Zootaxa 5284 (3): 553–563
https://www.mapress.com/zt/
Copyright © 2023 Magnolia Press

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.5284.3.6
http://zoobank.org/urn:lsid:zoobank.org:pub:E742B6DC-A5CB-4CB9-8DA2-D464FE3EC249

A new mud shrimp of the genus *Paragourretia* Sakai, 2004, from the Gulf of Mexico (Crustacea: Decapoda: Ctenochelidae)

DARRYL L. FELDER[1,2*] & PETER C. DWORSCHAK[3]
[1]*Department of Biology, University of Louisiana, Lafayette, Louisiana 70504-2451, U.S.A.*
dlf4517@louisiana.edu; *https://orcid.org/0000-0001-7679-7712*
[2]*Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560, U.S.A*
[3]*Dritte Zoologische Abteilung, Naturhistorisches Museum, Burgring 7, A 1010 Wien, Austria.*
Peter.Dworschak@nhm-wien.ac.at; *https://orcid.org/0000-0003-4705-6426*
[*]*Corresponding author*

Abstract

A new western Atlantic member of the ctenochelid genus *Paragourretia* Sakai, 2004 is described to accommodate a single unique specimen collected by dredge on muddy rubble substrates of the continental shelf in the southwestern Gulf of Mexico. *Paragourretia sandrae* **n. sp.** closely resembles *Paragourretia biffari* (Blanco Rambla & Liñero Arana, 1994), another regionally reported species for which photographs and additional illustrations are herein provided. While *P. biffari* and *P. sandrae* **n. sp.** are similar in habitus and known habitat to the more commonly encountered confamilial *Dawsonius latispina* (Dawson, 1967), the third maxillipeds in *Paragourretia* bear distinct exopods that are absent in *Dawsonius* Manning & Felder, 1991. As in eight other world congeners, *P. sandrae* **n. sp.** differs from both *P. biffari* and *Dawsonius* in lacking triangular ventrolateral projections on the sixth pleomere. It is further distinguished from *P. biffari* by lacking a distinctly incised notch in the anterodistal margin of the uropodal exopod and by absence of a median terminal spine on the telson. Additional sequence-quality specimens of *P. sandrae* **n. sp.** are required to clarify its relationships within the polyphyletic genus *Paragourretia* on a molecular genetic basis.

Key words: *Paragourretia*, Axiidea, new species, infauna, Gulf of Mexico

Introduction

Dredge and box core sampling on continental shelves of the Gulf of Mexico have added a number of new axiidean species to the regional decapod fauna summarized in Felder *et al*. (2009), including recent additions to the families Callianassidae Dana, 1852 and Axiidae Huxley, 1879 (Felder 2019; Felder & Robles 2020a, b; Felder 2021). Regional collections overall contributed substantially to initial molecular phylogenetic analyses of relationships in these and related families (Robles *et al.* 2009; Felder & Robles 2009), ultimately building toward robust morphological and molecular phylogenetic analyses of world callianassoids resulting in major recent taxonomic realignments and revisions (Poore *et al*. 2019; Robles *et al*. 2020).

Materials representing a therein revised membership of the family Ctenochelidae Manning & Felder, 1991, included specimens of *Paragourretia biffari* (Blanco Rambla & Liñero Arana, 1994), a Caribbean species that had been previously unreported from the Gulf of Mexico. In addition to the previously recorded *Dawsonius latispina* (Dawson, 1967) and *Ctenocheles leviceps* Rabalais, 1979 (Felder *et al*. 2009), this constituted a third known member of the family from the Gulf of Mexico region. Among the regional materials at first thought to represent *P. biffari* was a single somewhat fragmentary small specimen from the southwestern Gulf of Mexico noted to differ slightly in minor features of the sixth pleomere, uropodal exopods, and telson. While repeated tissue sampling did not successfully yield sequence data for inclusion in the multi-gene analyses of Robles *et al.* (2020), the male specimen appeared to be mature and exhibited unique morphological characters that justified its generic assignment as well as its distinction from any previously described ctenochelid species. It is herewith illustrated and described as *Paragourretia sandrae* **n. sp.**, the fourth known representative of the family from the Gulf of Mexico and the tenth

Accepted by J. Goy: 26 Apr. 2023; published: 12 May 2023

Licensed under Creative Commons Attribution-N.C. 4.0 International https://creativecommons.org/licenses/by-nc/4.0/

member of the genus. Reference to a recently obtained COI sequence for this specimen is also provided. Illustrations representing regional specimens of *P. biffari* are provided to facilitate recognition of *P. sandrae* **n. sp.**, along with color photographs of the two species.

Materials and methods

Except for museum holotypes of compared species, specimens used in this study were collected aboard the *R/V Pelican*, typically by dredge sampling, less commonly by trawling or box coring. Dredge gear and procedures were modeled after those used extensively in the eastern Gulf of Mexico during the "Hourglass" surveys conducted by the Florida Department of Natural Resources (Joyce & Williams 1969), except that intended sampling tracts were first surveyed by submarine camera to assure that they did not transect hermatypic corals or other massive accumulations of live bottom habitat. Bottom depths at collection sites are shown in meters (m). Collections were flash frozen briefly aboard ship in seawater or glycerine before being photographed, and then either fixed directly in 75% ethanol or returned to the lab frozen before alcohol fixation. Digital color photographs were made with subjects immobilized below the water surface of a shallow tray lined with black felt for framing of the exposure. Line illustrations were prepared with a Wild M5 dissecting microscope equipped with a camera lucida. Postorbital carapace length (cl) was measured in millimeters (nearest 0.1 mm) from the posterior orbital margin at the base of the rostrum to the posterior margin of the carapace. All measurements were determined with a calibrated ocular micrometer. Specimens were archived in the Smithsonian Institution National Museum of Natural History (USNM), Washington, D.C., USA and the Naturhistorisches Museum Wien, Austria (NHMW). Holdings of the University of Louisiana's Lafayette Zoological collection (ULLZ), Lafayette, Louisiana, are currently being transferred permanently to the USNM, where they will remain cross-referenced under both catalog systems. The barcode fragment of the cytochrome c oxidase subunit I (COI) was amplified under standard protocols of the Smithsonian Institution's Laboratories of Analytical Biology (LAB) for PCR and sequencing (as in Venera-Pontón *et al.* 2020).

Compared material of *Paragourretia biffari* included 1 female (holotype), Venezuela, USNM 259410; 1 male, southwestern Gulf of Mexico, USNM 1541736 (= ULLZ 7370); 1 male, northwestern Gulf of Mexico, USNM 1540482 (= ULLZ 4673); 1 female, southwestern Gulf of Mexico, USNM 1541735 (= ULLZ 7305); 1 male, off Bocas del Toro, Panama, USNM 1542549 (= ULLZ 5757); 1 ovigerous female, off Bocas del Toro, Panama, USNM 1550149 (= ULLZ 16980); 1 male, off San Blas Is., Panama (NHMW 26170). Compared specimens of *Dawsonius latispina* included 1 male (holotype), northwestern Gulf of Mexico, USNM 105398; 1 male, northeastern Gulf of Mexico USNM 1547664 (= ULLZ 14435); 1 female, northwestern Gulf of Mexico, USNM 1541972 (= ULLZ 7306); 1 female, northeastern Gulf of Mexico, USNM 1541456 (ULLZ 6423); 1 juvenile female, northeastern Gulf of Mexico, USNM 1546569 (= ULLZ 12683).

Taxonomy

Infraorder Axiidea de Saint Laurent, 1979

Family Ctenochelidae Manning & Felder, 1991

Paragourretia Sakai, 2004

Paragourretia sandrae n. sp.

https://zoobank.org/urn:lsid:zoobank.org:act:4E6884D8-4B64-4A1F-B00E-529BE672BD98
(Figs 1, 2, 3A–C)

Type material. Holotype (southwestern Gulf of Mexico): male, cl 4.4 mm; dredge station NSF-II-096, muddy eroded calcareous rubble, Campeche Banks, 22° 08.04′ N, 91° 23.67′ W, 53 m, 17 June 2005; coll D.L. Felder, R. Robles, H. Bracken-Grissom, S. Fredericq, E. Garcia and colleagues aboard *R/V Pelican*; USNM 1541885 (= ULLZ 7304, photograph voucher).

Diagnosis. Carapace with narrow triangular spiniform rostrum reaching beyond midlength of eyestalks. Eyestalk with subterminal cornea in distal third, diameter spanning over half of eyestalk width. Major chela with merus inferior keel bearing proximal hooked spine and adjacent ancillary spine, otherwise microdenticulate. First pleonal tergite crossed dorsally by smooth transverse furrow in anterior half, posterior sclerite narrowing anteriorly to acute middorsal terminus, sixth with neither angular nor arched projection in anterior third of lateral margin. Telson length slightly exceeding width, lateral margins converging posterior to weak lateral lobes, posterior margin truncate, lacking median spine. Uropodal endopod elongate ovoid with low longitudinal ridge; exopod anterodorsal plate obscure to obsolescent, lateral margin lacking incision. Diagnostic sequence data for the COI mitochondrial gene is provided under GenBank www.ncbi.nlm.nih.gov/genbank) accession number OQ413315.

Description. Carapace front (Figs 1A, B; 3A, B) with acute, narrowly triangular rostrum, deflected between eyestalks in lateral view, terminally spiniform, reaching beyond mid-length of eyestalks, rostral base flanked laterally by low, obtuse shoulders forming outer angles of orbits, orbital margin laterally lined by several small setal pits; postantennal carapace margin transverse, near vertical, strongly inset from front, slightly arched transverse row of four small setal pits posterior to margin; dorsal oval not defined; linea thalassinica extending full length of carapace; hepatic boss weakly developed; cardiac prominence poorly defined.

Eyestalks (Fig. 1A, B) elongate, narrowing distally to subtriangular tips not reaching to second (penultimate) article of antennular peduncle, carried slightly deflected, swollen proximally in lateral view, distal part dorsoventrally flattened, lateral margin developed into narrow crest laterally; subterminal cornea defined as rounded dorsal swelling in distal third of eyestalk, diameter spanning over half of eyestalk width, poorly faceted, pigmentation (Fig. 3A, B) filling cornea in life, dispersed into multiple coalesced dark spots with preservation.

Antennular peduncle (Fig. 1A, B) much shorter and distinctly heavier than antennal peduncle, reaching approximately to distal end of fourth article of antennal peduncle; first (basal) article swollen, more than twice length of second, third article approximately 1 and 1.5 times length of second; second and third articles bearing few minute marginal setae. Antennular flagella missing. Antennal peduncle (fifth articles and flagella missing) distinctly overreaching antennular peduncle; first article with short produced ventrolateral process bearing excretory pore; length of second article about twice width, distal articulation to third article overreached dorsally by short bladelike scaphocerite; fourth article slightly exceeding combined lengths of first two, all sparsely setose.

Mandible (Fig. 1C, D) with palp of three articles, proximal articles short, little if any longer than broad, third article elongate, heavy, arched, distal setae elongate, densely plumose; gnathal lobe subquadrate, distolateral shoulder angular, incisor process with 4 well-defined subacute triangular teeth on cutting margin, tips corneous, molar process on internal surface forming internal lip of concavity accommodating flexed palp, lip originating proximal and internal to incisor teeth. Maxillule (Fig. 1E) endopodal palp narrow, biarticulate, distal article deflected, over half length of proximal, bearing long terminal seta; proximal endite forming broad subangular lobe, uniformly fringed by dense row of setae along most of mesial margin, setae heavier, some spiniform, at distal prominence; distal endite elongate, terminally broadened, setation of mesial margin including closely set overlain rows of strongly spiniform setae. Maxilla (Fig. 2A) margins setose, endopod constricted distally to form narrow terminus; first and second endites each longitudinally subdivided, mesially directed distal margins fringed by long stiff setae; exopod forming broad scaphognathite.

First maxilliped (Fig. 2B) margins setose, endopod small, narrow, less than half length of exopod, partially concealed between base of distal endite and exopod; proximal endite a subangular lobe, field of dense stiff setae terminally; distal endite subrectangular, margins and most of external surface densely setose, strongest setae mesially directed, originating distal and along mesial margin; exopod elongate, arcuate, margins setose, strongest setae terminal and along convex lateral margin; epipod broad, not reaching beyond exopod, anterior and posterior lobes subtriangular.

Second maxilliped (Fig. 2C) much smaller than third, both rami setose; endopod merus subrectangular, slightly broadened proximally, weakly arched, length about 3 times width, length about twice combined length of propodus and dactylus; propodus robustly subcylindrical, most of surface setose, length about 1 ½ times breadth; dactylus short, broader than long, rounded terminus bearing long stiff setae; exopod narrow, straplike, carried closely against internal surface of endopod, not reaching end of endopod merus, terminally rounded with stiff marginal setae; short digitiform epipod evident near base of exopod.

Third maxilliped (Fig. 2D, E) with narrow biarticulate exopod, length approximately equal to ischium, bearing long stiff terminal seta; basis bearing spine on inner surface just proximal to articulation with ischium; endopod

fringed by long setae, densest on mesial margins of ischium, propodus, and dactylus, ischium subrectangular, length more than twice breadth, internal surface with slightly arched longitudinal row of 13 spiniform teeth forming strong crista dentata, distalmost tooth forming spine, several additional small ancillary teeth trailing row proximally; merus subquadrate, length approximately twice width, length over three-fourths that of ischium, flexor margin with few long setae and strong distal spine; carpus almost as broad as propodus, both much longer than broad, flexor margins of both distinctly convex; dactylus subcylindrical, digitiform, length exceeding two times breadth, with dense subterminal to terminal field of long setae originating primarily from internal surface.

First pereopods (Figs 2F, G; 3A, B) strongly heterochelous; major (right) cheliped (Fig. 2F) ischium slender, superior margin sinuous, inferior marginal carina armed by row of small denticles, merus superior margin smoothly convex, inferior (flexor) margin forming keel with triangular proximal spine, smaller more distal sharp spine, denticulate margin followed by smooth margin over distal half; carpus short, subtriangular, much broader than long, superior and inferior margins smoothly keeled, superior terminating distally at low rounded corner, inferior terminating distally in obtusely angular rounded corner; propodus heavy, more inflated than carpus, upper margin of palm 3 times length of carpus, length of fixed finger about 2/3 to 3/4 length of palm, palm superior margin keeled proximally, propodus inferior marginal keel weakly serrate, extending onto fixed finger, fixed finger weakly bowed ventrally, prehensile edge with few proximal microdenticles, otherwise unarmed, weak submarginal longitudinal furrow to internal side of tip not notably upturned; dactyl superior margin smooth arched over most of length, prehensile edge with minute notch in proximal 1/4, broadly triangular tooth centered proximal to mid-length, remainder mostly smooth, tip weakly deflected.

Minor cheliped (Fig. 2G) ischium narrowly elongate, superior margin sinuous, inferior margin weakly serrate; merus subovoid, superior margin strongly convex, inferior margin with smooth keel with prominent proximal spine (possibly doublet, as damaged); carpus superior margin nearly straight, inferior margin arcuate, article length subequal to breadth; propodus palm longer than fixed finger, palm length over twice breadth, 2.5 times as long as carpus; fixed finger and dactylus with unarmed prehensile edges, gape minimal, weakly hooked tips acute, crossed distally when closely opposed.

Second pereopod (Fig. 2H) chelate, superior margin of merus terminating distally in setal tuft including long stiff seta, flexor margin of merus, distal flexor margin of carpus, inferior margin of propodus lined by long regularly spaced setae, those of fixed finger becoming distally short, stiff, more hooked; outer surface of dactylus and fixed finger bearing tufts of stiff setae.

Third pereopod (Fig. 2I) merus length near four times width; carpus elongate, length over twice breadth, inferior margin distally with dense field of long stiff setae; propodus with superior margin ending distally in dense tuft of long setae, inferior margin weakly subdivided into eight low lobes, each surmounted by tuft of long stiff setae, proximal lobe slightly produced to form rounded heel, most of outer surface covered by tufts of setae; dactylus lanciform, slightly hooked, tip slightly twisted from arc of flexure, outer and inner surface with dense distal tuft of short stiff setae.

Fourth pereopod not subchelate, coxa mobile, (Fig. 2J), propodus length approximately three times width, inferior (flexor) margin lined by closely spaced long setae, inferodistal corner with dense field of stiff setae, superodistal corner including long stiff seta greatly exceeding full length of dactylus; dactylus approximately half length of propodus, weakly hooked, tapering distally to corneous tip, flexor margin will dense row of stiff setae.

Fifth pereopod (Fig. 2K) obscurely subchelate terminally amid dense setation, propodus length slightly exceeding three times breadth, with dense inner and outer fields of long setae proximal to and overlying articulation of dactylus, another along distal half of inferior margin proximal to fixed finger, fixed finger slightly hooked, narrowly acute, terminating in corneous spine; dactylus elongate, approximately half length of propodus, distally twisted from arc of flexure, ending distally in upturned tip, appearing sinuous in lateral outline.

Gills limited to paired arthrobranchs on third maxilliped and each of first through fourth pereopods.

Pleonal tergites glossy smooth, enamel-like dorsally (Fig. 1F; 3A, B), few setae and obscure tracks of setal pits laterally. First pleonal tergite crossed by smoothly depressed transverse furrow in anterior half, posterior 2/3 covered by triangular dorsal sclerite with acute anterior, middorsal terminus. Second tergite slightly longer than first, almost twice length of third. Third to fifth tergites slightly decreasing in length to posterior. Sixth tergite approximately 2/3 length of second, dorsally with posterolateral track of fine short setae extending anteriorly as row of setal pits converging anteriorly, ventrolaterally with neither angular nor arched projection or keel in anterior half of marginal to submarginal region.

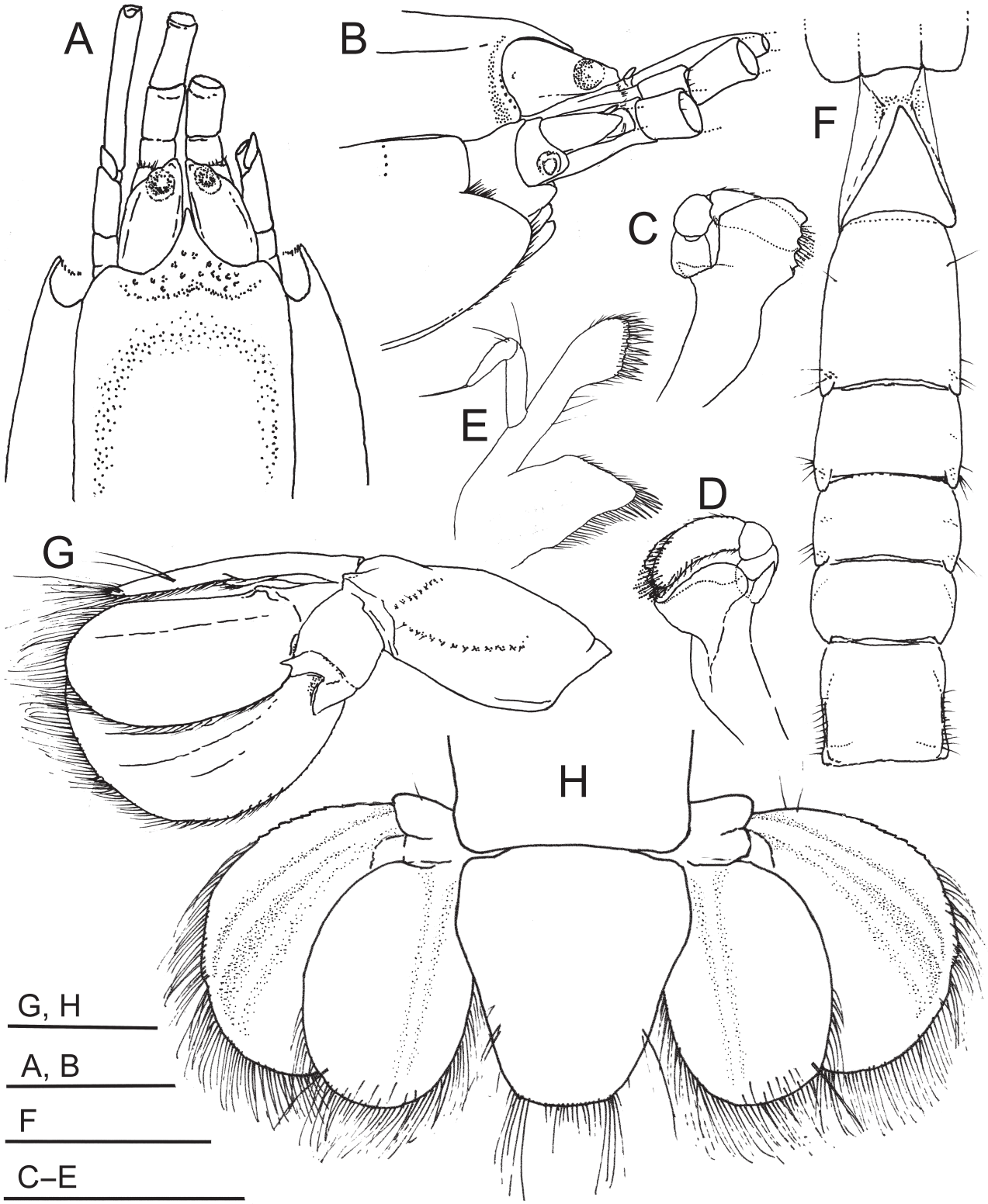

FIGURE 1. *Paragourretia sandrae* **n. sp.**, male holotype, cl 4.4 mm, Campeche Banks, southwestern Gulf of Mexico, USNM 1541885 (= ULLZ 7304). A, carapace front, eyestalks, antennular and antennal peduncles, dorsal surface; B, same, right lateral surface; C, right mandible, external surface; D, same, internal surface; E, right maxillule, external surface; F, posterior carapace and pleomeres 1–6, dorsal surface; G, sixth pleomere, telson, and uropods, right lateral surface; H, same, dorsal surface. Scale bars = 1 mm (A–E, G, H); 3 mm (F).

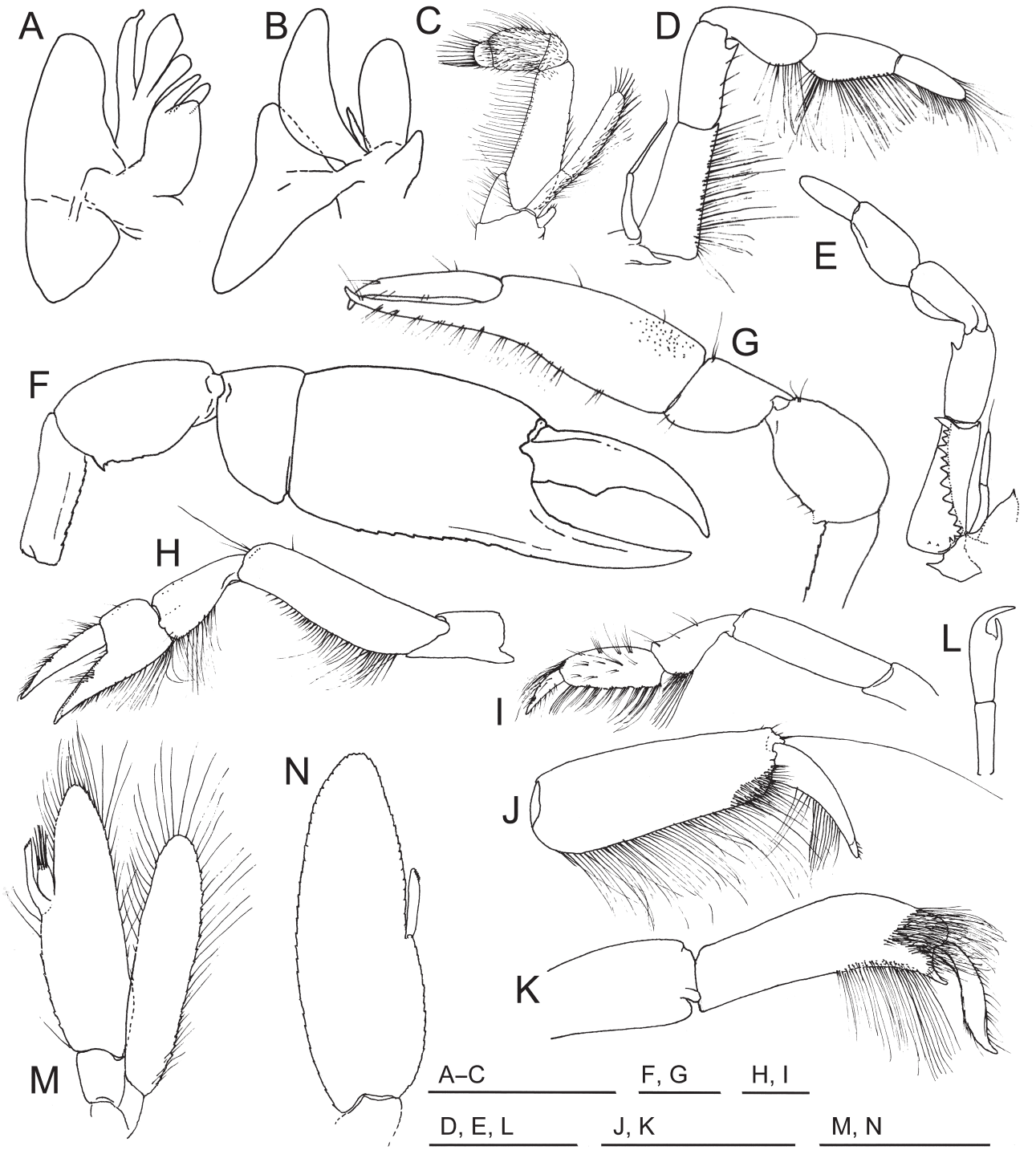

FIGURE 2. *Paragourretia sandrae* **n. sp.**, male holotype, cl 4.4 mm, Campeche Banks, southwestern Gulf of Mexico, USNM 1541885 (= ULLZ 7304). A, right maxilla, external surface, setae not shown; B, right first maxilliped, external surface, setae not shown; C, right second maxilliped, internal surface; D, right third maxilliped, external surface; E, same, internal surface, setae not shown; F, major (right) cheliped, external surface; G, minor (left) cheliped, external surface; H, left second pereopod, external surface; I, left third pereopod, external surface; J, right fourth pereopod, terminal articles, external surface; K, right fifth pereopod, terminal articles, external surface; L, left first pleopod, lateral surface; M, right second pleopod, posterior surface; N, endopod of right third pleopod, anterior surface, setae not shown. Scale bars = 1 mm.

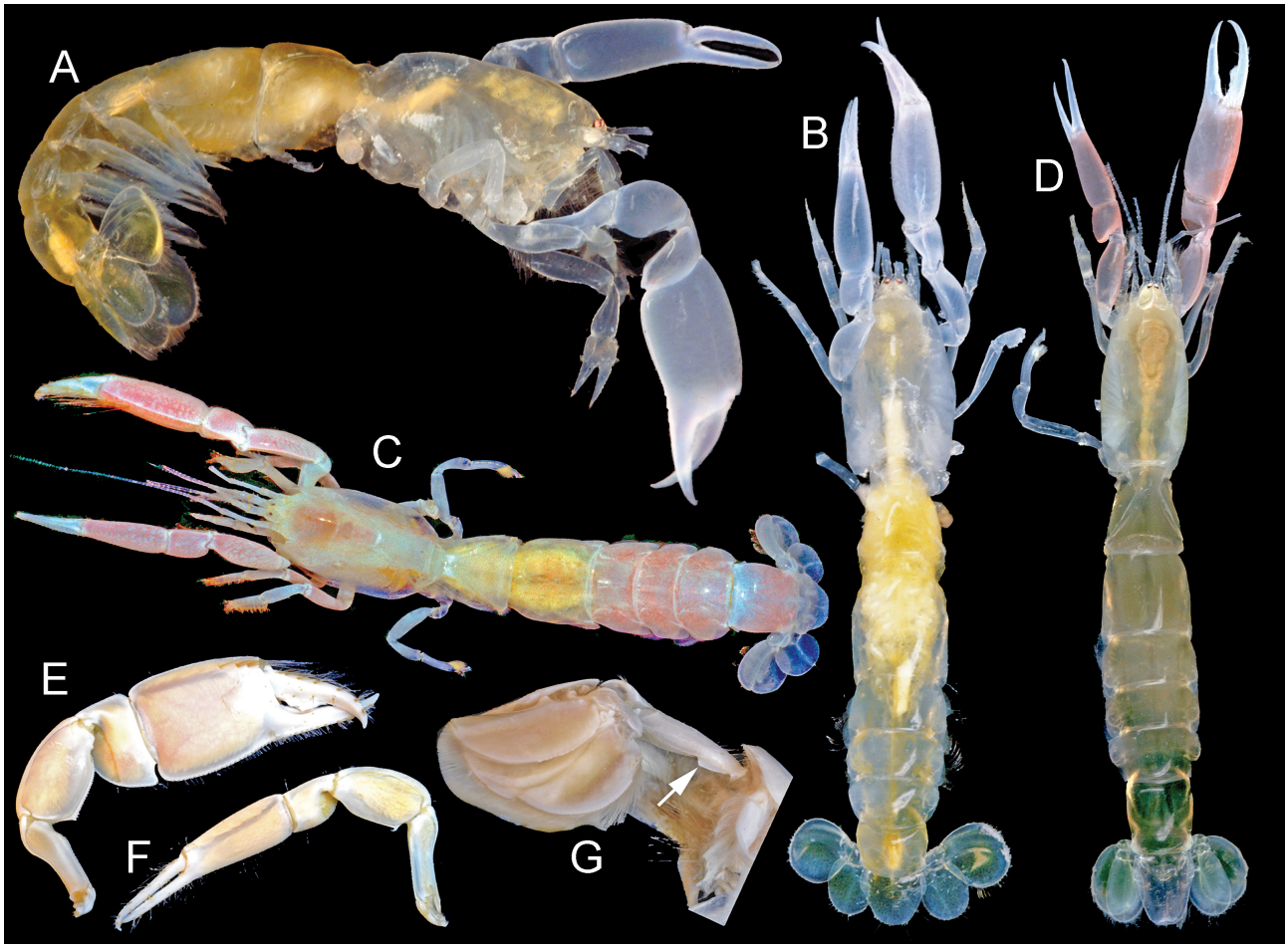

FIGURE 3. *Paragourretia sandrae* **n. sp.**, male holotype, cl 4.4 mm, Campeche Banks, southwestern Gulf of Mexico, USNM 1541885 (= ULLZ 7304): A, right lateral surface; B, dorsal surface. *Paragourretia biffari* (Blanco Rambla & Liñero Arana, 1994), male, cl 10.6 mm, northwestern Gulf of Mexico, USNM 1540482 (ULLZ 4673): C, dorsal surface. *P. biffari*, female cl 6.0 mm, Campeche Banks, southwestern Gulf of Mexico, USNM 1541735 (ULLZ 7305): D, dorsal surface. *P. biffari*, female holotype, cl 17.3 mm, Venezuela, USNM 259410: E, major (left) cheliped, internal surface; F, minor (right) cheliped, internal surface; G, posterior pleon and uropods, right ventrolateral, arrow indicating angular submarginal keel.

First pleopod uniramous (Fig. 2L), less than half length of third pleopod, biarticulate, distal article slightly longer than proximal, broadened distal end of article terminating in strong hooked spine over-reaching shorter straight distally directed spine. Second pleopod (Fig. 2M) biramous, approximately twice length of first; exopod narrowly ovoid, not reaching end of endopod when flexed against it, margins bearing long setae; endopod broader than exopod, lateral and distal margins with long setae, mesial margin with long narrow appendix interna bearing minute terminal hooks and shorter robust appendix masculina bearing long distal setae. Third (Fig. 2N) to fifth pleopods larger than second, forming biramous, posteriorly cupped fans, endopod of each an elongate ovoid with elongate digitiform appendix interna projecting distinctly from mesial margin, opposed surfaces on appendix internae of two sides each with small field of microscopic hook setae.

Telson (Figs 1G, H; 3A, B) elongate subhexagonal, narrowing posteriorly, length slightly exceeding width, broadest where lateral margins protrude as weak lobes in anterior 1/3, margins beyond converging posteriorly, dorsally with each posterolateral region bearing 2 submarginal tufts of long setae, posterior margin truncate, lacking median spine, posterolateral corners each with short track of long setae, shorter setae along margin between corners.

Uropods (Figs 1G, H; 3A, B) with endopod broad, ovoid, about 1.5 times longer than broad, dorsal surface with weak longitudinal ridge, sparse submarginal setation distally, and single tuft of several stiffer longer setae posterolaterally, posterior margin with continuous fringe of long setae; exopod broadly ovoid, length approximately 1.3 times breadth, anterodorsal plate obscure to obsolescent, pair of weak, arcuate longitudinal ridges diverging

distally from common basal origin, anterolateral of two ridges producing slight vertical offset where intersecting lateral margin (obscure in lateral view), margin lacking distinct notch or incision, anterolateral margin weakly serrate, posterior margin with continuous fringe of long setae.

Color. Primarily translucent pale yellowish integument (Fig. 3A, B), more opaque portions of chelipeds and other pereopods whitish, especially at thickened articulations, traces of pinkish violet proximal to fingers of chelipeds.

Habitat and Distribution. Known from only 53 m depth on the Campeche Banks of the western Yucatan shelf, southwestern Gulf of Mexico, in muddy calcareous rubble comprised in part of dead coral and molluscan shells.

Etymology. The species name "sandrae" honors Sandra Cheryl Collier, for her generous contributions to Smithsonian Institution research efforts in Florida and Belize.

Remarks. In accord with recent revisions (Poore *et al.* 2019), *Paragourretia* and *Gourretia* de Saint Laurent, 1973 are separated from *Dawsonius*, the only other ctenochelid genus known to occur in the western Atlantic, by the presence of an exopod on the third maxilliped. Species of these genera also differ from *Dawsonius* in lacking a lateral projection or keel in the anterior half of the sixth pleomere, except for *Paragourretia biffari* in which it occurs in a somewhat ventrolateral position (Figs 3G, 4F). All members of *Paragourretia* can in turn be separated from *Gourretia* by their lacking sharp proximally directed teeth along the cutting edges of the minor cheliped fingers characteristic of that genus (Poore *et al*. 2019: fig. 17i). As in most other members of the genus, the carapace in *P. sandrae* **n. sp.** appears to have a dorsal cardiac prominence of its carapace, albeit weakly expressed. As in its congeners, the antennular peduncle is both heavier and shorter than the antennal peduncle, and the antenna bears a short bladelike dorsal scaphocerite where its second article joins to the third. Typical of the genus, its second maxilliped is comparatively small, with a straplike exopod carried against the internal surface of the slightly longer endopodal merus, and a small epipod originating at its base.

The description of *P. sandrae* **n. sp**. brings known world membership of the genus *Paragourretia* to ten, six of which are found only in the Indo-West Pacific . Among the known species, the majority differ from *P. sandrae* **n. sp**. and resemble *P. biffari* in having a distinct marginal notch or indentation in the margin of the uropodal exopod. From illustrations accompanying descriptions, this feature appears to be conspicuous in at least *P. aungtonyae* (Sakai, 2002), *P. coolibah* (Poore & Griffin, 1979), *P. galathea* (Sakai, 2017), and *P. laevidactyla* (Liu & Liu, 2010). However, it appears to be weakly evident in *P. crosnieri* (Ngoc-Ho, 1991) and not evident in illustrations of *P. phuketensis* (Sakai, 2002) and *P. lahouensis* (Le Loeuff & Intès, 1974). In *P. sandrae* **n. sp.**, the anterolateral margin of the uropodal exopod is intersected by the anteriormost of two dorsal longitudinal ridges producing a very slight vertical offset in the margin, most evident when viewed obliquely under magnification. The ridge itself appears to demarcate the edge of a very slightly offset dorsal plate on the exopod that is found in most members of the genus (Poore *et al*. 2019: 118, fig. 16e).

The absence of an obvious marginal notch in the uropodal exopod of *P. sandrae* **n. sp**, a feature shared with regional ctenochelids of the genera *Dawsonius* and *Gourretia*, readily separates the new species from *P. biffari*. Like *Dawsonius latispina* (see Rabalais *et al.* 1981: fig. 3I), *P. sandrae* **n. sp**. also lacks a median terminal spine on the telson (Fig. 1H), a character now documented to occur in *P. biffari* following re-examination of the holotype and study of additional specimens. Specimens from the western Gulf of Mexico and the Caribbean coast of Panama (see Materials and methods, above) were assigned to *Paragourretia biffari* only after direct comparisons to the female holotype (USNM 259410). These add to the original report from Venezuela and Honduras, suggesting that the species is widely distributed in offshore tropical to subtropical waters of the western Atlantic. Illustrations accompanying the original description (Blanco Rambla & Liñero Arana 1994) were of limited detail and did not show the now confirmed characteristic posterior median spine on the telson (Fig. 4G), which was also not mentioned in the accompanying text. The authors did specifically mention the lack of a sharp lateral projection on the sixth pleomere, which, along with the presence of an exopod on the third maxilliped, was postulated to distinguish the species from *Dawsonius latispina*. However, on close study of the holotype this sharp ridge-like projection or keel is present, albeit in a somewhat ventrolateral position, as is also the case in some Gulf of Mexico specimens. Varying in the degree to which it projects laterally, perhaps due to effects of preservation, it is not always evident in dorsal view. Gulf of Mexico and Panamanian materials share this keel, the median telson spine, dentition of the chelae, and other morphology with the Venezuelan holotype of this species. However, the female holotype is much larger (cl 17.3 mm) than known Gulf of Mexico and Panamanian materials (cl 5.7–13 mm).

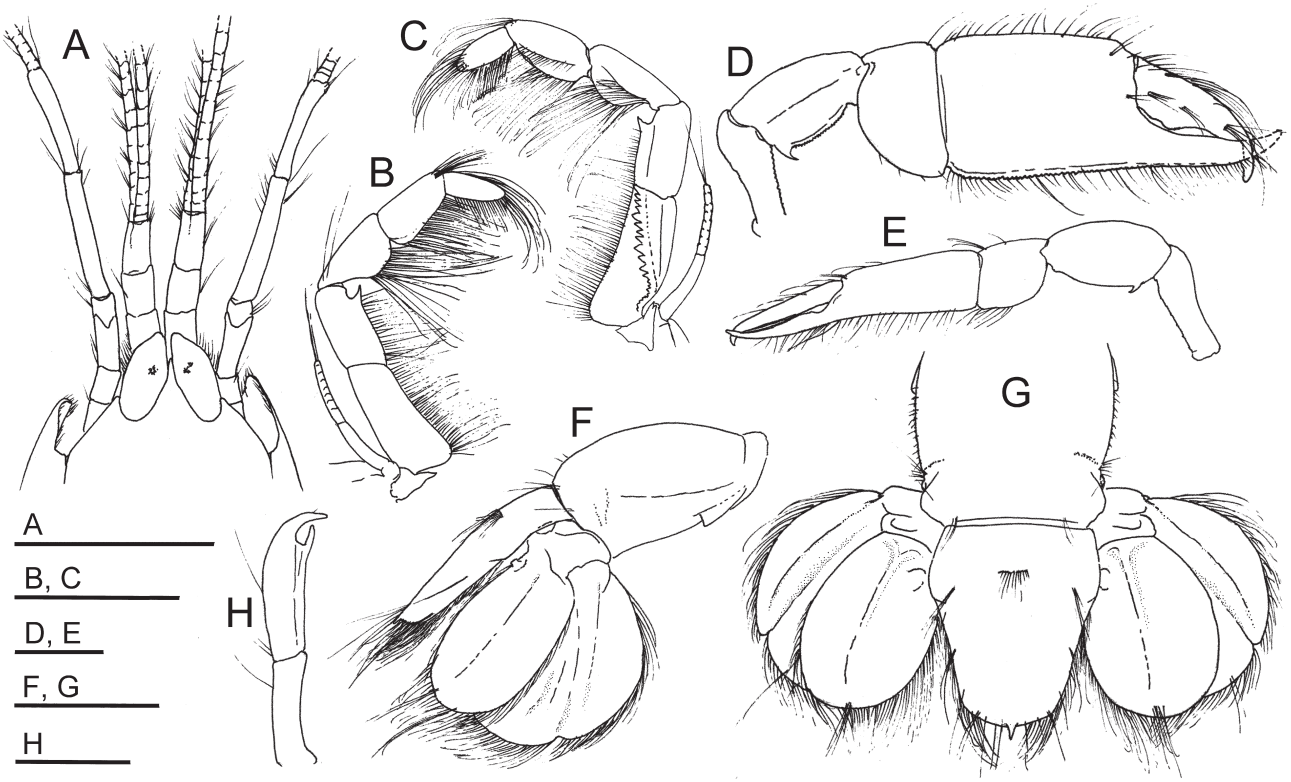

FIGURE 4. *Paragourretia biffari* (Blanco Rambla & Liñero Arana, 1994), male, cl 10.6 mm, northwestern Gulf of Mexico, USNM 1540482 (ULLZ 4673). A, carapace front, eyestalks, and anterior appendages, dorsal surface; B, right third maxilliped, external surface; C, same, internal surface; D, major (right) cheliped, external surface; E, minor (left) cheliped, external surface; F, sixth pleomere, telson, and uropods, right lateral surface; G, same, dorsal surface; H, left first pleopod, lateral surface. Scale bars = 3 mm (A–G); 1 mm (H).

Acknowledgements

Among colleagues who assisted with access to field sites for this project or field work and related laboratory studies, we especially thank Fernando Alvarez, Heather Bracken-Grissom, Elva Escobar, Suzanne Fredericq, Emilio Garcia, Steve Rabalais, and Rafael Robles. Field sampling was conducted under special permit for operations in Mexican waters aboard the Louisiana Universities Marine Consortium's *R/V Pelican*. Karen Reed, Amy Driskell, and Keith Macdonald of the Museum of Natural History, Smithsonian Institution, Washington, D.C., were essential in cataloging accessioned specimens and furnishing of sequence data. Funding was provided under U.S. Department of Energy grant DE-FG02-97ER1220 and U.S. National Science Foundation grant NSF/AToL EF-0531603. This is UL Lafayette Laboratory for Crustacean Research contribution number 221.

References

Blanco Rambla, J.P. & Liñero Arana, I. (1994) New records and new species of ghost shrimps (Crustacea: Thalassinidea) from Venezuela. *Bulletin of Marine Science*, 55, 16–29.

Dana, J.D. (1852) Conspectus crustaceorum, &c. Conspectus of the Crustacea of the Exploring Expedition under Capt. C. Wilkes, U.S.N. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 6, 10–28. [http://biodiversitylibrary.org/page/1779546]

Dawson, C.E. (1967) *Callianassa latispina* (Decapoda, Thalassinidea), a new mud shrimp from the Northern Gulf of Mexico. *Crustaceana*, 13, 190–196.
https://doi.org/10.1163/156854067X00350

Felder, D.L. (2019) Designation of a neotype for *Glypturus rabalaisae* Sakai, 2011, a ghost shrimp from continental shelf waters of the northern Gulf of Mexico (Crustacea: Decapoda: Callianassidae). *Zootaxa*, 4679 (1), 194–200.

https://doi.org/10.11646/zootaxa.4679.1.12
Felder, D.L. (2021) Description of *Paraxiopsis kensleyi* n. sp., a new axiid lobster from the Gulf of Mexico (Axiidea, Decapoda, Crustacea). *Zootaxa*, 4965 (1), 129–141.
https://doi.org/10.11646/zootaxa.4965.1.6
Felder, D.L., Álvarez, F., Goy, J.W. & Lemaitre, R. (2009) Chapter 59: Decapoda (Crustacea) of the Gulf of Mexico, with comments on the Amphionidacea. *In*: Felder, D.L. & Camp, D.K. (Eds.), *Gulf of Mexico Origin, Waters, and Biota. Vol. 1. Biodiversity*. Texas A&M University Press, College Station, Texas, pp. 1019–1104.
Felder, D.L. & Robles, R. (2009) Molecular phylogeny of the family Callianassidae based on preliminary analyses of two mitochondrial genes. *In*: Martin, J.W., Crandall, K.A. & Felder, D.L. (Eds.), *Crustacean Issues. Vol. 18. Decapod Crustacean Phylogenetics*. Taylor and Francis/CRC Press, Boca Raton, Florida, pp. 327–342
Felder, D.L. & Robles, R. (2020a) A new mud shrimp of the genus *Pugnatrypaea* from outer continental shelf waters of the northern Gulf of Mexico, commonly associated with hydrocarbon seeps (Crustacea: Decapoda: Callianassidae) *Zootaxa*, 4732 (4), 545–555.
https://doi.org/10.11646/zootaxa.4732.4.3
Felder, D.L. & Robles, R. (2020b) Two new mud shrimp of the genus *Gilvossius* from the Gulf of Mexico (Crustacea: Decapoda: Callianassidae). *Nauplius*, 28, e2020018.
https://doi.org/10.1590/2358-2936e2020018
Huxley, T.H. (1879) On the classification and the distribution of the crayfishes. *Proceedings of the Zoological Society of London*, 1878, 752–788. [http://biodiversitylibrary.org/page/28519446]
https://doi.org/10.1111/j.1469-7998.1878.tb08020.x
Joyce, E.A. & Williams, J. (1969) Rationale and pertinent data. *Memoires of the Hourglass Cruises*, 1, 1–50.
Le Loeuff, P. & Intès, A. (1974) Les Thalassinidea (Crustacea, Decapoda) du Golfe de Guinée systématique—écologie. *Cahiers de l'Office de Recherches Scientifiques et Techniques Outre-Mer, série Océanographique*, 12, 17–69. [http://www.documentation.ird.fr/hor/fdi:19672]
Liu, W.L. & Liu, R.Y. (2010) Two new species of the axiidean genus*Gourretia* de Saint Laurent, 1973 (Decapoda: Ctenochelidae) from the South China Sea. *Journal of Crustacean Biology*, 30, 745–756.
https://doi.org/10.1651/10-3282.1
Manning, R.B. & Felder, D.L. (1991) Revision of the American Callianassidae (Crustacea: Decapoda: Thalassinidea). *Proceedings of the Biological Society of Washington*, 104, 764–792. [https://www.biodiversitylibrary.org/page/34809466]
Ngoc-Ho, N. (1991) Sur quelques Callianassidae et Upogebiidae de Nouvelle-Calédonie (Crustacea, Thalassinidea). *In*: Richer de Forges, B. (Ed.), Le benthos des fonds meubles des lagons de Nouvelle-Calédonie. ORSTOM Editions, Paris, pp. 281–311, figs. 281–211. [https://www.documentation.ird.fr/hor/fdi:35618]
Poore, G.C.B., Dworschak, P.C., Robles, R., Mantelatto, F. & Felder, D.L. (2019) A new classification of families and genera of Callianassoidea (Crustacea: Decapoda: Axiidea) derived from a molecular phylogeny with morphological support. *Memoirs of Museum Victoria*, 78, 73–146.
https://doi.org/10.24199/j.mmv.2019.78.05
Poore, G.C.B. & Griffin, D.J.G. (1979) The Thalassinidea (Crustacea: Decapoda) of Australia. *Records of the Australian Museum*, 32, 217–321.
https://doi.org/10.3853/j.0067-1975.32.1979.457
Rabalais, N.N. (1979) A new species of *Ctenocheles* (Crustacea: Decapoda: Thalassinidea) from the northwestern Gulf of Mexico. *Proceedings of the Biological Society of Washington*, 92, 294–306. [https://archive.org/details/biostor-83189]
Rabalais, N.N., Holt, S.A. & Flint, R.W. (1981) Mud shrimps (Crustacea, Decapoda, Thalassinidea) of the northwestern Gulf of Mexico. *Bulletin of Marine Science*, 31, 96–115.
Robles, R., Dworschak, P.C., Felder, D.L., Poore, G.C.B. & Mantelatto, F.L. (2020) A new molecular phylogeny of the Callianassoidea (Crustacea: Decapoda: Axiidea) with morphological support. *Invertebrate Systematics*, 34, 113–132
https://doi.org/10.1071/IS19021
Robles, R., Tudge, C.C., Dworschak, P.D., Poore, G.C.B. & Felder, D.L. (2009) Molecular phylogeny of the Thalassinidea based on nuclear and mitochondrial genes. in Martin, J.W., Crandall, K.A. & Felder, D.L. (Eds.), *Crustacean Issues. Vol. 18. Decapod Crustacean Phylogenetics*. Taylor and Francis/CRC Press, Boca Raton, Florida, pp. 309–326.
https://doi.org/10.1201/9781420092592-c15
Saint Laurent, M. de (1973) Sur la systématique et la phylogénie des Thalassinidea: definition des familles des Callianassidae et des Upogebiidae et diagnose de cinq genres noveaux (Crustacea Decapoda). *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences, Paris*, 277D, 513–516. [http://gallica.bnf.fr/ark:/12148/bpt6k5474901n/f589.image]
Saint Laurent, M., de (1979) Vers une nouvelle classification des crustacés décapodes Reptantia. *Bulletin de l'Office National des Pêches de Tunisie*, 3 (1), 15–31.
Sakai, K. (2002) Callianassidae (Decapoda, Thalassinidea) in the Andaman Sea, Thailand. *Phuket Marine Biological Center Special Publication*, 23, 461–532.
Sakai, K. (2004) Dr. R. Plante's collection of the families Callianassidae and Gourretiidae (Decapoda, Thalassinidea) from Madagascar, with the description of two new genera and one new species of the Gourretiidae Sakai, 1999 (new status) and two new species of the Callianassidae Dana, 1852. *Crustaceana*, 77, 553–602.
https://doi.org/10.1163/1568540041718019

Sakai, K. (2017) Descriptions of eight species from the superfamilies Axioidea Huxley, 1879 and Callianassoidea Dana, 1852, with a revised key to the species of the genus *Acanthaxius* Sakai & de Saint Laurent, 1989 (Decapoda, Callianassidea). *Crustaceana*, 90, 177–197.
https://doi.org/10.1163/15685403-00003621

Venera-Pontón, D.E., Driskell, A.C., De Grave, S., Felder, D.L., Scioli, J.A. & Collin, R. (2020) Combining field training in taxonomy with DNA barcoding to document decapod biodiversity in the Caribbean. *Biodiversity Data Journal*, 8, e47333.
https//doi.org/10.3897/BDJ.8.e47333