
THE FRESHWATER SHRIMPS
(ATYIDAE AND PALAEMONIDAE)
OF JAMAICA, W. I.

With a Discussion of Their Relation to the Ancient
Geography of the Western Caribbean Area

BY
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THE FRESHWATER SHRIMPS (ATYIDAE AND PALAEMONIDAE)
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ABSTRACT.—The following freshwater shrimps are reported from Jamaica, W. I.—Family Palaemonidae: *Macrobrachium acanthurus*, *M. carcinus*, *M. crenulatum*, *M. faustum*, and *M. heterochirus*; family Atyidae: *Atya occidentalis*, *A. scabra*, *Jonga serrei*, *Micritya poeyi*, *Polimirim americana*, *P. mexicana*, and *Xiphocaris elongata*. Detailed ecological data are given for all collecting stations, and a brief discussion of the relation of a few groups of animals to the geological history of the western Caribbean is included.

When the amount of work that has been done on other aspects of Jamaica's animal life is considered, it is surprising how little work has been done on the freshwater shrimps.

Early in 1959 I became aware of the need for a study of the Jamaican freshwater shrimps to add to the already available knowledge of the crustacea of the Caribbean region, and possibly to serve as a basis for a study of the relationships between the freshwater fauna of the Caribbean islands and their ancient geography.

In April, 1959, I visited Jamaica and, with the cooperation of the Institute of Jamaica in Kingston, was able to collect shrimps from a number of representative drainage systems. I returned to Jamaica in January, 1960,¹ and continued these collections, at that time filling in many important gaps which I had missed on the first trip.

Although the number of species dealt with here is not large, it probably represents most, if not all, of the freshwater shrimps found in Jamaica—exclusive of those which may inhabit subterranean waters.

Except where noted, all collections were made by myself, either alone or with the assistance of Dr. Thomas Farr, Mr. Ronald Bengry, or Mrs. Gloria Thomas. Where records in the literature are sufficiently detailed and reliable, they are included and the sources given. References in the literature giving locality data only as "Jamaica" are included in a separate paragraph under the pertinent species.

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The collections made on these trips have been deposited in the Academy of Natural Sciences of Philadelphia (ANSP), in the Rijksmuseum van Natuurlijke Historie in Leiden, Netherlands (RMNH), and in the U. S. National Museum in Washington, D. C. (USNM). A synoptic series has been deposited in the Institute of Jamaica in Kingston (IJ).

I am most grateful to Dr. Bernard Lewis, Director of the Institute of Jamaica, for his cooperation and help in carrying out these studies. Dr. Thomas Farr, Mr. Ronald Bengry, and Mrs. Gloria Thomas, also of the Institute of Jamaica, were most generous with their time and assistance on both of my visits. I am also indebted to Dr. L. B. Holthuis of the Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands; Dr. Fenner Chace of the U. S. National Museum, Washington, D. C.; and Dr. Horton Hobbs of the University of Virginia for their help. Dr. Alfred E. Smalley of Tulane University, New Orleans, La., most generously loaned me specimens of *Potimirim americana* that he collected in Jamaica in June, 1960.

COLLECTING STATIONS

Figure 1 shows the locations of collecting stations (1-42) visited in 1959 and 1960. The data corresponding to this figure (in the *first* paragraphs under the respective parishes, below) give the station numbers, the collection numbers (from which may be gathered the collecting dates—i.e., coll. no. 9-459-1 = 9 April 1959, collection no. 1), the station locations, descriptions, and altitudes. The altitudes given are those of the next map contour lines above the respective stations. The stations should, therefore, be considered to be slightly lower than the elevation given.

Table 1 summarizes the species found at Stations 1-42 so that an idea may be gained of what species are found together. It should be remembered, however, that although several species may have been taken at any

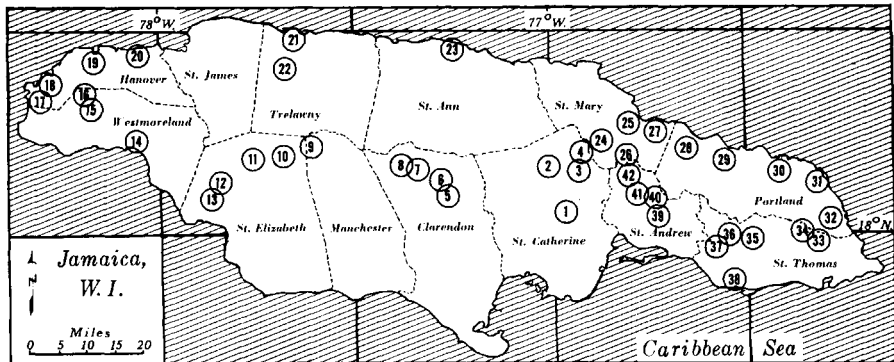


FIGURE 1.—Map of Jamaica, W. I., showing the locations of collecting stations visited in 1959 and 1960. Table 1 summarizes the shrimp species collected at each of these stations.

one collecting station, those species do not necessarily inhabit the same ecological niches within the bounds of the station. Table 1 corresponds to Figure 1.

Figure 2 shows the locations (A-K) of collecting stations which appear in the literature or which are the sources of other collections which I have examined. The data corresponding to this figure (included in the *second* paragraphs under the respective parishes, below) give the information that is available with these collections. An exclamation point (!) following the data indicates that I have not personally examined the specimens involved. The altitudes given are, of necessity, only reasonable guesses.

Table 2 summarizes the species found in other collections that I have examined or which appear in the literature (Stations A-K). It corresponds to Figure 2.

TABLE 1.—Summary of shrimp species collected at Stations 1-42. (See fig. 1.)

Shrimps	Collecting Stations													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Macrobrachium acanthurus</i>									X					X
<i>Macrobrachium carcinus</i>								X					X	
<i>Macrobrachium faustinum</i>	X	X	X	X	X	X	X	X		X	X	X		
<i>Macrobrachium heterochirus</i> ...														
<i>Atya occidentalis</i>			X						X					
<i>Atya scabra</i>		X				X	X							
<i>Jonga serrei</i>														
<i>Micratya poeyi</i>						X							X	
<i>Potimirim mexicana</i>												X		
<i>Xiphocaris elongata</i>											X	X		X

Shrimps	Collecting Stations													
	15	16	17	18	19	20	21	22	23	24	25	26	27	28
<i>Macrobrachium acanthurus</i>			X	X	X		X				X			
<i>Macrobrachium carcinus</i>														X
<i>Macrobrachium faustinum</i>	X		X		X	X	X	X	X	X	X	X	X	X
<i>Macrobrachium heterochirus</i> ...								X				X		
<i>Atya occidentalis</i>								X	X	X				
<i>Atya scabra</i>														
<i>Jonga serrei</i>					X		X							
<i>Micratya poeyi</i>	X								X	X		X	X	X
<i>Potimirim mexicana</i>	X													
<i>Xiphocaris elongata</i>	X	X	X	X	X	X	X		X	X	X	X	X	

Shrimps	Collecting Stations													
	29	30	31	32	33	34	35	36	37	38	39	40	41	42
<i>Macrobrachium acanthurus</i>														
<i>Macrobrachium carcinus</i>				X										
<i>Macrobrachium faustinum</i>		X	X	X	X		X		X	X				
<i>Macrobrachium heterochirus</i> ...					X			X	X				X	
<i>Atya occidentalis</i>	X						X	X	X	X		X		
<i>Atya scabra</i>														
<i>Jonga serrei</i>				X										
<i>Micratya poeyi</i>	X				X									
<i>Potimirim mexicana</i>														
<i>Xiphocaris elongata</i>	X	X	X	X	X	X	X			X		X	X	X

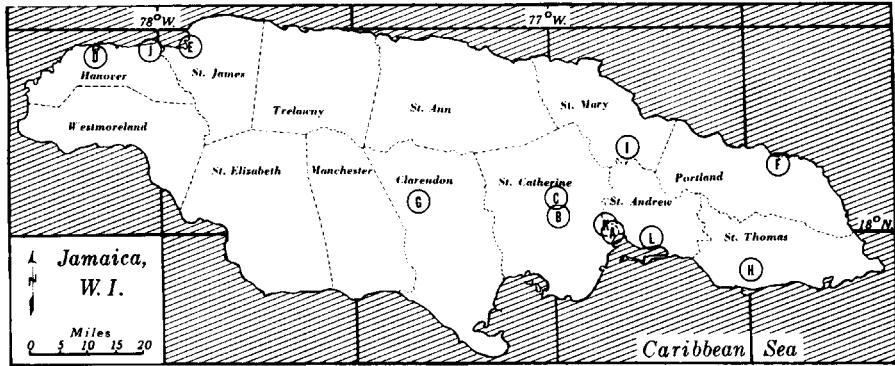


FIGURE 2.—Map of Jamaica, W. I., showing the locations of collecting stations which appear in the literature or which are the sources of collections that I have examined. Table 2 summarizes the shrimp species collected at each of these stations.

TABLE 2.—Summary of shrimp species found in other collections or which appear in the literature. (See fig. 2.)

Shrimps	Collecting Stations											
	A	B	C	D	E	F	G	H	I	J	K	L
<i>Macrobrachium acanthurus</i>	X				X							
<i>Macrobrachium carcinus</i>		X	X	X		X						
<i>Macrobrachium crenulatum</i>					X					X		
<i>Macrobrachium faustinum</i>					X					X	X	X
<i>Macrobrachium heterochirus</i>								X				
<i>Atya scabra</i>							X					
<i>Potimirim americana</i>									X			

Clarendon Parish

Station 5 (coll. no. 9-459-1)—Tributary of Thomas River at Summerfield; 25 ft. wide; 1-2 ft. deep; sand bottom; current sluggish; water turbid and containing much debris; altitude 750 ft. **Station 6** (coll. no. 9-459-2)—Thomas River, at ford 1 mi. N. of Summerfield; 30-40 ft. wide; 1-2 ft. deep; sand and rock bottom; current moderate; water clear; altitude 750 ft. **Station 7** (coll. no. 9-459-3)—Rio Minho at confluence with Pennants River; broad river bed, but stream only 25 ft. wide because of lack of rain; 2-3 ft. deep; rock and gravel bottom; current moderate to swift; water clear; altitude 750 ft. **Station 8** (coll. no. 9-459-4)—Rio Minho near Guinea Corn; 25-35 ft. wide; 1-2 ft. deep; some sand in bed, mostly of bed rock; current moderate; water clear; altitude 1,000 ft.

Station G—Rio Minho, 2 mi. S.E. of Crooked River P. O.; altitude about 1,000 ft.; coll. of *Atya scabra* by R. Proctor, in Institute of Jamaica.

Hanover Parish

Station 17 (coll. no. 11-160-2)—Small stream flowing into Great Morass, 250 ft. N. of Westmoreland-Hanover parish boundary; 3-5 ft. wide; less than 1 ft. deep; sand and mud bottom; current sluggish; water clear; altitude 50 ft. **Station 18** (coll. no. 11-160-3)—Roadside drainage ditch containing permanent water, $\frac{1}{4}$ mi. S. of Salt Spring; 3-4 ft. wide; 1-3 ft. deep; sand and mud bottom; current sluggish; water clear; altitude 50 ft. **Station 19** (coll. no. 10-459-4)—West Lucea River at Eaton, near ford; 10-50 ft. wide; 2-3 ft. deep; sand and gravel bottom; current swift; water turbid;

altitude 100 ft. **Station 20** (coll. no. 10-459-5)—Flint River near highway bridge; 25-40 ft. wide; 1-2 ft. deep; rocky bottom with some sand; current swift; water clear; altitude 100 ft.

Station D—Lucea (probably W. Lucea River); altitude, about 50 ft.; USNM collection of *Macrobrachium carcinus*. **Station J**—Flint River near Sandy Beach; altitude, about 50 ft.; USNM coll. of *M. crenulatum*.

Manchester Parish

Station 9 (coll. no. 13-160-2)—One Eye River,² 100 yards S. of bridge S. Auchtem-

² This river is known locally as Roaring River and Noisy River, as well as One Eye River. It may be connected underground with Hectors River. beddie; 25-35 ft. wide; 1-2 ft. deep; gravel bottom interspersed with large boulders; current swift; water clear; altitude 750 ft.

Portland Parish

Station 28 (coll. no. 8-459-2)—Buff Bay River near Charles Town; 300-400 ft. wide; 3-5 ft. deep; sand bottom with large rocks; current swift; water clear; altitude 500 ft. **Station 29** (coll. no. 8-459-3)—Tributary of Back River near Elysium; 6 ft. wide; 1-2 ft. deep; sand and gravel bottom; current rapid; water muddy; altitude 250 ft. **Station 30** (coll. no. 8-459-4)—Sandy River at Fellowship (trib. of Rio Grande); 75-100 ft. wide; 1-3 ft. deep; sand and gravel bottom; current moderate; water clear; altitude 250 ft. **Station 31** (coll. no. 8-160-2)—Priestmans River, 100 ft. upstream from highway bridge; 25-35 ft. wide; 1-3 ft. deep; sandy mud bottom with some large stones; flow back and forth, apparently affected by wave action of nearby sea; water clear and probably brackish; altitude, near sea level. **Station 32** (coll. no. 8-160-1)—Drivers River, at ford about 1 mi. W. of Muerton; 30-50 ft. wide; 1-5 ft. deep; sand bottom with some rocks and abundant aquatic vegetation near rt. bank; current moderate to swift; water clear; altitude 50 ft.

Station F—"Streams around Port Antonio," (Andrews, 1892: 75); altitude ca. 50 ft.; coll. of *Macrobrachium carcinus*!

St. Andrew Parish

Station 39 (coll. no. 6-459-3)—Mammee River near Maryland; 12-15 ft. wide; 1-3 ft. deep; sand bottom with large rocks; current very swift; water clear; altitude 1,250 ft. **Station 40** (coll. no. 5-160-1)—Wag Water River near its entrance into Hermitage Reservoir; 15-20 ft. wide; 1-4 ft. deep; sand bottom with large boulders; current swift; water clear; altitude 1,750 ft. **Station 41** (coll. no. 5-160-2)—Moresham River at its entrance into Hermitage Reservoir; 10-15 ft. wide; 1-2 ft. deep; steep gradient among boulders; current very rapid; water clear; altitude 1,750 ft. **Station 42** (coll. no. 8-160-3)—Tributary of Wag Water River several hundred yards N. of Coakley; 1-3 ft. deep pool in rock cleft extending into side of mountain about 30 ft.; spring fed; current only slight; water clear; altitude 1,000 ft.

Station L—Kingston, Jamaica [W. J. Fox, 1891; coll. of *Palaemon jamaicensis* (= *Macrobrachium faustinum*) in ANSP coll., no. 1001].

St. Ann Parish

Station 23 (coll. no. 10-459-7)—Great River at Llandoverly; 30-50 ft. wide; 1-5 ft. deep; sand bottom; current very rapid; water turbid; altitude 100 ft.

St. Catherine Parish

Station 1 (coll. no. 7-459-2)—Rio Cobre at Raby's Corner, near Flat Bridge; 50-75 ft. wide; 2-3 ft. deep; rocky bottom; current swift; water clear; altitude 250 ft.

Station 2 (coll. no. 7-459-3)—Stream in Byndloss Gully, $1\frac{1}{2}$ mi. N. of Linstead on road to Ewarton; 25-30 ft. wide; 1-2 ft. deep; current moderate; water clear; altitude 500 ft. **Station 3** (coll. no. 7-459-4)—Rio D'Oro at William's Field; 25-35 ft. wide; 1-2 ft. deep; sand bottom; current moderate; water clear; altitude 500 ft. **Station 4** (coll. no. 7-459-5)—Troja River beside road between Troja and Harewood; 4-5 ft. wide; less than 1 ft. deep; sand bottom; current moderate; water clear; altitude 750 ft.

Station A—Rio Cobre near Kingston Harbour; USNM coll. of *Macrobrachium acanthurus*; altitude about 50 ft. **Station B**—Rio Cobre near Flat Bridge; altitude 250 ft.; Institute of Jamaica coll. of *M. carcinus*. **Station C**—Rio Cobre at Bog Walk; altitude 500 ft.; Institute of Jamaica coll. of *M. carcinus*. **Station K**—Fresh River; altitude 50 ft.; USNM coll. of *M. faustinum*.

St. Elizabeth Parish

Station 10 (coll. no. 9-459-5)—Black River at Windsor Bridge; 15-20 ft. wide (flooded); ? ft. deep; current very swift; water muddy; altitude 500 ft. **Station 11** (coll. no. 9-459-6)—Tributary of Black River between Vauxhall and Maggoty; 30-40 ft. wide (flooded); ? ft. deep; current rapid; water muddy; altitude 750 ft. **Station 12** (coll. no. 9-459-7)—Ys River at Ys; 10-20 ft. wide (flooded); ? ft. deep; current very swift; water muddy; altitude 100 ft. **Station 13** (coll. no. 9-459-8)—Black River Morass at Middle Quarters; specimens bought from small boy; specimens reputedly caught in traps in Black River Morass; altitude 100 ft.

St. Mary Parish

Station 24 (coll. nos. 7-459-6 and 7-160-1)—Tributary of Trunnels River, crossing road about 4 mi. S. of Richmond; 6-10 ft. wide; less than 1 ft. deep; sandy mud bottom; current slow to moderate; water clear; altitude 750 ft. **Station 25** (coll. no. 7-459-7)—Wag Water River below bridge W. of Chovey; 20-30 ft. wide; 1-4 ft. deep; gravel and rock bottom; current moderate; water clear; altitude 50 ft. **Station 26** (coll. no. 7-459-8)—Wag Water River at Castleton Gardens; 50-75 ft. wide; 1-3 ft. deep; sand bottom with scattered large boulders; current moderate to swift; water clear; altitude 750 ft. **Station 27** (coll. no. 8-459-1)—Pencar River at Fort George, 2 mi. S. of Annotto Bay; 50-100 ft. wide; 1-4 ft. deep; sand and gravel bottom; current slow to moderate; water clear to slightly turbid; altitude 100 ft.

Station I—Tributary of Wag Water River 4 mi. N. of Castleton Gardens; altitude 750 ft.; Tulane University coll. of *Potimirim americana*.

St. James Parish

Station E—Montego Bay (probably the Montego River); altitude about 50 ft.; USNM coll. of *Macrobrachium acanthurus* and American Museum of Natural History coll. of *M. faustinum*!

St. Thomas Parish

Station 33 (coll. no. 5-459-1)—Sulphur River, $\frac{1}{2}$ mi. N. of Bath Fountain Hotel; 10-20 ft. wide; 1-15 ft. deep; sand and rock bottom; current moderate; water clear; altitude 1,000 ft. **Station 34** (coll. no. 5-459-2)—Bugaboo River, $\frac{1}{2}$ mi. below Corn Puss Gap; clear pool area; altitude 2,000 ft. **Station 35** (coll. no. 6-160-3)—Negro River, behind home of Misses Bartlett, $2\frac{1}{2}$ mi. N.W. of Trinity Ville; 15-20 ft. wide; 1-3 ft. deep; sand and rock bottom; current rapid; water clear; altitude 1,500 ft. **Station 36** (coll. no. 6-160-2)—Banana River, about 1 mi. N.W. of Richmond Vale; 6-10 ft. wide; 1-2 ft. deep; sand, mud, and stone bottom; current rapid; water clear; altitude 1,500 ft. **Station 37** (coll. no. 6-160-1)—Yallahs River, beneath Ramble Bridge; 250-300 ft. wide; 1-3 ft. deep; sandy and rocky bottom; current rapid; water clear; altitude

750 ft. **Station 38** (coll. no. 6-160-4)—East loop of Mundicat River at Yallahs; 15–20 ft. wide; 3–4 ft. deep; sand bottom with heavy aquatic plant growth; current moderate; water clear; altitude 50 ft.

Station H—Yallahs River; ? altitude; USNM colls. of *Macrobrachium faustinum* and *M. heterochirus*.

Trelawny Parish

Station 21 (coll. no. 10-459-6)—Martha Brae River behind dam near Martha Brae; 50–75 ft. wide; 4–6 ft. deep; current sluggish; water dark with much organic debris; altitude 50 ft. **Station 22** (coll. no. 10-160-1)—Martha Brae River $\frac{1}{2}$ mi. S. of Bunkers-hill; 75–100 ft. wide; 1–3 ft. deep; flowing over stone bed with some mud in crevasses; current swift; water clear; altitude 250 ft.

Westmoreland Parish

Station 14 (coll. no. 10-459-1)—Watercress Creek, 0.6 mi. S.E. of Ferris Cross; 6–8 ft. wide; 1–3 ft. deep; sand bottom with aquatic vegetation; current moderate; water clear; altitude 50 ft. **Station 15** (coll. no. 10-459-2)—Cabarita River at Frome; 75–100 ft. wide; 2–10 ft. deep; rock and gravel bottom with some mud; current moderate; water turbid; altitude 100 ft. **Station 16** (coll. no. 10-459-3)—Morgans Cut, $\frac{1}{4}$ mi. N.E. of Glasgow; 6–8 ft. wide; less than 1 ft. deep; sand and gravel bottom; current moderate; water clear; altitude 250 ft.

A KEY TO THE FAMILIES, GENERA, AND SPECIES OF THE JAMAICAN FRESHWATER SHRIMPS

1. —Pereiopods usually with exopods; if not, chelae with conspicuous terminal brushes of hairs *Atyidae* ... 2
 - 1a.—Pereiopods without exopods. Chelae without terminal brushes of hairs *Palaemonidae* ... 8
 2. —Chelae with conspicuous terminal brushes of hairs 3
 - 2a.—Chelae without conspicuous terminal brushes of hairs *Xiphocaris elongata*
 3. —First pereiopods with an arthrobranch 4
 - 3a.—First pereiopods without an arthrobranch *Micratya poeyi*
 4. —Carpus of second pair of legs shorter than broad; anterior part deeply excavate .. 7
 - 4a.—Carpus of second pair of legs longer than broad; distinctly, but not deeply, excavate 5
 5. —Superior orbital border with row of small teeth *Jonga serrei*
 - 5a.—Superior orbital border without row of small teeth 6
 6. —Base of *appendix masculina* of 2nd pleopod of male two-thirds its height *Potimirim mexicana*
 - 6a.—*Appendix masculina* of 2nd pleopod of male disc-shaped ... *Potimirim americana*
 7. —Lateral angle of rostrum forming right or acute angle with acumen (fig. 3) *Atya scabra*
 - 7a.—Lateral angle of rostrum forming obtuse angle with acumen (fig. 4) *Atya occidentalis*
-
8. —Second chelae of adult males equal in shape; unequal in size *Macrobrachium heterochirus*
 - 8a.—Second chelae of adult males equal in shape and size 9
 - 8b.—Second chelae unequal in size and shape 10

9. —Fingers of 2nd chelae thickly pubescent throughout entire length. Carpus of 2nd chelae in adult males 6-8 times as long as broad . . . *Macrobrachium acanthurus*
 9a.—Fingers of 2nd chelae not thickly pubescent throughout entire length. Carpus of 2nd chelae of adult males more than twice as long as broad
 *Macrobrachium carcinus*
 10. —Carpus of second leg longer than merus *Macrobrachium faustinum*
 10a.—Carpus of second leg shorter than merus *Macrobrachium crenulatum*

SYSTEMATIC SECTION

Class CRUSTACEA

Order DECAPODA

Supersection NATANTIA

Section CARIDEA

Superfamily PALAEMONOIDA

Family PALAEMONIDAE

Subfamily PALAEMONINAE

Macrobrachium acanthurus (Wiegmann)

Fig. 5.

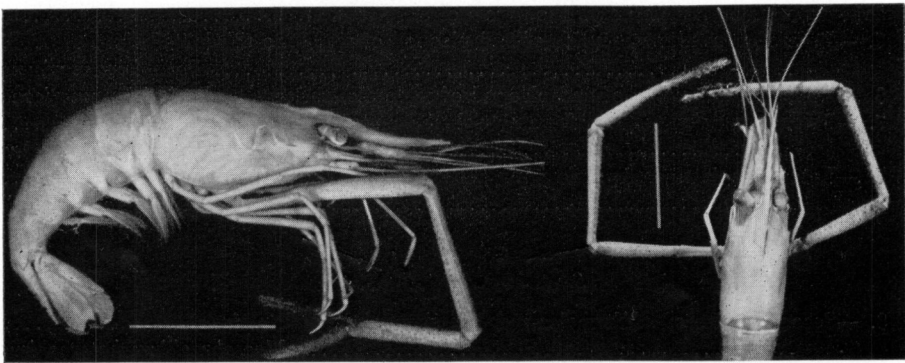
Description and synonymy.—Holthuis, 1952: 48-50, pl. 8, pl. 9 figs. a, b.*Type locality.*—Coast of Brazil. *Distribution.*—East coast of America from Georgia to southern Brazil; West Indies. Fresh and brackish waters.*Occurrence in Jamaica.*—**Hanover Parish:** Station 17—17 specimens (RMNH); Station 18—2 specimens (USNM); Station 19—1 specimen (USNM). **St. Catherine Parish:** Station A (USNM). **St. James Parish:** Station E (USNM). **St. Mary Parish:** Station 25—1 specimen (USNM). **Trelawny Parish:** Station 21—11 specimens (ANSP). **Westmoreland Parish:** Station 14—2 specimens (IJ).

FIGURE 5.—Lateral and dorsal views of *MACROBRACHIUM ACANTHURUS*. The horizontal and vertical lines equal one inch.

Remarks.—This species is apparently restricted to the relatively broad low-lying areas of the island. It was found only once at an altitude greater than 50 ft.—West Lucea River at Eaton (altitude 100 ft.).

Macrobrachium carcinus (Linnaeus)

Fig. 6.

Description and synonymy.—Holthuis, 1952: 119–123, pl. 30, pl. 31 figs. a–c.

Type locality.—Linnaeus's locality is given as “*in Americae fluviis*,” but his description is generally considered to be based on the description and figure given by Sloane (1725) of *Astacus fluviatilis major, chelis aculeatis* from Jamaica, and the type, if extant, to be in the British Museum, London. Recent attempts to locate the specimen have, however, been futile. *Distribution.*—East coast of America from Florida to southern Brazil; West Indies. Fresh and brackish waters.

Occurrence in Jamaica.—**Clarendon Parish:** Station 8—1 specimen (USNM). **Hanover Parish:** Station D (USNM). **Portland Parish:** Station 28—1 specimen (USNM); Station 32—1 specimen + fragment of chela (USNM); Station F (Andrews, 1892:75)!. **St. Catherine Parish:** Station B—2 specimens, coll. by R. Bengry, 19 June 1952 (IJ); Station C—1 specimen, coll. by R. Bengry, 10 Feb. 1957 (IJ). **St. Elizabeth Parish:** Station 13—3 specimens (ANSP, USNM, RMNH).

Literature references to “Jamaica” only.—*Astacus fluviatilis major, chelis aculeatis* Sloane, 1725: 271, pl. 245, fig. 2; *Astacus* 2 Browne, 1789: 424; *Cancer (Astacus) Jamaicensis* Herbst, 1796: 57–58, pl. 27, fig. 2; *Palaemon carcinus* Leach, 1815: 92, pl. 92; *Palaemon Jamaicensis* White, 1847: 78; Gosse, 1851: 85; *Palaemon jamaicensis* Gundlach, 1887: 132–133; *Bithynis jamaicensis* Rathbun, 1897: 44.

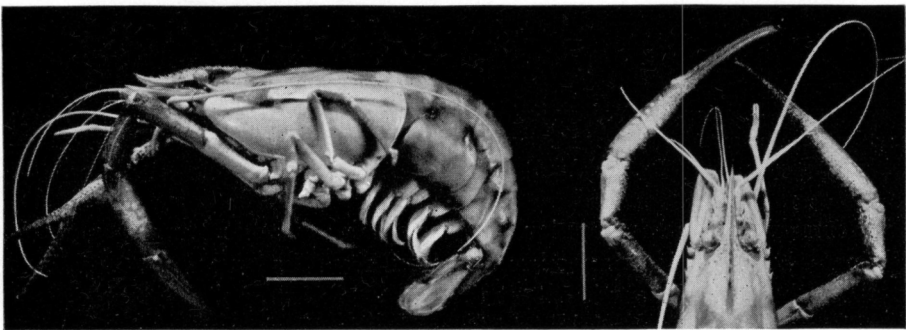


FIGURE 6.—Lateral and dorsal views of *MACROBRACHIUM CARCINUS*. The horizontal and vertical lines equal one inch.

Remarks.—Although I did not find this to be the most abundant freshwater shrimp in Jamaica, it is certainly the best known. This can, of course, be attributed partly to the extreme size which it attains. Specimens

that exceed 25 inches in total length are not rare, and although not particularly tasty, it is considered to be good food.

M. carcinus is probably represented in all of the major drainage areas of the island, and it occurs in streams to an altitude of at least 1,000 ft. The young of *M. carcinus* are almost impossible to distinguish from the young of *M. faustinum* and *M. crenulatum*, another circumstance that probably helps account for the relatively small number of specimens recorded here.

Macrobrachium crenulatum Holthuis

Fig. 7.

Description and synonymy.—Holthuis, 1952: 107–110, pl. 27, figs. a–d; pl. 28.

Type locality.—Pejebobo River, Panama. *Distribution.*—Central and South America; West Indies. Fresh water.

Occurrence in Jamaica.—**St. James Parish:** Station E—Spring in streamlet, Montego Bay, coll. by E. A. Andrews (USNM). **Hanover Parish:** Station J—Flint River near Sandy Beach, coll. by E. A. Andrews (USNM).

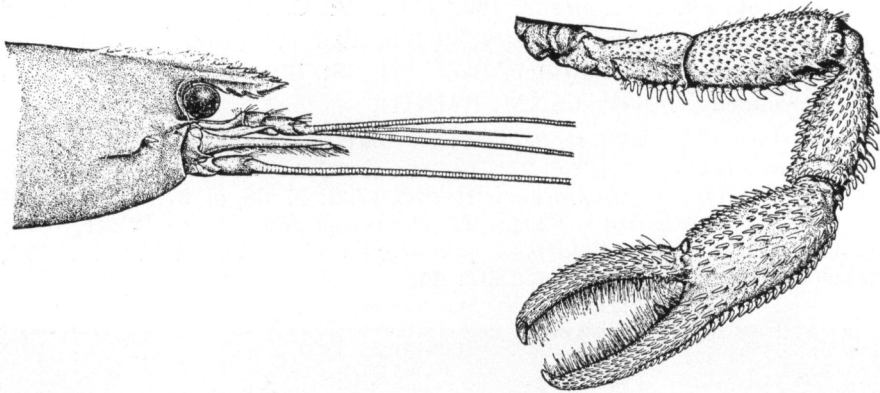


FIGURE 7.—Lateral view of cephalic portion of *MACROBRACHIUM CRENULATUM* (left); smallest of the second chelae of *M. CRENULATUM* (right). [From Holthuis, L. B. 1952—with the permission of Dr. Holthuis.]

Remarks.—It seems peculiar that the species was not found in my collections—but since it has not been reported from Jamaica since 1910, it is possible that it no longer is extant there.

The young of this species might be confused with the young of *M. crenulatum* and *M. faustinum*.

Macrobrachium faustinum (de Saussure)

Fig. 8.

Description and synonymy.—Holthuis, 1952: 88–95, pl. 22, pl. 23 figs. a–c.

Type locality.—A river near Jaemel, Haiti. *Distribution.*—West Indian islands.

Occurrence in Jamaica.—**Clarendon Parish:** Station 5—4 specimens (USNM); Station 6—3 specimens (USNM); Station 7—3 specimens (USNM); Station 8—7 specimens (ANSP). **Hanover Parish:** Station 17—1 specimen (ANSP); Station 19—2 specimens (USNM); Station 20—1 specimen (USNM); Station J—(USNM). **Portland Parish:** Station 28—4 specimens (ANSP); Station 30—8 specimens (IJ); Station 31—2 specimens + fragment of chela (ANSP); Station 32—25 specimens (RMNH). **St. Andrew Parish:** Station L—(ANSP). **St. Ann Parish:** Station 23—18 specimens (USNM). **St. Catherine Parish:** Station 1—15 specimens (RMNH); Station 2—2 specimens (RMNH); Station 3—6 specimens (RMNH); Station 4—11 specimens (RMNH); Station K—(USNM). **St. Elizabeth Parish:** Station 10—3 specimens (RMNH); Station 11—1 specimen (RMNH); Station 12—18 specimens (RMNH). **St. Mary Parish:** Station 24—2 specimens (ANSP), 1 specimen (USNM); Station 25—11 specimens + fragment of chela (RMNH); Station 26—5 specimens (ANSP); Station 27—7 specimens (USNM). **St. James Parish:** Station E—(American Museum of Natural History coll.). **St. Thomas Parish:** Station 33—10 specimens (USNM); Station 35—9 specimens (IJ); Station 37—5 specimens (USNM); Station 38—12 specimens (IJ); Station H—(USNM). **Trelawny Parish:** Station 21—1 specimen (USNM); Station 22—1 specimen (USNM). **Westmoreland Parish:** Station 15—2 specimens (USNM).

Literature references to "Jamaica" only.—*Palaemon faustinus* Benedict, 1892: 77; *Palaemon olfersii* Sharp, 1893: 123; *Bithynis faustinus* Rathbun, 1897: 45; *Bithynis olfersii* Rathbun, 1902: 124.

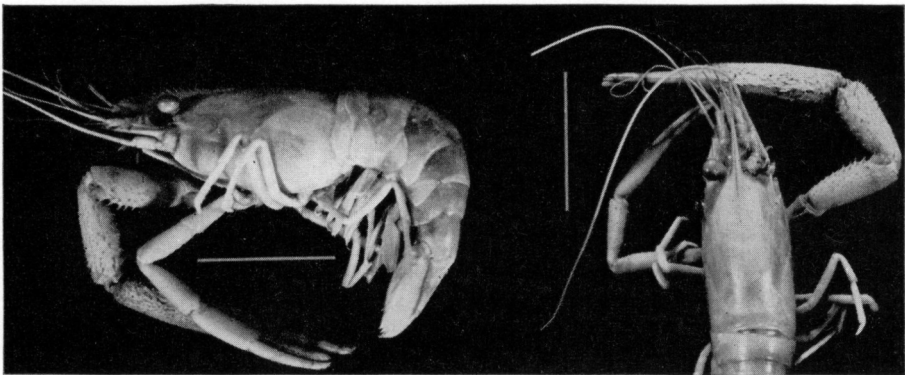


FIGURE 8.—Lateral and dorsal views of *MACROBRACHIUM FAUSTINUM*. The horizontal and vertical lines equal one inch.

Remarks.—This is without doubt the most ubiquitous freshwater shrimp in Jamaica (see Table 1). It was found at almost all stations up to an altitude of 1,000 ft., but was not found higher.

This species is similar to *M. crenulatum*, and it is possible to confuse the young of the two. This is also true of the young of *M. carcinus*.

Macrobrachium heterochirus (Wiegmann)

Fig. 9.

Description and synonymy.—Holthuis, 1952: 69–74, pl. 15 figs. a, b; pl. 16 figs. a–c.

Type locality.—"East coast of Mexico." *Distribution.*—Eastern, Central and South America from Mexico to southern Brazil; West Indies. Fresh water.

Occurrence in Jamaica.—**St. Andrew Parish:** Station 41—1 fragment of chela (ANSP). **St. Mary Parish:** Station 26—1 specimen (IJ). **St. Thomas Parish:** Station 33—1 specimen (USNM); Station 36—1 specimen (USNM); Station 37—1 specimen (ANSP); Station H—(USNM). **Trelawny Parish:** Station 22—2 specimens (RMNH).

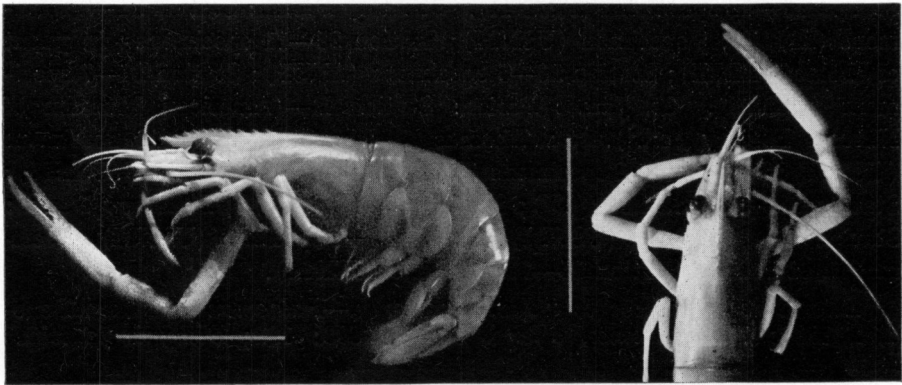


FIGURE 9.—Lateral and dorsal views of *MACROBRACHIUM HETEROCHIRUS*. The horizontal and vertical lines equal one inch.

Remarks.—While most of the species of the genus *Macrobrachium* appear to prefer low altitudes and to frequent brackish as well as fresh water, the lowest altitude at which I found *M. heterochirus* in Jamaica was 250 feet (Station 22). It was found in streams up to an altitude of 1,750 ft. (Station 41).

Superfamily OPLOPHOROIDA

Family ATYIDAE

Atya occidentalis Newport

Fig. 10.

Description and synonymy.—Bouvier, 1925: 312–314, figs. 700–702.

Type locality.—Jamaica. *Distribution.*—Central America and the West Indies. Fresh water.

Occurrence in Jamaica.—**Manchester Parish:** Station 9—2 specimens (USNM). **Portland Parish:** Station 29—4 specimens (USNM). **St. Andrew Parish:** Station 39—6 specimens (USNM). **St. Ann Parish:** Station 23—18 specimens (USNM). **St. Catherine Parish:** Station 3—2 specimens

(ANSP). **St. Mary Parish:** Station 24—4 specimens (7-459-6) (USNM), 4 specimens (7-160-1) (USNM). **St. Thomas Parish:** Station 34—1 specimen (IJ); Station 35—1 specimen (ANSP); Station 36—61 specimens (USNM); Station 37—2 specimens (USNM). **Trelawny Parish:** Station 22—22 specimens (RMNH).

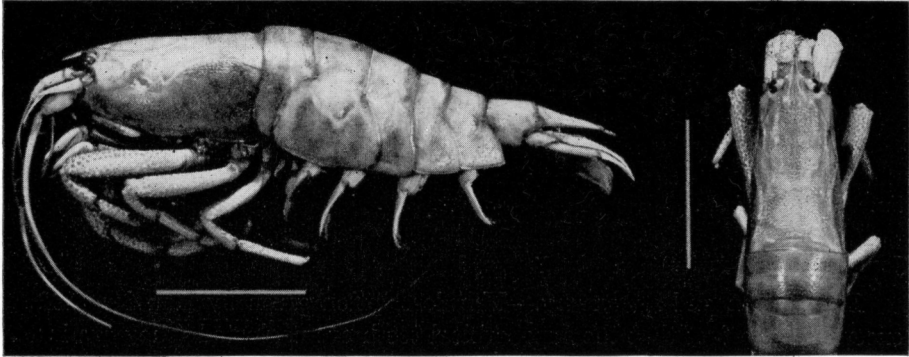


FIGURE 10.—Lateral and dorsal views of *ATYA OCCIDENTALIS*. The horizontal and vertical lines equal one inch.

Remarks.—This shrimp occurs in abundance in the streams of Jamaica, and is one of the smaller shrimps that is used by the people as food. It is collected locally by holding baskets made of reeds in the swift waters and then turning over rocks a few feet upstream.

The two specimens from Station 9 (Manchester Parish) may prove to be intermediates between *A. occidentalis* and *A. scabra* (see below).

Atya scabra Leach

Fig. 11.

Description and synonymy.—Bouvier, 1925: 314–317, figs. 703–706.

Type locality.—? *Distribution.*—Central and South America, East Africa, Australia, West Indies. Fresh water.

Occurrence in Jamaica.—**Clarendon Parish:** Station 6—1 specimen (ANSP); Station 7—2 specimens (RMNH); Station G—2 specimens (coll. by R. Proctor, 12 April 1953, IJ). **St. Catherine Parish:** Station 2—5 specimens (USNM).

Literature references to "Jamaica" only.—*Atya scabra* Rathbun, 1897: 44.

Remarks.—Rathbun (1897) reported *A. scabra* from Jamaica, but questioned whether *A. scabra* might not be synonymous with *A. occidentalis*. *A. scabra* is not synonymous with *A. occidentalis*, but some doubt exists concerning the validity of the records of this species occurring in East Africa and in Australia.

Specimens possibly intermediate between *A. scabra* and *A. occidentalis* were taken at Station 9 (Manchester Parish).

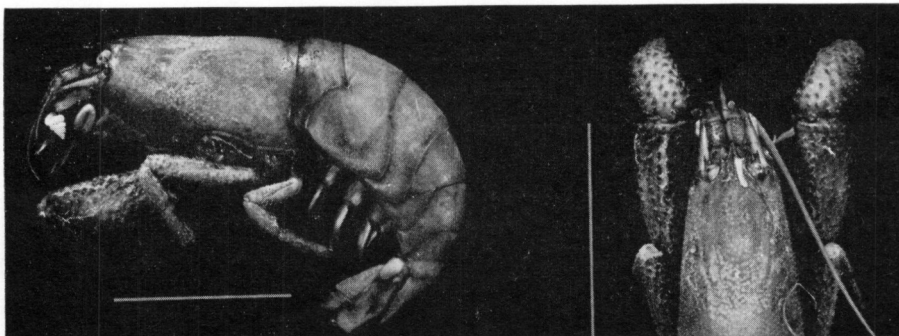


FIGURE 11.—Lateral and dorsal views of *ATYA SCABRA*. The horizontal and vertical lines equal one inch.

Jonga serrei (Bouvier)

Fig. 12.

Description and synonymy.—The description given by Bouvier (1925), except for the fact that the supraorbital teeth are neglected (they are in his original description—Bouvier, 1909), is an adequate description of this species. Because of the supraorbital spines mentioned above, I have removed this species from the genus *Potimirim* and placed it in a new genus, *Jonga* (Hart, 1961). A complete synonymy is included in that paper.³

Type locality.—Havana, Cuba. *Distribution.*—Cuba, Jamaica, Barbados, Puerto Rico. Fresh water.

Occurrence in Jamaica.—**Hanover Parish:** Station 19—1 specimen (USNM). **Portland Parish:** Station 32—16 specimens (RMNH). **Trelawny Parish:** Station 21—4 specimens (IJ).

Remarks.—This species shows some variation in color—ranging from light brown (Station 19) to black (1 of the specimens at Station 32).

This is the first record of this shrimp from Jamaica.

Micratya poeyi (Guerin-Meneville)

Fig. 13.

Description.—Bouvier, 1925: 325–327, figs. 702–716.

Type locality.—Cuba. *Distribution.*—Cuba and Jamaica.

Occurrence in Jamaica.—**Portland Parish:** Station 29—16 specimens (USNM); Station 28—2 specimens (ANSP). **St. Ann Parish:** Station 23—7 specimens (USNM). **St. Mary Parish:** Station 24—14 specimens (RMNH); Station 26—1 specimen (USNM); Station 27—11 specimens (RMNH). **St. Thomas Parish:** Station 33—4 specimens (IJ). **Westmoreland Parish:** Station 15—6 specimens (USNM).

³ I erred in that paper when I stated that Holthuis (1954) included all of the species of *Ortmannia* in the genus *Potimirim* except *O. henschawi*. Actually, Holthuis erected the genus *Potimirim* for Bouvier's second group of *Ortmannia* (containing *O. americana*, *O. mexicana*, and *O. serrei*), and excluded all of his first group (containing *O. henschawi*, *O. alluaudi*, and *O. Edwardsi*).

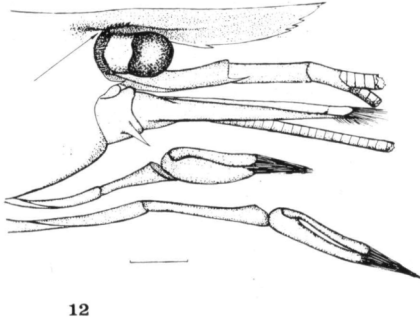


FIGURE 12.—Lateral view of cephalic portion of *JONGA SERREI*. The arrow indicates supraorbital spines peculiar to this genus. The horizontal line equals one millimeter.

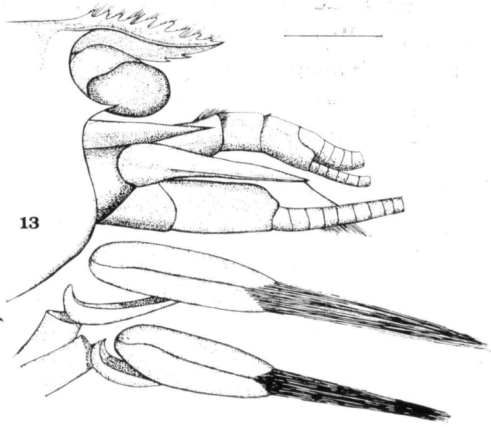


FIGURE 13.—Lateral view of cephalic portion of *MICRATYA POEYI*. The horizontal line equals one millimeter.

Remarks.—Live specimens of this species exhibit considerable variation in color patterns—ranging from light to dark brown. Occasionally the darker specimens have three or four transverse bands of lighter brown. Banded specimens were noted at Stations 15 and 24.

This species, which is the only species in the genus, has previously been reported only from Cuba.

Potimirim americana (Guerin-Meneville)

Figs. 14, 15.

Description and synonymy.—Bouvier, 1925: 282–284, figs. 655–659.

Type locality.—Cuba. ? *Distribution.*—Cuba, Trinidad, Jamaica. Fresh water.

Occurrence in Jamaica.—**St. Mary Parish:** Station I—2 specimens (Tulane University Collection).

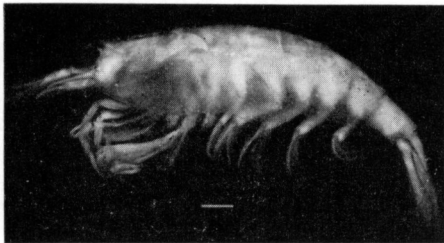


FIGURE 14.—Lateral view of *POTIMIRIM AMERICANA*. The horizontal line equals one millimeter.



FIGURE 15.—Lateral view of rostrum of *POTIMIRIM AMERICANA*.

Remarks.—These two specimens were collected in June 1960 by Dr. Alfred Smalley of Tulane University. Dr. Smalley was kind enough to permit me to include the specimens in this paper, for which I am most grateful. This species was not represented in any of my collections.

This is the first and only record of this shrimp in Jamaica.

Potimirim mexicana (de Saussure)

Figs. 16, 17.

Description.—Bouvier, 1925: 284–288, figs. 660–667.

Type locality.—Vera-Cruz, Mexico. *Distribution.*—Mexico to Brazil; Porto Rico, Cuba, Jamaica. Fresh water.

Occurrence in Jamaica.—**Clarendon Parish:** Station 6—8 specimens (RMNH). **St. Elizabeth Parish:** Station 12—12 specimens (IJ). **Westmoreland Parish:** Station 15—2 specimens (ANSP).

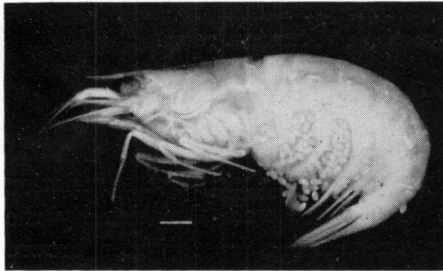


FIGURE 16.—Lateral view of *POTIMIRIM MEXICANA*. The horizontal line equals one millimeter.



FIGURE 17.—Lateral view of rostrum of *POTIMIRIM MEXICANA*.

Remarks.—*Caridina mexicana* de Saussure [= *P. mexicana* (de Saussure)] was designated as the type species of the genus *Potimirim* by Holthuis (1954).

This is the first record of this species in Jamaica.

Xiphocaris elongata (Guerin-Meneville)

Figs. 18, 19.

Description and synonymy.—Bouvier, 1925: 9–20, 48–55, figs. 1–51.

Type locality.—Havana, Cuba. *Distribution.*—West Indies. Fresh water.

Occurrence in Jamaica.—**Hanover Parish:** Station 17—3 specimens (RMNH); Station 18—3 specimens (USNM); Station 19—12 specimens (USNM); Station 20—21 specimens (ANSP). **Portland Parish:** Station 29—2 specimens (RMNH); Station 30—5 specimens (ANSP); Station 31—16 specimens (ANSP); Station 32—19 specimens (USNM). **St. Andrew Parish:** Station 40—29 specimens (RMNH); Station 41—32 specimens (ANSP); Station 42—20 specimens (ANSP). **St. Ann Parish:** Station 23—2 specimens (USNM). **St. Elizabeth Parish:** Station 11—20 specimens

(IJ); Station 12—11 specimens (ANSP). **St. Mary Parish:** Station 24—34 specimens (2 collections, USNM); Station 25—8 specimens (ANSP); Station 26—4 specimens (IJ); Station 27—36 specimens (ANSP). **St. Thomas Parish:** Station 33—7 specimens (RMNH); Station 34—18 specimens (ANSP); Station 35—4 specimens (USNM); Station 38—11 specimens (ANSP). **Trelawny Parish:** Station 21—34 specimens (RMNH). **Westmoreland Parish:** Station 14—7 specimens (ANSP); Station 15—1 specimen (USNM); Station 16—6 specimens (ANSP).

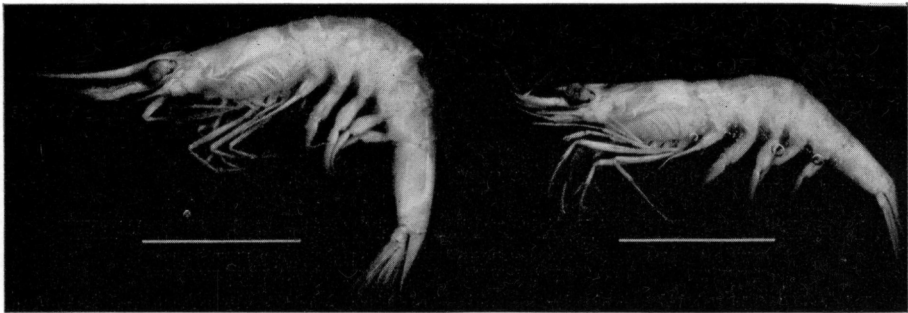


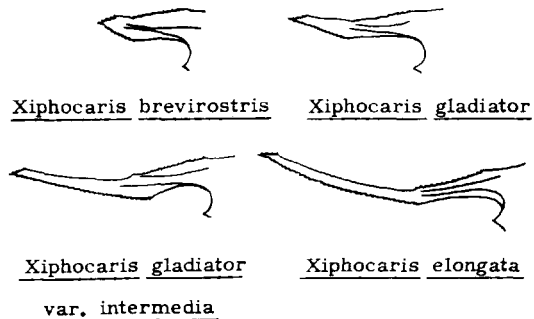
FIGURE 18.—Lateral views of two specimens of *XIPHOCARIS ELONGATA*. The specimen on the left is a typical *X. ELONGATA*; the specimen on the right corresponds to *X. GLADIATOR* of Pocock. The horizontal lines equal one-half inch.

Remarks.—Because of extreme variations in the rostral length of this animal, Pocock (1889) placed it in three species and one variety—basing that division on differences in rostral lengths. In 1925, Bouvier agreed with earlier work of Ortmann (1894) that only one species was involved and that Pocock's species were, if anything, only subspecies or varieties. A preliminary analysis of the Jamaican specimens (over 400) merely confirms these conclusions—and because any one collection may contain as many as three of the four varieties, I think it is more accurate to say that *X. elongata* is a species in which the length of the rostrum relative to the length of the carapace is highly variable. Figure 19 shows variations in rostral length and form encountered in this animal, together with the designations of Pocock. With the exception of the rostra, I have been unable to find any significant differences between these varieties.

X. elongata seems to prefer relatively quiet pools in well-aerated streams. Specimens may be seen moving slowly about on the bottom and sides of such pools if the water is placid, but when they are disturbed (as in an attempt to seín them), they prove to be strong swimmers and often jump considerable distances out of the water to avoid capture.

One of the most striking features of this shrimp is the color of the rostrum in some specimens—particularly in those specimens having conspicuously long rostra. The rostra are usually colorless, but in some populations

FIGURE 19.—Variations in the rostral length and form encountered in *XIPHOCARIS ELONGATA*. The designations corresponding to the rostra are those proposed by Pocock (1889), and are used here for historical purposes only.



they may be bright orange; in others, varying shades of yellow.

The bodies of the young are almost completely transparent; the adults only slightly less so.

This is the first record of this species in Jamaica.

NOTES ON THE EARLY LAND CONNECTIONS BETWEEN CUBA, JAMAICA, AND CENTRAL AMERICA

Rivas (1958) has concisely summarized the multitude of arguments for and against ancient land connections between Central America and the Greater Antilles—and he concludes that land connections between Central America and Cuba must have existed in order for girardinin poeciliid fishes (as well as certain other animals) to have become established in Cuba.

Similar conclusions may be drawn from distribution patterns of certain crayfishes and freshwater shrimps.

The crayfish *Cambarus cubensis* (Erichson) is found in Cuba and the Isle of Pines, its closest relative, *C. mexicanus* (Erichson), is found in Mexico, and crayfish are found on no other Antillean islands (Ortmann 1902, 1905). This is similar to the distribution of the poeciliid fishes discussed by Rivas—which are found in Central America and in Cuba, but on no other Antillean island.

The Atyid shrimps are animals of great antiquity (possibly having arisen as early as the Jurassic, according to Ortmann)—and bodies of salt water present insurmountable topographic barriers to some of the freshwater species [Ortmann, 1894, says all Atyid shrimps are freshwater animals, but more recent work shows this to be untrue (Holthuis 1951, 1953)]. Certain of the truly freshwater Atyid shrimps, however, are found in Central America, Cuba, Jamaica, and other Antillean islands—distributions which again must be accounted for by the past existence of land connections.

Two such connections are generally supposed to have existed between Central America and the Greater Antilles during the Miocene-Pliocene: (1) Between the Honduras-Nicaragua region and Jamaica and Hispaniola; and (2) Between the British Honduras-Yucatan region and western Cuba.

Rivas concludes that the poeciliid fishes came to Cuba via the second of these connections—and I assume that the ancestor of the crayfish *C. cubensis* came along the same route.

The existence of the poeciliid fishes and *C. cubensis* only in Cuba (and the Isle of Pines) and on no other Antillean islands, plus the existence of certain closely related freshwater Atyid shrimps in Cuba, Jamaica, and Central America immediately poses the question of why such a distribution.

To me, two alternatives present themselves: (1) That the Honduras–Nicaragua–Jamaica–Hispaniola connection must have been broken before the British Honduras–Yucatan–Cuba connection was broken, and that in the early Miocene the Atyid shrimps found their way to Jamaica and Cuba via both of these bridges—the ancestors of the poeciliid fishes and *C. cubensis* not existing in the region before the break occurred, or (2) That some topographic barrier existed to bar the fishes and crayfishes from the Honduras–Nicaragua–Jamaica–Hispaniola connection.

The first alternative seems to me to be the most likely, but as far as the present-day distribution of *C. mexicanus* is concerned, the second should not be entirely rejected.

The palaemonid shrimps emerged from salt into fresh water in such comparatively recent times that they are of little value in such considerations.

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