

Onubactis rocioi gen. et spec. nov., a new species of Actiniidae (Anthozoa: Actiniaria) from the southern Iberian Peninsula

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Key words: Actiniaria; Actiniidae; *Onubactis rocioi* gen. et spec. nov.; southern Iberian Peninsula.

A new genus and species of sea anemone, *Onubactis rocioi* gen. et spec. nov. (Actiniidae) is described from the Atlantic coast of the southern Iberian Peninsula.

The main features of *Onubactis rocioi* are: a smooth to corrugate scapus, a delicate scapulus provided with a ruff of non-adherent papillate outgrowths, absence of acrorhagi, more mesenteries distally than proximally, a weak diffuse sphincter, and presence of numerous spirocysts in the pedal disc.

The new genus is discussed in relation to five other genera which are characterized by a distal ruff of columnar outgrowths: *Actinostella* Duchassaing, 1850; *Oulactis* Milne-Edwards & Haime, 1851; *Saccactis* Lager, 1911; *Isocradactis* Carlgren, 1924; and *Isoulactis* Carlgren, 1959. Of these, it seems closest to *Saccactis*.

Introduction

During storms in February 1986 and March 1987, nine specimens of a hitherto unknown sea anemone were found in the estuary of the Rio Piedras, washed up on the beach of El Portil, province of Huelva, Atlantic coast of the southern Iberian Peninsula. The presence of living individuals of this sea anemone in two consecutive years on the beach of El Portil suggests that its natural habitat is to be found somewhere in deeper water down this beach, where sandy and muddy bottoms predominate. However, observations in situ in this estuarine area so far were impossible due to strong and dangerous tidal currents.

The present paper provides a description of this new species and a discussion on its affinities.

Material and Methods

The specimens were relaxed using menthol crystals in sea-water, fixed in 10% formalin/sea-water and subsequently preserved in 6% formalin/sea-water. Some specimens were transferred later to 70% ethanol. For histological purposes fragments of tissue were dehydrated in ethanol or butanol, and embedded in paraffin. Histological sections, 6-10 μ m thick, were stained with Ramón & Cajal's Triple Stain (Gabe, 1968).

Measurements of cnidae were taken from undischarged capsules in squash prep-

arations of preserved tissue at 1000× magnification with Nomarski interference contrast optics. The nematocyst typology used is basically after Schmidt (1969; 1972), the terminology after Stephenson (1928: 62-63) and den Hartog (1980: 7-8; 1995: 156).

The specimens were deposited in the Museo Nacional de Ciencias Naturales de Madrid, Spain (MNCN), the Nationaal Natuurhistorisch Museum (NNM; formerly Rijksmuseum van Natuurlijke Historie, RMNH), Leiden, The Netherlands, and at the Laboratorio de Biología Marina, Universidad de Sevilla, Spain (LBM).

Descriptive part

Family Actiniidae Goldfuss, 1820

Onubactis gen. nov.

Type species by monotypy: *Onubactis rocioi* spec. nov.

Diagnosis.— Actiniidae with well developed pedal disc. Column differentiated into a relatively firm scapus and thin-walled scapulus with a ruff of hollow papilla-like outgrowths. Scapus smooth to slightly corrugate. Acrorhagi absent. Arrangement of tentacles and mesenteries hexamerous. More mesenteries distally than proximally. Mesenteries 48, arranged in four cycles: those of cycles I-III fertile, those of cycle IV microcyclic, without filaments and gonads, and only present in the distalmost part of the body. Stomodaeum with two siphonoglyphs supported by two pair of directives. Sphincter weak, diffuse to restricted diffuse. Retractors of the mesenteries very strong and diffuse. Zooxanthellae absent.

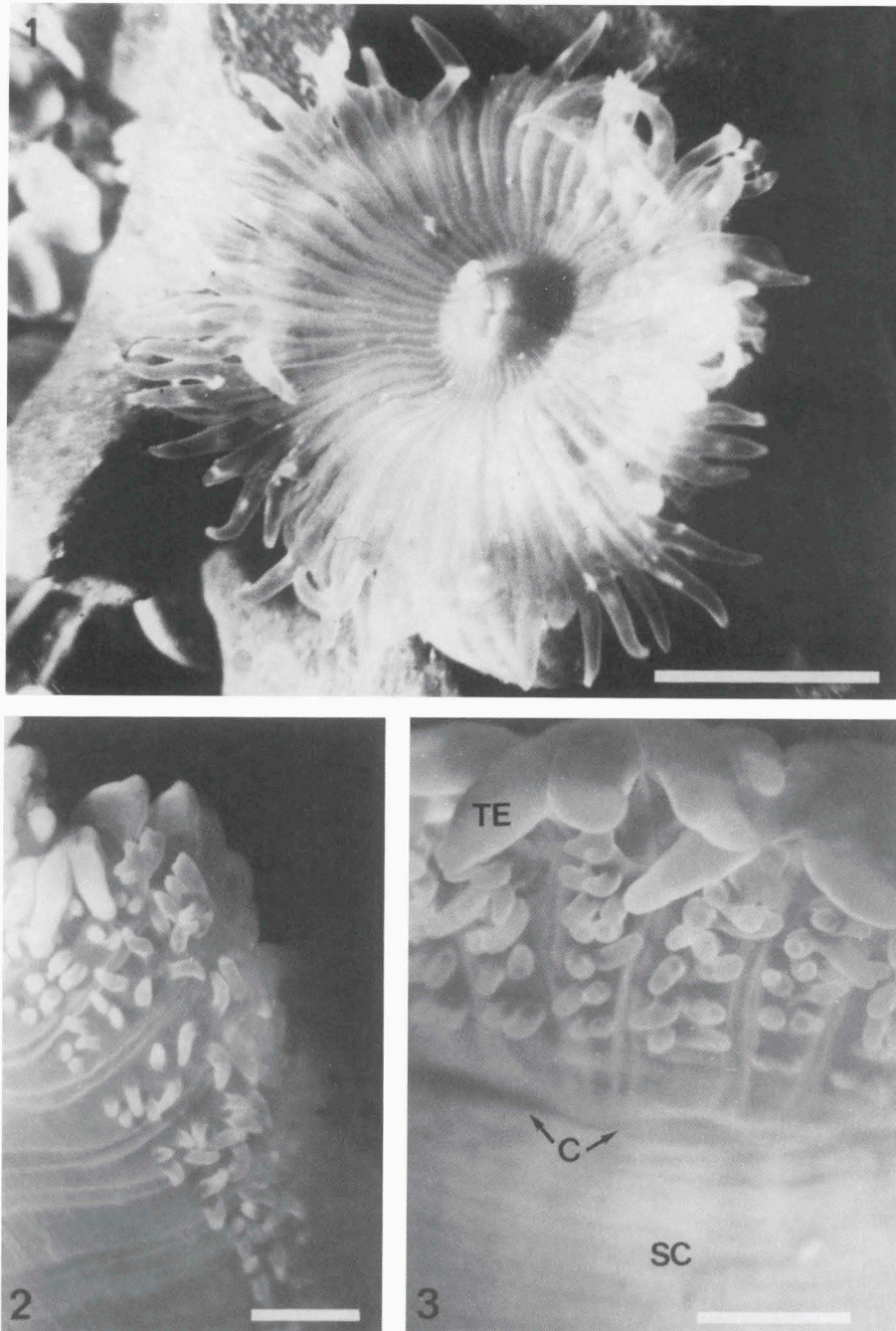
Cnidom: spirocysts (numerous in tentacles and base), spirulae (in all body parts), penicilli A (in filaments only) and penicilli B1 (present in sparse numbers in filaments).

Etymology.— The generic name is a combination of the Latin *Onuba* (= Huelva: the province in Spain where the new genus was found) and *actis* (Greek for ray or radius). The gender is feminine.

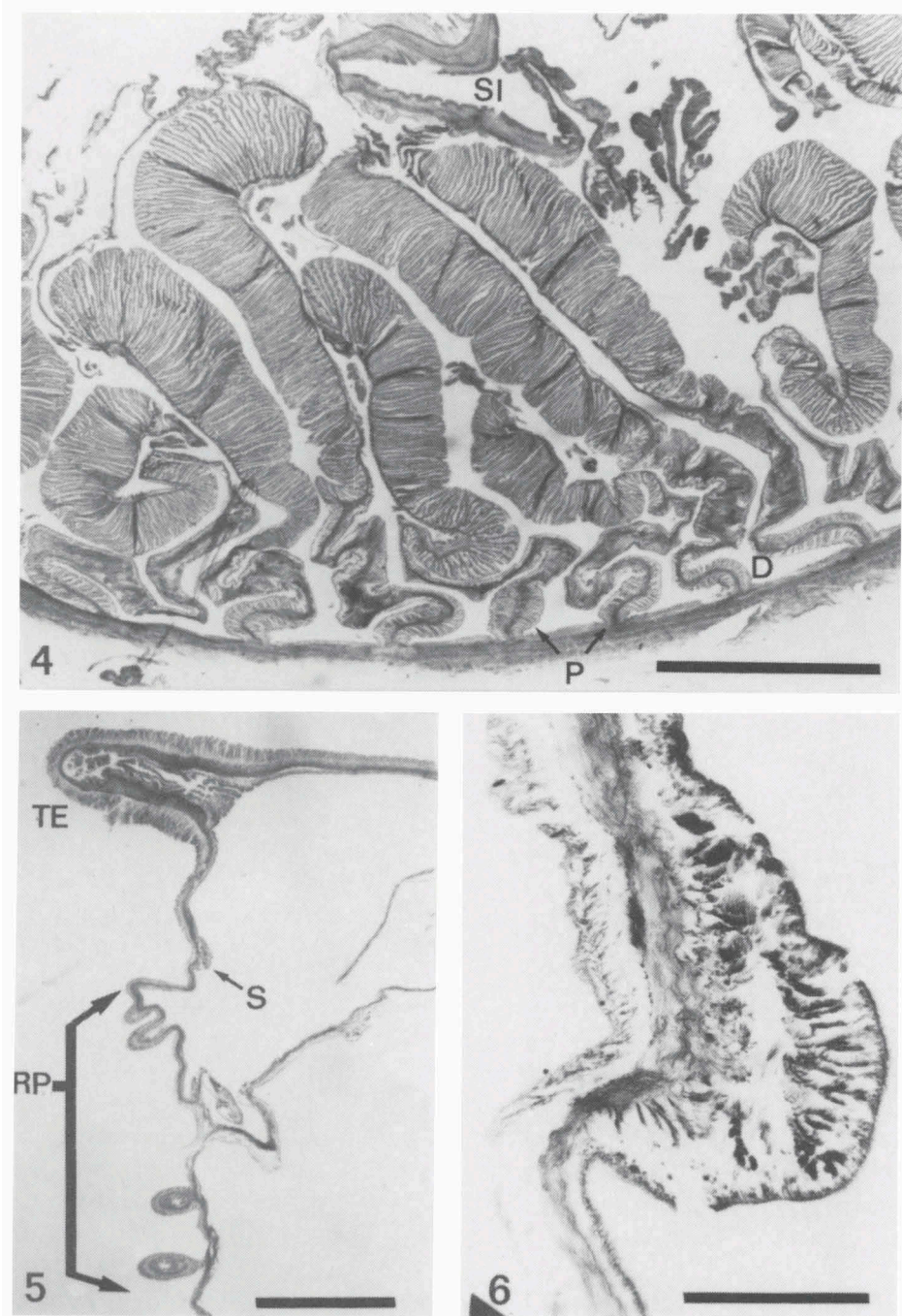
Onubactis rocioi spec. nov.
(figs 1-7)

Material.— MNCN 2.04/390 (holotype, El Portil, Huelva, southern Iberian Peninsula, 37°18.40'N 7°07.50'W, 16.ii.1986, leg. P. López-González); LBM s.n. (same data; 2 paratypes, one of them fragmented); RMNH Coel. 19694 (same data, ii.1986; 1 paratype); LBM s.n. (same data, iii.1987; 3 paratypes, one of them fragmented; a 4th specimen was completely destroyed during histological work, and its remnants disposed of); RMNH Coel. 19695 (same data, 15.iii. 1987; 1 paratype + 3 histological slides).

Morphology (figs 1-3).— Pedal disc well developed, slightly exceeding diameter of the column, firm, with thick ectoderm and with distinct concentric and radial furrows. Column cylindrical, up to 5 cm in diameter and 6.5 cm in height (holotype), divided into a relatively firm scapus and a delicate, thin-walled scapulus, in preserved specimens about $\frac{1}{8}$ to $\frac{1}{10}$ of the column length and separated from the scapus by a more or less distinct constriction. Scapus in both living and preserved specimens opaque and smooth to slightly corrugated. Scapulus thinwalled and semi-translucent, clearly showing mesenterial insertions, at least the distal $\frac{2}{3}$ provided



Figs 1-3. *Onubactis rocioi*, morphological details. Fig. 1. Oral disc and tentacles of living individual; note raised hypostome and short, about equally long marginally arranged tentacles. Figs 2, 3. Distal region of the column showing tentacles (TE) and scapulus with ruff of endocoelic papillae (two rows per endocoel); note mesenterial insertions, and the constriction (C) between opaque scapulus (SC) and semi-translucent scapulus in fig. 3. Scale bars: fig. 1 = 25 mm; figs 2, 3 = 5 mm.



Figs 4-6. *Onubactis rocioi*, anatomical details. Fig. 4. Transverse section of column showing mesenteries with strong diffuse retractors and parietal muscles (P); note pair of directives (D) connected with siphonoglyph (SI). Fig. 5. Longitudinal section of distal part of column showing tentacle (TE), thin-walled scapulus with weak, diffuse endodermal sphincter (S), and ruff of papillae (RP). Fig. 6. Detail of diffuse endodermal sphincter. Scale bars: fig. 4 = 4 mm; fig. 5 = 1 mm; fig. 6 = 100 μ m.

with endocoelic, hollow, papilla-like (rarely bifurcate) outgrowths, arranged in parallel rows of 7-13 papillae each, two rows corresponding to each endocoel. The three to six distalmost pairs of papillae on a short, acute marginal lobe. Acrorhagi absent.

Diameter of oral disc about equally large to slightly exceeding that of scapus. Mouth on a definite cone surrounded by a slight depression. Stomodaeum with two externally visible siphonoglyphs.

Tentacles short, all about equally long (ca 8-12 mm in the living holotype, ca 3-4 mm in the preserved holotype), up to 96 in number, marginally arranged, so that it is hard to distinguish between the different cycles.

Colour.— Scapus and base of living individuals dirty opaquely white. Scapulus, oral disc and tentacles whitish and semi-translucent; tentacles sometimes at about halfway their length with a small, distinct white spot. Stomodaeum whitish. Preserved specimens (both in formalin and alcohol) are dirty white to flesh-coloured.

Anatomy (figs 4-6).— Mesenteries 48 pairs, hexamerously arranged in four regular cycles. More mesenteries distally than proximally. Cycle I and II perfect, cycle III imperfect. Cycles I-III with well-developed gonads. Cycle IV microcnemic, without a trace of filaments and gonads, and only present in the distalmost portion of the column. Sexes separate. Stomodaeum with two distinct siphonoglyphs supported by two pairs of directives. Retractor muscles of cycles I-III diffuse and very strong. Parietobasilar muscle without a free flap, moderately strong and about equally developed as the adjacent parietal part of the longitudinal muscle sheet on the retractor side of the mesenteries, together forming a muscular band that can be referred to as a parietal muscle. Basilar muscles well developed. Sphincter endodermal, diffuse and very weak, situated just below the tentacles. Endoderm without zooxanthellae.

Scapus without the slightest indication of verrucae or other specialisations; it has a distinct circular muscle sheet, which is relatively strong at the boundary with the scapulus. Scapulus delicate, without circular muscles. Scapus and scapulus differ distinctly in thickness. Scapus ca 800 μm thick: mesogloea with projections toward the exterior ca 550 μm , ectoderm ca 40 μm and endoderm ca 200 μm . Scapulus and wall of papillae ca 80 μm thick: mesogloea and ectoderm ca 30 μm each, endoderm ca 20 μm .

Cnidom (fig. 7).— A survey of the cnidom of the species is presented in table 1. Four details are worth mentioning, viz.: 1) the abundance and relatively large size of spirocysts in the ectoderm of the pedal disc; 2) the decrease in size of the ectodermal spirulae from the base, via the scapus to the papillae of the scapulus; 3) the apparent absence of penicilli A in the stomodaeum; and 4) the (sporadic) presence of penicilli B1 in the filaments.

Etymology.— The species is named for Rocío Juan, who generously supported the senior author with the preparation of his PhD thesis on the anthozoan fauna of the Strait of Gibraltar.

Distribution and ecology.— At present, *Onubactis rocioi* is only known from the estuary of the Rio Piedras on the south Atlantic coast of Spain (see introduction).

The marginal ruff of papillate outgrowths of the species represents a considerable increase in surface, which may be functional in the uptake/exchange of dissolved oxygen and carbondioxide, and, as suggested by several authors (e.g. Sassaman &

Table 1. *Onubactis rocioi*, survey of the cnidom of the holotype (MNCN 2.04/390) (H) and a paratype (RMNH Coel. 19695) (P).

+++ = very common, ++ = common, + rather common, - = uncommon, - - - = sporadic.

Body part	Nematocyst type	Specimen	Mean and range (in parentheses) of length and width of nematocyst capsules in μm	N	Frequency
1. Pedal disc	a. Spirocysts	H	29.5(24.0 - 33.8) \times 2.9(2.7 - 3.1)	20	+++
		P	24.7(20.5 - 26.7) \times 2.8(2.7 - 2.9)	20	++/+++
	b. Spirulae	H	19.9(17.4 - 22.7) \times 2.4(2.3 - 2.7)	30	++
		P	15.9(13.4 - 18.2) \times 2.2(2.0 - 2.5)	40	+
2. Scapus	a. Spirulae	H	16.7(12.9 - 19.6) \times 2.1(2.0 - 2.3)	30	++
		P	14.8(13.4 - 16.5) \times 2.0(2.0 - 2.2)	25	+ / ++
3. Papillae	a. Spirulae	H	10.3(9.3 - 11.6) \times 1.8(1.6 - 2.0)	20	- / +
		P	10.9(8.9 - 13.4) \times ca 1.8	30	+
4. Tentacles	a. Spirocysts	H	ca 13.5 - 24 \times 2.0 - 2.7	—	+++
		P	ca 13 - 25 \times 2.0 - 2.7	—	+++
	b. Spirulae	H	15.2(12.5 - 16.0) \times 1.8(1.6 - 2.0)	10	- - -
		P	15.7(13.4 - 18.7) \times 1.9(1.8 - 2.2)	10	- - -
	c. Spirulae	H	23.8(21.4 - 25.8) \times 2.4(2.2 - 2.7)	20	++
		P	24.9(21.4 - 27.6) \times 2.5(2.2 - 2.7)	50	+++
5. Stomodaeum	a. Spirulae	H	27.2(24.9 - 30.3) \times 2.7(2.7 - 2.9)	20	+ / ++
		P	25.8(21.4 - 29.8) \times 2.8(2.5 - 2.9)	35	+
6. Filaments	a. Spirulae	H	16.8(14.5 - 18.2) \times 1.6(1.3 - 1.8)	20	+
		P	15.5(14.2 - 16.9) \times ca 1.6	20	++
	b. Spirulae	H	28.5(21.8 - 29.6) \times 4.2(3.8 - 4.9)	30	+
		P	30.9(27.6 - 34.7) \times 4.3(3.6 - 4.9)	30	++
	c. Penicilli A	H	19.5(16.5 - 22.3) \times 4.1(3.6 - 4.5)	20	+
		P	21.7(17.8 - 24.9) \times 3.9(3.6 - 4.9)	30	+
	d. Penicilli B1	H	16.3(13.4 - 17.8) \times 3.4(3.1 - 3.8)	13	- - -
		P	17.1(13.8 - 17.8) \times 3.3(3.1 - 3.6)	10	- - -

Mangum, 1972; Riemann-Zürneck and Gallardo, 1990), may represent an adaptation to a life style in bottoms with low concentrations of dissolved oxygen and high organic matter levels.

Whether *Onubactis rocioi* lives unattached, partly or entirely buried in soft substrata (the base primarily acting as a digging organ), or whether the base is normally attached to submerged objects in the bottom can only be guessed at, but the abundant presence of relatively large spirocysts in the basal ectoderm suggests it to be adherent.

Discussion.— *Onubactis rocioi* cannot be confused with any other NE Atlantic and Mediterranean sea-anemone. Its most striking feature is the ruff of non-adhesive, hollow papilla-like outgrowths, which marks the distalmost region of the column; this region is also thinner than the scapus and devoid of circular muscles. The pres-

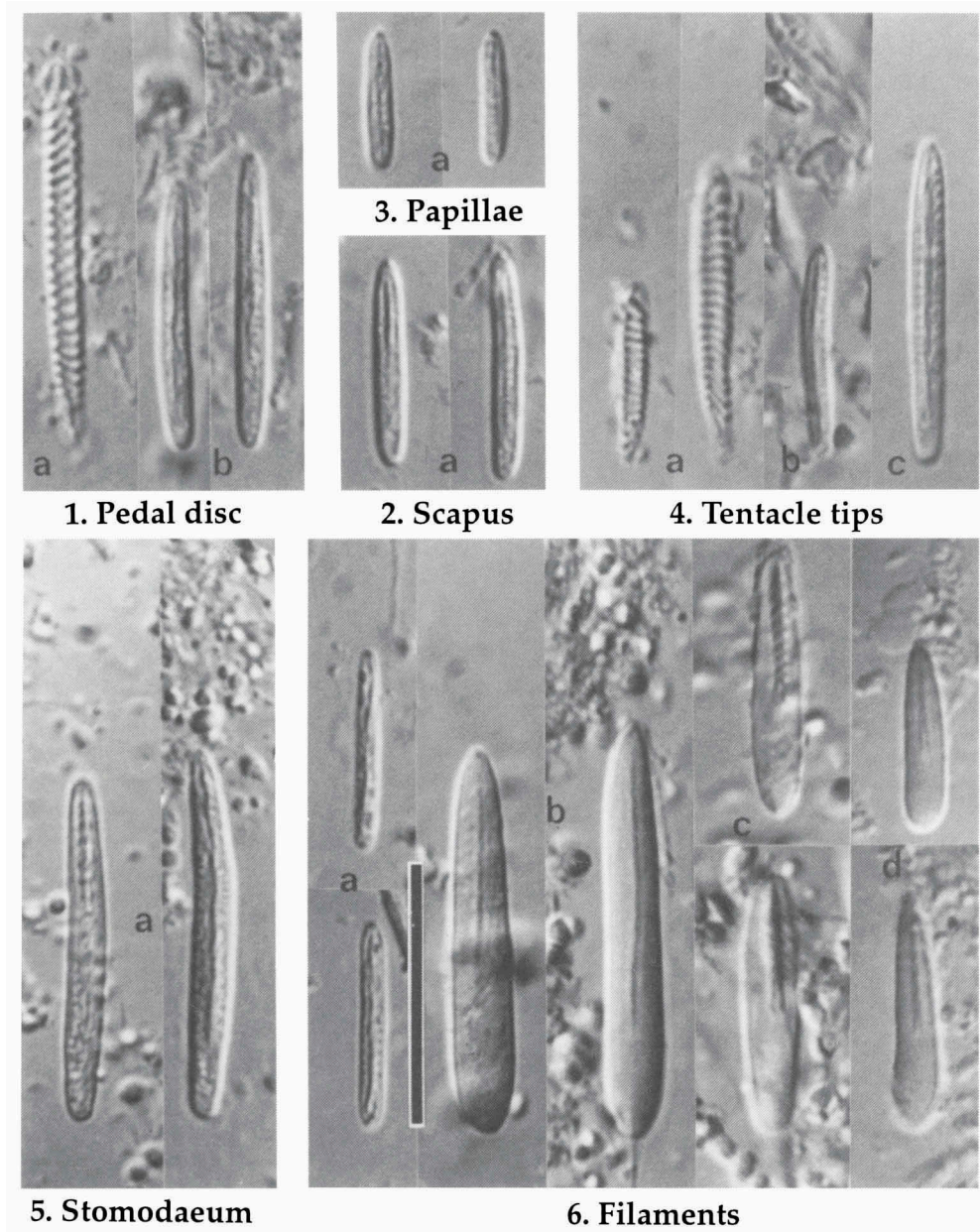


Fig. 7. *Onubactis rocioi*. Pictorial survey of the cnidom, based on the holotype. Numerals and letters correspond to table 1

1. Pedal disc: a. Spirocyst; b. Spirulae. **2. Scapus:** a. Spirulae. **3. Scapular papillae:** a. Spirulae. **4. Tentacles:** a. Spirocysts; b. Spirula; c. Spirula. **5. Stomodaeum:** a. Spirulae. **6. Filaments:** a. Spirulae; b. Spirulae; c. Penicilli A; d. Penicilli B1. Scale bar = 20 µm.

ence of this character is shared with members of the genera *Saccactis* Lager, 1911 (SW Australia; Chile), and *Actinostella* Duchassaing 1850 (= *Phyllactis* Milne-Edwards & Haime, 1851 = *Asteractis* Verrill, 1869) (tropical western Atlantic; Cape Verde and Canary Islands in the tropical/subtropical eastern Atlantic; west coast of tropical/subtropical America). However, in members of these genera the scapus is verrucose, whereas it is smooth to somewhat corrugate (without the slightest histological indication of verrucae) in *Onubactis rocioi*. Moreover, *Actinostella* is a genus of zooxanthellate species with maximally 48 tentacles and strong parietobasilar muscles with a free flap, whereas species of *Saccactis*, unlike those of *Onubactis* and *Actinostella*, usually develop acrorhagi*.

Three other genera with a distal ruff of columnar outgrowths are *Oulactis* Milne-Edwards & Haime, 1851 (New South Wales, Australia), *Isocradactis* Carlgren, 1924 (New Zealand) and *Isoulactis* Carlgren, 1959 (Chile). In these three genera the column is verrucose and not differentiated into a thick-walled scapus and a thin-walled scapulus. The similarities and differences between these last three genera were recently preliminary reviewed and discussed by Riemann-Zürneck & Gallardo (1990).

Although a revision of all the genera mentioned in the present discussion is necessary for a detailed comparison and to appraise the taxonomic value (specific or generic) of differences in the cnidom, it is obvious that *Onubactis* shows the closest resemblance to *Saccactis*. This genus was synonymised with *Oulactis* by Carlgren (1949), but recently restored by Riemann-Zürneck & Gallardo (1990) because of its delicate marginal region lacking circular muscles. The three species of *Saccactis* described by Lager (1911) are exclusively known from the type collections, which unfortunately appear to be in poor condition (cf. Riemann-Zürneck & Gallardo: 450), so that the incomplete original descriptions form the only practical reference to these species. However, a new species, *Saccactis coliumensis* was added to this genus by Riemann-Zürneck and Gallardo, and provided with a detailed description.

It is interesting to note that *Onubactis rocioi* and *Saccactis coliumensis* show striking similarities in the character of the distalmost part of the column (thin-walled, without musculature, and provided with non-adhesive papillae, though generally simple in *O. rocioi* and compound in *S. coliumensis*), the weak diffuse sphincter, and the cnidom (including the absence of penicilli A in the stomodaeum, and the dominant presence of spirocysts in the base). However, the difference in the character of the column of the two species (smooth to somewhat corrugate versus verrucose) and the absence versus presence of acrorhagi are generally regarded as generic characters. Hence, on the basis of these differences, we establish a new genus, *Onubactis*, to accommodate the present new species. Whether the presence of a distal cycle of (inconspicuous) micro-mesenteries is a character of generic importance needs further study. Riemann-Zürneck & Gallardo (1990) do not mention this character in their description of *Saccactis coliumensis*.

*It should here be mentioned that Riemann-Zürneck & Gallardo did not find acrorhagi in two of their seven specimens of *Saccactis coliumensis*, and that in some specimens verrucae were only evident in histological sections. The absence of acrorhagi in the nine available specimens of *Onubactis rocioi* does not, therefore, prove fully beyond doubt that this species cannot develop them.

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