



Description of *Paraxiopsis kensleyi* n. sp., a new axiid lobster from the Gulf of Mexico (Crustacea: Decapoda: Axiidea)

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Abstract

A new species of axiid was discovered during sampling offshore deep banks on the middle continental shelf off Louisiana. *Paraxiopsis kensleyi* n. sp. appears to inhabit interstices and cavities of coralline algal rubble, rhodoliths, coral rubble, and other eroded calcareous substrates. Weakly separated from *Eutrichocheles* Wood-Mason, 1876 on the basis of morphology, present assignments of western Atlantic species to *Paraxiopsis* de Man, 1905 are regarded as provisional. The new species is described morphologically, and the coloration of freshly captured specimens is documented and compared to related species where possible. Coloration readily distinguishes mature specimens of the new species from *Paraxiopsis spinipleura* Kensley, 1996, with which it was initially confused. The diagnosis includes GenBank accession numbers for COI sequences to allow future molecular phylogenetic comparisons. Compared to regional species that share a similar dentation or spination on the submedian carina, the pleon of the new species is distinctive in the truncate ventral margin on pleura 2–4, as opposed to being broadly rounded or directed ventrally in an acutely triangular tip. The new species is the eighteenth species of *Paraxiopsis* worldwide and the ninth from western Atlantic waters, seven of which are now known to range into the Gulf of Mexico. An updated key to western Atlantic members of the genus is provided.

Key words: new species, Axiidae, *Paraxiopsis*, reef, Gulf of Mexico

Introduction

In the course of recent faunistic surveys and phylogenetic studies in the northern Gulf of Mexico, a number of new decapod crustaceans have been discovered, many associated with deep banks of the middle and outer continental shelf and dredged in samples of rhodoliths and other hard substrate rubble (Felder & Thoma 2010; Bracken-Grissom & Felder 2014a, b; Felder *et al.* 2019; Thoma & Felder 2020; Felder 2020; Felder & Lemaitre 2020). Two specimens of the herein described axiid lobster were first taken from these habitats off Louisiana in 1998 and initially thought to represent a variant of *Paraxiopsis spinipleura* Kensley, 1996. Additional dredge sampling of rubble and rhodoliths from nearby sites over the following two decades occasionally produced additional specimens. While most specimens were to some degree mutilated in the process of collection, the resultant series enabled recognition of consistent differences from *P. spinipleura* and other species of the genus.

The seventeen species presently assigned to the genus *Paraxiopsis* de Man, 1905 (Kensley 1996; Ngoc-Ho *et al.* 2005; Poore & Collins 2009; Dworschak 2020) are widely distributed through tropical to warm-temperate world oceans, and include eight previously described from western Atlantic waters. For the present, all are regarded to represent a genus similar to two Indo-west Pacific species representing the genus *Eutrichocheles* Wood-Mason, 1876. The separation is based on only a few morphological characters, not all of which consistently apply across sexes, specimens of varied sizes, or varied species within each genus.

The present work describes the new species, distinguishes it from other western Atlantic species in an updated and revised key, and documents its fresh coloration in the course of making color comparisons to other regional species where possible.

Material and methods

Materials examined include holdings from the University of Louisiana at Lafayette Zoological Collection, Lafayette, LA (ULLZ) recently transferred to the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM). Both catalog numbers are used, as specimens are now permanently cross-referenced under both numbers at the USNM. The following comparative specimens were examined: *Paraxiopsis defensus* (USNM 1545515 = ULLZ 11322), 1 juvenile male, 1 juvenile unsexed, coll. J.W. Tunnell *et al.*, Isla Lobos, Veracruz, Mexico, 13 June 1977; (USNM 1541219 = ULLZ 5953), 1 intersex hermaphrodite, coll. R. White, Isla En Medio, Veracruz, Mexico, 24 June 1979. *Paraxiopsis foveolata* (USNM 1543866 = ULLZ 8402), 1 ovigerous female, coll. D.L. Felder *et al.*, Sackett Bank, northwestern Gulf of Mexico, 25 March 1996; (USNM 1541111 = ULLZ 5740), 1 ovigerous female, coll. D.L. Felder *et al.*, northwestern Gulf of Mexico, 1 August 2002. *Paraxiopsis gracilimana* (USNM 1547846 = ULLZ 14645), 1 male coll. D.L. Felder *et al.*, Belize, 27 October 2012; (USNM 1545577 = ULLZ 11134), 1 juvenile female, coll. D.L. Felder *et al.*, Belize, 22 February 2009. *Paraxiopsis granulimana* (USNM 1540500 = ULLZ 4696), 1 male, coll. D.L. Felder *et al.*, northwestern Gulf of Mexico, 27 May 2000. *Paraxiopsis hispida* (USNM 243389), 1 intersex holotype, coll. *R/V Pillsbury*, Honduras, Caribbean. *Paraxiopsis spinipleura* (USNM 1409793), 1 female, coll. Smithsonian DROP project, Dominica; (USNM 1409795), 1 female, coll. Smithsonian DROP project, Dominica, 8 March 2016; (USNM 1547855 = ULLZ 14659), 1 juvenile male, coll. D.L. Felder *et al.*, Belize, 27 October 2012.

Collections from offshore waters of Louisiana in the northwestern Gulf of Mexico were all taken as box dredge samples aboard the *R/V Pelican*. Two specimens from Dominica, used for comparative study, were taken by dip net from surface waters while the *R/V Chapman* was at anchor. Measurements were determined with a calibrated ocular micrometer. Specimen size (± 0.1 mm) is reported as postorbital carapace length (pocl), from the posterior margin of the orbital excavation to the posterior extreme of the cardiac region. Embryonated egg size is reported as the greatest dimension (± 0.01 mm). Digital color photographs were made immediately after defrosting specimens briefly frozen in seawater, with the subject immobilized below the water surface of a shallow tray lined with black felt. Line illustrations were prepared on a Wild M5 dissecting microscope equipped with a camera lucida, after staining of selected structures with chlorazole black E when necessary. The GenBank accession numbers included at the end of the species diagnoses apply to sequences obtained in general accord with methods previously reported by Wong *et al.* (2015).

Taxonomy

Family Axiidae

Genus *Paraxiopsis* de Man, 1905

Paraxiopsis kensleyi n. sp.

(Figs 1A–K; 2A–M; 3A–C)

Type material. Holotype: male, pocl 15.5 mm (USNM 1638661 = ULLZ 18301), rhodoliths and rubble, 23°05.68'N, 91°01.39'W, 55 m, 15 May 2019.

Paratypes: *Northwestern Gulf of Mexico*. 1 male, pocl 8.7 mm (USNM 1548303 = ULLZ 14979), rhodoliths and rubble, 27°48.43'N, 93°02.88'W, 55.5 m, 16 August 1998. 1 male, pocl 13.6 mm (USNM 1540507 = ULLZ 4708), 27°48.65'N, 93°02.53'W, 55–65 m, 16 August 1998. 1 female, pocl 8.7 mm (USNM 1548222 = ULLZ 15006), DOE stn 9-1, 27°56.22'N, 92°00.32'W, 60.5 m, 30 June 2001. 1 female, pocl 7.8 mm (USNM 1540514 = ULLZ 4726), DOE stn 1-2, 28°03.61'N, 92°27.54'W, 61–63 m, 30 June 2001. 1 female, pocl 5.9 mm (USNM 1540552 = ULLZ 4791) DOE stn 3.2, 27°56.36'N, 92°00.54'W, 65–91 m, 1 July 2001. 1 mutilated ovigerous female, pocl indeterminate (USNM 1548557 = ULLZ 14976), “29 Fathom Fish Haven”, rubble and rhodoliths, off Isles Dernieres, Louisiana, 65–67 m, 1 August 2002. 1 male, pocl 9.0 mm (USNM 1638662 = ULLZ 18496), rubble, 27°48.65'N, 93°02.85'W, 63–79 m, 23 August 2008.

Diagnosis. Carapace weakly punctate with low granulation, sparsely setose, not deeply pitted; rostrum acute, triangular, length about one-quarter distance from anterior tip to cervical groove, margin typically with 3 lateral

spines, largest originating above eyestalk anterior to strong supraocular spine generally aligned with lateral gastric carina; lateral gastric carina armed with single strong postorbital spine and weak posterior elevation; submedian gastric carina (immediately to either side of median carina) multidentate, with typically 5 or 6 short acute teeth; median carina unarmed, postcervical median line with low, posterior median carina. Eye cornea darkly pigmented. Second antennal article with dorsolateral spine not reaching distal end of antennular peduncle; scaphocerite (= antennal acicle) short and inconspicuous, plate-like, bifid distally, not reaching proximal end of penultimate article of antennular peduncle. First pereopods sparsely setose, broad surfaces weakly granulate, lacking coarse tuberculation. Minor chela fixed finger shorter, narrower, less robust than palm. Pleon with second through fourth pleura subquadrate in lateral view, ventrolateral margins truncate, ventral margins of third and fourth pleura truncate, sloped to posteroventral corner, anteroventral corner of third through fifth pleura typically bearing small spinule; second pleuron broad, height subequal to maximum length in lateral view. Third through fifth pleopods lacking appendices internae on mesial margins of endopods; male second pleopod with small appendix masculina on mesial margin of endopod. Telson subrectangular, with dorsal ridges or elevations bearing teeth or spines. Uropodal exopod with distinct, distal, transverse suture (= diaeresis). Diagnostic 16S and 12S mitochondrial gene sequences for the holotype specimen are available under GenBank accession numbers MW650791 (16S) and MW650792 (12S).

Description (of holotype except where otherwise stated). Carapace (Figs 1A; 3A–C) weakly punctate with low granulation, sparsely covered by minute setae, punctae closely anastomosed to define weak, low oblique ridges posterolaterally on branchiostegites; posterior margin of transverse cervical groove minutely granulate. Rostrum (Fig. 1A–D) acute, triangular, length about one-quarter distance from anterior tip to cervical groove, margin typically with 3 lateral spines, posteriormost the largest, originating anterior to strong supraocular spine, rostrum lateral spines and supraocular spine of each side generally aligned with lateral gastric carina; lateral gastric carina armed with single strong postorbital spine and weak posterior elevation; submedian gastric carina armed by row of 5 or 6 spines (range includes paratypes); median carina anterior to cervical groove with rounded tubercle near midlength; median line posterior to cervical groove marked by short, low, rounded carina at posterior end.

Eyestalk (Fig. 1C) short, heavy, almost half length of rostrum; cornea slightly swollen, subspherical, pigmented. Antennular peduncle reaching to distal half of antennal peduncle fourth article. Antennal peduncle first article distoventral margin with 2–5 low denticles or subacute granules (range includes paratypes); second article forming acute lateral spine, tip weakly curved mesiad, reaching to midlength of scaphocerite; scaphocerite weakly curved mesiad, reaching proximal end of fourth article; third article with 2–4 spines on mesial lower margin (range includes paratypes); fourth article length subequal to or slightly exceeding length of second; fifth article about two-thirds length of fourth article.

Mandible (Fig. 1E, F) thickly sclerotized, gnathal lobe with distolateral shoulder sloped, incisor process with cutting edge broadly rounded, lacking dentition; slightly concave internal surface with strong lip giving rise to heavy smooth ridge forming molar process with concave anterolateral terminus; palp large, setose, 3-segmented, third article arched, elongate subovoid. First maxilla (Fig. 1G) endopodal palp narrow, terminal article almost length of proximal; proximal endite with dense, close-set setation lining sinuous mesial margin, setae stronger distally; distal endite elongate, terminally broadened with margin bearing dense long setae, some rows strongly spiniform; exopodite low, rounded. Second maxilla (Fig. 1H) endopod tapered distally, terminated in narrow elongate article tipped with several very long setae, first and second endites each longitudinally subdivided, mesial margins densely lined by long setae, exopod forming scaphognathite with elongate distal lobe and single long seta extending from proximal lobe.

First maxilliped (Fig. 1I) endopod small, narrow, with elongate, lanceolate terminal article, distal endite subovoid, mesial margin with long dense setae; proximal endite with subacute terminus and mesial margin with long dense setae; exopod elongate with setose distal lobe bearing setose distal flagellum of several articles; epipod broadly elongate, proximal lobe subrectangular. Second maxilliped (Fig. 1J) endopodal merus and propodus nearly straight, extensor margins weakly arcuate; merus length about 4 times width, flexor margin with comb of long setae; propodus short, length subequal to breadth, not exceeding one-quarter merus length; dactylus stubby, rounded terminally, length subequal to breadth, distal setation including dense set of enlarged, blunt, stiffly cornified setae; exopod narrow, multiply jointed, flagellum-like, distinctly overreaching endopodal merus and carpus, setose; epipod thin, leaf-like, tapered to narrow distal end. Third maxilliped (Fig. 1K) coxa with strong spine, basis with mesial spine and lower internal spine; ischium with 7–9 spines on mesial margin, crista dentata with 14–17 teeth; merus with 6 or 7 spines, 3 or 4 distalmost large; carpus with single distomesial spine (ranges include paratypes).

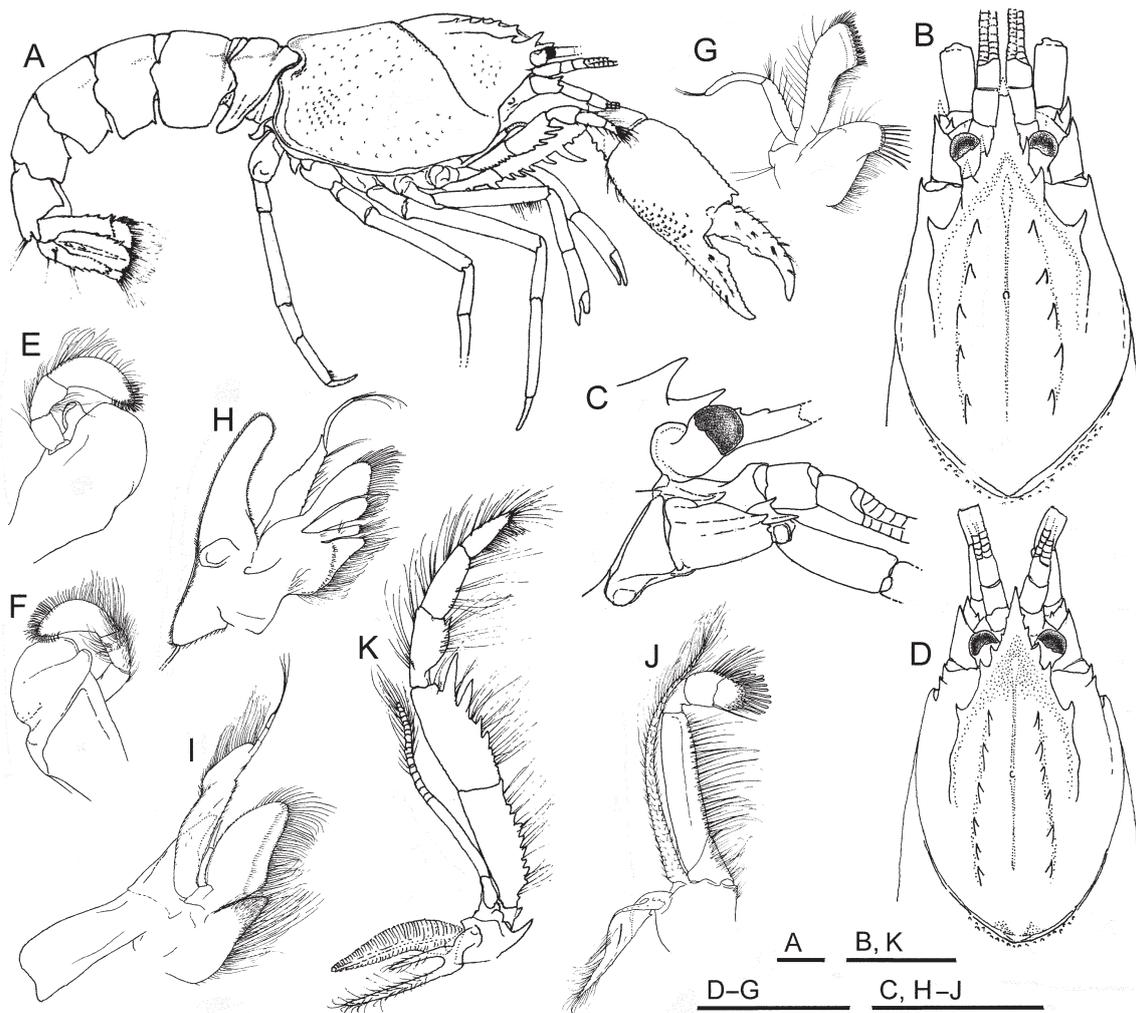


FIGURE 1. *Paraxiopsis kensleyi* n. sp., male holotype (USNM 1638661 = ULLZ 18301), A–C, E–K; male paratype (USNM 1638662 = ULLZ 18496), D. A, habitus, left side; B, D, anterior carapace, eyes, and peduncles, dorsal surfaces; C, anterior carapace, eyes, and peduncles, left side; E, right mandible, outer surfaces; F, right mandible inner surfaces; G, right first maxilla, outer surface; H, right second maxilla, outer surface, full length of enlarged seta on proximal lobe of exopod not shown; I, right first maxilliped, outer surface; J, right second maxilliped, outer surface; K, right third maxilliped, outer surface. Scale bars = 3.0 mm.

First pereopods sparsely setose, slightly asymmetrical, broad surfaces weakly granulate, lacking coarse tuberculation (Fig. 3A, B; paratype), propodus of major cheliped heavier, more inflated, usually longer than minor. Major cheliped (Fig. 2A) coxa lower margin with 2 low subacute triangular teeth and several smaller dentiform granules; basis lower mesial margin with single, low, subacute tubercle; ischium lower inner margin with 2 or 3 spines and few smaller denticles (range includes paratypes), lower outer margin with parallel row of very weak dentiform granules, upper margin with dentiform granules; merus upper margin distinctly convex, with 2 strong spines and several shorter spinules, lower inner and outer margins with parallel rows of dentiform granules, flattened lower surface between rows with 5 strong spines and few spinules, strongest spine subdistal; carpus upper margin at most with one or more subacute granules, lower margin with about 4 short, subtriangular, distally directed subacute teeth, lateral surface tuberculate, lower tubercles strongest and distally directed; propodus upper margin marked by raised crest of elongate depressed dentiform granules, strongest distally, terminating in single slightly elevated distal spine, lower margin coarsely granulate, appearing weakly serrate, distally directed low denticles disposed as separated parallel inner and outer rows on palm, converging on lower margin of fixed finger, lateral and inner surfaces with scattered rounded small tubercles, coarsest on lower distal areas of palm; fixed finger about three-quarters length of palm, cutting edge mostly straight, slightly upturned distally, armed by about 20 low denticles in addition to raised

irregularly rounded prominent tooth centered proximal to midlength; dactylus upper margin unarmed, smooth to slightly granulate, lateral and mesial surfaces with multiple tufts of setae, cutting edge nearly straight proximally, distinctly concave in distal half, granulate subtriangular tooth centered near midlength.

Minor cheliped (Fig. 2B) of paratypes with coxa and ischium similar to those of major cheliped; merus upper margin convex, distal half with 3 or 4 enlarged spines along margin of otherwise dentiform granules, lower margin with 2–4 spines, largest in distal half; carpus upper margin granulate, lower outer margin with 2 or 3 distally directed denticles, lower lateral surface with few additional depressed distally directed denticles; propodus upper margin with raised crest of elongate, depressed, dentiform granules, terminating distally in low spine, lower margin lined by distally directed low, elongate denticles disposed as broad fusion of weakly distinguishable parallel inner and outer rows on palm, converging into smooth crest on lower margin of fixed finger, lateral and inner surfaces with few scattered enlarged granules and punctae; fixed finger two-thirds to three-quarters length of palm, distal tip sometimes slightly upturned, cutting edge almost straight, armed by small denticles in addition to large, raised subtriangular to rounded granular tooth centered proximal to midlength of finger; dactylus upper surface mostly smooth, 1 or 2 depressed, distally directed denticles near proximal end of external margin, lateral and mesial surfaces with multiple tufts of setae, cutting edge nearly straight proximally, weakly concave in distal half, granulate subtriangular tooth centered near midlength.

Second pereopod (Fig. 2C, D) coxa anterior surface with acute anteriorly directed spine among few additional spinules; coxa, basis, and ischium mesial margins armed by row of small denticles, those of ischium acute to subacute with distally directed tips, distalmost slightly enlarged; merus lower margin nearly smooth, at most (in paratypes) with few small denticles or spinules, lined by long stiff setae in distal two-thirds; carpus slightly longer than palm of chela, lower margin lined by long stiff setae in distal two-thirds; propodus with upper margin of palm about 1.5 times length of dactylus. Third pereopod (Fig. 2E) coxa anterior surface with one or more slightly enlarged sharp spinules among others, mesial margin armed by small acute denticles or spinules; mesial margins of basis and ischium at most with low denticles; merus lower margin terminated in distal spine, otherwise unarmed; carpus unarmed, about three-fifths length of propodus; propodus more than 2 times length of dactylus, lower external surface with row of about 7–9 sets of short, robust, corneous, setal spines, many as doublets or triplets, with parallel row of similar single setal spines on upper external surface (range includes paratypes); dactylus less than one-half length of propodus, dorso-ventrally flattened, row of very short corneous setal spines along part of proximal upper surface and along full length of lower external surface. Fourth pereopod (Fig. 2F) coxa mesial margin armed by small acute denticles or spinules, anteromesial surface with two spines along short longitudinal ridge; mesial margins of basis and ischium unarmed or with few very low denticles; merus, carpus, propodus and dactylus as in pereopod 3. Fifth pereopod (Fig. 2G) coxa mesial surface and distomesial margin with several acute to subacute denticles, typically with one enlarged on posteromesial area of distal margin; basis and ischium unarmed, merus lower margin without distal spine; carpus no more than one-half length of propodus, slightly inflated distally; propodus lower internal surface armed by longitudinal row of about 11–14 sets of short, robust, corneous setal spines, most as doublets, distalmost pair strongest, with parallel row of similar single setal spines on upper internal surface, distal end of article extended as short broadly rounded fixed finger forming subchela with dactylus, distal end of finger line by closely set fringe of short, stiff, corneous setae; dactylus no more than one-third length of propodus, article broadened proximally by flattened lateral lobe, upper surface with patch of elongate stiff setae aligned as an oblique fusion of tufts near midlength, positioned to small corneous setal spine positioned proximal to corneous tip of article.

Seventh thoracic sternite (between coxae of fourth pereopods) divided at midline, separated posteriorly into pair of obliquely arched lips, each terminating as strong, acute, anteriorly directed spine behind fourth pereopod coxa, posterior margin of sternite behind each arched lip with slightly hooked posteromesially directed spine on posterior surface (Fig. 2H, I). Eighth thoracic sternite (between coxae of fifth pereopods) produced posterolaterally (exposed laterally behind fifth pereopod coxa) as twisted spur with acute posteromesially directed tip.

Pleon (Figs 1A; 3B, C) with first pleuron height at least 1.5 times maximum length in lateral view, tapered ventrally and posteriorly swept in lateral view, narrowing to terminate in rounded posteroventral corner; second through fifth pleura laterally subquadrate; second pleuron broad, height in lateral view subequal to maximum length, ventral margin weakly convex, typically without spinule near anteroventral corner; third to fifth pleura with ventral margins truncate, margin of each typically with spinule near anteroventral corner; sixth pleuron with ventrolateral margin produced to triangular tip terminated in small posteriorly directed spinule or denticle.

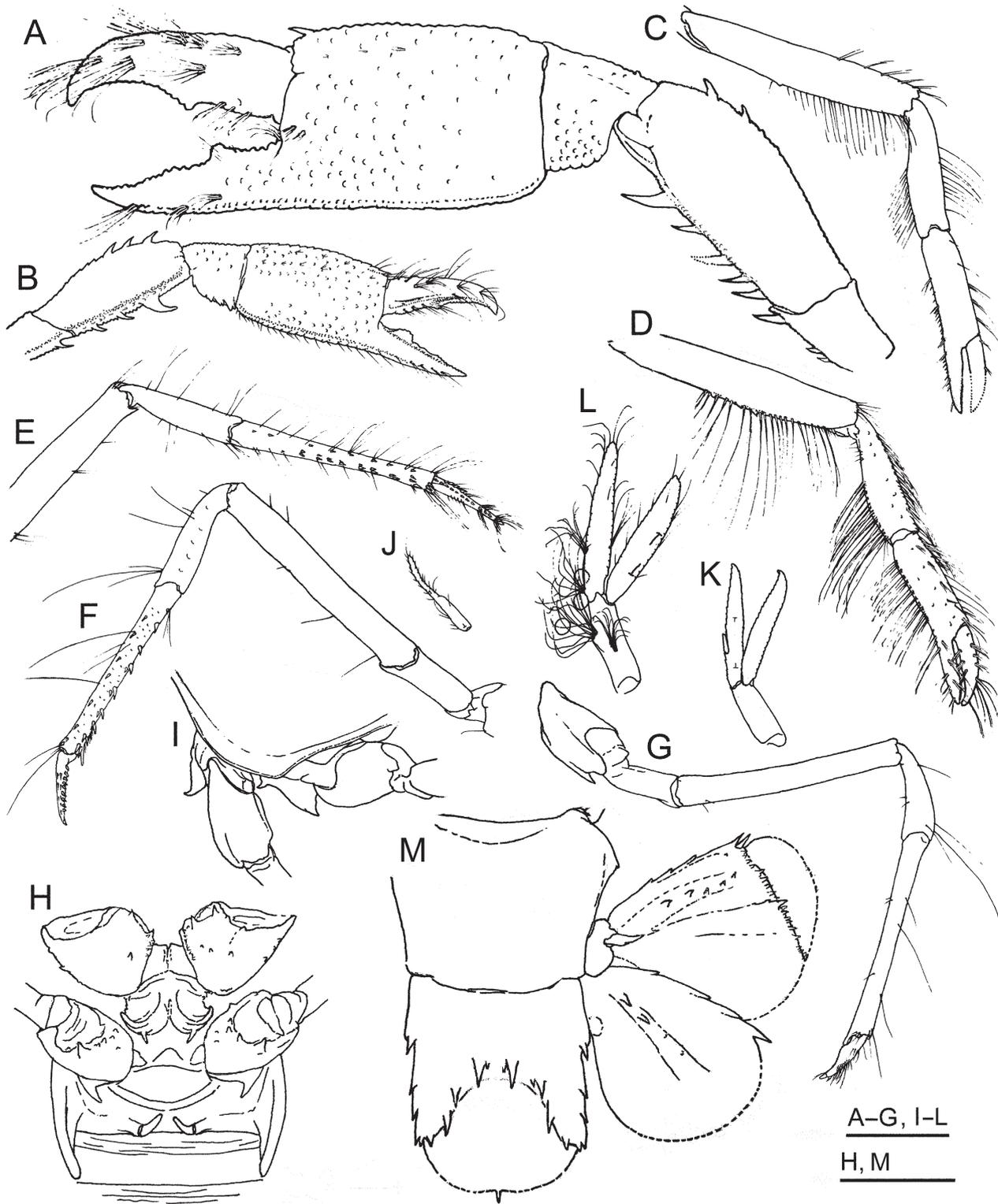


FIGURE 2. *Paraxiopsis kensleyi* n. sp., male holotype (USNM 1638661 = ULLZ 18301), A, C–I, M; male paratype (USNM 1638662 = ULLZ 18496), B, K; ovigerous female paratype (USNM 1548557 = ULLZ 14976), J, L. A, left first pereopod (major cheliped), outer surface; B, left first pereopod (minor cheliped), inner surface; C, right second pereopod, outer surface; D, left second pereopod, inner surface; E, right third pereopod, outer surface; F, left fourth pereopod, outer surface; G, right fifth pereopod, external surface; H, posterior coxae, intervening thoracic sternum, and first pleon with gonopods, ventral surfaces; I, right lower carapace, posterior coxae, and projecting sternal processes, lateral surfaces; J, female right first pleopod, posterior surface; K, male right second pleopod, posterior surface; L, female right second pleopod with embryonated eggs, posterior surface; M, sixth pleonite, telson, and uropods (setae not shown), dorsal surfaces. Scale bars = 3.0 mm (A–I, M); 2.0 mm (J–L).

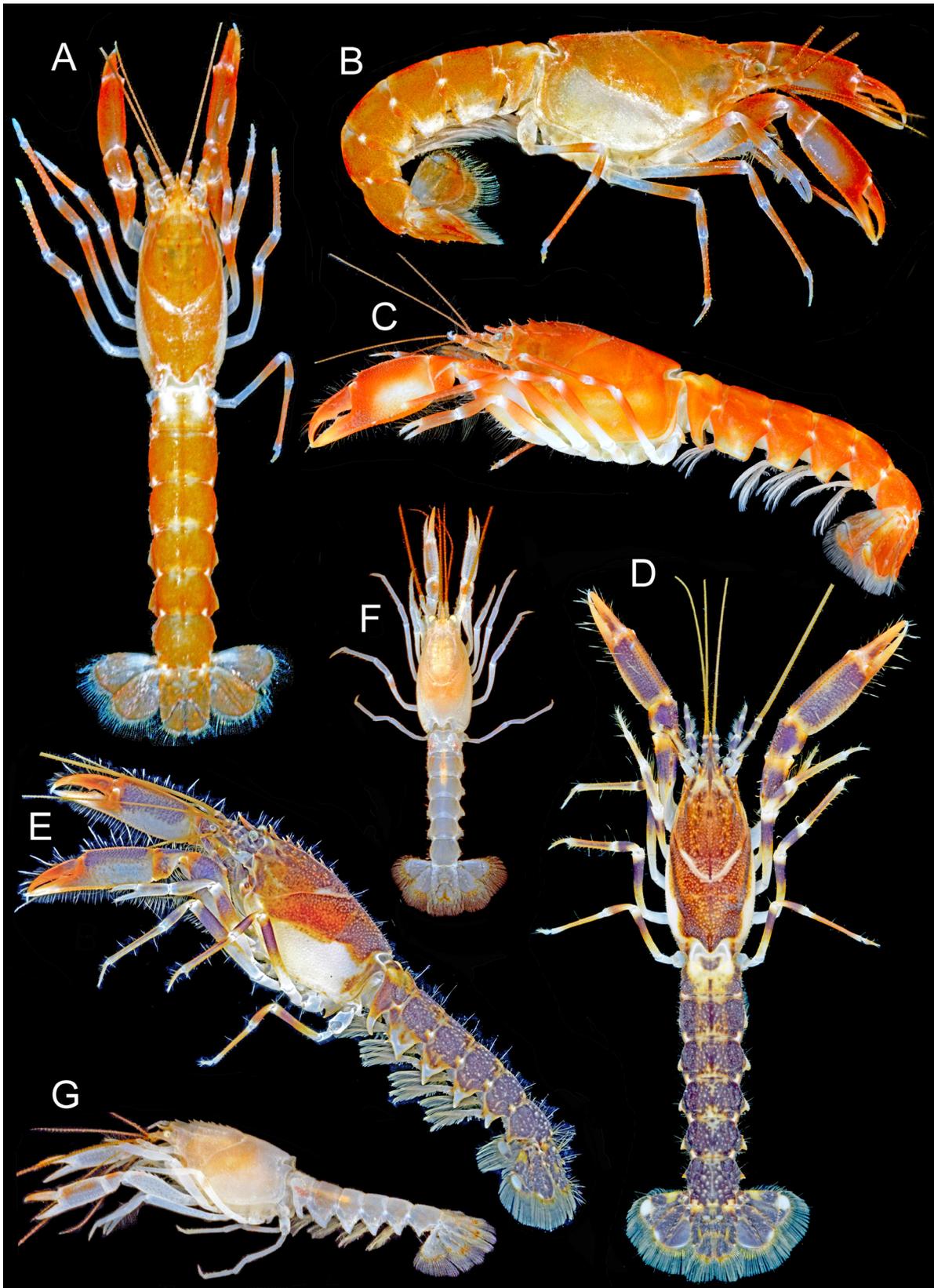


FIGURE 3. *Paraxiopsis kensley* n. sp., male paratype, pocl 8.7 mm (USNM 1548303 = ULLZ 14979), northwestern Gulf of Mexico: A, habitus, dorsal; B, habitus, right side. *P. kensleyi* n. sp., male holotype (lacking minor cheliped), pocl 15.5 mm (USNM 1638661 = ULLZ 18301), northwestern Gulf of Mexico: C, habitus, left side. *Paraxiopsis spinipleura*, female, pocl 13.0 mm (USNM 1409793), Dominica: D, habitus, dorsal; E, habitus left side. *P. spinipleura*, juvenile male, pocl 5.4 mm (USNM 1547855 = ULLZ 14659), Belize: F, habitus, dorsal; G, habitus, left side.

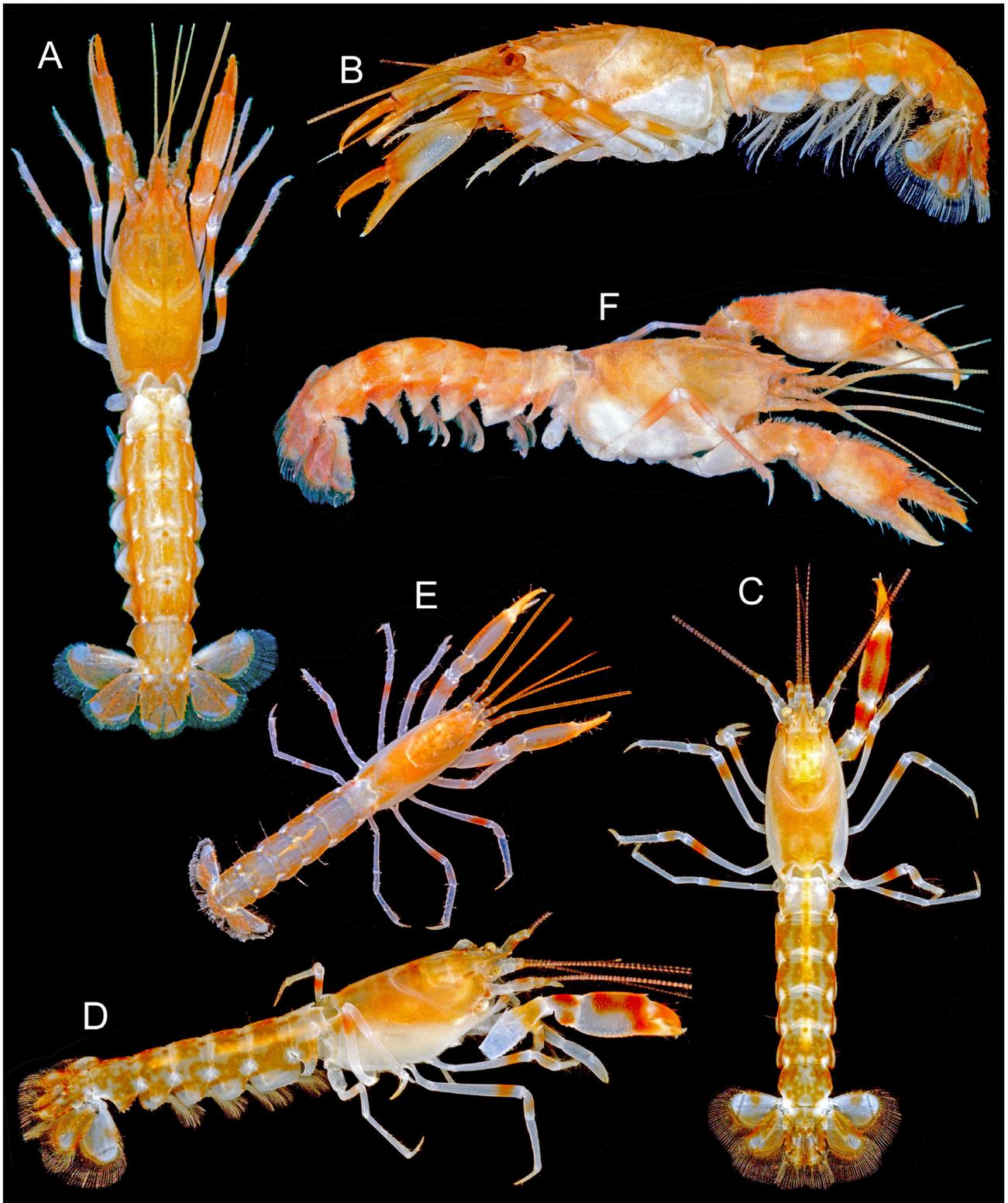


FIGURE 4. *Paraxiopsis foveata*, ovigerous female, pocl 10.3 mm (USNM 1542866 = ULLZ 8402), northwestern Gulf of Mexico: A, habitus, dorsal; ovigerous female, pocl 13.0 mm (USNM 1541111 = ULLZ 5740), northwestern Gulf of Mexico: B, habitus, left side. *Paraxiopsis gracilimana*, male, pocl 6.7 mm USNM 1547846 = ULLZ 14645), Belize: C, habitus, dorsal; D, habitus, right side, cheliped detached; juvenile female, pocl 5.7 mm (USNM 1545577 = ULLZ 11134), Belize: E, habitus, dorsal. *Paraxiopsis granulimana*, male, pocl 10.9 mm (USNM 1540500 = ULLZ 4696), northwestern Gulf of Mexico: F, habitus, right side.

Male first pleopod (Fig. 2H) minute, uniramous, forming single narrowly cylindrical article, slightly tapered distally, tip directed ventromesially. Female first pleopod (Fig. 2J) minute, uniramous, longer with more setae than in male, appearing flagelliform with marginal incisions distally. Male second pleopod (Fig. 2K) biramous, endopod and exopod similarly developed as elongate flattened blades, endopod bearing appendix masculina, lacking appendix interna. Female second pleopod and pleopods 3–5 of both sexes similar to male second pleopod but lacking both appendix masculina and appendix interna.

Telson (Figs 2M; 3A) slightly longer than broad, lateral margin with buttressed spiniform proximal tooth and three distal spiniform marginal teeth, in addition to close-set pair of spines at posterolateral angle, distal margin broadly convex, with posteromedian spine; dorsal surface with pair of large submedian spines anterior to transverse offset from posterior region of telson, 3 spines along each oblique ridge of offset extending posteriorly (and often smaller accessory spinules). Uropodal endopod slightly longer than broad, with 3 or 4 spines along anterior margin and strong spine at anterodistal corner, longitudinal ridge typically with 2 or 3 spines and distal marginal spine (marginal spine sometimes lacking). Uropodal exopod slightly longer than broad, distally marked by distinct transverse suture (diaeresis), with 3 or 4 spines along anterior margin, additional spine at anterodistal angle positioned immediately next to spiniform seta near margin of transverse suture; dorsal surface with outer of two longitudinal ridges armed by loosely defined tract of 4–7 spines or spinules, inner ridge unarmed except for slightly enlarged spinule or pair of spinules at distal end above transverse suture (not in all specimens), margin above transverse suture lined by 14–20 spinules.

Color. Orange to reddish orange predominant dorsally on carapace, chelipeds, and pleon. Merus, carpus, and propodus each with broad band of orange on second through fifth pereopods, white background exposed near articulations. Diffuse white to off-white or pale orange patch on lower inner and outer surfaces of palms. Ventral surfaces predominantly white to off-white on proximal articles of pereopods and pleon, fringes of orange to pale orange often on some margins and stronger spines of posterior pereopod coxae, sculpted structures of posterior thoracic sternites, as arc on sixth pleonite, and on distal reaches of uropodal exopods.

Etymology. The species name “kensleyi” honors the late Brian Kensley (1944–2004) for his extensive contributions to knowledge of axiid decapods and other groups of decapod and non-decapod crustaceans.

Size. Postorbital carapace lengths range to a maximum of 15.5 mm the male holotype. An ovigerous female (USNM 1548557 = ULLZ 14976), too damaged for carapace measurement, otherwise appears to be of comparable size to the male holotype. The greatest dimension of available embryonated eggs ranges from 0.38–0.41 mm.

Habitat. Hard substrates, interstices and cavities of coral and coralline algal rubble, rhodoliths, and other eroded calcareous substrates of hard banks and reefs on the middle continental shelf; 55–91 m.

Distribution. Western Atlantic: Northwestern Gulf of Mexico.

Remarks. The character set used by Kensley (1996) to separate *Paraxiopsis* from *Eutrichocheles* was edited by Ngoc-Ho *et al.* (2005) who redescribed *E. modestus* Wood-Mason, 1876, type species of *Eutrichocheles*. They rediagnosed *Eutrichocheles* and concluded that a second species, *E. crosnieri* Ngoc-Ho, 1998 should remain assigned to it. Primary characters separating the genera had been previously regarded by Kensley (1996) to include 1) the absence of a posterior post-cervical median carina in *Paraxiopsis* (present in *Eutrichocheles*); 2) lack of a wide gape and strong tubercle on the fixed finger on the major chela of *Paraxiopsis* (both present in *Eutrichocheles*); 3) lack of a distinct median notch on the posterior margin of the telson in *Paraxiopsis* (present in *Eutrichocheles*); and 4) smaller size of *Paraxiopsis*, carapace lengths usually 8–12 mm (larger, usually 20–30 mm in *Eutrichocheles*).

In review of these characters, Ngoc-Ho *et al.* (2005) noted that the posterior post-cervical median carina was found in only the type species of *Eutrichocheles*, excluding it as a definitive character of the genus. Thus, the presence of this feature as a low crest in *P. kensleyi* **n. sp.** is not here regarded to bear on its generic assignment. They also noted that the wide gape and strong tubercle on the fixed finger of major chela were present in males only, limiting diagnostic value of those characters. The relative width of this gape and strength of the tubercle in *P. kensleyi* **n. sp.** vary markedly with maturation as well as sex and are at best subjective characters even when the chela is fully developed (Figs 2A; 3B, C). However, Ngoc-Ho *et al.* (2005) found that the median notch on the posterior of the telson was “pronounced” in *Eutrichocheles*, while “not in *Paraxiopsis* (though sometimes present)”, and that the difference in overall size was especially obvious between members of the two genera. The telson notch is weakly evident but not pronounced in specimens of *P. kensleyi* **n. sp.**, and several specimens range to sizes intermediate between the typically reported ranges for the two genera. Ngoc-Ho *et al.* (2005) added the observation that fingers of the chelae are generally longer than the palm in *Eutrichocheles*, and “(with variations)” shorter than

the palm in *Paraxiopsis*, as found in *P. kensleyi* **n. sp.** Poore & Collins (2009) additionally found that the diagnosis by Kensley (1996), which indicated the absence of a male first pleopod in *Paraxiopsis* (present in *Eutrichocheles*), did not apply to at least one species of *Paraxiopsis* in which it was evident as a minute appendage, as is here also reported for *P. kensleyi* **n. sp.**

For the description of *Paraxiopsis tomentosus* Dworschak, 2020, generic placement was based on its triangular rostrum exceeding the length of the eyestalks, absence of a post-cervical median carina, a small bifid scaphocerite, the second to fifth pleopods lacking an appendix interna, a second male pleopod with an appendix masculina, and the absence of pleurobranchs (Dworschak 2020). It remains to be seen whether thorough reexaminations of *Eutrichocheles* spp. confirm that these characters support distinctions from that genus. However, they are, except for absence of a post-cervical carina, shared with *P. kensleyi* **n. sp.** and underpin the present assignment of what becomes the eighteenth member of the genus. This count of congeners would not conform to the generic assignments made by Sakai (2011), in which species were separated into *Eutrichocheles* and *Paraxiopsis* on the basis of a different set of morphological characters. Unfortunately, some of those characters were found to be contradictory between the keys and diagnoses included in that work or were inconsistently applicable to the species assigned by that author to each of the two genera. Molecular phylogenetic analyses, beyond the scope of the present paper, are required to address the relationship of these two genera, and present assignments to *Paraxiopsis* must be regarded as provisional.

Paraxiopsis kensleyi **n. sp.** represents the ninth described western Atlantic species of the genus, with six now known to occur in the Gulf of Mexico. *Paraxiopsis pindatyba* (Rodrigues & Kensley, 1991) and *Paraxiopsis vicina* (Coelho & Ramos-Porto, 1991) remain thus far reported from only Brazilian waters. *Paraxiopsis hispida* Kensley, 1996 remains known from only the originally reported type materials, with the paratype being from Belize. However, the original report of the holotype being taken off the Yucatán Peninsula appears to be in error, it instead originating from off Puerto Castilla, Honduras.

Paraxiopsis defensus (Rathbun, 1901) has been previously reported from Puerto Rico, the Dominican Republic and Brazil (Kensley 1996; Melo 1999), though provisionally identified photographs have suggested that it may also have been taken in Guadeloupe (Poupin 2018: 82, fig. 68D; see also http://crustiesfroverseas.free.fr/photo_search.php). It seems unlikely that those photographs represent *P. defensus*, given the specimen's double spination on the upper margin of the major cheliped merus and the relative acuity of the posterolateral corners of pleura on several pleonites. However, three archived specimens from Isla Lobos and Isla En Medio, Veracruz, in the southwestern Gulf of Mexico (see comparative specimens in Material and Methods) appear to conform to the original account and species redescription (Kensley 1996), which extends the reported range into the Gulf of Mexico (USNM 1545515 = ULLZ 11322), (USNM 1541219 = ULLZ 5953).

In addition to these new records, ranges can be updated for the four species previously reported from the Gulf of Mexico by Kensley (1996) and Felder *et al.* (2009). *Paraxiopsis spinipleura* Kensley, 1996 is herewith reported to range well south of original records from the Florida Keys, Belize, and the U.S. Virgin Islands to Dominica in the southern Caribbean (Fig. 3F–I), at depths from <1–11 m, with possibly an additional collection from 11 m depth off Guadeloupe (Poupin 2018: 82, fig. 68A). *Paraxiopsis foveolata* Kensley, 1996 remains to date known from only the Gulf of Mexico, but its reported range is herewith extended to deep banks of the northwestern Gulf of Mexico, at depths from 54–230 m (USNM 1541111 = ULLZ 5740; USNM 1542866 = ULLZ 8402). *Paraxiopsis gracilimana* Kensley, 1996 was reported to range from off the southeastern US Atlantic seaboard to the eastern Gulf of Mexico and southern Caribbean at depths from 1–40 m, a range within which previously unreported occurrences include Jamaica (USNM 243384) and Panama (USNM 280206), both identifications being made by B. Kensley but not listed in Kensley (1996). Finally, *Paraxiopsis granulimana* Kensley, 1996 remains confirmed from only the original male holotype taken from 54 m depth in the eastern Gulf of Mexico on the southwest Florida shelf and the male paratype from 93–95 m depth off Trinidad, though it may also occur in waters of Guadeloupe (Poupin 2018: 82, fig. 68B). Yet, in his introduction to that description, Kensley (1996:711) notes this species to have a greater depth range than any of its then-congeners, extending from “the intertidal to 95 m” depth. As his description and subsequent papers identified no collections of this species from intertidal depths, and none can be found among materials deposited in the USNM, this introductory comment is assumed to be in error. Clearly, present ranges reflect limited collection efforts to date, and all are likely to be further expanded.

While most western Atlantic members of *Paraxiopsis* are known from relatively few specimens, which unlikely represent a full scope of gender (often including hermaphrodites) and maturational variations, characters for

distinction of *P. kensleyi* **n. sp.** and its congeners appear to be reliably based upon relative development of dentition on the submedian carina, relative shape and spination of ventral margins on the abdominal pleura, and spination of the cheliped merus, in addition to setation, tuberculation, or pitting of the carapace. The following key builds on that published previously by Kensley (1996):

Key to western Atlantic species of *Paraxiopsis*

1. Carapace dorsally with submedian gastric carina (immediately to either side of median carina) multidentate, subdivided into row or weakly curved longitudinal arc of short teeth or spines (typically 4–8) 2
- Carapace dorsally with submedian gastric carina sometimes marked anteriorly by a tooth, tubercle, abrupt elevation, or medially directed curvature, mostly defined as continuous or nearly continuous crest, sometimes slightly broken or weakly tuberculate 6
2. Pleonal pleura 2–4 ventral margins rounded in lateral view, at most with obtuse corner positioned ventrally to posteroventrally 3
- Pleonal pleura 2–4 ventral margins subtriangular to subquadrately truncate in lateral view, tapered to acute corner positioned ventrally or posteroventrally 4
3. Carapace distinctly pitted; major first cheliped merus upper margin armed with multiple spines or spinules *Paraxiopsis foveolatus*
- Carapace mostly smooth; major first cheliped merus upper margin armed with single spine (sometimes in addition low denticles distally) *Paraxiopsis defensus*
4. Pleonal pleura 2–4 ventral margins truncate, appearing subquadrate laterally, margins of pleura 3 and 4 weakly sloped to posteroventral corner; pleuron 2 broad, height subequal to maximum length in lateral view *Paraxiopsis kensleyi* **n. sp.**
- Pleonal pleura 2–4 ventral margins appearing subtriangular laterally, strongly tapered to acute ventral corner; pleuron 2 narrow, height exceeding maximum length in lateral view 5
5. First pereopod chela densely setose and tuberculate; pleonal pleura 2–5 lacking strong marginal spine, often with small subacute denticle on anterior margin *Paraxiopsis granulimana*
- First pereopod chela mostly smooth, not heavily setose or conspicuously tuberculate; pleonal pleura 2–4 with strong sharp elongate (sometimes weakly hooked, rarely compound) spine on anterior margin *Paraxiopsis spinipleura*
6. Carapace dorsally with submedian carina without anterior tubercle, abrupt elevation, or sharp tooth, anterior end slightly curved medially *Paraxiopsis vicina*
- Carapace dorsally with submedian carina marked anteriorly by tubercle, abrupt elevation, or sharp tooth 7
7. Carapace dorsally with submedian carina terminating anteriorly in a sharp tooth, surface overall appearing smooth, with few sparse setae; uropodal exopod dorsal surface lacking spines along either of weak longitudinal ridges proximal to transverse suture *Paraxiopsis gracilimana*
- Carapace dorsally with submedian carina terminating anteriorly in a blunt tubercle or abrupt elevation; uropodal exopod dorsal surface with multiple small spines along lateral of two weak longitudinal ridges proximal to transverse suture 8
8. Carapace and pleura of pleon mostly with dense cover of short bristles *Paraxiopsis hispida*
- Carapace and pleura of pleon relatively smooth, without dense cover of short bristles *Paraxiopsis pindatyba*

In addition to distinctions in structural morphology, predominantly orange to reddish orange coloration in *Paraxiopsis kensleyi* **n. sp.**, with minimal patterning (Fig. 3A–C), was characteristic of freshly collected specimens of all sizes, and readily distinguishes the species from the closely related species *P. spinipleura* (Fig. 3D, E). This comparison of mature specimens was enabled only by the fortunate nocturnal collection of live *P. spinipleura* in Dominica, where several individuals were netted below a surface light while our vessel was at anchor in 11 m depth (see Acknowledgements). Immature specimens of the latter species, which represent most collections of it other than the holotype, show only early traces of the mature color pattern in life, being primarily a semi-transparent off-white (Fig. 3F, G), while the mature adults were uniquely patterned with violet purple to yellow orange. For other western Atlantic species, confirmed color patterns of *P. hispida*, *P. pindatyba*, *P. vicina*, and *P. defensus* remain unknown, with that suggested by Poupin (2018:82, fig. 68D) to perhaps represent *P. defensus* remaining of uncertain identity. However, coloration in *P. foveolata*, *P. gracilimana*, and *P. granulimana* has been documented in specimens from the Gulf of Mexico (Fig. 4A–F). In all cases, predominant pigmentation in fresh specimens of

these species is shades of reddish orange, though in available examples, this pigment is somewhat more complexly patterned than seen in *P. kensleyi* n. sp.

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