Lysianassoid Amphipoda (Crustacea) from Deep-Sea Thermal Vents

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ABSTRACT

Barnard, J.L., and Camilla Ingram. Lysianassoid Amphipoda (Crustacea) from Deep-Sea Thermal Vents. *Smithsonian Contributions to Zoology*, 499, 80 pages, 43 figures, 1990.—Lysianassoid Amphipoda found in the biotic communities surrounding deep-sea thermal vents are described. Most of the material comes from communities dominated by vestimentiferans, clams, and crabs near vents on the Galapagos Rift (0°) and similar vents at 13°N and 21°N in the eastern Pacific Ocean. These samples are supplemented by others collected from seamounts and trenches throughout the Pacific Ocean.

Species occur in the well-known genera *Euonyx*, *Hirondellea*, *Abyssorchomene*, and *Paralicella* and in the newly described genera *Apotectonia*, *Diatectonia*, *Tectovalopsis*, *Transtectonia*, and *Ventiella*. Genera with the "tecto" root in their name belong to a group with affinities to *Valettiopsis*, a genus heretofore considered to be bathypelagic.

The dominant amphipod is *Ventiella sulfuris*, new species, which comprises more than 98 percent of the 100,000 specimens examined. This genus is a derivative of the widespread deep-sea *Schisturella*.

Important new observations on taxonomy in the Lysianassoidea are offered just at the time the family of 150+ genera is being revised and divided into several families and superfamilies. The principal problem characters involve toothed incisors and armament patterns of maxillae.

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Contents

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Introduction

This is the first report on the taxonomy of amphipods associated with deep-sea thermal vents. Amphipods are poorly diverse as species but very abundant as individuals, especially so on the bodies of the sedentary biota; amphipods are 1 or 2 orders of magnitude more abundant on sedentary organisms than on the inorganic rubble of the vent communities.

Amphipods in the superfamily Lysianassoidea constitute more than 99 percent of the amphipod individuals collected in vent communities. The other one percent is dominantly of the family Pardaliscidae. Over 98 percent of the amphipods comprise the single species *Ventiella sulfuris*, a new genus and new species that is considered to be an advancement of the diverse and widespread deep-sea *Schisturella*.

A remarkable cluster of new genera and species in the *Valettiopsis* group of lysianassoids comprises a significant share of the diversity in vent areas, but some of the new taxa we describe originate from seamounts outside of vent areas. The *Valettiopsis* group is remarkable because the bulk of it has remained undiscovered until now and contains species that confuse some previous assumptions about classification within the lysianassoids (see "Discussion of the *Valettiopsis* Group"). This comes at the time when the lysianassoids are being divided into new families and superfamilies by various colleagues.

None of the taxa is particularly novel in the sense that all are relatives of previously known taxa. New species of the classic genera *Euonyx, Hirondellea, Orchomene (Abyssorchomene)*, and *Paralicella* are described along with new species in the new genera *Apotectonia, Diatectonia, Tectovalopsis*, and *Transtectonia*, which have affinities to *Valettiopsis*. The new genus *Ventiella* is a derivative of the classic *Schisturella*. Revisions of *Euonyx, Hirondellea, Paralicella, Schisturella*, and *Valettiopsis* are presented.

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Methods and Presentation

The 153 genera of the Lysianassidae have been reviewed and widely revised by Barnard and Karaman (in press), and those results have been used here to identify the vent amphipods. Consultation with J.K. Lowry, who is revising the Lysianassoidea, has also been undertaken. Species in previously described genera are set in a generic framework in the style to be presented by Barnard and Karaman (in press), which includes synonymies, diagnoses, lists of species, relationships, variables, and distribution. Each species is provided with a distribution code (in brackets) that follows the world divisions of Barnard and Barnard (1983:183).

Materials

Materials came to us from 3 sources: Scripps Institution of Oceanography (SIO), Woods Hole Oceanographic Institution (WHOI), and the Centre National de Tri d'Oceanographique Biologique (CENTOB); the persons involved are thanked in the acknowledgments. The three institutions were involved in cooperative ventures to collect the materials, the bulk of which comprises duplicate individuals (over 98,000) of the single species *Ventiella sulfuris*, new species, taken from the vestimentiferan and clam communities near the vents.

Master Legend

Capital letters denote main parts; lower case letters to left of capital letters or in body of figure indicate modifications; lower case letters to right of capital letters indicate specimens described in legends as follows:

A	antenna	S	maxilliped
B	body	T	telson
C	coxa	U	labrum
D	dactyl	V	palp
E	spine(s)	W	pleon
F	accessory flagellum	X	maxilla
G	gnathopod	Y	gill

H	head	Z	oostegite
I	inner plate or ramus	a	accessory lobe
J	prebuccal	d	dorsal
K	lacinia mobilis	e	enlarged
L	labium	m	medial
M	mandible	o	opposite
N	molar	r	right
O	outer plate or ramus	s	setae removed
P	pereopod	t	left
Q	locking spines	v	ventral
R	uropod		

Figures unattributed to a particular specimen depict the specimen named first in the legend. Scale bars in figures indicate additional lengths of parts that are not drawn in detail.

ACKNOWLEDGMENTS

We thank Robert R. Hessler of SIO for his help in organizing this project; Ms. Nancy J. Copley and Ms. I.P. Williams of WHOI and Michel Segonzac of CENTOB for lending us materials, and Ruth Turner of Harvard University, who established the undersea panels on which various amphipods were collected. Linda Lutz of Vicksburg, Mississippi, rendered our pencil work into the inked plates. At the Smithsonian Institution we thank Janice Clark and Lori B. Jackintell for their assistance.

Euonyx Norman

Euonyx Norman, 1867:202 [*Euonyx chelatus* Norman, 1867, monotypy].—Lincoln, 1979:54.

Leptochela Boeck, 1876:190 [homonym, Decapoda] [*Opis leptochela* Bate and Westwood, 1868, monotypy].

DIAGNOSIS.—Mouthparts forming quadrate bundle. Labrum and epistome differentially produced, prominent, separate, epistome either strongly dominant in size and projection or not, sharp or blunt. Incisor ordinary, molar of medium size, subconical, setulose, occasionally with weak apical triturative surface but considered as simple molar, palp attached strongly distal. Inner plate of maxilla 1 weakly (usually 3) setose; palp biarticulate, large. Inner plate of maxilla 2 shorter than outer, lined with setae on apical half of medial margin. Inner and outer plates of maxilliped well developed or outer plate small (type), palp strongly exceeding outer plate, dactyl well developed.

Coxa 1 strongly shortened and partly covered by coxa 2, tapering. Gnathopod 1 elongate, thin, strongly chelate, article 5 usually longer than 6, dactyl large; article 6 of gnathopod 2 greatly shorter than article 5, ordinary, propodus strongly subchelate.

Inner ramus of uropod 2 without notch or with weak notches. Uropod 3 ordinary, peduncle ordinary, inner ramus slightly shortened, outer ramus 2-articulate. Telson ordinary to elongate, deeply cleft.

ADDITIONAL CHARACTER.—Article 3 of gnathopod 1 elongate.

VARIABLES.—Body almost fully carinate (*E. scutatus*); article 1 of antenna 1 carinate (type, *E. coecus*), not cristate (*E. biscayensis, E. normani,* etc.); epistome produced (type), not produced (*E. pirloti,* etc.); molar present (*E. biscayensis*), conicosetulose (*E. normani,* etc.); spines on outer plate of maxilla 1 small (type), large (most other species); plates of maxilla 2 thin (*E. laqueus, E. talismani*); outer plate of maxilliped not larger than inner plate (type), much larger (most other species); plates of maxilliped thinner and more pointed (*E. talismani*); carpus of gnathopod 1 much shorter than article 6, propodus sinuous (*E. normani*); propodus of gnathopod 2 powerful and palm excavate (type), feeble (*E. biscayensis, E. normani*); length of gnathopod 2 similar to gnathopod 1 (most species), gnathopod 2 much longer than gnathopod 1 (*E. talismani*).

RELATIONSHIP.—Differing from *Opisa* in the elongate, non-eusirid carpus of gnathopod 1.

From *Valettia* in the smooth incisor, non-acute outer plate of maxilliped, and the difference in size between coxae 1-2 (both small in *Valettia*).

From *Aristiopsis* in the stronger chela of gnathopod 1, and the long unlobate carpus.

From *Cheirimedon* in the thin, elongate, and chelate gnathopod 1.

From *Kyska* in the small coxa 1 and thin gnathopod 1.

SPECIES.—See Stephensen (1923b).

E. biscayensis Chevreux, 1908, 1935.—J.L. Barnard, 1961 [426B]

E. chelatus Norman, 1867 (= *leptochela* Bate and Westwood, 1868).—Sars, 1895.—Gurjanova, 1951.—Lincoln, 1979 [216I + B]

E. coecus Pirlot, 1933 [718B]

E. conicurus K.H. Barnard, 1955.—Griffiths, 1974b, 1975 [743]

E. laqueus J.L. Barnard, 1967.—Sekiguchi and Yamaguchi, 1983 [510BP]

E. mytilus, new species [501A]

E. normani Stebbing, 1888, 1906 [523B]

E. pirloti Sheard, 1938 (= *normani* ID of Chilton, 1921) [780]

E. scutatus Griffiths, 1977 [701A]

E. talismani Chevreux, 1919-1920.—Stephensen, 1923.—Chevreux, 1927 [240B].

DISTRIBUTION.—Marine, cosmopolitan, descending into cold waters, demersal (coming to baited traps), occasionally associated with echinoderms and deep-sea corals, rarely shallow in rock reefs (see "[780]" above), 1-2900 m, 10 species.

Key to the Species of *Euonyx*

1. Propodus of gnathopod 1 over twice as long as carpus . . . . . ***E. normani***
   Propodus of gnathopod 1 less than 1.3 times as long as carpus 2

2. Lateral cephalic lobe with sharp point, urosomite 1 with elevated crest 3
   Lateral cephalic lobe blunt, urosomite 1 lacking crest 6
3. Article 1 of antenna 1 lacking crest, pereonites 6-7 and pleonites 1-2 with dorsal teeth . . . . . ***E. scutatus***
   Article 1 of antenna 1 with crest, pereonites 6-7 and pleonites 1-2 lacking dorsal teeth 4
4. Pleonite 3 with dorsoposterior tooth-hump, tooth of urosomite 1 reverted forward . . . . . ***E. conicurus***
   Pleonite 3 lacking dorsal process, tooth of urosomite 1 if present not reverted forward 5
5. Palm of gnathopod 2 long and excavate . . . . . ***E. chelatus***
   Palm of gnathopod 2 short and slightly protuberant . . . . . ***E. coecus***
6. Epimeron 3 rounded posteroventrally, article 1 of mandibular palp elongate . . . . . ***E. pirloti***
   Epimeron 3 angular posteroventrally, article 1 of mandibular palp not elongate . . 7
7. Dactyl of gnathopod 2 not reaching apex of excavate palm . . . . . ***E. talismani***
   Dactyl of gnathopod 2 reaching apex of straight or weakly excavate palm 8
8. Epimeron 2 with posteroventral tooth . . . . . ***E. mytilus,*** new species
   Epimeron 2 lacking significant tooth 9
9. Palm of gnathopod 2 excavate . . . . . ***E. laqueus***
   Palm of gnathopod 2 not excavate . . . . . ***E. biscayensis***

Euonyx mytilus, new species

FIGURES 1-3

ETYMOLOGY.—The specific epithet is from the Latin *mytilus* (mussel), referring to associated fauna.

DIAGNOSIS.—Body lacking any prominent dorsal teeth, urosomite 1 smoothly and broadly convex dorsally, urosomite 2 with weak dorsocentral depression bounded laterally by weak notch marking lateral vertical face; lateral cephalic lobes rounded, blunt; article 1 of antenna 1 lacking dorsal crest; propodus about 1.2 times as long as carpus; palm of gnathopod 2 long, almost straight, dactyl barely reaching apex of palm; epimeron 2 with strong tooth, epimeron 3 with tiny posteroventral tooth.

DESCRIPTION.—*Holotype:* Female "x" (20.04 mm): Ocular lobes submammilliform, evidence of eyes dim (same as figured for male). Article 1 of primary flagellum short, accessory flagellum 9-articulate. Article 5 of antenna 2 shorter than article 4. Epistome not protruding beyond upper lip. Upper lip with sharp narrow lobe hanging anteroventrally. Incisors bounded by weak tooth on each side, right lacinia mobilis absent, left clavate and denticulate. Inner plate of maxilla 1 with 3 large setae and 8+ apicolateral smaller setae, outer plate with 11 spines, outer margin of palp sinuous, apex with 3 spines, apicolateral margin with 1 spine, 1 seta. Inner plate of maxilliped with 3 small thick apical spines, third spine disjunct from medial pair, with 5 apicomedial locking spines, ventral face with subapical row of 8 short spines; outer plate lined medially with tiny chisel-shaped spines; nail of dactyl very short.

Chela of gnathopod 1 about 0.35 times as long as total propodus including chela. Pereopod 4 like pereopod 3, principal unlocking spine clavate, ornamented, with tiny partner spinule; inner margin of dactyl rugose. Gills present on coxae 2-7, those on coxae 5-6 with accessory gill bearing apical appendage. Oostegites very tiny, slender, present on coxae 2-4 only.

Pleopods 1-3 each with 4 coupling hooks, with 2 accessory straight spines on pleopods 1-2, 3 on pleopod 3.

Uropods 1-3 as shown in illustrations but obscured details: medial spines on peduncles of uropods 1-2 = 8 and 3, on outer rami of uropods 1-2 = 3 and 4. Telson with male form of basodorsal denticle rows.

Other Material: Male "y" (19.61 mm): Like female but antennae longer, article 1 of primary flagellum on antenna 1 conjoint, nearly as long as article 1, peduncle of antenna 2 slightly larger than in female; both medial margins of rami on uropod 3 densely setose.

Female "f" (19.85 mm): Article 4 of pereopods 5-7 much stouter than in type series and other specimens reported in "Material"; thus like *E. talismani.*

Male "e" (23.85 mm): Palm of gnathopod 2 slightly longer and scarcely more excavate than in type series, thus slightly more like *E. talismani.*

HOLOTYPE.—USNM 195194, female "x" 20.04 mm.

TYPE LOCALITY.—SIO sta 882, Galapagos Vents, 00°47.9′N, 86°09.2′W, 23 Jan 1979, 2491 m, mussel bed, subsample: clam-bucket residue.

MATERIAL.—Type locality, male "y" 19.61 mm, female "z" 19.54 mm. SIO Station 884, Garden of Eden, 00°47.7′N, 86°07.7′W, 2482 m, 25 Jan 1979, clam bucket residue, 1 male, 1 female; 894, Rose Garden, 00°48.2′N, 86°13.5′W, 2447 m, 19

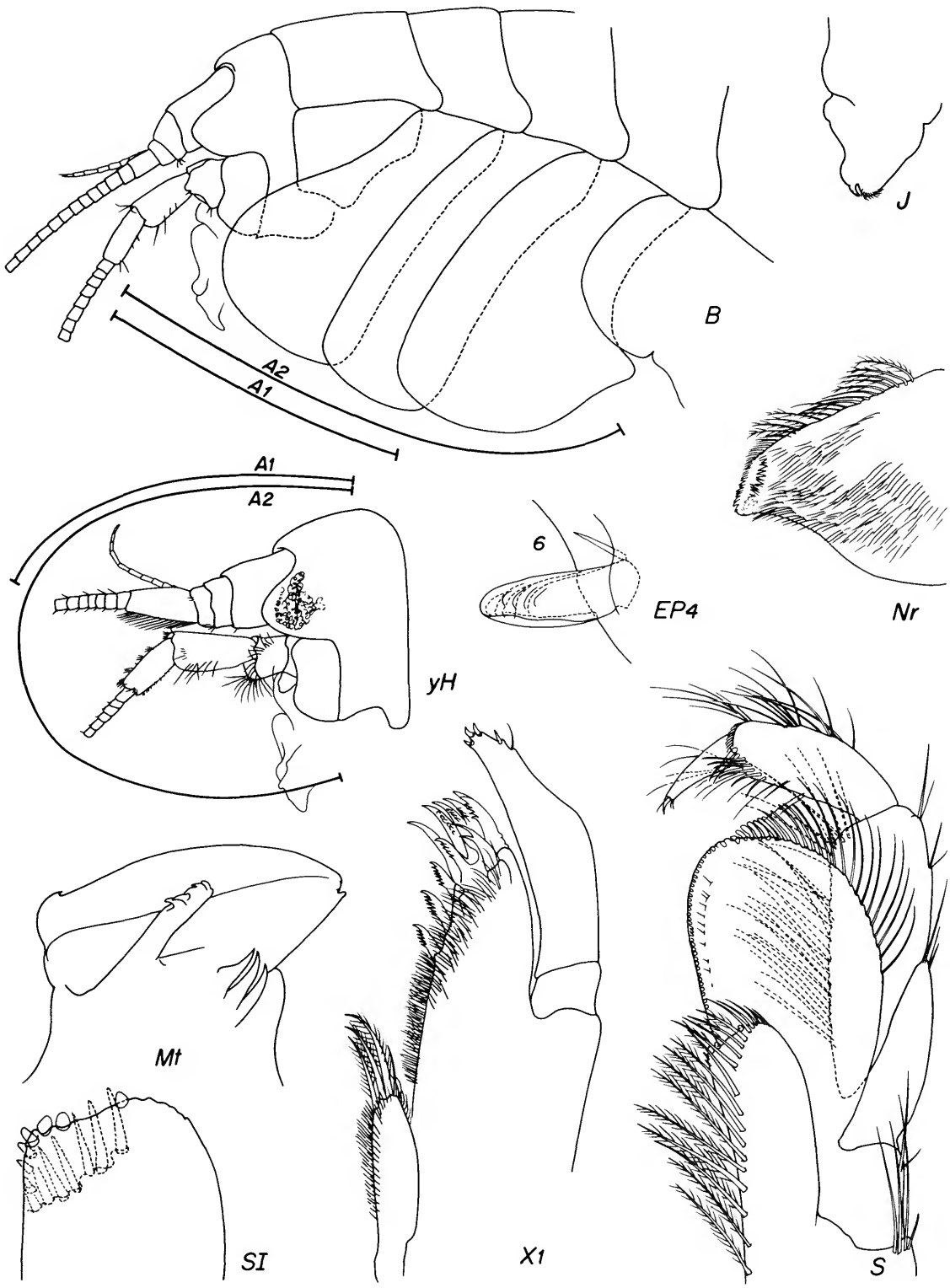

FIGURE 1.—*Euonyx mytilus*, new species: unattributed figures = holotype female "x" 20.04 mm; y = male "y" 19.61 mm.

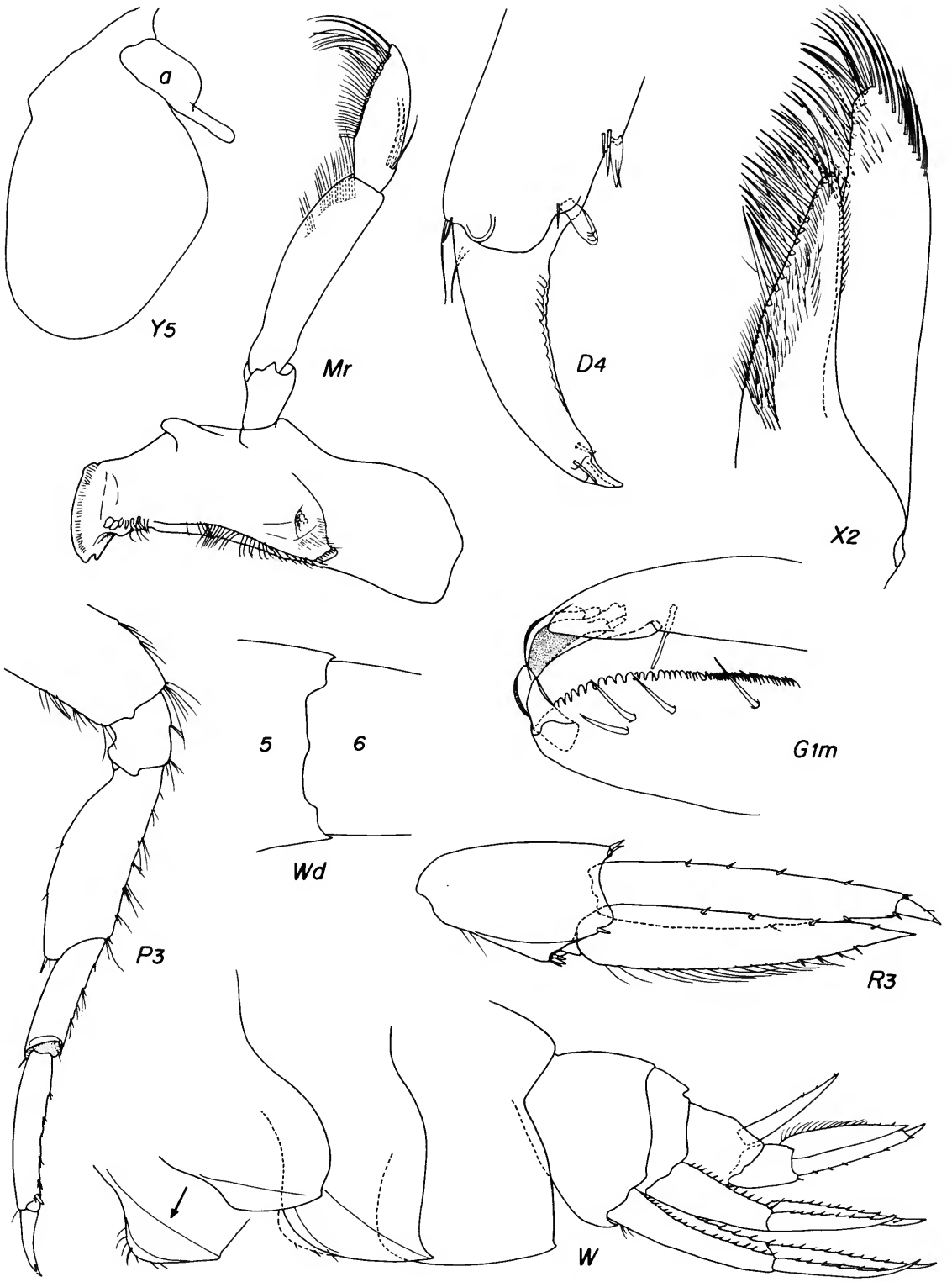

FIGURE 2.—*Euonyx mytilus*, new species, holotype female "x" 20.04 mm.

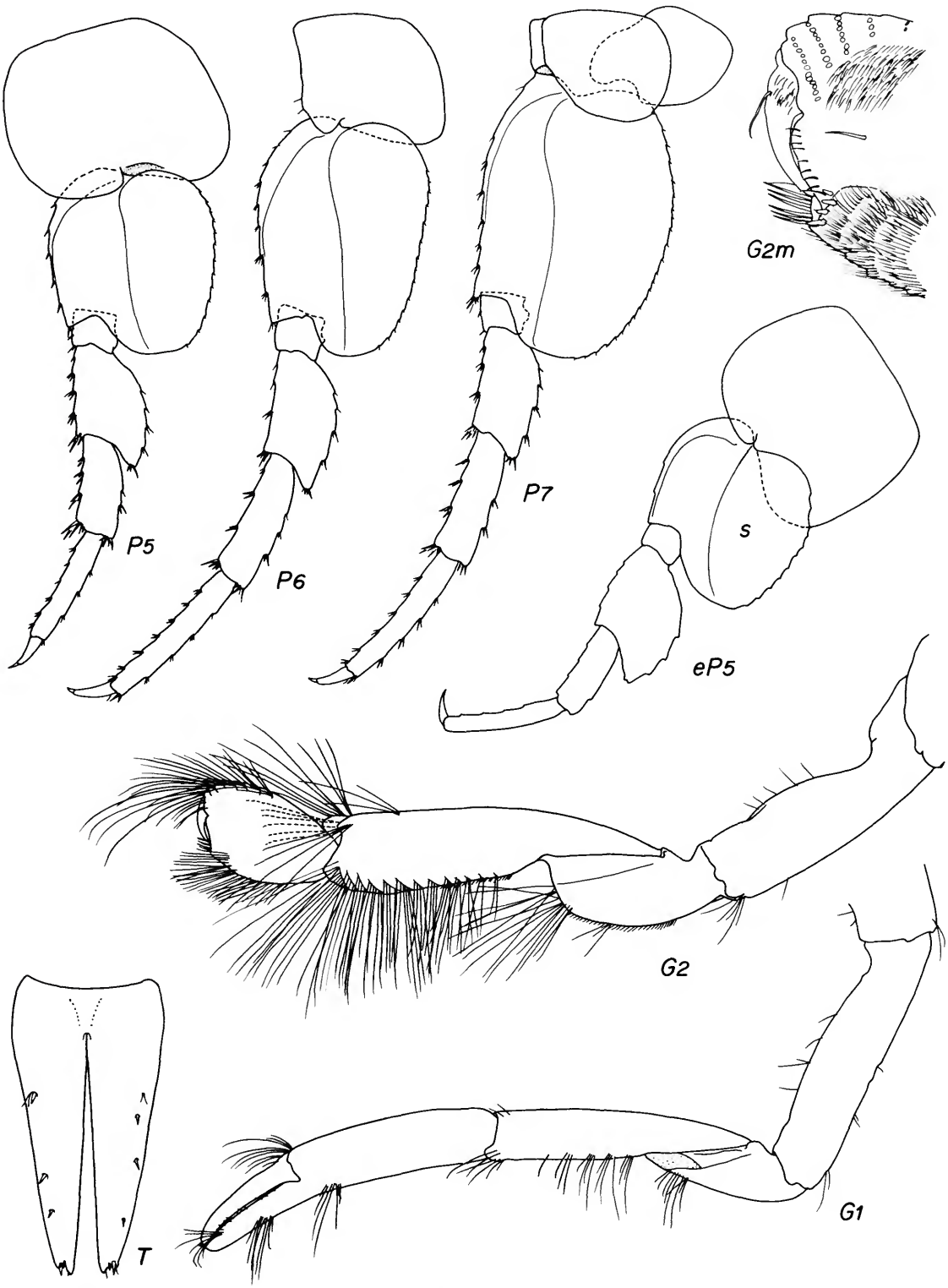

FIGURE 3.—*Euonyx mytilus*, new species: unattributed figures = holotype female "x" 20.04 mm; e = male "e" 23.85 mm.

Feb 1984, amphipod trap; Biocyarise 13°N, 84-41, Thirteen Degree North Rift, 12°48.6'N, 103°56.7'W, 2635 m, 23 Mar 1984, aspirator, male "e" 23.85 mm; Biocyarise 84-45, Thirteen Degree North Rift, 12°48.8N, 103°56.8'W, 2635 m, 27 Mar 1984, trap 1, female "f" 19.85 mm and 1 female.

RELATIONSHIP.—Close to *Euonyx laqueus* and *E. biscayensis* but differing from both in the large tooth on epimeron 2. Also differing from *E. laqueus* in the more adz-shaped coxa 2, smaller tooth of epimeron 3, narrower article 4 of pereopods 6–7 and less-excavate palm of gnathopod 2.

Closest to but differing from *E. talismani* in the poorly excavate palm of gnathopod 2, the narrower article 4 of pereopod 5, and the orthodox outer plate of the maxilliped; in *E. talismani* the outer plate of the maxilliped is pointed and lacks apicolateral armaments. The specimens from the 13°N vents are slightly closer to *E. talismani* than the type series because of slight intermediation in gnathopod 2 and article 4 of pereopods 5–7 (see female "f" and male "e" above).

DISTRIBUTION.—Galapagos Vents and 13°N Vents, 2482–2635 m.

Hirondellea Chevreux

Hirondellea Chevreux, 1889:285 [*Hirondellea trioculata* Chevreux, 1889, original designation].

Tetronychia Stephensen, 1923b:63 [*Tetronychia abyssalis* Stephensen, 1923b, original designation].

DIAGNOSIS.—Mouthparts forming quadrate bundle. Labrum and epistome differentially produced, prominent, separate, both strongly projecting, blunt. Incisor ordinary, molar simple, large, conicolaminate or subconical, setulose; palp attached opposite molar. Inner plate of maxilla 1 weakly (2) setose, in adults setae sickle-shaped; palp biarticulate, large. Inner and outer plates of maxilliped well developed, palp strongly exceeding outer plate, dactyl well developed.

Coxa 1 strongly shortened and partly covered by coxa 2, tapering or subrectangular, setation much stronger than on coxae 2–4.

Gnathopod 1 short, strongly subchelate, palm transverse, sometimes chelate, article 5 subequal to or longer than 6, dactyl large; article 6 of gnathopod 2 greatly shorter than article 5, ordinary, propodus minutely chelate.

Inner ramus of uropod 2 with or without large notch. Uropod 3 almost aequiramous, ordinary, peduncle ordinary, outer ramus 2-articulate. Telson elongate, deeply cleft.

ADDITIONAL CHARACTERS.—Eyes when present diffuse, present on the top and sides and sickle-shaped from lateral view; medial apex of palp on maxilla 1 toothed; plates of maxilla 2 short and stout; accessory gill on coxae 5–6 (*H. antarctica, H. gigas*).

SEXUAL DIMORPHISM.—Flagellum of male antenna 1 prolif - erate and more elongate (*H. gigas*); articles 4–5 of antenna 2 with anterior male armament tufts, flagellum elongate (*H. gigas*), but tufts also present in females of our material.

VARIABLES.—Eyes forming sinuous upside-down question mark or divided into 3 parts, 2 side and 1 top; article 1 of antenna 1 carinate (*H. dubia*); article 1 of accessory flagellum flat (*H. dubia*); setae on inner plate of maxilla 1 not sickle-shaped, just thick (*H. gigas*); outer plate of maxilliped smaller than in type (*H. gigas*); dactyl of gnathopod 1 very long (*H. fidenter*), with spinules (*H. fidenter*), with teeth and setae (young *H. gigas*), corner of palm projecting (chelate) (*H. abyssalis, H. antarctica*); inner ramus of uropod 3 slightly shortened (*H. gigas*); telson short (*H. brevicaudata, H. gigas*), cleft weak (*H. abyssalis, H. brevicaudata*).

RELATIONSHIP.—Differing from *Euonyx* in the short chela of gnathopod 1.

From *Opisa* and *Cheirimedon* in the feeble gnathopod 1 and more equally extending rami of uropod 3.

From *Adeliella* in the longer and more deeply cleft telson, longer rami of uropods 1–2, better armed maxillae, more conicolaminate molar, and stronger lobe of coxa 4.

From *Aristiopsis* in the unlobate carpus of gnathopod 1 and longer telson.

From *Paralicella* and *Alicella* in the short article 3 of gnathopod 1 and the poor medial setosity on the inner plates of maxillae 1–2.

From *Eurythenes* in the weak article 1 of antenna 2, larger head, and fewer setae on the inner plate of maxilla 1.

From *Ambasiopsis* in the lack of a differentially produced labrum and larger head.

SPECIES.

H. abyssalis (Stephensen, 1923) [209B]

H. antarctica (Schellenberg, 1926a).—K.H. Barnard, 1930.—Birstein and Vinogradov, 1960.—Andres, 1983 [870 + B + ?523A]

H. brevicaudata Chevreux, 1910, 1935, and see herein [231A]

H. dubia Dahl, 1959.—Birstein and Vinogradov, 1960 [390A = 714,715,523]

H. fidenter J.L. Barnard, 1966a [310B]

H. gigas Birstein and Vinogradov, 1955, 1958, 1960.—Dahl, 1959.—Gurjanova, 1962.—Hessler et al., 1978.—Kamenskaya, 1981 [390A = Philippine, Marianas, Kurile Trenches only]

H. glutonis, new species [504A]

H. guyoti, new species [504A]

H. trioculata Chevreux, 1889; 1900.—Stebbing, 1906 [304B].

DISTRIBUTION.—Marine, Antarctica shallow and cosmopolitan abyssal and hadal, 170–10,190 m (deepest amphipod record, *H. gigas*, Philippine Trench), 9 species.

Key to the Species of *Hirondellea*

1. Inner ramus of uropod 2 constricted 2
   Inner ramus of uropod 2 not constricted 6

2. Telson weakly cleft . . . . . *H. glutonis,* new species, *H. antarctica, H. abyssalis**
   Telson deeply cleft 3
3. Epimeron 1 with strong anteroventral tooth . . . . . *H. guyoti,* new species
   Epimeron 1 rounded anteroventrally 4
4. Epimeron 3 subsharply quadrate behind . . . . . *H. trioculata*
   Epimeron 3 rounded behind 5
5. Dactyl of gnathopod 1 strongly overlapping palm, dactyl strongly toothed . . . . . *H. fidenter*
   Dactyl of gnathopod 1 scarcely overlapping palm, dactyl weakly toothed . . . . . *H. glutonis,* new species
   Dactyl of gnathopod 1 multitoothed, article 2 of pereopods 5–6 broad . . *H. gigas*
   Dactyl of gnathopod 1 not multitoothed, article 2 of pereopods 5–6 narrow . . . 6
6. Hand of gnathopod 1 short and broad, barely tapering, urosomite 1 lacking deep dorsal sinus . . . . . *H. brevicaudata*
   Hand of gnathopod 1 elongate, strongly tapering, urosomite 1 bearing deep dorsal sinus . . . . . *H. dubia*

*For further, tentative differentiation, see "Relationship" under discussion of *Hirondellea glutonis*.

Hirondellea gigas (Birstein and Vinogradov)

Tetronychia gigas Birstein and Vinogradov, 1955:228, figs. 11, 12.
Hirondellea gigas.—Birstein and Vinogradov, 1958:230; 1960:184; 1963:92.—Dahl, 1959:214, fig. 2.—Gurjanova, 1962:90, fig. 19A,B.—Hessler et al., 1978:1029.—Kamenskaya, 1981:95, figs. 1, 2.

MATERIAL.—SIO sta H 186, Philippine Trench, 36.5°N, 125°36.6′E, 9604 m, 2–3 Mar 1975, 16+ specimens; FVBT 11, Mariana Trench, 11°21.7′N, 142°09.5′E, 9755 m, 1 specimen.

DISTRIBUTION.—Kurile-Kamchatka Trench, Philippine Trench, Mariana Trench, 6000–10,150 m (the deepest recorded amphipod collection).

Hirondellea glutonis, new species

FIGURES 4–6

ETYMOLOGY.—The species name is from the Latin *gluto* (gormandizer).

DIAGNOSIS.—Dactyl of gnathopod 1 mostly fitting palm in adult, scarcely overlapping excavate palm, scarcely toothed, with small inner setules and 3 cusps; pleonite 3 unproduced dorsoposteriorly; epimeron 1 rounded anteroventrally, epimeron 3 rounded behind; urosomite 1 with deep dorsal sinus and long low dorsal hump, urosomal prickles poorly developed; spine row on peduncle of uropod 1 without basal gap; inner ramus of uropod 2 constricted; telson moderately cleft.

DESCRIPTION.—*Holotype:* Female "p" 12.45 mm: Rostrum vestigial, lateral cephalic lobe broadly mammilliform, with medium sinus for antenna 2, anteroventral corner sharp; eyes barely indicated by sigmoid outer stain and internal glandular tissue.

Article 3 of antenna 1 invaginated medially, primary flagellum 12-articulate on left, 6-articulate on right (thus right antenna 1 probably regenerant), longer than peduncle, basally conjoint, article 1 slightly shorter than peduncle, heavily armed with rows of aesthetascs; accessory flagellum conjoint basally, 6 articulate on left, 3-articulate on right. Antenna 2 slightly longer than antenna 1, gland cone large, articles 4–5 armed anteriorly with setular tufts, flagellum 13-articulate, shorter than peduncle.

Epistome dominating upper lip, with thin anterior keel, upper lip entire, with small distal lobule. Incisors with inner and outer notch and tooth, right lacinia mobilis apparently absent, left slender, curved, attached at edge of fossa; principal right and left rakers 3 and 2 (unless first right raker = lacinia mobilis), remainder of raker row composed of numerous setae, molar large and strongly pubescent along one side; palp thin, article 2 with line of apicomarginal setae, article 3 slender, tapering, setae = A,10D,3E. Lower lip with small gape between outer lobes, mandibular lobes strong, blunt, inner lobes absent. Inner plate of maxilla 1 with typical giant falcate seta and one smaller seta, outer plate with 11 spines in sets of 6 and 5, heavily pubescent, palp article 2 with one or 2 inner notches, inner apex sharp, apex with 5 thick and one slender spines. Apices of maxilla 2 beveled mediad, heavily setose, no facial setae. Inner plate of maxilliped with apicolateral sinus marked laterally with 2 thin spines, medially with 3 teeth, first member of long apicomedial setal row spine-like; outer plate enlarged, medial margin weakly crenulate, bearing line of weak facial setules; articles 3–4 thin, latter unguiform, with weak accessory setule.

Coxa 1 reduced, broader than long, coxae 2–4 longer than broad, coxa 4 well excavate, coxa 5 much shorter than 4. Article 2 of gnathopod 1 densely setose anteriorly, article 6 slightly shorter than 5, weakly tapering, palm weakly excavate, armed with row of 7 principal spines and row of 2 setae; dactyl slightly overlapping palm, with up to 3 small inner teeth or spines. Gnathopod 2 slender and elongate, article 6 much

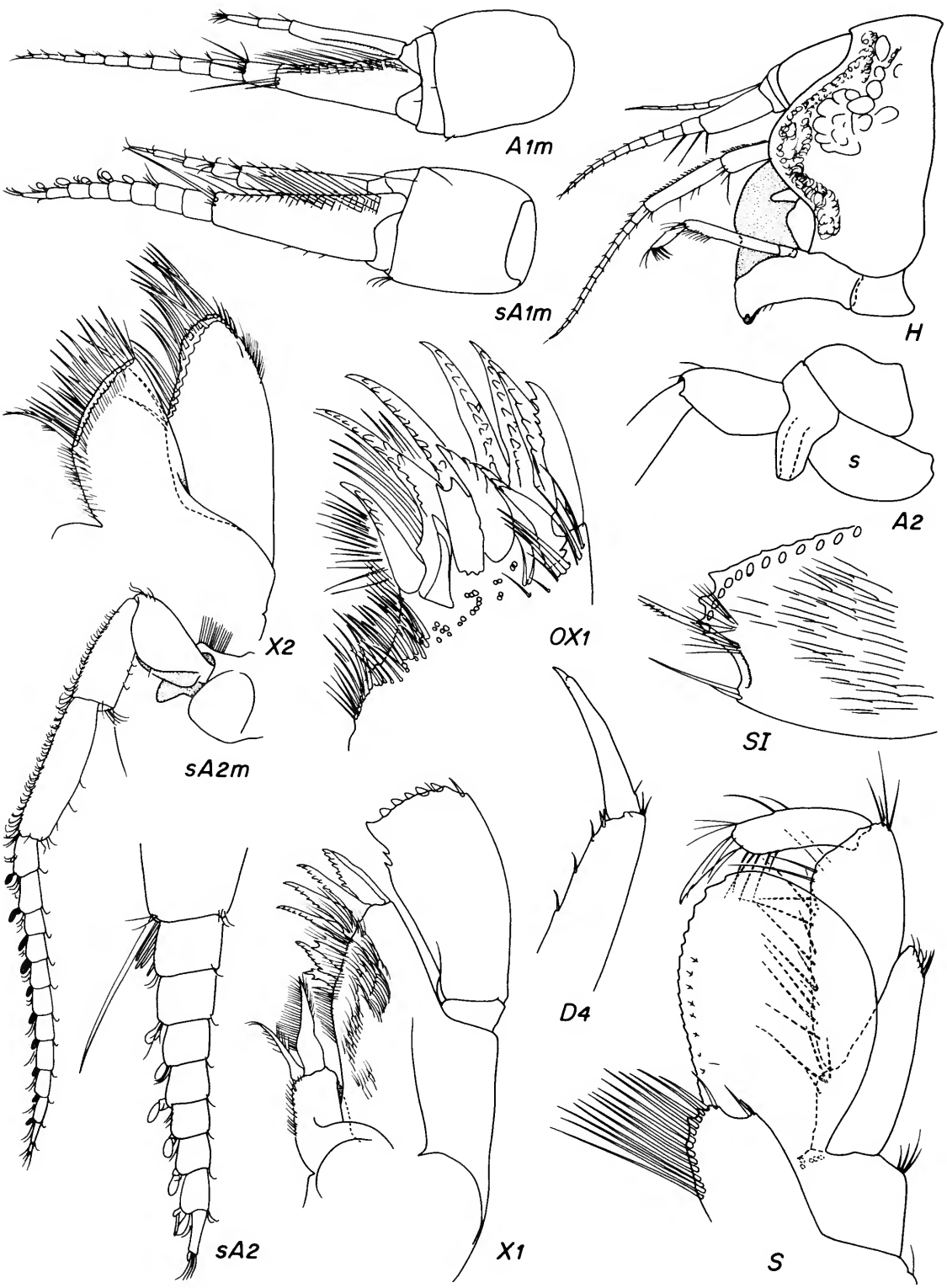

FIGURE 4.—*Hirondellea glutonis*, new species: unattributed figures = holotype female "p" 12.45 mm; s = male "s" 7.87 mm.

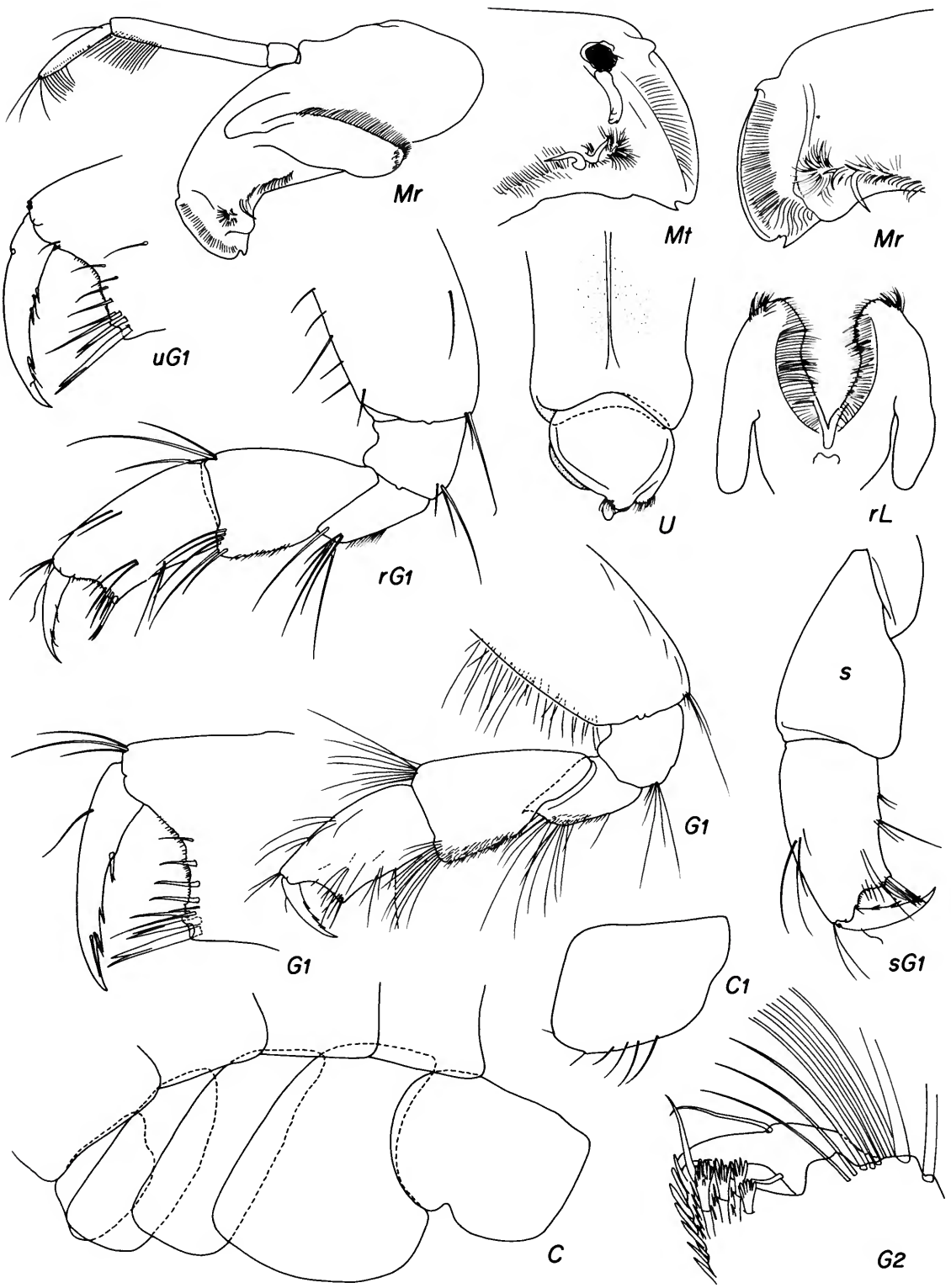

FIGURE 5.—*Hirondellea glutonis*, new species: unattributed figures = holotype female "p" 12.45 mm; r = juvenile "r" 5.5 mm; s = male "s" 7.87 mm; u = female "u" 9.21 mm.

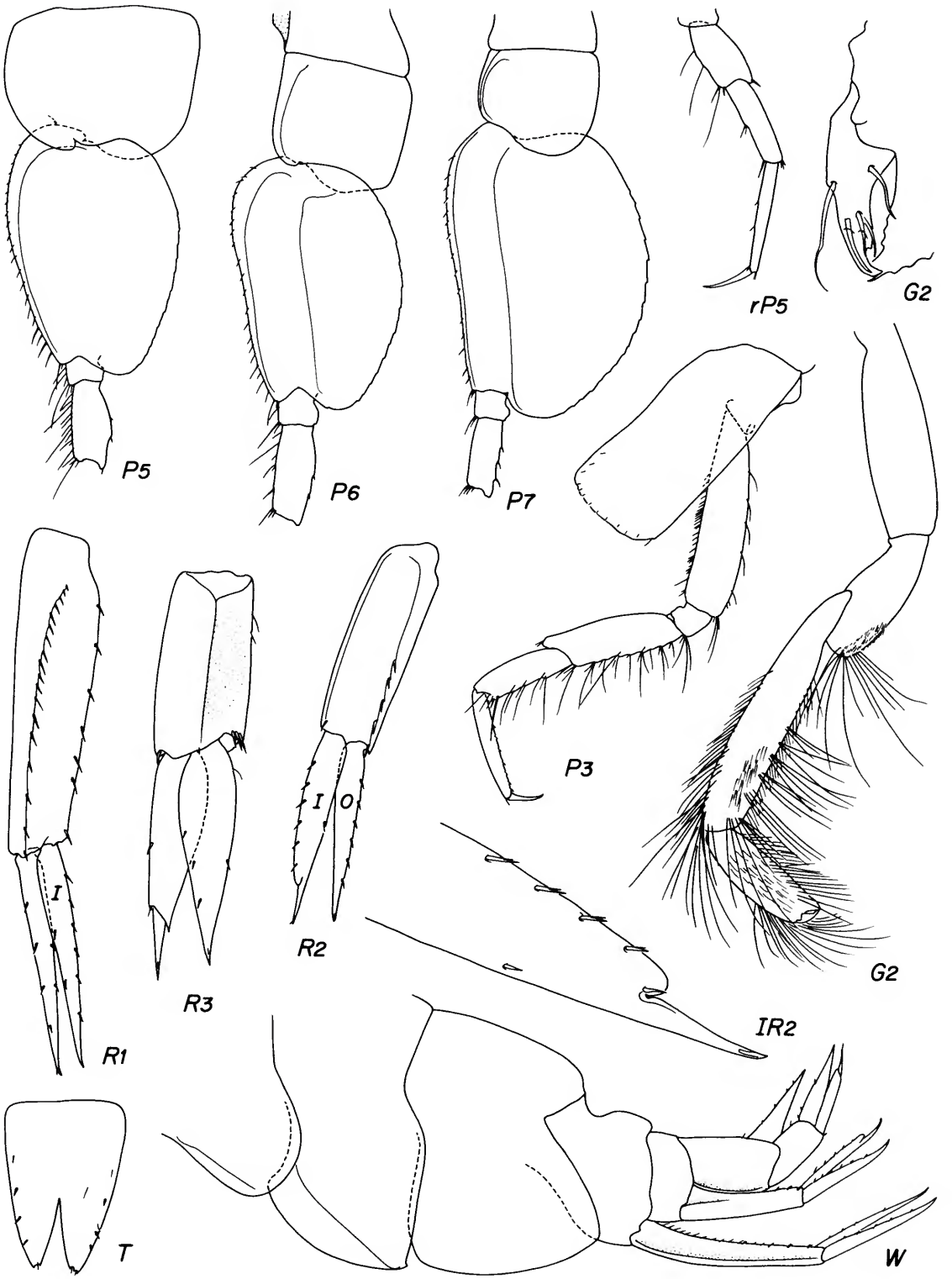

FIGURE 6.—*Hirondellea glutonis*, new species: unattributed figures = holotype female "p" 12.45 mm; r = juvenile "r" 5.5 mm.

shorter than 5, minutely chelate, palm defined by long thin spine, bearing many palmate spines projecting from inner face of propodus; dactyl fitting palm, with inner and outer wire-seta, subapex with 3 setules.

Pereopods ordinary and slender, with 2 locking spines, pereopod 4 scarcely smaller than 3; posteroventral margins of article 2 on pereopods 5–7 weakly beveled and lobate. Gills present on coxae 2–6, large, flat, unplaited, only gill 6 with small bullet-shaped accessory lobe.

Epimera unarmed, first rounded behind, second with weak posteroventral tooth, third rounded-quadrate. Pleopods 1–3 elongate, each with 2 coupling hooks, only peduncle of pleopod 1 sparsely setose laterally, rami about 1.35 times as long as peduncle, multiarticulate. Oostegites on coxae 2–5, thin, strap-shaped, well setose mostly behind.

Urosomite 1 with dorsal hump, urosomite 3 much longer than 2. Peduncles of uropods 1–2 each with lateral flange, rami extending equally on both pairs, spinosity ordinary, apical nails not apparent, inner ramus of uropod 2 constricted. Uropod 3 ordinary, rami subequal, outer 2-articulate, poorly spinose. Telson about as long as rami of uropod 3, cleft about 40 percent, each apex with 1–2 weak setule-notches, dorsolateral margins on each side with row of spinules.

Other Material: Female "q" 12.6 mm: Substantially similar to holotype.

Female "u" 9.21 mm: Palm and dactyl of gnathopod 1 as shown in Figure 5.

Male "s" 7.87 mm: Not as large as largest females, therefore setosity and spinosity sparser; flagella of antennae 1–2 stouter than in female, calceoliferous, peduncle of antenna 2 with setular tufts denser than in female; dactyl of gnathopod 1 more strongly overlapping palm than in female (Figure 5); gill of coxa 5 with large subsidiary bullet-shaped lobe (in contrast to female), coxa 6 with smaller lobe as in female; rami of uropod 3 lacking marginal spines; telson with 2 narrowly separated dorsolongitudinal lines of tiny basal denticles.

Juvenile "r" 5.5 mm: Antennae 1–2 much shortened, especially articles 4–5 of antenna 2 shorter and stouter than in adults, flagellum shorter, primary flagellum with 8 articles, accessory flagellum with 4; flagellum of antenna 2 with 8 articles; gnathopod 1 substantially similar to adult but article 2 poorly setose (Figure 5); dorsolateral margin of peduncle on antenna 1 with 10 spines, on uropod 2 with 2 spines.

ILLUSTRATIONS.—Figure groups of similar magnification: (1) pereopods 3,5,6,7; (2) uropod 3, telson. Apex of pereopod 5 inserted at same relative magnification from juvenile "q." Only articles 1–2 of peduncle on antenna 1 show medially on male illustration; article 2 of antenna 1 attached to head like article 1, shown in illustration of male by series of close-set lines.

HOLOTYPE.—USNM 195195, female "p" 12.45 mm.

TYPE LOCALITY.—Biocyarise 84-39, Thirteen Degree North Rift, 12°48.6N, 103°56.7′W, 2635 m, 16 Mar 1984, from trap 6.

MATERIAL.—Biocyarise 84-45, 12°48.8′N, 103°56.8′W, 2635 m, trap 1 (7 specimens, including female "q" 12.6 mm, juvenile "r" 5.5 mm); Biocyarise 84-38, 12°48.8N′, 103°56.8′W, 2635 m, 15 Mar 1984, aspirator (female "u" 9.21 mm, oostegites rudimentary); Biocyarise 84-44, 12°48.8′, 103°56.8W, 2635 m, 26 Mar 1984, basket, bicarbonate antibiotic, (large female "t," oostegites rudimentary). SIO sta 882, Galapagos Vents, 00°47.9′ N, 86°09.2 W, mussel bed, 23 Jan 1979, 2491 m, mix of subsamples, mussel washings and clam bucket residue (11 specimens, including male "s" 7.87 mm).

GLUTTONY.—Most specimens with midgut densely packed with bait food, sterna ventrally extended but coxae not pushed outward as in *Paralicella* species.

RELATIONSHIP.—There is little distinction between this entity and *H. abyssalis* (Stephensen, 1923) or *H. antarctica* Schellenberg (1926a). The latter two species are distinguished from each other by the short dactyl of gnathopod 1 for *H. abyssalis* and the somewhat more overlapping dactyl of *H. antarctica;* our entity has the dactyl slightly more overlapping than in *H. antarctica*. Article 2 on the outer ramus of uropod 3 is elongate as in our entity in *H. abyssalis* but much shorter in *H. antarctica*. This may be anomalous in the sense that it was illustrated incorrectly because the beveled attachment plane is deceptive, as shown by Stephensen in right and left views of attached uropod 3 for *H. abyssalis*. The epistome of our material is more strongly rounded than in *H. abyssalis* where it is somewhat more subsharply protuberant. K.H. Barnard (1930) shows 4 medial spines on the inner ramus of uropod 3 for *H. antarctica* versus one spine on our species. *Hirondellea abyssalis* has 3 of these spines. *Hirondellea antarctica* has an accessory lobe on gill 5 not present in our material, which has such lobe only on gill 6.

Hirondellea fidenter J.L. Barnard (1966a) differs minutely from this species in the slightly deeper cleft of the telson (somewhat variable in present species), the shorter palm of gnathopod 1 with narrower propodus, more projecting keel on epistome and much more broadly rounded epimeron 3.

DISTRIBUTION.—Galapagos Vents, 2491 m, 13°N Vents, 2635 m.

Hirondellea guyoti, new species

FIGURES 7–9 (part)

ETYMOLOGY.—The species is named for the type locality, Hess Guyot.

DIAGNOSIS.—Dactyl of gnathopod 1 strongly overlapping palm in adult, scarcely toothed, with small inner setules and 1 cusp, palm narrow and deeply excavate. Pleonite 3 unproduced posterodorsally; epimeron 3 with strong recurved anteroventral tooth; epimeron 3 rounded behind; urosomite 1 with strong dorsal sinus followed by large rounded hump, urosomites 1 and 3 without dense dorsal prickles; spine row on peduncle of uropod 1 with basal gap; inner ramus of uropod 2 constricted;

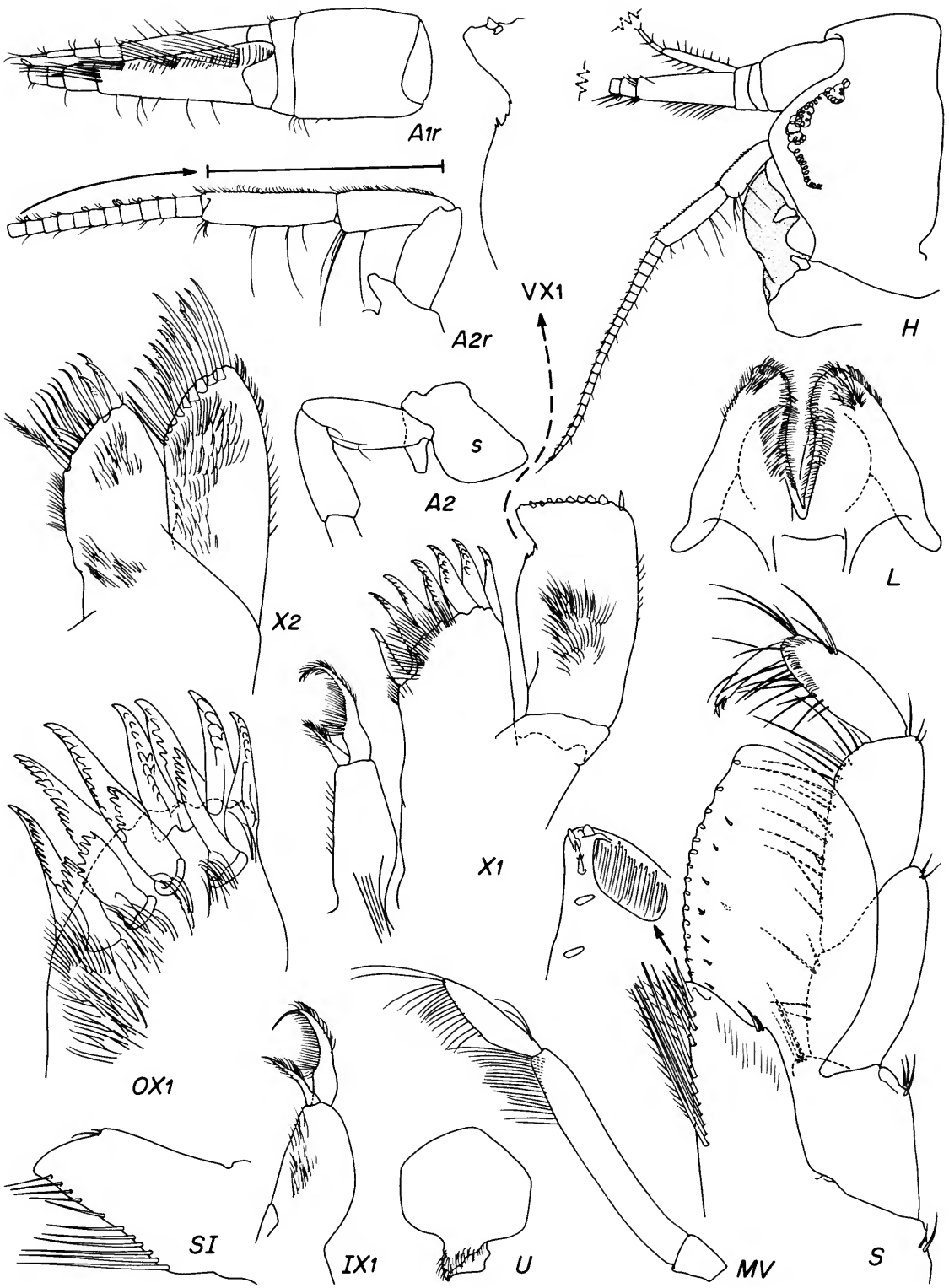

FIGURE 7.—*Hirondellea guyoti*, new species, holotype male 11.63 mm.

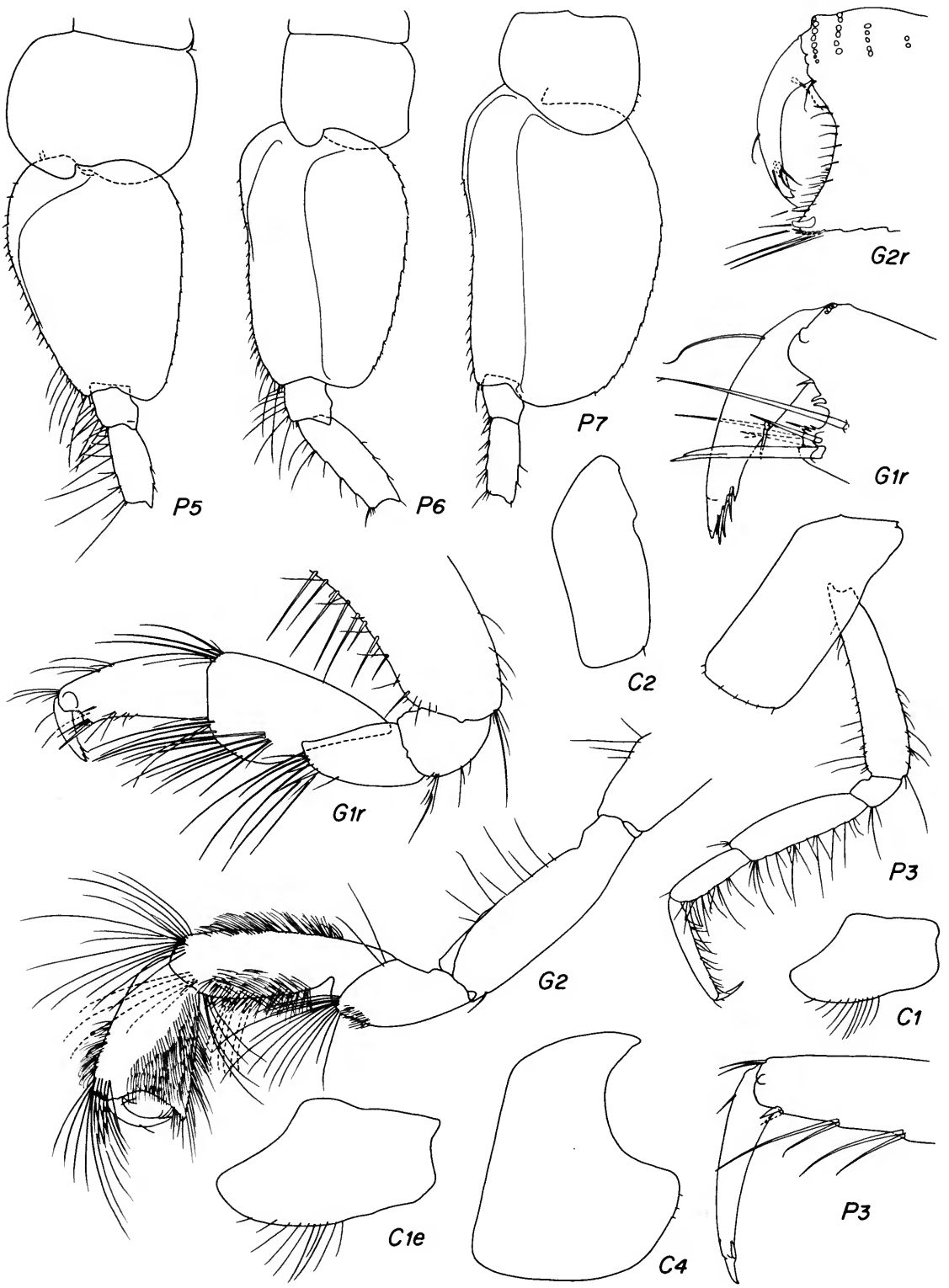

FIGURE 8.—*Hirondellea guyoti*, new species, holotype male 11.63 mm.

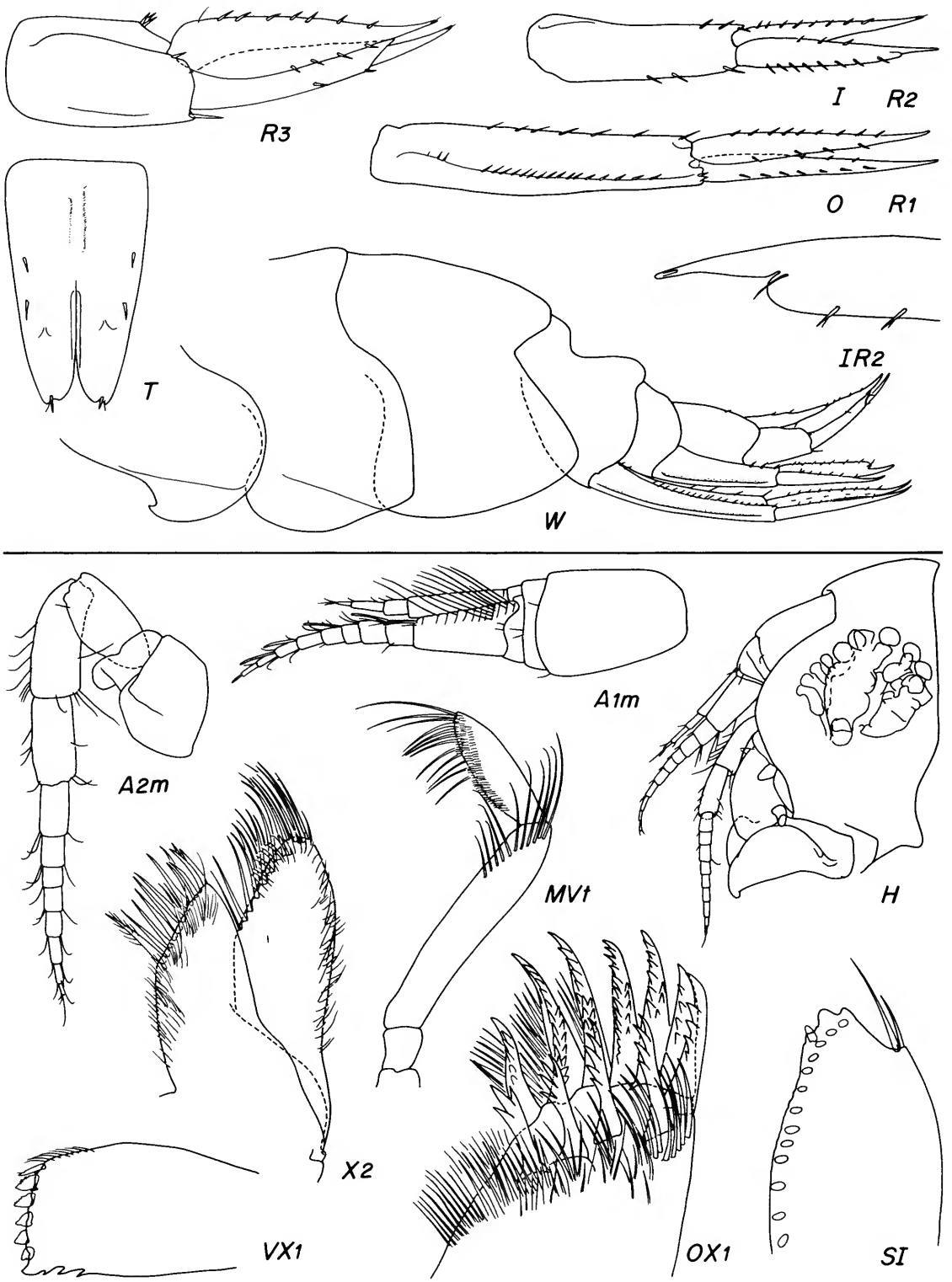

FIGURE 9.—Upper, *Hirondellea guyoti*, new species, holotype male 11.63 mm. Lower, *Hirondellea brevicaudata*, juvenile female "b" 5.03 mm.

telson moderately cleft.

DESCRIPTION.—*Holotype:* Male "Gvp" 11.63 mm: Probably not as fully mature as male of *H. glutonis*. Rostrum vestigial, lateral cephalic lobe broadly mammilliform, with medium sinus for antenna 2, anteroventral corner sharp; eyes barely indicated by sigmoid outer stain and internal glandular tissue.

Article 3 of antenna 1 invaginated medially, primary flagellum ?-articulate (broken), ?longer than peduncle, basally conjoint, article 1 as long as peduncle, heavily armed with rows of aesthetascs; accessory flagellum conjoint basally, ?5-articulate on left. Antenna 2 ?slightly longer than antenna 1, gland cone large, articles 4–5 armed anteriorly with setular tufts, flagellum 23-articulate, shorter than peduncle, calceoli small.

Epistome dominating upper lip, with thin anterior keel, upper lip entire, with small distal lobule. Incisors with inner and outer notch and tooth, right lacinia mobilis apparently absent, left slender, curved, attached at edge of fossa; principal right and left rakers 3 and 3, remainder of raker row composed of numerous setae, molar large and strongly pubescent along one side, with strong sharp recurved apical point; palp thin, article 2 with line of apicomarginal setae, article 3 weakly falcate, setae = 2A,14D,2E. Lower lip with small gape between outer lobes, mandibular lobes strong, blunt, inner lobes absent. Inner plate of maxilla 1 with typical giant falcate seta and one smaller seta, outer plate with 11 spines in sets of 7 and 4, heavily pubescent, palp article 2 with one inner notch, inner apex subsharp, apex with 8 thick and one slender spines. Apices of maxilla 2 beveled mediad, heavily setose, no facial setae. Inner plate of maxilliped with apicolateral notch marked laterally with 2 thin spines, medially with long apicomedial row of setae; outer plate enlarged, medial margin weakly crenulate, bearing line of weak facial spines; articles 3–4 thin, latter unguiform, with weak accessory spinule.

Coxa 1 reduced, broader than long, coxae 2–4 longer than broad, coxa 4 well excavate, coxa 5 much shorter than 4. Article 2 of gnathopod 1 densely setose anteriorly, article 6 slightly shorter than 5, tapering, palm narrow, excavate, armed with cusps on either side of excavation, defined by thick spine and slender spine, dactyl strongly overlapping palm, with 1 small inner tooth and several setules. Gnathopod 2 slender and elongate, article 6 much shorter than 5, strongly broadened, minutely chelate, palm broad and hemilunar, defined by short thick spine, bearing few palmate spines projecting from posterior margin but inner face of propodus densely covered with straw-like setules; dactyl failing full reach of palm, with inner wire-seta, subapex with 3–4 setules.

Pereopods ordinary and slender, with 2 locking spines, pereopod 4 smaller than 3; posteroventral margins of article 2 on pereopods 5–7 lobate, weakly beveled only on pereopod 7. Gills present on coxae 2–6, large, flat, weakly plaited, only gill 6 with small conical accessory lobe.

Epimera unarmed, first with anteroventral tooth, rounded behind, second with weak posteroventral protrusion, third rounded-quadrate. Pleopods 1–3 elongate, each with 2 coupling hooks, no peduncle setose laterally, rami about 1.6–1.7 times as long as peduncle, multiarticulate. Oostegites on coxae 2–5, thin, strap-shaped, well setose mostly behind.

Urosomite 1 with dorsal hump (of shape distinct from *H. glutonis*), urosomite 3 much longer than 2. Peduncles of uropods 1–2 each with lateral flange, spine row on dorsolateral margin of peduncle on uropod 1 with basal gap, rami extending subequally on both pairs, spinosity ordinary, apical nails not apparent, inner ramus of uropod 2 constricted. Uropod 3 ordinary, rami subequal, inner with 8 medial spines, outer 2-articulate, poorly spinose. Telson about as long as rami of uropod 3, cleft about 45 percent, each apex with 1 weak setule-notch, dorsolateral margins on each side with row of 2 spinules.

Other Material: Female "x" 15.70 mm: Much larger than male holotype; head and antennae like male (latter not mature), accessory flagellum 7-articulate; primary flagella broken; flagellum of antenna 2 with 22 articles, calceoli absent; oostegites strap-shaped, thin; spine row on peduncle of uropod 1 also with basal gap, on uropod 2 with 5 spines (versus 3 in male "y"), inner ramus dorsomedially with 9 spines (versus 8), same ramus on uropod 3 with 7 spines; telson like male, also with dorsal denticles.

Juvenile "w" 8.06 mm: Primary flagellum of antenna 1 with 10 articles, of antenna 2 with 14 articles, accessory flagellum broken, calceoli absent; peduncle of uropod 2 with 3 dorsolateral spines, inner ramus with 3 medial spines, same ramus of uropod 3 with 4 medial spines, basalmost spine on each side of telson weak.

ILLUSTRATIONS.—Mandibles like *H. glutonis*.

HOLOTYPE.—USNM 195196, male "v" 11.63 mm (illustrated).

TYPE LOCALITY.—SIO Cat. No. C5703, Acc. No. BI-68-45, Cruise STYX-7 MPE 68091 & 2, sta 5, Hess Guyot, 17°53'N, 174°14.8W, 1–2 Sep 1968, 1740 m, free vehicle trap, R/V *Agassiz*.

MATERIAL.—Type locality, female "x" 15.70 mm, juvenile "w" 8.06 mm, and 2 broken specimens.

RELATIONSHIP.—This is a very distinctive species of *Hirondellea* because of the strong anteroventral tooth on epimeron 1 and the greatly expanded propodus and hemilunar palm on gnathopod 2. Minor distinctions from *H. glutonis* include details on the inner and outer plates of the maxilliped, the slightly thicker article 3 of the mandibular palp, the gap in basal spination on the peduncle of uropod 1, the very narrow propodus and palm of gnathopod 1 with strongly overlapping dactyl, the fewer inner teeth on that dactyl, and the less strongly beveled article 2 on pereopod 7.

DISTRIBUTION.—Hess Guyot, 1740 m.

Hirondellea brevicaudata Chevreux

FIGURES 9–11 (part)

Hirondellea brevicaudata Chevreux, 1910:1–4, figs. 1, 2; 1935:5–7, pl. 5: fig. 1, pl. 16: fig. 4.

DIAGNOSIS.—Dactyl of gnathopod 1 mostly fitting palm in adult, slightly overlapping excavate palm, scarcely toothed, with small inner setules and 1 (to 3 in adults of literature) cusp; pleonite 1 with dorsoposterior protrusion overhanging urosome; epimeron 1 rounded anteroventrally, epimeron 3 subquadrate behind; urosomite 1 flattened, dorsal hump weak, urosomites 1 and 3 densely prickled; dorsolateral spine row on peduncle of uropod 1 without basal gap; inner ramus of uropod 2 not constricted; telson moderately cleft.

DESCRIPTION.—Juvenile female "b" 5.03 mm: Rostrum vestigial, lateral cephalic lobe broadly mammilliform, with medium sinus for antenna 2, anteroventral corner sharp; eyes barely indicated by internal glandular tissue.

Article 3 of antenna 1 weakly invaginated medially, primary flagellum 8 (?9)-articulate, longer than peduncle, basally conjoint, article 1 shorter than peduncle, heavily armed with rows of aesthetascs; accessory flagellum conjoint basally, 4-articulate. Antenna 2 slightly longer than antenna 1, gland cone large, articles 4–5 armed anteriorly with single setules, flagellum 8-articulate, shorter than peduncle.

Epistome dominating upper lip, with thin anterior keel, upper lip entire, with small distal lobule. Incisors with inner and outer notch and tooth, right lacinia mobilis apparently absent, left slender, curved, attached at edge of fossa; principal right and left rakers 3, remainder of raker row composed of numerous setae, molar large and strongly pubescent along one side, apex of right molar only weakly pointed and composed of 2 weakly articulated spines; palp thin, article 2 with line of apicomarginal setae, article 3 broadened, weakly falcate, tapering, setae = 0A,9D,3E. Lower lip with small gape between outer lobes, mandibular lobes strong, blunt, inner lobes absent. Inner plate of maxilla 1 with typical giant falcate seta and one smaller seta, outer plate with 11 spines in sets of 7 and 4, heavily pubescent, palp article 2 with 3 large inner teeth, inner apex sharp, apex with 5 thick and one slender spines. Apices of maxilla 2 beveled mediad, heavily setose, no facial setae, inner plate smaller than in *H. glutonis* (see illustration). Inner plate of maxilliped with apicolateral sinus marked laterally with 2 thin spines, medially with 2 teeth and one thick short spine, first member of long apicomedial setal row not spine-like; outer plate enlarged, medial margin weakly crenulate, bearing line of weak facial setules; articles 3–4 thin, latter unguiform, with weak accessory setules.

Coxa 1 reduced, broader than long, setae sparse, coxae 2–4 longer than broad, coxa 4 well excavate, coxa 5 much shorter than 4. Article 2 of gnathopod 1 moderately setose anteriorly, article 6 slightly shorter than 5, weakly tapering, palm weakly excavate, armed with row of 3 principal spines and row of 2 setae; dactyl slightly overlapping palm, with 1 inner tooth. Gnathopod 2 slender and elongate, article 6 much shorter than 5, minutely chelate, palm defined by short thick spine, bearing many straw-like setules projecting from inner face of propodus; dactyl fitting palm, with inner and outer wire-seta, subapex with 2 setules.

Pereopods ordinary and slender, with 2 locking spines, pereopod 4 slightly smaller than 3; posteroventral margin of article 2 on only pereopod 7 weakly beveled and lobate, posteroventral lobe on pereopods 5–7 weak, article 2 on pereopods 5–6 especially narrow. Gills present on coxae 2–6, large, flat, unplaited, only gill 6 with vestigial accessory lobe.

Epimera unarmed, first rounded behind, second with weak posteroventral protrusion, third rounded-quadrate. Pleopods 1–3 elongate, each with 2 coupling hooks, no peduncle setose laterally, rami of pleopods 1–3 consecutively 1.4, 1.15, and 1.66 times as long as peduncle, multiarticulate. Oostegites on coxae 2–5 rudimentary.

Urosomite 1 with weak dorsal hump, urosomite 3 much longer than 2, urosomites 1 and 3 with dense dorsal prickles. Peduncle of only uropod 1 with lateral flange, rami extending equally on both pairs, spinosity sparse, apical nails weak, inner ramus of uropod 2 not constricted. Uropod 3 ordinary, rami subequal, outer 2-articulate, poorly spinose. Telson short, about as long as peduncle of uropod 3, cleft about 35 percent, each apex with 1 weak setule-notch, dorsolateral margins on each side without spinules.

Other Material: Juvenile male "c" 4.87 mm: Scarcely distinct from juvenile female; accessory flagellum with 4 articles, primary flagellum of antenna 1 with 9 articles, one calceolus each on articles 6–7; flagellum of antenna 2 with 8 articles; examples of spinosity on uropods: peduncle of uropod 2 with 2 dorsolateral spines, outer ramus with 3; inner ramus of uropod 3 with 1 spine.

Juvenile "d" 3.84 mm: Examples of morphology: main flagellum of antenna 1 with 7 articles, of antenna 2 with 7; peduncle of uropod 2 with 2 dorsolateral spines, outer ramus with 1; inner ramus of uropod 3 with 1 spine.

Juvenile "e" 3.48 mm: Examples of morphology: main flagellum of antenna 1 with 6 articles, of antenna 2 with 5; peduncle of uropod 2 with 1 dorsolateral spine, outer ramus with 1; inner ramus of uropod 3 naked.

ILLUSTRATIONS.—Not illustrated: mandibles (except palp), lower lip, and inner plate of maxilla 1 like *H. glutonis;* note inner plate of maxilla 2 smaller than in *H. glutonis*, outer plate and palp of maxilla 1 distinctive (illustrated).

MATERIAL.—SIO, Cruise Ship *Climax II*, station H232, 28°42.0′N, 155°29.2′W, 5899 m, 14 Jun 1977, funnel trap at 0 m (meaning at bottom), 14 specimens, including juvenile female "b" 5.03 mm (illustrated), male "c" 4.87 mm, juvenile "d" 3.84 mm, juvenile "e" 3.48 mm. SIO MPG-I, H248, 30°11.9′N, 157°52.7W, 5765 m, 9 Aug 1978, funnel trap at 0 m (at full depth), 5 specimens.

RELATIONSHIP.—No fully adult specimens are present.

This species is characterized by the distinctive appearance of

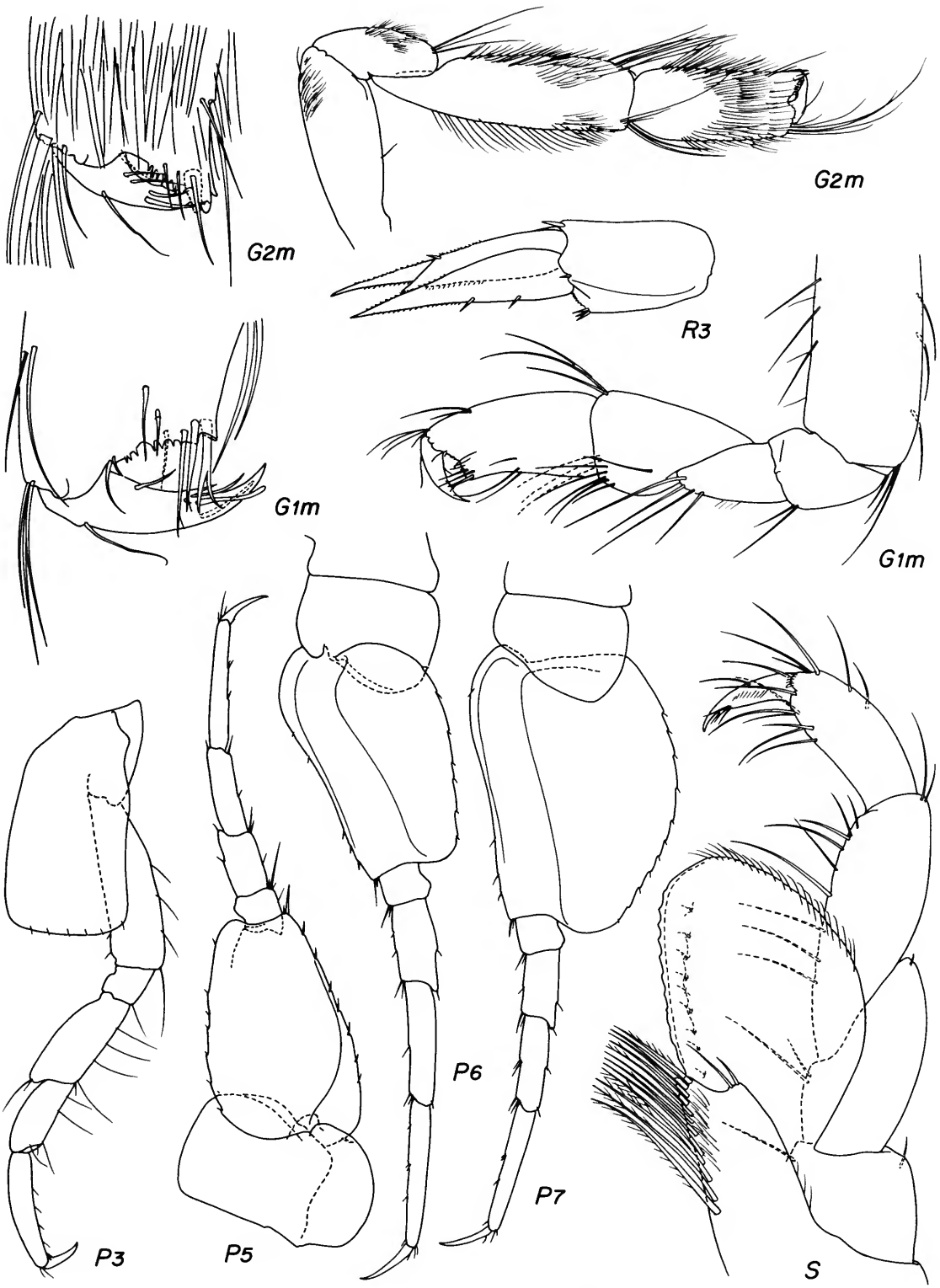

FIGURE 10.—*Hirondellea brevicaudata*, juvenile female "b" 5.03 mm.

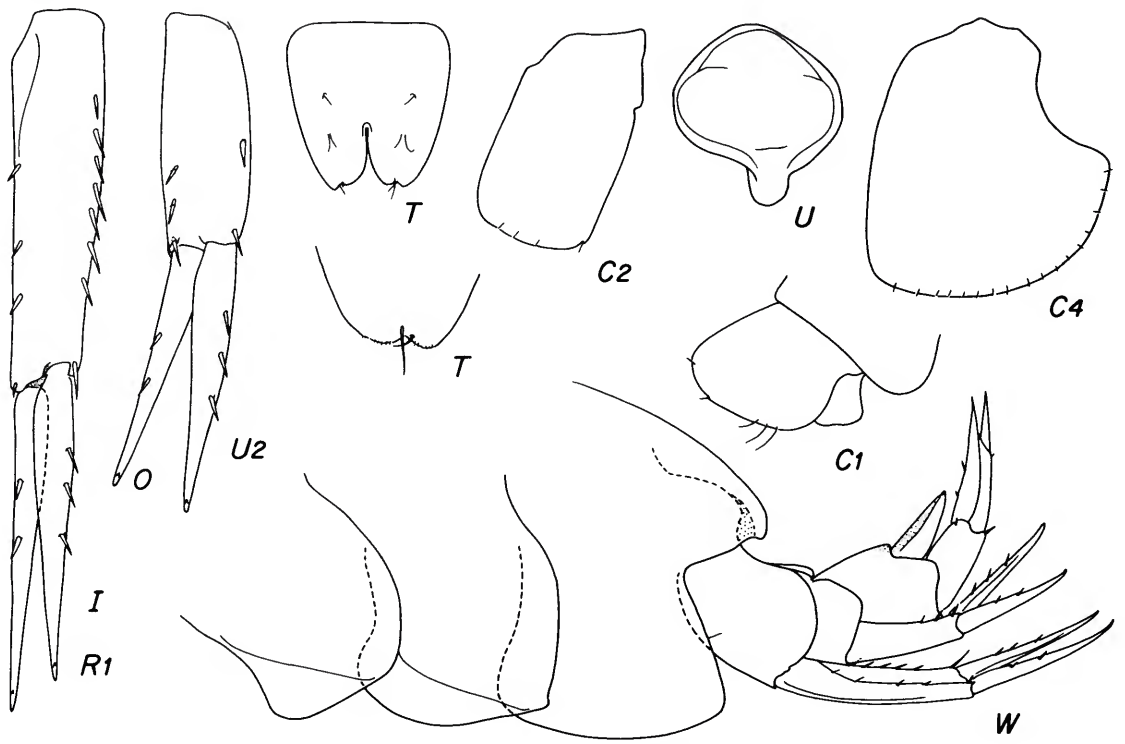

FIGURE 11.—*Hirondellea brevicaudata*, juvenile female "b" 5.03 mm.

the dorsum on the urosome, the rather flat dorsal hump, and the dense dorsal prickles. The species belongs with the group lacking an incision on the inner ramus of uropod 2; it further differs from *H. glutonis*, in the lack of flange on uropod 2 peduncle and many minute details of the outer plate and palp of maxilla 1, the inner plate of maxilla 2 and the maxilliped, the narrowness and poor lobation on article 2 of pereopods 5–6, and the shape and lack of spination on the telson. The medial spines on the peduncle of uropod 1 are slightly concentrated basally. Relative to the axial length of epimeron 3, pleonites 1–3 and urosomite 3 are taller than in *H. glutonis*, and uropods 1–2 are shorter, uropod 3 longer and epimeron 1 larger. We assume these characters are not connected with smallness of the subadults.

The distinctive appearance of the pleon, the lack of incision on the inner ramus of uropod 2, the narrowed article 2 of pereopods 5–6, the short telson, shape of gnathopods, short antennae, and sparse setation on coxa 1 relate this material specifically to *H. brevicaudata*, an Atlantic species.

To distinguish the material and the original description of *H. brevicaudata* from *H. dubia* Dahl (1959, Kermadec Trench) requires the minutiae mentioned by Dahl to be examined, as shown in the key to species. Hence, gnathopod 1 has the shorter and less-tapering propodus not characteristic of *H. dubia*. *Hirondellea brevicaudata* has a distinctive urosomite 1 because Dahl describes that of *H. dubia* as having a deep dorsal excavation.

Hirondellea brevicaudata differs from *H. gigas* Birstein and Vinogradov (1955) in the narrower article 2 of pereopods 5–6, shorter telson and in large adults (one assumes) the presence of only one inner tooth on the dactyl of gnathopod 1 (see key above). A juvenile 7 mm long depicted by Birstein and Vinogradov (1955) has only 1 inner tooth on the dactyl of gnathopod 1; however, that juvenile, which is larger than ours, has poorly developed setae on maxilla 2, weak palm of gnathopod 1, many fewer articles on flagella of antennae and such poorly developed inner teeth on the palp of maxilla 1 that we question the proper placement of our own material except by invoking the idea that species occurring in trenches have larger-bodied individuals.

Possible characters of value left undescribed in the literature include medial armament on palp of maxilla 1 (*H. brevicaudata* original description, *H. dubia*, *H. gigas*); details of spine pattern on outer plate of maxilla 1 (*H. brevicaudata*, *H. dubia*, *H. gigas*); and full dorsal configuration of pleon (*H. dubia*, *H. gigas*).

DISTRIBUTION.—Atlantic Ocean 3000–5940 m (minimum depth based on 0–3000 m tows); Pacific Ocean, north of Hawaii, 5765–5899 m.

Orchomene Boeck

Orchomene Boeck, 1871:114 [*Anonyx serratus* Boeck, 1861, selected by Boeck, 1876].—J.L. Barnard, 1964b:82 [key].—Lincoln, 1979:68. [Valid subgenus.]

Tryphosa Boeck, 1871:117 [*Anonyx nanus* Kroyer, 1846b, selected by Boeck, 1876].

Orchomenella Sars, 1895:66 [*Anonyx minutus* Kroyer, 1846b, original designation of Sars, 1895:67]. [Valid subgenus.]

Orchomenopsis Sars, 1895:73 [*Orchomenopsis obtusa* Sars, 1895, monotypy]. [Valid subgenus.]

?Allogaussia Schellenberg, 1926a:245 [*Allogaussia paradoxa* Schellenberg, 1926a, selected by Stasek, 1958]. [?Valid genus.]

Orchomenonyx de Broyer, 1984:198 [*Orchomenella macronyx* Chevreux, 1905, original designation]. [Valid subgenus of *Orchomenopsis*.]

Abyssorchomene de Broyer, 1984:198 [*Orchomenella chevreuxi* Stebbing, 1906, original designation]. [Valid subgenus.]

CLASSIFICATION.—This complex of genera and subgenera is being worked out slowly in the 1980s and 1990s, but is too difficult to treat in more than a superficial way until all of the species have been allocated to their proper genera by the taxonomists engaged in the study. If we allocated to their genera and subgenera various species that have been studied adequately, a pool of taxa would still remain that would have to be "dumped" into *Orchomene*. The species are divided into subgenera on the basis of extremely small characters that we have not yet been able to use adequately even on preserved specimens. We prefer therefore to leave these taxa together under the genus *Orchomene*, and refer to them, for the most part, in this section without generic identification.

A summary of the sketchy distinctions of the taxa listed in the synonymy is as follows: *Orchomene* with mandibular molar in the form of a crest or comb bearing cusps, denticles and "setae" (actually pubescence), outer plate of maxilliped without 2 strong apical spines; *Orchomenella* with mandibular molar button-shaped (truncated cylinder) and armed with denticles and cusps but no pubescence, outer plate of maxilliped with 2 strong apical spines; this is divided into subgenus *Orchomenella* with carpal lobe broad and propodus not excavate along posterior margin; and subgenus *Orchomenopsis* with carpal lobe thinner and propodus with excavate posterior margin; *Abyssorchomene* with molar like *Orchomene*, maxilliped like *Orchomenella* and gnathopod 1 like *Orchomenopsis; Allogaussia* differing from above genera in lack of coxal gill 7, grotesquely enlarged basis of pereopod 5, uncleft telson and an "elongate" peduncle of antenna 1. We find some of these characters very difficult to evaluate and await further clarification.

DIAGNOSIS.—Mouthparts forming quadrate bundle. Labrum and epistome typically differentially produced, prominent, separate, usually epistome slightly to strongly dominant in size and projection, blunt. Incisor ordinary; molar triturative or simple, medium to small, occasionally conicolaminate or subconical, setulose, palp attached strongly proximal to molar. Inner plate of maxilla 1 weakly (2) setose; palp biarticulate, large. Inner and outer plates of maxilliped well developed, palp slightly exceeding outer plate, dactyl well developed.

Coxa 1 large and visible, not tapering.

Gnathopod 1 subchelate, palm oblique to transverse, articles 5 and 6 subequal, or 5 shorter than 6, dactyl medium; article 6 of gnathopod 2 shorter than article 5, ordinary, propodus minutely subchelate.

Inner ramus of uropod 2 without notch. Uropod 3 ordinary, peduncle ordinary, inner ramus slightly shortened, outer ramus 2-articulate. Telson ordinary, weakly to deeply (type) cleft or emarginate or entire.

SEXUAL DIMORPHISM.—Male eyes enlarged, antenna 1 stouter and more strongly armed, antenna 2 elongate, with dorsal male setae on articles 4–5 (but often these also present in female), flagellum calceolate, urosomite 1 often more strongly humped and notched dorsally, rami of uropod 3 more subequal and more setose, article 2 on outer ramus often obsolescent to absent.

VARIABLES.—Article 1 of primary flagellum and usually of accessory flagellum elongate in both sexes (but scarcely so in *pelagica*) (not in *franklini*, etc.).

Epistome triangularly produced (*oxystoma*, is this *Tryphosites*?); epistome and upper lip not differentially produced (*chilensis, pinguis*, etc.), upper lip dominant (*rossi*, etc.), weakly so (*holmesi*), epistome dominant (*minuta, serrata*, etc.), epistome large and nasiform but poorly separated from labrum (*batei*).

Molar more or less universal, triturative and symmetrical (*goniops, chelipes*) to setulose and conicolaminate, thus asymmetrical (*obtusus*), kernalled and furnished strongly with pubescence between rakers and molar (for example, *crispata, amblyops, pectinata*), not so (*nanus*); see Olerod, 1975, for discussion of possible generic values in molar and on outer plate of maxilliped). Article 1 of mandibular palp elongate (*magdalenensis*); palp strongly proximal to molar (European species, especially *serratus, crispatus, humilus, pectinatus*, also *chilensis*), poorly proximal (*hureaui, chelipes, goniops, plebs*). Inner plate of maxilla 1 with 2 + 2 setae (*hureaui*); spines on outer plate reduced and fused together or broadened (*arnaudi*, etc.). Coxa 1 geniculate forward, (*lobata* and some specimens of *nanus*); coxa 1 tapering distally (*goniops, crenatus, pinguides*, etc.), slightly beveled (*littoralis, chelipes, tabarini*), expanded apically (*plebs*, etc.). Gnathopod 1 weakly chelate (*charcoti, chelipes, reconditus*, etc.); article 3 elongate (*plicatus*); article 5 very short but with long lobe (*plicatus*) or with long lobe only (*rotundifrons, pelagicus, obtusus*, etc.), less lobate (*minutus*). Article 2 of pereopod 5 grotesquely lobate (*Allogaussia*, for example, *paradoxus, pinguides*, etc.); article 2 of pereopods 5–7 generally diverse. Epimeron 3 smooth or serrate. Outer rami of uropods 1–2 often slightly shortened, or inner ramus shortened (*littoralis*); peduncle of uropod 3 plate-like (*franklini, grimaldii*, etc.), or not (*rossi*, etc.); inner ramus of uropod 3 significantly reduced (*grimaldii, morbihanensis*). Telson cleft (typical) to entire (*Allogaussia*, for example, *goniops*), or barely cleft and emarginate (*gri-*

maldii and *chelipes*); telson elongate (*abyssorum*).

REMARKS.—In regard to distinctions among the several genera put into synonymy here, we have studied Olerod (1975) and place *O. distinctus* and *O. abyssorum*, described below, into the subgenus *Abyssorchomene*. This is based on the "large" triturative area of the mandible, with the "hairy process" situated medially, combined with the emergence of 2 long apical spines on the outer plate of the maxilliped. Olerod found that the type species of *Orchomene* has a very small triturative area, a proximal "hairy process," and unemergent apical spines on the outer plate of the maxilliped. He put the description of the outer plate on the maxilliped in different words than we use here because we see the difference between outer plates of *Orchomene* and *Orchomenopsis-Orchomenella* simply as the emergence or non-emergence of the apical spines and see no particular distinction in the medial and apical spines as being of different kinds as implied by Olerod. Only the type species of *Orchomenopsis* and *Orchomenella* and 5 species of *Orchomene* were studied by Olerod. Until a wider range of species in the complex outside the northeast Atlantic can be studied we prefer to assume these genera represent a range of transformations.

RELATIONSHIP.—Differing from *Tryphosites* in the unnotched inner ramus of uropod 2 and the shorter carpus of gnathopod 1, which is shorter than the propodus.

Orchomene oxystomus has a sharp protruding epistome like *Tryphosites* but is distinguished by the above differences.

From *Uristes* and *Tryphosella* in the larger head and non-tapering, unreduced coxa 1.

Merging with *Lepidepecreum* but distinguished by the lack of carinations on antenna 1.

See *Gronella*.

REMOVALS.—*abyssalis* Stephensen (1925) to *Uristes; groenlandicus* (Hansen, 1888) to *Gronella; takoradia* J.L. Barnard (1961) to *Adeliella; reductus* (Schellenberg, 1931) to *Falklandia*.

SPECIES.—See K.H. Barnard (1932); Bellan-Santini (1972a,b); Chevreux and Fage (1925); Gurjanova (1951, 1962); Hurley (1963); G.S. Karaman (1973); Krapp-Schickel (1974); Ledoyer (1977); Lowry and Bullock (1976); Nicholls (1938); Olerod (1975, mouthparts); Reid (1951); Schellenberg (1925, 1926a, 1942); Shoemaker (1920, 1930a,b, 1955); Stephensen (1923a,b, 1925, 1928, 1929, 1935, 1944).

aahu Lowry and Stoddart, 1983 [840]

abyssorum Stebbing, 1888.—Nicholls, 1938.—Birstein and Vinogradov, 1960, 1962, 1964 [420BAV]

acanthurus (Schellenberg, 1931).—Shoemaker, 1945.—Thurston, 1974.—de Broyer, 1985b [870]

amblyops Sars, 1895.—Stephensen, 1935.—Gurjanova, 1951 [216B]

anaquelus J.L. Barnard, 1964b [373]

[dubious species: *annulatus* (Bate, 1862).—Steele, 1969 (but see Gurjanova, 1962, as *Lepidepecreum* [395])]

arnaudi Bellan-Santini, 1972b [870]

cavimanus Stebbing, 1888.—J.L. Barnard, 1961.—Bellan-Santini, 1972a,b.—Thurston, 1979.—Andres, 1983.—c. *rostratus* Schellenberg, 1931 [800BAV + ?303]

charcoti (Chevreux, 1912a,b).—K.H. Barnard, 1932.—Schellenberg, 1931 [870]

chelipes (Walker, 1906, 1907).—de Broyer, 1975 [881]

chevreuxi (Stebbing, 1906) (= *excavata* Chevreux, 1903, homonym) (valid despite J.L. Barnard, 1961) [304A]

chilensis (Heller, 1868).—Schellenberg, 1931, part.—Hurley, 1965b [765]

commensalis (Chevreux and Fage, 1925) [?353]

crenatus (Chevreux and Fage, 1925).—Reid, 1951 [330]

crispatus (Goes, 1866).—Sars, 1895.—Gurjanova, 1951 [240 + B]

decipiens (Hurley, 1963).—J.L. Barnard, 1966a,b, 1971 [379 + B]

depressus Shoemaker, 1930b [254]

dilatatus (Chevreux, 1903, 1935) [302A]

distinctus (Birstein and Vinogradov, 1960) [531A]

faeroensis Stephensen, 1923b [209B]

franklini (Walker, 1903) (= *litoralis* Schellenberg, 1926a) [*Allogaussia*].—Hurley, 1965a.—Bellan-Santini, 1972a,b.—Andres, 1983) [870]

galeatus (Schellenberg, 1926a) [*Allogaussia*] [881]

gerulicorbis Shulenberger and Barnard, 1976 (= *affinis* ID of Birstein and Vinogradov, 1955).—Thurston, 1979 [422A]

glabrus (Lagardere, 1968) [295]

goniops Walker, 1906, 1907.—de Broyer, 1975 [876]

grimaldii Chevreux, 1890.—G.S. Karaman, 1973 [340 + B]

guillei de Broyer, 1985a [851]

hanseni Meinert, 1893 (? = *melanophthalmus* Norman, 1867).—Sars, 1895.—Stephensen, 1923a [240]

hiata Andres, 1983 [870,875+B]

holmesi (Hurley, 1963) [369 + B]

humilis (Costa, 1853, 1857) (= *goesii* Della Valle, 1893) (= *batei* Sars, 1883, 1895; Gurjanova, 1951).—Lincoln, 1979 [352]

hureaui de Broyer, 1973 [878]

indicus (Giles, 1890) (see *mannarensis*) [664]

intermedius (Gurjanova, 1962) [389]

japonicus (Gurjanova, 1962).—Kudrjaschov, 1972 [389]

kryptopinguides Andres, 1983 [871]

laevipes Stephensen, 1923b [209B]

lepidulus (Gurjanova, 1962).—Bryazgin, 1974 [280 + B]

littoralis (Nagata, 1965) (= sp. Nagata, 1960) [395]

lobatus (Chevreux, 1907, 1935).—Stephensen, 1935.—Gurjanova, 1951 [295 + B]

macronyx (Chevreux, 1905, 1906).—Bellan-Santini, 1972.—Thurston, 1972) [800I]

macrophthalmus (Birstein and Vinogradov, 1962) [*Allogaussia*] [806B]

macroserratus Shoemaker, 1930b.—Dunbar, 1954.—Gurjanova, 1962.—Bryazgin, 1974 [200]

magdalenensis (Shoemaker, 1942).—J.L. Barnard, 1964a,b, 1969a,b) [370]

?mannarensis (Rabindranath, 1971) (? = *Anonyx indicus* Giles, 1890) [664]

massiliensis Ledoyer, 1977 [348 +B]

melanophtalmus [misspelling] (Gurjanova, 1962) [not *melanophthalmus* Norman, see *hanseni*] [286]

minor Bulycheva, 1952.—Gurjanova, 1962.—Kudrjaschov and Zvjagintsev, 1975 [389]

minusculus (Gurjanova, 1962).—Kudrjaschov, 1972 [389]

minutus (Kroyer, 1846a,b).—Sars, 1895.—Bousfield, 1973 [200]

morbihanensis Bellan-Santini and Ledoyer, 1974 [851]

musculosus Stebbing, 1888.—J.L. Barnard, 1961 [280N + 7740A]

nanus (Kroyer, 1846a,b) (= *ciliata* G.O. Sars, 1883, 1895).—G.S. Karaman, 1973.—Lincoln, 1979 [385]

naviculus (K.H. Barnard, 1932) [*Allogaussia*] [871 + B]

nodimanus (Walker, 1903).—Bellan-Santini, 1972a,b.—Thurston, 1974 [870]

nugax (Holmes, 1904).—Gurjanova, 1962 [277]

obtusus (Sars, 1895) (= *affinis* Holmes, 1908).—Hurley, 1963 [210 + B]

oxystomus Stephensen, 1923b [212A]

pacificus (Gurjanova, 1938, 1951, 1962).—J.L. Barnard, 1971 [230 + B]

paradoxus (Schellenberg, 1926a) [*Allogaussia*] [881]

pectinatus Sars, 1883, 1895.—Gurjanova, 1951 [200 + B]

pelagicus (Birstein and Vinogradov, 1960) [523A]

pinguides (Walker, 1903) [*Allogaussia*] (= *lobata* K.H. Barnard, 1932.—Hurley, 1965a) [870]

pinguis (Boeck, 1861).— Sars, 1895.—Bousfield, 1973 [200 + B]

plebs (Hurley, 1965c).—Bellan-Santini, 1972.—Thurston, 1974.—Andres, 1983 [870 + B]

plicatus (Schellenberg, 1926a) (= *chilensis* ID of Schellenberg, 1925).—Griffiths, 1973, 1974a,b, 1975 [743]

proximus (Chevreux, 1903, 1935) [401B]

reconditus (Stasek, 1958) [*Allogaussia*] [371]

rossi (Walker, 1903).—Hurley, 1965a.—Andres, 1979, 1983 [870 + B]

rotundifrons (K.H. Barnard, 1932).—Thurston, 1974a,b [870]

schellenbergi Thurston, 1972 [833]

scotianensis Andres, 1983 [871 + B]

serratus (Boeck, 1861).—Sars, 1895.—Vader, 1969 [200 + B]

sibirjakovi Gurjanova, 1951 [220 + B]

similis Chevreux, 1912b.—Chevreux and Fage, 1925.—Toulmond, 1964 [242]

tabarini Thurston, 1972, 1974a.—Andres, 1979, 1983 [875]

tabasco J.L. Barnard, 1967 [309B]

thorii Stephensen, 1923b [209B]

triangulus (Stephensen, 1925).—Gurjanova, 1951 [253]

tschernyschevi Bruggen, 1909.—Stephensen, 1935.—Gurjanova, 1951 [216 + 280]

ultimus Bellan-Santini, 1972b [878]

zschaui (Pfeffer, 1888).—Schellenberg, 1931.—K.H. Barnard, 1932.—Stephensen, 1938.—Andres, 1983 [833 +871B]

species (plural).—Sowinsky, 1898 [334]

affinis ID of Sivaprakasam, 1968 [664]

DISTRIBUTION.—Marine, cosmopolitan, but mostly cold or deep water, rare in shallow tropics, occasionally inquilinous, 0–9938 m, 79 species.

Orchomene (Abyssorchomene) distinctus Birstein and Vinogradov, new combination

FIGURES 12–14

Orchomenella distinctus Birstein and Vinogradov, 1960:191–192, fig. 10.

DIAGNOSIS.—(Based on new material.) Lateral cephalic lobes broadly rounded. Eyes long, flask-shaped, very pale pink, mostly glandular, ommatidia not evident, about 60 percent as high as head. Peduncle of antenna 1 not keeled. Epistome and upper lip each rounded anteriorly, projecting equally, epistome weakly dominant in size. Each mandible with 3 rakers, molar of medium size, trituration surface of medium extent, with 4 crater-pits, hairy process attached medial to molar; article 1 of palp very short. Inner plate of maxilliped with mediodistal extension.

Carpus of gnathopod 1 short, posterior lobe narrow, scarcely exceeding posterior tangential line between merus and propodus, lobe rounded apically, propodus 2.2 times as long as carpus, weakly tapering, posterior margin weakly sinuate, lacking tubercle, palm transverse, convex, almost chelate, dactyl barely overriding palm. Carpus of gnathopod 2 elongate, about 0.35 times as wide as long, propodus about 0.55 times as long as carpus, 60 percent as wide as long, scarcely narrower than carpus, palm elongate, transverse, sinuate, dactyl long but covering only 60 percent of palmar edge, palm defined by cusp.

Coxa 5 with weak posterior lobe exceeding anterior ventral tangent. Article 2 of pereopods 5–7 with sparse, very weak posterior setule-notches. Article 2 of pereopod 5 of normal breadth and dimensions. Article 4 of pereopod 5 weakly expanded and bearing posterior setae, of pereopods 6–7 narrower and with short posterior spines only; article 6 of pereopods 5–7 much longer and slightly narrower than article 5.

Epimeron 3 broadly rounded posteroventrally, smooth. Dorsal process of urosomite 1 hood-shaped, weakly overvaulting urosomite 2. Female uropod 3 setose on medial margins of both rami, outer non-apical margins with 2 (outer) and 1 (inner) spines. Telson cleft about 53 percent of its length.

DESCRIPTION.—Female "o": See illustrations. Upper lip with asymmetrical weakly bifid anterior lobe (shown unrolled in one illustration). Weakly plaited gills present on coxae 2–7, those of coxae 5–6 with conical accessory lobe. Oostegites poorly developed, bearing only few setal buds.

Other Material: Male "r": Poorly developed; callynophore better developed than in female "o"; antenna 2 flagellum beginning to proliferate, calceoli present.

ILLUSTRATIONS.—Uropod 3 and telson equally magnified, uropod 2 less, uropod 1 even less. Maxillae 1–2 evenly magnified. Male antenna 2 enlarged more than antenna 1. One view of upper lip showing ventral lobe unrolled from normally curled position.

MATERIAL.—Illustrated, Biocyarise 84-39, 12°48.6′, 103°56.7′W, 2635 m, 16 Mar 1984, 2635 m, subsample aspirator (1 specimen), subsample in vestimentiferan refuse (24 specimens), female "o" 13.92 mm, prinicpal illustration, female "p" 15.92 mm, female "q" 14.04 mm, male "r" 12.32 mm; specimens "o," "q," and "r" were of gluttonous form. Other material from the same locality: Biocyarise 84-33, 12°48.6′N, 103°56.7′W, 2635 m, 10 Mar 1986, aspirator, mature female about 17 mm long, with fully setose oostegites; PL 37, left tubes, one female; Biocyarise 84-38, 12°48.8′N, 103°56.8′W, 2635 m, aspirator, 4 specimens.

REMARKS.—The original description of this species con-

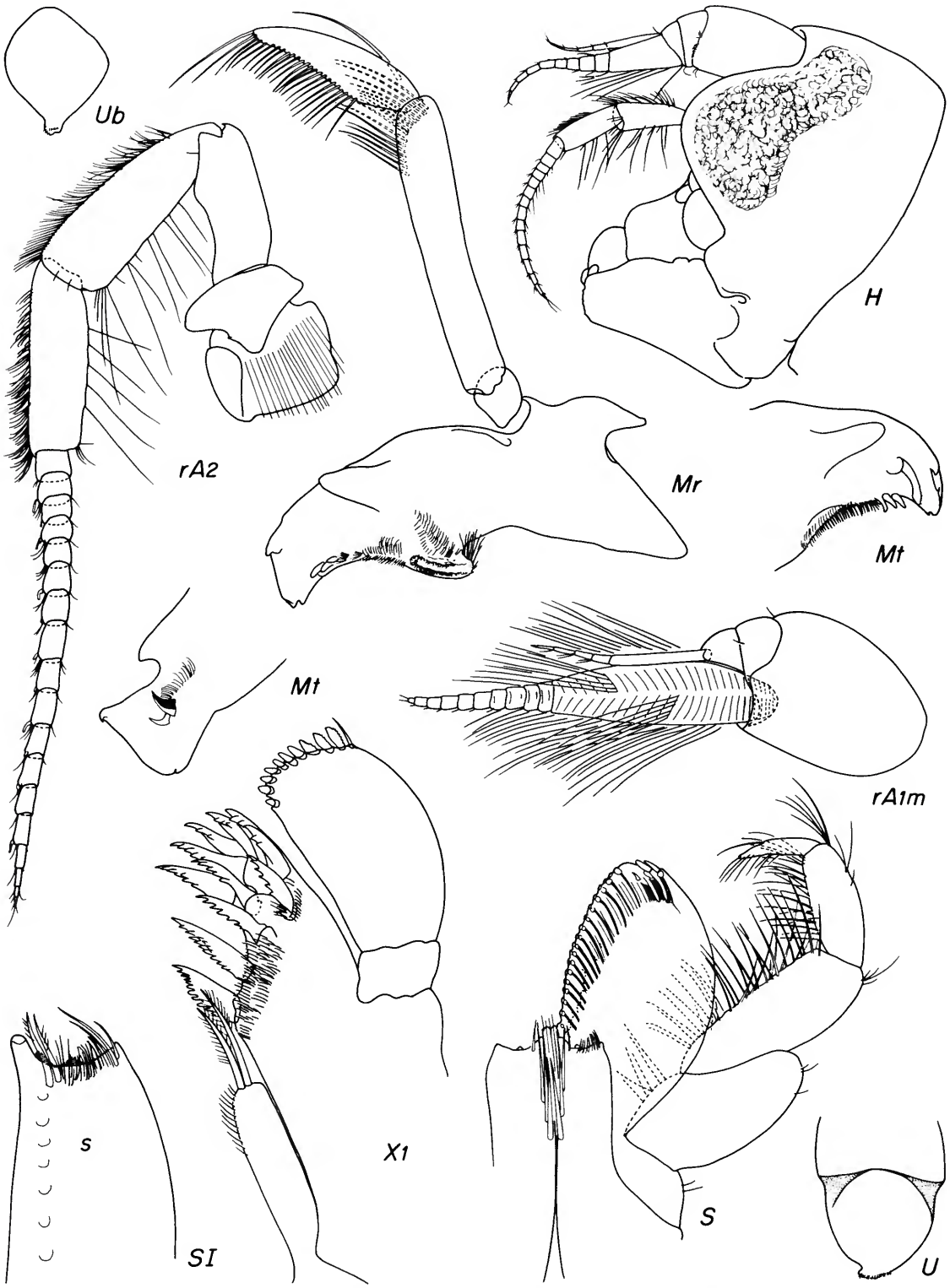

FIGURE 12.—*Orchomene distinctus:* unattributed figures = female "o" 13.92 mm; r = male "r" 12.32 mm.

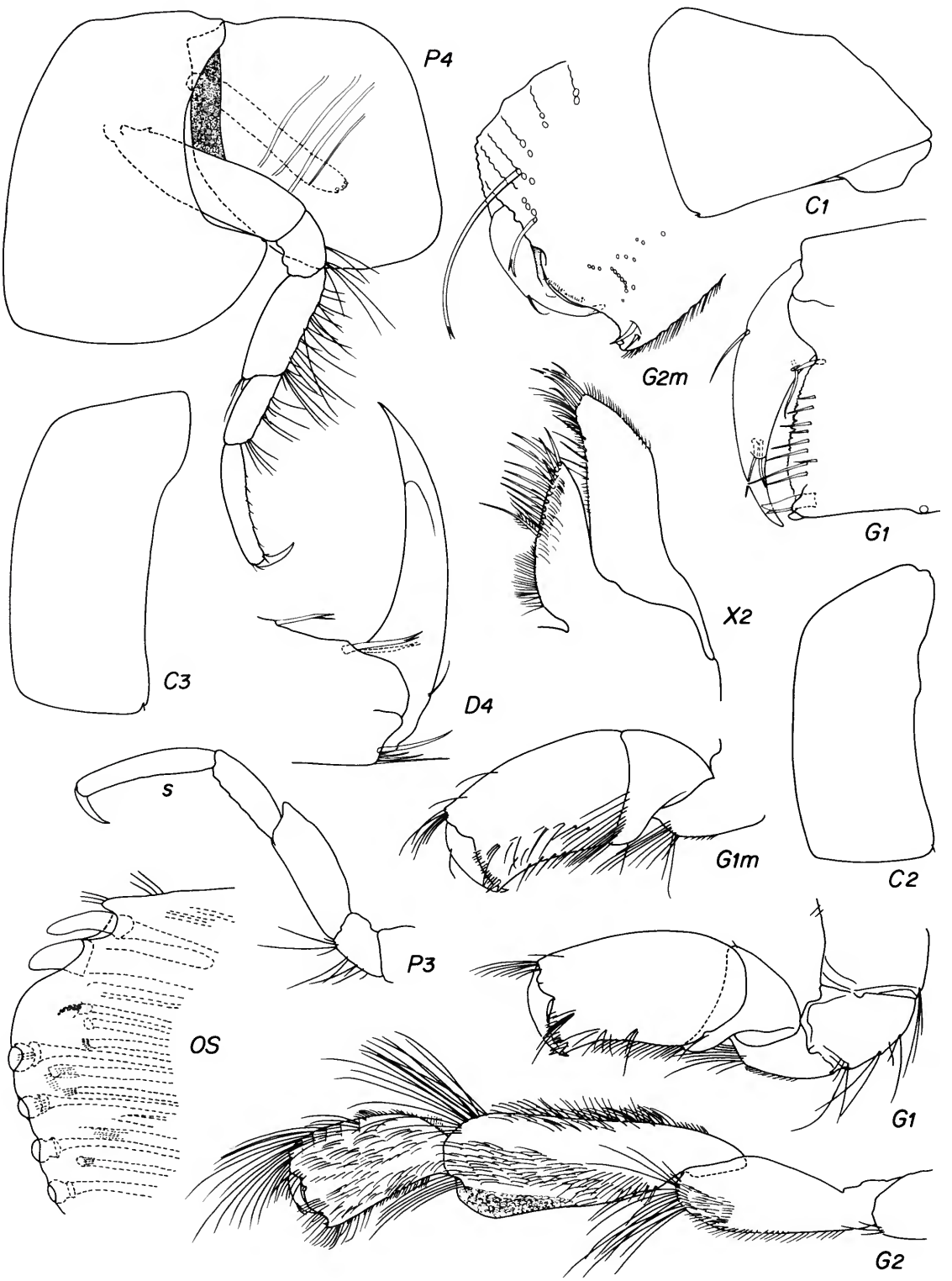

FIGURE 13.—*Orchomene distinctus*, female "o" 13.92 mm.

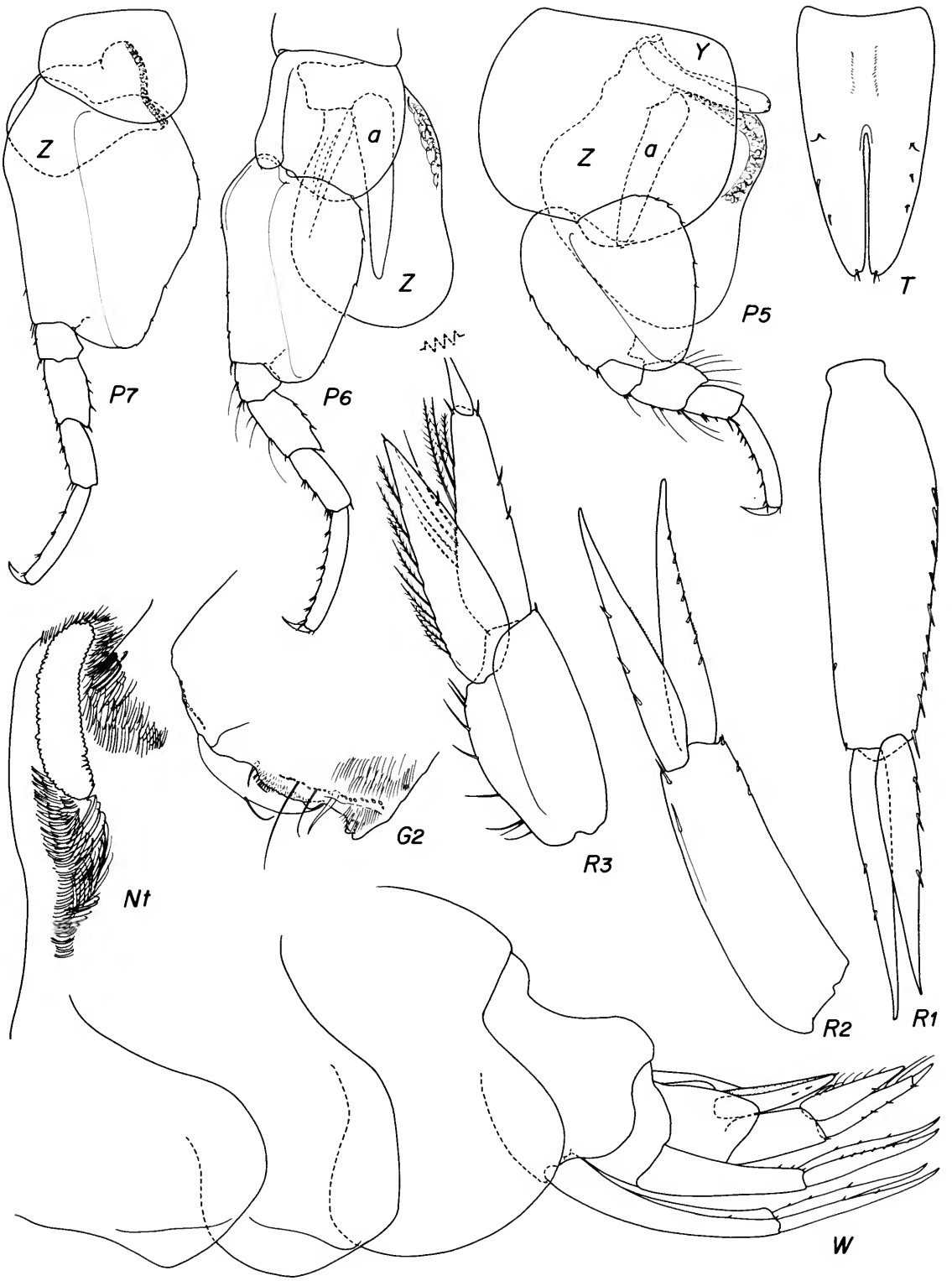

FIGURE 14.—*Orchomene distinctus*, female "o" 13.92 mm.

tained illustrations only of antenna 1, palp of maxilla 1, maxilla 2, gnathopods 1-2, urosomite 3 with epimeron 3, uropod 3 and the telson. The species, is however, so unique within the *Orchomene* complex because of the shape of gnathopod 2 that we have no hesitation in identifying our material with *O. distinctus*.

DISTRIBUTION.—Type locality, near Palau, 5°02′N, 135°33′E, 4732 m, trawl 0-2000 m; East Pacific vent region 13°N, 2635 m.

Orchomene (Abyssorchomene) abyssorum Stebbing, new combination

FIGURES 15-17

Orchomene abyssorum Stebbing, 1888:676-679, pl. 21; 1906:84.—Chevreux, 1900:23-24; 1903:92; 1905:7; 1935:59-60.—Stephensen, 1925:125.—Nicholls, 1938:35-36, fig. 15.—Dahl, 1954:282.—Birstein and Vinogradov, 1960:188-189, fig. 8; 1962:44; 1964:164.

?Not *Orchomenopsis chilensis* forma *abyssorum* Schellenberg, 1926a:291-292, fig. 27.

?Orchomenella abyssorum K.H. Barnard, 1932:69, figs. 27b, 28.—?Nicholls, 1938:35-36, fig. 15.

DIAGNOSIS.—(Based on new material.) Lateral cephalic lobes broadly rounded. Eyes long, lunate, colorless in alcohol, glandular, ommatidia not evident, about 40 percent as high as head. Peduncle of antenna 1 barely keeled. Epistome flat and and upper lip rounded anteriorly, projecting equally, epistome weakly dominant in size. Each mandible with 3 rakers, molar of medium size, trituration surface of medium extent, with 4 crater-pits, hairy process attached medial to molar; article 1 of palp very short. Inner plate of maxilliped with mediodistal extension.

Carpus of gnathopod 1 short, posterior lobe narrow, well exceeding posterior tangential line between merus and propodus, guarding propodus, lobe rounded apically, propodus 1.75 times as long as carpus, weakly tapering, posterior margin weakly sinuate, lacking tubercle, palm transverse, convex, almost chelate, dactyl barely overriding palm. Carpus of gnathopod 2 not greatly elongate, about 0.40 times as wide as long, propodus about 0.44 times as long as carpus, 50 percent as wide as long, much narrower than carpus, palm short, chelate, not lunate, dactyl short and covering 100 percent of palmar edge, palm defined by thin spinule and bearing weak inner setal basket.

Coxa 5 with weak posterior lobe exceeding anterior ventral tangent. Article 2 of pereopods 5-7 with sparse, weak posterior setule-notches. Article 2 of pereopod 5 of normal breadth and dimensions. Article 4 of pereopod 5 weakly expanded and bearing posterior few posterior setae, of pereopods 6-7 narrower and with short posterior spines only; article 6 of pereopods 5-7 much longer and slightly narrower than article 5.

Epimeron 3 weakly sinuous posteriorly, produced into weak blunt tooth posteroventrally, smooth. Dorsal process of urosomite 1 hood-shaped, weakly overvaulting urosomite 2. Female uropod 3 sparsely setose on medial margins of both rami, outer non-apical margins naked. Telson cleft 50 percent of its length.

DESCRIPTION.—Male "s": See illustrations. Right antenna 2 with only one calceolus present, on article 4 of flagellum; see left antenna 2 illustrated. Upper lip with asymmetrical weakly bifid anterior lobe as shown for *O. distinctus*. Left lacinia mobilis with 2 apical prongs. Weakly plaited gills present on coxae 2-7, those of coxae 5-6 with terete accessory lobe. Male penes extremely small and located centrally on sternite 7. Oostegites unknown, female not collected.

ILLUSTRATIONS.—Uropod 3 and telson equally magnified, uropod 2 less, uropod 1 even less. Maxillae 1-2 not evenly magnified. Straw-like publescence on enlargement of inner plate on maxilliped reduced in illustratioon. Enlargement for gnathopod 2 more magnified than for gnathopod 1; note on propodus apex of gnathopod 2 medial side with giant complex setae, lateral side with thin simple setae. Dactyl of pereopods 3-4 like *O. abyssorum* illustration.

MATERIAL.—Illustrated, SIO Station 882, Galapagos Vents, 00°47.9′N, 86°09.2′W, 23 Jan 1979, 2491 m, mussel bed, clam bucket residue, one male "s" 6.41 mm.

REMARKS.—The single male specimen corresponds favorably with the original description of the species and with Birstein and Vinogradov's (1960) figures and description. These are the only other firm identifications for this species, the original from the South Atlantic off Buenos Aires at 3578 m and the second from north of New Zealand at about 3000 and 9000 m. This would seem to confirm that this species may have a worldwide abyssal distribution. The record by K.H. Barnard (1932) from the South Shetlands 0-800 m seems doubtful owing to remarks by Barnard on the maxillae. The record by Nicholls (1938) must be questioned because he saw only 7 or 8 spines on the outer plate of maxilla 1; however, the configuration of spines on those plates can be misleading, with only 8 showing clearly. The record by Schellenberg (1926a) is clearly wrong because of distinctive shapes on gnathopod 2 and epimeron 3. Despite those probable misidentifications of antarctic material, the unsubstantiated records by Birstein and Vinogradov (1962 and 1964) of antarctic material must be accepted because of the correct identification in (1960). Those records range between 210 and ?3700 (?9120) m (calculating bottom depths and wire lengths). Dahl (1954) also found the species at 550-560 m in the antarctic in Ross Sea. Stephensen (1925) reported the species from west of Iceland, 2317 m; and Chevreux (1900, 1903, and 1935) gave numerous records from the North Atlantic Ocean between depths of 1414 and 4330 m.

DISTRIBUTION.—Type locality, off Buenos Aires; confirmed also from north of New Zealand and from the Galapagos Vent area, 2491 m; depths generally 550 to 4330 m; if other antarctic records prove to be valid, depths in Antarctica may be much shallower; and individuals there may be very abundant.

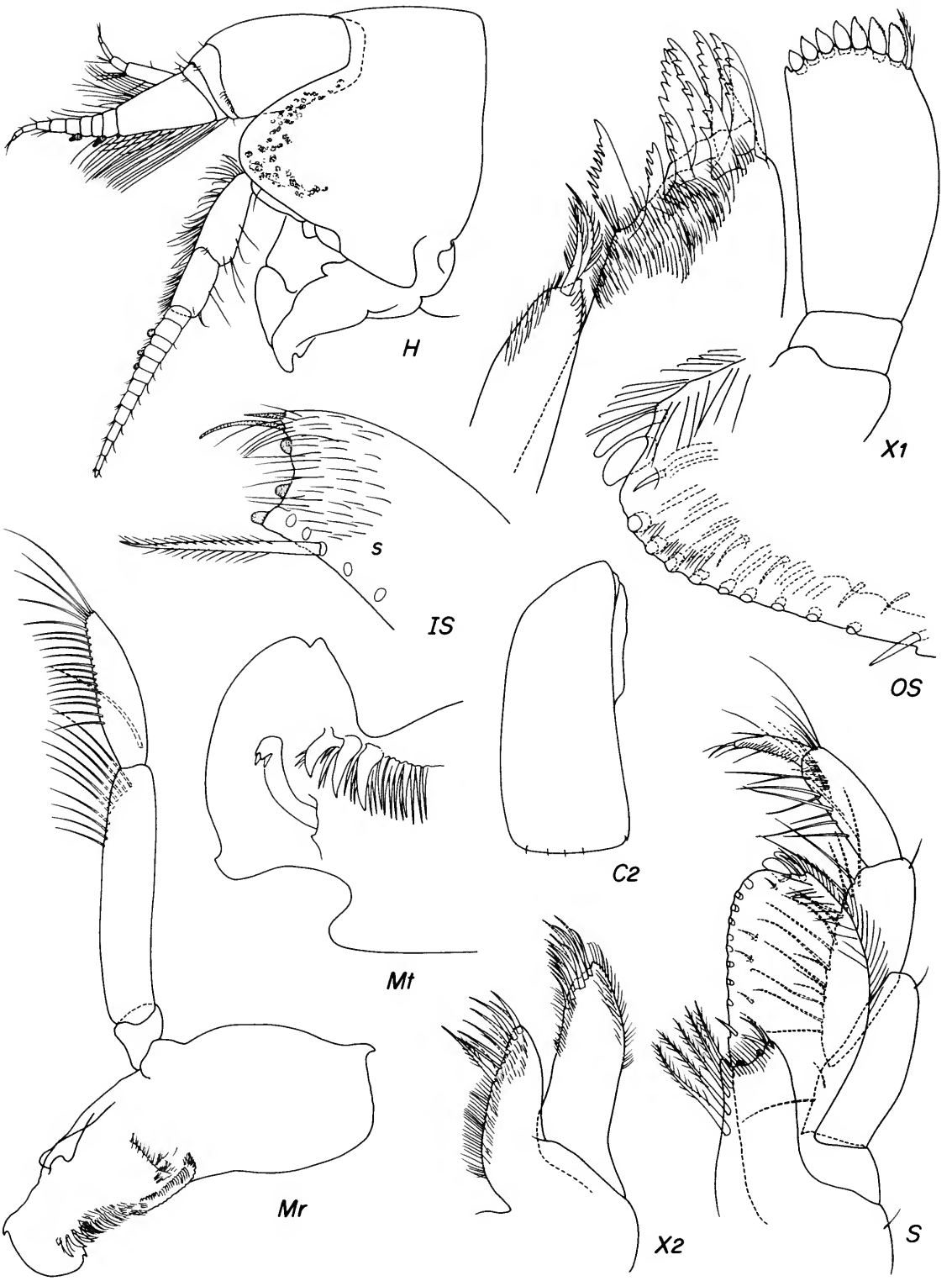

FIGURE 15.—*Orchomene abyssorum*, male "s" 6.41 mm.

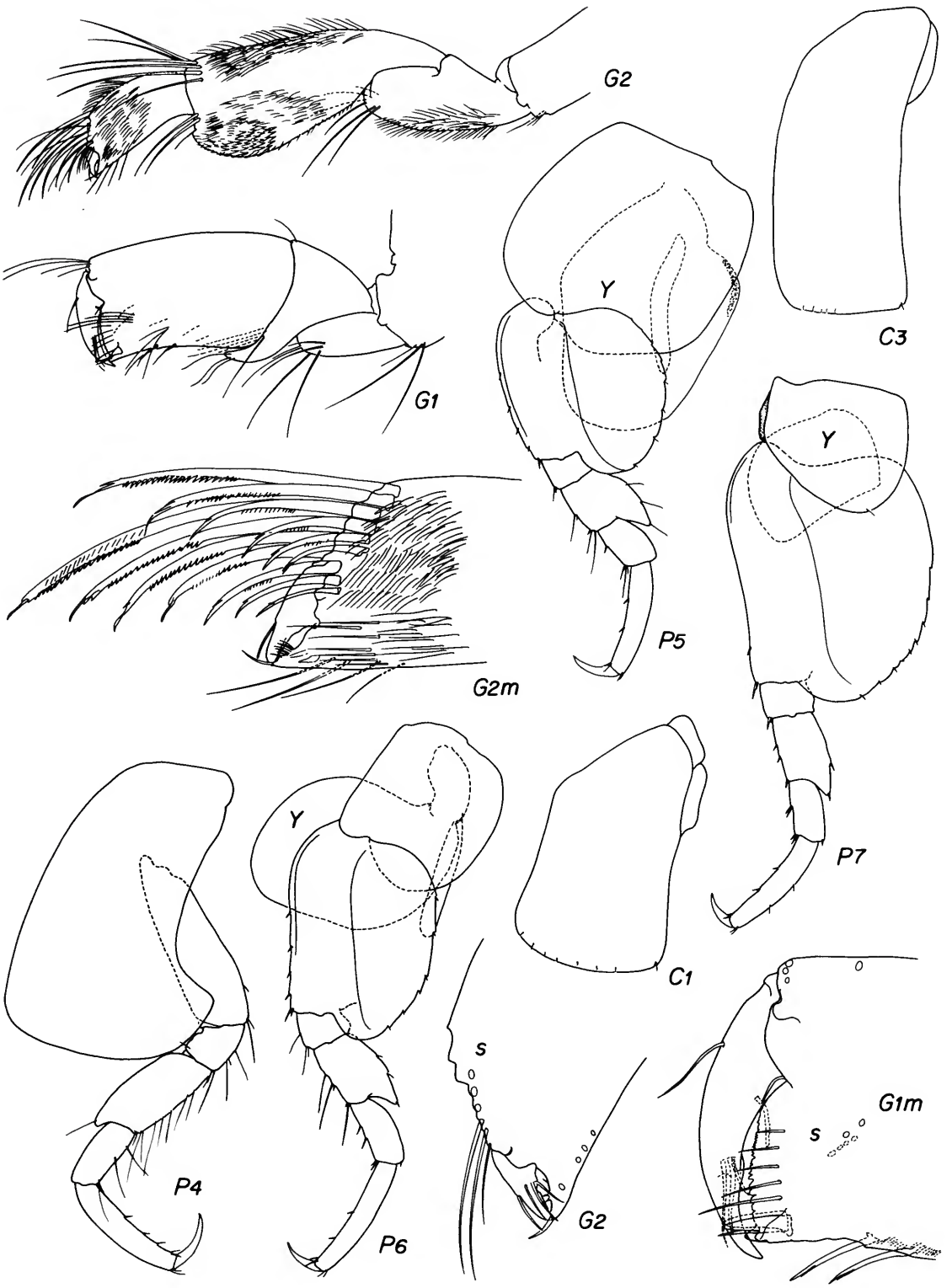

FIGURE 16.—*Orchomene abyssorum*, male "s" 6.41 mm.

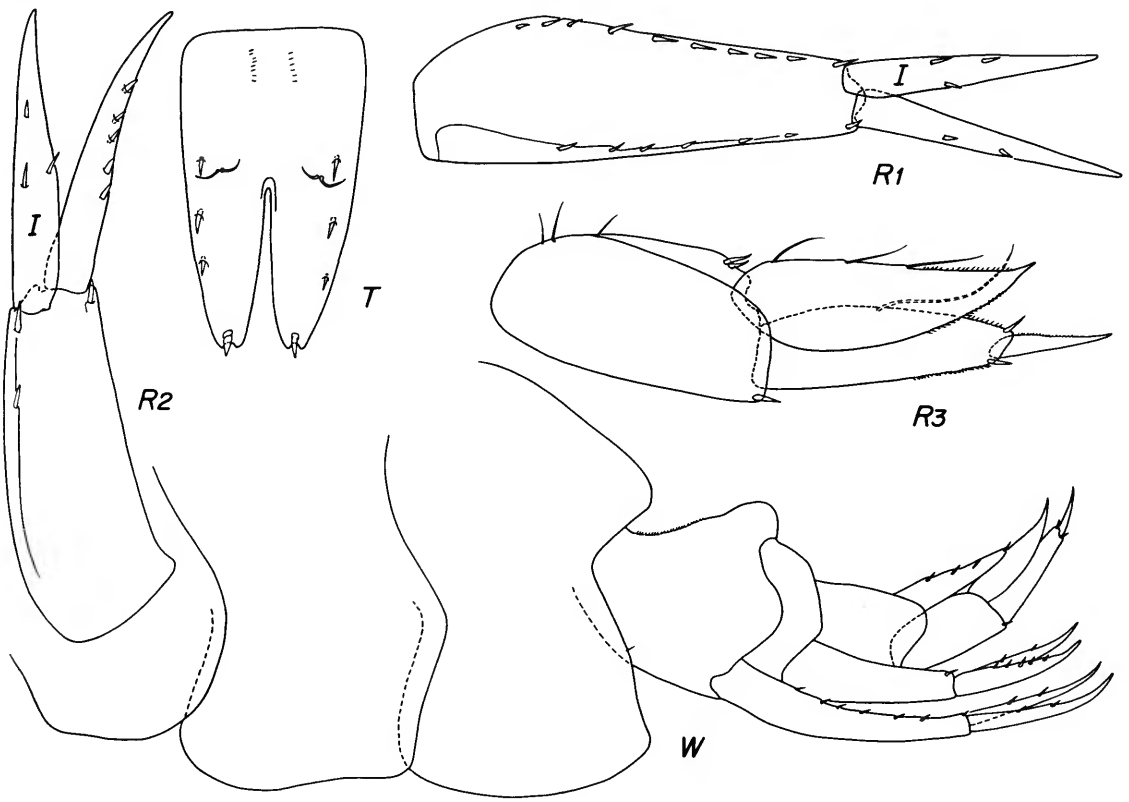

FIGURE 17.—*Orchomene abyssorum*, male "s" 6.41 mm.

Schisturella Norman

Schisturella Norman, 1900:208 [*Tryphosa pulchra* Hansen, 1887, monotypy].—J.L. Barnard, 1967:71 [key].

Pseudonesimus Chevreux, 1926:3 [*Pseudonesimus abyssi* Chevreux, 1926, monotypy].

Thrombasia J.L. Barnard, 1966a:72 [*Thrombasia tracalero* J.L. Barnard, 1966a, original designation].

DIAGNOSIS.—Mouthparts forming quadrate bundle. Labrum and epistome differentially produced, prominent, separate, labrum strongly dominant in projection, blunt. Incisor ordinary, molar weakly triturative, large, also setulose; palp attached opposite molar. Inner plate of maxilla 1 weakly (2) setose; outer plate with 7 spines; palp biarticulate, large. Inner and outer plates of maxilliped well developed, palp strongly exceeding outer plate, dactyl well developed.

Coxa 1 strongly shortened and partly covered by coxa 2, tapering or truncate.

Gnathopod 1 short, nearly simple (type) or strongly subchelate, palm oblique to transverse, articles 5 and 6 subequal, or 6 shorter than 5, dactyl large; article 6 of gnathopod 2 greatly shorter than article 5, ordinary, propodus minutely chelate.

Inner ramus of uropod 2 with large notch. Uropod 3 almost aequiramous, ordinary, peduncle ordinary, outer ramus 2-articulate. Telson elongate (type) or short, weakly to deeply (type) cleft.

ADDITIONAL CHARACTERS.—Inner plate of maxilla 2 medially setose, one seta enlarged, apex of outer plate of maxilliped with 2-3 spines (versus 5-7 in *Parschisturella*).

SEXUAL DIMORPHISM.—Male flagellum of antennae 1-2 elongate and calceoliferus, female antenna 1 with calceoli.

VARIABLES.—Antenna 1 apex of flagellum article 1 with large spine (*S. pulchra*); mandibular molar poorly triturative and well setulose (*S. tracalero; S. totorami*), palp article 3 very short (*S. zopa*) (*S. grabensis*); coxa 1 variable, short or long, quadrate or triangular, but coxa 1 also slightly elongate (*S. tracalero*); gnathopod 1 simple (type), subchelate, palm oblique (*S. adversicola, S. rotundatus, S. dorotheae*), almost simple (*S. cocula*), subchelate, palm transverse (*S. zopa; S. robusta; S. abyssi*); telson deeply cleft (type, etc.), cleft 1/3 (*S. adversicola*, etc.)

RELATIONSHIP.—*Metambasia* differing from *Schisturella*

and *Ambasiopsis* primarily in complete loss of palm in gnathopod 1.

From *Ambasiopsis* in the strong notch on the inner ramus of uropod 2, stronger medial setation on maxilla 2, and lack of major dorsal hump or tooth on urosomite 1. The type species of *Ambasiopsis* has no apical spines on the outer plates of the maxillipeds. The type species of *Schisturella* has many distal spines. Usually *Ambasiopsis* has a stout gnathopod 1 and *Schisturella* has a thin gnathopod 1.

From *Hirondellea* in smaller head, sharper ocular lobe, dominance of labrum, and lack of inner serration on palp of maxilla 1.

From *Aristiopsis* in lacking hump on epistome and absence of lobe on carpus of gnathopod 1.

From *Gronella groenlandica* in dominance of upper lip (not dominance of epistome), unlobed carpus of gnathopod 1 and more distally placed mandibular palp.

REMOVAL.—*Schisturella galatheae* Dahl (1959) transferred to *Galathella* Barnard and Karaman (1987).

SPECIES.

S. abyssi (Chevreux, 1926, 1935).—J.L. Barnard, 1967.—*S. a. tasmanensis* J.L. Barnard, 1961 [420A]

S. adversicola (K.H. Barnard, 1925).—Schellenberg, 1926b.—J.L. Barnard, 1962 [735BA]

S. cocula J.L. Barnard, 1966a [372]

S. dorotheae (Hurley, 1963) [373]

S. grabensis J.L. Barnard, 1967 [309B]

S. pulchra (Hansen, 1888).—Shoemaker, 1930a.—Schellenberg, 1935.—Gurjanova, 1962.—Sekiguchi and Yamaguchi, 1983 [200 + AB]

S. robustus (J.L. Barnard, 1961).—*S. r. cedrosiana* J.L. Barnard, 1967 [715A + 309B]

S. rotundatus (K.H. Barnard, 1926).—J.L. Barnard, 1962, 1967 [735BA]

S. totorami J.L. Barnard, 1967 [373]

S. tracalero J.L. Barnard, 1966a [373]

S. zopa J.L. Barnard, 1966a [310B]

DISTRIBUTION.—Marine, cosmopolitan cold water, thus tropically submergent, 75–4961 m, comes to baited traps, 11 species.

Key to the Species of *Schisturella* and *Ventiella*, new genus

1. Pleonal epimeron 3 with posteroventral tooth distinctly separated from body of epimeron 2
   Pleonal epimeron 3 lacking posteroventral tooth but occasionally posteroventral corner sharp or slightly attenuated 7
2. Palm of gnathopod 1 transverse or slightly oblique, fully evident 3
   Palm of gnathopod 1 very oblique, obsolescent 5
3. Palm of gnathopod 1 perfectly transverse; pleonal epimeron 2 rounded-quadrate posterodistally; epimeron 1 with adz-shaped anterior extension, no tooth . . . . . ***S. zopa***
   Palm of gnathopod 1 oblique; pleonal epimeron 2 with protruding posterodistal subacute angle; epimeron 1 not adz-shaped, with strong anteroventral hook 4
4. Article 3 of mandibular palp falcate, outer plate of maxilliped reaching middle of article 2, male uropod 3 setose, posteroventral lobe of coxa 4 pointed, article 2 of gnathopod 1 much longer than coxa 1 . . . . . ***S. totorami***
   Article 3 of mandibular palp not falcate, outer plate of maxilliped reaching apex of article 2, male uropod 3 not setose, posteroventral lobe of coxa 4 broadly truncate, article 2 of gnathopod 1 subequal to coxa 1 . . . . . ***S. tracalero***
5. Eyes absent . . . . . ***S. grabenis***
   Eyes present 6
6. Article 3 of mandibular palp falcate, posteroventral lobe of coxa 4 not truncate, weakly attenuate . . . . . ***S. cocula***
   Article 3 of mandibular palp not falcate, posteroventral lobe of coxa 4 strongly truncate . . . . . ***S. dorotheae***
7. Upper lip scarcely lobate, nearly flush with epistome . . . . . ***S. abyssi***
   Upper lip with large anterior lobe strongly projecting in from of epistome 8
8. Eyes present, palm of gnathopod obsolescent, extremely oblique . . . ***S. pulchra***
   Eyes absent, palm of gnathopod 1 present and transverse 9
9. Inner ramus of uropod 2 lacking notch, telson cleft only one tenth . . . . . ***Ventiella sulfuris***, new genus, new species
   Inner ramus of uropod 2 bearing notch, telson cleft one third or more 10

10. Telson cleft one third its length . . . . . *S. adversicola*
    Telson cleft one half its length 11
11. Coxa 1 hemi-oval . . . . . *S. robusta robusta* and *S. robusta cedrosiana*
    Coxa 1 subconical, anteroventrally extended . . . . . *S. rotundata*

Ventiella, new genus

ETYMOLOGY.—The genus name is from the Latin *ventilare* (to fan) plus *ella* (diminutive).

Mouthparts forming quadrate bundle. Labrum and epistome differentially produced, prominent, separate, labrum strongly dominant in size and projection, blunt. Incisor ordinary, molar triturative, small; palp attached opposite molar. Inner plate of maxilla 1 weakly (2) setose; palp biarticulate, large. Inner plate of maxilla 2 with mediomarginal row of about 7 setae. Inner and outer plates of maxilliped well developed, palp strongly exceeding outer plate, dactyl well developed.

Coxa 1 strongly shortened and partly covered by coxa 2, tapering.

Gnathopod 1 short, poorly subchelate, palm oblique, article 5 longer than 6, dactyl large; article 6 of gnathopod 2 greatly shorter than article 5, ordinary, propodus minutely chelate.

Inner ramus of uropod 2 without notch. Uropod 3 ordinary, peduncle ordinary, inner ramus slightly shortened, outer ramus 2-articulate. Telson ordinary, short, weakly cleft.

ADDITIONAL CHARACTERS.—Antenna 1 base of primary flagellum conjoint and thin; inner plate of maxilla 2 basalmost medial seta largest; dactyl of gnathopod 1 with inner tooth.

SEXUAL DIMORPHISM.—Male antenna 1 accessory flagellum basal article as long as article 1 of primary flagellum (shorter in female).

TYPE SPECIES.—*Ventiella sulfuris*, new species, here designated.

RELATIONSHIP.—Differing from *Ambasiopsis* in the thinner gnathopod 1, presence of 11 spines on outer plate of maxilla 1 (versus 7), presence of 1 major and 2 appressed spines on apex of inner plate on maxilliped (intermediated by *A. tumicornis*), short gape-cleft of telson, major inner seta on inner plate of maxilla 2 basalmost, non-pubescent molar with strong ridges, and appressed lobes of lower lip.

From *Galathella* in the unproduced epistome.

From *Schisturella* in the more compressed apex of inner plate on maxilliped, bearing lateral acclivities, uropod 2 inner ramus not incised, and telson with short gape-cleft.

From *Cedrosella* Barnard and Karaman (1987) in article 5 of gnathopod 1 being longer than article 6, better triturative molar, weakly cleft telson and oblique palm of gnathopod 1.

SPECIES.

V. sulfuris, new species [540A]

DISTRIBUTION.—Marine, deep sea sulphurated hydrothermal vent communities, eastern Pacific Ocean, 2450–2676 m, 1 species.

Ventiella sulfuris, new species

FIGURES 18–21

ETYMOLOGY.—The species name is from the Latin *sulfur* (brimstone).

DIAGNOSIS.—With the characters of the genus.

DESCRIPTION.—*Holotype:* Female "a" 6.24 mm: Rostrum small, sinus for antenna 1 rather flat; sinus for antenna 2 shallow, marked below by sharp tooth; eyes absent. Front of head with long thin keel partly comprising epistome, upper lip well projecting, blunt, marked off by deep sinus-fold, from anterior view upper lip small, narrow, comprising 2 setulose lobes widely separated.

Base of primary flagellum conjoint, article 1 thus slightly longer than articles 2–3 of peduncle combined, armed with about 6 ranks of mostly medial aesthetascs between M0.6 and M.60, seventh rank fully terminal medially; flagellum with 19 articles, following articles with one each apicomedial aesthetasc: 3,7,11,15,17; accessory flagellum with 5 articles, basalmost elongate and medially flattened. Antenna 2 reaching to apex of antenna 1 in normal mode, article 5 longer than 4, flagellum with 21 articles.

Incisors of mandibles slightly convex, smooth in middle, each outer corner with 1–2 sharp boundary teeth, right lacinia mobilis absent, left, long and linguiform, right and left with 3 rakers each, edge between rakers and molar finely pubescent; molars small but strongly triturative, lacking molarial seta; palp attached opposite molar, article 1 short, article 2 elongate, bearing outer apical brush of 10 setae, article 3 almost 60 percent as long as article 2, scarcely falcate, with one basal A-seta, 9 D-setae, 3 E-setae.

Lower lip as illustrated. Inner plate of maxilla 1 with 2 thick apical setae, outer plate with 11 spines, one of these disjunct medioproximally, another small one disjunct to medial side of main group, spines denticulate; apex of palp article 2 with 10 thick short spines and one apciolateral thinner spine and one apicolateral thin seta. Inner plate of maxilla 2 thinner than outer, both reaching subequally, inner with medial setae on apical half, basalmost seta enlarged. Inner plate of maxilliped reaching apex of palp article 1, inner apex with one stout spine and 2 thinner overlain spines, apicolateral margin acclivitous, outer plate not exceeding inner plate, apex with one stout and 3 thin spines, medial margin with subcircular immersed spines, palp strongly exceeding outer plate, dactyl elongate, unguiform, with short nail and 2 accessory setules.

Coxa 1 about 65 percent as long as coxa 2, apex blunt, coxae 2–3 rectangular, coxa 4 with large, dorsally subsharp posteroventral lobe; coxae 1–4 armed ventrally with sparse

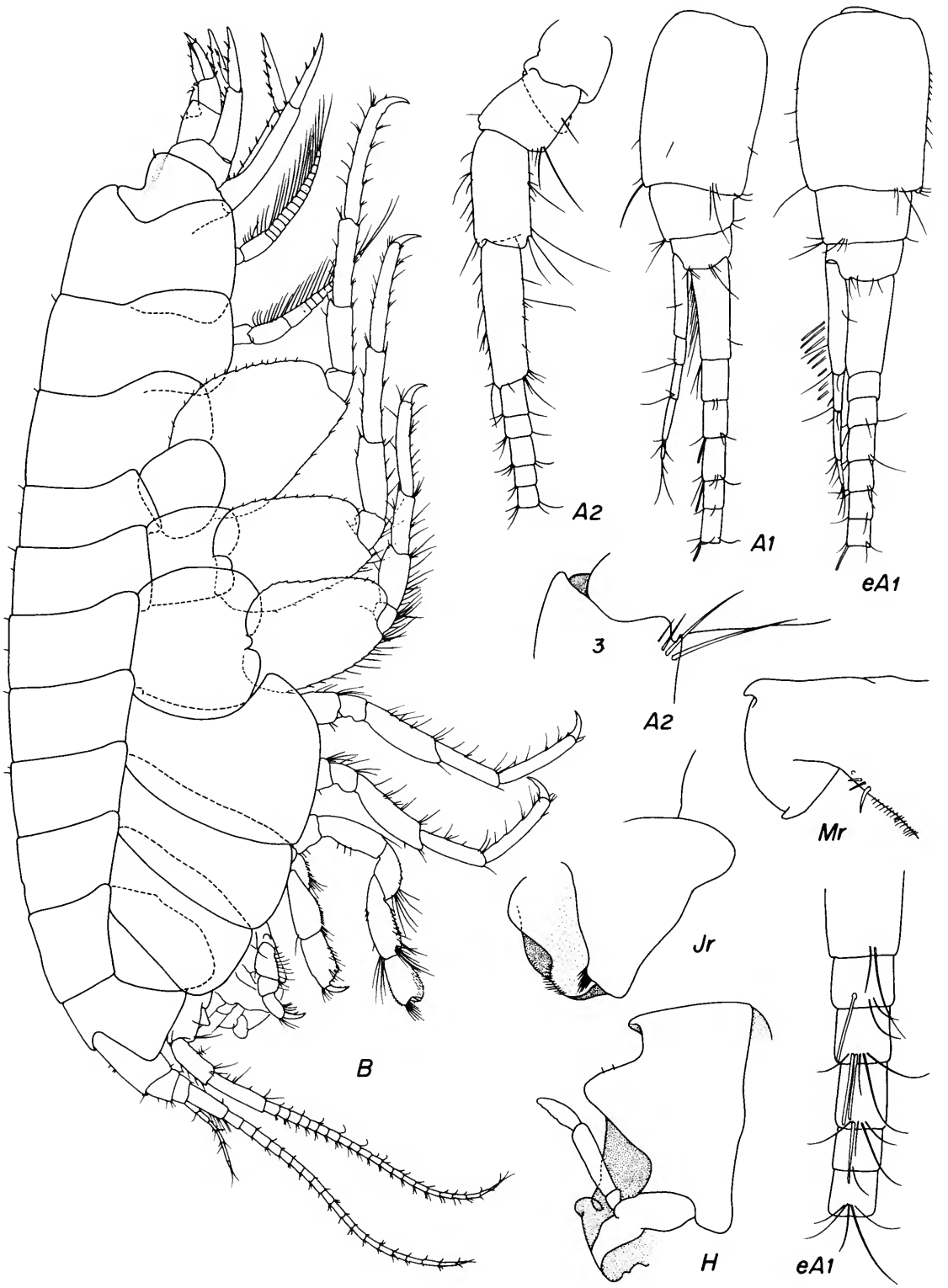

FIGURE 18.—*Ventiella sulfuris*, new species: unattributed figures = holotype female "a"; e = male "e."

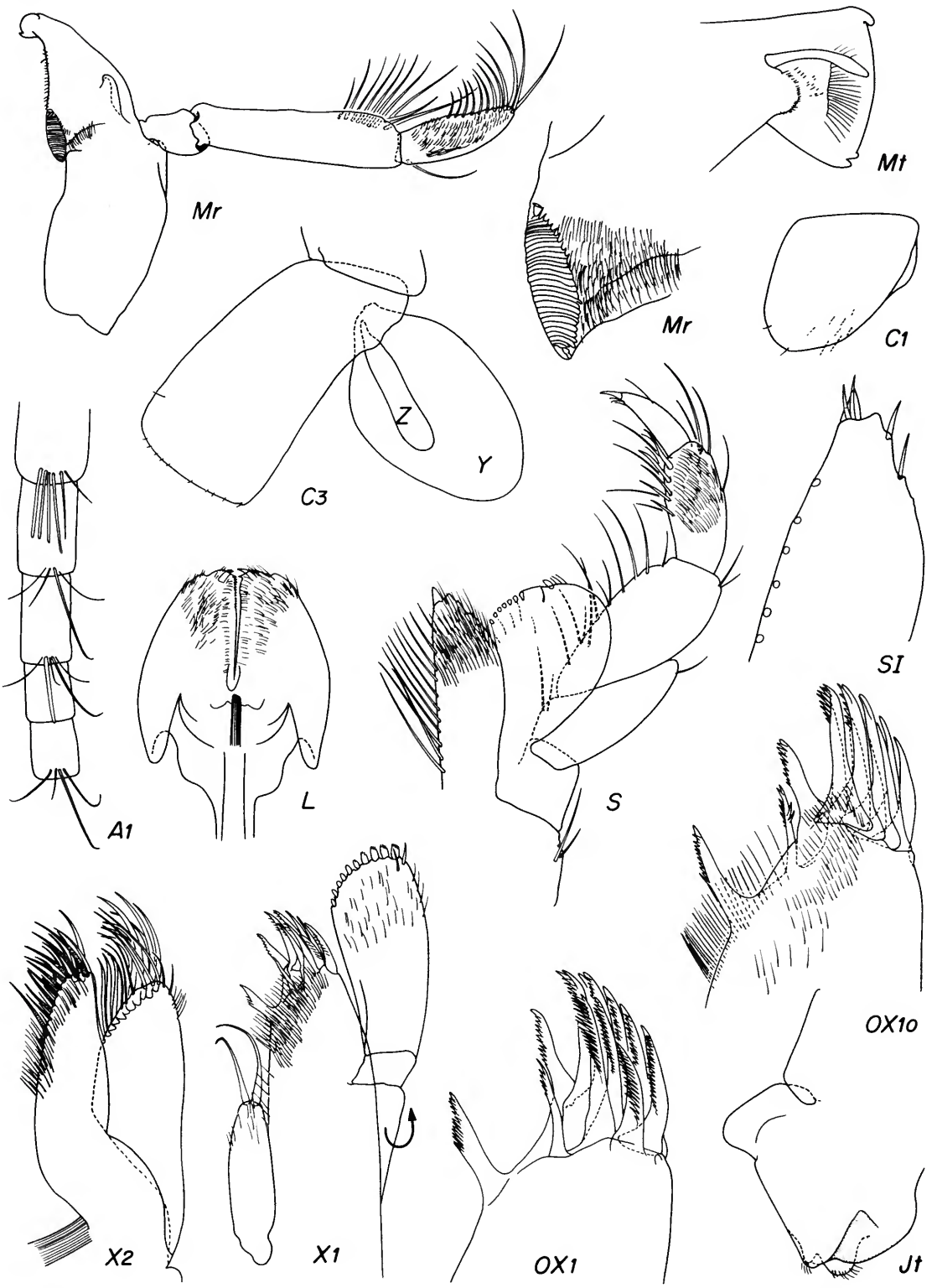

FIGURE 19.—*Ventiella sulfuris*, new species, holotype female "a."

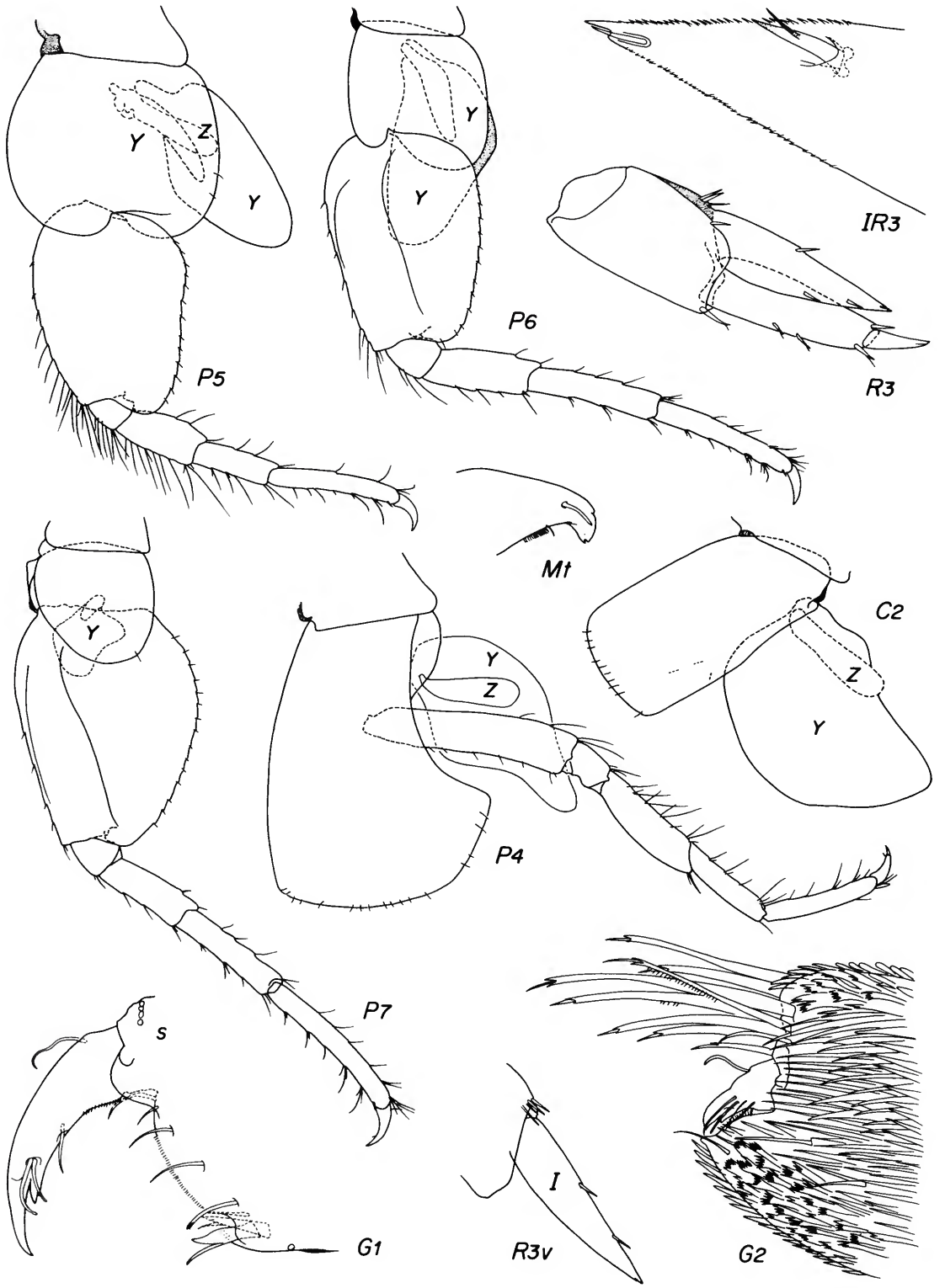

FIGURE 20.—*Ventiella sulfuris*, new species, holotype female "a."

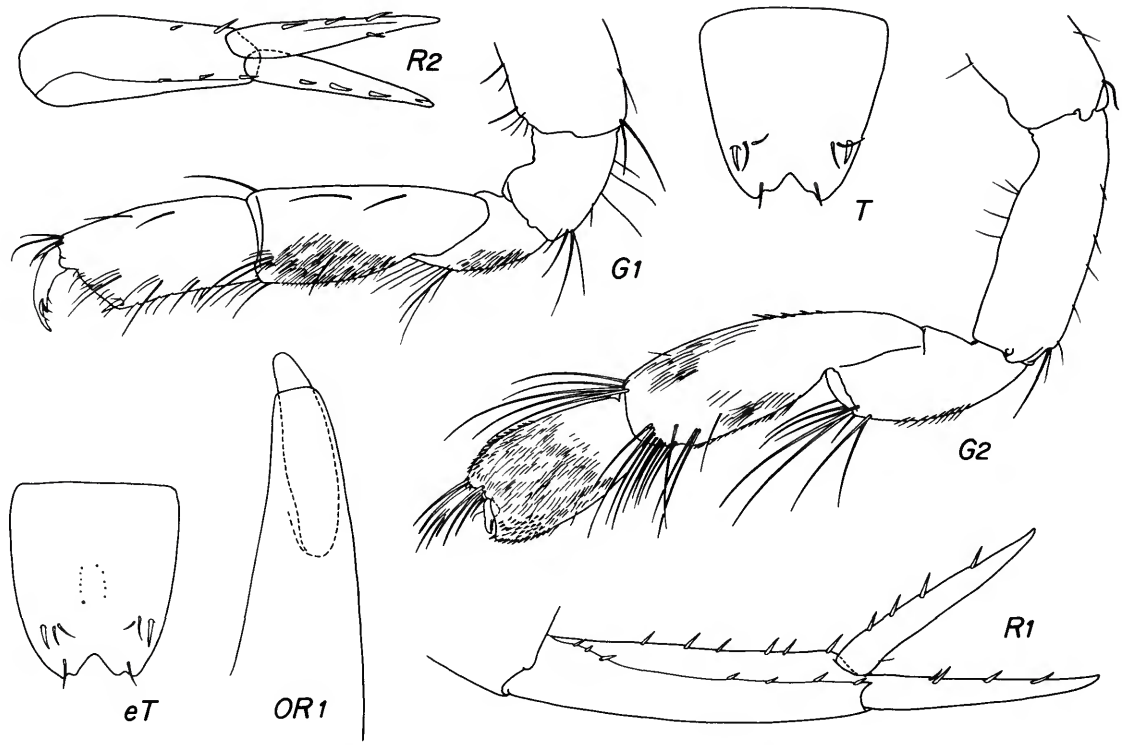

FIGURE 21.—*Ventiella sulfuris*, new species: unattributed figures = holotype female "a"; e = male "e."

setules. Oostegites on coxae 2–5 small, slender, asetose. Branchiae on coxae 2–7, that of coxa 2 largest, that of coxa 7 small, gills 5–6 each with long tubular accessory lobe, of coxa 7 with shorter mostly amalgamated lobe-like thickening.

Article 2 of gnathopod 1 about 1.3 times as long as coxa 1, article 6 of gnathopod 1 about 85 percent as long as article 5, palm 45 degrees oblique, defined by one spine, dactyl curved, fitting palm, with inner tooth; dactyl of gnathopod 2 in middle of apex on article 6, not reaching apex of slightly chelate palm.

Pereopods 3–4 slender, each with one unlocking spine. Pereopod 7 longest of pereopods 5–7, each article 2 with small posteroventral lobe, article 2 of pereopod 7 strongly pyriform; only mid anterior margin of pereopod 5 heavily setose (parts of articles 2–4).

Epimeron 1 broadly rounded behind, epimera 2–3 with straighter posterior margins, rounded posteroventral corners, no significant armaments; pleopodal peduncles without setae, bearing 2 coupling hooks, rami 1.6 times as long as peduncle, inner rami with 13 articles, outer rami of uropods 1–2 with 15, of pleopod 3 with 14 articles. Urosomite 1 with thick, low dorsal keel rising rearward.

Uropods 1–3 reaching equally; peduncle of uropod 1 evenly spinose medially but dorsolateral row discontinguous in middle, outer ramus with 3–4 dorsal spines, inner with 4; apical nails on rami of uropods 1–2 present but very transparent; peduncle of uropod 1 with 3 dorsolateral spines subapically, with 2 medial spines, outer ramus with 3 spines, inner with 3 medial and one subapicolateral. Outer ramus of uropod 3 slightly longer than peduncle, article 2 about 33 percent as long as article 1, latter with 2 lateral spines and 1 apical spine on each side, apex of article 2 with setule notch; inner ramus reaching to base of article 2 on outer ramus, with 1–2 (variable) medial and 2 lateral spines. Telson as long as wide, cleft only 10 percent, each apex with setule notch, armed dorsally at M.70 with pair of penicillate setules and slightly lateral spine.

Other Material: Male "e" 5.61 mm: Like female but articles of flagella on antennae slightly thicker, primary flagellum of antenna 1 with 21 articles, one medial aesthetasc present on articles 2,4,8,12,18,20,21, 2 aesthetascs each on articles 3 and 14, conjoint base with 9 ranks of aesthetascs evenly distributed from base to apex; accessory flagellum with 4 articles, basal article as long as conjoint base of primary flagellum (in female this article much shorter than conjoint base); uropod 3 like female but outer ramus lacking lateral spines (probably size or age factor); telson like female but slightly narrower, middorsal surface with 2 apposed rows of tiny denticles.

ILLUSTRATIONS.—Pereopod 3 (not illustrated) like pereopod 4. Maxillae 1–2 and maxilliped magnified alike. Coxae as shown on body not flattened but legs flattened.

Juvenile "j" 1.82 mm: Primary flagellum of antenna 1 with 9 articles, accessory flagellum with 3, flagellum of antenna 2 with 8 articles; all rami of uropods 1–2 with 1 spine; peduncle of uropod 1 with 1 apicolateral spine, 2 medial spines, peduncle of uropods 2–3 with 1 apicolateral spine; outer ramus of uropod 3 with 1 apicolateral spine on article 1, no spine medially, inner ramus lacking spines. Telson like adult.

HOLOTYPE.—USNM 195147, young female "a," 6.24 mm.

TYPE LOCALITY.—Galapagos Rift Vent, SIO station 990, 00°48″N, 86°13′W, 7 Dec 1979, 2451 m.

MATERIAL.—Type locality, male "e" 5.61 mm (illustrated), juvenile "j" 1.82 mm, and 16 other specimens. I.P. Williams material, WHOI-EPR-21°N Dive 1218-15, clam & crab trap wash, 11 adults, 49 juveniles; 1221-12, slurp fissure with clams, 2 young; 1223-11, fine frac, about 900 juveniles. OASIS 5/718 2, sta 1223-17, 9 adults, 10 hatchlings. Turner/Copley material, WHOI, Dive 984, Panel 10, Rose Garden, 6 specimens.

DISTRIBUTION.—Eastern Pacific at Galapagos Vents about 00°N, 86°W, and vents at 13°N, 109°W, 2450–2676 m.

SELECTED SAMPLE SUMMARY

Many duplicate samples not reported.

Aspirator: used to obtain samples of water and small organisms on and around the polychaetes and vestimentiferans.

Basket: used to refer to any part of the basket attached to the front of the submersible, including boxes used for various experiments.

Dive no.	*Date*	*Latitude*	*Longitude*	*Depth (m)*	*Number caught*	*How collected*
			Galapagos Rift, DSRV *Alvin*, January–February 1979			
879	20 Jan	00°48.2′N	86°04.1′W	2495	7	mussel washings
880	21 Jan	00°47.6′N	86°06.4′W	2493	2636	mussel washings and rubble residue
883	24 Jan	00°47.0′N	86°08.0′W	2493	1	slurp gun sample from mussels
884	25 Jan	00°48.1′N	86°07.0′W	2482	231	wash of rubble from crevices in mussel area
					1	vestimentiferan tube wash
					5	residue from suction filter and netting
887	12 Feb	00°48.5′N	86°09.1′W	2488	33	washings
888	13 Feb	00°47.1′N	86°08.5′W	2483	110	mussel washings
890	14 Feb	00°48.7′N	86°12.7′W	2458	9	washings
894	19 Feb	00°48.2′N	86°14.9′W	2457	21	washings
896	21 Feb	00°48.2′N	86°13.6′W	2460	3	washings from clam bucket
TOTAL					3057	
			Galapagos Rift, DSRV *Alvin*, December 1979			
984	01 Dec	00°48.0′N	86°13.0′W	2451	1	vestimentiferan body wash
					118	mussel wash
988	05 Dec	00°48.0′N	86°13.0′N	2450	1	vestimentiferan tube wash
990	07 Dec	00°48.0′N	86°13.0′W	2451	1075	vestimentiferan wash
					2438	slurp gun
993	10 Dec	00°47.0′N	86°08.0′W	2518	21	vestimentiferan wash
					30	crab trap
TOTAL					3684	

Dive no.	*Date*	*Latitude*	*Longitude*	*Depth (m)*	*Number caught*	*How collected*
			East Pacific Rise, 13°N, DSRV *Cyana*, 1982—BIOCYATHERM			
82-10	n.d.	12°50.0′N	103°57.0′W	2625	1	basket
82-33	08 Mar	12°48.6′N	103°56.7′W	2630–2635	33	trap
82-34	11 Mar	12°48.6′N	103°56.7′W	2630–2635	1927	trap
					27	from vestimentiferan tube
82-35	12 Mar	12°48.6′N	103°56.7′W	2630–2635	140	trap
82-36	13 Mar	12°48.6′N	103°56.7′W	2630–2635	14	trap
TOTAL					2142	
			1984—BIOCYARISE			
84-32	09 Mar	12°49.1′N	103°56.9′W	2635	724	from vestimentiferans
84-33	10 Mar	12°48.6′N	103°56.7′W	2635	23	aspirator
84-34	11 Mar	12°49.1′N	103°56.9′W	2635	12	in and among polychaete tubes
84-37	14 Mar	12°46.6′N	103°56.7′W	2630	9	basket refuse
					15	aspirator
84-38	15 Mar	12°48.8′N	103°56.8′W	2635	203	aspirator
					4	basket with *Alvinella* (polychaete)
TOTAL					990	
			East Pacific Rise, 13°N, DSRV *Cyana*			
84-39	16 Mar	12°48.6′N	103°56.7′W	2635	70	from vestimentiferan refuse
					1	aspirator
					4	trap #5
					4	trap #6
84-40	17 Mar	12°48.6′N	103°56.7′W	2635	5	aspirator
84-41	23 Mar	12°48.6′N	103°56.7′W	2635	48	basket
					151	in and among *Alvinella* (polychaete)
84-42	24 Mar	12°48.6′N	103°56.7′W	2635	588	basket
					125	from vestimentiferans
84-43	25 Mar	12°48.6′N	103°56.7′W	2635	14	basket
84-44	26 Mar	12°48.8′N	103°56.8′W	2635	12	basket
84-45	27 Mar	12°48.8′N	103°56.8′W	2635	8	basket
					1	trap #1
84-46	28 Mar	12°48.6′N	103°56.7′W	2635	57	basket
TOTAL					1088	
			East Pacific Rise, 21°N, DSRV *Alvin*, April–May 1982			
1211	17 Apr	20°50.0′N	109°06.0′W	2615	2676	vestimentiferan and clam wash
1213	19 Apr	20°50.0′N	109°06.0′W	2617	9499	*Alvinella* wash
1214	20 Apr	20°50.0′N	109°06.0′W	2633	6428	vestimentiferan wash
1215-5A	21 Apr	20°50.0′N	109°06.0′W	2616	14	slurp gun
5B					14	slurp gun
6B					2	slurp gun
1218	24 Apr	20°50.0′N	109°06.0′W	2618	58	clam and crab trap wash
1219-1A	25 Apr	20°50.0′N	109°06.0′W	2612	100	slurp gun – vestimentiferan habitat

Dive no.	*Date*	*Latitude*	*Longitude*	*Depth (m)*	*Number caught*	*How collected*
1B					149	slurp gun - vestimentiferan habitat
2A					1939	slurp gun - *Alvinella* habitat
2B					1544	slurp gun - *Alvinella* habitat
10AB					1128	vestimentiferan and clam
1221-12	04 May	20°50.0'N	109°06.0'W	2618	2	slurp gun - fissure with clams
15					4567	vestimentiferan and clam wash
1222	06 May	20°50.0'N	109°06.0'W	2614	104	wash of rubble from fissure and clams
1223-11	07 May	20°50.0'N	109°06.0'W	2616	5233	*Alvinella* and clam wash
17					19	rubble wash
1226	10 May	20°50.0'N	109°06.0'W	2616	1097	*Alvinella*, clam and vestimentiferan wash
1229	14 May	20°50.0'N	109°06.0'W	2615	9	rubble wash
TOTAL					34,582	

Paralicella Chevreux

Paralicella Chevreux, 1908:3 [*Paralicella tenuipes* Chevreux, 1908, original designation].—Barnard and Shulenberger, 1976:267.

DIAGNOSIS.—Mouthparts forming quadrate bundle. Labrum and epistome not differentially produced, separate, labrum weakly dominant. Incisor ordinary, molar simple or barely triturative, large, conicolaminate, setulose, palp attached opposite molar. Inner plate of maxilla 1 strongly (10+) setose; palp biarticulate, large. Inner plate of maxilla 2 slightly smaller than outer, with oblique facial row of setae (9+), but number of setae about half that in *Valettietta*. Inner and outer plates of maxilliped well developed, inner with oblique apical margin, with excavation separating spines or some spines attached within excavation, palp strongly exceeding outer plate, dactyl well developed, ordinary, tapering, lacking strong acclivity, with long apical nail(s) and accessories.

Coxa 1 large and visible, adz-shaped and expanding apically, or occasionally significantly shortened, tapering and partially covered by coxa 2. Coxa 4 with well-developed posteroventral lobe.

Gnathopod 1 subchelate, palm oblique, article 3 elongate (versus *Aristias, Eurythenes*); articles 5 and 6 subequal, dactyl large; article 6 of gnathopod 2 slightly shorter than article 5, both very elongate and linear, propodus subchelate, palm oblique or almost obsolescent, but well defined, dactyl large. Article 2 of pereopods 5–7 diverse in size and form.

Outer ramus of uropod 2 and usually uropod 1 shorter than inner; inner ramus of uropod 2 without notch. Uropod 3 ordinary, peduncle slightly elongate, rami subequal, outer ramus 2-articulate. Telson elongate, deeply cleft.

ADDITIONAL CHARACTERS.—Flagella of antennae elongate, articles short; article 1 of antenna 2 swollen; article 5 of antenna 2 usually moderately to greatly shortened.

SEXUAL DIMORPHISM.—Article 1 of primary flagellum on antenna 1 more elongate and better armed in male; urosomite 1 often with dorsal notch in male.

VARIABLES.—Coxa 1 reduced (*P. similis, P. vaporalis,* new species); article 2 of pereopods 5–7 alike (*P. fusiformis*), diverse (type, etc.); article 2 of pereopod 7 strongly beveled (type, etc.), poorly beveled (*P. caperesca*, etc.), not beveled (*P. fusiformis*, etc.); article 2 on outer ramus of uropod 3 variable in length.

RELATIONSHIP.—Like *Alicella* but gnathopod 1 subchelate.

Differing from *Eurythenes* in the elongate article 3 of gnathopod 1.

SPECIES.—See Gurjanova (1962, minor records).

P. caperesca Shulenberger and Barnard, 1976.—Thurston, 1979 [422A]

P. fusiformis (Birstein and Vinogradov, 1955, 1958) [510A]

P. microps (Birstein and Vinogradov, 1958, 1960) [510A]

P. similis Birstein and Vinogradov, 1960, 1962 [520A]

P. vaporalis Barnard and Ingram, new species, herein [310B, 317B]

P. tenuipes Chevreux, 1908, 1935.—Shulenberger and Barnard, 1976.—Barnard and Shulenberger, 1976 [422BA]

DISTRIBUTION.—Marine, cosmopolitan, bathy- and abyssopelagic, 706–5720 m, 5 species.

Key to the Species of *Paralicella*

1. Article 2 of pereopod 7 beveled posteroventrally 2
   Article 2 of pereopod 7 rounded posteroventrally 3
2. Inner plate of maxilliped with spine set in middle of apical excavation . . . . . ***P. microps***
   Inner plate of maxilliped lacking spine in middle of apical excavation (or excavation absent) . . . . . ***P. tenuipes***
3. Coxa 1 short, hemicircular or triangular, apically tapered, right lacinia mobilis well developed 4
   Coxa 1 not short, adz-shaped, apically expanded, right lacinia mobilis vestigial or absent 5
4. Coxa 1 hemicircular, article 2 of pereopods 5–7 narrow, epimeron 3 with posteroventral point, coxa 2 with large medial brush of setae, outer ramus of uropod 1 strongly shortened . . . . . ***P. similis***
   Coxa 1 triangular, article 2 of pereopods 5–7 broad, epimeron 3 rounded posteriorly, coxa 2 lacking medial brush of setae, outer ramus of uropod 1 not shortened . . . . . ***P. vaporalis,*** new species
5. Article 2 on outer ramus of uropod 3 about 0.75 times as long as article 1, palm of gnathopod 2 very oblique . . . . . ***P. caperesca***
   Article 2 on outer ramus of uropod 3 about 0.20 times as long as article 1, palm of gnathopod 2 almost transverse . . . . . ***P. fusiformis***

Paralicella vaporalis, new species

FIGURES 22–25

ETYMOLOGY.—The species name is from the Latin *vaporalis* (of steam).

DIAGNOSIS.—Right lacinia mobilis well developed, broad, multitoothed and partially bifid; inner plate of maxilliped with spine(s) on each side of excavation; coxa 1 triangular, tapering, partially covered by coxa 2; coxa 2 lacking medial brush of setae or brush weak; palm of gnathopod 2 extremely oblique; article 2 of pereopod 7 rounded posteroventrally; epimeron 3 subquadrate at posteroventral corner; outer ramus of uropod 1 not shortened; article 2 on outer ramus of uropod 3 about 0.16 times as long as article 1.

DESCRIPTION.—*Holotype:* Female "t" 19.4 mm: Apparently blind, front part of head filled with dispersed glandular blots appressed to inside surface of head; lateral lobe bluntly mammilliform, antennal sinus moderately deep. Article 5 of antenna 2 as long as article 4. Epistome and upper lip weakly articulate, separated by notch from side view, neither dominant, upper lip broadly pyriform below.

Right incisor with blunt apicomedial and apicolateral tooth, distal margin with notch and hump, left incisor with middle hump and ragged margin; right lacinia mobilis well developed, flake-like, jaggedly serrate, much broader than long, composed of two appressed parts; left lacinia mobilis also much broader than long, better developed, almost evenly serrate apically; rakers numerous; molars of medium size, subconical, densely setulose, tapering to medium-sized diffuse apical region with weak triturative surface; palp article 1 short, article 2 well setose, article 3 short, clavate, with 3 A-setae and many D- and 6E-setae. Lower lip with blunt mandibular lobes, with gape between main lobes, inner lobes absent. Inner plate of maxilla 1 with beveled apical part bearing 4 setae, with 10+ small denticle-setae, medial margin with 16 setae, spines on outer plate 11; palps with 12 lateral setae, apices broad, multispinose and with numerous apicofacial setae. Inner plate of maxilla 2 much smaller than outer, facial setal row with about 20 setae. Mediofacial row of setae on inner plate of maxilla 2 about 21. Inner plate of maxilliped with 3 main apical spines divided into 2 sets, dactyl ordinary, evenly tapering, with inner subapical tooth, with 1 main apical nail and 3 accessory setules.

Dactyls of gnathopods 1–2 with inner subapical tooth. Dactyls of pereopods with weak nail, one strong inner and weak facial spinule; unlocking spines paired. Oostegites 2–5 moderately developed but asetose. Gills broad and unpleated, large on coxae 2–7,?each with medium thick conical accessory lobe (confirmed on gills 4–6 only, others too rotted for analysis on available material).

Epimeron 1 with 10 anteroventral setae and spines, epimeron 2 with 5 facial setae narrowly spread and 10 ventral setae, epimeron 3 with 1 facial and 6 ventral spines moderately spread. Each pleopod with 2 coupling hooks and 3–4 simple accessory spines, peduncles poorly setose, rami very long, subequal.

Peduncle of uropod 1 with basolateral row of 9 spines, apicolateral corner with large spine, other corner spines on uropods 1–2 small, all rami bearing 2 rows of spines (not all seen laterally); peduncle of uropod 3 weakly elongate, with 3 mid-ventrolateral spines. Each apex of telson strongly bifid,

FIGURE 22.—*Paralicella vaporalis*, new species, holotype female "t" 22.78 mm.

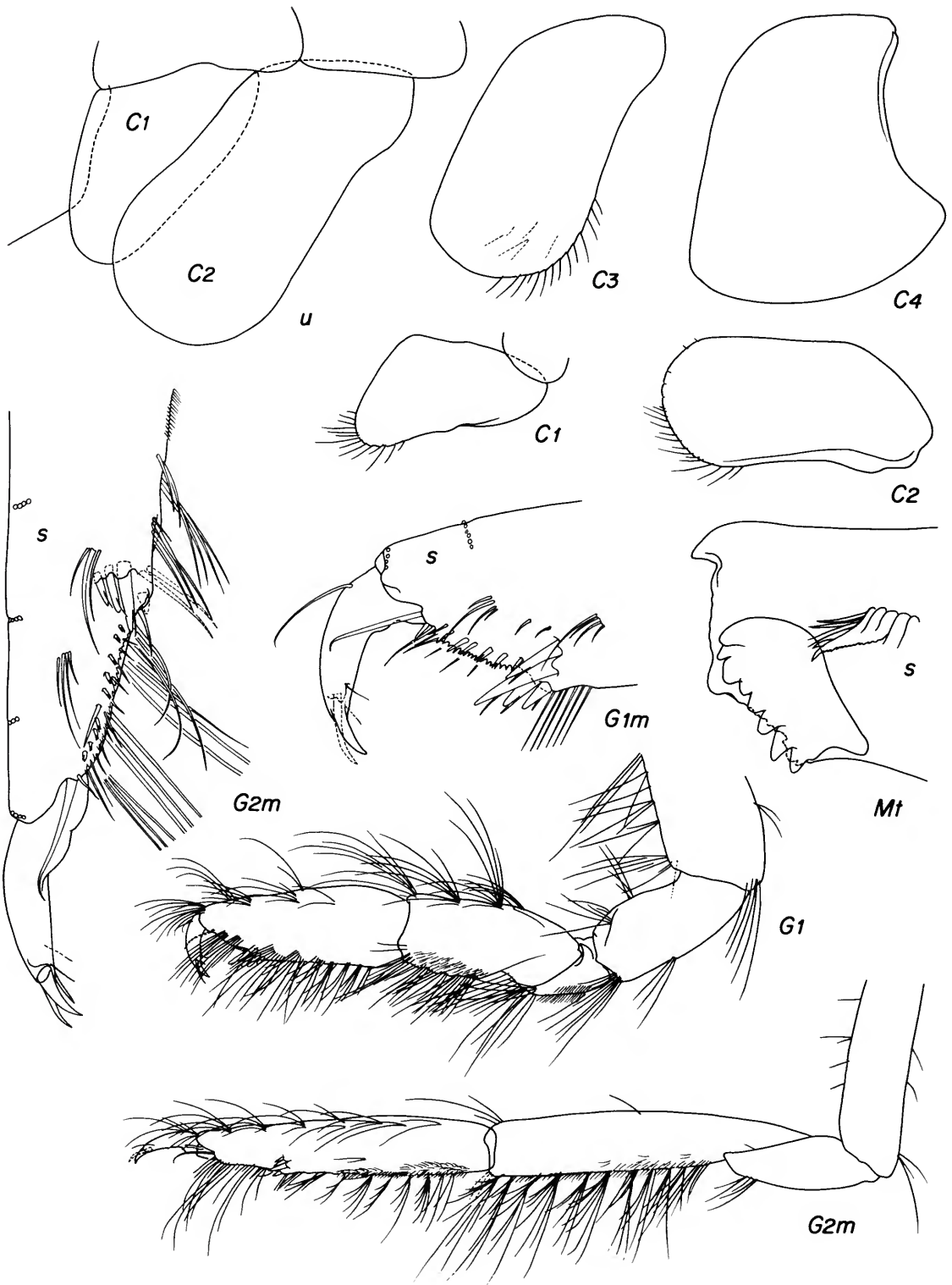

FIGURE 23.—*Paralicella vaporalis*, new species: unattributed figures = holotype female "t" 22.78 mm; u = female "u" 18.18 mm.

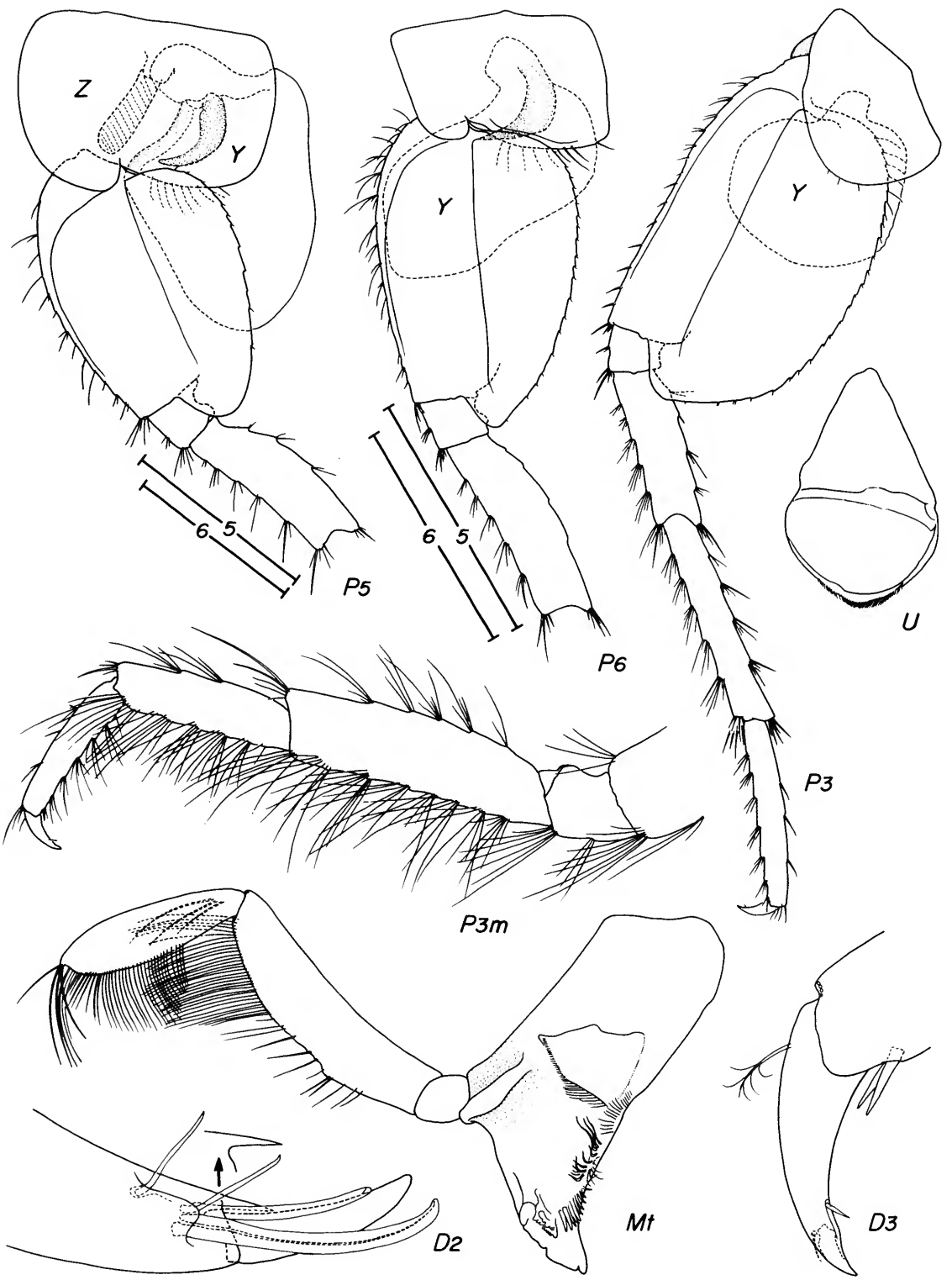

FIGURE 24.—*Paralicella vaporalis*, new species, holotype female "t" 22.78 mm.

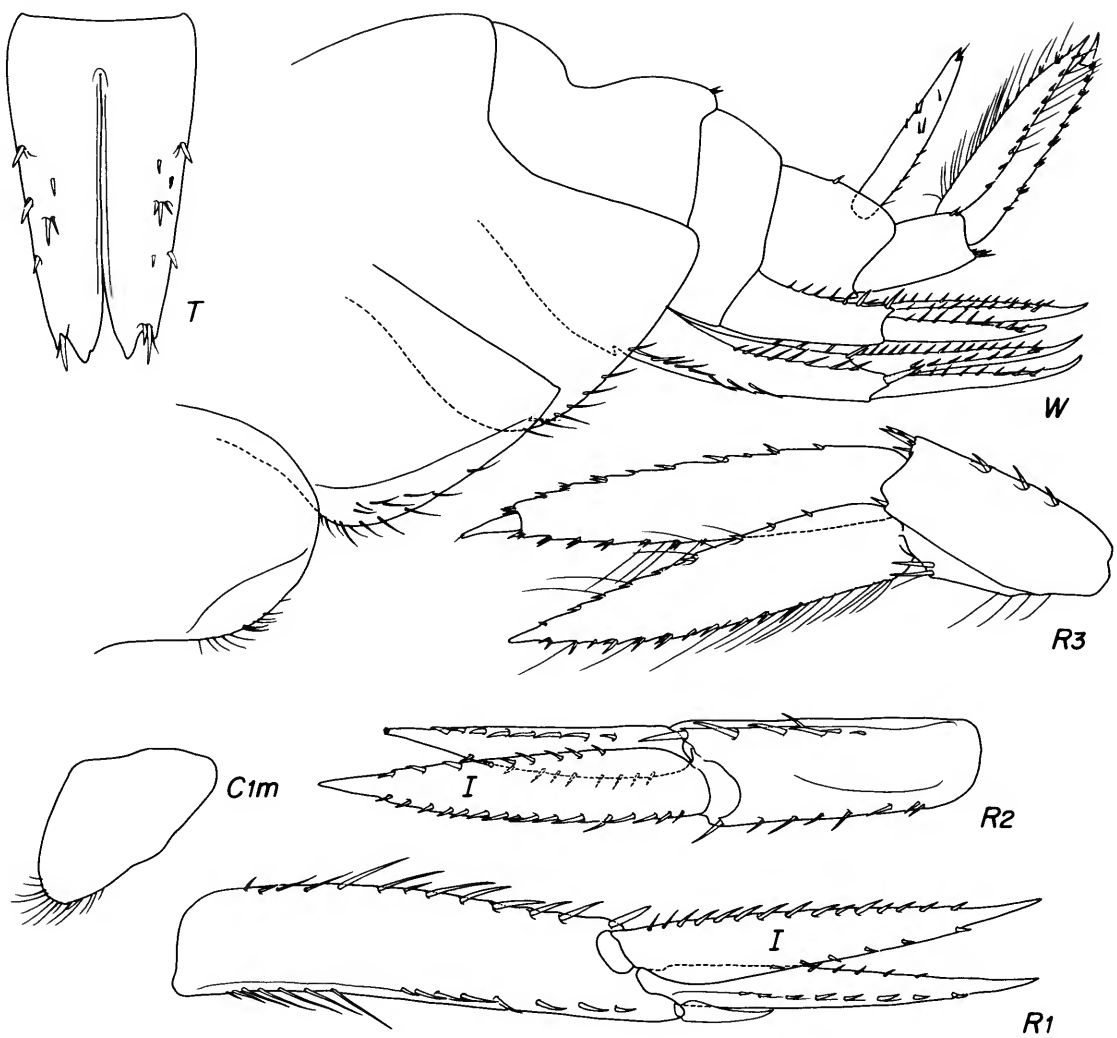

FIGURE 25.—*Paralicella vaporalis*, new species, holotype female "t" 22.78 mm.

with 1-2 spines and setule, dorsum of each lobe with 2-4 sets of dorsal spines or spine pairs, most basal set near M.35.

Other Material: Male "v": Like female and therefore probably young, but oostegites absent, penes present.

ILLUSTRATIONS.—Pereopod 3 enlarged more than pereopods 5-7; pereopod 4 similar to pereopod 3; pereopod 5 with oostegite anterior, next shaded area indicating fold of main gill, posterior shaded area indicating accessory lobe.

HOLOTYPE.—USNM 195197, female "t" 22.78 mm.

TYPE LOCALITY.—SIO Cat. No. C5694, SIO Acc. No. BI68-45, STYX-7, MPE 68091 & 2, sta 5, Hess Guyot, 17°53'N, 174°14.8'W, 1-2 Sep 1968, 1740 m, free vehicle traps on R/V *Agassiz*.

MATERIAL.—The type locality, female "u" 18.18 mm (oostegites rudimentary). SIO Cat. No. C3697, SIO Acc. No. BI65-65, Jasper Seamount off Baja California, 30°23.2'N, 119°58.8W, 5 Sep 1965, 706 m, fish trap, R/V *Agassiz*, male "v" 20.02 mm.

RELATIONSHIP.—This species and *P. similis* differ from typical species of *Paralicella* in the reduced and tapering coxa 1 and *P. vaporalis* also is anomalous because of the large right lacinia mobilis. *Paralicella vaporalis* differs from *P. tenuiipes* in the unbeveled article 2 of pereopod 7, the presence of an extra leaf on the right lacinia mobilis, and in the different tooth pattern on the incisor. It differs from *P. similis* in the broader article 2 of pereopods 5-7 and the shape of epimeron 3; otherwise *P. similis* is similar to *P. vaporalis* in the reduced and tapering coxa 1. Our new species differs from *P. fusiformis* in the reduced and tapering coxa 1, the very oblique palm of gnathopod 1, and the greater density of spination on the medial

margin of the outer plate on the maxilliped. And, finally, from *P. caperesca* our species differs in the reduced and tapering coxa 1, large right lacinia mobilis, much more oblique palm of gnathopod 2, and the high density of spination on the outer plate of the maxilliped.

DISTRIBUTION.—Pacific Ocean, from Hess Guyot to Jasper Seamount, 706–1740 m.

Discussion of the *Valettiopsis* Group

The remaining taxa to be described in this paper fall into a group resembling *Valettiopsis*, a genus heretofore considered to be of bathypelagic provenance. These taxa comprise the new genera *Apotectonia*, *Diatectonia*, *Tectovalopsis*, and *Transtectonia*. No specimens of *Valettiopsis* were collected in the vent areas. The new taxa also bear some resemblance to classic genera *Alicella*, *Paralicella*, and *Eurythenes*.

The following keys are very constrained in diversity but include genera of the *Valettiopsis* group, which is newly elaborated, and other commonly encountered and morphologically similar deep sea genera such as *Alicella*, *Eurythenes*, *Paralicella*, and *Schisturella* and its apomorph, *Ventiella*.

Keys to Certain Deep-Sea Genera of Lysianassoidea

KEY 1

1. Inner plate of maxilla 1 with only apical setae 2
   Inner plate of maxilla 1 with medial setae . . . . . Keys 2–4
2. Inner plate of maxilla 1 with 5 apical setae, incisor with 4 teeth, upper lip not projecting in front of epistome, outer plate of maxilliped exceeding article 2 of palp . . . . . ***Valettia***
   Inner plate of maxilla 1 with 2 apical setae, incisor with 2 teeth, upper lip projecting in front of epistome, article 2 of maxillipedal palp exceeding apex of outer plate 3
3. Inner ramus of uropod 2 lacking notch, telson with short gape-cleft, inner plate of maxilliped tapered apically . . . . . ***Ventiella,*** new genus
   Inner ramus of uropod 2 bearing notch, telson entire, inner plate of maxilliped not tapered apically . . . . . ***Schisturella***

KEY 2

1. Urosomite 1 with sharp dorsal tooth or teeth 2
   Urosomite 1 with smooth dorsal hump 6
2. Mandibular incisor with 6 large teeth, right lacinia mobilis large, bifid or doubled, molar strongly triturative . . . . . ***Valettiopsis***
   Mandibular incisor with 0–4 small teeth or 0–10 tiny serrations or lacking teeth or serrations, right lacinia mobilis vestigial or absent, molar weakly triturative or simple 3
3. Inner plates of maxillae 1–2 setose medially only along upper half, left lacinia mobilis as long as broad or longer, coxa 1 not reduced . . . . . ***Transtectonia,*** new genus
   Inner plates of maxillae 1–2 fully setose medially, left lacinia mobilis short or absent, coxa 1 reduced 4
4. Gnathopod 1 simple, right lacinia mobilis absent . . . . . ***Apotectonia,*** new genus
   Gnathopod 1 subchelate, right lacinia mobilis present 5
5. Tooth of urosomite 1 singular, gnathopod 1 not elongate, setae on midface of innner plate on maxilla 2 about 12–13 . . . . . ***Tectovalopsis,*** new genus
   Tooth on urosomite 1 multifid, gnathopod 1 elongate, setae on midface of inner plate on maxilla 2 about 27 . . . . . ***Diatectonia,*** new genus
6. Gnathopod 1 simple . . . . . ***Alicella***
   Gnathopod 1 subchelate 7
7. Mandibular incisor strongly toothed, right lacinia mobilis large and doubled, molar triturative . . . . . ***Valettietta***
   Mandibular incisor poorly or not toothed, right lacinia mobilis, small and simple or

absent, molar not triturative 8
8. Left lacinia mobilis present, inner plate of maxilliped apically excavate, article 3 of gnathopod 1 elongate, maxilla 1 fully setose medially . . . . . ***Paralicella***
Left lacinia mobilis absent, inner plate of maxilliped without apical excavation, article 3 of gnathopod 1 ordinary, maxilla 1 partly setose medially . . . . . ***Eurythenes***

KEY 3

1. Coxa 1 ordinary 2
Coxa 1 reduced 4
2. Urosomite 1 with sharp dorsal tooth, inner plates of maxillae 1–2 medially setose only halfway to base . . . . . ***Transtectonia,*** new genus
Urosomite 1 with blunt dorsal tooth, inner plates of maxillae 1–2 fully setose medially 3
3. Gnathopod 1 simple, right lacinia mobilis large and doubled, heavily toothed, molar simple . . . . . ***Alicella***
Gnathopod 1 subchelate, right lacinia mobilis small, simple, poorly toothed, molar triturative . . . . . ***Valettietta***
4. Urosomite 1 with sharp dorsal tooth or teeth 5
Urosomite 1 with rounded dorsal hump . . . . . see Key 2, couplet 8
5. Gnathopod 1 simple, dorsal process of urosomite 1 doubled, inner plate of maxilliped with strongly oblique apex . . . . . ***Apotectonia,*** new genus
Gnathopod 1 subchelate, dorsal process on urosomite 1 singular 6
6. Incisor strongly toothed, right lacinia mobilis large, doubled, molar triturative . . . . . ***Valettiopsis***
Incisor weakly toothed, right lacinia mobilis vestigial, molar almost simple . . . . . see Key 2, couplet 5

KEY 4

1. Inner plate of maxilliped beveled apically 2
Inner plate of maxilliped not beveled apically 5
2. Inner plate of maxilliped with apical spines separated by excavation, gnathopod 1 strongly subchelate . . . . . ***Paralicella***
Inner plate of maxilliped lacking apical excavation, gnathopod 1 scarcely subchelate or simple 3
3. Urosomite 1 lacking dorsal tooth . . . . . ***Alicella***
Urosomite 1 with dorsal tooth 4
4. Coxa 1 reduced, urosomite 1 with 2 dorsal teeth, maxillae 1–2 fully setose medially, left lacinia mobilis simple or vestigial . . . . . ***Apotectonia,*** new genus
Coxa 1 ordinary, urosomite 1 with simple dorsal tooth, inner plates of maxillae 1–2 setose only halfway, left lacinia mobilis well developed, molar moderately triturative . . . . . ***Transtectonia,*** new genus
5. Coxa 1 not reduced . . . . . ***Valettietta***
Coxa 1 reduced 6
6. Mandibular molar triturative, incisor strongly toothed, right lacinia mobilis large, bifid, and well-toothed . . . . . ***Valettiopsis***
Mandibular molar not triturative, incisor not strongly toothed, right lacinia mobilis poorly developed 7
7. Article 3 of gnathopod 1 not elongate, urosomite 1 lacking dorsal tooth, left lacinia mobilis absent . . . . . ***Eurythenes***
Article 3 of gnathopod 1 elongate, urosomite 1 with dorsal tooth, left lacinia mobilis present . . . . . see Key 2, couplet 5

Valettiopsis Holmes

Valettiopsis Holmes, 1908:494 [*Valettiopsis dentatus* Holmes, 1908, original designation].

DIAGNOSIS.—Mouthparts forming quadrate bundle. Labrum and epistome separate, labrum slightly dominant in size, blunt. Incisor widely toothed; left lacinia mobilis longer than broad, right variable (very short in type, elongate in other species), molar with large apical trituration surface; palp attached slightly distal to molar. Inner plate of maxilla 1 strongly setose (about 32) medially; palp biarticulate, large. Inner plate of maxilla 2 not smaller than outer plate, with strong mediofacial row of setae (about 27), with about twice as many setae as in *Paralicella* and *Tectovalopsis*, new genus. Inner and outer plates of maxilliped well developed, palp strongly exceeding outer plate, dactyl well developed, ordinary, tapering.

Coxa 1 strongly shortened and partly covered by coxa 2, tapering. Posteroventral lobe on coxa 4 weak or absent.

Gnathopod 1 elongate, strongly subchelate, palm almost transverse, article 3 slightly to greatly elongate, articles 5 and 6 subequal, dactyl small; article 6 of gnathopod 2 almost equal to article 5, both very elongate and linear, propodus subchelate. Pereopods 5–7 elongate, article 2 diverse in size and form.

Pleonite 4 carinate sharply (versus *Paralicella*). Only outer ramus of uropod 2 shortened. Inner ramus of uropod 2 without notch. Uropod 3 aequiramous, ordinary, peduncle ordinary, inner ramus not shortened, outer ramus 2-articulate. Telson elongate, deeply cleft.

VARIABLES.—Pleon and pereon carinate (*V. multidentatus*); propodus of gnathopod 2 expanded (*V. macrodactylus*).

REMOVAL.—*Valettiopsis anacanthus* Birstein and Vinogradov (1963) to *Valettietta*.

RELATIONSHIP.—Differing from *Valettia* in coxa 1 being shorter than coxa 2, the elongate rectangular coxa 2, and the fully setose inner plates of maxillae 1–2; in *Valettia* coxae 1–2 are both short together and the inner plates of the maxillae are setose mostly terminally.

Differing from *Paralicella* in the more elongate gnathopod 1, serrate incisor, smaller coxa 1 tapering distally, poorly developed posteroventral lobe on coxa 4, and carinate pleonite 4.

From *Eurythenes* in the more elongate coxa 1, serrate incisor, poorly developed lobe on coxa 4, facial row of setae on the inner plate of maxilla 2, and the unswollen article 1 of antenna 2.

From *Tryphosella, Ambasia, Tmetonyx*, and relatives in the densely setose maxillae 1–2.

From *Aristias* in the elongate, strongly subchelate gnathopod 1 with elongate article 3 and the better developed inner plates of the maxillipeds.

From *Onesimoides* in the reduced and tapering coxa 1, medially setose maxillae 1–2, elongate gnathopod 1 with elongate article 3, and the large inner ramus of uropod 3.

From *Aristiopsis* in the elongate gnathopod 1 with elongate, unlobate carpus and the multisetose maxillae 1–2.

See *Valettietta* (in context of world monograph).

SPECIES.

V. dentatus Holmes, 1908.—Gurjanova, 1962.—J.L. Barnard, 1967 [310B]
macrodactylus Chevreux, 1909, 1935.—Lincoln and Thurston, 1983 [240BA]
multidentatus J.L. Barnard, 1961 [715B]

DISTRIBUTION.—Marine, demersal cosmopolitan, 183–4300 m, coming to baited traps, 3 species.

Apotectonia, new genus

ETYMOLOGY.—The genus name is from the Greek *apo* (after, away from) plus *tecto* (root of *Tectovalopsis*, new genus).

DIAGNOSIS.—Mouthparts forming quadrate bundle. Labrum and epistome separate, neither dominant in size, blunt. Incisor weakly toothed; left lacinia mobilis shorter than broad, right vestigial; molar large, conical, setulose, without tiny apical trituration surface, palp attached strongly distal to molar. Inner plate of maxilla 1 strongly setose medially (13), palp biarticulate, large. Inner plate of maxilla 2 much smaller than outer, with strong row of mediofacial setae (20, but number of setae in row about three-fourths that in *Valettiopsis* and *Valettietta*). Inner and outer plates of maxilliped well developed, inner beveled, palp strongly exceeding outer plate, dactyl well developed, with apical nail and several accessory setules.

Coxa 1 scarcely shortened, beveled, partly covered by coxa 2. Posteroventral lobe on coxa 4 of medium size.

Gnathopod 1 elongate, simple, articles 5 and 6 subequal, article 3 greatly elongate; dactyl small; article 6 of gnathopod 2 slightly shorter than article 5, both very elongate and linear, propodus subchelate. Pereopods 5–7 elongate.

Pleonite 4 complexly carinate (versus *Alicella* and *Paralicella*). Only outer ramus of uropod 2 shortened. Inner ramus of uropod 2 without notch. Uropod 3 aequiramous, ordinary, peduncle ordinary, inner ramus not shortened, outer ramus 2-articulate. Telson elongate, deeply cleft.

TYPE SPECIES.—*Apotectonia heterostegos*, new species.

RELATIONSHIP.—Differing from *Valettiopsis* and *Valettietta* in the same way as *Tectovalopsis*, new genus. Closely related to *Tectovalopsis* and *Transtectonia*, new genus, but gnathopod 1 simple and dorsal process of urosomite 1 complexly toothed. These facts alone should not necessarily be used to distinguish a new genus except for the facts that various other minor characters prevent assignment to the other genera.

Differing from *Transtectonia* in some of the same characters as in *Tectovalopsis*, except labrum broad as in *Transtectonia*, though much more shortened and not weakly excavate below.

Like *Tectovalopsis* in broad palp of maxilla 1 bearing outer basal setae and small inner plate of maxilla 2 but differing in the vestigial right lacinia mobilis, beveled inner plate of maxilliped, unreduced coxa 1, and in a more minor way the lack of basal setae on article 2 of the mandibular palp.

Like *Transtectonia* in the vestigial right lacinia mobilis and beveled inner plate of the maxilliped but differing in the broad palp of maxilla 1 bearing basolateral setae, beveled coxa 1, small unlocking spines of pereopods 3–4, diverse plates of maxilla 2, and small, broader than long, left lacinia mobilis.

Apotectonia is unusual in the disproportionate antennae, the second antenna being longer than the first.

Differing from *Alicella* in the unproduced epistome, head with antennal sinus; incisors of mandibles broad relative to body of mandible; left lacinia mobilis tiny (versus large); inner plate of maxilla 1 narrow (versus broad); apex of palp on maxilla 1 strongly expanded (versus poorly expanded); apex of inner plate on maxilliped lacking spines in middle; pereopods 5–7 elongate (versus short); article 2 of pereopods 5–7 with evenly rounded-sloping posterior lobes (versus ventrally truncate); epimeron 1 with posteroventral tooth; urosomite 4 with large, elevated pair of dorsal cusps (versus smooth dorsally); outer ramus of uropod 1 as long as inner ramus.

Apotectonia heterostegos, new species

FIGURES 26–28

ETYMOLOGY.—The species name is from the Greek *heteros* (different) plus *stegos* (cover, sheath (plate)), referring to the unusual number of oostegites (5) in this species.

DIAGNOSIS (for comparison to *Tectovalopsis*).—Antennae not especially short but antenna 2 longer than 1. Coxae 1–2 not of broadened form, coxa 1 scarcely shortened, beveled, tapering; coxa 2 scarcely adz-shaped; palm of gnathopod 1 absent; palm of gnathopod 2 oblique; accessory gills well developed, slender, gill of pereopod 6 with one accessory lobe; ventral spines on epimeron 2 sparse and poorly spread, adults without facial spine; tooth on epimeron 2 strong, epimeron 3 with weak tooth; dorsal tooth on pleonite 3 slightly developed as overhang; dorsal tooth on urosomite 2 small; middle keel on urosomite 3 obsolescent or absent; apicolateral spine on peduncle of uropod 2 not larger than other spines; inner ramus of uropod 3 as long as outer; maturation not delayed.

DESCRIPTION.—*Holotype:* Female "g" 18.3 mm: As in illustrations; primary flagellum of antenna 1 with large and small spines in following formula commencing with article 1 (L = large, S = small, M = medium, 0= absent): left flagellum, L,L,L,L,L,M,M,S,M,0,S,S,S,0,S,S,0,S,0,0,S,S,0,S,0,0,S,0,S, and 11 zeros (total 36 articles); right flagellum, L,L,L,L,S,L,L,S,L,L,S,S,0,S,S,0,0,0,S,0,S,0,0,S,0,S, and 12 zeros (34 articles); aesthetascs on right flagellum per article, 6 rows, 2 rows, 2 rows, 1 row, 1,1,1,1,1, each in rows, and absent on articles 10–34.

Prebuccal mass with epistome and upper lip each produced as rounded anterior lobe. Right and left incisors with inner notch-tooth and plain tooth respectively, with 3 and 2 minute outer teeth respectively, right lacinia mobilis tiny, bifid, left scarcely larger and multitoothed, rakers about 14, molars long, slender, pointed, pubescent; palp article 3 with ADE setae.

Right outer plate of maxilla 1 with 10 spines, left with 11; palps symmetrical.

Coxa 1 beveled anteroventrally; coxae 1–3 with 5,4,1 mediofacial setae respectively. Unplaited gills, each with minor secondary sausage-shaped lobe present on coxae 2–7; oostegites narrow, poorly developed, on coxae 1–5.

Gnathopod 2 lacking pubescence; article 2 well setose anteriorly (not illustrated), posterior margin with only one main setal bundle in middle.

Pereopod 4 stouter but not longer than pereopod 3. Pereopod 6 longest.

Pleopods large, rami about 1.3 times as long as peduncle, peduncles naked except for one apicolateral spine on pleopods 2–3, outer rami with 25 or 24 (pleopod 3) articles, inner with 21; coupling hooks 2 with 3 unhooked accessory spines each.

Ventral spine formula on epimera 1–3 respectively = 1–3–4. Urosomite 5 with weak dorsal flange appearing sharp from side view; urosomite 6 with dorsal spine.

Apices of rami on uropods with small apical setule emerging from mostly amalgamated inner nail. Apices of telsonic lobes notched, each with small spine, each side of telson with subbasal spine, each dorsum with small middle spine.

Other Material: Female "k" 17.4 mm: Oostegites large, slender, strap-shaped, fully setose.

Female "m" 11.73 mm: Oostegites forming tiny buds.

Juvenile "h" 12.4 mm: Slightly larger than female "m" but brood buds absent.

Juvenile "p" 8.31 mm: Accessory flagellum 4-articulate; inner plate of maxilliped with 4 facial setae (versus 4 for illustrated adult); accessory lobes of gills fully developed; article 2 of pereopod 7 with 7 posterior setule notches (versus 10); posteroventral tooth on epimeron 1 rudimentary, spine counts on epimera 1–3 = 1–2–3; pleonite 1 with 1 ventral spine; spine counts on uropods (number = spine, s = seta, b = bud of spine), uropod 1 peduncle basofacial = 1–1–1 (latter at M.40), dorsolateral = 6, medial = 6, outer ramus lateral = 4, medial = 4, inner ramus lateral = 3, medial = 4; uropod 2 peduncle dorsolateral = 2, medial = 1, outer ramus lateral = 4, medial = 1, inner ramus lateral = 3, medial = 4; uropod 3 peduncle dorsolateral = 1, dorsal = 0, ventral = 1, medial = 1, outer ramus lateral = 1–1–2, medial = b–1–1, inner ramus lateral = 1–1+s, medial = basal spine, then apically b-b-b-b-1+s–1+s–1.

ILLUSTRATIONS.—Sets of similarly magnified drawings are (1) coxae 1–4, (2) pereopods 5–7, (3) uropod 3 and telson, (4) uropods 1–2 (smaller than 3). Maxilla 2 magnified less than maxilla 1. Lines of extension from antennae showing total length.

HOLOTYPE.—USNM 195149, female "g" 18.3 mm (illustrated).

TYPE LOCALITY.—Station 891, Galapagos Vents, Garden of Eden, 00°47.7′N, 86°07.7′W, 16 Feb 1979, 2488 m, collected by Scripps Institution of Oceanography (hereafter SIO),

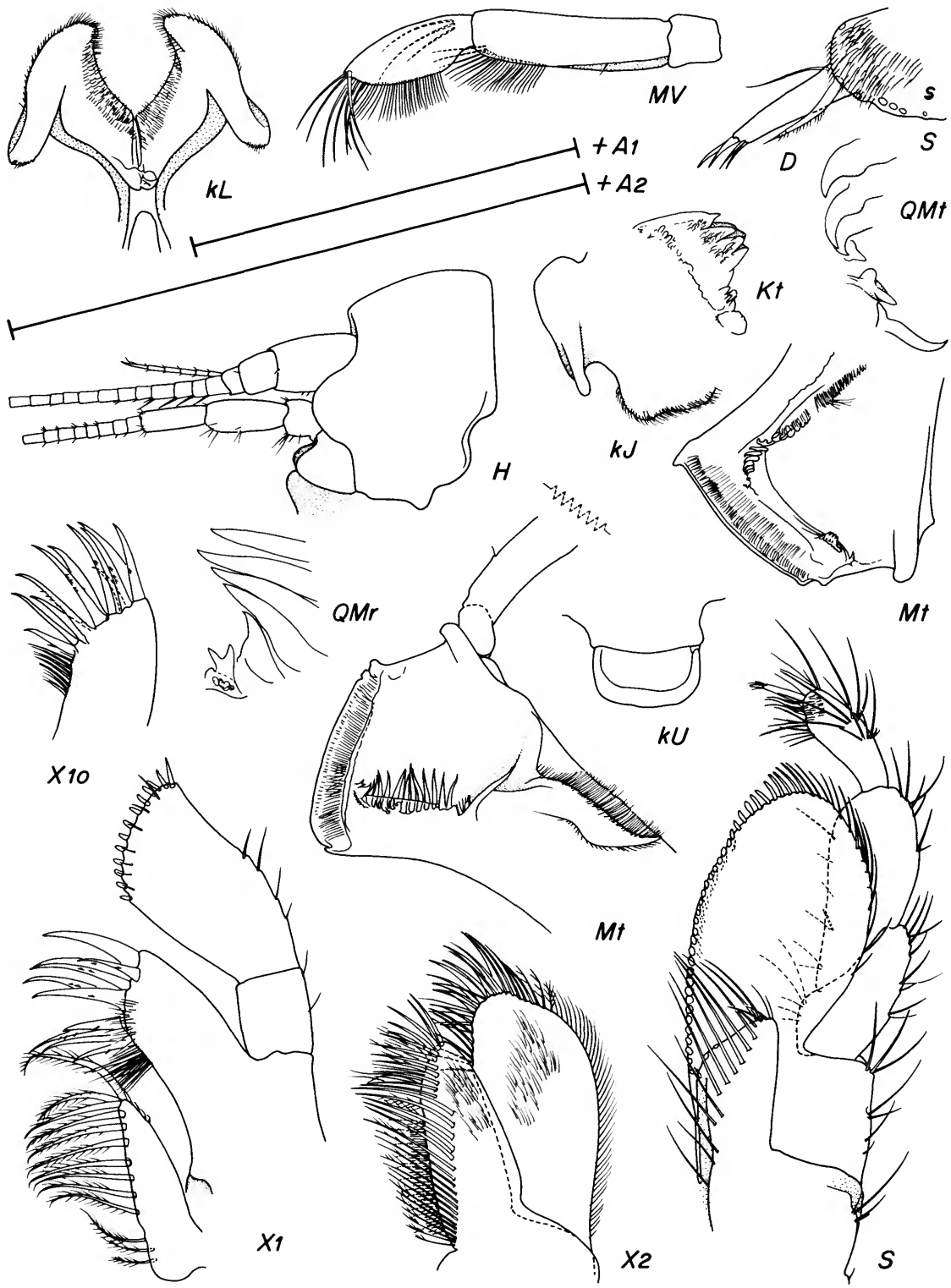

FIGURE 26.—*Apotectonia heterostegos*, new species: unattributed figures = holotype, female "g"; k = female "k" 17.4 mm.

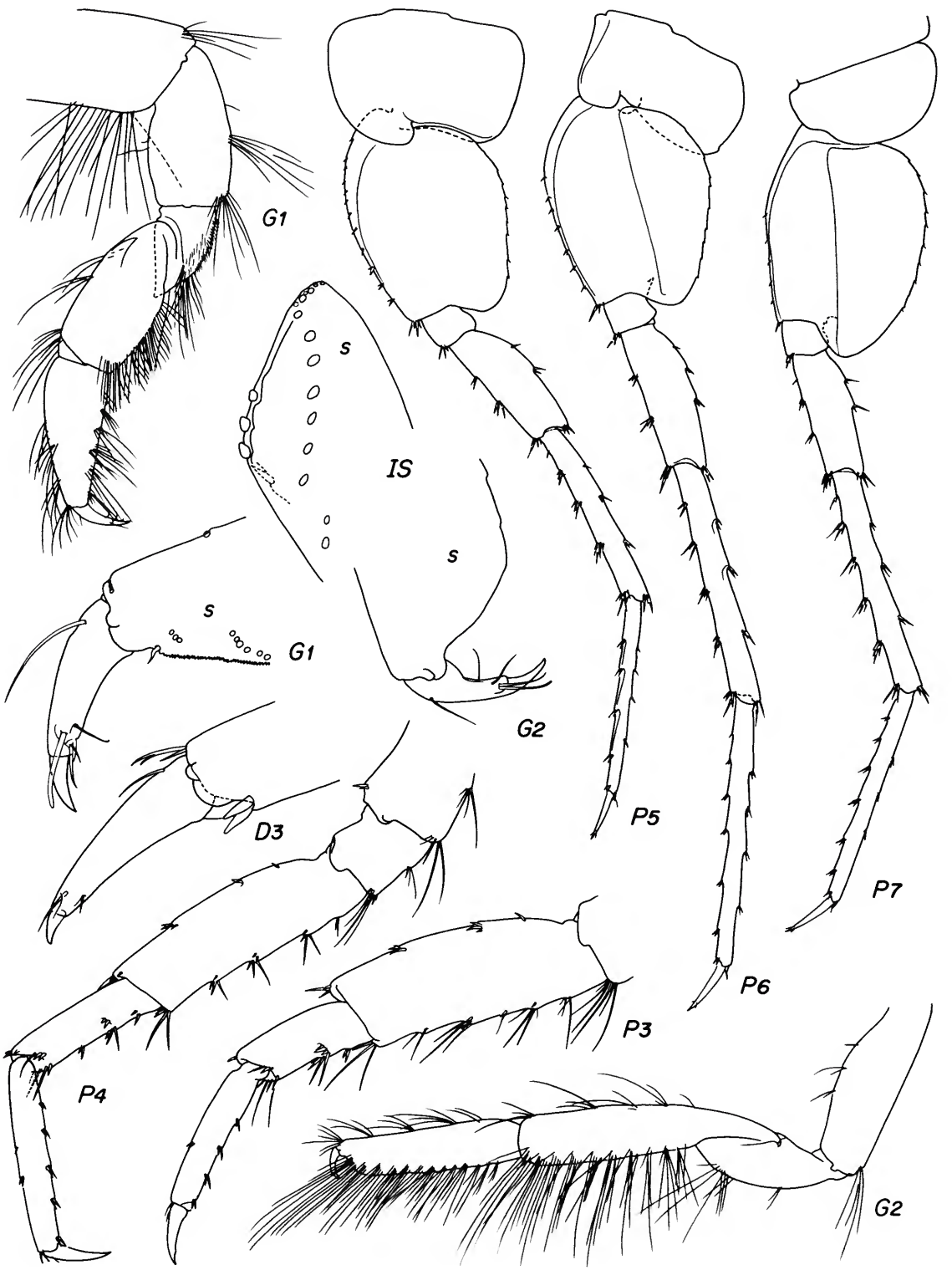

FIGURE 27.—*Apotectonia heterostegos*, new species, holotype, female "g."

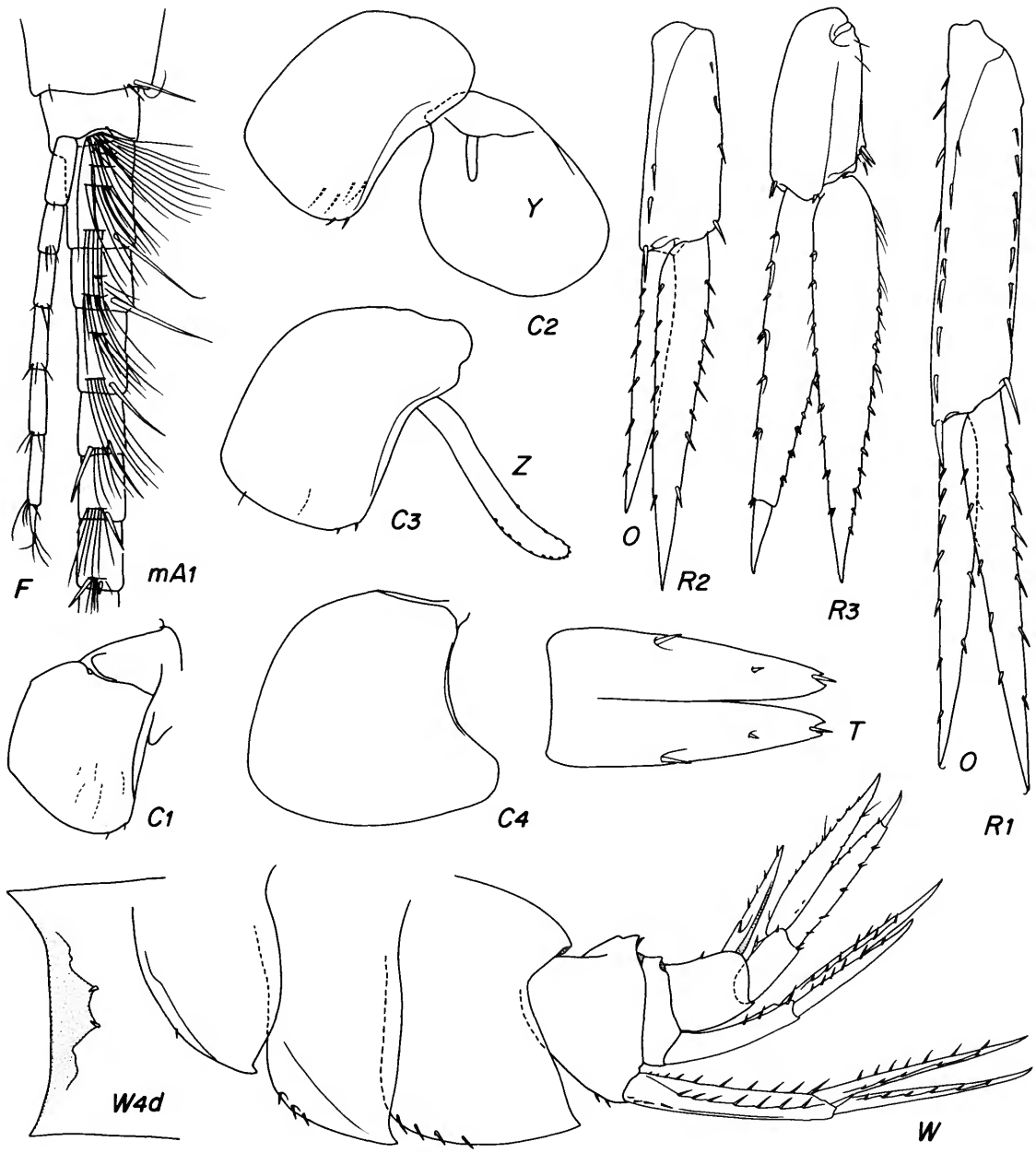

FIGURE 28.—*Apotectonia heterostegos*, new species, holotype, female "g"; m = female "m," 11.73 mm.

amphipod trap.

MATERIAL.—Type locality, juvenile "h" 12.4 mm, female "i" 15.4 mm, juvenile "j" 5.31 mm, female "k" 17.4 mm (illustrated), female "m" 11.73 mm, juvenile "n": 7.85 mm (total in sample, 317 specimens). SIO Galapagos 993, Galapagos Vents, 00°47.0'N, 86°08.0'W, 2518 m, 10 Dec 1979, subsample unspecified, juvenile "p" 8.31 mm. WHOI Dive 984 00°48.0'N, 86°13.0'W, 2451 m, 01 Dec 1979, Panel 10, Rose Garden, Turner/Copley, 1 large and 1 small specimens.

REMARKS.—The presence of an oostegite on coxa 1 is probably the first record of this occurring in gammaridean Amphipoda. This is consistent on adult females.

RELATIONSHIP.—The diagnosis compares this species to *Alicella gigantea*. The most conspicuous difference of *A.*

heterostegos is the elevation of urosomite 1 into a pair of closely connected cusps. The shape of article 2 on pereopods 5-7 is also significant, these being rounded-attenuate, rather than truncate. The basal spines on the primary flagellum of antenna 1 are also conspicuous.

DISTRIBUTION.—Galapagos Vents, 2451-2518 m.

Diatectonia, new genus

ETYMOLOGY.—The genus name is from the Greek *dia* (between) plus *tekos* (molten).

DIAGNOSIS.—Mouthparts forming quadrate bundle. Labrum and epistome separate, neither dominant in size, blunt. Incisor weakly toothed (4 teeth each side); left and right laciniae mobiles shorter than broad, right very small; molar large, conical, setulose, with tiny apical trituration surface; palp attached strongly distal to molar. Inner plate of maxilla 1 strongly setose medially (19), palp biarticulate, large. Inner plate of maxilla 2 slightly smaller than outer, with strong row of mediofacial setae (27), number of setae in row like that in *Valettiopsis* and *Valettietta*. Inner and outer plates of maxilliped well developed, inner scarcely beveled, with 4 widely spread jewel-spines; palp strongly exceeding outer plate, dactyl well developed, ordinary, with 1 apical nail and several accessory setules.

Coxa 1 strongly shortened and partly covered by coxa 2, tapering. Posteroventral lobe on coxa 4 strong.

Gnathopod 1 elongate, strongly subchelate, palm oblique, article 6 shorter than 5, article 3 greatly elongate; dactyl small; article 6 of gnathopod 2 shorter than article 5, both very elongate and linear, propodus barely subchelate. Pereopods 5-7 elongate.

Pleonite 4 carinate (versus *Paralicella*), with 3 teeth (versus *Tectovalopsis*, new genus). Only outer ramus of uropod 2 shortened. Inner ramus of uropod 2 without notch. Uropod 3 aequiramous, ordinary, peduncle ordinary, inner ramus not shortened, outer ramus 2-articulate. Telson elongate, deeply cleft.

TYPE SPECIES.—*Diatectonia typhodes*, new species, here designated.

RELATIONSHIP.—Differing from *Valettiopsis* in the poorly toothed incisor, evanescent right lacinia mobilis, somewhat more distally placed palp of the mandible, reduction of the triturative surface on the molar to a very small plaque or button, the many fewer medial setae on the inner plate of maxilla 1 (but setae on maxilla 2 are alike), the wider spread of 4 (versus 3) spines on the apex of the inner plate on the maxilliped, the elongate gnathopods, the more strongly oblique palm of gnathopod 1 and the slightly more oblique palm of gnathopod 2 (variable), larger lobe of coxa 4, and trifid condition of the dorsal process on urosomite 1. The diagnoses of the genera show other distinctions.

The reduction or loss of incisorial cuspidation complicates classification within the Lysianassoidea because colleagues have suggested that lysianassoids with incisorial teeth belong in a family group remote from lysianassoids. Because this occurs in a genus with reduced coxa 1, which cannot be a plesiomorph, the precise definition of such a family group will be difficult.

The similar *Valettietta* Lincoln and Thurston (1983) differs from our genus in the more strongly toothed incisor, larger right lacinia mobilis, strongly triturative molar, narrow palp of maxilla 1, different inner plate of the maxilliped, longer coxa 1, shorter gnathopod 1, relative equality in length of articles 5-6 on gnathopod 2 and the bluntness and singularity of the dorsal tooth of urosomite 1.

Differing from its very close relative, *Tectovalopsis* in the multifid keel of urosomite 1, the many more setae in the oblique facial row on the inner plate of maxilla 2, much longer gnathopod 1 and the absence of a tooth on epimeron 3.

Differing from *Transtectonia*, new genus, in the shortened coxa 1, fully setose inner plates of maxillae 1-2, broad palp of maxilla 1, broad left lacinia mobilis, and broad spread of spines on the inner plate of the maxilliped.

Differing from *Apotectonia* in the subchelate gnathopod 1, larger antenna 2, more strongly toothed incisors, large left lacinia mobilis, presence of right lacinia mobilis, slight trituration of and thicker molar, much more strongly setose inner plate of maxillae 1-2, the broad spread of spines on the inner plate of the maxilliped, and the elongate gnathopod 1. *Diatectonia* and *Apotectonia* are similar in the multidentation of the dorsal process on urosomite 1.

Differing from *Paralicella* in the presence of a sharp tooth on urosomite 1, the stronger toothing of the mandibular incisors, broader left lacinia mobilis, slightly triturative molar, presence of many more setae on the inner plates of maxillae 1-2, the lack of an apical excavation on the inner plate of the maxilliped (with no separation between spines), and the more elongate gnathopod 1.

There is intermixture of characters in this genus that combines features of *Tectovalopsis* and *Valettiopsis* on the one propodus and *Apotectonia* and *Tectovalopsis* on the other propodus. Besides the characters noted above in the individual comparisons, *Diatectonia* differs from all three genera in the wide spread of the spines on the inner plate of the maxilliped. *Diatectonia* appears to stand near the *Valettiopsis* morphology in retaining the apomoprhic multisetose maxillae, and slightly better toothing on mandibular incisors, but like *Tectovalopsis* and *Apotectonia* has lost integrity in molar and right lacinia mobilis.

SPECIES.

D. typhodes, new species [317B].

DISTRIBUTION.—Marine demersal or epibenthic, Hamilton Guyot, 1790 m.

Diatectonia typhodes, new species

FIGURES 29–32

ETYMOLOGY.—The species name is from the Greek *typhodes* (smoky).

DIAGNOSIS (in sense of *Tectovalopsis*).—Coxa 2 of broadened form, coxa 1 shortened and subtruncate, evenly tapering; coxa 2 distinctly adz-shaped; palm of gnathopod 1 oblique, well developed; palm of gnathopod 2 oblique; accessory gills short and thick, gill of pereopod 6 with one accessory lobe; ventral spines on epimeron 2 sparse and widely spread, adults with no facial spine; tooth on epimera 2–3 evanescent; dorsal tooth on pleonite 3 absent; dorsal tooth on urosomite 1 trifid; dorsal tooth on urosomite 2 obsolescent; middle keel on urosomite 3 obsolescent or absent; apicolateral spine on peduncle of uropod 2 not larger than other spines; inner ramus of uropod 3 as long as outer; maturation [unknown].

DESCRIPTION.—*Holotype:* Female "w" 28.59 mm: Apparently blind, head filled with dispersed glandular blots appressed to inside surface of head; lateral lobe truncate, antennal sinus shallow. Epistome and upper lip weakly articulate, separated by notch from side view, neither dominant, upper lip pyriform below.

Right incisor with 3 medium sharp apicomedial teeth, distal margin barely crenulate laterally, then with large outer tooth, left incisor similar but only one inner tooth large, 2–3 other evanescent; right lacinia mobilis small, flake-like, jaggedly serrate, much broader than long; left lacinia mobilis also much broader than long, very well developed, almost evenly serrate apically; rakers numerous (13 large right, 15 large left, each side with 3 small rakers, many fimbriate interrakers); molars medium to large, subconical, densely setulose, tapering to small apical plaque with weak triturative surface; palp article 1 short, article 2 well setose, article 3 short, thinly clavate, with 3 A-setae and many D and E setae. Lower lip with subsharp mandibular lobes, with gape between main lobes, inner lobes absent. Inner plate of maxilla 1 heavily setose medially (19), with tiny denticle-setules on apicoposterior ridge, very broad aboral part extending behind outer plate; spines on outer plate 11, no spine small and inserted on oral face; palps with several lateral setae, apices broad, multispinose and with numerous apicofacial setae. Inner plate of maxilla 2 distinctly smaller than outer (and thus differing from *Valettiopsis* and *Valettietta*), facial setal row with about 27 setae (and thus similar to the 2 genera mentioned). Inner plate of maxilliped with 4 main apical spines widely spread, dactyl long, evenly tapering, with main apical nail and several accessory setules.

Dactyls of gnathopods 1–2 without inner acclivity and tooth, with slit and 2 heavy setule-spinules and 0–2 setules. Dactyls of pereopods with weak nail, one weak inner and weak facial setule; unlocking spines paired. Oostegites slender, strongly setose, present on coxae 2–5. Gills broad and unpleated, large on coxae 2–7, each with medium thick conical accessory lobe except lobe small and rounded on coxa 7.

Epimeron 1 with 5 anteroventral spines, epimeron 2 with 5 spines widely spread, without facial spines, epimeron 3 with 6 spines widely spread, all spines placed singly. Each pleopod with 2 coupling hooks and 2–3 simple accessories, peduncles of pleopods 1–3 respectively with 4 medium, 5 tiny and 3 large stiff vertically aligned marginal spines each, rami very long, inner slightly the shorter, outer and inner rami generally with 31 and 27 articles respectively.

Peduncle of uropod 1 with basolateral row of spines, apicolateral corner with large spine, other corner spines on uropods 1–2 small, all rami bearing 2 rows of spines (not all seen laterally); peduncle of uropod 3 weakly elongate, with subapical ventrolateral spine. Each apex of telson barely bifid, with one spine and setule, dorsum of each lobe with 2–3 sets of dorsal spines, basolateral set of these at M.40 bearing 2 inner setules (presumably the normal basolateral setule pair found in most amphipods).

ILLUSTRATIONS.—Pereopod 3 more enlarged than pereopods 5–7. Antenna 2 much longer than antenna 1 but flagellum broken and missing. Maxilla 1 is magnified more than maxilla 2 and both are magnified more than the maxilliped; article 3 of the maxillipedal palp is not fully flattened. One row of medial spines on inner ramus of uropod 2 not seen from lateral view.

HOLOTYPE.—USNM 235006, female "w" 28.5 mm. Unique.

TYPE LOCALITY.—SIO Cat. No. C5697, Acc. No. BI68-30, STYX-7 MPE 68094 sta 4, Hamilton Guyot, 18°32′N, 179°18′W, 4, 5 Sep 1968, ~1790 m, free vehicle trap, R/V *Agassiz*, unique holotype.

DISTRIBUTION.—Hamilton Guyot, 1790 m.

Tectovalopsis, new genus

ETYMOLOGY.—The genus name is from the Greek *tekos* (molten) plus roots of *Valettiopsis*, a similar genus.

DIAGNOSIS.—Mouthparts forming quadrate bundle. Labrum and epistome separate, neither dominant in size, blunt. Incisor weakly toothed or smooth; left and right laciniae mobiles shorter than broad; molar large, conical, setulose, with tiny apical trituration surface; palp attached strongly distal to molar. Inner plate of maxilla 1 strongly setose medially (about 15); palp biarticulate, large. Inner plate of maxilla 2 slightly smaller than outer, with strong row of mediofacial setae (about 11), but number of setae in row about half that in *Valettiopsis* and *Valettietta*. Inner and outer plates of maxilliped well developed, inner not beveled, with 3 spines grouped medially, apicolateral margin bulging, palp strongly exceeding outer plate, dactyl well developed, either ordinary or with inner acclivity and tooth, 2 apical nails and several accessory setules.

Coxa 1 strongly shortened and partly covered by coxa 2, tapering or weakly truncate. Posteroventral lobe on coxa 4 strong.

Gnathopod 1 elongate, strongly subchelate, palm oblique, articles 5 and 6 subequal, article 3 greatly elongate; dactyl small; article 6 of gnathopod 2 shorter than article 5, both very

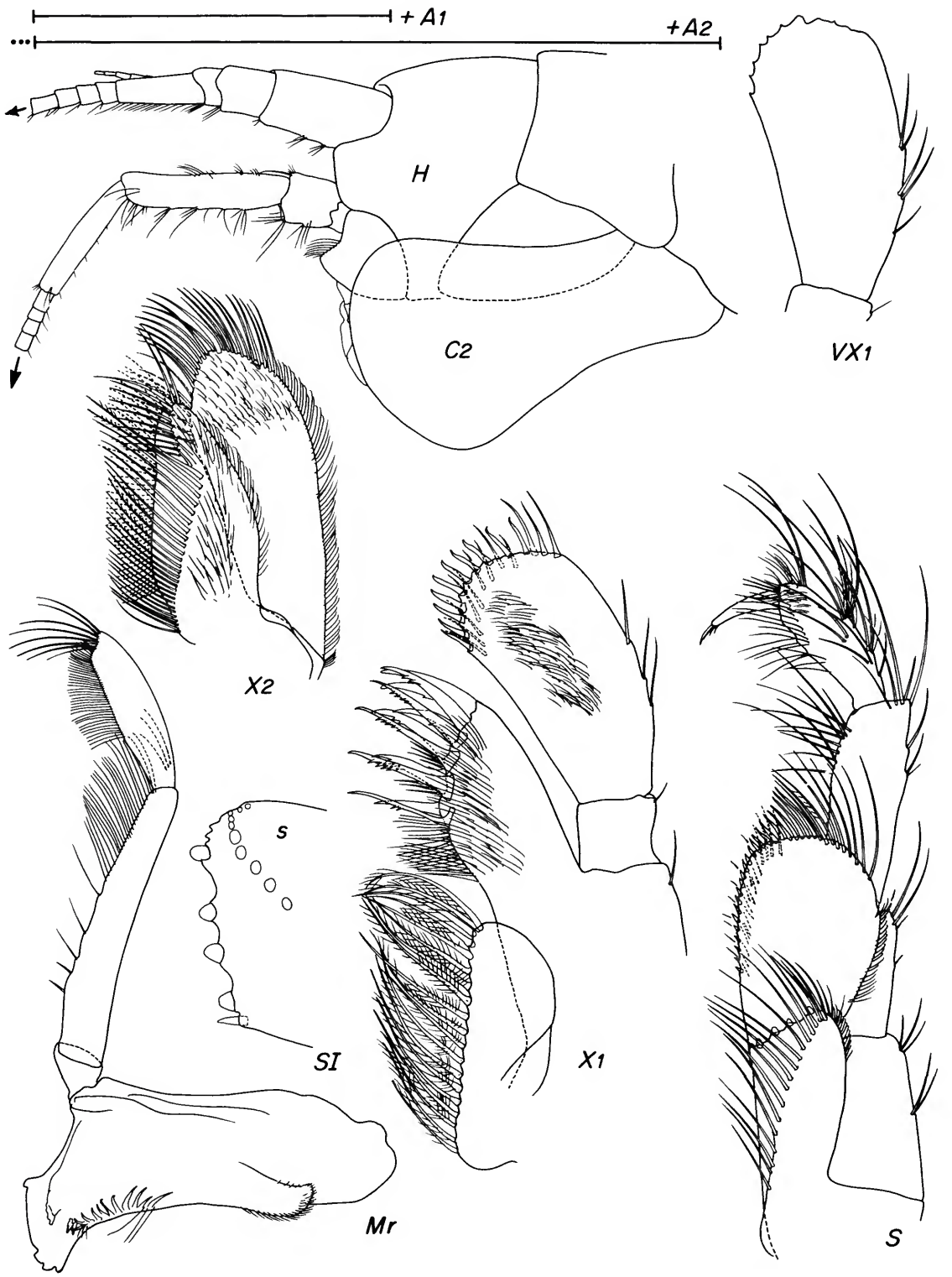

FIGURE 29.—*Diatectonia typhodes*, new species, holotype female "w" 28.5 mm [3 dots at end of scale bar = broken apex not figured].

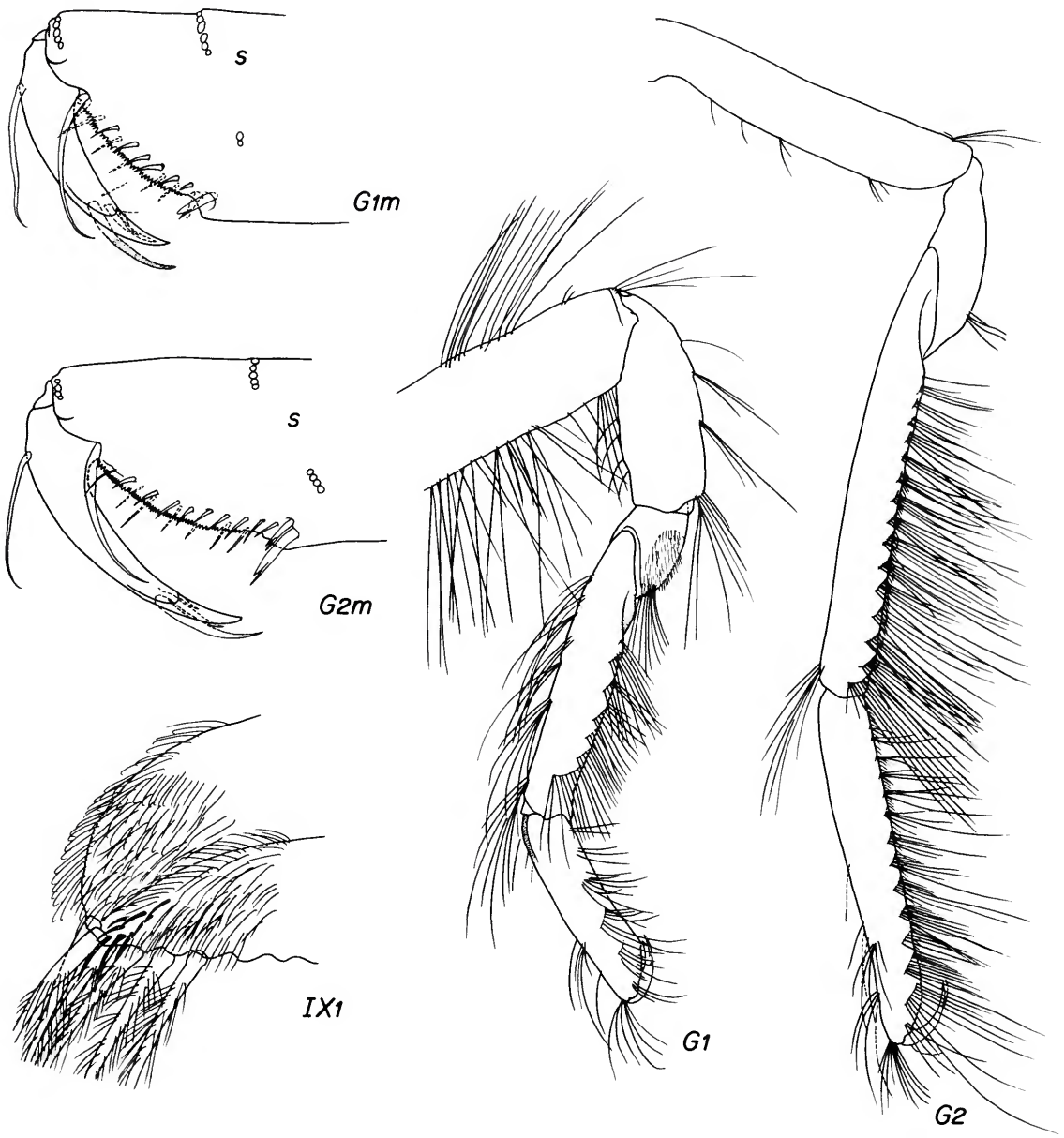

FIGURE 30.—*Diatectonia typhodes*, new species, holotype female "w" 28.5 mm.

elongate and linear, propodus subchelate. Pereopods 5–7 elongate.

Pleonite 4 carinate (versus *Paralicella*). Only outer ramus of uropod 2 shortened. Inner ramus of uropod 2 without notch. Uropod 3 aequiramous, ordinary, peduncle ordinary, inner ramus not shortened, outer ramus 2-articulate. Telson elongate, deeply cleft.

TYPE SPECIES.—*Tectovalopsis wegeneri*, new species.

RELATIONSHIP.—Differing from *Valettiopsis* in the poorly toothed or smooth incisor, elongate left lacinia mobilis, somewhat more distally placed palp of the mandible, reduction of the triturative surface on the molar to a very small plaque or button, the more strongly oblique palm of gnathopod 1, and the slightly more oblique palm of gnathopod 2 (variable). The diagnoses of the genera show other distinctions.

See also comments on reduction or loss of incisorial

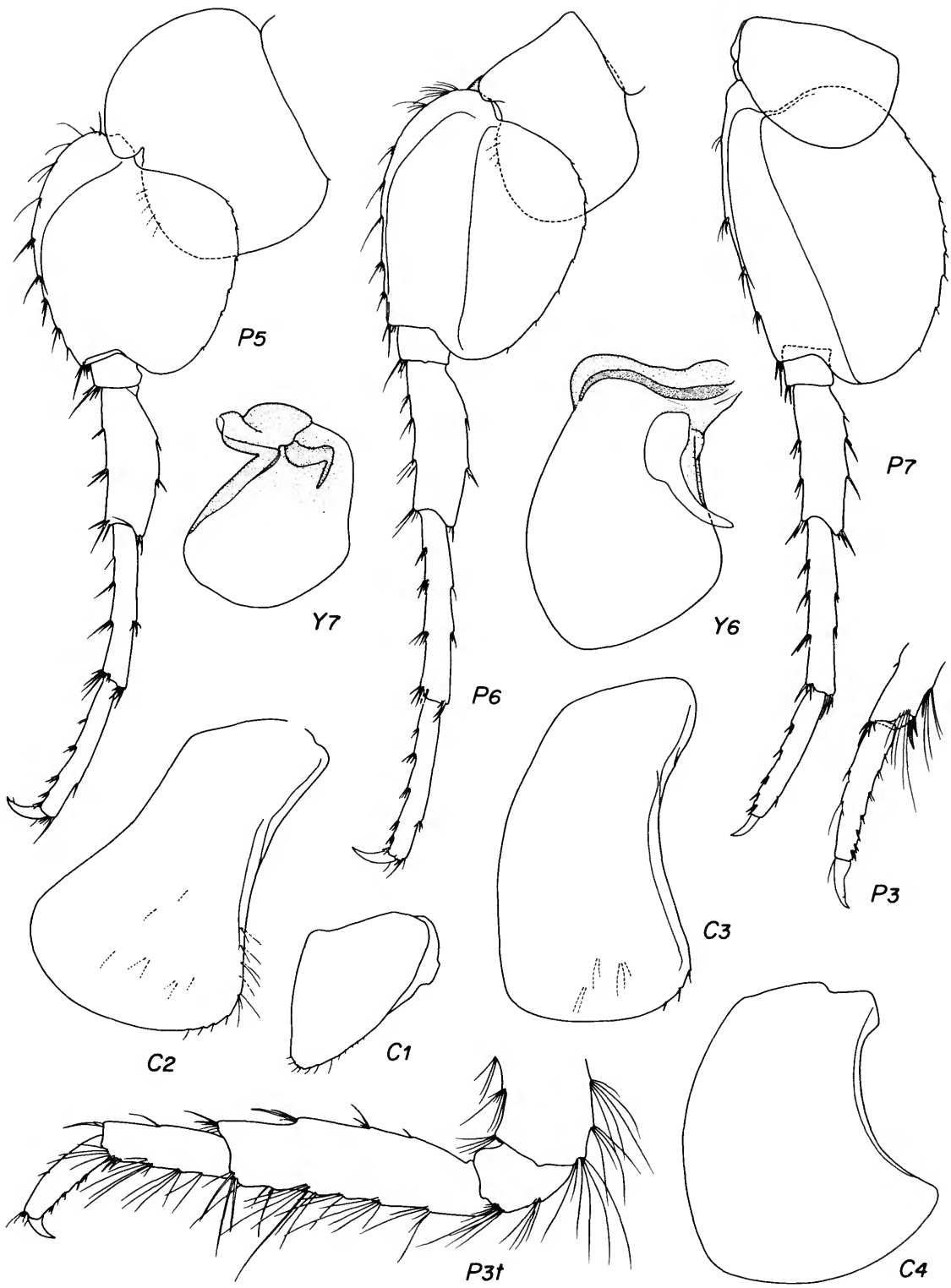

FIGURE 31.—*Diatectonia typhodes*, new species, holotype female "w" 28.5 mm.

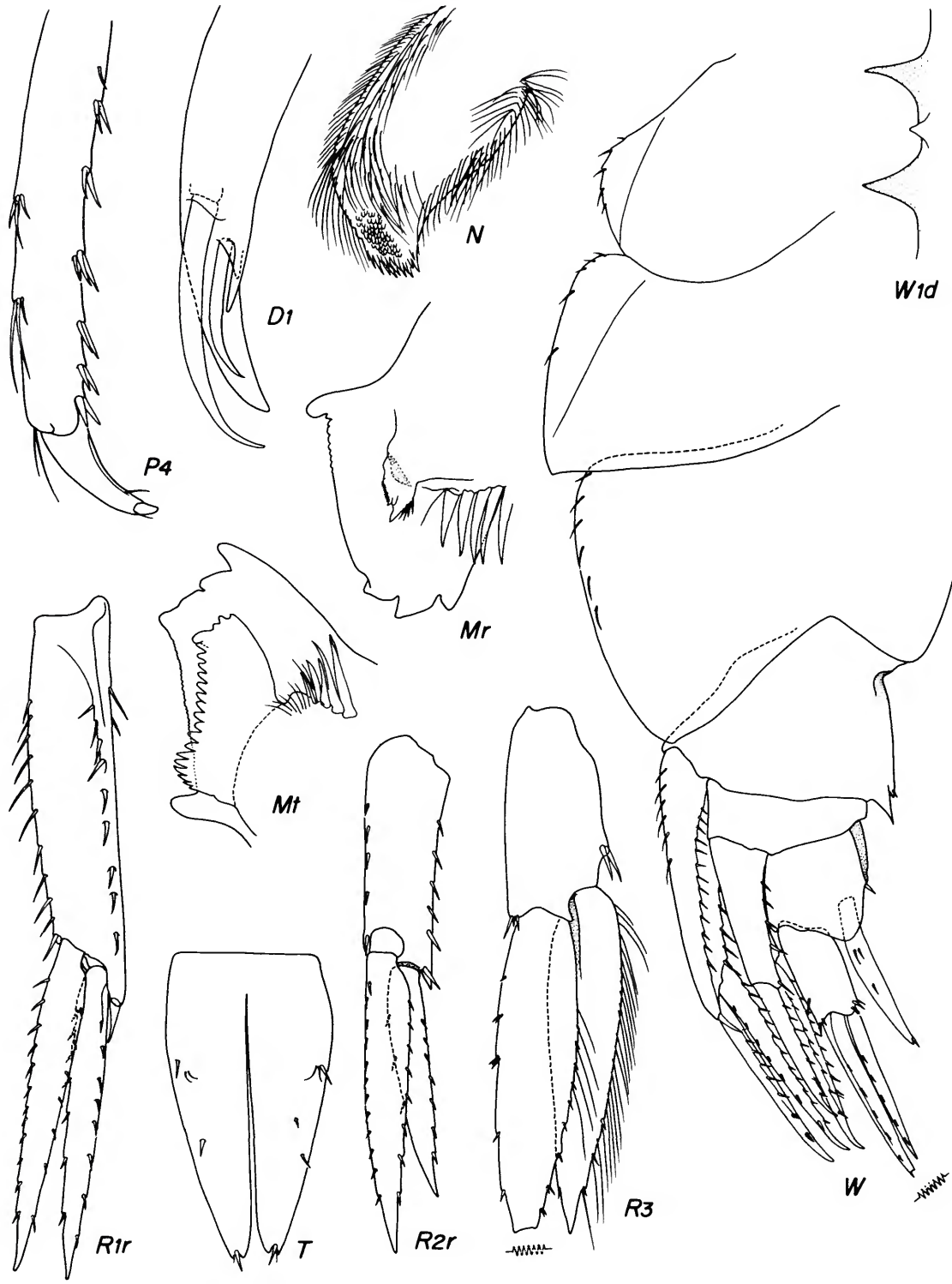

FIGURE 32.—*Diatectonia typhodes*, new species, holotype female "w" 28.5 mm.

cuspidation under discussion of *Diatectonia.*

The similar *Valettietta* Lincoln and Thurston (1983) differs from our genus in the toothed incisor, ordinary left lacinia mobilis, longer coxa 1, relative equality in length of articles 5–6 on gnathopod 2, and the bluntness of the dorsal tooth of urosomite 1.

There is intermixture of characters in this genus that combines features of *Paralicella* and *Valettiopsis.* The incisors, laciniae mobiles, molar, inner plate of maxilla 2, dactyl of maxilliped, coxa 4, and gnathopods are much closer to *Paralicella* than to *Valettiopsis,* whereas the short coxa 1, uropods 1–2, and sharp tooth of urosomite 1 resemble those in *Valettiopsis.* In contrast to either genus, article 2 of pereopods 5–7 is even and not diverse in size and form, a character we assume is plesiomorphic. Any suggestion that one or the other of the genera *Paralicella* and *Valettiopsis* could be directly ancestral to the other with transition traced through *Tectovalopsis* is obviated by the short coxa 1 of *Valettiopsis* and *Tectovalopsis,* which is apomorphic, while the slightly reduced inner plate of maxilla 2 and unusual dactyl of the maxilliped in *Paralicella* and *Tectovalopsis* are also apomorphic. The reduced triturative surface on the molar of *Paralicella* and *Tectovalopsis* is apomorphic. The reduced lobe on coxa 4 of *Valettiopsis* is apomorphic. The reduced outer ramus of uropod 1 in *Paralicella* is apomorphic. One presumes the sharpness of the dorsal tooth on urosomite 1 is apomorphic in *Valettiopsis* and *Tectovalopsis,* but such judgment is less secure than in the other characters. The laciniae mobiles seem to run in a sequence of increasing apomorphy from *Valettiopsis* to *Paralicella* to *Tectovalopsis.* The dactyl of the maxilliped appears to be more apomorphic in *Tectovalopsis* than in *Paralicella,* both of which seem to be more apomorphic than *Valettiopsis* and *Valettietta.* To supply an evolutionary tree, one must therefore hypothesize additional plesiomorphic ancestors with earlier branching than demonstrated in these 3 genera. The evenness of article 2 on pereopods 5–7 in *Tectovalopsis* is also distinctive from that of *Paralicella* and *Valettiopsis.* This evenness of shape is replicated in *Valettietta* but in that genus there is considerable size distinction among the pereopods mentioned.

SPECIES.

T. diabolus, new species [504A]
T. fusilus, new species [309A]
T. nebulosus, new species [310B]
T. regelatus, new species [317B]
T. wegeneri, new species [504A].

DISTRIBUTION.—Marine demersal or epibenthic, North Pacific at 13°N Vents, Hess Guyot, Jasper Seamount, and off southwest Mexico, 706–2884 m, 5 species.

Keys to the Species of *Diatectonia* and *Tectovalopsis,* new genera

KEY 1

1. Palm of gnathopod 2 short, weakly oblique; (tooth of epimeron 2 large; urosomite 3 without distinct middorsal keel) . . . . . ***Tectovalopsis wegeneri,*** new species
   Palm of gnathopod 2 long, strongly oblique. 2
2. Epimeron 3 lacking significant tooth, keel of urosomite 1 multifid . . . . . ***Diatectonia typhodes,*** new species
   Epimeron 3 bearing significant tooth, keel of urosomite 1 simple 3
3. Tooth of epimeron 2 small; urosomite 3 with erect dorsal keel . . . . . ***Tectovalopsis diabolus,*** new species
   Tooth of epimeron 2 large; urosomite 3 with almost flat or concave dorsal surface 4
4. Pleonite 3 with dorsal tooth . . . . . ***Tectovalopsis regelatus,*** new species
   Pleonite 3 lacking dorsal tooth 5
5. Inner ramus of uropod 3 significantly shortened, incisorial teeth obsolescent, gill 6 with one accessory lobe . . . . . ***Tectovalopsis fusilus,*** new species
   Inner ramus of uropod 3 not shortened, incisorial teeth well developed, gill 6 with 2 accessory lobes . . . . . ***Tectovalopsis nebulosus,*** new species

KEY 2

1. Teeth of epimera 2–3 weak, epimeron 2 lacking facial spines, urosomite 3 with dorsal keel . . . . . ***Tectovalopsis diabolus,*** new species
   Teeth of epimera 2–3 strong, epimeron 2 with facial spine(s), urosomite 3 lacking dorsal keel 2
2. Palm of gnathopod 2 slightly oblique, coxa 2 tear-drop-shaped . . . . . .

. . . . . *Tectovalopsis wegeneri,* new species
Palm of gnathopod 2 very oblique, coxa 2 adz-shaped, mandibular incisor toothed
. . . . . Key 1, couplet 3

KEY 3

1. Accessory lobes on coxal gills 2–7 very thin . . . . . .
. . . . . *Tectovalopsis nebulosus,* new species
Accessory lobes on coxal gills 2–7 thick 2
2. Urosomite 3 with dorsal keel, incisors toothed . . . . . .
. . . . . *Tectovalopsis diabolus,* new species
Urosomite 3 lacking dorsal keel, incisors smooth 3
3. Palms of gnathopods weakly oblique . . . . . *Tectovalopsis wegeneri,* new species
Palms of gnathopods extremely oblique 4
4. Pleonite 3 with dorsal tooth . . . . . *Tectovalopsis regelatus,* new species
Pleonite 3 lacking dorsal tooth . . . . . *Tectovalopsis fusilus,* new species

Tectovalopsis wegeneri, new species

FIGURES 33–35

ETYMOLOGY.—This species is named for A.L. Wegener, 1880–1930.

DIAGNOSIS.—Coxae 1–2 not of broadened form, coxa 1 shortened and subtruncate, not evenly tapering; coxa 2 not distinctly adz-shaped; palm of gnathopod 1 weakly oblique, well developed; palm of gnathopod 2 slightly oblique; accessory gills short and thick, gill of pereopod 6 with one accessory lobe; ventral spines on epimeron 2 numerous and widely spread, adults with 1+ facial spine; tooth on epimera 2–3 strong; dorsal tooth on pleonite 3 absent; dorsal tooth on urosomite 2 obsolescent; middle keel on urosomite 3 obsolescent or absent; apicolateral spine on peduncle of uropod 2 not larger than other spines; inner ramus of uropod 3 as long as outer; maturation delayed.

DESCRIPTION.—*Holotype:* Female "u" 33.9 mm: Apparently blind, head filled with dispersed glandular blots appressed to inside surface of head; lateral lobe bluntly mammilliform, antennal sinus shallow. Epistome and upper lip weakly articulate, separated by notch from side view, neither dominant, upper lip weakly pointed below.

Right incisor with small sharp apicomedial tooth, distal margin barely crenulate laterally, left incisor almost glass-smooth; right lacinia mobilis very small, flake-like, jaggedly serrate, much broader than long; left lacinia mobilis also much broader than long, better developed, almost evenly serrate apically; rakers numerous; molars medium to large, subconical, densely setulose, tapering to tiny apical plaque with weak triturative surface (much less developed than in species to follow); palp article 1 short, article 2 well setose, article 3 short, clavate, with about 4 A-setae and many D- and E-setae. Lower lip with subsharp mandibular lobes, with gape between main lobes, inner lobes absent. Inner plate of maxilla 1 with narrow oral part heavily setose medially, with small denticle-spines on apicolateral edge, very broad aboral part extending behind outer plate; spines on outer plate 11, one spine small and inserted on oral face; palps with several lateral setae, apices broad, multispinose, and with numerous apicofacial setae. Inner plate of maxilla 2 distinctly smaller than outer (and thus differing from *Valettiopsis* and *Valettietta*), facial setal row with about 11 setae (and thus much less dense than in 2 genera mentioned). Inner plate of maxilliped with 3 main apical spines, dactyl short, not evenly tapering, with inner apical tooth guarding 2 main apical nails and several accessory setules.

Dactyls of gnathopods 1–2 with inner acclivity and tooth. Dactyls of pereopods with weak nail, one weak inner and weak facial setule; unlocking spines paired. Oostegites slender, strongly setose, present on coxae 2–6. Gills broad and unpleated, large on coxae 2–7, each with medium thick conical accessory lobe except lobe small on coxa 7.

Epimeron 1 with 3 anteroventral spines, epimeron 2 with 6 spines widely spread, with 2 facial spines, epimeron 3 with 6 spines widely spread, all spines placed singly. Each pleopod with 2 coupling hooks and 3 simple accessories, peduncles poorly setose or asetose, rami very long, subequal, outer and inner rami generally with 33 and 29 articles respectively.

Peduncle of uropod 1 with basolateral row of spines, apicolateral corner with large spine, other corner spines on uropods 1–2 small, all rami bearing 2 rows of spines (not all seen laterally); peduncle of uropod 3 weakly elongate, with mid-ventrolateral spine. Each apex of telson barely bifid, with one spine and setule, dorsum of each lobe with 3 sets of dorsal spines, also with basolateral set at M.44 opposite dorsobasal set, basolateral set of 1 bearing 2 inner setules (presumably the normal basolateral setule pair found in most amphipods).

Other Material: Female "v": Spine formula on epimera 1–3 = 3–5–6. Coxa 1 less truncate than in holotype. Oostegites rudimentary, lacking setae.

Male "w" 26.6 mm: Like female holotype, but because smaller, coxa 1 slightly less truncate; antennae 1–2 thicker than

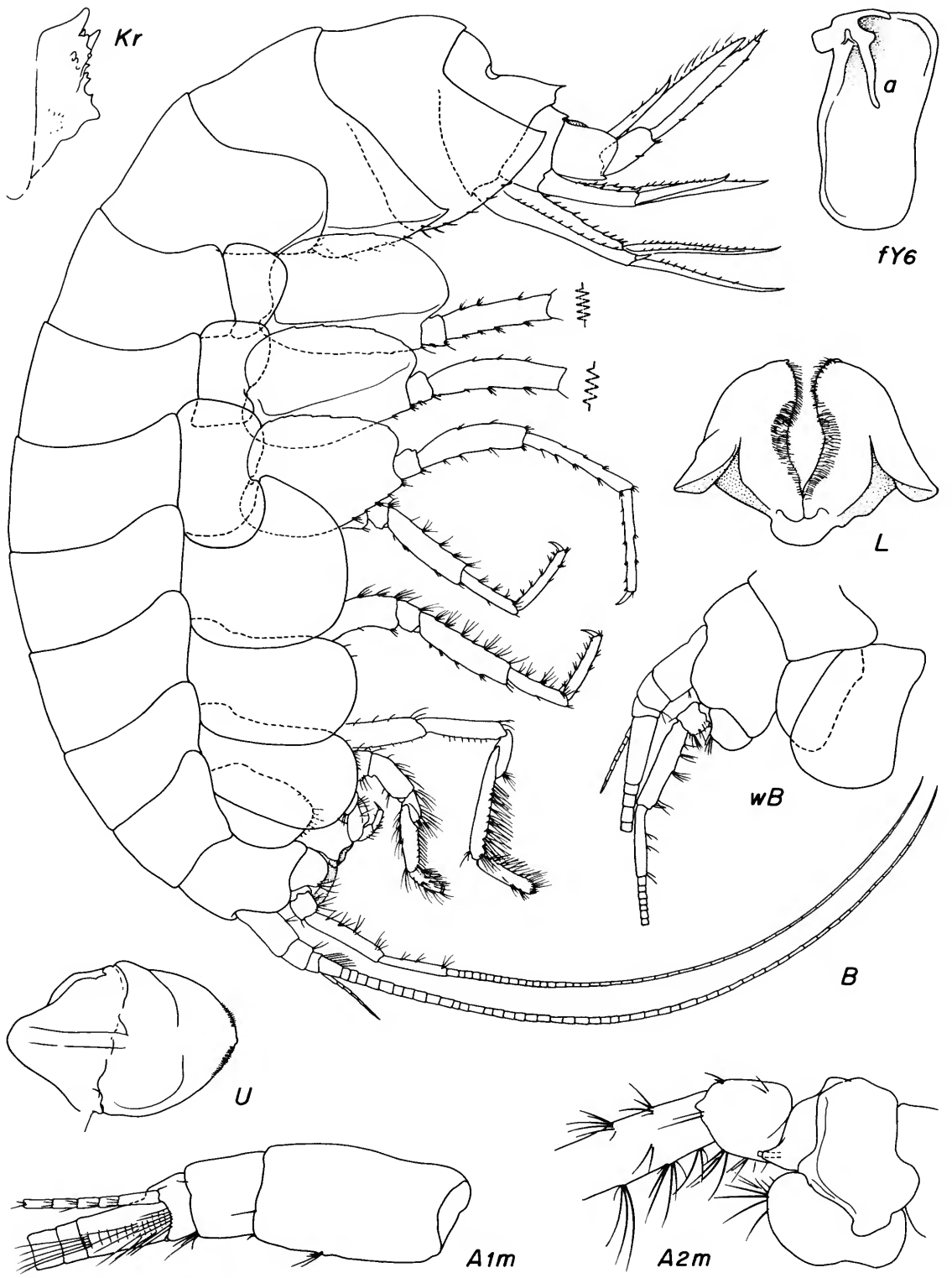

FIGURE 33.—*Tectovalopsis wegeneri*, new species: unattributed figures = holotype, female "u" 33.9 mm; w = male "w" 26.6 mm; f = *Tectovalopsis nebulosus*, new species, female "f" 21.4 mm.

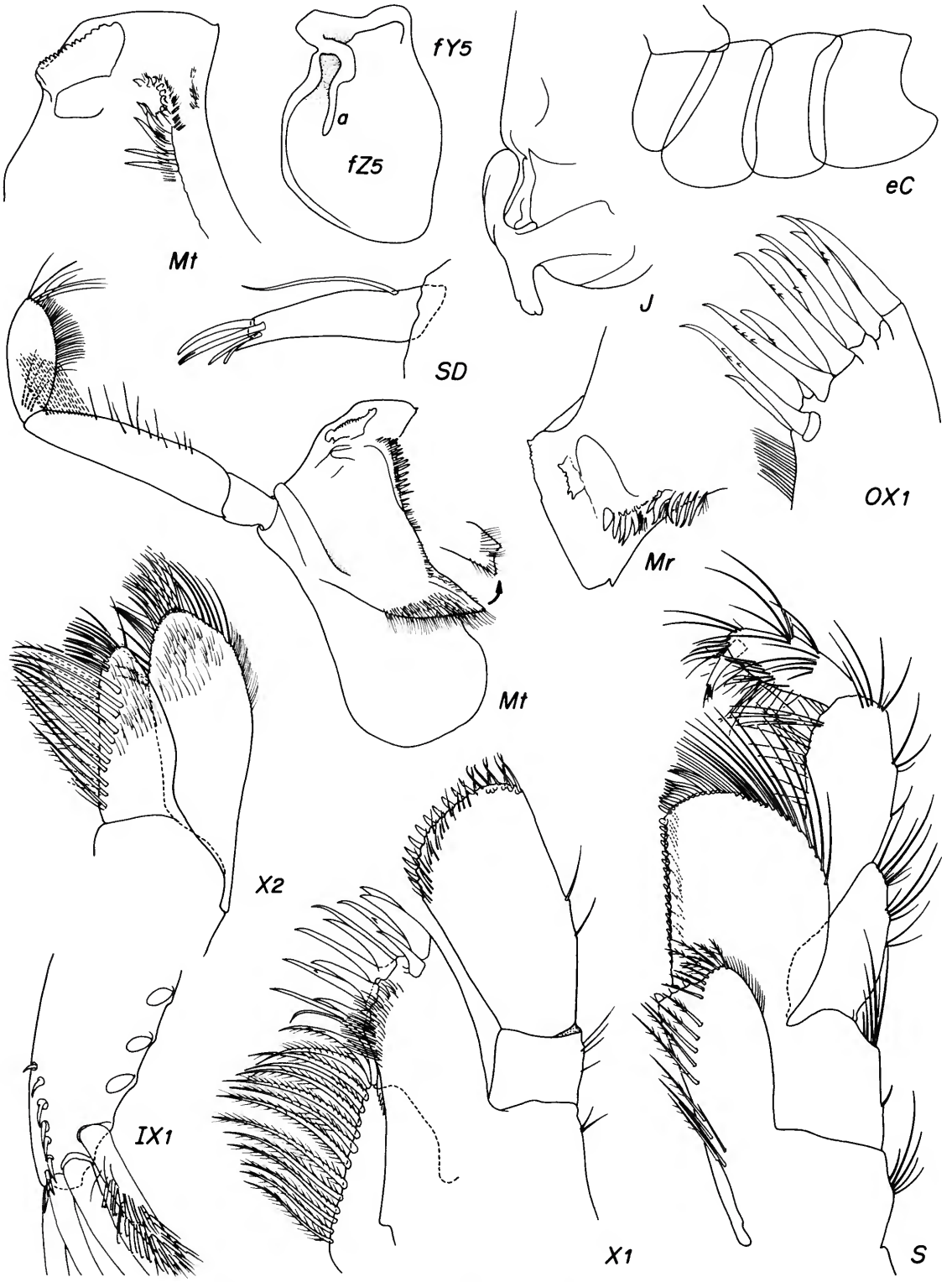

FIGURE 34.—*Tectovalopsis wegeneri*, new species: unattributed figures = holotype, female "u" 33.9 mm; f = *Tectovalopsis nebulosus*, new species, female "f" 21.4 mm; e = *Tectovalopsis diabolus*, new species, juvenile "e" 11.8 mm.

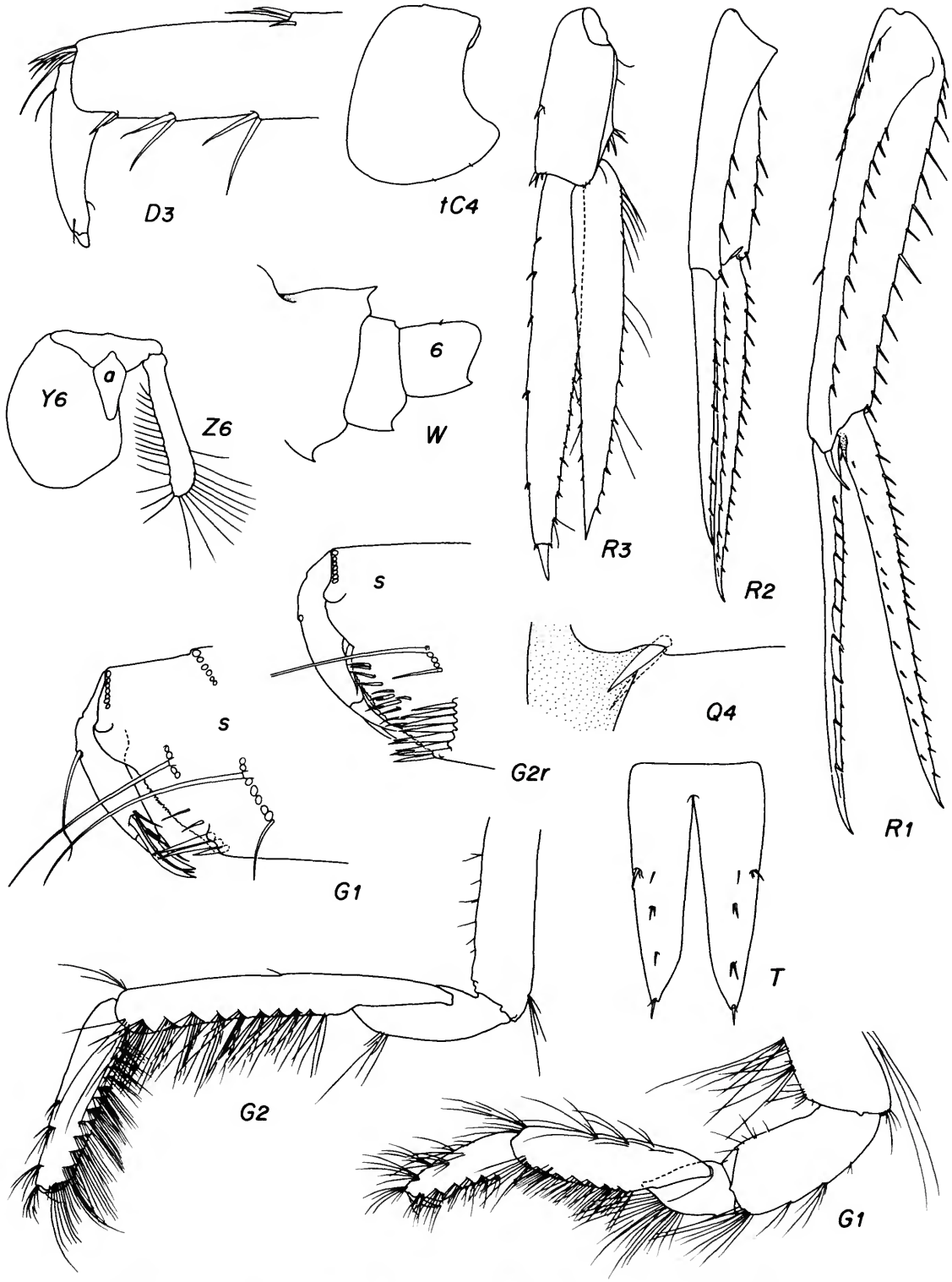

FIGURE 35.—*Tectovalopsis wegeneri*, new species: unattributed figures = holotype, female "u" 33.9 mm; t = *Tectovalopsis diabolus*, new species, holotype, female "t" 19.1 mm.

in female, conjoint base of primary flagellum on antenna 1 more elongate. Spine formula on epimera 1-3 same as female "v."

Juveniles "b" and "d": Spine formula on epimera 1-3 = 1-2-3 and 1-2-6.

ILLUSTRATIONS.—In figures of the holotype the upper and lower lips are magnified equally; maxilla 1 is magnified more than maxilla 2 and both are magnified more than the maxilliped; one outer plate of maxilla 1 is magnified more than the other and the outer face setules are omitted; article 3 of the maxillipedal palp is not flattened. One row of medial spines on inner ramus of uropod 2 not seen from lateral view.

HOLOTYPE.—USNM 195199, female "u" 33.9 mm.

TYPE LOCALITY.—Biocyarise 84-38, 12°48.8′N, 103°56.8′W, 2635 m, 15 Mar 1984, basket with *Alvinella*, aspirator. Biocyarise 84-39, 12°48.6′N, 103°56.7′W, 2635 m, 16 Mar 1985, aspirator, 1 specimen.

MATERIAL.—Type locality, female "v" 29.4 mm, male "w" 26.6 mm, juvenile "x" 21.0 mm, juvenile "b" 20.6 mm, juvenile "c" 15.0 mm, juvenile "d" 14.2 mm.

RELATIONSHIP.—See keys above and species to follow.

DISTRIBUTION.—East Pacific, 13°N Vents, 2635 m.

Tectovalopsis regelatus, new species

FIGURES 36-38 (part)

DAMAGE.—Unique specimen missing most information on uropod 3 and telson and left uropods 1-2.

ETYMOLOGY.—The species name is from the Latin *regelatus* (thaw).

DIAGNOSIS.—Coxae 1-2 not of broadened form, coxa 1 shortened but rounded apically, subconical, strongly tapering; coxa 2 not distinctly adz-shaped; palm of gnathopod 1 strongly oblique, moderately developed; palm of gnathopod 2 strongly oblique; accessory gills short and thick, gill of pereopods 5-6 with one accessory lobe; ventral spines on epimeron 2 sparse and widely spread, occurring in singlets, adults with 2 facial spines; tooth on epimera 2-3 strong; dorsal tooth on pleonite 3 present; dorsal tooth on urosomite 2 absent; middle keel on urosomite 3 obsolescent; apicolateral spine on peduncle of uropod 2 not larger than other spines; [? inner ramus of uropod 3 shorter than outer; ? maturation ordinary].

DESCRIPTION.—*Holotype:* Male "n" 19.4 mm: Apparently blind, head filled with dispersed glandular blots appressed to inside surface of head; lateral lobe bluntly mammilliform, antennal sinus shallow. Article 5 of antenna 2 slightly longer than article 4. Epistome and upper lip weakly articulate, separated by notch from side view, neither dominant, upper lip broadly rounded below.

Right incisor with sharp apicomedial and apicolateral tooth, distal margin smooth, left incisor almost glass-smooth; right lacinia mobilis well developed, flake-like, jaggedly serrate, much broader than long, composed of two appressed parts; left lacinia mobilis also much broader than long, better developed, almost evenly serrate apically; rakers numerous; molars medium to large, subconical, densely setulose, tapering to medium sized diffuse apical region with weak triturative surface (much better developed than in type species); palp article 1 short, article 2 poorly setose except apically, apical row with 10 (right) to 12 (left) setae, remainder of article with 3 medial setae, article 3 short, clavate, with 3 A-setae and many D- and 6E-setae. Lower lip with blunt mandibular lobes, with gape between main lobes, inner lobes absent. Inner plate of maxilla 1 with narrow oral part heavily setose (13 setae) medially, with 4 small denticle-spines on apicolateral edge, very broad aboral part extending behind outer plate; spines on outer plate 11, one spine small and inserted on oral face; palps with 2 lateral setae, apices broad, multispinose and with numerous apicofacial setae (elements slightly longer than in type species). Inner plate of maxilla 2 not much smaller than outer (and thus scarcely differing from *Valettiopsis* and *Valettietta*), facial setal row with about 10 setae (and thus much less dense than in 2 genera mentioned). Inner plate of maxilliped with 3 main apical spines (but one side with 4), dactyl short, evenly tapering, without inner apical tooth but with 2 main apical nails, 3 subsidiary nails and 2 accessory setules.

Dactyls of gnathopods 1-2 with inner acclivity and tooth. Dactyls of pereopods with weak nail, one weak inner and weak facial setule; unlocking spines paired. Oostegites [unknown]. Gills broad and unpleated, large on coxae 2-7, each with medium thick conical accessory lobe.

Epimeron 1 with 1 anteroventral spine, epimeron 2 with 2 spines widely spread, epimeron 3 with 6 spines narrowly spread and crammed anteriorly. Each pleopod with 4 coupling hooks and 1 simple accessory, peduncles poorly setose, rami very long, subequal, outer and inner rami generally with 24 and 23 articles (23 on pleopods 2-3) and inner rami with 21-22-19 articles respectively.

Peduncle of uropod 1 with basolateral row of 6 spines, apicolateral corner with large spine, other corner spines on uropods 1-2 small, all rami bearing 2 rows of spines (not all seen laterally); peduncle of uropod 3 weakly elongate, with mid-ventrolateral spine. [? Each apex of telson barely bifid, with xxx-x spines and setule, dorsum of each lobe with x sets of dorsal spines, most basal set near M. xx].

ILLUSTRATIONS.—Following items not illustrated and as in *T. wegeneri:* prebuccal (except as described), labium, mandibles and palps (except as figured), maxillae 1-2 (except as figured), maxilliped (except inner plate and dactyl as figured), and pereopods 3-4. Coxa 4 not flattened on view of coxae 1-4 together (see separate flattened version). Spine or seta counts on appendages not illustrated: Mandibular palp article 3 = 3A, many D, 6E; inner plate of maxilla 1 with 13 setae and 4 apicolateral spines.

OTHER DIFFERENCES FROM TYPE SPECIES.—Antennae shorter, first antenna 40 percent and second antenna 45 percent

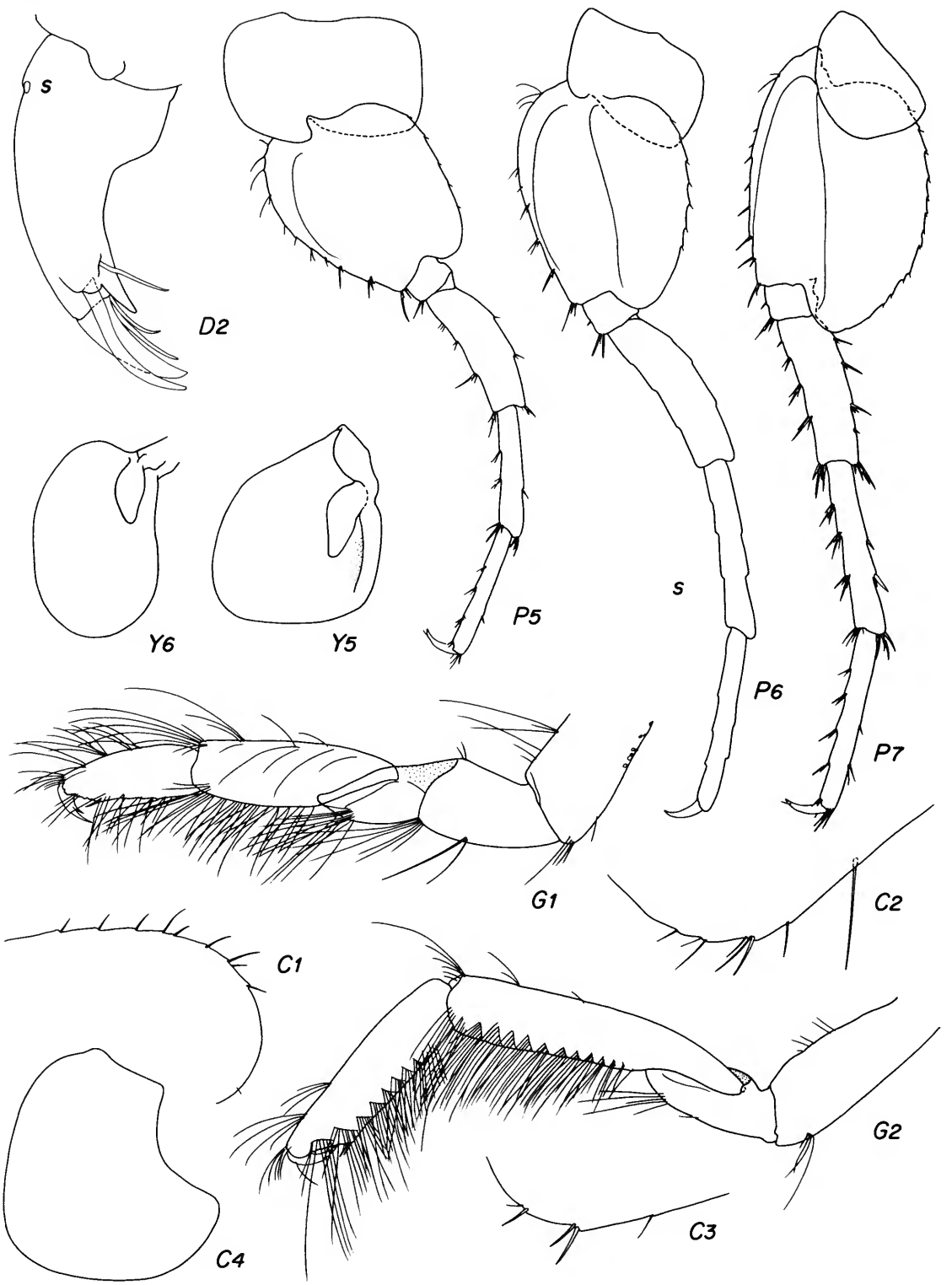

FIGURE 36.—*Tectovalopsis regelatus*, new species, holotype, male "n" 19.4 mm.

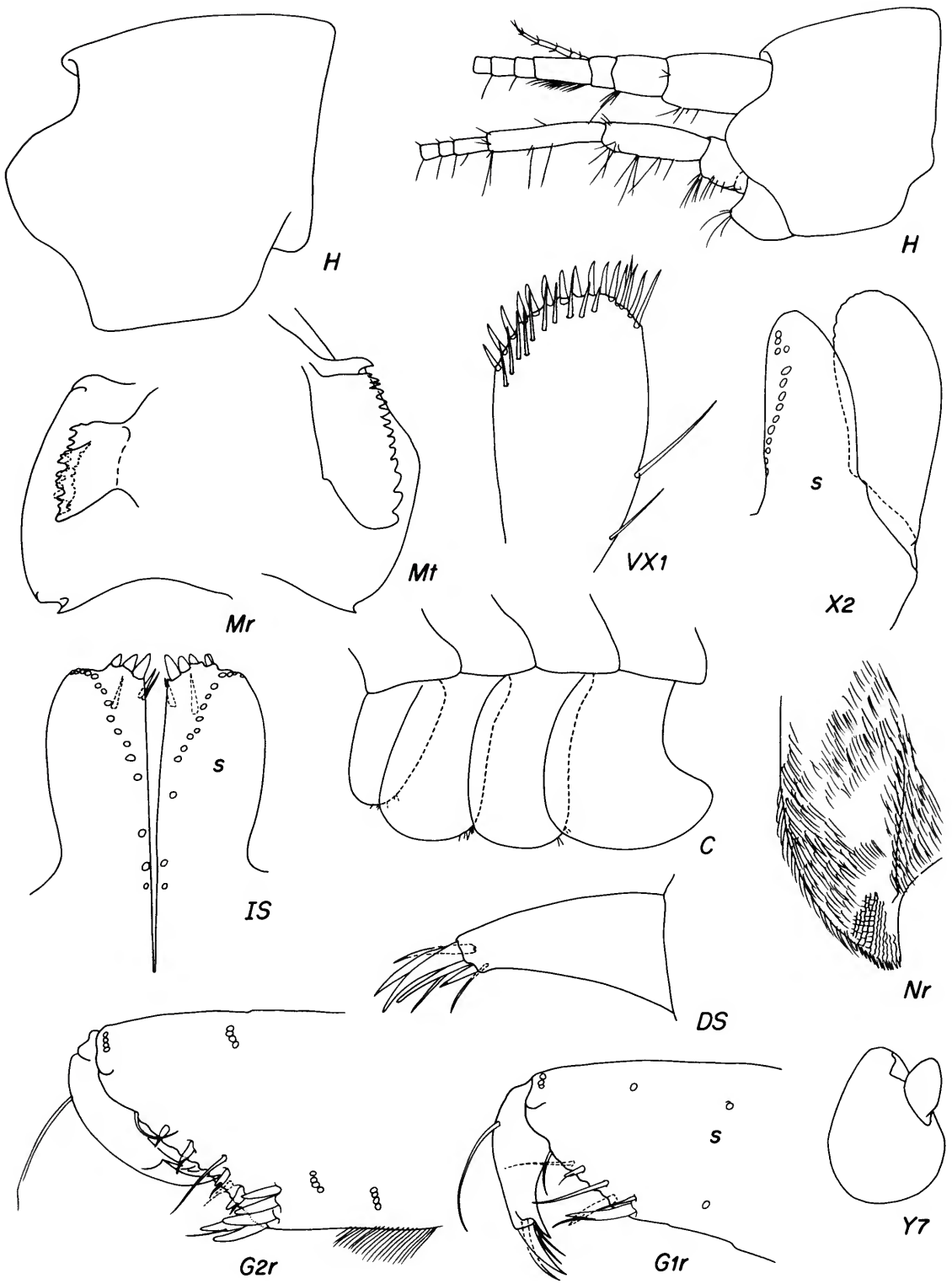

FIGURE 37.—*Tectovalopsis regelatus*, new species, holotype, male "n" 19.4 mm.

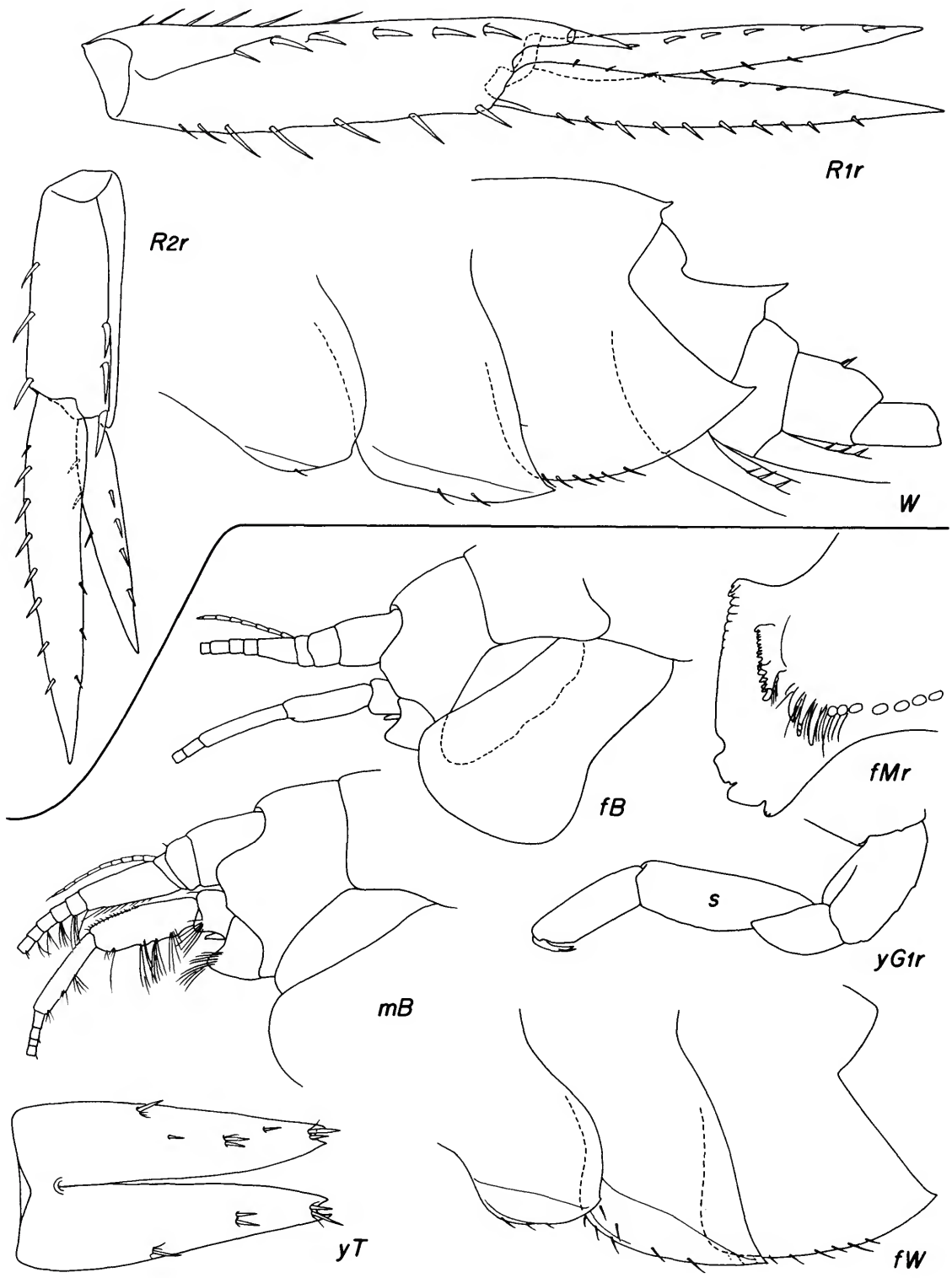

FIGURE 38.—Upper, *Tectovalopsis regelatus*, new species, holotype, male "n" 19.4 mm. Lower, *Tectovalopsis nebulosus*, new species: y = holotype, female "y" 23.4 mm; f = female "f" 21.4 mm; m = male m, 23.5 mm.

as long as body; accessory flagellum with 6 articles; shape of maxilla 2 distinctive (see illustrtaion); inner plate of maxilliped with main spines borne on extension (illustration); posteroventral setae of coxae 1-3 in groups; article 2 of pereopods 5-7 slightly broader (illustrated).

HOLOTYPE.—USNM 235000, male "n" 19.4 mm (illustrated).

TYPE LOCALITY.—SIO Cat. no. C5693, Acc. No. BI 68-45, R/V *Agassiz* Cruise STYX-7, MPE 68091 & 2, Sta. 5, Hess Guyot, 17°53'N, 174°14.8'W, 1-2 Sep 1968, 1740 m, free vehicle trap.

MATERIAL.—Unique.

RELATIONSHIP.—This species differs from *T. wegeneri* in (1) the reversal in dominance of articles 4-5 on antenna 2, article 5 being the longer; (2) larger laciniae mobiles; (3) stronger triturative surface on the molar; (4) slightly longer armaments on the maxillary palps; (5) the more obtuse outer plate of maxilla 2; (6) the extended margin on the inner plate of the maxilliped; (7) the more tapering coxa 1; (8) the doubled armament sets on coxae 1-3; (9) the shorter palm of gnathopod 1 with more strongly overlapping dactyl; (10) the differing spine pattern on the palms of the gnathopods; (11) relatively shorter carpus of gnathopod 2; (12) thicker accessory lobes on the gills; (13) anteriorly crammed spines on epimeron 2; (14) sparsity of spines on epimeron 3 (15) more numerous hooked coupling spines on the pleopods; (16) the presence of a dorsal tooth on pleonite 3; and (17) the large distolateral projection on the peduncle of uropod 1.

This species differs from *T. fusilus*, new species, in items cited above: 2,3,5,6,7,10,13,14,16, and 17. In addition gnathopod 2 is stouter in *T. regelatus*.

This species lacks the characters found in *T. nebulosus*, new species, and *T. diabolus*, new species, such as keel on urosomite 3, incisorial teeth, and adz-shaped coxa 2.

DISTRIBUTION.—Hess Guyot, 1740 m.

Tectovalopsis nebulosus, new species

FIGURES 33,34,38,39 (part)

ETYMOLOGY.—The species name is from the Latin *nebulosus* (misty).

DIAGNOSIS.—Coxae 1-2 not of broadened form, coxa 1 shortened and tapering; coxa 2 distinctly adz-shaped in terminal adult, less so in juveniles; palm of gnathopod 1 weakly oblique, well developed; palm of gnathopod 2 strongly oblique; accessory gills long and thin, gill of pereopod 6 with two accessory lobes; ventral spines on epimeron 2 numerous (in female only) and widely spread, facial spine(s) present; tooth on epimera 2-3 strong; dorsal tooth on pleonite 3 absent; dorsal tooth on urosomite 2 moderate; middle keel on urosomite 3 obsolescent; apicolateral spine on peduncle of uropod 2 significantly larger than others; inner ramus of uropod 3 as long as outer; maturation intermediate.

DESCRIPTION.—*Holotype:* Female "y" 23.4 mm: Apparently blind, head filled with dispersed glandular blots appressed to inside surface of head; lateral lobe bluntly mammilliform, antennal sinus shallow. Peduncle of antenna 1 thicker than in preceding species. Epistome and upper lip weakly articulate, separated by notch from side view, neither dominant, upper lip rounded below.

Right incisor with three small sharp or blunt apicomedial teeth, distal margin strongly crenulate laterally, left incisor with 4 strong teeth, margin wavy; right lacinia mobilis very small, flake-like, jaggedly serrate, much broader than long; left lacinia mobilis also much broader than long, better developed, almost evenly serrate apically; rakers numerous; molars medium to large, subconical, densely setulose, tapering to tiny apical plaque with weak triturative surface (much better developed than in *T. wegeneri*), palp article 1 short, article 2 well setose, article 3 short, clavate, with about 6 A-setae and many D- and E-setae. Lower lip with subsharp mandibular lobes, with gape between main lobes, inner lobes absent. Inner plate of maxilla 1 with narrow oral part heavily setose (17) medially, with thin denticle-spines on apicolateral edge, very broad aboral part extending behind outer plate; spines on outer plate 11, one spine small and inserted on oral face; only left palp articles 1-2 with one lateral seta each (less than in 2 preceding species), apices broad, multispinose and with numerous apicofacial setae. Inner plate of maxilla 2 distinctly smaller than outer (and thus differing from *Valettiopsis* and *Valettietta*), facial setal row with about 16 setae (and thus much less dense than in 2 genera mentioned). Inner plate of maxilliped with 3 main apical spines, dactyl short, evenly tapering, without inner apical tooth but with 2 main apical nails and several accessory setules.

Dactyls of gnathopods 1-2 with inner acclivity and tooth. Dactyls of pereopods with weak nail, one weak inner and weak facial setule; unlocking spines small and paired. Oostegites slender, strongly setose, present on coxae 2-5. Gills broad and unpleated, large on coxae 2-7, each with medium thin conical accessory lobe except lobe small on coxa 7 and coxa 6 with 2 accessory lobes.

Epimeron 1 with 1 anteroventral spine, epimeron 2 with 1-2 small anteroventral spines narrowly spread, one facial spine, and one large spine at M.70 on ventral margin, epimeron 3 with 7 spines widely spread, all spines placed singly. Each pleopod with 2 coupling hooks and 3 simple accessories, peduncles poorly setose or asetose, rami very long, subequal, outer and inner rami generally with 31-33 and 27 articles respectively.

Peduncle of uropod 1 with basolateral row of spines, apicolateral corner with large spine, other corner spines on uropods 1-2 small except apicolateral on uropod 2 slightly enlarged (larger than in *T. diabolus*); all rami with 2 rows of spines (not all seen laterally); peduncle of uropod 3 weakly elongate, with 2 groups of mid-ventrolateral spines. Each apex of telson strongly bifid, with one spine and setule, dorsum of each lobe with 3 sets of dorsal spines, also with basolateral set at M.40 opposite dorsobasal set, basolateral set of 1 bearing 2

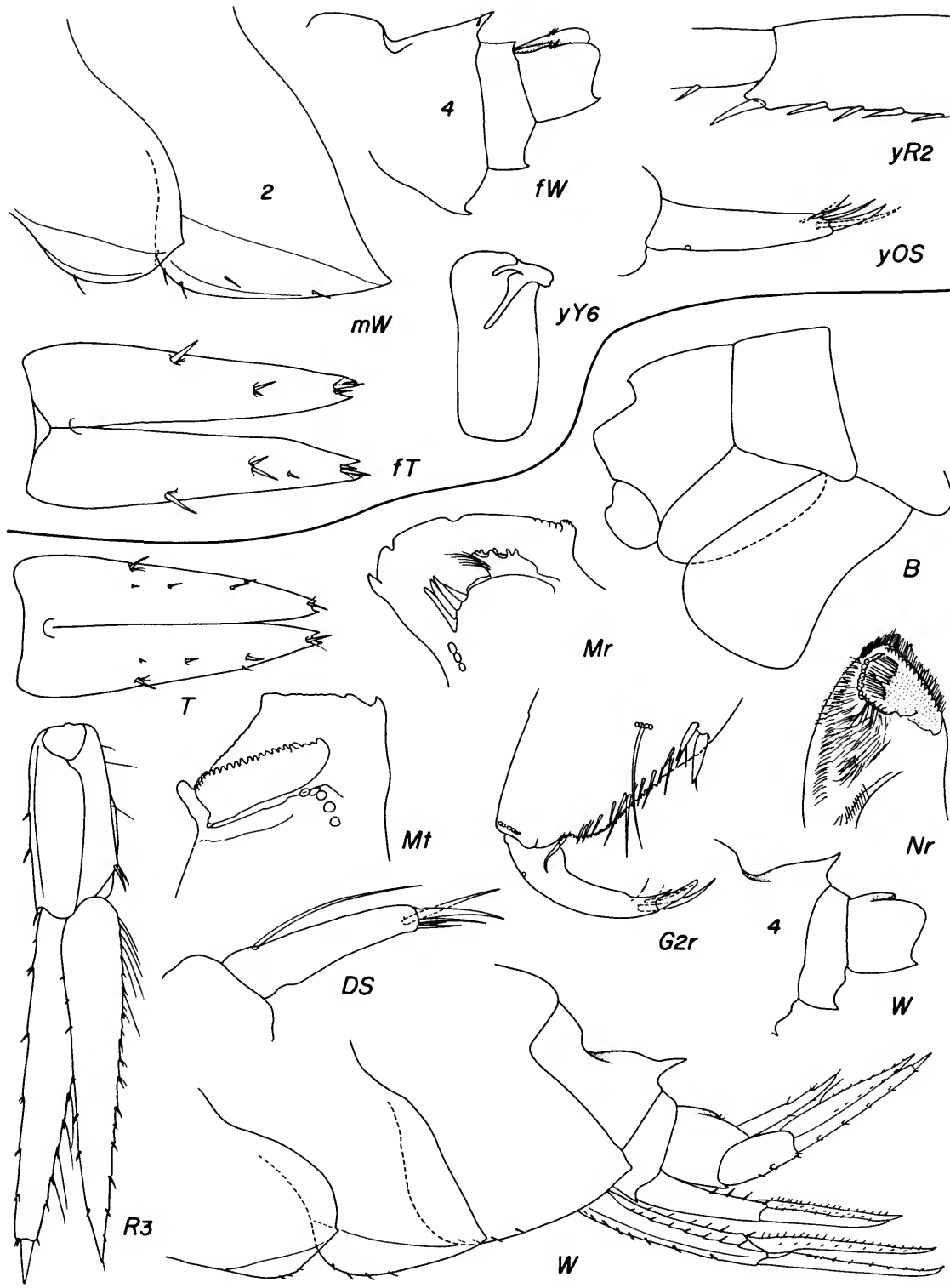

FIGURE 39.—Upper, *Tectovalopsis nebulosus*, new species: y = holotype, female "y" 23.4 mm; f = female "f" 21.4 mm; m = male "m", 23.5 mm. Lower, *Tectovalopsis diabolus*, new species, holotype, female "t" 19.1 mm.

inner setules (presumably the normal basolateral setule pair found in most amphipods).

Other Material: Male "m" 23.5 mm: Base of primary flagellum on antenna 1 conjoint, this article more than 0.75 times as long as peduncle; articles 4-5 of peduncle on antenna 2 thickened, posterior setae on article 4 elongate, anterior margin densely furnished with tufts of male setules; epimeron 1 with 1 spine, epimeron 2 with 1 facial and 4 marginal spines, 3 of these anteroventral, fourth strongly posterior, epimeron 3 with 8 spines; rami of uropod 3 strongly setose.

Female "f" 21.4 mm: Telson with different spine formula than in holotype, see illustration. This species appears to have the most proximal lateral spine lacking a dorsal partner in contrast to the 2 preceding species.

ILLUSTRATIONS.—Most parts resembling previous 2 species; only following illustrations provided: head-antennae-coxae-1-2 of female, head-antennae of male, epimera 1-3 of female, epimera 1-2 of male, urosome of female, uropod 2, gills 5 and 6.

HOLOTYPE.—USNM 235001, female "y" 23.4 mm (illustr.).

TYPE LOCALITY.—Jasper Seamount, off Baja California, 30°23.2'N, 119°58.5'W, 706 m, 6 Sep 1965, fish trap, R/V Agassiz, SIO Cat. No. C5709, Acc. No. BI65-65.

MATERIAL.—Type locality, 7 specimens, including "f" female 21.4 mm, "m" male 23.5 mm (illustr.).

RELATIONSHIP.—This species, which is probably much more widely spread than the previous 2 species that appear to be confined to hydrothermal vents, mixes together characters of the 2 preceding species: from *T. wegeneri* it has epimera 2-3 and urosome; from *T. diabolus* it has coxae 1-2, gnathopod 2 and mandibular incisor (even better developed teeth), and the slightly enlarged apicolateral spine on the peduncle of uropod 2. It differs from either species in the very thin accessory lobes on the gills.

DISTRIBUTION.—Jasper Seamount, 706 m.

Tectovalopsis diabolus, new species

FIGURES 39,40 (part)

ETYMOLOGY.—The species name is from the Latin *diabolus* (devil).

DIAGNOSIS.—Coxae 1-2 not of broadened form, coxa 1 shortened and tapering; coxa 2 distinctly adz-shaped in terminal adult, less so in juveniles; palm of gnathopod 1 weakly oblique, well developed; palm of gnathopod 2 strongly oblique; accessory gills short and thick, gill of pereopod 6 with one accessory lobe; ventral spines on epimeron 2 few and narrowly spread, no facial spines present; tooth on epimera 2-3 weak; dorsal tooth on pleonite 3 absent; dorsal tooth on urosomite 2 weak; middle keel on urosomite 3 moderately developed; apicolateral spine on peduncle of uropod 2 significantly larger than others; inner ramus of uropod 3 as long as outer; maturation early.

DESCRIPTION.—*Holotype:* Female "t" 19.1 mm: Apparently blind, head filled with dispersed glandular blots appressed to inside surface of head; lateral lobe bluntly mammilliform, antennal sinus shallow. Peduncle of antenna 1 thinner than in preceding species. Epistome and upper lip weakly articulate, separated by notch from side view, neither dominant, upper lip rounded below.

Right incisor with two small sharp or blunt apicomedial teeth, distal margin strongly crenulate laterally, left incisor with 2 weak teeth, margin wavy; right lacinia mobilis very small, flake-like, jaggedly serrate, much broader than long; left lacinia mobilis also much broader than long, better developed, almost evenly serrate apically; rakers numerous; molars medium to large, subconical, densely setulose, tapering to tiny apical plaque with weak triturative surface (much better developed than in species preceding); palp article 1 short, article 2 well setose, article 3 short, clavate, with about 5 A-setae and many D- and E-setae. Lower lip with subsharp mandibular lobes, with gape between main lobes, inner lobes absent. Inner plate of maxilla 1 with narrow oral part heavily setose medially, with small denticle-spines on apicolateral edge, very broad aboral part extending behind outer plate; spines on outer plate 11, one spine small and inserted on oral face; palps with several lateral setae (more than in preceding species), apices broad, multispinose and with numerous apicofacial setae. Inner plate of maxilla 2 distinctly smaller than outer (and thus differing from *Valettiopsis* and *Valettietta*), facial setal row with about 10 setae (and thus much less dense than in 2 genera mentioned). Inner plate of maxilliped with 3 main apical spines, dactyl short, not evenly tapering, with inner apical tooth guarding 2 main apical nails and several accessory setules.

Dactyls of gnathopods 1-2 with inner acclivity and tooth. Dactyls of pereopods with weak nail, one weak inner and weak facial setule; unlocking spines small and paired. Oostegites slender, strongly setose, present on coxae 2-5. Gills broad and unpleated, large on coxae 2-7, each with medium thick conical accessory lobe except lobe small on coxa 7.

Epimeron 1 with 3 anteroventral spines, epimeron 2 with 4 spines narrowly spread, epimeron 3 with 4 spines narrowly spread, all spines placed singly. Each pleopod with 2 coupling hooks and 3 simple accessories, peduncles poorly setose or asetose, rami very long, subequal, outer and inner rami generally with 22 articles respectively.

Peduncle of uropod 1 with basolateral row of spines, apicolateral corner with large spine, other corner spines on uropods 1-2 small except apicolateral on uropod 2 scarcely enlarged; all rami with 2 rows of spines (not all seen laterally); peduncle of uropod 3 weakly elongate, with 2 groups of mid-ventrolateral spines. Each apex of telson strongly bifid, with one spine and setule, dorsum of each lobe with 3 sets of dorsal spines, also with basolateral set at M.40 opposite dorsobasal set, basolateral set of 1 bearing 2 inner setules (presumably the normal basolateral setule pair found in most amphipods).

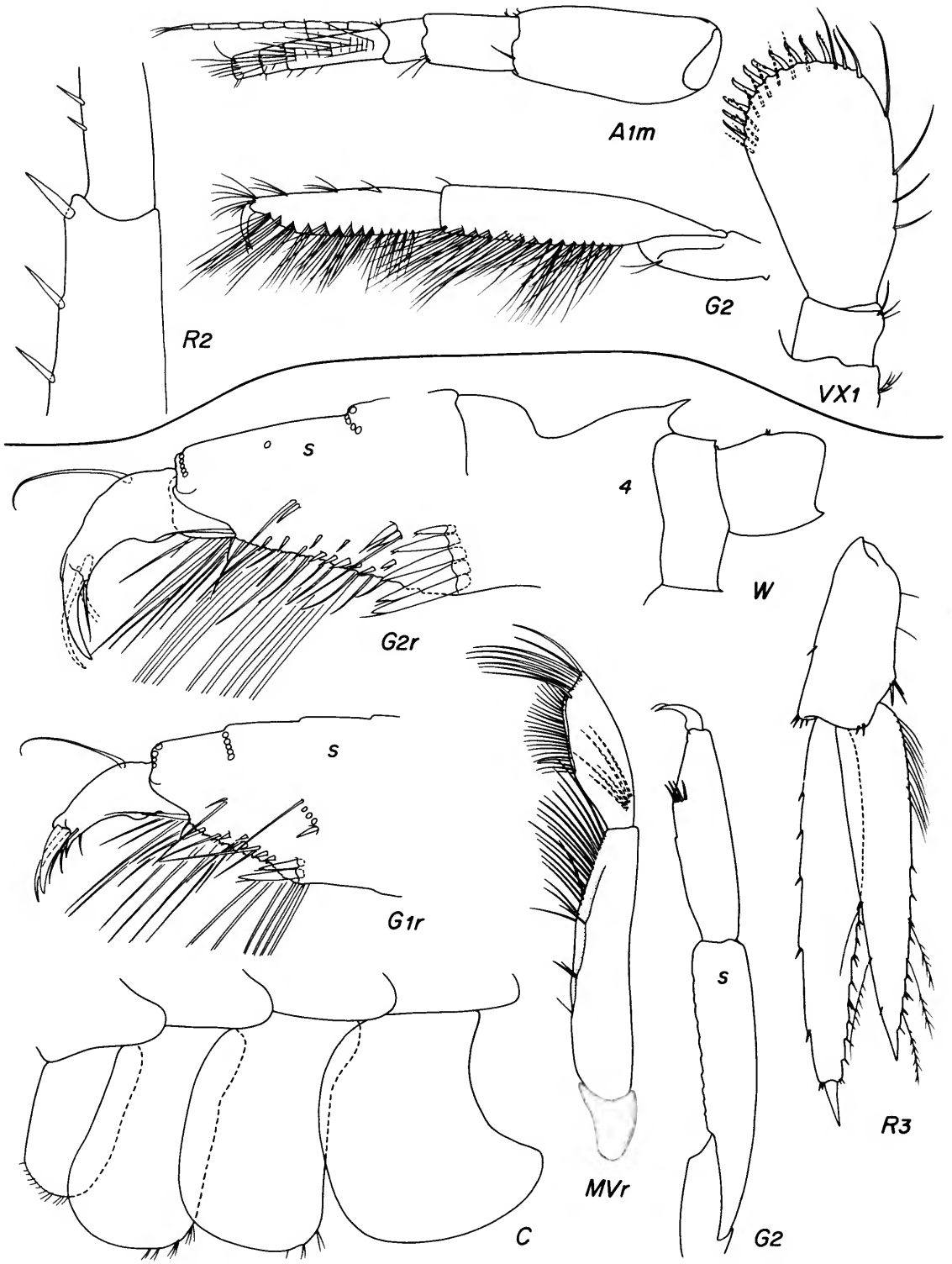

FIGURE 40. Upper, *Tectovalopsis diabolus*, new species, holotype, female "t" 19.1 mm. Lower, *Tectovalopsis fusilus*, new species, holotype, female "z" 23.1 mm.

Other Material: Female "y" 23.4 mm: Gill of coxa 6 with 2 accessory lobes and all other single accessory lobes on gills 2,3,4,5,7 very thin and elongate.

Juvenile "e" 11.8 mm: Spine formula on epimera 1-3 = 1-1-2.

ILLUSTRATIONS.—Most attributes are so similar to *T. wegeneri* that illustrations for the following parts are omitted: head, antenna 2, prebuccal, lower lip, inner and outer plates of maxilla 1, maxilla 2, maxilliped, pereopods 3-7, and coxae 3-7. However, articles 3-7 of pereopods 3-7 are slightly better spinose, the posterior serrations on article 2 of pereopods 5-7 are scarcely stronger; the palp of maxilla 1 is drawn to show slightly stronger lateral setation; outer plate of maxilliped slightly more setose laterally. Illustration of gnathopod 2 enlarged to same degree as on *T. wegeneri* by matching dactyls, then rolled so defining spines of palm at articular margin.

MINOR COMPARISONS.—This species differs from *T. wegeneri* in the slightly weaker lobe of coxa 4, and slightly stouter gnathopods with shorter articles 5-6 on gnathopod 2.

HOLOTYPE.—USNM 235002, female "t" 19.1 mm.

TYPE LOCALITY.—Biocyarise 84-33, 12°48.6′N, 103°56.7′W, 2635 m, 10 Mar 1984, aspirator.

MATERIAL.—The type locality (1); Biocyarise 84-38, 12°48.8′N, 103°56.8′W, 2635 m, 15 Mar 1984, aspirator, female "a" 19.2 mm, juvenile "e" 11.8 mm. Biocyarise 84-39, 12°48.6′N, 103°56.7′W, 2635 m, 16 Mar 1984, trap number 5, 1 specimen.

RELATIONSHIP.—This species differs from *T. wegeneri* in (1) the slightly more tapering coxa 1; (2) the more adz-shaped coxa 2; (3) the very oblique palm of gnathopod 2; (4) the fewer and less widely spread spines on epimera 2-3; (5) the smaller tooth on epimera 2-3; (6) slightly stronger dorsal projection of urosomite 2 and strong dorsal keel on urosomite 3; and (7) outer ramus of uropod 2 even shorter. In addition, as noted above, most specimens show noticeable distinctions in short gnathopod 2, smaller lobe on coxa 4, and narrower base of antenna 1.

DISTRIBUTION.—East Pacific, 13°N Vents, 2635 m.

Tectovalopsis fusilus, new species

FIGURES 40 (part), 41

ETYMOLOGY.—The species name is from the Latin *fusilus* (molten).

DIAGNOSIS.—Coxae 1-2 not of broadened form, coxa 1 shortened but rounded apically, rectangular, weakly tapering; coxa 2 not distinctly adz-shaped; palm of gnathopod 1 strongly oblique, poorly developed; palm of gnathopod 2 strongly oblique; accessory gills short and thick, gill of pereopods 5-6 with one accessory lobe; ventral spines on epimeron 2 numerous and widely spread, mostly occurring in doublets, adults with 1+ facial spine; tooth on epimera 2-3 strong; dorsal tooth on pleonite 3 absent; dorsal tooth on urosomite 2 obsolescent; middle keel on urosomite 3 obsolescent or absent; apicolateral spine on peduncle of uropod 2 not larger than other spines; inner ramus of uropod 3 shorter than outer; maturation ordinary.

DESCRIPTION.—*Holotype:* Female "z" 23.1 mm: Apparently blind, head filled with dispersed glandular blots appressed to inside surface of head; lateral lobe bluntly mammilliform, antennal sinus shallow. Articles 4-5 of antenna 2 equally long (unusual). Epistome and upper lip weakly articulate, separated by notch from side view, neither dominant, upper lip weakly pointed below.

Right incisor with obsolescent blunt apicomedial tooth, distal margin barely crenulate laterally, left incisor almost glass-smooth; right lacinia mobilis very small, flake-like, jaggedly serrate, much broader than long; left lacinia mobilis also much broader than long, better developed, almost evenly serrate apically; rakers numerous; molars medium to large, subconical, densely setulose, tapering to medium sized diffuse apical region with weak triturative surface (much better developed than in species above); palp article 1 short, article 2 well setose, article 3 short, clavate, with about 5 A-setae and many D- and E-setae. Lower lip with blunt mandibular lobes, with gape between main lobes, inner lobes absent. Inner plate of maxilla 1 with narrow oral part heavily setose medially, with small denticle-spines on apicolateral edge, very broad aboral part extending behind outer plate; spines on outer plate 11, one spine small and inserted on oral face; palps with several lateral setae, apices broad, multispinose and with numerous apicofacial setae. Inner plate of maxilla 2 distinctly smaller than outer (and thus differing from *Valettiopsis* and *Valettietta*), facial setal row with about 11 setae (and thus much less dense than in 2 genera mentioned). Inner plate of maxilliped with 3 main apical spines, dactyl short, evenly tapering, without inner apical tooth but with 2 main apical nails and several accessory setules.

Dactyls of gnathopods 1-2 with inner acclivity and tooth. Dactyls of pereopods with weak nail, one weak inner and weak facial setule; unlocking spines paired. Oostegites slender, strongly setose, present on coxae 2-6. Gills broad and unpleated, large on coxae 2-7, each with medium thick conical accessory lobe except lobe small on coxa 7.

Epimeron 1 with 5 anteroventral spines, epimeron 2 with spines widely spread in formula of s-s-s-[ss]-s-s-s, (brackets indicating slightly subfacial pair), with 2 facial spines, epimeron 3 with 6 spine positions widely spread, in formula of s-s-2s-2s-2s-2s, thus 4 sets of doublets present. Each pleopod with 2 coupling hooks and 4-3-1 (pleopods 1-2-3) simple accessories, peduncles poorly spinose, rami very long, subequal, outer and inner rami generally with 28 and 24 articles (23 on pleopod 3) respectively.

Peduncle of uropod 1 with basolateral row of spines, apicolateral corner with large spine, other corner spines on uropods 1-2 small, all rami bearing 2 rows of spines (not all seen laterally); peduncle of uropod 3 weakly elongate, with mid-ventrolateral spine. Each apex of telson barely bifid, with

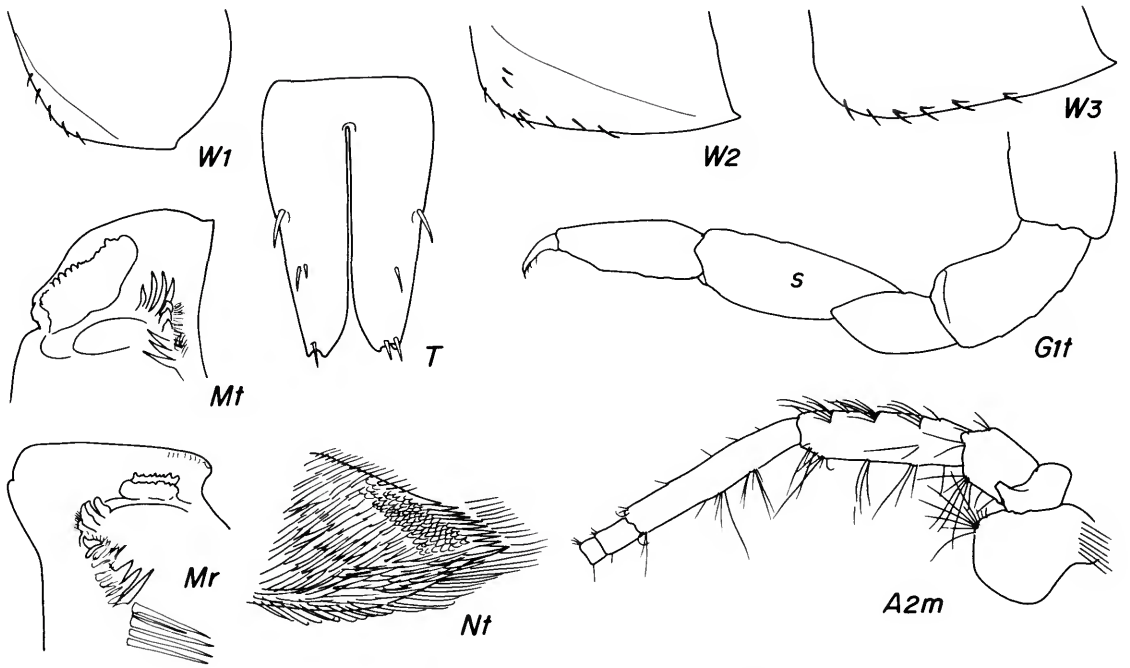

FIGURE 41.—*Tectovalopsis fusilus*, new species, holotype, female "z" 23.1 mm.

1-2 spines and setule, dorsum of each lobe with 2 sets of dorsal spines, most basal set near M.48.

ILLUSTRATIONS.—Following items as in *T. wegeneri:* head, lengths of antennae, antenna 1 (except ventral setae of articles 1-2 longer and article 1 of primary flagellum 33 percent more elongate; accessory flagellum 9-articulate), prebuccal, labium, maxillae 1-2, maxilliped (except dactyl like *T. diabolus*, pereopods 3-7 (except article 2 of pereopods 6-7 more robust).

Spine counts on non-illustrated parts: uropod 1 peduncle ventrolateral = 8, dorsolateral = 14, medial = 11 (slightly enlarged), outer ramus lateral = 9, medial = 15, inner ramus lateral = 9, medial = 24; uropod 2 peduncle dorsolateral = 6, medial = 6, outer ramus lateral = 8, medial = 11, inner ramus lateral = 11, medial = 20; uropod 3 peduncle dorsolateral = 2, ventral = 5, outer ramus lateral formula (s = seta) 1-2+s-2-2+s-2-2, medial = 1-1-1-2-1-2+s-2-2+s-1-2-2+s-2, inner ramus lateral = 1-1+s-1+s-1, medial = 8 basal setae, then at M.46 1-1-1+s-1+s-1+s-1-2-1+s-2; urosomite 3 with 2 dorsal spines on each side.

HOLOTYPE.—USNM 235003, female "z" 23.1 mm (illustrated).

TYPE LOCALITY.—SIO Cat. no. C5712, Acc. No. BI 73-13, R/V *Agassiz* Cruise MV-73-I-26, Punta San Telmo, Guerrero, Mexico, 17°48.8'N, 103°09.7'W, 2884 m, 4-5 Apr 1973, free vehicle trap.

MATERIAL.—Unique.

RELATIONSHIP.—This species differs from *T. wegeneri* in the very oblique palms of the gnathopods and the doubling of spines in ventral sets on epimeron 3. Of lesser or uncertain importance are: the equally long articles 4-5 of antenna 2, the broader telsonic apices, and the shorter inner ramus of uropod 3.

This species lacks the characters found in *T. nebulosus* and *T. diabolus*, such as keel on urosomite 3, incisorial teeth, and adz-shaped coxa 2. See *T. regelatus* for distinctions from that species.

DISTRIBUTION.—Off Punta San Telmo, Mexico, 2884 m.

Transtectonia, new genus

ETYMOLOGY.—The genus name is from the Latin *trans* (across) plus *tecto* (root from *Tectovalopsis*).

DIAGNOSIS.—Mouthparts forming quadrate bundle. Labrum and epistome separate, neither dominant in size, blunt. Incisor strongly toothed; left and right laciniae mobiles longer than broad, right vestigial; molar large, conical, setulose, with tiny apical fused spine cluster; palp attached strongly distal to molar. Inner plate of maxilla 1 strongly setose medially (16), palp biarticulate, large. Inner plate of maxilla 2 slightly smaller than outer, with strong row of barely submarginal mediofacial setae (4), but number of setae in row about one-third or less that in *Valettiopsis* and *Valettietta*. Inner and outer plates of

maxilliped well developed, inner beveled, palp strongly exceeding outer plate, dactyl well developed, with apical nail and several accessory setules.

Coxa 1 not shortened and not strongly covered by coxa 2, scarcely tapering, not truncate. Posteroventral lobe on coxa 4 large.

Gnathopod 1 elongate, weakly subchelate, palm oblique, articles 5 and 6 subequal, article 3 slightly elongate, dactyl small; article 6 of gnathopod 2 shorter than article 5, both very elongate and linear, propodus subchelate. Pereopods 5–7 elongate.

Pleonite 4 carinate (versus *Paralicella*). Only outer ramus of uropod 2 shortened. Inner ramus of uropod 2 without notch. Uropod 3 dispariramous, ordinary, peduncle ordinary, inner ramus shortened, outer ramus 2-articulate. Telson elongate, deeply cleft.

TYPE SPECIES.—*Transtectonia torrentis*, new species.

RELATIONSHIP.—Differing from *Valettiopsis* and *Valettiella* in the non-triturative molar, unshortened coxa 1, small number of medial setae on the maxillae, narrow poorly armed palp of maxilla 1, vestigial right lacinia mobilis, unusual left lacinia mobilis (ovoid, longer than broad, poorly toothed), large lobe of coxa 4, and poorly subchelate gnathopods.

This genus forms a weak transition from the *Valettiopsis* morph to that of *Tectovalopsis* but is clearly not on the direct ancestral line because the apex of the molar retains no mark of trituration surface, only a few fused spinules (versus weak trituration surface in some species of *Tectovalopsis*). *Transtectonia* differs from *Tectovalopsis* in the unreduced coxa 1, broader labrum with weak ventral excavation (like *Valettiopsis*), well-developed teeth of the incisor, vestigial right lacinia mobilis, ovate and narrow left lacinia mobilis, many fewer setae on inner plate of maxilla 1, narrow palp of maxilla 1 with distinctive spination, subequal plates of maxilla 2 with medial setae barely submarginal, and beveled inner plate of maxilliped.

The type species of *Transtectonia* differs from the species of *Tectovalopsis* in a subtly distinct shape of coxa 4, more strongly tapering article 2 of pereopods 5–7 (especially 7), more elongate pereopods 3–4, enlargement of one unlocking spine on pereopods 3–4, shorter antennae and poorly developed spination on the epimera. Accessory lobes on the gills are very weak. The eleventh subsidiary spine on the outer plate of maxilla 1 is barely facial. The head is very short.

SPECIES.

T. torrentis, new species [504A].

DISTRIBUTION.—Marine, 13°N Vents, 2630–2635 m, 1 species.

Transtectonia torrentis, new species

FIGURES 42,43

ETYMOLOGY.—The species name is from the Latin *torrentis* (torrential).

DIAGNOSIS (for comparison to *Tectovalopsis*).—Antennae especially short, antenna 2 slightly shorter than 1. Coxae 1–2 not of broadened form, coxa 1 not shortened, subtruncate, scarcely tapering; coxa 2 scarcely adz-shaped; palm of gnathopod 1 strongly oblique, poorly developed; palm of gnathopod 2 strongly oblique; accessory gills very poorly developed and thick, gill of pereopod 6 with one accessory lobe; ventral spines on epimeron 2 sparse and poorly spread, adults with 1+ facial spine; tooth on epimeron 2 weak, epimeron 3 broadly rounded behind; dorsal tooth on pleonite 3 absent; dorsal tooth on urosomite 2 obsolescent; middle keel on urosomite 3 obsolescent or absent; apicolateral spine on peduncle of uropod 2 not larger than other spines; inner ramus of uropod 3 much shorter than outer; maturation not delayed.

DESCRIPTION.—*Holotype:* Male "g" 10.6 mm: Apparently blind, head filled with dispersed glandular blots appressed to inside surface of head; lateral lobe bluntly mammilliform, antennal sinus shallow. Epistome and upper lip weakly articulate, separated by notch from side view, neither dominant, upper lip broad and weakly excavate below.

Right incisor with 2 small blunt apicomedial teeth, one large apicolateral tooth and notch, distal margin barely crenulate, left incisor subovate, elongate, longer than broad, with 4–5 small teeth, right lacinia mobilis vestigial, spine-like; rakers numerous; molars medium to large, subconical, densely setulose, tapering to narrow spinose point; palp article 1 short, article 2 setose only apically, article 3 short, clavate, with 2 A-setae and many D- and E-setae. Lower lip with blunt mandibular lobes, with gape between main lobes, inner lobes absent. Inner plate of maxilla 1 with narrow oral part heavily setose medially, with small denticle-spines on apicolateral edge, very broad aboral part extending behind outer plate; spines on outer plate 11, one spine small and inserted on oral face; palps narrow, with 2 apicolateral setae, apices narrow, with about 6 thin apical spines and with 3 apicofacial setae. Inner plate of maxilla 2 scarcely smaller than outer (and thus not differing from *Valettiopsis* and *Valettietta*), facial setal row barely submarginal, with about 4–5 setae (and thus much less dense than in 2 genera mentioned). Inner plate of maxilliped with 3 main apical spines, dactyl short, evenly tapering, with weak apical nail and 2 accessory setules.

Dactyls of gnathopods 1–2 with inner acclivity and appressed tooth. Pereopod 4 as large as pereopod 3 (unusual, distinct therefore from *Tectovalopsis*), dactyls of pereopods with weak nail, one weak inner and weak facial setule; unlocking spines paired, uneven, one greatly enlarged on pereopods 3–4. Oostegites slender, strongly setose, present on coxae 2–6. Gills broad and unpleated, large on coxae 2–7, each with very small thick conical accessory lobe except lobe small or absent on coxa 7.

Epimeron 1 with 1 anteroventral spine, epimeron 2 with 2 ventral spines narrowly spread, with 1 facial spine, epimeron 3 with 6 spines narrowly spread, all spines placed singly. Each

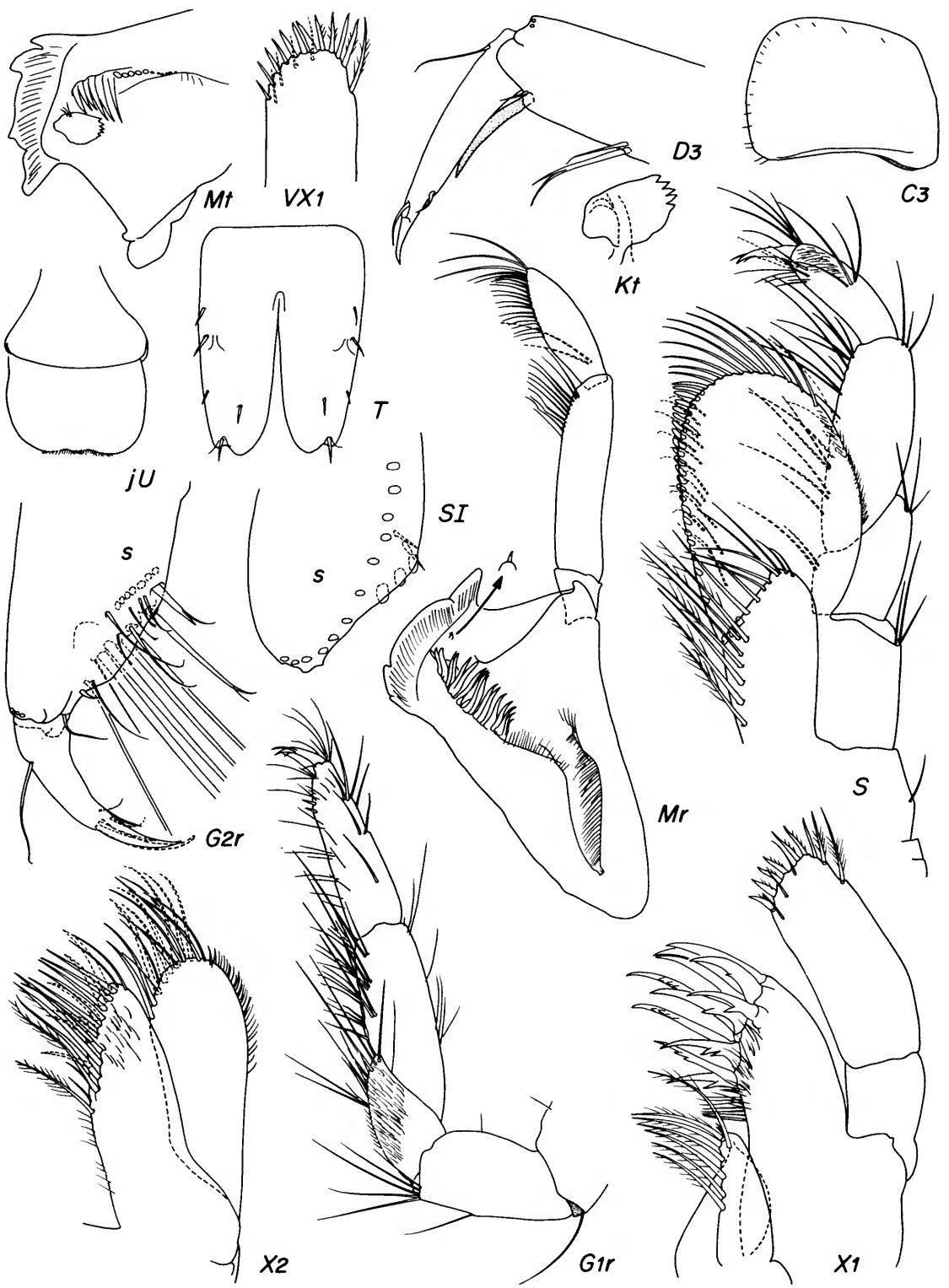

FIGURE 42.—*Transtectonia torrentis*, new species: unattributed figures = holotype, female "g" 10.6 mm; j = female "j" 20.3 mm.

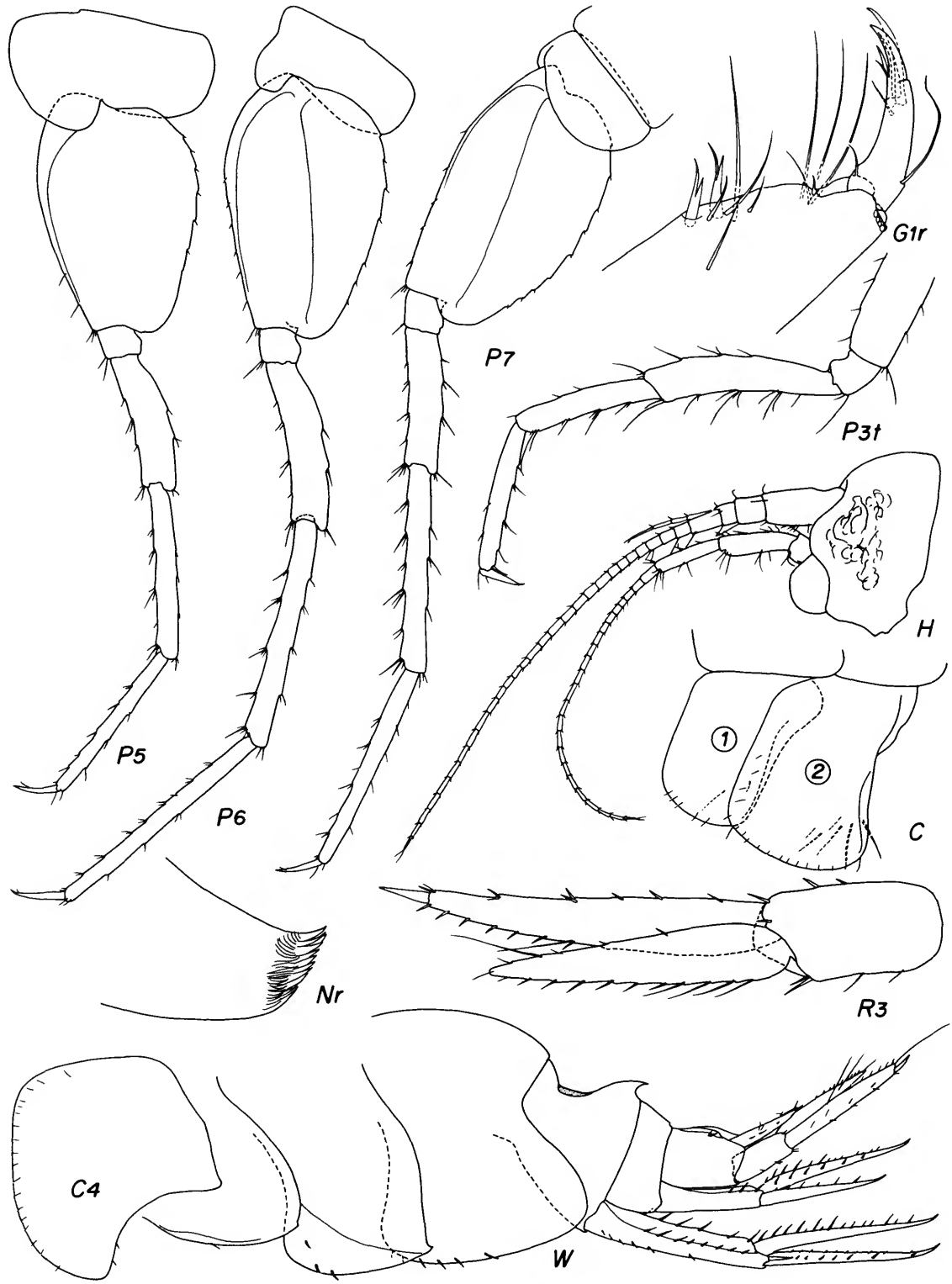

FIGURE 43.—*Transtectonia torrentis*, new species, holotype, female "g" 10.6 mm.

pleopod with 2 coupling hooks and 1 simple accessory, peduncles poorly setose or asetose, rami very long, subequal, outer and inner rami generally with 19 and 16 articles respectively.

Peduncle of uropod 1 with basolateral row of spines, apicolateral corner with large spine, other corner spines on uropods 1–2 small, all rami bearing 2 rows of spines (not all seen laterally); peduncle of uropod 3 weakly elongate, with 2 mid-ventrolateral spines. Each apex of telson weakly bifid, with one spine and setule, dorsum of each lobe with 4 sets of dorsal spines, basolateral set at M.35, next distal set of 1 bearing 2 inner setules (presumably the normal basolateral setule pair found in most amphipods).

Spine counts: uropod 1 peduncle ventrofacial = 6, dorsolateral = 9, medial = 8, outer ramus lateral = 7, medial = 9, inner ramus lateral = 7, medial = 15; uropod 2 peduncle dorsolateral = 3, medial = 4, outer ramus lateral = 6, medial = 4, inner ramus lateral = 7, medial = 11.

Other Material: Female "h" 21.2 mm: Oostegites small and asetose.

Female "i" 20.3 mm: Oostegites fully developed, narrow, setose.

Juvenile female "i" 16.4 mm: Oostegites rudimentary. Examples of spination: ventral epimeron 2 = 2, facial = 2; uropod 1 peduncle dorsolateral = 11, ventrofacial = 5; uropod 2 peduncle dorsolateral = 4, outer ramus lateral = 9.

REMARKS.—These specimens are gluttonous but the coxae are not splayed laterally. Note that proportions of gnathopod 1 are distinct from *Tectovalopsis wegeneri* in that articles 4–6 are much longer and thicker relative to the widths of articles 2 and 3. The palms of the gnathopods are smooth, unlike those of *Tectovalopsis*. Antenna 2 is shorter than 1 by the length of 3 flagellar articles. The mandibular palp is smaller relative to the body than that of *Tectovalopsis*. The ventral setae on the outer plate of the maxilliped are much larger than in *Tectovalopsis*. Coxa 4 has a distinctive shape. Article 2 on the outer ramus of uropod 3 is especially small compared with species in *Valettiopsis*, *Valettietta*, and *Tectovalopsis*.

ILLUSTRATIONS.—Pereopods 5–7 reduced to 87 percent of coxae 1–4. Gnathopod 2 aspect like *Tectovalopsis wegeneri*, see enlargement of palm.

HOLOTYPE.—USNM 235004, male "g," 10.6 mm (illustrated).

TYPE LOCALITY.—Biocyarise 84-39, 12°48.6′N, 103°56.7′W, 2635 m, 16 Mar 1984, subsample source unknown.

MATERIAL.—Type locality, 3 specimens. Biocyarise 84-34, 12°49.1′N, 103°56.9′W, 2635 m, 11 Mar 1984, 2 subsamples, associated with polychaetes and in the basket, 3 specimens. Biocyatherm 82-34, 12°48.6′N, 103°56.7′W, 11 Mar 1982, 2630–2635 m, trap, female "h" 21.2 mm, juvenile female "i" 16.4 mm, female "j" 20.3 mm. Biocyarise 84-41, 12°48.6′N, 103°56.7′W, 2635 m, 23 Mar 1984, subsample source unknown, 2 specimens. Biocyarise 84-42, 12°48.6′N, 103°56.7′W, 2635 m, 24 Mar 1984, basket, 1 specimen. Biocyarise 84-46, 12°48.6′N, 103°56.7′W, 2635 m, 28 Mar 1984, basket 2, 3 specimens.

DISTRIBUTION.—East Pacific, 13°N Vents, 2630–2635 m.

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