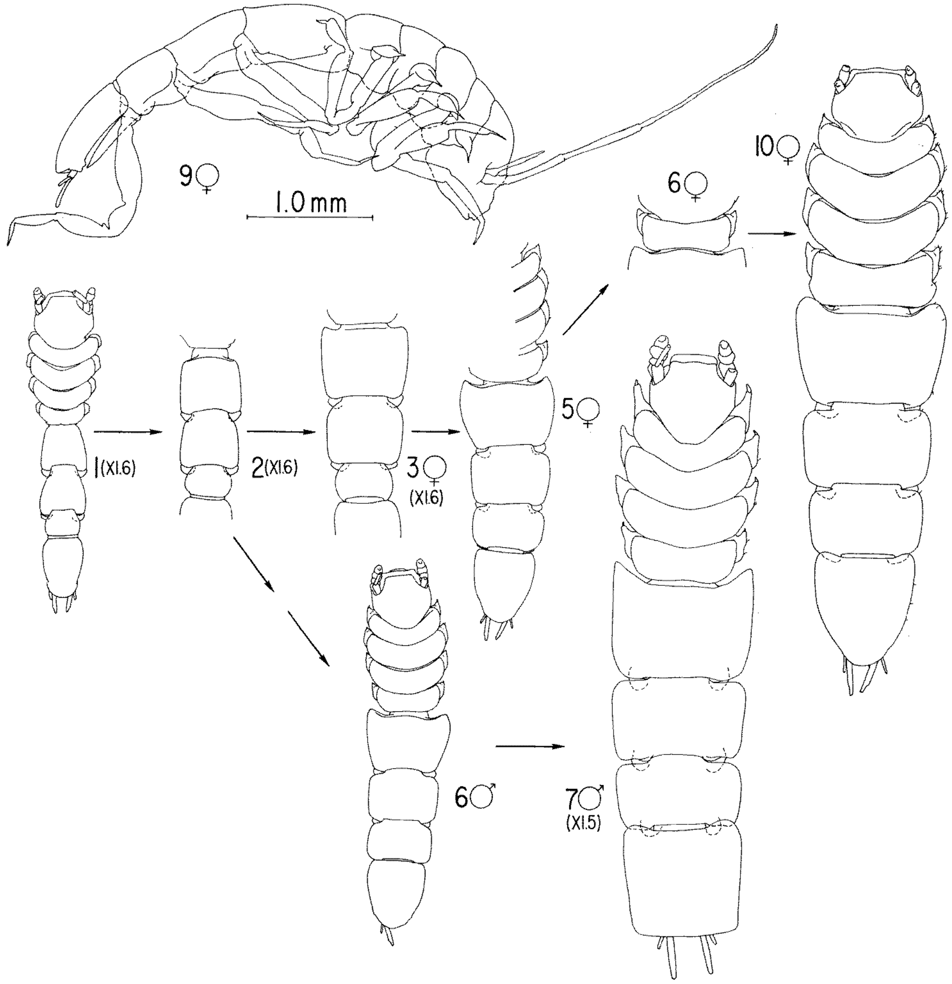

Fig. 24. *Eugerda tetarta* n. sp. Body in dorsal and lateral views. The scale line applies to all drawings, except that stages 1-3 have been magnified by 1.6, and stage 7 ♂ by 1.5. The numbers indicate the stage of development (see fig. 6 and text). The arrows show the direction of development.

1 ♂). Station G1: 2 individuals (including 1 ♂). Station G9: 4 individuals. Station 62: 3 individuals (including 1 ♂). Station 128: 21 individuals (including 7 ♂ ♂).

Previous records.—Part of the material from the Ingolf Expedition was so poorly preserved that Hansen (1916) did not feel justified in describing it formally. Three such specimens from Ingolf station 24, Davis Strait, 63°06'N, 56°00'W, 2,194 meters, almost surely belong to this species.

Distribution.—North Atlantic; 530-2, 496 meters.

Diagnosis of brooding female.—Body (fig. 24, 10 ♀) 4.6 times longer than tergal width of pereonite 2, widest at pereonite 5. Pereonite 1 smaller than pereonite 2, its length being only .78 that of the latter. Pereonites 2 and 3 subequal. Pereonite 4 short, its tergal width being 3.5 times that of its midsagittal length; sides parallel adjacent to coxae, but bulging laterally posterior to this. Pereonite 5 with broad

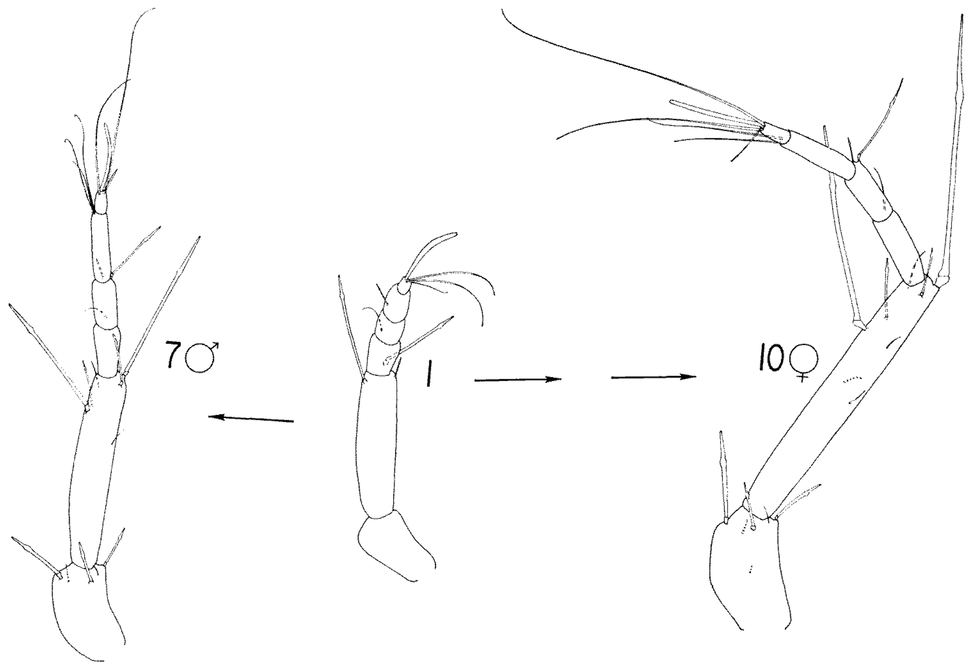

Fig. 25. *Eugerda tetarta* n. sp. First antenna. Explanation of symbols in caption to figure 24.

lateral flanges that are best developed anteriorly, making width of segment 1.1 times that of pereonite 2; tergite 1.5-1.7 times wider than midsagittal length; sides gently convex, diverging gradually anteriorly; anterior end of lateral flanges produced forward, rounded. Pleotelson .76 width of pereonite 2, 1.1-1.3 times longer than wide, widest anteriorly; sides gently convex, converging strongly posteriorly to acutely rounded posterior end; a pair of slight indentations just lateral to base of uropods.

Coxae of pereopods I-IV (fig. 24, 10 ♀) with short anterior projections, that of the first tipped with small, stout seta, the rest by 1 or more very small, slender setae.

First antenna (fig. 25, 10 ♀) 6-segmented. Second peduncular segment about 2.4 times longer than first, 6.9-7.8 times longer than wide. Flagellum .81-.84 length of peduncular segment 2; third flagellar segment long, comprising .31-.38 total length of flagellum; distal segment very short, being about one-third length of preceding segment. Medial surface of both peduncular segments and lateral surface of second peduncular segment provided with very small, simple setae. Distal end of third flagellar segment with long, slender setae.

Second antenna (fig. 26, 9 ♀) long, slender; flagellum with 13-14 segments.

Left mandible (fig. 27, 10 ♀): Incisor process lacking distinct teeth, consisting of single blunt lobe with faint indication of secondary tooth on dorsal flank. Lacinia mobilis terminating in 2 blunt teeth. Ten to eleven saw bristles. Molar process with 18-20 terminal setae. Palp well developed; third segment with row of 9 major setae.

Maxilliped (fig. 28, 10 ♀): Palp .86-.96 width of basis; medial length segment

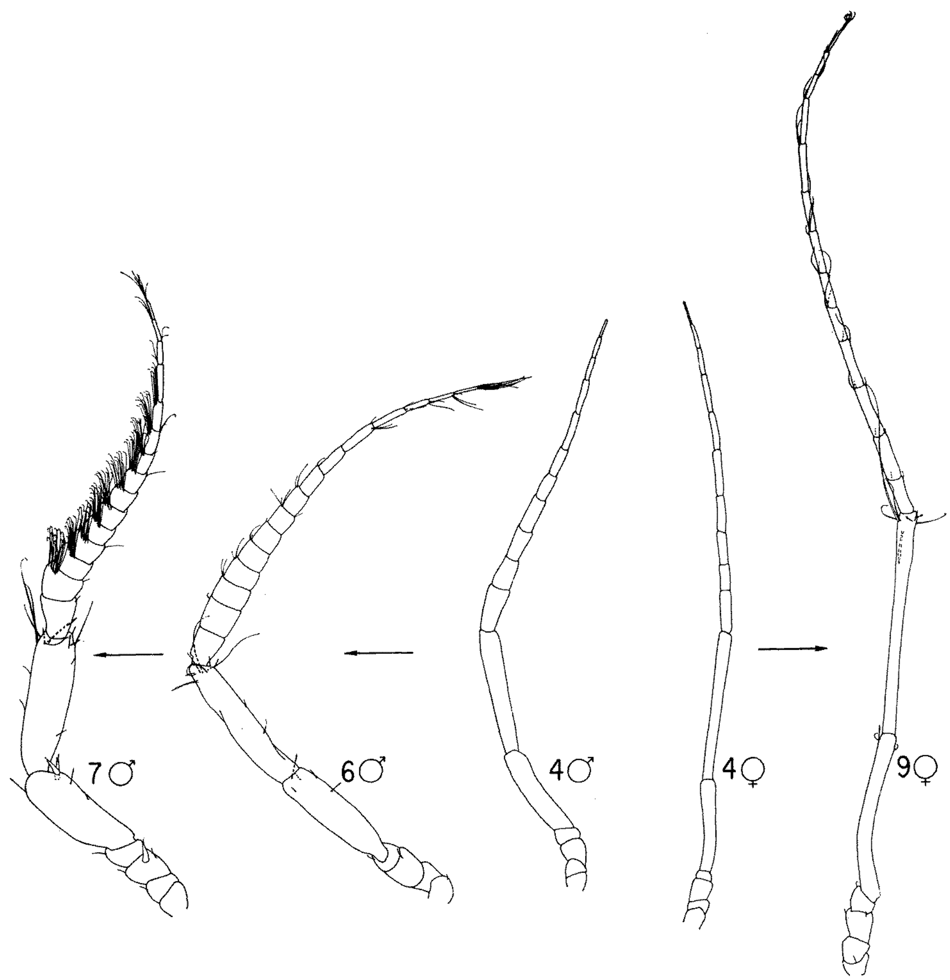

Fig. 26. *Eugerda tetarta* n. sp. Second antenna. Explanation of symbols in caption to figure 24.

3.75-.81 that of 2; joint separating segments 2 and 3 only moderately oblique. Two coupling hooks.

Pereopod I (fig. 29, 10 ♀) rather heavily built. Dactylus fringed, .50-.55 length of propodus. Propodus 4.8-5.2 times longer than wide, longer than carpus; dorsal margin with single small seta midway; ventral margin fringed, and with row of 3-4 small setae terminating distally in tuft of 3 small setae. Carpus 2.7-3.0 times longer than wide; main dorsal row of 5-6 laterally directed setae of moderate size located on lateral surface of segment; dorsal margin with 1-2 very small setae; ventral margin with 6 heavily built, unequally bifid setae. Merus with 4 stout, unequally bifid, ventral setae; distal end of dorsal margin with 1 stout, unequally bifid seta and 1 very small simple seta. Ischium 2.0-2.2 times longer than wide; ventral margin with 5 setae; dorsally, distal end of segment with 1 large lateral seta and transverse row of 4-5 setae on medial surface. Basis 4.4-4.7 times longer than wide; 3-4 distoposterior setae, of which only 1 is moderately large.

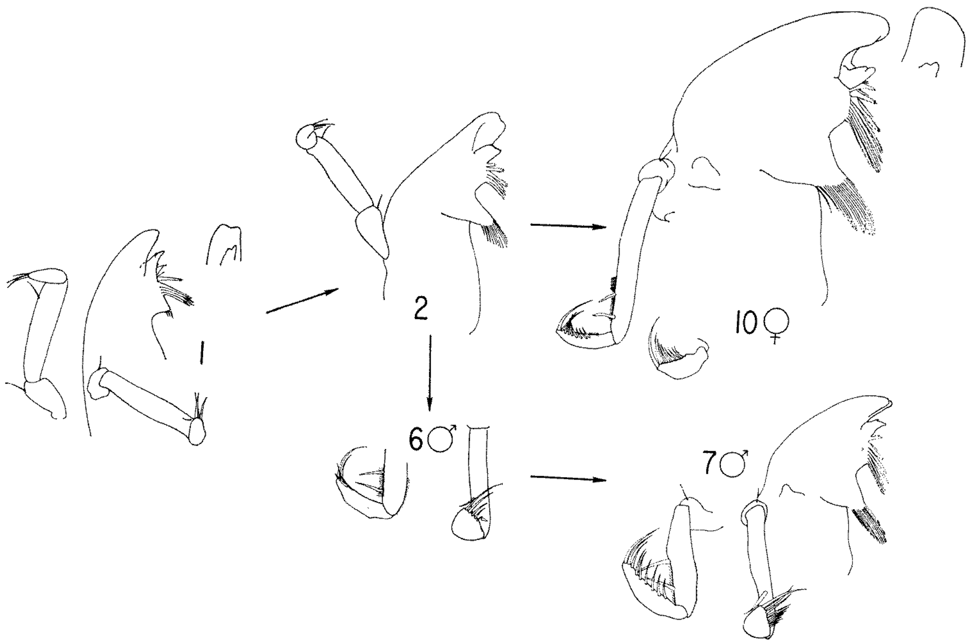

Fig. 27. *Eugerda tetarta* n. sp. Left mandible. Explanation of symbols in caption to figure 24.

Pereopod II (fig. 30, 10 ♀): Dactylus .65-.68 length of propodus. Propodus 3.0-3.5 times longer than wide; dorsal margin with main row of 6-8 large setae, and with subsidiary row of 2-3 very small setae medial to it; ventral margin with row of 4-5 short, stout, unequally bifid setae. Carpus 2.8-3.0 times longer than wide; main dorsal row of 13-15 large setae runs from lateral surface proximally to margin distally; subsidiary row of 4-6 very small setae runs along dorsal margin; ventral margin with row of 9-10 stout, unequally bifid setae. Merus with 4 stout, unequally bifid setae ventrally, and 2 small setae dorsally. Ischium 2.1-2.2 times longer than wide; ventral margin with irregular row of 5-8 moderate-sized setae; 1 large dorsal seta distolaterally. Basis 2.6-3.3 times longer than wide, about 1.5 times wider than that of the preceding limb and a little longer; 5-6 distoposterior setae, of which only 1 is large.

Pereopod V (fig. 31, 10 ♀): Dactylus 4.9-5.9 times longer than wide, about .5 length of propodus. Propodus 3.5-3.8 times longer than wide; dorsal margin with 4-6 long slender setae followed by 1-2 shorter, stout, unequally bifid setae, another long, slender seta, and another short, stout, unequally bifid seta; ventral margin with row of 5 long, unequally bifid setae; simple seta on lateral surface above ventral margin. Carpus 2.3-2.6 times longer than wide; dorsal margin with row of 8-9 long, slender setae followed by shorter, stouter, clawlike seta; row of 3-4 very small setae on medial surface below dorsal margin; ventral margin with row of 7-9 unequally bifid setae of which the distal ones are quite long, followed by single short, stout, unequally bifid seta. Merus with 2 dorsal and 2 ventral setae. Ischium 2.3-2.4 times longer than wide; row of 6-8 slender dorsal setae, of which

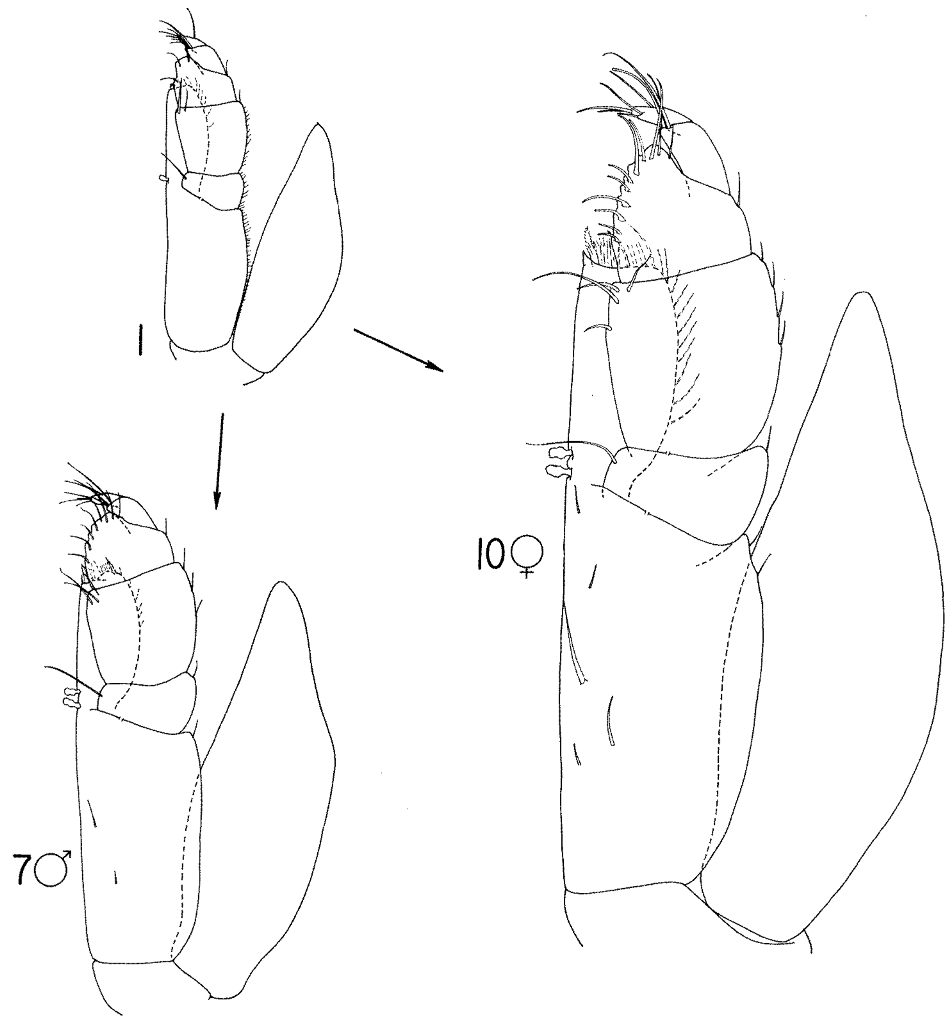

Fig. 28. *Eugerda tetarta* n. sp. Maxilliped. Explanation of symbols in caption to figure 24.

middle ones are longest; single small seta distomedially; ventral margin with 2-3 small setae. Basis 3.4-3.9 times longer than wide.

Pleopod II (fig. 33, 10 ♀) 1.0-1.1 times longer than wide, widest about one-third from anterior end, with gently concave posterior margin. Numerous (26-32) small marginal setae, and several small setae scattered on ventral surface.

Uropod (fig. 34, 10 ♀) about .45 length of pleotelson. Protopod with 3-4 medial setae, 3-4 lateral setae, and 1 dorsal seta. Endopod 5.8-7.7 times longer than wide, 2.1-2.3 times longer than exopod. Exopod long, slender, about 6.7 times longer than wide.

Length of body 4.8-5.2 millimeters.

Major differences of copulatory male from female.—Much smaller, body length being 2.9-3.2 millimeters. Therefore, because of allometry setation tends to be less than on mature female, except on pereopods V-VII.

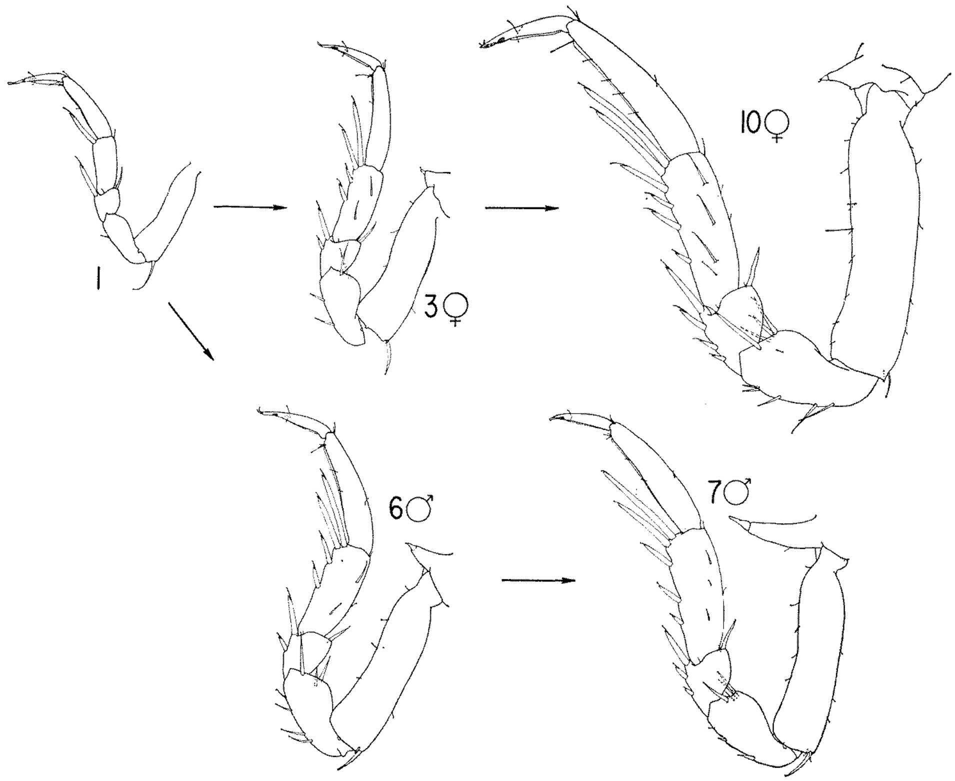

Fig. 29. *Eugerda tetarta* n. sp. First pereopod. Explanation of symbols in caption to figure 24.

Cephalon in profile with more convex forehead, resulting in more steeply sloping face and giving cephalon more truncate appearance. Pereonite 4 (fig. 24, 7 ♂) with evenly convex sides, widest anteriorly, without posterolateral expansions. Pereonite 5 1.6-1.8 times longer than wide, with straight, parallel sides; anterior projections of lateral flanges acute. Pleotelson nearly square, 1.1-1.2 times wider than long because of wide lateral flanges; sides nearly straight, converging only slightly posteriorly toward quadrate posterolateral corners; posterior margin nearly straight.

Coxae of pereopods I-IV (fig. 24, 7 ♂) with longer anterior projections, especially on the first; each projection tipped with small, stout seta.

First antenna (fig. 25, 7 ♂): Second peduncular segment shorter, 4.9-5.8 times longer than wide. Flagellum .92-.98 length of previous segment.

Second antenna (fig. 26, 7 ♂) stouter. Fifth and sixth peduncular segments 2.6 and 3.5 times longer than wide, respectively, the latter 1.3 times longer than the former; segments 3 and 5 with 1 and 2 stout, bifid setae, respectively. Flagellum with about 15 segments, slightly longer than peduncle, broadest at second segment, tapering evenly distally; ventral surface of segments 2-12 each with tuft of sensory setae, the more proximal segments being densely setose, and setal number decreasing gradually distally.

Left mandible (fig. 27, 7 ♂): Bifid nature of incisor process more distinct. Teeth

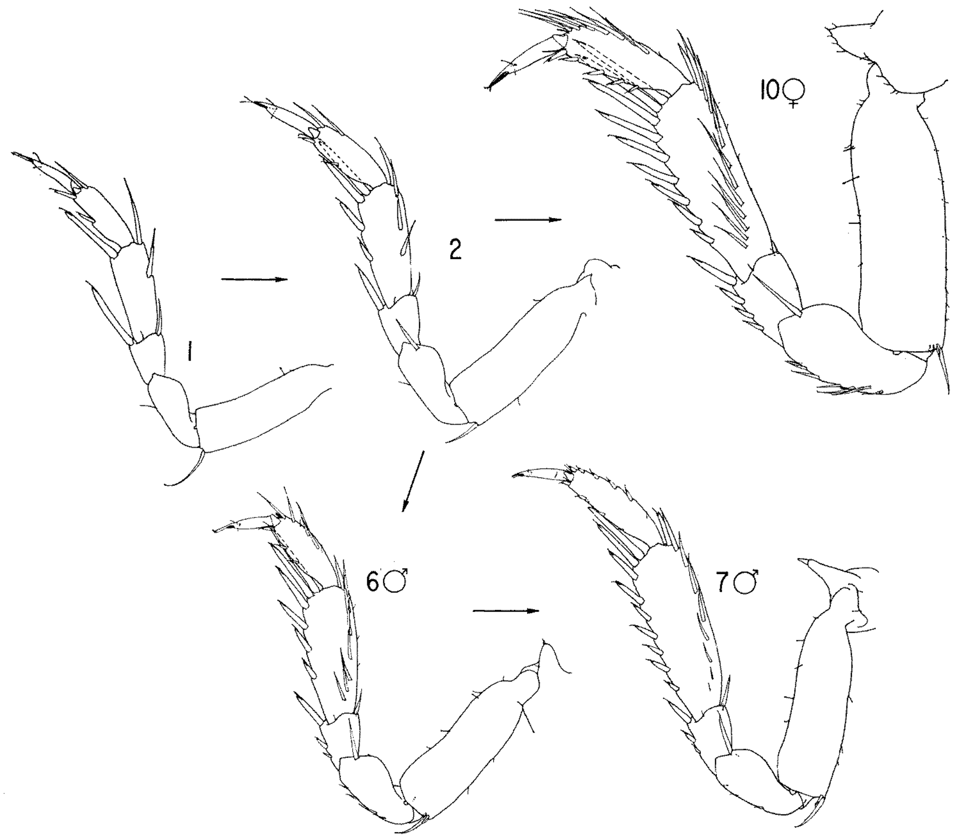

Fig. 30. *Eugerda tetarta* n. sp. Second pereopod. Explanation of symbols in caption to figure 24.

of lacinia mobilis more acute. Second palp segment proportionately shorter; third segment larger and major setae more widely spaced.

Pereopod I (fig. 29, 7 ♂): Dactylus .45-.51 length of propodus. Propodus 4.4-4.7 times longer than wide. Dorsal setae on carpus smaller. Ventral setae on ischium shorter, stouter, unequally bifid. Basis 4.8-4.9 times longer than wide; larger distoposterior setae unequally bifid.

Pereopod II (fig. 30, 7 ♂): Dactylus .50-.55 length of propodus. Propodus 3.7-3.8 times longer than wide; setae of ventral row and main dorsal row much shorter, stout, unequally bifid. Carpus 2.8-3.1 times longer than wide; setae of ventral and main dorsal rows shorter; distal seta of dorsal row bifid. Ventral setae of merus shorter, but main dorsal seta larger. Ischium 2.0-2.2 times longer than wide; ventral setae much smaller, and most proximal one bifid. Basis 3.7-3.9 times longer than medial width, more constricted just distal to proximal point.

Pereopod V (fig. 31 ♂): Dactylus 6.0-7.0 times longer than wide. Propodus 3.3-3.5 times longer than wide; dorsal margin with 13-15 long, slender setae; ventral margin with 5-8 shorter, slender, unequally bifid setae. Carpus much broader, 2.0-2.1 times longer than wide; dorsal and ventral margins with many more major setae, 17-22 and 11-12, respectively. Merus proportionately smaller. Basis more slender, 4.0-4.2 times longer than wide.

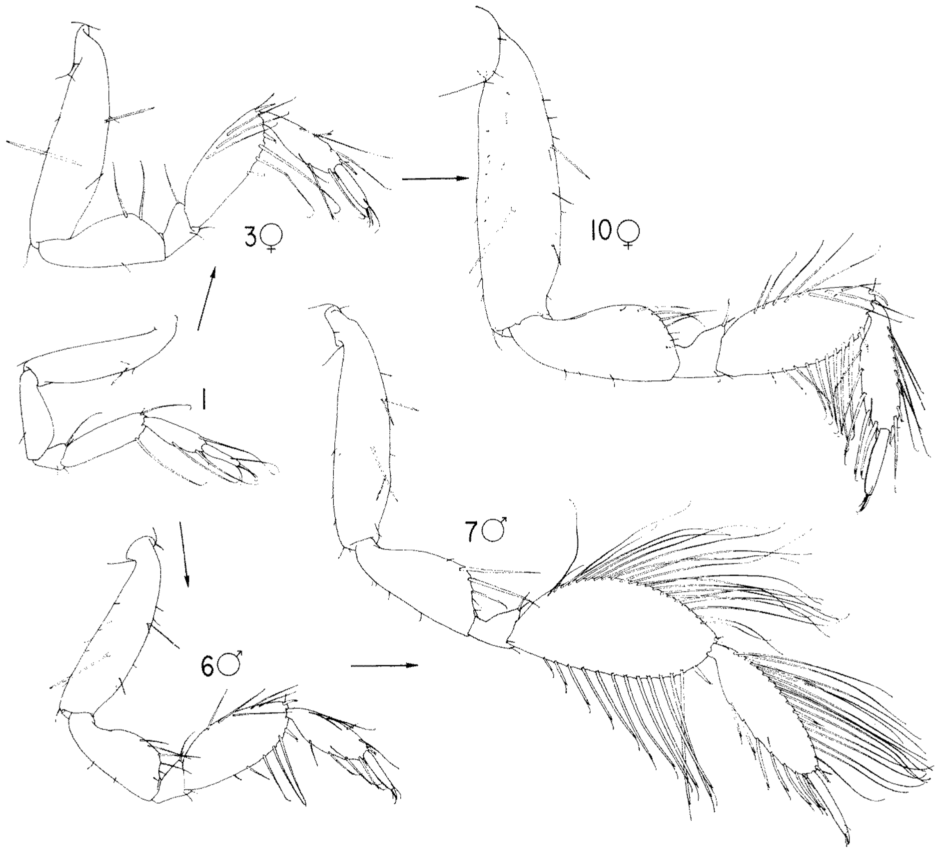

Fig. 31. *Eugerda tetarta* n. sp. Fifth pereopod. Explanation of symbols in caption to figure 24.

Pleopod I (fig. 33, 7 ♂) 2.9-3.4 times longer than wide, constricted two-thirds length from proximal end. Lateral lobes small, blunt hooks. Medial lobes evenly rounded, extending .07-.08 length of limb beyond lateral lobes; margin of each medial lobe with row of 5-6 moderate-sized setae flanked laterally by 3-7 closely spaced, very small setae.

Pleopod II (fig. 33, 7 ♂): Stylus moderately long, gradually becoming quite slender toward distal end. Setae along most of margin of protopod.

Uropod (fig. 34, 7 ♂) more angular. Most setae of protopod unequally bifid. Endopod 2.3–2.8 times longer than exopod; setae along medial margin large, unequally bifid; 3 largest distal setae stouter, unequally bifid.

Remarks.—Development and individual variation in this species have already been discussed (pp. 35, 36, 43, 44).

Eugerda tetarta is easily distinguished from other members of the genus by the following combination of major characters: Pereopod I nearly as well developed as pereopod II, and pereonite 1 unusually large for this genus; pereonite 5 with broad lateral flanges in both sexes; posterolateral margin of pleotelson angular in male; incisor teeth of mandible poorly developed.

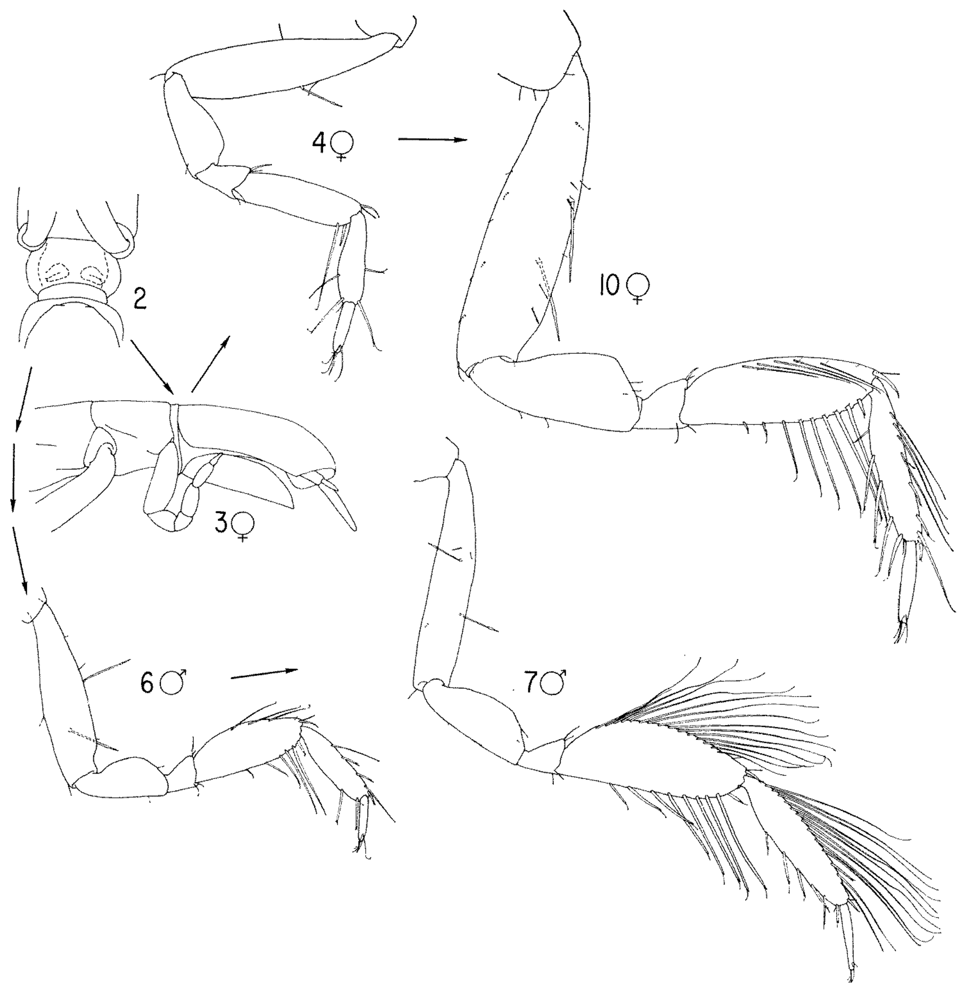

Fig. 32. *Eugerda tetarta* n. sp. Seventh pereopod. The drawing of stage 2 shows pereonite *7* in ventral view. The observer can see through the cuticle and note the *anlagen* of the pereopods developing within. Explanation of symbols in caption to figure 24.

Eugerda, imbricata n. sp.
(Fig. 35)

Holotype.—Station 121: USNM 125094, brooding female on which most of the oostegites are broken off.

Other material.—Station 121: at least 3 additional individuals, paratypes. Station 125: at least 4 individuals (including 1 copulatory ♂), paratypes.

Distribution.—North Atlantic; 4,800-4,825 meters.

Diagnosis of female.—Body (figs. 35*a, b*) flattened, broad, 4.2 times longer than tergal width of pereonite 2, widest at pereonite 5. Pereonite 1 much smaller than pereonite 2, its midsagittal length being only .58 that of the latter. Pereonite 2 slightly larger than 3, somewhat expanded posterolaterally; posterolateral corners of pereonite 3 even more expanded than on 2. Pereonite 4 4.9 times wider than midsagittal

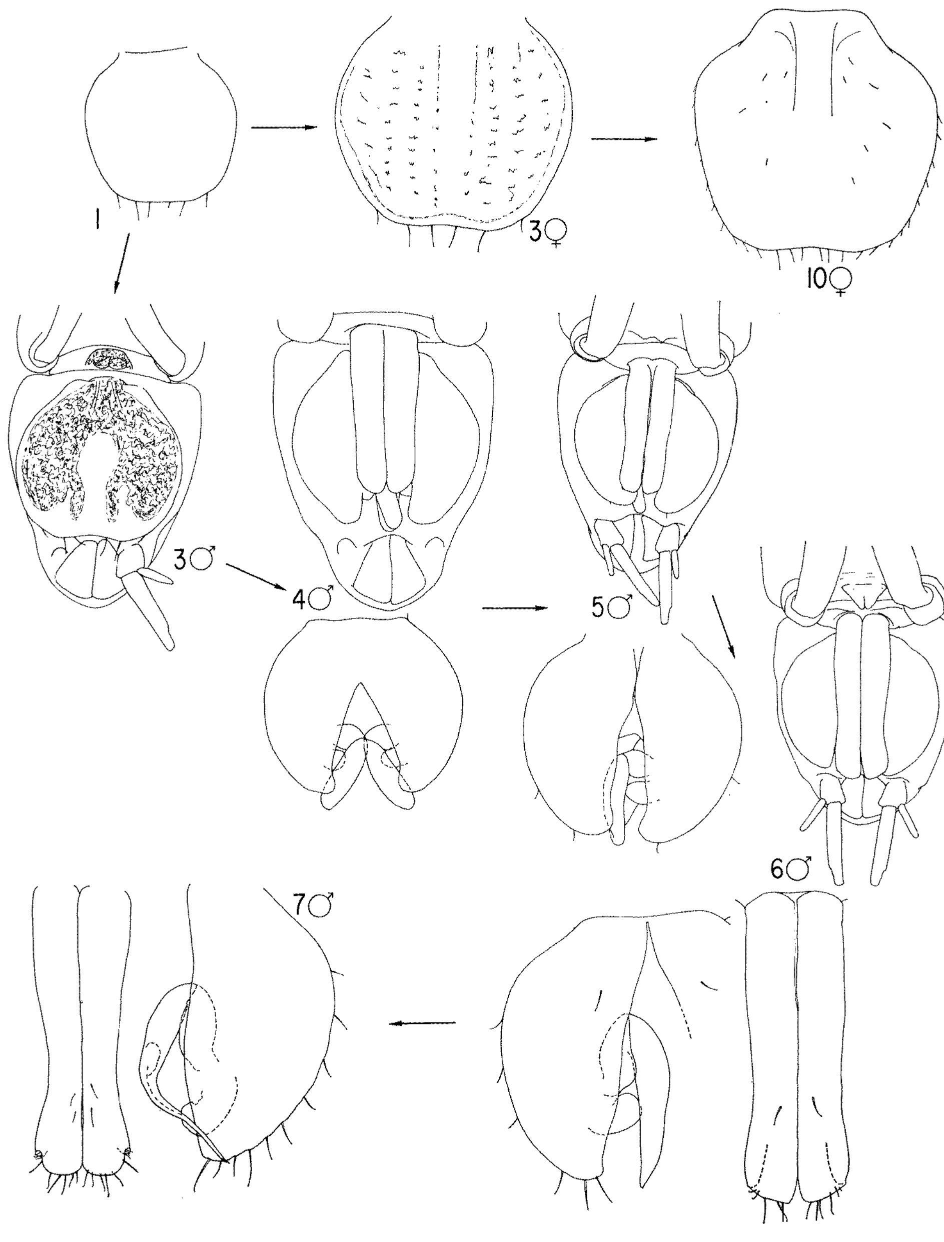

Fig. 33. *Eugerda tetarta* n. sp. First and second pleopods. The mottling of the stage 3 ♂ and stage 3 ♀ pleopods II shows the distribution of cells within the limb cavity. This can be easily seen by looking through the cuticle. It shows that in the stage 3 ♂, the *anlagen* of typical male pleopods II are developing within the cavity of a female-type limb. Explanation of symbols in caption to figure 24.

length, much the widest posteriorly where posterolateral corners are considerably expanded, subangular; sides acutely concave. Pereonites 5-7 with lateral marginal flanges. Flanges of pereonite 5 the broadest, best developed anteriorly, such that tergite is 1.6 times wider than long; anterior end of flanges produced forward, acutely rounded; sides gently convex. Pleotelson 1.2 times wider than long, with anterolateral corners somewhat produced; sides gently convex, converging strongly posteriorly. Anterior ends of tergites of pereonites 5-7 and pleotelson overlapping to an unusual extent the posterior portion of tergites of immediately preceding segments; as result, coxae of pereopods V-VII concealed in dorsal view. No ventral body spines.

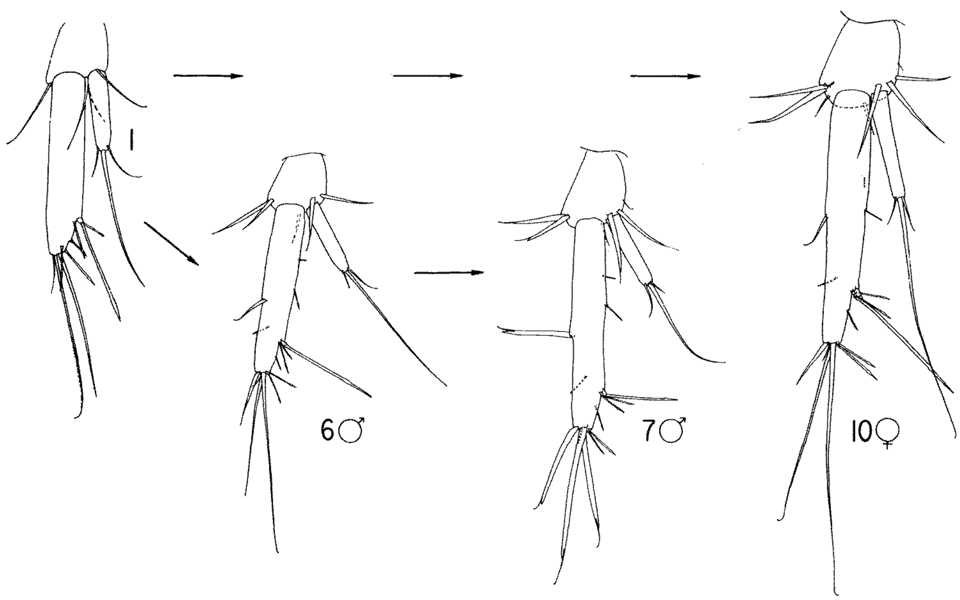

Fig. 34. *Eugerda tetarta* n. sp. Uropod. Explanation of symbols in caption to figure 24.

Coxae of pereopods I-IV (fig. 35*a*) produced very acutely anteriorly, each tipped with slender seta.

Trunk segments and coxae of pereopods I-IV fringed with numerous small setae (fig. 35*a*).

First antenna (fig. 35*e*) 6-segmented. First peduncular segment with a number of small, slender setae, and with row of broom setae along dorsal margin. Second peduncular segment 1.4 times longer than first, 4.9 times longer than wide. Flagellum 1.5 times longer than second peduncular segment; first segment comprising .43 total length of flagellum.

Third peduncular segment of second antenna (fig. 35*e*) unusually long.

Left mandible (figs. 35*f*, *f'*, *f''*): Incisor process with 4 teeth. Lacinia mobilis with 4 teeth. Twelve saw bristles. Setae of molar process limited to distal end, about 17 in number. Mandibular palp well developed; second segment long, slender; third segment large, with 7 major setae.

Maxilliped (fig. 35*d*): Palp about as wide as basis; medial length segment 3 1.2

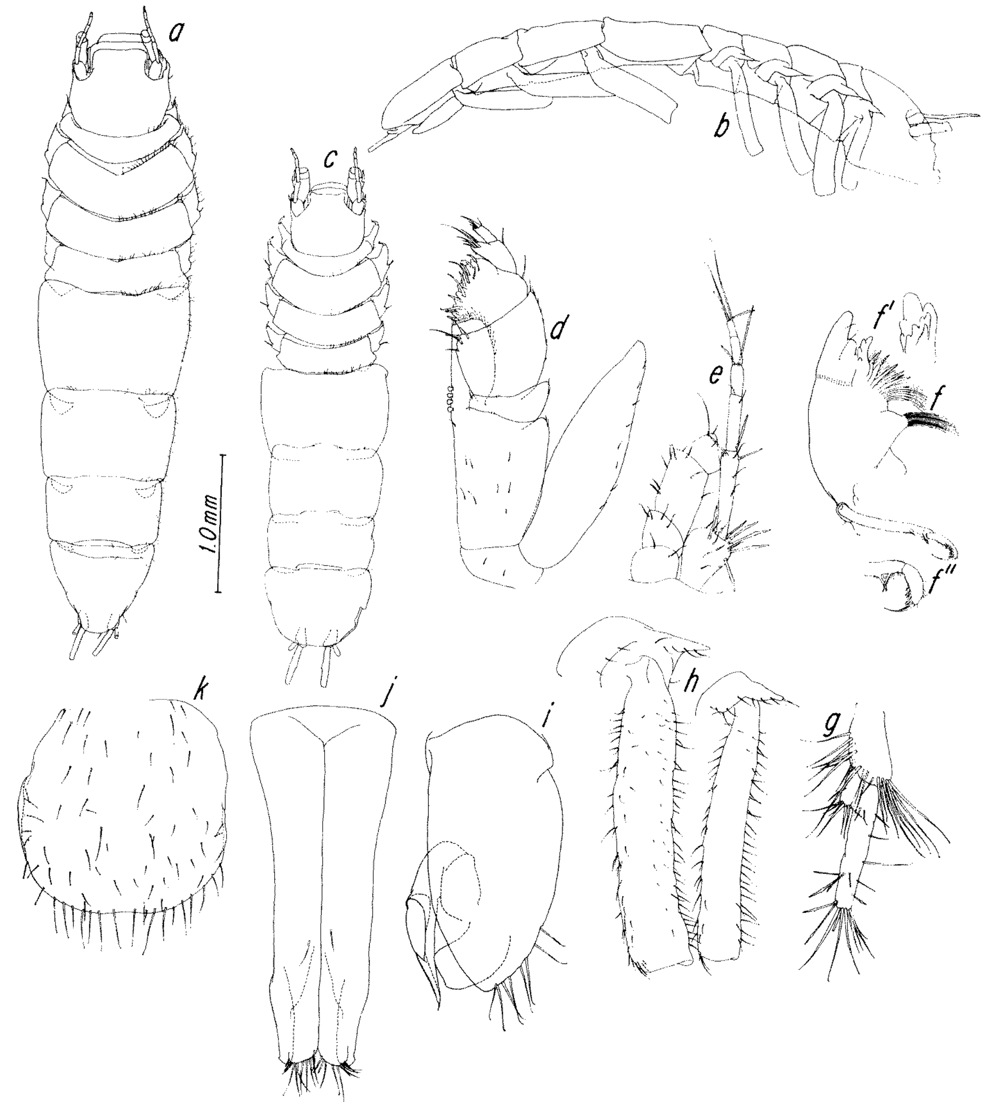

Fig. 35. *Eugerda imbricata* n. sp. *a,* body, B ♀ ; *b,* body, B ♀ ; *c,* body, C ♂; *d,* Mpd, P ♀ ; *e,* A I and base of A II, P ♀ ; *f,* Md, P ♀ ; *f'*, ip, Im, and first saw bristle, P ♀ ; *f''*, distal palp segment, P ♀ ; *g,* Ur, B or P ♀ ; *h,* Per I and II, basis and coxa, B ♀ ; *i,* Pl II, C ♂; *j,* Pl I, C ♂; *k,* Pl II, ♀, stage indeterminate. See section on symbols for explanation of abbreviations.

times that of 2; joint separating segments 2 and 3 strongly oblique. Four coupling hooks.

Basis of pereopod I (figs. 35*b, h*) 7.3 times longer than medial width. Basis of pereopod II 5.6 times longer than medial width, 1.5 times wider than that of pereopod I. Both bases fringed with numerous fine setae; no major distoposterior setae, there being instead a row of small setae.

Pleopod II (fig. 35*k*) round in outline, structurally weak and therefore easily distorted. Distal margin fringed with many large setae; ventral surface with numerous smaller setae.

Uropod (fig. 35*g*) about .53 length of pleotelson. Protopod long, slender; distolateral margin with row of large dorsal and row of large ventral setae; distomedial margin with dorsoventral row of many large setae. Endopod 5.6 times longer than wide, 3.1 times longer than exopod. Exopod 2.9 times longer than wide. Both rami with distal corona of several large setae.

Length of body 4.4 millimeters.

Major differences of copulatory male from female.—Body (fig. 35*c*) somewhat broader, especially posterior segments. Pleotelson with well-developed marginal flanges, tapering only gradually posteriorly, faintly quadrate in outline, without posterolateral spines; posterior margin broadly convex.

Coxae of pereopods I-IV (fig. 35*c*) more strongly produced, not so acute, tipped with stout, moderately small, unequally bifid setae; posterior lobes of coxae each tipped with slender, unequally bifid seta.

Pleopod I (fig. 35*j*) 2.5 times longer than wide, broadest basally, tapering gradually distally, but bulging slightly one-fifth way from distal end. Lateral lobes large, recurved, extending beyond tips of medial lobes. Medial lobes with fringe of many setae; no abrupt discontinuity in size between smaller lateral setae and larger distal setae.

Stylet of pleopod II (fig. 35*i*) rather stout.

Major setae of uropod unequally bifid.

Body 3.4 millimeters long.

Remarks.—Important features uniquely combined in this species are the broadly expanded marginal flanges of pereonite 5, the strongly tapered pleotelson, the overlap of the posterior tergites (which is the origin of the species' name), the extensive setation, the 4 incisor teeth on the mandible, and the pronounced lateral lobes on pleopod I of the male. In general form *E. imbricata* is reminiscent of *E. tetarta,* and they undoubtedly have a common ancestor at a subgeneric level. On the basis of its more extensively reduced first pereonite and pereopod, *E. imbricata* is clearly more derivative.

Eugerda setifluxa n. sp.
(Fig. 36)

Holotype.—Station GH1: USNM 125096, juvenile female.

Distribution.—North Atlantic; 2,500 meters.

Diagnosis.—Body (figs. 36*a, b*) 5.0 times longer than tergal width pereonite 2. Pereonite 1 reduced, only .53 length of pereonite 2. Pereonite 4 short. Pereonite 5 1.1 times wider than long, widest posteriorly, with only slightly convex sides. Pleotelson .15 length of body, 1.1 times longer than wide, widest anteriorly, tapering evenly posteriorly to broadly rounded posterior end.

Coxae of pereopods II-IV (fig. 36*a*) each with short, acute anterolateral projection tipped with short, slender seta.

Body and coxae of pereopods I-IV unusually setose, the setae involved being short and slender (figs. 36*a, h*).

First antenna (fig. 36*c*) 6-segmented. Second segment 1.4 times longer than

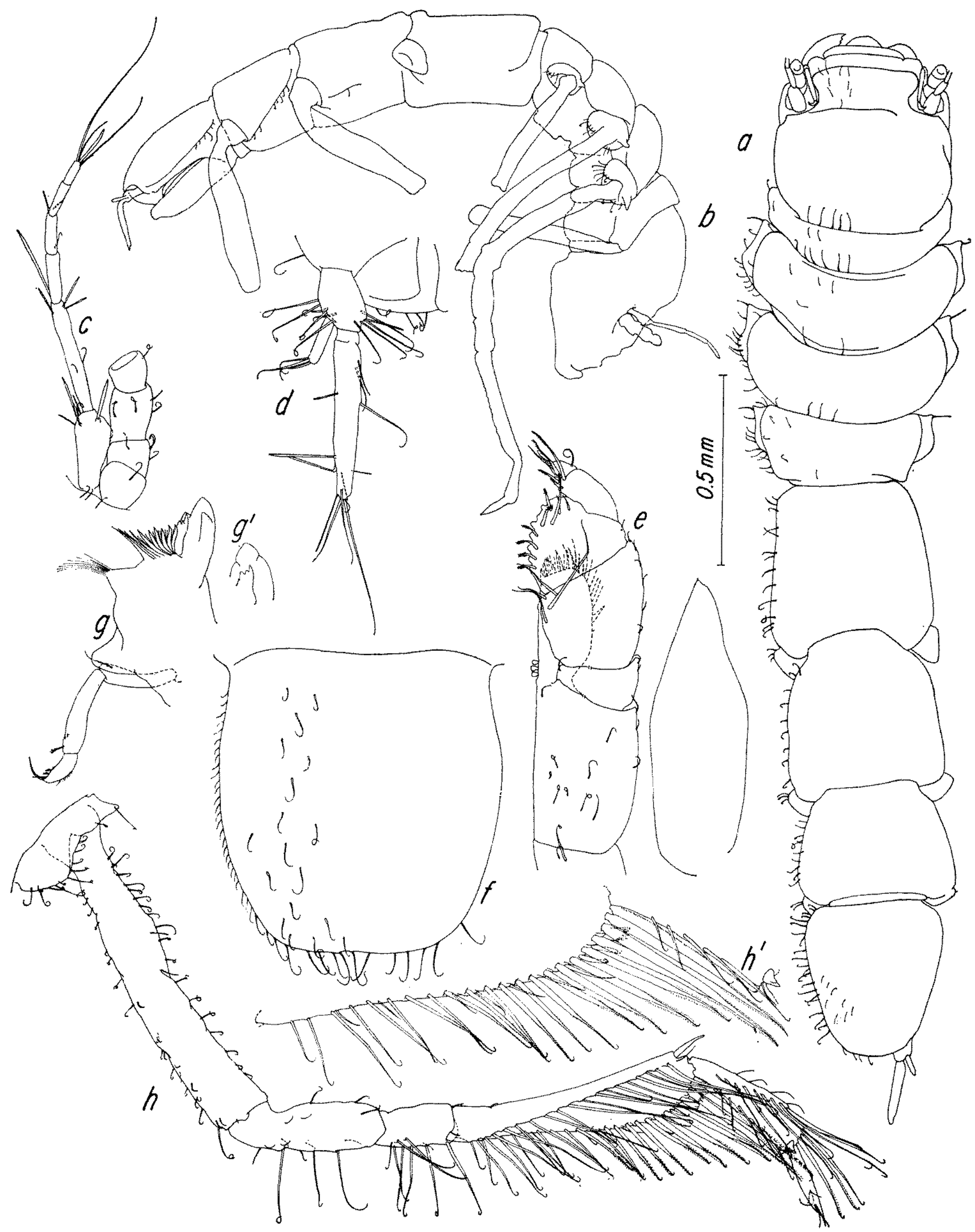

Fig. 36. *Eugerda setifluxa* n. sp. *a,* body, J ♀ ; *b,* body, J ♀ ; *c,* A I and base of A II, J ♀ ; *d,* Ur, J ♀ ; *e,* Mpd, J ♀ ; *f,* Pl II, J ♀ ; *g,* Md, ventral view, J ♀ ; *g,* ip and lm, J ♀ ; *h,* Per II, J ♀ ; *h',* Per II, ventral margin of carpus and propodus, J ♀. See section on symbols for explanation of abbreviations.

first, 6.8 times longer than wide; flagellum 1.3 times longer than second peduncular segment; 4 flagellar segments decreasing gradually in length distally.

Left mandible (figs. 36*g*, *g*'): Incisor process consists of large medial tooth flanked symmetrically by pair of equally developed, smaller teeth. Ten saw bristles. Molar process with a few terminal setae limited to tip. Palp well developed.

Maxilliped (fig. 36*e*): Palp slightly wider than basis; joint between segments 2 and 3 strongly oblique so that medial length of segment 3 is 1.4 times that of 2, but lateral length of 3 is only .18 that of 2. Three coupling hooks.

Pereopod I: All but basis absent on specimen. Basis slender, 9.5 times longer than wide.

Pereopod II (figs. 36*h*, *h*') long and slender in general aspect. Dactylus .66 length of propodus. Propodus 3.6 times longer than wide; dorsal margin with 2 rows of setae; on crest of margin is row of 4 small slender setae; major dorsal row of 14 laterally directed, slender setae begins proximally on lateral surface of segment, but attains dorsal margin toward distal end; ventral margin with conspicuous fringe accompanied by row of 6 slender setae. Carpus about 4 times longer than wide; dorsal margin straight, reflected laterally, particularly toward base so that the 18 long, slender setae in dorsal row are directed ventrolaterally; 1 small and 1 stout, clawlike seta at distal end of dorsal margin; ventral margin with 21 slender setae; regularly interspersed among these are 9 smaller setae, the more distal of which are unequally bifid; medial to penultimate large seta in ventral row is large comb which is probably homologous to fringe of propodus. Merus and ischium slender, clothed with a number of slender setae, particularly ventrally. Basis about 1.3 times wider than that of preceding limb, slender, being about 6.5 times longer than wide; 1 moderately small, slender seta distoposteriorly; numerous smaller setae scattered along anterior and posterior margins.

Pleopod II (fig. 36*f*) slightly longer than wide, with broad base; sides evenly convex; distal end truncate; free margin of limb with row of closely spaced setae which increase gradually in length toward distal margin; setae also scattered upon ventral surface.

Uropod (fig. 36*d*) .63 length of pleotelson. Protopod with row of setae both dorsal and ventral to base of exopod, as well as distomedial row. Exopod 4.2 times longer than wide, .33 length of endopod. Endopod 2.7 times longer than protopod, 6.3 times longer than wide.

Length 5.3 millimeters.

Remarks.—*Eugerda setifluxa* can be distinguished from more closely related species by the abundant major and minor setae on its body and limbs, the slenderness of the basis on the more anterior pereopods and of the more distal segments of pereopod II, the dentition of the mandibular incisor process, and the length of the uropodal exopod. The adult body size in this species must be very large in view of the large size of this single juvenile specimen.

Eugerda pannosa n. sp.
(Figs. 37, 38)

Holotype.—Station 121: USNM 125095, preparatory female.

Other material.—Station 121: 3 additional individuals. Station II1: 1 individual (copulatory ♂), paratype. Station 85: 1 individual, paratype.

Distribution.—North Atlantic; 3,742-4,800 meters.

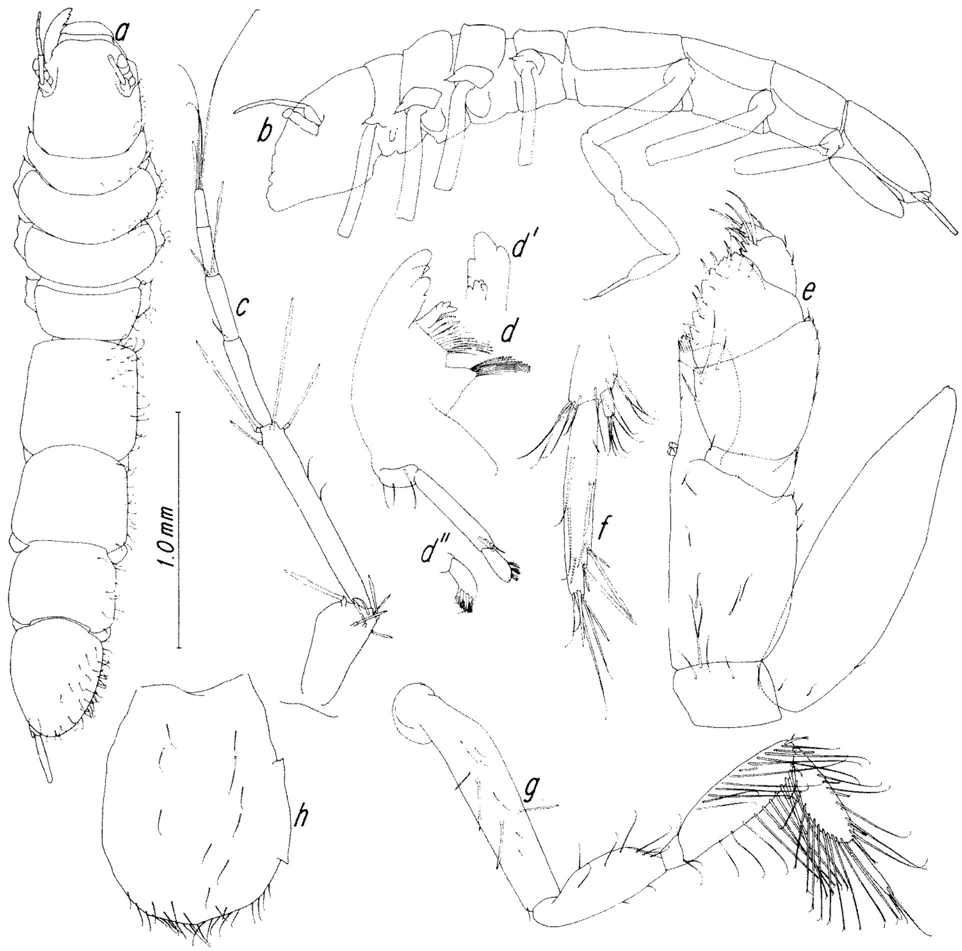

Fig. 37. *Eugerda pannosa* n. sp. *a,* body, P ♀ ; *b,* body, P ♀ *c,* A I, B ♀ *d,* Md, P ♀ ; *d,* Md, P ♀ ; *d',* ip and lm, P ♀ ; *d'',* distal palp segment, P ♀ *e,* Mpd, P ♀ *f,* Ur, P ♀ ; *g,* Per V, P ♀ ; *h,* Pl II, B ♀. See section on symbols for explanation of abbreviations.

Description of female.—Body (fig. 37*a*) slender, about 5 times longer than tergal width pereonite 2. Pereonite 1 reduced, .75 length of pereonite 2. Pereonite 4 narrowing posteriorly, with evenly convex sides, 2.4 times wider than long. Pereonite 5 elongate, only 1.1 times wider than long; sides faintly convex, nearly parallel; anterolateral corners rounded. Pleotelson 1.3 times longer than wide, widest anteriorly, with evenly convex sides; posterior margin narrowly rounded.

Coxae of pereopods I-IV (fig. 37*a*) with acute, moderately produced anterolateral angles, each tipped with very small, stout seta.

First antenna (fig. 37*c*) 6-segmented. First segment long. Second segment 1.9 times longer than first, 8.5 times longer than wide, with 1-2 small setae along length. Flagellum 1.2 times longer than second peduncular segment; segments decreasing evenly in length distally; last segment .42 length of first, 3.3 times longer than wide.

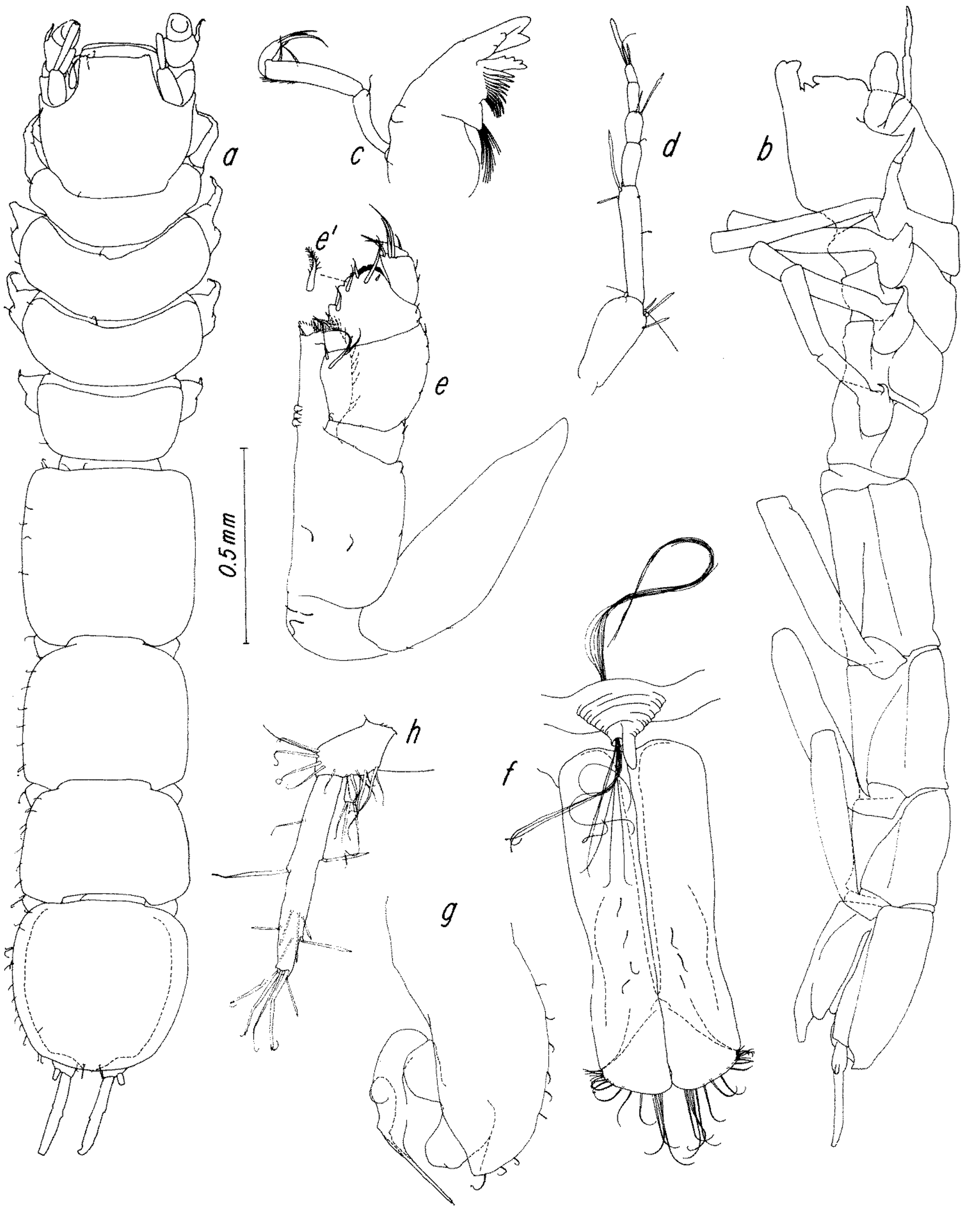

Fig. 38. *Eugerda pannosa* n. sp. *a,* body, C ♂; *b,* body, C ♂; *c,* Md, C ♂; *d,* A I, C ♂; *e,* Mpd, C ♂; *e',* medial seta on segment 3, C ♂; *f,* Pl I, C ♂, also showing genital cones of pereonite 7, one torn and with sperm; *g,* Pl II, C ♂; *h,* Ur, C ♂. See section on symbols for explanation of abbreviations.

Left mandible (figs. 37*d, d', d"*): Incisor process with 2 teeth dorsal and proximal to main tooth. Lacinia mobilis well developed, with 4 teeth. Eleven to fourteen saw bristles. Molar process with numerous terminal setae. Palp well developed; second segment long and slender; distal segment with 4 major setae.

Maxilliped (fig. 37*e*): Palp as wide as basis; joint between segments 2 and 3 strongly oblique; medial length segment 3 1.5 times that of 2. Lateral margin of basis and palp segments 1, 2, and 4 with a number of moderately small setae. Two or three coupling hooks.

Basis of pereopod I (fig. 37*b*) long, slender, 9.9 times longer than wide. Basis of pereopod II as long as that of I, but 1.2 times broader, 8.0 times longer than wide. Both with single distoposterior seta and numerous marginal setae.

Pereopod V (fig. 37*g*): Dactylus 8.4 times longer than wide, .64 length of propodus. Propodus 3.2 times longer than wide; dorsal margin with row of 6 long, slender setae interspersed with 4 shorter, unequally bifid setae; ventral margin with row of 11 setae, all but the most proximal of which are long and unequally bifid. Carpus 3.2 times longer than wide; dorsal margin with row of 12 long, slender setae plus shorter, unequally bifid distal seta; ventral margin with 10 setae, all but the more proximal of which are long and unequally bifid, plus a shorter, unequally bifid distal seta. Ischium 2.8 times longer than wide, with many moderately long, slender setae dorsally, and 2 short setae ventrally.

Pleopod II (fig. 37*h*) about as long as wide; numerous marginal and ventral setae; basal articulation about as broad as limb.

Uropod (fig. 37*f*) .56 length of pleotelson. Protopod with rows of 4 distomedial and 5 distolateral setae. Endopod 3.0 times longer than protopod, 6.3 times longer than wide. Exopod .14 length of endopod, 2.4 times longer than wide.

Body of holotype 3.0 millimeters long.

Differences of copulatory male from female.—Lateral margins of pereonites 5-7 and pleotelson (fig. 38*a*) with thin flanges which are very narrow on pereonites, slightly broader on pleotelson. Pleotelson as long as wide, widest toward anterior end, broader posteriorly than in female; posterior margin very broadly rounded.

Coxa of pereopod I (figs. 38*a, b*) produced forward into thin process approximately as long as midsagittal length of pereonite; its seta is somewhat shorter. Pereopods II-IV display same development, but to gradually decreasing degree.

First antenna (fig. 38*d*) shorter. Second segment 1.3 times longer than first, 5.7 times longer than wide. Flagellum as long as second peduncular segment; flagellar segments all proportionately shorter than on female.

Setae of distal segment on mandibular palp (fig. 38c) more strongly developed.

Pleopod I (fig. 38*f*) 2.4 times longer than wide, of equal width proximally and distally, constricted medially. Medial lobes extending .09 length of limb beyond lateral lobes; margin of each medial lobe very gently convex for most of length, but more acutely rounded toward midsagittal line; numerous marginal setae, long medially, gradually becoming very short and densely crowded laterally.

Copulatory stylus of pleopod II (fig. 38*g*) short.

Many setae of uropod (fig. 38*h*) stouter, unequally bifid.

Body 2.6 millimeters long.

Remarks.—*Eugerda pannosa* is most easily distinguished on the basis of the following characters: pereonite 5 long, with subparallel sides and rounded anterolateral corners; posterolateral corners of pleotelson rounded in copulatory male; mandible with 4 incisor teeth; bases of anterior pereopods very slender; coxae of pereopods I-IV moderately produced in female, more so in male; uropodal exopod short.

This species is most similar to *E. setifluxa,* from which it can best be distinguished by its smaller size, its more produced coxae I-IV, and its shorter uropodal exopods.

The inclusion of the male from station II1 in this species is based on the shape of the fifth pereonite, the slenderness of the first four pereopods, the dentition of the mandible, and the length of the uropodal exopods. One difference in this male which is not easily attributable to sexual dimorphism is the relative shortness of its first antenna.

Eugerda fulcimandibulata, n. sp.
(Figs. 39, 40)

Holotype.—Station 155: USNM 125093, preparatory female.

Other material.—Station 155: 2 additional individuals (including 1 copulatory ♂), paratypes. Station 122: 1 individual, paratype. Station 119: 1 individual. Station 95: 5 individuals (including 1 ♂), paratypes. Station 85: 2 individuals (including 1 copulatory ♂), paratypes. Station 156: 22 individuals (including 2 ♂ ♂). Station 169: 8 individuals. Station 142: 82 individuals (including 11 ♂ ♂ of which 2 are copulatory).

Previous records.—Among the Ingolf specimens that Hansen (1916) thought were too fragmentary to describe is a single individual that probably belongs to this species. Its locality is Ingolf station 40, south of Iceland, 62° 00’N, 21°36’W, 1,546 meters.

Distribution.—North and Equatorial Atlantic; 587-4,833 meters.

Diagnosis of female.—Body (figs. 39*a-e*) 4.5 times longer than tergal width of pereonite 2. Cephalon giving impression of being proportionately larger than usual, with pair of large, bulging sockets (fig. 39*e*) dorsolateral to base of labrum, serving to contain dorsal hinges of mandibles. Pereonite 1 very small, its midsagittal length being only .6 that of pereonite 2. Pereonite 4 broadest anteriorly, tapering strongly posteriorly. Pereonite 5 1.1 times longer than wide, with gently convex sides and rounded anterolateral corners. Pleotelson highly vaulted, 1.3 times longer than wide; sides converging very slightly posteriorly; posterior end broadly rounded.

Coxae of pereonites I-IV (fig. 39*a*) not produced anteriorly, each with very small, slender seta.

First antenna (fig. 39*k*): Second peduncular segment 4.4 times longer than wide. Flagellum 3-segmented; first 2 segments of equal length; distal segment longer.

Left mandible (figs. 39*f, f’, f”*) stout, heavily built. Incisor process consisting of single main tooth, but with much smaller ventral tooth faintly defined. Lacinia mobilis strongly reduced, with weak dentition. Nine saw bristles. Molar process with about 15 distal setae. Palp well developed, 3-segmented.

Both maxillae (figs. 39*g, h*) normally developed.

Maxilliped (fig. 39*i*): Basis and palp subequal in width. Medial length palp segment 3 1.2 times that of 2; joint separating segments 2 and 3 strongly oblique. Two coupling hooks.

Pereopod I (fig. 39*m*) very elongate and slender. Dactylus 11.5 times longer than wide, .47 length of propodus. Propodus 15.2 times longer than wide, widest at base, .92 length of carpus; nearly straight, but ventral margin slightly concave; single small seta at distal end of ventral margin. Carpus widest at base, 11.8 times longer than wide, gently curved such that ventral margin is noticeably concave; no setae. Ischium 7.5 times longer than wide; 2 small ventral setae and row of about

Fig. 39. *Eugerda fulcimandibulata* n. sp. *a,* body, J ♀ ; *b,* body, P ***; *c,* pereonite 5, B ♀ ; *d,* pleotelson, P ♀ ; *e,* cephalon, lateral view, B ♀ ; *f,* Md, J ♀ ; *f'* , ip, J ♀ ; *f''* , distal palp segment, J ♀ ; *g,* Maxilla II, B ♀ ; *h,* Maxilla I, B ♀ ; *i,* Mpd, B ♀ ; *j,* Ur, J ♀ ; *k,* A I, B ♀ ; *l,* Per II, P ♀ ; *l'* , ventral comb on carpus, P ♀ ; *m,* Per I, P ♀ ; *n,* Per V, P ♀ ; *o,* Pl II, J ♀. Figures *b, d, m,* and *n* are of material from station 155 in the Equatorial Atlantic; the other figures illustrate Transect material. See section on symbols for explanation of abbreviations.

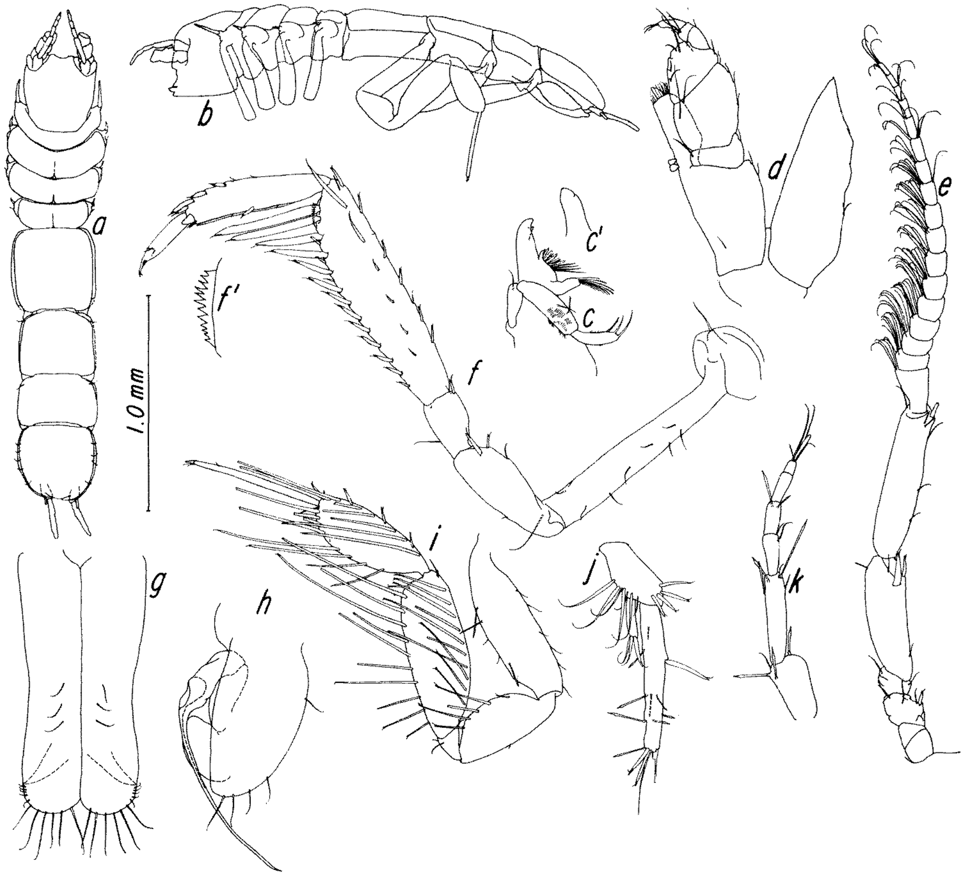

Fig. 40. *Eugerda fulcimandibulata* n. sp. *a,* body, C ♂; *b,* body, C ♂; *c,* Md, C ♂; *c',* ip, C ♂; *d,* Mpd, C ♂; *e,* A II, C ♂; *f,* Per II, C ♂; *f',* ventral comb on carpus, C ♂; *g,* Pl I, C ♂; *h,* Pl II, C ♂; *i,* Per V, C ♂; Ur, C ♂; *k,* A I, C ♂. Figures *e, f,* and *f'* are of material from station 155 in the Equatorial Atlantic; the rest illustrate Transect material. See section on symbols for explanation of abbreviations.

7 dorsal setae. Basis 8.0 times longer than wide, fringed with numerous moderately large setae, both anteriorly and posteriorly, including single large distoposterior seta.

Pereopod II (figs. 39*l*, *l*'): Dactylus .8 length of propodus, fringed ventrally for part of its length; triad of small medial setae located far more proximally than usual. Propodus 2.8 times longer than wide; dorsal margin with row of 7-8 large setae and with 1-2 small setae medial to row; ventral margin fringed, and with 1 seta midway and 2 distally. Carpus 2.8 times longer than wide; just lateral to dorsal margin is main row of 7-9 large setae; on margin itself is subsidiary row of 5-6 small setae; ventral margin with row of 12-14 main setae; just medial to this, along distal half of margin is intercalated row of 3-4 small setae (proximal ones of which are slender, but distal ones are stout and unequally bifid) which is followed by well-developed hand-shaped comb (probably homologous to fringe of propodus). Merus with 1 dorsal seta and 4 ventral setae of varying length. Ischium with 1 large and 1 small dorsal seta and with 7 ventral setae of varying size. Basis 4.8 times longer than medial width, with single distoposterior seta, but with ***addiional large seta just dorsal to it.

Pereopod V (fig. 39*n*): Dactylus 7.2 times longer than wide, .64 length of propodus. Propodus 3.0 times longer than wide; dorsal margin with 3 long, slender setae alternating with 4 short, distally bifid setae; ventral margin with row of 9 setae, the longest of which are distally bifid. Carpus 3.4 times longer than wide; dorsal margin with 9 slender setae and single large broom seta; ventral margin with 7 setae, most of which are distally bifid, and most distal of which is short and stout. Ischium 2.4 times longer than wide; dorsal margin with row of several slender setae; a few setae ventrally.

Pleopod II (fig. 39*o*) about as long as wide, widest midway; posterior end truncate; numerous marginal setae, those of posterior margin being quite long.

Uropod (fig. 39*j*) .82 length of pleotelson. Protopod slender; lateral margin with ventral and dorsal setal rows, the later having far fewer setae than the former; distomedially angle of ventral surface bears third row of setae. Endopod 2.4 times longer than protopod, 6.8 times longer than wide. Exopod .2 length of endopod, 4.4 times longer than wide.

Body of holotype 2.6 millimeters long.

Major differences of copulatory male from female.—Body (figs. 40*a, b*) flatter. Cephalon proportionately smaller, less rounded, with more pronounced forehead, lacking bulging mandibular sockets. Pereonites 5-7 and pleotelson broader, with thin marginal flange; pereonite 5 as wide as long; pleotelson a little wider than long, broadly rounded posterolaterally.

Coxae of pereopods I-IV (fig. 40*a*) with acute, slightly produced anterolateral corners each tipped with stout seta, that of pereopod I being particularly large.

Flagellum of first antenna (fig. 40*k*) distinctly 4-segmented.

Second antenna (fig. 40*e*) stouter. Fifth and sixth peduncular segments 3.1 and 4.0 times longer than wide, the latter 1.2 times longer than the former; segments 3, 5, and 6 with 1, 2, and 1 stout setae, respectively. Flagellum with 17 segments, as long as peduncle, tapering evenly toward end, with usual tufts of sensory setae.

Mandible (figs. 40*c*, *c*') less heavily built. Teeth of incisor process more acutely pointed. Palp relatively larger.

Pereopod II (figs. 40*f*, *f*') more slender. Propodus 4.5 times longer than wide; dorsal and ventral setae much shorter; only 4 major dorsal setae. Carpus 4.2 times longer than wide; dorsal margin straight; setae in main dorsal row much smaller, but setae of subsidiary row slightly larger, robust, unequally bifid; ventral margin less convex, its setae shorter proximally, more robust, unequally bifid; comb toward distal end of ventral margin more broadly based, with more teeth. Merus with fewer, shorter setae. Ischium with short, stout, unequally bifid dorsal setae; ventral setae few, small. Basis 6.2 times longer than wide, with fewer setae.

Pereopod V (fig. 40*i*): Dactylus unusually long, 15 times longer than wide, as long as propodus; claw short. Propodus 2.6-2.8 times longer than wide; ventral margin with 8-9 long setae; dorsal margin with very long, unequally bifid setae and short, unequally bifid setae alternating in pattern, going distally, of 1 long, 1 short, 2 long, 1 short, 2 long, 1 short, 2 long, 1 short. Carpus 2.7-3.0 times longer than wide; ventral margin with row of 8-10 long setae and single short, unequally bifid seta distally; dorsal margin with 9-10 long, unequally bifid setae followed by 2 very small setae. Ischium 2.2-2.8 times longer than wide; large dorsal setae unequally bifid.

Pleopod I (fig. 40*g*) 2.1 times longer than wide, constricted medially. Medial lobes broadly and evenly rounded, extending .13 length of limb beyond inconspicuous lateral lobes; 6 large distal setae flanked by 5-6 abruptly shorter lateral setae.

Stylet of pleopod II (fig. 40*h*) long, extending well beyond tip of limb.

Many setae of uropod (fig. 40 *j*) stouter, unequally bifid.

Body 1.9 millimeters long.

Remarks.—The differences from the female of the cephalon of the copulatory male are unusually profound. Although the shape of the cephalon of maturing males is known to change in this genus, it is surprising that something so basic as the articulation of the mandible should be involved. The changes in the mandibular articulation are as abrupt as with the other dimorphie characters; the immature male looks just like the female in this respect.

For these reasons one might question whether the copulatory male described here truly belongs to this species. Its inclusion is based on several similarities: outline of pereonite 5, shape of pereopod I, dentition of mandibular incisor process, reduced lacinia mobilis, presence of small lateral setae on maxilliped and its epipodite, form and setation of uropod, and general body size. Furthermore, all samples having this type of copulatory male also contained females of this species, and the samples are from widely different geographic areas. Finally, no other known copulatory male bears any resemblance to the female of this species.

Features especially useful in distinguishing the female of *Eugerda fulcimandibulata* are the bulging mandibular sockets, the incisor dentition, the especially reduced first pereonite and its long, slender pereopod, and the ventral comb on the carpus of pereopod II. In addition to some of the above features, copulatory males are distinguished by the rounded outline of the pleotelson, the short coxal processes of pereopods I-IV, the long coxal seta of pereopod I, the rounded medial lobes of pleopod I, and the long stylet of pleopod II.

Genus Mirabilicoxa n. gen.
Mirabilicoxa gracilipes (Hansen, 1916)
(Figs. 41, 42)

Desmosoma graoilipes Hansen, 1916, p. 113, pl. 11, figs. 1*a-f*. Gurjanova, 1933, pp. 418, 466.

Menzies, 1962, p. 163, figs. 50*A, B*. Kussakin, 1965, pp. 137, 142.

Lectotype.—Of all the material on which Hansen's description is based, a juvenile female from Ingolf station 24 is most complete. It is here designated lectotype.

Material.—Station 62: 5 individuals (including 1 copulatory ♂). Station 126: 1 possible individual.

Previous records.—Ingolf station 24, Davis Strait, 63°06'N, 56°00'W, 2,194 meters. Ingolf station 36, Davis Strait, 61°50'N, 56°21'W, 2,702 meters.

Distribution.—North Atlantic; 2,194–2,702 meters, perhaps as deep as 3,806 meters.

Diagnosis of female.—Body (figs. 41*a, b*) 4.3 times longer than tergal width of pereonite 2. Pereonite I less well developed than 2, but the same midsagittal length. Pereonite 4 quadrate, with concave sides, slightly expanded posterolaterally.

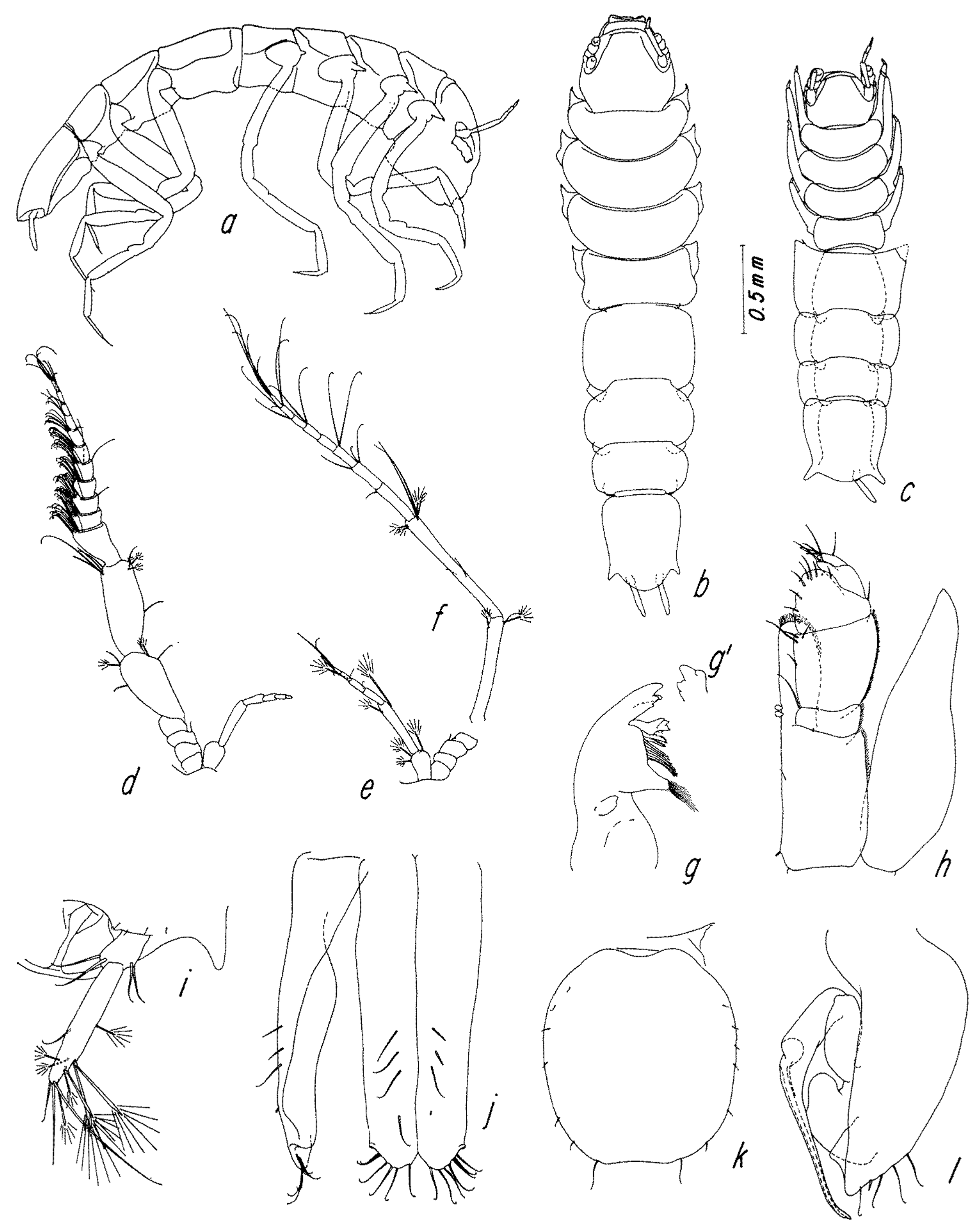

Fig. 41. *Mirabilicoxa gracilipes* (Hansen). *a,* body, B ♀; *b,* body, B ♀; *c,* body, C ♂; *d,* A I and A II, C ♂, setae on A I omitted; *e,* A I and base of A II, B ♀; *f,* A II, flagellum and peduncular segments 5 and 6, B ♀; *g,* Md, B ♀; *g',* ip, B ♀; *h,* Mpd, B ♀; *i,* Ur, B ♀; *j,* PI I, ventral and lateral views, C ♂; *k,* PI II, B ♀; *l,* PI II, C ♂. See section on symbols for explanation of abbreviations.

Pereonite 5 .83 width of pereonite 2, 1.5 times wider than long, with parallel, gently convex sides and rounded anterolateral corners. Pleotelson .58 width of pereonite 2, 1.3 times longer than wide, widest near anterior end, with gently convex sides converging gradually posteriorly to large posterolateral spines located .8 the way back from anterior end; posterior margin broadly rounded.

Coxae of pereopods I-IV (fig. 41*b*) with anterolateral angles produced into short, acute processes, tipped with very small, stout setae.

First antenna (fig. 41*a*) reaching almost to end of fifth peduncular segment of second antenna, 6-segmented. Second segment twice as long as first, 5.5 times longer than wide. Flagellum same length as second peduncular segment; first 2 flagellar segments abruptly larger than distal 2.

Second antenna (fig. 41*f*) .4 length of body. Segments 5 and 6 combined form .5 length of limb, the latter segment 1.2 times longer than the former. Flagellum with 8 segments.

Left mandible (figs. 41*g*, *g'*): Incisor process with 4 teeth, the second most dorsal of which is only slightly more proximal than the most ventral. Nine saw bristles. Molar process with many terminal setae. No mandibular palp.

Maxilliped (fig. 41*h*): Palp same width as basis; joints bounding segment 1 only moderately curved; medial length of segment 3.9 that of 2. Two coupling hooks.

Pereopod I (fig. 42*a*): Dactylus .67 length of propodus. Propodus 5.1 times longer than wide; no dorsal setae except distally; ventral margin with 1-2 small setae midway. Carpus 3.1 times longer than wide, lacking dorsal setae except distally; ventral margin with 4-5 unequally bifid setae. Merus with 2 large setae dorsally and 2 ventrally. Ischium with 1-2 large dorsal setae; ventral margin with row of 1 large seta and several very small setae more proximally. Basis 6-7 times longer than wide, with single large distoposterior seta.

Pereopod II (fig. 42*b*): Dactylus 5.8-6.0 times longer than wide, .71 length of propodus. Propodus 3.2-3.5 times longer than wide, with dorsal row of 7-8 distally setulate setae; ventral margin fringed, and with row of 2-3 slender, unequally bifid setae midway. Carpus 3.6-3.9 times longer than wide; dorsal margin straight; proximal end of row of 9 slender, ventrolaterally directed setae located well down on lateral margin; ventral margin with 8-9 unequally bifid setae. Merus with 1 large dorsal seta and 3 unequally bifid ventral setae. Ischium with 1 large dorsal seta and 2-3 very slender ventral setae of varying lengths. Basis 5.4-5.9 times longer than wide, 1.3 times wider than on previous limb, with single large distoposterior seta.

Pereopod V (fig. 42*c*): Dactylus 9 times longer than wide. Propodus 3.8-4.1 times longer than wide, .7 length of carpus; dorsal margin with 3 long, simple setae and with 2 shorter, unequally bifid setae located in middle and at end of row; ventral margin with 7 long setae. Carpus 3.7-3.9 times longer than wide, with 8 long, slender setae ventrally and 4-5 dorsally; shorter, unequally bifid seta at distal end of dorsal margin. Merus with 1 medium-sized and 1 small dorsal seta; ventral margin with 2 small setae. Ischium 2.2-2.6 times longer than wide, with few setae. Basis 5.0-5.2 times longer than wide.

Pleopod II (fig. 41*k*) 1.1 times longer than wide, widest midway, with rounded axial ridge; posterior margin slightly concave; free margins fringed with several setae.

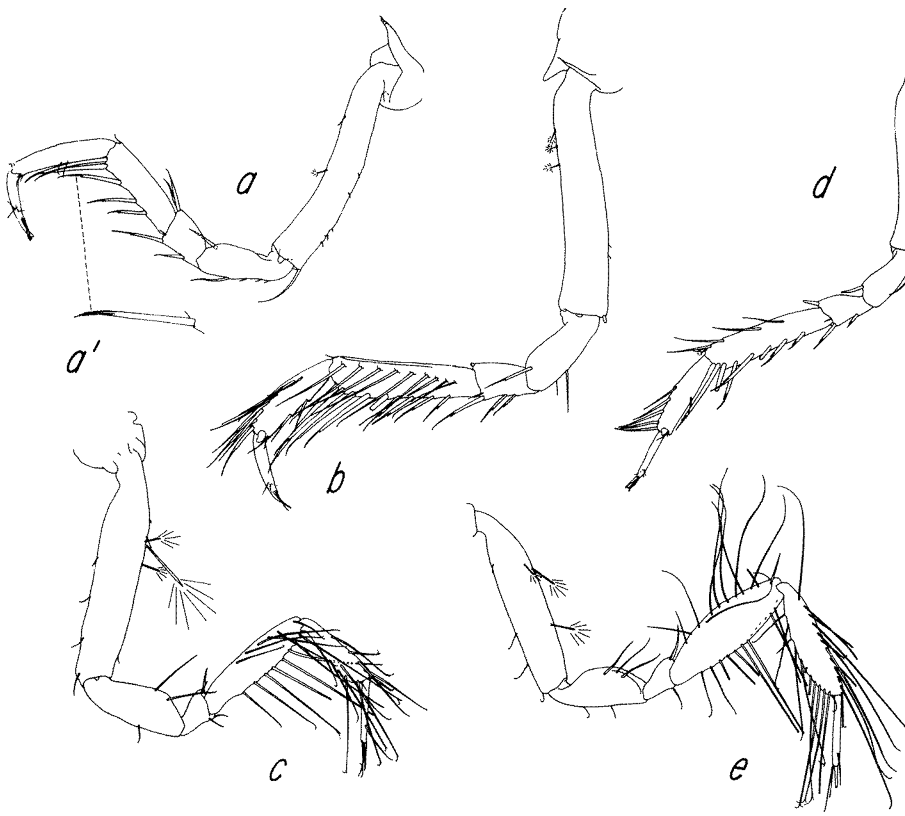

Fig. 42. *Mirabilicoxa gracilipes* (Hansen). *a,* Per I, B ♀; *a'*, ventral setsa, B ♀; *b,* Per II, B ♀; *c,* Per V, B ♀; *d,* Per II, C ♂; *e,* Per V, C ♂. See section on symbols for explanation of abbreviations.

Uropod (fig. 41*i*) uniramous, .44 length of pleotelson. Protopod with 4 large distal setae. Endopod about 3 times longer than protopod, 5.7 times longer than wide.

Body 3.3 millimeters long.

Major differences of copulatory male from female.—Pereonite 4 (fig. 41*c*) evenly convex laterally. Pereonites 5-7 and pleotelson relatively much broader because of flangelike expansion of lateral margins. Pereonite 5 broadest segment of body, 1.3 times wider than pereonite 2, 2 times wider than long; anterolateral corners acute, produced somewhat anteriorly; sides nearly straight, converging gradually posteriorly. Pleotelson as long as wide; posterolateral spines located .9 way back from anterior end, larger than on female, more laterally directed; posterior margin more broadly rounded.

Coxae of pereopods I-IV (fig. 41*c*) produced extremely far forward, so that tips of coxae I and II reach level of anterior end of cephalon, coxa II reaches to posterior end of cephalon, and coxa, IV reaches to posterior end of pereonite 2; each process tipped with large, stout seta.

Second antenna (fig. 41*d*): Peduncular segments 5 and 6 .39 total length of limb. Flagellum .85 width of fifth peduncular segment, 5.7 times longer than wide, 11-segmented, with all but more distal segments being densely setose ventrally.

Pereopods I and II tending to have fewer setae, pereopod II (fig. 42*d*) with more slender propodus and earpus, 4.0 and 4.4 times longer than wide, respectively; dorsal row of setae on carpus directed dorsolaterally.

Pereopod V (fig. 42*e*): Propodus longer, being .9 length of carpus. Carpus proportionately broader, only 3.2 times longer than wide. Both carpus and propodus with many more large marginal setae.

Pleopod I (fig. 41*j*) 2.5 times longer than wide. Lateral lobes hardly evident; at lateral edge of each medial lobe is slender ridge which is continuous with lateral edge of adjacent lateral lobe. Medial lobes extending .06 length of limb beyond lateral lobes; each medial lobe with fringe of 6-7 slender setae.

Body 2.4 millimeters long.

Remarks.—This species is uniquely characterized by the following combination of major features: Antero-lateral corners of pereonite 5 of female rounded and sides convex. Mandible without palp. Uropod uniramous. Large.

The male described here differs considerably in body shape from that described by Hansen. Inspection of his material shows, however, that the males are immature, and therefore these differences are not surprising. That the body form of immature males of this species already differs from that of the female stands in contrast to the situation seen in other genera. The copulatory male described here is included in this species for the following reasons: Large size; mandible lacking palp; uropod uniramous; found at same station.

This copulatory male resembles that of *M. magnispina* (Menzies), but differs in its longer, 4-segmented flagellum of the first antenna, the less convex lateral borders on pereonites 6 and 7, and the more mutely convex medial lobes of pleopod I.

Mirabilicoxa similis (Hansen, 1916)
(Fig. 43)

Desmosoma simile Hansen, 1916, p. 112, pl. 10, figs. 7*a-e*. Gurjanova, 1933, pp. 418, 466. Menzies, 1962, p. 164, figs. 50*F, G*. Kussakin, 1965, pp. 137, 142.

Lectotype.—Hansen's description of *M. similis* is based on five individuals from Ingolf station 24. Limbs from the single well-preserved brooding female were used for the illustrations. This female is here designated lectotype.

Material.—Station 105, subsample B: 1 fragmentary individual. Station 131: 4 individuals.

Previous records.—Ingolf station 124, Davis Strait, 63°06'N, 56°00'W, 2, 194 meters.

Distribution.—North Atlantic; 530-2, 194 meters.

Diagnosis of female.—Body (figs. 43*a, b*) 3.9 times longer than width of pereonite 2. Pereonite 1 less well developed than pereonite 2, but as long midsagitally. Pereonite 4 2.2 times wider than long, with convex sides, equally wide anteriorly and posteriorly. Pereonite 5 1.6 times wider posteriorly than long, widest anteriorly (1.8 times wider anteriorly than long) where lateral corners are produced laterally into short, blunt points; from base of points, sides diverging gently posteriorly. Pleotelson 1.1 times longer than wide, widest anteriorly; sides unusually sinuous, converging strongly posteriorly to posterolateral spines located .82 way back from anterior end. Posterior margin broadly rounded. Pereonite 5

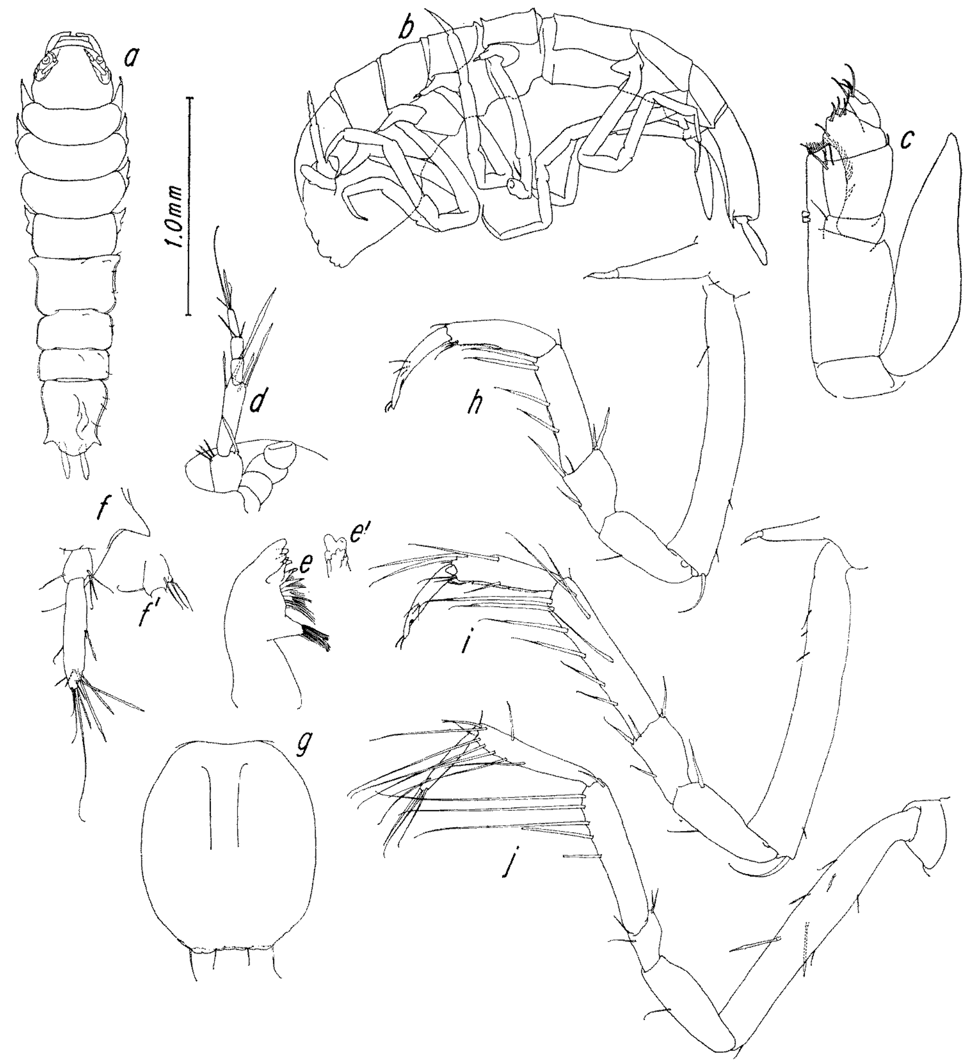

Fig. 43. *Mirabilicoxa similis* (Hansen). *a,* body, B ♀ ; *b,* body, J ♀ ; *c,* Mpd, B ♀ ; *d,* A I, B ♀ ; *e,* Md, B ♀ ; *e'*, 1m and ip, B ♀ ; *f,* Ur, B ♀ ; *f'*, Ur protopod, B ♀ ; *g,* Pl II, B ♀ ; *h,* Per I, B ♀ ; *i,* Per II, B ♀ ; *j,* Per V, B ♀. See section on symbols for explanation of abbreviations.

to pleotelson unusually thin, sheetlike laterally; lateral margins with thin, easily broken rim (posterolateral corner of pereonite 7 often appears to be acute as a result of this breakage).

Coxae of pereopods I-IV (fig. 43*a*) more strongly produced than is customary for females of this genus, those of I being particularly strong; all tipped with moderately large, stout setae.

First antenna (fig. 43*d*) 5-segmented. Second peduncular segment 3.5 times longer than wide. Flagellum 1.1 times longer than second peduncular segment.

Left mandible (figs. 43*e*, *e*') without palp. Incisor process and lacinia mobilis each with 4 well-defined teeth. Eight saw bristles. Molar process with about 20 terminal setae.

Maxilliped (fig. 43*c*): Palp .80 width of basis; medial length of segments 2 and 3 subequal. Two coupling hooks.

Pereopod I (fig. 43*h*): Dactylus large, .86 length of propodus. Propodus 3.9 times longer than wide; dorsal margin with single distal seta; ventral margin fringed, with 1 small seta midway and 3 distally. Carpus 3.4 times longer than wide; dorsal margin with single small distal seta; ventral margin with 4 large, unequally bifid setae. Merus with 2 ventral and 2 dorsal setae. Ischium with single small ventral seta. Basis 7.0 times longer than wide, distinctly curved, with single distoposterior seta.

Pereopod II (fig. 43*i*): Dactylus .78 length of propodus. Propodus 3.9 times longer than wide; dorsal margin with row of 3 large setae; ventral margin fringed, with single seta midway and 2 setae distally. Carpus 4.7 times longer than wide; 3 large setae in dorsal row; ventral margin with row of 6 large, unequally bifid setae. Merus with 2 dorsal and 2 ventral setae, one of the former being very small. Ischium with 1 dorsal and 1 ventral seta. Basis 7.3 times longer than wide, 1.1 times wider than that of previous limb and a little longer, with single distoposterior seta.

Pereopod V (fig. 43*j*): Dactylus 6.9 times longer than wide, .62 length of propodus. Propodus 5.6 times longer than wide; dorsal margin with 2 slender, unequally bifid setae separated by single long, slender seta; ventral margin with 5 very long, slender setae and most distally a single much smaller seta. Carpus 4.4 times longer than wide; 1 short seta distally on dorsal margin; ventral margin with row of 5 very long, slender setae. Merus with 1 ventral and 2 dorsal setae. Ischium 2.9 times longer than wide, with single ventral seta. Basis 7.2 times longer than wide.

Pleopod II (fig. 43*g*) long, 1.2 times longer than wide, widest midway. Posterior margin slightly truncate, fringed, with 2 pairs of setae.

Uropod (figs. 43*f*, *f'*) .48 length of pleotelson, biramous. Exopod vestigial, with 2 terminal setae. Endopod 3.6 times longer than protopod, 5.0 times longer than wide, with smoothly convex sides.

Body of brooding female 1.9 millimeters long.

Remarks.—Inspection of the type material confirms the membership of these specimens in *Mirabilicoxa similis*. Hansen makes no mention of a uropodal exopod, but it is present on his types.

This species is best distinguished as follows: pereonite 5 with pointed anterolateral corners; sides of pleotelson unusually sinuous; margins of pereonite 5 to pleotelson very thin; coxae of pereopods I-IV large; pereopods paucisetose.

Mirabilicoxa longispina (Hansen, 1916)
(Fig. 44)

Desmosoma longispinum Hansen, 1916, p. 111, pl. 10, figs. 6*a-i*. Gurjanova, 1933, pp. 418, 466.

Menzies, 1962, p. 105, figs. 50*L, M*. Kussakin, 1965, pp. 137, 142.

Lectotype.—Of the four individuals from Ingolf station 38 on which this species was originally based, the best preserved of two preparatory females is here designated lectotype.

Material.—Station 62: 1 individual (♂).

Previous records.—Ingolf station 38, south of Davis Strait, 59°12'N, 51°05'W, 3,422 meters.

Distribution.—North Atlantic; 2,496-3, 422 meters.

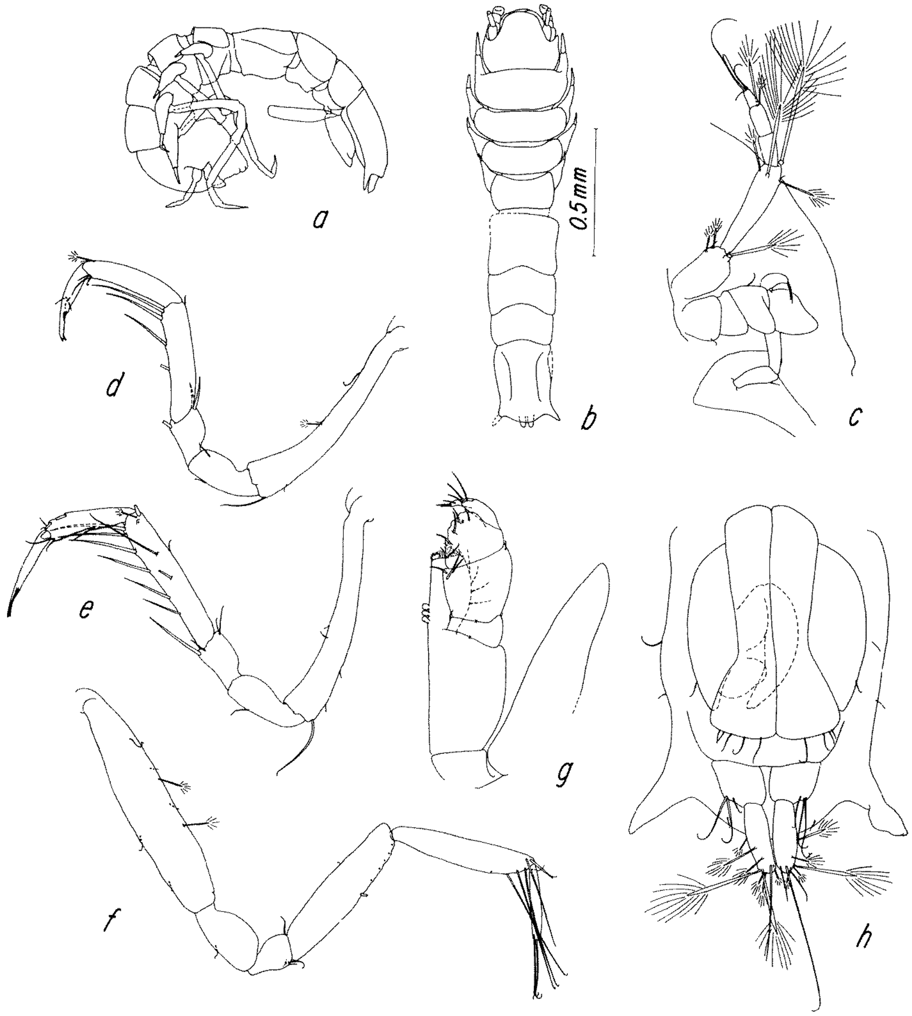

Fig. 44. *Mirabilicoxa longispina* (Hansen). *a,* body, ♂, immature; *b,* body, ♂, immature; *c,* cephalon, lateral view, showing A I, base of A II, and Md palp, ♂, immature; *d,* Per I, ♂, immature; *e,* Per II, ♂, immature; *f,* Per VI, ♂, immature; *g,* Mpd, ♂, immature; *h,* pleotelson, ventral view, showing PI, I, PI II, and Ur, ♂, immature. See section on symbols for explanation of abbreviations.

Diagnosis of immature male.—Body (figs. 44*a, b*) 4.4 times longer than tergal width of pereonite 2. Pereonite 1 1.3 times longer than 2. Pereonite 4 2.3 times wider than long, with very convex sides. Pereonite 5 nearly square, with slightly concave sides. First pleonal segment not evident dorsally. Pleotelson about .6 width of pereonite 2, about 1.4 times longer than wide, widest a little anterior to midway, with gently convex sides; large posterolateral spines located .9 way back from anterior end; posterior margin only gently convex. Surface of body ornamented with very fine, tightly spaced, irregular longitudinal ridges.

Coxal projections of pereopods I-IV (figs. 44*a, b*) long, each extending to level of middle of preceding segment; each tipped with large, stout seta, that of pereopod I being as long as the projection, those of subsequent limbs being progressively shorter.

First antenna (fig. 44*c*) 5-segmented. Second segment about 4 times longer than wide, 1.7 times longer than first. Flagellum stout, .8 length of second peduncular segment; third segment shorter than first and second, which are subequal in length.

Left mandible with well-developed palp (fig. 44*c*).

Maxilliped (fig. 44*g*): Palp .9 width of basis; medial length of segment 3 1.2 times that of 2. Three coupling hooks.

Pereopod I (fig. 44*d*): Dactylus .67 length of propodus. Propodus 4.6 times longer than wide; setae only at distal end. Carpus 4.4 times longer than wide; dorsal margin with single very small seta distally; 4 large ventral setae. Distal end of merus with 1 ventral and 2 dorsal setae of moderate size. Ischium with small seta on both dorsal and ventral margins. Basis much broader distally than proximally, 9.5 times longer than medial width, with single large distoposterior seta.

Pereopod II (fig. 44*e*): Dactylus 1.1 times longer than propodus. Propodus 4.3 times longer than wide; ventral margin fringed, with 1 very slender seta midway and 2 distally; 2 large setae toward distal end of dorsal margin. Carpus 5.4 times longer than wide; ventral margin with 6 large, slender setae; dorsal margin with small, slender seta midway, large slender seta and broom seta distally; midway on lateral surface are 2 large, slender setae which correspond to dorsal setal row on other desmosomatids. Merus with 1 large and 1 small seta ventrally and 2 small setae dorsally. Ischium with 1 small seta ventrally. Basis as on preceding limb, the same width.

Pereopod V (fig. 44*f*): Dactylus 7.3 times longer than wide. Propodus 5.1 times longer than wide, .9 length of carpus; dorsal margin with 1 long, slender seta and 1 unequally bifid seta distally; ventral margin with 4 large, distal setae. Carpus 4.1 times longer than wide; 6 major setae along distal half of ventral margin, none dorsally. Merus with 1 small seta dorsally, 2 ventrally. Ischium 2.0 times longer than wide, strongly convex dorsally; 1 small seta ventrally. Basis 6.5 times longer than wide.

Pleopod I (fig. 44*h*): Sides gradually converging for first two-thirds of length, then strongly flaring so that limbs widest distally; length 1.8 times width; distal margin slightly convex, with a few slender setae.

Uropods (fig. 44*h*) uniramous, short, .36 length of pleotelson, unusually close together to almost cover anal operculum. Protopod flat, almost as wide as long and of uniform width; 3 slender setae distolaterally. Endopod 1.4 times longer than protopod, 3.0 times longer than wide.

Body 1.6 millimeters long.

Remarks.—Inspection of the type material reveals inaccuracies in Hansen's treatment of the pleotelson. The sexual dimorphism of this structure is far less than that given in his description. In both female and immature male, the pleotelson is widest about midway, but because of the very slight convexity of the sides, only slightly narrower anteriorly. Also, the posterior margin is equally convex in both sexes. Hansen's figures 6*a* and *e* are in error with reference to the pleotelson; his figure 6*i* is fairly accurate in outline.

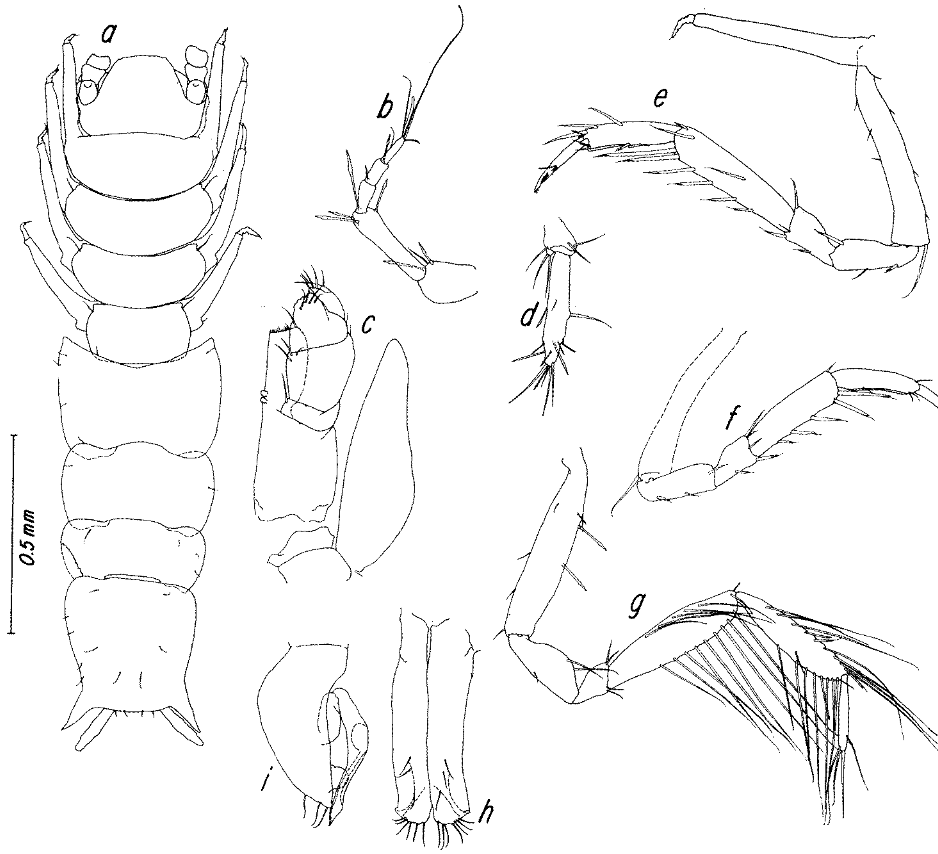

Fig. 45. *Mirabilicoxa exopodata* n. sp. *a,* body, C ♂; *b,* A I, C ♂; *c,* Mpd, C ♂; *d,* Ur, C ♂; *e,* Per II, C ♂; *f,* Per I, C ♂; *g,* Per V, C ♂; *h,* PI I, C ♂; *i,* PI II, C ♂. See section on symbols for explanation of abbreviations.

Mirabilicoxa longispina is best distinguished as follows: Pereonite 1 larger than 2; pereonite 5 square, with rounded anterolateral corners; pleotelson with large posterolateral spines; coxae of pereopods I-IV unusually strongly produced; pereopods II and V both poorly developed, with few setae; pleopod I strongly constricted medially, broad distally; uropods close together, short, with broad protopod.

Mirabilicoxa exopodata n. sp.
(Fig. 45)

Holotype.—Station 85: USNM 125101, copulatory male.

Distribution.—North Atlantic; 3,834 meters.

Diagnosis.—Closely similar to copulatory male of *M. gracilipes,* but differing as follows: Body (fig. 45*a*) much smaller, only 1.6 millimeters long. Pleotelson with less convex posterior margin and longer posterolateral spines. Ischium of pereopods I and II (figs. 45*e, f*) with stout, unequally bifid seta at proximal end of ventral margin; dorsal margin of propodus and both margins of carpus of pereopod II with fewer setae. Carpus of pereopod V (fig. 45*g*) with fewer setae. Stylet of

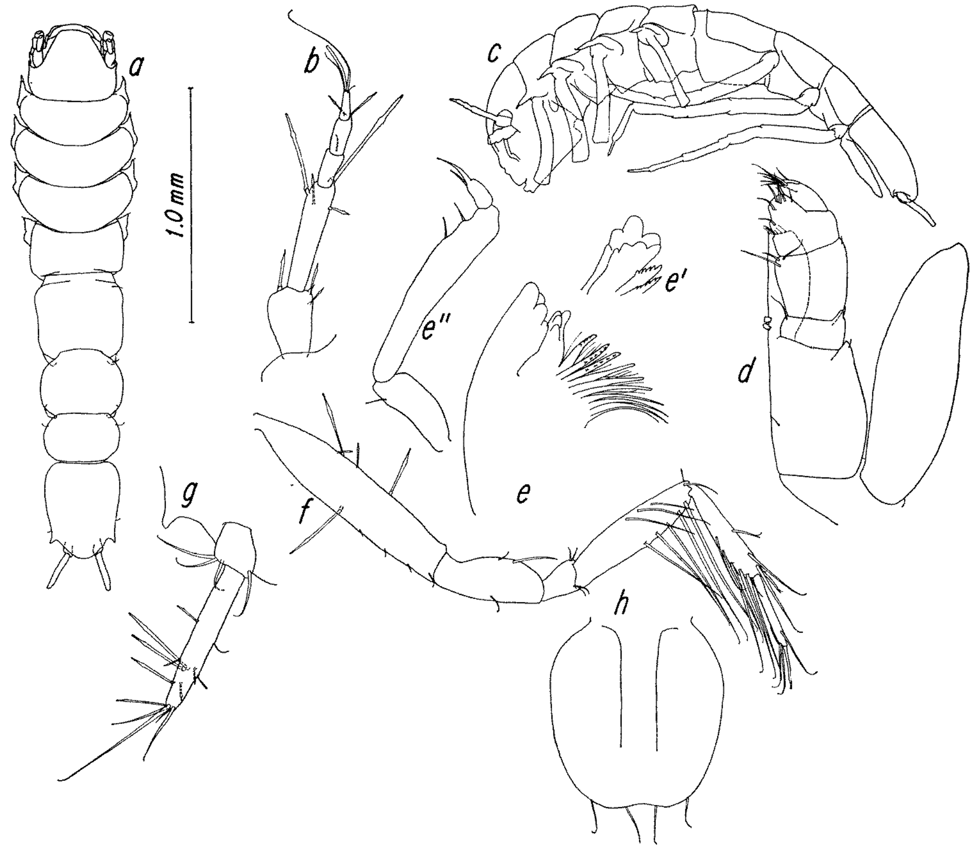

Fig. 46. *Mirabilicoxa palpata* n. sp. *a,* body, P ♀ ; *b,* A I, P ♀ ; *c,* body, P ♀ ; *d,* Mpd, P ♀ ; *e,* Md, palp omitted, P ♀ ; *e',* ip, 1m, and first two saw bristles, P ♀ ; *e'',* palp, P ♀ ; *f,* Per V, P ♀ ; *g,* Ur, P ♀ ; *h,* Pl II, P ♀. See section on symbols for explanation of abbreviations.

pleopod II (fig. 45*f*) much broader distally. Uropod (fig. 45*d*) biramous; exopod very short, rudimentary, not movably articulated with protopod.

Remarks.—*Mirabilicoxa exopodata* differs from *M. magnispina* as follows: uropod with exopod; segments of flagellum of first antenna (fig. 45*b*) much longer; posterolateral spines of pleotelson more posteriorly directed; coxal projection of pereopod II extends further anteriorly than that of I.

Mirabilicoxa palpata n. sp.
(Fig. 46)

Holotype.—Station 85: USNM 125103, preparatory female.

Distribution.—North Atlantic; 3,834 meters.

Diagnosis.—This species, represented by a single incomplete individual, is extremely similar to *M. gracilipes,* but the following differences are noted: Sides of pereonite 4 evenly convex (fig. 46*a*). Tergum of pereonite 5 1.3 times wider than long. Setae on anterior coxal projections of pereopods II-IV very small and slender.

First antenna (fig. 45*b*) with 5 segments. Mandible (figs. 45*e, e' e"*) with well-developed palp; third segment reduced. Maxillipodal palp (fig. 45*d*) narrower than basis; medial length of segments 2 and 3 subequal; epipodite with strongly curved distomedial margin.

Bases of pereopods I and II (fig. 46*c*) 6.3 and 6.2 times longer than medial width, respectively; basis of second limb is 1.1 times wider than that of first. Propodus and carpus of pereopod V (fig. 46*f*) 4.8 and 4.0 times longer than wide, respectively, with former limb segment .8 length of latter.

Pleopod II (fig. 46*h*) with 2 pairs of large setae on distal margin.

Uropod (fig. 46*g*) .53 length of pleotelson; endopod about 3.4 times longer than protopod, 6.3 times longer than wide.

Body 2.3 millimeters long.

Remarks.—Most of these differences from *Mirabilicoxa gracilipes* are minor and may prove to be no more than developmental or individual variation. The only feature that absolutely distinguishes this species is the presence of a mandibular palp. It is remarkable that animals that otherwise look so much alike should differ in so basic a character, yet no specimen of *M. gracilipes,* including Hansen's types, showed any sign of a mandibular palp, making it unlikely that such a difference could result from damage. Among these specimens of *M. gracilipes* were preparatory females, which proves that the difference is not developmental.

Mirabilicoxa acuminata n. sp.
(Fig. 47)

Holotype.—Station 85: USNM 125102, preparatory female.

Other material.—Station 85: 5 additional individuals, paratypes. Station 121: 1 individual (♂), paratype. Station 126: 2 individuals (including 1 ♂).

Distribution.—North Atlantic; 3,834–4,800 meters.

Diagnosis of female.—Body (figs. 47*a, c*) 4.3 times longer than tergal width of pereonite 2. Pereonite 1 slightly less well developed than pereonite 2, but of same midsagittal length. Pereonite 4 widest posteriorly, with nearly straight or even slightly concave sides. Pereonite 5 1.6 times wider than long, with straight sides and acute anterolaterally produced anterolateral corners. Pleotelson 1.2 times longer than wide, widest near anterior end, with convex sides converging posteriorly to acute posterolateral spines located .84 way back from anterior end; posterior margin broadly rounded.

Coxae of pereopods I-IV (fig. 47*a*) with moderately long, acute anterolateral projections, each tipped with short, stout seta.

First antenna (fig. 47*i*) 6-segmented, but distal 2 segments only indistinctly separated from each other. Second segment 4.9 times longer than wide. Flagellum slightly shorter than second segment.

Left mandible (figs. 47*b*, *b*') without palp. Incisor process with 4 well-defined teeth. Twelve saw bristles. Molar process with numerous setae.

Maxilliped (fig. 47*f*): Palp .86 width of basis; medial length of segment 3 .92 that of 2. Two coupling hooks.

Pereopod I (fig. 47*d*): Dactylus .58 length of propodus. Propodus 5.0 times longer than wide, as long as carpus; 2–3 small setae midway along ventral margin,

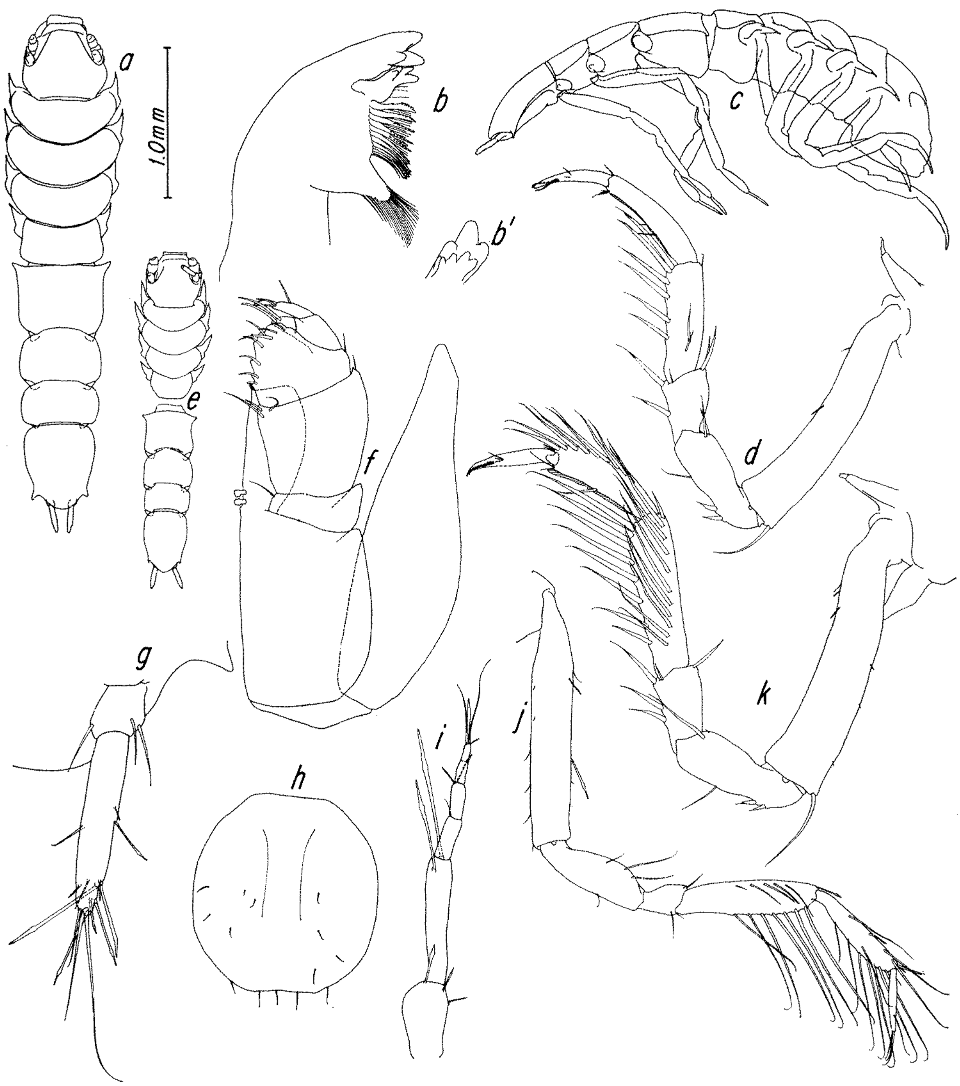

Fig. 47. *Mirabilicoxa acuminata* n. sp. *a,* body, P ♀; *b,* Md, P ♀; *b',* ip and Im, P ♀; *c,* body, P ♀; *d,* Per I, P ♀; *e,* body, ♂, immature; *f,* Mpd, P ♀; *g,* Ur, P ♀; *h,* Pl II, P ♀; *i,* A I, P ♀; *j,* Per V, P ♀; *k,* Per II, P ♀. See section on symbols for explanation of abbreviations.

fringed. Carpus 3.0 times longer than wide; dorsal setal row consisting of 2 slender setae on lateral surface one-quarter way from proximal end of segment; ventral margin with 5-6 large, unequally bifid setae. Merus with 2 large setae dorsally and 2 ventrally. Ischium with 2 dorsal setae; ventral margin with very slender seta two-thirds way from proximal end and 2 short, stout, unequally bifid setae one-third way from proximal end. Basis curved, 6.1 times longer than medial width, with single large distoposterior seta.

Pereopod II (fig. 47*k*): Dactylus .74 length of propodus. Propodus 3.6 times longer than wide; dorsal margin with row of 9 setae; ventral margin fringed, with

1 seta midway. Carpus 3.5 times longer than wide; dorsal margin straight; proximal end of row of 11-13 ventrolaterally directed dorsal setae located well down on lateral margin; ventral margin with 8 large, distally bifid setae. Merus with 1 large dorsal seta and 2-3 bifid ventral setae. Ischium with 1 large dorsal seta; ventral margin as on previous limb. Basis 5.4 times longer than wide, 1.2 times wider than on previous limb, and slightly longer; single large distoposterior seta.

Pereopod V (fig. 47*j*): Dactylus 8.3 times longer than wide. Propodus 5.0 times longer than wide, .8 length of carpus; dorsal margin with 3 long, slender setae and with 2-3 shorter, unequally bifid setae interspersed at middle and distal end of row; ventral margin with 8-9 long, slender setae. Carpus 4.0 times longer than wide, with 7 long ventral setae and 5 much smaller dorsal setae. Merus with 2 dorsal and 2 ventral setae. Ischium 3.0 times longer than wide; dorsal margin broadly rounded, with 3 setae; 1 ventral seta. Basis 6.2 times longer than wide.

Pleopod II (fig. 47*h*) only slightly longer than wide, nearly round, but slightly truncate or even concave posteriorly; a few setae scattered along posterior margin and on ventral surface.

Uropod (fig. 47*g*) uniramous, .41 length of pleotelson. Protopod with 1 medial and 2 lateral setae. Endopod nearly 4 times longer than protopod, 5.2 times longer than wide.

Body length of preparatory female 3.3 millimeters.

Remarks.—*Mirabilicoxa similis* is rather similar to this species in the acutely produced anterolateral corners of its fifth pereonite, but differs from *M. acuminata* in several ways: Smaller; pereonite 5 proportionately shorter; coxal spines on pereopods I-IV longer; bases of pereopods I and II more slender; ischia of same limbs lack stout ventral setae proximally; carpus of pereopod I longer than propodus, without major dorsal setae and with fewer ventral ones; carpus and propodus of pereopods II and III distinctly less setose.

Mirabilicoxa plana n. sp.
(Fig. 48)

Holotype.—Station 85: USNM 125104, preparatory female.

Distribution.—North Atlantic; 3,834 meters.

Diagnosis.—Body (figs. 48*a, b*) about 4 times longer than wide. Pereonite 1 less well developed than pereonite 2, but 1.2 times longer midsagittally. Pereonite 4 large, moderately long, being .55 as long as wide, widest toward anterior end; sides convex. Pereonite 5 small, being only .9 the width and 1.1 the length of pereonite 4; 1.4 times wider than long, widest anteriorly, narrowing very slightly posteriorly; sides faintly concave; anterolateral corners angular, not produced. Pleotelson 1.3 times longer than wide, widest one-third from anterior end, with gently convex sides converging posteriorly to large posterolateral spines located .82 way back from anterior end; posterolateral spines nearly laterally directed. In profile, tergites of all pereonites flat, giving body smooth dorsal outline.

Coxae of pereopods I-IV (fig. 48*a*) with very acute anterolateral projections tipped with small, stout setae.

First antenna (fig. 48*d*) 5-segmented. Second peduncular segment 3.9 times longer than wide. Flagellum .95 length of second peduncular segment.

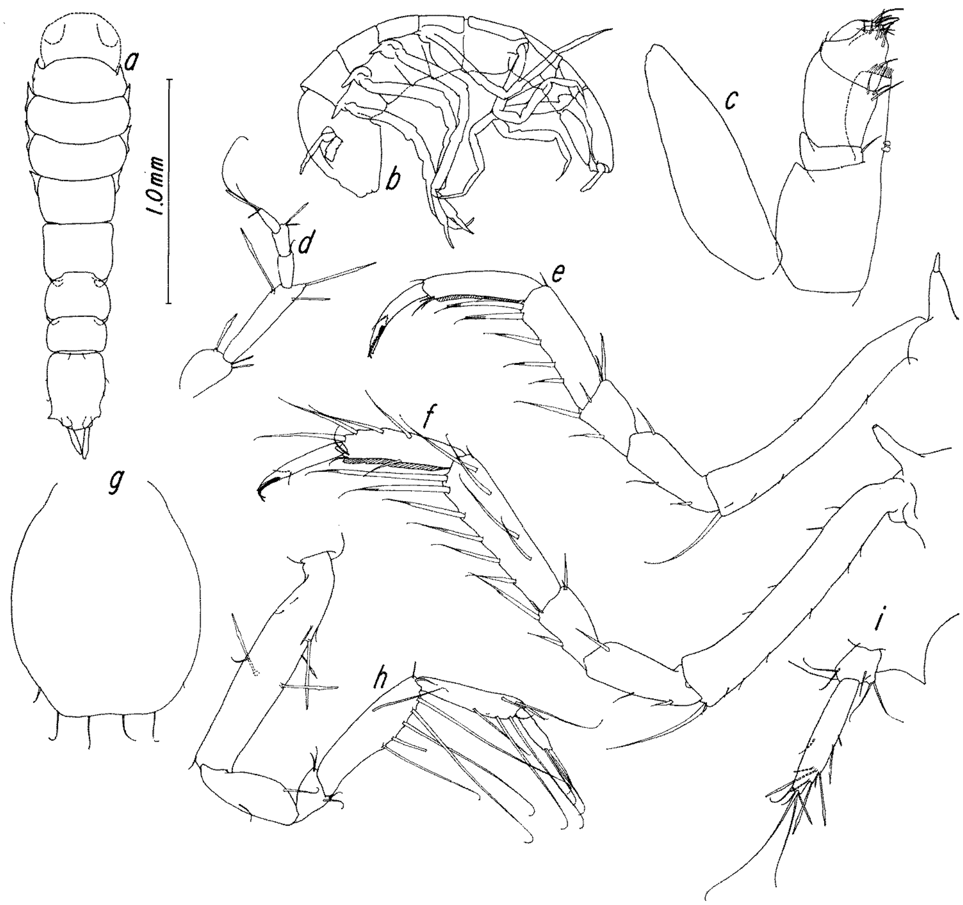

Fig. 48. *Mirabilicoxa plana* n. sp. *a,* body, P ♀ ; *b,* body, P ♀ ; *c,* Mpd, P ♀ ; *d,* A I, P ♀ ; *e,* Per I, P ♀ ; *f,* Per II P ♀ ; *g,* PI II, P ♀ ; *h,* Per V, P *i,* Ur, P ♀. See section on symbols for explanation of abbreviations.

Left mandible without palp. This limb not dissected off, but from what can be seen in place, incisor process appears to have 4 well-defined teeth.

Maxilliped (fig. 48*c*): Palp .73 width of basis, which has distinctly convex lateral margin; lateral end of palp segment 1 strongly produced distally; medial length of segment 3 1.1 times that of 2; joint between segments 2 and 3 strongly oblique. Two coupling hooks.

Pereopod I (fig. 48*e*): Dactylus .72 length of propodus. Propodus fringed, 4.5 times longer than wide; 1 ventral seta midway; single distal seta dorsally. Carpus 2.9 times longer than wide; single distal seta on dorsal margin; ventral margin with 5 large, distally bifid setae. Merus with 2 dorsal and 2 ventral setae. Ischium with 1 slender seta dorsally; ventral margin with single slender seta toward distal end and 1 short, stout, distally bifid seta proximally. Basis 7.5 times longer than medial width, distinctly curved, with single large distoposterior seta.

Pereopod II (fig. 48*f*): Dactylus .80 length of propodus, 7.0 times longer than wide. Propodus 4.0 times longer than wide; dorsal margin with 4 large setae; ventral margin fringed, with 1 seta midway. Carpus 3.5 times longer than wide; dorsal margin straight; dorsal row of 4 laterally directed setae located on lateral surface of segment; 6 large, unequally bifid setae in ventral row. Merus with 1 large and 1 small dorsal seta and 2 large ventral setae. Ischium as on previous limb. Basis 6.6 times longer than medial width, 1.2 times wider than previous limb and a little longer; shape and setation as on previous limb.

Pereopod V (fig. 48*h*): Dactylus short, 4.4 times longer than wide, .48 length of propodus. Propodus 4.5 times longer than wide, .76 length of carpus; dorsal margin with single long, slender seta toward distal end, flanked by 2 short, bifid setae; ventral margin with 4 long setae. Carpus 3.7 times longer than wide, with 5 long ventral setae and single long dorsal seta. Merus with 2 dorsal and 2 ventral setae. Ischium 2.8 times longer than wide; dorsal margin somewhat acutely rounded toward distal end, with 1 seta; ventral margin with single seta. Basis 4.8 times longer than wide.

Pleopod II (fig. 48*g*) long, 1.2 times longer than wide, widest midway, with evenly convex sides; distal end truncate, with a few large setae.

Uropod (fig. 48*i*) .56 length of pleotelson, biramous, with very small protuberance lateral to endopod representing the last vestige of the exopod. Protopod with 1 lateral and 2 medial setae; exopod with 2 setae. Endopod 3.5 times longer than protopod, 4.9 times longer than wide.

Body 1.8 millimeters long.

Remarks.—*Mirabilicoxa plana* is best distinguished as follows: tergites flat in profile; pereonite 4 proportionately large, more elongate; pereonite 5 not produced anterolaterally; posterolateral spines of pleotelson more laterally directed; mandible without palp; ischia of pereopods I and II with stout, unequally bifid seta proximally on ventral margin; uropod with vestigial exopod; body small.

Mirabilicoxa minuta n. sp.
(Fig. 49)

Holotype.—Station 121: USNM 125105, brooding female.

Distribution.—North Atlantic; 4,800 meters.

Diagnosis.—Body (fig. 49*a*) 4.1 times longer than tergal width of pereonite 2. Pereonite 1 1.1 times longer than 2. Pereonite 4 2.1 times wider than long, with evenly convex sides. Pereonite 5 .72 width of pereonite 2, 1.4 times wider than long, with nearly straight, parallel sides; anterolateral corners rounded. Pleotelson .58 width of pereonite 2, 1.4 times longer than wide, widest only a little anterior of midway; sides evenly convex; posterolateral spines located .76 way back.

Coxae of pereopods I-III (fig. 49*a*) produced forward into short, acute processes, each tipped with very small, stout seta. Coxa of pereopod IV only faintly produced, with very small, slender seta.

First antenna (fig. 49*g*) 5-segmented. Second peduncular segment twice as long as first, about 5 times longer than wide. Flagellum 1.1 times longer than second peduncular segment; distal segment the longest.

Left mandible (not dissected off) lacking palp.

Maxilliped (fig. 49*b*): Palp 1.1 times wider than basis; joints bounding segment 1 only moderately curved; medial length segment 3 1.1 times that of 2. Two coupling hooks.

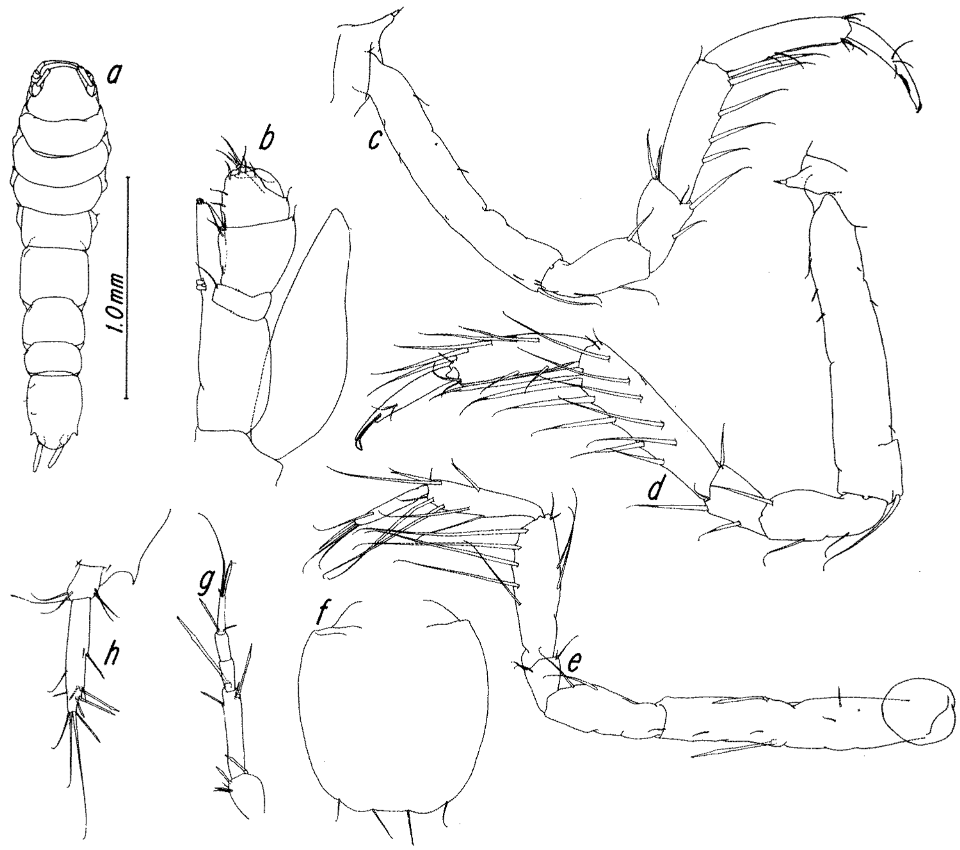

Fig. 49. *Mirabilicoxa minuta* n. sp. *a,* body, B ♀ ; *b,* Mpd, B ♀ ; *c,* Per I, B ♀ ; *d,* Per II, B ♀ ; *e,* Per V, B ♀ ; *f,* Pl II, B ♀ ; *g,* A I, B ♀ ; *h,* Ur, B ♀. See section on symbols for explanation of abbreviations.

Pereopod I (fig. 49*c*): Dactylus .75 length of propodus. Propodus 4.9 times longer than wide; no dorsal setae except distally; ventral margin fringed, with 2 small setae midway. Carpus 3.0 times longer than wide; single small dorsal seta distally; ventral margin with 5 large setae. Merus with 2 large setae dorsally and 2 ventrally. Ischium with single large dorsal seta and 2 slender ventral setae. Basis about 6.5 times longer than wide, with single large distoposterior seta.

Pereopod II (fig. 49*d*): Dactylus .8 length of propodus. Propodus 3.6 times longer than wide, with dorsal row of 5 large setae; ventral margin fringed, with row of 2 setae midway. Carpus 3.4 times longer than wide; dorsal margin with row of 5 major setae ending distally with 2 very small setae; single small seta located midway and just medial to dorsal margin; ventral margin with 6 large setae. Merus with 2 large ventral setae, and 1 large and 1 small dorsal seta. Ischium as on pereopod I. Basis about 5.4 times longer than wide, about 1.3 times wider than on previous limb, with single large distoposterior seta.

Pereopod V (fig. 49*e*): Dactylus 6.6 times longer than wide. Propodus 4.1 times longer than wide, .8 length of carpus; dorsal margin with single long, slender seta flanked by 2 shorter, distally bifid setae; ventral margin with 4 large setae. Carpus 3.1 times longer than wide; dorsal margin with 2 large setae midway, ventral margin with 5 large setae. Merus with 1 medium-sized and 1 small seta dorsally and 1 small seta ventrally. Ischium 2.4 times longer than wide, with 2 dorsal setae.

Pleopod II (fig. 49*f*) widest midway, with truncate distal margin.

Uropod (fig. 49h) uniramous, .51 length of pleotelson. Protopod with 4 distal setae. Endopod 3.2 times longer than protopod, 5.3 times longer than wide.

Body 1.7 millimeters long.

Remarks.—The following features are most important in distinguishing this species: very small in size; tergum of pereonite 4 not bulging laterally posterior to base of limbs; pereonite 5 rounded anterolaterally; pleotelson widest midway; coxal projections of pereopod IV extremely short; mandible without palp; ventral margin of ischium on pereopods I and II without stout seta proximally; uropod uniramous.

Genus Thaumastosoma n. gen.
Thaumastosoma platycarpus n. sp.
(Figs. 50, 51)

Holotype.—Station 64: USNM 125112, preparatory female.

Other material.—Station 64: 4 additional individuals (including 1 copulatory ♂), paratypes.

Distribution.—North Atlantic; 2,886 meters.

Diagnosis of female.—Body (figs. 50*a, f,* 51*a*) 5.2 times longer than tergal width of pereonite 2. Pereonite 4 rectangular, with acute posterolateral corners; sides straight, converging slightly posteriorly. Pereonite 5 .95 tergal width of pereonite 2, 1.6 times wider than long, with essentially straight, posteriorly converging sides; anterolateral corners rounded; anterior margin concave. Pereonites 6 and 7 rectangular, with nearly straight sides, the latter only .7 the length of the former. Pleotelson very large, nearly as wide as pereonite 2, equal in length and width; sides convex, converging strongly posteriorly to form acutely rounded posterior end; posterior margin with pair of very poorly developed posterolateral angularities. Pereonite 7 with acute, midsagittal, ventral projection tipped with stout seta.

First antenna (fig. 50*d*) 6-segmented. First segment flattened anteriorly (not shown in figure) to allow close approximation to second antenna. Second peduncular segment only a little longer than first, 3.4 times longer than wide. Flagellum 1.7 times longer than second peduncular segment; second and third segments shorter than first and fourth; distal end of first segment at level of distal end of fourth segment of second antenna.

Only first 4 segments of second antenna known (fig. 50*d*). Third segment with small dorsolateral scale having 2 distal setae.

Left mandible (figs. 51*e, e', e"*): All segments of palp well developed. Incisor process with ventral tooth forming apex; other teeth only faintly indicated. Lacinia mobilis with smooth ventral and irregularly scalloped dorsal margins. About 7 saw bristles. Molar process short, with setae limited to distal end.

Maxilliped (figs. 51*h*, *h*'): Palp .9 width of basis; joints bounding segment I strongly curved toward lateral edge; medial length of segment 3 .6 that of 2; all segments but fourth with distolateral setae. Epipodite broad. Two coupling hooks.

Pereopod I (fig. 51*b*) stout. Dactylus .77 length of propodus, 3.8-4.3 times

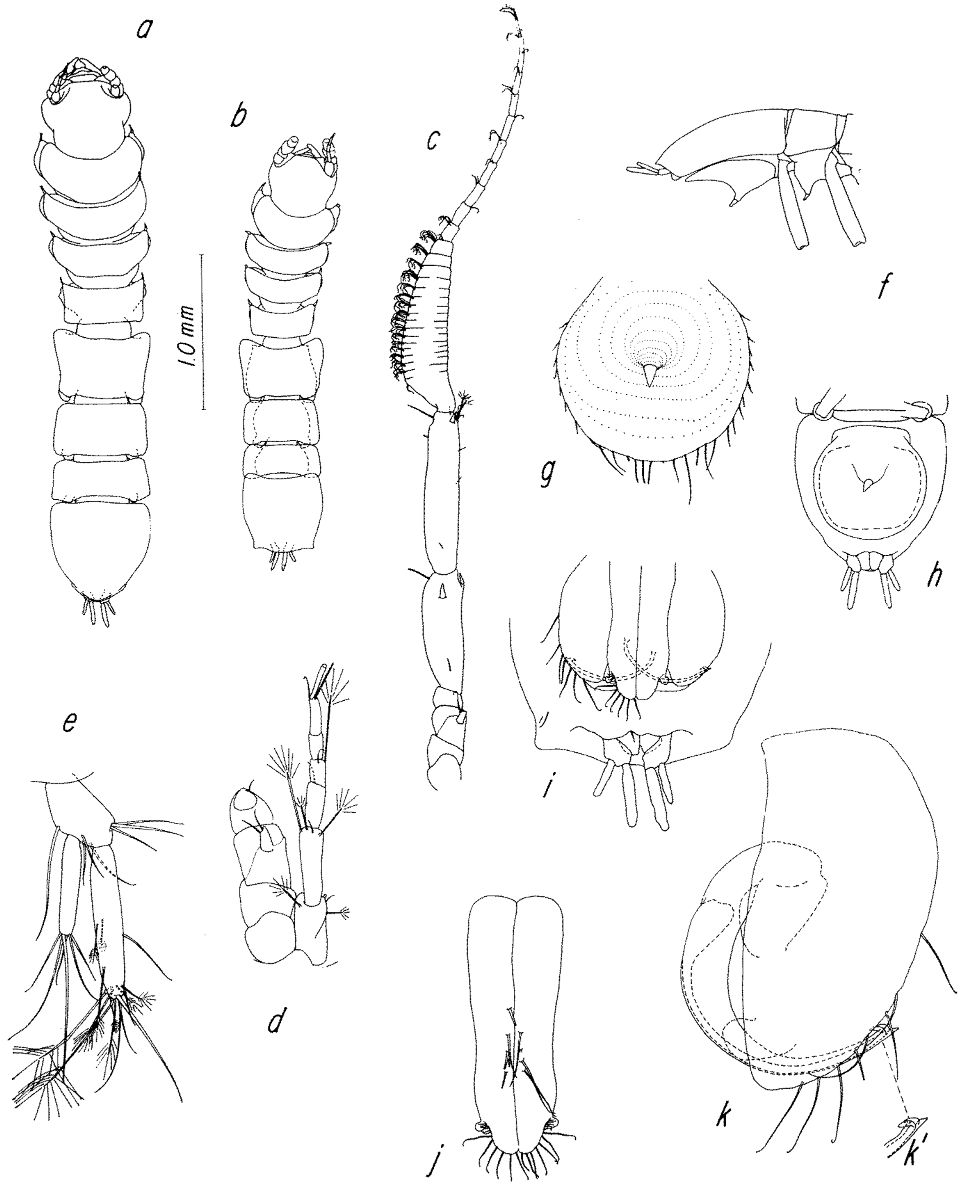

Fig. 50. *Thaumastosoma platycarpus* n. sp. *a*, body, P ♀ ; *b*, body, C ♂; *c*, A II, C ♂; *d*, A I and base of A II, B ♀ ; *e*, Ur, B ♀ ; *f*, pleotelson, lateral view, B ♀ ; *g*, Pl II, P ♀ ; *h*, pleotelson, B ♀ ; *i*, pleotelson, distal half, ventral view, showing Pl I and Pl II, C ♂; *j*, Pl I, C ♂; *k*, Pl II, C ♂; *k'*, tip of stylus, C ♂. See section on symbols for explanation of abbreviations.

longer than wide. Propodus 2.4-2.8 times longer than wide; row of 4-6 dorsal setae; ventral margin fringed, without setae except usual small ones distally. Carpus 1.4 times longer than wide; 6-8 slender setae dorsally; 6 stout, unequally bifid setae ventrally. Merus relatively large; dorsal margin acute distally; row of 6-7 slender dorsal setae on lateral surface, 1 on medial; ventral margin with 4-5 slender

Fig. 51. *Thaumastosoma platycarpus* n. sp. *a*, body, P ♀ ; *b*, Per I, B ♀ ; *c*, Per II, B ♀ ; *d*, Per V, B ♀ ; *d'*, dorsal seta of carpus, B ♀ ; *e*, Md, B ♀ ; *e'*, palp, B ♀ ; *f*, Maxilla I, ventral view, B ♀ ; *g*, Maxilla II, ventral view, B ♀ ; *g'*, basal endite, medial view, B ♀ ; *h*, Mpd, B ♀ ; *h'*, medial seta of segment 3, B ♀. See section on symbols for explanation of abbreviations.

setae along ventral margin; 4-7 slender dorsal setae on lateral surface. Basis 2.0-2.2 times longer than wide, 1.2 times broader than that of following limb.

Pereopod II (fig. 51*c*): Dactylus as long as propodus, 6.8-7.3 times longer than wide. Propodus 3.6-4.1 times longer than wide, ventrally fringed, without ventral setae except distally; dorsal margin with 7 slender setae. Carpus 2.4-2.5 times longer than wide; dorsal row of 17-18 slender, laterally directed setae; ventral margin with 7 stout, unequally bifid setae, fringed (not shown in illustration). Merus acutely produced dorsally; dorsal row of 6 slender setae on lateral surface; ventral margin with 6 setae, all slender except for the penultimate one, which is stout and unequally bifid. Ischium long; dorsal row of 8-10 slender setae on lateral surface; ventral margin with 9 slender setae. Basis 2.8-3.1 times longer than wide, with 1 large distoposterior seta.

Pereopod V (figs. 51*d, d*'): Propodus 3.5 times longer than wide, .8 length of carpus; dorsal margin with 10 long, slender setae and 1 smaller seta; ventral margin with single slender seta and 1 distally bifid seta. Carpus broad, only 2.1 times longer than wide; 14 slender setae dorsally, but far fewer ventrally. Ischium 3.0 times longer than wide; dorsal margin broadly rounded, with 5 slender setae of varying size; 1 ventral seta. Basis 4.7 times longer than wide.

Pleopod II (figs. 50*f-h*) as wide as long, nearly round in plan view. Center occupied by acute, posteriorly directed elevation tipped with stout, posteriorly directed seta. Posterior margin with several slender setae.

Uropod (fig. 50*e*) about .4 length of pleotelson. Protopod with 2-3 medial, 1 lateral, 1 ventral, and 2 dorsal setae. Endopod 1.9 times longer than protopod, 5.7 times longer than wide; single simple seta located three-fifths way out along medial margin. Exopod .62-.66 length of endopod, 5.5 times longer than wide, with several slender setae distally.

Body of holotype 4.0 millimeters long.

Major differences of copulatory male from female.—Pereonite 4 (fig. 50*b*) tapering more strongly posteriorly. Pleotelson with acute, almost spinelike posterolateral corners, giving pleotelson somewhat quadrangular shape, with only slightly convex posterior margin.

Second antenna (fig. 50*c*) with stout segments. Peduncular segments 5 and 6 .35 total length of limb; segment 5 3.3 times longer than wide, with 2 stout setae distally; segment 6 4.6 times longer than wide, 1.3 times longer than 5, with 1 stout seta distally. Flagellum 1.2 times wider than fifth peduncular segment, 1.2 times longer than peduncle, 27-segmented; first 17 segments indistinctly separated from each other, with each segment having dense tuft of ventral setae; more distal segments abruptly narrower and less setose.

Pereopods I and II with fewer setae.

Pleopod I (fig. 50*j*) 2.7 times longer than wide. Lateral lobes shaped like blunt hooks. Medial lobes extending .1 length of limb beyond lateral lobes; each medial lobe with fringe of 6-7 moderately large, slender setae, and in vicinity of lateral lobes 6-7 abruptly smaller setae.

Pleopod II (figs. 50*k, k*') with several slender marginal setae. Stylet tapering uniformly toward distal end; tip pointed, but with 2 similar recurved processes.

Body length 2.9 millimeters.

Remarks.—*Thaumastosoma platycarpus* can be distinguished from *T. distinctum* as follows: pereonite 7 longer; posterolateral margin of pleotelson not acute in female; third segment on flagellum of first antenna not as long; pereopod I more setose, its propodus with more curved dorsal margin, its carpus broader, with more curved margins; pleopod II of female more nearly circular, with strong midventral spine, smaller marginal setae.

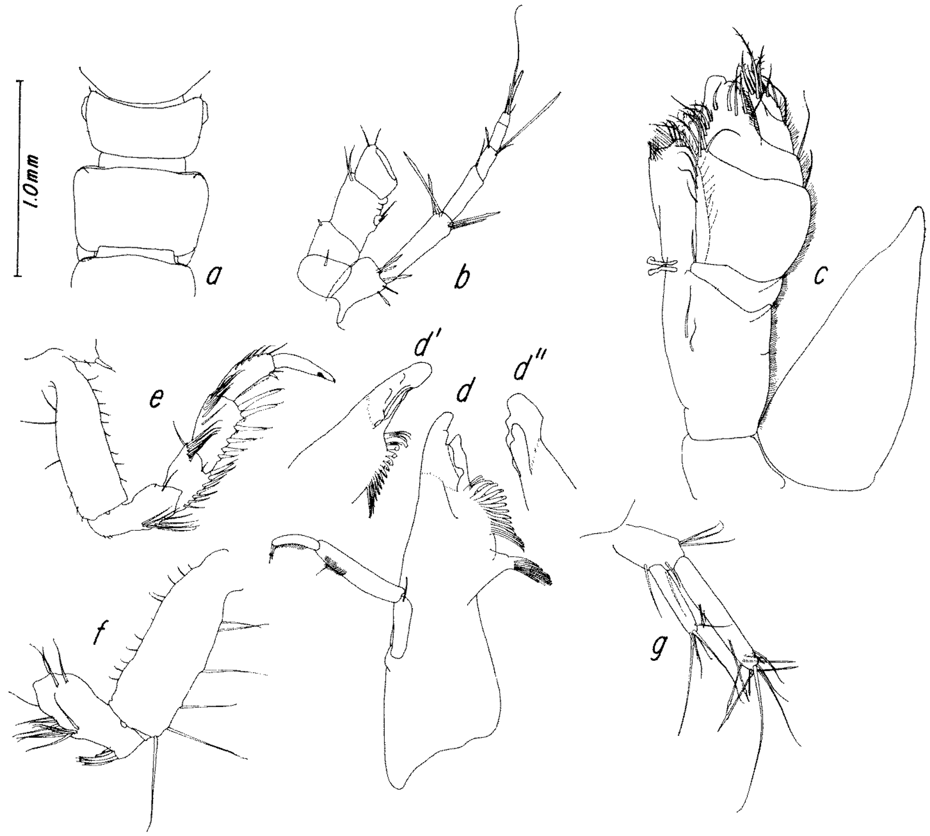

Fig. 52. *Thaumastosoma tenue* n. sp. *a*, pereonites 4 and 5, dorsal view, B ♀ ; *b*, A I and base of A II, B ♀ ; *c*, Mpd, B ♀ ; *d*, Md, B ♀ ; *d*', Md, distal portion, oblique medial view, showing membranous form of lm, B ♀ ; *d*'', ip and lm, B ♀ ; *e*, Per I, B ♀ ; *f*, Per I, basis and ischium, P ♀ ; *g*, Ur, B ♀. See section on symbols for explanation of abbreviations.

Thaumastosoma tenue n. sp.
(Fig. 52)

Holotype.—Station 64: USNM 125113, preparatory female.

Other material.—Station 64: I additional individual, paratype. Station 95: I individual, paratype.

Distribution.—North Atlantic; 2,886-3,753 meters.

Diagnosis of female.—Very similar to *T. platycarpus,* but differing in the following ways: Setae on anterolateral corners of pereonites 2-4 smaller, more slender (fig. 52*a*). Anterior margin of tergite of pereopod 5 nearly straight.

Second segment of first antenna (fig. 52*b*) longer, 1.3 times longer than first segment; first flagellar segment also longer; as result, distal end of first flagellar segment well beyond level of distal end of fourth segment on second antenna; fourth flagellar segment very short.

Left mandible (figs. 52*d*', *d*'') with 14 saw bristles. Teeth of incisor process more distinctly developed, there being 3 located proximal to main ventral tooth.

Fourth segment of palp on maxilliped (fig. 52*c*) with distolateral seta.

Pereopod I (figs. 52*e, f*): Dactylus longer, 4.3-4.9 times longer than wide. Propodus more slender, 2.7-3.1 times longer than wide. Carpus more slender, 1.8 times longer than wide, with less convex margins. Ventral margin of merus with 5-7 distinctly more slender setae, only the most distal of which is unequally bifid. Ischium with only 1 dorsolateral seta; main ventral row of 6-9 slender setae strongly transverse and limited to distal half of segment; at proximal end of ventral margin is another transverse setal row made up of 3 very small setae in brooding females (fig. 52*e*), but of 8 large, robust, unequally bifid setae in the single preparatory female (fig. 52*f*). Basis more slender, 3.1 times longer than wide, with several large posterior setae.

Basis of pereopod II more slender, 3.8 times longer than wide, with long posterior setae.

Pereopod V unknown.

Midventral seta of pleopod II a little longer.

Uropod (fig. 52*g*): Protopod with only 1 dorsal seta. Endopod lacking simple seta three-fifths way along medial margin.

Body of holotype preparatory female 4.1 millimeters long; length of two brooding females 2.9-3.7 millimeters.

Remarks.—This species differs from *Thaumastosoma distinctum* in the same ways as does *T. platycarpus*.

Genus Eugerdella Kussakin, 1965
Eugerdella natator (Hansen, 1916)
(Fig. 53)

Desmosoma natator Hansen, 1916, p. 115, pl. 11, figs. 2*a-e*. Gurjanova, 1933, pp. 418, 466.

Desmosoma coarctatum (part): Hult, 1936, p. 10; 1937, p. 24; 1941, p. 86, map 26. Menzies, 1962, p. 165, fig. 50*K*.

Eugerdella coarctata (part): Kussakin, 1965, pp. 138, 141.

Material.—Station 122: 3 individuals (including 1 ♂). Station 121: 1 individual.

Previous records.—Ingolf station 36, Davis Strait, 61°50’N, 56°21’W, 2,626 meters.

Distribution.—North Atlantic; 2,626-4,833 meters.

Diagnosis of female.—Body (figs. 53*a, b*) 4.1 times longer than tergal width of pereonite 2. Transverse ridge on frons and frons-clypeal furrow not developed. Pereonite 1 a little larger than 2. Pereonite 4 1.8 times wider than long, equally wide midway and posteriorly; sides of posterior half concave. Pereonite 5 1.7 times wider than long, widest at laterally directed, subacute anterolateral corners; sides concave, converging strongly posteriorly. Pleotelson 1.2 times longer than wide, .64 tergal width of pereonite 2, widest anteriorly; sides convex, gently converging to posterolateral spines located .83 way back from anterior end.

Coxae of pereopods I-IV (fig. 53*a*) produced somewhat anteriorly, each tipped with short, stout, unequally bifid seta.

First antenna (fig. 53*e*) 6-segmented. Second peduncular segment 3.7 times longer than wide, about 1.7 times longer than first. Flagellum a little shorter than second peduncular segment; distal segment short.

Left mandible (figs. 53*f-f”*): Incisor process with 3 teeth. Six saw bristles. About 10 setae on molar process. Palp well developed; 3 major setae on distal segment.

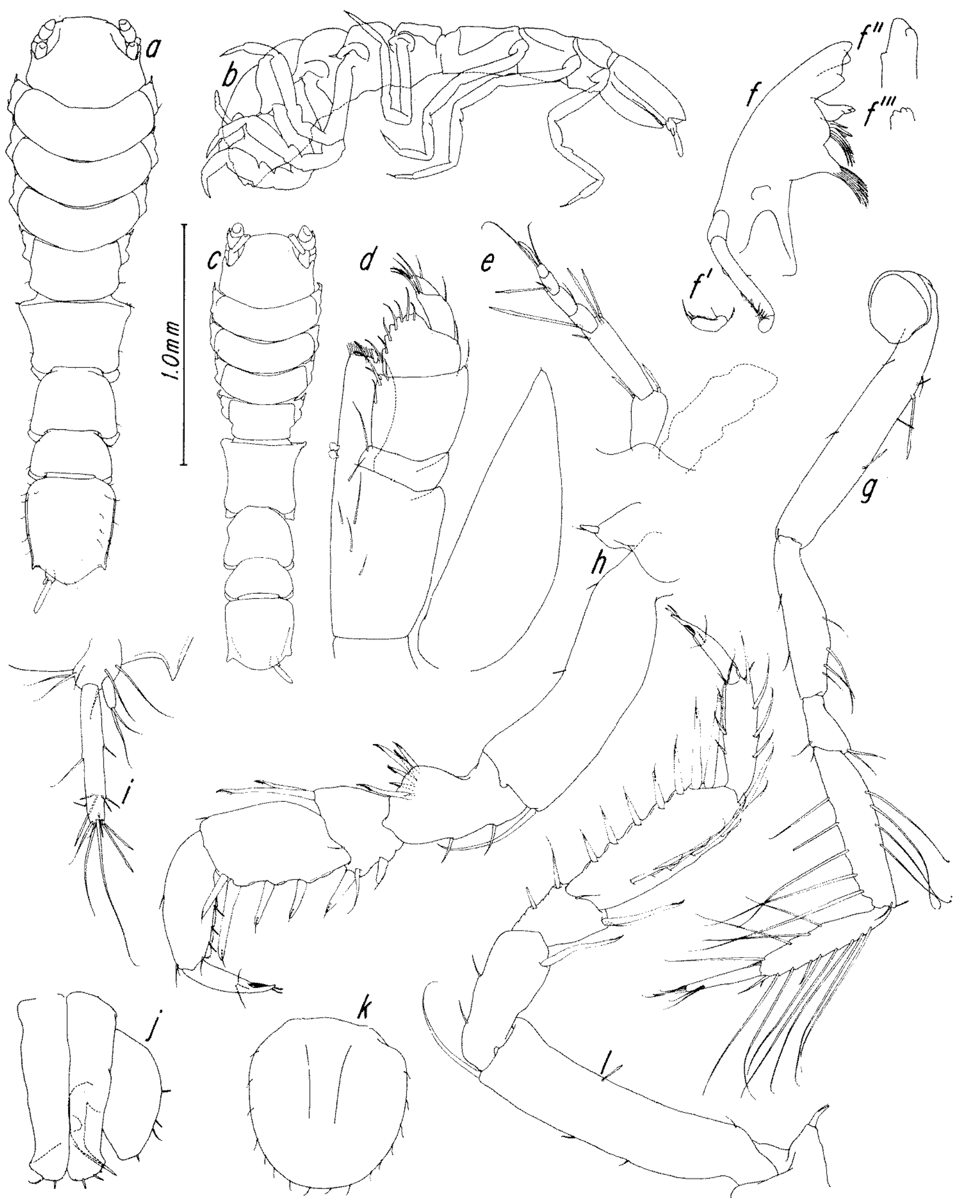

Fig. 53. *Eugerdella natator* (Hansen). *a*, body, B ♀ ; *b*, body, B ♀ ; *c*, body, C ♂, holotype from Ingolf station 36; *d*, Mpd, B ♀ ; *e*, A I and outline of base of A II, J ♀ ; *f*, Md, B ♀ ; *f'*, palp, B ♀ ; *f"*, ip, B ♀ ; *f'"*, tip of lm, B ♀ ; *g*, Per V, B ♀ ; *h*, Per I, B ♀ ; *i*, Ur, B ♀ ; *j*, Pl I and Pl II, C ♂, holotype; *k*, Pl II, B ♀ ; *l*, Per II, B ♀. See section on symbols for explanation of abbreviations.

Maxilliped (fig. 53*d*): Palp .82 width of basis; joints bounding segment 1 strongly curved; medial length segments 2 and 3 subequal. Two coupling hooks.

Pereopod I (fig. 53*h*) robust. Dactylus .66 length of propodus. Propodus 2.7 times longer than wide; dorsal margin evenly convex, with small seta midway; ventral margin gently convex, with 4 small setae, fringed. Carpus 1.6 times longer than wide; no dorsal setae except distally; ventral margin with 4 stout, unequally bifid setae; most distal ventral seta about three-fifths length of penultimate one. Merus with 2 unequally large dorsal setae; ventral margin with row of 2 stout, unequally bifid setae and with slender seta lateral to distal end of row. Ischium with row of 2 moderately small ventral setae; 1 large seta lateral to dorsal margin and transverse row of 6 setae medial to it. Basis 3.9 times longer than wide, with single large distoposterior seta.

Pereopod II (fig. 53*l*): Dactylus .75 length of propodus. Propodus 3.5 times longer than wide; dorsal margin with row of 4 setae; 2 setae located along first half of ventral margin, which is fringed distal to second seta. Carpus 2.8 times longer than wide; 6 setae in dorsal row, 7 in ventral. Merus with 1 dorsal seta much larger than other; 2 slender setae in ventral row. Ischium with 1 large dorsal seta and row of 2 small ventral ones. Basis .9 width of previous limb, 2.1 times longer than wide, with single large distoposterior seta.

Pereopod V (fig. 53*g*): Dactylus 6.3 times longer than wide. Propodus 4.7 times longer than wide; dorsal margin with row of 7 long, slender setae and with 2 shorter, stouter setae in middle and at end of row; ventral margin with 4 long, slender setae. Carpus 4.4 times longer than wide; row of 4 long setae toward middle of dorsal margin and 5 long setae in ventral row. Ischium 4.0 times longer than wide; 4 setae in row along dorsal margin; 2 small ventral setae. Basis 6.7 times longer than wide.

Pleopod II (fig. 53*k*) 1.1 times longer than wide; lateral and posterior margins evenly convex, with many marginal setae.

Uropod (fig. 53i) .44 length of pleotelson, biramous. Endopod 2.8 times longer than protopod, 6.8 times longer than wide. Exopod .23 length of endopod, 2.8 times longer than wide.

Body of brooding female 2.4 millimeters long.

Major differences of holotype copulatory male from female.—Cuticle more calcified, with reticulate ornamentation. Pereonite 5 (fig. 53*c*) more elongate, length being .85 posterior width, instead of .76 as on female; anterolateral corners more sharply produced. Pleotelson a little shorter, not tapering as strongly posteriorly, with more broadly rounded posterior margin.

Coxae of pereopods I-IV (fig. 53*c*) more acutely produced.

Pereopod I: Distal seta on ventral margin of coxa longer, four-fifths length of penultimate one.

Pereopod II with fewer dorsal setae on propodus and dorsal and ventral setae on carpus; second and third setae from distal end of ventral row on carpus in closer proximity.

Pereopod V with more numerous setae on carpus and propodus.

Uropodal endopod broader, 4.5 times longer than wide.

Body 1.8 millimeters long.

Remarks.—The following features are uniquely combined in this species: pereonites 1 and 2 nearly equal in size, pereonite 5 with acutely produced anterolateral corners, far wider anteriorly than posteriorly; pereopod I only moderately robust, tending toward chelate condition; pereopod II relatively setose; uropod biramous.

Eugerdella natator is most similar to *E. armata, E. polita,* and *E. coarctata.* It clearly differs from the first in having a well-developed uropodal exopod and from the second in the shape of the fifth pereonite.

Hult (1936, 1941) synonymized *E. natator* with *E. coarctata,* pointing out that one of Hansen's major distinguishing characters, the presence of a fourth ventral spine on the carpus of pereopod I, is invalid because *E. coarctata* actually possesses this feaure; Sars (1899) had overlooked it. Indeed, the two species are even more similar than Hult imagined because on pereopod I both species have a transverse row of dorsomedial ischial setae which both Sars and Hansen neglected to illustrate. In spite of these similarities, however, the two species should still be considered separate because of the different shapes of their fifth pereonites. This difference is not attributable to maturity or sex. My personal inspection of a male of *E. coarctata* and the holotype male of *E. natator* revealed them both to be in a copulatory condition.

Eugerdella ischnomesoides n. sp.
(Fig. 54)

Holotype.—Station 84: USNM 125099, immature male.

Other material.—Station 118, subsample A: 1 individual (copulatory ♂), paratype. Station 122: 1 individual. Station 156: 2 individuals (♂ ♂).

Distribution.—North and Equatorial Atlantic; 1,150-4,833 meters.

Diagnosis of immature male.—Body (figs. 54*a, b*) slender, elongate, being 6.1 times longer than tergal width of pereonite 2. Transverse ridge on frons and frons-clypeal furrow well developed. Within series of first 4 pereonites, midsagittal length increases gradually posteriorly. Posterolateral corners of pereonites 1-3 acutely rounded. Pereonite 4 long, length being nearly .8 tergal width, widest anteriorly, constricted midway. Pereonite 5 very elongate, tergal length being 1.2 times width; anterolateral corners hardly defined; sides diverging posteriorly and flaring somewhat just anterior to limb bases; widest posteriorly; tergite not sharply defined anteriorly. Pereonites 6 and 7 much like 5, but shorter. Pleotelson 1.4 times longer than wide, .88 width of pereonite 2, broadly convex laterally, acutely rounded posteriorly. Many slender setae on dorsal surface of segments.

Coxae of pereopods I-IV (fig. 54*a*) only faintly produced anteriorly, each tipped with small, slender seta; coxae of pereopods II-IV strongly bilobed in plan view.

First antenna (fig. 54*h*): Second peduncular segment 3.8 times longer than wide. Flagellum 4-segmented, 1.5 times longer than second peduncular segment.

Flagellum of second antenna with 16-17 segments.

Left mandible with large, well-developed palp (fig. 54*b*). Incisor process with 3 teeth. Second most dorsal tooth of lacinia mobilis larger than third. Five saw bristles. Molar process broad, with numerous terminal setae.

Maxilliped (fig. 54*i*): Palp almost as wide as basis; medial length of segment 3 1.3 times that of 2. Two coupling hooks.

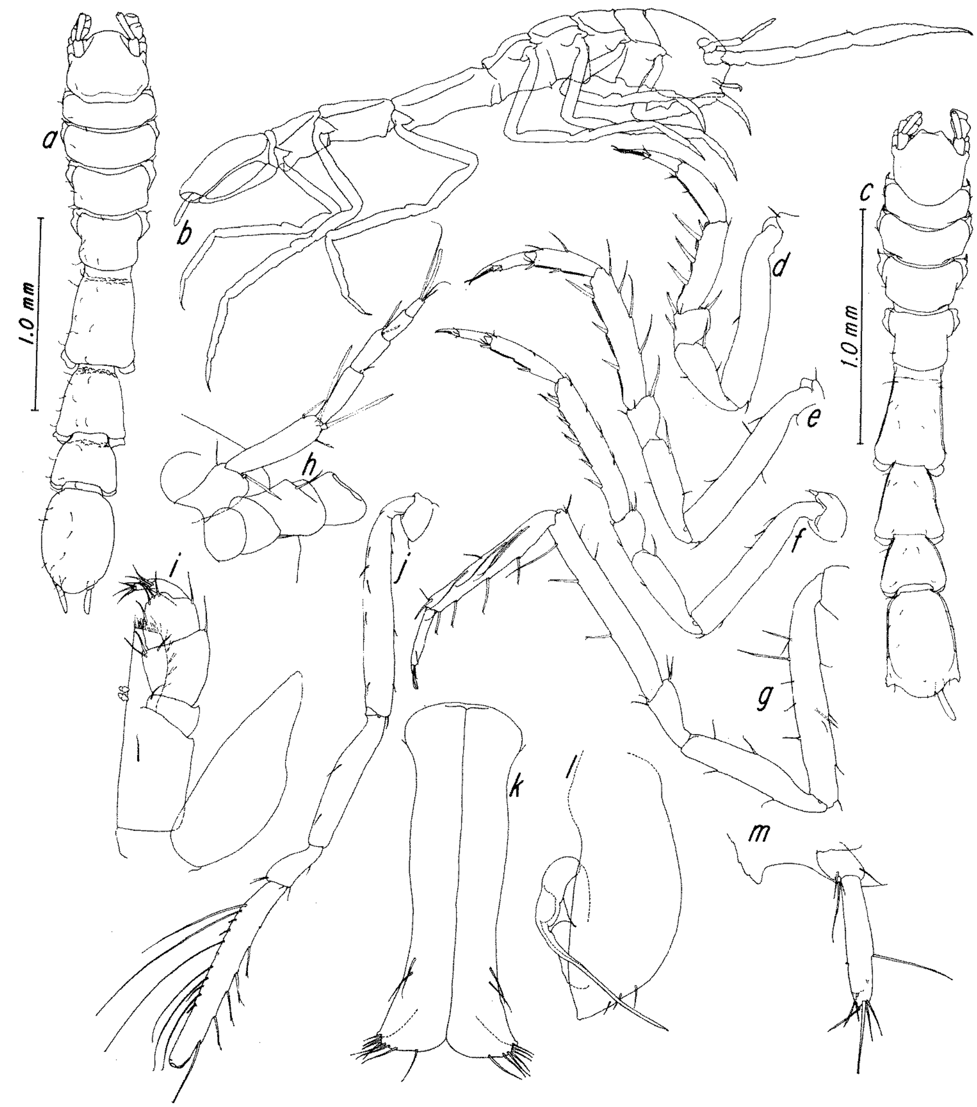

Fig. 54. *Eugerdella ischnomesoides* n. sp. *a*, body, ♂, immature; *b*, body, ♂, immature; *c*, body, C ♂; *d*, Per I, ♂, immature; *e*, Per II, ♂, immature; *f*, Per II, C ♂; *g*, Per V, ♂, immature; *h*, A I and base of A II, ♂, immature; *i*, Mpd, ♂, immature; *j*, Per V, C, ♂; *k*, Pl I, C ♂; *l*, Pl II, C ♂; *m*, Ur, C ♂. See section on symbols for explanation of abbreviations.

Pereopod I (fig. 54*d*): Dactylus .9 length of propodus. Propodus 3.1 times longer than wide; dorsal margin convex, with small seta midway and 1 distally; ventral margin straight, fringed, with small seta midway. Carpus 3.5 times longer than wide; dorsal margin with single small seta distally; ventral margin slightly concave, fringed at regular intervals, with 4 stout, unequally bifid setae, the most distal of which is only one-third the length of the penultimate one. Merus heavily built, with 2 stout, unequally bifid setae ventrally, and 1 small and 1 large seta dorsally. Ischium 2.7 times longer than wide; single small seta ventrally; dorsal margin with 1 large seta, and much more proximally, 1 small one. Basis 5.9 times longer than medial width, with single small distoposterior seta.

Pereopod II (fig. 54*e*) longer than preceding limb, with more slender carpus, merus, and ischium. Dactylus .91 length of propodus. Propodus 3.1 times longer than wide; dorsal margin with 2 setae; ventral margin fringed, with small, stout seta midway, and 1 distally. Carpus 4.8 times longer than wide, slightly concave ventrally; dorsal margin with 5 slender setae; ventral margin fringed at regular intervals, with 4 stout setae, of which all but penultimate one are short. Merus with 1 small ventral seta, and 1 large and 1 small dorsal seta. Ischium 3.8 times longer than wide, with setation as on preceding limb. Basis 6.1 times longer than medial width, with single small distoposterior seta.

Pereopod V (fig. 54*g*) with very elongate propodus, carpus, merus, and ischium; setae poorly developed for swimming. Propodus 6.6 times longer than wide; 6 dorsal setae, all but fourth and last of which are long and slender; 4 short, unequally bifid ventral setae. Carpus 7.3 times longer than wide; only 3 small, slender dorsal setae; ventral margin with 2 short, unequally bifid setae followed by single longer, more slender seta. Ischium 4.9 times longer than wide.

Uropod .32 length of pleotelson. Endopod 3.7 times longer than wide, broadest in distal half, with straight lateral and convex medial margins. Longest lateral seta of protopod arising from minute exopod which may or may not be distinctly articulated with protopod.

Length of holotype 2.9 millimeters.

Major differences of copulatory male.—Pleotelson (fig. 54*c*) with large, but thin posterolateral spines located .85 way back from anterior end; pleotelson widest at tips of these spines, 1.5 times longer than wide; sides nearly straight, slightly convex, diverging very gradually posteriorly.

Coxae of pereopods I-III (fig. 54*c*) acutely, but very slightly produced, each tipped with stout, unequally bifid seta of moderate size.

First antenna: Second peduncular segment shorter, 3.4 times longer than wide.

Pereopod II (fig. 54*f*): Dactylus .65 length of propodus; claw proportionately shorter. Propodus and carpus more slender, being 4.5 and 6.1 times longer than wide, respectively; dorsal setae of both segments much smaller; ventral margin more setose, with 3 and 6 major setae, respectively.

Pereopod V: Carpus more setose, 6 ventral setae, most distal of which is long and slender; dorsal margin with 10 long, slender setae; propodus missing, but probably also more setose.

Pleopod I (fig. 54*k*) flaring markedly at distal end; medial lobes broad, almost truncate in appearance, extending .04 length of limb beyond small, but well-defined, recurved, lateral lobes; each medial lobe with 1 large seta halfway across, 2-3 large setae toward lateral edge, and 4 smaller setae adjacent to lateral lobes. Two pairs of setae located one-quarter length of limb from distal end located at lateral margin.

Uropod (fig. 54*m*) clearly biramous. Exopod minute, being only .03 length of endopod. Seta along medial edge of endopod much longer.

Body 2.4 millimeters long.

Remarks.—All the differences between these two males can be accounted for as resulting from the maturation of sexual dimorphism within the species or as being individual variation. The immature male, rather than the mature one, was chosen as holotype because it is more complete and because it probably reflects more closely the morphology of the female.

Although there are numerous features that are uniquely combined in this species, it is the set of characters that superficially makes this demosomatid look like a member of the Ischnomesidae which is most striking. The body is slender, with an unusually elongate fifth pereonite. The pleotelson and uropods are similar to those of many members of the genus *Ischnomesus*. Most significantly, all the pereopods except for the first have become very elongate. Instead of the long swimming setae so characteristic of the last three pereopods of desmosomatids, most of the setae on those appendages in this species are short, except in the copulatory male. The primary mode of locomotion in *E. ischnomesoides* is probably walking, and it would appear that in having evolved a basic morphology like that of the ischnomesids, this species has probably also adopted a similar mode of life.

Eugerdella cornuta n. sp.
(Fig. 55)

Holotype.—Station 85: USNM 125098, preparatory female.

Distribution.—North Atlantic; 3,834 meters

Diagnosis.—Body (figs. 55*a, b-b"*) 4.1 times longer than tergal width of pereonite 2. Cephalon with pair of conspicuous, anteriorly directed spines just lateral to insertion of antennae; transverse ridge on frons and frons-clypeal furrow not developed. Tergites of anterior pereonites each with shallow, broad, transverse fold. Pereonites 1 and 2 subequal. Pereonite 4 with slightly convex sides which diverge strongly posteriorly; tergal width 2.9 times length. Tergum of pereonite 5 1.6 times wider than long; sides nearly straight, converging slightly posteriorly; anterolateral corners subangular. Sides of pereonite 6 straight. Posterolateral corners of pereonite 7 pointed. Pleotelson 1.2 times longer than wide, .58 width of pereonite 2; sides converging posteriorly, but diverging again at large posterolateral spines located .85 way back from anterior end.

Coxae of pereopods I-IV (fig. 55*b*) with acute anterior projections tipped with small, stout setae.

First antenna (fig. 55*c*) slender. Second peduncular segment 1.6 times longer than first, 4.7 times longer than wide. Flagellum 4-segmented, a little longer than second peduncular segment.

Left mandible with well-developed palp.

Maxilliped (fig. 55*d*): Palp .84 width of basis; medial length segment 3 1.1 times that of 2. Four coupling hooks.

Pereopod I (fig. 55*e*): distal segments more heavily built than those of pereopod II. Propodus 3.2 times longer than wide; ventral margin convex proximally, concave and fringed distally, with 2 small setae midway; no dorsal setae except distally. Carpus 3.0 times longer than wide; dorsal margin with 2 very small setae; ventral margin with 6 large, distally bifid setae, of which terminal one is about half as long as penultimate one. Merus and ischium each with 1 large and 1 small seta

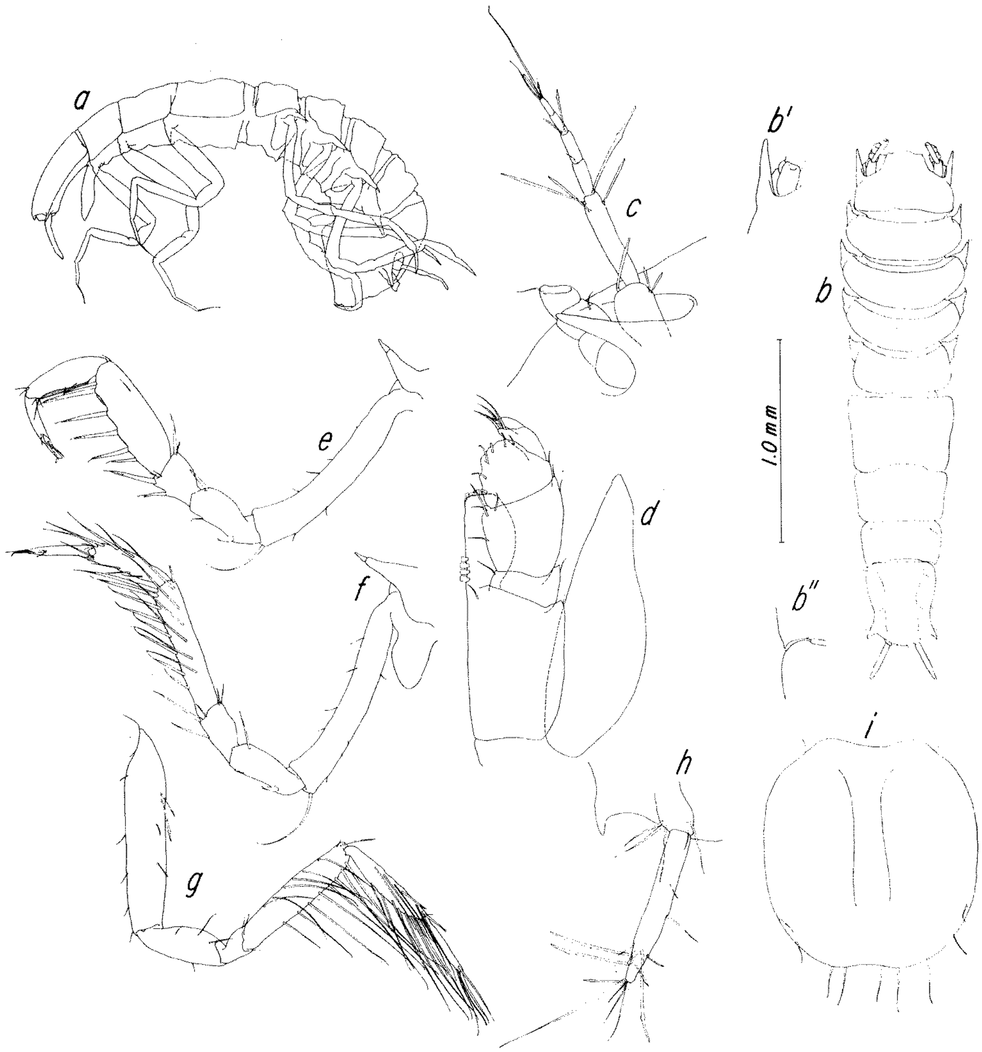

Fig. 55. *Eugerdella cornuta* n. sp. *a*, body, P ♀; *b*, body, P ♀; *b*', anterolateral portion of cephalon, dorsal view, P ♀; *b*", posterolateral corner of pereonite 4 and anterolateral corner of pleotelson, dorsal view, P ♀; *c*, anterolateral portion of cephalon, with A I and base of A II, lateral view, P ♀; *d*, Mpd, P ♀; *e*, Per I, P ♀; *f*, Per II, P ♀; *g*, Per V, P ♀; *h*, Ur, P ♀; *i*, Pl II, P ♀. See section on symbols for explanation of abbreviations.

distally on dorsal margin; ventral margin of merus with 2 unequally bifid setae and 1 very small seta distomedially; ventral margin of ischium with small seta toward distal end and short, very stout, unequally bifid seta proximally. Basis slender, 6.8 times longer than wide, slightly flaring distally, with single large distoposterior seta.

Pereopod II (fig. 55*f*) slender. Propodus 3.8 times longer than wide; ventral margin with 3 setae along edge and 2 distal setae, 1 of which is distinctly longer; dorsal margin with 4 major setae. Carpus 5.2 times longer than wide; dorsal row of

7 setae on lateral surface; all but most distal seta, which is short and bifid, are long, slender, and ventrally directed; 8 slender setae in ventral row, of which distal ones are unequally bifid. Merus with 2 dorsal and 2 larger ventral setae. Ischium and basis as on preceding limb.

Pereopod V (fig. 55*g*) with slender distal segments bearing very slender setae. Propodus 5.1 times longer than wide; ventral margin with 7 setae; dorsal margin with 7 setae, of which fourth and last are short and unequally bifid. Carpus 4.5 times longer than wide; 8 ventral setae; 7 major dorsal setae, of which last is short.

Pleopod II (fig. 55*i*) as wide as long. Distal margin concave. Several distal setae.

Uropod (fig. 55*h*) slender, .65 length of pleotelson, uniramous. Endopod 6.8 times longer than wide.

Body 2.5 millimeters long.

Remarks.—The following combination of major characters define this species: cephalon with large lateral spines; pereonite 4 broadest posteriorly; pereonite 5 trapezoidal, widest anteriorly; pereonite 7 pointed posterolaterally; pleotelson with large posterolateral spines; pereopods I and II with similar proximal segments; the carpus and propodus of pereopod I robust, with reduced setation except ventrally on carpus; on pereopod II carpus and propodus slender, with many slender setae; pereopod V with many long, slender setae; uropods uniramous, slender.

Eugerdella pugilator n. sp.
(Fig. 56)

Holotype.—Station 64: USNM 125100, preparatory female.

Other material.—Station 64: 4 additional individuals, paratypes. Station 72: 1 individual.

Distribution.—North Atlantic; 2,864-2,886 meters.

Diagnosis.—Body (figs. 56*a, b-b*''') 3.4 times longer than tergal width of pereonite 2. Transverse ridge on frons and frons-clypeal furrow well developed; anterior face of cephalon more flattened than with other desmosomatids. Pereonite 1 much enlarged, 1.8 times longer than 2. Pereonite 4 tapering strongly posteriorly, with broadly convex sides. Pereonite 5 small, only .57 width of 2, widest anteriorly, 1.6 times wider than long; anterolateral corners acute; sides sinuous, being strongly concave anteriorly, convex posteriorly. Pleotelson .4 width of pereonite 2, angular in aspect; sides nearly straight, parallel for most of length; posterior end acutely rounded. Anterior end of cephalon and lateral margins of most of the body segments ornamented with rows of somewhat irregular, flattened spines. Ventrally, each of the first five pereonites with a slender, midsagittal spine.

Coxae of pereopods I-IV (figs. 56*b, b''*) with short, slender anterior projections, each tipped with a small, stout seta.

First antenna (fig. 56*c*) 5-segmented. Segment 2 slender, 6 times longer than wide. Flagellum short, .9 length of second peduncular segment; third flagellar segment much smaller than first 2.

Left mandible (figs. 56*j-j''*) with short, but well-developed, 3-segmented palp; distal segment of palp with single major seta. Most ventral tooth of incisor process and tooth next to it located most distally; remaining 2 more dorsal teeth located more proximally. Six saw bristles.

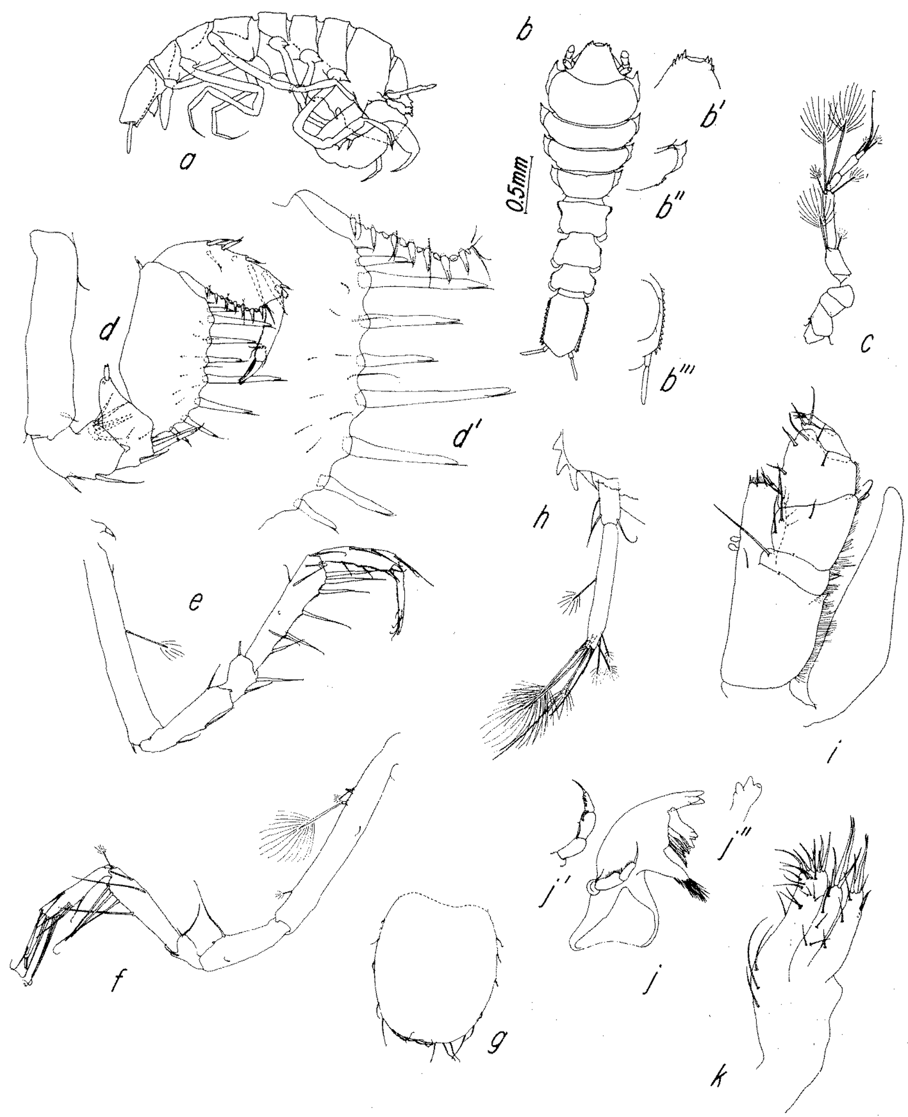

Fig. 56. *Eugerdella pugilator* n. sp. *a*, body, P ♀ ; *b*, body, P ♀ ; *b*', anterior end of cephalon, P ♀ ; *b*", pereonite 3, P ♀ ; *b*'", pleotelson, left side, ventral view, P ♀ ; *c*, A I and base of A II, P ♀ ; *d*, Per I, P ♀ ; *d*', ventral margin of carpus and propodus, P ♀ ; *e*, Per II, P ♀ ; *f*, Per V, P ♀ ; *g*, Pl II, P ♀ ; *h*, Ur, P ♀ ; *i*, Mpd, P ♀ ; *j*, Md, P ♀ ; *j*', palp, P ♀ ; *j*", ip, P ♀ ; *k*, Maxilla II, P ♀. See section on symbols for explanation of abbreviations.

Maxilliped (fig. 56*i*): Palp .9 width of basis; medial length of segment 3 twice that of 2; medial side of segments 1 and 2 with very long, slender setae; medial side of segment 3 with few setae. Two coupling hooks.

Pereopod I (figs. 56*d*, *d*'): Dactylus .75 length of propodus, ventrally fringed. Propodus bent about 90° at base so that segment is reflected toward ventral margin of carpus, 2.9 times longer than wide; distal three-fifths of ventral margin with 2 rows of setae; on margin itself is row of 7 small, stout, unequally bifid setae alternating with very short, crenulate lobes; medial to this is row of 3 slender setae; dorsal margin with row of 4 short, robust, unequally bifid setae; just medial to this is row of 5 large, stout, unequally bifid, ventrally reflected setae. Carpus 1.7 times longer than wide; distal two-thirds of dorsal margin slightly concave, with single small, robust, unequally bifid seta at distal end; ventral margin crenulate, each convexity coinciding with one of 8 large, robust, unequally bifid setae; most distal of these setae approximately two-fifths length of penultimate one; on medial surface just above ventral edge are several small, slender setae. Merus with dorsal margin strongly produced, tipped with 1 large and 1 small seta; ventral margin with 2 large, stout, unequally bifid setae; a few very slender setae on medial surface and ventral margin. Ischium with 3 stout ventral setae; transverse row of 5 closely spaced, large, stout setae extends from apex of dorsal margin onto medial surface. Basis 4.6 times longer than medial width; distal end with very small, slender posterior seta and small, robust anteromedial seta.

Pereopod II (fig. 56*e*) much more slender than preceding limb. Dactylus .82 length of propodus, ventrally fringed, slightly bulbous proximally. Propodus 4.4 times longer than wide; dorsal margin with 4 slender setae; ventral margin with 4 slender setae, fringed. Carpus 3.9 times longer than wide, widest distally; irregular row of 4 slender dorsal setae on lateral surface and 1 dorsally; ventral margin with 6 large, setulate setae and intermittently fringed. Merus with 2 dorsal and 2 ventral setae. Ischium long, slender, 3.6 times longer than wide; 1 dorsal and 2 ventral setae. Basis about 7.3 times longer than wide, .6 width of that on pereopod I; 1 small distoposterior seta.

Pereopod V (fig. 56*f*): Propodus 4.8 times longer than wide, .8 length of carpus; dorsal and ventral margins bearing 2 and 6 major setae, respectively. Carpus 3.9 times longer than wide; dorsal and ventral margins with 3 and 4 slender setae, respectively. Ischium 3.1 times longer than wide; dorsal margin only slightly curved, with 2 large, slender setae. Basis 8.2 times longer than wide.

Pleopod II (fig. 56*g*) 1.2 times longer than wide, evenly rounded, with many small marginal setae, especially posteriorly.

Uropod (fig. 56*h*) slender, .5 length of pleotelson. Protopod 2.2 times longer than wide, of uniform width. Endopod 7.6 times longer than wide, 3 times longer than protopod, tipped with numerous large broom setae and slender setae.

Preparatory female 2.7 millimeters long. Largest brooding female 2.6 millimeters long.

Remarks.—This species is among the most specialized members of the genus. It is similar only to *E. falklandica,* from which it may be distinguished by its enlarged first pereonite, more angular pleotelson, setation of the propodus on the first pereopod, proportions and setation of the second pereopod, and its more elongate second pleopod.

Genus Prochelator n. gen.
Prochelator lateralis (G. O. Sars, 1899)
(Fig. 57)

Eugerda lateralis G. O. Sars, 1899, p. 254, pl. 4, fig. 1. Hansen, 1910, p. 216.

Desmosoma laterale: Hansen, 1916, p. 116, pl. 11, figs. 3*a-c*. Gurjanova, 1933, pp. 418, 466.

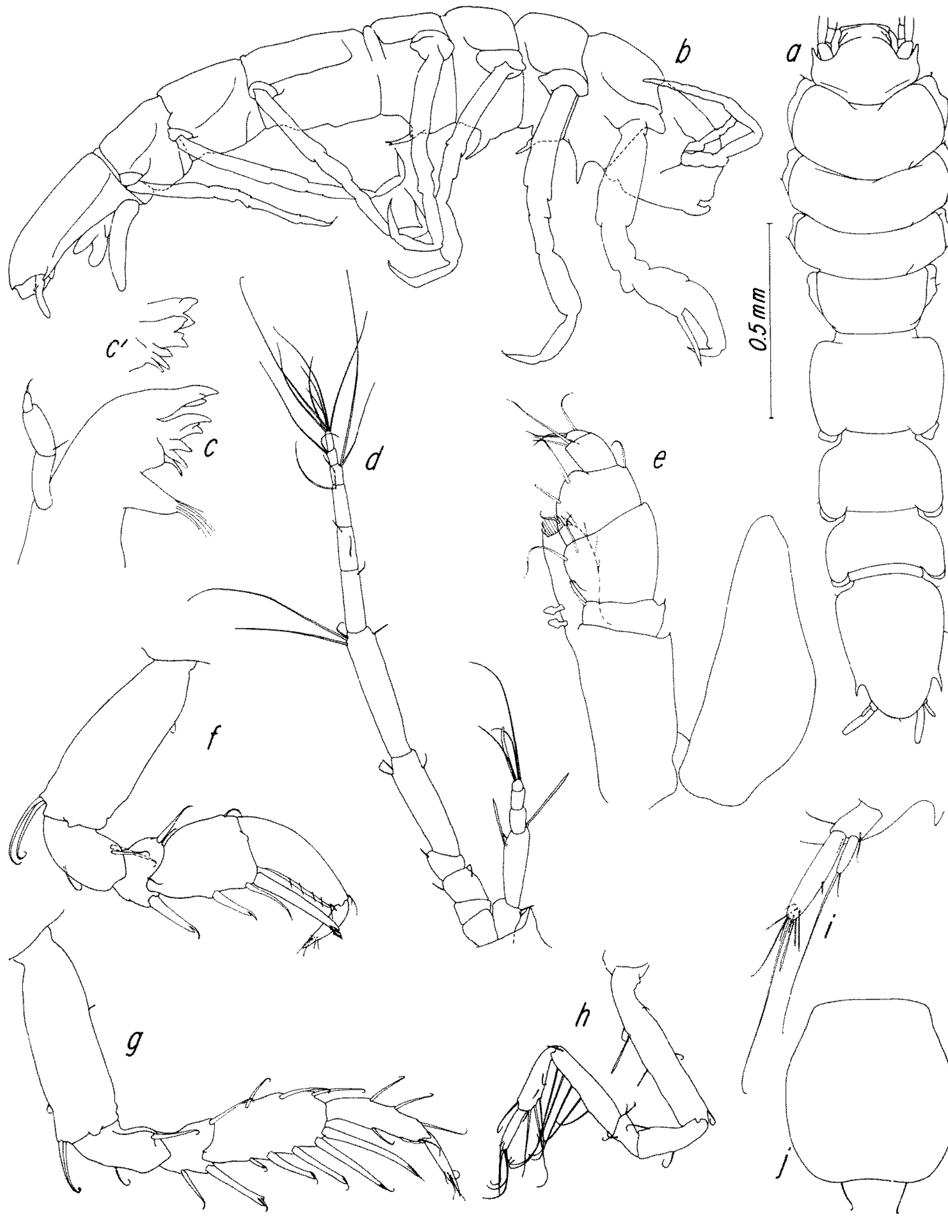

Fig. 57. *Prochelator lateralis* (G. O. Sars). *a*, body, B ♀; *b*, body, P ♀; *c*, Md, B ♀; *c'*, ip and lm, B ♀; *d*, A I and A II, B ♀; *e*, Mpd, B ♀; *f*, Per I, B ♀; *g*, Per II, B ♀; *h*, Per V, B ♀; *i*, Ur, B ♀; *j*, Pl II, B ♀. See section on symbols for explanation of abbreviations.

Nierstrasz and Schuurmans Stekhoven, 1930, p. 106, fig. 54. Hult, 1937, p. 25, fig. 12; 1941, p. 89, maps 27, 28. Stephensen, 1948, p. 92, fig. 25, nos. 5-7.

Eugerdella lateralis: Kussakin, 1965, pp. 138, 141.

Material.—Station E3: 9 individuals. Station F1: 3 individuals. Station G1: 1 individual.

Station G9: 2 individuals. Station 73: 22 individuals. Station 87: 60 individuals. Station 128:8 individuals.

Previous records.—Skagerrak, 77-460 meters. West coast of Norway, 50-475 meters. Ingolf station 25, Davis Strait, 63°30'N, 54°25'W, 1,065 meters.

Distribution.—North Atlantic; 50-2,021 meters

Diagnosis of female.—Body (figs. 57*a, b*) 4.3 times longer than tergal width of pereonite 2. Cephalon with pair of acute, dorsoanteriorly directed projections lateral to insertion of antennae. Pereonite 1 enlarged, 1.4 times longer than 2. Pereonite 4 2.3 times wider than long, tapering posteriorly, with evenly convex sides. Pereonite 5 1.5 times wider than long, with rounded anterolateral corners and distinctly convex, parallel sides. Pleotelson .65 width of pereonite 2, 1.4 times longer than wide, widest anteriorly, with gently convex sides converging posteriorly to sharp posterolateral spines located .74 way back from anterior end; posterior margin broadly rounded. Pereonites 1-4 with large, midsagittal ventral spines.

Coxae of pereopods I-IV (fig. 57*a*) not produced anteriorly; a small, thin seta may or may not be present on anterior corner of each.

First antenna (fig. 57*d*) reaching only to middle to fifth peduncular segment on second antenna, with 5 segments. Second peduncular segment about twice as long as first, 3.0 times longer than wide. Flagellum .76 length of second peduncular segment; distal segment much the shortest.

Second antenna (fig. 57*d*) short, being .33 length of body; fourth and fifth peduncular segments thick, 3.6 and 4.4 times longer than medial width, respectively.

Left mandible (figs. 57*c*, *c*'): Incisor process with 3 teeth. Only 3 saw bristles. Molar process with few terminal setae. Palp with 3 segments; distal segment reduced, with single major seta.

Maxilliped (fig. 57*e*): Palp as wide as basis; joints bounding segment 1 hardly curved; medial length segment 3 1.3 times that of 2. Two coupling hooks.

Pereopod I (fig. 57*f*): Dactylus .49-.56 length of propodus. Propodus 2.5-3.0 times longer than wide; ventral fringe accompanied by 4 small setae; dorsal margin more evenly convex than in many species. Carpus short, ventral margin being only 1.2-1.5 times longer than distal width; single small seta on distal end of dorsal margin; ventral margin with large accessory setae, not produced at base of fixed claw. Merus with single large, robust, unequally bifid seta on distal end of ventral margin, with 1 small and 1 large seta on distal end of dorsal margin. Ischium with 2 large dorsal setae distally, and with single seta midway on ventral margin. Basis 2.6 times longer than wide, with 2 large distoposterior setae.

Pereopod II (fig. 57*g*): Dactylus .61-.70 length of propodus. Propodus 3.4-4.1 times longer than wide; 3 evenly spaced, slender setae along dorsal margin; ventral margin with single slender seta midway and 2 finer setae of unequal size distally. Carpus 1.8-2.2 times longer than wide; dorsal margin with 2-4 (usually 3) slender setae; ventral margin with 4-5 robust, unequally bifid setae. Merus with moderately large, slender seta and perhaps small seta also on distal end of dorsal margin; ventral margin with moderately large, slender seta midway and large, robust, unequally bifid seta distally. Ischium with single slender seta dorsally and smaller seta ventrally. Basis 3.2 times longer than wide, .86 as wide as that of preceding limb, with 2 distoposterior setae.

Pereopod V (fig. 57*h*): Dactylus .62 length of propodus, 4.6 times longer than wide. Propodus 3.7 times longer than wide; single bifid seta at distal end of dorsal margin; ventral margin with row of 3 large setae, and 1 small seta toward distal end; 2 small setae on ventrolateral surface more proximally. Carpus 4.0 times longer than wide; single small dorsal seta distally; ventral margin with row of 5 long setae. Ischium 2.7 times longer than wide, with 1 dorsal and 1 ventral seta.

Pleopod II (fig. 57*j*) widest midway, as wide as long, with evenly convex lateral margins; posterior margin slightly truncate, with very few setae.

Uropod (fig. 57*i*) about one-third length of pleotelson, biramous. Exopod .4 length of endopod. Endopod 2.4 times length of protopod, 4.9 times longer than wide.

Brooding female 1.8 millimeters long.

Remarks.—The combination of the following characters best distinguishes *Prochelator lateralis* from other members of the genus: pereonite 5 short, with convex sides and broadly rounded anterolateral corners; pleotelson tapering posteriorly; flagellum of first antenna 3-segmented; distal segment of mandibular palp reduced; carpus of pereopod I with large accessory setae; carpus of pereopod II stout, with few setae; pleopod II widest midway, not bilobed.

To date, no males of this species have ever been found. In view of the large number of individuals now known, this situation is noteworthy.

Prochelator uncatus n. sp.
(Fig. 58)

Holotype.—Station SS3: USNM 125111, brooding female.

Other material.—Station SS3: 23 additional individuals, paratypes. Station SS2: 25 individuals (inc. 2 copulatory ♂ ♂), paratypes. Station 89: 1 individual. Station 172: 1 individual. Station 173: 12 individuals (including 3 ♂ ♂, 2 of which are copulatory).

Distribution.—North Atlantic; 119-300 meters.

Diagnosis of female.—Very similar to *P. lateralis,* but differing as follows: smaller, a brooding female being only 1.4 millimeters long. Pereonite 5 (figs. 58*b, c*) with concave sides; anterolateral corners acute, somewhat produced, sometimes slightly hooked. Pleotelson more vaulted; posterolateral spines smaller, located far more ventrally, so that often they are not obvious. Ventral body spines smaller, sometimes absent. Mandible without palp. Propodus of pereopod I (fig. 58*d*) nearly always with small seta located midway along dorsal margin, and merus with moderate-sized seta located midway along ventral margin. Carpus of pereopod II (fig. 58*e*) with only 2 dorsal setae in brooding females, more usually 3 in preparatory females.

Differences of copulatory male from female.—Differing only slightly: Smaller, being 1.1 millimeters long. Second antenna (fig. 58*h*) only moderately stouter; flagellum with relatively sparsely distributed, long, slender setae, as compared

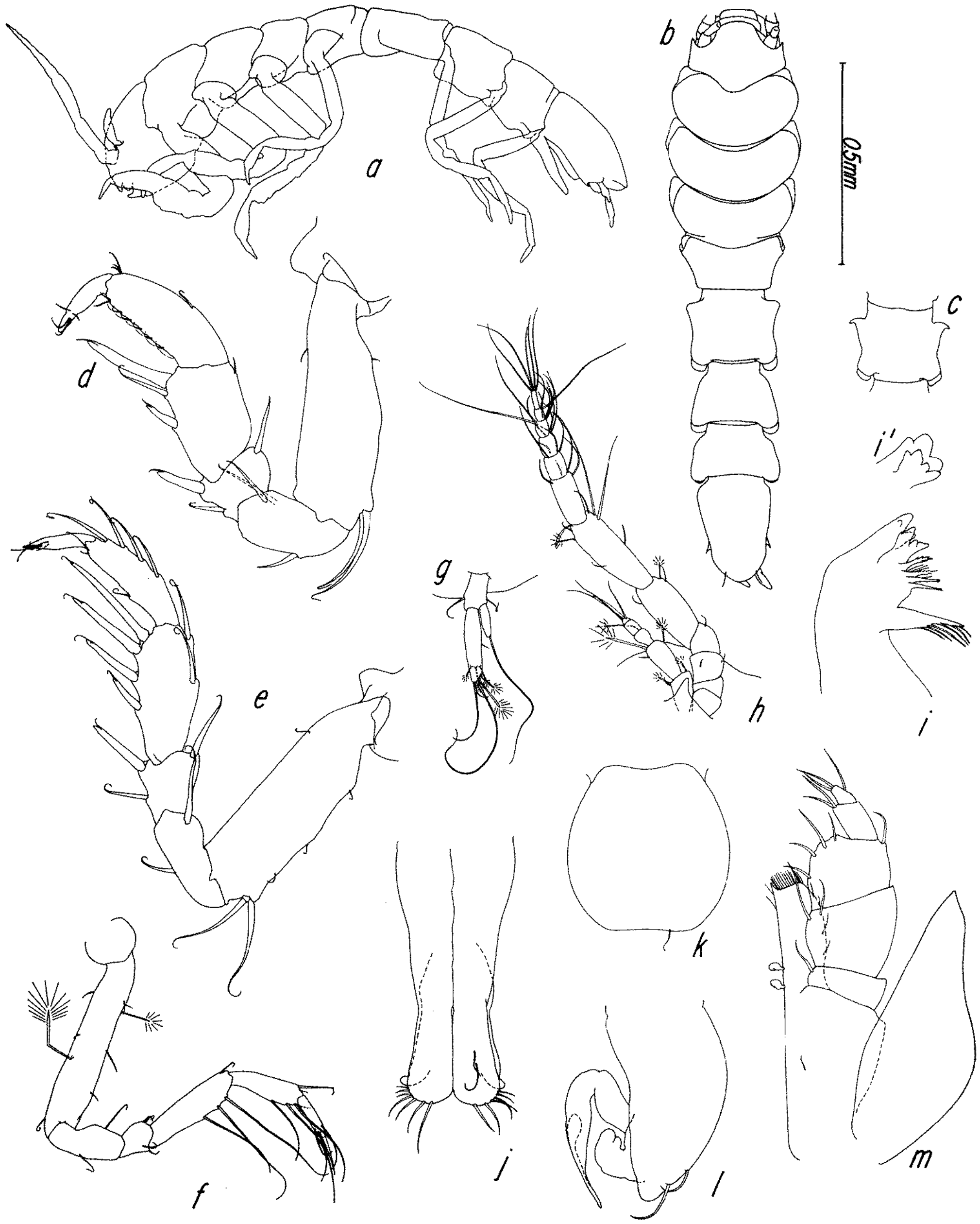

Fig. 58. *Prochelator uncatus* n. sp. *a*, body, B ♀ ; *b*, body, B ♀ ; *c*, pereonite 5, P ♀ ; *d*, Per I, B ♀ ; *e*, Per II, B ♀ ; *f*, Per V, B ♀ ; *g*, Ur, B ♀ ; *h*, A I and AII, C ♂; *i*, Md, B ♀ ; *i'*, ip and lm, B ♀ ; *j*, Pl I, C ♂; k, Pl II, B ♀ ; *l*, Pl II, C ♂; *m*, Mpd, B ♀. See section on symbols for explanation of abbreviations.

with usual condition in copulatory males of this family. Carpus of pereopod II with 3 dorsal setae. Pereopod V with 1 and 2 large, slender setae on dorsal margins of carpus and propodus, respectively; propodus broader. Pleopod I (fig. 58*j*) slender, with concave sides; distal end divided into pair of broadly rounded medial lobes and pair of smaller, bluntly hooked lateral lobes; each medial lobe with 6-7 marginal setae, the 3 most lateral of which are abruptly shorter than the others.

Prochelator hampsoni n. sp.
(Figs. 59, 60)

Holotype.—Station 70: USNM 125108, brooding female.

Other material.—Station 70: 11 additional individuals (including 3 ♂ ♂, 1 of which is anterior half of specimen in copulatory condition), paratypes. Station KK3: 1 individual, paratype. Station 84: 8 individuals (including 3 ♂ ♂). Station 92: 2 individuals.

Distribution.—North Atlantic; 4,680-4,758 meters.

Diagnosis of female.—Body (figs. 59*a, b*) 4.3 times longer than tergal width of pereonite 2. Pereonite 1 1.4 times longer than pereonite 2, with anteriorly directed spine on midventral surface. Pereonite 4 long, with posterior portion abruptly more slender than anterior part. Pereonite 5 1.2 times wider than long, almost as long as pereonites 3 and 4 combined, with concave sides, expanding anteriorly to form acute, slightly produced anterolateral corners. Pleotelson .4 width of pereonite 2, 1.8 times longer than wide, with well-vaulted axis; sides parallel, nearly straight, terminating posterolaterally in short points located .81 way back from anterior end; posterior margin acutely convex between base of uropods.

Coxae of pereopods I-IV (fig. 59*a*) sharply bilobed, not produced strongly anteriorly, tipped with very small, stout setae.

First antenna (fig. 59*e*) reaching almost to end of fifth peduncular segment of second antenna, 6-segmented. Second peduncular segment 2.0 times longer than the first, 5.8 times longer than wide. Flagellum with 4 slender segments, 1.1 times longer than second peduncular segment; segments decreasing gradually in length distally, the last segment being two-thirds the length of the first.

Second antenna (fig. 59*e*) very slender, about .5 length of body. Peduncular segments 5 and 6 combined total .48 appendage length; both very slender, being 9.5 and 13.7 times longer than median width, respectively; segment 6 1.3 times longer than 5. Flagellum 7-segmented.

Left mandible (figs. 59*h*, *h*'): Three incisor teeth. Six saw bristles. Molar process relatively broad, with abundant terminal setae. Palp with well-developed third segment bearing 7 major setae.

Maxilliped (fig. 59*c*): Palp .83 width of basis; joints bounding segment 1 nearly straight; medial length of segments 2 and 3 nearly equal; distomedial margin of segments 4 and 5 with series of very fine setae. Two coupling hooks.

Pereopod I (fig. 60*c*): Dactylus .5 length of propodus. Propodus 3.4 times longer than wide, 1.1 times longer than carpus; dorsal margin convex proximally, straight distally; ventral margin straight, with membranous fringe running entire length, accompanied by row of approximately 25 short, curved setae. Carpus 1.8 times longer than wide; ventral margin straight, with moderately small accessory setae, not produced at base of fixed claw; no setae along dorsal margin. Merus with 1-2

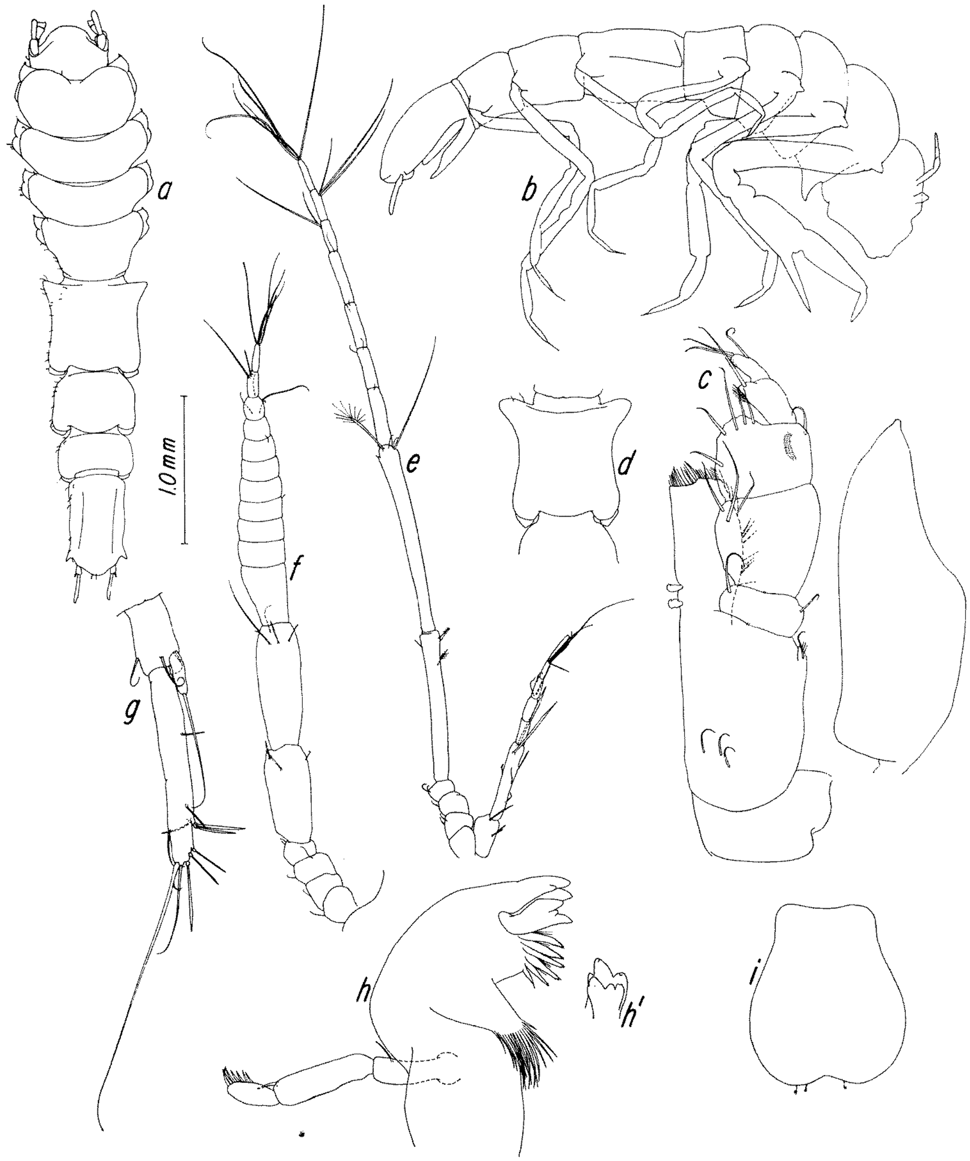

Fig. 59. *Prochelator hampsoni* n. sp. *a*, body, B ♀ ; *b*, body, P ♀ ; *c*, Mpd, P ♀ ; *d*, pereonite 5, C ♂; *e*, A I and A II, B ♀ ; *f*, A II, ♂, immature; *g*, Ur, P ♀ ; *h*, Md, P ♀ ; *h'*, ip and lm, P ♀ ; *i*, Pl II, P ♀. See section on symbols for explanation of abbreviations.

very small dorsal setae and 3 ventral setae, the most distal of which is somewhat larger than the rest. Ischium with no dorsal setae and single very small ventral seta. Basis 5.2 times longer than wide, with 2-3 large distoposterior setae.

Pereopod II (fig. 60*b*): Dactylus .96 length of propodus. Propodus 3.9 times longer than wide; dorsal margin with 5-6 large setae; ventral margin with 3 slender setae proximally, followed by fringe of fine hairs, and terminating distally in

Fig. 60. *Prochelator hampsoni* n. sp. *a*, Per V, P ♀ ; *b*, Per II, P ♀ ; *c*, Per I, P ♀. See section on symbols for explanation of abbreviations.

2 setae. Carpus 3.0 times longer than wide; dorsal margin with up to 18 slender setae; ventral margin with up to 13 robust setae, all but more proximal of which are unequally bifid. Merus with 1-2 dorsal setae and 4-5 ventral ones, most distal of which is more robust and unequally bifid. Ischium with 1 moderately long, slender seta at distal end of dorsal margin, and 2-3 small setae on ventral margin. Basis 6.5 times longer than width at midpoint, as wide as that of previous limb, with 2-3 distoposterior setae.

Pereopod V (fig. 60*a*): Dactylus 7.0 times longer than wide. Propodus 4.7 times longer than wide, with about 6 slender, but short, unequally bifid dorsal setae and about 11 mostly long ventral setae. Carpus 4.9 times longer than wide; setation of dorsal margin limited to 4 very small setae; approximately 13 ventral setae, all but more proximal few being quite long and slender. Ischium 3.3 times longer than wide; dorsal margin not markedly convex, with 3 small setae; 4 small ventral setae. Basis 8 times longer than wide.

Pleopod II (fig. 59*i*) 1.1 times longer than wide, widest one-third distance from distal end. Lateral margins broadly concave proximally, broadly convex distally. Distal edge strongly bilobed, with a few sparsely located, small setae.

Uropod (fig. 59*g*) about .4 length of pleotelson, biramous. Exopod .23 length of endopod, slender, tipped with 1 very long seta. Endopod 3.0 times longer than protopod, slender, being 7.2 times longer than wide; tip dominated by 1 large, very long seta.

Length of brooding female 3.7 millimeters.

Major differences of copulatory male from female.—Specimen badly damaged. Trunk and coxae of pereopods I-IV differ only modestly from those of female. Pereonite 5 (fig. 59*d*) more strongly constricted, anterolateral corners more broadly rounded. Setae of pereopod II shorter, fewer in number; dactylus longer. Carpus and propodus of pereopod V slightly broader, with many more marginal setae. Length of body 3.6 millimeters.

Remarks.—*Prochelator hampsoni* is best characterized by the following combination of characters: Pereonite 5 long, with acutely produced anterolateral corners; pleotelson slender, straight-sided; pereopod II with abundantly setose carpus, with propodus having ventral setae only proximally; pleopod II of female strongly bilobed.

Prochelator litus n. sp.
(Fig. 61)

Holotype.—Station 84: USNM 125110, preparatory female.

Other material.—Station 84: 5 additional individuals, paratypes. Station 70: 4 individuals, paratypes. Station 121: 5 individuals.

Distribution.—North Atlantic; 4,680-4,800 meters.

Diagnosis of female.—Body (figs. 61*a, i*) 4.3 times longer than tergal width of pereonite 2; anterior half of body not strikingly wider than posterior half. Pereonite 1 1.3 times longer than pereonite 2. Pereonite 4 short, although slightly longer than preceding segment, tapering posteriorly, with convex sides. Pereonite 5 1.2 times wider than long, trapezoidal, widest anteriorly, with sharply rounded anterolateral corners; sides nearly straight, converging gently posteriorly, but slightly flaring posteriorly at insertion of limbs. Pleotelson .52 width of pereonite 2, 1.2 times longer than wide, widest anteriorly, with convex sides converging posteriorly to posterolateral spines located .68 way back from anterior end. No ventral body spines.

Coxae of pereopods I-IV (fig. 61*i*) blunt anteriorly, tipped with small, stout setae.

First antenna (fig. 61*h*) reaching to middle of fifth peduncular segment of second antenna. Second peduncular segment 1.5 times longer than first, 4.1 times longer than wide. Flagellum 1.1 times longer than second peduncular segment, with 4 segments in brooding female, but distal 2 segments fused in preparatory female; first and second segments subequal in length; third and fourth segments also subequal, .65 length of first two.

Second antenna (fig. 61*h*) .42 length of body. Peduncular segments 5 and 6 .52 total length of limb, slender, being 9.5 and 11.5 times longer than width at midpoint, respectively; segment 6 1.1 times longer than 5. Flagellum 6-segmented.

Fig. 61. *Prochelator litus* n. sp. *a*, body, B ♀ ; *b*, Per I, B ♀ ; *c*, Per II, P ♀ ; *d*, Per V, B ♀ ; *e*, Ur, P ♀ ; *f*, Md, B ♀ ; *g*, Mpd, B ♀ ; *h*, A I and A II, B ♀ ; *i*, body, B ♀ ; *j*, Pl II, B ♀. See section on symbols for explanation of abbreviations.

Left mandible (fig. 61*f*): Three incisor teeth. Five saw bristles. Molar process broad, with numerous terminal setae. Palp short; terminal segment somewhat reduced in size, with 2 setae.

Maxilliped (fig. 61*g*): Palp .84 width of basis; joints bounding segment 1 straight; medial length of segment 3 1.2 times that of 2. Two coupling hooks.

Pereopod I (fig. 61*b*): Dactylus .5 length of propodus. Propodus 3.0 times longer than wide, equal in length to carpus; dorsal margin convex for proximal third, essentially straight for remaining distance, with 2 small setae distally; ventral margin straight, with membranous fringe accompanied by row of about 16 small setae. Carpus 2.0 times longer than wide, not produced at base of claw; dorsal margin faintly concave for distal two-thirds, with very small seta distally; ventral margin straight, with accessory setae of moderate size. Merus with 2 small setae at distal end of dorsal margin; ventral margin with 1 small seta and 1 moderate-sized, robust seta more distally. Ischium with no dorsal setae and only single small seta on ventral margin. Basis slender, 5.5 times longer than wide, with single distoposterior seta.

Pereopod II (fig. 61*c*): Dactylus same length as propodus, with slender, pointed tip. Propodus 4.0 times longer than wide; row of 3 evenly spaced, slender setae along distal half of dorsal margin; ventral margin with slender seta about two-fifths way from proximal end; margin distal to this fringed, followed most distally by slender seta and small, robust, unequally bifid seta. Carpus 3.7 times longer than wide; dorsal margin with 4-5 large, slender setae; ventral margin with 5 robust, unequally bifid setae. Merus and ischium each with 1 very small and 1 large, slender seta on distal end of dorsal margin; small seta in middle and larger, robust, unequally bifid seta at distal end of ventral margin of merus; ventral margin of ischium with 2 small setae. Basis .67 width of that of previous limb, slender, 7.2 times longer than wide, with single distoposterior seta.

Pereopod V (fig. 61*d*) slender. Dactylus 5.8 times longer than wide. Propodus 4.3 times longer than wide; small, slender, unequally bifid seta at distal end of dorsal margin and small seta midway; 4 long setae along ventral margin. Carpus 4.3 times longer than wide; 4-5 long, slender setae ventrally; 1-2 small setae dorsally. Ischium 3.2 times longer than wide; dorsal margin only moderately convex, with single small seta; 2 small setae ventrally. Basis 7.5 times longer than wide.

Pleopod II (fig. 61*j*) as long as wide, widest midway; lateral margin broadly convex; distal margin flattened, with a few small setae.

Uropod (fig. 61*e*) .45 length of pleotelson, biramous. Exopod .26 length of endopod, slender, being 4.5 times longer than wide. Endopod 8.5 times longer than wide, 2.1 times longer than protopod. Protopod long, slender.

Length of brooding female 3.1 millimeters.

Remarks.—*Prochelator litus* is best distinguished as follows: pereonite 5 trapezoidal, with sharply rounded anterolateral corners, and posteriorly with slightly concave sides; pleotelson with posterolateral spines located unusually far forward; basis of pereopods I-IV slender; pereopod II with few setae, slender carpus; pleopod II widest midway, not bilobed; uropod with long protopod.

Prochelator abyssalis n. sp.
(Figs. 62, 63)

Holotype.—Station 122: USNM 125107, preparatory female.

Other material.—Station 122: 7 additional individuals (including 1 ♂), paratypes. Station JJ3: 1 individual, paratype. Station 121: 1 individual. Station 125: 2 individuals. Station 84: 1 possible individual. Station 156: 1 individual.

Distribution.—North and Equatorial Atlantic; 3,459—4,833 meters.

Diagnosis of female.—Body (figs. 62*a, b*) 4.6 times longer than tergal width of pereonite 2. Pereonite 1 1.2 times longer than pereonite 2. Pereonite 4 tapering gradually posteriorly; sides at most only slightly concave posterior to base of limbs. Pereonite 5 about 1.5 times wider than long; tergum indistinctly defined anteriorly, with concave sides, slightly wider anteriorly than posteriorly; anterolateral corners sharply rounded. Pleotelson 1.2 times longer than wide, .75 width of pereonite 2, widest about two-fifths way back from anterior end; sides broadly convex; short posterolateral spines located .78 way back from anterior end; posterior margin acutely rounded. No ventral body spines.

Coxae of pereopods I-IV (fig. 62*a*) not projecting strongly anteriorly, each tipped with short, stout seta.

First antenna (fig. 62*c*) reaching nearly to tip of segment 5 of second antenna, with 5 segments. Second peduncular segment 3.5 times longer than wide, 1.4 times longer than first. Flagellum 1.2 times length of second peduncular segment; segments increasing in length distally.

Second antenna (fig. 62*c*) .31 length of body. Peduncular segments 5 and 6 .42 total length of limb, 5.3 and 9.7 times longer than width at midpoint, respectively; segment 6 1.4 times longer than 5. Flagellum with 7 segments.

Left mandible (fig. 62*g, g*'): Three incisor teeth. Four saw bristles. Molar process with numerous terminal setae, most of which are located on proximal edge. Third segment of palp reduced, with 2 major setae.

Maxilliped (fig. 62*d*): Maximum width of palp .86 that of basis; joints bounding palp segment 1 nearly straight; segment 3 short, its medial length being only 1.3 times that of 2. Two coupling hooks.

Pereopod I (fig. 63*a*): Dactylus .47 length of propodus. Propodus 2.6 times longer than wide, same length as carpus; dorsal margin convex for whole length; fringe of ventral margin accompanied by 12 small setae. Carpus 1.7 times longer than wide; dorsal margin with single stout distal seta; ventral margin nearly straight, somewhat produced at base of claw; accessory setae of moderate size. Merus with 2 slender dorsal setae and 1 stouter ventral seta. Ischium with 1 small ventral seta and 2 moderately small dorsal setae. Basis 2.2 times longer than wide, with single large distoposterior seta.

Pereopod II (fig. 63*b*) with slender segments. Dactylus .57 length of propodus. Propodus 4.2 times longer than wide; dorsal margin with row of 3-4 major setae; ventral margin with 1 small, nearly proximal seta followed by fringe extending to distal end, terminating in 2 small setae. Carpus 3.4 times longer than wide; ventral margin slightly concave, paralleling dorsal margin, with row of 5 stout, unequally bifid setae; dorsal margin with 6 slender setae. Merus with 1 large and 1 small, slender seta, both dorsally and ventrally. Ischium with 1 large and 1 small seta dorsally, and 1 small seta ventrally. Basis 5.2 times longer than wide, .63 length of that of preceding limb, with 1-2 large distoposterior setae.

Pereopod V (fig. 63*c*): Dactylus 5.2 times longer than wide. Propodus 3.5 times longer than wide; dorsal margin with row of 5 long, very slender setae, with much shorter, stout, bifid seta in middle and at end of row; row of 5 slender setae ventrally, the more distal of which are unequally bifid. Carpus broad, 3.0 times longer than wide, with 5-6 very slender dorsal setae and 7 larger ventral setae; 2 small

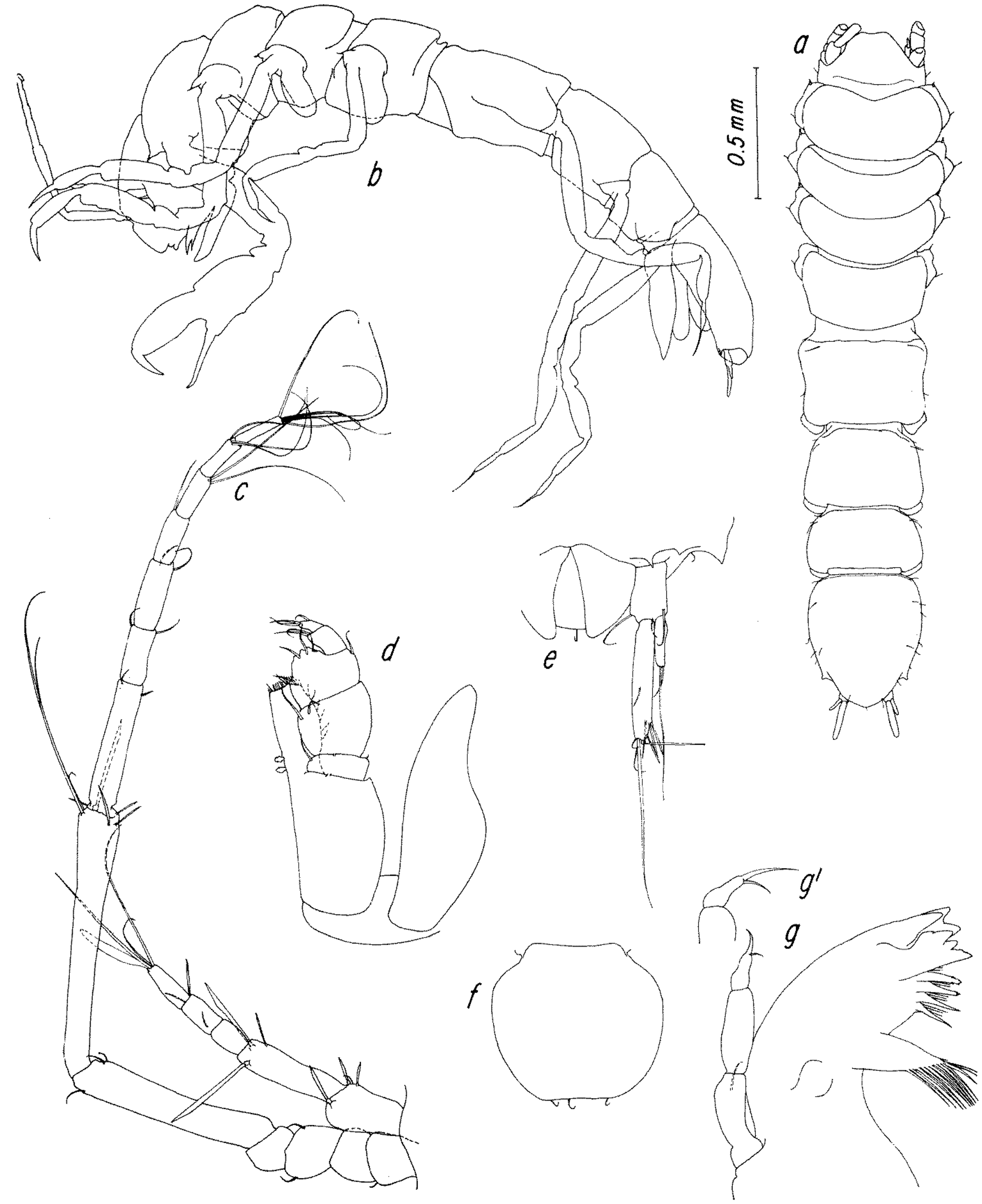

Fig. 62. *Prochelator abyssalis* n. sp. *a*, body, P ♀ ; *b*, body, P ♀ ; *c*, A I and A II, P ♀ ; *d*, Mpd, P ♀ ; *e*, Ur, P ♀ ; *f*, Pl II, P ♀ ; *g*, Md, P ♀ ; *g*', distal palp segment, P ♀. See section on symbols for explanation of abbreviations.

setae at distal end of dorsal row. Ischium 2.7 times longer than wide, acutely convex dorsally, with single large dorsal seta and small ventral seta. Basis 5.4 times longer than wide.

Pleopod II (fig. 62*f*) 1.1 times wider than long, widest near base; distal end truncate or concave, with a few small, irregularly spaced setae.

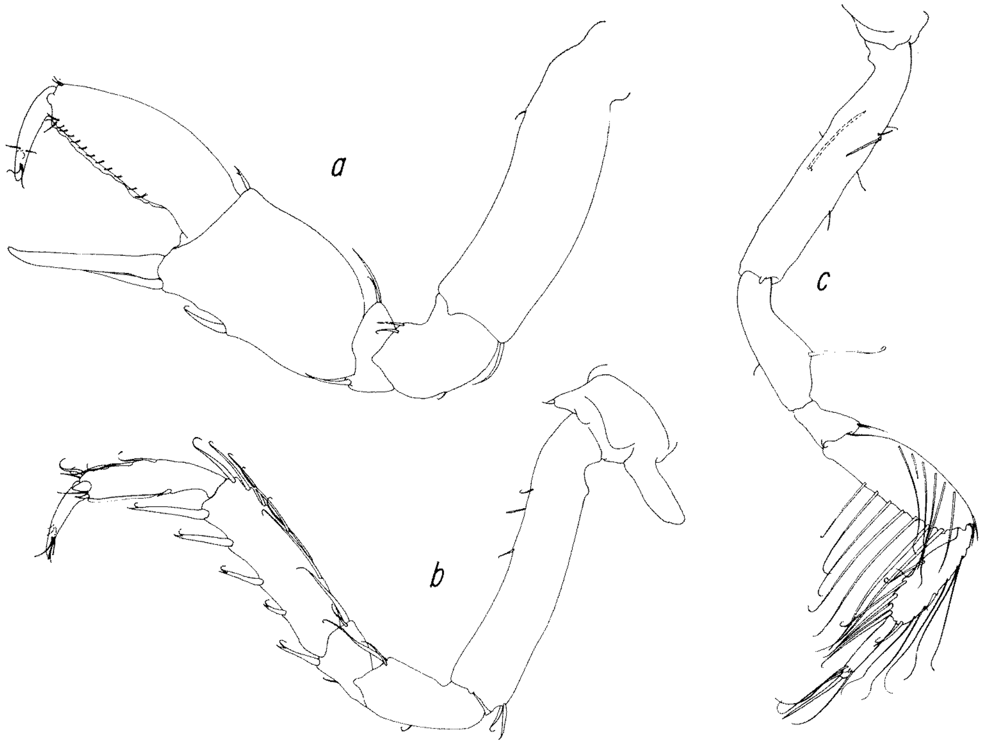

Fig. 63. *Prochelator abyssalis* n. sp. *a*, Per I, P ♀ ; *b*, Per II, P ♀ ; *c*, Per V, P ♀. See section on symbols for explanation of abbreviations.

Uropod (fig. 62*e*) .34 length of pleotelson. Protopod 1.5 times longer than wide. Endopod 2.1 times longer than protopod, 5.8 times longer than wide. Exopod .42 length of endopod, 4.6 times longer than wide. Tip of endopod and exopod each dominated by single slender, very long seta.

Length of brooding female 2.3 millimeters. Preparatory females up to 3.9 millimeters long.

Remarks.—*Prochelator abyssalis* is best distinguished as follows: pereonite 5 squarish, with concave sides; pleotelson very broad, with small posterolateral spines; distal segment of mandibular palp reduced; pereopod II with few setae, slender carpus; propodus and carpus of pereopod V broad, with numerous large setae, both dorsally and ventrally; pleopod II widest near base, distally truncate.

Prochelator incomitatus n. sp.
(Fig. 64)

Holotype.—Station 120: USNM 125109, brooding female.

Distribution.—North Atlantic; 5,100 meters.

Diagnosis.—Body (figs. 64*a, b*) 4.2 times longer than tergal width of pereonite 2. Pereonite 1 considerably enlarged, being twice as long as 2. Pereonite 4 1.8 times wider than long, widest anteriorly, with evenly convex sides. Tergite of pereonite 5 1.4 times wider than long; sides slightly convex, nearly parallel, but diverging

Fig. 64. *Prochelator incomitatus* n. sp. *a*, body, B ♀ ; *b*, body, B ♀ ; *c*, Mpd, B ♀ ; *d*, A I, B ♀ ; *e*, Md, B ♀ ; *e*', ip and lm, B ♀ ; *e*", palp, B ♀ ; *f*, Per I, B ♀ ; *g*, Per II, B ♀ ; *h*, Per V, B ♀ ; *i*, Ur, B ♀ ; *j*, Pl II, B ♀. See section on symbols for explanation of abbreviations.

slightly posteriorly; anterolateral corners broadly rounded. Pleotelson half the width of pereonite 2, 1.6 times longer than wide, widest anteriorly; sides straight, converging somewhat posteriorly; posterolateral spines very small, located .82 length of pleon from anterior end; posterior margin angular. No ventral body spines.

Coxae of pereopods I-IV (fig. 64*a*) not produced anteriorly, tipped with very small, stout setae.

First antenna (fig. 64*d*) 5-segmented. Second peduncular segment 1.7 times longer than the first, 3.8 times longer than wide. Flagellum 1.1 times longer than second peduncular segment; distal segment much the longest.

Left mandible (figs. 64*e–e*"): Incisor process with 3 teeth; dorsal tooth small, most proximal. Three saw bristles. Molar process with numerous setae. Palp well developed; distal segment with 3 major setae.

Maxilliped (fig. 64*c*): Palp .82 width of basis; joints bounding segment 1 not strongly curved; medial length segment 3 1.4 times that of 2. Two coupling hooks.

Pereopod I (fig. 64*f*): Dactylus .52 length of propodus. Propodus 2.8 times longer than wide; dorsal margin nearly straight for distal three-fifths, with 2 small setae midway; ventral margin with row of 17 small setae. Carpus 1.7 times longer than wide; ventral margin with single small seta proximal to usual complement of claw seta and well-developed accessory setae; claw seta keeled for part of opposable margin. Merus with 1 large and 1 small dorsal seta, and ventral margin with row of 2 large, stout setae. Ischium with 1 small seta dorsally and 2 small setae ventrally. Basis 4.9 times longer than wide, 1.2 times longer and 1.7 times broader than that of subsequent limb; single large distoposterior seta.

Pereopod II (fig. 64*g*): Dactylus 1.1 times longer than propodus. Propodus 3.2 times longer than wide; ventral margin fringed, with slender seta midway, and slender and stout seta distally; dorsal margin with row of 4 large, slender setae. Carpus 2.9 times longer than wide; dorsal margin with 9 long, slender setae; ventral margin with 6 large, stout, unequally bifid setae. Merus with 1 large and 1 small dorsal seta, and with ventral row of 2 large, stout setae. Ischium with single large, slender seta dorsally, and 2 smaller setae ventrally. Basis 6.9 times longer than wide, with single distoposterior seta.

Pereopod V (fig. 64*h*) well supplied with setae. Dactylus 7.5 times longer than wide. Propodus 4.2 times longer than wide; dorsal margin with row of 6 very long, slender setae and with much smaller bifid seta in middle and at end of row; distal half of ventral margin with row of 6 long, slender, unequally bifid setae and with single smaller seta at each end. Carpus 4.1 times longer than wide; row of 2 long setae in middle of dorsal margin; ventral margin concave proximally, with 7 long, slender setae along distal half. Ischium 3.0 times longer than wide, moderately convex dorsally, with single small dorsal and ventral seta. Basis 7.2 times longer than wide.

Pleopod II (fig. 64*j*) about as long as wide, widest midway. Distal margin gently bilobed, with 2 pairs of setae.

Uropod (fig. 64*i*) one-third length of pleotelson, uniramous. Endopod 3.2 times longer than protopod, 5.3 times longer than wide.

Body 2.6 millimeters long.

Remarks.—This species is not difficult to distinguish from other members of the genus. Its uniramous uropod is unique. Other major distinguishing features are the rounded anterolateral corners of pereonite 5, the straight sides and minute posterolateral spines of the pleotelson, the well-developed mandibular palp, and the relatively setose second and fifth pereopods.

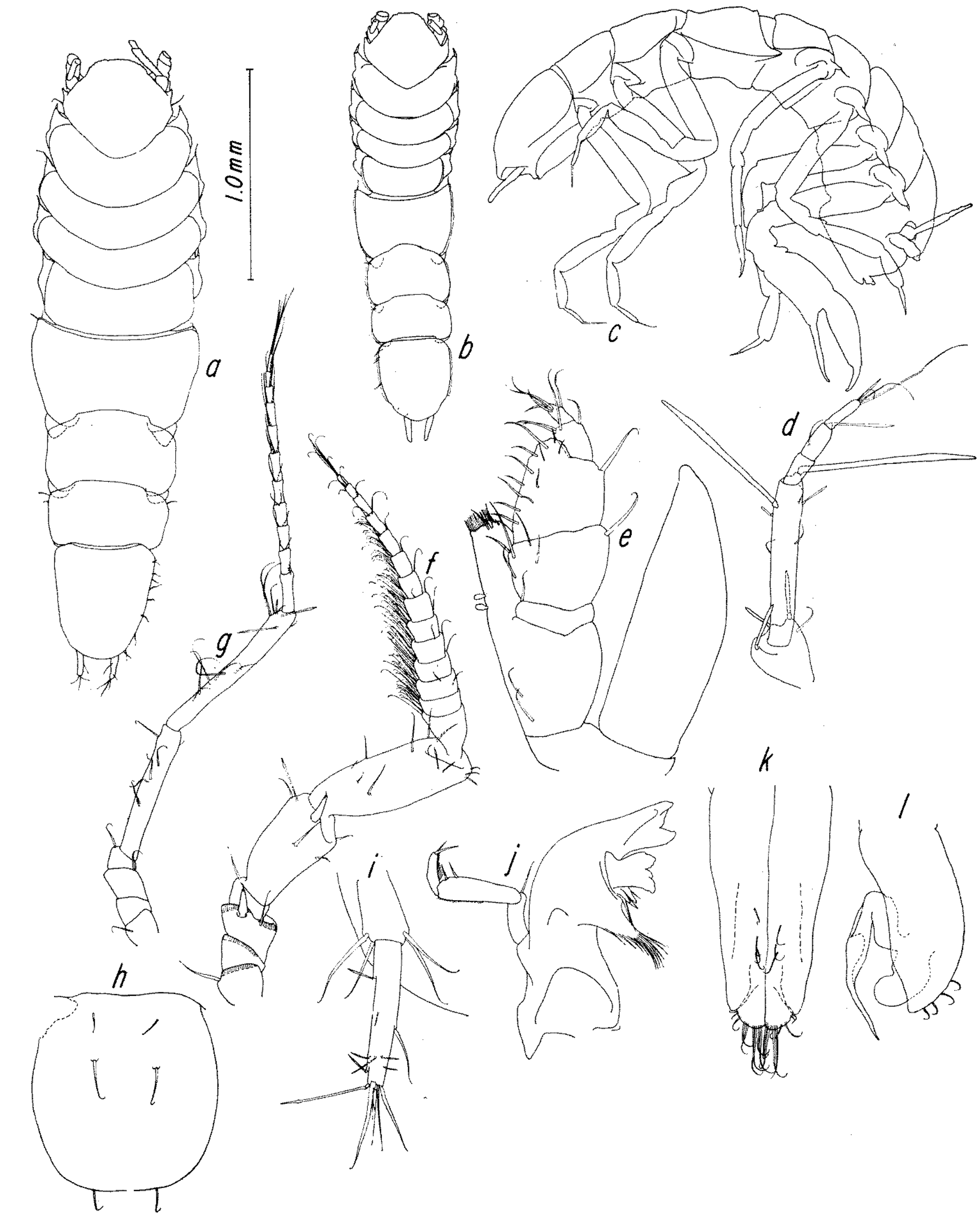

Fig. 65. *Chelator insignis* (Hansen). *a*, body, B ♀ ; *b*, body, C ♂; *c*, body, B ♀ ; *d*, A I, B ♀ ; *e*, Mpd, B ♀ ; *f*, A II, C ♂; *g*, A II, P ♀ ; *h*, Pl II, B ♀ ; *i*, Ur, B ♀ ; *j*, Md, B ♀ ; *k*, Pl I, C ♂; *l*, Pl II, C ♂. See section on symbols for explanation of abbreviations.

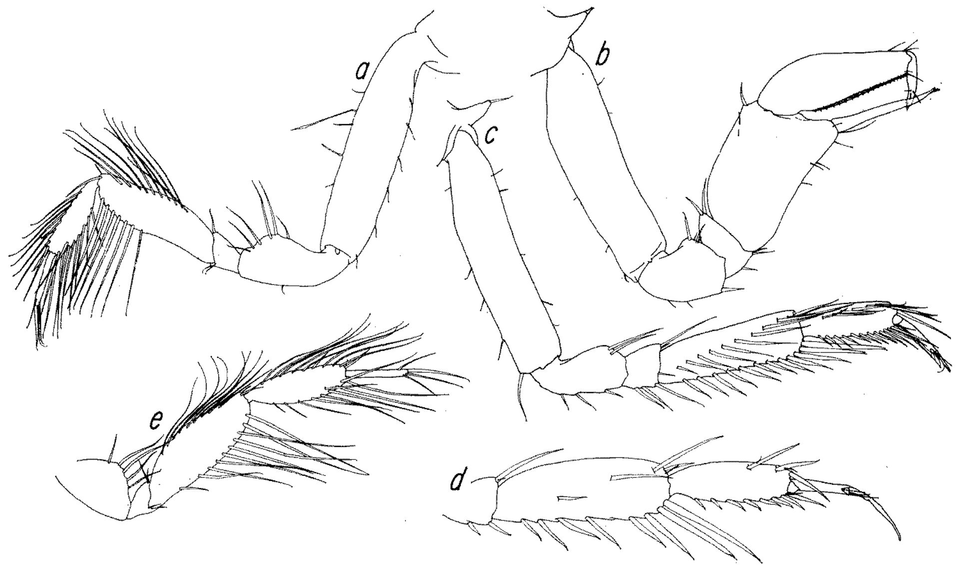

Fig. 66. *Chelator insignis* (Hansen). *a*, Per V, B ♀; *b*, Per I, B ♀; *c*, Per II, B ♀; *d*, Per II, distal segments, C ♂; *e*, Per V, distal segments, C ♂. See section on symbols for explanation of abbreviations.

Genus Chelator n. gen.
Chelator insignis (Hansen, 1916)
(Figs. 65, 66)

Desmosoma insigne Hansen, 1916, p. 118, pl. 11, figs. 5*a-g*. Gurjanova, 1933, pp. 418, 466. Menzies, 1962, p. 163, figs. 50*C-E*.

Desmosomella insignis: Kussakin, 1965, pp. 138, 143.

Lectotype.—Of the six cotypes from Ingolf station 36, the single brooding female is here designated lectotype.

Material.—Station F1: 12 individuals (including 1 copulatory ♂). Station 73: 271 individuals (including 67 ♂ ♂, 22 of which are in copulatory condition). Station 128: 4 individuals (including 3 ♂ ♂, 1 of which is copulatory).

Previous records.—Ingolf station 36, Davis Strait, 61°50'N, 56°21'W, 2,626 meters. Ingolf station 25, Davis Strait, 63°30'N, 54°25'W, 1,065 meters.

Distribution.—North Atlantic; 1,065–2,626 meters.

Diagnosis of female.—Body (figs. 65*a, c*) 3.8 times longer than tergal width of pereonite 2. Pereonite 1 1.2 times longer than pereonite 2. Pereonite 4 short, the same length as pereonite 1, with nearly parallel sides. Pereonite 5 very large, expanded laterally in a sheetlike fashion, 2.0 times wider than long, widest near anterior end, tapering posteriorly; sides concave midway; anterolateral corners acute, produced somewhat anteriorly, each tipped with thin seta; in young individuals, the anterolateral expansion of this segment is less well developed. Pleotelson .66 width of pereonite 2, slightly wider than long, widest anteriorly, broadly rounded posteriorly; fringe of 4-5 setae on each side.

Coxae of pereopods I-IV (fig. 65*a*) bilobed in dorsal view, produced anteriorly into acute points, tipped with stout seta on pereopod I, with more slender setae on the others.

First antenna (fig. 65*d*) reaching to middle of sixth peduncular segment of second antenna, with 5 segments. Second peduncular segment 6.2 times longer than wide, 2.4 times longer than first. Flagellum .7 length of second peduncular segment; segments 2 and 3 equal in length; segment 1 slightly shorter.

Second antenna (fig. 65*g*) .39 length of body. Peduncular segments 5 and 6.47 total length of limb, 6.8 and 9.6 times longer than wide, respectively; segment 6 1.2 times longer than 5. Flagellum with 13 segments.

Left mandible (fig. 65*j*): Three incisor teeth. Five saw bristles. Molar process with few terminal setae. Palp segment 3 well developed, with 2 major setae.

Maxilliped (fig. 65*e*): Palp same maximum width as basis; joints bounding segment 1 strongly curved; segment 3 long, its medial length being 2.0 times that of 2. Two coupling hooks.

Pereopod I (fig. 66*b*): Dactylus .32-.38 length of propodus. Propodus 2.8-3.2 times longer than wide, 1.0-1.2 length of carpus; dorsal margin convex for proximal third, otherwise straight, with 1-2 small setae distally; ventral margin straight, with membranous fringe accompanied by row of about 20 small setae. Carpus 1.5-1.7 times longer than wide, strongly produced at base of claw; dorsal margin straight distally, with a single slightly stout seta at distal end; ventral margin concave, with single small seta midway, 3 small setae distally; 1 of the latter larger than rest, two-fifths length of claw. Merus with 2 large setae dorsally, 2 somewhat smaller ones ventrally. Ischium with 1-2 large and 1 small sets dorsally; ventrally, 1 large seta at distal end and 1-2 small ones more proximally. Basis 3.5 times longer than wide, 1.1 times wider than that of subsequent limbs, with no major distoposterior setae.

Pereopod II (fig. 66*c*): Dactylus .68-.93 length of propodus; terminal claw stout, about one-third total length of segment. Propodus 2.8-3.3 times longer than wide; dorsal margin with row of 4-9 long, slender setae; ventral margin with row of 9-13 slender setae, the more distal 2-3 being rather long. Carpus 1.4-1.6 times longer than propodus, 2.8-3.5 times longer than wide; dorsal margin rather straight; row of 7-11 slender dorsal setae beginning proximally well down on lateral face of segment, gradually reaching dorsal margin by distal end; ventral margin with row of 10-13 stouter, distally setulate setae; setae of ventral row becoming longer and unequally bifid toward distal end of segment. Merus with 1 very long and 1 small dorsal seta; 2-3 stouter ventral setae. Ischium with 1-2 long, slender setae dorsally and 2 small setae ventrally. Basis about 3 times longer than wide, with single large distoposterior seta.

Pereopod V (fig. 66*a*): Dactylus 8.3 times longer than wide. Propodus broad, 3.3 times longer than wide; dorsal margin with about 8 long, slender setae interspersed with shorter seta midway and at distal end of row; 9-10 large ventral setae. Carpus 2.9 times longer than wide; 7-8 large dorsal setae; ventral margin strongly concave proximally, with 6-7 large setae. Ischium broad, only 2.0 times longer than wide, acutely convex dorsally; 3-4 long, slender dorsal setae, 1 small ventral seta. Basis 4.0 times longer than wide.

Pleopod II (fig. 65*h*) about as long as wide, widest midway, with broadly convex lateral margins, and faintly truncate distal margin which is sometimes even slightly concave; 1 pair of setae on distal margin; a few setae on ventral surface.

Uropod (fig. 65*i*) about .4 length of pleotelson. Protopod 1.7 times longer than wide, with long distal setae. Endopod 1.9 times longer than protopod, 4.9 times longer than wide.

Length of brooding female 2.8-4.1 millimeters.

Major differences of copulatory male from female.—Cuticle well calcified; surface much more heavily sculptured. Forehead of cephalon extending further forward, giving cephalon appearance of being more inflated anteriorly. Lateral margin of pereonites 5-7 and anterior three-quarters of pleotelson with narrow lateral, easily damaged flange (fig. 65*b*). Posterior margin of pleotelson faintly acute medially.

Anterior coxal processes of pereopods I-IV (fig. 65*b*) somewhat longer.

Second antenna (fig. 65*f*) with stout segments. Peduncular segments 5 and 6 combined .35 total length of limb; distal end of segments 3 and 5 each with stout, bifid seta. Flagellum with about 15 segments, broadest at base where width is two-thirds that of fifth peduncular segment and .15 flagellar length; each flagellar segment, except for distal few, with distal edge densely setose ventrally.

Pereopod II (fig. 66*d*): Claw of dactylus very long, 1.3 times longer than segment itself. Propodus 3.4-3.6 times longer than wide; ventral margin with fewer and shorter setae; dorsal margin with only 3 setae. Carpus with more rounded dorsal margin; only 4-5 dorsal setae, and fewer ventral ones as well.

Pereopod V (fig. 66*e*): Claw of dactylus longer, as long as segment. Carpus broader, only 3.0 times longer than wide; ventral margin with more setae.

Pleopod I (fig. 65*k*) twice as long as wide, tapering gradually to distal end; sides straight or gently convex for entire length. Lateral lobes acutely rounded, with poorly developed, blunt, laterally directed terminal hooks. Medial lobes extending .07 length of limb beyond lateral lobes, broadly rounded; distal margin of each with 4 long, slender medial setae and 4-5 abruptly smaller lateral setae. Several long, slender setae on ventral surface in pair of irregular longitudinal rows about two-thirds distance from base.

Length of body 2.1-2.2 millimeters.

Remarks.—*Chelator insignis* is best distinguished as follows: pereonite 5 large, expanded anterolaterally into sheets whose surface is not strongly concave as seen from above; carpus of pereopod I strongly produced at base of claw; carpus and propodus of pereopod II broad, fringed with numerous setae.

Of the known species, only the closely related *Chelator chelatus* could be confused with this species. Hansen has listed several differences between the species, but only a few of these differences seem significant: *C. chelatus* is much larger, 4.5 millimeters long, and the propodus of its first pereopod (fig. 72*g*) is more slender, being 3.6 times longer than wide.

Inspection of the type material of both species reveals a yet more important difference. The lateral flangelike portions of the fourth and fifth pereonites (fig. 72*d*) are very strongly concave in dorsal view in *C. chelatus*, so much so that the lateral margins are vertical, and the posterolateral portions of pereonite 5 actually overhang more medial portions of the tergite. Stephensen's (1915) drawing of the holotype is inaccurate because it does not show this condition.

Chelator vulgaris n. sp.
(Fig. 67)

Holotype.—Station 84: USNM 125090, brooding female.

Other material.—Station 84: 5 additional individuals (including 2 ♂ ♂, 1 of which is in copulatory condition), paratypes. Station 64: 12 individuals, paratypes. Station 70: 5 individuals (including 1 ♂), paratypes. Station 62: 3 individuals. Station 72: 1 individual. Station 85: 3 individuals. Station 96: 9 individuals (including 4 ♂ ♂, of which 1 is in copulatory condition). Station 126: 13 individuals (including 2 ♂ ♂). Station JJ3: 1 individual. Station 122: 11 individuals (including 4 ♂ ♂). Station 121: 4 individuals. Station 125: 3 individuals. Station 100: 3 individuals. Station 155: 14 individuals (including 2 ♂ ♂, of which 1 is in copulatory condition). Station 156: 87 individuals (including 18 ♂ ♂, of which 8 are in copulatory condition).

Distribution.—North and Equatorial Atlantic; 2,496-4,833 meters.

Diagnosis of female.—Body (figs. 67*a–c*) 3.8 times longer than tergal width of pereonite 2. Pereonite 1 enlarged, 1.4 times longer than pereonite 2. Pereonite 4 short, although slightly longer than preceding segment, tapering posteriorly. Pereonite 5 about 1.3 times wider than long, of even width; sides nearly straight or slightly convex. Pleotelson highly vaulted, about .6 width of pereonite 2, 1.1 times longer than wide, widest anteriorly, with convex sides, tapering posteriorly to broadly rounded posterior margin.

Coxae of pereopods I-IV (fig. 67*c*) distinctly bilobed in dorsal view, with short, acute anterolateral projections tipped with slender setae.

First antenna (fig. 67*f*) reaching to base of sixth peduncular segment of second antenna, 5-segmented. Second peduncular segment 2.7 times longer than first, 5.7 times longer than wide. Flagellum .7 length of second peduncular segment; first and second segments subequal in length; third segment somewhat longer.

Second antenna (fig. 67*f*) .35 length of body. Peduncular segments 5 and 6 .47 total length of limb, 6.8 and 8.8 times longer than wide, respectively; segment 6 1.2 times longer than 5. Flagellum with 11 segments.

Left mandible (fig. 67*l*): Incisor process with 3 teeth, most dorsal of which is very small. Five saw bristles. Molar process with numerous terminal setae. Palp well developed; 2 major setae on third segment.

Maxilliped (fig. 67*p*): Palp same width as basis; segment 3 very long, its medial length being about twice that of segment 2; joints bounding segment 1 strongly curved. Two coupling hooks.

Pereopod I (figs. 67*g, g*'): Dactylus .35 length of propodus. Propodus 2.9-3.4 times longer than wide, same length as ventral margin of carpus; dorsal margin convex for proximal third, essentially straight for remaining distance, with 1-2 small setae midway; ventral margin straight, with membranous fringe accompanied by row of up to 27 small setae. Carpus with ventral margin 1.7-2.0 times longer than distal width, strongly produced at base of claw; dorsal margin straight distally, with 1-3 small setae; ventral margin concave, with 4-7 small setae scattered along distal half, that at base of fixed claw being larger than the others; claw extending to end of propodus, curved, unequally bifid. Merus with 2 large, slender setae dorsally and 1 distoventrally. Ischium with 1-4 small ventral setae, and 1 small and 1 large, slender seta dorsally. Basis 4.0 times longer than wide, thicker than that of subsequent limbs; posterior margin with 2-3 large, slender setae, 1 of which is at distal end of segment.

Pereopod II (figs. 67*h, h*'): Dactylus .62-.76 length of propodus. Propodus broad, being 2.5-3.7 times longer than wide; dorsal margin with row of up to 13 long, slender setae; ventral margin distinctly convex, with up to 16 stout, distally setulate setae, most distal 3 of which are abruptly longer than the others. Carpus broad, 2.5-3.8 times longer than wide; dorsal row of up to 21 long, slender setae starts proximally on lateral surface, but gradually attains dorsal margin toward distal end; ventral margin with row of up to 20 stout, distally setulate setae, the latter becoming much longer toward distal end of row and also becoming unequally bifid. Merus with 1-3 long, slender setae dorsally and ventrally. Ischium with 1 long seta dorsally and from 2-4 smaller setae ventrally. Basis 4.3-4.6 times longer than wide, with 3-6 long, slender setae on posterior margin, 1 of which is at distal end of segment.

Pereopod V (fig. 67*i*): Dactylus 6.0 times longer than wide. Propodus broad, 2.5-3.7 times longer than wide; 6-9 long, slender dorsal setae, with a shorter, unequally bifid seta interspersed in middle and at distal end of row; 8-11 long, slender ventral setae. Carpus broad, 2.8-3.6 times longer than wide, with 9-14 major dorsal and 7-10 major ventral setae. Ischium about 2 times longer than wide, acutely convex dorsally; row of 1-2 very small and 3-5 long setae dorsally; 1-2 small setae ventrally.

Pleopod II (fig. 67*m*) about as wide as long, broadly attached at base, with broadly convex lateral margins; posterior margin slightly concave; numerous small, slender marginal setae.

Uropod (fig. 67*j*) .37 length of pleotelson. Protopod 1.3 times longer than wide. Endopod 2.6 times longer than protopod, 4.4 times longer than wide.

Brooding female 2.7-4.2 millimeters long.

Major differences of copulatory male from female.—Body (figs. 67*d, e*) relatively more slender anteriorly, more dorsoventrally flattened overall. Pleotelson with obtuse posterolateral corners, equivalent to posterolateral spines in other desmosomatids, located .8 way back from anterior end.

Second antenna (fig. 67*k*) stout. Peduncular segment 3 with robust lateral seta; peduncular segments 5 and 6 .4 total length of limb; segment 5 2.4 times longer than wide; segment 6 3.4 times longer than wide, 1.2 times longer than 5. Flagellum with 15 segments; no abrupt differentiation into proximal and distal portions; first segment .83 width of fifth peduncular segment; first 9 segments densely setose ventrally.

Pleopod I (fig. 67*o*) very broad, distally flaring and deeply cleft at midline. Medial lobes broadly rounded, extending .04 length of limb beyond lateral lobes; each medial lobe with fringe of 7-8 moderately large, slender setae, and most laterally with 3 abruptly smaller setae. Ventral surface with several approximately paired setae.

Stylet of pleopod II (fig. 67*n*) becoming very abruptly narrower for distal half.

Body 1.9-2.8 millimeters long.

Remarks.—*Chelator vulgaris* is best distinguished by the following combination of characters: pereonite 5 nearly square, with nearly straight sides converging

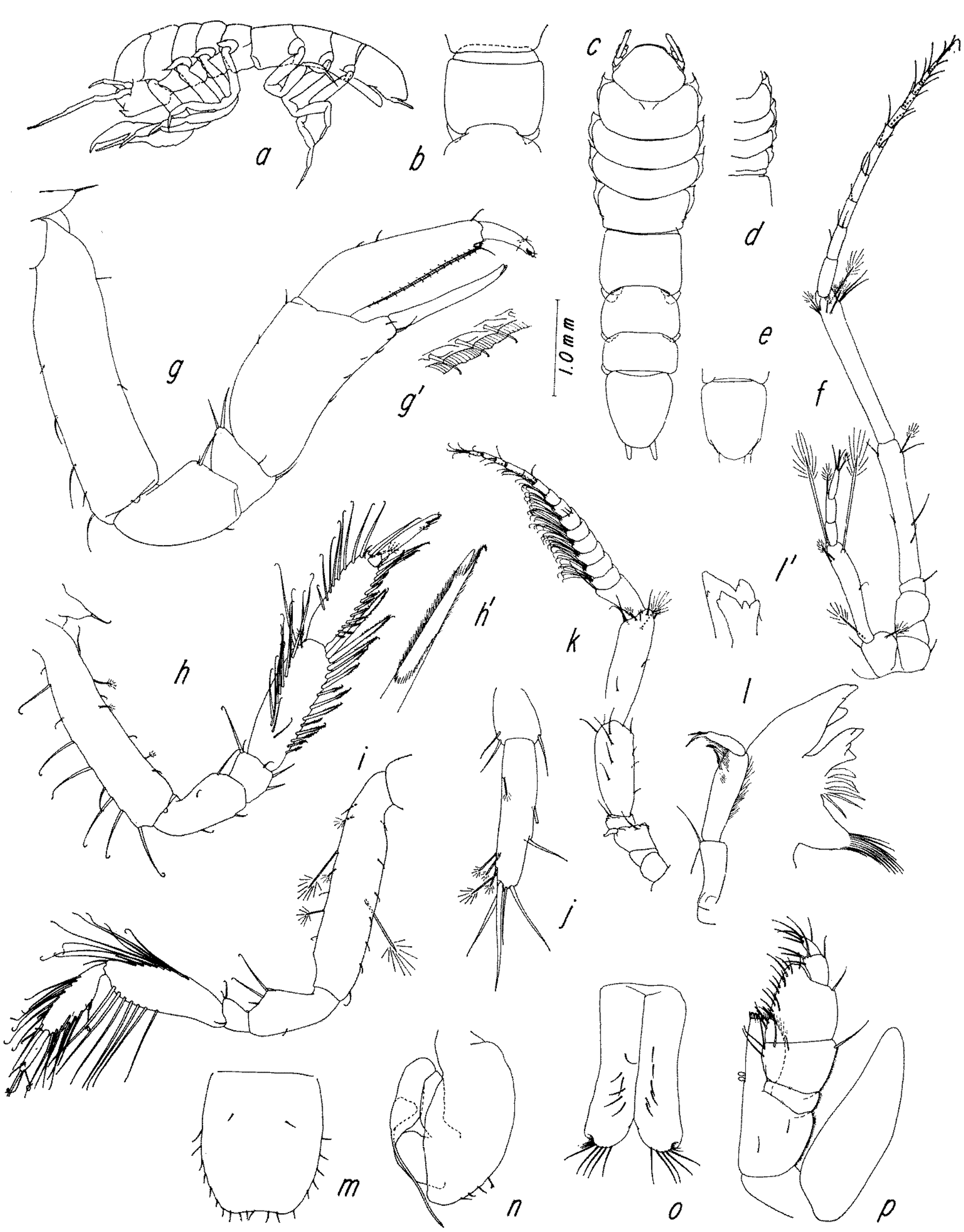

Fig. 67. *Chelator vulgaris* n. sp. *a*, body, J ♀ ; *b*, pereonite 5, P ♀ ; *c*, body, P ♀ ; *d*, pereonites 1-4, right side, dorsal view, C ♂; *e*, pleotelson, C ♂; *f*, A I and A II, P ♀ ; *g*, Per I, J ♀ ; *g*' ventral fringe and setae of propodus, J ♀ ; *h*, Per II, J ♀ ; *h*', ventral seta of carpus, J ♀ ; *i*, Per V, J ♀ ; *j*, Ur, P ♀ ; *k*, A II, C ♂; *l*, Md, B ♀ ; *l*', ip and lm, B ♀ ; *m*, Pl II, P ♀ ; *n*, Pl II, C ♂; *o*, Pl I, C ♂; *p*, Mpd, P ♀. See section on symbols for explanation of abbreviations.

slightly anteriorly; carpus of pereopod I strongly produced at base of claw; pereopod II with broad carpus and propodus fringed with numerous setae; pleopod I of male very broad.

Chelator verecundus n. sp.
(Figs. 68, 69)

Holotype.—Station 119: USNM 125089, preparatory female.

Other material.—Station 119: 1 additional indvidual, paratype. Station 118, subsample A: 6 individuals (including 3 copulatory ♂♂), paratypes. Station Ber7: 1 individual. "Alvin" dive 152: 1 individual.

Distribution.—North Atlantic; 1,150-2,500 meters.

Diagnosis of female.—Body (figs. 68*a, b*) about 4 times longer than tergal width of pereonite 2. Pereonite 1 no more strongly developed than 2. Pereonite 4 2.3 times wider than long, widest at level of posterior end of coxae, tapering with concave sides posterior to this. Pereonite 5 1.3 times wider than long, anteriorly only a little wider than connection to preceding segment; sides subparallel, slightly convex to slightly concave; anterolateral corners subangular. Pleotelson 1.2 times longer than wide, .7 width of pereonite 2, widest anteriorly, tapering only slightly posteriorly, with convex sides; posterior margin broadly rounded.

Coxae of pereopod I (fig. 68*a*) produced somewhat anteriorly, tipped with stout seta; coxae of pereopods II-IV not produced, tipped with slender setae.

First antenna (fig. 68*c*) 5-segmented. Second peduncular segment 2.6 times longer than first, 5.7 times longer than wide. Flagellum .7 length of second peduncular segment; distal segment much the longest.

Left mandible (fig. 68*e*): Incisor process with 3 teeth. Three saw bristles. Few setae on molar process. Palp well developed; distal segment with 2 major setae.

Maxilliped (fig. 68*l*): Palp nearly same maximum width as basis; joints bounding segment 1 strongly curved; medial length segment 3 1.8 times that of 2. Two coupling hooks.

Pereopod I (fig. 69*a*): Dactylus .42 length of propodus. Propodus 2.9 times longer than wide, .95 length of carpus; dorsal margin straight only for distal half; ventral margin fringed, with row of 9 small setae. Carpus 2.1 times longer than wide, only moderately produced at base of claw; ventral margin with 1 small, slender seta midway and 2 larger, slender setae at base of claw. Merus and ischium each with 2 subequal dorsal setae and 1 slender ventral seta. Basis 4.8 times longer than wide, same length as that of subsequent limb, but 1.6 times broader; 1 distoposterior seta.

Pereopod II unknown on female. Pereopod III (fig. 69*c*) of female probably much like II. Segments slender, with few setae. Carpus and propodus ventrally concave.

Pereopod V (fig. 69*e*): Dactylus 6.9 times longer than wide. Propodus 4.6 times longer than wide; dorsal margin with 4 long, slender setae and with shorter, slender, bifid seta in middle and at end of row; ventral margin with 6 long, slender setae. Carpus 4.0 times longer than wide; 4 long setae along dorsal margin; ventral margin with 5 long setae. Ischium 2.6 times longer than wide; 2 dorsal setae, distal one of which is very long. Basis 6.1 times longer than wide.

Pleopod II (fig. 68*j*) slightly wider than long, truncate distally, with pair of distal marginal setae.

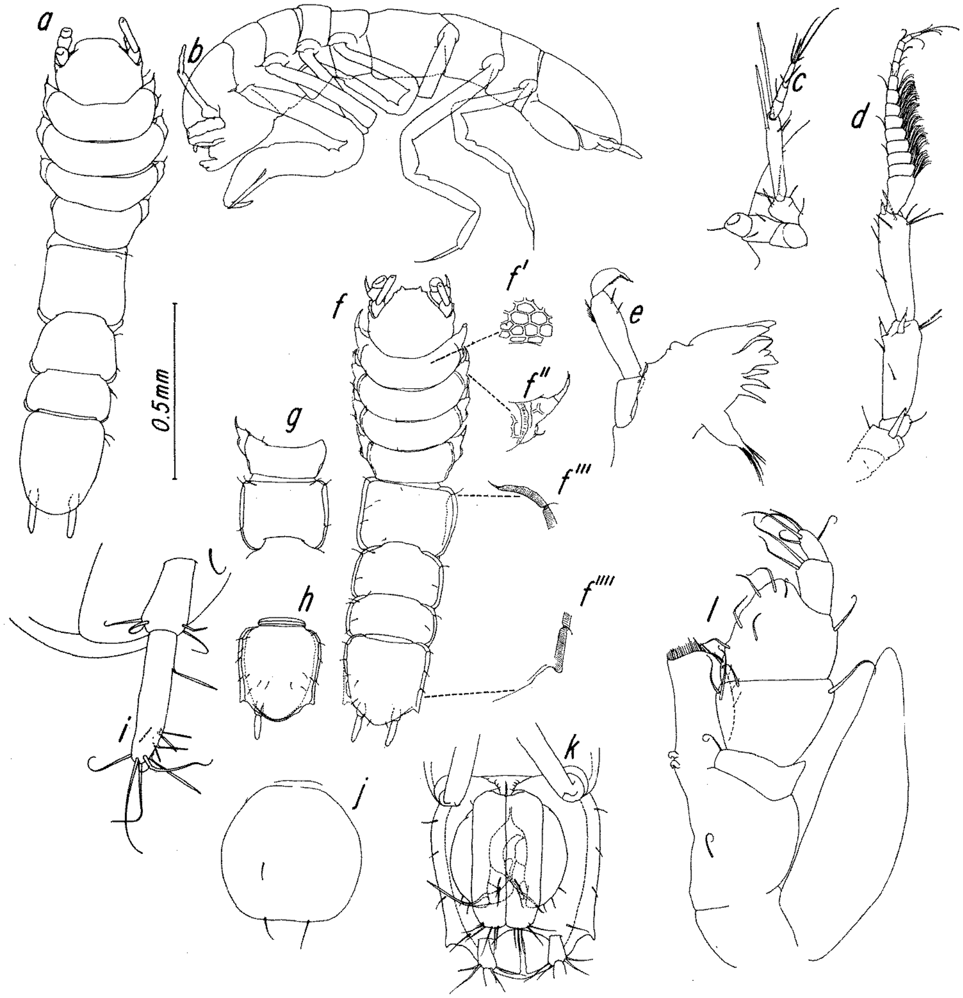

Fig. 68. *Chelator verecundus* n. sp. *a*, body, P ♀; *b*, body, P ♀; *c*, A I and base of A II, P ♀; *d*, A II, C ♂; *e*, Md, B ♀; *f*, body, C ♂; *f'*, structure of cuticle, pereonite 1, C ♂; *f''*, structure of cuticle, pereonite 2 and coxa of Per II, C ♂; *f'''*, structure of cuticle, pereonite 5, C ♂; *f''''*, structure of cuticle, pleotelson, C ♂; *g*, pereonites 4 and 5, C ♂; *h*, pleotelson, C ♂; *i*, Ur, B ♀; *j*, Pl II, B ♀; *k*, pleotelson, ventral view, showing Pl I and Pl II, C ♂; *l*, Mpd, B ♀. See section on symbols for explanation of abbreviations.

Uropod (fig. 68*i*) .45 length of pleotelson. Protopod long. Endopod 4.7 times longer than wide, 1.8 times longer than protopod.

Length of holotype 1.4 millimeters.

Major differences of copulatory male from female.—Cuticle more heavily calcified. Surface ornamented with reticulate pattern of calcareous ridges (figs. 68*f'*, *f''*). Lateral margins of each segment with continuous calcareous fringe (figs. 68*f*, *f''* - *f''''*). Face more vertically oriented. Pereonite 4 a little shorter. Pereonites 5-7 (figs. 68*f, g, h*) and pleotelson with lateral marginal flanges. Pereonite 5 1.7 times wider than long; tergite distinctly wider anteriorly than articulation with preceding

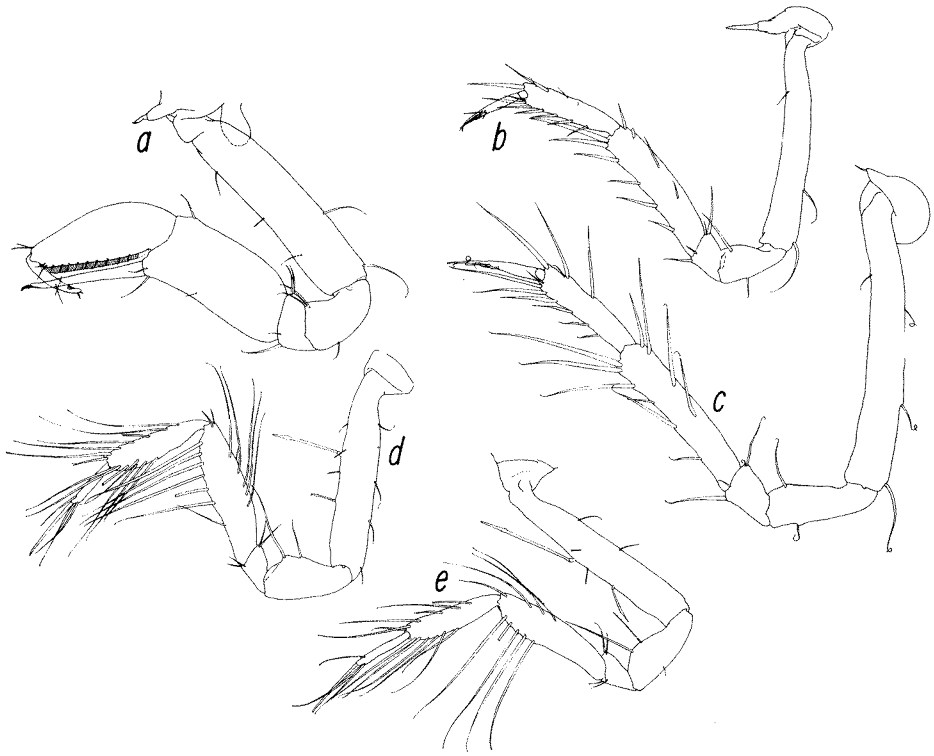

Fig. 69. *Chelator verecundus* n. sp. *a*, Per I, P ♀ ; *b*, Per II, C ♂; *c*, Per III, B ♀ ; *d*, Per V, C ♂; *e*, Per V, P ♀. See section on symbols for explanation of abbreviations.

segment; sides gently convex; anterolateral corners acutely rounded. Pleotelson with short posterolateral spines located .8 way back from anterior end.

Coxae of pereopods I-IV (fig. 68*f*) produced anteriorly; each tipped with stout, bifid, medially curved seta which is distinctly longer than produced portion of coxa.

Second antenna (fig. 68*d*) with stout segments. Distal ends of third, fifth, and sixth peduncular segments with 1, 2, and 1 stout, unequally bifid seta, respectively. Flagellum shorter than peduncle, with 14 segments, of which first 8 bear dense tuft of ventral setae.

Pereopod II (fig. 69*b*): Dactylus .7 length of propodus. Propodus 4.2 times longer than wide; dorsal margin with row of 3 large setae, and medial to this with accessory row of 2 small setae; ventral margin concave, with 6 major setae. Carpus 4.5 times longer than wide; 4 setae of small to moderate size in dorsal row; ventral margin concave, with row of 6 setae. Merus with 1 ventral seta and 2 dorsal setae of unequal size. Ischium with single dorsal and single ventral seta. Basis 8.0 times longer than wide, with single distoposterior seta.

Pereopod V (fig. 69*d*) essentially same as on female, but carpus and propodus each a little broader, and each with 1 or 2 more setae in dorsal and ventral rows. Carpus broadest midway.

Pleopod I (fig. 68*k*) 1.9 times longer than wide, with nearly parallel sides, except where they converge distally. Medial lobes extending .03 length of limb beyond lateral lobes, each with flattened margin bearing 5 long setae, and lateral to this a single very small seta.

Body 1.3 millimeters long.

Remarks.—The following combination of characters distinguishes this species from other members of the genus: small in size; pereonite 5 of female not produced laterally into flanges; propodus of pereopod I relatively stout; pereopod II slender, its carpus and propodus with few setae; pleopod I of male uniform in width for most of length; uropodal protopod slender.

Genus Disparella n. gen.
Disparella valida n. sp.
(Figs. 70, 71)

Holotype.—Station 126: USNM 125092, juvenile female.

Other material.—Station 155: 12 individuals (including 5 ♂ ♂, of which 1 is in copulatory condition), paratypes. Station 156: 10 individuals (including 1 ♂).

Distribution.—North and Equatorial Atlantic; 3,459-3,806 meters.

Diagnosis of holotype female.—Body (figs. 70*a-c*) 4.1 times longer than tergal width of pereonite 2. Pereonite 1 as long as pereonite 2. Pereonite 4 a little longer than pereonite 3, slightly narrower posteriorly than anteriorly, with faintly concave sides. Tergite of pereonite 5 1.3 times wider than long, nearly square, about as wide anteriorly and posteriorly, with faintly concave sides and acutely rounded anterolateral corners. Pleotelson .54 width of pereonite 2, 1.3 times longer than wide, widest toward anterior end; short posterolateral spines located four-fifths way back from anterior end; sides evenly convex; posterior margin acutely rounded at apex. No ventral body spines.

Coxae of pereopods I-IV (figs. 70*a, b*) at most only faintly bilobed, produced acutely anteriorly, tipped with very small, stout setae.

First antenna (fig. 70*e*) 6-segmented. Second peduncular segment a little more than twice as long as first, slender, being 6.7 times longer than wide. Slender flagellum nearly same length as second segment of peduncle, with segments decreasing in length distally, being .44, .25, .17, and .14 flagellar length, respectively.

Left mandible (figs. 70*f-f''*): Incisor process with 3 teeth; middle tooth most distal; dorsal tooth far more proximal than ventral one. Second of 4 teeth on lacinia mobilis unusually elongate. Twelve saw bristles. Molar process with about 17 setae. Palp well developed; last segment with 3 major setae.

Maxilliped (fig. 70*g*): Palp as wide as basis; medial length of segment 3 1.4 times that of 2. Three coupling hooks.

Pereopod I (fig. 71*b*): Dactylus .46 length of propodus. Propodus slender, 3.3 times longer than wide, as long as carpus; dorsal margin convex for proximal third, the rest being straight, with 2 small setae midway; ventral margin fringed, with row of about 9 very small setae medially and row of 4 somewhat larger setae laterally. Carpus slender, having ventral margin 2.2 times longer than wide; ventral margin only faintly concave, with 5 small setulate and indistinctly bifid setae along length and larger distal accessory seta at base of fixed claw; dorsal margin with small seta distally. Merus with 2 setae at distal end of dorsal margin and 3 small, robust setae ventrally. Ischium with 3 large setae of varying size on medial surface of dorsal margin, and 2 small setae on lateral surface; 3 small, robust, unequally bifid setae along ventral margin. Basis slightly thicker than that of subsequent limbs, about 4 times longer than wide, with 1 large distoposterior seta.

Pereopod II (fig. 71*c*): Dactylus .5 length of propodus. Propodus 3.8 times longer than wide; dorsal margin with main row of 8 setae and medial to this row of 3 very small setae; ventral margin fringed, with row of 7 moderately small, robust, unequally bifid, distally setulate setae. Carpus 3.4 times longer than wide; row of 16 setae begins proximally on lateral surface but gradually approaches dorsal margin distally; accessory row of 4 small setae just medial to margin; row of 13 unequally bifid, distally setulate setae on ventral margin. Merus with 2 slender setae dorsally; ventral margin with 3 robust, distally setulate setae. Ischium with 2 slender setae at distal end of dorsal margin and single small seta more proximally; ventral margin with 3 robust, unequally bifid, distally setulate setae. Basis 4.5 times longer than wide, with single large, slender distoposterior seta.

Pereopod V (fig. 71*d*): Dactylus .75 length of propodus, 7.2 times longer than wide; claw short. Propodus 4.0 times longer than wide; dorsal margin with row of 9 setae, all of which are long and slender except for short, bifid seta in middle and end of row; 10 long, for the most part unequally bifid setae along ventral margin. Carpus 3.3 times longer than wide, with 9 slender setae dorsally and 10 ventral setae, most of which are unequally bifid. Ischium 2 times longer than wide; 4 dorsal setae and 1 smaller ventral seta. Basis 3.2 times longer than wide.

Pleopod II (fig. 70*k*) almost as wide as long, broadest a little distal to midway; posterior margin concave, fringed with many setae.

Uropod (fig. 70*h*) .6 length of pleotelson. Exopod 2.3 times longer than wide, .16 length of endopod. Endopod 6 times longer than wide, 2.8 times longer than protopod. Distal end of protopod with several distal setae, both medially and laterally.

Body 3.9 millimeters long.

Major differences of copulatory male from female.—Pereonite 4 (fig. 70*d*) widest posteriorly. Pereonite 5 trapezoidal, 1.5 times wider than long, distinctly widest anteriorly; anterolateral corners acutely rounded; sides faintly concave. Pleotelson widest posteriorly because of large, broad posterolateral spines located .88 way back from anterior end; sides of pleotelson gently converging until base of spines.

Coxae of pereopods I-IV (fig. 70*d*) somewhat longer, those of the first limb being most noticeably lengthened.

Distal segment of mandibular palp with 6 major setae.

Pereopod II with more elongate propodus, 4.7 times longer than wide.

Pereopod V (fig. 71*e*): Propodus relatively larger, being .85 length of carpus, with more marginal setae (18 dorsal, 20 ventral). Carpus with more marginal setae (20 dorsal and 13 ventral).

Pleopod I (fig. 70*j*) 2.7 times longer than wide, tapering gently distally, somewhat

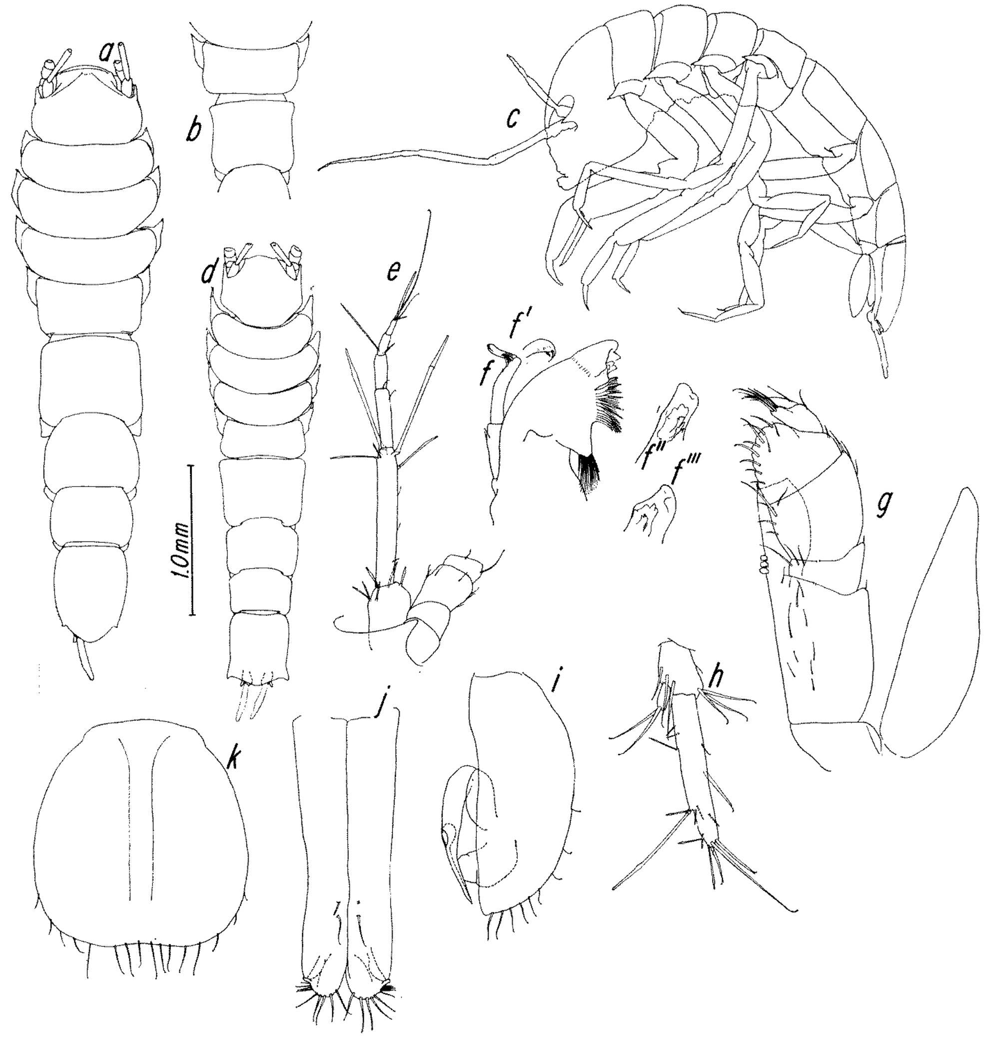

Fig. 70. *Disparella valida* n. sp. a, body, J ♀ ; b, pereonites 4 and 5, B ♀ ; c, body, J ♀ ; d, body, C ♂; *e*, A I and base of A II, J ♀ ; f, Md, J ♀ ; f', distal palp segment, J ♀ ; f'', ip, lm, and first saw bristles, J ♀ ; f''', ip, lm, and first saw bristle, oblique view, J ♀ ; g, Mpd, J ♀ ; h, Ur, J ♀ ; i, Pl II, C ♂; *j*, Pl I, C ♂; *k*, Pl II, J ♀. Figures b-d, i, and j are of material from station 155 in the Equatorial Atlantic; the rest are of Transect material. See section on symbols for explanation of abbreviations.

concave midway. Medial lobes extending .06 length of limb beyond lateral lobes, each with 5 distal setae and 4-5 abruptly smaller lateral setae. Lateral lobes little more than vertically oriented ridges on flanks of medial lobes.

Stylet of pleopod II (fig. 70*i*) short.

Body 3.4 millimeters long.

Remarks.—Females from station 155 differ from the diagnosis in that the sides of pereonite 5 (fig. 70*b*) are distinctly more concave. A mature female from this locality is 4.8 millimeters long.

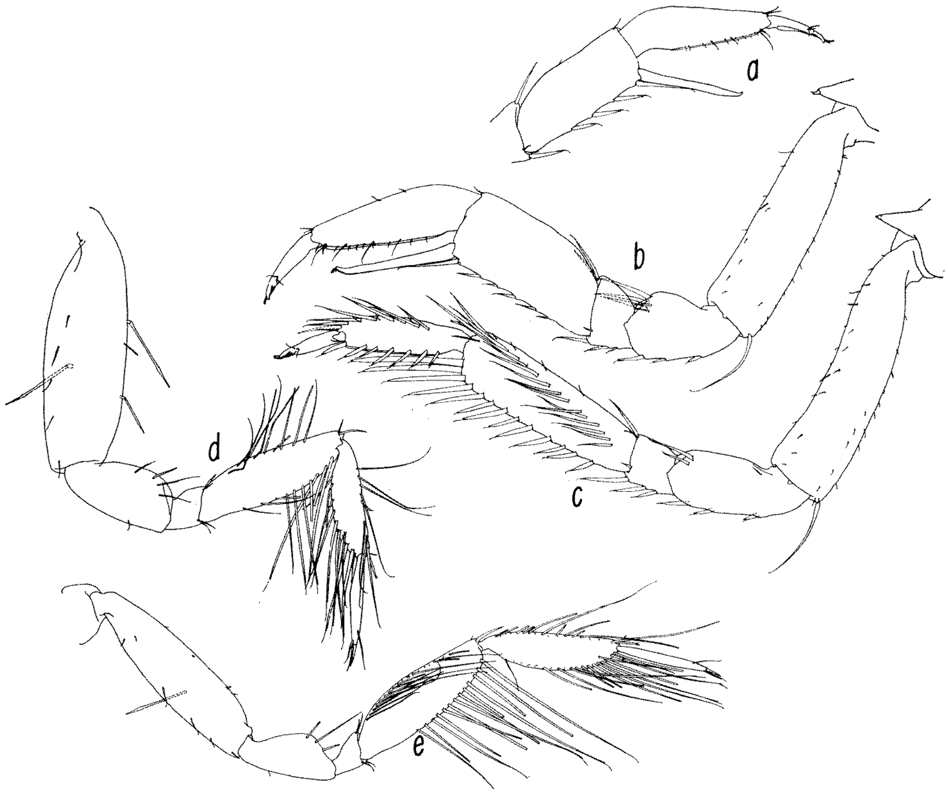

Fig. 71. *Disparella valida* n. sp. a, Per I, distal segments, C ♂; b, Per I, J ♀; c, Per II, J ♀; d, Per V, J ♀; e, Per V, C ♂. Figures a and e are of material from station 155 in the Equatorial Atlantic; the rest are of Transect material. See section on symbols for explanation of abbreviations.

Disparella longimana (figs. 72e, f, h-k) differs from this species as follows: Ventral margin of carpus on pereopod I distinctly concave, with smaller setae; propodus of pereopod I longer, 3.9 times longer than wide; carpus of pereopod II with many more marginal setae (25 dorsal, 19 ventral).

Disparella pachythrix n. sp.
(Fig. 73)

Holotype.—Station 70: USNM 125091, immature male.

Distribution.—North Atlantic; 4,680 meters.

Diagnosis.—Body (figs. 73a, b) 4.1 times longer than width of pereonite 2. Pereonite 1 1.3 times longer than 2. Pereonite 4 longer than pereonite 3, widest anteriorly. Pereonite 5 1.4 times wider than long, equally wide anteriorly and posteriorly, with distinctly concave sides; anterolateral angles acutely rounded. Pleotelson 1.1 times longer than wide, widest toward anterior end, tapering evenly to short posterolateral spines located .84 way back from anterior end; posterior margin acutely rounded.

Coxae of pereopods I-IV (fig. 73*a*) scarcely bilobed, produced acutely anteriorly, each tipped with very small, stout seta.

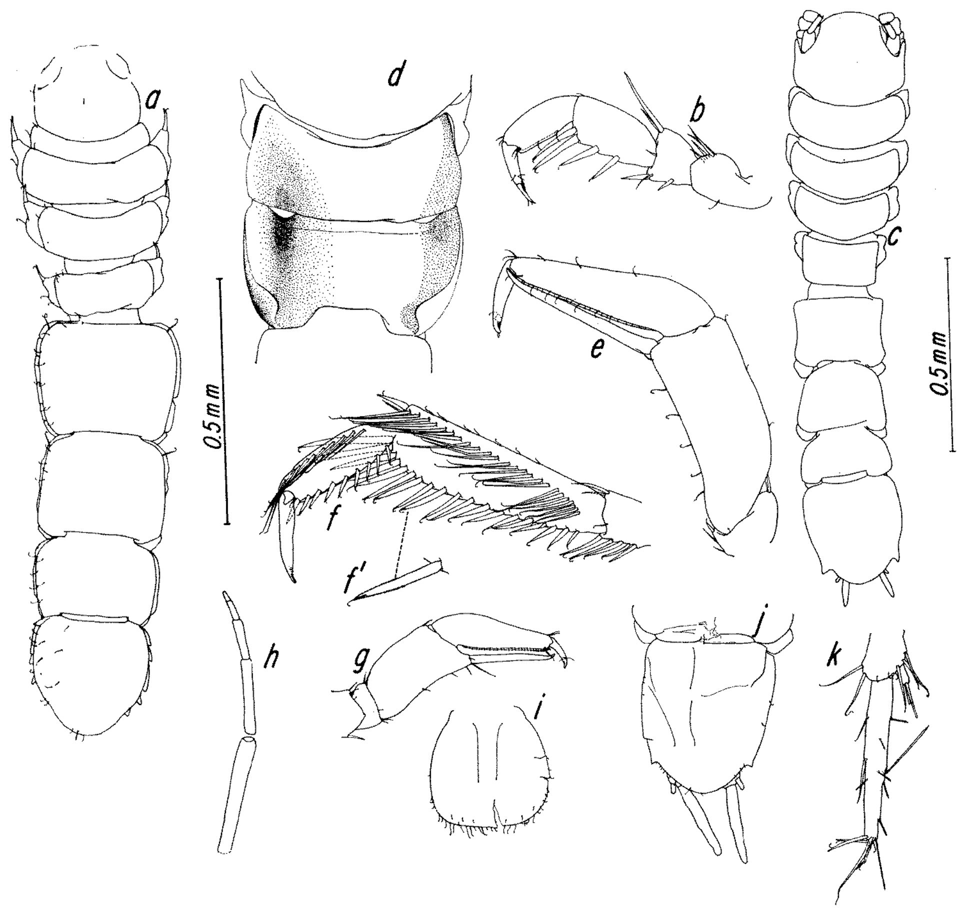

Fig. 72. Type specimens of previously described species. a, *Eugerda intermedium* (Hult), cotype, C ♂, body. b, c, *Eugerdella coarctata* (G. O. Sars), cotype, C ♂: b, Per I; c, body. d, g, *Chelator chelatus* (Stephensen), holotype, B ♀: d, pereonites 4 and 5; g, Per I, distal portion. e-f', h-k, *Disparella longimana* (Vanhöffen), holotype, P ♀: e, Per I, distal portion; f, Per II, distal portion; f', ventral seta of carpus; h, A I, segments 2-6, setae omitted; i, Pl II; i, pleotelson, dorsal view; k, Ur. See section on symbols for explanation of abbreviations.

First antenna (fig. 73c) with 6 segments. Second peduncular segment less than twice as long as first, 4.7 times longer than wide. Flagellum 1.2 times longer than second peduncular segment; segments decreasing in length distally, being .46, .26, .18, and .09 total flagellar length, respectively.

Mandible (fig. 73*d*): Incisor process as on *D. valida*. Lacinia mobilis with 5 teeth (the extra tooth being a result of subdivision of the enlarged tooth of other species). Ten saw bristles. Molar process with 18 setae. Distal segment of palp with 11 major setae.

Maxilliped (fig. 73*e*): Palp .95 width of basis; medial length of segment 3 1.4 times that of 2. Three coupling hooks.

Pereopod I (fig. 73*h*): Dactylus .41 length of propodus. Propodus 3.3 times longer than wide; 2 small setae midway along dorsal margin; fringe of ventral

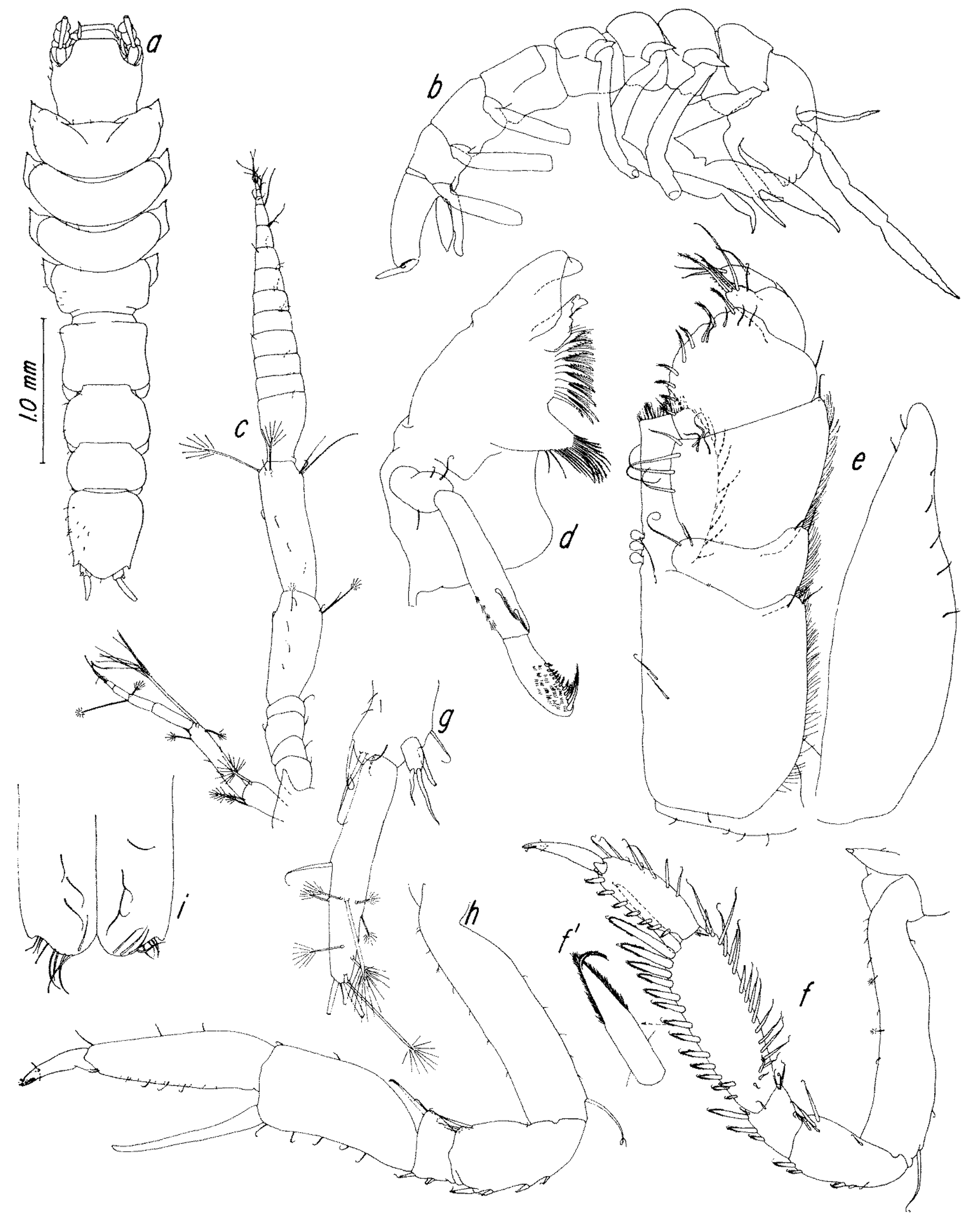

Fig. 73. *Disparella pachythrix* n. sp. a, body, ♂, immature; b, body, ♂, immature; c, A I and A II, ♂, immature; d, Md, ♂, immature; e, Mpd, ♂, immature; f, Per II, ♂, immature; f', ventral seta on carpus, ♂, immature; g, Ur, ♂, immature; h, Per I, ♂, immature; i, Pl I, distal half, ♂, immature. See section on symbols for explanation of abbreviations.

margin accompanied by 11 very small medial setae and 4 larger lateral setae, in addition to usual distal setae. Carpus 2.1 times longer than wide; ventral margin conspicuously concave, with 5 small, rather slender setae proximal to fixed claw; most distal of these 5 setae no larger than others; dorsal margin with 1 small seta midway. Merus with 2 dorsal setae of unequal size and 2 short, stout, unequally bifid ventral setae. Ischium with transverse row of 3 setae medial to dorsal margin; ventral margin with 4 rather short, stout, unequally bifid setae, with gap subdividing the row. Basis 4.2 times longer than wide, with single large distoposterior seta.

Pereopod II (figs. 73*f, f'*): Dactylus .71 length of propodus. Propodus broad, 2.7 times longer than wide; dorsal margin with main row of 6 setae accompanied by more medial row of 2 much smaller setae; ventral margin with row of 7 short, very stout, unequally bifid setae. Carpus broad, only 2.7 times longer than wide; dorsal row of 18 setae, each of which is oriented distinctly dorsally as well as laterally; ventral margin with row of 14 very stout, unequally bifid setae; single additional seta of similar form located on lateral surface above proximal end of ventral row. Merus with 3 small dorsal setae and 3 stout, unequally bifid ventral setae; additional small seta at end of ventral row. Ischium with 5 setae of varying size at distal end of dorsal margin and 1 small seta proximally; ventral margin with row of 3 stout, unequally bifid setae, and more proximally 2 very small setae. Basis about 5.2 times longer than wide, with 1 large distoposterior seta.

Uropod (fig. 73*g*): Endopod 2.8 times longer than protopod, 5.7 times longer than wide. Exopod 1.9 times longer than wide, .15 length of endopod.

Body 3.8 millimeters long.

Remarks.—This species is best distinguished from *D. valida* as follows: Ventral margin of carpus on pereopod I distinctly concave, with small, more slender setae; distal accessory seta undefined. Carpus and propodus of pereopod II broader, with stouter ventral setae; dorsal setae of carpus more dorsally oriented. Five teeth on lacinia mobilis. Most of these differences also serve to separate this species from *D. longimana* (figs. 72*e-f'*, *h-k*). On its first pereonite, its carpus is no more concave than on the latter species, but both its carpus and propodus are not so elongate.

Genus Oecidiobranchus n. gen.
Oecidiobranchus plebejum (Hansen, 1916)
(Figs. 74, 75)

Desmosoma plebejum Hansen, 1916, p. 120, pl. 11, figs. 6*a-d*. Gurjanova, 1933, pp. 418, 467.

Desmosomella plebeja: Kussakin, 1965, pp. 138, 143.

Lectotype.—Of the three specimens mentioned by Hansen in the original description, only one is a brooding female. This individual from Ingolf station 102 is here designated lectotype.

Material.—Station 73: 25 individuals (including 4 ♂ ♂, of which 1 is in copulatory condition).

Station 128: 36 individuals (including 11 ♂ ♂, 2 of which are in copulatory condition).

Previous records.—Ingolf station 102, east of Iceland, 66°23'N, 10°26'W, 1,373 meters. Ingolf station 120, northeast of Iceland, 67°29'N, 11°32'W, 1,620 meters.

Distribution.—North Atlantic, Arctic; 1,330-1,620 meters.

Diagnosis of female.—Body (figs. 74*a*, *c*, 75*i*, *j*) 4.7 times longer than tergal width of pereonite 2. Pereonite 1 only .83 length of pereonite 2. Pereonite 4 1.3 times longer than pereonite 2, only slightly narrower posteriorly than anteriorly. Pereonite 5 1.4 times wider than long, slightly wider posteriorly than anteriorly, with very slightly convex sides; anterior portion of segment scarcely constricted, so that segment lacks well-defined anterolateral corners. Pleotelson .9 width of pereonite 2, as long as wide, widest anteriorly, tapering strongly posteriorly with gently convex sides to acutely rounded distal end; resulting shape of unit is subtriangular; branchial chamber (and pleopod II) occupying only about one-half total length and width of pleotelson.

Coxae of pereopods I-IV (fig. 74*a*) not produced anteriorly; anterior corner of first acute, tipped with small, robust seta; the others rounded, tipped with small, thin setae.

First antenna (fig. 75*a*) short, with 5 segments. Distoanterior margin of first peduncular segment somewhat acute. Second peduncular segment 1.8 times longer than first, 2.9 times longer than wide. Flagellum same length as second peduncular segment; second segment longest; terminal segment abruptly thinner than other 2.

Left mandible (figs. 75*c*, *c*'): Four incisor teeth. Three saw bristles. Slender molar process with very few terminal setae. No palp.

Maxilliped (fig. 75*d*): Palp same maximum width as basis; joints bounding segment 1 only moderately curved; segment 3 not strongly expanded distally medial to insertion of segment 4, with medial length 1.7 times that of 2. Lateral edge of epipodite convex for entire length, with distal three-fifths serrate. Two coupling hooks.

Pereopod I (fig. 74*d*): Dactylus .57-.62 length of propodus, with expanded distal end. Propodus 2.3-2.6 times longer than wide, 1.3 times longer than carpus; dorsal margin convex for entire length, with 2 small distal setae; ventral margin gently convex, with row of about 8 setae accompanying ventral fringe. Carpus 1.4 times longer than wide; ventral margin concave, not produced at base of claw, with small seta about two-thirds way from proximal end and moderately long, slender seta just proximal to base of claw; claw curved ventrally, with unequally bifid tip; dorsal margin very slightly concave toward distal end, with single moderately large distal seta ventrally and 2 large setae dorsally. Ischium with 1 large seta dorsally and 1 moderately small seta ventrally. Basis 3.7-3.9 times longer than wide, at most only slightly wider than that of subsequent limbs, with single moderately small distoposterior seta.

Pereopod II (fig. 74*e*): Dactylus .82-.90 length of propodus; terminal claw robust, about .45 total length of segment. Propodus 3.1-3.2 times longer than wide; 3 long, slender setae in dorsal row; ventral row with 5 slender setae ranging from very short proximally to very long distally. Carpus 1.1-1.2 times longer than propodus, 2.3-2.4 times longer than wide; dorsal row with 4 slender setae increasing in length distally; ventral margin with row of 5 stout, unequally bifid setae that increase gradually in length distally. Merus with 1 large ventral seta, and 1 large and 1 small dorsal seta. Ischium with 1 large dorsal seta and 2 small ventral setae. Basis 3.9-4.4 times longer than wide, with a single medium-sized distoposterior seta.

Pereopod V (fig. 74*g*): Dactylus 5.9-6.3 times longer than wide. Propodus 2.-3.6 times longer than wide; dorsal margin with 2 slender setae and a terminal, unequally bifid seta; ventral margin with 5-6 setae. Carpus 2.4-2.8 times longer than wide, with 5 dorsal setae; ventral margin distinctly concave proximally, with 4 setae. Ischium twice as long as wide, acutely convex dorsally, with 1-2 large dorsal setae and a single small ventral seta. Basis 4.1-4.5 times longer than wide.

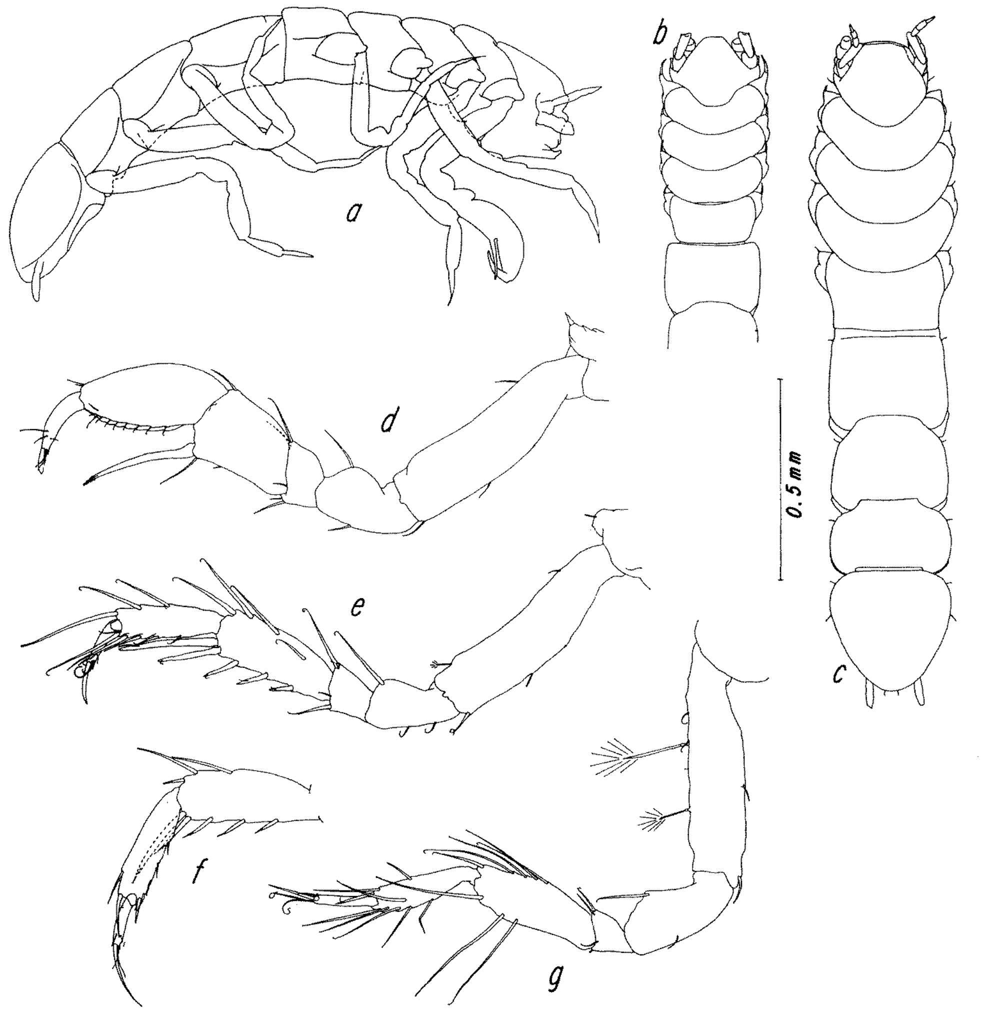

Fig. 74. *Oecidiobranchus plebejum* (Hansen). *a*, body, B ♀ ; *b*, body, anterior half, C ♂; *c*, body, B ♀ ; *d*, Per I, B ♀ ; *e*, Per II, B ♀ ; *f*, Per II, distal segments, C ♂; *g*, Per V, P ♀. See section on symbols for explanation of abbreviations.

Pleopod II (figs. 75*g*, *i*, *j*) of equal length and width, widest toward anterior end, broadly rounded posteriorly, without setae; ventral surface concave in profile.

Uropod (fig. 75*e*) uniramous, one-third length of pleotelson. Protopod expanded distally so that distal width equals length, with medium-sized lateral seta and long medial seta. Endopod 2.7 times longer than protopod, 3.8 times longer than wide.

Brooding female 1.5 millimeters long.

Major differences of copulatory male from female.—Pereonite 4 (fig. 74*b*) tapering more strongly posteriorly. Pereonite 5 broader, 1.6 times wider than long, distinctly wider anteriorly than its articulation with the preceding segment; anterolateral corners bluntly rectangular.

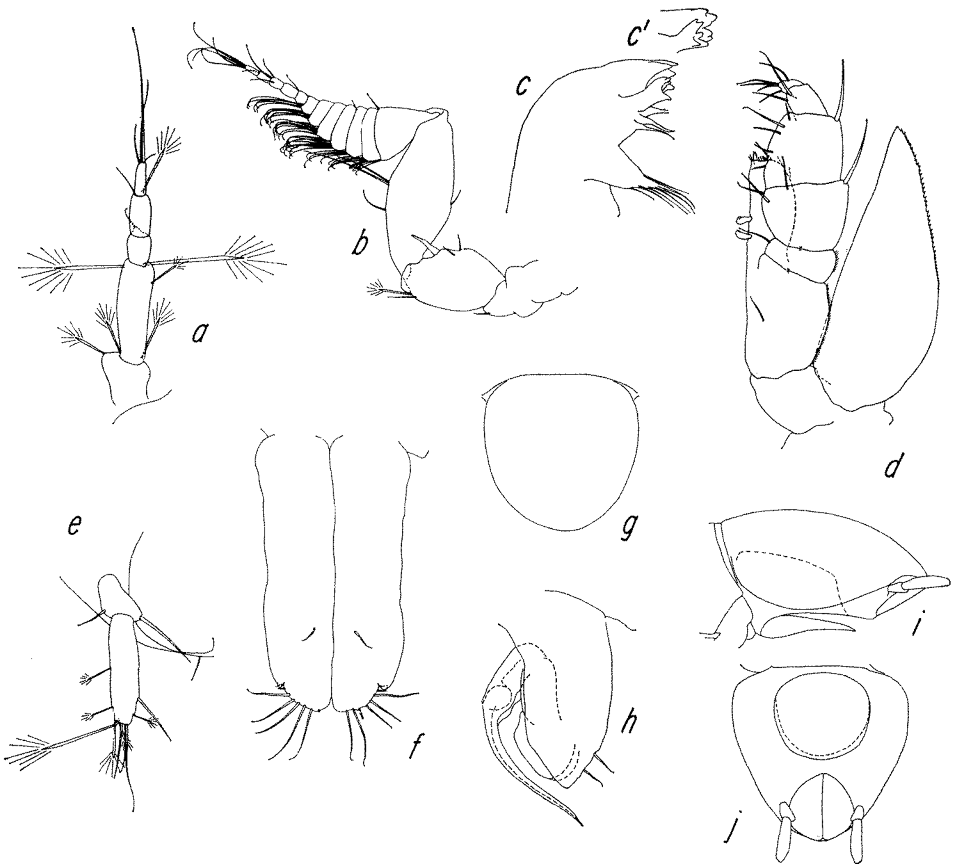

Fig. 75. *Oecidiobranchus plebejum* (Hansen). *a*, A I, B ♀ ; *b*, A II, C ♂; *c*, Md, P ♀ ; *c*', ip and lm, P ♀ ; *d*, Mpd, B ♀ ; *e*, Ur, B ♀ ; *f*, Pl I, C ♂; *g*, Pl II, B ♀ ; *h*, Pl II, C ♂; *i*, pleotelson, lateral view, B ♀ ; *j*, pleotelson, ventral view, B ♀. See section on symbols for explanation of abbreviations.

Coxa of pereopod I (fig. 74*b*) produced strongly anteriorly, tipped with long, robust seta; anterior projection and its seta progressively less well developed on more posterior limbs.

Second antenna (fig. 75*b*) unusually robust. Peduncular segments 5 and 6 .47 total length of limb; distal end of segment 5 with large, stout dorsal seta; ventral margin of segment 6 with 3 long, thin setae. Flagellum broadest at basal segment, where width is .83 that of fifth peduncular segment and .28 length of flagellum; 12 segments, last 5 of which lack ventral sensory setae and are as a whole abruptly slimmer than more proximal segments.

Pereopod II (fig. 74*f*): Claw of dactylus longer, more slender, .6 total length of segment. Propodus 3.9 times longer than wide, with 2 shorter dorsal setae and 5 very short ventral setae. Carpus 2.6 times longer than wide, with 3 dorsal setae of which most distal is shortest.

Pereopod V: Dactylus 6.7 times longer than wide. Propodus 3.1 times longer than wide; dorsal margin with row of 6 slender setae and with shorter bifid seta in middle and at end of row; ventral margin with 8 slender setae. Carpus 3.3 times longer than wide, only slightly concave ventrally; 8 large setae ventrally and 7 dorsally; additional stouter seta at end of dorsal row.

Pleopod I (fig. 75*f*) 1.8 times longer than wide, only slightly wider proximally than distally; sides slightly concave medially. Lateral lobes acutely rounded, with poorly developed, blunt, laterally directed terminal hooks. Medial lobes extending .08 length of limb beyond tips of lateral lobes, broadly rounded; distal margin of each with 6 long, slender setae flanked most laterally by 2 very small setae. A pair of setae on ventral surface of limb toward tip.

Body 1.2 millimeters long.

Genus Torwolia n. gen.
Torwolia subchelatus n. sp.
(Figs. 76, 77)

Holotype.—Station HH3: USNM 125115, brooding female.

Other material.—Station HH3: 13 additional individuals (including 3 ♂ ♂), paratypes. Station 62: 3 individuals, paratypes. Station II1: 1 individual. Station JJ1: 2 individuals. Station 120: 3 individuals (including 1 copulatory ♂), paratypes. Station 122: 1 individual. Station 100: 3 individuals (including 2 ♂ ♂). Station OO2: 1 individual (♂) Station 119: 2 individuals.

Distribution.—North Atlantic; 2,000-5,100 meters.

Diagnosis of female.—Body (figs. 76*a, c*) long, 4.9 times longer than tergal width of pereonite 2. Pereonite 1 reduced, .47 length of 2 and considerably narrower. Pereonite 2 large, inflated, 1.4 times longer than pereonite 3. Pereonite 4 short, 2.5 times wider than long. Pereonite 5 very long, as long as wide, barrel-shaped, having evenly convex sides. Pereonite 6 also rather long. Pleotelson .71 width of pereonite 2, 1.2 times longer than wide, with convex sides; posterior margin acutely rounded; no posterolateral spines.

Coxae of pereopods I-IV (fig. 76*a*) not produced anteriorly; each with single small anterior seta.

First antenna (fig. 76*d*) reaching to level one-quarter way up sixth peduncular segment of second antenna; 6 segments. Second peduncular segment 1.7 times longer than first, 3.5 times longer than wide. Flagellum 1.2 times longer than second peduncular segment; segments decreasing gradually in length distally.

Second antenna (fig. 76*d*) .32 length of body. Peduncular segments 5 and 6 .43 total length of limb. Flagellum with 12 stout segments.

Left mandible (figs. 76*e*, *e*'): Four incisor teeth. Six saw bristles; most distal one dentate. Palp well developed.

Maxilliped (fig. 76*f*): Palp somewhat wider than basis; medial length of segment 3 1.1 times that of 2; distal end of last segment slightly bilobed. Two coupling hooks.

Pereopod I (fig. 77*a*): Dactylus with blunt tip, .53-.55 length of propodus; ventral edge appears to be fringed proximally. Propodus enlarged, 2.4-2.6 times longer than wide; dorsal margin evenly convex, with single small seta midway, and 2 distally; ventral margin fringed, convex proximally, concave distally, with irregular row of sparsely distributed setae. Carpus small, its ventral margin being only .44 length of propodus; dorsal margin convex, with single small seta distally;

ventral margin straight, with about 6 setae of varying size, usually in a row. Merus same shape as carpus, but shorter; 2 large dorsal setae; 3-5 setae of varying size on ventral margin. Ischium slightly inflated, with 2 large setae dorsally, 2 smaller ones ventrally. Basis 3.0 times longer than wide, with single small seta distoposteriorly.

Pereopod II (figs. 77*c*, *c*') quite heavily built. Dactylus .85-.88 length of propodus. Propodus very broad, being only 1.7-1.9 times longer than wide; dorsal margin with row of 9-10 setae which increase in size distally and which are setulate toward their tips; ventral margin with 6 short, stout setae, and distal to these a single slender seta; gap occurs between fifth and sixth setae. Carpus 1.9-2.0 times longer than wide; dorsal row of 11-14 distally setulate setae begins proximally on lateral face of segment, but curves gradually onto dorsal margin; ventral margin produced distally; 9-11 very stout, unequally bifid setae in ventral row. Merus with 2 small setae dorsally; ventral margin with row of 3-5 moderately large, distally setulate setae. Ischium with single large subdorsal seta and 1-2 small ventral setae. Basis 1.5 times broader than that of adjacent limbs, 2.4 times longer than wide, with single large distoposterior seta.

The setation of the ventral margin of the carpus on pereopod II of specimens from stations 62 and HH3 shows some similarity to the staggered configuration of that on *T. creper* (see below), but instead of 3 waves, there are only 2, and the distal seta of the proximal wave is only equal in size to the proximal seta of the distal wave, not larger. This is most evident in younger individuals.

Pereopod V (fig. 77*f*): Dactylus 5.2 times longer than wide. Propodus 2.3-3.0 times longer than wide; 4-5 ventral setae; dorsal margin with 3 rather short, slender setae and with a shorter bifid seta in middle and at end of row. Carpus 2.54.2 times longer than wide; 3 large ventral setae; 1-3 smaller dorsal setae. Ischium 1.9 times longer than wide, broadly convex dorsally, with small setae. Basis broad, 3.2-3.6 times longer than wide.

Pleopod II (fig. 76*k*) subcircular, only slightly wider than long, with a few small marginal setae.

Uropod (fig. 76*h*) .45 length of pleotelson, uniramous. Protopod 1.5 times longer than wide, about as broad proximally as distally. Endopod 4.0 times longer than wide, 2.1 times longer than protopod.

Length of brooding female 1.8 millimeters.

Major differences of copulatory male from female.—Differing only modestly from female. Cuticle more strongly calcified. Face of cephalon more strongly sloping. Pereonite 4 (fig. 76*b*) shorter, 3.7 times wider than long. Pereonites 5-7 broader; anterolateral corners of pereonite 5 more strongly developed, flangelike. Pleotelson more oval, more broadly rounded posteriorly.

Coxae of pereopods I-IV (fig. 76*b*) more acute, each with stout, unequally bifid seta, those of first 2 coxae being moderately large.

Pereopod II (fig. 77*d*): Propodus more slender, 2.4 times longer than wide; dorsal margin with 6 large setae; ventral margin fringed, with 4 small setae along proximal half and 2 distally. Ventral setae on merus smaller.

Pereopod V (fig. 77*e*): Dactylus long, about 10 times longer than wide, almost as long as propodus; claw short and stout. Propodus and carpus broader, 2.7 and

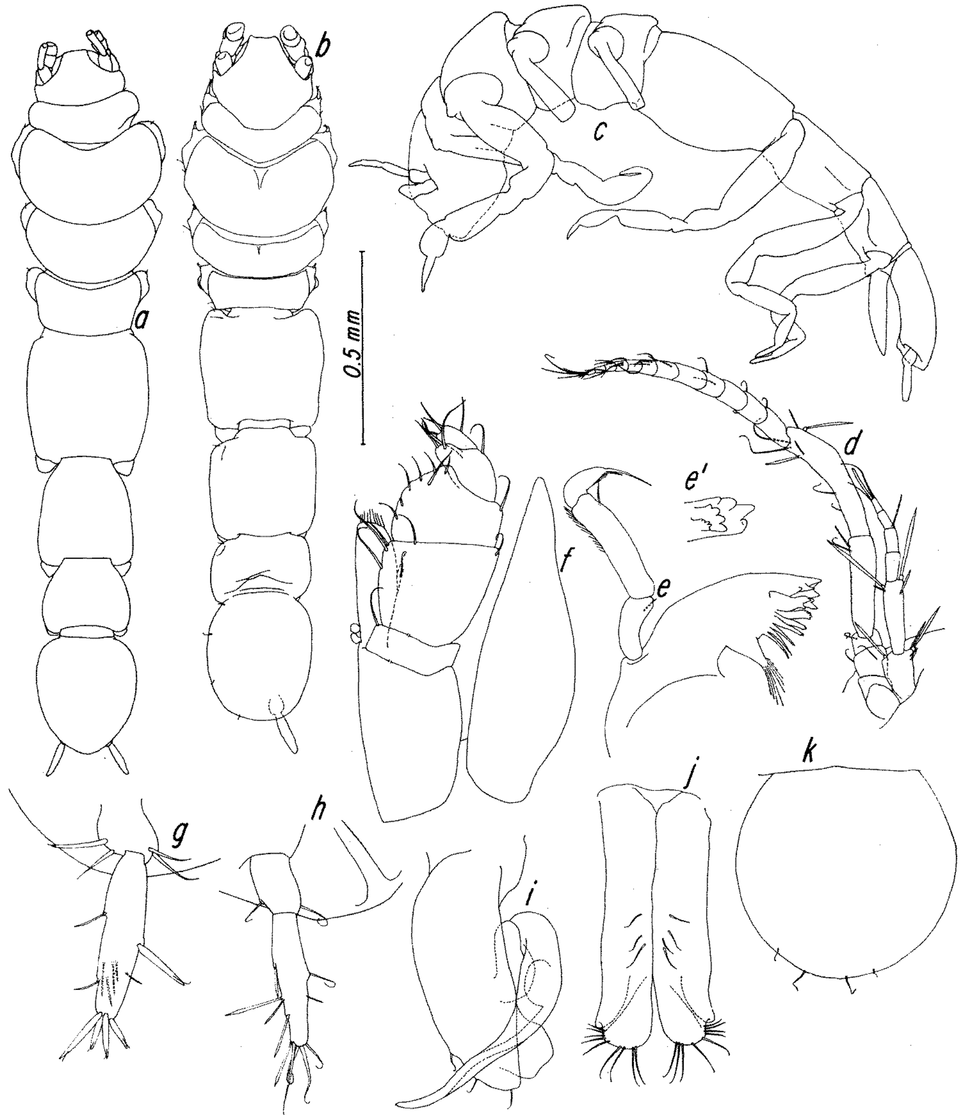

Fig. 76. *Torwolia subchelatus* n. sp. *a*, body, B ♀ ; *b*, body, C ♂; *c*, body, P ♀ ; *d*, A I and A II, B ♀ ; *e*, Md, B ♀ ; *e'*, ip, lm, and first saw bristle, B ♀ ; *f*, Mpd, B ♀ ; *g*, Ur, C ♂; *h*, Ur, B ♀ ; *i*, Pl II, C ♂; *j*, Pl I, C ♂; *k*, Pl II, B ♀. See section on symbols for explanation of abbreviations.

2.6 times longer than wide, respectively; each with many more large, unequally bifid marginal setae. Ischium with large dorsal setae.

Pleopod I (fig. 76*j*) 2.4 times longer than wide, of uniform width. Medial lobes extending .08 length of limb beyond distinct lateral lobes, each bearing 5 large medial setae and 4 smaller lateral ones.

Many major setae on uropod (fig. 76*g*) stout and unequally bifid.

Length of body 1.7 millimeters.

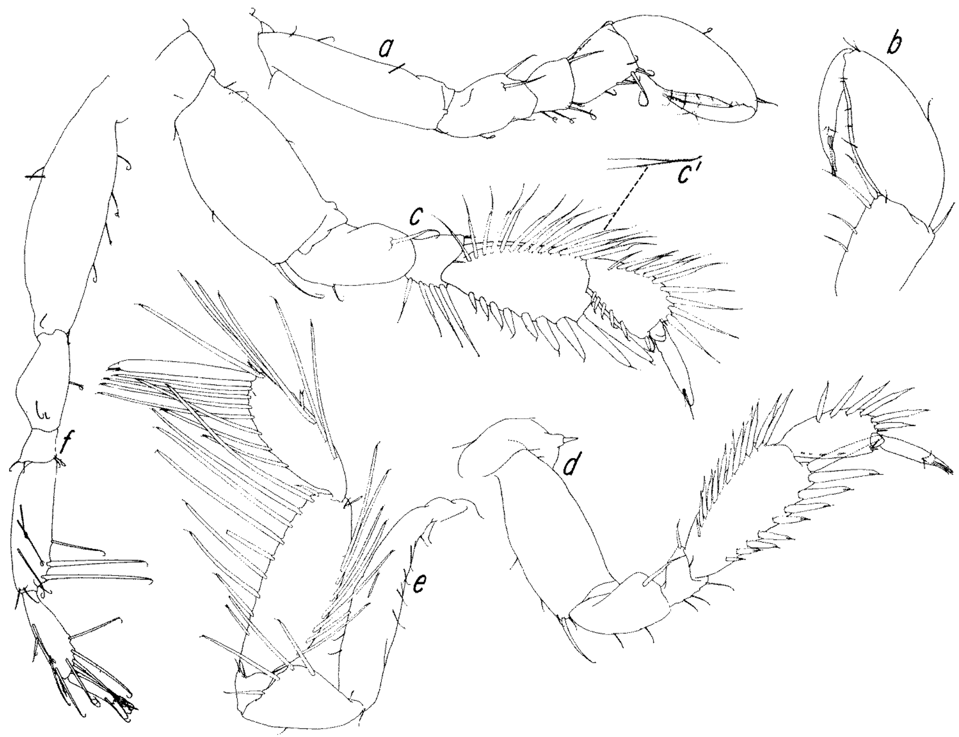

Fig. 77. *Torwolia subchelatus* n. sp. *a*, Per I, B ♀; *b*, Per I, distal segments, C ♂; *c*, Per II, B ♀; *c'*, dorsal seta of carpus, B ♀; *d*, Per II, C ♂; *e*, Per V, C ♂; *f*, Per V, B ♀. See section on symbols for explanation of abbreviations.

Torwolia creper n. sp.
(Fig. 78)

Holotype.—Station 85: USNM 125114, preparatory female.

Other material.—Station 95: 14 individuals (including 2 ♂ ♂, of which 1 is in copulatory condition), paratypes. Station 120: 4 individuals, paratypes. Station 122: 1 individual.

Distribution.—North Atlantic; 3,753-5,100 meters.

Diagnosis of female.—This species is so similar to *T. subchelatus* that only the more important differences are mentioned here.

Tergum of pereonite 5 (fig. 78*f*) more elongate, 1.1 times longer than wide; anterolateral corners acute.

First antenna: On all specimens of this species the first antenna is shriveled to some extent, but neglecting this artifact, it still appears to be more elongate.

Left mandible (figs. 78*g-g"*): Most distal saw bristle finely serrate. Molar process with more numerous setae which are more broadly distributed along tip of process.

Pereopod II (figs. 78*c, e, e'*) distinctly more slender. Propodus 2.2 times longer than wide. Carpus 2.6-2.7 times longer than wide; ventral margin with more setae (as many as 16), these setae increasing in length in three distinct waves, with most distal seta in each wave being slightly offset and markedly longer than most

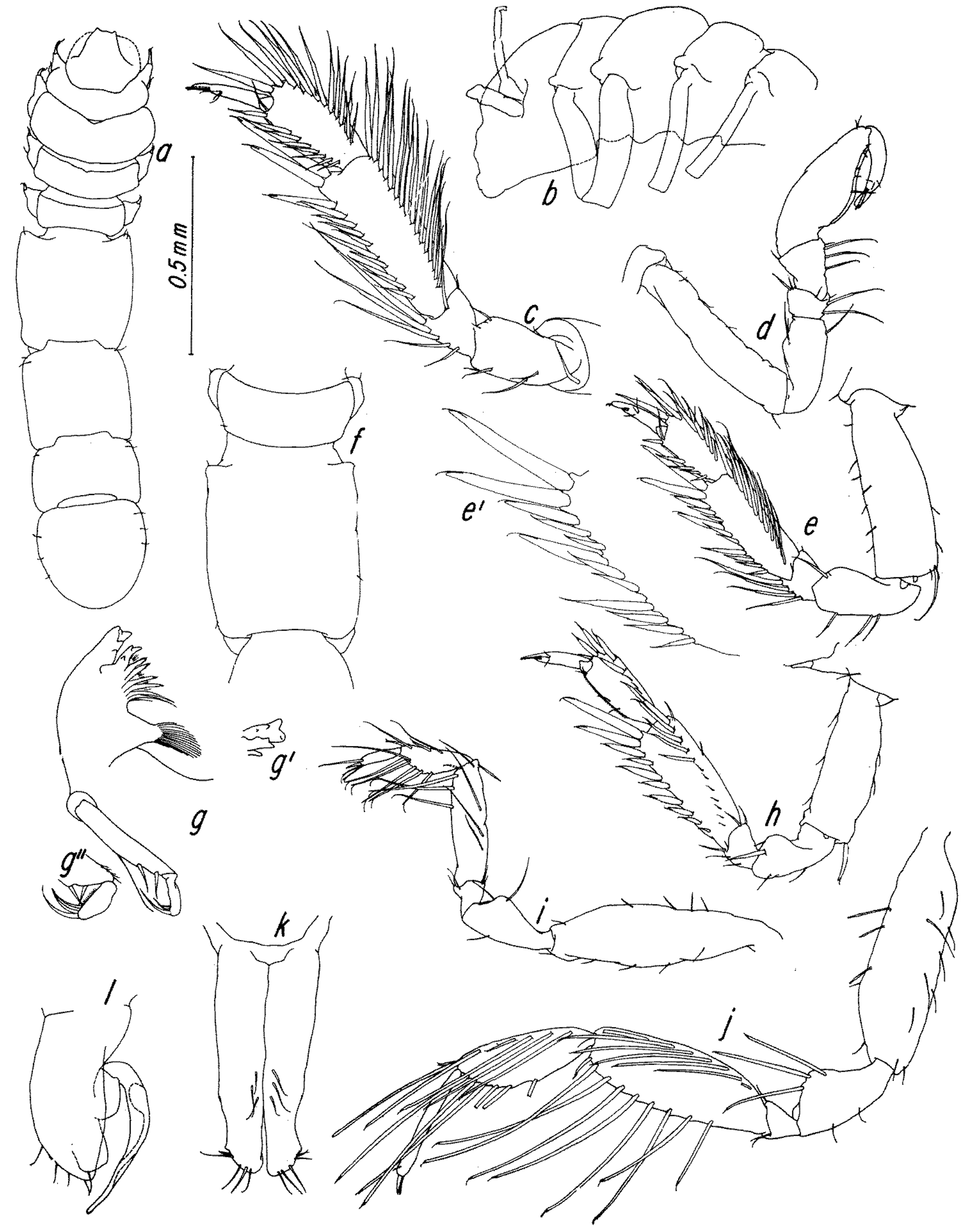

Fig. 78. *Torwolia creper* n. sp. *a*, body, C ♂; *b*, body, anterior half, P ♀ ; *c*, Per II, distal portion, P ♀ ; *d*, Per I, B ♀ ; *e*, Per II, P ♀ ; *e'*, ventral margin of carpus, P ♀ ; *f*, pereonite 5, dorsal view, P ♀ ; *g*, Md, P ♀ ; *g'*, ip, lm, and first saw bristle, P ♀ ; *g''*, distal palp segment, P ♀ ; *h*, Per II, C ♂; *i*, Per V, P ♀ ; *j*, Per V, C ♂; *k*, P1 I, C ♂; *l*, P1 II, C ♂. See section on symbols for explanation of abbreviations.

proximal seta of subsequent wave (fig. 78*e'*). Ventral seta of merus longer. Basis 2.9 times longer than wide. On one specimen from station 120, this limb differs yet further from that of *T. subchelatus* in having more ventral setae on propodus (7 along proximal two-thirds of margin) and more dorsal setae on both carpus and propodus (16 and 13, respectively).

Preparatory or brooding females from stations 85 and 95 about 1.7 millimeters long, but preparatory females from station 120 much larger, about 2.3 millimeters long.

Major differences of copulatory male from that of T. subchelatus.—Anterolateral corners of pereonite 5 (fig. 78*a*) more acute. Pleotelson perhaps more tapered.

On dorsal margin of both carpus and propodus of pereopod II (fig. 78*h*), more than half of the setae (proximal members of rows) abruptly smaller than rest.

Body 1.5 millimeters long.

Remarks.—Even though the geographic range of *Torwolia creper* is included within that of *T. subchelatus*, both species sometimes being found in the same sample, the lack of morphological intermediate individuals justifies separate species.

By far the most significant difference of *T. creper* from *T. subchelatus* is its relatively more slender pereopod II. It is perhaps significant that this difference is also the most important difference between two closely related species pairs found in two other genera, that is, *Thaumastosoma tenue* compared with *T. platycarpus*, and *Whoia variabilis* compared with *W. angusta*.

PROBLEMATICAL MATERIAL

Inevitably, some of the material collected along the Gay Head-Bermuda Transect is not amenable to precise identification. Some specimens are quite similar to known species but differ in enough ways to cast doubt on the correctness of their inclusion. Others are too fragmentary to identify or describe. Some of them may be new species. Finally, many are too young to identify.

Specimens Possibly Belonging to Known Species

Eugerda cf. setifluxa

Material.—Station 120: 3 individuals, fragmental, all pereopods broken.

Remarks.—Very similar to *E. setifluxa*, but incisor process of mandible not so acute, body less pubescent and much larger, a brooding female being about 3.8 millimeters long.

Eugerda cf. intermedia

Material.—Station. 126: 1 preparatory female, consisting only of cephalon through pereonite 4, with all limbs well preserved.

Remarks.—Differing from *E. intermedia* in the following ways: Coxal seta of pereopod I stout, unequally bifid; ischial setae more numerous, longer. Flagellar segments of first antenna shorter, so that total length of flagellum only .67 that of second peduncular segment. One seta of subsidiary dorsal row on carpus of pereopod II much longer.

It is possible that the specimen from Ingolf station 24 which Hult tentatively included in *E. intermedia* is more closely related to this specimen. Both of these specimens come from considerably deeper than the typical depth range of *E. intermedia*.

Mirabilicoxa cf. exopodata *(Fig. 79)*

Material.—Station 105, subsample B: 1 copulatory male, complete.

Remarks.—This individual is nearly identical to the holotype of *M. exopodata*, but differs as follows: Anterolateral corners of pereonite 5 (fig. 79*a*) slightly more acute, more flaring. Terminal aesthete of first antenna (fig. 79*e*) unusually long, twice the length of the flagellum. Ischium of pereopods I and II (figs. 79*b, c*) lacking stout, bifid seta on ventral margin; merus of pereopod I with only 1 ventral seta; carpus of both limbs each with I less ventral seta. Claw of pereopod V longer, 1.2 times length of dactylus. Stylet of pleopod II (fig. 79*d*) slender. Uropodal exopod (fig. 79*f*) as small, but more distinctly defined at base.

Mirabilicoxa is a very conservative genus. Therefore, while most of the above differences are not profound, they still may reflect a truly separate species, especially in view of the great difference in depth between the locality of this specimen and that of *M. exopodata*.

Mirabilicoxa cf. acuminata

Material.—Station 95: 1 poorly preserved brooding female and 1 manca. Station 93: 1 fragmental preparatory female.

Remarks.—The specimens differ from *M. acuminata* as follows: smaller, being only three-quarters as long; carpus of pereopod I without dorsal setae along lateral surface; anterolateral corners of pereonite 5 not acutely produced.

Specimens Too Fragmentary to Identify

Eugerda

Material.—Station KK1: 1 individual. Station 100: 2 individuals. Station 85: 1 individual.

Mirabilicoxa

Material.—Station 100: 1 individual. Station 120: 1 individual. Station 121: 1 individual. Station 126: 2 individuals.

cf. Eugerdella

Material.—Station NN1: 1 individual.

Prochelator or Momedossa

Material.—Station 120; 1 individual.

Eugerdellatinae, gen. indet.

Material.—Station 85: 1 individual. Station 100: 1 individual.

Specimens Too Young to Identify

Eugerda

Material.—Station 73: 1 individual. Station G9: 2 individuals.

Mirabilicoxa

Material.—Station 73: 2 individuals. Station 120: 1 individual.

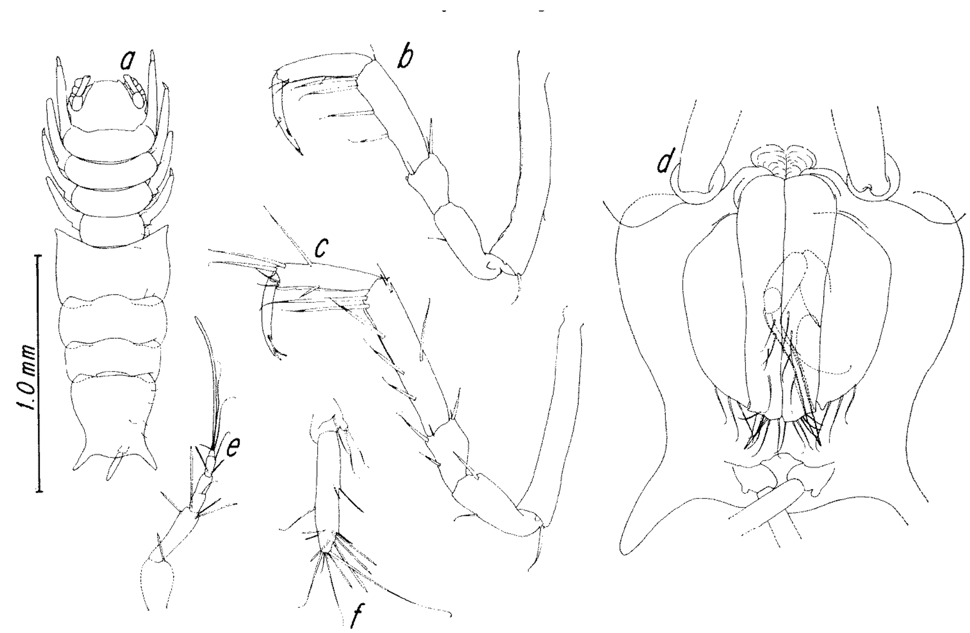

Fig. 79. *Mirabilicoxa* cf. *exopodata* n. sp. *a*, body, C ♂; *b*, Per I, C ♂; *c*, Per II, C ♂; *d*, pleotelson, ventral view, showing P1 I and P1 II, and their relationship to the genital cones of pereonite 7, C ♂; *e*, A I, C ♂; *f*, Ur, C ♂. See section on symbols for explanation of abbreviations.

Thaumastosoma

Material.—Station 122: 1 individual.

Prochelator

Material.—Station 84: 1 individual.

Chelator

Material.—Station JJ1: 2 individuals.

ADDENDUM

Two important papers on the Desmosomatidae appeared after the present monograph was sent to press. Schiecke and Fresi (1969) and Fresi and Schiecke (1969) both describe desmosomatids found in relatively shallow water, 30-300 meters, in the Bay of Naples of the Mediterranean Sea. At least thirteen species were found. Three of them are new.

Desmosoma serratum Fresi and Schiecke, 1969, should be included in *Prochelator* in the present scheme. It fits in all respects except its apparent lack of posterolateral spines on the pleotelson. These are often obscure, however, and may have been overlooked. *Prochelator serratus* differs from all the new species described here in the serrate anterolateral margins of its pleotelson.

Desmosoma thoracicum Fresi and Schiecke, 1969, should be placed in *Eugerda*, to which it conforms in all respects, and is especially close to *E. tetarta* and *E. imbricata*. It differs from *E. tetarta* as follows: incisor process of mandible strongly dentate; uropodal exopod shorter; pereonite 5 of female does not taper posteriorly;

pleotelson of copulatory male rounded posteriorly. *Eugerda thoracica* differs from *E. imbricata* as follows: less setose; uropodal exopod somewhat shorter; female pleotelson not as tapered; pleopod I of copulatory male with medial lobes extending well beyond lateral lobes.

Desmosoma atypicum Schiecke and Fresi, 1969, does not fit well into any of the present genera. The form of the anterior pereopods in combination with the uniramous uropods suggests affinity with *Desmosoma*, but the posterolateral spines on the pleotelson would prevent inclusion. The strange midventral spine on pereonite 4 makes this species sufficiently unique that it should probably form the basis of a new genus.

Of the remaining ten species, only four previously known species are mentioned specifically: *Whoia angusta, Eugerda filipes, E. latipes*, and *Chelator chelatus* (Schiecke and Fresi, 1969). The material they place in *W. angusta* actually may not belong to this species: male pleotelson too slender; distal end of ventral margin of carpus on pereopod I produced distally; propodus of same segment too slender. Similarly, specimens they place in *E. latipes* may not belong to that species because the carpus on pereopod II (labeled "peraeopod I" in their fig. 11*d*) is distinctly too short. In discussing *E. latipes*, Schiecke and Fresi name allotypes and paratypes from their material. These designations must be rejected since they are not being applied to material used in the original description.

In addition to the thirteen desmosomatids, Schiecke and Fresi mention finding members of many other typically deep-sea asellote genera in their shallow-water studies. This strong documentation of a well-rounded deep-sea isopod fauna in the warm shallow water of the Mediterranean gives support to the speculations on pages 61, 62.

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ADDENDUM

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