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DEMOSPONGIAE FROM THE FIJI ISLANDS

By OLE SECHER TENDAL
Zoological Laboratory, University of Copenhagen

During an expedition in the Pacific Ocean with the U.S. research vessel "Te Vega"[1] in 1965, Dr. T. Wolff collected some low-water sponges on Viti Levu, Fiji Islands. In view of the incomplete knowledge of the sponge fauna from the smaller oceanic islands in the Pacific, also such a little collection is of importance.

Previously only four species of sponges seem to have been reported from the Fiji Islands. Bowerbank (1873) reported three species, *Ecionemia acervus, E. densa* and *Pachymatisma contorta.* Lendenfeld (1887) mentioned *Euchalinopsis oculata.*

Sponges are known from the following oceanic islands in the West and Central Pacific: The Palaus (Laubenfels 1954; Bergquist 1965); Yap Archipelago (Laubenfels 1949); the Marianas, the eastern Carolines and the Marshalls (Laubenfels 1954); Hawaii (Laubenfels 1950, 1951, 1957); Onotoa (Gilbert Islands) (Laubenfels 1955); Funafuti (Ellice Islands) (Whitelegge 1897, Kirkpatrick 1900); New Caledonia (Lévi 1967); Samoa (Selenka 1867); Kermadec Islands (Kirk 1910).

The fauna of the Great Barrier Reef, Australia, is well known through the work of Burton (1934).

The classification used herein is that of Topsent (1928), with minor modifications following Laubenfels (1936).

Averages given in the descriptions are based on 25-50 measurements. The collection is preserved in alcohol.

LIST OF SPECIES

Ecionemia acervus Bowerbank, 1862.
Stelletta purpurea Ridley, 1884.
Cinanchyra australiensis (Carter, 1886).
Halina plicata (Schmidt, 1868).
Chondrilla australiensis Carter, 1873.
Rhabdastrella dura sp. n.
Tethya diploderma Schmidt, 1870.
Spirastrella vagabunda Ridley, 1884.

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Spirastrella solida Ridley & Dendy, 1886.
Timea stellata (Bowerbank, 1866).
Placospongia carinata (Bowerbank, 1858).
Microciona eurypa (Laubenfels, 1954).

DESCRIPTION AND REMARKS

Order CHORISTIDA

Family STELLETIDAE

Ecionemia acervus Bowerbank, 1862

For synonymy, see Bergquist (1965 p. 191).

Locality: Suva Harbour. 18. 5. 1965. Reef flat at low tide. Dead corals. Three specimens.

Description: Massive, lumpy, 10-25 mm in diameter. The surface is smooth and finely granular in two of the specimens, rather hispid in the third. Oscules are found concentrated in small areas. The individual oscules are about 0.5 mm in diameter. Minute pores are scattered over the surface. The consistency is hard.

Spicules: The megascleres are oxeas, plagiotriaenes, anatriaenes and protriaenes.

The oxeas have gradually tapering, pointed ends. They measure 1120-2240 μ in length (average 1725 μ) and 24-60 μ in width (average 43 μ). The plagiotriaenes, which are nearly orthotriaenes, measure 480-2240 μ in length (average 1463 μ). The width at the base is 48-72 μ (average 62 μ). The length of the clads is 64-192 μ (average 140 μ). The anatriaenes measure 1440-2240 μ in length (average 1910 μ). Width at the base is 12-18 μ (average 15 μ). The length of the clads is 24-42 μ (average 35 μ). The protriaenes are rare. They measure about 1600 μ in length.

The microscleres are microrhabds and tylasters.

The spiny microrhabds measure 10-18 μ in length (average 14 μ) and up to 4 μ in width. The tylasters are rare; they have 5-8 rays and measure 10-13 μ in diameter.

Remarks: The specimens conform closely with *Hezekia walkeri* Laubenfels, 1954. Bergquist (1965 p. 193) has shown that this species belongs to the *Ecionemia acervus* complex.

Distribution: Wide Indo-Pacific.

Stelletta purpurea Ridley, 1884

For a discussion of synonymies, see Burton (1926 p. 44) and Laubenfels (1954 p. 240).

Locality: Suva Harbour. 17. 5. 1965. Reef flat at low tide. Living corals. One specimen.

Description: Massive, almost spherical, 6-8 mm in diameter. The colour is greyish brown. The surface is smooth and strewn with numerous small pores. There are five oscules, each about 0.5 mm in diameter and covered by a thin membrane. There is a cortex about 0.2 mm in thickness. The choanoderm is strongly radiate in structure.

Spicules: The megascleres are oxeas, orthotriaenes and anatriaenes. Protriaenes were not found.

The oxeas are rather rare. They measure 610-1040 μ in length and about 18 μ in width. The orthotriaenes vary from 160-960 μ in length (average 589 μ). They measure 12-18 μ in width at the base of the rhabd. The clads vary from 36-126 μ in length. The anatriaenes vary from 320-960 μ in length (average 702 μ). The width is about 12 μ at the base of the rhabd. The clads vary from 36-48 μ in length.

The only microscleres are tylasters measuring 7.5-12.5 μ in diameter. They have 5-14 rays. Some tylasters are smooth, others are more or less spined. Tylasters are rather rare.

Remarks: Following Burton (1926 p.45) and Laubenfels (1954 p.239), *S. purpurea* is here regarded as having great variation. The dimensions of the spicules in the specimen under consideration do not conform throughout with the diagnosis given by Burton, but agree with Laubenfels' description of a specimen from the Ebon Atoll, one of the Marshall Islands.

Distribution: Indo-West Pacific.

Family TETILLIDAE

Cinanchyra australiensis (Carter, 1886)

For synonymies and discussion of the species complex, see Burton (1934 p.523).

Locality: Suva Bay, south of Ndra Nimbota. 11.5.1965. Tidal flat at low tide. Sand and stones. Two specimens.

Description: Subspherical, 2.5-3 cm thick, 3-5 cm in diameter. The colour is greyish brown and the surface is hispid with projecting spicules. The oscules are not visible. The pores are situated in poral calyces, 2-6 mm in diameter. These are arranged in an equatorial belt around the sponge. There is a conspicuous cortex, about 1 mm thick. The choanoderm is strongly radiate in structure.

Spicules: (Fig. 1) Megascleres are oxeas, anatriaenes, protriaenes and prodiaenes.

The oxeas measure 1760-3520 μ in length (average 2867 μ). They are 24-54 μ in width. The anatriaenes measure 2240-3200 μ in length, 6-12 μ in width. The clads are 36-66 μ. The protriaenes measure 1920-4320 μ in length and 6-12 μ in width. The clads are 36-90 μ. The prodiaenes measure 2240-4480 μ in length, 6-12 μ in width. The clads are 72-138 μ.

Microscleres are more or less curved sigmaspires, 5-12 μ in length (average 8 μ). Width about 1 μ.

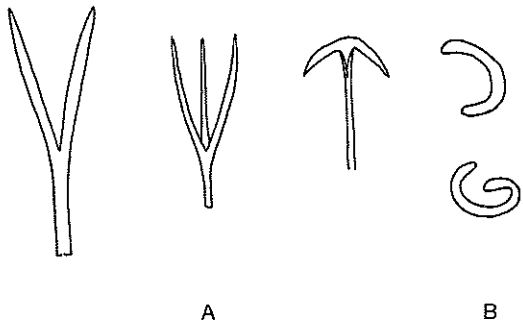

Fig. 1. *Cinanchyra australiensis.*
A. Heads of prodiaene, protriaene and anatriaene (170×).
B. Sigmaspires (1200×).

No microxeas were found.

Remarks: As they lack microxeas the specimens belong to the *Cinanchyra porosa* group of Burton (1934 p. 526). It is a matter of opinion whether *C. porosa* can be considered a distinct species or a variety of *C. australiensis,* as in one form *(C. albatridens)* referred by Burton to the *porosa* group these spicules are so rare that they readily escape detection.

Distribution: Atlantic, Indo-Pacific.

Family HALINIDAE

For the synonymies of the genus *Halina,* see Laubenfels (1936 pp. 179-180).

Halina plicata (Schmidt, 1868)

Restricted synonymy:

Corticium plicatum, Schmidt, 1868, p. 2; Vosmaer, 1881, p. 4; Buccich, 1886, p. 227.
Samus simplex, Carter, 1880, p. 60.
Calcabrina plicata, Sollas, 1888, p. 281.
Stoeba simplex, Sollas, 1888, p. 102; Dendy, 1905, p. 70.
Dercitus plicatus, Lendenfeld, 1894, p. 105; Topsent, 1895, p. 531; Sollas, 1902, p. 218; Lendenfeld, 1903, p. 82; Topsent, 1928, p. 129.
Dercitus plicatus var. *simplex,* Burton & Rao, 1932, p. 309.
Dercitus simplex, Thiele, 1900, p. 20; Lendenfeld, 1903, p. 82.
Dercitus pauper, Sollas, 1902, p. 218.
Stoeba extensa, Dendy, 1905, p. 70.
Stoeba plicata, Dendy, 1905, p. 70.
Dercitus occultus, Hentschel, 1909, p. 352.
Stoeba plicata var. *simplex,* Annandale, 1915, p. 458.

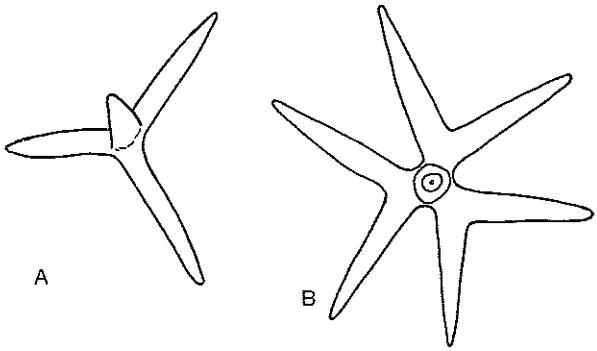

Fig. 2. *Halina plicata.*
A. Calthrops (170 ×).
B. Cladome of dichotriaene (170 ×).

Locality: Suva Harbour. 18.5.1965. Reef flat at low tide. Dead corals. One specimen.

Description: A little irregular mass, about 2 × 5 × 4 mm, sitting in a crevice in a dead piece of coral. It is dark grey, with a hard consistency and a smooth surface. Oscules and pores are not visible.

Spicules: (Fig. 2) Megascleres are calthrops and short-shafted dichotriaenes.

The calthrops have rays varying in length from 150-240 μ (average 200 μ). The width of the rays at the base is 18-36 μ (average 32 μ). The dichotriaenes have rhabds varying in length from 90-210 μ. Protoclads vary from 24-66 μ, and deuteroclads from 36-126 μ. The deuteroclads are always longer than the protoclads.

Microscleres are spiny microrhabds, varying from 10-20 μ in length (average 15 μ). The thickness varies from 1-4 μ.

Remarks: Topsent (1895 p. 536) considered *Samus simplex* Carter, 1880, to be a very likely synonym of *Halina plicata.* Dendy (1905 p. 71) found it quite possible that *Halina plicata, Samus simplex* and *Stoeba extensa* should be considered as mere variations of one species. Annandale (1915 p. 458) showed *Halina plicata* and *Samus simplex* to be identical. The present knowledge of the geographical distribution of *Halina plicata,* sensu strictu, and the demonstrations by Topsent (l. c.) and Annandale (l. c.) indicate great variability in spiculation (especially in the relative occurrence of calthrops and dichotriaenes) and spicule dimensions. Therefore, as they fall within the limits of this variation, it does not seem reasonable to maintain *Dercitus pauper* Sollas, 1902, *Stoeba extensa* Dendy, 1905, and *Dercitus occultus* Hentschel, 1909, as distinct species.

Distribution: Mediterranean, Indo-West Pacific.

Family CHONDRILLIDAE

Chondrilla australiensis Carter, 1873

For synonymies, see Burton (1924b p. 207; 1959 p. 197) and Lévi (1967 p. 14).

Locality: Suva Harbour. 18. 5. 1965. Reef flat at low tide. Dead corals. One specimen.

Description: The sponge forms an irregular crust, 1-2 mm thick and up to 25 mm long. It is reddish brown, with a smooth surface and a rather hard consistency. Oscules are not visible. What seem to be numerous small pores are strewn all over the surface.

Spicules: These are rather rare.

Spherasters are 8-33 μ in diameter (average 16 μ). Oxyasters are 10-23 μ in diameter (average 19 μ); they have 6-11 strongly microspinous, rather blunt ending rays.

Distribution: Indo-West Pacific.

Order EPIBOLASIDA

Family JASPIDAE

Rhabdastrella dura n. sp.

Locality: Suva Harbour. 18. 5. 1965. Reef-flat at low tide. Dead corals. One specimen.

Description: The specimen is a somewhat flattened lump, measuring about 30 × 20 × 10 mm. The colour is white; the consistency is hard (it can not be bent without breaking). A group of six small oscules is found at one edge, presumably the top of the sponge; the largest oscule measures 1 × 0.5 mm. Scattered over the surface are small pore areas, situated in slight depressions. The diameters of these areas are about 0.3 mm each. Many pores are found in each area. There is a very distinct cortex, 1-1.5 mm thick, composed of tightly packed spherasters. The choanosome is not radiate in structure, but forms a flexible network.

Spicules: (Fig. 3) Megascleres are straight or slightly curved oxeas, 160-1600 μ in length (average 1044 μ). The width is 6-36 μ (average 23 μ).

Microscleres are spherasters, oxyasters and sphaeroxyasters.

The spherasters are more or less ellipsoidal, measuring 102-120 μ in length and 84-108 μ in width. The oxyasters measure 15-27 μ in diameter. They have 5-9 rays, which in the outer part are covered with fine spines. The sphaeroxyasters measure 5-7 μ in diameter. They have 7-11 rays, which are more or less split at the points.

Remarks: The genus *Rhabdastrella* was erected by Thiele (1903 p. 934) for *Coppatias distinctus* Thiele, 1900, p. 56. Laubenfels (1936 p. 161) and Lévi (1958 p. 16) included the genus *Diastra* Row (1911 p. 300), with the type-species *D. sterrastraea,* in *Rhabdastrella.* Previously, Dendy (1916 p. 245) proposed to include

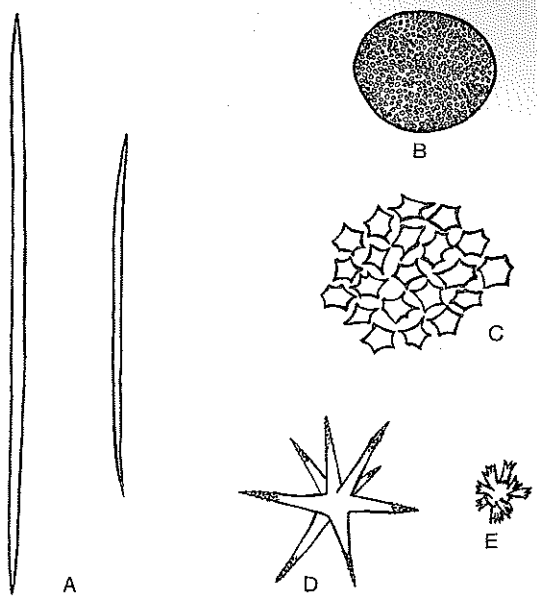

Fig. 3. *Rhabdastrella dura*. A. Oxeas (60 ×). B. Spheraster (170 ×). C. Part of the surface of a spheraster (1200 ×). D. Oxyaster (1200 ×). E. Spheroxyaster (1200 ×).

Rhabdastrella and *Diastra* in *Aurora* Sollas, 1888, p. 187. It is not at present possible to take a definitive decision on the problem.

Rhabdastrella dura is distinguished from *R. distincta* (Thiele) by its bright colour, thicker cortex and the form and dimensions of the spicules.

R. dura is distinguished from *R. sterrastraea* (Row) by its bright colour, hard consistency, the grouped oscules, the presence of pore areas and the dimensions of the spicules.

Order HADROMERINA

Family TETHYIDAE

Tethya diploderma Schmidt, 1870

For synonymy, see Burton (1924a p. 1039).

Locality: South of Ndra Nimbota, Suva Bay. 11. 5. 1965. Tidal flat. Sand and stones. Two specimens.

Suva Harbour. 18. 5. 1965. Reef flat at low tide. Five specimens.

Description: The specimens are subspherical, varying from 6-30 mm in diameter. The surface is tuberculate, with tubercles 1-2 mm in diameter and 1 mm high. They are separated from each other by more or less conspicuous grooves. Oscules and pores are not visible. There is a distinct cortex 0.5-2 mm thick. The endosome is strongly radiate.

Spicules: Megascleres are oxystrongyles varying much in length, from 384-1760 μ. The width is 6-30 μ.

Microscleres are big spherasters and small euspherasters of two types.

The spherasters are 30-108 μ in diameter (average 71 μ). Ectosomal tylasters are 10-18 μ in diameter and have 8-15 rays. Endosomal oxytylasters are 15-25 μ in diameter and have 8-11 rays.

Distribution: Atlantic, Indo-Pacific.

Family SPIRASTRELLIDAE

Spirastrella vagabunda Ridley, 1884

For synonymy, see Bergquist (1965 p. 184) and Lévi (1967 p. 16).

Locality: Suva Harbour. 18. 5. 1965. Reef flat at low tide. Dead corals. One specimen.

Description: The sponge is on a piece of dead coral and forms a 0.5 mm thick crust measuring about 6 × 8 mm. It is yellow, with a hard consistency and a smooth surface. Oscules and pores are not visible.

Spicules: Tylostyles, which are slightly curved, measure 160-640 μ (average 434 μ). The width is 6-30 μ (average 23 μ). The heads are rather conspicuous.

Spirasters usually twisted three times, varying in length from 7.5-25 μ (average 18 μ). The thickness is 1-2 μ.

Distribution: Indo-West Pacific.

Spirastrella solida Ridley & Dendy, 1886

Restricted synonymy: See Vosmaer (1911 p. 17).

Locality: Suva Harbour. 18. 5. 1965. Reef flat at low tide. Dead corals. Three specimens.

Description: Massive and lumpy sponges containing a very large amount of foreign matter, mostly shell debris and small stones. The largest specimen, which is obviously a piece of one still larger, measures about 45 × 25 × 20 mm. The colour is light grey and the consistency is hard. The surface is without projecting spicules, and is only rugged becaused of the foreign matter. The specimen has three oscules, one measuring 6 × 3 mm, the other two 3 mm in diameter each. Very numerous small pores are strewn over the surface.

The skeleton consists of a very dense irregular reticulation of tylostyles. The microscleres are found scattered in the tissues of the sponge; they are not especially abundant in the very thin dermal membrane.

Spicules: Tylostyles measure 180-480 μ in length (average 396 μ) and 12-24 μ in width. They are slightly curved, with well-developed heads.

Spirasters measure 10-35 μ in length (average 21 μ) and 1-3 μ in width. Most of them have three bends. The spines are short, often rather warty.

Remarks: Vosmaer (1911) seriously tried to reduce the great number of species in the genus *Spirastrella*. Most authors agree (Topsent 1918; Wilson 1925;

Burton 1934; Bergquist 1965) that Vosmaer has gone too far, but on the other hand there are without doubt many synonymies in this big genus, which can be said to be in a state of confusion.

The specimens under consideration superficially resemble the specimen S.E. 1945 of Vosmaer (1911 pl.III, fig.2). Ridley and Dendy (1887 p.232) referred, with a slight hesitation, two specimens and a fragment of the same appearence to *S. solida*.

Distribution: West Pacific.

Timea stellata (Bowerbank, 1866)

For synonymy and some records, see Burton (1934, p.569).

Further records:

Hymedesmia stellata var. *centrifera* Hentschel, 1909, p.380.
Timea stellata, Burton, 1937, p.15.

Locality: Suva Bay. South of Ndra Nimbota. 11.5.1965. Sand and stones. Three specimens.

Suva Harbour. 18.5.1965. Reef flat at low tide. Dead corals. One specimen.

Description: An encrusting sponge up to 1 mm thick, totally covering stones of which the greatest measures about 50 × 35 × 15 mm. The specimen from Suva Harbour covers a part of *Spirastrella solida*. From the stone-encrusting specimens long papillae are projecting. These are up to about 20 mm in length. They are circular in cross-section with a diameter of 1-3 mm. The colour is light brown. The surface is hispid from projecting spicules, between which are found many grains of sand. Oscules and pores are not visible.

Spicules: Megascleres are tylostyles, varying very much in length, 80-1600 μ (average 601 μ) and 3-12 μ in width.

Miscroscleres are chiasters, 6-20 μ in diameter (average 11 μ). They have 5-8 rays, 6 rays being most common. The rays are more or less spined, always in the ends, but often also along the sides.

Remarks: The record from 1934 is not, as mentioned by Burton, the first from non-European waters. The first is that of Hentschel, from 1909.

Distribution: East Atlantic, Mediterranean Sea, Indian Ocean, Australia.

Family PLACOSPONGIDAE

Placospongia carinata (Bowerbank, 1858)

For synonymy, see Vosmaer & Vernhout (1902).

Locality: Suva Harbour. 18.5.1965. Reef flat at low tide. Dead corals. Three specimens.

Description: Encrusting, irregularly formed masses. The largest specimen

measures approximately 40 × 20 × 15 mm. The colour is reddish brown and the consistency is hard. The surface is smooth, with the characteristic carinae. Oscules and pores are not visible.

Spicules: Megascleres are tylostyles, 160-800 μ in length, 6-18 μ in width. There is no sharp distinction between cortical and parenchymal tylostyles in size, probably because the specimens are rather young. Cortical tylostyles are 160-720 μ (average 429 μ). Parenchymal tylostyles range from 240-800 μ (average 554 μ).

Microscleres are sterrasters, microstrongyles, spirasters and spherasters.

The sterrasters are more or less kidney-shaped to ellipsoidal, 72-84 μ in length (average 79 μ) and 54-72 μ in width (average 64 μ). The microstrongyles are entirely spined, seldom smooth, 6-15 μ in length (average 8.5 μ) and 2-3 μ in width. The spirasters are elongated with 5-9 long spines, most of which have secondary small spines. Length is from 7.5-17.5 μ (average 10 μ). The spherasters have a sphaerical centrum covered with small tent-like spines. They are 15-30 μ in diameter (average 23 μ).

Distribution: Atlantic, Indo-Pacific.

Family Microcionidae

Microciona eurypa (Laubenfels, 1954)

Dictyociona eurypa, Laubenfels, 1954, p. 143.
Microciona eurypa, Bergquist, 1965, p. 164.

Locality: Suva Harbour. 18.5.1965. Reef flat at low tide. Dead corals. One specimen.

Description: The species is encrusting and of varying thickness, up to 10 mm. The colour is greyish brown. The surface is minutely hispid from projecting spicules. Oscules and pores are not visible.

Spicules: Megascleres are tylostyles and acanthostyles.

The tylostyles vary in length from 160-640 μ (average 334 μ) and in width from 3-24 μ (average 10 μ). They are straight or slightly curved with a rather indistinct head, which in most cases is microspined. Asymmetrical heads are seen only very rarely. The acanthostyles vary in length from 84-132 μ (average 112 μ) and in width from 9-12 μ. They are slightly curved and have slightly recurved spines.

Microscleres are toxas and isochelae of two sizes.

The toxas are quite variable in length and shape. They are 25-337 μ in length and 0.7-2.5 μ in thickness. The short ones are well curved, the longer tend to be almost straight, often resembling oxeas. The isochelae palmatae are of two distinct size groups. The longest are 12.5-20 μ in length, the smaller 4-7 μ in length.

Remarks: *M. eurypa* and *M. maunaloa* Laubenfels, 1951, are the only species of *Microciona* in which extremely small isochelae are reported as a third microsclere category (Bergquist 1965 p. 165). Some species at present placed in

Table 1. The geographical distribution of the species in the present material from the Fiji Islands.

Species from Fiji:	Geographical area:										
	Atlantic	Indian Ocean	Australia	Micronesia*	Hawaii	Onotoa	Funafuti	New Caledonia	Samoa	Kermadec Islands	East Pacific
Ecionemia acervus		+	+	+				+			
Stelletta purpurea		+	+	+							
Cinanchyra australiensis	+	+	+	+							+
Halina plicata	+	+	+								
Chondrilla australiensis		+	+	+				+			
Tethya diploderma	+	+	+	+	+	+					+
Spirastrella vagabunda		+	+	+				+			
Spirastrella solida		+?	×								
Timea stellata	+	+	+								
Placospongia carrinata	+	+	+								+
Microciona eurypa				+							

* Micronesia: Palaus, Yap, Marianas, Carolines and Marshalls.

Eurypon show the same feature (Laubenfels 1954 p. 143). It is advisable not to place too much significance on this special character as such small spicules are easily overlooked, especially if they are rather rare, and in the literature they are in many cases taken for development stages and therefore not measured, pictured or even mentioned.

Distribution: Palau Islands.

ZOOGEOGRAPHICAL REMARKS

The fifteen species of sponges at present known from the Fiji Islands are certainly only a small percent of the entire sponge fauna, presumably about one forth of the total number of species (Laubenfels 1955 p. 137).

From Table I it is seen that the sponge fauna is clearly Indo-Australian, as is that of Micronesia (Laubenfels 1954 p. 297). Moreover, the composition of the species agrees with the experience of Laubenfels (1955 p. 137) that oceanic Pacific islands in general tend to have a few species which are presumably endemic for the island (here: *Rhabdastrella dura)*, some species which are cosmopolitan in distribution (here: *Cinanchyra australiensis, Tethya diploderma, Placospongia carinata)* (but these to some degree are other species than the cosmopolitan ones of the neighbouring islands) and some species which are widely distributed in the (Indo-) Pacific area (here: *Ecionemia acervus, Stelletta purpurea, Halina plicata, Chondrilla australiensis, Spirastrella vagabunda, Timea stellata)*.

SUMMARY

In a collection of low-water sponges from Viti Levu, Fiji Islands, 12 species are identified and one of these, *Rhabdastrella dura,* is described as new. The sponge fauna of the island is typical in composition for the oceanic islands in the Pacific, and clearly Indo-Pacific with some cosmopolitan species.

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