Morphology of the first zoea of the spider crab *Macropodia linaresi* (Brachyura, Majidae, Inachinae)

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The first zoea of the majid crab *Macropodia linaresi* is described and illustrated from laboratory hatched material obtained from an ovigerous female collected on the western Mediterranean continental shelf. The morphology of the zoea is compared with the same larval stage of other known *Macropodia*.
Keywords: *Brachyura,* Macropodia linaresi, *first zoea.*

MORFOLOGIA DE LA PRIMERA ZOEA DEL CRANC *MACROPODIA LINARESI* (BRACHYURA, MAJIDAE, INACHINAE). Es descriu el primer estadi larvari del cranc *Macropodia linaresi*. Les larves es varen obtenir al laboratori a partir de femelles ovígeres provinents de captures realitzades a la Mediterrània occidental. Els seus caràcters morfològics es comparen amb els d'altres espècies del gènere *Macropodia*.
Paraules clau: *Brachyura,* Macropodia linaresi, *primera zoea.*

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Introduction

Macropodia linaresi Forest & Zariquiey-Álvarez, 1964 has a reported distribution from the Adriatic Sea, western Mediterranean to the North Sea, North-East Atlantic at depths of around 30-80 m (Zariquiey-Álvarez, 1968; Noël, 1992).

The morphology of *Macropodia* larval stages is known only in detail for *M. tenuirostris* (Salman, 1981), *M. rostrata* (Ingle, 1982) and *M. longipes* (Guerao & Abelló, 1997). However, under the name *M. egyptia* Lebour (1927, 1928) superficially described the development of *M. deflexa.*

The present study aims to describe the morphology of the first zoeal stage of *Macropodia linaresi*, hatched from an

ovigerous specimen captured by trawling in the western Mediterranean, and to compare its larval features with those known for other species of the genus.

Material and methods

An ovigerous crab *Macropodia linaresi*, 8.4 mm carapace length (including rostrum), with eggs in an advanced stage of development, was collected by trawling on muddy bottoms of the continental shelf off Cape La Nao (38°41'53"N, 0°14'39"E, western Mediterranean) from a depth of 48 m on 23rd May 1997. Sampling was performed within the frame of the EU demersal fisheries research program "MEDITS" on board B/O "Cornide de Saavedra".

The crab was placed in an aquarium (60 X 35 X 30 cm) on board the ship containing well-aerated sea water at a salinity of approx. 37.5 and kept at 17 ± 1°C. Larvae hatched six days after capture of the female, on the 29th May 1997. First zoeas were preserved in 7% buffered formalin.

An Olympus phase contrast microscope and Nikon Apophot microscope was used in the dissection and observation of the setal formula of the appendages after mounting in polyvinyl lactophenol. Measurements were taken with a Wild M8 binocular microscope equipped with an ocular micrometer, and are based on measurements of 5 individuals. All drawings were made with the aid of a *camera lucida*. The following measurements were taken: distance from base to tip of dorsal spine (DS); carapace length, from between eyes to the posterio-lateral margin of the carapace (CL); antenna length, from base of eye to tip of spinous process (AL).

To allow comparison with related species of the genus, the ratios between furca (F) and lateral spine (LS) lengths (F/LS) were studied. Furca length was measured from a line across the base of the spine to the furcal tip.

The adult female crab of the present study was deposited in the Biological Collections of Reference of the *Institut de Ciències del Mar* (CSIC) in Barcelona (Registration Number: ICMD 300/1997).

Results

Size: (DS) 1.20-1.25 mm; (CL) 0.60-0.63 mm; (AL) 0.64-0.66 mm.

Carapace (Figs 1A, B, E): With well developed dorsal spine, long and slightly curved backwards; rostral and lateral spines absent; dorso-median and frontomedian tubercles present; anterior (majid) seta present; 1-2 posterolateral subterminal setae on ventral margin; postero-lateral margin with minute denticles; 1 pair of anterior dorsal setae and 1 pair of posterior dorsal setae; eyes sessile.

Antennule (Fig. 1G): Uniramous; endopod absent; exopod unsegmented with 3 terminal aesthetascs and 2 setae.

Antenna (Fig. 1H): Protopod (spinous process) with sparse minute distal spinules; exopod slightly shorter than the spinous process, with 2 unequal medial setae and sparse minute distal spinules.

Mandible: Incisor and molar processes well developed; mandibular palp (endopod) absent.

Maxillule (Fig. 2A): Coxal endite with 7 setae; basial endite with 7 setae; endopod 2-segmented, proximal segment without a seta, distal segment with 1 sub-terminal and 2 terminal setae; exopod seta absent.

Maxilla (Fig. 2B): Coxal endite bilobed with 4+3 setae; basial endite bilobed with 5+4 setae; endopod bilobed with 4 terminal setae; exopod (scaphognathite) margin with 10 setae and 1 distal stout process.

First maxilliped (Fig. 2C): Basis with 9 (2,2,2,3) setae; endopod 5-segmented with 3,2,1,2,1+4 setae, respectively; exopod incompletely 2-segmented, distal segment with 4 long terminal plumose natatory setae.

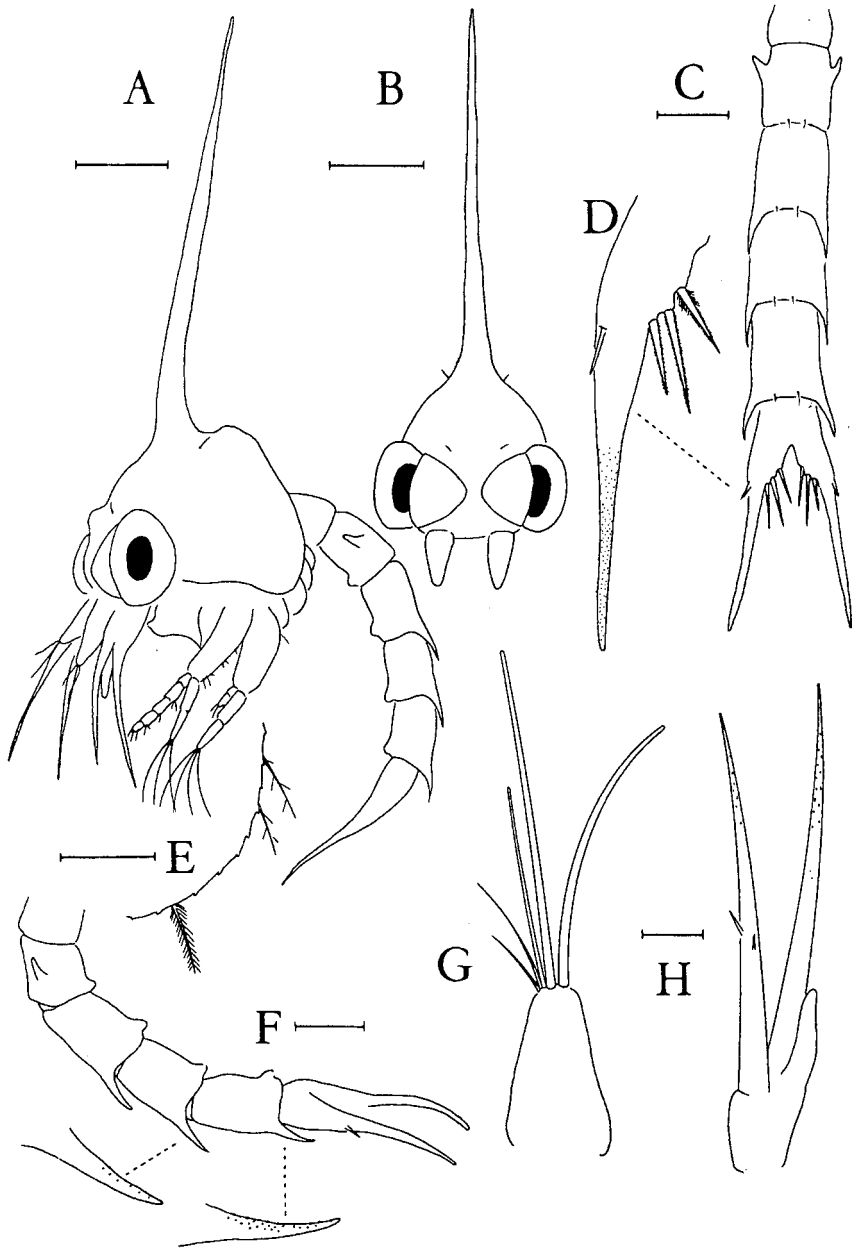

Fig. 1. *Macropodia linaresi*, first zoea. (A) lateral view; (B) frontal view; (C) abdomen, dorsal view; (D) half of telson, enlarged; (E) posterolateral margin of the carapace; (F) abdomen lateral view; (G) antennule; (H) antenna. Scale bars of A-C and F = 0.2 mm; scale of D, G and H = 0.1 mm.

Fig. 1. Macropodia linaresi, *primera zoea. (A) visió lateral; (B) visió frontal; (C) abdomen, visió dorsal; (D) meitat del telson, augmentat; (E) marge posterolateral de la closca; (F) visió lateral de l'abdomen; (G) antènula; (H) antena. Escala de A-C i F = 0,2 mm; escala de D, G i H = 0,1 mm.*

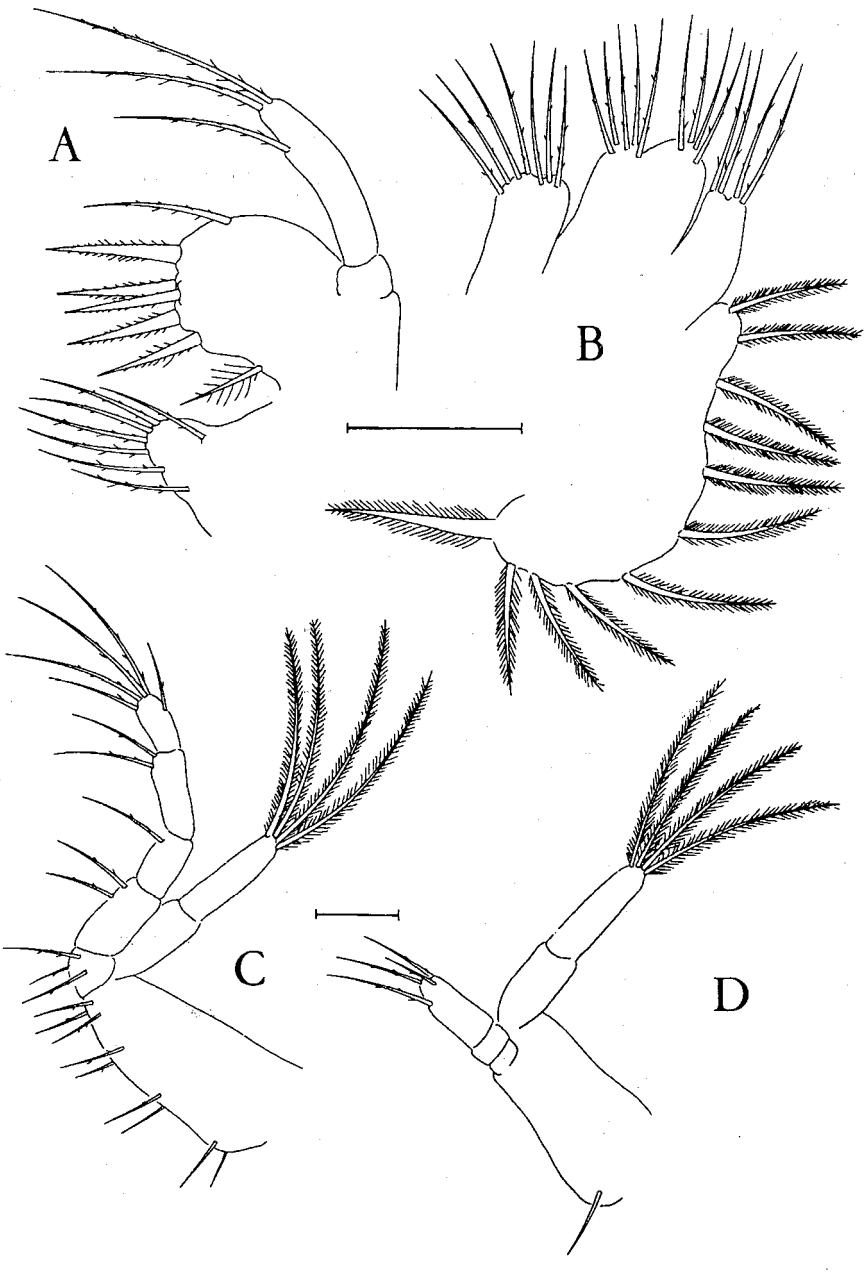

Fig. 2. *Macropodia linaresi*, first zoea. (A) Maxillule; (B) maxilla; (C) 1st maxilliped; (D) 2nd maxilliped. Scale = 0.1 mm.
Fig. 2. Macropodia linaresi, *primera zoea. (A) Maxil.lula; (B) maxil.la; (C) 1er maxil.liped; (D) 2on maxil.líped. Escala = 0,1 mm.*

Second maxilliped (Fig. 2D): Basis with 1 seta; endopod 3-segmented with 0,0,1+3 setae, respectively; exopod incipiently 2-segmented, distal segment with 4 long terminal plumose natatory setae.

Third maxilliped: Present, rudimentary, bilobed.

Pereiopods: Present, rudimentary; chela bilobed.

Abdomen (Figs. 1C, F): 5 somites; somite 1 unarmed, somite 2 with 1 pair of lateral processes directed anteriorly; somites 3-5 with a pair of long postero-lateral processes, which are covered with minute protuberances; somites 2-5 with 1 pair of postero-dorsal setae; incipient pleopod buds on segments 2-5.

Telson (Figs. 1C, D, F): Each telson fork with a lateral spine (F/LS ratio range: 6.6-7.0) and distally spinulated; inner margin with 3 pairs of plumodenticulate setae, the second pair the longest; setules of the inner pair longer on the seta base; medial notch present.

Discussion

The known first zoeal stages of *Macropodia* species are similar in chaetotaxy and therefore it is difficult to differentiate between the larvae of *M. linaresi* (this present study) and *M. tenuirostris* (by Salman, 1981), *M. rostrata* (by Ingle, 1982) and *M. longipes* (Guerao & Abelló, 1997). Differences among described zoeas of the different species are practically limited to morphometric, not to meristic, characters, such as the relative lengths of the carapace, dorsal spine and antenna.

The first zoea of *M. linaresi* differs in several characteristics from the other described first zoeas of the genus. The length of the dorsal spine (DS) is approximately twice the carapace length (CL) in *M. linaresi*: the ratio CL/DS is smaller (0.48-0.52) in *M. linaresi* than in *M. longipes* (0.79-0.85) and *M. tenuirostris* (0.81-1.0), but similar to *M. rostrata* (0.5-0.6). The first zoea of *M. linaresi* differs mainly from *M. rostrata* in the antenna length, longer in *M. rostrata* (1.2 mm; CL/AL= 0.58-0.60) than in *M. linaresi* (0.64-0.66 mm; CL/AL= 0.90-0.98). Also, the carapace length (CL) and antenna length (AL) are smaller than in *M. longipes*.

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References

Forest, J. & Zariquiey-Álvarez, R. 1964. Description et étude comparative des espèces. Le genre *Macropodia* Leach en Méditerranée. I. (Crustacea Brachyura Majidae). *Bull. Mus. Nat. Hist. nat. Paris (2)*, 36(2): 222-244.

Guerao, G. & Abelló, P. 1997. Larval development of the spider crab *Macropodia longipes* (Brachyura: Majidae: Inachinae). *J. Crust. Biol.*, 17(3): 459-471.

Ingle, R.W. 1982. Larval and post-larval development of the Slender-legged Spider Crab, *Macropodia rostrata* (Linnaeus) (Oxyrhyncha: Majidae: Inachinae), reared in the laboratory. *Bull. Br. Mus. nat. Hist. (Zool.)*, 42(3): 207-225.

Lebour, M.V. 1927. Studies of the Plymouth Brachyura. I. The rearing of crabs in captivity, with a description of the larval stages of *Inachus dorsettensis*, *Macropodia longirostris* and *Maia squinado*. *J. mar. biol. Ass. U.K.*, 14: 795-820.

Lebour, M.V. 1928. The larval stages of the Plymouth Brachyura. *Proc. Zool. Soc. London*, 2: 473-560.

Noël, P. 1992. *Clé préliminaire d'identification des Crustacea Decapoda de France et des principales autres espèces d'Europe*. Muséum National d'Histoire Naturelle, Paris. 145 pp.

Salman, S.D. 1981. Larval development of *Macropodia tenuirostris* (Leach) (Crustacea, Brachyura, Majidae), reared in the laboratory. *J. Nat. Hist.*, 15: 931-938.

Zariquiey-Álvarez, R. 1968. Crustáceos decápodos ibéricos. *Inv. Pesq.*, 32: 1-510.