

TWO NEW HERMIT CRABS  
(CRUSTACEA: DECAPODA: PAGURIDAE)  
FROM THE CARIBBEAN SEA

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*Abstract.*—Two new species of hermit crabs are described from the southern Caribbean, *Pylopagurus pattiae*, living in empty polychaete tubes, and *Xylopagurus tayrona*, living in pieces of wood. *Xylopagurus tayrona* is the second known species of *Xylopagurus* A. Milne Edwards, 1880, in the western Atlantic, and the third of the genus. Both species are fully illustrated.

During studies of the marine environments of the Caribbean coast of Colombia, several interesting hermit crab specimens were collected in the vicinity of Santa Marta. Thirty-seven of these specimens were found living in empty polychaete tubes, and represent an undescribed species of the genus *Pylopagurus* A. Milne Edwards & Bouvier, 1891 (sensu McLaughlin 1981). Another specimen, a large ovigerous female found living in a hollow piece of wood, clearly belonged in the genus *Xylopagurus* A. Milne Edwards, 1880, but differed from the only known western Atlantic species of this genus, *X. rectus* A. Milne Edwards, 1880, in several significant characters. In order to ascertain the identity of our specimen we compared it with the type material of A. Milne Edwards' taxon deposited at the Museum of Comparative Zoology, Harvard University (MCZ 4097, 4098), and concluded that the Santa Marta specimen represented an undescribed species of *Xylopagurus*. Subsequently, while examining supplemental, unreported material identified as *X. rectus* from the University of Miami collections, we discovered that in addition to *X. rectus*, the material contained numerous specimens conspecific with our Santa Marta specimen. The two new species, named *P. pattiae*, and *X. tayrona*, are described and illustrated.

The material used for this study remains

deposited in: Instituto de Ciencias Naturales, Museo de Historia Nacional, Universidad Nacional de Colombia (ICN-MHN-CR); Instituto de Investigaciones Marinas de Punta de Betín, Santa Marta (INVE-MAR-CRU); Rosenstiel School of Marine and Atmospheric Sciences, University of Miami (UMML); and National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM). The following abbreviations or symbols are used: O, M/V Oregon; P, R/V John Elliott Pillsbury; SL, shield length, measured from the tip of the rostrum to the midpoint of the posterior margin of the shield; and ♀♀, ovigerous females.

*Pylopagurus pattiae*, new species  
Figs. 1, 2

*Holotype.*—♂ (SL 2.0 mm), Bahía de Chengue, Parque Nacional Natural Tayrona, north of Santa Marta, Colombia, dredged in 20–40 m, 3 Dec 1988, coll. N. H. Campos, USNM 259412.

*Paratypes.*—Parque Nacional Natural Tayrona, north of Santa Marta, Colombia: 2 ♂ (SL 1.7, 1.8 mm), Bahía de Chengue, dredged in 20–40 m, 3 Dec 1988, coll. N. H. Campos, USNM 251896.—2 ♂ (SL 1.5, 1.7 mm), 2 ♀♀ (SL 1.7, 1.8 mm), Bahía de Cinto, dredged in 20–40 m, 30 Nov 1989, coll. N. H. Campos, USNM 251897.—16 ♂



(SL 1.1–2.0 mm), 4 ♀ (SL 1.5–1.9 mm), 10 ♀♀ (SL 1.6–1.9 mm), Bahía de Concha, dredged in 40–60 m, 3 Dec 1988, coll. N. H. Campos, INVEMAR-CRU-1202, ICN-MHN.

*Description.*—Shield (Fig. 1a) distinctly longer than broad; dorsal surface glabrous, evenly convex, with few scattered short setae; anterior margin between rostrum and lateral projections concave. Rostrum triangular, acute or bluntly rounded. Lateral projections broadly triangular, rounded. Anterolateral margin sloping.

Ocular peduncles (Fig. 1a, b) stout, combined length of peduncle and cornea more than half length of shield. Cornea moderately dilated, pigmented. Dorsal surface naked or with few scattered short setae. Ocular acicles triangular, terminating acutely and with small submarginal spine; separated basally by slightly more than basal width of 1 acicle.

Antennular peduncle slightly overreaching distal margin of cornea; segments naked or with few scattered short setae. Basal segment with small spine on lateral face distally. Dorsal flagellum long, about same length as that of ultimate and penultimate segments combined.

Antennal peduncle (Fig. 1a, c) slightly exceeding distal margin of cornea, supernumerary segment present. Fifth segment slender, with row of setae on mesial margin. Fourth segment with setae on distomesial margin. Third segment with small spine (usually curved dorsally) on ventrodistal angle. Second segment with dorsolateral distal angle produced and terminating in strong spine, bearing few setae on lateral face distally; dorsomesial distal angle with small spine. First segment with spine at ventrodistal angle. Acicle exceeding distal margin of fourth segment, nearly straight, slender, and terminating in strong spine, bearing few setae distally. Flagellum short, reaching to about distal margin of carpus of right cheliped, articles usually with pair of short setae, equal or less than 1 article in length.

Sternite of third maxillipeds with small spine on each side of midline.

Right cheliped (Fig. 1d, e) with chela about twice as long as broad; fingers dorsoventrally flattened, terminating in small corneous claw, cutting edges formed by unequal calcareous teeth. Chela with ovate region on dorsal surface forming an operculum delimited by raised ridge on palm, lateral margin of fixed finger, and mesial margin of dactyl. Operculum with surface flat, naked, margins finely crenulate. Palm with scattered small tubercles and short setae on posterior portion of dorsal face and lateral and mesial faces; ventral face smooth, naked, or at most with scattered minute tubercles and short setae. Carpus longer than broad, distal margin often with small spine mesially; dorsal margin with row of small tubercles or protuberances bearing short setae; lateral and mesial faces with scattered small tubercles and setae; ventral face smooth or with scattered small tubercles and short setae. Merus more than 2 times as long as broad, triangular in crosssection, distal margin often with small spine laterally; dorsal margin with few minute protuberances bearing short setae; ventral face smooth or with scattered small tubercles and short setae. Ischium with row of long setae on ventromesial margin.

Left cheliped (Fig. 1f) reaching to about distomesial angle of palm of extended right chela. Fingers with tufts of setae on distal half of dorsal and ventral faces; cutting edge of dactyl with distal row of small, fused, corneous spinules; cutting edge of fixed finger formed of small calcareous teeth. Palm longer than broad, broadest between distomesial angle and lateral margin; dorsolateral margin with finely dentate, low ridge on distal  $\frac{2}{3}$ ; dorsomesial margin with several minute tubercles; dorsal surface also with several minute tubercles proximally; ventral face smooth, with scattered short setae. Carpus with 4 blunt to sharp spines on dorsodistal margin; dorsal surface with row of setae on each side of midline; mesial,



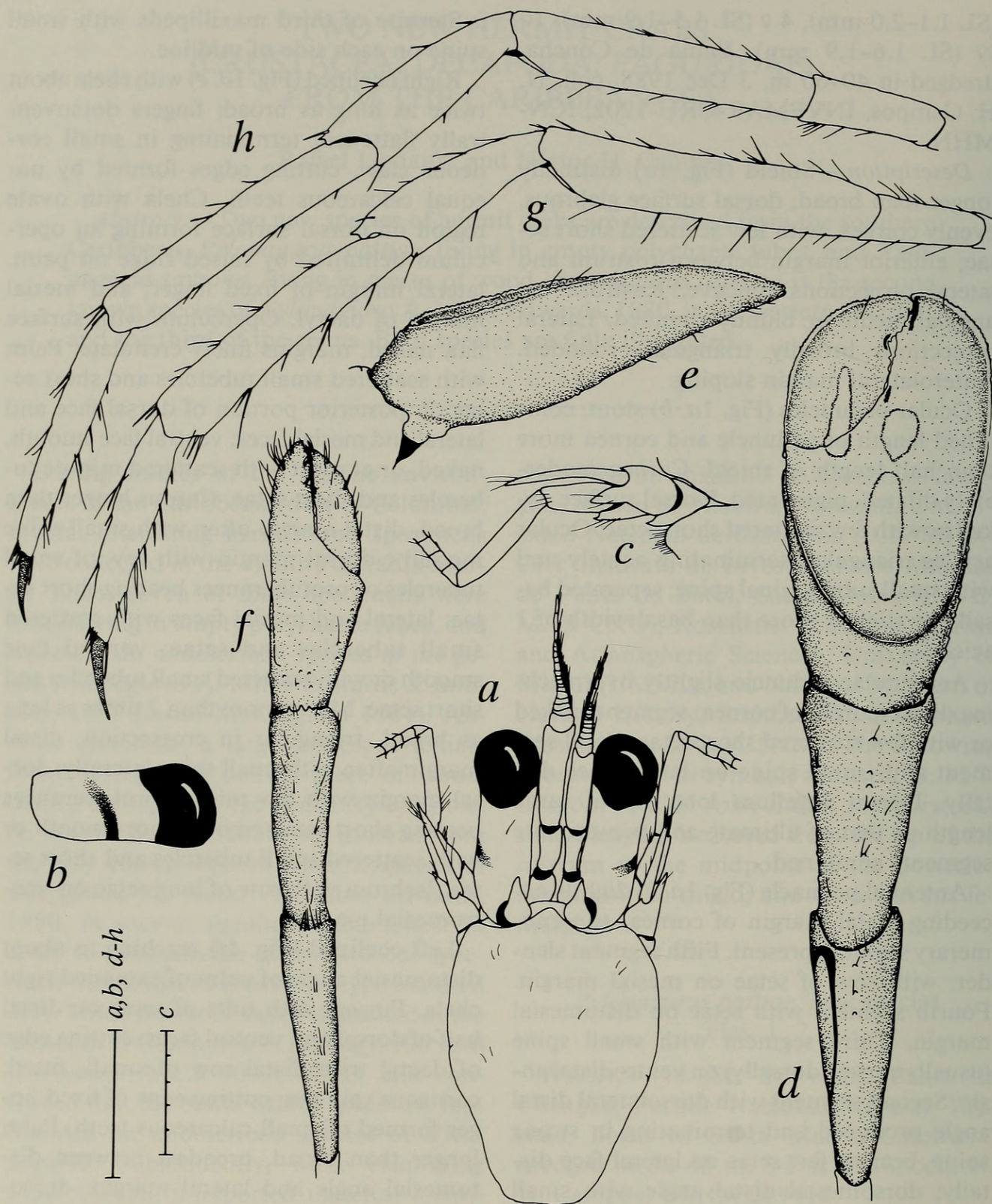


Fig. 1. *Pylopagurus pattiae*, new species. Holotype, USNM 259412: *a*, shield and cephalic appendages; *b*, right eye, lateral view; *c*, left antennal peduncle, lateral view; *d*, right cheliped, dorsal view; *e*, right chela, lateral view; *f*, left chela, dorsal view; *g*, second left pereopod, lateral view; *h*, third left pereopod, lateral view. Scales equal 1 mm (*a*, *b*, *d-h*), and 5 mm (*c*). (Stippled areas in *a*, *b*, and ovals shown on chela in *d*, indicate color pattern.)



lateral and ventral faces smooth, or at most with scattered setae. Merus triangular in cross-section, with row of bristles on dorso-distal margin; dorsal margin with row of setae; mesial, lateral and ventral faces smooth, or at most with scattered setae. Ischium with row of long setae on ventromesial margin.

Ambulatory legs (second and third pereopods; Fig. 1g, h) similar from right to left, usually not exceeding extended right cheliped, or at most overreaching right cheliped by length of claws of dactyls; mesial and lateral faces of segments naked. Dactyls about same length as propodi, terminating in long, slender corneous claw; dorsal margin with row of long setae and bristles; ventral margin armed with 5–8 long, slender corneous spines (including spine at base of claw). Propodi with row of setae on dorsal margin, and dorsodistal row of bristles; ventral margin with row of long, slender corneous spines and long setae, and row of bristles on ventrodistal angle. Carpi with small dorsodistal spine, dorsal row of setae and few bristles; ventral margin with 1 or 2 long bristles. Meri and ischia with row of setae and some bristles on dorsal and ventral margins.

Sternite of third pereopods (Fig. 2b) with anterior lobe subovate, setose. Sternite of fourth pereopods with cluster of capsulate setae. Sternite of fifth pereopods with pair of capsulate setae.

Fourth pereopods with inconspicuous preungual process at base of claw.

Abdomen straight (Fig. 2a), tightly fitting into tube housing. Uropods and telson symmetrical. Telson (Fig. 2c) with lateral margins of posterior lobes evenly rounded (often nearly sub-semicircular), each ending posteriorly in strong spine; posterior lobes separated by shallow median cleft, with terminal margins oblique and each armed with 2–3 unequal sharp or blunt spines.

Females with 15–40 eggs about 0.4 mm in maximum width.

*Color* (Fig. 1a, b, d).—In life, general col-

oration orange. Ocular peduncles with light orange band at about midline. Cutting edges of fingers orange. Operculum of right chela with three longitudinally ovate white spots with orange outlines, as follows: two medially on palm and base of fixed finger respectively, and one medially on base of dactyl and extending slightly on palm. Capsulate setae on sternite of fourth pereopods yellow.

*Habitat*.—Found living in corneous, semi-transparent tubes (Fig. 2a) built by polychaetes of the genus *Hyalinoecia*, family Onychidae. The tubes inhabited by the specimens have one opening slightly larger than the other, and range in length from 25 to 28.5 mm. The tube openings range in diameter from 1.6 to 1.9 mm (larger openings), and from 1.1 to 1.3 mm (smaller openings).

*Distribution*.—So far known only from the Bays of Chengue and Cinto, north of Santa Marta, on the Caribbean coast of Colombia; 20–60 m.

*Etymology*.—The specific name is derived from “Pat,” a friendly version of Dr. Patsy A. McLaughlin’s first name, and is given in recognition of her many contributions to hermit crab systematics in general and the *Pylopagurus*-group of species in particular.

*Remarks*.—This species most closely resembles *Pylopagurus discoidalis* (A. Milne Edwards, 1880), a species distributed from the Lesser Antilles to North Carolina (Provenzano 1963). A. Milne Edwards & Bouveret (1893:79) and recently Williams (1984:227), have suggested that the large chela of *P. discoidalis* is initially elongate, but becomes more discoidal with age. *Pylopagurus pattiae* differs from *P. discoidalis* most significantly in the shape and armature of the dactyls, propodi and carpi of the ambulatory legs. In *P. pattiae* these segments all are moderately long and narrow (lateral view), whereas they all are short and broad in *P. discoidalis*. Although the ventral margins of the dactyls each carry a row of corneous spines in both species, the dorsal margins



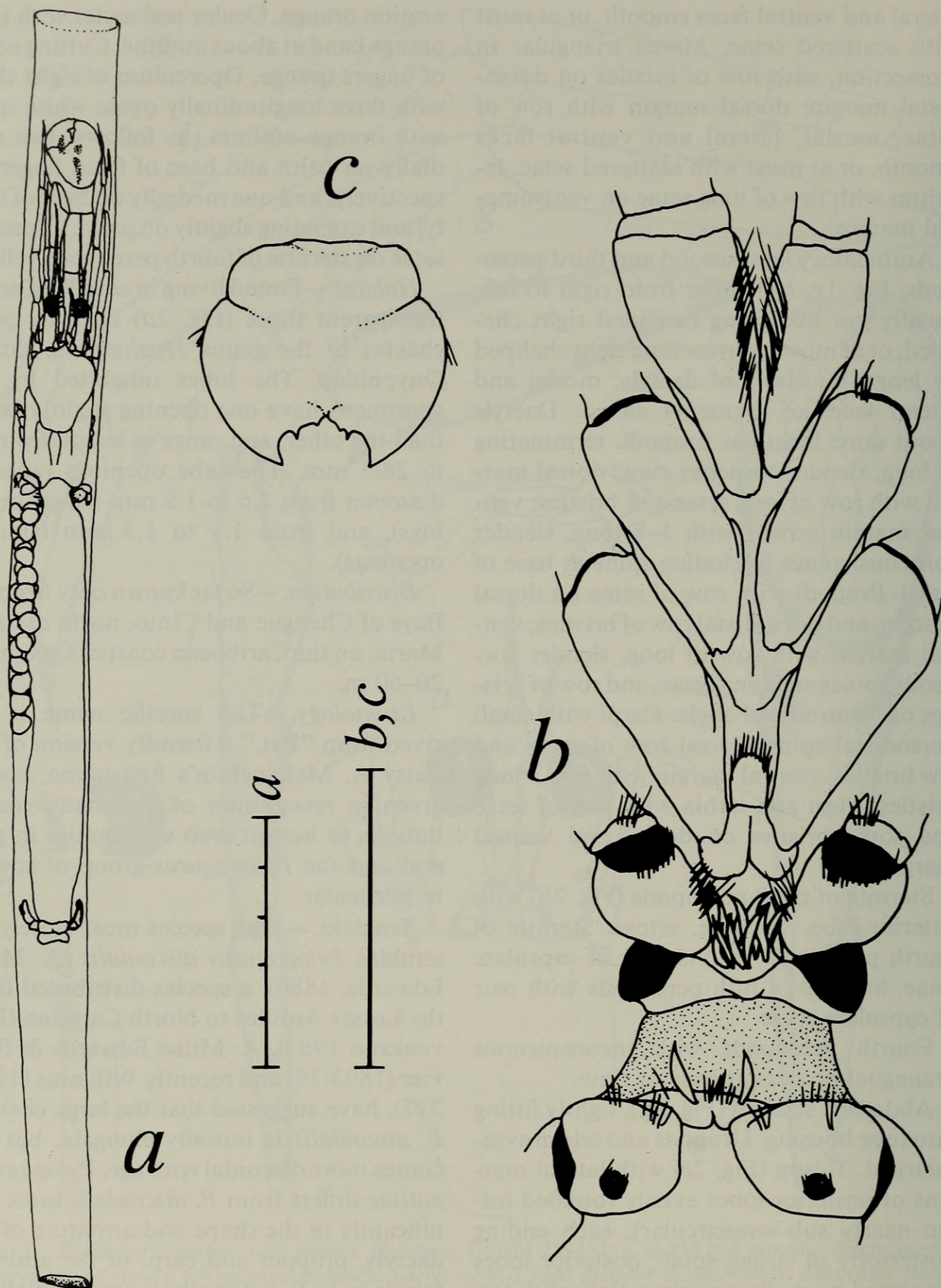


Fig. 2. *Pylopagurus pattiae*, new species. *a*, ovigerous female (SL 1.8 mm) shown inside polychaete tube housing, USNM 251897. *b*, *c*, holotype, USNM 259412: *b*, sternum; *c*, telson, dorsal view. Scales equal 5 mm (*a*), and 1 mm (*b*, *c*).



of the propodi and carpi of *P. discoidalis* are each armed with one or two rows of spinules or small spines. With the exception of the dorsodistal carpal spines, these surfaces are unarmed in *P. pattiae*. The ocular peduncles of *P. discoidalis* are nearly twice as broad at the base of the cornea as the peduncular base, and the corneae are strongly dilated. In *P. pattiae* the ocular peduncles are nearly uniform in breadth over their entire length and the corneae are only slightly dilated. The general shape of the telson in both species is similar; however, the new species has only two or three spines on the terminal margins, whereas *P. discoidalis* has several more. The color patterns of the right cheliped in particular, also differ. This chela in *P. discoidalis* is basically white with a band of red or reddish-orange on the dactyl and fixed finger, and irregular bands on the palm. The extent of pigmentation on the palm is variable. In the new species, the base color of the chela is orange with ovate patches of white rimmed with orange on the palm, fixed finger and dactyl. *Pylopagurus discoidalis* most commonly occupies shells of *Dentalium* spp., whereas *P. pattiae* has only been found living in corneous, semi-transparent tubes built by polychaetes of the family Onychidae (*Hyalinoecia* sp.).

*Xylopagurus tayrona*, new species

Figs. 3–5

*Holotype*. — ♀♀ (SL 11.9 mm), Punta Gayra, Bahía de Santa Marta, Colombia, 118 m, from trap and living inside of a bamboo-like piece of wood, Feb 1984, coll. Octavio Galvis, USNM 251902.

*Paratypes*. — 1 ♀ (SL 15.5 mm), 12°27'N, 69°51'W, 0–5648, 229 m, 2 Oct 1965, UMML 32:4996. — 26 ♂ (SL 3.0–12.3 mm), 15 ♀ (SL 2.5–5.8 mm), 1 ♀♀ (SL 9.0 mm), 11°22'N, 73°44'W, P-783, 174 m, 31 Jul 1968, USNM 265141, 265142. — 1 ♂ (SL 14.4 mm), 11°6.7'N, 74°30'W, O-4844, 183 m, 17 May 1964, UMML 32:4995. — 1 ♀ (SL

13.0 mm), 11°5.2'N, 64°45'W, P-722, 91 m, 21 Jul 1968, USNM 265143.

*Description*. — Shield (Fig. 3a) distinctly longer (about 1.4 times) than wide, evenly convex. Dorsal surface glabrous except for few scattered minute pits and tufts of setae; with short, low dorsal ridge posterior to rostrum, and small, shallow depressed region posterior to each lateral projection. Rostrum subtriangular, slightly exceeding lateral projections. Anterior margin nearly straight. Lateral projections broadly subtriangular. Anterolateral margins sloping, with distinct indentation on distolateral angle. Accessory calcified portions of carapace partially fused to shield (see Fig. 3a). Branchiostegite with narrow calcified portion adjacent and parallel to *linea anomurica*; anterior margin rounded, setose. Posterior carapace with dorsal surface well calcified medially.

Ocular peduncles stout, combined length of peduncle and cornea about half length of shield; cornea dilated. Ocular acicles (Fig. 3a, b) developed as broad ovate plate armed marginally with 13–14 small spines (10–12 in small specimens, SL ≤ 3.0 mm); separated basally by about basal width of 1 acicle.

Third maxilliped with ischium (Fig. 3e) having well developed crista dentata and strong accessory tooth.

Antennular peduncle reaching to about distal margin of cornea. Ultimate segment about 2.4 to 2.8 times as long as broad. Ultimate and penultimate segments subequal in length, with scattered setae. Basal segment with ventrodorsal spine, and setose lobe on lateral face proximally. Dorsal flagellum long, about twice as long as ultimate segment; ventral flagellum usually with 12 articles.

Antennal peduncle (Fig. 3a, c, d) not exceeding distal margin of cornea, supernumerary segment present. Fifth segment with long setae on lateral margin. Fourth segment with scattered setae dorsally, and short transverse row of long setae on ventral face



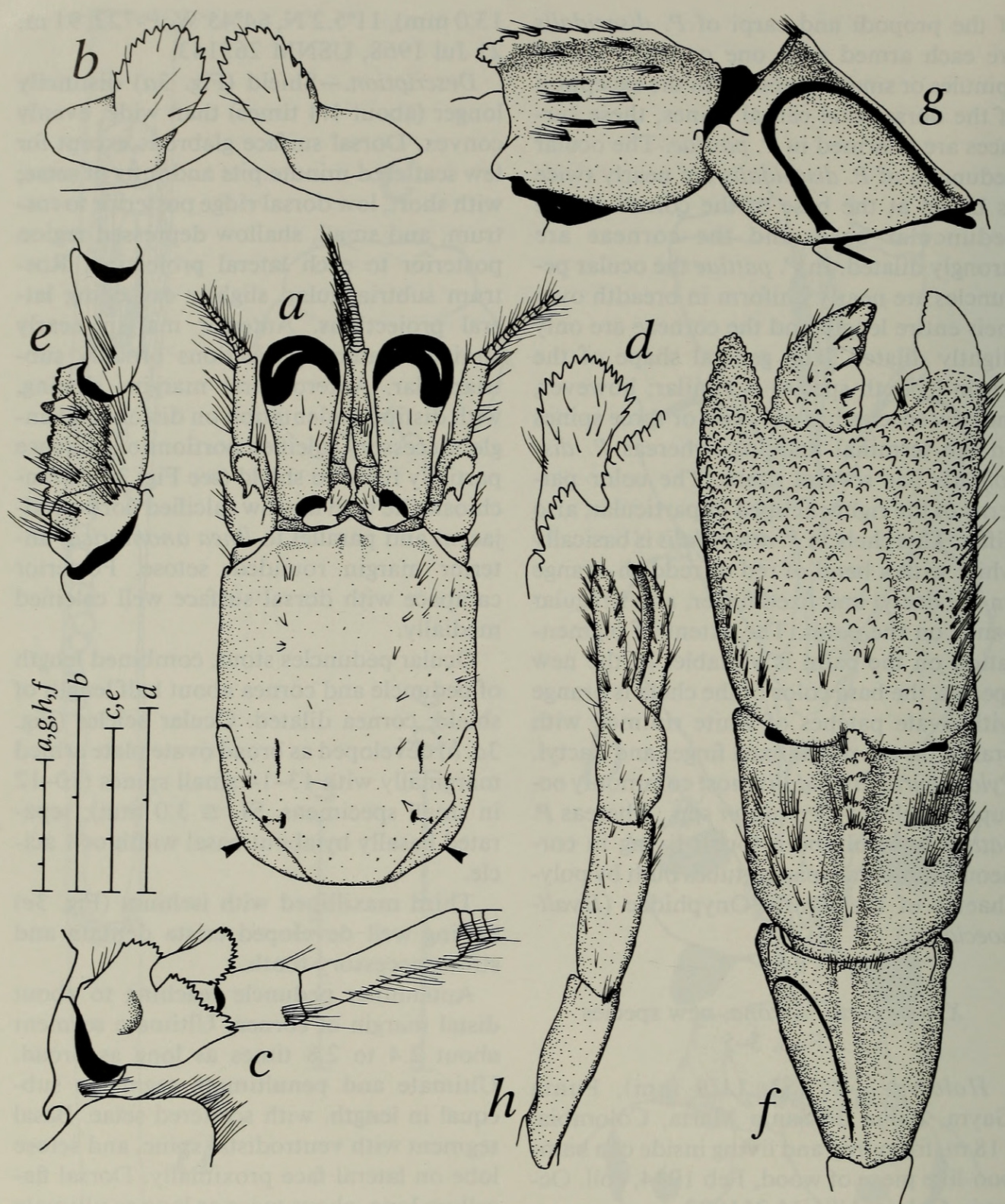


Fig. 3. *Xylopagurus tayrona*, new species. Holotype, USNM 251902: *a*, shield (arrows indicate accessory calcified portions of carapace) and cephalic appendages; *b*, ocular acicles, dorsal view; *c*, right antennal peduncle, lateral view; *d*, right antennal acicle, dorsal view; *e*, basis, ischium, and merus of left third maxilliped, external view; *f*, right cheliped (tip of fixed finger reconstructed); *g*, merus and carpus of same, mesial view; *h*, left cheliped. Scales equal 5 mm (*a*, *g*, *h*, *f*), 2 mm (*b*), 3 mm (*c*, *e*), and 2 mm (*d*).



distally. Third segment with blunt ventrodistal angle. Second segment with distolateral angle developed as very broad subrectangular projection armed with 12–15 small spines on distal margin (8 spines in small specimens  $SL \leq 3.0$  mm); mesial margin with dorsodistal angle armed with 7–8 small spines (4 in small specimens  $SL \leq 3.0$  mm). First segment unarmed, with tuft of setae on lateral face. Acicles short, broad, straight, terminating in fan-like distal margin armed with 14–16 small spines (elongate and with 4 small spines in small specimens  $SL \leq 3.0$  mm). Flagellum reaching to about midlength of right chela, densely setose, each article with up to 10 short and long setae.

Chelipeds markedly dissimilar. Right cheliped (Fig. 3f) strong, massive. Fingers each terminating in blunt calcareous claw. Dactyl with small tubercles on dorsal surface, and row of tufts of setae parallel to cutting edge; mesial margin with tufts of setae and small tubercles; cutting edge proximally with 1 massive, molar-like calcareous tooth about half as long as dactyl, and distally with 8 small calcareous teeth; ventromesial margin with row of tubercles interspersed with tufts of setae; ventral surface smooth except for scattered tufts of setae. Fixed finger slightly overreaching dactyl; cutting edge proximally with 2 large molar-like calcareous teeth, and distally with 4 small teeth; ventromesial margin with row of tubercles interspersed with tufts of setae. Palm about 1.2 to 1.4 times as long as wide; spiniform dorsomesial projection about  $\frac{2}{3}$  as long as dactyl, with tubercles and spines on dorsal and mesial faces; dorsal surface armed on distal  $\frac{2}{3}$  with numerous tubercles and spines (largest on medial region; tubercles and spines less numerous in small specimens  $SL < 5.0$  mm), smooth and with scattered tufts of setae proximally; dorsomesial and dorsolateral margins each delimited by irregular row of small tubercles or spines; mesial face with numerous small tubercles and spines on distal  $\frac{1}{3}$ ; lateral face convex, with numerous tufts of setae; ventral face

smooth except for scattered small tubercles and tufts of setae. Carpus about as long as wide, triangular in cross-section; dorsal margin distinctly delimited (usually elevated), projecting slightly anteriorly over palm, and armed with series of transverse rows of small tubercles usually bearing setae at bases; dorsolateral and dorsomesial faces with transverse rows of long bristles; ventral face smooth, with scattered tufts of setae. Merus about as long as wide, triangular in cross section, unarmed, with scattered setae.

Left cheliped (Fig. 3h) slender, short, reaching to about distal margin of carpus of right cheliped. Fingers longer than palm, terminating in corneous claws, opposing faces of fingers concave; cutting edges each with row of minute, fused corneous teeth; dorsal and ventral surfaces with numerous tufts of setae. Palm smooth except for scattered setae. Carpus and merus subequal in length, unarmed, with scattered short setae.

Ambulatory legs (Fig. 4a–d) similar from right to left. Dactyls each terminating in corneous claw, with cluster of short bristles near base of claw on lateral and mesial faces; ventral margin nearly straight, usually armed with 30 or more short and long corneous spines (small specimens  $SL \leq 3.0$  mm with as few as 15 spinules); with row of setae dorsally, and 3–4 short oblique rows of setae dorsolaterally and dorsomesially. Ischia, meri, carpi, and propodi unarmed except for row of 4–6 minute spinules on ventral margin of propodus; segments with setae or tufts of setae on dorsal and ventral margins; lateral and mesial faces of segments with scattered setae or with longitudinal rows of tufts of short setae. Sternite of third pereopods (Fig. 4g) narrow, anterior lobe naked, flat, sloping down anteriorly.

Fourth pereopod (Fig. 4e) with dactyl subtriangular, terminating in corneous claw curved laterad, with tufts of setae on dorsolateral and ventrolateral margins, and longitudinal row of strong corneous spinules directed slightly laterad. Propodus strongly produced ventrally; propodal rasp



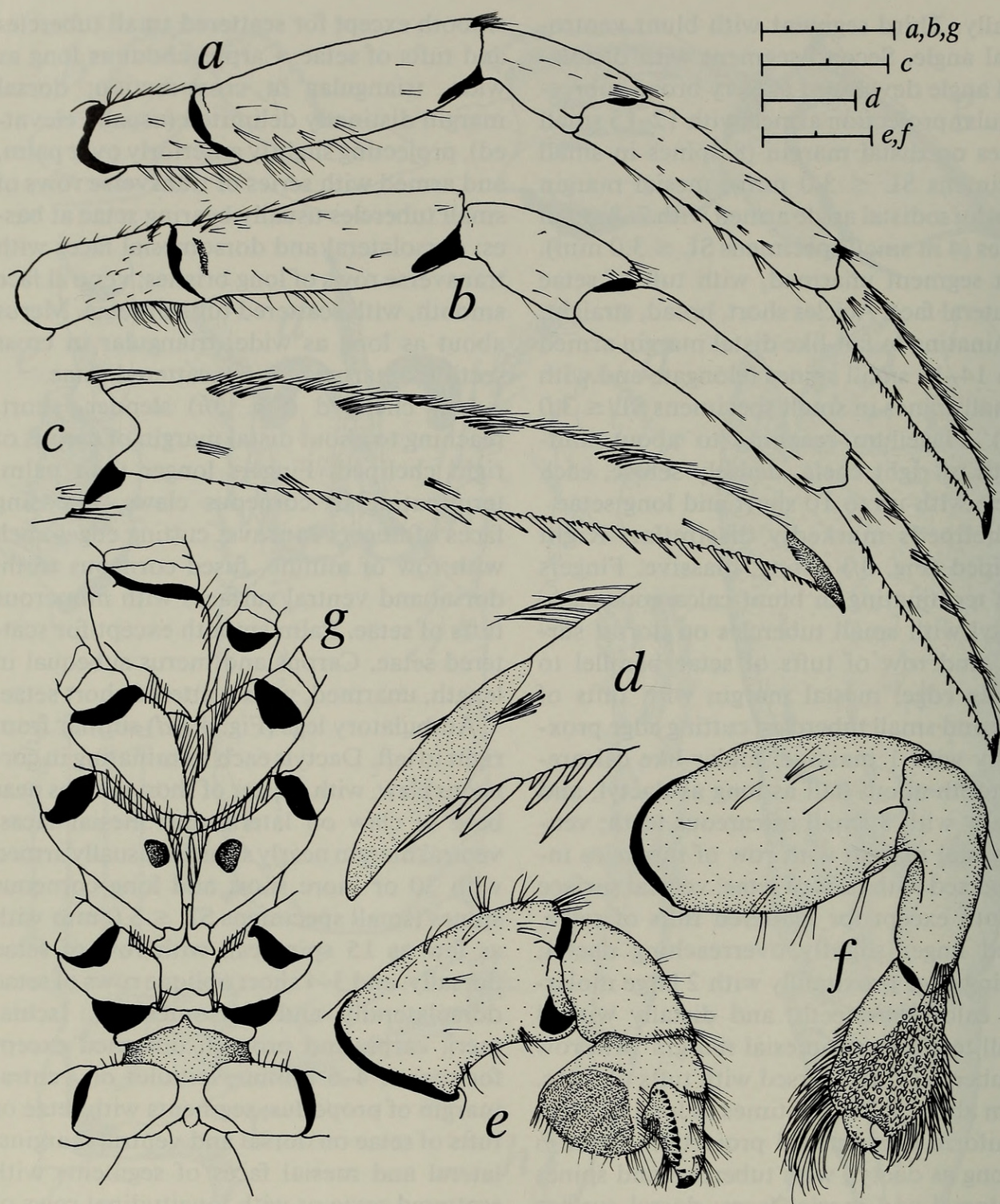


Fig. 4. *Xylopagurus tayrona*, new species. Holotype, USNM 251902: *a*, second right pereopod, lateral view; *b*, third right pereopod, lateral view; *c*, dactyl of right third pereopod, lateral view; *d*, tip of dactyl of left third pereopod, lateral view; *e*, right fourth pereopod, lateral view; *f*, right fifth pereopod, lateral view; *g*, sternum, ventral view. Scales equal 5 mm (*a*, *b*, *g*), 2 mm (*c*), 1 mm (*d*), 2 mm (*e*, *f*).

well developed, occupying subovate area covering nearly half of lateral face of segment and formed of numerous minute scales densely packed and arranged in straight rows

in form of grid. Merus and carpus unarmed, with scattered setae.

Fifth pereopod (Fig. 4*f*) subchelate, with propodus bearing long setae on dorsal and



ventral margin; rasp formed of conical or lanceolate scales. Merus and carpus unarmed, with scattered setae.

Tergite of sixth abdominal somite strongly calcified, operculate (Fig. 5a), with raised crenulate margins bearing evenly spaced tufts of long setae (more separated on anterior margin). Dorsal surface divided into anterior and posterior regions by broad transverse depression; anterior region occupying about  $\frac{2}{3}$  surface of tergite; posterior region directed slightly upwards (planes of surface of anterior and posterior regions forming obtuse angle). Anterior and posterior regions separated laterally by narrow notch. Anterior region nearly flat, covered with numerous small, shallow, rounded pits, and often scattered, irregularly-shaped, short grooves; occasionally with pair of small median tubercles near center of operculum. Posterior region covered with numerous small, shallow, rounded pits; with median longitudinal furrow not reaching posterior margin of tergite, and usually with 1 or 2 small tubercles on each side near posterolateral angle; with broad, depressed, triangular region basally encompassing nearly entire posterior margin, and with blunt apex in advance of anteriormost point of median furrow.

Telson (Fig. 5b, c, d) not visible in dorsal view of abdomen, more than 2 times as broad as long. Lateral margins with tuft of short setae near distolateral angle. Dorsal surface with 3 depressions (2 deep lateral, and 1 shallow median). Posterior margin divided into very broadly rounded lobes by shallow (sometimes inconspicuous) cleft, and armed with small, mostly blunt spines with corneous tips.

Uropods (Fig. 5b) symmetrical. Protopod robust, dorsal face flattened; posterodorsal margin corneous, proximally with broad triangular and subrectangular teeth, and row of tufts of long setae; ventrodistal angle produced into prominent blunt spine with row of setae laterally. Rasp of endopod and ex-

opod formed of strong conical and lanceolate scales; endopod with small denticles on anterior margin; rasp of exopod occupying almost entire surface of lateral face, scales stronger and more spaced proximally.

Male with paired first and second pleopods modified as gonopods; first pleopod 1-segmented, curved anteriorly, with long dense setae distally; second pleopod 3-segmented, distal segment directed anteriorly and long setae distally. Female with biramous unpaired left second to fourth pleopods; eggs about 1.8 mm in diameter.

*Etymology.*—The specific name is given in honor of the Tayrona indians, whose descendants still populate the coastal mountain range of the Sierra Nevada de Santa Marta.

*Distribution.*—Southern Caribbean Sea, from Venezuela and Colombia; 91 to 229 m.

*Remarks.*—*Xylopagurus tayrona* can be separated most readily from the only other known western Atlantic species of the genus, *X. rectus*, by the armature of the dactyls of the ambulatory legs, and the shape of the operculate tergite of the sixth abdominal somite. In *X. tayrona* the dactyls of the ambulatory legs are armed with 30 or more corneous spines, whereas in *X. rectus* there are at most six spines. In *X. tayrona*, the tergite of the sixth abdominal somite is nearly flat on the anterior half, and the lateral margin of the anterior region is separated from that of the posterior region by a narrow notch. In contrast, the tergite of the sixth abdominal somite of *X. rectus* is very uneven on the anterior region, with irregular ridges, pits, and a distinct median longitudinal groove with raised margins; and the lateral margin of the anterior region is separated from that of the posterior region by a broad rounded notch.

*Xylopagurus tayrona* most closely resembles the eastern Pacific *X. cancellarius* Walton, 1950. Similarities between the two species are evident in the massive right cheliped with a triangular carpus, the development



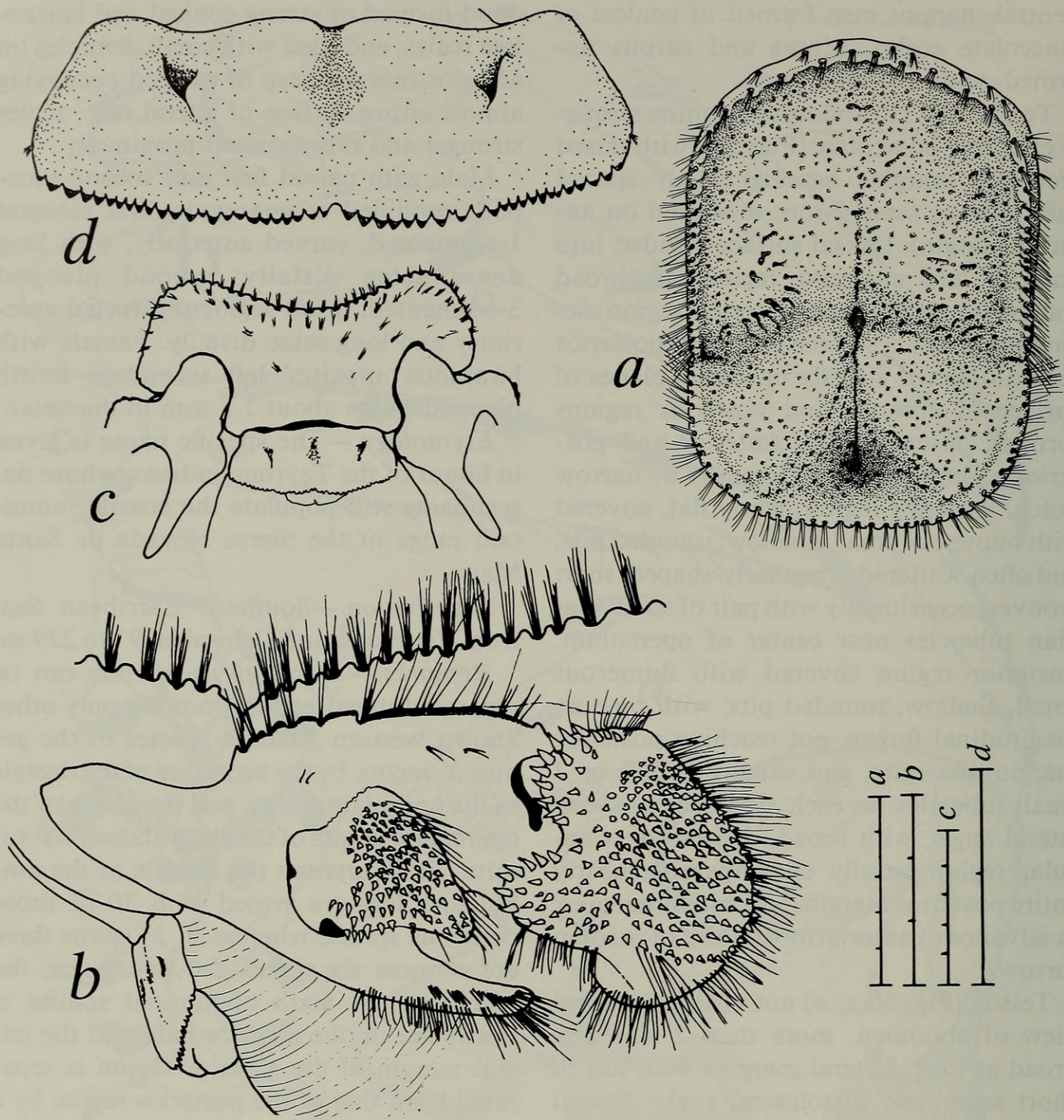


Fig. 5. *Xylopagurus tayrona*, new species. Holotype, USNM 251902: *a*, operculate tergite of sixth abdominal somite, dorsal view (figure by Molly K. Ryan); *b*, left uropod and margin of tergite of sixth abdominal somite, lateral view (left side of figure is posterior region); *c*, posterior portion of tergite of sixth abdominal somite and telson, ventral view; *d*, telson. Scales equal 5 mm (*a*), 3 mm (*b*), 5 mm (*c*), and 2 mm (*d*).

of a fan-like terminal margin on the antennal acicles, the dense setation of the antennal flagella, and the armature of the ventral margin of the dactyls of the ambulatory legs. However, *X. tayrona* lacks the two pairs of prominent central, conical protuberances present on the tergite of the sixth abdominal somite of *X. cancellarius*.

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UMML, is gratefully acknowledged. Molly K. Ryan prepared Fig. 5a. This study was possible, in part, thanks to a Short-Term Visitor travel grant awarded to one us (NHC) by the Office of Fellowships and Grants, Smithsonian Institution, during the summer of 1992. Thanks are also extended to P. A. McLaughlin, for comments on an earlier version of the manuscript; and K. Fauchald and J. J. A. Laverde, for the name of the polychaete.

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