

## ***Flabelliderma cinari* (Polychaeta: Flabelligeridae), a new species from the Eastern Mediterranean**

S.Ü. KARHAN<sup>1</sup>, N. SIMBOURA<sup>2</sup> and S.I. SALAZAR-VALLEJO<sup>3</sup>

<sup>1</sup> Division of Hydrobiology, Department of Biology, Faculty of Science, Istanbul University, TR-34134 Vezneciler, Istanbul, Turkey

<sup>2</sup> Hellenic Centre for Marine Research, Institute of Oceanography, P.O. Box 712, 19013, Anavissos, Attica, Greece

<sup>3</sup> Departamento de Ecología Acuática, ECOSUR, CONACYT, Apdo. Postal 424, Chetumal, Quintana Roo, 77000, México

Corresponding author: [unsalkarhan@yahoo.com](mailto:unsalkarhan@yahoo.com)

Received: 13 September 2011; Accepted: 10 April 2012; Published on line: 7 September 2012

### **Abstract**

A new species of flabelligerid polychaete, *Flabelliderma cinari*, is described from the Turkish coast of the Eastern Mediterranean Sea. This represents the first occurrence of the genus *Flabelliderma* in the Mediterranean. *Flabelliderma cinari* sp. nov. is closely allied to *F. claparedei* in having dorsal tubercles of two different sizes; however, these species differ in the relative shape and number of dorsal tubercles, the number of capillaries per fascicle in the notopodia and the shape of the curved distal articles in the neuropodial hooks.

**Keywords:** Polychaeta, Flabelligeridae, *Flabelliderma cinari*, new species, Eastern Mediterranean.

### **Introduction**

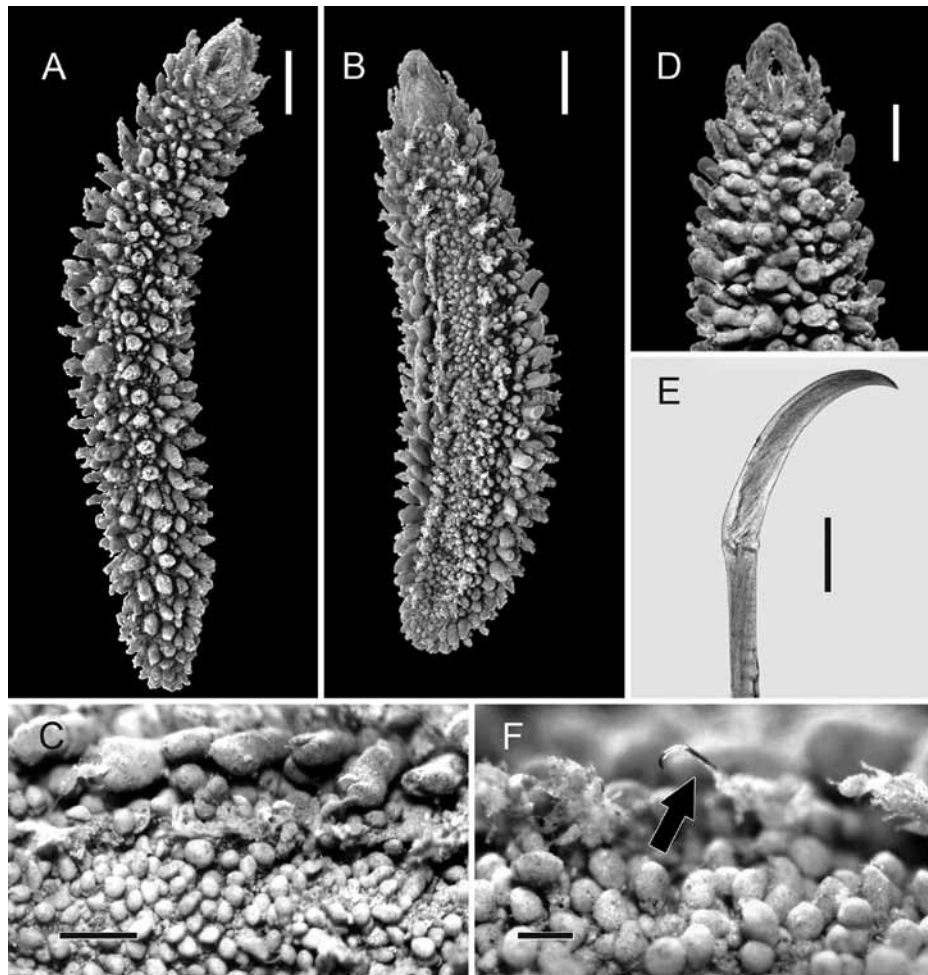
Polychaetes of the family Flabelligeridae de Saint-Joseph, 1894 live within sediments, among marine plants on rocks or other hard substrates, and they occasionally bore into calcareous rocks or consolidated sediments (Salazar-Vallejo, 2007; Salazar-Vallejo *et al.*, 2008). They can often be distinguished from other polychaetes by their long cephalic chaetae, retractable head region, and papillate body surfaces. Two genera within this family, *Flabelliderma* Hartman, 1969, and *Flabelligera* Sars, 1829, resemble each other closely, but differ in that the body papillae of *Flabelliderma* form large tubercles, often coated with sediment particles, rather than elongate filaments within a gelatinous sheath, as in *Flabelligera* (Salazar-Vallejo, 2007). This feature makes the detection of *Flabelliderma* species difficult, because they can be overlooked or confused with sediment granules or debris. This may explain why *Flabelliderma* species are poorly known, despite the wide distribution of the genus.

During recent biodiversity surveys, two specimens of a species of *Flabelliderma*, closely resembling the north-eastern Atlantic species *F. claparedei* (de Saint-Joseph, 1898), were collected from the Eastern Mediterranean coast of Turkey. This collection represents the first re-

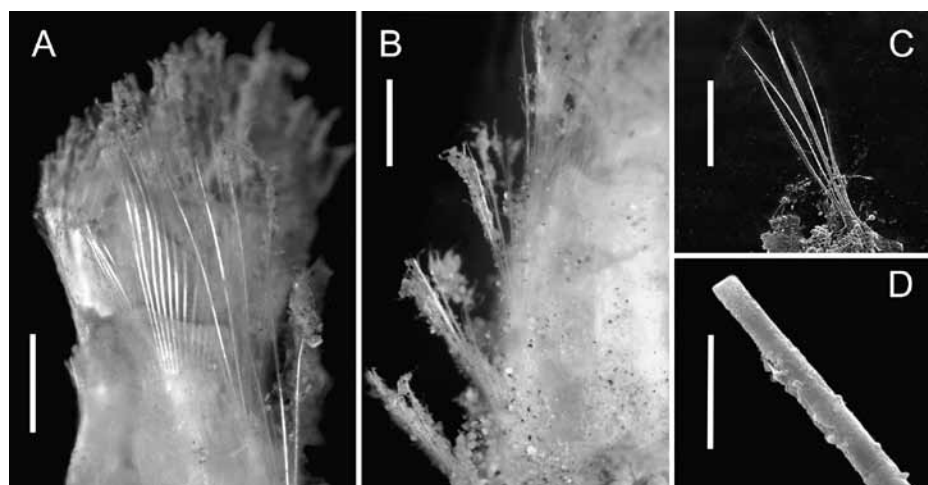
cord of the genus *Flabelliderma* for the Mediterranean Sea. Upon examination, the species proved to be new to science. A description of this new species, along with a discussion of its taxonomic affinities, is presented herein.

### **Material and Methods**

Two specimens of the new species were obtained from Kaş (Antalya, southern Turkey) in August 2009. The collection of specimens was carried out by SCUBA diving. The specimens were photographed alive soon after collection, and were relaxed in 5% MgCl<sub>2</sub>, prior to fixation and preservation in 75% ethanol. Close-up photographs of the holotype were taken using a digital SLR camera (Nikon D700 D-SLR with 60 mm Micro Nikkor lens), and light micrographs were taken using a digital camera (Olympus DP25) mounted on a compound (Olympus CX31) or stereo (Olympus SZ61) microscope. For scanning electron microscope (SEM) observations of the notochaetae capillaries, a parapodium from chaetiger 5 was dissected from the body, critical-point dried, mounted on a copper stub, coated with gold, and examined in a Philips XL20 SEM. The holotype and one paratype are deposited in the Istanbul University Science Faculty Hydrobiology Museum (IUSHM), Turkey.



**Fig. 1:** *Flabelliderma cinari* sp. nov., holotype (IUSHM- 20100310-01). (A) Living animal in dorsal view; B–F, same specimen after fixation. (B) ventral view; (C) close-up of the median region, in ventral view, showing the sediment covered tubercles; (D) anterior end in dorsal view; (E) tip of a neuropodial hook from a median chaetiger; (F) close-up of the median region, in ventral view, showing the position of a neuropodial hook. Scales A, B = 1 mm; C = 200  $\mu$ m; D = 500  $\mu$ m; E = 50  $\mu$ m; F = 100  $\mu$ m.



**Fig. 2:** *Flabelliderma cinari* sp. nov. (A) Paratype (IUSHM- 20100310-02), anterior end showing the cephalic cage chaetae in dorso-lateral view, sediment cover removed; (B) same, some anterior chaetigers, left parapodia in dorsal view, sediment cover removed; (C) holotype (IUSHM-20100310-01), notochaetal fascicle in parapodium 5; (D) same, notochaetal distal article. Scales A, B, C = 500  $\mu$ m; D = 20  $\mu$ m.

## Results

### Systematics

Class POLYCHAETA Grube, 1850

Order FLABELLIGERIDA Pettibone, 1982

Family FLABELLIGERIDAE de Saint-Joseph, 1894

Genus *Flabelliderma* Hartman, 1969

Type species: *Stylarioides papillosa* Essenberg, 1922.

### Diagnosis

Flabelligerid with cephalic cage chaetae short, in a single continuous series. Dorsal surface with tubercles, often incorporating fine sediment particles. Parapodia laterally placed along the body. Notopodial lobes thin or ovoid, projected, free from the body surface, sometimes including large globular papillae. Neurochaetal hooks with multiarticulated handle and crests entire, bent. Free living in rocky or mixed bottoms, rarely symbiotic with sponges.

*Flabelliderma cinari* sp. nov.

(Figs. 1, 2)

### Type material

Holotype (IUSHM-20100310-01) and one paratype (IUSHM-20100310-02) collected in Kaş (36°09'34"N, 29°44'47"E), southern coast of Turkey, Eastern Mediterranean Sea, 12 m depth, 7 August 2009, sand, under a small boulder (ca. 25 cm in diameter), in a *Cymodocea nodosa* meadow, SCUBA diving, coll. S.Ü. Karhan.

### Description

Both holotype (IUSHM-20100310-01) and paratype (IUSHM-20100310-02) complete, soft, light brown, 10 mm long, approximately 3 mm maximal width, with 27 chaetigers. Body slightly convex dorsally, flat ventrally, densely covered with irregular, lobate tubercles covered by fine sediment particles. Tubercles number 22-24 per segment dorsally and laterally (Fig. 1A). Dorsal tubercles of two different sizes: several large, long, and many smaller, more globular; ventral tubercles all small, globose (Fig. 1B, C). Notopodial papillae fused to each other, coated with sediment particles forming ovoid notopodial lobes; notochaetae completely embedded. Notopodial lobes shorter than adjacent dorsal tubercles; individual papillae distally rounded. Dorsal tubercles with fine sediment, larger along the lateral margins, soft, clavate with narrow bases. Neuropodia conical, projected lobes, masked by globular tubercles, only neuropodial hooks protruding from the ventral surface. Anterior end with cephalic cage completely covered with tubercles, cephalic chaetae not exposed (Fig. 1D).

Prostomium a high cone, with four dark-reddish eyes in rectangular arrangement, very close to each other, anterior ones larger. Caruncle well-developed, lateral keels

elevated, thin, median one wider, swollen. Palps long, bases rounded, small. Two branchial groups with about 40 filaments each. Nephridial lobes placed at the level of prostomium.

Cephalic cage chaetae (Fig. 2A) about one-sixth body length, about half as long as body width (excluding chaetae). Chaetigers 1-3 of about the same length. Chaetal transition from cephalic cage to body chaetae abrupt; neuropodial hooks present from chaetiger 2, one per ramus.

Parapodia well-developed. Notochaetae multiarticulate capillaries with short median and basal articles, longer ones distally. Each notopodium with 7-8 at most multiarticulate capillaries (Fig. 2B, C), articles long (Fig. 2D), extended about three tenths of notochaetal length (35µm to 200µm total length), embedded in the parapodial lobe. Neurochaetae multiarticulate hooks from chaetiger 2, mostly a single hook per ramus, ventral in position (Fig. 1F); hooks not completely covered by the neuropodial chaetal lobe. Handle with three longer articles medially, becoming progressively longer, distal articles shorter. Curved distal articles, especially those of posterior parapodia, darker, tapering, slightly curved at tip, fairly uniform in shape throughout the body (Fig. 1E). Posterior chaetigers shorter. Posterior end slightly tapering; pygidium with terminal anus, short muscular ring, without anal cirri.

### Etymology

The new species is named after Dr. Melih Ertan Çinar, in recognition of his extensive contributions to polychaete taxonomy and to the knowledge of the polychaete fauna from the Eastern Mediterranean Sea. The epithet is a noun in the genitive case.

### Remarks

*Flabelliderma cinari* sp. nov. is closely allied to *F. claparedei* from the Bay of Biscay, in having dorsal tubercles of two different sizes. However, these two species differ in several features. First, in *F. cinari* the dorsal tubercles have rough surfaces owing to the different sizes of adhering sediment particles, whereas in *F. claparedei* dorsal tubercles have smooth surfaces owing to the homogeneous sizes of the sediment particles. Second, there is a slight difference in the relative number of sediment tubercles, since there are 22-24 per segment in *F. cinari* and about 20 in *F. claparedei*. Third, there are 7-8 multiarticulate capillaries per notopodium in *F. cinari*; whereas there are 12-14 in *F. claparedei*. And lastly, the distal articles of the neuropodial hooks differ. Those of *F. cinari* are sharper and less distally curved than those of *F. claparedei*, which are blunt and with more strongly curved tips.

On the other hand, in having irregular dorsal tubercles, *F. cinari* resembles *F. ockeri* Salazar-Vallejo, 2007. However, these two species differ in two main features.

First, in *F. ockeri* the dorsal tubercles vary greatly in size, such that two distinct sizes cannot be determined, while in *F. cinari* the dorsal tubercles are of two clearly distinct sizes. Further, the notopodial lobes in *F. ockeri* are clearly expanded distally, often showing large, globular papillae, while in *F. cinari*, the notopodial lobes are small, lobate, not expanded distally and lack globular papillae.

*Flabelliderma cinari* can be distinguished from the other species in the genus using the key below.

#### Type locality

Kaş (36°09'34"N, 29°44'47"E), southern Turkey, Eastern Mediterranean Sea, 12 m depth, under boulders in a *Cymodocea nodosa* meadow.

#### Distribution

Only known from the type locality in the Eastern Mediterranean coast of Turkey.

#### Key to species of *Flabelliderma* Hartman, 1969

1. Dorsum covered with large tubercles or papillae, often with sediment particles . . . 2
  - Dorsum covered with small globular papillae . . . 7
2. Dorsal tubercles soft, clavate with a narrow base . . . 3
  - Dorsal tubercles tough, digitate or rectangular, with a broad base . . . *F. ockeri* Salazar-Vallejo, 2007.
3. Notopodial lobes smooth, individual papillae distally rounded . . . 4
  - Notopodial lobes hirsute, individual papillae distally pointed with distinct mucrones. . . *F. gourdoni* (Gravier, 1906)
4. Dorsal tubercles of two different sizes . . . 5
  - Dorsal tubercles of a single type, clavate . . . 6
5. Dorsal tubercles smooth; curved distal articles of neuropodial hooks blunt, distally incurved; 12-14 capillaries per fascicle in notopodia . . . *F. clapparedei* (de Saint-Joseph, 1898)
  - Dorsal tubercles rough; curved distal articles of neuropodial hooks sharp, not markedly incurved distally; 7-8 capillaries per fascicle in notopodia . . . *F. cinari* sp. nov.
6. Notopodial lobes with little sediment (living in sponges); 20-22 papillae per transverse row per segment, all shorter than notopodial lobes . . . *F. lighti* Salazar-Vallejo, 2007
  - Notopodial lobes with abundant fine sediment (living in sandy bottoms or kelp holdfasts); 12-14 papillae per transverse row per segment, most about as long as notopodial lobes, some longer . . . *F. papillosa* (Essenberg, 1922)

7. Dorsal papillae without sediment particles; notopodial lobes short and thick . . . *F. pruvoti* (Fauvel, 1930)
  - Dorsal papillae with sediment particles; notopodial lobes long and slender . . . *F. berkeleyorum* Salazar-Vallejo, 2007

#### Acknowledgements

We would like to thank Volkan Demir, Evrim Kalkan, Inés López, and Baki Yokes for their kind help in the field. We are also very thankful to Dr. Th. Kanellopoulos for the SEM micrographs and to Elizabeth Hemond for polishing the English of the manuscript. This work was partially funded in the framework of MedPAN South - Pilot Project in Turkey by the World Wide Fund for Nature (WWF) Turkey.

#### References

- de Saint-Joseph, A., 1894. Les annélides polychètes des côtes de Dinard, troisième partie (Nephtydiens-Serpuliens). *Annales des Sciences Naturelles, Zoologie*, 7ème série, 17: 1-395.
- de Saint-Joseph, A., 1898. Les annélides polychètes des côtes de France (Manche et Océan). *Annales des Sciences Naturelles, Zoologie*, 8ème série, 5: 209-464.
- Essenberg, C.E., 1922. *Stylarioides papillosa*, sp. nov., a new annelid from the San Diego region. *University of California Publications in Zoology*, 22 (6): 379-381.
- Fauvel, P., 1930. Annélides polychètes de Nouvelle Calédonie recueillies par Mme A. Pruvot-Fol en 1928. *Archives de Zoologie Expérimentale et Générale, Paris*, 69: 501-562.
- Gravier, C., 1906. Sur les annélides polychètes recueillies par l'Expédition Antarctique Française (Aphroditien, Amphinomiens, Flabelligériens, Maldaniens, Ampharétien). *Bulletin du Muséum d'Histoire Naturelle, Paris*, 12: 535-540.
- Grube, A.E., 1850. Die Familien der Anneliden. *Archiv für Naturgeschichte, Berlin*, 16: 249-364.
- Hartman, O., 1969. *Atlas of the sedentary polychaetous Annelids from California*. University of Southern California, Allan Hancock Foundation, Los Angeles, 812 pp.
- Pettibone, M.H., 1982. Annelida. p. 1-43. In: *Synopsis and classification of living organisms*. S.P. Parker (Ed). McGraw Hill, New York.
- Salazar-Vallejo, S.I., 2007. Revision of *Flabelliderma* Hartman, 1969 (Polychaeta: Flabelligeridae). *Journal of Natural History*, 41 (33-36): 2037-2061.
- Salazar-Vallejo, S.I., Carrera-Parra, L.F. & Fauchald, K., 2008. Phylogenetic affinities of the Flabelligeridae (Annelida, Polychaeta). *Journal of Zoological Systematics & Evolutionary Research*, 46 (3): 203-215.
- Sars, M., 1829. *Bidrag til Söedyrenes Naturhistorie*. Dahl, Bergen, 60 pp.