A NEW SPECIES OF *SCANTILETTA* (DEMOSPONGIAE, CLIONAIDAE) FROM THE MEDITERRANEAN PRECIOUS RED CORAL WITH SOME REMARKS ON THE GENUS

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ABSTRACT

A new species, *Scantiletta corallophila*, observed to bore colonies of *Corallium rubrum* is described from different Mediterranean locations. The species is characterized by a spiculation consisting in stout oxeas, short and thin oxeas, vermiform, delicately microspined spirasters and rare spiny microrhabds. We propose, in agreement with the earlier suggestion of de Laubenfels (1936), to include in the genus *Scantiletta* only the species with two size classes of megascleres, vermiform, smooth or slightly spiny spirasters and sometimes spiny microrabds.

Sponge boring affects the scleraxis of the Mediterranean precious red coral (*Corallium rubrum*) and results in a loss of its commercial value (Liverino, 1984; Barletta and Vighi, 1968; Corriero et al., 1997; Bavestrello et al., 1999). Boring sponges, excavating extensive chambers along the scleraxis, may also contribute to coral detachment thus influencing its population structure (Corriero et al., 1997; Cerrano et al., 2001). Despite this important role played by boring sponges on red coral, only few studies have been devoted to the effect of bioerosion (Melone, 1965; Barletta and Vighi, 1968; Corriero et al., 1988; Maldonado, 1992; Corriero et al., 1997; Bavestrello et al., 1999; Calcinai et al., 2000a). In these studies 15 boring sponge species, belonging to different family and to the genera *Aka*, *Alectona*, *Cliona*, *Delectona*, *Scantiletta*, *Spiroxya*, *Thoosa*, have been recorded. Other species of the genera *Dercitus*, *Holoxea*, and *Dendroxea* have been also observed by the authors (unpubl. data).

Corriero et al. (1988, 1997) and Bavestrello et al. (1999), studying the boring species associated to the Mediterranean red coral, reported a species of *Scantiletta* (*Cliona*), identified as *S. sarai*. This species described by Melone (1965), in coral colonies from Sardinia, is characterized by oxeas very variable in size (112 to 1300 μm), not clearly separated in two size categories, sometimes modified to styles or strongyles, and by vermiform spirasters. The specimens recorded by Corriero et al. (1988, 1997) and Bavestrello et al. (1999) are completely devoid of the long oxeas described by Melone, that are supposed foreign by these authors. On the other hand, the lack of the holotype of *S. sarai* makes it impossible to compare our material with Melone's specimen: under these conditions, Melone's *S. sarai* should be considered valid and the sponge attributed to *S. sarai* by Bavestrello et al. (1999) and Corriero et al. (1988, 1997) should be considered belonging to a separate species described here as *S. corallophila* n. sp.

Materials and Methods

The material consists of dried portions of colonies of *C. rubrum* scleraxis collected from different sites of the Mediterranean coasts (Italy, France, and Spain). Depth is known only for the material directly collected by the authors in Portofino (Italy).

Sponges were studied by opening bored cavities present in basal portions of the red coral; dehydrated sponge tissue filling the chambers was mounted *in toto* on a slide. Spicules preparations for light microscopy and SEM were obtained by dissolving sponge fragments taken from the chambers in 60% nitric acid, rinsing them with water, dehydrating in ethanol. The pitting pattern of the boring chambers was also observed by SEM after removing of organic matter, boiling coral fragments in hydrogen peroxide (39% weight/volume: about 130 vol.).

Type material is deposited at the Museum of Natural History of Genoa (MSNG).

Systematic Account

Family Clionaidae d'Orbigny, 1851

Genus *Scantiletta* de Laubenfels, 1936

Diagnosis.—Clionaids displaying the alpha stage only. Two size classes of megascleres: the larger are smooth oxeas, with frequent modifications to styles or strongyles; the second type of megasclere can be oxeas, subtylostyles or styles. The largest megascleres are disorderly arranged but sometimes form tracts in the boring chambers or in the canals connecting the chambers; the spicules of the shortest category are arranged in palisade in the papillae. Microscleres are vermiform, smooth, or slightly spiny spirasters. Spiny microrhabds may be also present.

Type Species.—*Scantiletta levispira* (Topsent, 1898).

Scantiletta corallophila new species
(Figs. 1,2E,E′,E″)

Material Examined.—Holotype: MSNG 50852, Santa Teresa di Gallura; Italy, 1987. Paratype: MSNG 50853, Palma di Majorca; Spain, 1986. Other material: several fragments from Castiglione di Rovello, Montaldo di Castro, Portofino (30–35 m depth), Italy; Corsica, France.

Description.—The sponges have been recorded in dead and living coral colonies. Sponge papillae, 200–400 μm in diameter, have been observed only on the basal portion of the scleraxis devoid of the living coenenchime cover (Fig. 1A). The papillar skeleton is composed by the smaller oxeas disposed as a palisade (Fig. 1A,B). The boring chambers, 1–4 mm wide, are subspherical, polygonal, prevalently located in the central part of the scleraxis, in its basal portions. In dry preserved specimens the tissue filling the chambers is yellow and the choanosomal skeleton is composed by tracts of the main oxeas and by dispersed microscleres. From the chambers, small pioneer channels arise (Fig. 1C,D). Only vermiform spirasters were observed in the tissue filling these channels. Probably a new papilla originates when a group of these channels reaches the coral surface (Fig. 1D). The pitting patter of boring chamber walls is composed of ovoid scars 30–60 μm in maximal diameter (Fig. 1D,E) derived by the detachment of carbonate chips 25–50 μm in maximal diameter (Fig. 1F,G).

Spiculation.—(a) generally straight or slightly curved, squat oxeas 300–510 × 20–30 μm (419 × 24 μm on average) showing narrowing of their central part (Figs. 1H,2E); the tips are acerate, sometimes mucronate or bifid. Some styles and strongyles (modified

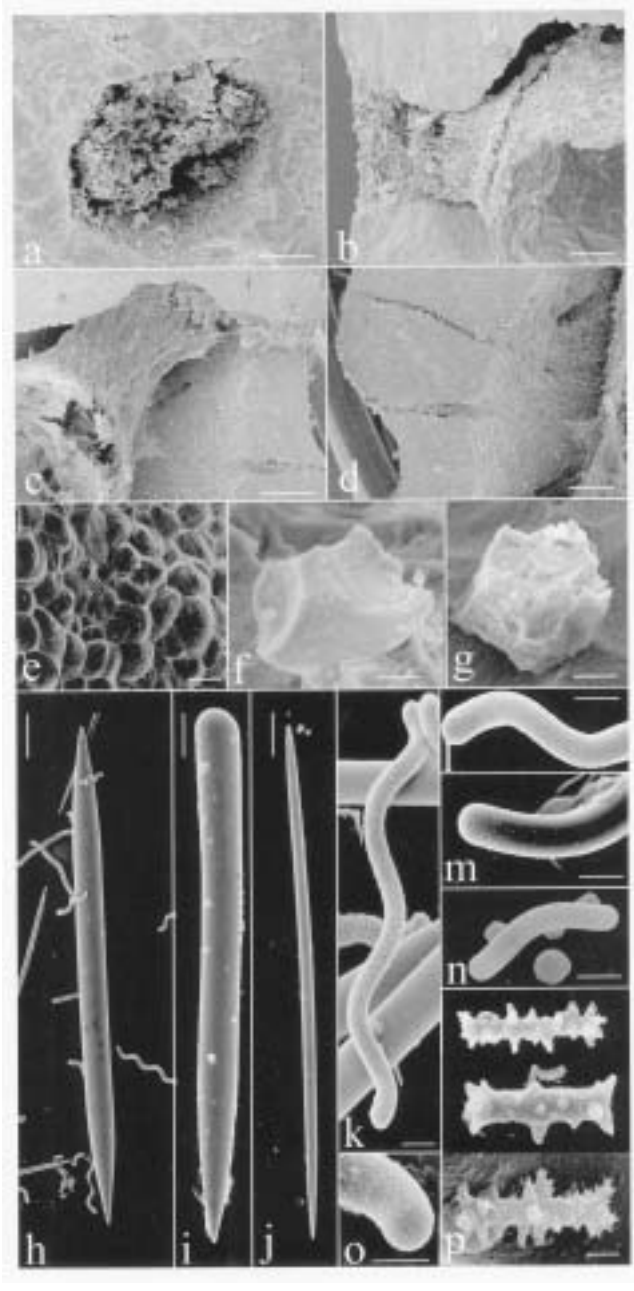

Figure 1. *Scantiletta corallophila,* new species. a, surface view of a papilla; b, transversal view of a papilla showing the papillar canal and the chamber below. c, bored chamber showing the choanosmal skeleton composed by tracts of the main oxeas; d, pioneer channels probably originating a new papilla; e, erosion scars in excavated wall chambers; f,g, sponge chips; h, main oxea; i, modified oxea; j, straight, thin oxea; k, vermiform spiraster; l, particular of vermiform spiraster showing spines arranged on alternate bends; m, particular of a smooth vermiform spiraster, n, bent spiraster; o, magnification of a tip of a spiraster; p, straight, spined microrhabds. Scale bars a,b,d = 100 μm; c = 300 μm; e = 30; f, g = 10 μm; h,i = 40 μm; j = 15 μm; k–o = 4 μm; p = 3 μm.

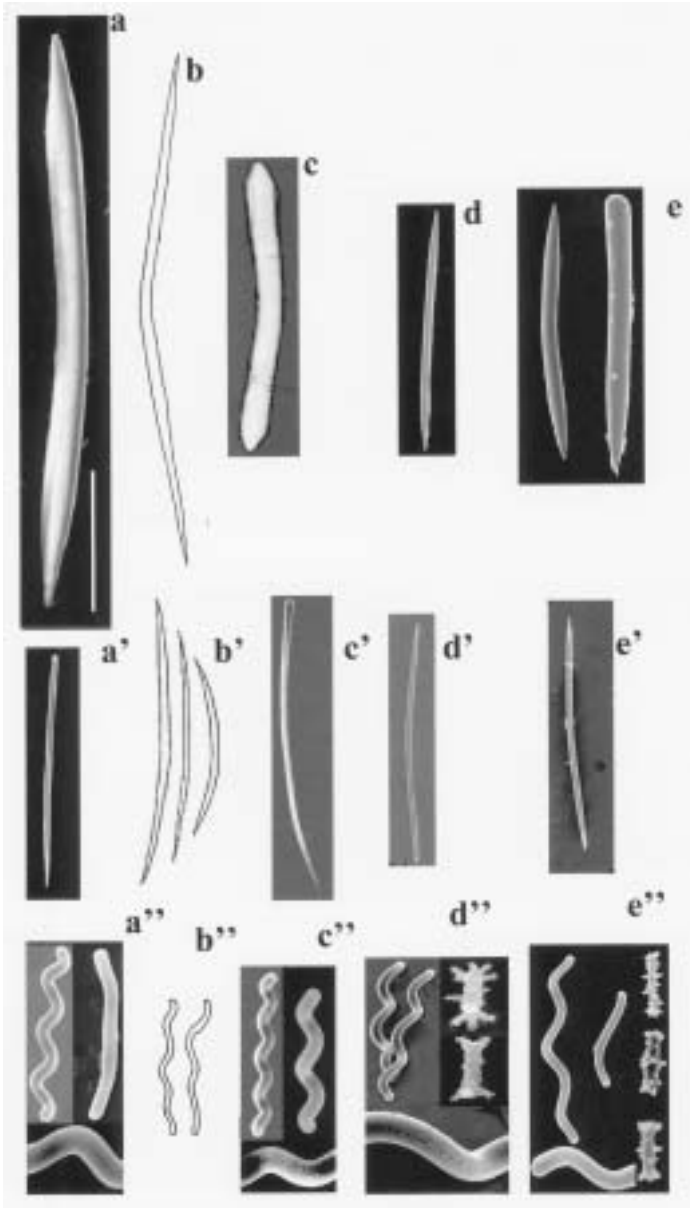

Figure 2. *Scantiletta* species. a–e, large macrosleres to scale with each other. a, curved, large oxea, of *S. macroxeata.* b, bent oxea of *S. sarai.* c, thick, with a central slight thinning oxea of *S. acus.* d, straight oxea of *S. levispira*. e, slightly curved, squat oxeas and modification to strongyle of *S. corallophila*. a′–e′, small macroscleres to scale with each other. a′, thin anisoxea of *S. macroxeata*. b′, slightly curved oxeas of *S. sarai*. c′, needle shaped subtylostyles of *S. acus*. d′, anisoxeas of *S. levispira*. e′, straight and thin oxea of *S. corallophila*. a″–b″, microscleres of *Scantiletta* species to scale with each other (except microrahabds in d″ and e″). a″, SEM micrograph of *S. macroxeata*. b″, *S. sarai*. c″, SEM micrograph of *S. acus*. d″, Sem micrographs of *S. levispira*. e″, SEM micrograph of *S. corallophila* new species. Scale bars a–e = 250 μm; a′–e′ = 100 μm; a″–e″ = 50 μm; microrhabds in d″ and e″ = 25 μm. a,a′,a″ from Calcinai et al. 2001. b,b′,b″ from Melone, 1965. c,c′,c″ from Bavestrello et al. 1995.

oxeas) are present (Figs. 1I,2E). (b) small, straight, thin oxeas (Figs. 1J,2E′), 110–216 × 3–5 μm (184 × 4.4 μm on average). (c) vermiform microspined spirasters sometimes straight or bent (Figs. 1K,N,2E″), 30–100 × 3-4 μm (52 × 3.8 on average). Very thin spirasters, probably young forms, are also present. The presence of spines, that are visible only by SEM analysis, is very variable: some spirasters are completely covered by spines (Figs. 1K,O,2E″), others have the spines arranged on alternate bends (Figs. 1l,2E″) others, with very rare spines look like smooth (Fig. 1M). (d) rare, small straight microrhabds 8–10 × 2 μm covered by microspined outgrowths (Fig. 1P,2E").

Etymology.—For its habit boring the Mediterranean red coral *Corallium rubrum.*

Discussion

The genus *Scantiletta* was erected by de Laubenfels (1936) for *Scantilla spiralis*, Johnson (1899), as *Scantilla* was pre-occupied. According to de Laubenfels (1936) this genus includes clionaids with "only oxeas as principal spicules with spirasters as microscleres" while species "that have as megascleres only oxeas and have as microscleres very short thick streptasters" are included in *Donotella.* In the same paper, the author erroneously transferred *Cliona levispira* Topsent, 1898, with oxeas and vermiform spirasters, to *Donotella*. De Laubenfels' proposal was subsequently neglected and all the species comprised in the two genera were attributed to *Cliona.* In 1997, Rosell and Uriz revised the Clionaidae, based on cladistic, and redefined *Scantiletta* to include species with two sizes of smooth oxeas, amphiasters, and spiny or smooth vermiform microstrongyles. According to this new definition the genus includes (1) all the species of *Scantiletta sensu* de Laubenfels: *S. spiralis* (Johnson, 1899)*, S. levispira* (Topsent, 1898)*, S. sarai* (Melone, 1965), *S. acus* (Bavestrello et al., 1995), *S. macroxeata* Calcinai et al. (2001); (2) the species attributed to *Donotella* by de Laubenfels: *S. acustella* (Annandale, 1915)*, S. pruvoti* (Topsent, 1900).

Within the genus *Scantiletta sensu* Rosell and Uriz, 1997, a group of species is clearly set apart by their characteristic spicule features: two size classes of megascleres, vermiform, smooth or slightly spiny spirasters (microstrongyles, according to Rosell and Uriz, 1997) and sometimes spiny microrabds (amphiasters, according to Rosell and Uriz, 1997). In contrast the phylogenetic position of *S. acustella* and *S. pruvoti,* with oxeas and spiny microrhabds, is ambiguous: they must be interpreted as species that have lost a spicular type (the vermiform spirasters) but they could also be considered related to the genus *Holoxea*, which have a similar spicule features and whose boring aptitude has been recently demonstrated (Calcinai et al., 2001). In this conditions, that need further investigations, we consider more convenient to maintain the de Laubenfels' proposal of two genus: *Scantiletta* for *levispira, sarai*, *acus*, *macroxeata* and the here described *corallophila* n. sp. and *Donotella* for *acustella* and *pruvoti*.

S. spiralis (Johnson, 1899), from Madeira, was not clearly described because only a few taxonomic features were given. As already focused by Rosell and Uriz (1997) the type material is not traceable. Consequently the species *S. spiralis* introduced by Johnson (1899) should be regarded as *nomen nudum* and therefore we consider as the type species of the genus *Scantiletta*, *S. levispira* (Topsent, 1898). Differences between *S. corallophila* n. sp. and the other known *Scantiletta* are summarised in Table 1 and Figure 2. In detail, *S. sarai* differs from *S. corallophila* n. sp. for the greater size of the oxeas that are gener-

Table 1. *Scantiletta* species hitherto described.

Species	Large megascleres	Modification of large megascleres	Vermiform spirasters	Microrhabds	Distribution	Substratum	Depth (m)	References
S. levispira (Topsent, 1898)	Straight or slightly curved oxeas 355–461 × 8–13 μm	Absent	Microspined 26–120 × 2.6–5.2 μm	Spiny 5–7 × 1.5–2 μm	Mediterranean, Atlantic Ocean, Indian Ocean	Corals	200–300	Boury-Esnault et al., 1994
S. sarai (Melone, 1965)	Bent oxeas 750–1330 × 15–25 μm	Styles, strongyles	Smooth 26–78 × 1.5–2 μm	Absent	Mediterranean	*Corallium rubrum*	68–75	Corriero et al., 1988
S. acus (Bavestrello et al., 1995)	Thick, with a central slight thinning oxeas 409–660 × 27–45 μm	Styles, strongyles	Microspined 20–92 × 2–7 μm	Absent	Western Pacific Ocean	*Corallium elatius*	150–200	Bavestrello et al., 1995
S. macroxeata Calcinai et al., 2001	Slightly curved oxeas 900–1500 × 46–56 μm	Styles, strongyles	Almost straight, or irregularly curved, microspined spirasters 22–92 × 2–4 μm	Absent	Western Pacific Ocean	*Corallium elatius*	250–400	Calcinai et al., 2001
S. corallophila n. sp.	Straight or slightly curved, squat oxeas 300–510 × 20–30 μm	Styles, strongyles	Microspined, curved, straight or bend spirasters spirasters 30–100 × 3 μm	Spiny 8–10 × 2 μm	Mediterranean	*Corallium rubrum*	30–35	Present work

ally bent in the middle and devoid of central narrowing (Fig. 2B). Moreover the spirasters of *S. sarai* are slender and more irregularly coiled (Fig. 2B″).

S. levispira, recorded from the Mediterranean Sea, Atlantic and Indian Ocean (Calcinai et al., 2000b), has straight or slightly curved oxeas (Fig. 2D), different in shape and size from those of *S. corallophila* and the smaller type of oxeas often transformed in styles or anisoxeas (Fig. 2D′). *S. levispira* is the only species that shares with *S. corallophila* the presence of microrhabds. Those of *S. levispira* show two groups of spines at their extremities while those of *S. corallophila* are uniformly covered by shorter microspined outgrowths. *S. acus* (Bavestrello et al. 1995) described from the Pacific Ocean has thicker oxeas characterised by short and triangular tips (Fig. 2C), and needle-shaped subtylostyles (Fig. 2C′), instead of small oxeas present in *S. corallophila*; its vermiform spirasters are always regular (Fig. 2C″). *S. macroxeata* (Calcinai et al., 2001) differs from *S. corallophila* in the extremely large size of its megascleres (Fig. 2A) and for the presence of thin anisoxeas (Fig. 2A′). SEM observations of the vermiform spirasters of *S. macroxeata*, *S. acus*, *S. levispira* and *S. corallophila* reveal the presence of fine microspinulation often regularly arranged on alternate bends (Figs. 2A″,C″,D″,E″). In *S. corallophila* this feature is very variable to smooth spirasters as those described by Corriero et al. (1997).

Acknowledgments

We wish to thank F. Cicogna who kindly placed at our disposal the material for the study and M. Pansini for his useful suggestions. This work was supported by Italian MIUR funds.

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Date Submitted: January 26, 2001. Date Accepted: August 10, 2001.

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