

# ANNALES

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*Annali di Studi istriani e mediterranee*  
*Annals for Istrian and Mediterranean Studies*  
*Series Historia Naturalis, 29, 2019, 2*





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FIRST RECORD OF *FLABELLIDERMA CINARI* KARHAN,  
SIMBOURA & SALAZAR-VALLEJO, 2012 (POLYCHAETA: FLABELLIGERIDAE)  
FROM THE ADRIATIC SEA

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ABSTRACT

Eleven specimens of the flabelligerid polychaete *Flabelliderma cinari* Karhan, Simboursa & Salazar-Vallejo, 2012 were found in colonies of the Mediterranean stony coral *Cladocora caespitosa* (Linnaeus, 1767), in the northern Adriatic Sea. This finding represents the first record of the species outside its type range and provides additional information on its area of distribution and potential ecological role.

**Key words:** *Flabelliderma cinari*, *Cladocora caespitosa*, symbiosis, northern Adriatic

PRIMA SEGNALAZIONE DI *FLABELLIDERMA CINARI* KARHAN, SIMBOURA & SALAZAR-  
VALLEJO, 2012 (POLYCHAETA: FLABELLIGERIDAE) NEL MARE ADRIATICO

SINTESI

Undici esemplari del polichete flabelligeride *Flabelliderma cinari* Karhan, Simboursa & Salazar-Vallejo, 2012 sono stati osservati all'interno delle colonie della madrepora a cuscino *Cladocora caespitosa* (Linnaeus, 1767) nell'Adriatico settentrionale. Si tratta della prima segnalazione di questa specie al di fuori dell'area di ritrovamento del suo olotipo e ha permesso di ottenere ulteriori informazioni sulla sua distribuzione e sul suo potenziale ruolo ecologico.

**Parole chiave:** *Flabelliderma cinari*, *Cladocora caespitosa*, simbiosi, Adriatico settentrionale

## 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. Current understanding of the flabelligerid polychaetes is quite irregular and the whole family presents many taxonomic uncertainties (Salazar-Vallejo, 2012). Within this family, the genus *Flabelliderma* Hartman, 1969, includes species sharing notopodial lobes with globular papillae, dorsal tubercles of varying length, and neuropodial hooks with articulated handle and blunt entire crest (Salazar-Vallejo, 2007). The latest revision of the genus (Salazar-Vallejo, 2007) described seven species recorded in different habitats from shallow tropical to deep Antarctic waters. The genus *Flabelliderma* was recorded in Mediterranean Sea for the first time in 2012, when the species *Flabelliderma cinari* Karhan, Simboursa & Salazar-Vallejo, 2012 was described, based on a record from the Turkish coast of the Eastern Mediterranean Sea (Karhan *et al.*, 2012).

During a research carried out on the fauna associated with the Mediterranean stony coral *Cladocora caespitosa* (Linnaeus, 1767) eleven specimens of *F. cinari* were collected from the northern Adriatic Sea. This collection represents the first record of this species outside its type locality. A brief description of the species, along with

additional information on its distributional range and ecological role, is presented herein.

## Material and Methods

Eleven specimens of *F. cinari* were found in the Gulf of Trieste (northern Adriatic Sea) strictly associated to colonies of the scleractinian coral *C. caespitosa*. The collection of the colonies was carried out by SCUBA diving in 2012 at four different sites (Fig. 1) between depths of 4 m and 9 m (Tab. 1).

Colonies fix to small rocks and detritus, and they were easily detached from the substrate without hammer and chisel, collected, immediately put in plastic buckets full of seawater and brought to laboratory. The total volume of each colony (Tab. 1) was measured through water displacement, after covering them with a plastic foil (Schiller, 1993). The precise percentage of living polyps within colonies was also estimated in laboratory (Tab. 1). Colonies were broken apart and animals were sorted from coral fragments under a stereomicroscope, then fixed and preserved in 75% ethanol. Diagnostic characters of the specimens were examined, drawn and photographed under a compound microscope. Light micrographs of the specimens were taken using a digital camera (Olympus DP25) mounted on a compound (Olympus CX31) and a stereo (Olympus SZX16) microscope. All specimens are deposited at the Marine Biology Station of the National Institute of Biology in Piran, Slovenia.

## RESULTS

## Taxonomic account

Class POLYCHAETA Grube, 1850

Order TERESELLIDA *sensu* Rouse & Fauchald, 1997

Family FLABELLIGERIDAE de Saint-Joseph, 1894

Genus *Flabelliderma* Hartman, 1969

*Flabelliderma cinari* Karhan, Simboursa & Salazar-Vallejo, 2012

## Material examined

Eleven specimens, two of them incomplete, one lacking the anterior and the other lacking the posterior part, northern Adriatic Sea (Gulf of Trieste, Slovenian coast), spring 2012.

## Description

All specimens soft, light brown. Complete specimens from 6 mm of length and 1.6 mm of width, with 18 chaetigers, to 19 mm long and 5.5 mm of maximal width, with 28 chaetigers. Body slightly convex dorsally, flat ventrally, densely covered with irregular, lobate tubercles covered by fine sediment particles (Fig. 2A, 2B). Tubercles number 13 to 20 per segment at maximum body width. Dorsal tubercles of two different sizes. Many small, more



**Fig. 1:** Areas where *Flabelliderma cinari* has been recorded to date, with details of sampling sites where specimens of *F. cinari* were found associated with colonies of *Cladocora caespitosa* (Debeli Rtič – DR, Pacug – PA, Cape Ronek – RR and Strunjanček – STR).

**Sl. 1:** Predeli, v katerih je bila doslej najdena vrsta *Flabelliderma cinari* s podatki o vzorčevalnih lokalitetah, kjer je bila vrsta najdena v kolonijah sredozemske kamene korale (Debeli Rtič – DR, Pacug – PA, Rt Ronek – RR in Strunjanček – STR).

**Tab. 1: Sampling sites with coordinates, sample code, depth, date of sampling, total colony volume, percentage of living polyps and number of specimens of *Flabelliderma cinari* found.****Tab. 1: Vzorčevalne lokalitete s koordinatami, kodo in podatki o globini, celokupni prostornini kolonije, deležu živih polipov in številu najdenih primerkov vrste *Flabelliderma cinari*.**

Sampling site	Latitude (N)	Longitude (E)	Sampling date	Sample code	Depth	Total colony volume	% living polyps	Number of specimens
Cape Ronek	45°32'25"	13°36'56"	9.7.2012	RR2	8.6	195	95	2
Cape Ronek	45°32'25"	13°36'56"	9.7.2012	RR3	8.7	1590	100	1
Cape Ronek	45°32'25"	13°36'56"	9.7.2012	RR4	8.5	955	60	2
Pacug	45°31'34"	13°35'24"	10.8.2012	PA2	6.0	1265	50	2
Pacug	45°31'34"	13°35'24"	10.8.2012	PA3	6.2	1230	60	1
Debeli rtič	45°35'28"	13°42'88"	19.10.2012	DR2	6.0	340	90	1
Debeli rtič	45°35'28"	13°42'88"	19.10.2012	DR5	6.0	2445	80	1
Strunjanček	45°32'5"	13°36'10"	22.8.2012	STR2	4.6	1410	50	1

globular and some bigger ones more elongated and about twice bigger on the dorsal part, while ventral tubercles are all small and globose (Fig. 2A, 2B). Dorsal tubercles with fine sediment, larger along the lateral margins, soft, clavate with narrow bases. Notopodial and neuropodial lobes shorter and masked by adjacent dorsal tubercles, only neuropodial hooks protruding from the ventral surface. Neurochaetae multiarticulate hooks (Fig. 2C), mostly a single hook per ramus, ventral in position; hooks not completely covered by the neuropodial chaetal lobe. Notochaetae multiarticulate capillaries. Each notopodium with 7–8 at most multiarticulate capillaries. Anterior end with cephalic cage (Fig. 2D) completely covered with tubercles and sediments, cephalic chaetae not exposed. Prostomium (Fig. 2D) a high cone, with dark-reddish eyes, caruncle well-developed, palps long, two branchial groups with about 30 filaments each. Posterior end tapering, pygidium without anal cirri.

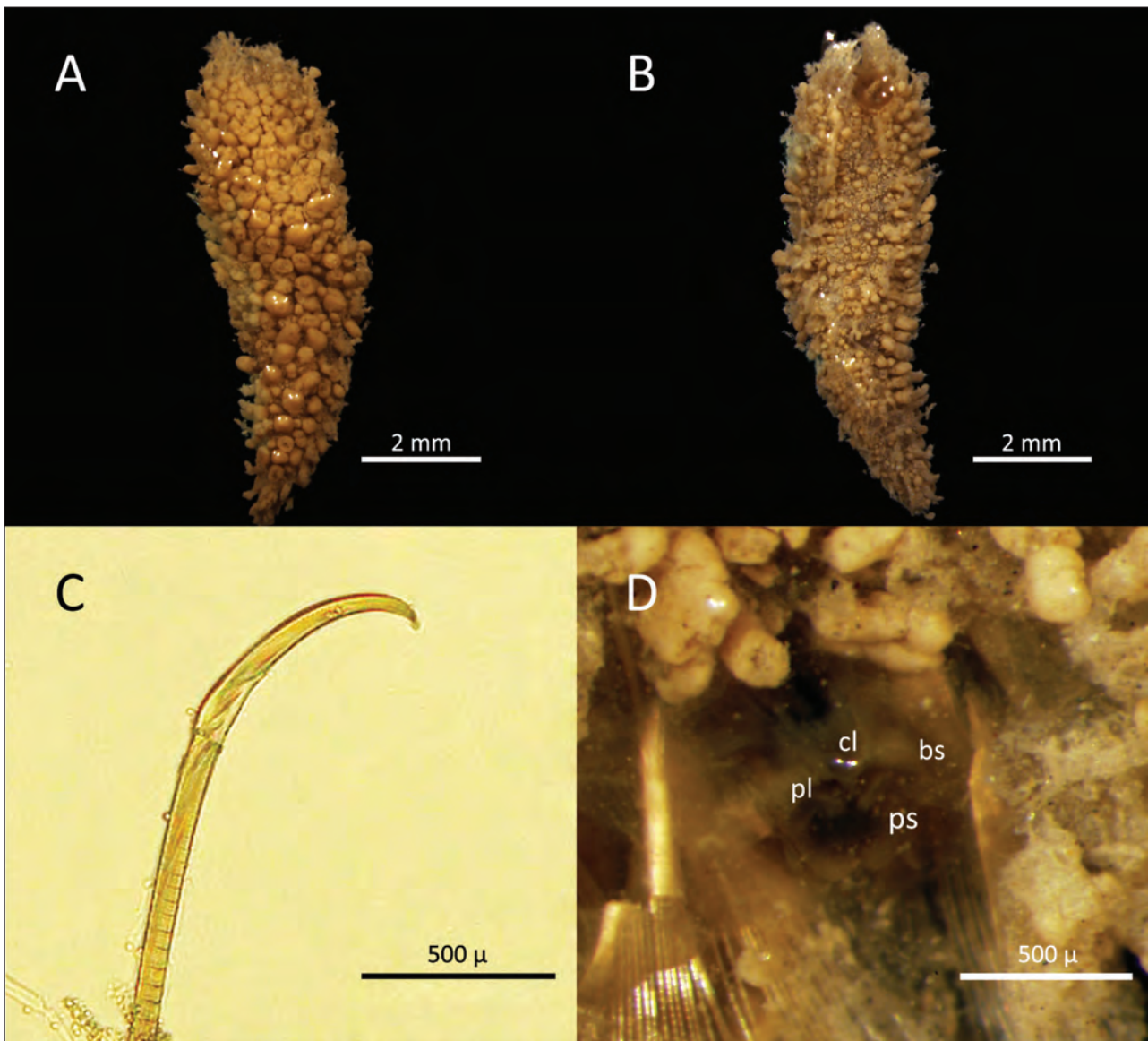
## DISCUSSION

This is the first record of *F. cinari* outside its type locality in the Eastern Mediterranean coast of Turkey. Species of *Flabelliderma* are poorly known, despite the wide distribution of the genus, because they can easily be overlooked or confused with sediment granules or debris (Karhan *et al.*, 2012). In fact, the body papillae of *Flabelliderma* form large tubercles, often coated with sediment particles (Salazar-Vallejo, 2007). Current knowledge is still limited for assessing its distribution and ecology, but it is reasonable to guess a wide geographical and ecological distribution for the species. In particular, the Gulf of Trieste (northern Adriatic Sea) is characterised by the lowest winter temperatures in the Mediterranean Sea (Boicourt *et al.*, 1999), suggesting a wide thermal tolerance for the species. The genus is known for being free living in rocky or mixed bottoms

and often associated with other species (Salazar-Vallejo, 2007; Karhan *et al.*, 2012). This species was found under boulders surrounded by *Cymodocea nodosa* meadow (at the type locality) and in corals surrounded by sciaphilic algal communities (present work).

These new findings prove it to be also a symbiont of the scleractinian coral *C. caespitosa*. Living tropical and temperate scleractinian corals provide microhabitats for a large number of parasitic and commensal associates, which use the tissue and skeletons of the colonies as substrata (Arvanitidis & Koukouras, 1994; Floros *et al.*, 2005; Stella *et al.*, 2011; Pitacco *et al.*, 2014). Most of these coral associates stress the coral to some degree, and some of them can do considerable harm (Sammarco & Risk, 1990; Smith & Harriott, 1998), such as the boring polychaetes species (Sammarco & Risk, 1990) or the corallivorous fireworm *Hermodice carunculata* (Wolf & Nugues, 2013). The newly described autolytine polychaete *Proceraea janetae* is also known to feed on tropical scleractinian corals and its behaviour is closer to parasitism rather than to specialized predation (Martin *et al.*, 2015). Other polychaetes associated with scleractinian corals are carnivores and it has been postulated that some of them can feed directly on their host (Giangrande *et al.*, 2000; Lattig & Martin, 2011), as it happens for the syllid *Haplosyllis spongicola*, feeding on the sponge host (Martin *et al.*, 1998). However, coral associates could also have a mutualistic relation with their host. This is the case of the serpulid *Spirobranchus giganteus*, settling on different scleractinian hosts (Hunte *et al.*, 1990; Marsden *et al.*, 1990). The coral provides the worm with support, nutrition and protection from predation and the worm enhances water circulation for coral feeding, and provides a refuge for polyps adjacent to the tube from predation and algal growth (DeVantier, 1986; Ben-Tzvi *et al.*, 2006). Commensalisms are the most abundant relationships among symbiotic polychaetes. However,





**Fig. 2:** Dorsal (A) and ventral (B) view of *Flabelliderma cinari* after fixation, tip of a neuropodial hook from a median chaetiger (C) and anterior end showing the cephalic cage chaetae in dorsal view, sediment cover, palps and tentacles removed (D). Legend: cl = caruncula, bs = branchial scars, ps = palp scars, pl = palp lobes.

**Sl. 2:** Dorzalni (A) in ventralni (B) pogled na primerek vrste *Flabelliderma cinari* po konzerviranju, konica neuropodialnega kavljca iz sredinskega hetigerja (C) in sprednja konica naglavnih ščetin (dorzalno), potem ko je bil odstranjen sediment, palpi in lovke (D). Legenda: cl = caruncula, bs = škvrčne brazgotine, ps = palpne brazgotine, pl = režnji na palpih.

their status may be further modified with the appraisal of new information on host-symbiont relationships (Martin *et al.*, 1998). Commensal polychaetes prefer organisms providing them with good shelter or animals possessing protective physiological or morphological characteristics (Martin *et al.*, 1998). Scleractinian corals provide them holes and grooves within their skeletons, as well as good chemical defences, with the nematocysts of their polyps.

All flabelligerids are surface deposit-feeders, and they can be free living or commensal. For instance, *Flabesymbios commensalis* is a commensal of a sublittoral population of the diademid seaurchin *Centrostephanus coronatus* (Verrill, 1867), often observed feeding on the faecal material of its sea urchin host (Spies, 1975). *Flabelliderma pruvoti* has been recorded in Southwestern Pacific Ocean among corals and breaking corals, and *Flabelliderma lighti* was found associated

with a species of yellow sponge (Salazar-Vallejo, 2007). Commensal forms feed in the same manner as the free-living members of the family (Fauchald & Jumars, 1979). All members of the family Flabelligeridae (Fauchald & Jumars, 1979) feed while sitting in crevices using their grooved palps to gather food particles, consisting of unicellular algae and fragments of larger algae and detritus. The nature of the relation between *F. cinari* and *C. caespitosa* requires further evidence for its clarification: it is reasonable to think of *F. cinari* as a commensal or perhaps a mutualistic symbiont. In fact, coral associates can benefit the hosts by removing detritus and coral mucus (Nogueira, 2003). Coral mucus in particular is

an important carrier of energy and nutrients (Marshall & Wright, 1998; Clode & Marshall, 2002), but can also be a vector for coral pathogen bacteria adhesion (Banin *et al.*, 2001), therefore the worm may also have a potential role of pathogen removal.

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## PRVI ZAPIS O POJAVLJANJU VRSTE *FLABELLIDERMA CINARI* KARHAN, SIMBOURA & SALAZAR-VALLEJO, 2012 (POLYCHAETA: FLABELLIGERIDAE) V JADRANSKEM MORJU

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*Avtorji poročajo o najdbi enajstih primerkov mnogoščetinca iz družine Flabelligeridae Flabelliderma cinari Karhan, Simboursa & Salazar-Vallejo, 2012 v koloniji sredozemske kamene korale Cladocora caespitosa (Linnaeus, 1767) v severnem Jadranu. Najdba predstavlja prvi zapis o pojavljanju te vrste izven njenega območja pojavljanja in podaja dodatne podatke o razširjenosti te vrste in njeni potencialni ekološki vlogi.*

**Ključne besede:** *Flabelliderma cinari*, *Cladocora caespitosa*, simbioza, severni Jadran

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