

## *Axiopsis caespitosa* (Thalassinidea, Axiidae), a new species from the Pacific coast of Colombia

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*Axiopsis (Axiopsis) caespitosa* is a new species of the Axiidae from the Pacific coast of Colombia, South America. It has a carina on the carapace behind the cervical groove but is typically axiopsid. One specimen, the female holotype, was trawled in 90 m and is deposited in the Smithsonian Institution, Washington, D.C. The species appears to be the Pacific analogue of the Atlantic species *A. (A.) hirsutimana*. Differences are fewer spines on the median carina, on the rostrum, and at the transverse suture of the outer uropod, as well as two groups of three spines just behind the cervical groove. Several species of axiid named *Calastacus* are referred to the genus *Axiopsis* in view of a strict definition of the former.

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*Axiopsis (Axiopsis) caespitosa* est une nouvelle espèce d'Axiidae de la côte Pacifique de Colombie, en Amérique du Sud. L'espèce porte une carène sur la carapace, derrière le sillon cervical, mais elle est typiquement axiopsid. Un spécimen, l'holotype femelle, a été capturé à la drague à 90 m et déposé au musée Smithsonian, à Washington D.C. Cette espèce semble être l'analogue de l'espèce de l'Atlantique *A. (A.) hirsutimana*; elle s'en distingue par la présence d'un plus petit nombre d'épines sur la carène médiane, sur le rostre et à la suture transversale de l'uropode externe, et par la présence de deux groupes de trois épines juste derrière le sillon cervical. Plusieurs espèces d'Axiidés classifiées dans le genre *Calastacus* sont transférées au genre *Axiopsis*, suite à une définition plus stricte du genre *Calastacus*.

[Traduit par le journal]

### Introduction

Among eastern Pacific genera of the family Axiidae (decapod crustaceans sometimes called 'mud lobsters'), *Axiopsis* is generally considered to be from more shallow areas (9–130 m; Squires 1977) than *Calastacus* (293–1220 m). The present species from the Pacific coast of Colombia, South America, in accordance with this supposition, is also from a depth of only 90 m.

One specimen, the holotype, a female 29 mm in C1 (75 mm in total length) (Fig. 1), was taken during exploratory trawling for shrimp on the muddy slopes of the Colombian shelf off Rio San Juan del Sur on the 16th of February 1971. The net used by the multipurpose, 33-m, stern-trawler CHOCO was a semiballoon shrimp trawl with a footrope of 30 m and doors weighing 250 kg each.

A small quantity of a commercial shrimp species, *Solenocera agassizi*, was also present in the catch at Station 520 (Estevez et al. 1971).

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<sup>2</sup>Measurement of C1 from the orbit to posterior edge of carapace in the midline dorsally.

### Family Axiidae

#### *Axiopsis (Axiopsis) caespitosa* new species

The holotype (USNM No. 172265), a female 29 mm C1<sup>2</sup> and 75 mm total length from off Rio San Juan del Sur, Colombia, is deposited in the United States National Museum of Natural History, Smithsonian Institution, Washington, D.C.

#### Material Examined

Off Rio San Juan del Sur, Pacific coast of Colombia, South America, Lat. 02°26' N, Long. 72°28' W, 90 m; 16 February, 1971; CHOCO Station 520; one female (the holotype; Figs. 1–3), 29 mm C1.

#### Description

Rostrum short, exceeded by eyes (Fig. 2); laterally with four spines on left and four on right, unpaired; also many lateral plumose setae; tip depressed slightly.

Carapace divided into two portions by the cervical groove. Anterior or gastric portion with five low, longitudinal carinae, each with a few or several sutured<sup>3</sup> spines directed forward as follows.

<sup>3</sup>Sutured means with basal crease and possibly moveable.

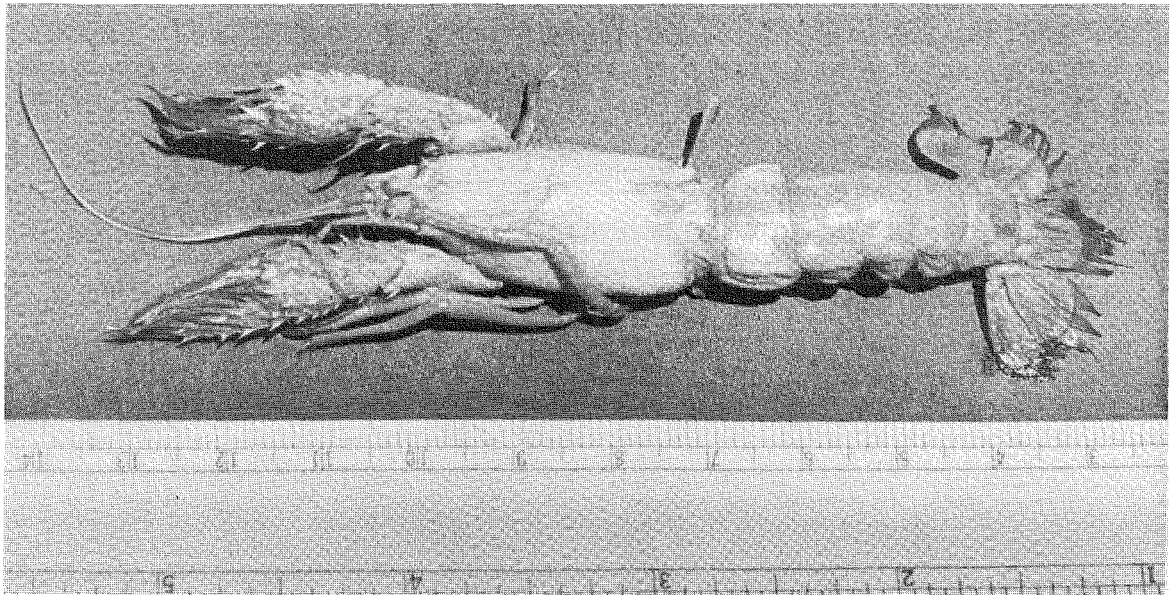


FIG. 1. *Axiopsis (Axiopsis) caespitosa* new species. Photograph of holotype, a female 29 mm C1, total length 75 mm.

Median carina continued a short distance out on the rostrum and forming a low ridge at its base. A depression on each side of this ridge continues laterally in short arcs, extending towards lateral carina on each side. Two spines anteriorly close together on this carina followed by a third separated from them. Behind the three spines at about anterior third is a low, rounded protuberance with a sutured centre. Rest of carina a low ridge almost reaching the cervical groove (Fig. 2). Medirolateral carinae with four spines and interspersed tufts of setae paired with four spines and four tufts in right carina, but one extra spine, unpaired, in left just ahead of second anterior spine (Fig. 2). Lateral carinae continuous with lateral edges of rostrum, intervening ridge with setae but no spines. In left lateral, three spines are paired with three in right lateral carinae but separated posteriorly from four in left and three in right, smaller and unpaired.

Laterals and mediolaterals do not reach the cervical groove. Also between median and mediolateral carinae surface is smooth with few setal tufts, but between mediolaterals and laterals are low granulations, most with a central seta (Fig. 2). Anteriorly on the carapace a strong antennal spine (Fig. 2).

Behind the cervical groove, a median trench is followed by a distinct median ridge gradually increasing in height and width to the posterior edge of the carapace. Also behind the groove and close to it are two groups of small sutured spines: three on left and three on right, lateral to the carinae (Fig. 2).

Posterior portion of carapace granulate or covered with numerous low, rounded tubercles, most with a short seta or setal tuft in front and directed forward. Anterior portion almost devoid of such tubercles except anterolaterally a few with many tufted setae (Fig. 2).

#### 1. Abdomen

Abdomen slightly larger at centre, tapering to both ends. Including telson it is 1.63 times as long as carapace. Pleura of first to fifth segments with thin border and toothed edge with lateral spines, some moveable: sixth with one moveable spine anterolaterally; fifth with lateral spines only; anterior three moveable. Dense plumose setae along inner edge of pleura. Terga smooth except for occasional pits with short setae; separated from pleura by ridges with tufts of long setae; lateral faces of pleura with rows of rounded tubercles near distal edges (Fig. 2).

Telson (10 mm long, 9 mm wide) with regular trapezoid pattern of four spines dorsally on short ridges ending with setal tufts (about 10 major tufts and many smaller, bilaterally paired except 1 large in centre). Two large sutured spines on each lateral edge proximally and one small triangular spine at centre of distal edge which has two rows of long plumose setae (one row on a subterminal ridge; Fig. 3).

#### 2. Uropods

Inner branch (10 mm long) with spinous central ridge dorsally (with five large sutured spines, one

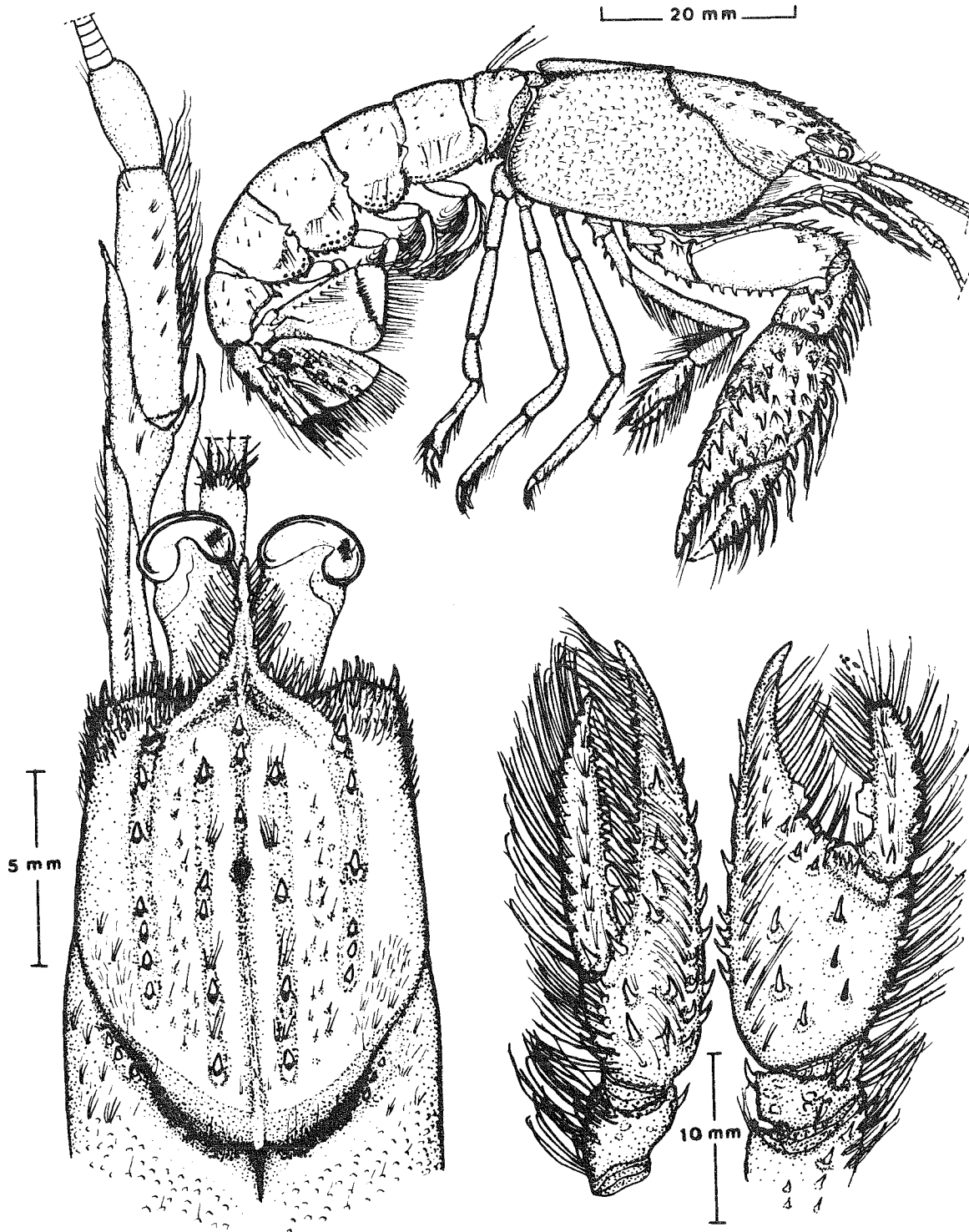


FIG. 2. *Axiopsis (Axiopsis) caespitosa* new species. Holotype, female 29 mm C1, right side; anterior portion of carapace, and chelae of first pereiopods.

separated proximally from the others) joined at right angles by short strong ridge between two proximal spines and forming a concave area at inner proximal quarter of uropod. A strong lateral ridge at outer edge with one strong dorsal spine near centre, a series of tufts of long setae and a strong distal spine; distal edge closely fringed with long and short plumose setae (Fig. 3).

Outer branch (11 mm long) with two ribs and a lateral outside ridge; setae in tufts on ridge and between ribs; three small sutured spines at outer edge and two moveable spines (the outer smaller) at the transverse suture. Ten strong spines along forward edge of suture directed posteriorly. Distal edge fringed with long and short plumose setae (Fig. 3).

### 3. Appendages

Eyes subglobular, wider than stalk; about one-third length of ocular peduncle; exceeding tip of rostrum but less than length of first segment of antennular peduncle; faceted and apparently pigmented (most pigment lost in formalin; Fig. 2).

#### *Antennules*

Strong spine at outer edge on distal third of first segment of peduncle; also rows of long circum-plumose setae (plumes surrounding the rachis); flagella equal in diameter: 31 and 39 mm long, tapered and pointed (Fig. 3), outer shorter.

#### *Antennae*

First segment polygonal in ventral aspect, with a strong central (moveable) spine, three fixed spines with setal tufts at inner edge, and one moveable spine at outer edge; protuberance (centrally sutured) on ventral surface (Fig. 3).

Second segment thick with very strong fixed spine (stylocerite) at outer edge and a short, rounded, central, and fused process distally (in ventral aspect; Fig. 3). Scaphocerite attached distally to second segment; modified as a long spinelike process and with a strong fixed inner spine laterally (in dorsal aspect) and a small spine (sutured) at tip; also many circum-plumose setae ventrally. Does not reach end of fourth segment (Fig. 3).

Third segment fused longitudinally and obliquely with second segment, with a very strong inner lateral fixed spine distally (larger than lateral spine of scaphocerite; Fig. 3).

Fourth segment with inner and ventral tufts of circum-plumose setae.

Fifth segment about half as long as fourth, with row of inner laterally plumose setae; flagellum 46 mm long, flattened at tip.

#### *Mandible*

Obtusely pointed, wide and thick incisor blade

with two small cusps at inner edge; horizontal molar process behind it and almost as wide but flat on grinding edge. Mandibular palp with three segments (Fig. 3).

First maxilla as illustrated (Fig. 3).

Second maxilla. Scaphognathite with subterminal seta proximally (Fig. 3).

First maxilliped as illustrated (Fig. 3).

Second and third maxillipeds. Podobranchs attached proximally to epipods (with mastigobranch). Ischium of third with 'crista dentata' along inner edge comprising 15 teeth, the distal 3 forming an extension (Fig. 3). Many circum-plumose long setae laterally on all segments, also some laterally plumose setae.

First pereiopods. Chelae large, unequal, both covered with large mostly fixed spines directed forward on both sides and along edges; outer faces also covered with long circum-plumose setae (spines: 14 on left, 17 on right on outer faces); setae longest on fingers and all in small or large tufts directed forward (Fig. 2 shows inner faces or palms of chelae).

Right chela larger: 26 mm long, 12 mm wide, 8 mm thick. Dactyl with tip broken away in specimen. Palm with three pairs of large spines; outer margin of propodus with raised row of large spines; tufts of nonplumose setae extend in a row along outer edge of propodus to tip of finger (more closely spaced on finger). On propodus at junction with dactyl is a short rounded ridge with six large spines, two largest near the dactyl. Toothed edge of propodus with five small rounded molarlike teeth and one large flat-topped molar with two cusps followed by sharp serrate series almost to tip. Also one large flat-topped molar on dactyl. Carpus short, five strong spines and six small, sutured, with tufted setae on upper surface. Merus laterally compressed, wide, with border above and three large spines (sutured) and setal tufts distally; also two rows of fixed spines below, one with four large and the other with six small, with accompanying row of long circum-plumose setal tufts. Ischium with two rows of three spines each below, the inner stronger; fused with basis which has one large spine below. Autotomy point at fusion of basis and ischium forming a projection which locks against process from coxa (Fig. 2).

Left chela smaller: slender, 28 mm long, 8 mm wide, 5 mm thick; finger of propodus exceeding dactyl by 3 mm. Palm with two pairs of spines and row of setal tufts, long and nonplumose, along edge of finger almost to pointed tip; also two rows of 12 strong spines along outer edge. Short rounded ridge at junction with dactyl with one large spine only. Large spinelike teeth on finger interspersed with

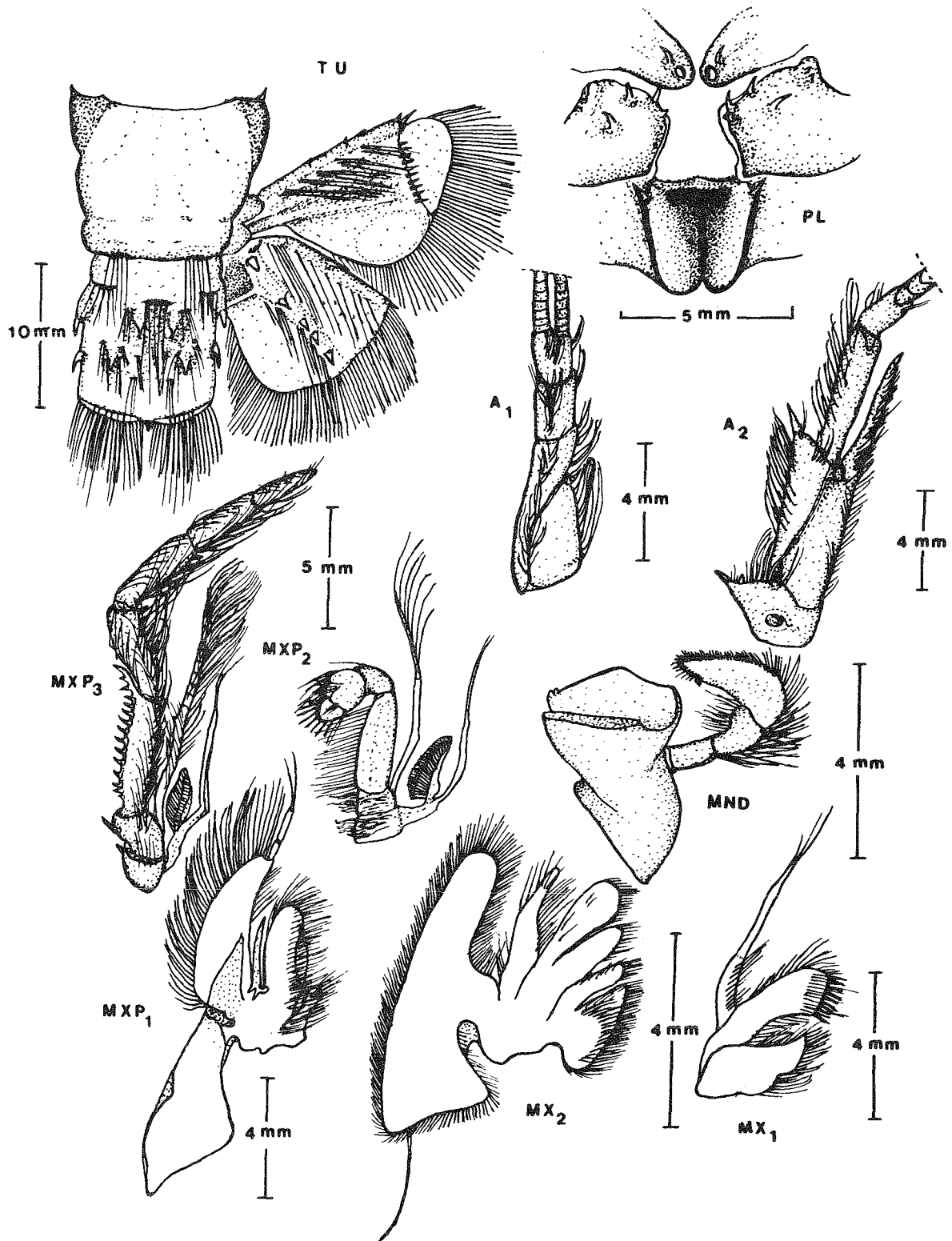


FIG. 3. *Axiopsis (Axiopsis) caespitosa* new species. Details of appendages: TU, telson and uropods; PL, sternal plaque of fourth pereiopods; A<sub>1</sub>, antennule; A<sub>2</sub>, antenna; MND, mandible; MX<sub>1</sub>, first maxilla; MX<sub>2</sub>, second maxilla; MXP<sub>1</sub>, first maxilliped; MXP<sub>2</sub>, second maxilliped; MXP<sub>3</sub>, third maxilliped. Scales for most at right of drawing.

shorter ones; on dactyl teeth are spinelike and even, decreasing in size toward tip. Dactyl densely covered with tufts of circum-plumose setae along nontoothed edge which has five large spines. Carpus with eight large fixed and five small sutured spines anteriorly. Merus similar to right but with eight small and five large spines in two rows below. Other segments of pereopod similar to right (Fig. 2).

Second pereopods. Chelae equal; slender; slightly compressed; laterally double rows of long nonplumose setae (mostly below except on chelae and at distal end of merus); merus with four large spines, and ischium with three large spines below (Fig. 2).

Third and fourth pereopods similar to each other, the third slightly longer.

Fifth pereopods subchelate; dactyl with oval area on inner face edged with short setae, opposed to an expansion of distal end of propodus with comblike edge of 19 moveable spines.

Coxa of each pereopod has anterolaterally a bunch of long silky setae.

Female gonopores with an accompanying large curved spine on coxae of third pereopods ventrally (Fig. 3).

Sternal plaque of fourth pereopods with one lateral spine on each side anteriorly, and a narrow cleft along centre for most of its length. Coxae of fourth each with arc of four spines, the inner one smallest (Fig. 3).

First pleopods small, uniramous, 4 mm long; with fringing plumose setae.

Second to fifth pleopods biramous, large, foliaceous and with long fringing, laterally plumose setae; endopods with stylamblys (appendix interna) 2 mm long; approximate lengths of basipod, endopod, and exopod of pleopods: 5, 9, and 8 mm, respectively. A thick row of plumose setae along ventral ridge of each segment of abdomen. No anal spine.

4. Size

Total length 75 mm (C1 29 mm), relatively large for genus (De Man 1925).

5. Colour

No trace of original colour after 2 years in forma-

lin in specimen collection at Buenaventura, Colombia.

6. Name Source

Latin for 'tufted' is *caespitosa*, referring to preponderance of tufts of setae on body and appendages.

Discussion

Recent authors (Boesch and Smalley 1972; Saint Laurent 1972; Williams 1974) refer to the inadequacy of the definitions of axiid genera by Borradaile (1903) and De Man (1925), and the need for a revision of the Axiidae. *Calastacus*, especially, had been included in subgenera of *Calocaris* without sufficient reason. Saint Laurent (1972), however, reestablishes this subgenus to full generic status by defining it to include only two species: *Calastacus stylirostris* Faxon, 1893 and *C. laevis* Saint Laurent, 1972. The main characters are a short, unarmed styliform rostrum with only two basal spines, long antennal spines and a middorsal carina that does not reach the posterior border of the carapace (or may be lacking). *Calocaris* Bell, 1853 is also reestablished as a separate genus (Saint Laurent, 1972) with a toothed rostrum, unpigmented eyes, small antennal thorns and a strong middorsal carina reaching the posterior edge of the carapace.

With the redefinition of these genera, the species of Sakai (1967), Miyake and Sakai (1967), Boesch and Smalley (1972), Williams (1974), and possibly others cannot be included in *Calastacus* but should probably be placed in the genus *Axiopsis*. Unfortunately, the definition of *Axiopsis* given by De Man (1925) is self-contradictory with respect to the middorsal carina on the hinder part of the carapace in some species. It states initially that the carina is not present in the genus but mentions three exceptions: *A. habereri*, *A. spinosissima*, and *A. biserrata* (De Man, 1925). In fact, *A. habereri* is included in De Man's (1925) key to the sub-genus under an entry alternative to the featured absence of a carina. It is possible to accommodate the species of the authors mentioned above, as well as the present species, under this entry. The following provisional key is suggested.

KEY TO *Axiopsis* (*Axiopsis*) SPP.

De Man's (1925) entry in the key states: "A sharp median carina extends from the cervical suture to the posterior border of the carapace."

- A<sub>1</sub>. Gastric carinae with only a few spines.....B<sub>1</sub>
- B<sub>1</sub>. Lateral carinae unarmed.....*A. habereri* Balss
- B<sub>2</sub>. Laterals with only a few spines.....C<sub>1</sub>
- C<sub>1</sub>. Laterals with only one spine.....*A. jenneri* Williams
- C<sub>2</sub>. Laterals with more than one spine.....D<sub>1</sub>

D <sub>1</sub> . Laterals with two spines .....	<i>A. amakusana</i> Miyake & Sakai
D <sub>2</sub> . Laterals with three spines .....	<i>A. oxypleura</i> Williams
A <sub>2</sub> . Gastric carinae with several to many spines .....	E <sub>1</sub>
E <sub>1</sub> . Carinae with numerous spines .....	<i>A. spinosissima</i> Rathbun
E <sub>2</sub> . Carinae with several spines, laterals six to seven .....	F <sub>1</sub>
F <sub>1</sub> . Median carina with about eight spines .....	<i>A. hirsutimana</i> Boesch & Smalley
F <sub>2</sub> . Median carina with about three spines .....	<i>A. caespitosa</i> n.sp.

Branchial formula (Table 1) for *A. (A.) caespitosa* is similar to that reported for *A. (A.) hirsutimana* (Boesch & Smalley, 1972), although a podobranch is present on the epipods of the second pereopods (said to be absent in their specimens) and there is a rudimentary epipod on the fifth pereopod. *Axiopsis (Axiopsis) baronai* (Squires, 1977) is different from these species by the absence of an arthrobranch on the second maxilliped and a rudimentary epipod on the fifth pereopod. According to Saint Laurent (1972) the branchial formula for *Calocaris macandreae* is the same as in the present species except for the absence of the rudimentary epipod on the fifth pereopod. *Calastacus laevis* (Saint Laurent, 1972) appears more different in that the podobranchs are all defined as rudimentary (absent on the second maxilliped) and the arthrobranch on the second maxilliped is rudimentary also.

There are many similarities between the present

species and *A. (A.) hirsutimana* (Boesch and Smalley, 1972). Main similarities are: rostrum short, median carina becomes a trench posterior to cervical groove before increasing in height and has rounded protuberance at anterior third, pleura have toothed edges and rows of tubercles distally, and chelae are heavily setose with large spines. On the other hand differences appear to be substantial (Table 2) although the present species is described from a female while the other is described from males only. The two species may, however, be analogous geographic Atlantic-Pacific species such as *Xiphopenaeus kroyeri* and *X. riveti* (Mora, 1972) and *Palaemon (Nematopalaemon) schmitti* and *P. (N.) colombiensis* (Squires and Mora, 1971).

The exploratory fishing in 90 m which obtained the present specimen (Estévez *et al.* 1971) was outside the usual shrimp-fishing area of 5–50 m deep along the Pacific coast of Colombia. In view of the low capability of shrimp trawls to capture

TABLE 1. Branchial formula of *Axiopsis (Axiopsis) caespitosa*

	Maxillipeds		Pereopods				
	2	3	1	2	3	4	5
Exopods	1	1	0	0	0	0	0
Epipods	1	1	1	1	1	1	r*
Podobranchs	1	1	1	1	1	0	0
Arthrobranchs	1	2	2	2	2	2	0
Pleurobranchs	0	0	0	0	0	0	0

\*r = rudimentary.

TABLE 2. *Axiopsis (Axiopsis) hirsutimana* compared with *A. (A.) caespitosa*

Main features showing difference	<i>A. (A.) hirsutimana</i>	<i>A. (A.) caespitosa</i>
Spines in median carina	8	3
"    mediolateral carinae	5, 5	5, 4
"    lateral carinae	6, 7	7, 5
"    laterally on rostrum	6, 6	4, 5
Median carina reaches cervical groove	No	Yes
Spines behind and along cervical groove	None	3 left, 3 right
Abdomen + telson times carapace length	1.25	1.63
Teeth of large chela molarlike	Small	Large
Pairs of spines on large chela	2	3
Spines on outer edge of propodus of slender chela	9	12
Spines laterally on telson, pairs	3	2
Spines at transverse suture of outer uropod	13–15	10

species which burrow deeply in mud, the large area of muddy substrate off this coast, and that three species of axiids have now been reported from this area, it is possible that the use of a grab to sample deep in the mud would obtain more specimens and more species of the family in this area.

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