TWO PELAGIC STAGES OF *STEREOMASTIS PACIFICA* (FAXON)
COLLECTED IN THE CHILE-PERU TRENCH
(POLYCHELIDAE: MACRURA)

With 4 Text-figures

By

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チリー・ペルー海溝で採集された *Stereomastis pacifica* (FAXON)
(センジュエビ科・長尾類) の浮遊幼生期について

挿図 4

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Abstract: Two pelagic stages of the eryonid lobster, *Stereomastis pacifica* (FAXON) from the Chile-Peru Trench are described and illustrated in detail. This is the first description and record of pelagic forms of this species for Chilean waters.

Four species belonging to family Polychelidae have been reported for Chilean waters: *Polycheles chilensis*, *Stereomastis pacifica*, *S. suhmi* and *S. sculpta*. In 1972 the R/V "Thomas Washington", of Scripps Institution of Oceanography, carried out the South Tow Expedition, leg 3 off Chilean coast (23°8.8'S to 37°2.2'S) mainly over the Chile-Peru Trench. Among the material studied, three specimens belonging to eryonid stages of *Stereomastis pacifica* (FAXON) were collected. The interest in describing these types of pelagic stages lies in the infrequent descriptions of Polychelidae pelagic forms. Early megalopal forms and juvenile stage are described and illustrated in detail.

Materials and Methods

The material was obtained with an IKMT, aboard the R/V "T. Washington" (S.I.O.) and the locations of stations are shown in Table 1. The specimens were indentified as *Stereomastis pacifica* (FAXON) and they correspond to two pelagic stages of 12 mm and 34 mm of carapace length respectively. The smaller corresponds with a megalopal

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Table 1. Locations of analyzed material

Material	Specimens	Station	Date	Position
Megalopal form	2	10 MV	10. 4. 72	27° 4,5' S ; 71° 43,0' W
Early juvenile stage	1	23 MW	20. 4. 72	24° 14.8' S ; 71° 22,4' W

form and the larger with an early juvenile stage. The larvae were dissected under stereoscopic microscope and their appendages were drawn with aid of camera lucida, previous staining with Methylene Blue.

Results

Both pelagic stages observed show advanced morphological features and their appendages functional.

Megalopal form

Carapace length, 12 mm; carapace width, 11 mm. Carapace slightly longer than wide, globulous (Figs. 1A, B). Surface glabrous, ungranulose, only with spines, distributed according to following formula: medial dorsal carina spine formula 1-2-1-C-2-2-1-2; supra lateral carina (on posterior half of carapace) with 4 spines and 12 along the lateral carina; 5 spines fringe the posterior half of carapace inferior border (Figs. 1A, B). Orbitocervical line with 3 minute spines. Rostral margin rounded, strongly downward curved, with poorly developed eyes (called ophtalmopods, BATE, 1888).

Antennule (Fig. 1C) biramous: inner flagellum with 7 segments (setal formula 0-0-3-3-4-3-4) and the outer with 12 segments (0-2-6-0-8-0-7-0-7-4-7-4). Basal article of peduncle, inflated, with 3 stout spines which length (except for the central one) reach the proximal margin of the peduncular article; the outer apparently should correspond to stylocerite or antennular scale; it is possible to distinguish the statocyst inside the basal segment and its opening near the base of medial spine.

Antenna (Fig. 1D) uniflagellate, 13 segmented (0-0-0-3-6-8-0-6-7-7-4-7-3). Basal article of antennal peduncle with an elongate, slender and upcurved phymacerite; a scaphocerite rises on outer margin, four times longer than wide, over reaching the second antennal segment in length. Inner margin of third article of peduncle armed with a short spine.

Mandible (Fig. 1E) with palp 3 segmented, setose on central and distal segments; basal segment glabrous. Second segment with a longitudinal groove on outer margin. Cutting edge of powerful mandibular plate armed with 13 strongly chitinized teeth.

Maxillule (Fig. 1F) with endo and exopodite curved inward, similar in length. Endopodite with 22 denticulate setae, grouped in 8 setae on proximal portion and 14 on

Fig. 1. *Stereomastis pacifica* (FAXON). Megalopa. A, dorsal view; B, lateral view; C, antennule; D, antenna; D₁, ventral view of phymacerite; E, mandible; F, maxillule; G, maxilla; H-J, first to third maxilliped. Bar scales=500 μ , except for G.

distal end. Exopodite with 21 denticulate setae, most fringing the outer margin.

Maxilla (Fig. 1G): endopodite trilobed, setose, one third the scaphognathite length. The latter, largely oval and fringed with numerous plumose setae.

First maxilliped (Fig. 1H): exopodite slightly curved inward, notched on distal end. Endopodite slender, bisegmented, setose on margins. Protopodite broad, setose on proximal border. An ovoid, flattened epipodite emerges from base of protopodite, fringed with setae on proximal outer third. Epipodite 1.5 times the exopodite length.

Second maxilliped (Fig. 1I): strong protopodite indistinctly segmented from which a short endopodite grows on inner margin. Exopodite 3 segmented, with first segment very wide; tip of third segment acuminate.

Third maxilliped (Fig. 1J): similar to second, with a short endopodite emerging from protopodite; a minute spine on outer margin of protopodite, near the base of exopodite. Exopodite 5 segmented, profusely setose on each segment.

Chelipeds (Fig. 2A) elongate, slender, smooth, longer than carapace. Fingers 1.3 times longer than palm, with minute cutting plates along inner margins (Fig. 2A₂); fingers slender, crossing only at tips when chela is closed (Fig. 2A₁). Carpus with a tiny, sharp, spine on distal inner margin (not visible in figure). Outer margin of merus armed with 3 tiny spines. Basischium joint with a small arthrobranch. Coxa with 3 spines near the junction of basis, with a developed pinnate podobranch attached to proximal margin.

First walking leg (Fig. 2B) chelate, setose, palm and fingers with no spines on surface. Carpus with 3 elongate, slightly curved and stout spines on outer margin. Merus with 4 elongate, stout spines on outer margin, arranged in two pairs. A small spine on inner distal margin of basischium. A little arthrobranch lies near the joint basischium-merus. Coxa with a well developed pinnate podobranch.

Second walking leg (Fig. 2C): chelate and fringed with long plumose setae. Movable finger with two acute spines on tip, unequal in length and one subterminal plumose seta (Fig. 2C₁). Carpus one-half length of palm, with a sharp, slightly curved spine on distal end and long plumose setae near its base. Merus almost four times longer than carpus, with a sharp, slightly curved spine distolaterally; under high magnification it is possible to observe two tiny spines near the base of the spine (not visible in figure). Protopodite with 9 plumose setae; an podobranch is also present.

Third walking leg (Figs. 2D, D₁) also chelate, with movable finger ending in two sharp spines; dactyl acuminate. Carpus one-half the length of palm, with a spine on distal margin. Merus length equal to carpus plus palm; a sharp spine on its distal margin. Basischium and coxa fringed with long plumose setae. There is a well developed podobranch attached to coxa.

Fourth walking leg (Fig. 2E): the only non-chelate and without podobranch attached to coxa. Dactyl ending in four setae, unequal in length. Carpus with three setae on

Fig. 2. *Stereomastis pacifica* (FAXON). Megalopa. A, cheliped; A₁, tip of fingers; A₂, cutting border of finger; B-E, first to fourth walking leg; C₁, D₁, tip of movable finger of second and third walking leg respectively; F, abdomen, lateral view; G, first pleopod; H, second pleopod; I, tip of stylambly. Bar scales as indicated in figure.

distal margin. Basischium with long plumose setae on inner margin.

Abdomen (Fig. 2F): 6 segmented, with slender and biramous pleopods from segment 2 to 5. First abdominal segment with a posterior, middorsal, upright, strong spine and with a knob on postero-ventral margin of pleuron. Second to sixth segments with dorsal spinal formula 1-2-2-2-1 respectively; one strong spine laterally and another smaller on lower third of pleura. Postero lateral border of pleura 2 to 5 denticulate, except for the sixth which has a stout spine on anterior portion. First pleopod (Fig. 2G) uniramous and curved inward. Each inner ramus of pleopods 2 to 4 (Fig. 2H) with stylamblys; tips of second and third stylamblys with 8 cincinnuli (Fig. 2I) and 6 at tip of fourth stylambly. Uropods foliaceous, smooth and only fringed with setae on their borders. Telson with setae on lateral margins, armed with two mid-dorsal backward spines, dissimilar in length; another lateral spine on proximal third; tip ending in an acute spine.

Juvenile Stage

Carapace length, 34 mm; carapace width, 32 mm. Carapace globose, height three quarters the carapace length (Fig. 3B). Middorsal carina spine formula 1-2-1-1-2-C-2-1-2 (Fig. 3A); supralateral carina bearing 6 spines; lateral carina with 13 minute spines on anterior half and 4 longer spines on posterior half (Figs. 3A, B); 6 spines on posterior portion of inferior border. A frontal notch permits observation dorsally of the small ophthalmopods, beneath which the antennae appear (Fig. 3C).

Antennule (Fig. 3D) biramous: short flagellum more than the half of long flagellum in length, each with many segments. Outer plate of basal article (stylocerite) distinct, lanceolate, and fringed with setae on both margins; its length is greater than the flagellar joint.

Antenna (Figs. 3E, E₁) similar in shape to previous megalopal stage. Flagellum multisegmented. Scaphocerite and basal articles of antennal peduncle equal in length.

Mandible (Fig. 3F) profusely toothed on cutting border. Palp with a dense setation on each of three segments, but mainly on distal segment.

Maxillule (Fig. 3G): endo and exopodite more profusely setose than previous stage, and with powerful spines on apical margin of exopodite.

Maxilla (Fig. 3H): endopodite trilobed bearing long and short setae on margins. Scaphognathite fringed with numerous setae; surface bears many small setae.

First maxilliped (Fig. 3I): exopodite broad, with a groove on distal margin and fringed with numerous setae. Endopodite apparently unsegmented, 3/4 the exopodite length and also fringed with numerous setae. The broad protopodite of previous stage is now comparatively reduced. Epipodite broad, greatly developed, setose both on surface and margins, except on a marginal portion, near the distal border.

Second maxilliped (Fig. 3J): indistinctly 5-segmented; 3 strong spines on distal margin of dactylopodite; propodite 2 times the dactyl length, with many setae on distal

Fig. 3. *Stereomastis pacifica* (FAXON) Early juvenile stage. A, dorsal view; B, lateral view; C, orbital portion, dorsal view; D, antennule; E, antenna; E₁, tip of phymacerite, ventral view; F, mandible; G, maxillule; H, maxilla; I-K, first to third maxilliped; L, cheliped. Bar scales=2 mm, except for A and B.

margin ; carpopodite broadly oval, flattened, setose ; ischiomeral portion strongly chitinized, bearing setae covering its surface.

Third maxilliped (Fig. 3K) : 5 segmented and profusely setose along inner margin. Exopodite shorter but stronger than the previous stage. Merus longer than the carpus-propodite and dactilopodite together.

Chelipeds (Fig. 3L) long, slender. Fingers similar in length, crossing on the tips, and longer than palm. Propodite with 2 tiny spines near the joint of fingers. Carpus one half the chela length, with a small spine on outer distal margin (not visible in figure). Merus 2 times longer than carpus, with tiny spines along inner and outer edges.

First walking leg (Fig. 4A) chelate ; fingers similar in length. Chela densely setose but not spiny ; inner margins of fingers with no setae or spines. Carpus with stout and acute spines : 3 on distal joint and 1 on proximal third. Merus large, twice the carpus length, and with 2 enormous, acute spines on distal border and other smaller, stout spines on surface ; outer smaller spines on outer margin. Whole leg profusely setose covering all the surface.

Second walking leg (Fig. 4B) chelate, more slender than previous appendage, surface profusely setose. A sharp spine and another smaller on distal border of merus and carpus respectively. Merus slightly longer than chela.

Third walking leg (Fig. 4C) chelate, more slender than second appendage and profusely setose. Merus and carpus with a sharp spine on distal joint respectively.

Fourth walking leg (Fig. 4D) chelate ; propodite is 3 times longer than the small movable finger. Surface very setose but without spines.

First pleopod (Fig. 4E) uniramous, lanceolate and smooth. Protopodite fringed with 5 finely plumose setae.

Second pleopod (Fig. 4F) biramous ; both rami equal in length and fringed with numerous long setae. Inner ramus with appendix masculina and appendix interna developing as two soft projections, unequal in length.

Abdomen 6 segmented, each with a strong spine dorsally, directed forwardly (Fig. 4G). Borders of segments with sharp spines as figured.

Telson (Fig. 4G) triangular, apically acute ; dorsally with 4 small spines on proximal third. Outer margins finely serrated and fringed with setae. Minute spines cover the distal half of plate.

Uropods (Fig. 4G) well developed, lanceolate, oval, both rami fringed with setae. Seven small spines are arranged along two third of outer margin of endopodite (not visible in figure).

Fig. 4. *Stereomastis pacifica* (FAXON). Early juvenile stage. A-D, first to fourth walking leg; E, first pleopod; F, second pleopod; G, abdomen, telson and uropods, dorsal view. Bar scales = 2 mm.

Discussion and Conclusions

The larval specimens here described and illustrated correspond to advanced *Stereomastis pacifica* (FAXON) pelagic forms, apparently megalopal and early juvenile stages; this surmise lies in the advanced grade of development observed on legs and pleopods, moreover of other morphological features. The assumption of considering the largest as a juvenile is based on the well developed chelipeds, walking legs and above all, the developing appendix masculina observed on second pleopod, which should imply to be a very young male. For the megalopal form stage it is not easy to determine the sexual condition because the functionless of some appendages.

Literature

- BÁEZ, P. and H. ANDRADE. 1979. Crustáceos Decápodos arquibentónicos frecuentes frente a la costa de Chile central. *An. Mus. Hist. Nat.*, 12: 219-231.
- BATE, C.S. 1888. Report on the Crustacea Macrura collected by H.M.S. Challenger during the years 1873-1876. *Rep. Voy. Challenger*, 24: 1-942.
- BOUVIER, E.L. 1905. Sur les palinurides et les eryonides recueillies dans l'Atlantique orientale par les expéditions françaises et malagaches. C.r. hebdomadaire. *Acad. Sci., Paris*, 140: 479-482.
- KENSLEY, B.F. 1968. Deep sea decapod Crustacea from west of Cape Point, South Africa. *Ann. S. Afr. Mus.*, 50(12): 283-323.
- MAN, DE, J.G. 1920. The decapoda of the Siboga Expedition. *Siboga Exped. Monogr.*, 39: 1-320.
- WILLIAMSON, D.I. 1957. Crustacea, Decapoda: Larvae. I General. Sheet 67: 1-7. In J.H. Fraser (Ed.) Fiches d'identification du zooplankton. *Cos. Inst. Explor. Mer, Charlottenlund Slot, Denmark*.

要 約

ペルー海溝で採集されたセンジュエビの一種 *Stereomastis pacifica* (FAXON) の二つの浮遊幼生期について図示し記載した。