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## SHORT COMMUNICATION

### ***Stephos marsalensis* new species (Copepoda, Calanoida, Stephidae) from coastal waters of Sicily, Italy**

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**Abstract.** A new species of calanoid copepod, *Stephos marsalensis*, is described from central Mediterranean coastal waters. It differs from congeners mainly in the structure of the fifth legs in both sexes.

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#### **Introduction**

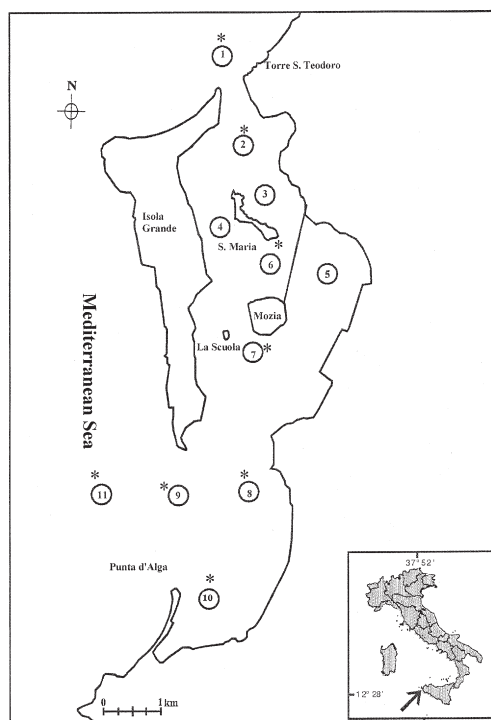
In the course of research on copepod fauna from the western coast of Sicily (Stagnone di Marsala), we collected numerous specimens of a new species of the copepod genus *Stephos* T. Scott, 1892. The genus is widespread throughout the North Atlantic and adjacent waters, northern Indo-West Pacific and temperate, tropical and polar waters. It includes 25 species which live in shallow coastal waters. Recently, species of *Stephos* have been found in an anchihaline lava pool on the Canary Islands in the Atlantic (Boxshall *et al.*, 1990), in marine caves, in the western Mediterranean (Riera *et al.*, 1991; Carola and Razouls, 1996), and in shallow coastal waters in the central Mediterranean (Zagami *et al.*, 2000).

The new species of *Stephos* is described below and compared with the other species of the genus.

The 'Stagnone di Marsala' (37°52'N, 12°28'E) is a large (2000 ha), shallow (average depth about 1.5 m) semi-enclosed basin located on the western coast of Sicily (Figure 1). It is characterized by large fluctuations in the values of physical-chemical parameters, especially temperature (11.2–29.1°C) and salinity (32.8–47.1 PSU). The bottom is sandy–muddy and covered mainly by *Cymodocea nodosa* (Ucria) Ascherson and *Caulerpa prolifera* (Forskål) Lamouroux. Meadows of *Posidonia oceanica* (Linneus) Delile are restricted to the central and southern basins.

#### **Method**

The specimens were collected from coastal waters of western Sicily (Stagnone di Marsala: 37°52'N, 12°28'E) in April, May and December 1996, and January 1997 (during the day). In addition, three day–night surveys were carried out in July and October 1996, and March 1997, in which samples were collected every 3 h during 24 h cycles. Sampling was carried out with a subsurface plankton tow-net, towed horizontally near the coast at a depth of about 2–3 m above a sandy–muddy bottom. Sampling stations are shown in Figure 1. The net was conical, with a length of 150 cm and a mouth 40 cm in diameter. The mesh size was 125 µm.



**Fig. 1.** Map of the sampling area (Stagnone di Marsala, western Sicily) with sampling stations.  
\*Occurrence of *Stephos marsalensis*.

An adult female, collected from the north-western coastal waters of Sicily near Marsala, was designated as holotype. An adult female and an adult male paratype are deposited in the Natural History Museum, London (Reg. ns. 592–593). The female holotype and remaining paratypes are deposited in the collection of the authors.

The morphological terminology used follows Huys and Boxshall (Huys and Boxshall, 1991). All drawings were prepared with a Reichert ‘Visopan’ projection microscope.

### Systematics

Subclass Copepoda Milne Edwards, 1830.

Order Calanoida Sars, 1903.

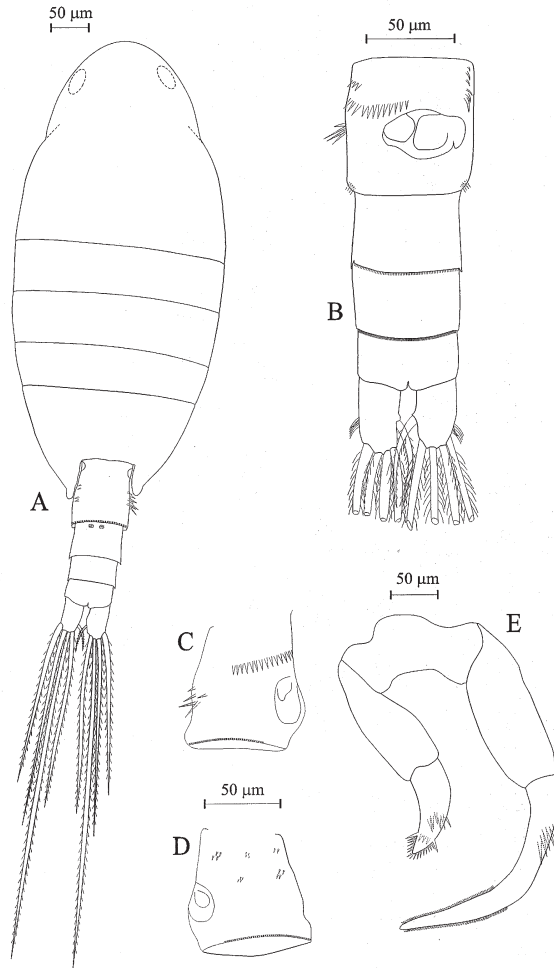
Family Stephidae Sars, 1902.

Genus *Stephos* T. Scott, 1892.

*Stephos marsalensis* sp. nov.

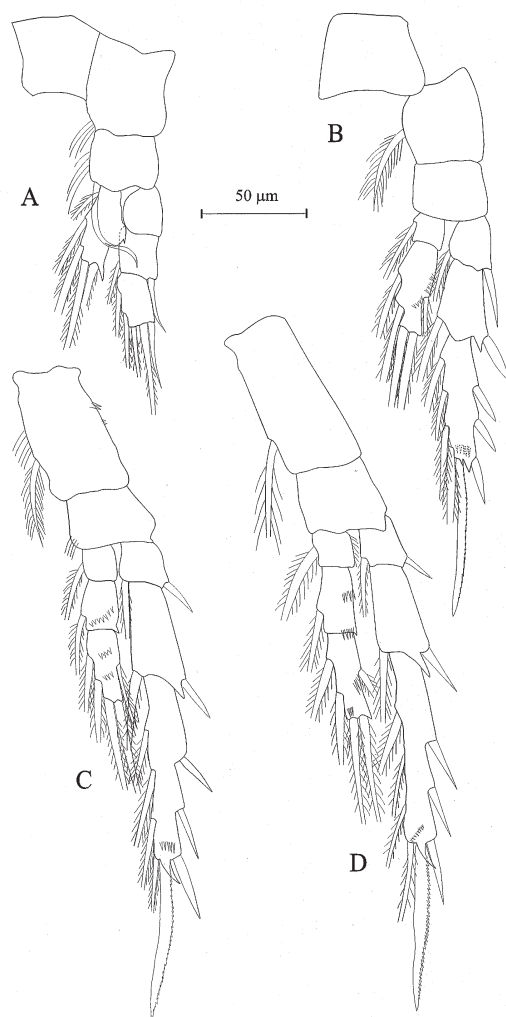
#### *Adult female (holotype)*

Body (Figure 2A) slender and elongate. Length to extremity of furcal rami 0.76 mm. Prosoma length 0.59 mm; width 0.27 mm; length–width ratio 2.18:1.



**Fig. 2.** *Stephos marsalensis* sp. nov., adult female. (A) Dorsal view; (B) urosome, ventral; (C) genital double-somite, right side; (D) genital double-somite, left side; (E) fifth legs, posterior view.

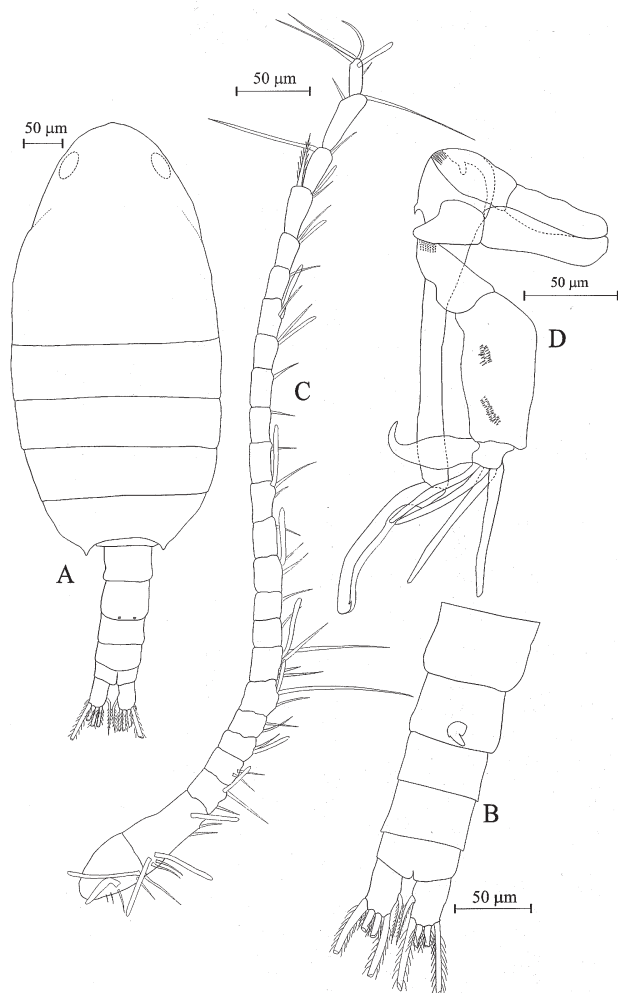
Cephalosome rounded in dorsal view; rostrum absent. Postero-lateral corners of prosome slightly asymmetrical: left side more elongate than right side. First pedigerous segment demarcated from cephalic region. Fourth and fifth pedigerous somites fused. Urosome 4-segmented. Genital double-somite symmetrical, longer than wide; genital aperture closed off by single unarmed operculum, located more or less medially on postero-ventral surface of genital double-somite (Figure 2B); posterior margin bearing row of minute spinules dorso-laterally (Figure 2A). Proximal part of lateral surface on right side with transverse incomplete row of spinules and other spinules sub-marginally (Figure 2C); left side surface with patch of minute spinules (Figure 2D). Second urosomite just longer than third. Anal somite shorter than third; whole posterior margins of second and third



**Fig. 3.** *Stephos marsalensis* sp. nov., adult female. (A) First leg; (B) second leg; (C) third leg; (D) fourth leg.

urosomites feebly striated (Figure 2B). Furcal rami longer than wide, armed with 4 marginal long plumose setae, short plumose seta on inner margin, and minute lateral seta in patch of setules.

Antennule 24-segmented, extending approximately to posterior margin of first urosomite; segments 1 (I–II) and 2 (III–IV) completely separated, segments 8 (X–XI) and 24 (XXVII–XXVIII) representing double segments. Antennule, antenna, mandible, maxillule, maxilla and maxilliped as in *Stephos cryptospinosus* (Zagami *et al.*, 2000) in segmentation and setation. Swimming legs 1 to 4 with 3-segmented exopods; endopod 1-segmented in leg 1, 2-segmented in leg 2 and 3-segmented in legs 3 and 4. The spine and seta formula (Figure 3A–D) as follows:



**Fig. 4.** *Stephos marsalensis* sp. nov., adult male. (A) Dorsal view; (B) urosome, ventral view; (C) antennule; (D) fifth legs, anterior view.

	Coxa	Basis	Exopod	Endopod
Leg 1	0-0	0-1	0-0; I-1; I,1,3	0,2,3
Leg 2	0-1	0-0	I-1; I-1; III,I,4	0-1; 1,2,2
Leg 3	0-1	0-0	I-1; I-1; III,I,4 0-1;	0-1; 1,2,2
Leg 4	0-1	0-0	I-1; I-1; III,I,4 0-1;	0-1; 1,2,2

Fifth legs (Figure 2E) uniramous 2-segmented and asymmetrical; proximal part representing fused coxae and intercoxal sclerite; first free segment (basis) of leg naked. Second left segment with patch of spinules on anterior surface and spinulate, pointed tip; second right segment sickle-shaped with patch of spinules on proximal anterior surface and two rows of fine spinules distally.

*Adult male*

Body (Figure 4A) 0.73 mm in length. Prosome length 0.52 mm; width 0.28 mm; length–width ratio 1.85:1. Cephalosome and first pedigerous somite separate; fourth and fifth pedigerous somites fused; postero-lateral margins of prosome symmetrical. Rostrum absent. Prosome 2.26 times longer than urosome. Urosome 5-segmented; genital somite symmetrical. Second urosomite produced postero-ventrally into short process (Figure 4B). Furcal rami armed as in female. Antennule (Figure 4C) 24-segmented, extending approximately to posterior margin of second urosomite. Segments 1 (I–II) and 2 (III–IV) separate; segments 2 (III–IV), 8 (X–XI) and 24 (XXVII–XXVIII) representing double segments. Segmentation and armature as follows: segment 1 (I–II) 5+2 aesthetascs, 2 (III–IV) 4+3 aesthetascs, 3 (V) 2+1 aesthetasc, 4 (VI) 2, 5 (VII) 1+1 aesthetasc, 6 (VIII) 2, 7 (IX) 2+1 aesthetasc, 8 (X–XI) 4+1 aesthetasc, 9 (XII) 1, 10 (XIII) 1, 11 (XIV) 2+1 aesthetasc, 12 (XV) 1, 13 (XVI) 2+1 aesthetasc, 14 (XVII) 1, 15 (XVIII) 1, 16 (XIX) 1, 17 (XX) 1+1 aesthetasc, 18 (XXI) 1+1 aesthetasc, 19 (XXII) 1, 20 (XXIII) 1+1 aesthetasc, 21 (XXIV) 2+1 aesthetasc, 22 (XXV) 2, 23 (XXVI) 2, 24 (XXVII–XXVIII) 4+1 aesthetasc. First two setae of first antennular segment minute, hardly discernible. Under LM, no discernible combs of spinules on ventral surface of antennular segments. Mouthparts and swimming legs 1 to 4 as in female in segmentation and setation. Some minor differences apparent between sexes in number and position of spinules on surfaces of legs. Fifth legs (Figure 4D) elongate and markedly asymmetrical. Both legs uniramous. Right leg slender, 4-segmented; first and second segments short, second bearing spinular row along distal margin, third segment elongate with basal part expanded and produced into acute lateral process, last segment curved inwards ending with small incision and bordered by low lamella. Left leg 5-segmented, first to third segments short; second segment bearing spinular row along distal margin; fourth segment tumid, with two patches of short spinules on anterior surface. Fifth segment with 4 terminal narrow lamellar processes and a hook-like broad lamellar process.

*Etymology*

The specific name refers to the locality ‘Marsala’ where the specimens were found.

**Discussion**

The genus *Stephos* includes 25 species: six from the North Atlantic, four from the Central Atlantic, eight from the Indo-Pacific, three from Antarctic waters and four from the Mediterranean Sea.

The general shape and ornamentation of the female genital double-somite, and the fifth legs of the male and female found in the central Mediterranean Sea, suggest that they, like *Stephos cryptospinosus* Zagami *et al.*, 2000, are more closely related to the Indo-Pacific species, *Stephos pacificus* and *Stephos robustus* Ohtsuka and Hiromi 1987, and the North Atlantic species, than to the warm water Atlantic species.

All boreal *Stephos* species have the fifth segment of the male left fifth leg complex, bearing wide lamellar processes.

The new species is distinguished from the other previously described congeneric species by the shape of the fifth legs in both sexes. The female fifth legs of the new species are similar to those of *Stephos robustus* [cf. (Ohtsuka and Hiromi, 1987)] only in that the distal part of the terminal segment of the right leg carries two rows of fine spinules and is distinctly curved inwards. It differs in its asymmetrical condition and in the different ornamentation of the remaining part.

The female of the new species is also easily distinguished from the congeneric species *S.robustus* by the shape of the genital double-somite. It is asymmetrical in *S.robustus* and symmetrical in *S.marsalensis*. The anterior margin of the genital operculum is fringed with a row of spinules in *S.robustus*, while it is naked in *S.marsalensis*. Finally, a transverse row of spinules is present on both sides in *S.robustus* but only on the right side in *S.marsalensis*, the left side bearing a patch of very minute spinules.

The male fifth legs of the new species are similar to those of *S.pacificus*, [cf. (Ohtsuka and Hiromi, 1987)], but differ from the latter in the left fourth segment being tumid, not elongate, and in the armature of the fifth segment. The new species also differs from *S.pacificus* in lacking a very large aesthetasc on the first antennule segment of the latter species.

Finally, a comparison of *S.marsalensis* with the other four Mediterranean species shows that there are many substantial differences. The most important and easily recognized of these are: (i) the different shape and the asymmetrical condition of the female fifth legs with respect to *Stephos gyrans* Giesbrecht, 1892, *Stephos margalefi* Riera *et al.*, 1991, *Stephos balearensis* Carola and Razouls, 1996, and *Stephos cryptospinosus* Zagami *et al.*, 2000 (all of which have fifth legs symmetrical); (ii) the shape of the male fifth legs is similar to that of *S.margalefi* Riera *et al.*, 1991 and *S.balearensis* Carola and Razouls, 1996 in the number of lamellar processes (4 of approximately equal length and 1 stronger), but differs from both in the armature of the penultimate segment. *Stephos marsalensis* differs from the other two Mediterranean species, *S.gyrans* Giesbrecht, 1892 and *S.cryptospinosus* Zagami *et al.*, 2000, notably in the smaller number of lamellar processes on the fifth segment of the left fifth leg.

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## References

- Boxshall,G.A., Stock,J.H. and Sánchez,E. (1990) A new species of *Stephos* Scott,1892 (Copepoda: Calanoida) from an anchihaline lava pool on Lanzarote, Canary Islands. *Stygologia*, **5**, 33–41.
- Carola,M. and Razouls,C. (1996) Two new species of Calanoida from a marine cave on Minorca Island, Mediterranean Sea: *Stephos balearensis* new species (Stephidae) and *Paracyclopia gitana* new species (Pseudocyclopiidae). *Bull. Mar. Sci.*, **58**, 344–352.
- Huys,R. and Boxshall,G.A. (1991) *Copepod Evolution*. The Ray Society, London, 468 pp.
- Ohtsuka,S. and Hiromi,J. (1987) Calanoid copepods collected from the near-bottom in Tanabe Bay on the Pacific coast of the Middle Honshu Japan. III. Stephidae. *Publ. Seto Mar. Biol. Lab.*, **32**, 219–232.
- Riera,T., Vives,F. and Gili,J. (1991) *Stephos margalefi* sp. nov. (Copepoda: Calanoida) from a submarine cave of Majorca Island (Western Mediterranean). *Oecol. Aquatica*, **10**, 317–323.
- Zagami,G., Campolmi,M. and Costanzo,G. (2000) A new species of *Stephos* T. Scott, 1892 (Copepoda: Calanoida) from coastal waters of Sicily, Italy. *J. Plankton Res.*, **22**, 15–27.

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