

The Genus *Rhepoxynius*
(Crustacea: Amphipoda:
Phoxocephalidae)
in American Seas

J. LAURENS BARNARD
and
CHARLINE M. BARNARD

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J. Laurens Barnard
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ABSTRACT

Barnard, J. Laurens, and Charline M. Barnard. The Genus *Rhepoxynius* (Crustacea: Amphipoda: Phoxocephalidae) in American Seas. *Smithsonian Contributions to Zoology*, number 357, 49 pages, 6 figures, 1982.—The recently described *Rhepoxynius* contains 15 named species and three unnamed probable species. Three new species, *R. hudsoni*, *R. menziesi*, and *R. homocuspидatus*, are described, based on material formerly identified as *R. epistomus* and *R. variatus*. Only two of the species have been isolated in the western Atlantic Ocean, whereas the remaining 13 species are confined to the eastern Pacific Ocean. Analysis of evolutionary deployment indicates that the Atlantic species are derived from Pacific species.

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The Genus *Rhepoxynius* (Crustacea: Amphipoda: Phoxocephalidae) in American Seas

J. Laurens Barnard
and *Charline M. Barnard*

Introduction

This paper continues an extensive revision of the "*Paraphoxus*" group and its relatives, common members of the North American near-shore amphipod fauna.

The genus *Rhepoxynius*, recently described by Barnard (1979) and created from the old concept of *Paraphoxus* Sars (as conceived of by J.L. Barnard, 1960) is now reviewed at species level. The basic material, where available, of all known species is redescribed using the system of Barnard and Drummond (1976, 1978) for Phoxocephalidae. The approach is typological so as to give a foundation for several beta taxonomists interested in studying these species with other methods. Dozens of new characters are added. In the process of reordering phoxocephalids, several new species in *Rhepoxynius* came to light, but the alpha stage in the genus is far from complete. Only those new taxa that confound the earlier descriptions are described. Many raw materials remain in Smithsonian collections.

The only figures presented herein are those supplementing the originals, the majority of which can be found in J.L. Barnard (1960). A good figure of a whole animal is shown by Bousfield (1973, pl. 34.2). See Barnard and Drum-

mond (1978) for terms and format.

Rhepoxynius is an American genus characterized by constricted rostrum, slightly ensiform antenna 2 (= article 1 with tooth), generally elongate article 2 of antenna 1 bearing distinctly ventral setae (seen when antenna 2 itself dissected and mounted in normal fashion), with more than three normal spines on a nontritulative mandibular molar and with all other characters in neutral condition as specified in subfamilial key found in Barnard and Drummond (1978) (for example, telson lacking subapical or dorsal setae and spines except for setules; pereopod 7 of normal enlargement and article 3 small).

At first we thought it possible to separate this genus into two parts based on the presence or absence of a displaced medial spine on the peduncle of uropod 1, but the value of that distinction is so broadly bridged by *R. hudsoni* and *R. variatus* that we decided against dividing the genus. One could also distinguish *R. vigitegus* as the type-species of a distinct genus based on the strongly developed pygidization, but we find no particular use in it until more species like *vigitegus* are discovered and a flock can therefore be constructed.

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Hancock Foundation, University of Southern California, our colleague for 33 years, who continues to help us with the Allan Hancock collections.

Roland H. Brown and Dessie M. Best helped us in many ways, as they have helped so well for 16 years. Mr. Don Fisher, our editor at the Smithsonian Institution Press, improved our manuscript in many ways, and we thank him for his patience.

TEXT ABBREVIATIONS.—For collection designations of specimen numbers.

AHF	Allan Hancock Foundation, University of Southern California
JLB & JLB BLA	for J. Laurens Barnard and Bahía de Los Angeles, specimens deposited in the National Museum of Natural History, Smithsonian Institution
USNM	former United States National Museum collections in the National Museum of Natural History, Smithsonian Institution

FIGURE ABBREVIATIONS (in specimen drawings).—Capital letters indicate body parts.

<i>A</i>	antenna	<i>N</i>	molar of mandible
<i>B</i>	prebuccal mass, lateral, including epistome and upper lip (labrum)	<i>O</i>	outer plate or ramus
<i>C</i>	coxa	<i>P</i>	pereopod (labeled as 3–7, gnathopods 1–2 counting as pereopods 1–2 also)
<i>D</i>	dactyl		

<i>F</i>	accessory flagellum	<i>R</i>	uropod
<i>G</i>	gnathopod	<i>S</i>	maxilliped
<i>H</i>	head	<i>T</i>	telson
<i>I</i>	inner plate or ramus	<i>V</i>	palp
<i>M</i>	mandible	<i>W</i>	pleon
		<i>X</i>	maxilla

Lowercase letters to the left of capital letters denote the specimens from which the part was taken, as cited in the figure legends and text of voucher material; lowercase letters to the right of capital letters denote modifications as follows:

<i>d</i>	dorsal	<i>t</i>	right (all other parts are left sided if without “t”)
<i>e</i>	broken		
<i>i</i>	inner		
<i>s</i>	setae removed		

For other lowercase letters see definition in legend.

Rhepoxynius J.L. Barnard

Rhepoxynius J.L. Barnard, 1979:371 [type-species, *Pontharpinia epistoma* Shoemaker, 1938, original designation].

DIAGNOSIS.—See J.L. Barnard (1979).

REMARKS.—An evolutionary deployment of the species is shown in Figure 1.

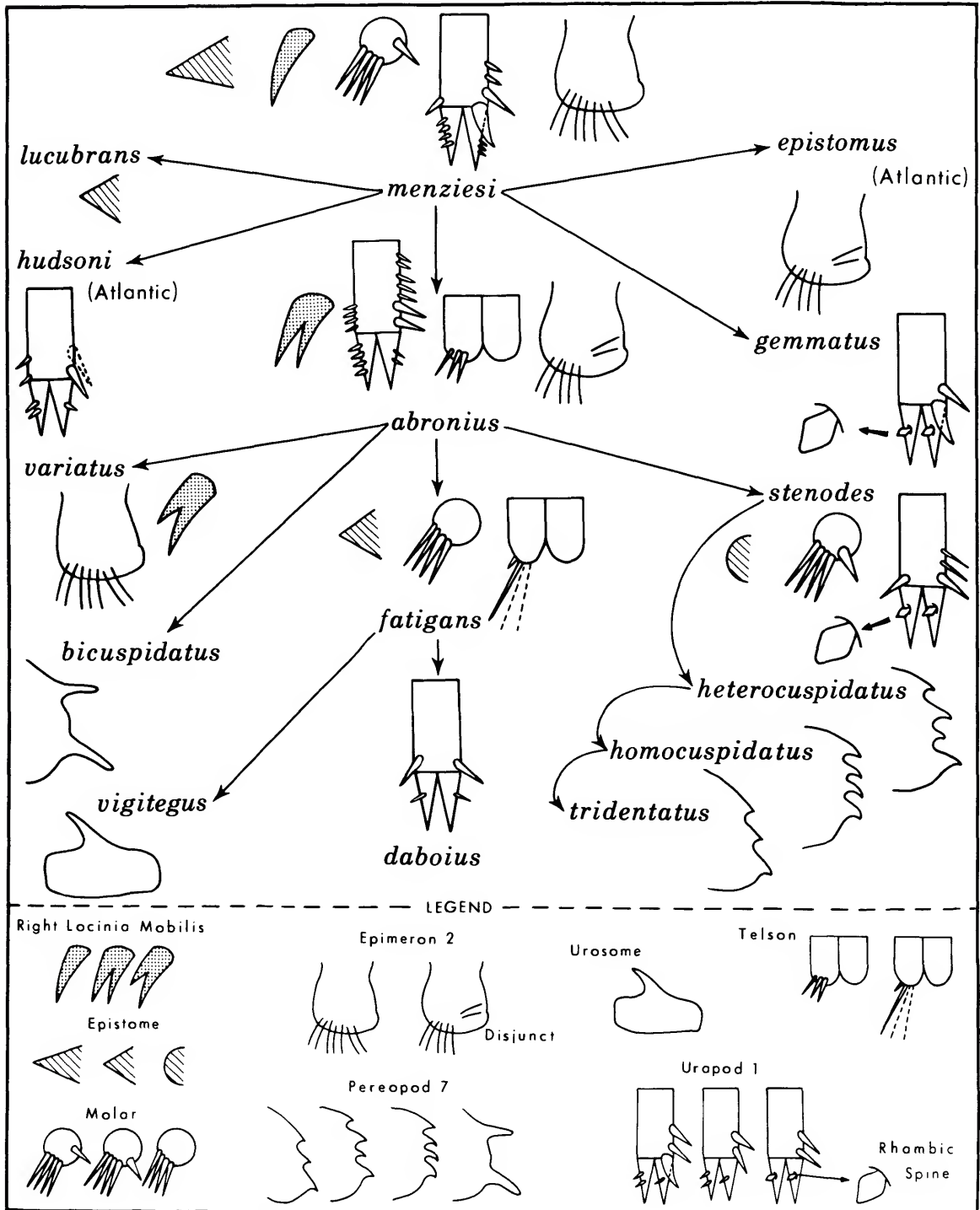
Only two species occur in the Atlantic Ocean, and both appear to stand in a position apomorphic to the Pacific *R. menziesi* as justified morphologically in Figure 1.

Key to the Species of *Rhepoxynius*

(Context of words such as “large,” “small,” “elongate,” “short,” “sharp,” as taken from and illustrated by J.L. Barnard (1960); “jewel-like” = rhombic or diamond shaped)

- Uropod 1 with displaced peduncular spine (right lacinia mobilis simple except *R. sp. D*) 2
Uropod 1 lacking displaced spine (right lacinia mobilis bifid except in *R. hudsoni*) 6
- Some spines on uropods 1–2 jewel-like and very closely contiguous, each lobe of telson with only one apical spine and setule *R. gemmatus*
Some spines on uropods 1–2 jewel-like but not closely contiguous, each lobe of telson with 3+ long setae and setule *R. species C*
Spines on uropods 1–2 not jewel-like and usually not closely packed, each lobe of telson with 2+ apical spines 3

3. Posterior setae on face of epimeron 2 not disjunct, one spine on mandibular molar scarcely discontinuous from other spines ***R. epistomus***
 Posterior setae on face of epimeron 2 displaced from others, one spine on mandibular molar strongly disjunct from other spines 4
4. Anterior epistomal cusp small ***R. lucubrans***
 Anterior epistomal cusp large 5
5. Urosomite 1 lacking lateral facial setae, right lacinia mobilis simple ***R. menziesi***, new species
 Urosomite 1 bearing lateral facial setae, right lacinia mobilis bifid ***R. species D***
6. Right lacinia mobilis simple, urosomite 1 with lateral facial setae ***R. hudsoni***, new species
 Right lacinia mobilis bifid, urosomite 1 lacking facial setae (often bearing minute setules at edge basal to uropod 1) 7
7. Article 2 of pereopod 7 with 2 spikes ***R. bicuspidatus***
 Article 2 of pereopod 7 lacking spikes 8
8. Urosomite 2 with large dorsal spike ***R. vigitegus***
 Urosomite 2 lacking spike 9
9. Epistome with distinctly sharp anterior cusp 10
 Epistome lacking anterior cusp 13
10. Face of epimeron 2 with posterior setae not set vertically, teeth on article 2 of pereopod 7 usually large ***R. variatus***
 Face of epimeron 2 with posterior setae set vertically, teeth on article 2 of pereopod 7 usually small 11
11. Anterior epistomal cusp elongate, apical telsonic armaments spinelike (thick and short) ***R. abronius***
 Anterior epistomal cusp short, apical telsonic armaments setal-like (long, slender, flexible) 12
12. Hand of gnathopod 1 narrow, ventral margin of article 2 on pereopod 7 beveled ***R. fatigans***
 Hand of gnathopod 1 broad, ventral margin of article 2 on pereopod 7 not beveled ***R. daboius***
13. One or more spines on uropods 1–2 elongate ***R. stenodes***
 All spines on uropods 1–2 jewel-like 14
14. Posterior serrations on article 2 of pereopod 7 very small and numerous ***R. homocuspidatus***, new species
 Posterior serrations on article 2 of pereopod 7 large and/or few (generally 5 or fewer, 3 or 4 of these large) 15
15. Posterior serrations on article 2 of pereopod 7 asymmetrically uneven, generally 4–5 in number, 4 of these large, apical armaments of telson elongate ***R. heterocuspidatus***
 Posterior serrations on article 2 of pereopod 7 symmetrically even, generally 3 in number, all large, apical armaments of telson short 16
16. Hands of gnathopods broad ***R. tridentatus tridentatus***
 Hands of gnathopods narrow ***R. tridentatus pallidus***



***Rhepoxynius epistomus* (Shoemaker)**

FIGURE 2 (part)

Pontharpinia epistoma Shoemaker, 1938:326-329, fig. 1.
 Not *Paraphoxus epistomus*.—J.L. Barnard, 1960:205;
 1964b:243; 1966a:88; 1966b:28; 1969:222; 1971:70; Reish
 and Barnard, 1967:18 [= *Rhepoxynius menziesi*, new species].
 Not *Trichophoxus epistomus*.—Bousfield, 1973:126, pl. 34.2 [= *Rhepoxynius hudsoni*, new species].

DESCRIPTION OF FEMALE (female "w," 4.20 mm).—Head about 22 percent of total body length, greatest width about 75 percent of length; rostrum constricted, broad, elongate, slightly exceeding apex of article 1 on antenna 1. Eyes medium, clear of occluding pigment but stained dark, ommatidia ordinary. Article 1 of peduncle on antenna 1 about 1.25 times as long as wide, about twice as wide as article 2, ventral margin with about 5 setules, unproduced dorsal apex with 2 setae; article 2 about 0.8 times as long as article 1, with proximoventral cycle of 7 setae; primary flagellum with 10 articles, about 0.67 times as long as peduncle, bearing several short aesthetascs; accessory flagellum with 8 articles. Spine formula of article 4 on antenna 2 = 4-3-3, dorsal margin with notch bearing 2 setae and 2 spines, ventral margin with 4 groups of 2-4 long to short setae, 1 ventrodorsal long spine and 2 setae and 2 setules; article 5 about 0.8 times as long as article 4, facial spine formula = 2, dorsal margin bearing pair of setules, ventral margin with 3 sets of setae, 1 long, 1 short, 3 ventrodorsal long to medium spines; flagellum about 0.8 times

as long as articles 4-5 of peduncle combined, with 13 articles; ensiform process large.

Epistomal cusp long and sharp. Mandibles with weak palpar hump, right incisor with 3 teeth; left incisor with 3 teeth in 2 humps; right lacinia mobilis simple, sharp, broad, like raker, left lacinia mobilis with 4 shallow teeth, middle teeth shortened; right rakers 10, plus several minute rudimentaries, left rakers 9 plus 1 rudimentary; molars composed of bulbous humps; right and left molars with 4 short to medium spines, fifth short spine weakly disjunct, molars with plume; palp article 1 slightly elongate, article 2 with 1 medium inner apical seta and 2 other short inner setae, article 3 about as long as article 2, oblique apex with 13 spine-setae, basofacial formula = 1 (in notch). Lower lip with 1 cone on each lobe. Inner plate of maxilla 1 ordinary, bearing 1 short apical pluseta each side, 1 longer apicomedial seta, 1 apicolateral seta of same length; outer plate with 11 spines, palp article 2 with stout apical spine, 1 apicolateral seta and 6 mediomarginal setae, in 4 sets. Plates of maxilla 2 extending equally, outer not broader than inner, outer with 3 apicolateral setae, inner with 1 medial and 6 apical submarginal setae. Inner plate of maxilliped with 1 large thick apical spine, 2 apicofacial setae, 6 medial setae, no gap; outer plate with 3 medial spines, and 3 setae, plus no apicolateral setae or cusp; palp article 1 without apicolateral seta, article 2 with 2 groups of 2 apicolateral setae, medial margin of article 2 moderately setose, article 3 with 5 facial setae, 3 lateral setae in 2 groups, nail of article 4 obsolete, dactyl with 2 accessory setules.

Coxa 1 not expanded apically, anterior margin almost straight, main ventral setae of coxae 1-4 = 6-10-10-9, posteriormost seta of coxae 1-3 slightly shortened; anterior and posterior margins of coxa 4 strongly divergent, posterior margin very oblique, almost straight, posterodorsal corner rounded, posterodorsal margin ordinary, concave, width-length ratio of coxa 4 = 1:1.

Gnathopods generally ordinary, but hands rather wide, dactyls slightly shortened; width ra-

FIGURE 1.—Evolutionary deployment in *Rhepoxynius*. Because various apomorphic conditions, such as loss of uropodal spines, are associated with species such as *R. daboius*, *R. heterocuspoidatus*, and *R. variatus*, one assumes the bifid right lacinia mobilis can also be considered apomorphic; it is probably the fusion of 2 raker spines. Therefore, the evolutionary scheme proceeds from complicated species to simplified species (or those with pygidization). Character states include right lacinia mobilis, epistome, molar, article 2 of pereopod 7, epimeron 2, uropod 1 (displaced peduncular spine and nonjeweled ramal spines = plesiomorphic), telson, and urosomal fusion with dorsal spine.

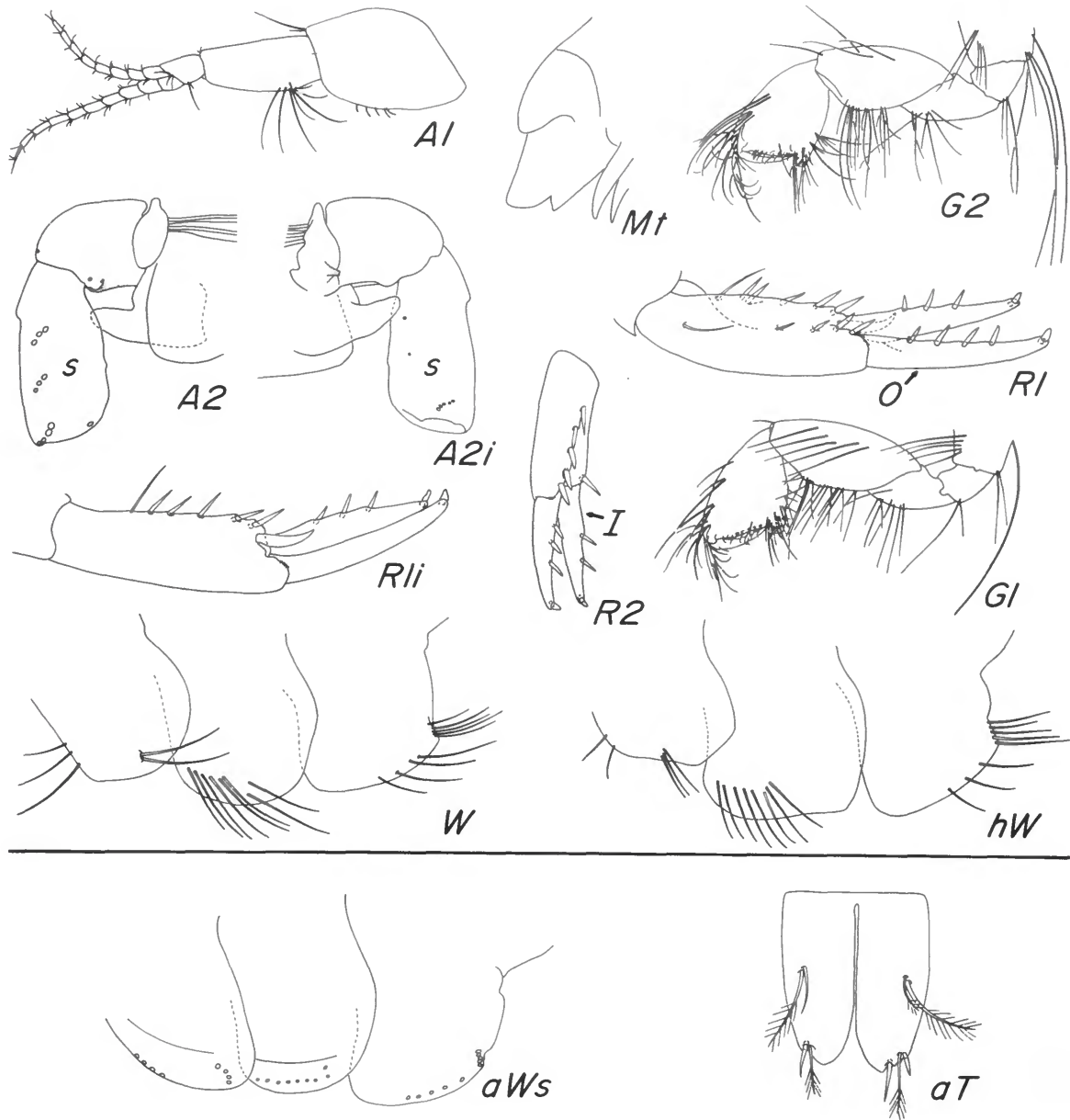


FIGURE 2.—Upper: *Rhepoxynius epistomus* (Shoemaker) female "w," 4.20 mm (*h* = holotype, male "h," 4.05 mm). Lower: *Rhepoxynius menziesi*, new species, holotype, female "a," 3.19 mm.

tios of articles 5-6 on gnathopods 1-2 = 26:33 and 26:33, length ratios = 65:49 and 54:47, palmar humps large, palms weakly oblique; article 5 of gnathopod 1 elongate, ovate, posterior

margin flat, short, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded, short.

Pereopod 4 stouter than pereopod 3, especially on article 4; facial setae formula on article 4 = 7

and 8, on article 5 = 9 and 6, main spine of article 5 extending to M. 80 and M. 90 on article 6, article 5 with no proximoposterior spines, spine formula of article 6 = 7 -10 + 0 and 8-9 + 0, some spines especially long; acclivity on inner margin of dactyls of pereopods 3-4 aberrantly absent or sharp, produced as tooth, emergent setule short, midfacial pluseta short. Coxae 5-7 posteroventral seta formula = 10-15-5. Article 4-5 of pereopods 5-6 of ordinary width, facial spine rows sparse to moderately developed; facial ridges of article 2 on pereopods 5-7 = faint to absent; width ratios of articles 2, 4, 5, 6 of pereopod 5 = 53:38:34:17, of pereopod 6 = 78:40:30:14, of pereopod 7 = 90:22:18:12; length ratios of pereopod 5 = 90:49:46:45, of pereopod 6 = 95:76:52:68, of pereopod 7 = 100:27:32:32; article 2 of pereopod 7 almost reaching apex of article 4, with 9 medium posterior serrations; medial apex of article 6 finely combed, bearing 2 weak digital processes. Posteroventral corner of epimeron 1 rounded and beveled, posterior margin convex, corner without setule, anteroventral margin with 3 long to medium setae, mid-ventral face with pair of long setae set almost vertically. Posteroventral corner of epimeron 2 rounded and beveled, no setule sinus, posterior margin strongly convex, facial setae = 8, posteriormost pair set vertically and disjunct. Posteroventral corner of epimeron 3 weakly protuberant, no setule sinus, with 5 long setae, posterior margin short, weakly convex, smooth, ventral margin with 4 setae all posterior and evenly spread, face naked; epimera without large seta on posterodorsal margin and no lateral ridges.

Urosomite 1 with 2 pairs of setae above base of uropod 1, articulation line almost complete, urosomite 3 unprotuberant. Rami of uropods 1-2 with articulate but tightly fixed apical nails; outer ramus of uropod 1 with 4 widely spread dorsal spines, inner with 3, outer ramus of uropod 2 with 3 widely spread dorsal spines, inner with 2 dorsomedial spines, peduncle of uropod 1 with 1 basofacial seta and 1 medium apicolateral spine and 3 other marginal spines, medially with 6

marginal setae and spines, apicalmost slightly enlarged, plus 1 giant displaced spine. Peduncle of uropod 2 with 5 dorsal spines, medially with 1 slightly larger apical spine; apicolateral corners of peduncles on uropods 1-2 with comb. Peduncle of uropod 3 with 5 ventral spines, dorsally with 1 lateral spine, 1 medial setule; rami feminine, inner extending to M.80 on article 1 of outer ramus, apex with 2 long setae, medial margin with 1 seta; article 2 of outer ramus ordinary, 0.20, bearing 2 long setae; medial margin of article 1 with 4 setae, lateral margin with 2 acclivities, spine formula = 1-1-1, setal formula = 1-1-1.

Telson especially long, length-width ratio = 3:2, almost fully cleft, each apex of medium width to broad, rounded lateral acclivities of moderate size, with short lateral and medial spines separated by setule; mid-lateral setules medium.

DESCRIPTION OF HOLOTYPE MALE.—Male "h," 4.05 mm: As generally described by Shoemaker (1938) for the species but with following restrictions: facial spine formula on article 4 of antenna 2 = 3-2-2, on article 5 = 1, dorsal margin of article 5 with 5 groups of 3-8 very thick male aesthetascs (or setae?), article 4 of peduncle thickly beset apicomediaally with similar aesthetascs-setae, primary flagellum of antenna 1 also with several of these in shorter form per article.

Epimeron 1 with 3 setae in vertical midventral group; epimeron 2 with 8 facial setae in groups of 5 and 3 forming weak V, posterior 3 setae fixed obliquely in vertical direction, epimeron 3 with 3 ventral and 5 posterior setae, no facial setae. Urosomite 1 lacking facial setae (a male development).

Dorsolateral margin of peduncle on uropod 1 with 4 spines, medially with large special spine, mediodorsal margin with 3 spines, outer ramus with 3 spines widely spread, inner with 2; dorsolateral margin of peduncle on uropod 2 with 6 spines, basalmost not enlarged or elongate, apicomediaal corner with 1 slightly enlarged spine, outer ramus with 2 spines, inner with 2.

Each apex of telson with 2 short spines separated by setule.

Other males: Urosomite 1 with weak ventral brush of setae but no lateral setae.

DISCUSSION.—The original materials studied by Shoemaker have been reexamined, and only the specimens from the type-locality, Block Island, Rhode Island, and those from Beaufort, North Carolina, represent *R. epistomus*, whereas all the remainder represent *R. hudsoni*, new species. Shoemaker (1938, fig. 1t,u) figured uropods 1–2 of that species in the belief they represented larger specimens of *R. epistomus*. The pattern of setal distribution on epimeron 1 is here corrected to show that they are arranged vertically, unlike Shoemaker's illustration. The holotype actually has two spines and a setule on each telsonic lobe rather than one spine and setule as represented by Shoemaker. In other ways the holotype fits Shoemaker's excellent description and figures.

MATERIAL.—USNM 75671, holotype, male "h," 4.05 mm (parabolic), remeasured, illustrated, Block Island, Rhode Island, 8 July 1883, and 1 other male and some dissected appendages; USNM 160881, Beaufort, North Carolina, Fort Macon Beach, 10 feet, 8 August 1941, female "w," 4.20 mm (illustrated), and 2 other specimens.

DISTRIBUTION.—Block Island, Rhode Island to Beaufort, North Carolina.

Rhepoxynius menziesi, new species

FIGURE 2 (part)

Paraphoxus epistomus.—J.L. Barnard, 1960:205–209, pls. 6–8; 1964b:243; 1966a:88; 1966b:28; 1969:222; 1971:70.—Reish and Barnard, 1967:18.

Not *Trichophoxus epistomus*.—Bousfield, 1973:126, 127, pl. 34.2 [= *R. hudsoni*].

ETYMOLOGY.—Named for the late Professor Dr. Robert James Menzies, expert on Isopoda, who died in Costa Rica while exploring. He was our friend for 31 years.

DESCRIPTION OF HOLOTYPE FEMALE (female "a," 3.19 mm).—Head about 23 percent of total

body length, greatest width about 75 percent of length, rostrum constricted, narrow, elongate, reaching middle of article 2 on antenna 1. Eyes medium, partly occluded with pigment, ommatidia ordinary. Article 1 of peduncle on antenna 1 about 1.3 times as long as wide, about twice as wide as article 2, ventral margin with about 5–6 setules, weakly produced dorsal apex with 1 seta, article 2 about 0.8 times as long as article 1, with ventral narrow cycle of 8 setae, primary flagellum with 6 articles, about 0.45 times as long as peduncle, bearing several short aesthetascs in the formula 0–0–1–1–1–0; accessory flagellum with 6 articles. Spine formula of article 4 on antenna 2 = 4–3–3, dorsal margin with notch bearing 1 seta and 2 spines, ventral margin with 6 groups 1–2 long to short setae, 1 ventrodorsal medium spine and 2 setules, article 5 about 0.9 times as long as article 4, facial spine formula = 2, dorsal margin bearing group of 2 setules, ventral margin with 3 sets of single setae plus setule, 2 ventrodorsal long to medium spine and seta, no subdistal facial spine; flagellum about 0.8 times as long as articles 4–5 of peduncle combined, with 7 articles.

Epistomal cusp long and sharp. Mandibles with weak palpal hump, right incisor with 3 teeth, left incisor with 4 weak teeth on main hump plus large basal tooth; right lacinia mobilis simple, sharp, broad, like raker, left lacinia mobilis with 5 teeth, middle teeth shortened, right rakers 9, left rakers 7; molars composed of bulbous humps, right molar with 6 short spines plus 1 short spine strongly disjunct, left molar with 5 short spines plus 1 short spine strongly disjunct, each molar with plume; palp article 1 short, article 2 with 1 long inner apical seta and 1 other short inner seta, article 3 as long as article 2, oblique apex with 11 spine-setae, basofacial formula = 1–2 or 0–2. Each lobe of lower lip with 1 cone. Inner plate of maxilla 1 ordinary, bearing 1 medium apical pluseta, 1 shorter similar apicomedial seta, 2 apicolateral similar setae, palp article 2 with 1 apical spine and 1 apicolateral and 2 apicomedial setae and 4 submarginal setae. Plates of maxilla 2 extending equally, outer scarcely broader than inner, outer with 3 apico-

lateral setae, inner with 2 medial setae. Inner plate of maxilliped with 1 large thick apical spine, 3 apicofacial setae, 6 medial setae; outer plate with 5 medial spines, no apicolateral setae and cusp; palp article 1 without apicolateral seta, article 2 with 2 groups of 1–2 apicolateral setae, medial margin of article 2 moderately setose, article 3 with 2–3 facial setae, 2 lateral setae, nail of article 4 obsolescent, with one accessory setule.

Coxa 1 scarcely expanded apically, anterior margin almost straight, main ventral setae of coxae 1–4 = 10–14–11–9, posteriormost seta of coxae 1–4 slightly shortened, anterior and posterior margins of coxa 4 divergent, posterior margin oblique, almost straight, posterodorsal corner rounded, posterodorsal margin ordinary, concave, width-length ratio of coxa 4 = 5 : 6.

Gnathopods generally ordinary, width ratios on articles 5–6 of gnathopods 1–2 = 32 : 36 and 31 : 38, length ratios = 67 : 60 and 57 : 58, palmar humps ordinary, palms weakly oblique, article 5 of gnathopod 1 elongate, ovate, posterior margin rounded-flat, short, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded, short.

Pereopod 3 stouter than pereopod 4 especially on article 4, facial setae formula on article 4 = 7 and 7, on article 5 = 7 and 6, main spine of article 5 extending to M. 95 on article 6, article 5 with no proximoposterior spines, spine formula of article 6 = 5 + 6 + 0 and 6 + 7 + 0 plus no middistal seta, some spines especially long; activity on inner margin of dactyls of pereopods 3–4 sharp, produced as tooth, emergent setule short, midfacial pluseta ordinary, highly distad. Coxae 5–7 posteroventral seta formula = 12–13–7. Articles 4–5 of pereopods 5–6 of ordinary width, facial spine rows sparse to moderately developed, facial ridge formula of article 2 on pereopods 5–7 = 0–1–1; width ratios of articles 2, 4, 5, 6 of pereopod 5 = 59:48:36:18, of pereopod 6 = 81:42:30:15, of pereopod 7 = 100:23:22:10; length ratios of pereopod 5 = 92:47:45:42, of pereopod 6 = 100:67:53:55, of pereopod 7 = 104:25:27:29; article 2 of pereopod 7 reaching middle of article 4, with 9 medium posterior

serrations, medial apex of article 6 finely combed, bearing 2 weak digital processes.

Posteroventral corner of epimeron 1 rounded, posterior margin weakly convex, corner without setule, anteroventral margin with 4 long setae, posteroventral face with 4 long setae in oblique row. Posteroventral corner of epimeron 2 rounded, without setule sinus, posterior margin weakly convex, facial setae = 9, posteriormost pair set vertically and disjunct. Posteroventral corner of epimeron 3 weakly protuberant, without setule sinus, with 5 long setae, posterior margin short, weakly convex, smooth, ventral margin with 5 setae mainly posterior, face naked. Epimera without large seta on posterodorsal margin, epimera 2–3 with lateral ridges.

Urosomite 1 naked above base of uropod 1, articulation line almost complete, urosomite 3 unprotuberant. Rami of uropods 1–2 with articulate but tightly fixed apical nails, outer ramus of uropod 1 with 4 widely spread dorsal spines, inner with 2–3, outer ramus of uropod 2 with 2 widely spread dorsal spines, inner with 1 dorso-medial spine. Peduncle of uropod 1 with 4 basofacial setae and 1 apicolateral spine and 3 other marginal spines, medially with 4 marginal spines, apicalmost ordinary, plus 1 giant spine displaced. Peduncle of uropod 2 with 7 dorsal spines, 2 of basalmost thin and elongate, medially with 1 large apical spine. Apicolateral corners of peduncles on uropods 1–2 with comb. Peduncle of uropod 3 with 5 ventral spines, dorsally with 1 lateral spine, 1 medial setule, rami feminine, inner extending to M. 65 on article 1 of outer ramus, apex with 1 long seta, medial and lateral margins naked; article 2 of outer ramus ordinary, 0.26, bearing 2 long setae, apicomедial margin of article 1 with 2 setae, lateral margin with 3 acclivities, spine formula = 0–1–1–1, setal formula = 1–1–1–1.

Telson especially long, length-width ratio = 9 : 7, almost fully cleft, each apex of medium width to broad, rounded, lateral acclivities of moderate size, with short lateral and medium medial spines separated by setule, mid-lateral setules diverse, larger of large size.

Coxal gills present on segments 2-7.

MALE.—Unknown.

NOTES.—Description of mandibles taken from female "i."

HOLOTYPE.—AHF5322, female "a," 3.19 mm.

TYPE-LOCALITY.—*Velero IV* 2311-53, coast of southern California, 33°40'00"N, 118°05'08"W, 12 fms (22 m), 16 May 1953.

MATERIAL.—Type-locality, also female "i," 3.07 m, and 7 other specimens; *Albatross* 2835, coast of Baja California, off Abrejos Point, 26°42'30"N, 113°34'15"W, 5.5 fms (10 m), 4 May 1888 (12 specimens).

RELATIONSHIP.—Now that western Atlantic *R. epistomus* is clarified, the new species *R. hudsoni* extracted from it (to follow), and a more detailed and stringent search for minute characters undertaken, this new species, *R. menziesi*, from the west coast of America, is removed from its former umbrella, *R. epistomus*. There are two other morphs to follow, *R. lucubrans* and *R. species D*, and the Allan Hancock collections need to be revised to determine whether or not *R. menziesi*, new species, *R. lucubrans*, and *R. species D* are all valid species and what their distributional ranges might be. The old west coast distribution of *R. epistomus* ranged from Oregon to Panama, 0-507 m, and, therefore, much material needs revision.

Rhepoxynius menziesi differs from *R. epistomus* in the disjunction of one spine on the mandibular molar, the disjunction of posterofacial setae on epimeron 2 and in the female the naked lateral surface of urosomite 1; however, the morph represented by *R. species D* (to follow) has these facial setae; whether or not *R. species D* is distinct will reflect in the future usefulness of urosomal setae as a distinction among the species in the complex.

The elongation of apical telsonic spines on *R. menziesi* is also distinctive in females, because these spines are short in females of *R. epistomus* (east coast). The character is poorly useful in males, because telsonic spines often become altered in male phoxocephalids. The presence of four (more or less) basofacial setae on the peduncle of uropod 2 is another character of the west coast *R. menziesi*,

whereas east coast *R. epistomus* has only one (more or less).

One must suspect that *R. menziesi* of the west coast is the plesiomorphic state, whereas *R. epistomus* is the apomorphic state, in that it has lost degrees of differentiation in facial setae on epimeron 2, length of armaments on telson, or lost number of setae on uropod 1. The only character state retained by east coast *Rhepoxynius* is the lateral setosity of urosomite 1, lost in *R. menziesi* but retained in *R. species D*.

DISTRIBUTION.—Warm-temperate southern California and Baja California (and probably much wider spread), 10-22 m.

Rhepoxynius species D

NOMENCLATURE.—These specimens may be gerontic *menziesi*, and are so labeled in our collections. They have bifid right lacinia mobilis and lateral setae on urosomite 1; the latter character resembles that found in each coast *R. epistomus*.

DESCRIPTION OF FEMALE.—Female "n," 6.29 mm: Head about 21 percent of total body length, greatest width about 73 percent of length, rostrum constricted, narrow, elongate, reaching middle of article 2 on antenna 1. Eyes medium, clear of pigment, ommatidia ordinary. Article 1 of peduncle on antenna 1 about 1.6 times as long as wide, about twice as wide as article 2, ventral margin with about 10 setules, weakly produced dorsal apex with 2-setules-setae, article 2 about 0.65 times as long as article 1, with proximoven-tral narrow L-shaped cycle of 11 setae; primary flagellum with 10 articles, almost 0.6 times as long as peduncle, bearing 1 each short aesthetasc on articles 4-9; accessory flagellum with 8 articles. Spine formula of article 4 on antenna 2 = 1-3-4-6, dorsal margin with notch bearing 2 setae and 1 spine, ventral margin with 7 groups of 3-5 long to short setae, 1 ventrodiscal long spine, article 5 about 0.8 times as long as article 4, facial spine formula = 4, dorsal margin bearing 2 sets of small setae, ventral margin with 5 sets of 2-4 medium to short setae, 3 ventrodiscal long to medium

spines; flagellum about 0.9 times as long as articles 4–5 of peduncle combined, with 13 articles.

Epistome with long and sharp anterior cusp. Mandibles with weak palpal hump, right incisor with 3 teeth, left incisor with 3 humps in 2 branches; right lacinia mobilis deeply bifid, distal branch little shorter than proximal, narrow, proximal branch simple, pointed, left lacinia mobilis with 4 teeth, middle teeth not shortened; right rakers 11, left rakers 10 plus 1 rudimentary; molars composed of bulbous humps, right molar with 6 short spines plus 1 short spine strongly disjunct, left molar with 6 short spines plus 1 short spine strongly disjunct, each molar with plume; palp article 1 short, article 2 with 3 long to medium inner apical setae and 4 other long and short inner setae, article 3 about 1.1 times as long as article 2, oblique apex with 17 spine-setae, basofacial formula = 0–2. Each lobe of lower lip with 1 cone. Inner plate of maxilla 1 ordinary, bearing 1 long apical pluseta, 1 similar apicomedeal seta, 2 apicolateral much shorter setae, palp article 2 with 1 apical and 1 medial marginal spines, 3 medial and 4 submarginal setae. Plates of maxilla 2 extending subequally, outer slightly broader than inner, outer with 3 apicolateral setae, inner with 1 medial seta. Inner plate of maxilliped with 1 large thick apical spine, 2 apicofacial setae, 4 medial setae, outer plate with 5 medial spines, no apicolateral setae; palp article 1 without apicolateral seta, article 2 with 3 groups of 3 lateral setae, medial margin of article 2 moderately setose, article 3 with 6 facial setae, 2 groups of 6 lateral setae, nail of article 4 obsolete, with 2 accessory setules.

Coxa 1 scarcely expanded apically, anterior margin almost straight, main ventral setae of coxae 1–4 = 6–16–14–24, narrowly spread on coxa 1, posteriormost seta of coxae 1–4 slightly to greatly shortened; anterior and posterior margins of coxa 4 moderately divergent, posterior margin weakly convex, posterodorsal corner quadrate, posterodorsal margin ordinary, concave, V-shaped, width-length ratio of coxa 4 = 13:12.

Gnathopods generally ordinary, width ratios on articles 5–6 of gnathopods 1–2 = 29:31 and

25:31, length ratios = 65:54 and 58:49, palmar humps ordinary, palms weakly oblique, article 5 of gnathopod 1 elongate, ovate, posterior margin rounded-flat, short, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded-short, almost lobate.

Pereopod 4 stouter than pereopod 3 especially on article 4, facial setae formula on article 4 = 8 and 8, on article 5 = 10 and 7, main spine of article 5 extending to M. 100–80 on article 6, article 5 with no proximoposterior spines, spine formula of article 6 = 9 + 9 and 11 + 10 plus tiny middistal seta, some spines especially long; acclivity on inner margin of dactyls of pereopods 3–4 weak, sharp, emergent setule almost fully immersed, midfacial pluseta absent. Coxae 5–7 posteroventral seta formula = 20:18:10. Articles 4–5 of pereopods 5–6 of ordinary width, facial spine rows dense to moderately developed, facial ridge formula of article 2 on pereopods 5–7 = 0–1–1, width ratios of articles 2, 4, 5, 6 of pereopod 5 = 51:47:35:15, of pereopod 6 = 82:43:30:15, of pereopod 7 = 96:22:20:10, length ratios of pereopod 5 = 100:47:45:47, of pereopod 6 = 100:70:51:61, of pereopod 7 = 100:25:30:35, article 2 of pereopod 7 scarcely exceeding apex of article 3, extremely broad and short, with 9 large posterior serrations, medial apex of article 6 finely combed, bearing 1 obsolescent digital process.

Posteroventral corner of epimeron 1 rounded-quadrate, posterior margin convex, corner without setule, anteroventral margin with 4 long setae, posteroventral face with 5 long setae in form of L. Posteroventral corner of epimeron 2 rounded-quadrate, without setule sinus, posterior margin weakly convex, facial setae = 13, posteriormost pair set vertically and disjunct. Posteroventral corner of epimeron 3 weakly protuberant, without setule sinus, with 11 setae set increasingly submarginal to dorsal end, posterior margin short, strongly convex, with setule notch, ventral margin with 6 setae mainly posterior but widely spread, face naked.

Urosomite 1 with 8 large lateral setae in long row on face, articulation line almost complete, urosomites 1–3 unprotuberant dorsally. Rami of

uropods 1-2 with articulate but tightly fixed apical nails, outer ramus of uropod 1 with 5 dorsal spines, inner with 3, outer ramus of uropod 2 with 5 dorsal spines, inner with 2 dorsomedial spines. Peduncle of uropod 1 with 3 basofacial setae and 4 widely spread lateral spines, medially with 5 thin marginal spines and enlarged displaced spine. Peduncle of uropod 2 with 6 thin dorsal spines, basalmost slightly more elongate, medially with 3-4 large widely spread spines. Apicolateral corners of peduncles on uropods 1-2 with vestigial comb. Peduncle of uropod 3 with 7 ventral spines in groups of 5 and 2, dorsally with 2 lateral spines, 1 medial setule; rami submasculine, inner extending to M. 100 on article 1 of outer ramus, apex with 2 setae, medial and lateral margins setose, article 2 of outer ramus ordinary, 0.24, bearing 2 long setae, medial margin of article 1 setose, lateral margin with 5 acclivities, spine formula = 1-1-1-1-1, long setal formulae = 0-1-1-1-1, short setae = 0-0-0-0-1. Telson long, length-width ratio = 23:16, almost fully cleft, each apex of medium width, rounded, lateral acclivities of moderate size, with long lateral and medial spines separated by setule, midlateral setules diverse, larger of large size.

Gerontic female "t," 7.88 mm: Right lacinia mobilis also bifid as if 2 rakers joining together. Coxa 1 with setae widespread and numerous. Urosomite 1 with 5 lateral very small setae in long oblique, sublongitudinal row.

DESCRIPTION OF MALE (male "m," not measured).—Urosomite 1 with lateral setae.

MATERIALS.—USNM Acc. 125734, nos. 9 and 13, off Corona del Mar, California, near bell buoy, 17 May and 31 Jan-3 Mar 1933, respectively, 15 fms (27.4 m), coll. G.E. MacGinitie, female "n," 6.29 mm, female "o" and male "m" not measured. USNM Acc. 113295, Balboa [?California, presumably, because authors visited this site well known for *Amphioxus* in 1946], with *Amphioxus* on sand bar, 19 Nov 1930, PBL [?Pacific Biological Laboratory], Univ. App. Co., Berkeley, Calif. [presumably the famous E.F. Ricketts coll.], female "t," 7.88 mm.

RELATIONSHIP.—These specimens differ from *R. menziesi* in the presence of lateral setae on urosomite 1 and in the presence of two elements in the right lacinia mobilis. They therefore differ from *R. epistomus* in the latter but not the former character. They also differ from *R. epistomus* in the disjunct posterior facial setae of epimeron 2. They have the appearance of being gerontic *R. menziesi* in which one raker has joined with the right lacinia mobilis and in which new urosomal setosity appears.

DISTRIBUTION.—Balboa, California [inside Newport Bay lagoon] and in closely adjacent open-sea Corona del Mar, 0-27 m.

Rhepoxynius hudsoni, new species

FIGURE 3 (part)

Pontharpinia epistoma Shoemaker, 1938:326-329, fig. 1t,u [in part, not other figures, and most of description].

Trichophoxus epistomus.—Bousfield, 1973:126, pl. 34.2 [in part, especially figures].

ETYMOLOGY.—Named for Henry Hudson (died 1611?), English navigator and explorer.

DESCRIPTION OF HOLOTYPE FEMALE.—Holotype female "f," 4.76 mm: Head about 22 percent of total body length, greatest width about 67 percent of the length; rostrum constricted, broad, elongate, exceeding middle of article 2 on antenna 1. Eyes small, poorly stained or clear of pigment, ommatidia especially sparse. Article 1 of peduncle on antenna 1 about 1.4 times as long as wide, about 1.75 times as wide as article 2, unproduced dorsal apex with 1 setule and 1 seta, article 2 about 0.75 times as long as article 1, with ventral cycle of 4 setae, closely crowded, primary flagellum with 8 articles, about 0.65 times as long as peduncle, bearing several short aesthetascs, accessory flagellum with 6-7 articles. Spine formula of article 4 on antenna 2 = 3-2-2, dorsal margin with notch bearing 2 setae and 1 spine, ventral margin with 5 groups of 1-2 long to medium setae, 1 ventrodistal long spine and 2 long + 2 short setae; article 5 about 0.93 times as long as article 4, facial spine formula = 1, dorsal margin

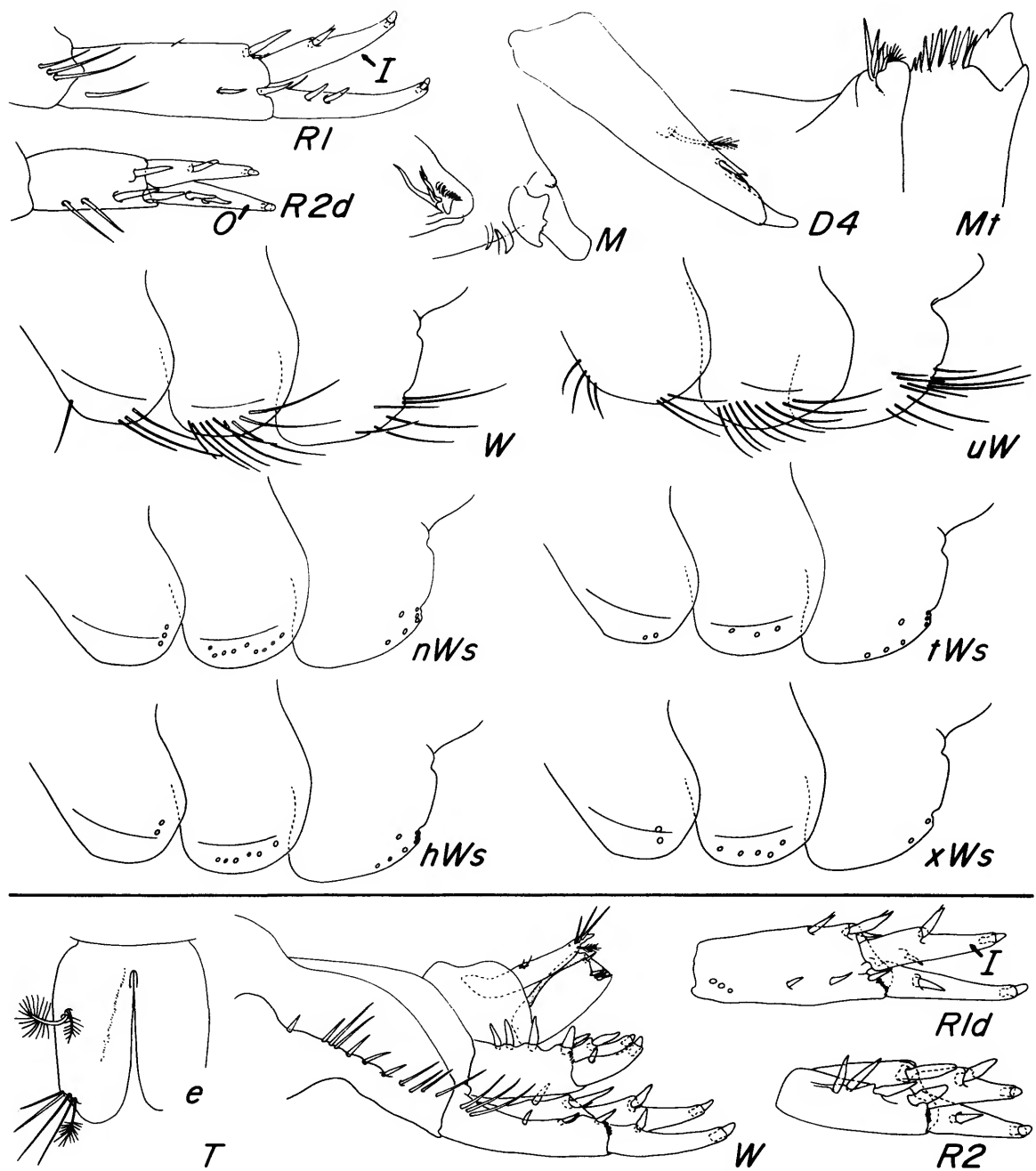


FIGURE 3.—Upper: *Rhexopynius hudsoni*, new species, holotype, female “f,” 4.76 mm (h = female “h,” n = female “n,” t = male “t,” u = male “u,” x = juveniles of New Hampshire). Lower: *Rhexopynius* species C, male “p,” 4.32 mm.

bearing 2 sexual setae, ventral margin with 3 sets of 1 seta each, 1 ventrodistal long spine, 2 subdistal facial spines, flagellum about as long as articles 4-5 of peduncle combined with 12+ articles; ensiform process large.

Epistome with large anterior cusp. Mandibles with weak palpar hump, right incisor with 3 teeth, left incisor with 2 humps in 2 branches; right lacinia mobilis simple, narrow, left lacinia mobilis with 4 teeth, middle teeth shortened; right rakers 6, left rakers 2; molars composed of bulbous humps, right molar with 5 primarily medium spines, no spine disjunct, left molar with 3 primarily medium spines, only right molar with plume; palp article 1 short, article 2 with 1 long inner apical seta and 2 other shorter inner setae, article 3 about 1.1 times as long as article 2, oblique apex with 11 setae, basofacial formula = 1-1. Inner plate of maxilla 1 ordinary, bearing 1 stout apical pluseta, 1 shorter similar apical seta, 1 apicomedial seta, 1 apicolateral seta, palp article 2 with one apical spine, 1 seta, and 5 submarginal setae. Inner plate of maxilla 2 shorter than outer, outer not much broader than inner, outer with 3 apicolateral setae, inner with 4 medial or facial setae. Inner plate of maxilliped with 1 large thick apical spine, 2 apicofacial setae, 3 medial setae; outer plate with 4 medial and apical spines, plus apicolateral cusp; palp article 1 with 1 apicolateral seta, article 2 with 4 lateral setae, medial margin of article 2 moderately setose, article 3 with 3 facial setae, 1 lateral seta, nail of article 4 absent, inner edge with 2 accessory setules.

Coxa 1 not expanded apically, anterior margin weakly convex, main ventral setae of coxae 1-4 = 5-9-8-5, posteriormost seta of coxae 1-3 slightly shortened or as long as others; anterior and posterior margins of coxa 4 strongly divergent, posterior margin very oblique, almost straight, posterodorsal corner rounded, posterodorsal margin ordinary, concave, width-length ratio of coxa 4 = 8:9.

Gnathopods generally ordinary, width ratios on articles 5-6 of gnathopods 1-2 = 26:32 and 24:34, length ratios = 65:58 and 59:58, palpar

humps ordinary, palms weakly oblique, article 5 of gnathopod 1 elongate, ovate, posterior margin flat, long, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded, short.

Pereopods 3-4 similar, facial setae formula on article 4 = 7 and 6, on article 5 = 6 and 6, main spine of article 5 extending to M. 100 and M. 90 on article 6, article 5 with one debatedly proximoposterior spine, spine formula of slender article 6 = 6-7+0 and 7-7+0; acclivity on inner margin of dactyls of pereopods 3-4 weak, sharp, emergent setule short, midfacial pluseta ordinary. Coxae 5-7 posteroventral seta formula = 8-9-3. Articles 4-5 of pereopods 5-6 of ordinary width, facial spine rows sparse to moderately developed, facial ridge formula of article 2 on pereopods 5-7 = 0-1-1; width ratios on articles 2, 4, 5, 6, of pereopod 5 = 62:42:38:18, of pereopod 6 = 84:42:29:11, of pereopod 7 = 94:20:17:8, length ratios of pereopod 5 = 94:49:47:40, of pereopod 6 = 94:71:44:52, of pereopod 7 = 100:30:26:28, article 2 of pereopod 7 almost reaching apex of article 4, with 6 medium posterior serrations, medial apex of article 6 almost smooth.

Posteroventral corner of epimeron 1 rounded and beveled, posterior margin convex, corner without setule, anteroventral margin with 1 medium seta, posteroventral face with 3 long to medium setae in tandem, almost horizontal. Posteroventral corner of epimeron 2 rounded and beveled, no setule sinus, posterior margin strongly convex, facial setae = 9 in 2 weakly arcuate rows. Posteroventral corner of epimeron 3 weakly protuberant, no setule sinus, with 2 long setae, posterior margin short, weakly convex, smooth, ventral margin with 3 setae all posterior and evenly spread, face with 1 seta; epimera 1-3 without large seta on posterodorsal margin.

Urosomite 1 with 3 setae at base of uropod 1, articulation line complete. Rami of uropods 1-2 with articulate but tightly fixed apical nails; outer ramus of uropod 1 with 2 dorsal spines, tightly contiguous, inner with 1, outer ramus of uropod 2 with 2 contiguous dorsal spines, inner with 1 dorsomedial spine. Peduncle of uropod 1 with 1 basofacial seta and 1 medium apicolateral spine

and 1 smaller marginal spine, medially with 1 marginal setule, and apical slightly enlarged spine (occasionally second inferior spine present). Peduncle of uropod 2 with 4 dorsal spines and setae, medially with 1 large apical spine. Apicolateral corners of peduncles on uropods 1-2 without gross comb. Peduncle of uropod 3 with 2 widely spaced ventral spines, dorsally with 1 lateral spine, 1 medial setule, rami feminine, inner extending to M. 55 on article 1 of outer ramus, apex with 1 seta, medial and lateral margins naked; article 2 of outer ramus ordinary, 0.28, bearing 2 long setae, apicomедial margin of article 1 with 2 setae in tandem, lateral margin with 2 acclivities, spine formula = 0-1-1, setal formula = 1-1-1.

Telson especially long, length-width ratio = 9:5, almost fully cleft, each apex of medium width, rounded, with 2 lateral acclivities of moderate size, with short lateral and medial spines separated by setule; mid-lateral setules large.

Female "h," 4.8 mm (Charleston, South Carolina): Epimeron 1 with 2 facial setae fixed almost vertically and unusually posteriad (illustrated diagrammatically). Basal spines on peduncle of uropod 2 not elongate; otherwise specimen with correct formulas and position of spines and setae on uropods 1-2 and epimera 2-3; epimera 2-3 illustrated. Peduncle of uropod 1 with 3 lateral, 3 medial spines, of uropod 2 with 5 spines, ramal counts = 2 and 2, 2 and 1.

Female "n," illustrated (Vineyard Sound, Massachusetts): Epimeron 1 with 3 facial setae fixed almost vertically and unusually posteriad (diagrammatically illustrated). Antepenultimate basal spine on peduncle of uropod 2 elongate; otherwise specimen with correct formulas and positions of spines and setae on uropods 1-2 and epimera 2-3; epimera 2-3 illustrated. Peduncle of uropod 1 with 2 lateral, 2 medial spines, of uropod 2 with 5 spines, ramal counts = 3 and 2, 2 and 1.

Male "u," illustrated (Broadkill, Delaware): Generally of same form as male of *R. epistomus*, with fully elongate antenna 2 flagellum, large eyes, modified urosome, uropod 3. Article 2 of antenna 1 with 5 setae in cycle, primary fla-

gellum with 9 articles, 1 calceolus each on articles 1, 2, 3, 4, 5, 7 . . . n; accessory flagellum with 8 articles, calceolus each on articles 2, 3. Facial spine formulas on article 4 of antenna 2 = 3-2-2, on article 5 = 2 (near dorsal edge); article 4 ventrally with setal formula of 3-2-2-2 plus spine; article 5 with 3 dorsal groups of male setae, ventral setal formula = 1-2, apical face with 2 setae.

Article 2 of pereopod 7 with 8 posterior serrations. Epimera illustrated, epimeron 3 with 4 facial setae. Urosomite 1 with 4 facial setae. Spine formulas on peduncles of uropods 1-2 = 3-2 and 5, not elongate on uropod 2, ramal spines = 2 and 1, 2 and 1. Urosomite 1 with 3 setae in tandem. Peduncle of uropod 3 with 3 ventral and one apicolateral spines, inner ramus reaching to M. 100+ on outer ramus, inner strongly setose, with 13 medial, 7 lateral and 2 apical setae, article 1 of outer ramus with 9 medial setae, formula of lateral spines = 0-1-1-1, setae = 1-1-1-1; article 2 about 14 percent as long as article 1, with 2 long apical setae.

Male "t," illustrated (Skull Creek, South Carolina): Epimera illustrated, poorly setose. Urosomite 1 with 4 setae tightly contiguous and highly distad. Fresh material probably with dark eyes.

DESCRIPTION OF JUVENILES (3.10-3.40 mm, New Hampshire).—Epimera illustrated diagrammatically, epimeron 1 with 1 or 2 setae (set vertically when paired). Uropods 1-2 as in adult, lacking special spine, peduncle of uropod 1 with 1 spine on each apex or 2 apicomедially, of uropod 2 with 3 dorsolateral spines, spines of rami = 1 and 1, 1 and 1.

ILLUSTRATIONS.—Setal formulas of epimera for specimens "h," "n," "t," and New Hampshire juveniles plotted diagrammatically on common base.

HOLOTYPE.—USNM 171438, female "f," 4.76 mm.

TYPE-LOCALITY.—Long Island Sound, New York, USA, 1874, U.S. Fish Commission.

VOUCHER MATERIAL.—Type-locality, male "m," 4.28 mm; one mile off Broadkill, Delaware,

12 feet, H.S. Richards, male "u" (illustrated); west end of Skull Creek, South Carolina, *Fish Hawk*, male "t" (illus.); Vineyard Sound, 1871, 23 fathoms, female "n" (illus.); off Charleston, South Carolina, 88 fm, *Albatross* 2312, female "h," 4.8 mm (illus.); New Hampshire, NW 1.6 [miles], Isles of Shoals, 60 feet, 3 juveniles, 3.10–3.40 mm (illus.); Maine, off Newport, 1880, U.S. Fish Commission, female "c," 5.5 mm [apparently figured as larger "male" by Shoemaker, 1938, fig. 1t,u (uropods 1–2)]. Other material, *Fish Hawk* 8834, off Cape Henry, [?Virginia], 43 fms (1).

RELATIONSHIP.—*Rhepoxynius hudsoni* differs from *R. epistomus* in the spine and setal patterns of uropods 1–2 and the epimera. Except for the weak aberration of female "f," the holotype, in which uropod 1 bears a vestigial special spine on the peduncle, all specimens lack the special spine in contradistinction to *R. epistomus*, which bears a heavy spine in that special terminal position. Adults of *R. hudsoni* bear one or more facial setae on epimeron 3 and do not have the posterior pair of setae on epimeron 2 fixed in vertical alignment; the females have small eyes and have the spines on the outer ramus of uropod 1 arranged in close contiguity near the base. The ramal spines on uropods 1–2 generally are stouter than in *R. epistomus*.

Characters of lesser consistency that distinguish *R. hudsoni* are the elongation of basal spines on the peduncle of female uropod 1 (not found to be elongate in *R. epistomus* in the limited material in hand), the frequently occurring horizontal alignment of ventral setae on epimeron 1, and the absence of a disjunct spine on the mandibular molar. Setal arrangement on epimeron 1, however, is variable as shown in the several illustrations. The doubled arcuity in the setal pattern of epimeron 2 is characteristic of *R. hudsoni*. Apparently *R. epistomus* lacks lateral ridges on epimera 1–2 of females in contrast to *R. hudsoni*, but this is a character not examined in all material at hand. The hands of the gnathopods in *R. epistomus* are much wider and the palmar humps larger in *R. epistomus* than in *R. hudsoni*.

DISTRIBUTION.—Maine to South Carolina, 4–161 m.

Rhepoxynius lucubrans (J.L. Barnard)

FIGURE 4 (part)

Paraphoxus lucubrans J.L. Barnard, 1960:212–218, pls. 12–14.

DESCRIPTION OF FEMALE.—Head about 21 percent of total body length, greatest width about 70 percent of length, rostrum constricted but broad, elongate, weakly flaring apically, reaching middle of article 2 on antenna 1. Eyes medium-large, mostly occluded with pigment, ommatidia ordinary. Article 1 of peduncle on antenna 1 about 1.5 times as long as wide, about 1.9 times as wide as article 2, ventral margin with about 7 setules, weakly produced dorsal apex with 1 setule, 1 seta; article 2 about 0.72 times as long as article 1, with ventral cycle of 6 setae; primary flagellum with 11 articles, about 0.8 times as long as peduncle, bearing several very short aesthetascs; accessory flagellum with 10 articles, one aesthetasc each on articles 4–10, spine formula of article 4 on antenna 2 = 1–3–4–3, dorsal margin with notch bearing 2 setae and 1 spine and second proximal notch with 2 setae, ventral margin with 4 groups of 2–3 long to medium setae, 1 ventrodistal long facial spine and 1 marginal seta and 2 small submarginal setae; article 5 about 0.95 times as long as article 4, facial spine formula = 2, dorsal margin bearing 3 pairs of small setules, ventral margin with 4 sets of 2–4 long to short setae, 3 ventrodistal long to short spines, one of them a short facial spine; flagellum about 1.3 times as long as articles 4–5 of peduncle combined, with 13 articles.

Epistomal cusp small to medium. Mandibles with weak palpar hump, right incisor with 3 teeth, right lacinia mobilis simple, sharp, small, like raker, left lacinia mobilis with 4 teeth, middle teeth shortened; right rakers 8 plus 1 rudimentary, left rakers 7 plus 1 rudimentary; molars composed of wide plaques, each molar with 6 primarily long to medium spines plus 1 short thick spine strongly disjunct, each molar with

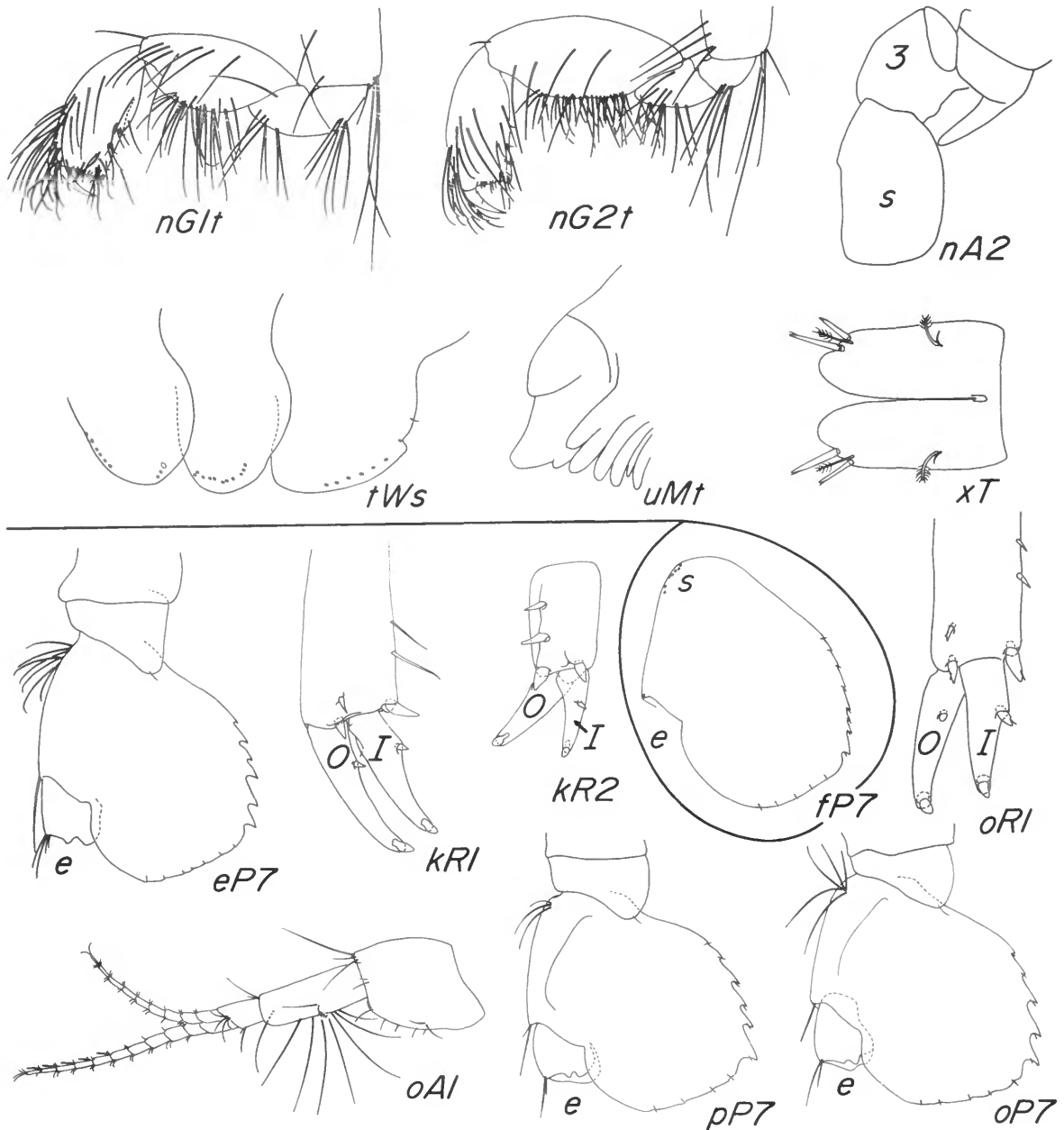


FIGURE 4.—*Rhepoxynius heterocuspoidatus* (J.L. Barnard) (e = female “e,” 6.85 mm, k = female “k,” 4.69 mm, o = female “o,” 5.05 mm, p = female “n,” 4.76 mm). *Rhepoxynius stenodes* (J.L. Barnard) (t = female “t,” 3.39 mm, u = female “u,” 3.33 mm). *Rhepoxynius lucubrans* (J.L. Barnard) (x = female “u,” 5.05 mm). *Rhepoxynius variatus* (J.L. Barnard) (n = female “n,” 3.21 mm). *Rhepoxynius* species L, f = female “f,” 5.71 mm.

plume; palp article 1 short, article 2 with 3 long to medium inner apical setae and 4 other long and short inner setae, and 3-4 outer setae, article 3 about as long as article 2, oblique apex with 11-9 (right and left) spine-setae, basofacial formula = 0-2. Each outer lobe of lower lip with 1 large cone. Inner plate of maxilla 1 ordinary, bearing 1 medium apical pluseta, 1 similar apicomedial seta, 2 apicolateral much shorter setae, palp article 2 with 1 apical spine, 1 apicolateral seta, 3 medial setae, and 5 submarginal setae. Inner plate of maxilla 2 shorter than outer, outer broader than inner, outer with 3 apicolateral setae, inner with 1 medial seta. Inner plate of maxilliped with 1 thick short apical spine, 2 apicofacial setae, 4 medial setae, outer plate with 3 medial spines, no apicolateral setae nor cusp, palp article 1 with 2 apicolateral setae, article 2 with 5 groups of 7 apicolateral setae, medial margin of article 2 strongly setose, article 3 with 7 facial setae, 3 lateral setae, nail of article 4 obsolete, with 2 accessory setules.

Coxa 1 scarcely expanded apically, anterior margin weakly convex, main ventral setae of coxae 1-4 = 10-11-8-7, widely spread, posteriormost seta of coxae 1-4 shortened; anterior and posterior margins of coxa 4 strongly divergent, posterior margin oblique, convex, posterodorsal corner rounded, posterodorsal margin ordinary, concave, width-length ratio of coxa 4 = 1:1.

Gnathopods generally ordinary, width ratios on articles 5-6 of gnathopods 1-2 = 26:31 and 25:32, length ratios = 65:50 and 62:50, palmar humps ordinary, palms weakly oblique, article 5 of gnathopod 1 elongate, ovate, posterior margin rounded-flat, long, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded. Pereopod 4 stouter than pereopod 3 especially on article 4, posterior margin of latter more strongly setose on pereopod 4, facial setae formula on article 4 = 7 and 6, closely parallel to apical margin, on article 5 = 8 and 6, main spine of article 5 extending to M. 85 on article 6, article 5 with no proximoposterior spines (only 1 long main spine), spine formula of article 6 = 7 + 8 and 9 + 8 and no middistal seta, some spines especially long, accliv-

ity on inner margin of dactyls of pereopods 3-4 weak, obsolescent, emergent setule almost fully immersed, midfacial pluseta short, position normal. Coxae 5-7 posteroventral seta formula = 11-17-7. Articles 4-5 of pereopods 5-6 of ordinary width, facial spine rows sparse to moderately developed, facial ridge formula of article 2 on pereopods 5-7 = 0-1-1; width ratios of articles 2, 4, 5, 6 of pereopod 5 = 61:42:36:18, of pereopod 6 = 85:42:31:14, of pereopod 7 = 83:21:19:10; length ratios of pereopod 5 = 97:52:49:48, of pereopod 6 = 95:70:52:69, of pereopod 7 = 100:29:29:35; article 2 of pereopod 7 almost reaching apex of article 4, posterior margin with 9 small serrations, medial apex of article 6 smooth, bearing 1 weak digital process.

Posteroventral corner of epimeron 1 rounded, posterior margin weakly convex, corner without setule, anteroventral margin with 3 long setae, posteroventral face with 3 long setae set vertically. Posteroventral corner of epimeron 2 rounded, without setule sinus, posterior margin weakly convex, facial setae = 8, posteriormost pair set vertically, otherwise evenly arcuate. Posteroventral corner of epimeron 3 weakly protuberant, without setule sinus, with 6 long setae, posterior margin short, convex, with 1 setule notch, ventral margin with 4-5 setae almost evenly spread; epimera 1-3 without large seta on posterodorsal margin.

Urosomite 1 with 4 widely spread short setae on lateral face, articulation line almost complete, urosomite 3 unprotuberant dorsally. Rami of uropods 1-2 with articulate but tightly fixed apical nails, outer ramus of uropod 1 with 5 widely spread dorsal spines, inner with 3, outer ramus of uropod 2 with 3 widely spread dorsal spines, inner with 3 dorsomedial spines. Peduncle of uropod 1 with 3 basofacial setae and 5 evenly short dorso-lateral spines, medially with 5 marginal spines, apicalmost ordinary plus 1 giant displaced spine. Peduncle of uropod 2 with 5 dorsal spines and 1 basad seta, medially with 1 large apical spine, apicolateral corners of peduncles on uropods 1-2 without comb. Peduncle of uropod 3 with 6 ventral spines, dorsally with 1 lateral spine, 1 medial setule, rami submasculine, inner extending to M.

100+ on article 1 of outer ramus, apex with 2 setae, medial and lateral margins setose, article 2 of outer ramus ordinary, 0.18, bearing 2 long setae, medial margin of article 1 with 6 setae, lateral margin with 4 acclivities, spine formula = 0-0-0-1-1; short setal formula = 1-1-1-0-0; long setae = 0-1-1-1-1. Telson especially long, length-width ratio = 5:4, almost fully cleft, each apex wide, rounded, lateral acclivities narrow, weak, with large lateral and medial spines separated by small setule; mid-lateral setules diverse, larger of medium size.

DESCRIPTION OF MALE.—Male “g,” 4.11 mm: Rostrum slightly narrower than in female. Article 2 of antenna 1 with 5 ventral setae, primary flagellum with 9 articles, 1 calceolus each on articles 2-5, aesthetascs weakly developed. Facial spine formula on article 4 of antenna 2 = 0-3-4-3, article 5 with 2 facial spines, with 5 dorsal sets of male setae and no calceoli, ventrodistal apex with 2 thin spines, calceoli formulae = 2, 4, 6, 8 . . . n. Epistomal cusp obsolete. Basofacial setal formula of article 3 on mandibular palp = 0:1. Article 2 of only pereopod 7 narrower than in female. Epimera 1-3 broadened, posterior margin of epimeron 3 deeply convex. Setal formulas: epimeron 1 anteroventral = several, posteroventral = 5, mostly vertical; epimeron 2 facial = 7, but only posteriormost slightly offset; epimeron 3 posterior = 8, facial = 0, ventral = 4-5. Urosomite 1 without lateral setae. Spine formulas of uropods; uropod 1 peduncle dorsolateral = 4, basofacial = 3; uropod 2 peduncle dorsal = 6; dorsal spines on outer ramus of uropod 1 = 3, of uropod 2 = 2; inner ramus of uropod 1 = 2, of uropod 2 = 2; ventral spines on peduncle of uropod 3 = 7; spine formula on article 1 of outer ramus = 0; long setal formula = 1-1-1-1, short setae = 0-1-1-1.

Telson broadened, distal spines scarcely shortened; formula = short spine, longer setule, longer spine, very small spine, each lobe with short dorsal row of denticles.

Male “t,” 4.61 mm: Rostrum like female. Article 1 of antenna 1 with numerous ventral setules and small patch of medial pubescence,

article 2 with 6 ventral and 3 lateral setae, primary flagellum with 12 articles, 1 calceolus each on articles 2, 3, 4, 5, and 6; aesthetascs weakly developed; accessory flagellum with 10 articles. Article 4 of antenna 2 medially pubescent, facial formula = 4-5-4, on article 5 = 1, article 5 with 4 dorsal sets of male setae but no calceoli, ventrodistal apex with 2 thin spines; calceolus formula on flagellum = 1, 2, 4, 6, 8 . . . n.

Epistomal cusp small. Basofacial setal formula of article 3 on mandibular palp = 0-1. Facial and setal spine formulas of pereopods 3-4 on article 4 = 6 and 5 (oblique but not parallel to apex, contrasted to female), on article 5 = 7 and 7, on article 6 = 6 + 7 and 8 + 8. Article 2 of pereopod 7 narrower than in female (as in J.L. Barnard, 1960, pl. 6: fig. R, for *R. epistomus*). Epimera 1-3 broadened, posterior margin of epimeron 3 shortened as in female, convex. Setal formulas: epimeron 1 anteroventral = 5, posteroventral = 1, face = 3 vertical, posterior in notch = 1 long seta; epimeron 2 facial = 9 with posterior pair vertical, posterior margin with 2 notches and 2 large setae; epimeron 3 posterior = 7, facial = 0, ventral = 5.

Urosomite 1 with 4 facial spines. Spine formulas of uropods: uropod 1 peduncle dorsolateral = 7, basofacial = 3, medial = 1 displaced plus 4 marginal, basalmost thin and elongate; uropod 2 peduncle dorsal = 7, basalmost slightly elongate, medial = 1 large apical spine; dorsal spines on outer ramus of uropod 1 = 5, of uropod 2 = 3, inner ramus of uropod 1 = 3, of uropod 2 = 2; uropod 3 ventral spines on peduncle = 6, spines on article 1 of outer ramus = 0-0-0-1-1-1, short setae = 0-1-1-1-1-1, long setae = 1-0-1-1-1-1; opposite uropod 3, spines = 0-0-0-0-1-1, short setae = 1-0-1-1-1-1, long setae = 0-2-1-2-1-1.

Telson not elongate, broadened, only lateral distal spines shortened, each lobe with dorsal denticle row.

REMARKS.—We re-identify the variety of *R. lucubrans* shown by J.L. Barnard (1960:217, pl. 14: fig. A-X) as *R. daboius*, based now on the elongation of armaments on the telson; the weakly enlarged eyes are discounted, and the telsonic

armament difference plus the larger serrations on article 2 of pereopod 7 on *R. daboius* are considered to be more useful to distinguish it from *R. lucubrans*. The latter, of course, has a displaced spine on uropod 1, whereas *R. daboius* does not.

MATERIAL.—AHF *Velero IV* 2624, San Felipe, Mexico, Gulf of California on Baja California side, 31°00'N, 114° 51'W, beach south of town, intertidal, mud and sand flats, 13–14 April 1954, female “s,” 3.62 mm, male “t,” 4.61 mm, female “u,” 5.05 mm (illus.). USNM Acc. 160366, Bahía de San Carlos, Mexico, Baja California (outer Pacific side), no. 2, pelagic haul by night light at anchorage, 30 March 1940, male “g,” 4.11 mm, and 3 other specimens.

RELATIONSHIP.—*Rhepoxynius lucubrans* differs from *R. menziesi* (the old west coast *epistomus*) in the much smaller epistomal cusp, the presence of lateral armaments on urosomite 1, and in the following subtle and poorly useful characters: broader rostrum, narrower article 2 of pereopod 7, narrower hands of gnathopods, larger ensiform process of antenna 2, and in the female (but not the male, at least certain males, see male “t” herein) the more closely parallel-to-apex direction of facial setal row on article 4 of pereopods 3–4.

Rhepoxynius lucubrans is close to *R. epistomus* (east coast) in the lateral setae of urosomite 1 and may be the link between *menziesi* and *epistomus*; *R. lucubrans* differs from *R. epistomus* in the short epistomal cusp and the more strongly disjunct spine on the mandibular molars.

As in all members of the *epistomus* species group, urosomite 1 has two sets of ventral setae.

DISTRIBUTION.—Southern California, 9–91 m (old data); Baja California and Gulf of California, 0 m, neritic and intertidal (new material). [Subtract AHF *Velero IV* 2232-52 from data pool and transfer to *R. daboius*.]

Rhepoxynius gemmatus (J.L. Barnard)

Paraphoxus gemmatus J.L. Barnard, 1969:222–224, fig. 29.

DESCRIPTION OF MALE.—Male “n,” 4.70 mm: Head about 23 percent of total body length,

greatest width about 70 percent of length, rostrum constricted, broad, elongate, reaching middle of article 2 on antenna 1. Eyes large, mostly occluded with pigment, ommatidia ordinary. Article 1 of peduncle on antenna 1 about 1.25 times as long as wide, about 2.2 times as wide as article 2, ventral margin with about 7 setules, unproduced dorsal apex with 2 setae, article 2 about 0.95 times as long as article 1, with ventral cycle of 8 setae; primary flagellum with 12 articles, about 0.9 times as long as peduncle, bearing several short aesthetascs in formula of 0–0–0–0–1–1–1–1–1–1–0 and 1 calceolus each on articles 2–5; accessory flagellum with 10 articles. Antenna 2 strongly ensiform; spine formula of article 4 = 3–3–3, dorsal margin fuzzy, with notch bearing 2 setae and 1 spine, ventral margin with 6 groups of 1–4 long to medium setae, 1 ventrodistal long spine; article 5 about as long as article 4, facial spine formula = 2, dorsal margin bearing 6 groups of male setae, ventral margin with 2 sets of 1 medium seta, 2 ventrodistal medium spine-setae on face; flagellum elongate, with 35 articles; calceolus formula = 2, 4, 6 . . . 26; article 1 very large and produced, article 2 with 2 setae (as usual).

Epistomal cusp long and sharp. Mandibles with weak palpal hump, right incisor with 3 teeth, left incisor with 3 humps in 2 branches; right lacinia mobilis simple, like raker, left lacinia mobilis with 5 teeth plus 1 accessory tooth, all teeth shortened; right rakers 9, plus 1–2 rudimentaries, left rakers 7 plus 1 rudimentary; molars composed of bulbous plaques, right molar with 4 primarily short spines plus 1 short spine strongly disjunct, left molar with 7 primarily medium spines, 1 short spine strongly disjunct, each molar with plume; palp article 1 short, article 2 with pair of medium inner apical setae and 4 other shorter inner setae, and 2 long outer setae, article 3 about as long as article 2, oblique apex with 11 spine-setae, basofacial formula = 0–2. Each outer lobe of lower lip with 1 cone. Inner plate of maxilla 1 ordinary, bearing 1 medium apical pluseta, 1 similar apicomedia seta, 2 apicolateral much shorter setae, palp article 2 with 1 apical

spine, 1 apicolateral seta, 5 medial setae and 5 submarginal setae. Plates of maxilla 2 extending equally, outer not broader than inner, outer with 3 apicolateral setae, inner with 1 medial seta. Inner plate of maxilliped with 1 large thick apical spine, 3-4 apicofacial setae, 4-5 medial setae, outer plate with 5 medial spines, no apicolateral setae, no cusp, palp article 1 with 3 apicolateral setae, article 2 with 5 groups of 1 each lateral setae, medial margin of article 2 strongly setose, article 3 with 4 facial setae, 2 lateral setae, nail of article 4 obsolete, with 2 accessory setules.

Coxa 1 scarcely expanded apically, anterior margin almost straight, main ventral setae of coxae 1-4 = 8-9-9-7, posteriormost seta of coxae 1-3 shortened; anterior and posterior margins of coxa 4 strongly divergent, posterior margin very oblique, almost straight, posterodorsal corner sharp-rounded, posterodorsal margin ordinary, straight; width-length ratio of coxa 4 = 1 : 1.

Gnathopods generally ordinary, but hands thin, width ratios on articles 5-6 of gnathopods 1-2 = 22 : 26 and 21 : 26, length ratios = 64 : 46 and 59 : 43, palmar humps ordinary, palms weakly oblique, article 5 of gnathopod 1 elongate, ovate, posterior margin rounded, almost flat, long, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded-flat.

Pereopod 4 slightly stouter than pereopod 3 especially on article 4, facial setae formula on article 4 = 7 and 6, not parallel to apex, on article 5 = 6 and 4, main spine of article 5 extending to M. 90 on article 6, article 5 with no proximoposterior spines, spine formula of article 6 = 5 + 6 and 6 + 7 plus middistal seta, some spines especially long, acclivity on inner margin of dactyls of pereopods 3-4 sharp, produced as tooth, emergent setule short, midfacial pluseta ordinary.

Coxae 5-7 posteroventral seta formula = 9-17-5; articles 4-5 of pereopods 5-6 of ordinary width, facial spine rows sparse to moderately developed, facial ridge formula of article 2 on pereopods 5-7 = 0-1-1; width ratios of articles 2, 4, 5, 6 of pereopod 5 = 51 : 35 : 41 : 18, of pereopod 6 = 72 : 42 : 32 : 12, of pereopod 7 = 71 : 19 : 17 : 7; length ratios of pereopod 5 = 80 : 42 : 45 : 41, of

pereopod 6 = 89 : 65 : 48 : 64, of pereopod 7 = 100 : 28 : 30 : 35; article 2 of pereopod 7 narrow, reaching apex of article 4, with 6 medium posterior serrations; ventral margin of article 2 finely combed; medial apex of article 6 finely combed, bearing 2 weak digital processes.

Posteroventral corner of epimeron 1 rounded, posterior margin convex, corner without setule, anteroventral margin with 4 long setae, mid-posterior face with 7 long setae in vertical row. Posteroventral corner of epimeron 2 rounded, without setule sinus, posterior margin convex, facial setae = 11, posterior triad set almost vertically; epimera 1-2 broad, posterior setae of epimeron 2 at M. 50.

Posteroventral corner of epimeron 3 quadrate, with 9 setae, posterior margin strongly convex, with 1 setule notch, ventral margin with 5 setae (plus 1 small adjunct), mainly posterior, face naked. Epimera 1-3 without large seta on posterodorsal margin, epimera 1-2 with lateral ridge.

Urosomite 1 with 5 setae in 3 sets at base of uropod 1, articulation line almost complete, urosomite 3 unprotuberant. Rami of uropods 1-2 with articulate but tightly fixed apical nails, outer ramus of uropod 1 with 2 contiguous dorsal spines, inner with 2 enlarged spines, outer ramus of uropod 2 with 1 dorsal spine, inner with 1 dorsomedial spine, some spines jewel-like. Peduncle of uropod 1 with 6 basofacial setae and 5 apicolateral spines, apicalmost scarcely enlarged, medially with 2 marginal spines, apicalmost ordinary, plus slightly enlarged displaced spine, peduncle of uropod 2 with 4 dorsal spines, basalmost shortened, medially with 1 large apical spine; apicolateral corners of peduncles on uropods 1-2 with very weak comb. Peduncle of uropod 3 with 5 ventral spines, dorsally with 1 lateral spine and setule, 1 medial setule, rami masculine, inner extending to M. 105 on article 1 of outer ramus, apex with 2 setae, medial and lateral margins strongly setose, article 2 of outer ramus short, 0.13, bearing 2 long setae, medial margin of article 1 densely setose, lateral margin with 8 acclivities, setal formula = 1 × 6, 2-2-2.

Telson especially long, length-width ratio =

4:3, almost fully cleft, each apex wide, rounded, lateral acclivity shallow, bearing ordinary lateral setule, spine next medial of length equal to setule, each lobe with long midrow of denticles, midlateral setules medium, 1 much enlarged.

Male "o," 3.74 mm: Article 5 of pereopods 3-4 each with 1 posteroproximal spine (apart from ordinary elements). Facial setal formula on urosomite 1 from ventral to dorsal = 2-1-2-1-1-1. Apicolateral corners of peduncles on uropods 1-2 with weak comb. Outer ramus of uropod 2 with 2 spines.

REMARKS.—Article 5 of pereopods 3-4 has the two main spines in tandem horizontally and not vertically; hence this condition is like that of *R. epistomus*, *R. menziesi*, and *R. hudsoni*.

MATERIAL.—JLB BLA 102, Bahía de Los Angeles, Mexico, Baja California, Gulf of California, 6 m, gray sand, 31 October 1963, coll. J.L. Barnard and colleagues, male "n," 4.70 mm. USNM Acc. 159124, same area, Bahía Concepción, neritic, night light at anchorage, 28 March 1940, male "o," 3.74 mm.

RELATIONSHIP.—The jewel-like (rhomboid or diamond-shaped) spines on uropods 1-2 coupled with the displaced spine on the peduncle of uropod 1 plus the long epistomal cusp separate this species from all others in *Rhepoxynius*. *Rhepoxynius* species C, discussed in the following section and cited as an aberration, differs in the rounded epistome.

Rhepoxynius gemmatus differs from *R. epistomus* and *R. menziesi* also in the crowded spines on the outer ramus of uropod 1, the narrower hands of the gnathopods, and the longer lobe on article 2 of pereopod 7.

From *R. hudsoni*, *R. gemmatus* differs in the vertically placed setae on epimera 1-2, the absence of facial setae on epimeron 3, and the shortening of the basalmost spines on the peduncle of uropod 2.

The pairing of setae on urosomite 1 may be a valuable character but is very difficult to use taxonomically because of difficulty in seeing these armaments. The presence of only one orthodox

spine on each telsonic apex is also of the same category.

DISTRIBUTION.—Gulf of California, west shore, 0-9 m.

Rhepoxynius species C

FIGURE 3 (part)

Description of Male (male "p," 4.32 mm).—Head about 18 percent of total body length, greatest width about 70 percent of length, rostrum constricted, broad, elongate, scarcely exceeding apex of article 1 on antenna 1. Eyes large, mostly occluded with pigment, ommatidia ordinary. Article 1 of peduncle on antenna 1 about 1.1 times as long as wide, about 2.7 times as wide as article 2, ventral margin with about 14 setules, unproduced dorsal apex with 2 setules-setae, article 2 about 0.93 times as long as article 1, with proximoventral tightly constrained crescent of 6 setae; primary flagellum with 10 articles, about 0.8 times as long as peduncle, bearing 1 short aesthetasc each on articles 5-9, 1 calceolus each on articles 2-5; accessory flagellum with 7-8 articles. Antenna 2 not ensiform; spine formula of article 4 = 3-3-2, dorsal margin with notch bearing 2 setae and 1 spine, ventral margin with 6 groups of 1-4 short to medium setae, 1 ventrodiscal long, thin spine; article 5 about as long as article 4, facial spine formula = 2, dorsal margin bearing 3 sets of male setae, no calceoli, ventral margin with 4 sets of 1-2 medium to short setae, 2 ventrodiscal medium spines set facially; flagellum highly elongate, formula of calceoli = 1, 2, 4, 6, 8 . . . n.

Anterior epistomal margin rounded, lacking cusp. Mandibles with weak palpar hump, right incisor with 3 teeth, left incisor with 3 teeth in 2 branches; right lacinia mobilis simple, like raker, but no armaments or serrations, left lacinia mobilis with 4 teeth, middle teeth shortened; right rakers 6 plus 2 rudimentaries, left rakers 6 plus 2 rudimentaries; molars composed of bulbous humps, right molar with 5 primarily short to medium spines, plus 1 wirelike spine strongly

disjunct, left molar with 6 primarily short spines, plus 1 wirelike spine strongly disjunct, molars without plume; palp article 1 short, article 2 with 2 long inner apical setae and 1 other shorter inner seta, article 3 about 1.1 times as long as article 2, oblique apex with 11 spine-setae, basofacial formula = 1-2. Each outer lobe of lower lip with 1 cone. Inner plate of maxilla 1 ordinary, bearing 1 short apical pluseta, 1 similar apicomedial seta, 2 similar apicolateral setae, palp article 2 with 1 apical spine, 1 apicolateral, 4 apicomedial, and 4 submarginal setae. Plates of maxilla 2 extending equally, outer much broader than inner, outer with 3 apicolateral setae, inner with 1 medial seta. Inner plate of maxilliped with 1 large thick apical spine, 2 apicofacial setae, 5 medial setae, outer plate with 6 medial spines, no apicolateral setae, palp article 1 with 1 apicolateral seta, article 2 with 3 groups of 3 lateral setae, medial margin of article 2 moderately setose, article 3 with 4 facial setae, 2 lateral setae, nail of article 4 absorbed, with 2 accessory setules.

Coxa 1 scarcely expanded apically, anterior margin convex, main ventral setae of coxae 1-4 = 8-10-10-7, posteriormost seta of coxae 1-3 shortened; anterior and posterior margins of coxa 4 strongly divergent, posterior margin very oblique, convex, posterodorsal corner rounded, posterodorsal margin long, weakly concave; width-length ratio of coxa 4 = 14:15.

Gnathopods generally ordinary, hands scarcely thinned, width ratios on articles 5-6 of gnathopods 1-2 = 21:24 and 20:26, length ratios = 65:42 and 60:42, palmar humps ordinary, palms almost transverse, article 5 of gnathopod 1 elongate, ovate, posterior margin flat, long, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded.

Pereopods 3-4 similar, facial setae formula on article 4 = 7 and 9, (not parallel on pereopod 3, forming parallel crescent on pereopod 4) on article 5 = 6 and 6, main spine of article 5 extending to M. 85 on article 6, article 5 with 1 proximo-posterior spine only on pereopod 3, spine formula of article 6 = 5 + 6 and 6 + 6 + middistal seta, some spines especially long, acclivity on inner

margin of dactyls of pereopods sharp, produced as tooth, emergent setule short, almost fully immersed, midfacial pluseta short, in ordinary position. Coxae 5-7 posteroventral seta formula = 8-13-7. Articles 4-5 of pereopods 5-6 of ordinary width, facial spine rows moderately developed, facial ridge formula of article 2 on pereopods 5-7 = 0-1-1. Width ratios of articles 2, 4, 5, 6 of pereopod 5 = 54:40:38:17, of pereopod 6 = 72:44:32:14, of pereopod 7 = 72:19:16:9; length ratios of pereopod 5 = 92:47:46:? (broken), of pereopod 6 = 100:78:47:68, of pereopod 7 = 97:28:32:32, article 2 of pereopod 7 exceeding middle of article 4, of narrow male form, posterior edge with 5 serrations, bottom 3 almost as large as in *R. heterocrepidatus* but not asymmetrical, ventral margin coarsely combed, article 5 with 2 male spines, medial apex of article 6 finely combed, bearing 2 weak digital processes.

Epimera of broadened male form. Posteroventral corner of epimeron 1 rounded, posterior margin deeply convex, setose, corner without setule, anteroventral margin with 4 long setae, midposterior face with 7 long setae in vertical row. Posteroventral corner of epimeron 2 rounded, without setule sinus, posterior margin weakly convex, facial setae = 11, posterior triad set almost vertically at M. 50. Posteroventral corner of epimeron 3 quadrate, with 7 setae, posterior margin strongly convex, with 1 setule notch, ventral margin with 7 setae, evenly spread, midface with 1 seta.

Urosomite 1 with large mixed spines and setae in long row, none paired, formula from ventral to dorsal-anterior = SSSPPSSPP; without lateral or ventral setule at base of uropod 1, articulation line almost complete, urosomite 3 unprotuberant dorsally. Rami of uropods 1-2 with articulate but tightly fixed apical nails, outer ramus of uropod 1 with 1 dorsal spine, inner with 1, both in deep acclivities, outer ramus of uropod 2 with 1 dorsal spine, inner with 1 dorsomedial spine, some spines jewel-like. Peduncle of uropod 1 with 3 basofacial setae and 3 small lateral widely spread spines, medially with 2 marginal spines, apicalmost an enlarged spine, plus small displaced spine, pedun-

cle of uropod 2 with 4 stout short dorsal spines, apicalmost very stout, medially with 1 giant apical spine; apicolateral corners of peduncles on uropods 1-2 with coarse comb. Peduncle of uropod 3 with 2 ventral spines, dorsally with 2 lateral spines and 1 setule, 1 medial setule, rami submasculine, inner extending to M. 120+ on article 1 of outer ramus, apex with 2 setae, medial and lateral margins setose, article 2 of outer ramus ordinary, 0.15, bearing 2 long setae, medial margin of article 1 setose, lateral margin with 4 acclivities, spine formula = 0, short setal formula = 0-1-1-1-1, long setae = 2-1-2-2-2. Telson especially long, length-width ratio = 34:29, not fully cleft, each apex wide, rounded, lateral acclivity broad, shallow, bearing 3-4 long lateral setae and shorter medial setule; midlateral setules diverse, largest of medium size.

RELATIONSHIP.—This single specimen may belong to a new species but for the moment must be considered to be an aberration. It differs from *R. gemmatus* in the narrowness of the spread of setae on article 2 of antenna 1, the absence of molarial pubescence, the smallness of the displaced spine on uropod 1, the presence of only one spine each on the rami of uropod 1, the difference in the armament formula on article 1 of the outer ramus on uropod 3, and in the long apicolateral telsonic setae.

Rhepoxynius species C differs from all other species in couplet 6 onward (see "Key") in the presence of a weak, displaced spine but closely resembles *R. hudsoni*, which has the rudiments of a displaced spine plus a facial seta on epimeron 3, narrow spread of setae on article 2 of antenna 1, and the simple right lacinia mobilis; however, *R. hudsoni* also has a large sharp epistomal cusp, short and few telsonic elements, and no displaced molarial spine.

A species with long telsonic elements is *R. fatigans*, but *R. species C* differs from that species in the rounded epistomal cusp, simple right lacinia mobilis, and presence of facial armaments on urosomite 1.

The nonensiform antenna 2 is unusual for *Rhepoxynius*, and that plus the rarity of specimens and

absence of females for description suggests caution before naming the taxon.

Rhepoxynius species C is also close to *R. stenodes* in attributes such as epistome, molar, epimera 1-2, telson and uropods but differs from *R. stenodes* in the simple right lacinia mobilis, nonensiform antenna 2, lack of facial armament on urosomite 1, and narrow spread of setae on article 2 of antenna 1.

MATERIAL AND DISTRIBUTION.—USNM Acc. 159124, Bahía Concepción, Mexico, Baja California, neritic, night light at anchorage, 28 March 1940, male "p," 4.32 mm (illus.).

Rhepoxynius variatus (J.L. Barnard)

FIGURE 4 (part)

Paraphoxus variatus J.L. Barnard, 1960:198-202, pls. 3, 4; 1964b:245; 1966a:90; 1966b:30.

Description of Female (female "n," 3.21 mm).—Head about 17 percent of total body length, greatest width about 72 percent of length, rostrum constricted, narrow, elongate, exceeding apex of article 2 on antenna 1. Eyes small, clear of pigment, ommatidia ordinary. Article 1 of peduncle on antenna 1 about 1.3 times as long as wide, about 2.2 times as wide as article 2, ventral margin with about 4 setules, weakly produced dorsal apex with 2 setules-setae, article 2 about 0.65 times as long as article 1, with widely spread ventral row of 8 setae, and 2 midlateral setae; primary flagellum with 7 articles, about 0.55 times as long as peduncle, bearing 1 short aesthetasc on articles 3-6; accessory flagellum with 6 articles. Antenna 2 strongly ensiform; article 3 lacking dorsal spine; spine formula of article 4 = 3-2, dorsal margin with notch bearing 5 setae, ventral margin with 13 groups of 1 long seta each, 1 ventrodistal long spine; article 5 about 0.75 times as long as article 4, facial spine formula = 0, dorsal margin naked, bearing 2 sets of medium setae, ventral margin with 3 sets of 1-2 long to short setae, 3 ventrodistal long to medium spines, 1 set facially; flagellum about 0.85 times as long

as articles 4–5 of peduncle combined, with 9 articles.

Epistome with long sharp anterior cusp. Mandibles with weak palpar hump, right incisor narrow, with 3 teeth, third set apicad, left incisor with 4 humps in 2 branches; right lacinia mobilis weakly bifid or with side tooth, distal branch much shorter than proximal, pointed, proximal branch broad, blunt, left lacinia mobilis narrow, with 5 teeth, middle teeth slightly shortened; right rakers 8 plus 2 rudimentaries, left rakers 11 plus 1 rudimentary; molars composed of short bulbous protrusions, right molar with 5–6 primarily medium spines, no spine disjunct, left molar with 4–5 primarily medium spines, no spine disjunct, no molar with plume; palp article 1 short, article 2 without setae, article 3 about as long as article 2, oblique apex with 13 spine-setae, basofacial formula = 0–1 or 0–2. Each outer lobe of lower lip with 1 cone. Inner plate of maxilla 1 especially thin, bearing 1 medium apical pluseta, 1 similar apicomедial seta, 2 apicolateral much shorter setae, palp article 2 with 1 apical spine, 2 apicolateral, 7 apicomедial and 5 submarginal setae. Plates of maxilla 2 extending equally, outer very much broader than inner, outer with 1 apicolateral seta, inner with 2 medial setae. Inner plate of maxilliped with 1 large thick apical spine, 3 apicofacial setae, 4 medial setae, outer plate with 5–6 medial and apical spines, no apicolateral setae or cusp, palp article 1 with 1 apicolateral seta, article 2 with 2 groups of 3 apicolateral setae, medial margin of article 2 moderately setose, article 3 with 8 scattered facial setae, 3 lateral setae, nail of article 4 short, almost fully fused, with 2 accessory setules.

Coxa 1 expanded apically, anterior margin weakly convex, main ventral setae of coxae 1–4 = 6–8–6–5, posteriormost seta of coxae 1–4 slightly shortened, anteroventral setule close to main setae, coxae 2–3 very narrow; anterior and posterior margins of coxa 4 almost parallel, posterior margin almost straight, posterodorsal corner rounded, posterodorsal margin ordinary, concave; width-length ratio of coxa 4 = 11:15.

Gnathopods with very thin hands, moderately

setose anteriorly, width ratios on articles 5–6 of gnathopods 1–2 = 27:21 and 26:21, length ratios = 65:48 and 56:43, palmar humps ordinary, palms transverse, short, article 5 of gnathopod 1 elongate, ovate, posterior margin flat, long, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded.

Pereopods 3–4 similar, facial setae formula on article 4 = 7 and 8, aligned parallel to apex, on article 5 = 6 and 4, main spine of article 5 extending to M. 100 (or 90 on pereopod 4) on article 6, article 5 with no proximoposterior spines, spine formula of article 6 = 5 + 6 and 5 + 6 plus no middistal seta, some spines especially long; acclivity on inner margin of dactyls of pereopods 3–4 weak, emergent setule short, mid-facial pluseta short. Coxae 5–7 posteroventral seta formula = 2–11–1; articles 4–5 of pereopods 5–6 broad, facial spine rows moderately developed (spines thin), facial ridge formula of article 2 on pereopods 5–7 = 0–1–1. Width ratios of articles 2, 4, 5, 6 of pereopod 5 = 68:60:59:19, of pereopod 6 = 88:55:38:15, of pereopod 7 = 103:24:19:9; length ratios of pereopod 5 = 110:54:50:42, of pereopod 6 = 105:80:47:58, of pereopod 7 = 100:28:28:32; article 2 of pereopod 7 reaching middle of article 4, posterior margin with 3 large teeth; medial and lateral apices of articles 5–6 coarsely combed, lacking digital processes.

Posteroventral corner of epimeron 1 rounded, posterior margin weakly convex, naked, anteroventral margin with 7 short to medium setae, posteroventral margin with 2 long setae parallel to margin or arranged vertically (variable). Posteroventral corner of epimeron 2 rounded, posterior margin weakly convex, naked, ventral marginal setae = 12, none set vertically. Posteroventral corner of epimeron 3 rounded, posterior margin straight, with 3 setae near corner, ventral margin with 5 posterior setae.

Urosomite 1 with lateral setule at base of uropod 1, articulation line almost complete, urosomite 3 unprotuberant dorsally. Rami of uropods 1–2 with articulate but tightly fixed apical nails, rami naked. Peduncle of uropod 1 with 3 baso-

facial setae and 1 apicolateral spine, medially with 3 widely spread marginal setae and spines, apicalmost an enlarged spine, no displaced spine. Peduncle of uropod 2 with 3 long dorsal spines, medially with 1 large apical spine; apicolateral corners of peduncles on uropods 1-2 without comb. Peduncle of uropod 3 with no ventral spines, dorsally with 1 lateral setule, 1 medial setule, rami feminine, inner extending to M. 30 on article 1 of outer ramus, apex with 1 setule, medial and lateral margins naked, article 2 of outer ramus elongate, 0.30, bearing 2 medium setae, apicomедial margin of article 1 with 1 seta, lateral margin with 2 acclivities, short setal formula = 1-1-1, long setal formula = 1-1-1.

Telson especially long, length-width ratio = 2:1, almost fully cleft, each apex very narrow and pointed, lateral acclivity shallow, narrow, bearing ordinary lateral setule, next seta laterad much longer than setule; midlateral setules diverse, largest medium.

VARIABLES.—See J.L. Barnard (1960). Rostrum broader or narrower; hands of gnathopods broader or narrower; teeth on article 2 of pereopod 7 larger or smaller; posterior facial setae on epimeron 1 horizontal or vertical; rami of uropods 1-2 naked or with 1 spine each except inner ramus of uropod 2; setal elements on each telsonic lobe alternative, lateralmost either shortest or longest.

MATERIAL.—AHF *Velero IV* 5973, southern California, 17 m, female "n," 3.21 mm (illus.), female "o," 3.22 mm, and 4 other specimens. Data not cited as sample within middle of species range.

RELATIONSHIP.—This species belongs to the *variatus-fatigans-daboius-abronius* group with sharp epistomal cusp, lack of displaced medial spine on peduncle of uropod 1, and no other unusual characters such as spikes on pereopod 7 or urosome.

Rhepoxynius variatus differs from its flock members in the absence of vertically placed facial setae on epimeron 2 and generally larger teeth or serrations on article 2 of pereopod 7, though these are variable.

DISTRIBUTION.—Eastern Pacific Ocean from

Monterey Bay, California to Bahía San Ramon, Baja California, 5-93 m.

Rhepoxynius abronius (J.L. Barnard)

Paraphoxus abronius J.L. Barnard, 1960:203-205, pl. 5; 1966a:88.

DESCRIPTION OF FEMALE (female "p," 3.11 mm).—Head about 20 percent of total body length, greatest width about 75 percent of length, rostrum constricted, narrow, almost reaching middle of article 2 on antenna 1. Eyes medium, largely occluded with pigment, ommatidia ordinary. Article 1 of peduncle on antenna 1 about 1.2 times as long as wide, about twice as wide as article 2, ventral margin with about 7 setules, weakly produced dorsal apex with 2 setules-setae, article 2 about 0.65 times as long as article 1, with ventral row near apex of 5 setae, primary flagellum with 7 articles, about 0.6 times as long as peduncle, bearing 1 each short aesthetasc on articles 3-6; accessory flagellum with 6 articles. Antenna 2 sharply ensiform as in *variatus*; article 3 with dorsal spine; spine formula of article 4 = 3-3-3, dorsal margin with weak notch bearing 3 setae, ventral margin with 9 groups of 1-2 long to medium setae, 1 ventrodiscal long spine, article 5 about 0.65 times as long as article 4, facial spine formula = 2, dorsal margin bearing 2 sets of thin setae, ventral margin with 4 sets of 1-2 long to short setae, 3 ventrodiscal long to medium spines, 1 spine set facially; flagellum about 0.85 times as long as articles 4-5 of peduncle combined, with 8 articles.

Epistomal cusp huge, blunt. Mandibles with weak palpar hump, right incisor with 3 teeth, third about in middle, left incisor with 3 humps in 2 branches; right lacinia mobilis thick, bifid, both branches blunt, left lacinia mobilis with 5 teeth, middle teeth shortened; right rakers 8 plus 1 rudimentary, left rakers 8 plus 2 rudimentaries; molars composed of short, bulbous protrusions, right molar with 6 primarily long spines plus thin seta weakly disjunct, left molar with 7 primarily long spines, plus 1 thin seta weakly disjunct,

molar without plume; palp article 1 short, article with 1 short inner apical seta and 1 other short inner seta, article 3 about as long as article 2, oblique apex with 11 spine-setae, basofacial formula = 0-2. Inner plate of maxilla 1 ordinary, bearing 1 medium apical pluseta, no apicomedial seta, 2 apicolateral much shorter setae, palp article 2 with 1 apical spine, 1 apicolateral, 5 medial, and 5 submarginal setae. Plates of maxilla 2 extending equally, outer much broader than inner, outer with 1 apicolateral seta, inner with 1 medial seta. Inner plate of maxilliped with 1 large thick apical spine, 2 apicofacial setae, 4 medial setae, outer plate with 5 medial spines, no apicolateral setae or cusp, palp article 1 with 1 apicolateral seta, article 2 with 2 groups of 3 apicolateral setae, medial margin of article 2 moderately setose, article 3 with 13 scattered facial setae, 2 lateral setae, nail of article 4 short, almost fused, with 2 accessory setules.

Coxa 1 scarcely expanded apically, anterior margin straight, main ventral setae of coxae 1-4 = 5-9-8-1; posteriormost seta of coxae 2-3 slightly shortened; anterior and posterior margins of coxa 4 weakly divergent, posterior margin weakly convex, posterodorsal corner rounded, posterodorsal margin short to ordinary, weakly concave, width-length ratio of coxa 4 = 15:13.

Gnathopods generally ordinary but hands weakly mitelliform and palms almost transverse, width ratios on articles 5-6 of gnathopods 1-2 = 30:30 and 30:30, length ratios = 65:45 and 55:42, palmar humps very small, palms transverse, article 5 of gnathopod 1 elongate, ovate, posterior margin rounded, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded, almost lobate. Pereopods 3-4 similar, facial setae formula on article 4 = 7 and 7, on article 5 = 7 and 5, main spine of article 5 extending to M. 90 on article 6, article 5 with 1 small proximoposterior spine on pereopod 4 only, spine formula of article 6 = 5 + 7 and 5 + 7 plus no middistal seta, some spines especially long, acclivity on inner margin of dactyls of pereopods 3-4 sharp, produced as tooth, emergent setule short, midfacial pluseta ordinary. Coxae 5-7 posteroventral

seta formula = 2-12-2; articles 4-5 of pereopods 5-6 broad, facial spine rows moderately developed, spines thin, facial ridge formula of article 2 on pereopods 5-7 = 0-1-1; width ratios of articles 2, 4, 5, 6 of pereopod 5 = 57:51:46:20, of pereopod 6 = 87:44:34:14, of pereopod 7 = 103:27:24:12; length ratios of pereopod 5 = 94:41:48:43, of pereopod 6 = 103:75:46:50, of pereopod 7 = 100:25:31:31; article 2 of pereopod 7 reaching middle of article 4, posterior margin with 7 large serrations, medial and lateral apices of article 6 very finely combed, lacking digital processes.

Posteroventral corner of epimeron 1 rounded, posterior margin weakly convex, naked, anteroventral margin with 5 long to medium setae, posteroventral face with 3 long setae set vertically. Posteroventral corner of epimeron 2 rounded, posterior margin weakly convex, naked, facial setae = 10, posterior triad set vertically. Posteroventral corner of epimeron 3 quadrate, weakly protuberant, posterior margin weakly convex, with 3 setae near corner, above with 1 setule notch, ventral margin with 4 setae mainly posterior.

Urosomite 1 with lateral setule at base of uropod 1, articulation line only partly complete, urosomite 3 unprotuberant dorsally. Rami of uropods 1-2 with articulate but tightly fixed apical nails, outer ramus of uropod 1 with 4 widely spread dorsal spines, inner with 2, outer ramus of uropod 2 with 2 dorsal spines, inner with 1 dorsomedial spine. Peduncle of uropod 1 with no basofacial setae, 4 apicolateral thin spines (basalmost = short seta), medially with 6 marginal setae and spines, apicalmost a thin spine, no displaced spine. Peduncle of uropod 2 with 6 long and thin dorsal spines, medially with 1 medium apical spine; apicolateral corners of peduncles on uropods 1-2 without comb. Peduncle of uropod 3 with 3-4 ventral spines, dorsally with 1-2 lateral spines, 1 medial setule, rami submasculine, inner extending to M. 100 on article 1 of outer ramus, apex with 2 long setae, medial margin with 1 seta, article 2 of outer ramus ordinary, 0.18, bearing 2 long setae, medial margin of article 1 with

3 setae, lateral margin with 2 acclivities, spine formula = 1-1-1, setal formula = 1-1-1. Telson especially long, length-width ratio = 18:11, almost fully cleft, each apex narrow, pointed (but not as extended as in *R. variatus*), lateral acclivity broad, shallow, bearing ordinary lateral setule, 2 spines next medial longer (or second shorter) than setule, midlateral setules diverse, larger medium in size.

DESCRIPTION OF MALE (male "m," 2.77 mm).—Rostrum like female. Article 1 of antenna 1 and articles 3-4 of antenna 2 with medial pubescence; article 2 of antenna 1 with 7 ventral setae evenly spread, not skewed apically, primary flagellum elongate, with 8 articles, 1 calceolus each on articles 2-5, aesthetascs weakly developed, accessory flagellum shortened, 5-articulate. Facial spine formula on article 4 of antenna 2 = 3-3-2, article 5 with 3 dorsal sets of male setae and no calceoli, ventrodorsal apex with 2 thin spines and 1 setule, calceolus formula on flagellum = 2, 3, 4, 6, 8 . . . n. Basofacial setal formula of article 3 on mandibular palp = 0-2, right lacinia mobilis bifid, distal branch shortened.

Article 5 of pereopods 3-4 with 1 posteroproximal small spine. Article 2 of pereopod 7 narrower than in female, article 5 with 2 special posterodistal male spines. Epimera 1 and 3 but not 2, broadened, posterior margin of epimeron 3 shortened and very convex, setal formulas, epimeron 1 anteroventral = 3, posteroventral = 3; epimeron 2 facial = 12 (posterior triad vertical), epimeron 3 posterior = 2, ventral = 5 (widely spread). Spine formulas of uropods: uropod 1 peduncle apicolateral = 3, basofacial = 1, uropod 2 peduncle dorsal = 6, dorsal spines on outer ramus of uropod 1 = 3, of uropod 2 = 2, inner ramus of uropod 1 = 2, of uropod 2 = 1, spine formula on article 1 of outer ramus on uropod 3 = 0-0-0-0-0-1, short setal formula = 0-0-1-1-1-1, long setae = 1-1-1-1-1-1. Telson like female but with 1 row of denticles on each lobe, distal spines scarcely shortened.

MATERIAL.—AHF *Velero IV* 5180, southern California, 20 m, male "m," 2.77 mm, female "p," 3.11 mm. USNM Acc. 125734, no. 9, off Corona

del Mar, California, near bell buoy, 7 fms, 17 May 1933, coll. G.E. MacGinitie, 2 specimens.

RELATIONSHIP.—Differing from *R. variatus* in the vertical placement of the posterior facial setae on epimeron 2, the broader hands of the gnathopods, and the generally smaller and more numerous (5+) serrations on article 2 of pereopod 7. Minor and more unwieldy characters of *R. abronius* are the more equally bifid right lacinia mobilis, more strongly spinose uropod 1 (3 spines dorsolaterally on peduncle, more than 1 spine on outer ramus), the presence of more than 2 apical elements on each telsonic lobe, and the denser facial spination on articles 4-5 of antenna 2 (at least 3 sets of spines on article 4, at least 2 spines total on article 5). This is the final species to have any semblance of a fully displaced spine on the molar; the element present on the specimen in this reanalysis is very thin and wire-like.

DISTRIBUTION.—California, 9-274 m.

Rhepoxynius fatigans (J.L. Barnard)

Paraphoxus fatigans J.L. Barnard, 1960:209, 210, pl. 9; 1964b:244; 1966a:88; 1966b:28, 29, figs. 6, 7; 1971:70.

DESCRIPTION OF FEMALE (female "f," 3.98 mm).—Head about 21 percent of total body length, greatest width about 60 percent of length, rostrum constricted, narrow, elongate, reaching middle of article 2 on antenna 1. Eyes small, largely occluded with pigment, ommatidia ordinary. Article 1 of peduncle on antenna 1 about 1.4 times as long as wide, about 2.1 times as wide as article 2, ventral margin with about 7 setules, strongly produced dorsal apex with 2 setules-setae, article 2 about 0.62 times as long as article 1, with widely spread ventral row of 6 setae, and 2 lateral setae, primary flagellum with 7 articles, about 0.62 times as long as peduncle, bearing 1 each short aesthetasc on articles 3-6; accessory flagellum with 7 articles. Antenna 2 with long thin ensiform process; article 3 with thin dorsal spine; spine formula of article 4 = 3-3-2, dorsal margin with notch bearing 5 setae, ventral margin with 12 groups of 1-2 long to short setae

(mostly 1 seta each), 1 ventrodiscal spine, article 5 about 0.8 times as long as article 4, facial spine formula = 0, dorsal margin bearing 2 sets of medium setae, ventral margin with 5 sets of 1–2 long to short setae, 3 ventrodiscal long to medium spines, 1 set facially; flagellum about 0.95 times as long as articles 4–5 of peduncle combined, with 10 articles.

Epistomal cusp of medium size. Mandibles with weak palpar hump, right incisor with 3 teeth, third very distal, left incisor with 3 humps in 2 branches, right lacinia mobilis bifid, distal branch little shorter than proximal, proximal branch simple, pointed, left lacinia mobilis narrow, with 5 teeth, middle teeth slightly shortened; right rakers 12, plus 2 rudimentaries, left rakers 13 plus 2 rudimentaries; molars composed of short bulbous protrusions, right molar with 3–4 primarily medium stout spines, no spine disjunct, left molar with 4 primarily medium stout spines, no spine disjunct, molars without plume; palp article 1 short, article 2 with 2 short inner apical setae and 2 short inner setae, article 3 as long as article 2, oblique apex with 13 spine-setae, basofacial formula = 0–3. Lower lip lacking cones. Inner plate of maxilla 1 ordinary, bearing one medium apical pluseta, 1 similar apicomедial seta, 2 apicolateral shorter setae, palp article 2 with 1 apical spine, 2 apicolateral, 3 apicomедial and 8 submarginal setae. Plates of maxilla 2 extending equally, outer much broader than inner, outer with 2 apicolateral setae, inner with 2 medial setae. Inner plate of maxilliped with 1 large thick apical spine, 2 apicofacial setae, 5 medial setae, outer plate with 7 medial and apical spines, no apicolateral setae, palp article 1 with 1 apicolateral seta, article 2 with 3 groups of 5 lateral setae, medial margin of article 2 moderately setose, article 3 with 9 scattered facial setae, 5 lateral setae, nail of article 4 short, almost fully fused, with 2 accessory setules.

Coxa 1 scarcely expanded apically, anterior margin weakly convex, main ventral setae of coxae 1–4 = 8–10–9–9, posteriormost seta of coxae 1–4 slightly shortened, anteroventral seta near anterior corner (edge); anterior and posterior

margins of coxa 4 almost parallel, posterior margin almost straight, posterodorsal corner rounded, posterodorsal margin short, V-shaped, width-length ratio of coxa 4 = 2:3.

Gnathopods with thin hands, moderately setose anteriorly, width ratios on articles 5–6 of gnathopods 1–2 = 28:24 and 28:23, length ratios = 65:43 and 59:41, palmar humps small, palms strongly transverse, short, article 5 of gnathopod 1 elongate, ovate, posterior margin flat, long, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded.

Pereopods 3–4 similar, facial setae formula on article 4 = 7 and 8, aligned parallel to apex, on article 5 = 5 and 5, main spine of article 5 extending to M. 95 on article 6, article 5 with no proximoposterior spines, spine formula of article 6 = 5 + 7 and 6 + 7 plus no middistal seta, some spines especially long, acclivity on inner margin of dactyls of pereopods 3–4 sharp, produced as tooth, emergent setule almost fully immersed, midfacial pluseta very short, highly distad. Coxae 5–7 posteroventral seta formula = 4–13–1. Articles 4–5 of pereopods 5–6 broad, facial spine rows moderately developed, spines thin, facial ridge formula of article 2 on pereopods 5–7 = 0–1–1; width ratios of articles 2, 4, 5, 6 of pereopod 5 = 58:55:55:22, of pereopod 6 = 60:55:41:17, of pereopod 7 = 88:25:24:10, length ratios of pereopod 5 = 102:56:52:40, of pereopod 6 = 105:85:47:60, of pereopod 7 = 100:25:31:28, article 2 of pereopod 7 exceeding middle of article 4, posterior margin with 7 small serrations closely crowded, posteroventral margin strongly beveled, medial and lateral apices of articles 5–6 finely to moderately combed, lacking facial digital processes.

Posteroventral corner of epimeron 1 rounded, posterior margin weakly convex, naked, anteroventral margin with 4 long to medium setae, posteroventral face with 2 long setae set obliquely. Posteroventral corner of epimeron 2 rounded, posterior margin weakly convex, naked, ventral marginal setae = 18 very widely spread, posteriormost quartet set vertically and directly at posterior margin. Posteroventral corner of epi-

meron 3 rounded, posterior margin strongly convex, with 4 setae near corner, above with 1 setule notch, ventral margin with 4 setae mainly posterior, face with 1 seta posteriorly.

Urosomite 1 with lateral setule at base of uropod 1, articulation line short, urosomite 3 unprotuberant dorsally. Rami of uropods 1-2 with articulate but tightly fixed apical nails, outer ramus of uropod 1 with 1 dorsal spine, inner with 1, outer ramus of uropod 2 with 1 dorsal spine, inner with none. Peduncle of uropod 1 with 2 basofacial setae and 1 apicolateral spine, medially with 4 widely spread marginal setae and spines, apicalmost an enlarged spine, basalmost a thin seta, no displaced spine. Peduncle of uropod 2 with 3 long dorsal spines, medially with 1 large apical spine, apicolateral corners of peduncles on uropods 1-2 without comb. Peduncle of uropod 3 with 1 ventral spine, dorsally with 1 lateral setule, 1 medial setule, rami feminine, inner extending to M. 60 on article 1 of outer ramus, apex with 1 seta, medial and lateral margins naked, article 2 of outer ramus elongate, 0.34, bearing 2 long setae, apicomedial margin of article 1 with 1 seta, lateral margin with 2 acclivities, spine formula = 0, short setal formula = 0-1-1, long setae = 1-1-1. Telson especially long, length-width ratio = 5:3, almost fully cleft, each apex of medium width, rounded but attenuate, lateral acclivity broad, shallow, with 3 lateral and 1 medial elongate setae separated by long setule, midlateral setules diverse or not, largest large.

MATERIAL.—AHF *Velero IV* 6426, southern California, 71 m, female "r," 3.98 mm.

RELATIONSHIP.—This species is characterized by the thin hands of the gnathopods, the ventral bevel on article 2 of pereopod 7, which crams the posterior serrations into a small space, the long and "numerous" (three or more) setae on each telsonic apex, and the medium sized epistomal cusp. In addition to this combination of characters, the vertically placed posterior group of setae on epimeron 3 distinguishes the species also from *R. variatus*. The sparsity of spines on uropods 1-2 distinguishes *fatigans* also from *R. abronius*.

DISTRIBUTION.—Oregon to Baja California, 12-385 m.

Rhepoxynius daboius (J.L. Barnard)

Paraphoxus daboius J.L. Barnard, 1960:210-212, pls. 10, 11; 1966a:88; 1971:70.

DESCRIPTION OF FEMALE (female "e," 2.93 mm).—Head about 22 percent of total body-length, greatest width about 75 percent of length, rostrum constricted, narrow, elongate, reaching middle of article 2 on antenna 1. Eyes small, or diffuse, largely clear of pigment, ommatidia ordinary. Article 1 of peduncle on antenna 1 about 0.9 times as long as wide, about 1.9 times as wide as article 2, ventral margin with about 4 setules, produced dorsal apex with 2 setae, article 2 about 0.45 times as long as article 1, with ventral cycle of 5 widely spread setae, primary flagellum with 7 articles, about 0.55 times as long as peduncle, bearing several short aesthetascs in the formula 0-0-1-1-1-0; accessory flagellum with 6 articles. Antenna 2 strongly ensiform; spine formula of article 4 = 2-2-2, dorsal margin with notch bearing 3-5 setae and weak spines, ventral margin with 8 groups of 8 long setae, 1 ventrodistal long spine, article 5 about 0.8 times as long as article 4, facial spine formula = 0, dorsal margin bearing pair of setules, ventral margin with 5 sets of 1 seta each, 2 ventrodistal long setae, and 1 short subdistal facial spine; flagellum about 0.9 times as long as articles 4-5 of peduncle combined, with 9 articles.

Epistomal cusp weak. Mandibles with weak palpal hump, right incisor with 3 teeth, left incisor with 3 teeth in 2 branches; right lacinia mobilis bifid, distal branch shorter than proximal, left lacinia mobilis with 4 teeth plus 1 accessory tooth, middle teeth shortened; right rakers 8 plus 1 rudimentary, left rakers 8 plus 1 rudimentary, molars composed of short protrusions demarcated mainly by spines, right molar with 5 long to short but stout spines, no spine disjunct, left molar with 6 similar spines, no molar with plume; palp article 1 short, article 2 with 1 short inner apical seta

and 1 other short inner seta, article 3 about as long as article 2, oblique apex with 9–8 spine-setae, basofacial formula = 0–2. Each outer lobe of lower lip with 1 weak broad cone (as in *R. stenodes*). Inner plate of maxilla 1 ordinary, bearing 1 short to medium apical pluseta, 1 similar apicomedial seta, 2 apicolateral much shorter setae, palp article 2 with 1 apical spine, 1 apicolateral seta, 2 apicomedial setae and 5 submarginal setae. Inner plate of maxilla 2 slightly shorter than outer, outer broader than inner, outer with 2 apicolateral setae, inner with 1 medial seta. Inner plate of maxilliped with 1 thick short apical spine, 2 apicofacial setae, 4 medial setae, outer plate with 6 medial spines, no apicolateral setae, no cusp, palp article 1 with 1 apicolateral seta, article 2 with 2 groups of 3 apicolateral setae, medial margin of article 2 moderately setose, article 3 with 4 facial setae, 2 lateral setae, nail of article 4 absent, with 2 accessory setules.

Coxa 1 scarcely expanded apically, anterior margin weakly convex, main ventral setae of coxae 1–4 = 5–6–6–4, posteriormost seta of coxae 1–3 slightly shortened, on coxa 4 as long as others, anterior and posterior margins of coxa 4 weakly divergent, posterior margin almost straight, posterodorsal corner rounded, posterodorsal margin short, concave, width-length ratio of coxa 4 = 27:31.

Gnathopods generally ordinary, hands somewhat thin, width ratios on articles 5–6 of gnathopods 1–2 = 27:29 and 26:29, length ratios = 65:46 and 57:45, palmar humps ordinary, palms almost transverse, article 5 of gnathopod 1 elongate, ovate, posterior margin rounded, long, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded, short.

Pereopods 3–4 similar, posterior margin of article 4 more strongly setose on pereopod 4 than on pereopod 3, facial setae formula on article 4 = 5 and 6, set almost parallel to apical margin, on article 5 = 4 and 5, main spine of article 5 extending to M. 100+ on article 6, article 5 with 2–0 and 3–0 proximoposterior spines (thin and elongate as always), spine formulae of article 6

= 5 + 7 and 5 + 7 and no middistal seta, spines especially long, acclivity on inner margin of dactyls of pereopods 3–4 obsolescent, emergent setule short, midfacial pluseta ordinary. Coxae 5–7 posteroventral seta formula = 3–10–3. Articles 4–5 of pereopods 5–6 of ordinary width, facial spine rows sparse to moderately developed, facial ridge formula of article 2 on pereopods 5–7 = 0–1S–1, width ratios of articles 2, 4, 5, 6 of pereopod 5 = 54:51:49:20, of pereopod 6 = 79:49:35:15, of pereopod 7 = 95:23:21:8, length ratios of pereopod 5 = 98:47:55:33, of pereopod 6 = 100:75:47:54, of pereopod 7 = 102:23:31:25, article 2 of pereopod 7 reaching middle of article 4 with 4–5 medium-small posterior teeth, ventral margin straight to concave, slightly beveled, medial apex of article 6 grossly combed, lacking digital processes.

Posteroventral corner of epimeron 1 rounded, posterior margin convex, corner without setule, anteroventral margin with 6 medium setae, posteroventral face with 2 long setae set vertically. Posteroventral corner of epimeron 2 rounded, lacking setule sinus, posterior margin convex, facial setae = 11, posterior triad set obliquely. Posteroventral corner of epimeron 3 weakly protuberant, with 1 seta, posterior margin not very short, convex, with 1 setule notch, ventral margin with 5 setae mainly posterior, almost evenly spread; epimera 1–3 without large seta on posterodorsal margin.

Urosomite 1 without lateral setae at base of uropod 1, articulation line short, urosomite 3 unprotuberant dorsally. Rami of uropods 1–2 with articulate but tightly fixed apical nails, outer ramus of uropod 1 with 1 dorsal spine, inner with 1, outer ramus of uropod 2 with 1 dorsal spine, inner with 1 dorsomedial spine. Peduncle of uropod 1 with 3 basofacial setae and 1 small apicolateral spine, medially with 2 marginal elements, apicalmost an enlarged spine, basalmost a small seta highly basad. Peduncle of uropod 2 with 2 dorsal spines, apical enlarged, medially with 1 large apical spine; apicolateral corners of peduncles on uropods 1–2 without comb. Peduncle of uropod 3 with 1 ventral spine, dorsally with 1

lateral spine, 1 medial spine, rami feminine, inner extending to M. 45 on article 1 of outer ramus, apex with 1 short seta, medial and lateral margins naked, article 2 of outer ramus ordinary, 0.27, bearing 2 long setae, apicomedial margin of article 1 naked, lateral margin with 1 acclivity, spine formula = 0, setal formula = 1-1. Telson especially long, length-width ratio = 3:2, fully cleft, each apex narrow, almost acute, lateral acclivity broad, shallow, bearing ordinary lateral setule, seta next medial highly elongate; midlateral setules diverse, largest of large size.

MATERIAL.—AHF *Velero IV* 2122-52, Santa Catalina Island, California, 0.47 miles ESE of Jewfish Point, 33°19'04" N, 118°17'39"W, 19 June 1952, sandy mud, female "e," 2.93 mm, male "z," 3.33 mm.

RELATIONSHIP.—This species is very similar to *R. fatigans* but differs in the broader hand of gnathopod 1 and the much less strongly beveled article 2 of pereopod 7.

DISTRIBUTION.—Oregon to southern California, 77-813 m.

***Rhepoxynius stenodes* (J.L. Barnard)**

FIGURE 4 (part)

Paraphoxus stenodes J.L. Barnard, 1960:221-224, pls. 17, 18; 1964b:244, 245; 1966a:89; 1969:198.—Reish and Barnard, 1967:19.

DESCRIPTION OF FEMALE (female "t," 3.39 mm).—Head about 21 percent of total body length, greatest width about 75 percent of length, rostrum constricted, narrow, elongate, slightly exceeding apex of article 1 on antenna 1. Eyes small to medium, stained mahogany, ommatidia ordinary. Article 1 of peduncle on antenna 1 about 1.5 times as long as wide, about twice as wide as article 2, ventral margin with about 4 setules, weakly produced dorsal apex with 2 setules and seta, article 2 about 0.7 times as long as article 1, with ventral cycle of 9 widely spread setae, primary flagellum with 6 articles, about 0.45 times as long as peduncle, bearing several short aesthescs in formula of 0-0-1-1-1-0; accessory fla-

gellum with 6 articles. Antenna 2 poorly ensiform; spine formula of article 4 = 3-3-3, dorsal margin with notch bearing 3 setae, ventral margin with 6 groups of 1 each long setae, 5 ventrodistal long setae and long facial spine, article 5 about 0.75 times as long as article 4, facial spine formulae = 1, dorsal margin naked, bearing pair of setules, ventral margin with 4 sets of 1-2 long to short setae, 3 ventrodistal long setae, 1 subdistal thin facial spine; flagellum about 0.85 times as long as articles 4-5 of peduncle combined, with 7 articles.

Epistome unproduced. Mandibles with weak palpal hump, right incisor with 3 teeth, left incisor with 3 humps in 2 branches, right lacinia mobilis bifid, distal branch shorter than proximal, proximal branch simple, left lacinia mobilis with 1 main tooth at side plus 5 accessory vestigial teeth, latter tooth area shortened; right rakers 9, left rakers 11; molars composed of short bulbous humps, right molar with 5 primarily short to medium spines plus 1 short spine weakly disjunct, left molar with 5 short to medium spines, no spine disjunct, no molar with plume; palp article 1 short, article 2 with 1 short inner apical seta and 1 other short inner seta, article 3 about as long as article 2, oblique apex with 13 spine-setae, basofacial formula = 0-1. Each outer lobe of lower lip with 1 weak cone. Inner plate of maxilla 1 thin, bearing 1 medium apical pluseta, 1 similar apicomedial seta, 2 apicolateral much shorter setae, palp article 2 with 1 apical spine, 1 apicolateral seta and 2 apical medial marginal setae and 5 submarginal setae. Inner plate of maxilla 2 shorter than outer, outer broader than inner, outer with 2 apicolateral setae, inner with 1 medial seta. Inner plate of maxilliped with 1 thick short apical spine, 2 apicofacial setae, 4 medial setae, outer plate with 7+ medial and apical spines, no apicolateral setae, no cusp, palp article 1 with 1 apicolateral seta, article 2 with 2 groups of 2-3 apicolateral setae, medial margin of article 2 strongly setose, article 3 with 5 facial setae, 3-5 lateral setae, nail of article 4 short, scarcely distinct, with 2 accessory setules.

Coxa 1 scarcely expanded apically, anterior

margin convex, main ventral setae of coxae 1-4 = 7-9-9-7, posteriormost seta of coxae 1-4 longest; anterior and posterior margins of coxa 4 weakly divergent, posterior margin not very oblique, weakly convex, posterodorsal corner sharp, posterodorsal margin short, concave, width-length ratio of coxa 4 = 3:4.

Gnathopods generally ordinary, hands somewhat thin, width ratios on articles 5-6 of gnathopods 1-2 = 33:32 and 30:31, length ratios = 65:48 and 56:48, palmar humps ordinary, palms weakly oblique, article 5 of gnathopod 1 elongate, ovate, posterior margin rounded, short, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded, short, weakly produced.

Pereopods 3-4 similar, facial setae formula on article 4 = 7 and 9, row closely parallel to apex, not axial, on article 5 = 7 and 5, main spine of article 5 extending to M. 90 on article 6, article 5 with 1, weakly 2 proximoposterior spines, spine formula of article 6 = 5 + 7 and 5 + 8 and no middistal seta, some spines especially long, acclivity on inner margin of dactyls of pereopods 3-4 obsolescent, emergent setule short, midfacial pluseta ordinary. Coxae 5-7 posteroventral seta formula = 2(none posterior)-7 (none posterior)-1. Articles 4-5 of pereopods 5-6 of ordinary width, facial spine rows sparse to moderately developed, facial ridge formula of article 2 on pereopods 5-7 = 0-1-1; width ratios of articles 2, 4, 5, 6 of pereopod 5 = 54:46:41:17, of pereopod 6 = 70:45:32:14, of pereopod 7 = 85:24:23:10; length ratios of pereopod 5 = 90:40:40:30, of pereopod 6 = 92:65:39:45, of pereopod 7 = 100:23:25:27; article 2 of pereopod 7 reaching apex of article 4, with 7-8 medium teeth on posterior margin, medial apex of article 6 strongly combed, straight.

Posteroventral corner of epimeron 1 rounded, posterior margin convex, corner without setule, anteroventral margin with 6-7 medium setae, posteroventral face with 3 long setae set obliquely. Posteroventral corner of epimeron 2 rounded, not guarded by setule sinus, posterior margin convex, facial setae = 11, posterior triad set somewhat vertically. Posteroventral corner of epimeron 3

weakly protuberant, with 1 seta, posterior margin weakly convex, with 1 setule notch, ventral margin with 6 setae mainly posterior but almost evenly spread, face naked; epimera 1-3 lacking large seta on posterodorsal margin.

Urosomite 1 with lateral setule at base of uropod 1, articulation line almost complete, urosomite 3 unprotuberant dorsally. Rami of uropods 1-2 with fused apical nails, outer ramus of uropod 1 with 1 dorsal spine near base, inner with 1, outer ramus of uropod 2 with 1 dorsal spine near base, inner with 1 dorsomedial spine. Peduncle of uropod 1 with 2-3 basofacial setae and 1 medium apicolateral spine, plus smaller marginal seta, medially with 3 marginal setae and spines, apicalmost an ordinary spine, others = setae. Peduncle of uropod 2 with 2 apical dorsal spines in tandem and 4 setae towards base, medially with 1 large apical spine; apicolateral corners of peduncles on uropods 1-2 without comb. Peduncle of uropod 3 with 3 ventral spines, dorsally with lateral spine and medial setule, rami feminine, inner extending to M. 95 on article 1 of outer ramus, apex with 1 seta, medial margin with 1 seta, article 2 of outer ramus short, 0.17, bearing 2 long setae, apicomедial margin of article 1 with 1 seta, lateral margin with 2 acclivities, spine formula = 0, setal formula = 1-1-2. Telson especially long, length-width ratio = 8:5, almost fully cleft, each apex narrow, rounded, lateral acclivity shallow, with lateral and medial elongate seta separated by medium setule or with 2 lateral setae, setule and medial seta, midlateral setules medium, equal or diverse (variable).

MATERIAL.—AHF *Velero IV* 5111-57, southern California, female "t," 3.39 mm, female "u," 3.33 mm (both illus.).

RELATIONSHIP.—This species is the plesiomorphic member of the flock of *Rhepoxynius* characterized by rounded anterior face of the epistome; it is the only member with normal, non-rhombic or nonjeweled spines on uropods 1-2. In addition it differs from *R. daboius* just ahead of it in gradational morphology, in the more numerous dorsal spines on the peduncle of uropod 2, in the more numerous medial spines on the peduncle

of uropod 1, and in the weakly disjunct, ordinary (not wire-like) spine on the molar. Hence, *stenodes*, though lacking epistomal cusp, is more plesiomorphic in the other characters mentioned than is *R. dabiou*s. One would suspect, therefore, that *R. dabiou*s could not be the ancestor of *stenodes*, because *R. dabiou*s lacks the slightly disjunct molarial spine and has lost important spines on uropods 1-2.

DISTRIBUTION.—California from Morro Bay to Baja California at Bahía de San Cristobal, 2-374 m.

***Rhepoxynius homocuspидatus*, new species**

FIGURES 5, 6

ETYMOLOGY.—From the Greek *homos* (same) plus the Latin *cuspидatus* (pointed), referring to the similarity of teeth on article 2 of pereopod 7.

DESCRIPTION OF FEMALE (holotype female "p," 3.13 mm).—Head about 23 percent of total body length, greatest width about 75 percent of length, rostrum constricted, of medium breadth, elongate, not reaching middle of article 2 on antenna 1. Eyes medium, largely occluded with pigment, ommatidia ordinary. Article 1 of peduncle on antenna 1 about 1.2 times as long as wide, about twice as wide as article 2, ventral margin with about 5 setules, weakly produced dorsal apex with setule and seta, article 2 about 0.7 times as long as article 1, with ventral cycle of 6 setae widely spread to apex, primary flagellum with 8 articles, about 0.9 times as long as peduncle, bearing several short to medium aesthetascs in formula of 0-0-0-1-1-1-1-0; accessory flagellum with 7 articles. Antenna 2 strongly ensiform; spine formula of article 4 = 3-2-2, dorsal margin with notch bearing 2 setae and 1 spine, ventral margin with 5 groups of 1-2 long to medium setae, 1 ventrodistal long spine and 2 long setae, article 5 about 0.8 times as long as article 4, facial spine formula = 1, dorsal margin naked, bearing pair of setae, ventral margin with 2 sets of 1 seta each, 3 ventrodistal long to medium setae, 1 subdistal facial spine; flagellum about 0.9 times as long as articles 4-5 of peduncle combined, with 9 articles.

Epistome broadly rounded anteriorly. Mandibles with weak palpar hump, right incisor with 3 teeth, left incisor with 3 teeth in 2 branches; right lacinia mobilis bifid, distal branch little shorter than proximal, left lacinia mobilis with 5 teeth, middle teeth slightly shortened; right rakers 7, left rakers 8; molars composed of short plaques demarcated mainly by spines, right molar with 6 long to medium spines, no spine disjunct, left molar with 6 long to medium spines, no spine disjunct, molars without plume; palp article 1 short, article 2 with 1 short inner apical setae and 1 other short inner seta, article 3 about 1.1 times as long as article 2, oblique apex with 8 spine-setae, basofacial formula = 0-1. Each outer lobe of lower lip with very weak cone. Inner plate of maxilla 1 ordinary, bearing 1 medium apical pluseta, 1 longer apicomedial seta, 2 apicolateral much shorter setae, palp article 2 with 1 apical spine, 1 apicolateral seta, 3 apicomedial setae and 4 submarginal setae. Plates of maxilla 2 extending subequally, outer much broader than inner, outer with 1 apicolateral seta, inner with 1 medial seta. Inner plate of maxilliped with 1 thick short apical spine, 2 apicofacial setae, 4 medial setae, outer plate with 5 medial and apical spines, no apicolateral setae or cusp, palp article 1 with 1 apicolateral seta, article 2 with 3 groups of 4 apicolateral setae, medial margin of article 2 moderately setose, article 3 with 6 facial setae, 2 lateral setae, nail of article 4 absent, with 2 accessory setules.

Coxa 1 scarcely expanded apically, anterior margin weakly convex, main ventral setae of coxae 1-4 = 8-6-5-2, posteriormost seta of coxae 1-4 slightly shortened; anterior and posterior margins of coxa 4 strongly divergent, posterior margin oblique, almost straight, posterodorsal corner sharp-rounded, posterodorsal margin ordinary, concave, width-length ratio of coxa 4 = 7:8.

Gnathopods generally ordinary, hands somewhat thin, width ratios on articles 5-6 of gnathopods 1-2 = 28:27 and 31:28, length ratios = 65:50 and 60:47, palmar humps very small, palms transverse, article 5 of gnathopod 1 elongate, ovate, posterior margin rounded, long, ar-

ticle 5 of gnathopod 2 elongate, ovate, posterior margin rounded, short, weakly produced.

Pereopod 3 stouter than pereopod 4 especially on article 4, but more slender on article 5, facial setae formula on article 4 = 5 and 6, on article 5 = 5 and 4, main spine of article 5 extending to M. 100 on article 6, article 5 with no proximo-posterior spines, spine formula of article 6 = 4 + 5 and 4 + 5, but middistal seta absent, some spines especially long, acclivity on inner margin of dactyls of pereopods 3-4 sharp, produced as tooth, emergent setule short, midfacial pluseta short, highly distad. Coxae 5-7 posteroventral setule formula = 1-5-1.

Articles 4-5 of pereopods 3-4 of ordinary width, facial spine rows sparse to moderately developed, facial ridge formula of article 2 on pereopods 5-7 = 0-0-1; width ratios of articles 2, 4, 5, 6 of pereopod 5 = 72:58:53:21, of pereopod 6 = 98:59:40:14, of pereopod 7 = 94:25:20:10, length ratios of pereopod 5 = 102:50:42:40, of pereopod 6 = 103:80:43:57, of pereopod 7 = 100:30:30:33, article 2 of pereopod 7 reaching middle of article 4, posterior margin with 7 small, even serrations, lateral and medial apices of article 6 grossly combed, lacking digital processes.

Posteroventral corner of epimeron 1 rounded and beveled, posterior margin convex, corner without setule, anteroventral margin with 3 medium setae. Posteroventral face with 1 long, 1 short setae set vertically and wide apart. Posteroventral corner of epimeron 2 rounded, lacking setule sinus, posterior margin convex, facial setae = 9, posteriormost pair set vertically. Posteroventral corner of epimeron 3 weakly protuberant, posterior margin weakly convex, with 2 setules, ventral margin with 2 setae near posterior end, face without setae; epimera 1-3 without large setae on posterodorsal margin.

Urosomite 1 with lateral setule at base of uropod 1, articulation line almost complete, urosomite 3 unprotuberant. Rami of uropods 1-2 with articulate but tightly fixed apical nails, outer ramus of uropod 1 without dorsal spines, inner with 1 spine, outer ramus of uropod 2 without dorsal spines, inner with 1 dorsomedial spine.

Peduncle of uropod 1 with 1 small basofacial seta and 1 small apicolateral spine, medially with 1 apical enlarged spine. Peduncle of uropod 2 with 2 dorsal spines, apical spine large, proximal spine very small, medially with 1 small apical spine; apicolateral corners of peduncles on uropods 1-2 without comb. Peduncle of uropod 3 with 2 ventral spines, dorsally with 1 lateral spine, 1 medial setule, rami feminine, inner extending to M. 95 on article 1 of outer ramus, apex with 2 setae, apicomедial margin with 1 seta, article 2 of outer ramus short, 0.13, bearing 2 long setae, apicomедial margin of article 1 with 2 setae, lateral margin with 1 acclivity, spine formula = 0, setal formula = 1-1. Telson especially long, length-width ratio = 3:2, almost fully cleft, each apex narrow, sharply rounded, lateral acclivity narrow, weak, with long lateral and shorter medial setae separated by setule, midlateral setules diverse, larger of medium size.

HOLOTYPE.—USNM 171437, female "p," 3.13 mm.

TYPE-LOCALITY.—JLB 40-G-9, Coal Oil Point, Goleta, California, intertidal, wash of *Phyllospadix* on bare sand mixed with sea anemones, short-tufted algal mat and *Ulva*, 2 July 1961.

VOUCHER MATERIAL.—AHF *Velero IV* 5172, southern California, 64 m; 5610, same, 45 m.

RELATIONSHIP.—This species differs from *R. heterocuspидatus*, to follow, in the more numerous, smaller, and even posterior serrations on article 2 of pereopod 7. Antenna 2 is more strongly ensiform on *R. homocuspидatus* than on *R. heterocuspидatus*, but this is a difficult character to use in routine identification. The outer ramus of uropod 1 lacks a spine in *R. homocuspидatus*, but whether or not this holds up invariably must await the examination of large amounts of material.

The specimens attributed to this species cannot be identified as *R. daboius*, because the epistome is unproduced; *R. daboius* generally has a longer article 2 on the outer ramus of uropod 3 and a spine on the outer ramus of uropod 2.

The holotype of *R. homocuspидatus* has article 2 of antenna 1 shorter than in *R. heterocuspидatus*, and the setae occur mainly on the apical half.

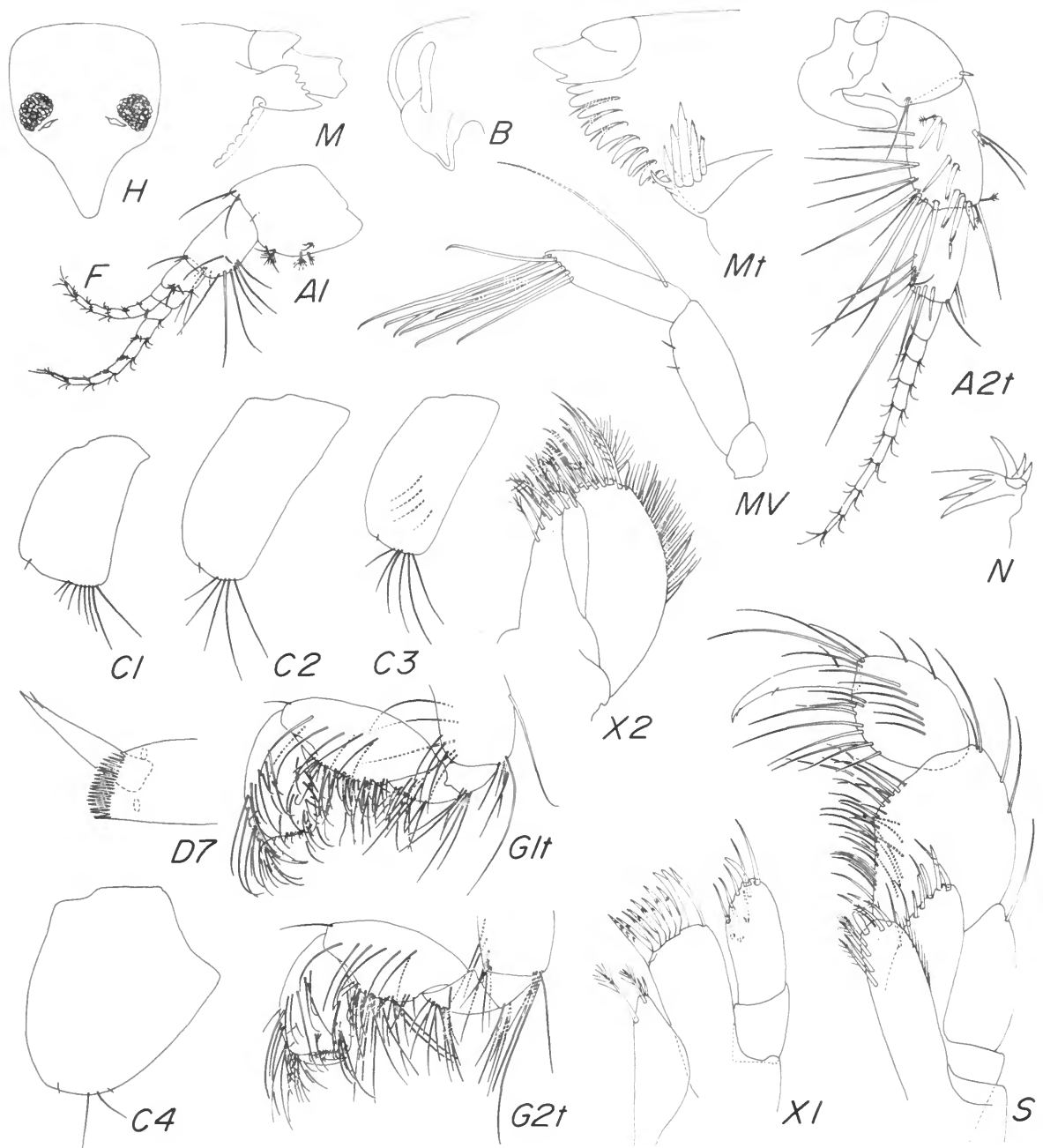


FIGURE 5.—*Rhexopynius homocuspoidatus*, new species, holotype, female "p," 3.13 mm.

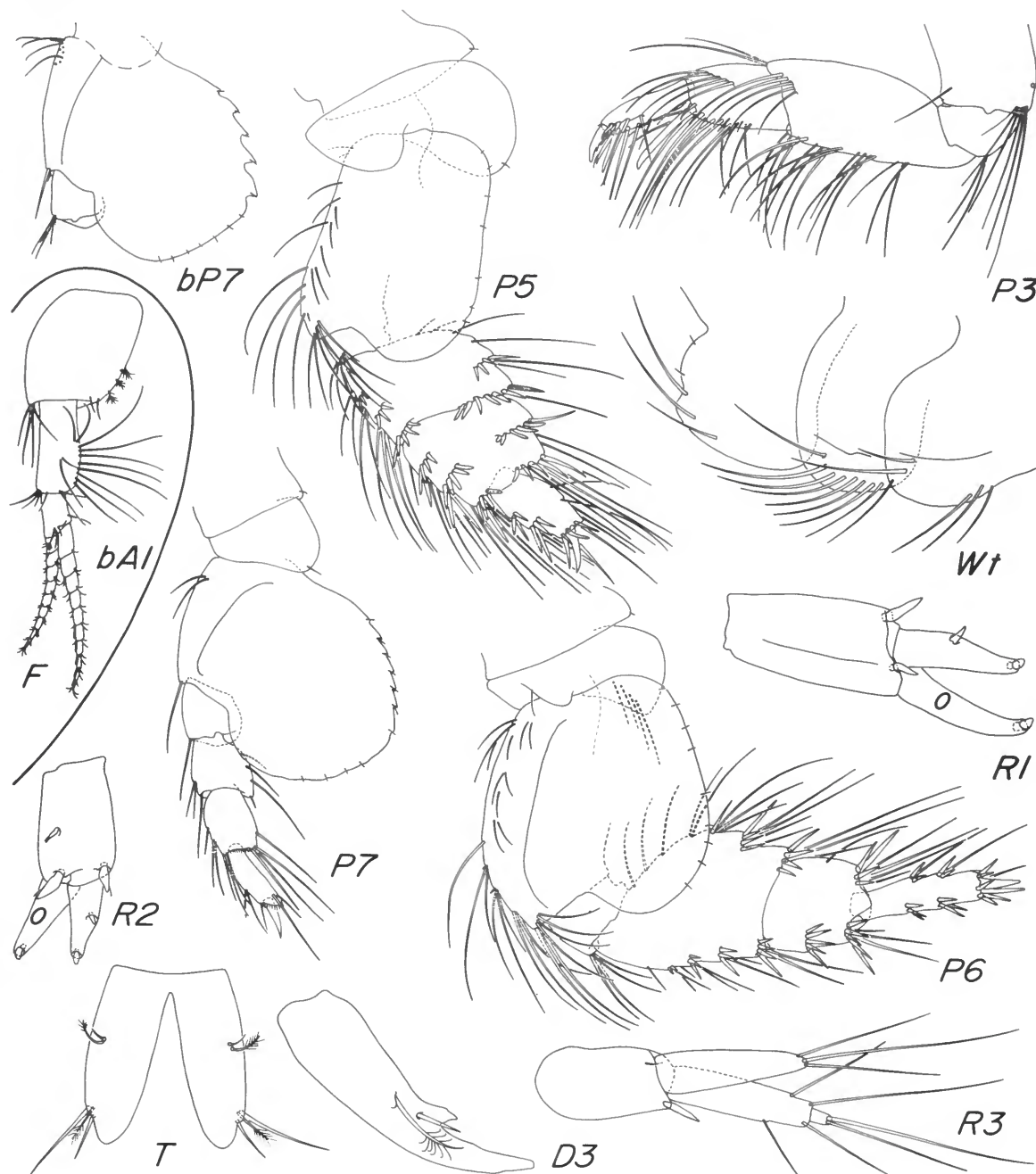


FIGURE 6.—*Rhepoxynius homocuspидatus*, new species, holotype, female “p,” 3.13 mm. *Rhepoxynius tridentatus* (J.L. Barnard) (b = female “b,” 7.81 mm).

DISTRIBUTION.—Southern California from Coal Oil Point south to the Mexican border at 32°31'12"N, 0–64 m.

Rhepoxynius species L

FIGURE 4 (part)

These eight specimens combine characters of both *R. homocuspoidatus* and *R. heterocuspoidatus*. Antenna 1 is of the *heterocuspoidatus*-kind in which article 2 is elongate and the setae fail to reach the apex. Pereopod 7 (illus.) is like *R. homocuspoidatus* in that the posterior serrations of article 2 are small and the ventral margin is strongly convex.

MATERIAL.—AHF, Pacific Marine Station, Lawson Flat, Dillon Beach, California, coll. James Weinberg, date unknown, female "f," 5.71 mm (illus.), and 7 other specimens.

***Rhepoxynius heterocuspoidatus* (J.L. Barnard)**

FIGURE 4 (part)

Paraphoxus heterocuspoidatus J.L. Barnard, 1960:224–226, pls. 19, 20; 1964a:103, 105; 1966a:89; 1969:196, 197.

DESCRIPTION OF FEMALE.—Female "k," 4.69 mm: Head about 21 percent of total body length, greatest width about 77 percent of length, rostrum constricted, broad, moderately elongate, not reaching middle of article 2 on antenna 1. Eyes medium, clear of pigment, ommatidia large. Article 1 of peduncle on antenna 1 about as long as wide, about 2.7 times as wide as article 2, ventral margin with about 6 setules, weakly produced dorsal apex with 2 setules-setae, article 2 about 0.92 times as long as article 1, with widely spread but not reaching apex ventral cycle of 9 setae and 2 laterals, primary flagellum with 10 articles, about 0.7 times as long as peduncle, bearing 1 each short aesthetasc on articles 4–9, accessory flagellum with 8 articles. Antenna 2 with long ensiform process; spine formula of article 4 = 3–3–3, dorsal margin with notch bearing 4 long to short setae, ventral margin with 7 groups of 1–3 long to short setae, 2 ventrodorsal long setae and 1 long facial spine, article 5 about 0.75

times as long as article 4, facial spine formula = 1, dorsal margin bearing 2 sets of 2 short setae, ventral margin with 5 sets of 1–2 long to short setae, 3 ventrodorsal long to short spines, one of these subdistal facial spine; flagellum about as long as articles 4–5 of peduncle combined, with 12 articles.

Epistome without anterior cusp. Mandibles with weak palpar hump, right incisor with 3 teeth, third tooth very apical, left incisor with 3 humps in 2 branches, right lacinia mobilis bifid, like 2 rakers fused, left lacinia mobilis with 4 teeth, middle teeth shortened; right rakers 9, plus 1 rudimentary, left rakers 11 plus 1 rudimentary; molars composed of short protrusions demarcated mainly by spines, right molar with 4 primarily short spines, no spine disjunct, left molar with 4 primarily medium spines, no spine disjunct, no molar with plume; palp article 1 short, article 2 with 1 very short inner apical seta and 1–2 other short inner setae, article 3 about 1.1 times as long as article 2, oblique apex with 11–10 spine-setae, basofacial formula = 0–1. Each outer lobe of lower lip with 1 cone. Inner plate of maxilla 1 ordinary, bearing 1 medium apical pluseta, 1 similar apicomedial seta, 2 apicolateral much shorter setae, palp article 2 with 1 apical marginal spine, 1 apicolateral, 2 apicomedial and 9 submarginal setae. Plates of maxilla 2 extending equally, outer broader than inner, outer with 2 apicolateral setae, inner with 2 medial seta. Inner plate of maxilliped with 1 thick short apical spine, 2 apicofacial setae, 4 medial setae, outer plate with 6 medial spines, no apicolateral setae or cusp, palp article 1 with 1 apicolateral seta, article 2 with 3 groups of 4 apicolateral setae, medial margin of article 2 moderately setose, article 3 with 6 scattered facial setae, 4 lateral setae, nail of article 4 absent, with 2 accessory setules.

Coxa 1 scarcely expanded apically, anterior margin weakly convex, main ventral setae of coxae 1–4 = 8–9–8–6, posteriormost seta of coxae 3–4 scarcely shortened; anterior and posterior margins of coxa 4 divergent, posterior margin oblique, convex, posterodorsal corner rounded, postero-

dorsal margin short, concave, width-length ratio of coxa 4 = 13:15.

Gnathopods generally ordinary, but hands thin, width ratios on articles 5–6 of gnathopods 1–2 = 24:23 and 22:24, length ratios = 65:45 and 59:42, palmar humps small, palms weakly oblique, article 5 of gnathopod 1 elongate, ovate, posterior margin rounded, long, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded, short.

Pereopods 3–4 similar, facial setae formula on article 4 = 6 and 7 almost parallel to apex, on article 5 = 6 and 5, main spine of article 5 extending to M. 80 on article 6, article 5 with no proximoposterior spines, spine formula of article 6 = 6 + 8 and 6 + 8 plus no middistal seta, some spines especially long, acclivity on inner margin of dactyls of pereopods 3–4 weak, emergent setule short, midfacial pluseta short, position ordinary. Coxae 5–7 posteroventral seta formula = 2–10–1. Articles 4–5 of pereopods 5–6 of ordinary width, facial spine rows sparse to moderately developed, facial ridge formula of article 2 on pereopods 5–7 = 0–1–1, width ratios of articles 2, 4, 5, 6 of pereopod 5 = 64:52:50:20, of pereopod 6 = 68:53:38:14, of pereopod 7 = 93:22:22:9, length ratios of pereopod 5 = 103:57:53:39, of pereopod 6 = 109:78:50:67, of pereopod 7 = 100:27:29:33, article 2 of pereopod 7 reaching apex of article 4, posterior margin with 3 large and 2 small serrations, articles 4 and 5 slightly expanded, both apices of articles 5 and 6 finely combed, lacking digital processes.

Posteroventral corner of epimeron 1 rounded, posterior margin weakly convex, corner without setule, anteroventral margin with 6 long setae, posteroventral face with 2 long setae set vertically. Posteroventral corner of epimeron 2 rounded, without setule sinus, posterior margin convex, facial setae = 10, posterior pair set vertically. Posteroventral corner of epimeron 3 weakly protuberant, with 2 long setae, posterior margin weakly convex, not shortened, with 1 setule notch, ventral margin with 3 setae all in posterior half but widely spread; epimera 1–3 without large seta on posterodorsal margin.

Urosomite 1 with lateral setule at base of uropod 1, face naked, articulation line almost complete, urosomite 3 unprotuberant. Rami of uropods 1–2 with articulate but tightly fixed apical nails, outer ramus of uropod 1 with 1 dorsal spine, inner with 1, outer ramus of uropod 2 without dorsal spines, inner with 1 dorsomedial spine, spines jewel-like. Peduncle of uropod 1 with 3 basofacial setae and 2 apicolateral spines, medially with 2 marginal setae and 1 apical enlarged spine. Peduncle of uropod 2 with 3 jewel-like dorsal spines, medially with 1 large apical spine, apicolateral corners of peduncles on uropods 1–2 without comb. Peduncle of uropod 3 without ventral spines, dorsally with 1 lateral spine, 1 medial setule, rami submasculine, inner extending to M. 100+ on article 1 of outer ramus, apex with 2 setae, medial margin with 2 setae, article 2 of outer ramus ordinary, 0.23, bearing 2 long setae, medial margin of article 1 with 3 setae, lateral margin with 2 acclivities, spine formula = 0, short setal formula = 1–1–1, long setae = 1–1–1. Telson especially long, length-width ratio = 15:11, almost fully cleft, each apex narrow, rounded, lateral acclivity broad, shallow, bearing ordinary lateral setule, seta next medial much longer than setule, midlateral setules diverse, larger of medium size.

Female “o,” 5.05 mm: Head about 22 percent of total body length, greatest width about 82 percent of length, rostrum constricted, narrow, short, scarcely exceeding apex of article 1 on antenna 1. Eyes medium, largely occluded with pigment, ommatidia ordinary. Article 1 of peduncle on antenna 1 about as long as wide, about 2.6 times as wide as article 2, ventral margin with about 7 setules, weakly produced dorsal apex with 2 setules-setae, article 2 about as long as article 1, with ventral, moderately confined cycle of 7 setae and 2 midlateral setae, primary flagellum with 11 articles, about 0.9 times as long as peduncle, bearing 1 each short aesthetasc on articles 5–10; accessory flagellum with 9 articles. Antenna 2 strongly ensiform; article 3 with apicodorsal spine; spine formula of article 4 = 3–3–3, dorsal margin with notch bearing 3 long to

short setae, ventral margin with 6 groups of 1–2 long to medium setae, 2 ventrodorsal long setae and 1 long facial spine, article 5 about 0.9 times as long as article 4, facial spine formula = 1, dorsal margin bearing 2 sets of short setae, ventral margin with 4 sets of 2 long to short setae, 3 ventrodorsal long to medium spines set facially; flagellum about 1.3 times as long as articles 4–5 of peduncle combined, with 13 articles.

Epistome unproduced. Mandibles with weak palpar hump, right incisor with 3 teeth, third tooth very apical, left incisor with 3 teeth in 2 branches; right lacinia mobilis bifid, like 2 rakers fused, distal branch shorter than proximal; left lacinia mobilis with 5 short teeth, middle teeth not shortened; right rakers 10 plus 1 rudimentary, left rakers 10; molars composed of short protrusions, or plaques, demarcated mainly by spines, right molar with 4 primarily short spines plus 1 short spine weakly disjunct, left molar with 4 primarily medium spines plus 1 short spine scarcely disjunct, no molar with plume; palp article 1 short, article 2 with 1 very short inner apical seta and 2 other short inner setae, article 3 about as long as article 2, oblique apex with 11 spine-setae, basofacial formula = 0–3. Lower lip lacking cones. Inner plate of maxilla 1 ordinary, bearing 1 medium apical pluseta, 1 similar apicomедial seta, 2 apicolateral much shorter setae, palp article 2 with 1 apical spine, 1 apicolateral, 3 apicomедial and 4 submarginal setae. Inner plate of maxilla 2 shorter than outer, outer much broader than inner, outer with 2 apicolateral setae, inner with 3 medial setae. Inner plate of maxilliped with 1 large short apical spine, 2 apicofacial setae, 4 medial setae, outer plate with 6 medial spines, no apicolateral setae or cusp, palp article 1 with 1 apicolateral seta, article 2 and 3 groups of 4 apicolateral setae, medial margin of article 2 strongly to moderately setose, article 3 with 5–6 facial setae, 2 lateral setae, nail of article 4 absent, with 2 accessory setules.

Coxa 1 scarcely expanded apically, anterior margin weakly convex, main ventral setae of coxae 1–4 = 6–6–6–4; posteriormost seta of coxae 3–4 shortened, anterior and posterior margins of

coxa 4 divergent, posterior margin oblique, almost straight, posterodorsal corner rounded, posterodorsal margin short, concave, width-length ratio of coxa 4 = 19:22.

Gnathopods generally ordinary, but hands thin, width ratios on articles 5–6 gnathopods 1–2 = 19:23 and 18:23, length ratios = 65:45 and 58:41, palmar humps small, palms weakly oblique, article 5 of gnathopod 1 elongate, ovate, posterior margin rounded-flat, long, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded-flat, long.

Pereopods 3–4 similar, facial setae formula on article 4 = 5 and 6, parallel to apex on pereopod 4, less so on pereopod 3, on article 5 = 6 and 6, main spine of article 5 extending to M. 85 on article 6, article 5 with no proximoposterior spines, spine formula of article 6 = 6 + 7 and 6 + 8 and no middistal seta, some spines especially long; acclivity on inner margin of dactyls of pereopods 3–4 sharp, produced as tooth, emergent setule short, midfacial pluseta ordinary. Coxae 5–7 posteroventral seta formula = 1–7–1. Articles 4–5 of pereopods 5–6 of ordinary width, facial spine rows sparse to moderately developed, facial ridge formula of article 2 on pereopods 5–7 = 0–1–1; width ratios of articles 2, 4, 5, 6 of pereopod 5 = 66:52:49:21, of pereopod 6 = 92:55:37:15, of pereopod 7 = 97:25:23:11; length ratios of pereopod 5 = 103:55:50:45, of pereopod 6 = 102:77:53:69, of pereopod 7 = 100:28:30:33; article 2 of pereopod 7 exceeding middle of article 4, posterior margin with 5 large serrations of even progression, articles 4 and 5 slightly expanded, both apices of article 6 and lateral of article 5 finely combed, lacking digital processes.

Posteroventral corner of epimeron 1 rounded, posterior margin convex, anteroventral margin with 6 long to medium setae, posteroventral face with 3 long setae set vertically. Posteroventral corner of epimeron 2 rounded, posterior margin convex, facial setae = 10, posteriormost pair set vertically. Posteroventral corner of epimeron 3 rounded, weakly protuberant, with 1 long seta,

posterior margin weakly convex, with 2 setule notches, ventral margin face with 3 setae mainly posterior but widely spread.

Urosomite 1 with lateral setule at base of uropod 1, face naked, articulation line complete, urosomite 3 unprotuberant dorsally. Rami of uropods 1-2 with articulate but tightly fixed apical nails, outer ramus of uropod 1 with 1 dorsal spine, inner with 1, outer ramus of uropod 2 with no dorsal spines, inner with 1 dorsomedial spine, spines jewel-like. Peduncle of uropod 1 with 2 basofacial setae and 2 apicolateral spines, medially with 2 marginal spines and 1 apical enlarged spine. Peduncle of uropod 2 with 5 jewel-like dorsal spines, medially with 1 large apical spine, apicolateral corners of peduncles on uropods 1-2 without comb. Peduncle of uropod 3 without ventral spines, dorsally with 1 lateral spine, 1 medial setule, rami feminine, inner extending to M. 100 on article 1 of outer ramus, apex with 2 setae, medial and lateral margins with 3 and 1 setae; article 2 of outer ramus ordinary, 0.16, bearing 2 long setae, medial margin of article 1 with 4 setae, lateral margin with 3 acclivities, spine formula = 0, setal formula = 1-1-2-2. Telson especially long, length-width ratio = 9:7, almost fully cleft, each apex of medium width, protrudingly rounded, lateral acclivity deep, narrow, bearing ordinary lateral setule, seta next medial greatly elongate, mid-lateral setules diverse, larger of medium size.

Female "e," 6.85 mm: Article 2 of antenna 1 with 8 setae widely spread towards apex; articles of primary flagellum = 10, accessory = 7. Facial formula on article 4 of antenna 2 = 3-4-6, article 5 = 3, article 5 about 0.9 times as long as article 4; articles of flagellum = 11.

Left lacinia mobilis with 6 teeth, one of these also bifid; right rakers = 13 plus 2 rudimentaries; right molar with 6 spines; palp article 2 with 4 outer setae, palp 3 with 15 apical setae, basofacial count = 0-3.

Setal formula of coxae 1-4 = 10-11-10-9, coxa 2 also with 1 midposterior seta and 12 medial facial setae in row. Armament formulas of pereopods 3-4, article 4 = 10 and 12, article 5 = 7

and 7, article 6 = 7 + 8 and 7 + 10 and no middistal seta; dactylar acclivity sharp; teeth on article 2 of pereopod 7 = 6!, fourth tooth from ventral small and asymmetrical (illus.).

Armament counts on epimera, anteroventral = 19, posteroventral facial oblique = 3; epimeron 2 = 17; epimeron 3 posterior = 2 long, 2 short, posteroventral facial = 8, 2 pairs set vertically (fully facial).

Urosomite 1 lacking large facial setae; armament formulas on uropods, uropod 1 peduncle basofacial = 4, dorsolateral apex = 1 stout jewel, then proximal smaller jewel, then short seta, outer ramus = 1, inner = 2-1 (right and left); uropod 2 peduncle = 4-5 jewels, medial = 1 jewel, outer ramus = 1 jewel, inner = 1 jewel; inner ramus of uropod 1 extending to M. 70 only, with 2 apical and 1 medial setae, article 1 outer ramus lateral short setae = 1-1-1-1, long = 1-1-1-1, article 2 only 0.15 times as long as article 1; peduncle with no ventral spines, 1 setule dorsolaterally, 2 setules dorsomedially.

Telson aberrant, each lobe only with 2 apicolateral setules in acclivity but with normal mid-lateral dorsal setule pairs.

DESCRIPTION OF MALE (male "m," 3.73 mm).—Rostrum similar to female. Article 2 of antenna 1 with 8 ventral setae, article 1 with medial pubescence, primary flagellum with 9 articles, 1 calceolus each on articles 1-6, aesthetascs more strongly developed. Articles 3-4 of antenna 2 with medial pubescence, facial spine formula on article 4 = 3-3-3, article 5 with 3 dorsal sets of male setae and 2 calceoli, ventrodiscal apex with 2 thin spines; calceolus formula on flagellum = 1, 2, 3, 4, 5, 7, 9, 11, 13 . . . n. Basofacial setal formula of article 3 on mandibular palp = 0-3. Article 2 of pereopods 5-7 narrower than in female; article 5 with 2 special male spines on pereopod 7. Epimera 2-3 broadened, posterior margin of epimeron 3 slightly shortened. Setal formulas: epimeron 1 anteroventral = 5, posteroventral = 2 vertical, epimeron 2 facial = 10 in 2 arcs, epimeron 3 posterior = 1-2 + 1 setule, ventral facial = 11, slightly staggered and facial. Spine formulas of uropods: uropod 1 peduncle apicolateral = 2,

basofacial = 3, medial = 1 stout + 2 thin spines, uropod 2 peduncle dorsal = 3, medial = 1, dorsal spines on outer ramus of uropod 1 = 1, of uropod 2 = 0, inner ramus of uropod 1 = 1, of uropod 2 = 1, ventral spines on peduncle of uropod 3 = 0, spine formula on article 1 of outer ramus = 0, long setal formula = $1 \times 7 + 2-2-2$, short setae = $0 \times 8, 1-1$. Telson not elongate, not broadened, distal setae shortened, 1 lateral setule, then 1 longer seta and 1 very short seta.

ILLUSTRATIONS.—Gnathopods very similar to those drawn for *R. homocuspoidatus*. Pereopod 7 of female "e" is illustrated because of its typical cusp formation.

REMARKS.—Body very stout. Female "o" differs from female "k" especially in the thickness of the medial armaments on the peduncle of uropod 1, which in "k" are thin setae, and in the blunter spines on the rami of uropod 1.

Intermediates of *Velero* 6694, southern California: article 2 of antenna 1 in this batch of 25 specimens bears setae all the distance to the apex, article 2 being short like *R. tridentatus*; however, article 2 of pereopod 7 is of the ordinary *heterocuspoidatus*-kind with 4 uneven cusps; outer ramus of uropod 1 and both rami of uropod 2 lacking spines (like *R. tridentatus* of J.L. Barnard, 1969, Bahía de Los Angeles).

VOUCHER MATERIAL.—AHF *Velero* IV 2312-53, southern California, 15 m, female "k," 4.69 mm (illus.), female "n," 4.76 mm (illus.); 6099, same, 26 m, female "o," 5.05 mm (illus.), aberrant, see description; 5535, same, 17 m, male "m," 3.73 mm, female "n," 4.02 mm; 6694, same, 9 m, 25 specimens intermediate. USNM Acc. 188747, Friday Harbor, Washington, E.F. Swan, 29 September 1950, female "e," 6.85 mm (illus.).

OTHER MATERIAL.—AHF *Velero* IV 4755 (2), 4836 (9), 5172 (4), 5189 (17), 5263 (1), 5557 (3), 5754 (4), 5764 (6), 5844 (2), 6688 (5), all southern California, 9-64m; JLB BLA 149, Bahía de Los Angeles, Mexico, Gulf of California (8), new identification, formerly "sp."; USNM Acc. 157334, Agua Verde Bay, Mexico, Gulf of California, electric light, *Albatross*, 1 April 1911 (1 male); USNM Acc. 160366, [Mexico], Bahía San Car-

los, 30 March 1940 (4 males); USNM Acc. 159124, San Lucas Cove, Mexico, Baja California, pelagic [neritic], electric light night anchorage, 29 March 1940 (43 males).

RELATIONSHIP.—This species differs from *R. homocuspoidatus* in the larger more uneven serrations or cusps on article 2 of pereopod 7.

Rhepoxynius heterocuspoidatus and *R. tridentatus* plus the subspecies *R. t. pallidus* (see J.L. Barnard, 1960) are probably synonymous but represent southern (*R. heterocuspoidatus*) and northern (*R. tridentatus*) subspecies, with *R. t. pallidus* representing some kind of bay or ponded water phenotype. The species stretches minimally from the Gulf of California north to Puget Sound and requires very thorough endemic studies. A purely clinal explanation of the morphological drift is not possible, because J.L. Barnard (1969) reported some specimens of *R. tridentatus* from the Gulf of California unlike the normal southern *R. heterocuspoidatus*. They may be the bay form or southern *R. pallidus* phenotype, but they lack certain spines on the rami of uropods 1-2.

Almost all specimens collected south of Point Conception, California, are of the *heterocuspoidatus*-kind, recognized by four uneven cusps on the adult article 2 of pereopod 7, whereas most northern specimens have three even teeth, a fourth if present being vestigial and above the three larger members; in the southern *R. heterocuspoidatus* form, the smaller odd cusp is in the middle of the group. The *R. pallidus* form has very thin hands on the gnathopods. The bodies of these taxa are immensely stout and the uropodal spines often are very jewel-like (rhombic, if you will).

DISTRIBUTION.—California from Point Conception southward into Gulf of California as far as Bahía de Los Angeles and Bahía San Carlos, 0-64 m.

Rhepoxynius tridentatus (J.L. Barnard)

FIGURE 6 (part)

Pontharpinia tridentata J.L. Barnard, 1954:4-6, pls. 4, 5.

Paraphoxus tridentatus.—J.L. Barnard, 1960:261-265, pls. 38, 39 [including subspecies *p. t. pallidus*]; 1966a:90; 1969:224.

DESCRIPTION OF FEMALE.—Female “b,” 7.81 mm: Head about 18 percent of total body length, greatest width about 90 percent of length, rostrum constricted, narrow, short, reaching middle of article 2 on antenna 1. Eyes small to medium, clear of pigment (long preseved), ommatidia ordinary. Article 1 of peduncle on antenna 1 about as long as wide, about 2.8 times as wide as article 2, ventral margin with about 5 setules, weakly produced dorsal apex with 4 setules-setae, article 2 about 0.8 times as long as article 1, with ventral cycle of 10 widely spread setae, and 2 lateral setae; primary flagellum with 10 articles, about 0.7 times as long as peduncle, bearing 1 each short aesthetasc on articles 3–9, accessory flagellum with 9 articles. Antenna 2 ensiform; facial setae of article 3 closely contiguous and subequally long (unusual); spine formula of article 4 = 3–4–6, dorsal margin with 2 notches bearing 3 setae each, ventral margin with 13 groups of 1–2 long to short setae, plus 3 ventrodorsal long setae and 1 facial spine, article 5 about 0.85 times as long as article 4, facial spine formula = 4, dorsal margin bearing 2 sets of long setae, ventral margin with 6 sets of 1–2 long to medium setae, 3 ventrodorsal long to medium spines set facially; flagellum about 0.95 times as long as articles 4–5 of peduncle combined, with 12 articles.

Upper lip and epistome distinct, upper lip dominant and upper edge forming weak anterior cusp from lateral view. Mandibles with weak palpar hump, right incisor with 3 teeth, third highly apical, left incisor with 2 sharp teeth in 2 branches, distal with tiny accessory hump; right lacinia mobilis bifid, distal branch little shorter than proximal, narrow, proximal branch simple, pointed, left lacinia mobilis very broadly flagellate, with 5 teeth plus 2 accessory teeth, middle teeth shortened; right rakers 11, left rakers 13; molars composed of elongate plaques bearing short protrusion, right molar with 7–8 long to medium spines, no spine disjunct, left molar with 4 primarily long spines plus 1–2 spines weakly disjunct, no molar with plume; palp article 1 short, article 2 with 1 short inner apical seta and

3 other short inner setae, and 5–6 long outer setae in 3–4 sets, article 3 about as long as article 2, oblique apex with 16 spine-setae, basofacial formula = 0–4. Each outer lobe of lower lip with tiny cone. Inner plate of maxilla 1 especially thin, bearing 1 medium apical pluseta, 1 similar apicomedial seta, 2 apicolateral slightly shorter setae, palp article 2 with 1 apical spine, 1 apicolateral, 5 medial and 9+ submarginal setae. Inner plate of maxilla 2 shorter than outer, outer broader than inner, outer with 2 apicolateral setae, inner with 4 medial setae. Inner plate of maxilliped with 1–2 large thick apical spines, 2 apicofacial setae, 6 medial setae, outer plate with 6 medial spines, no apicolateral setae or cusp, palp article 1 with 3 lateral setae, article 2 with 4 groups of 9 lateral setae, medial margin of article 2 moderately setose, article 3 with 9 strewn facial setae, 3 lateral setae, nail of article 4, short, almost completely fused, with 2 accessory setules.

Coxa 1 scarcely expanded apically, anterior margin weakly convex, straight, main ventral setae of coxa 1–4 = 10–14–12–11, moderately widely spread, posteriormost seta of coxae 1–4 as long as others; anterior and posterior margins of coxa 4 weakly divergent, posterior margin oblique, convex, posterodorsal corner rounded, posterodorsal margin ordinary, concave, width-length ratio of coxa 4 = 7:8.

Gnathopods generally ordinary, but hands thin, moderately setose anteriorly, width ratios on articles 5–6 of gnathopods 1–2 = 22:19 and 22:19, length ratios = 65:40 and 61:40, palmar humps small, palms transverse, article 5 of gnathopod 1 elongate, ovate, posterior margin rounded, long, article 5 of gnathopod 2 elongate, ovate, posterior margin flat, long.

Pereopod 4 stouter than pereopod 3 especially on articles 4–5, facial setae formula on article 4 = 10 and 15, parallel to apex, on article 5 = 8 and 6, main spine of article 5 extending to M. 75 on article 6, article 5 with no proximoposterior spines, spine formula of article 6 = 7 + 8 and 7 + 10 plus no middistal seta, some spines especially long, acclivity on inner margin of dactyls of pereopods 3–4 weak, emergent setule short, midfacial

plusea ordinary. Coxae 5-7 posteroventral seta formula = 6-21-1. Articles 4-5 of pereopods 5-6 of ordinary width, facial spine rows dense, facial ridge formula of article 2 on pereopods 5-7 = 0-1-1; width ratios of articles 2, 4, 5, 6 of pereopod 5 = 64:51:49:18, of pereopod 6 = 87:48:33:14, of pereopod 7 = 90:22:18:8, length ratios of pereopod 5 = 101:49:45:40, of pereopod 6 = 103:72:47:55, of pereopod 7 = 100:27:23:22, article 2 of pereopod 7 reaching middle of article 4, posterior margin with 4 large and 1 small serrations, medial and lateral apices of articles 5-6 finely combed, article 6 lacking digital processes.

Posteroventral corner of epimeron 1 rounded, posterior margin convex, anteroventral margin with 10 long to medium setae, posteroventral face with 2 long setae set obliquely. Posteroventral corner of epimeron 2 rounded, posterior margin strongly convex, ventral marginal and facial setae = 21, posteriormost triad set vertically. Posteroventral corner of epimeron 3 rounded, weakly protuberant, posterior margin almost straight, with 2 setae and 1 setule notch, ventral margin with 6 setae mainly posterior but widely spread, face with 2 setae near ventral posterior margin.

Urosomite 1 without lateral or ventral setule at base of uropod 1, articulation line almost complete, urosomite 3 unprotuberant dorsally. Rami of uropods 1-2 with articulate but tightly fixed apical nails, outer ramus of uropod 1 with 1 small dorsal spine, inner with 1 larger, outer ramus of uropod 2 without dorsal spines, inner with 1 dorsomedial spine. Peduncle of uropod 1 with 5 basofacial setae and 2 apicolateral spines, and 1 tiny more proximal seta, medially with 4 marginal thin setae and 1 thick apical spine. Peduncle of uropod 2 with 1 basofacial seta, and 6 even dorsal spines, basalmost thinner, medially with 1 large apical spine, apicolateral corners of peduncles on uropods 1-2 with no comb. Peduncle of uropod 3 with no ventral spines, dorsally with no lateral spine or setule, 1 medial setule, rami feminine, inner extending to M. 70 on article 1 of outer ramus, apex with 1 seta, medial and lateral margins naked, article 2 of outer ramus short,

0.15, bearing 2 medium setae, medial margin of article 1 with 5 setae, lateral margin with 4 acclivities, spine formula = 0, short setal formula = 1-1-1-1-1, long setae = 0-1-1-1-1. Telson especially long, length-width ratio = 3:2, almost fully cleft, each apex of medium width, rounded, lateral acclivity deep, narrow, bearing ordinary lateral setule, seta next medial shorter than setule, midlateral setules diverse, larger of medium size.

DESCRIPTION OF MALE (young male "c," 5.66 mm).—Setae on article 2 of antenna 1 not as widely spread as in other described specimens; outer ramus of uropod 1 lacking spine.

MATERIAL.—USNM Acc. 187867, False Bay, San Juan Island, Washington, eastern Pacific Ocean, coll. Margaret Dunn, 1 July 1950, female "b," 7.81 mm, young male "c," 5.66 mm (re-identified, formerly identified in USNM colls. as "milleri"); 163372, False Bay from burrows of *Leptosynapta inhaerens*?, coll. G.E. MacGinitie, 1 August 1940 (20). AHF *Velero IV* 4797-56, southern California, 20 m (2 specimens of 3-cuspidate form with widely spread first antennal setae lacking last setal position, thus normal *tridentata*).

RELATIONSHIP.—See *R. heterocuspoidatus*. *Rhepoxynius tridentatus* is the northern race or morph of *R. heterocuspoidatus*, but *R. tridentatus* nomenclaturally takes priority; however, there may be fairly good genetic distinction, because the mixture is fairly sharp as shown in male "c" quoted above. More research on these species is warranted.

FOUR-TOOTH FORM.—False Bay *P. t. pallidus* specimens from USNM Acc. 163372 have 4 posterior teeth on article 2 of pereopod 7, but unlike *R. heterocuspoidatus* they are formed evenly. Juveniles have the 3 teeth of the open-sea morphs.

DISTRIBUTION.—Puget Sound, Washington, to vicinity of Point Conception, California, 0-89 m; form of Bahía de Los Angeles, Baja California, reported by J.L. Barnard (1969) needs further study; *R. tridentatus* probably including *R. heterocuspoidatus*, thus distribution extending normally into Gulf of California.

Rhepoxynius bicuspoidatus (J.L. Barnard)

Paraphoxus bicuspoidatus J.L. Barnard, 1960:218-221, pls. 15, 16; 1963:462, 463; 1964a:103; 1964b:243, fig. 12; 1966a:88; 1966b:28; 1971:68-70.

DESCRIPTION OF FEMALE (female "u," 4.57 mm).—Head about 21 percent of total body length, greatest width about 80 percent of length, rostrum constricted, narrow, short, almost reaching apex of article 2 on antenna 1. Eyes small, largely occluded with pigment, ommatidia ordinary. Article 1 of peduncle on antenna 1 about 1.2 times as long as wide, about 2.3 times as wide as article 2, ventral margin with about 4 setules, weakly produced dorsal apex with 2 setules-setae, article 2 about 0.7 times as long as article 1, with widely spread ventral row of 6 setae, primary flagellum with 7 articles, about 0.5 times as long as peduncle, bearing 1 each short aesthetasc on articles 3–6; accessory flagellum with 6 articles. Antenna 2 with long ensiform process; article 3 with dorsodistal spine, spine formula of article 4 = 4–4–4, dorsal margin with notch bearing 5 setae, ventral margin with 14 groups of 1 long seta each, 1 ventrodorsal medium spine, article 5 about 0.8 times as long as article 4, facial spine formula = 3, dorsal margin bearing 2 sets of medium setae, ventral margin with 4 sets of 1–2 long to medium setae, 2 ventrodorsal long to medium spines, 1 set facially; flagellum about 0.7 times as long as article 4–5 of peduncle combined, with 8 articles.

Anterior cusp of epistome small. Mandibles with weak palpar hump, right incisor with 3 teeth, third slightly distad, left incisor with 2 apical humps and large basal tooth; right lacinia mobilis bifid, distal branch little shorter than proximal, both branches simple, pointed, left lacinia mobilis broad, with 5 teeth plus 2 accessory teeth, middle teeth not shortened; right rakers 8, plus 1 rudimentary, left rakers 9 plus 2 rudimentaries; molars composed of short bulbous protrusions, right molar with 6 primarily long spines, no spine disjunct, left molar with 5 primarily long spines, no spine disjunct, molars without plume; palp article 1 short, article 2 with 1 short inner apical seta and 1 other short inner seta, article 3 about 0.95 times as long as article 2, oblique apex with 14 spine-setae, basofacial formula = 0–4. Each outer lobe of lower lip with 1 small cone. Inner plate of maxilla 1 ordinary, bearing 1 me-

dium apical pluseta, 1 similar apicomедial seta, 2 apicolateral much shorter setae, palp article 2 with 1 apical spine, 1 apicolateral, 3 apicomедial and 8 submarginal setae. Plates of maxilla 2 extending subequally, outer much broader than inner, outer with 2 apicolateral setae, inner with 2 medial setae. Inner plate of maxilliped with 1 large thick apical spine, 2 apicofacial setae, 4 medial setae, outer plate with 5 medial spines, no apicolateral setae or cusp, palp article 1 with 1 apicolateral seta, article 2 with 2 groups of 5 apicolateral setae, medial margin of article 2 moderately setose, article 3 with 6 scattered facial setae, 2 lateral setae, nail of article 4 short, fully fused, with 2 accessory setules.

Coxa 1 scarcely expanded apically, anterior margin weakly convex, main ventral setae of coxae 1–4 = 9–9–10–8, posteriormost seta of coxae 1–4 shortened, anterior and posterior margins of coxa 4 weakly divergent, posterior margin almost straight, posterodorsal corner sharp-rounded, posterodorsal margin short to ordinary, concave, width-length ratio of coxa 4 = 7 : 10.

Gnathopods generally ordinary but hands moderately thin, poorly setose anteriorly, width ratios on articles 5–6 of gnathopods 1–2 = 30 : 26 and 26 : 26, length ratios = 65 : 50 and 55 : 48, palmar humps ordinary, palms weakly oblique, article 5 of gnathopod 1 elongate, ovate, posterior margin rounded, long, article 5 of gnathopod 2 elongate, ovate, posterior margin rounded, short.

Pereopods 3–4 similar, facial setae formula on article 4 = 4 and 5, on article 5 = 4 and 6, main spine of article 5 extending to M. 105–120 on article 6, article 5 with no proximoposterior spines, spine formula of article 6 = 5 + 8 and 6 + 7 plus no middistal seta, some spines especially long, acclivity on inner margin of dactyls of pereopods 3–4 obsolescent to absent, emergent setule fully immersed or absent, midfacial pluseta very short to absent. Coxae 5–7 posteroventral seta formula = 4–10–1. Articles 4–5 of pereopods 5–6 broad, facial spine rows moderately developed, spines slender, facial ridge formula of article 2 on pereopods 5–7 = 0–1–1; width ratios of articles 2, 4, 5, 6 of pereopod 5 = 63 : 50 : 48 : 21, of pereopod

6 = 78:43:31:15, of pereopod 7 = 100:21:18:8 (article 2 width including tooth, only 81 without tooth); length ratios of pereopod 5 = 106:43:47:35, of pereopod 6 = 107:70:52:46, of pereopod 7 = 100:22:23:23, article 2 of pereopod 7 almost reaching apex of article 4, posterior margin with 2 large spikes, medial and lateral apices of articles 5-6 coarsely combed, lacking digital processes.

Posteroventral corner of epimeron 1 rounded, posterior margin weakly convex, with setule, anteroventral margin with 12-13 short to medium setae, posteroventral face with 2 long setae set obliquely. Posteroventral corner of epimeron 2 rounded, posterior margin weakly convex, with setule, ventral marginal setae = 15, no pair set vertically. Posteroventral corner of epimeron 3 rounded, weakly protuberant, with 1 seta, posterior margin weakly convex, with 1 setule notch, ventral margin with 6 setae widely spread.

Urosomite 1 with lateral setule at base of uropod 1, articulation line complete, urosomite 3 unprotuberant dorsally. Rami of uropods 1-2 with articulate but tightly fixed apical nails, outer ramus of uropod 1 with 1 dorsal spine, inner with 1, outer ramus of uropod 2 with 1 dorsal spine, inner with no dorsomedial spine, peduncle of uropod 1 with 3 basofacial setae and 2 apicolateral spines, basal spine very small and thin, medially with 3 marginal setae and spines, apicalmost an enlarged spine, both basals thin and short, no displaced spine. Peduncle of uropod 2 with 5 long thin dorsal spines, medially with 1 large apical spine, apicolateral corners of peduncles on uropods 1-2 without comb. Peduncle of uropod 3 with 2 ventral spines, dorsally with 1 lateral setule, 1 medial setule, rami feminine, inner extending to M. 35 on article 1 of outer ramus, apex with 1 short seta, medial and lateral margins naked, article 2 of outer ramus ordinary, 0.17, bearing 1 short, 1 long setae, medial margin of article 1 with 3 setae, lateral margin with 2 acclivities, spine formula = 0, short setal formula = 0-1-1, long setae = 1-1-1. Telson especially long, length-width ratio = 5:3, almost fully cleft, each apex narrow, weakly pointed, lateral accliv-

ity narrow, weak, bearing ordinary lateral setule, setule next medial shorter than first setule, no spines present; lateral setules diverse, largest of medium size.

DESCRIPTION OF MALE (male "t," 3.86 mm).—Rostrum similar to female. Article 1 of antenna 1 and articles 3-4 of antenna 2 with medial pubescence; primary flagellum of antenna 1 with 7 articles, 1 calceolus each on articles 2-6, aesthetascs moderately developed. Facial spine formula on article 4 of antenna 2 = 3-3-3, article 5 with 3 dorsal sets of male setae and 1 calceolus, ventrodistal apex with one thin seta, ventral setae of articles 4-5 short; calceolus formula on flagellum = 1, 2, 3, 4, 5, 7, 9 . . . n.

Basofacial setal formula of article 3 on mandibular palp = 0-3. Coxa 4 broadened but smaller in relation to coxa 1 than in female. Article 2 of only pereopod 7 narrower than in female, article 5 with 2 male spines. Epimera 1-3 broadened, posterior margin of epimeron 3 shortened. Setal formulas: epimeron 1 anteroventral = 9, posteroventral = 3, epimeron 2 ventral = 12, epimeron 3 posterior = 1, ventral = 9.

Spine formulas of uropods: uropod 1 peduncle apicolateral = 2, basofacial = 3, uropod 2 peduncle dorsal = 5, dorsal spines on outer ramus of uropod 1 = 1, of uropod 2 = 1, inner ramus of uropod 1 = 1, of uropod 2 = 0, ventral spines on peduncle of uropod 3 = 1-2, setal formula on article 1 of outer ramus = 1-1-1-1-1-2-2-2, setae on article 2 fully elongate, article 2 shortened (aberrantly so on one side). Telson broadened, distal setae scarcely shortened, with single long row of denticles on each lobe. Inner ramus of uropod 1 slightly reduced.

REMARKS.—The presence of only two long facial spines in apicoventral position on article 5 of antenna 2 in the female is unusual.

MATERIAL.—AHF *Velero IV* 5879, southern California, 76 m, male "t," 3.86 mm, female "u," 4.57 mm. USNM, *Albatross* 2835, Mexico, Baja California, off Abreojos Point, 26°42'50"N, 113°34'15"W, 5.5 fms (10 m), 4 May 1888, 1 male.

RELATIONSHIP.—Although this species is sepa-

rated in the key to species from *R. variatus*, the relationship to that species is very close. Both species share, in their general group, the unusual feature of lacking vertically tiered setae on epimeron 2, and both have an epistomal cusp, though the cusp on *R. bicuspidatus* is weak. The immense spikes on article 2 of pereopod 7 are unique to *R. bicuspidatus* in *Rhepoxynius*. The telson has only small apical setules, no long setae, and no spines. The distal tooth on the right lacinia mobilis of *R. bicuspidatus* is short in contrast to the long distal branch in *R. variatus*.

DISTRIBUTION.—Oregon to Baja California, 8–475 m.

Rhepoxynius vigitegus (J.L. Barnard)

Paraphoxus vigitegus J.L. Barnard, 1971:70–74, figs. 44–46.

DESCRIPTION OF FEMALE (female “w,” 4.76 mm).—Head about 18 percent of total body length, greatest width about 80 percent of length, rostrum constricted, narrow, short, reaching middle of article 2 on antenna 1. Eyes tiny, clear of pigment, ommatidia ordinary. Article 1 of peduncle on antenna 1 about 1.3 times as long as wide, about 2.3 times as wide as article 2, ventral margin with about 6 setules, weakly produced dorsal apex with 2 setules-setae, article 2 about 0.7 times as long as article 1, with widely spread ventral row of 7 setae, primary flagellum with 8 articles, about 0.6 times as long as peduncle, bearing 1 short aesthetasc each on articles 3–7; accessory flagellum with 7 articles. Ensiform process of antenna 2 very long; article 3 with thin apicodorsal spine; spine formula of article 4 = 3–3–2, dorsal margin with notch bearing 5 setae, ventral margin with 9 groups of 1–2 long to short setae, 1 ventrodorsal long spine; article 5 about 0.7 times as long as article 4, facial spine formula = 0, dorsal margin bearing 2 sets of small setae, ventral margin with 5 sets of 1 long seta each, 3 ventrodorsal long to medium spines all set facially; flagellum about 1.1 times as long as articles 4–5 of peduncle combined, with 9 articles.

Sharp epistomal cusp curled upward into hook.

Mandibles with weak palpar hump, right incisor with 3 teeth, third in middle, left incisor with 3 hump teeth in 2 branches; right lacinia mobilis bifid, distal branch little shorter than proximal, both branches, narrow, pointed, left lacinia mobilis with 5 teeth, middle teeth scarcely shortened; right rakers 9 plus 2 rudimentaries, left rakers 10 plus 1 rudimentary; molars composed of short bulbous protrusions, right molar with 5 primarily medium spines, no spine disjunct, left molar with 6 primarily medium spines, no spine disjunct, molars without plume; palp article 1 short, article 2 with 1 short inner apical seta and 1 other short inner seta, article 3 about 0.9 times as long as article 2, oblique apex with 11 spine-setae, basofacial formula = 0–2. Each outer lobe of lower lip with 1 cone. Inner plate of maxilla 1 ordinary, bearing 1 medium apical pluseta, 1 similar apicomedial seta, 2 apicolateral shorter setae, palp article 2 with 1 apical spine, 1 apicolateral, 3 apicomedial, and 7 submarginal setae. Plates of maxilla 2 extending subequally, outer much broader than inner, outer with 2 apicolateral setae, inner with 2 medial setae. Inner plate of maxilliped with 1 large thick apical spine, 2 apicofacial setae, 5 medial setae, outer plate with 7 medial spines, no apicolateral setae or cusp, palp article 1 with 1 apicolateral seta, article 2 with 3 groups of 4 lateral setae, medial margin of article 2 moderately setose, article 3 with 8 facial setae, 3 lateral setae, nail 8 of article 4 short, completely fused, with 2 accessory setules.

Coxa 1 not expanded apically, anterior margin weakly convex, straight, main ventral setae of coxae 1–4 = 7–7–7–4, posteriormost seta of coxa 1–4 slightly shortened, anterior and posterior margins of coxa 4 almost parallel, posterior margin almost straight, posterodorsal corner sharp-rounded, posterodorsal margin short, concave, width-length ratio of coxa 4 = 11 : 17.

Gnathopods with moderately thin hands moderately setose anteriorly, width ratios on articles 5–6 of gnathopods 1–2 = 28:24 and 28:25, length ratios = 65:45 and 60:43, palmar humps very small, palms transverse, article 5 of gnathopod 1 elongate, ovate, posterior margin flat, long,

article 5 of gnathopod 2 elongate, ovate, posterior margin rounded, almost lobate.

Pereopod 4 stouter than pereopod 3 especially on article 5, facial setae formula on article 4 = 5 and 8 parallel to apex, on article 5 = 7 and 5, main spine of article 5 extending to M. 95 on article 6, article 5 with no proximoposterior spines, spine formula of article 6 = 6 + 7 and 7 + 7 plus no middistal seta, some spines especially long; acclivity on inner margin of dactyls of pereopods 3-4 sharp, produced as tooth, emergent setule short, midfacial pluseta ordinary. Coxae 5-7 posteroventral seta formula = 11-11-1. Articles 4-5 of pereopods 5-6 broad, facial spine rows moderately developed, facial ridge formula of article 2 on pereopods 5-7 = 0-0-0; width ratios of articles 2, 4, 5, 6 of pereopod 5 = 63:63:58:17 (article 2 width = 73 with posterior tooth), of pereopod 6 = 90:54:37:15, of pereopod 7 = 93:24:22:8; length ratios of pereopod 5 = 109:52:52:34, of pereopod 6 = 104:77:42:53, of pereopod 7 = 100:25:30:26, article 2 of pereopod 7 almost reaching apex of article 4, with 6 deep posterior castellations, posteroventral margin beveled, medial and lateral apices of articles 5-6 coarsely combed, bearing no digital processes; article 2 of pereopod 5 with large posterodorsal cusp.

Posteroventral corner of epimeron 1 rounded, posterior margin weakly convex, anteroventral margin with 7-8 short to medium setae, posteroventral face with 3 long setae set obliquely. Posteroventral corner of epimeron 2 rounded, posterior margin weakly convex, facial setae = 13, posteriormost triad set vertically and fully posterior. Posteroventral corner of epimeron 3 rounded, with 1 seta, posterior margin weakly convex, with 1 setule notch, ventral margin with 4 setae mainly posterior.

Urosomite 1 with lateral setule at base of uropod 1 and lateral ridge, articulation line almost complete, urosomite 2 with large hook dorsally. Rami of uropods 1-2 with articulate but tightly

fixed apical nails, rami of uropods 1-2 naked, inner ramus of uropod 2 shortened. Peduncle of uropod 1 with 1 basofacial seta and 1 apicolateral spine, medially with 1 apical spine, no displaced spine. Peduncle of uropod 2 with 3 dorsal spines, medially with 1 medium apical spine; apicolateral corners of peduncles on uropods 1-2 without comb. Peduncle of uropod 3 with 3 ventral spines, dorsally with 1 lateral spine, 1 medial setule, rami feminine, inner extending to M. 50 on article 1 of outer ramus, apex with 1 medium seta, medial and lateral margins naked, article 2 of outer ramus ordinary, 0.22, bearing 1 short and 1 medium setae, medial margin of article 1 naked, lateral margin with 2 acclivities, spine formula = 1-1-1, setal formula = 0. Telson especially long, length-width ratio = 8:5 or 16:9, almost fully cleft, each apex narrow, rounded, lateral acclivity shallow, narrow, bearing ordinary lateral setule, seta next medial longer than setule, or additional medial setule present, midlateral setules diverse, largest medium, set at M. 50.

MALE.—Unknown.

MATERIAL.—USNM, Oregon 1, AD 1 of A.G. Carey, Jr., off mouth of Columbia River, 44°39.8'N, 124°05.9'W, 30 m, 20 June 1962, female "w," 4.76 mm.

RELATIONSHIP.—If one keys this species on through couplet 9 of the "Key to the Species of *Rhepoxynius*," the closest relationship of *Rhepoxynius vigitegus* falls to *R. daboius*; but *R. vigitegus* differs from *R. daboius* in the absence of ramal spines on uropods 1-2 and in the two characters for which *R. vigitegus* is unique in the Phoxocephalidae: the curled epistomal cusp and the giant dorsal spike on urosomite 2. Actually, urosomites 1 and 2 are almost solidly fused but marked with a strong suture ridge.

Rhepoxynius vigitegus is also unusual in the genus because of the shortened inner ramus of uropod 2, the spike on article 2 of pereopod 5, and the distally placed dorsolateral setule pairs on the telson.

DISTRIBUTION.—Oregon, 30 m.

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