

*ENTEROCOLA AFRICANUS*, A NEW SPECIES  
(COPEPODA: ASCIDICOLIDAE) ASSOCIATED WITH A  
COMPOUND ASCIDIAN *SYNOICUM* SPECIES FROM  
NORTH AFRICA (STRAIT OF GIBRALTAR)

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**Abstract.** — The genus *Enterocola* van Beneden, 1860 is principally recorded from European waters. In this paper *Enterocola africanus*, new species, from the Strait of Gibraltar (North African side) is described from the compound ascidian *Synoicum* sp. *Enterocola fulgens*, *Enterocola clavelinae*, *Enterocola hessei*, *Enterocola precaria* and *Enterocola ianthina* are morphologically similar to the new species. All are discussed and compared with *Enterocola africanus*.

**Resumen.** — La mayor parte de las especies descritas dentro del género *Enterocola* van Beneden, 1860 proceden de las costas Europeas. Se describe una nueva especie, *Enterocola africanus* del Estrecho de Gibraltar (vertiente Norte Africana). *Enterocola fulgens*, *Enterocola clavelinae*, *Enterocola hessei*, *Enterocola precaria* y *Enterocola ianthina* son morfológicamente próximas a la nueva especie. Todas ellas son comparadas y discutidas con *Enterocola africanus*.

Recently the Laboratorio de Biología Marina of the University of Sevilla and Cádiz (Spain) initiated a program to study the copepods associated with marine invertebrates from the coasts of the Strait of Gibraltar and nearby areas. So far, three marine biological expeditions “Bahia 90” and “Bahia 91” in Algeciras Bay (Southern Iberian Peninsula) and “Ceuta 91” in Ceuta (North Africa) were carried out within a more comprehensive program of marine benthos. The studies were centered mainly on the copepod fauna associated with molluscs, ascidians, anthozoans, and echinoderms. The first results have already been reported (López-González et al. 1992).

Four female parasitic copepods belonging to the genus *Enterocola* were found in the colonies of the compound ascidian, *Synoicum* sp. collected during the “Ceuta 91” Expedition. They were later determined to be new to science.

Studies of the genus *Enterocola* have been concentrated in European waters with lim-

ited references to the North American coast and the Philippine Islands (Illg & Dudley 1980). Recently, Ooishi (1987) recorded an undetermined species of this genus from Okinawa. Shellenberg (1922) reported *Botryllophilus* sp. associated to *Polycitor renieri* from Plattenberg Bucht (South Africa), and not *Enterocola* sp. as Illg & Dudley (1980) referred to in their monograph on the Ascidicolidae.

In this work, *Enterocola africanus* from the North African coast (Ceuta) is described. It represents the only member of its genus described from this continent. Although it is not the only species reported, Barnard (1955) quotes *Enterocola fulgens* from South Africa.

#### Material and Methods

The compound ascidians were collected on stones from the infralittoral zone (6–12 m deep). They were maintained in separate glass bottles. The copepods were removed



through dissection of hosts and preserved in formalin (4% in sea water). The specimens were stained with cotton blue, dissected under a stereomicroscope, and semi-permanent mounts were made using lactophenol. All figures were drawn with the aid of a camera lucida. The letter after the explanation of each figure refers to the scale at which it was drawn.

Family Ascidicolidae Thorell, 1859  
Subfamily Enterocolinae Della Valle, 1883  
Genus *Enterocola* van Beneden, 1860  
*Enterocola africanus*, new species  
Figs. 1–2

*Type material*.—4 ♀♀ from 3 colonies of *Synoicum* sp. at Ceuta (Spain, North Africa) (35°53'430"N; 15°17'W), 18 Aug 1991. The holotype has been deposited in the Museo Nacional de Ciencias Naturales de Madrid (Spain) (MNCNM 20.04/3504). The three paratypes (two dissected) in the collection of the authors.

*Female*.—Body (Fig. 1a–c) of relaxed specimens 0.97 mm total length (based on 4 specimens). Proportions of cephalosome : metasome : urosome, 1:4.2:1.48. Uncontracted specimen with dorsal sutures and urosome folded without segmentation. Body covered ventrally with discontinuous rows of spinules.

Antennule (Fig. 1e) unimerous, apically narrowing suggesting 2 possible segments. Basal article covered with discontinuous rows of spinules. Distal component with minute conical apical protuberance. Junction of first and second components with about 5 setules. Antenna (Fig. 1f) obscurely bimerous. Basal segment unarmed, but with several rows of minute spinules. Distal segment with 1 subterminal and 5 terminal setae and several rows of minute spinules. Labrum (Fig. 1g) with 2 lateral spinose lobes; ventral surface with rows of spinules. Maxillule (Fig. 2a, b) bilobed. Basal portion lamelliform, somewhat trilobed distally; distal third of anterior margin with

unornamented lobe (Fig. 2a, b). A prominence near articulation of palp bearing barbed seta and short setule. Palp with 5 spinulose setae and 1 unornamented seta on its distal truncate margin. Maxilla (Fig. 2c) with a massive basal segment bearing an articulated digitiform, spinulose endite at its distal medial corner. Apical segment bifid distally, with one process somewhat shorter than the other, narrower than basal segment, but also heavily sclerotized. Junction of basal and apical segments with 1 short seta.

Intercoxal area of leg 2–4 with pronounced mammilliform processes (Fig. 1a, b). Legs 1–4 (Fig. 2d–g) biramous. Anterior surface of legs bearing rows of spinules. Protopodites with small seta at distal lateral corner. All legs with bimerous protopodites and unimerous rami. Exopodites terminating in a pointed process and slightly curved laterally. Exopodite of third leg (Fig. 2f) with characteristic styliiform outline in most species of the genus. Endopodites approximately equal to exopodites; lateral margin more convex than medial margin; 2 apical setae of each endopodite set close together and longer than ramus. Outer apical seta about 1.7 times the length inner apical seta on all legs. Pediform projection (probably leg 5) (Fig. 1b) a plate with subcircular margin, bearing 2 separate minute setules. Caudal rami (Fig. 1a–c) conical and apparently forming a definitive articulation with urosome.

Male unknown.

*Etymology*.—The specific name *africanus* was chosen because this is the first species of this genus described from Africa.

## Discussion

There are five species of *Enterocola* van Beneden, 1860 with mammilliform processes present between at least one pair but not all pairs of legs: *Enterocola fulgens* van Beneden 1860, *Enterocola clavelinae* Chatton & Harant 1924, *Enterocola hessei* Chatton



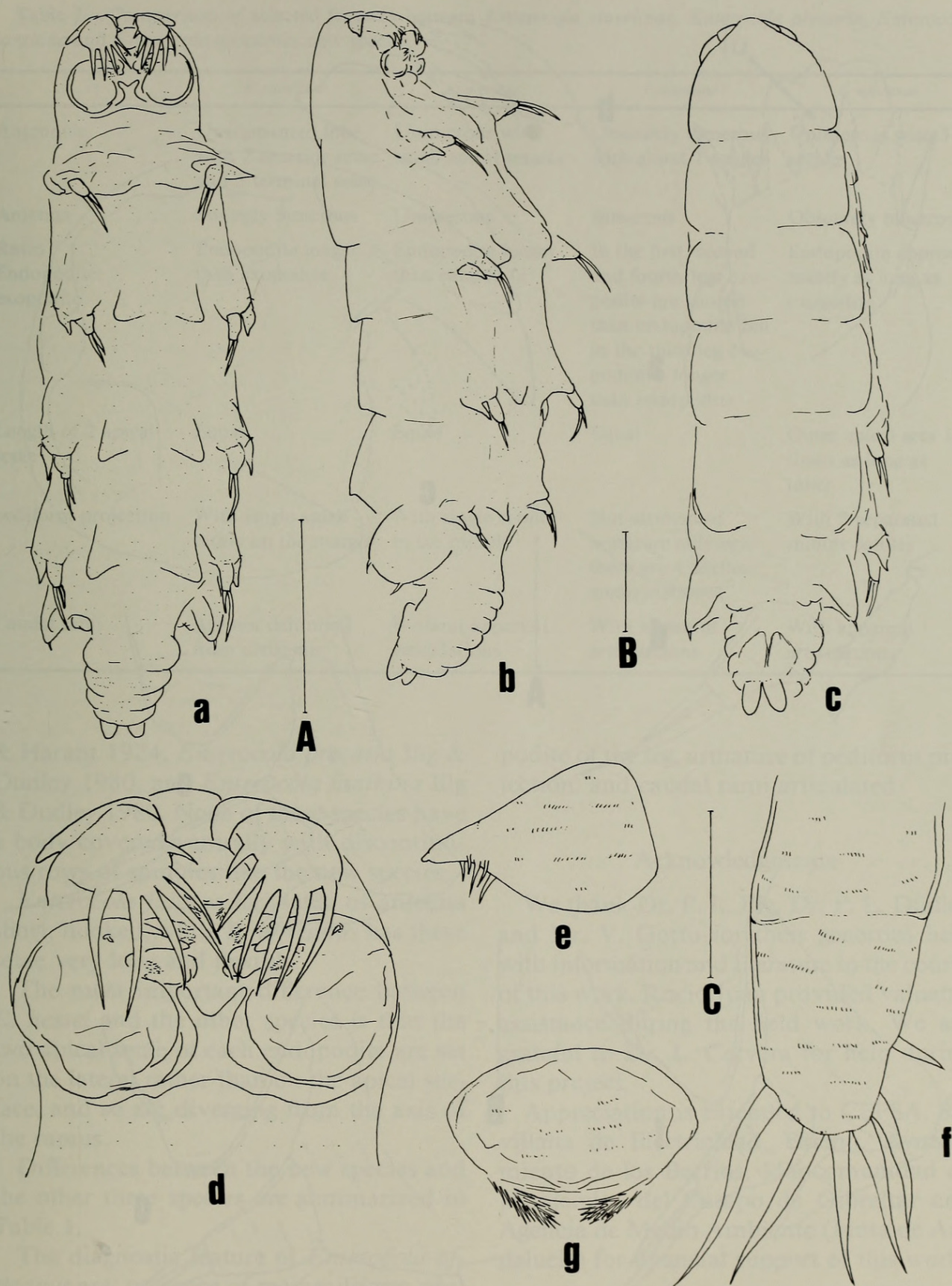


Fig. 1. *Enterocola africanus*, new species, female: a, habitus, ventral (A); b, habitus, lateral-oblique (A); c, habitus, dorsal (A); d, oral region (B); e, antennule (C); f, antenna (C); g, labrum (C). Scale bars, A: 600  $\mu$ m; B: 50  $\mu$ m; C: 50  $\mu$ m.



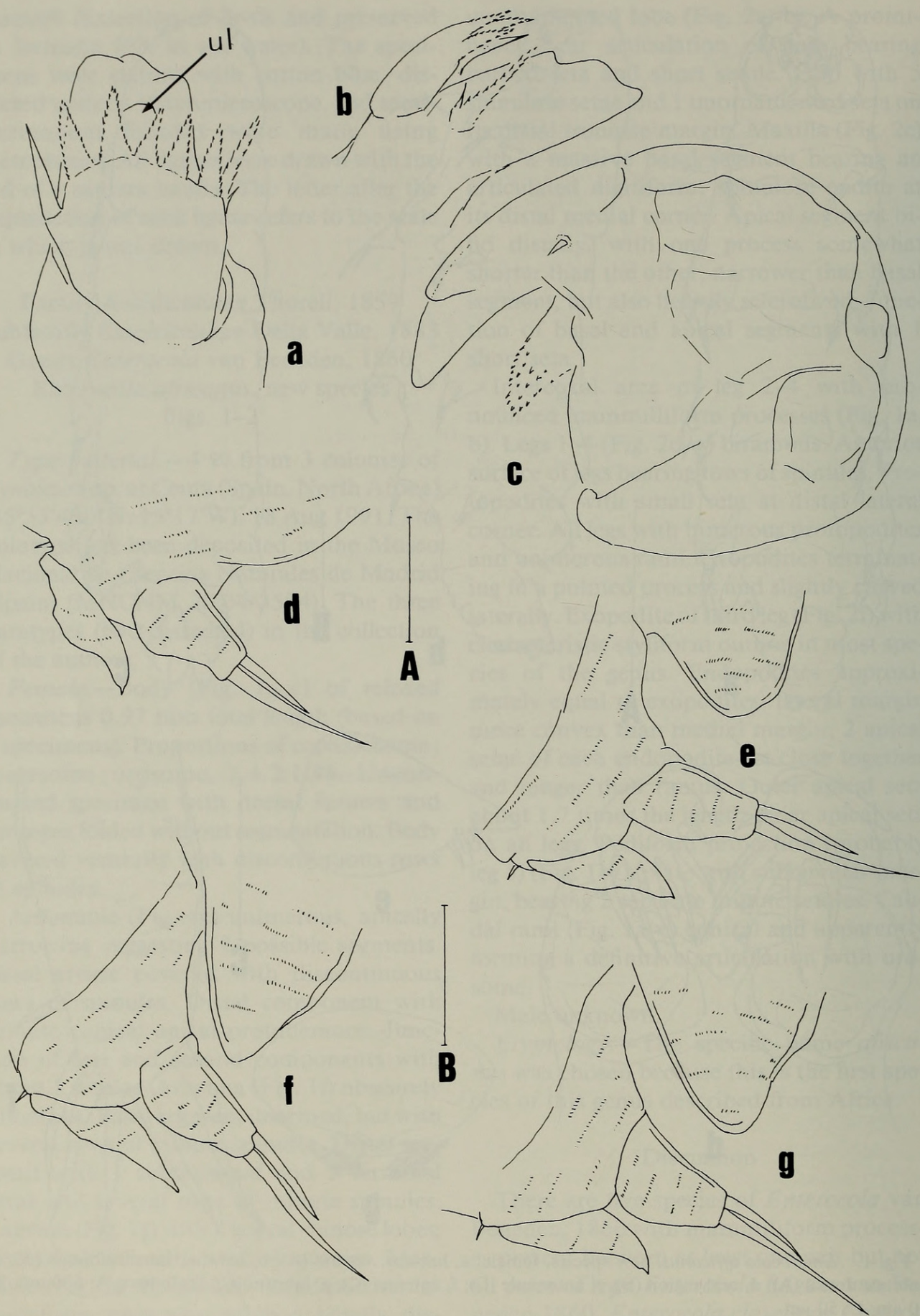


Fig. 2. *Enterocola africanus*, new species, female: a and b, maxillule (A), ul: unornamented lobe of the distal third anterior margin; c, maxilla (A); d, first leg (B); e, second leg (B); f, third leg (B); g, fourth leg (B). Scale bars, A: 25  $\mu$ m; B: 50  $\mu$ m.



Table 1.—Comparison of selected features between *Enterocola clavelinae*, *Enterocola precaria*, *Enterocola ianthina* and *Enterocola africanus*, new species.

	<i>E. clavelinae</i>	<i>E. precaria</i>	<i>E. ianthina</i>	<i>E. africanus</i>
Antennule	Unsegmented lobe with 2 anterior setae and 3 terminal setae	Unimerous with small apical setules	Obscurely bimerous with about 7 setules	Unimerous with 5 setules
Antenna	Strongly bimerous	Unimerous	Bimerous	Obscurely bimerous
Ratio Endopodite: exopodite	Endopodite longer than exopodite	Endopodite longer than exopodite	In the first, second and fourth legs exopodite are shorter than endopodite but in the third leg exopodite is longer than endopodite	Endopodite approximately as long as exopodite
Length of 2 apical setae	Equal	Equal	Equal	Outer apical seta 1.7 times as long as inner
pediform projection	With single small setule on the margin	With single setule in the middle	Not element of armature although there are 4 shallow emarginations	With 2 separated minute setules
Caudal rami	Are not delimited from urosome	Without apparent articulations	With apparent articulations	With apparent articulations

& Harant 1924, *Enterocola precaria* Illg & Dudley 1980, and *Enterocola ianthina* Illg & Dudley 1980. None of these species have a body covered ventrally with discontinuous rows of spinules like the new species.

*Enterocola fulgens* has setae of antenna short, hooked, while *E. africanus* has these setae very long and flexible.

The most important difference between *E. hessei* and the other species is that the two apical setae of each endopodite are set on the lateral rather than on the apical surface, and so are diverging from the axis of the ramus.

Differences between the new species and the other three species are summarized in Table 1.

The diagnostic feature of *Enterocola africanus* are: presence of mammiliform processes at the bases of legs 2–4, antennule being unimerous with five setules, antenna obscurely bimerous with six long flexible setae, length ratio of endopodite:exopodite, length of two apical setae of the endo-

podite of the leg, armature of pediform projection, and caudal rami articulated.

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