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***Neocallichirus cacahuate*, a new species of ghost shrimp
from the Atlantic coast of Florida, with reexamination of
N. grandimana and *N. lemaitrei*
(Crustacea: Decapoda: Callianassidae)**

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Abstract. — Diversity of infaunal crustaceans remains poorly known, even for macrofaunal forms from accessible shorelines that have been urbanized for decades and studied extensively. *Neocallichirus cacahuate*, new species, is described from sparsely vegetated intertidal flats of Peanut Island just inside Lake Worth Inlet on the Atlantic coast of Florida, where it occurs as a minor constituent of a thalassinid fauna dominated by the callianassids *Neocallichirus rathbunae* (Schmitt), *Sergio mericeae* Manning & Felder, and *Callichirus major* (Say). This new species, at first confused with *Neocallichirus grandimana* (Gibbes) which also occurs occasionally in this habitat, bears a general resemblance to the young of that larger congener in carapacial features, chelae, telson, and uropods. However, in addition to the much larger body size attained by *N. grandimana*, this species and *N. cacahuate* can be distinguished on the basis of differences in body coloration, eyes, proportions of cheliped articles, shape of the uropodal endopods, and sculpture of the first and second male pleopods. At present known from only four small specimens, all from the type locality, *N. cacahuate* appears to mature at a much smaller size than does *N. grandimana*.

In the early 1980's, we initiated studies to document exhaustively the coastal decapod crustacean diversity in the Indian River Lagoon and adjacent embayments of southeastern Florida, a task in which we remain engaged. We chose to focus initially on intertidal and shallow subtidal infaunal groups because the habitats were readily accessible, these groups were not well represented in local collections, and both the assemblage and the habitats appeared vulnerable to continuing shoreline development in this rapidly urbanizing region. Our experience in sampling with yabby pumps (see Manning & Felder 1995, and citations therein) facilitated our obtaining large samples of macroinfaunal forms, especially of the more

deeply burrowed thalassinid ghost shrimp. In the course of our subsequent studies of these large series of materials collected, we have come to recognize the divergent morphology which characterizes genera of the western Atlantic Callianassidae, the subtle characters that often separate closely related western Atlantic species, and the remarkable diversity of this taxocene in southern Florida (Manning & Felder 1986, 1991, 1992, 1995, Manning & Heard 1986, Manning 1987, 1993, Rodrigues & Manning 1992, Felder & Rodrigues 1993, Felder & Manning 1994, Manning & Lemaitre 1994).

We herewith report yet another previously unrecognized thalassinid species from this region, the third new thalassinid and

fifth new infaunal decapod that we have reported from this southeastern region of Florida. This new species, at first confused with juveniles of a sympatric congener, *Neocallichirus grandimana* (Gibbes, 1850), represents the fifth species of that genus (sensu Manning & Lemaitre 1994) to be described from the western Atlantic. As with several other new callianassids we have found, the atypical coloration of fresh specimens first suggested that they may represent a unique form. In order to definitively distinguish the new species, our present analyses includes detailed comparisons with juveniles and adults of *N. grandimana* from southern Florida, a markedly larger species at maturity.

Material examined is listed by location followed by date, collector, number of specimens per sex and condition (mutl = mutilated, ov = ovigerous, immat = immature), and museum number. Size is expressed as postorbital carapace length (cl) or postorbital total length (tl) measured in millimeters (mm). The holotype and two paratypes of *Neocallichirus cacahuate* have been deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM). A paratype has been deposited in the University of Southwestern Louisiana Zoological Collections, Lafayette, Louisiana (USLZ). As the single small female specimen of *N. cacahuate* appeared to be immature, the description was based primarily upon the larger male specimens. Comparative studies of *N. grandimana* are based upon males of that species from the Atlantic coast of Florida, some of which were immature stages (USLZ 3554) and of carapace lengths approximating those of *N. cacahuate*, others of which were much larger and fully mature (USLZ 3553). *Neocallichirus cacahuate* was also compared with two topotypic juvenile females of *N. grandimana* from Key West, Florida (USLZ 3555) and to the male holotype specimen of *Glypturus siguanensis* Boone, 1927 from Isle of Pines, Cuba (YPM 8160), obtained

on loan from the Yale University Peabody Museum of Natural History. From our examination, the latter specimen was confirmed as a junior synonym of *N. grandimana* (see Manning 1987). The types of *N. cacahuate* were compared with fresh, comparably sized topotypic material of *N. lemaitrei* Manning, 1993 obtained recently in the Islas del Rosario, Colombia by DLF and R. Lemaitre (USLZ 3556). Publication figures were prepared by DLF.

Family Callianassidae Dana, 1852

Subfamily Callichirinae

Manning & Felder, 1991

Neocallichirus Sakai, 1988

Neocallichirus cacahuate, new species

Figs. 1a–c, 2, 3a–e, 4a–c, 5

Type material.—Holotype: North side of Peanut Island, sparsely vegetated sandy to shelly sand intertidal flats, Lake Worth, West Palm Beach County, Florida, 26°46.7'N, 80°2.9'W, 23 Jul 1994, coll: D. L. Felder, J. M. Felder, R. D. Felder and W. D. Lee, 1 ♂ (cl 13.2 mm; photographic voucher) USNM 268770.

Paratypes: Same site as holotype, 4 Mar 1987 (RBM station 87-5), coll: R. B. Manning and W. D. Lee, 2 ♂ (cl 9.9 mm) USLZ 3552, (cl 10.5 mm) USNM 268861, 1 ♀ (cl 7.2 mm) USNM 268769.

Diagnosis.—Front of carapace with 3 small angular anterior projections, medial usually more acute and anteriorly advanced than laterals. Eyestalks broad, with large swollen cornea occupying more than half of stalk width. Third maxilliped with arched dactyl and broad propodus, height of propodus greater than length of dactyl; maximum diagonal length of merus-ischium more than twice width at joint between these articles. Major cheliped with inferior margin of merus lacking distinct spine, regularly rounded in outline and armed with line of small slightly hooked or distally-directed denticles; carpus greater than or equal to $\frac{2}{3}$

length of palm, inferior margins of both unarmed; dactylus with bilobed subrectangular tooth in proximal half, separated by deep cleft from broad subtriangular tooth distally, terminally with acute hooked tip. Minor cheliped with fingers subequal to or slightly longer than palm, palm subequal to or slightly longer than carpus. Uropodal endopod broadly subrectangular, posterior margin truncate, nearly straight; uropodal exopod with superior plate not reaching distal margin of inferior plate. Telson broader than long, posterior margin truncate to weakly sinuous.

Description.—Size small, males maturing at relatively small size; cl <15 mm and tl <65 mm in known specimens.

Frontal margin of carapace (Figs. 1a, 5a) with 3 anterior prominences, lateral of which are usually lobiform or obtusely angular, overlying inner margins of antennal peduncles; median prominence advanced slightly beyond laterals, forming short rostrum, not extending to cornea. Rostrum usually terminating in acute or slightly spiniform projection, lateral prominences sometimes terminating similarly in smaller specimens. Carapace lacking rostral carina, with distinct linea thalassinica, and with defined dorsal oval marked posteriorly by deep transverse cardiac furrow, latter extending anteroventrally to either side above linea thalassinica as shallow groove demarcating posterior half of dorsal oval. Frontal margin of carapace continued ventrolaterally beyond intersection with linea thalassinica and onto branchiostegite as thickened oblique ridge terminating at anterior end of prominent rounded hepatic boss and lower, more elongate swelling. Subantennular region of epistome forming calcified socket for antennal peduncle, bearing dense tuft of long setae below peduncle.

Eyestalks subtriangular, with large, bulbous, hemispherical, darkly pigmented corneas; swollen cornea occupying more than half of stalk width and markedly distending anterolateral margin of eyestalk. Length of

exposed eyestalk in dorsal view slightly exceeding basal width, lobate to obtusely angular tips reaching to or nearly to distal end of basal antennal article; mesial surfaces of eyestalks closely appressed over proximal portion of midline, slightly divergent terminally; base of eyestalk with mesial sensory punctae on either side of rostrum.

Antennular peduncle shorter and heavier than antennal peduncle, terminal article about 1.5 times length of penultimate and not exceeding midlength of terminal article of antennal peduncle; penultimate and terminal articles of peduncle with ventromesial and ventrolateral rows of long setae, those of ventrolateral row longer; rows of setae continued onto ventral ramus of flagellum, proximal articles of which also bear very long midventral setae; rami of flagellum subequal in length or with ventral slightly exceeding dorsal, 5–6 times length of terminal article of peduncle; dorsal ramus with sparse setae in proximal half, distal half with dense tufts of short ventrolateral setae, articles comprising tapered tip with dense line of ventral aesthetascs. Antennal peduncle with terminal article subequal to or slightly longer than penultimate article; short basal article forming slightly produced, setose lip above laterally produced excretory pore; second article with deep, diagonal ventral suture, distolaterally with single tuft of setae, small, distinct, dorsal scale articulated at joint with third article; third article elongate, much narrower than second, distinctly longer than combined lengths of first two, proximolaterally with partially fused condylar process articulated to distolateral extreme of second article; fourth article slightly narrower than third; antennal flagellum about 2.5 times length of antennular flagellum.

Mandibles (Fig. 2a) with large, 3-segmented palp, elongated third article of palp slightly tapered and terminally rounded, concave on external surface, long setae distally on second article and on proximal extensor surface of third, field of short,

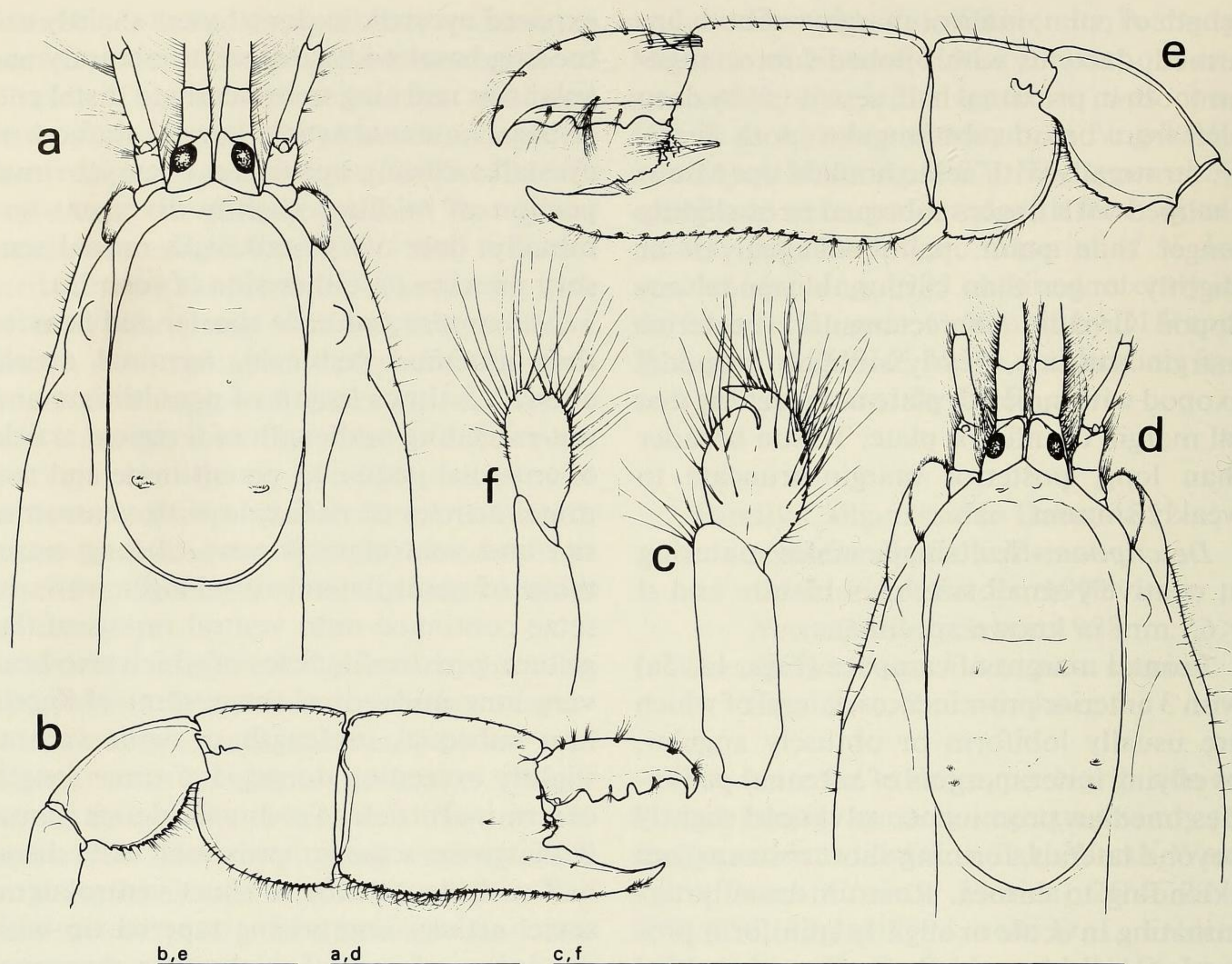


Fig. 1. *Neocallichirus cacahuate*, new species, male holotype (cl 13.2 mm) from Peanut Island, Lake Worth, Florida, USNM 268770: a, Carapace front, eyestalks, and basal antennal segments, dorsal view; b, Major cheliped, internal surface; c, First pleopod, posterolateral surface. *Neocallichirus grandimana* (Gibbes), immature male (cl 13.2 mm) from just north of St. Lucie Inlet, Florida, USLZ 3554: d, Carapace front, eyestalks, and basal antennal segments, dorsal view; e, Major cheliped, internal surface; f, First pleopod, posterolateral surface. Scale lines indicate 5 mm.

weakly hooked setae on most of extensor surface of third article, setae heavier and less hooked terminally; incisor process with well defined, terminally corneous teeth on cutting margin, teeth largest on proximal $\frac{2}{3}$ of cutting margin, internal surface with lip giving rise to molar process proximal to incisor teeth, molar process with about 6–7 small marginal teeth, 1 of which may be spaced proximally on internal margin apart from others; paragnath (Fig. 2b) rounded, scaliform, poorly sclerotized, set against and below molar process. First maxilla (Fig. 2c) with endopodal palp long, narrow, terminal article deflected proximally at articulation

and narrowed to terminal tip; proximal endite with very dense fine setation on most of lower mesial margin, terminal lobe with field of large, terminally bifurcate setae; distal endite elongate, proximally narrow, broadening terminally where armed with short stiff bristles, distalmost bristles may be weakly bifurcate; exopodite low, truncate and setose. Second maxilla (Fig. 2d) with endopod acute distally, first and second endites each longitudinally subdivided and densely setose terminally; first endite with low arcuate setose crest across external surface of lower lobe, internal surface fused to broad, rounded, plate bearing long marginal

setae; exopod forming large, broad, scaphognathite. First maxilliped (Fig. 2e) with proximal endite narrowly produced, dentiform, marginally setose; distal endite robust, subquadrate, mesial half of external surface and margins heavily setose, long dense setae of outer surface overreaching and obscuring stout bifurcate bristles on mesial margin, longest setae terminal, internal surface concave; exopod ovoid, divided by transverse suture marking notch on mesial margin, longest setae in field on external surface and mesial margin proximal to notch; epipod large, posterior lobe broad, anterior end tapered to narrow terminus. Second maxilliped (Fig. 2f) with long, narrow endopod; endopodal merus length about 4 times width, flexor margin with dense fringe of long, close-set setae; carpus short; propodus slightly arcuate, heaviest distally, greatest width about $\frac{2}{5}$ length; dactylus more than $\frac{1}{3}$ length of propodus, with terminal brush of stiff bristles; exopod narrow, arcuate, distally overreaching end of endopodal merus, marginally fringed by long setae; epipod small, partial suture subdividing angular terminal lobe; arthrobranch rudimentary. 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 endopodal merus-ischium exceeding 2 times width; ischium subrectangular, distinctly longer than broad, proximomesial margin rounded, not strongly produced, internal surface with well defined, longitudinally oriented elevation bearing curved row of sharp denticles; merus subtriangular, slightly broader than long; carpus heavy and subtriangular, with setose lobe on flexor margin, internal surface with dense field of fine setae distally; propodus large, subquadrate, height subequal to or exceeding length, internal surface with median field of fine, dense setae; dactylus narrow, slightly arcuate, shorter than height of propodus, terminally with small brush of stiff bristles.

Branchial formula including exopods and

epipods as described for first and second maxillipeds above; branchiae limited to single rudimentary arthrobranch on second maxilliped, pair of arthrobranches on third maxilliped, and pair of arthrobranches on each of first through fourth pereopods.

First pereopods forming dissimilar chelipeds, major cheliped heavy, massive in adults (Fig. 1b), similar to minor cheliped in juveniles. Major cheliped of adults strongly calcified; ischium slender, superior margin sinuous, inferior (flexor) margin with few widely spaced minute denticles; merus about 1.5 times as long as high, superior margin arcuate, inferior margin lacking distinct enlarged spine, regularly rounded in outline and armed with line of small slightly hooked or distally directed denticles; carpus almost as long as high, relatively shorter and higher in adults than in immature specimens, in larger adults length about $\frac{5}{6}$ height and greater than or equal to $\frac{2}{3}$ length of palm, superior margin weakly arcuate, forming keel terminated at distal acute corner of article, proximoinferior margin regularly rounded and smooth in outline, low submarginal denticles on internal surface; propodus heavy, length (including fixed finger) in adults distinctly less than twice height, latter greatest proximally, superior margin of palm forming unserrated keel in proximal half, proximal inferior margin with poorly defined smooth keel extending to base of fixed finger, keel lined on internal side by line of submarginal denticles extending onto base of fixed finger; angular, tuberculate prominence at base of gape, below which is rounded excavation in basal, opposable margin of fixed finger; fixed finger in adults with prehensile margin ranging from nearly smooth, with low broad teeth, to serrate; dactylus (movable finger) subequal to or shorter than palm, opposable margin with bilobed subrectangular tooth in proximal half, separated by deep cleft from broad subtriangular tooth distally, terminally with acute hooked tip.

Minor cheliped (Figs. 3a, 5b) well calci-

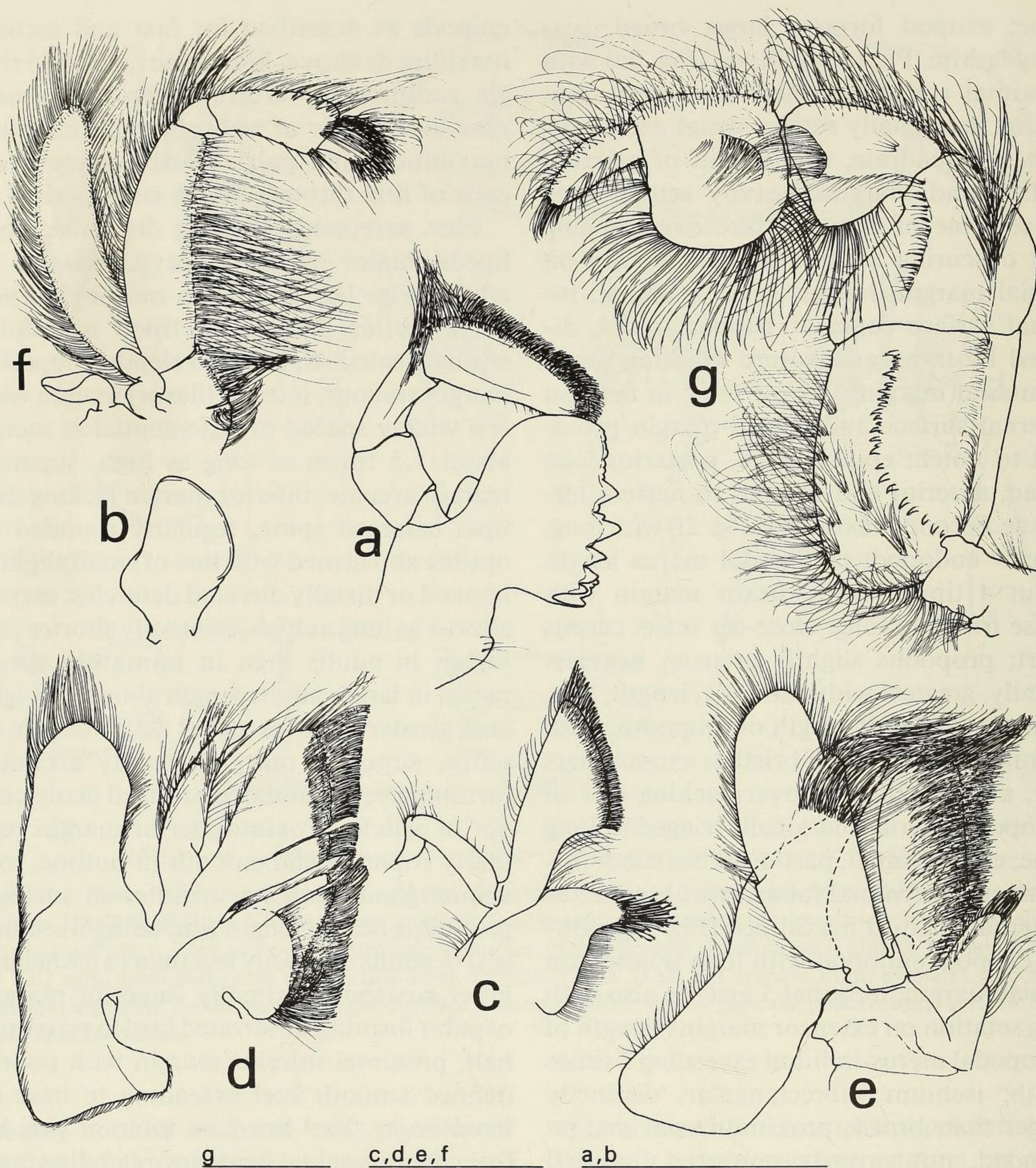


Fig. 2. *Neocallichirus cacahuate*, new species, male holotype (cl 13.2 mm) from Peanut Island, Lake Worth, Florida, USNM 268770, right mouthparts: a, Mandible, external surface; b, Paragnath, external surface; c, First maxilla, external surface; d, Second maxilla, external surface; e, First maxilliped, external surface; F, second maxilliped, external surface; g, Third maxilliped, internal surface. Scale lines indicate 2 mm.

fied but terminally more slender, less massive than major; ischium narrow, unarmed or with at most a few minute denticles on inferior margin, subequal in length to merus; merus elongately ovoid, length less than twice height, inferior margin usually with some minute denticles distally; carpus large,

subrectangular, forming most massive article of limb, slightly longer than merus, length slightly exceeding height and markedly exceeding length of palm, height greatest at or just proximal to midlength; chela narrower than and exceeding length of carpus; palm subrectangular, length subequal

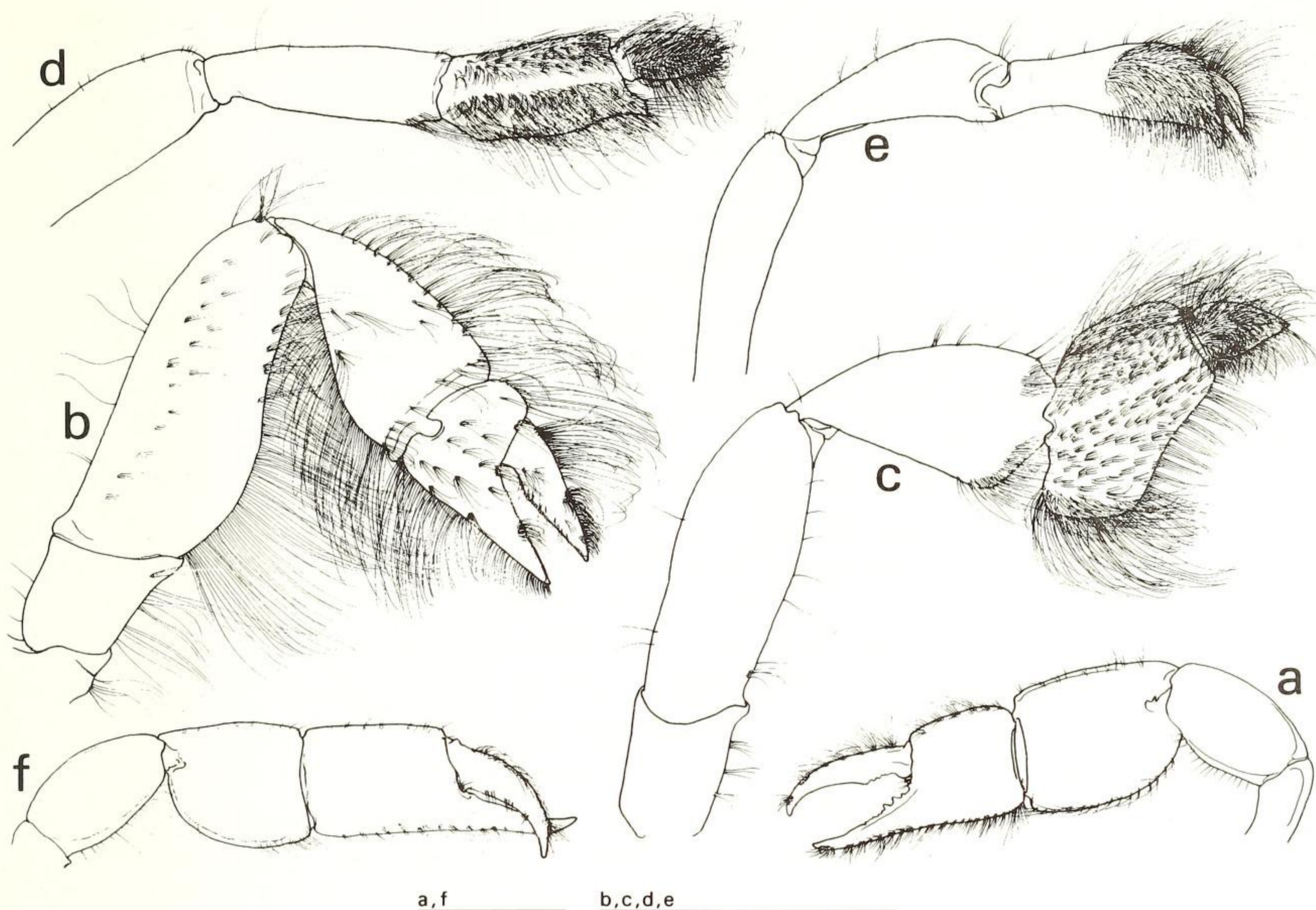


Fig. 3. *Neocallichirus cacahuate*, new species, male holotype (cl 13.2 mm) from Peanut Island, Lake Worth, Florida, USNM 268770: a, Minor cheliped, internal surface; b, Right second pereopod, external surface; c, Right third pereopod, external surface; d, Right fourth pereopod, external surface; e, Right fifth pereopod, external surface. *Neocallichirus grandimana* (Gibbes), immature male (cl 13.2 mm) from just north of St. Lucie Inlet, Florida, USLZ 3554: f, Minor cheliped, internal surface. Scale lines indicate 5 mm.

to height, latter distinctly less than (usually $\leq \frac{4}{5}$) that of carpus; fixed finger subequal in length to palm, opposable margin typically with 3–5 acute teeth proximally, beyond which margin grading from weakly serrate to smooth; gape slightly setose, armed by small denticle on internal side; dactylus (movable finger) in adults consistently exceeding length of palm, opposable margin usually with low, broad tooth and weak serration in proximal half.

Second pereopod (Fig. 3b) chelate, long setae sparsely distributed on inferior margin of ischium, more closely set over most of flexor margin on merus and both margins of carpus, those of superior margin of carpus set in a series of tufts, inferior margin of propodus with similar long setae proximally, progressively reduced in length and stiff-

ened distally, subterminally becoming dense patch of short, stiff bristles; prehensile margins of both fingers corneous, graded from finely micropectinate proximally to smooth distally in both, that of fixed finger obscured by conspicuous tuft of arched bristles on external side near midlength, margins terminated distally in thickened corneous tips of fingers; superior margin of dactylus nearly straight, with long marginal setation proximally, dense patch of short stiff setae and bristles distally; external surface of carpus, propodus and dactylus with scattered patches of short setae.

Third pereopod (Fig. 3c) merus broadest in distal half, length less than 3 times height; carpus broadest distally, length ≤ 2 times height, terminally with patches of long setae overreaching propodus; propodus with

proximally-directed lobe of inferior margin not reaching beyond broadest part of carpus, lobe terminally with long distally-directed setae, inferodistal margin with spaced tufts of slightly shorter setae, superior margin with fields of long setae grading to small patterned tufts of lighter, shorter setae on outer face of article; dactylus tear-shaped, densely setose on external surface, terminating in corneous tip hooked toward external side.

Fourth pereopod (Fig. 3d) with merus heavier, longer than carpus; subchelate, inferodistal corner of propodus produced into short fixed finger bearing heavy microseriate setae on external side and short bristles at tip; soft dense setation on outer surface of propodus and dactylus, that of propodus divided into upper and lower fields, densest in lower field where continued onto lower half of internal surface; dactylus terminating in narrow tip hooked toward external side.

Fifth pereopod (Fig. 3e) minutely chelate, opposable surfaces of propodus and minute dactylus excavate, spooned, terminally rounded, forming beak-like chela obscured by dense fields of setation on distal $\frac{1}{2}$ of propodus and superior surface of dactylus; corneous prehensile lip on fixed finger of chela pectinate.

Abdominal somites smooth, glabrous dorsally, with few paired punctae bearing short setae; second tergite posterolaterally with sulcus posterior to which is vertical, crescentic row of setose punctae on low carina, extreme of posterolateral lobe with small tuft of long setae; third through fifth tergites each with small midlateral depression bearing short setae, and broadly triangular depression bearing long soft dense setae on the lateral lobe, position of these depressions more anterior in the more posteriormost tergites; sixth tergite with pattern of small setose punctae and fine marginal setation laterally and distinct transverse, posteriorly-facing groove above telson.

First pleopod of male and female uniramous,

composed of 2 articles; in male (Fig. 1c), distal article spatulate, shorter than proximal, subdivided into 2 lobes by weak longitudinal furrow, anterior lobe terminally rounded in mature specimens, posterior lobe terminally acute with tip directed anteriorly; in female (immature, Fig. 5c) both articles narrow and elongate, terminal article with weakly produced shoulder just beyond midlength. Second pleopod of male and female biramous; in male (Fig. 4a), long setation largely restricted to tufts on lateral margin and terminus of exopod, lateral margin of endopod and terminus of appendix masculina; distal lobe of endopod almost as long as appendix masculina, demarcated from remainder of article by weak transverse suture; vestige of appendix masculina marked by small patch of microsetae on mesial margin; in female (Fig. 5d), both rami with long setae, appendix interna narrow and elongate. Third to fifth pleopods (Fig. 4b) forming large, posteriorly cupped fans when coupled at mesial margins of endopods; endopod of each subtriangular, short, stubby appendix interna tightly embedded into mesial margin of endopod.

Telson (Fig. 4c) broader than long, width less than 1.5 times length, subhexagonal, broadest at lateral lobes in anterior half, posteriorly truncate to weakly sinuous, posterolaterally corners broadly rounded, each bearing tuft of long setae; dorsal surface anteromedially elevated, with shallow sulci on lateral lobes to either side and short transverse line of setae to posterior. Uropod with angular, posterolaterally-directed lobe of protopod slightly overreaching anterior margin of endopod; endopod broad, subrectangular, slightly broader than long, posterior margin truncate, nearly straight, dorsal surface with longitudinal carina and small tuft of long setae near posterolateral corner; exopod with anterodorsal plate falling well short of distal endopod margin, distal edge of plate lined with short, thick spiniform setae grading to thinner longer setae of exopod margin; dorsal surface of exopod be-

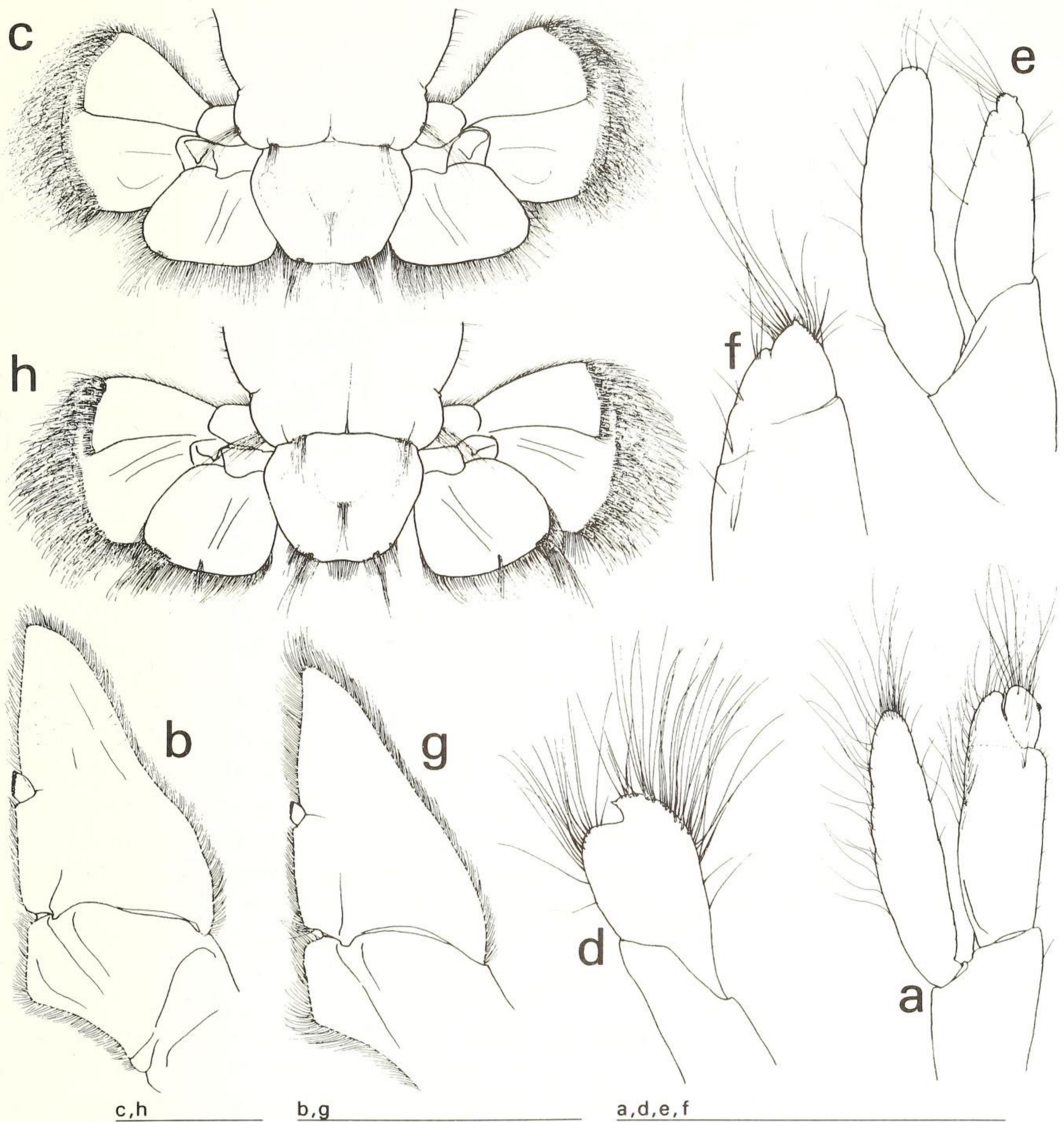


Fig. 4. *Neocallichirus cacahuate*, new species, male holotype (cl 13.2 mm) from Peanut Island, Lake Worth, Florida, USNM 268770: a, Right second pleopod, posterior surface; b, Right third pleopod, anterior surface; c, Telson, uropods, and part of sixth abdominal segment, dorsal surface. *Neocallichirus grandimana* (Gibbes), mature male (cl 27.1 mm) from Bear Cut, Biscayne Bay, Florida, USLZ 3553: d, Right first pleopod, posterolateral surface; f, Right second pleopodal endopod, terminus only, posterior surface. *Neocallichirus grandimana* (Gibbes), immature male (cl 13.2 mm) from just north of St. Lucie Inlet, Florida, USLZ 3554: e, Right second pleopod, posterior surface; g, Left third pleopod, distal endopod and appendix interna, posterior surface; h, Telson, uropods, and part of sixth abdominal segment, dorsal surface. Scale lines indicate 5 mm.

low plate concave, distal margin with dense fringe of setation, fringe diminished and supplemented by row of short spiniform setae on posterior margin.

Size.—Of the four known specimens,

three appear to be mature males ranging (after preservation) from cl 9.9 mm to 13.2 mm and tl from 39.4 mm to 51 mm. The single female specimen, cl 7.2 mm and tl 29.8 mm, is apparently immature, given the

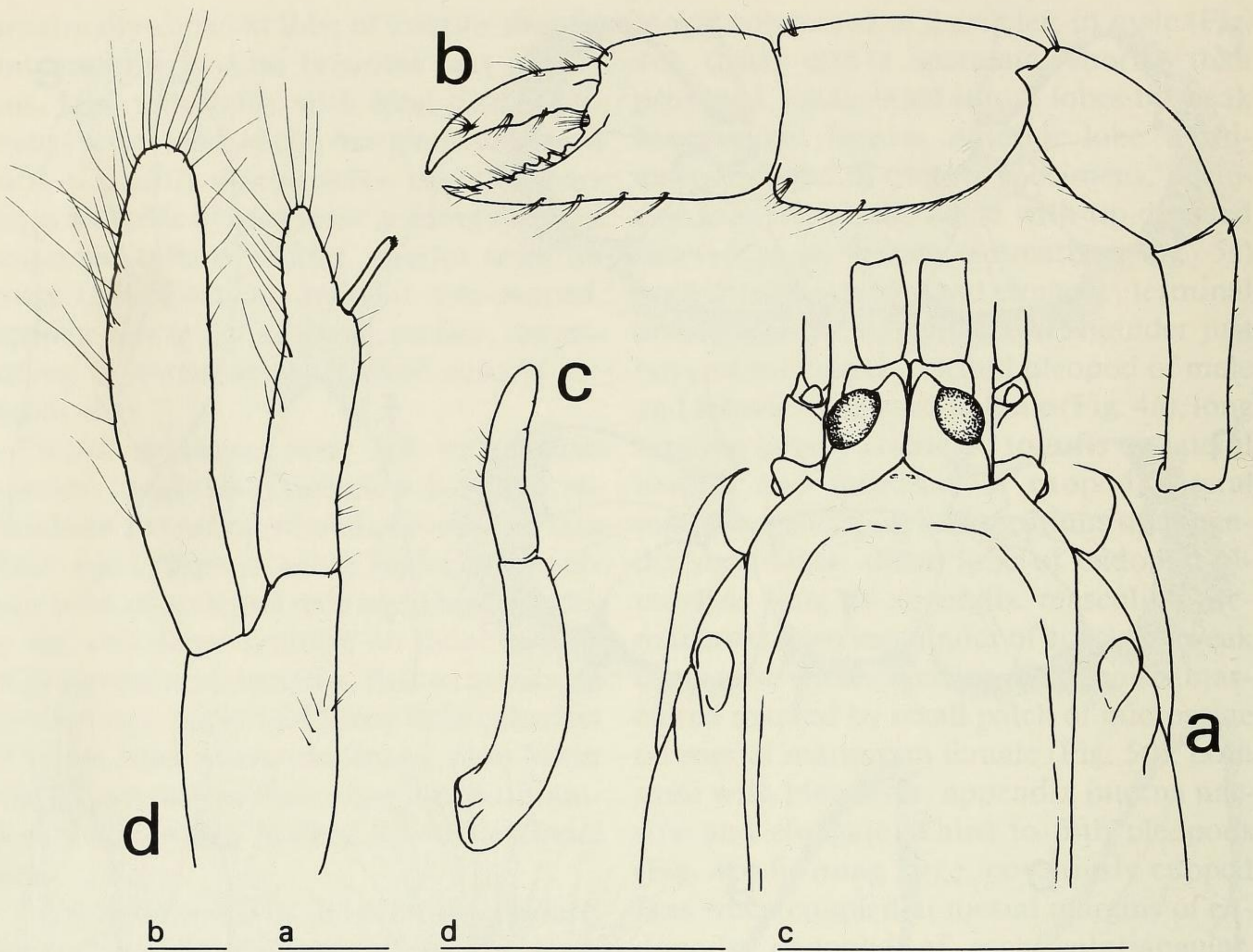


Fig. 5. *Neocallichirus cacahuate*, new species, paratype immature female (cl 7.2 mm) from Peanut Island, Lake Worth, Florida, USNM 268769: a, Carapace front, eyestalks, and basal antennal segments, dorsal view, setae not shown; b, Minor cheliped, external surface; c, First pleopod, posterolateral surface; d, Right second pleopod, posterior surface. Scale lines indicate 1 mm.

limited development of setation in its anterior pleopods.

Color.—Reddish orange, fading quickly to opaque white in alcohol. In life most adult specimens with striking scarlet red to reddish orange highlights on lighter faded orange to cream or translucent white ground color; usually with most vivid scarlet or orange-red patterns on the superior surfaces of the chelae, eyestalks, dorsal oval of carapace, tergites of abdominal segments 2–6, and as a very broad, poorly defined band across telson and uropods; color somewhat less or variably developed on antennae and cardiac region. Light cream to white on inferior surfaces of chelipeds and immediately bordering articulations of pereopodal arti-

cles. The reddish coloration is usually distinct from the pinkish-red to rose-violet typical of *N. grandimana*.

Known range and habitat.—Known only from intertidal to shallow subtidal habitats on the northern shores of Peanut Island in Lake Worth, a small marine embayment immediately inside Lake Worth Inlet on the heavily urbanized lower Atlantic coast of Florida, USA. All of the four known specimens of this species were taken with yabby pumps at low tide in sparsely vegetated sand to shelly sand substrates. *Neocallichirus cacahuate* represented a very small percentage of the thalassinids taken from this habitat. Both large and small specimens of *Neocallichirus rathbunae* (Schmitt, 1935) were par-

ticularly common in this habitat while *Sergio mericeae* Manning & Felder, 1995, *Callichirus major* (Say, 1818), *N. grandimana*, and *Corallianassa longiventris* (Milne Edwards, 1870) occurred in somewhat lesser abundance. In unvegetated areas on the northern end of the island, especially along the northeastern shoreline near a navigation canal, *Callichirus major* dominated. In the single instance that the burrow shape of a subsequently captured animal was noted, the surface aperture was about 4 mm in diameter and surrounded by a small mound of ejecta slightly darker than the adjacent sand surface.

Etymology.—Derivation of the species name from “cacahuate,” the Spanish word for “peanut,” recognizes contributions of Mr. Steven C. Rabalais, Supervisor of Vessel Operations and Assistant Director for Physical Facilities of the Louisiana Universities Marine Consortium. Long known to his many friends by the nickname “Cacahuate” in Latin America or “Peanut” in the U.S. Gulf states, Mr. Rabalais has contributed substantially to studies of western Atlantic decapod crustaceans through his expert operation of the research vessel R/V *Pelican* and as a volunteer field collector extraordinaire. The name is doubly appropriate in that the type locality for this species is Peanut Island in Lake Worth, Florida.

Remarks.—Like other species of the genus *Neocallichirus*, *N. cacahuate* can be distinguished from members of the closely related genus *Sergio* on the basis of its relatively longer, posteriorly rounded to truncate telson and its broader, more rectangular uropodal endopods. At the type locality, *N. cacahuate* occurs alongside a commonly encountered reddish colored ghost shrimp of that genus, *Sergio mericeae*, which can be readily distinguished by the aforementioned characters or by the striking shape of the major cheliped in that species (see Manning & Felder 1995). However, *N. cacahuate* also shares its habitat with the more

abundant congener *N. rathbunae* and, less commonly, *N. grandimana*, two species that are also commonly reddish to reddish pink in coloration. Fully mature specimens of either of these congeners are conspicuously larger than those of *N. cacahuate* and can be so distinguished outright. Small specimens of *N. rathbunae* can be distinguished on the basis of the uropodal endopod which differs strikingly from that of *N. cacahuate* and *N. grandimana* in that the anterodorsal plate reaches to the distal margin of the endopod. In addition, the lateral frontal spines of the carapace in *N. rathbunae* are almost always each tipped with a sharp conspicuous spinule, while these prominences usually terminate in obtuse lobes or at most sharp corners in *N. cacahuate* or *N. grandimana*.

While subtle variations are evident in the extensive materials of *N. grandimana* that we have examined from the western Atlantic (see also discussion under *Callianassa branneri* by Biffar 1971:666), detailed comparisons between regional subpopulations of this wide-ranging and common form are beyond the scope of the present work. For now, we continue to assign all western Atlantic specimens which (i) lack spinules on the frontal projections of the carapace and (ii) have a short carpus (less than half palm length) on the major cheliped to *N. grandimana* (sensu Manning 1987, Manning & Felder 1991). However, comparative materials of this species used in the present work have been limited to topotypic specimens from Key West, Florida, selected specimens from the Atlantic coast of Florida, and the large male holotype of *Glypturus siguanensis* Boone, 1927 (a subjective junior synonym of *Callianassa grandimana* Gibbes) from Isle of Pines, Cuba.

Differentiation of fresh material of *N. cacahuate* from live small specimens of the closely related *N. grandimana* can be based upon the more striking coloration of *N. cacahuate*, or can be based on a number of morphological characters. Perhaps most

obvious, specimens of *N. grandimana* that are of comparable size to mature specimens of *N. cacahuate* will obviously be immature in secondary sex characters such as the first male pleopods (see Figs. 1c, f, 4d). Also, even though corneas in immature specimens of *N. grandimana* (Fig. 1d) tend to be relatively larger than those in mature specimens, only the very smallest approach the relative size (width consistently $> \frac{1}{2}$ eyestalk width) or strongly bulbous shape seen in *N. cacahuate* (Fig. 1a). While corneal width in a small (cl 6.8 mm) topotypic female of *N. grandimana* was about half the eyestalk width, the cornea was not as bulbous as in comparably small specimens of *N. cacahuate* (Fig. 5a) and the major cheliped was clearly distinguishable as typical of *N. grandimana*. The major cheliped in *N. cacahuate* (Fig. 1b) is distinct in its more regularly arcuate, dentate inferior margin of the merus and the much longer carpus than in *N. grandimana* (Fig. 1e), while the minor chela may be distinguished by the larger relative size of the carpus and presence of dentition on opposable margins of the fingers (Fig. 3a), as compared to the minor chela of similar-sized specimens in *N. grandimana* (Fig. 3f). In addition, the mature male first and second pleopods of *N. cacahuate* (Figs. 1c, 4a) differ from both the immature (Figs. 1f, 4e) and mature (Fig. 4d, f) forms of these appendages in *N. grandimana*.

Neocallichirus cacahuate resembles at least two southern Caribbean congeners, *N. lemaitrei* Manning, 1993 and *N. nickellae* Manning, 1993, in reaching mature form at a smaller size than does *N. grandimana* and in having a relatively long carpus on the major chela. However, the major chelae of both these species have a stronger inferior marginal serration on the carpus and propodus which is conspicuously visible in external view. In *N. nickellae*, the broadly sulcate gape at the base of the fixed finger, coniform basal tooth on the opposable margin of the dactylus, and angular inferior margin on the carpus in the major chela, as well as

the relative lack of conspicuous teeth on the fingers of the minor chela and the relatively smaller carpus in this appendage, further distinguishes this species from *N. cacahuate*.

However, *N. lemaitrei* appears to be very close to *N. cacahuate* in the shape and dentition of the major chela, as well as in relative proportions of the carpus and propodus of the minor chela. The strong similarity in these features, as well as the similarly bulbous corneas and nearly identical coloration of these species (based on fresh topotypic specimens of *N. lemaitrei*), qualifies *N. lemaitrei* as the congener most similar to *N. cacahuate*. Whereas *N. lemaitrei* matures at smaller size than does *N. grandimana*, it reaches larger size (some with cl ≥ 22 mm) than does *N. cacahuate*, and can be distinguished from the latter species in a number of features related to strength of dentition and amount of setation. In particular, it can be distinguished readily from *N. cacahuate* by its less heavily toothed and more setose gape of the minor chela (Fig. 6a) and by the previously mentioned heavier setation of the inferior margins of the major chela, evident even in small, immature specimens. On the basis of our presently limited sample, the mature males of *N. cacahuate* and *N. lemaitrei* also appear to differ slightly in sculpture of the first pleopods, the anterior lobe of which is angular in *N. lemaitrei* (Fig. 6b), and second pleopods, the appendix masculina of which is relatively broader and bears a larger vestige of the appendix interna in *N. lemaitrei* (Fig. 6c) than in *N. cacahuate* (Fig. 4a).

Another recently reported southern Caribbean form, listed as *Neocallichirus* sp. by Blanco Rambla & Liñero Arana (1994) has proved to be a member of the genus *Sergio* rather than *Neocallichirus*. At the time that their record was published, the name *Sergio* was in press and the differences between *Neocallichirus* and *Sergio*, pointed out by Manning & Lemaitre (1994), were unknown to those authors.

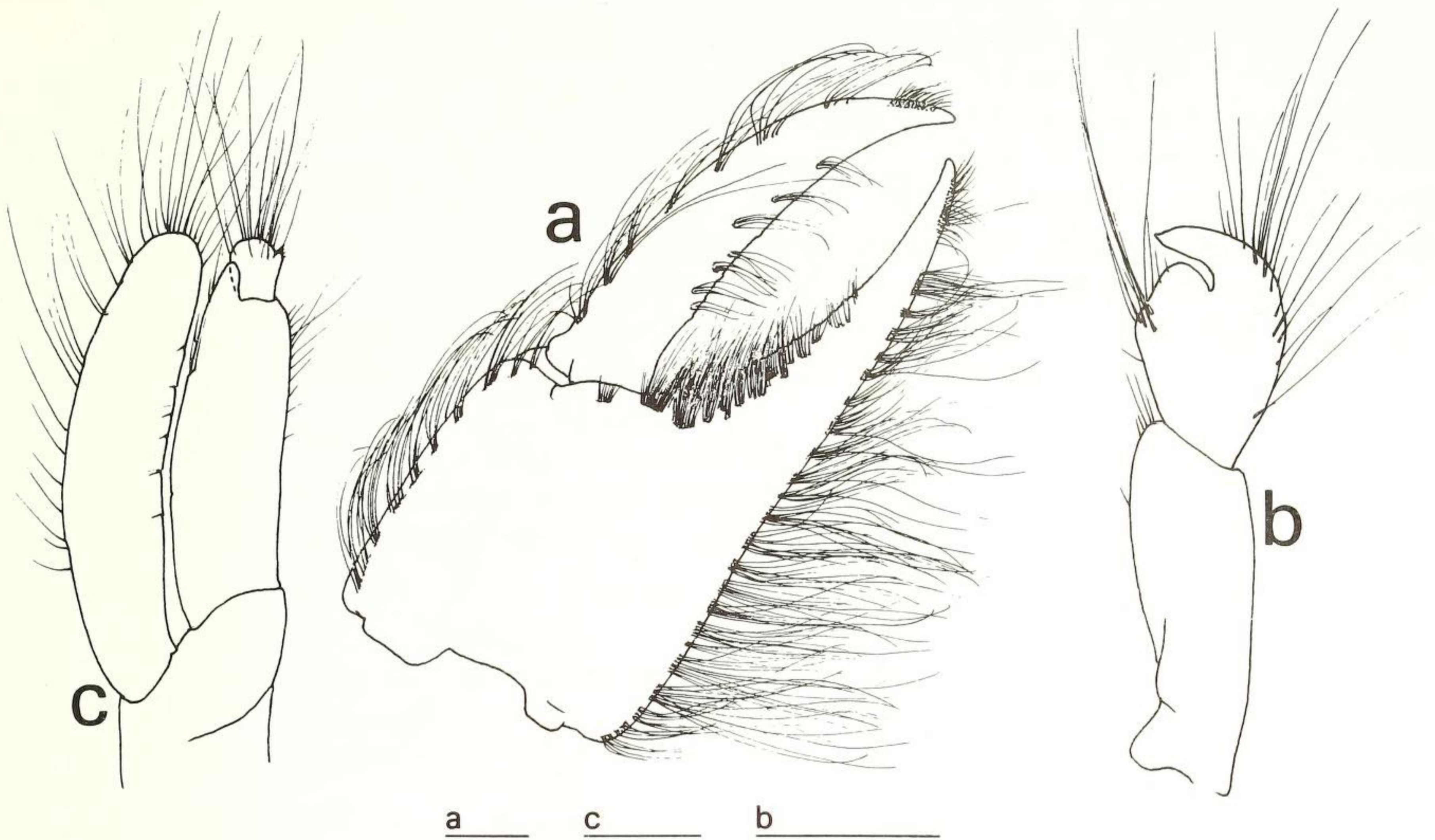


Fig. 6. *Neocallichirus lemaitrei* Manning, male (cl 13.8 mm) from Isla Rosario, Colombia, USLZ 3556. a, Minor chela, internal surface; b, Right first pleopod, posterolateral surface; c, Right second pleopod, posterior surface. Scale lines indicate 1 mm.

The single existing female specimen of *N. cacahuate* is almost certainly immature, given the relatively sparse development of setation in the anterior pleopods, as compared to that in mature females of congeners (see Manning 1993:fig. 3b, d). However, gonopores are clearly evident on the coxae of the third pereopods. While, other than for setation, the second pleopod (Fig. 5d) resembles that of congeners, it is doubtful that articular proportions of this appendage or those of the first pleopod (Fig. 5c) have reached mature form. In the mature female, the terminal article will almost certainly have developed to a larger relative size than seen in this individual and will have developed a more produced shoulder at mid-length and much longer and more abundant setation. The more acute frontal prominences on the carapace of this individual, the smallest of either sex collected, may suggest a character typical of immature specimens, perhaps for either sex. As the female specimen is missing the major cheliped,

possible sexual dimorphism in this appendage cannot be evaluated.

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Neocallichirus cacahuate, a new species of ghost shrimp
from the Atlantic coast of Florida, with reexamination of
N. grandimana and *N. lemaitrei*
(Crustacea: Decapoda: Callianassidae)

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Abstract. — Diversity of infaunal crustaceans remains poorly known, even for macrofaunal forms from accessible shorelines that have been urbanized for decades and studied extensively. *Neocallichirus cacahuate*, new species, is described from sparsely vegetated intertidal flats of Peanut Island just inside Lake Worth Inlet on the Atlantic coast of Florida, where it occurs as a minor constituent of a thalassinid fauna dominated by the callianassids *Neocallichirus rathbunae* (Schmitt), *Sergio mericeae* Manning & Felder, and *Callichirus major* (Say). This new species, at first confused with *Neocallichirus grandimana* (Gibbes) which also occurs occasionally in this habitat, bears a general resemblance to the young of that larger congener in carapacial features, chelae, telson, and uropods. However, in addition to the much larger body size attained by *N. grandimana*, this species and *N. cacahuate* can be distinguished on the basis of differences in body coloration, eyes, proportions of cheliped articles, shape of the uropodal endopods, and sculpture of the first and second male pleopods. At present known from only four small specimens, all from the type locality, NV. *cacahuate*

appears to mature at a much smaller size than does *N. grandimana*.

In the early 1980's, we initiated studies to document exhaustively the coastal decapod crustacean diversity in the Indian River Lagoon and adjacent embayments of southeastern Florida, a task in which we remain engaged. We chose to focus initially on intertidal and shallow subtidal infaunal groups because the habitats were readily accessible, these groups were not well represented in local collections, and both the assemblage and the habitats appeared vulnerable to continuing shoreline development in this rapidly urbanizing region. Our experience in sampling with yabby pumps (see Manning & Felder 1995, and citations therein) facilitated our obtaining large samples of macroinfaunal forms, especially of the more

deeply burrowed thalassinid ghost shrimp. In the course of our subsequent studies of these large series of materials collected, we have come to recognize the divergent morphology which characterizes genera of the western Atlantic Callianassidae, the subtle characters that often separate closely related western Atlantic species, and the remarkable diversity of this taxocene in southern Florida (Manning & Felder 1986, 1991, 1992, 1995, Manning & Heard 1986, Manning 1987, 1993, Rodrigues & Manning 1992, Felder & Rodrigues 1993, Felder & Manning 1994, Manning & Lemaitre 1994).

We herewith report yet another previously unrecognized thalassinid species from this region, the third new thalassinid and

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fifth new infaunal decapod that we have reported from this southeastern region of Florida. This new species, at first confused with juveniles of a sympatric congener, *Neocallichirus grandimana* (Gibbes, 1850), represents the fifth species of that genus (sensu Manning & Lemaitre 1994) to be described from the western Atlantic. As with several other new callianassids we have found, the atypical coloration of fresh specimens first suggested that they may represent a unique form. In order to definitively distinguish the new species, our present analyses includes detailed comparisons with juveniles and adults of *NV. grandimana* from southern Florida, a markedly larger species at maturity.

Material examined is listed by location followed by date, collector, number of specimens per sex and condition (mutl = mutilated, ov = ovigerous, immat = immature), and museum number. Size is expressed as postorbital carapace length (cl) or postorbital total length (tl) measured in millimeters (mm). The holotype and two paratypes of *Neocallichirus cacahuate* have been deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM). A paratype has been deposited in the University of South-

western Louisiana Zoological Collections, Lafayette, Louisiana (USLZ). As the single small female specimen of *N. cacahuete* appeared to be immature, the description was based primarily upon the larger male specimens. Comparative studies of *N. grandimana* are based upon males of that species from the Atlantic coast of Florida, some of which were immature stages (USLZ 3554) and of carapace lengths approximating those of *N. cacahuete*, others of which were much larger and fully mature (USLZ 3553). *Neocallichirus cacahuete* was also compared with two topotypic juvenile females of *N. grandimana* from Key West, Florida (USLZ 3555) and to the male holotype specimen of *Glypturus siguanensis* Boone, 1927 from Isle of Pines, Cuba (YPM 8160), obtained

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on loan from the Yale University Peabody Museum of Natural History. From our examination, the latter specimen was confirmed as a junior synonym of *N. grandimana* (see Manning 1987). The types of *N. cacahuete* were compared with fresh, comparably sized topotypic material of *N. lemaitrei* Manning, 1993 obtained recently in the Islas del Rosario, Colombia by DLF and R. Lemaitre (USLZ 3556). Publication figures were prepared by DLF.

Family Callianassidae Dana, 1852
Subfamily Callichirinae
Manning & Felder, 1991
Neocallichirus Sakai, 1988
Neocallichirus cacahuete, new species
Figs. 1a—c, 2, 3a—e, 4a-c, 5

Type material. —Holotype: North side of Peanut Island, sparsely vegetated sandy to shelly sand intertidal flats, Lake Worth, West Palm Beach County, Florida, 26°46.7'N, 80°2.9'W, 23 Jul 1994, coll: D. L. Felder, J. M. Felder, R. D. Felder and W. D. Lee, 1 ♀ (cl 13.2 mm; photographic voucher) USNM 268770.

Paratypes: Same site as holotype, 4 Mar 1987 (RBM station 87-5), coll: R. B. Manning and W. D. Lee, 2 ♀ (cl 9.9 mm) USLZ 3552, (cl 10.5 mm) USNM 268861, 1 ♂ (cl 7.2 mm) USNM 268769.

Diagnosis.—Front of carapace with 3 small angular anterior projections, medial

usually more acute and anteriorly advanced than laterals. Eystalks broad, with large swollen cornea occupying more than half of stalk width. Third maxilliped with arched dactyl and broad propodus, height of propodus greater than length of dactyl; maximum diagonal length of merus-ischium more than twice width at joint between these articles. Major cheliped with inferior margin of merus lacking distinct spine, regularly rounded in outline and armed with line of small slightly hooked or distally-directed denticles; carpus greater than or equal to 73

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length of palm, inferior margins of both unarmed; dactylus with bilobed subrectangular tooth in proximal half, separated by deep cleft from broad subtriangular tooth distally, terminally with acute hooked tip. Minor cheliped with fingers subequal to or slightly longer than palm, palm subequal to or slightly longer than carpus. Uropodal endopod broadly subrectangular, posterior margin truncate, nearly straight; uropodal exopod with superior plate not reaching distal margin of inferior plate. Telson broader than long, posterior margin truncate to weakly sinuous.

Description.—Size small, males maturing at relatively small size; cl <15 mm and tl <65 mm in known specimens.

Frontal margin of carapace (Figs. 1a, 5a) with 3 anterior prominences, lateral of which are usually lobiform or obtusely angular, overlying inner margins of antennal peduncles; median prominence advanced slightly beyond laterals, forming short rostrum, not extending to cornea. Rostrum usually terminating in acute or slightly spiniform projection, lateral prominences sometimes terminating similarly in smaller specimens. Carapace lacking rostral carina, with distinct linea thalassinica, and with defined dorsal oval marked posteriorly by deep transverse cardiac furrow, latter extending anteroventrally to either side above linea thalassinica as shallow groove demarcating posterior half of dorsal oval. Frontal margin

of carapace continued ventrolaterally beyond intersection with linea thalassinica and onto branchiostegite as thickened oblique ridge terminating at anterior end of prominent rounded hepatic boss and lower, more elongate swelling. Subantennular region of epistome forming calcified socket for antennal peduncle, bearing dense tuft of long setae below peduncle.

Eyestalks subtriangular, with large, bulbous, hemispherical, darkly pigmented corneas; swollen cornea occupying more than half of stalk width and markedly distending anterolateral margin of eyestalk. Length of

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exposed eyestalk in dorsal view slightly exceeding basal width, lobate to obtusely angular tips reaching to or nearly to distal end of basal antennal article; mesial surfaces of eyestalks closely appressed over proximal portion of midline, slightly divergent terminally; base of eyestalk with mesial sensory punctae on either side of rostrum.

Antennular peduncle shorter and heavier than antennal peduncle, terminal article about 1.5 times length of penultimate and not exceeding midlength of terminal article of antennal peduncle; penultimate and terminal articles of peduncle with ventromesial and ventrolateral rows of long setae, those of ventrolateral row longer; rows of setae continued onto ventral ramus of flagellum, proximal articles of which also bear very long midventral setae; rami of flagellum subequal in length or with ventral slightly exceeding dorsal, 5-6 times length of terminal article of peduncle; dorsal ramus with sparse setae in proximal half, distal half with dense tufts of short ventrolateral setae, articles comprising tapered tip with dense line of ventral aesthetascs. Antennal peduncle with terminal article subequal to or slightly longer than penultimate article; short basal article forming slightly produced, setose lip above laterally produced excretory pore; second article with deep, diagonal ventral suture, distolaterally with single tuft of setae, small, distinct, dorsal scale articulated at joint with third article; third article elongate, much narrower than second, distinctly longer than combined lengths of first two, proximolaterally with partially fused condylar process articulated

to distolateral extreme of second article; fourth article slightly narrower than third; antennal flagellum about 2.5 times length of antennular flagellum.

Mandibles (Fig. 2a) with large, 3-segmented palp, elongated third article of palp slightly tapered and terminally rounded, concave on external surface, long setae distally on second article and on proximal extensor surface of third, field of short,

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b,e a,d c,f

Fig. 1.

Neocallichirus cacahuat, new species, male holotype (cl 13.2 mm) from Peanut Island, Lake Worth,

Florida, USNM 268770: a, Carapace front, eyestalks, and basal antennal segments, dorsal view; b, Major cheliped, internal surface; c, First pleopod, posterolateral surface. *Neocallichirus grandimana* (Gibbes), immature male (cl 13.2 mm) from just north of St. Lucie Inlet, Florida, USLZ 3554: d, Carapace front, eyestalks, and basal antennal segments, dorsal view; e, Major cheliped, internal surface; f, First pleopod, posterolateral surface. Scale

lines indicate 5 mm.

weakly hooked setae on most of extensor surface of third article, setae heavier and less hooked terminally; incisor process with well defined, terminally corneous teeth on cutting margin, teeth largest on proximal 7 of cutting margin, internal surface with lip giving rise to molar process proximal to incisor teeth, molar process with about 6-7 small marginal teeth, 1 of which may be spaced proximally on internal margin apart from others; paragnath (Fig. 2b) rounded, scaliform, poorly sclerotized, set against and below molar process. First maxilla (Fig. 2c) with endopodal palp long, narrow, terminal article deflected proximally at articulation

and narrowed to terminal tip; proximal endite with very dense fine setation on most of lower mesial margin, terminal lobe with field of large, terminally bifurcate setae; distal endite elongate, proximally narrow, broadening terminally where armed with short stiff bristles, distalmost bristles may

be weakly bifurcate; exopodite low, truncate and setose. Second maxilla (Fig. 2d) with endopod acute distally, first and second endites each longitudinally subdivided and densely setose terminally; first endite with low arcuate setose crest across external surface of lower lobe, internal surface fused to broad, rounded, plate bearing long marginal

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setae; exopod forming large, broad, scaphognathite. First maxilliped (Fig. 2e) with proximal endite narrowly produced, dentiform, marginally setose; distal endite robust, subquadrate, mesial half of external surface and margins heavily setose, long dense setae of outer surface overreaching and obscuring stout bifurcate bristles on mesial margin, longest setae terminal, internal surface concave; exopod ovoid, divided by transverse suture marking notch on mesial margin, longest setae in field on external surface and mesial margin proximal to notch; epipod large, posterior lobe broad, anterior end tapered to narrow terminus. Second maxilliped (Fig. 2f) with long, narrow endopod; endopodal merus length about 4 times width, flexor margin with dense fringe of long, close-set setae; carpus short; propodus slightly arcuate, heaviest distally, greatest width about $\frac{1}{2}$ length; dactylus more than $\frac{1}{4}$ length of propodus, with terminal brush of stiff bristles; exopod narrow, arcuate, distally overreaching end of endopodal merus, marginally fringed by long setae; epipod small, partial suture subdividing angular terminal lobe; arthrobranch rudimentary. 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 endopodal merus-ischium exceeding 2 times width; ischium subrectangular, distinctly longer than broad, proximomesial margin rounded, not strongly produced, internal surface with well defined, longitudinally oriented elevation bearing curved row of sharp denticles; merus subtriangular, slightly broader than long; carpus heavy and subtriangular, with setose lobe on flexor margin, internal surface with dense field of fine

setae distally; propodus large, subquadrate, height subequal to or exceeding length, internal surface with median field of fine, dense setae; dactylus narrow, slightly arcuate, shorter than height of propodus, terminally with small brush of stiff bristles.

Branchial formula including exopods and

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epipods as described for first and second maxillipeds above; branchiae limited to single rudimentary arthrobranch on second maxilliped, pair of arthrobranches on third maxilliped, and pair of arthrobranches on each of first through fourth pereopods.

First pereopods forming dissimilar chelipeds, major cheliped heavy, massive in adults (Fig. 1b), similar to minor cheliped in juveniles. Major cheliped of adults strongly calcified; ischium slender, superior margin sinuous, inferior (flexor) margin with few widely spaced minute denticles; merus about 1.5 times as long as high, superior margin arcuate, inferior margin lacking distinct enlarged spine, regularly rounded in outline and armed with line of small slightly hooked or distally directed denticles; carpus almost as long as high, relatively shorter and higher in adults than in immature specimens, in larger adults length about % height and greater than or equal to *% length of palm, superior margin weakly arcuate, forming keel terminated at distal acute corner of article, proximoinferior margin regularly rounded and smooth in outline, low submarginal denticles on internal surface; propodus heavy, length (including fixed finger) in adults distinctly less than twice height, latter greatest proximally, superior margin of palm forming unserrated keel in proximal half, proximal inferior margin with poorly defined smooth keel extending to base of fixed finger, keel lined on internal side by line of submarginal denticles extending onto base of fixed finger; angular, tuberculate prominence at base of gape, below which is rounded excavation in basal, opposable margin of fixed finger; fixed finger in adults with prehensile margin ranging from nearly smooth, with low broad teeth, to serrate; dactylus (movable finger) subequal to or shorter than palm, opposable margin with bilobed subrectangular tooth in proximal half, separated by deep cleft from broad

subtriangular tooth distally, terminally with acute hooked tip.

Minor cheliped (Figs. 3a, 5b) well calci-

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Fig. 2. *Neocallichirus cacahuate*, new species, male holotype (cl 13.2 mm) from Peanut Island, Lake Worth, Florida, USNM 268770, right 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. Scale lines indicate 2 mm.

fied but terminally more slender, less massive than major; ischium narrow, unarmed or with at most a few minute denticles on inferior margin, subequal in length to merus; merus elongately ovoid, length less than twice height, inferior margin usually with some minute denticles distally; carpus large,

subrectangular, forming most massive article of limb, slightly longer than merus, length slightly exceeding height and markedly exceeding length of palm, height greatest at or just proximal to midlength; chela narrower than and exceeding length of carpus; palm subrectangular, length subequal

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a,f b,c,d,e

Fig. 3.

Neocallichirus cacahuate, new species, male holotype (cl 13.2 mm) from Peanut Island, Lake Worth,

Florida, USNM 268770: a, Minor cheliped, internal surface; b, Right second pereopod, external surface; c, Right third pereopod, external surface; d, Right fourth pereopod, external surface; e, Right fifth pereopod, external surface. *Neocallichirus grandimana* (Gibbes), immature male (cl 13.2 mm) from just north of St. Lucie Inlet, Florida, USLZ 3554: f, Minor cheliped, internal surface. Scale lines indicate 5 mm.

to height, latter distinctly less than (usually <%,) that of carpus; fixed finger subequal in length to palm, opposable margin typically with 3-5 acute teeth proximally, beyond which margin grading from weakly serrate to smooth; gape slightly setose, armed by small denticle on internal side; dactylus

(movable finger) in adults consistently exceeding length of palm, opposable margin usually with low, broad tooth and weak serration in proximal half.

Second pereopod (Fig. 3b) chelate, long setae sparsely distributed on inferior margin of ischium, more closely set over most of flexor margin on merus and both margins of carpus, those of superior margin of carpus set in a series of tufts, inferior margin of propodus with similar long setae proximally, progressively reduced in length and stiff-

ened distally, subterminally becoming dense patch of short, stiff bristles; prehensile margins of both fingers corneous, graded from finely micropectinate proximally to smooth distally in both, that of fixed finger obscured by conspicuous tuft of arched bristles on external side near midlength, margins terminated distally in thickened corneous tips of fingers; superior margin of dactylus nearly straight, with long marginal setation proximally, dense patch of short stiff setae and bristles distally; external surface of carpus, propodus and dactylus with scattered patches of short setae.

Third pereopod (Fig. 3c) merus broadest in distal half, length less than 3 times height; carpus broadest distally, length <2 times height, terminally with patches of long setae overreaching propodus; propodus with

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proximally-directed lobe of inferior margin not reaching beyond broadest part of carpus, lobe terminally with long distally-directed setae, inferodistal margin with spaced tufts of slightly shorter setae, superior margin with fields of long setae grading to small patterned tufts of lighter, shorter setae on outer face of article; dactylus tear-shaped, densely setose on external surface, terminating in corneous tip hooked toward external side.

Fourth pereopod (Fig. 3d) with merus heavier, longer than carpus; subchelate, inferodistal corner of propodus produced into

short fixed finger bearing heavy microseriate setae on external side and short bristles at tip; soft dense setation on outer surface of propodus and dactylus, that of propodus divided into upper and lower fields, densest in lower field where continued onto lower half of internal surface; dactylus terminating in narrow tip hooked toward external side.

Fifth pereopod (Fig. 3e) minutely chelate, opposable surfaces of propodus and minute dactylus excavate, spooned, terminally rounded, forming beak-like chela obscured by dense fields of setation on distal 2 of propodus and superior surface of dactylus; corneous prehensile lip on fixed finger of chela pectinate.

Abdominal somites smooth, glabrous dorsally, with few paired punctae bearing short setae; second tergite posterolaterally with sulcus posterior to which is vertical, crescentic row of setose punctae on low carina, extreme of posterolateral lobe with small tuft of long setae; third through fifth tergites each with small midlateral depression bearing short setae, and broadly triangular depression bearing long soft dense setae on the lateral lobe, position of these depressions more anterior in the more posteriormost tergites; sixth tergite with pattern of small setose punctae and fine marginal setation laterally and distinct transverse, posteriorly-facing groove above telson.

First pleopod of male and female uniramous,

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composed of 2 articles; in male (Fig. 4c), distal article spatulate, shorter than proximal, subdivided into 2 lobes by weak longitudinal furrow, anterior lobe terminally rounded in mature specimens, posterior lobe terminally acute with tip directed anteriorly; in female (immature, Fig. 5c) both articles narrow and elongate, terminal article with weakly produced shoulder just beyond midlength. Second pleopod of male and female biramous; in male (Fig. 4a), long setation largely restricted to tufts on lateral margin and terminus of exopod, lateral margin of endopod and terminus of appendix masculina; distal lobe of endopod almost as long as appendix masculina, demarcated from remainder of article by weak

transverse suture; vestige of appendix masculina marked by small patch of microsetae on mesial margin; in female (Fig. 5d), both rami with long setae, appendix interna narrow and elongate. Third to fifth pleopods (Fig. 4b) forming large, posteriorly cupped fans when coupled at mesial margins of endopods; endopod of each subtriangular, short, stubby appendix interna tightly embedded into mesial margin of endopod. Telson (Fig. 4c) broader than long, width less than 1.5 times length, subhexagonal, broadest at lateral lobes in anterior half, posteriorly truncate to weakly sinuous, posterolaterally corners broadly rounded, each bearing tuft of long setae; dorsal surface anteromedially elevated, with shallow sulci on lateral lobes to either side and short transverse line of setae to posterior. Uropod with angular, posterolaterally-directed lobe of protopod slightly overreaching anterior margin of endopod; endopod broad, subrectangular, slightly broader than long, posterior margin truncate, nearly straight, dorsal surface with longitudinal carina and small tuft of long setae near posterolateral corner; exopod with anterodorsal plate falling well short of distal endopod margin, distal edge of plate lined with short, thick spiniform setae grading to thinner longer setae of exopod margin; dorsal surface of exopod be-

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Fig. 4. *Neocallichirus cacahuate*, new species, male holotype (cl 13.2 mm) from Peanut Island, Lake Worth, Florida, USNM 268770: a, Right second pleopod, posterior surface; b, Right third pleopod, anterior surface; c, Telson, uropods, and part of sixth abdominal segment, dorsal surface. *Neocallichirus grandimana* (Gibbes), mature male (cl 27.1 mm) from Bear Cut, Biscayne Bay, Florida, USLZ 3553: d, Right first pleopod, posterolateral surface; f, Right second pleopodal endopod, terminus only, posterior surface. *Neocallichirus grandimana* (Gibbes), immature male (cl 13.2 mm) from just north of St. Lucie Inlet, Florida, USLZ 3554: e, Right second pleopod, posterior surface; g, Left third pleopod, distal endopod and appendix interna, posterior surface; h, Telson, uropods, and part of sixth abdominal segment, dorsal surface. Scale lines indicate 5 mm.

low plate concave, distal margin with dense three appear to be mature males ranging fringe of setation, fringe diminished and (after preservation) from cl 9.9 mm to 13.2 supplemented by row of short spiniform se- mm and tl from 39.4 mm to 51 mm. The tae on posterior margin. single female specimen, cl 7.2 mm and tl

Size.—Of the four known specimens, 29.8 mm, is apparently immature, given the

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b a d

Fig. 5.

Cc

Neocallichirus cacahuate, new species, paratype immature female (cl 7.2 mm) from Peanut Island,

Lake Worth, Florida, USNM 268769: a, Carapace front, eyestalks, and basal antennal segments, dorsal view, setae not shown; b, Minor cheliped, external surface; c, First pleopod, posterolateral surface; d, Right second

pleopod, posterior surface. Scale lines indicate | mm.

limited development of setation in its anterior pleopods.

Color.—Reddish orange, fading quickly to opaque white in alcohol. In life most adult specimens with striking scarlet red to reddish orange highlights on lighter faded orange to cream or translucent white ground color; usually with most vivid scarlet or or-

ange-red patterns on the superior surfaces of the chelae, eyestalks, dorsal oval of carapace, tergites of abdominal segments 2-6, | and as a very broad, poorly defined band across telson and uropods; color somewhat less or variably developed on antennae and cardiac region. Light cream to white on inferior surfaces of chelipeds and immediately bordering articulations of pereopodal articles. The reddish coloration is usually distinct from the pinkish-red to rose-violet typical of *N. grandimana*.

Known range and habitat.— Known only from intertidal to shallow subtidal habitats on the northern shores of Peanut Island in Lake Worth, a small marine embayment immediately inside Lake Worth Inlet on the heavily urbanized lower Atlantic coast of Florida, USA. All of the four known specimens of this species were taken with yabby pumps at low tide in sparsely vegetated sand to shelly sand substrates. *Neocallichirus cahuate* represented a very small percentage of the thalassinids taken from this habitat. Both large and small specimens of *Neocallichirus rathbunae* (Schmitt, 1935) were par-

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ticularly common in this habitat while *Sergio mericeae* Manning & Felder, 1995, *Callichirus major* (Say, 1818), *N. grandimana*, and *Corallianassa longiventris* (Milne Edwards, 1870) occurred in somewhat lesser

abundance. In unvegetated areas on the

northern end of the island, especially along the northeastern shoreline near a navigation canal, *Callichirus major* dominated. In the single instance that the burrow shape of a subsequently captured animal was noted, the surface aperture was about 4 mm in diameter and surrounded by a small mound of ejecta slightly darker than the adjacent sand surface.

Etymology. — Derivation of the species

name from “cacahuate,” the Spanish word for “peanut,” recognizes contributions of Mr. Steven C. Rabalais, Supervisor of Vessel Operations and Assistant Director for Physical Facilities of the Louisiana Universities Marine Consortium. Long known to his many friends by the nickname “Cacahuate” in Latin America or “Peanut” in the U.S. Gulf states, Mr. Rabalais has contributed substantially to studies of western Atlantic decapod crustaceans through his expert operation of the research vessel R/V Pelican and as a volunteer field collector extraordinaire. The name is doubly appropriate in that the type locality for this species is Peanut Island in Lake Worth, Florida.

Remarks. — Like other species of the genus *Neocallichirus*, *N. cacahuate* can be distinguished from members of the closely related genus *Sergio* on the basis of its relatively longer, posteriorly rounded to truncate telson and its broader, more rectangular uropodal endopods. At the type locality, *N. cacahuate* occurs alongside a commonly encountered reddish colored ghost shrimp of that genus, *Sergio mericeae*, which can be readily distinguished by the aforementioned characters or by the striking shape of the major cheliped in that species (see Manning & Felder 1995). However, *N. cacahuate* also shares its habitat with the more

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abundant congener *N. rathbunae* and, less commonly, *N. grandimana*, two species that are also commonly reddish to reddish pink in coloration. Fully mature specimens of either of these congeners are conspicuously larger than those of *N. cacahuate* and can be so distinguished outright. Small specimens of *N. rathbunae* can be distinguished on the basis of the uropodal endopod which differs strikingly from that of *N. cacahuate* and *N. grandimana* in that the anterodorsal plate reaches to the distal margin of the endopod. In addition, the lateral frontal spines of the carapace in *N. rathbunae* are almost always each tipped with a sharp conspicuous spinule, while these prominences usually terminate in obtuse lobes or at most sharp corners in *N. cacahuate* or *N. grandimana*.

While subtle variations are evident in the

extensive materials of *N. grandimana* that we have examined from the western Atlantic (see also discussion under *Callianassa branneri* by Biffar 1971:666), detailed comparisons between regional subpopulations of this wide-ranging and common form are beyond the scope of the present work. For now, we continue to assign all western Atlantic specimens which (1) lack spinules on the frontal projections of the carapace and (11) have a short carpus (less than half palm length) on the major cheliped to *N. grandimana* (sensu Manning 1987, Manning & Felder 1991). However, comparative materials of this species used in the present work have been limited to topotypic specimens from Key West, Florida, selected specimens from the Atlantic coast of Florida, and the large male holotype of *Glypturus siguanensis* Boone, 1927 (a subjective junior synonym of *Callianassa grandimana* Gibbes) from Isle of Pines, Cuba.

Differentiation of fresh material of *N. cacahuete* from live small specimens of the closely related *N. grandimana* can be based upon the more striking coloration of *N. cacahuete*, or can be based on a number of morphological characters. Perhaps most

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obvious, specimens of *N. grandimana* that are of comparable size to mature specimens of *N. cacahuete* will obviously be immature in secondary sex characters such as the first male pleopods (see Figs. 1c, f, 4d). Also, even though corneas in immature specimens of *N. grandimana* (Fig. 1d) tend to be relatively larger than those in mature specimens, only the very smallest approach the relative size (width consistently $>1/2$ eyestalk width) or strongly bulbous shape seen in *N. cacahuete* (Fig. 1a). While corneal width in a small (cl 6.8 mm) topotypic female of *N. grandimana* was about half the eyestalk width, the cornea was not as bulbous as in comparably small specimens of *N. cacahuete* (Fig. 5a) and the major cheliped was clearly distinguishable as typical of *N. grandimana*. The major cheliped in *N. cacahuete* (Fig. 1b) is distinct in its more

regularly arcuate, dentate inferior margin of the merus and the much longer carpus than in *N. grandimana* (Fig. 1e), while the minor chela may be distinguished by the larger relative size of the carpus and presence of dentition on opposable margins of the fingers (Fig. 3a), as compared to the minor chela of similar-sized specimens in *N. grandimana* (Fig. 3f). In addition, the mature male first and second pleopods of *N. cacahuete* (Figs. 1c, 4a) differ from both the immature (Figs. 1f, 4e) and mature (Fig. 4d, f) forms of these appendages in *N. grandimana*. *Neocallichirus cacahuete* resembles at least two southern Caribbean congeners, *N. lemaitrei* Manning, 1993 and *N. nickellae* Manning, 1993, in reaching mature form at a smaller size than does *N. grandimana* and in having a relatively long carpus on the major chela. However, the major chelae of both these species have a stronger inferior marginal serration on the carpus and propodus which is conspicuously visible in external view. In *N. nickellae*, the broadly sulcate gape at the base of the fixed finger, coniform basal tooth on the opposable margin of the dactylus, and angular inferior margin on the carpus in the major chela, as well as

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the relative lack of conspicuous teeth on the fingers of the minor chela and the relatively smaller carpus in this appendage, further distinguishes this species from *N. cacahuete*.

However, *N. lemaitrei* appears to be very close to *N. cacahuete* in the shape and dentition of the major chela, as well as in relative proportions of the carpus and propodus of the minor chela. The strong similarity in these features, as well as the similarly bulbous corneas and nearly identical coloration of these species (based on fresh topotypic specimens of *N. lemaitrei*), qualifies *N. lemaitrei* as the congener most similar to *N. cacahuete*. Whereas *N. lemaitrei* matures at smaller size than does *N. grandimana*, it reaches larger size (some with $cl = 22$ mm) than does *N. cacahuete*, and can be distinguished from the latter species in a number of features related to strength of dentition and amount of setation. In particular, it can be distinguished readily from *N. cacahuete* by its less heavily toothed and more setose gape of the minor chela (Fig.

6a) and by the previously mentioned heavier setation of the inferior margins of the major chela, evident even in small, immature specimens. On the basis of our presently limited sample, the mature males of *N. cacahuate* and *N. lemaitrei* also appear to differ slightly in sculpture of the first pleopods, the anterior lobe of which is angular in *N. lemaitrei* (Fig. 6b), and second pleopods, the appendix masculina of which is relatively broader and bears a larger vestige of the appendix interna in *N. lemaitrei* (Fig. 6c) than in *N. cacahuate* (Fig. 4a).

Another recently reported southern Caribbean form, listed as *Neocallichirus* sp. by Blanco Rambla & Linero Arana (1994) has proved to be a member of the genus *Sergio* rather than *Neocallichirus*. At the time that their record was published, the name *Sergio* was in press and the differences between *Neocallichirus* and *Sergio*, pointed out by Manning & Lemaitre (1994), were unknown to those authors.

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Fig. 6. *Neocallichirus lemaitrei* Manning, male (cl 13.8 mm) from Isla Rosario, Colombia, USLZ 3556. a, Minor chela, internal surface; b, Right first pleopod, posterolateral surface; c, Right second pleopod, posterior surface. Scale lines indicate | mm.

The single existing female specimen of *N. cacahuate* is almost certainly immature, given the relatively sparse development of setation in the anterior pleopods, as compared to that in mature females of congeners (see Manning 1993:fig. 3b, d). However, gonopores are clearly evident on the coxae of the third pereopods. While, other than for setation, the second pleopod (Fig. 5d) resembles that of congeners, it is doubtful that articular proportions of this appendage or those of the first pleopod (Fig. 5c) have reached mature form. In the mature female, the terminal article will almost certainly have developed to a larger relative size than seen in this individual and will have developed a more produced shoulder at mid-length and much longer and more abundant

setation. The more acute frontal prominences on the carapace of this individual, the smallest of either sex collected, may suggest a character typical of immature specimens, perhaps for either sex. As the female specimen is missing the major cheliped,

possible sexual dimorphism in this appendage cannot be evaluated.

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