

***Neocallichirus raymanningi*, a new species of ghost shrimp
from the northeastern coast of Venezuela
(Crustacea: Decapoda: Callinassidae)**

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Abstract.—A new species of ghost shrimp, *Neocallichirus raymanningi*, is described based on specimens collected in subtidal habitats in the Gulf of Cariaco, northeastern Venezuela. This new species is most similar to *N. rathbunae* (Schmitt), but differs from it primarily in having a broadly rounded rostrum, and in the case of males, unique armature of merus and dactylus on the major cheliped. A checklist of all known species in the world currently assigned to the genus *Neocallichirus* Sakai is included.

Recent studies of thalassinideans from the northeastern coast of Venezuela have shown the existence of at least 18 species of these ecologically important infaunal crustaceans commonly called ghost shrimps. Several species had not been recorded previously from this coast or were found to be undescribed (Blanco Rambla & Liñero Arana 1994, Blanco Rambla et al. 1995, Blanco Rambla (unpublished data)). During a recent faunistic survey of the Gulf of Cariaco, specimens were obtained of yet another undescribed species as here described.

The genus *Neocallichirus* Sakai, 1988 was originally proposed for nine Indo-West Pacific and two Atlantic species. Manning & Felder (1991) later assigned to this genus four more western Atlantic species. Subsequently, Manning & Lemaitre (1994) re-assigned four western Atlantic species previously in *Neocallichirus* to the genus *Sergio* Manning & Lemaitre, 1994. With the description of the new species, there are now 18 species recognized worldwide in *Neocallichirus*. In addition to the new species, five other *Neocallichirus* species occur in the western Atlantic: *N. rathbunae* (Schmitt, 1935), *N. grandimana* (Gibbes,

1850), *N. nickellae* Manning, 1993, *N. lemaitrei* Manning 1993, and *N. cacahuatense* Felder & Manning 1995. Species of this genus are characterized primarily by: carapace with well defined oval, lacking rostral carina or cardiac protuberance; corneae dorsal, subterminal, disk-shaped; antennular peduncles no longer or stouter than antennal peduncles; third maxillipeds lacking exopod, with ischium-merus subpediform, and merus not projecting beyond articulation with carpus; major cheliped lacking meral hook; in both sexes, first pleopod uniramous, and second pleopod biramous; second pleopod with appendix interna well developed in females, with appendix interna reduced or short and slender in males; and endopod of third to fifth pleopods with stubby, embedded appendix internae (Sakai 1988, Manning & Felder 1991).

Specimens of the new species were captured with yabby pumps at three localities in northeastern Venezuela on the southern and northern coasts of the Gulf of Cariaco (approximately at 10°30'N, 64°00'W). The Gulf has about 170 km of shoreline, and includes diverse habitats.

Measurements (mm) were made with an ocular micrometer. Carapace length (cl) was

measured along the middorsal line of the carapace from the anterior margin of rostrum to the posterior margin of the carapace. Total length (tl) was measured from the tip of the rostrum to posterior margin of the telson. Specimens are deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM), and Laboratorio de Carcinología, Instituto Oceanográfico de Venezuela, Universidad de Oriente (IOV).

Family Callianassidae Dana, 1852
Subfamily Callichirinae Manning &
Felder, 1991

Neocallichirus Sakai, 1988
Neocallichirus raymanningi, new species
Figs. 1–4

Holotype.—Playa Cristal, south coast of Gulf of Cariaco, Sucre State, Venezuela, 10°27'07.0"N, 63°57'01.7"W, sandy substrate, 0.5 m, 5 Aug 1997, coll. J. P. Blanco Rambla, M. Gómez, & A. De La Rosa: 1 ♂ cl 23.1 mm, tl 76.1 mm, USNM 276147.

Paratypes.—Same locality data as holotype: 1 ♀ (dry, damaged) cl 20.6 mm, tl 69 mm, USNM 276150.—Las Maritas, north coast of Gulf of Cariaco, Sucre State, Venezuela, 10°33'05.2"N, 63°50'45.5"W, subtidal sand-mud substrate, 4 Feb 1997, colls. J. P. Blanco Rambla, M. Gómez, & A. De La Rosa: 1 ♀ cl 23.1 mm, tl 80.1 mm, USNM 276148.—La Peña, south coast of Gulf of Cariaco, Sucre State, Venezuela, 10°28'08.5"N, 63°42'26.4"W, mud-sand substrate, 0.5 m, 26 Jun 1997, coll. J. P. Blanco Rambla, M. Gómez & A. De La Rosa: 1 ♀ cl 21.9 mm, tl 79.0 mm, USNM 276149; 1 ♀ cl 19.1 mm, tl 70.6 mm, IOV 1976.

Diagnosis.—Front of carapace with rostrum broadly rounded, each lateral projection armed with terminal spine slightly exceeding rostrum. Inferior portion of lateral wall of carapace with 3 small sharp or blunt spines: 1 on hepatic boss, and 2 just posterior to hepatic boss. Major cheliped merus armed with row of strong bifid teeth on in-

ferior margin proximally; prehensile margin of dactylus with large proximal subrectangular tooth separated from distal margin by deep quadrate cleft. Male second pleopod with distinct, slender appendix interna bearing short stiff setae terminally.

Description.—Mature male and females of relatively large size, ranging in known specimens from cl 19.1 to 23.1 mm, and tl from 69.0 to 80.1 mm.

Frontal margin of carapace (Fig. 1a, b) consisting of broadly rounded rostrum, and subtriangular lateral projections to each side; rostrum with short marginal setae; lateral projections each with terminal spine slightly exceeding rostrum and reaching to about midline of basal segment of antennal peduncle. Carapace lacking rostral carina, with distinct linea thalassinica; dorsal oval with distinct tubercle on each side of anterior half, oval distinctly marked posteriorly by deep transverse cardiac furrow, latter extending anteroventrally to either side above linea thalassinica as shallow groove marking posterior half of dorsal oval. Frontal margin of carapace continued ventrolaterally beyond intersection with linea thalassinica as thickened oblique ridge ending anteriorly to prominent hepatic boss, latter surmounted with small sharp or blunt tubercle followed posteriorly by 2 small sharp or blunt spines. Subantennular region of epistome bearing dense tuft of long setae.

Eyestalks (Fig. 1a, b) subtriangular, with flattened and moderately pigmented corneae occupying less than half width of stalk. Length of exposed eyestalk in dorsal view about 1.5 times basal width; tips lobate to obtusely angular, reaching distal end of basal segment of antennular peduncle; mesial margins of eyestalks closely appressed proximally, diverging terminally.

Antennular peduncle shorter and heavier than antennal peduncle; terminal article about 1.8 times length of penultimate, reaching to about proximal third of terminal antennal article; penultimate and terminal articles with ventromesial and ventrolateral rows of long setae; rami of flagellum sub-

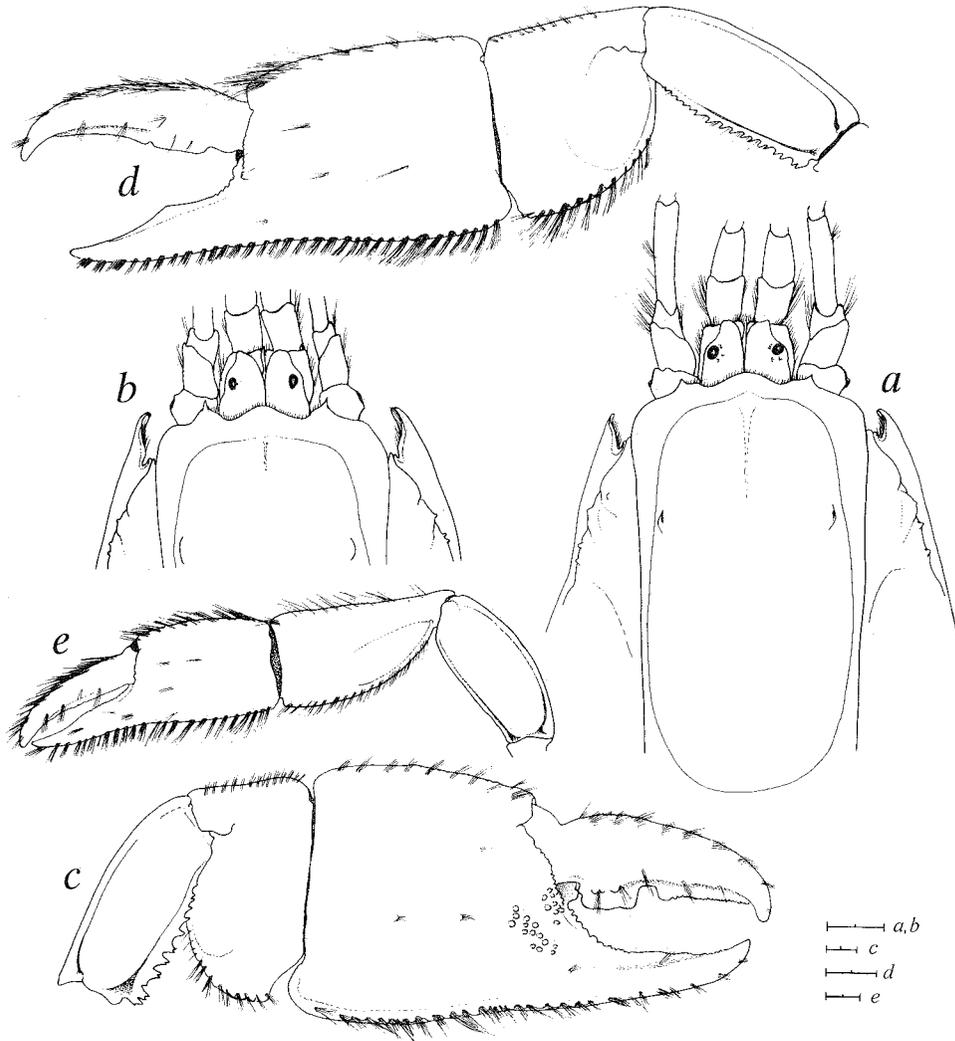


Fig. 1. *Neocallichirus raymanni*, new species, Gulf of Cariaco, Venezuela. a, c, e, Male holotype (cl 23.1 mm), USNM 276147; b, d, Female paratype (23.1 mm), USNM 276148. a, Anterior carapace, eyestalks and peduncles of cephalic appendages, dorsal view; b, Anterior carapace, eyestalks and portion of peduncles of cephalic appendages, dorsal view; c, Male major cheliped, internal surface; d, Female major cheliped, internal surface; e, Minor cheliped, internal surface. Scales equal 2 mm.

equal in length, dorsal ramus with sparse setae, ventral ramus with dense long setae.

Antennal peduncle with terminal article slightly shorter than penultimate; basal article with slightly produced excretory pore; second article with distinct oblique ventral suture, distolaterally with tuft of setae; third article narrower than second; fourth article longest, slightly narrower than third, and with tuft of long setae distolaterally.

Mandible (Fig. 2a) with large, 3-segmented palp; third article of palp elongated, rounded distally, and with short, weakly hooked setae on extensor surface; second article of palp with long setae distally; first article as long as wide, without setae. Incisor process with cutting margin consisting of well defined blunt corneous teeth on proximal half, and long, low tooth on distal half; internal surface with lip giving rise to

molar process with about 5 blunt teeth; paragnath (Fig. 2b) scaliform, with small sclerotized projection on upper distal half, set against and below molar process. First maxilla (Fig. 2c) with endopodal palp long, narrow, and with terminal article deflected proximally at articulation; proximal endite with dense fine setation on most of lower mesial margin, terminal lobe with long, distally bifurcate setae; distal endite elongate, narrow proximally, mesial margin with short bristles often bifurcated distally; exopod obsolete, marked by low truncate lobe with setae. Second maxilla (Fig. 2d) with endopod terminally flexed, rounded distally; proximal and distal endites each longitudinally subdivided and densely setose terminally, setae on second endite consisting of dense bristles; proximal endite with arcuate setose crest across internal surface; exopod forming large, broad, scaphognathite. First maxilliped (Fig. 2e) with proximal endite narrowly produced, marginally setose; distal endite robust, subrectangular, external surface with median longitudinal row of long setae directed mesially; exopod ovoid, marginally setose, with marked notch on mesial margin, and short arcuate row of setae on external surface; epipod large, posterior lobe broad, anterior end narrowing terminally. Second maxilliped (Fig. 2f) with long, narrow endopod; endopodal merus more than 4 times as long as broad, flexor margin with dense fringe of long setae; carpus short; propodus about half as long as merus, slightly arcuate, widening distally; dactylus elongate, about half as long as propodus, with terminal brush of short stiff setae; exopod narrow, slightly arcuate, overreaching end of endopodal carpus, and fringed with long setae; epipod small. Third maxilliped (Fig. 2g) without exopod; endopod with long setation on mesial margin; terminal 3 articles also with long setation on extensor margins; length of merus-ischium more than 2.5 times its width; ischium subrectangular, distinctly longer than broad, proximomesial margin rounded, internal surface with well defined

crista dentata consisting of curved row of sharp spines, distalmost spines closely set, median spines distinctly larger and wide apart; merus subtriangular, broader than long; carpus subtriangular, with setose lobe on flexor margin, internal surface with dense semicircular field of fine setae; propodus subrectangular, height more than 1.3 its length, internal surface with median semicircular field of fine dense setae, anterior margin setose and ending distally as lobe; dactylus narrow, slightly arcuate, longer than propodus, with small brush of stiff bristles; lacking epipod.

Branchial formula includes exopods and epipods as described for first to third maxillipeds. Other branchiae consisting of 1 rudimentary arthrobranch on second maxilliped, pair of arthrobranches on third maxilliped, and pair of arthrobranches on each of first to fourth pereopods.

First pereopods forming markedly dissimilar chelipeds. Major cheliped of male (Fig. 1c) heavy, strongly calcified; ischium with row of well spaced sharp or blunt spines on inferior margin; merus about 2.3 times as long as high, superior margin slightly arcuate distally, inferior margin keel-like and armed with row of strong teeth decreasing in size distally, teeth bifid proximally and simple distally; carpus short, about 1.9 times higher than long, superior margin keel-like and with tufts of short setae on inner side, posterior and proximal part of inferior margins crenulate with tufts of setae on inner side, evenly curved and forming blunt angle with distal part of inferior margin; chela about 1.8 times as long as high (greatest height on palm proximally); palm about 1.1 times as high as long (length measured on superior margin), outer surface smooth, glabrous except for scattered tufts of short setae, inner surface with scattered tufts of setae and cluster of low tubercles medially near base of fixed finger, superior margin broadly arcuate and with tufts of setae on inner side, inferior margin keel-like and turned inwards, crenulate and with tufts of long setae

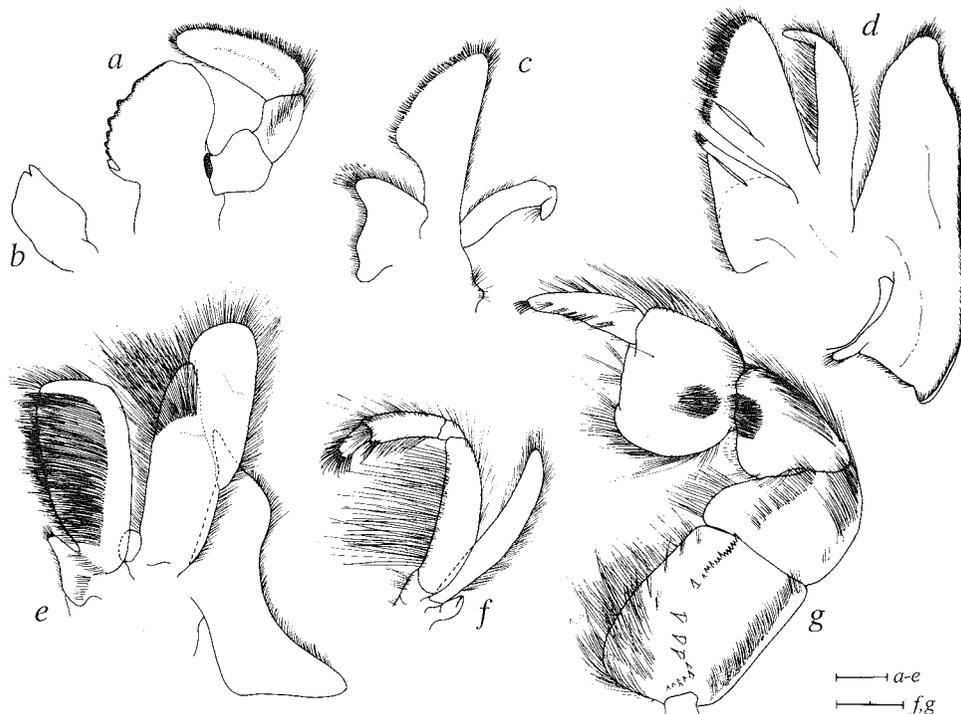


Fig. 2. *Neocallichirus raymanningi*, new species, male holotype (cl 23.1 mm), Gulf of Cariaco, Venezuela, USNM 276147, left mouthparts: a, Mandible, external surface; b, Paragnath, external surface; c, First maxilla, external surface; d, Second maxilla, external surface; e, First maxilliped, external surface; f, Second maxilliped, external surface; g, Third maxilliped, internal surface. Scales equal 1 mm (a-e), and 2 mm (f, g).

on inner side; fixed finger with tip curved upward, inferior margin with tufts of setae on inner side, prehensile margin with small rounded teeth proximally, and small or inconspicuous rounded teeth distally; dactylus slightly longer than palm, outer and inner surfaces with tufts of long setae in proximity to opposable margin, superior margin arcuate and with tufts of setae on inner and outer sides, tip curved downward, prehensile margin with large subrectangular tooth proximally and separated by deep subquadrate cleft from low rounded tooth, followed distally with row of small rounded teeth. Major cheliped of female (Fig. 1d) not as heavy and massive as in male; differing from that of male as follows: merus slightly more slender, about 2.4 times as long as high; teeth on inferior margin of merus simple; carpus about as long as high; chela more slender, about 2.3 times as long as

high, palm about 1.2 times as long as high (length measured on superior margin); fixed finger with prehensile margin forming a broadly triangular tooth at midline; opposable margin of dactylus with proximal tooth broader and lower.

Minor cheliped (Fig. 1e) similar between sexes, well calcified much less massive and more slender than in male; outer and inner surfaces of segments glabrous except for scattered tufts of short setae on chela. Ischium with inferior margin unarmed. Merus about 2.3 times as long as high, inferior margin slightly sinuous. Carpus about twice as long as high, slightly longer than merus, superior and inferior margins unarmed, with row of tufts of setae on interior side. Chela about 2.7 times as long as high. Palm about 1.3 times as long as high (length measured on superior margin), superior margin with row of tufts of setae; palm and fixed

finger with inferior margin slightly concave at base of fixed finger, with row of tufts of setae. Fixed finger shorter than dactylus, tip curved upward; prehensile margin minutely denticulate. Dactylus slightly longer than palm, tip curved downward; superior margin with tufts of setae; opposable margin minutely denticulate on proximal half.

Second pereopod (Fig. 3a) chelate. Ischium with sparse long setae on inferior margin. Merus with longitudinal row of well-spaced tufts of short setae on outer surface; flexor margin with dense row of long setae over most of margin, setae diminishing in length distally. Carpus with long setae on superior and inferior margins; outer surface with scattered setae in addition to row of tufts of short setae parallel to distal margin; inner surface with well spaced tufts of setae. Chela with fingers straight prehensile and opposable margins of fingers corneous, micropectinate proximally and smooth distally; outer and inner surfaces of palm and fingers with well spaced tufts of setae.

Third pereopod (Fig. 3b) with merus about 2.8 times as long as high. Carpus widening distally, twice as long as high, with patches of long setae terminally. Propodus with inferior margin produced into large lobe directed proximally; outer surface with numerous tufts of short setae except on longitudinal median portion; inner surface with scattered tufts of short setae; superior margin with tufts of long setae; inferior margin with dense tufts of long setae. Dactylus tear-shaped, terminating in corneous tip hooked toward external side; outer surface densely covered with long setae; inner surface with scattered setae.

Fourth pereopod (Fig. 3c) subchelate. Ischium about 2.6 times as long as high. Merus longer and heavier than carpus, about 4 times as long as high. Carpus slender, nearly 6 times as long as high, slightly widening distally. Propodus about 3.5 times as long as high; inferodistal corner produced into short, blunt fixed finger; outer surface densely covered with long micro serrate se-

tae except on longitudinal median portion; inner surface with scattered setae. Dactylus about twice as long as high, terminating in short corneous tip hooked toward external side; outer surface densely setose.

Fifth pereopod (Fig. 3d) minutely chelate. Merus and carpus with scattered setae. Propodus with dense patch of dense setae on distal half, upper limit of patch oblique. Fixed finger and dactylus with opposable surfaces spooned; prehensile lip of fixed finger corneous, minutely pectinate. Dactylus curving inward, densely setose on outer surface.

Abdominal somites smooth, glabrous dorsally except for short setae near posterior margin. Third to fifth somites laterally with semicircular tuft of dense short setae laterally. Sixth somite with 3 dorsal pairs of setae or tufts of setae (1 pair anteriorly, 1 pair medially, and 1 pair of longer setae on posterior margin), and short fine marginal setation; with short posterior mid-dorsal sulcus reaching posterior margin.

First pleopod of male and female uniramous, 2-segmented; in male (Fig. 4a), distal segment spatulate, shorter than proximal, subdivided into 2 lobes by weak longitudinal furrow, anterior lobe terminally rounded and setose, posterior lobe terminally acute and setose with tip directed anteriorly; in female (Fig. 4d), both articles narrow and elongate, proximal article curved outward and setose distally, terminal article marginally setose on distal half and with distinct setose shoulder at midlength. Second pleopod of male and female biramous; in male (Fig. 4b), exopod setose distally, slender and curved inward, endopod with distal lobe demarcated by weak transverse suture and longer than poorly demarcated appendix masculina, appendix interna (Fig. 4c) short and slender, with 3 short stiff setae distally; in female (Fig. 4e), exopod with marginal setae distally, endopod with well developed appendix interna (Fig. 4f) about 0.5 as long as distal lobe of endopod and with short hooked setae distally. Third to fifth pairs of pleopods forming large,

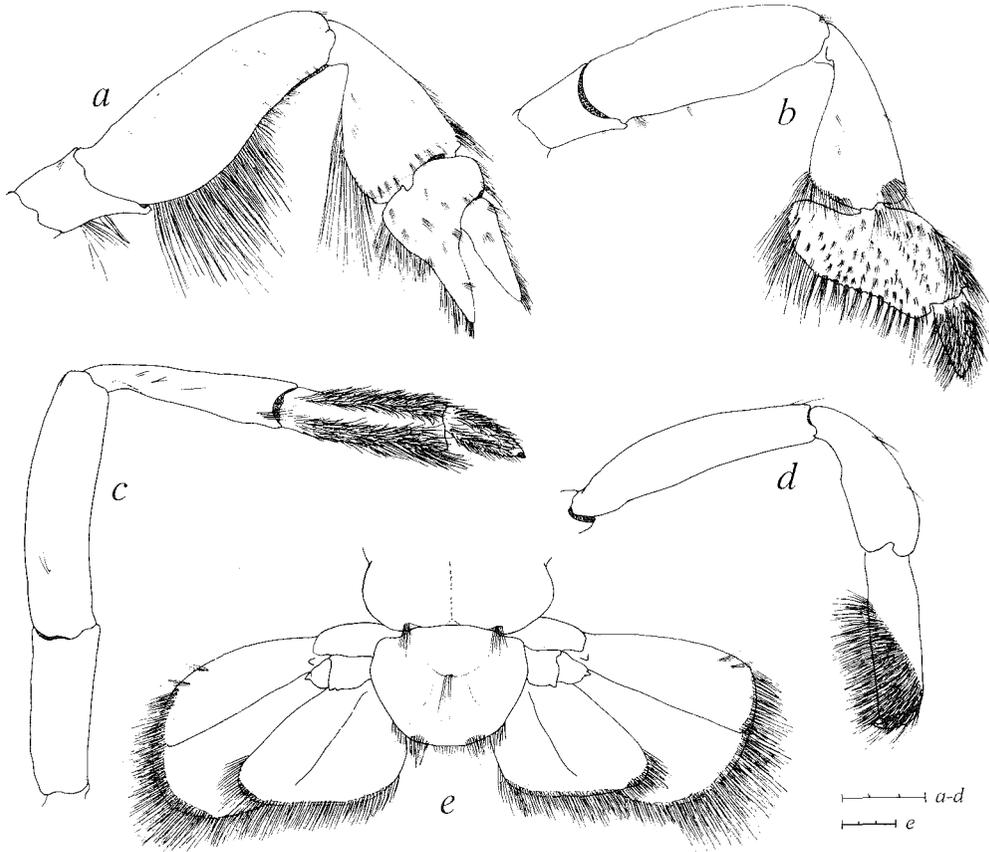


Fig. 3. *Neocallichirus raymanningi*, new species, male holotype (cl 23.1 mm), Gulf of Cariaco, Venezuela, USNM 276147: a, Right second pereopod, external surface; b, Right third pereopod, external surface; c, Right fourth pereopod, external surface; d, Right fifth pereopod, external surface; e, Telson and uropods, dorsal view. Scales equal 3 mm.

posteriorly cupped fans when coupled at mesial margins of endopods; endopod of each (Fig. 4g, h) subtriangular, short, with stubby appendix interna embedded into mesial margin of endopod.

Telson (Fig. 3e) about 1.3 times as broad as long, broadest at lateral lobes on anterior half; posterior margin broadly rounded or weakly sinuous, setose; posterolateral corners rounded, each bearing tuft of long setae; dorsal surface anteromedially elevated and with tuft of setae medially. Uropod with posterolaterally directed rounded lobe of protopod overreaching anterior margin of endopod; endopod broader than long, subrectangular, posterior margin truncate, nearly straight dorsal surface with longitudinal

carina and broad tuft of long setae on posterolateral corner; exopod with anterodorsal plate with dense spiniform setae distally, posterior plate marginally with dense, long spiniform setae grading posteriorly into thinner setae.

Known range and habitat.—Known only from the northern and southern shores of the Gulf of Cariaco, Venezuela. The specimens were found in shallow subtidal habitats at about 0.5 m in depth, on sand or sand-mud substrates. Salinity and temperature ranged from 34 to 35 ppt, and 23.6° to 25°C, respectively.

Etymology.—The specific name is given in honor of our colleague and friend, Raymond B. Manning, in recognition of his

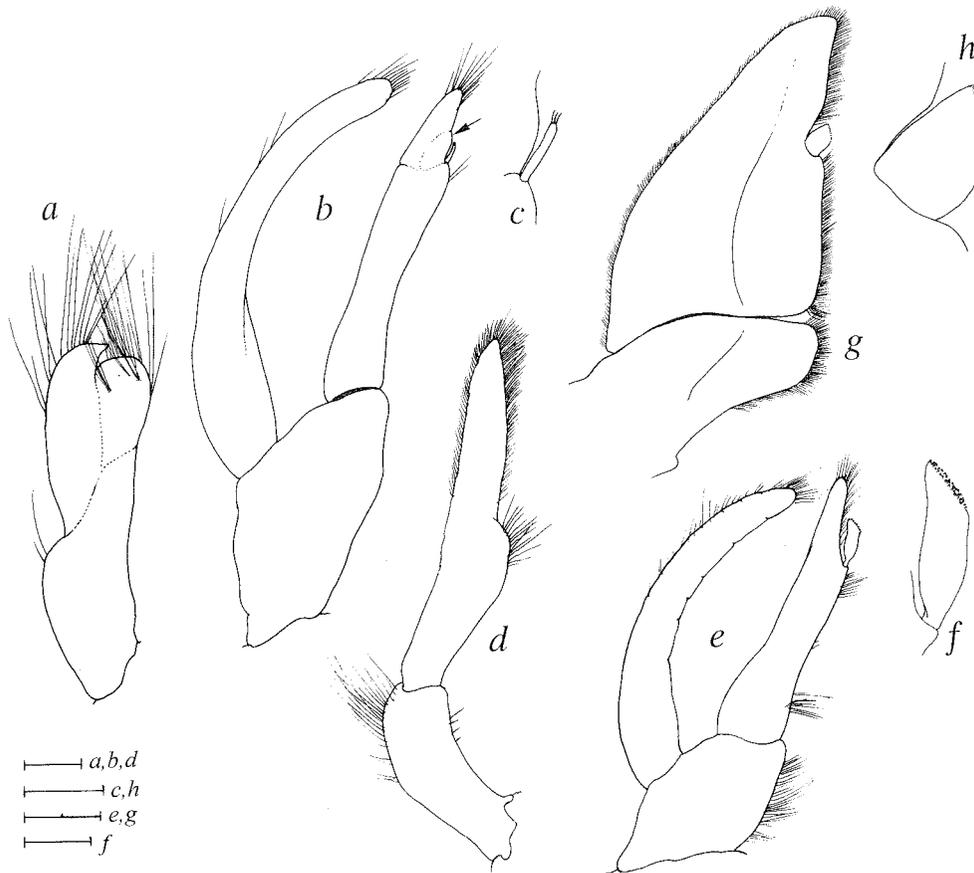


Fig. 4. *Neocallichirus raymanningi*, new species, Gulf of Cariaco, Venezuela. a–c, g, h, Male holotype (cl 23.1 mm), USNM 276147; d–f, Female paratype (23.1 mm), USNM 276148. a, Male left first pleopod, posterior surface; b, Male left second pleopod, posterior surface (arrow indicates appendix masculina); c, Appendix interna of same; d, Female first right pleopod, posterior surface; e, Female second right pleopod, posterior surface; f, Appendix interna of same; g, Third pleopod, posterior surface; h, Appendix interna of same, posterior surface. Scales equal 1 mm (a, b, d, c, h), 2 mm (e, g) and 0.5 mm (f).

contributions to the systematics of the Calianassidae. Over the years he has helped and encouraged us to collect and study these poorly known crustaceans.

Remarks.—Among the western Atlantic species of *Neocallichirus*, *N. raymanningi*, new species, is most similar to *N. rathbunae* (Schmitt, 1935). The two can be separated easily by differences in the frontal margin of the carapace and, in the case of males, the major cheliped. In the new species the rostrum is broadly rounded and unarmed, whereas in *N. rathbunae* the rostrum is subtriangular and has a terminal spine.

The major cheliped of the only known male of the new species has a row of irregular, bifid teeth on the inferior margin of the merus; the prehensile margin of the dactylus has a large proximal subrectangular tooth, which is separated from the distal part of the margin by a deep subquadrate cleft. In contrast, the major cheliped in males of *N. rathbunae* have simple spines on the inferior margin of the merus; the prehensile margin of the dactylus has a large, low subrectangular tooth proximally, which is separated from the rest of the margin by a shallow rounded (U-shaped) cleft.

The second pleopod of the male in *Neocallichirus raymanningi*, new species, and *N. rathbunae*, is distinct from that of other western Atlantic congeners in having a well developed, slender appendix interna with short stiff setae terminally (Fig. 4b). In other western Atlantic congeners the appendix interna is obsolete or at most a vestige is present in the form of a small patch of short microsetae.

The following is a checklist of all *Neocallichirus* species currently known from the world, and their general distribution:

- N. cacahuate* Felder & Manning, 1995: western Atlantic (Florida, U.S.A.).
- N. caechabitator* Sakai, 1988: western Pacific (Australia).
- N. darwinensis* Sakai, 1988: western Pacific (Australia).
- N. denticulatus* Ngoc-Ho, 1994: western Pacific (Australia).
- N. grandimana* (Gibbes, 1850): western Atlantic (Bermuda; Caribbean Sea; Brazil), and eastern Pacific (Panama to Ecuador).
- N. horneri* Sakai, 1988: western Pacific (Australia).
- N. indica* De Man, 1905: Indo-West Pacific (Mauritius; Java Sea; Japan).
- N. lemaitrei* Manning, 1993: western Atlantic (Colombia).
- N. limosa* (Poore, 1975): western Pacific (Australia).
- N. manningi* Kazmi & Kazmi, 1992: Indian Ocean (Arabian Sea, Pakistan).
- N. moluccensis* (De Man, 1905): western Pacific (Indonesia).
- N. natalensis* (Barnard, 1947): western Indian Ocean (Natal, South Africa).
- N. nickellae* Manning, 1993: western Atlantic (Tobago).
- N. pachydactyla* (A. Milne-Edwards, 1870): eastern Atlantic (Cape Verde Islands; Senegal; Ghana).
- N. rathbunae* (Schmitt, 1935): western Atlantic (Florida, U.S.A.; Bahamas; U.S. Virgin Islands; Jamaica).
- N. raymanningi*, new species: western Atlantic (Venezuela).
- N. sassandrensis* (Le Loeuff & Intès, 1974): eastern Atlantic (Ivory Coast).
- N. taiaro* Ngoc-Ho, 1995: South Pacific (French Polynesia).

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