

# The hydranth of *Salacia tetracythara* (Cnidaria: Hydrozoa: Sertulariidae) and its modified tentacles

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*Study of living colonies of Salacia tetracythara Lamouroux, 1816, led to an accurate description of the hydranths and adjoining tissues. A mantle is reported for the first time for this species, lining stem, hydrocladia and hydrotheca. An adcauline nematocyst clump located in the median part of the column, composed of large microbasic mastigophores, is also reported as a new structure for sertulariids. The hypothetical modified tentacles noted by Billard (1925) are confirmed and re-described. Among the 22–28 tentacles of the hydranth in a cirlet, two exhibit nematocyst-bearing organs connected at base. These organs are massive, racket-shaped, refringent, and composed of large microbasic mastigophores. They do not affect the tentacles in respect of their general shape and behaviour. One nematocyst-bearing organ can sometimes be linked to more than one tentacle depending on its size. The abcauline position of the two modified tentacles imparts a strong bilateral symmetry to the hydranth. This location explains why only one modified tentacle was previously described from preserved material, the second being hidden by the first when hydranths are retracted inside the hydrotheca. The modified tentacles of S. tetracythara are compared with the nematodactyls of the genus Nemaecium, with the ligula found in several sertulariid species, and with nematophores described in other thecate families. Beside remarks on species taxonomy and distribution, incitation is given to the study, with emphasis especially on hydranths.*

**Keywords:** Hydrozoa, Sertulariidae, *Salacia tetracythara*, hydranth, tentacles, ligula, mantle, nematocysts cluster, nematophores, taxonomy

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## INTRODUCTION

The family Sertulariidae is probably the largest within Hydrozoa, with about 500 species according to Bouillon *et al.* (2006). It is well known for its colony structure and hydrotheca morphology as taxonomic classification is mainly based, from the very beginning, on skeletal characters of the perisarc (i.e. Naumov, 1960; Millard, 1975). Besides, the scarcity of data on the coenosarc is striking, except for the presence of a caecum, considered of great taxonomic importance from Broch (1918), and of a mantle, though not systematically investigated by the author. Hydranth morphology is still largely unknown because it has to be studied on living colonies. Indeed, the ability of hydranths to withdraw inside the hydrotheca for protection, which is evident upon fixation of the animal for preservation, prevents observation. Differences between genera and species are then unrecognized (personal observations). Two rare sertulariid hydranth features however are already described, both of them nematocyst-bearing organs. The first is a tongue-shaped structure called ligula by Thornely (1904) for the species he named *Sertularia ligulata*. The second was described by Billard (1925)

as a single abcauline 'racket-shaped' mass of cnidocysts in *Salacia tetracythara* Lamouroux, 1816 and *Salacia hexodon* (Busk, 1852). Billard, who observed only preserved and contracted hydranths, did not give a special name to this structure and said that it could be a modified tentacle situated within the circle of tentacles. Bouillon *et al.* (2006), in their glossary, define the term ligula as 'an extensible outgrowth armed with cnidocysts from the base of the adcauline side of hydranths in some *Salacia* and *Sertularia* (a nematophore?)'. This mixes the two features into a single one and misses the difference in location—abcauline for the organ described by Billard for the *Salacia* species, adcauline for the ligula. In contrast to Cornelius (1995), for whom ligula and nematophores are separated, they also question the appropriateness of calling it a nematophore, a term used within the thecates for specialized zooids present in several families but not in the Sertulariidae (Gravier-Bonnet, 2004).

*Salacia tetracythara* was originally described from Australia and has been reported several times for other locations in tropical and subtropical regions of the Indo-Pacific province (see Rees & Vervoort, 1987 for references). Further, the species was reported at Fiji (Gibbons & Ryland, 1989), Sagami Bay, Japan (Hirohito, 1995), Australia (Watson, 2000) and Kei Islands, Indonesia (Schuchert, 2003). However the original description of the hydranth by Billard (1925), from specimens collected in Indonesia (and not from Madagascar as stated by Rees & Vervoort, 1987), was never completed or revised,

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probably because all the authors focused descriptions on skeleton (perisarc).

The present work is the first carried out on living animals of *S. tetracythara*, a necessary condition for observing soft tissues (coenosarc) and hydranth morphology and behaviour, as already recommended for the study of hydroids (Cornelius, 1998; Gravier-Bonnet & Bonnet, 2000; Gravier-Bonnet, 2008, this volume), and illustrated by earlier work on sertulariids (Nutting, 1904). The results bring new data on hydranth morphology (presence of a mantle and of a cluster of nematocysts), and corroborate and complete Billard's description of the modified tentacles.

## MATERIALS AND METHODS

Materials studied are from several islands of the south-western Indian Ocean belonging to the Comoros (Mohéli, Mayotte) and Mascarene (La Réunion, Rodrigues) archipelagos (Gravier-Bonnet & Bourmaud, unpublished results). Living colonies were sampled by SCUBA diving mainly on coral reefs and on nearby rocky shores from 5 to 30 m. Collected manually, they were put underwater into plastic bags or jars with a large volume of water to prevent soft tissue damage, and then transported inside isothermic containers. The study of living colonies with a stereomicroscope (Leica M420 or M3Z) was undertaken as soon as possible. Skeletal characteristics of each colony allowed unambiguous identification according to existing descriptions in the literature. Additional laboratory studies and measurements were carried out in La Réunion with a compound microscope equipped with Nomarski interference (Nikon Eclipse 80i). Microphotographs were taken with digital cameras (Nikon Coolpix 4500 and DS-Fi1). Video sequences were registered with a Sony Camscope. Specimens were then fixed in 4% formaldehyde in seawater.

## SYSTEMATICS

### *Salacia tetracythara* Lamouroux, 1816

*Salacia tetracythara* Lamouroux, 1816: 214, pl. 6, figures 3a, B–C; Deslongchamps, 1824(\*); Bedot, 1901: 462, 499; Stechow, 1922: 150; Stechow, 1923: 214; Billard, 1909a: 1064; Billard, 1924: 54–55, 66; Billard, 1925: 202–204, figure 47, pl. 8, figures 27–28; Dawydoff, 1952: 55 (\*\*); Pennycuik, 1959: 194; Mammen, 1965: 54, figure 87; Rédier, 1966: 81; Van Praët, 1979: 891–892, figure 61; Rees & Vervoort, 1987: 103–104, figure 6d; Gibbons & Ryland, 1989: 414–415, figure 31; Hirohito, 1995: 183, figure 60a–c; Watson, 2000: 23, figure 18A–F; Schuchert, 2005: 181–182, figure 37 Gravier-Bonnet, 2006: 122.

*Serialaria tetracythera*: Schweigger, 1820: 426 (\*\*); Bedot, 1901: 462.

*Salacia tetracyttara*: Lamouroux, 1821: 15, pl. 67, figures 7 & 9 (\*\*); Bale, 1884: 116–119.

*Thuiaria fenestrata* Bale, 1884: 116–119, pl. 7, figure 7, pl. 9, figure 14; Bale, 1888: 773; Kirkpatrick, 1890: 604; Bale, 1894: 103, pl. 4, figure 2; Nutting, 1905: 934, 950; Hartlaub, 1905: 617; Bartlett, 1907: 42, 64, figure; Thornely, 1916: 149.

*Calyptothuiaria opposita* von Campenhausen, 1896: 312–313, pl. 15, figure 7.

*Thuiaria tetracythara*: Billard, 1909a: 1064; Billard, 1909b: 319–320; Bedot, 1925: 450; Leloup, 1937: 5, 44.

Articles not at my disposal, references from: (\*) Bale, 1884; (\*\*) Bedot, 1901; (\*\*\*) Rees & Vervoort, 1987.

## REMARKS ON TAXONOMY

1—the term '*tetracythara*' was chosen by Lamouroux in reference to a tetramerous structure that was not confirmed further. In the original description—in French and in Latin '*cellulis terebitus, elongatis, quaternatim coalescentibus; oribus annulatis, quasi verticillatis; ovariis ovoïdeis truncatis*'—and on the drawings given by Lamouroux (1816, figure 3a, B, pl. 6), there are four tubes (one not drawn, hidden by the others) ending in identical cups (supposed to be the orifice of the hydrothecae) at the same level, verticillate. This is far from following descriptions of the species that are all near that of the synonym *Thuiaria fenestrata* Bale (1884). Bale, discussing his new species, cited the commentaries in the *Dictionnaire des Zoophytes* of Lamouroux *et al.* (1824) by Deslongchamps on 'the true structure of *Salacia tetracyttara*' after he had studied the collection of Lamouroux. Deslongchamps was the first to remark on the absence of tetramerous verticillate structure in the specimen described by Lamouroux in 1816. Further, Billard (1909b, p. 320; 1925, p. 203), examining the type of Lamouroux, supposed that the presence of triangular spaces below the hydrothecae could have induced an error by Lamouroux who interpreted the specimen as having four hydrothecae in a profile view. Bale (1884, p. 119, footnote) remarked: 'As the genus *Salacia* seems to have been founded on characters which had no existence in the type species, Lamouroux' name has of course no claim to acceptance'. For a while, the species was then cited either as *Thuiaria tetracythara* or *Thuiaria fenestrata*, until Billard (1924) re-established the genus *Salacia* after having re-examined specimens of *tetracythara* when taking into account new generic characters proposed for sertulariids by Levinsen (1913, operculum) and Broch (1918, caecum). He also proposed *Calyptothuiaria opposita* Von Campenhausen, 1896 as a synonym of *S. tetracythara*. Then, and until now, all other authors have agreed with Billard.

2—the *Sertularia crisioides* Lamouroux identified by Busk (1852: 389) is given by Bale (1884: 117–118) as a synonym of *T. fenestrata* from a suggestion of Busk himself, and further as a synonym of *S. tetracythara*. This synonymy seems doubtful because Busk (1852: 387) classified the species in a group with alternate cells (hydrothecae).

3—Pennycuik (1959) described from Queensland, Australia, a variety differing in hydrotheca length. New findings of fertile specimens, from Australia (Watson, 2000) and Indonesia (Schuchert, 2003), cover the gap she noticed between her material and the typical form.

4—Hirohito (1995) doubtfully assigned his material from Japan to *Salacia tetracythara*, remarking that it differed slightly from specimens he examined from Australia, Indonesia and the Indian Ocean, which resembled rather that of Billard, with long hydrothecae and racket-shape nematocyst groups. Conversely, specimens from Japan lack nematocyst-bearing organs. They also lack the characteristic triangular 'window' beneath the hydrotheca floor and the slight zigzag shape of

the stem. Moreover, figures given by Hirohito (1995) show obviously shorter hydrothecae (figure 60a–b) and differing in length/diameter ratio from those from the Indian Ocean (figure 60c). With such differences, specimens from Japan might be assigned to a different species to be described when fertile colonies are found.

#### MATERIAL EXAMINED

La Réunion—Cap La Houssaye: 21 February 2005, 10–15 m; 16 March 2005, 12–15 m; 1 April 2005, 10 m; 4 August 2005, 10–15 m; 13 January 2006, 10–15 m; 13 April 2007, 12 m. Boucan: 6 June 2001, 12–14 m (Trois Grottes); 23 March 2005, 15–20 m (Tour); 4 July 2005, 30 m (Grandes Gorgones); 27 April 2005, 15–20 m (Tour). Saint-Leu: 17 February 2005, 10 m (Langoustière); 28 October 2006, 30 m (Saliba).

Rodrigues—Le Chaland Sud: 28 November 2006, ROD16, 15 m; Le Chaland Nord: 29 November 2006, ROD32, 25 m; Cotton Bay: 12 June 2006, ROD104, 15–20 m.

Mayotte—Passe en S: 25 October 2006, MAY92, 40–55 m and MAY102, 20–26 m; Saziley: 26 October 2006, MAY142, 12–15 m; 27 October 2006, MAY192, 5–8 m.

Mohéli—Ouallah Un: 18 October 2006, MOH33, 2–6 m; M'Chaco: 21 October 2006, MOH79, 12–18 m.

#### RESULTS

**Colonies** erect and rigid, in one plane, light brown, up to 10 cm, settled on organic hard substrates on the outer slope of coral reefs and on basaltic cliffs, usually covered with diatoms, microscopic algae and particulate matter, this giving them a characteristic mucky appearance but not affecting the behaviour of the hydranth which remained able to extend and retract inside the hydrotheca (Figure 1). Stem rigid, mostly unbranched or with few branches, often polysiphonic at the base, nodes usually not visible, sub-opposite hydrothecae in two lateral rows with no contact between the rows, three hydrothecae between two successive hydrocladia on one side, hydrocladial apophyses not well demarcated from the hydrocladium (Figure 2A).

**Hydrocladia** straight and rigid, strictly in one plane, alternate, of maximal length at median part of stem (then diminishing slightly and regularly from middle towards base and

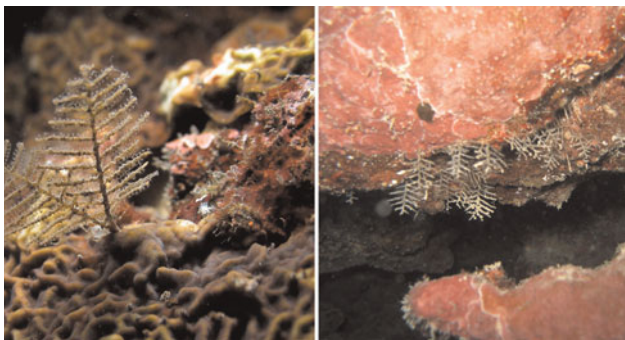
top) (Figures 1 & 2A), nodes almost not visible and usually detected only by a weak diameter constriction of hydrocladia between two successive pairs of hydrothecae, opposite or sub-opposite hydrothecae settled in two lateral rows with no contact, members of one row in contact or not, sometimes slightly overlapping (Figure 2B, C, F, G, L). Coenosarc on the growing tips usually bright orange.

**Hydrotheca** tubular, almost entirely adnate, adnate adcauline wall straight except distally, ending by a short free adcauline wall slightly curved, abcauline wall straight curving distally, with one small intrathecal abcauline thickening just under the aperture corresponding to operculum hinge, hydrothecal opening untoothed and approximately oval, almost parallel to main axis (Figure 2C, F, G, K, L). Operculum of one valve being an extension of the abcauline wall, bending just underneath the aperture, closing the hydrotheca in an intrathecal location in front of the orifice; pushed out by the hydranth while extending; during extension, remaining in contact with the column and becoming almost invisible; never opening further whereas the column itself remains in contact with the skeleton at the orifice of the hydrotheca, and thus the hydrotheca always remaining closed, even during the extension of the hydranth (Figure 2C, D, G, L).

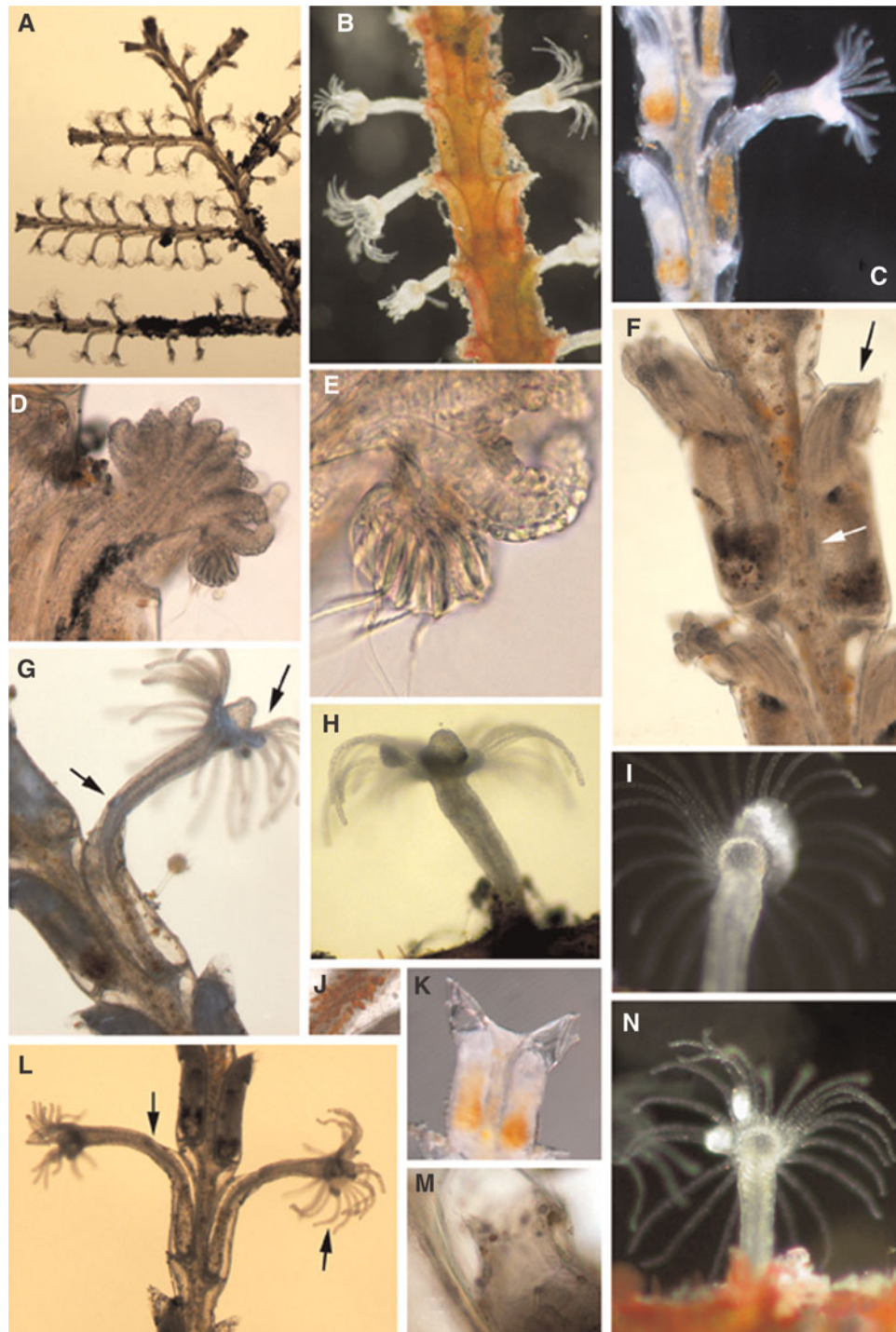
**Mantle** a thin layer of ectoderm lining the entire inner side of the skeleton of the colony, including the hydrotheca; at many points continuous with the ectoderm surrounding the coenosarc tubes inside stems, branches and hydrocladia; also linked to the ectoderm of the hydranth inside the hydrotheca; entirely enclosing hydranths when they are retracted, because wrapped around them (Figure 2M); mainly transparent (Figure 2K) but, in many areas of the stems and hydrocladia, it includes glandular cells with large and deep orange secretive granules (Figure 2J).

**Hydranth** with no caecum, due to its attachment to the skeleton on hydrotheca floor only (Figure 2G, L); column very extensible, length of extended hydranth two times that of the hydrotheca (1 mm), differentiated into proximal digestive and distal parts differing for both endoderm and ectoderm, bearing a small refringent nematocyst cluster in the middle of the adcauline side, located just above the hydrothecal aperture on extended hydranths (Figure 2F, G); large conical rounded hypostome (Figure 2G, H) surrounded by a crown of 22 to 28 tentacles, two of which are modified by large nematocyst-bearing organs on abcauline side (Figure 2N); tentacles of regular diameter, rounded at tip, with very small nematocysts dispersed and not prominent; marked bilateral symmetry in extension, obvious during tentacle folding and enhanced by abcauline nematocyst organs and adcauline cluster (Figure 2A, B, G, I, L, N). Column, tentacles and hypostome uncoloured except for white circle at tentacular level (visible in blue-grey on Figure 2G); stomach often exhibiting a deep orange coloration arising from pigmented glandular cells and turnover of waste products (Figure 2C, K).

**Nematocyst-bearing organs** on 'modified tentacles' as one pair per hydranth, both on abcauline side, looking singular in lateral view especially on contracted hydranths, the first hiding the second, with about 2–3 tentacles in between (Figure 2G, H, L, N); racket-shaped, strongly refringent, formed of a bundle of large microbasic mastigophores (Figure 2D, E, N); linked to the base and on the external side of a single tentacle when small (Figure 2D), but the larger ones attached to several tentacles (Figure 2I); much larger than a tentacle: about



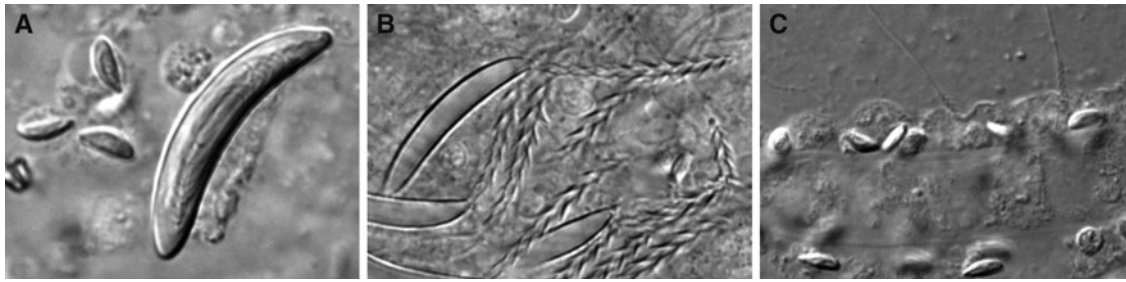
**Fig. 1.** *Salacia tetracythara* colonies (*in situ*, about 4–5 cm high): on the left long hydranths emerging from the 'mucky' skeleton are visible (underwater photographs by D. Caron at La Réunion on the left and C. Bourmaud at Rodrigues on the right).



**Fig. 2.** *Salacia tetracythara* trophosome: (A–C) parts of colony and hydrocladia with hydranths contracted and in extension (1 cm); (D, E) one modified tentacle on abcauline side of a semi-contracted hydranth, with racket-shaped nematocyst-bearing organ (E: close-up view); (F) hydranths retracted into hydrothecae (0.5 cm); (G, H) profile view of hydranths in extension showing a single modified tentacle and adcauline nematocysts cluster (G): the bilateral symmetric shape in (G) is at rest, the circular one in (H) is during release of waste products; (I) big nematocyst-bearing organ covering the base of several tentacles at a time; (J) bright orange cells in the mantle of hydrocladia coenosarc; (K) profile view of hydrothecae with smooth orifice; (L) a pair of hydranths with columns obviously in two parts, the basal digestive part being swollen by gastrovascular flux on left; (M) mantle tightened under the hydrotheca orifice during hydranth contraction (tips of tentacles on base), with coloured cells; (N) the pair of modified tentacles on a hydranth viewed from underneath. On (F, G) and (L), the arrows indicate the location of adcauline nematocysts clusters and modified tentacles (microphotographs by N. Gravier-Bonnet).

40/55  $\mu\text{m}$  on a contracted hydranth; usually with no autonomy but moving during tentacle activity and changing shape slightly, except for a large one, almost rounded in shape and flat, that was seen unfolding very slowly while, consequently, elongating.

**Cnidome:** microbasic mastigophores of two kinds very different in shape, size and location (Figure 3A–C). Tentacles: small, pip-shaped, undischarged capsules 5.1–5.8/1.6–2.1  $\mu\text{m}$ ; tubule everting longitudinally, shaft a bit longer than capsule (Figure 3C). Nematocyst-bearing organs and



**Fig. 3.** *Salacia tetracythara* cnidome. (A–C) Microbasic mastigophores nematocysts of two types: (A) undischarged large and small; (B) large discharged; (C) small undischarged and discharged on tentacles (microphotographs taken with compound microscope on more or less squashed preparations by N. Gravier-Bonnet).

nematocysts clusters: large, banana-shaped, capsules 26–28/4.3–4.7  $\mu\text{m}$  (undischarged), 23–26/3.2–4.3  $\mu\text{m}$  (discharged); tubule everting with an angle from 120 to 90°, shaft as long as the capsule, 26/1  $\mu\text{m}$ , enlarging slightly from base to tip and equipped with big spines (Figure 3A, B).

## DISCUSSION

The discovery of the presence of *Salacia tetracythara* in the Mascarene (La Réunion and Rodrigues) and Comoros (Mohéli and Mayotte) archipelagos extends the distribution of this tropical Indo-Pacific species to the south-west of the Indian Ocean.

Morphological characters of the trophosome of the specimens studied (colonies, hydrocladiae and hydrothecae) agree with those already described and figured (Bale, 1884; Billard, 1925; Gibbons & Ryland, 1989; Watson, 2000; Schuchert, 2003). According to the authors, the hydrotheca orifice of *S. tetracythara* is either said to be toothed (i.e. ‘two obscure lateral and one large pointed adcauline’ for Gibbons & Ryland, 1989) or smooth (Billard, 1925; Hirohito, 1995) as in this study. I agree with Billard (1924, 1925) who explained clearly that these teeth, previously checked by Bale (1884) for *T. fenestrata*, are not true teeth but angles made up by the skeleton plates of the hydrotheca wall at the orifice, due to its peculiar non-circular shape (Billard, 1925, figure 47P). But it is possible that these angles may be more marked in some specimens (Watson, 2000, figure 18D).

This study observes and describes in *S. tetracythara* for the first time: (i) a mantle lining the whole colony and the hydrothecae; and (ii) an adcauline nematocyst cluster on the hydranth column. According to the literature at my disposal, there is no other such cluster described for a sertulariid. The mantle is noted in several but not all sertulariid species, sometimes under the name ‘ectoderm lining’, and also in thysocypheids (Millard, 1975; see Bouillon *et al.*, 2006 for a definition). Nutting (1904) recalled that Hartlaub (1901) suggested that the hydrotheca was lined by an epithelial membrane in *Sertularella* species, but he did not succeed in finding it. As presence of the mantle seems not to be a constant feature within a single genus, according to genera diagnosis in use presently, it has never been used for classification. However, it is probably an important character to take in consideration to separate groups of species, maybe at generic level. What is the function of the mantle, and what functional difference its presence or absence implies for an individual is unknown.

Present results on *S. tetracythara* hydranths confirm the presence in the species of abcauline modified tentacles as

interpreted by Billard (1925). These results pinpoint their location and content (microbasic mastigophores), and reveal the presence of two per hydranth instead of one, these tentacles imparting strong bilateral symmetry to the hydranth. Identical to all others in shape, size, and structure, the modification they exhibit is a basal connection to a nematocyst-bearing organ. The width and length of one organ are variable, probably related to the number of large nematocysts inside. In consequence, when it reaches a large size, it is connected not to a single tentacle, very thin at the base, but to several at once. There are then several modified tentacles per hydranth and two large nematocyst-bearing organs suspected to grow enough to join in a single big one (Figure 2I). The behaviour of modified tentacles appears to be unaffected by the presence of nematocyst-bearing organs. Observed by light microscopy, these organs look like clusters of nematocysts, but they probably are true organs. Indeed, on video sequences read at low-speed, a large one was recorded slowly unfolding, and then reaching about twice its former length, as if it had been enrolled on itself when at rest. This obscure behaviour was checked once only though hydranths were studied several times. It has to be confirmed by additional observations.

Among the family Sertulariidae, the single tentacle with large nematocysts noted for *Salacia hexodon* (Busk, 1852) by Billard (1925) and Schuchert (2003), but not by Watson (2000), looks like the modified tentacles of *S. tetracythara* for its shape and location. Future studies of living specimens should confirm if it is really single or paired as in *S. tetracythara*. Another peculiar feature concerning tentacles is a smaller structure—perhaps composed of nematocysts—that was described for *Sertularia exerta* Allman, 1888, as a little cushion-like prominence at the base of every tentacle (Allman, 1888). Within the Haleciidae, modified tentacles characterizing the genus *Nemalium*, the nematodactyls, are twin and not symmetrically disposed within the tentacle circle as those of *S. tetracythara*, but large nematocysts are distributed along their whole length (Bouillon, 1986) instead of being gathered separately at the base. They are strictly defined as modified tentacles since the presence of big nematocysts of a special type (pseudostenoteles) goes with a change of their shape, size and behaviour.

The ligula, as described for *Sertularia loculosa* Busk, 1852, differs from the modified tentacles of *S. tetracythara*: (i) it does not belong to the hydranth but originates from the mantle; (ii) it has an adcauline position; (iii) there is only one per hydrothecal unit; and (iv) is very extensible (Migotto, 1996). Consequently, they have not to be confused, as in the definition cited in the introduction (Bouillon *et al.*, 2006). ‘Nematocyst batteries’ is a vivid term used by Millard (1975) to describe

nematocyst-bearing organs in the sertulariids (which at that time included thyroscyphids). This general term is useful in gathering together different sorts of nematocyst groupings, and authors still use it nowadays (Bouillon *et al.*, 2006). Millard (1975, figure 81C) represented the annular fold (a special shape of the mantle) of the genus *Thyroscyphus* as linked to the hydranth column at its base and equipped with two nematocyst batteries. Recently Schuchert (2003) noted a pad containing a dense cluster of large nematocysts on the mantle of *Thyroscyphus torresi* (Busk, 1852). The single extensible ligula of *Sertularia ligulata* Thornely, 1904, has such a location. It was doubtfully termed a dactylozoid by Billard (1925) and a nematophore by Bouillon *et al.* (2006). Different terms used by authors for the same part highlight problems of terminology encountered in the specialized hydrozoan vocabulary and illustrate the need for more research on the anatomy and function of structures that have been most often described from fixed material.

In a literal sense, the term nematophore (i.e. bearing nematocysts) could be used for the ligula and for the different nematocyst-bearing organs. But in thecate, nematophores are independent of hydranths and of hydrothecae. They are modified polyps, like the dactylozoids of athecates, whereas ligulae and nematocyst-bearing organs are specialized organs adjunct to the polyp and its extension (the mantle). In a recent revision, the author demonstrated that the so-called nematophores are an artificial grouping to be separated into three types differing in structure and function (Gravier-Bonnet, 2004). Though probably evolved separately, they all share a protective/defensive function, as does the adcauline nematocyst cluster of *S. tetracythara*, whereas some nematophores have additional functions that require further investigation.

Nematocyst batteries are rare amongst the sertulariids, but the morphology of hydranths is until now poorly documented. Those described as linked to the tentacles of *S. tetracythara* are unusual, being intermediate between a simple cluster and a true organ with its own characteristic shape and behaviour, such as a ligula or a nematophore. Additional histological and SEM studies might throw light on their structure and on their relation to hydranth and tentacles.

The study of peculiar features of the coenosarc, including hydranths, has to be generalized for the Sertulariidae. It brings to the hydroids new data that add more complexity to this family, hitherto well known for homogeneity. For example, a lot of the sertulariids species are provided with hydranths exhibiting a strong bilateral symmetry in extension (personal observation), a character that could be interesting for use in classification as well as the presence of a mantle. Coenosarcal features are used in other families at different levels of classification, and the caecum is already used in the sertulariids for genera, whereas Calder (1991) suggested that 'the systematic importance of the character should be carefully reassessed'. More data from more species are necessary for the level of use of nematocysts batteries, modified tentacles and ligula. But, to be consistent, as for example the presence of a nematodactyle in a hydranth of a Haleciidae induces its classification in the genus *Nemalcium* instead of *Halecium*, then the presence of a ligula in a *Sertularia* must lead to the creation of a new genus. For the genus *Salacia*, as *tetracythara* is the type species, the presence of modified tentacles has to be included in the diagnosis, while other species not provided with this character might be moved to a new genus.

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