

A KEY TO THE AMERICAN PACIFIC SHRIMPS OF THE GENUS
Trachypenaeus (DECAPODA, PENAEIDAE),
WITH THE DESCRIPTION OF A NEW SPECIES

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ABSTRACT

Study of American Pacific members of the genus *Trachypenaeus* reveals that variation in armature of the telson includes not only movable spines, but also fixed spines and even no spines at all. It also confirms that the eighth somite bears two arthrobranchiae instead of one arthrobranchia and one pleurobranchia. A new species, *Trachypenaeus fuscina*, is described, the specific features of *T. faoea* Loesch and Avila are presented, and a key to the five members of the genus occurring in the region, together with their ranges, is included.

Along the Pacific coast of Latin America species of *Penaeus* are the mainstay of the shrimp fisheries; however, members of various other genera contribute to the catches in significant quantities. Among the latter, three *Trachypenaeus* have been previously recognized: *T. byrdi* Burkenroad, *T. similis pacificus* Burkenroad, and *T. faoea* Loesch and Avila. A fourth, noncommercial species, *T. brevisuturæ* Burkenroad, is also found in the region. Burkenroad (1934a, 1938), presented detailed descriptions of the taxa he described, but the characters cited for *T. faoea*, except color pattern, have not proven to be diagnostic. Since the commercial *Trachypenaeus* are indiscriminately known by the common names of "tigre" and "cebra," a definition of *T. faoea* is needed.

The study of collections of American Pacific *Trachypenaeus* has shown that yet another commercial species of this genus occurs in the area. It also pointed out a previously undescribed variation in the armature of the telson, and confirmed the identity of the gills on the eighth somite.

The measurement of total length is the linear distance from tip of rostrum to posterior end of telson, and that of carapace length is the distance from orbital margin to midposterior margin of

carapace. The ratio, length of posteriormost pair of telsonic spines to width of terminal portion of telson, is presented in the following manner: length of spine/width of terminal portion = average ratio (*N*, number of specimens: range of variation).

GENUS *Trachypenaeus* ALCOCK

Trachypeneus Alcock, 1901: 15.—Burkenroad, 1934a: 49.—Burkenroad, 1934b: 73, 94.

Trachypenaeus.—Kubo, 1949: 391.—Dall, 1957: 202.

Type-species by original designation, *Penaeus anchoralis* Bate, 1881.

The telson of the genus *Trachypenaeus* was described by Kubo (1949) as lacking fixed spines, and by Dall (1957) as possessing several pairs of lateral movable spines. Previously, Burkenroad (1934b) had proposed a grouping of the genera of the subfamily Penaeinae in four series; he defined the series *Trachypenaeus* as having a variable number of mobile lateral spines on the telson and characterized the series *Parapenaeus* as possessing one to three pairs of movable spines in addition to a fixed posterior pair, considering the presence of fixed spines on the telson as a unique character for the latter series.

In the species of *Trachypenaeus* described below, however, the posteriormost of the four pairs of spines on the telson is fixed, and in *Trachy-*

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penaeus byrdi Burkenroad the telson lacks spines. The telson of the members of the genus, thus, must now be more broadly characterized as having several pairs of lateral movable spines, or several pairs of movable spines anteriorly and a fixed posterior pair, or unarmed. Furthermore, the evidence presented here indicates that the character of the posteriormost pair of telsonic spines is not a unique character of the series *Parapenaeus*.

The branchial formula of *Trachypenaeus* was given by Dall (1957) as follows: pleurobranchiae on somites IX to XII; a rudimentary arthrobranchia on somite VII, anterior and posterior arthrobranchiae on VIII to XII, and a posterior arthrobranchia only on XIII; mastigobranchiae (epipodites) on VII, VIII and XII [first, second maxillipeds and third pereopod], sometimes also on X and XI [first and second pereopods]. All American species possess this combination of branchiae, including epipodites on the first and second pereopods, and, in addition, a vestigial anterior arthrobranchia on somite XIII.

In *Trachypenaeus*, the anterior arthrobranchia on somite VIII is considerably displaced dorsally, and appears to occupy the position of a pleurobranchia; however, its attachment is on the arthrodistal membrane. In Figure 1 the openings of the branchiae on somites VIII and IX, together with the proximal parts of the second and third maxillipeds, are depicted; this figure clearly shows that the two arthrobranchiae on somite VIII are attached to the arthrodistal membrane, like those on somite IX, whereas the pleurobranchia on the latter somite has its origin on the pleural membrane.

Burkenroad (1934a; see also 1934b) divided the genus *Trachypenaeus* into two subgenera, *Trachypenaeus* and *Trachysalambria*, the latter possessing epipodites on the first and second pereopods, and a thelycum with a median pocket on sternite XIV; the former lacks these characters. Later, Burkenroad (1959) observed that some members of *Trachysalambria* lack such epipodites and, thus, questioned the "usefulness" of his division. Recently, a number of species from the Indo-Pacific have been described which bear epipodites on the first two pairs of pereopods but the thelyca, as indicated by Racek and

Dall (1965), differ from that Burkenroad attributed to the members of *Trachysalambria*. Consequently, more investigations are needed to interpret the interrelationships of the species of the genus. It should be pointed out, however, that all American species of *Trachypenaeus* exhibit the characters given by Burkenroad for *Trachysalambria*.

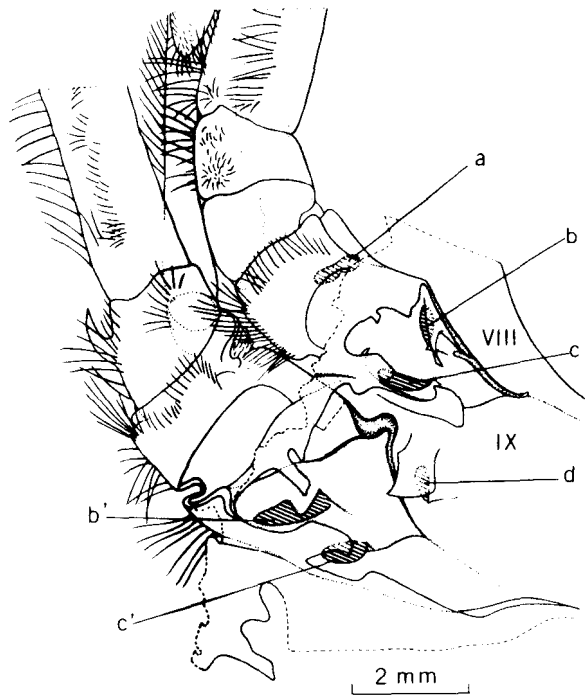


FIGURE 1.—*Trachypenaeus fuscina* sp. n., ♀ 33 mm carapace length, off Barra de San Marcos, Chiapas, México. Dorsal view of proximal part of second and third maxillipeds and attachments of gills on arthrodistal and pleural membranes of somites VIII and IX (second maxilliped has been displaced laterally). a, Podobranchia. b, b'. Anterior arthrobranchiae. c, c'. Posterior arthrobranchiae. d, Pleurobranchia.

The spelling of the generic name used here, *Trachypenaeus* instead of *Trachypeneus* as was originally published, is based on the decision reached by the International Commission on Zoological Nomenclature, Opinion 864, 1969, Bull. Zool. Nomencl. Vol. 25, Parts 4-5, p. 138-147.

Trachypenaeus fuscina SPECIES NOVA

FIGURES 1, 2, 3A, 4A-F, 5A, 6
"PINTO," "CEBRA," "TIGRE,"

Trachypenaeus faoe Lindner, 1957 [part], *nomen nudum*: 48, 49, 81, 145.—Crocker, 1967 [part]: 8, 57.

MATERIAL

Holotype.—♀, USNM 135403, off Cocodrilo, Chiapas, México, 22 m, October 31, 1969, H. Romero and G. Gómez, 35.25 mm carapace length, 135 mm total length, ratio length of spine/width of terminal portion of telson = 0.55.

Allotype.—♂, USNM 135404, off La Tapada, Chiapas, México, 22 m, July 31, 1970, D. Palacios, 26 mm carapace length, 108 mm total length, ratio length of spine/width of terminal portion of telson = 0.80.

Paratypes.—México. Oaxaca. 8 ♀, IBUNM-USNM, Salina Cruz, May, 1961, E. Martín F. 1 ♂, INIBP, Santa María Xadani, Laguna Superior, July 23, 1970, I. Pérez Farfante. 1 ♀, USNM, off Las Chiches, 24 m, August 6, 1966,

Z. Ortiz and G. Gómez. 2 ♂ 1 ♀, USNM, Golfo de Tehuantepec, July 14, 1963, I. Mayés. Chiapas. 3 ♀, USNM, off Barra de San Marcos, 27 m, March 18, 1964, A. Guerra. 3 ♀, INIBP-USNM, off mouth of Río Suchiate, 7-13 m, February 12, 1968, Romero, Ortiz, Sánchez, and Arias. 1 ♀, USNM, off La Tapada, 7-9 m, February 5, 1968, Romero, Ortiz, Sánchez, and Arias. 4 ♂ 5 ♀, INIBP-USNM, off La Tapada, 22 m, July 31, 1970, D. Palacios. 5 ♀, INIBP-USNM, off Cocodrilo, 22 m, October 31, 1969, H. Romero, and G. Gómez. Ecuador. 1 ♀, USNM, off Playas, September 2, 1962, fishermen. Perú. 2 ♀, USNM, Caleta La Cruz, Tumbes, 70 m, E. M. del Solar.

DESCRIPTION

Carapace pubescent (Figure 2); dorsum densely covered by setae; paired bands of longer setae flanking postrostral carina, from rostrum to various levels in posterior third of carapace; another band on dorsal side of antennal carina; longer setae also along cervical, hepatic and branchiocardiac sulci, and others forming patches on orbital region and posteroventral portion

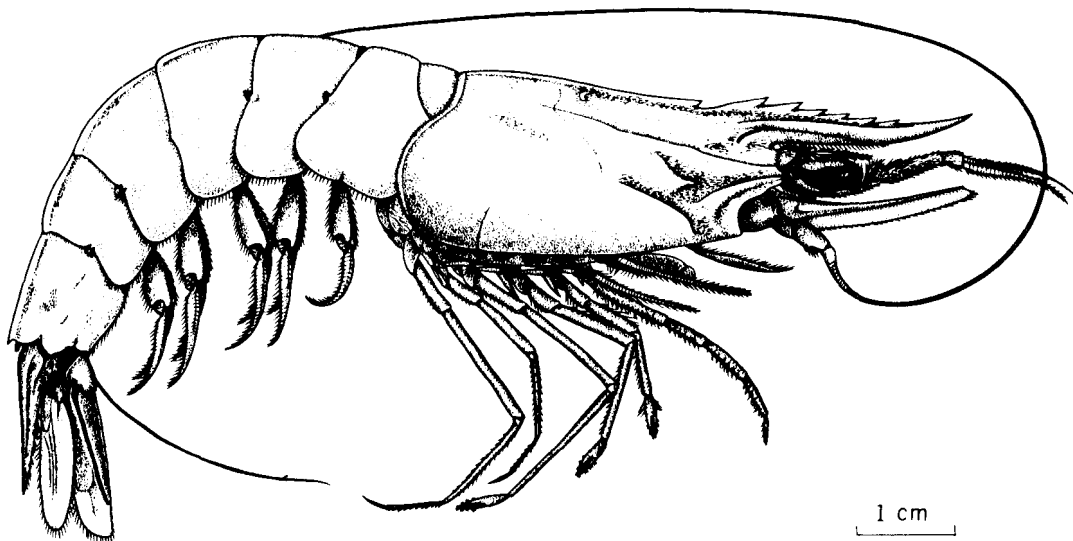


FIGURE 2.—*Trachypenaeus fuscina* sp. n. Lateral view, ♀ 33 mm carapace length, off Cocodrilo, Chiapas, México.

of antennal carina; branchial region covered with short setae; pair of small, bare, crescent-shaped to semicircular areas at anterior end of posterior third of carapace, flanking postrostral carina. Abdomen naked, except for elongate patches of long setae on each side of mid-dorsal carina on third to sixth somites, and two additional paired patches often present on sixth somite, one dorsal and other ventral to cicatrices. Telson (Figure 3A) with two pairs of longitudinal bands of long setae, one along walls of median sulcus, and other along lateral sulci.

Rostral teeth 6-7, first tooth situated immediately behind orbital margin; epigastric tooth at posterior end of anterior fourth of carapace. Rostrum reaching as far as proximal fourth of dorsal flagellum; basal portion ascending well above level of carapace, and apical one-third, unarmed portion, decreasing progressively in height, and curving upward. Adrostral carina slightly sigmoidal, ending about midway between first rostral and epigastric tooth. Postrostral carina strong, long, reaching almost to posterior margin of carapace, higher anteriorly, bearing elongate fossette, immediately behind midlength, and several pits posteriorly. Orbital angle produced into rather broad orbital spine. Gastro-orbital carina and orbito-antennal sulcus absent. Postocular sulcus deep, extending posteroventrally to about level of orbital angle. Longitudinal suture well marked, long, extending along two-thirds of carapace or slightly more. Transverse suture short, clearly distinct, situated at level of coxa of third pereiopod. Antennal and hepatic spines long and strongly acuminate. Antennal carina prominent, extending to below hepatic spine. Cervical sulcus shallow and short, not intercepting longitudinal suture. Hepatic carina and hepatic sulcus well marked, and inclined anteroventrally, their length about one-third that of carapace. Postcervical line sinuous, extending from postrostral carina to near posterior end of hepatic carina. Branchiocardiac sulcus feeble, marked ventrally by obtuse carina. Pterygostomian angle obtuse, its ventral margin sloping posteroventrally before turning backwards.

Antennular flagella subequal, shorter than either antennular peduncle or carapace, slightly longer in males than in females of same length,

and proportionally longest in subadult; ratio of flagellar length to carapace length about 0.66 in shrimp of 15 mm carapace length, ratio decreasing with increasing length of shrimp to about 0.40 in shrimp with carapace length of 40 mm. First segment of antennular peduncle with distomedian border produced into heavy, scalelike projection densely covered with long setae; distolateral spine prominent, slender and sharp; prosartema long, extending to distal end of segment; stylocerite attaining midlength of segment.

Antennal flagellum long, almost twice total length of shrimp; scaphocerite reaching distal end of antennular peduncle, elongate, its length $2\frac{1}{2}$ times maximum width; lateral, thickened margin ending anteriorly in strongly pointed spine.

Third maxilliped surpassing carapocerite by as much as dactyl and one-fourth of propodus; first pereiopod reaching, at most, base of carapocerite; second pereiopod surpassing distal end of carapocerite by as much as three-quarters of dactyl; third pereiopod exceeding carapocerite by as much as propodus and one-tenth of carpus; fourth pereiopod extending to about same level as first; fifth pereiopod very long and slender, exceeding carapocerite by entire length of dactyl, and surpassing fourth by propodus and four-fifths length of carpus. Spine on basis of third maxilliped, and, as in all members of genus, on first and second pereiopods. Epipodites on first and second pereiopods deeply bifurcate, epipodites on second maxilliped and third pereiopod unfurcate; vestigial anterior arthrobranchia on somite XIII.

Abdomen with middorsal carina extending from posterior half of second to sixth somite, carina low and rounded on second, rather acute on third, and forming high and sharp keel from fourth to sixth somites; fourth and fifth somites with posteromedian V-shaped notch; sixth somite bearing middorsal spine posteriorly, small spine at posteroventral angles, and two cicatrices on each side, anterior one sensibly longer. Telson (Figure 3A) shorter than inner ramus of uropod, with median sulcus deep anteriorly and well marked posteriorly to base of terminal portion; paired rounded carinae flanking median sulcus, and sharp carinae bordering oblique, lateral

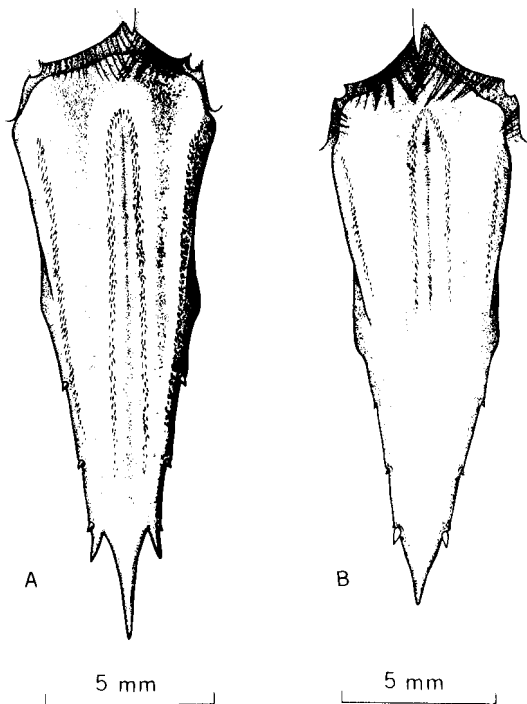


FIGURE 3.—Telsons. A. *Trachypenaeus fuscina* sp. n., ♀ 33 mm carapace length, off Cocodrilo, Chiapas, México. B. *Trachypenaeus faoea* Loesch and Avila, ♀ 37 mm carapace length, Ensenada de Garachiné, Golfo de Panamá, Panamá.

sulci; terminal portion (from mesial base of posteriormost spine to apex) from relatively short to long, its length relative to its width at base ranging from 1.60 to 3.70; telson armed with four pairs of lateral spines, posteriormost pair fixed and long, ratio length of spine/width of terminal portion = 0.70 ($N\ 27: 1-0.50$); other spines movable and strong, posterior pair (located at lateral base of longer fixed spines) relatively long, anterior two pairs (located posterior to midshoulder of telson) small, but usually visible with naked eye.

Petasma (Figure 4A, B) with large, hornlike, distolateral projections, broad at base, curving laterally, and opening dorsally near anterior margin by long, transverse slit; posteroventral wall of horns reflexed dorsally and produced forward into membranous flap; distomedian projec-

tions short, overhanging distoventral aperture of petasma. Ventrolateral lobule of petasma almost entirely cornified, including ventral wall of horns and dorsally reflexed lateral margin; proximomedian portion of lobule with rather flexible strip, tapering to base of distal two-fifths of median margin, there ending where corneous sclerite, curving mesially, reaches margin; soft elliptical area immediately distal to corneous section of margin. Dorsolateral lobule bearing narrow rib along proximomesial third, rib broadening proximally and turning mesially at proximal extremity resembling golf club. Dorsomedian lobule with narrow, distally bifurcate rib at base of distomedian projection, its length about one-third that of lobule. Length of petasma—from apex of distomedian projection to proximal margin of dorsolateral lobule—almost one and one-fifth times its width at level of distolateral projections.

In males, posterior margin of sternite XIII (Figure 4F) bearing large, elongate, subelliptical to ovate median plate, latter with obtuse to acute tip, and numerous marginal setae; anterior half of sternite XIV with strong, subpyramidal prominence, its anterolateral, ventromedially inclined edges often forming shelflike ridges.

Appendix masculina (Figure 4C-E) thick, subcircular in outline, its length along midline subequal to maximum width, and produced into two proximolateral prominences; dorsal wall cornified, except for distal and lateral margins, these, together with ventral wall, rather soft; entire, broad, median border setiferous, setae continuing on distal margin forming narrow band. Dorsal base of endopod with corneous, roughly trapezoidal sclerite, bearing strong median rib articulating distally with appendix masculina; rib with small setiferous depression on distal portion of ventral surface. Accessory sclerite on dorsolateral margin of endopod.

Thelycum (Figure 5A) with posterior part bearing anterolateral, subtriangular, heavily sclerotized projections; anterior part of sternite XIV, with platelike base, projecting as median prominence, and produced forward into pair of lateral, elongate, tongue-like flaps, extending al-

most to anterior margin of median plate; bases of flaps strongly inclined dorsomedially, forming depression limited posteriorly by prominence; margins of flaps often reflexed ventrally.

Platelike portion of sternite XIV naked; its lateral margins pronouncedly curving posteromedially, forming deep emarginations with projections from posterior part; basal portions of

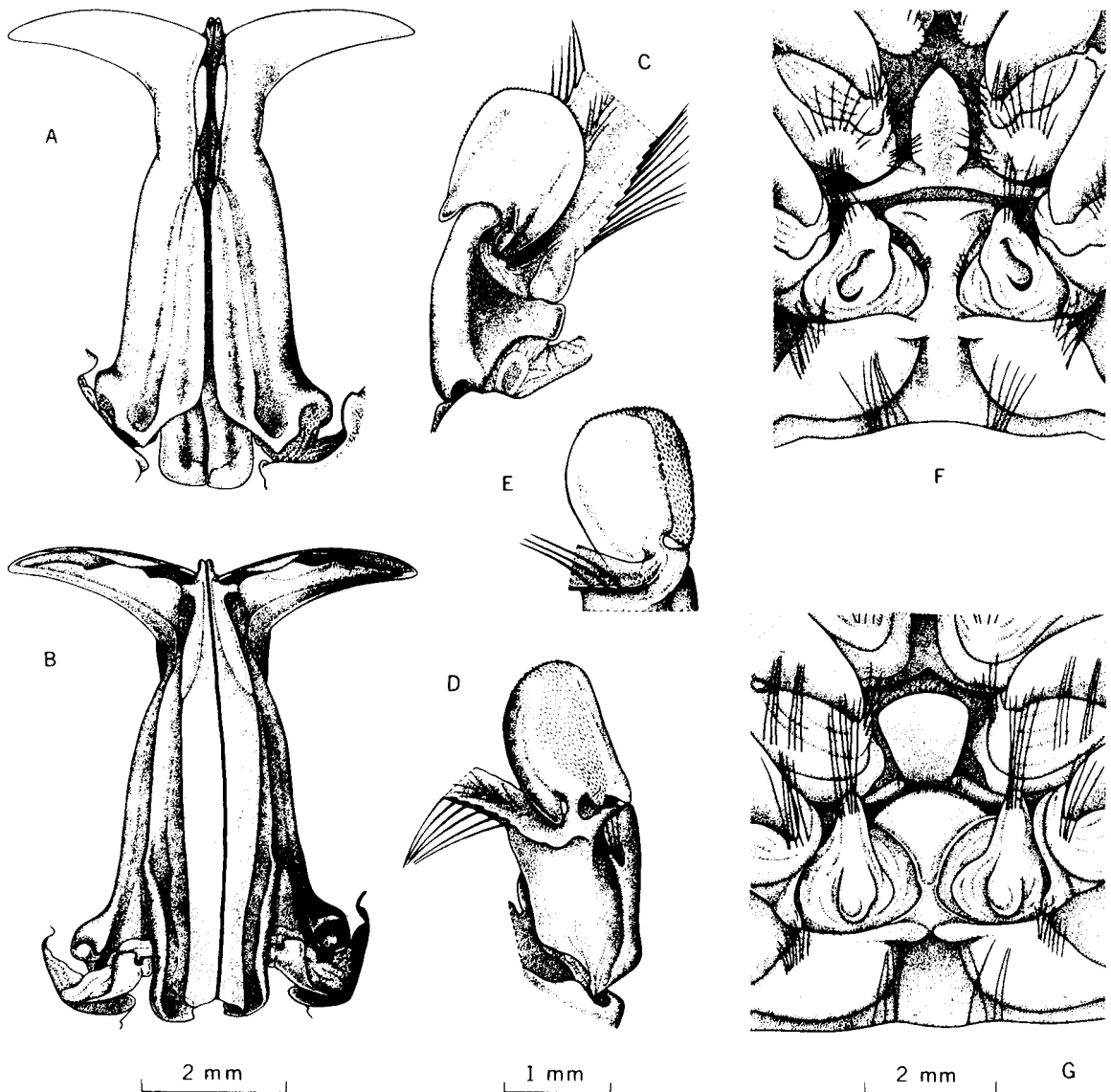


FIGURE 4.—*Trachypenaeus fuscina* sp. n., ♂ 20 mm carapace length, off Cocodrilo, Chiapas, México. Petasma: A. Ventral view. B. Dorsal view. Appendix masculina and proximal portion of endopod: C. Dorsal view. D. Ventral view (endopod displaced). E. Ventromedial view of appendix masculina. F. Sternites XIII and XIV. G. *Trachypenaeus faoea* Loesch and Avila, ♂ 18 mm carapace length, Playa Bella Vista, Panamá, sternites XIII and XIV.

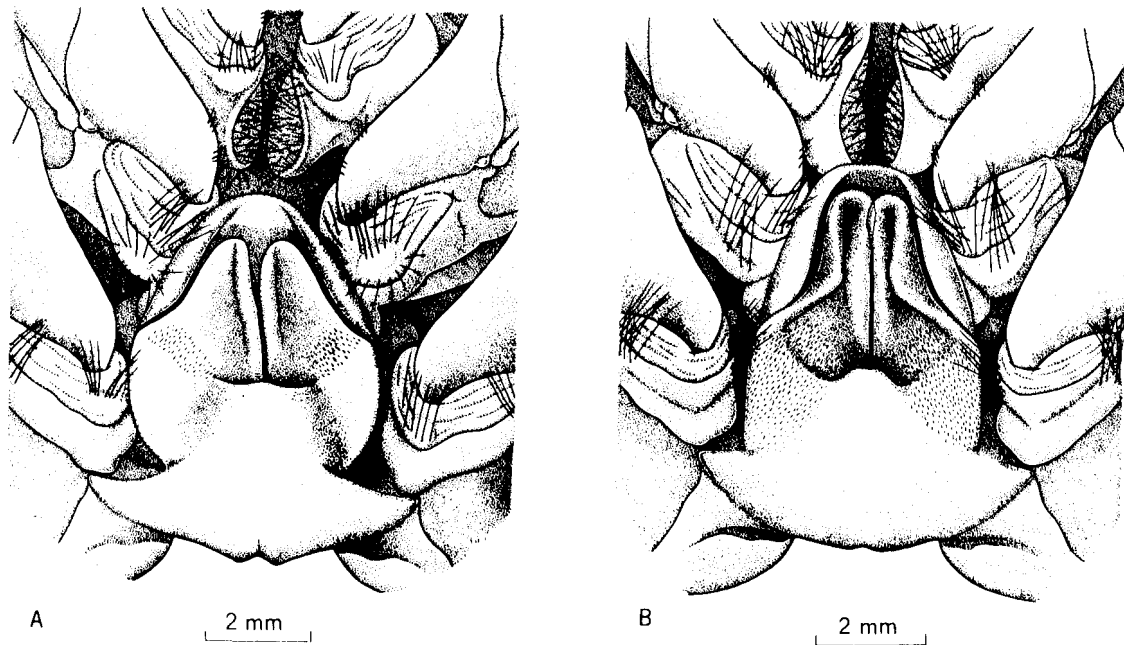


FIGURE 5.—Theelyca. A. *Trachypenaeus fuscina* sp. n., ♀ 34.5 mm carapace length, off Barra de San Marcos, Chiapas, México. B. *Trachypenaeus faoea* Loesch and Avila, ♀ 32.5 mm carapace length, Ensenada de Garachiné, Golfo de Panamá, Panamá.

flaps setose. Median plate of sternite XIII large, oval, strongly concave ventrally, with margin tumid, and bearing setae; plate extending posteriorly joining dorsal wall of flaps, thus giving rise to median pocket; latter bearing paired apertures of internal seminal receptacles laterally (Figure 6B). In impregnated females, median pocket occupied by sclerotized, sperm-free, brownish component of spermatophores, extending almost to anterior margin of median plate. Hardened, glutinous material, extruded with spermatophores, protruding through slit between flaps, forming plug on ventral surface of flaps.

Internal seminal receptacles (Figure 6A, B) consisting of paired, longitudinally arranged, trilobed, membranous sacs: single, large, posterior lobe, dorsal to median pocket, extending caudally almost to posterior margin of sternite XIV; and two small lobes, one directed anteromedially, dorsal to median plate, and the other laterally, dorsal to small hood of sternite XIV.

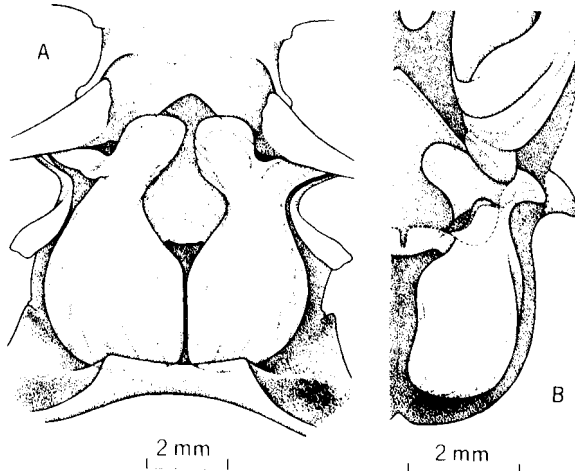


FIGURE 6.—*Trachypenaeus fuscina* sp. n. A. Seminal receptacles (dorsal view), ♀ 39.5 mm carapace length, off Salina Cruz, Oaxaca, México. B. Left seminal receptacle (ventral view), ♀ 31 mm carapace length, mouth of Río Suchiate, Chiapas, México.

Seminal receptacles derived from paired, deep invaginations at anterolateral extremities of sternite XIV. In impregnated females, seminal receptacles enclosing main component of spermatophores, consisting of thin walled sac containing subspherical masses of spermatozoa.

COLOR

Juveniles recently caught in inshore water of Oaxaca, México, light buff with brownish red suffusion; transverse, dark reddish brown bands on posterior part of abdominal somites; bands convex anteriorly, with widest portion on mid-dorsal line, extending ventrally and forming patch on posterior half of pleuron. Preserved adults (fresh ones not observed by me) with distinct dark abdominal bands, similar to those in juveniles.

SIZE

Largest specimen examined, ♀ 40.5 mm carapace length, about 150 mm total length, from off La Tapada, Chiapas, México, depth 7-9 m. Males smaller than females, largest observed ♂ allotype, 26 mm carapace length, 108 mm total length.

DISTRIBUTION

T. fuscina has been found in the Golfo de Tehuantepec, along the coasts of Oaxaca and Chiapas, México, and in the Golfo de Guayaquil, as far south as Tumbes, Perú. Although this species and *T. faoea* are sympatric in the Golfo de Guayaquil, apparently *T. fuscina* ranges farther north, since *T. faoea* has not been found along the southwestern coast of México.

REMARKS

T. fuscina is very closely related to *T. faoea*, but differs from it in several aspects—mainly in features of the telson (Figure 3A). In *T.*

fuscina the posteriormost pair of spines is longer, and fixed instead of movable, this being the only member of the genus *Trachypenaeus* with immovable spines on the telson; the anterior three pairs of telsonic spines are stronger than in *T. faoea*, particularly those spines at the lateral base of the posteriormost pair; also the median sulcus is well marked as far as the base of the terminal portion of the telson. In *T. fuscina* the platelike base of the anterior part of sternite XIV in females (Figure 5A) is naked, and its lateral margins curve strongly posteromesially, giving rise to a deep emargination at the junction of the plate with the posterior part of the thelycum (sternite XIV). In males, the median plate of sternite XIII narrows anteriorly, usually tapering to a point (Figure 4F).

It should be pointed out that during copulation in this species, as well as in *T. faoea*, the male transfers to each seminal receptacle a very thin sac containing the spermatozoa, which are grouped into subspherical masses. These masses are not individually transmitted to the seminal receptacles as believed by Burkenroad (1934b), a phenomenon considered by him to be typical of the genus *Trachypenaeus*.

ETYMOLOGY

Fuscina, L., = three-pronged fork—referring to the trifid appearance of terminal portion of telson.

Trachypenaeus faoea LOESCH AND AVILA

FIGURES 3B, 4G, 5B

"CEBRA," "TIGRE," "INDIO," "CARABALI"

Trachypenaeus faoe Lindner, 1957 [part], *nomen nudum*: 34, 35, 42, 43, 48, 49, 60, 61, 133, 134.

—U.S. Fish and Wildlife Service, 1962: 2, 6.—

Croker, 1967 [part]: 8, 19, 30, 39, 47, 57.

Trachypenaeus faoea Loesch and Avila, 1964: 4-8, 16, 21, 24-28, fig. 8b, 13b.—Avila and Loesch, 1965: 3, 5, 6, 9, 10, 16, 19, 20, 23, 24, fig. 4b.

Trachypenaeus face.—Food and Agriculture Organization of the United Nations, 1965: 10.

MATERIAL

Neotype.—♀, USNM 135398, Playas, Ecuador, January 7, 1964, Ortiz, 28 mm carapace length, 110 mm total length, ratio length of spine/width of terminal portion of telson = 0.25.

Panamá. 7 ♂ 21 ♀, USNM, Playa Bella Vista, March 20, 1955, M. D. Burkenroad. 3 ♀, USNM, Ensenada de Garachiné, Bahía San Miguel, 16 m, April 18, 1967, Shimada Sta. 14. 3 ♀, USNM, 4 km W of Punta Garachiné, 24 m, April 18, 1967, Shimada Sta. 78. Colombia. 7 ♀, USNM, Tortugas Grounds, S of Buenaventura, 9 m, September 19, 1969, L. W. Knapp, Cacique Sta. LK69-24. Ecuador. 22 ♀, USNM, Playas, January 7, 1964, Ortiz. 1 ♂ 4 ♀, USNM, Boca de Tenguel, April 14, 1966, Ansaldo.

TYPE MATERIAL

Loesch and Avila (1964) did not cite any material in particular; however, as the title of their work indicates, the specimens studied and illustrated in their keys were from Ecuador. Because of the close similarities between *T. faoea* and *T. fuscina* it seems mandatory that a neotype of *T. faoea* be selected, so that no confusion will arise as to the identity of the species of Loesch and Avila. Therefore, a neotype is here designated from a lot of females of *Trachypenaeus faoea* collected in Playas, Ecuador, which was identified and sent to me by the authors of the species. Inasmuch as the combination of specific morphological characters of this species have not been indicated previously, they are presented here.

"*Trachypeneus faoe*" first appeared in the literature in the report of a survey of the shrimp fisheries of Central and South America by Lindner (1957). This author grouped it with *T. byrdi* as one of the "larger zebra shrimp," noting the "blue-black" stripes on the abdomen and citing various other common names. Lindner, obviously, did not intend to describe the species, and did not include any specific character. He reported "*T. faoe*" in the shrimp fisheries of the American Pacific, from México to Perú, including El Salvador, Costa Rica, Panamá, Colombia, and Ecuador. Later (U. S. Fish and Wildlife

Service, 1962) the species was cited as one of "medium and small" shrimp found in the catches of Guatemala.

The original description of the species appeared in the keys to the commercial penaeid shrimps of Ecuador by Loesch and Avila (1964), and was mistakenly ascribed to Burkenroad. As stated by Avila and Loesch (1965), Burkenroad had planned to describe the species, but had not done so prior to the publication of their keys, nor has his description appeared since. *T. faoea* was distinguished from other penaeids found in the Ecuadorian catches on the basis of four morphological characteristics and color pattern. The following characters were cited: "No teeth on ventral portion of rostrum. . . . No well-developed dorsolateral sulcus on the posterior part of the last abdominal segment. . . . Backward-pointing dorsal spine on last abdominal segment only. . . . Telson not armed with lateral armature." The first two characters are shared by many species treated in their keys, and are actually supraspecific; the third character is common to all but one (*T. byrdi* Burkenroad) of the American Pacific *Trachypenaeus*, and the fourth is inaccurate: *T. faoea* does possess small lateral spines on the telson.

The color of the species was described as follows: "Tail section light anteriorly and dark posteriorly on each abdominal segment. . . . No distinctive patterns on second and third abdominal segments, each segment similarly colored with wide dark band covering $\frac{3}{4}$ the width of posterior part of each abdominal segment. More than $\frac{1}{2}$ of color of tail is dark (dark brown)." An entire animal and a separate abdomen were figured. In both illustrations the telson appears unarmed. The figure of the entire animal is accompanied by the rostral tooth formula, $\frac{6-7}{0}$. Of the characters cited, color is the only one that appears to be typical of the species, and it can only be applied to identification of fresh or recently preserved animals. It is unfortunate that circumstances prevented Loesch and Avila, who dealt with large numbers of specimens, from publishing a detailed description of *T. faoea*.

T. faoea is very closely related to *T. fuscina*, and except for the following, the above descrip-

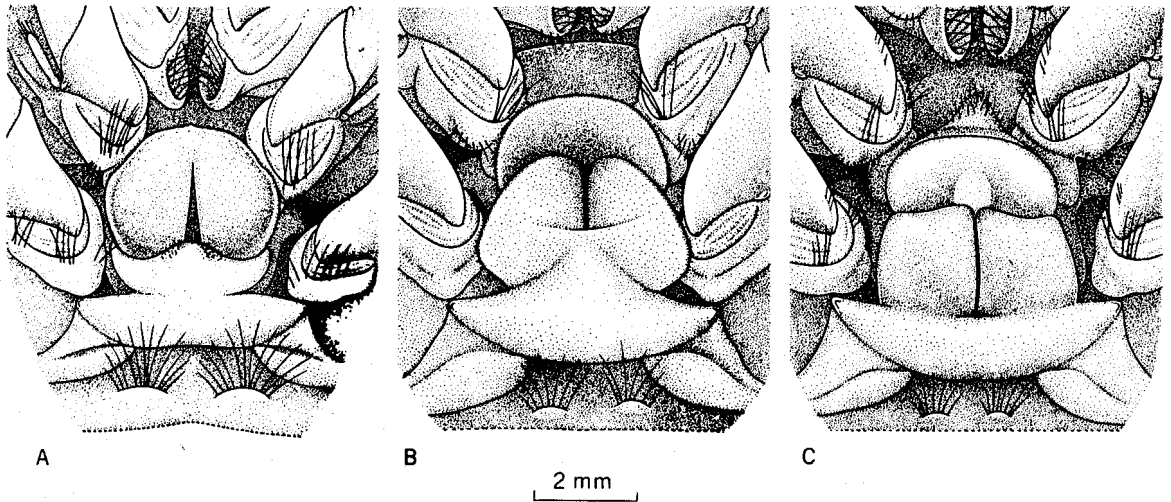


FIGURE 7.—Thelyca. A. *Trachypenaeus brevisuturae* Burkenroad, ♀ 21.5 mm carapace length, off Zacapulco, Chiapas, México. B. *Trachypenaeus byrdi* Burkenroad, ♀ 27 mm carapace length, Golfo de Panamá, Panamá (syntype). C. *Trachypenaeus similis pacificus* Burkenroad, ♀ 25 mm carapace length, Archipiélago de las Perlas, Golfo de Panamá, Panamá (syntype).

tion of *T. fuscina* also applies to *T. faoea*: the armature of the telson, the shape and pubescence of the platelike base of the anterior part of sternite XIV in females, the marginal contour of the median plate of sternite XIII in males, and perhaps color.

In *T. faoea* the posteriormost of the four pairs of spines on the telson (Figure 3B) are movable instead of fixed, and shorter than those of *T. fuscina*, the ratio length of spine/width of terminal portion = 0.40 ($N\ 47: 0.75-0.20$); the other three pairs of movable spines, including those located at the lateral base of the posteriormost spines, are minute, actually microscopic. In *T. faoea* the median sulcus of the telson is deep anteriorly but hardly perceptible or indistinct posteriorly.

In males of *T. faoea* the median plate at the posterior margin of sternite XIII (Figure 4G) usually varies from subtrapezoidal (widest anteriorly) to suborbicular. In females, the structure of the thelycum (Figure 5B) is similar to that of *T. fuscina*; however, lateral margins of the platelike base of the anterior part of sternite XIV are almost straight, not or barely curving posteromesially, forming about 90° angles with

projections of the posterior part; furthermore, the lateral areas of that platelike portion are studded with rather densely set setae, the latter extending onto basal portions of the flaps.

Avila and Loesch (1965) described the color of recently preserved juvenile specimens of *T. faoea* as dark blue or purple with light uropods. They noticed that specimens preserved for 2 days in 5% Formalin exhibit a clear, horse-shoe shaped band on the first three abdominal somites, which is open anteriorly. These observations were based on material from Ecuador and differ from those made by me on *T. fuscina*. Recorded notes on color are so limited that conclusions in regard to differences in this character between the two species must await further observations throughout their ranges.

DISTRIBUTION

Although this species has been reported from as far north as the coasts of Guatemala, El Salvador and Costa Rica, the collections available to me are limited to the area from Panamá to Ecuador. Examination of additional samples of

“cebra,” or “tigre” shrimp from Central and South America will be necessary to establish the actual distribution of *T. faoea* as well as that of *T. fuscina*, both known by the same common names.

With the discovery of an additional species of *Trachypena* in the American Pacific, it seems appropriate to present a key to the five members of the genus occurring in the region, together with the range of each.

KEY TO THE AMERICAN PACIFIC SPECIES OF *Trachypena*

1. Carapace with longitudinal suture short, not extending to hepatic spine. Third maxilliped lacking spine on basis; first pereopod bearing spine on ischium. Thelycum with median plate armed with small anteromedian spine (clearly distinct in juvenile, barely perceptible in adult); anterior part of sternite XIV shorter than posterior part, and not produced as paired flaps (Figure 7A). Petasma with dorsal spinelike projection near apex of horn *T. brevisuturæ* Burkenroad
 (From off Punta Arenas, Golfo de California, to El Salvador).
- Carapace with longitudinal suture long, extending posteriorly beyond hepatic spine. Third maxilliped bearing spine on basis; first pereopod lacking spine on ischium. Thelycum with median plate lacking anteromedian spine; anterior part of sternite XIV longer than posterior part, and produced as paired flaps. Petasma without projection near apex of horn 2
2. Spine present on posterior end of middorsal carina of last two, three, or four abdominal somites. Telson unarmed. Thelycum with slit between flaps never reaching posterior part of sternite XIV, and with median plate short, not reaching gonopores (Figure 7B) *T. byrði* Burkenroad
 (From Guatemala to Golfo de Guayaquil)
- Spine present only on posterior end of middorsal carina of last abdominal somite. Telson armed with lateral spines. Thelycum with slit between flaps reaching posterior part of sternite XIV, if not, with median plate long, reaching, or almost reaching, gonopores 3
3. Rostral teeth 7 to 10, usually 8 or more. Telson with proximal triangular patch of long setae on each side of median sulcus. Thelycum with median plate not excavated, short, and protruding ventrally on midportion. Anterior part of sternite XIV lacking platelike base and bearing subrectangular flaps, extending only to posterior part of median plate (Figure 7C) *T. similis pacificus* Burkenroad
 (From Bahía Concepción, Golfo de California, to Tumbes, Perú)
- Rostral teeth 6 or 7. Telson lacking proximal, triangular patches of long setae. Thelycum with median plate strongly excavated. Anterior part of sternite XIV with platelike base, and bearing paired, much elongate, tonguelike flaps, extending well beyond midlength of median plate 4
4. Telson with posteriormost pair of lateral spines fixed. Thelycum with platelike base of anterior part of sternite XIV lacking setae on each side, its lateral margins strongly curving posteromesially, forming deep emargination with posterolateral projections (Figure 5A) *T. fuscina* sp. n.
 (Golfo de Tehuantepec and Golfo de Guayaquil)
- Telson with posteriormost pair of lateral spines movable. Thelycum with platelike base of anterior part of sternite XIV setose, its lateral margins almost straight, forming about 90° angles with posterolateral projections (Figure 5B) *T. faoea* Loesch and Avila
 (From Guatemala to Golfo de Guayaquil)

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LITERATURE CITED

- ALCOCK, A.
1901. A descriptive catalogue of the Indian deep-sea Crustacea Decapoda *Macrura* and *Anomala*, in the Indian Museum. Being a revised account of the deep-sea species collected by the Royal Indian Marine survey ship *Investigator*. Indian Museum, Calcutta, v + 286 p., 3 pls.
- AVILA, Q., AND H. LOESCH.
1965. Identificación de los camarones (*Penaeidae*) juveniles de los esteros del Ecuador. (Identificación de the juvenile shrimp (*Penaeidae*) of the Ecuadorian estuaries.) Bol. Cient. Téc. (Guayaquil) 1(3), 24 p.
- BATE, C. S.
1881. On the *Penaeidea*. Ann. Mag. Nat. Hist., Ser. 5, 8: 169-196, pls. 11-12.
- BURKENROAD, M. D.
1934a. Littoral *Penaeidea* chiefly from the Bingham Oceanographic Collection with a revision of *Penaeopsis* and descriptions of two new genera and eleven new American species. Bull. Bingham Oceanogr. Collect. Yale Univ. 4, Artic. 7, 109 p.
- 1934b. The *Penaeidea* of Louisiana with a discussion of their world relationships. Bull. Am. Mus. Nat. Hist. 68: 61-143.
1938. The Templeton Crocker Expedition. XIII. *Penaeidae* from the region of Lower California and Clarion Island, with descriptions of four new species. Zoologica 23: 55-91.
1959. Addenda et corrigenda au Memoire XXV. *Penaeidae* par Martin D. Burkenroad (pages 67-92). In Mission Robert Ph. Dollfus en Egypte (décembre 1927 — mars 1929), S. S. "Al Sayad." Résultats scientifiques, 3^e Partie [contributions] (XXIII-XXXIV), p. 285. Centre national de la recherche scientifique, Paris.
- CROKER, R. S.
1967. The shrimp industry of Central America, the Caribbean Sea, and northern South America. U.S. Fish Wildl. Serv., Foreign Fish. Leaflet 74, 127 p.
- DALL, W.
1957. A revision of the Australian species of *Penaeinae* (Crustacea Decapoda: *Penaeidae*). Aust. J. Mar. Freshwater Res. 8: 136-231.
- FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS.
1965. Informe al gobierno de El Salvador sobre la pesquería de camarones y los recursos camarones de El Salvador. Basado en el trabajo de Robert W. Ellis, biólogo de pesca de la FAO/PAAT. Rep. FAO/EPTA 1936, 46 p.
- KUBO, I.
1949. Studies on penaeids of Japanese and its adjacent waters. J. Tokyo Coll. Fish. 36(1), 467 p.
- LINDNER, M. J.
1957. Survey of shrimp fisheries of Central and South America. U.S. Fish Wildl. Serv., Spec. Sci. Rep. Fish. 235, 166 p.
- LOESCH, H., AND Q. AVILA.
1964. Claves para identificación de camarones peneidos de interés comercial en el Ecuador. (Identification keys for commercial Ecuadorian penaeid shrimp.) Bol. Cient. Téc. (Guayaquil) 1(2), 29 p.
- RACEK, A. A., AND W. DALL.
1965. Littoral *Penaeinae* (Crustacea Decapoda) from northern Australia, New Guinea, and adjacent waters. Verh. K. Ned. Akad. Wet. Afd. Natuurkd. Sect. 2, 56(3): 1-116, 13 pls.
- U.S. FISH AND WILDLIFE SERVICE.
1962. Fisheries survey of shrimp fisheries in Guatemala, El Salvador and Nicaragua. U.S. Fish Wildl. Serv., Mark. News Leaflet 74, 13 p.