

ACANTHODISCUS NEW GENUS AND GENUS ANHETEROMEYENIA REDEFINED (PORIFERA, SPONGILLIDAE)

Cecília Volkmer-Ribeiro¹

ABSTRACT

The Neartic-Neotropical genus *Anheteromeyenia* Schröder, 1927 is restricted and redefined to include *A. argyrosperma* Potts, 1880, type species and *A. ornata* (Bonetto & Ezcurra de Drago, 1970) comb. n.. *Acanthodiscus*, new genus, with a Palearctic, Neartic-Neotropical distribution is proposed for *A. ryderi* (Potts, 1882) comb. n., type species, and *A. sheilae* (Volkmer-Ribeiro, De Rosa-Barbosa & Tavares, 1988) comb. n..

KEYWORDS. Neartic-Neotropical, freshwater sponges, *Anheteromeyenia*, *Acanthodiscus*, new genus.

INTRODUCTION

The sub-genus *Anheteromeyenia* Schröder (1927), elevated to generic rank by LAUBENFELS (1936), was originally defined to contain those *Heteromeyenia* Potts, 1881, species which missed microscleres. PENNEY & RACEK (1968) selected *Spongilla argyrosperma* Potts, 1880, as type species, enlarged Schröder's original definition, recognized the exclusive characters of *A. argyrosperma* and grouped the few species of the genus into two morphologically distinct groups. *A. argyrosperma* was solely placed in a group on account of its gemmules having a distinct porus tube and two classes of gemmoscleres differing in length rather than in shape. The other four species, *A. ryderi* (Potts, 1882), *A. pictouensis* (Potts, 1885), *A. conigera* (Old, 1931) and *A. biceps* (Lindenschmidt, 1950), composed the second group of species having gemmules devoid of a porus tube and with two classes of gemmoscleres exhibiting sharp differences in shape as well as in size. BONETTO & EZCURRA DE DRAGO (1970) described *Radiospongilla ornata* from argentinian waters. The gemmules in this species, similarly to those of *A. argyrosperma*, have a distinct porus tube and gemmoscleres grading from longer to shorter birotulates with rotules composed of an irregular arrangement of rays or spines. VOLKMER-RIBEIRO *et al.*, 1988 described *Anheteromeyenia sheilae*

¹ Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul, C.P. 1188, 90001-970, Porto Alegre, RS, Brasil (Fellow researcher of CNPq).

from South Brazil, included in the *A. ryderi* species group. The characteristics shared by *Anheteromeyenia argyrosperma* and *A. ornata* recommend the restriction of genus *Anheteromeyenia* to the type species plus *A. ornata*. The new genus *Acanthodiscus* is proposed for *A. ryderi* and *A. sheilae*. The characteristics presented in common by the two species are not shared with species in any of the presently known genera of freshwater sponges.

Abbreviations used: ANSP, Academy of Natural Sciences of Philadelphia; MCN, Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul, Porto Alegre; MNRJ, Museu Nacional da Universidade Federal do Rio de Janeiro. Measurements in micrometers.

Anheteromeyenia Schröder, 1927

Heteromeyenia (*Anheteromeyenia*) SCHRÖDER, 1927: 108 (partim).

Anheteromeyenia LAUBENFELS, 1936: 36 (partim); PENNEY & RACEK, 1968: 114 (partim);

Radiospongilla BONETTO & EZCURRA DE DRAGO, 1970: 39 (partim); DE ROSA-BARBOSA, 1984: 129 (partim).

Type species: *Spongilla argyrosperma* Potts, 1880, subsequent designation by PENNEY & RACEK, 1968: 114.

Diagnosis. Freshwater sponges with two series of slim, spiny, irregularly birotulated gemmoscleres which gradually proceed from long, into short ones; rotules of the longer gemmoscleres consisting of long recurved clawlike hooks, regular or irregularly placed around the shaft extremities; shorter gemmoscleres reaching about half the size of the long ones, their rotules consisting of several recurved or randomly turned small spines arranged in one or more irregular circles at the shaft extremities. Shafts of the longer gemmoscleres stout and with large spines, sometimes a ring of larger spines present at middle of the shaft; shafts of the shorter gemmoscleres slimmer with abundant small spines; spines in the middle portion of the shaft in both classes are straight whilst those placed towards the extremities are usually recurved. The shorter gemmoscleres predominate in the gemmular coat. Microscleres absent.

Redescription. Sponges forming very shallow gray or green incrustations or sponges perceived only by the conspicuous gemmular patches partially covered by a few megascleres.

Skeleton reduced and progressing from an irregular deposition of the megascleres on the gemmules to a few largely spaced horizontal fibers giving off very few lateral fibers. The very slim fibers are one or two spicules thick; ectosome thick at places. Osculae few and inconspicuous.

Megascleres stout, sparsely spined, straight to slightly curved, abruptly pointed oxea. Spines at the extremities of the spicules turned towards the spicule ends. Gemmoscleres as in the genus diagnosis.

Gemmules abundant, close to the substrate, large; foraminal tube short, delicate, straight, set in a conical depression in the fully developed gemmules. Gemmoscleres rather radially embedded in one single layer in the pneumatic coat, the larger gemmoscleres projecting half of their shafts beyond the level of the outer coat or supporting its

proeminences. Inner gemmular coat thick, pneumatic coat also thick with small polyedrical air spaces, outer gemmular coat thin and smooth.

Distribution. Neartic and Neotropical.

Key to the *Anheteromeyenia* species

1. Gemmoscleres of the long class with rotules consisting of a circle of regular or irregular large, sometimes bifid, recurved clawlike hooks; shaft spines large, few *A. argyrosperma*
 Gemmoscleres of the long class with rotules consisting of a circle of regular or, more frequently, an irregular grouping of recurved spines; shaft spines small, numerous *A. ornata*

Anheteromeyenia argyrosperma (Potts, 1880)

(Figs. 1,2,6,10)

Spongilla argyrosperma POTTS, 1880: 357; 1887: 239, pl. VI, fig. i; pl. XI, figs. I, II, type locality Lehigh River at Lehigh Gap, Pennsylvania, USA.

Anheteromeyenia argyrosperma; PENNEY & RACEK, 1968: 116, pl. 10, figs. 8, 9, 10 (and synonymy); HARRISON, 1974: 37; VOLKMER - RIBEIRO & TRAVESET, 1987: 233, fig. 6 (only topotypes found, ANSP); FROST, 1991: 115, fig. 4.9; RICCIARDI & REISWIG, 1993: 666, fig. 1.

Redescription. Sponge forming delicate incrustations consisting of patchy groups of large, whitish gemmules which may be covered by an irregular deposition of megascleres. Living sponge gray or green (when associated to symbiotic algae).

Megascleres small, thin, slightly curved to sigmoid, sparsely spined, abruptly pointed anfxioxa, spines at the extremities of the sclere turned towards the sclere ends.

Gemmoscleres forming a grading series of slim, spiny, domeshaped birotulates with small rotules. The series runs from long, stout, birotulates with rotules consisting of a circle of usually irregular, rarely regular, large, sometimes bifid, recurved hooks to short, slim birotulates with rotules consisting of a circle or of a terminal grouping of irregular, small spines. Shafts of the longer birotulates with a few large spines, shafts of the short birotulates with abundant small spines; spines at the middle part of the shaft in both long and short birotulates are straight whilst those placed towards the extremities are recurved (figs. 1, 2, 6, 10).

Gemmules abundant, large, silvery, provided with a thick pneumatic coat and a broad, short, foraminal tubule set in a conical depression of this coat. Pneumatic coat consisting of regular, polyedrical alveoli. Gemmoscleres radially embedded in this coat in one single layer, the longer gemmoscleres projecting their distal ends far beyond the pneumatic coat or supporting its conical proeminences. Some megascleres are usually found tangentially embedded in the pneumatic coat. Outer coat thin (fig. 6). Gemmules loosely to strongly solded to the basal plate and forming irregular groups of two to several ones gapped together by a number of megascleres singly stuck against the walls of any two closely set gemmules.

Skeleton drastically reduced to a disorderly deposition of megascleres around

and on top of the gemmular groups, such a deposition may progress as to partially conceal the gemmules; in such cases a granular ectosome may form but no oscules can be perceived in it.

Dimensions. Megascleres length 133 - 329, width 7 - 15; longer gemmoscleres length 114 - 179, width 5.9 - 10.2; shorter gemmoscleres length 57 - 89, width 3.9 - 6.7; diameter of gemmules 494 - 686.

Distribution. Eastern half of the Nearctic Region, from Quebec and New Brunswick (Canada) to Florida (USA) (FROST, 1991; RICCIARDI & REISWIG, 1993).

Habitat. The species is found in running waters but also occurs in lakes, ponds and even small standing roadside waters. It seems to prefer submersed stems and timber as support and has been found in pH and conductivity ranging respectively from 4.2 to 7.5 and 80 - 750 micromhos / cm (HARRISON, 1974).

Examined material. USA. **Pennsylvania**: Lehigh River at Lehigh Gap, topotypes, XI. 14. 1881, E. Potts leg. (ANSP 4538, 4587, 4588, 4589); **New Jersey**: River Styx, Lake Hopatcong, fragment of timber with several gemmular groups, 1882, E. Potts leg. (ANSP).

Remarks. The species was briefly introduced by POTTS (1880). A detailed redescription was presented by POTTS (1887). PENNEY & RACEK (1968: 666) synonymized *H. argyrosperma* var. *tenuis* in the nominal species. RICCIARDI & REISWIG (1993) studied a large number of *A. argyrosperma* specimens from Canada and reported the gemmoscleres to be so intergrading in many specimens as to make it impossible to distinguish two size classes. That in fact holds true for gemmoscleres taken out of several gemmules from a single specimen (fig. 10) as well as for those from one single gemmule. However, some entire gemmules taken out of a same specimen exhibit two very conspicuous size classes of gemmoscleres, the largest ones projecting their remarkable rotular hooks far beyond the level of the small ones (fig. 6).

Anheteromeyenia ornata (Bonetto & Ezcurra de Drago, 1970) comb. n.

(Figs. 3 - 5, 11)

Radiospongilla ornata BONETTO & EZCURRA DE DRAGO, 1970: 39, fig. 1, holotype, Arroio Paranay Guazú, Misiones Province, Argentina, 18. IX. 1968, I. Ezcurra de Drago leg. (Instituto Nacional de Limnología, Santa Fé, Argentina, examined); DE ROSA-BARBOSA, 1984: 130, fig. 1.

Redescription. Sponge forming inconspicuous, fragile crusts consisting of a very thin skeleton barely covering the abundant gemmules. Living sponges with gray and green portions.

Megascleres thin to thicker, slightly curved, sometimes sigmoid, sparsely spined, abruptly pointed anfioclea; spines small, acute, the ones at the extremities of the scleres turned towards the sclere ends.

Gemmoscleres consisting of two not sharply defined size classes of stout, strongly spined dome to pointed shaped birotulates. Birotulates of the longer class fewer in number, their rotules consisting of an irregular arrangement of long recurved spines around the shaft ends, shafts in this class with several large spines, some of them usually grouped at the middle of the shaft; birotulates of the short class predominate in the gemmular coat, rotules with a very irregular arrangement of also irregular, short, recurved spines; shafts

of the short class with abundant, regularly spaced small spines; spines in the middle portion of long and short birotulates are straight whilst those placed towards the extremities are incurved inwards. Both long and short class gemmoscleres may exhibit second and third rows of rotular spines or conspicuous swellings of the middle shaft. Also some small, spiny, spherical to irregularly shaped spicules, which seem to be abnormal gemmoscleres may be found in the gemmules (figs. 3 - 5, 11).

Gemmules abundant, quite large, brown to reddish brown, singly soded to the substrate or forming groups of many gemmules, one gemmule thick, soded to each other and to the substrate. Gemmules provided with a single cylindrical foraminal tubule set in a conical depression of the gemmular surface. Pneumatic coat thick with polyedrical alveoli, gemmoscleres rather radially embedded in this coat in one single layer, the longer gemmoscleres projecting beyond the level of the short ones. Several megascleres are also seen tangentially embedded in the pneumatic coat.

Dimensions. Megascleres length 150 - 370, width 5 - 16; long class gemmoscleres length 103 - 170, width 4 - 9.5; short class gemmoscleres length 61 - 126, width 5.5 - 9.6; diameter of gemmules 500 - 650.

Distribution. Brazil, from the Amazon Basin (Amazonas State) and several rivers in Rio Grande do Sul State to Parana River (Misiones Province, Argentina).

Habitat. The species seems to prefer rocky substrates in fast running waters.

Examined material. BRASIL. Amazonas: Presidente Figueiredo, Igarapé da Antonia, right margin of Uatumã River, downstream the Balbina Dam, 05. IX. 1990, C. Volkmer Ribeiro leg. (MCN 2703); Rio Grande do Sul: Nova Petrópolis, Caf River, 20. III. 1980, C. Volkmer Ribeiro leg. (MCN 697, 1031); Santana da Boa Vista, Arroio do Moinho, on the rocky banks under the bridge in the road taking from the town of Santana da Boa Vista to the Camaquã copper mine, 20. I. 1980, C. Volkmer-Ribeiro leg. (MCN 703, 735).

Acanthodiscus new genus

Heteromeyenia (*Anheteromeyenia*) SCHRÖDER, 1927: 108 (partim).

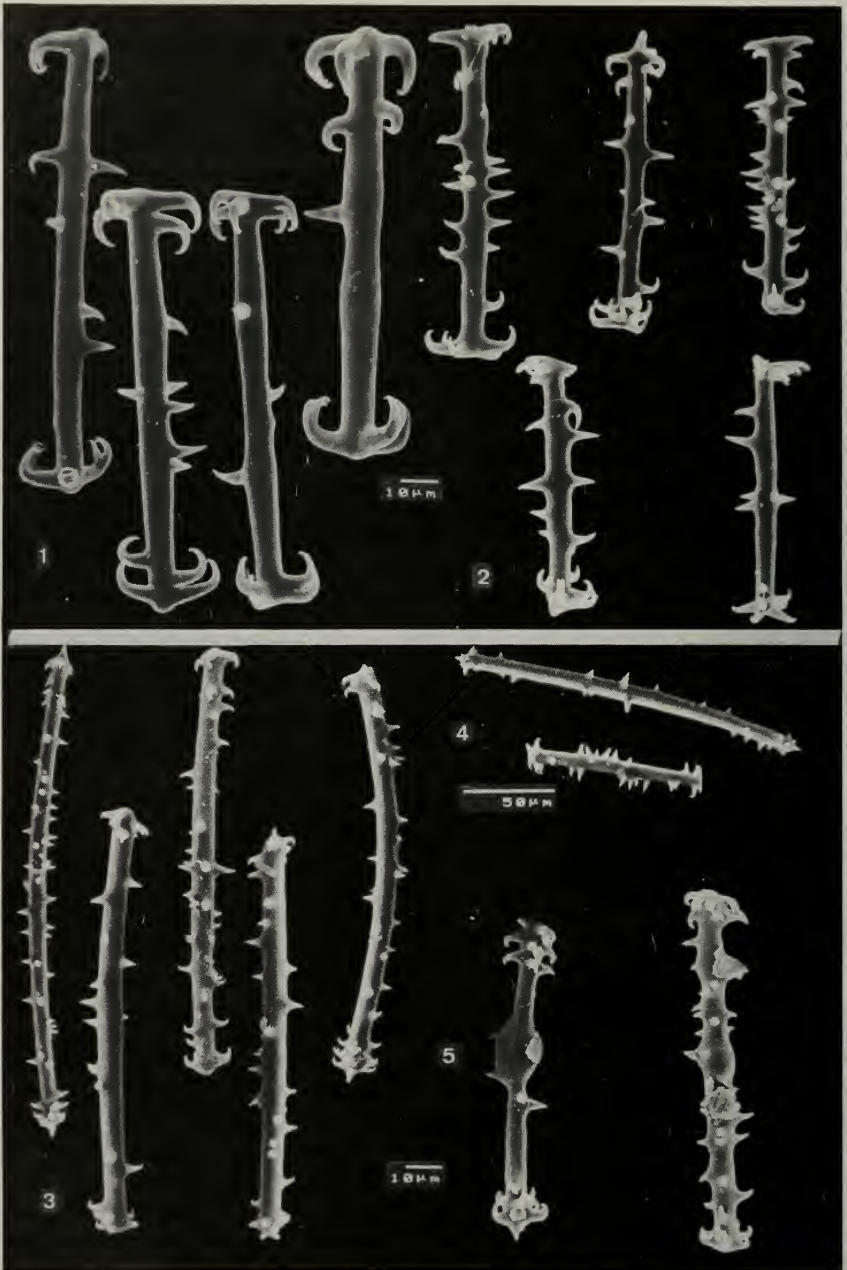
Anheteromeyenia LAUBENFELS, 1936: 36 (partim); PENNEY & RACEK, 1968: 114 (partim).

Etymology. The name refers to the spiny character of the outer and inner faces of the disk-like rotules in the short class gemmoscleres. Gender masculine.

Type species: *Heteromeyenia ryderi* Potts, 1882.

Diagnosis. Freshwater sponges with two classes of birotulate gemmoscleres, distinct in shape and size, the shorter class about two thirds the length of the long one. Short class, spool-shaped, with spiny or smooth shafts and expanded, flat, microspined or microgranulated rotules with borders serrated or cut in several straight rays, the outer rotule sometimes smaller than the inner one. Long class gemmoscleres with cylindrical, stout, spiny shafts and small, smooth, umbonate rotules composed of an irregular number of short and curved hooks or rays. Shaft spines in the short class straight and grouped in the middle of the shaft, with usually one or two larger spines; shaft spines in the long class usually conspicuously curved, grouped in the middle of the shaft or irregularly distributed along it.

Description. Sponges forming light green, white, yellow or brown, thin crusts or sponges forming small hemispherical growths or yet lobose or ramose, larger massive



Figs. 1-5. *Anheteromeyenia argyrosperma* (Potts): 1, 2, longer and shorter gemmoscleres; *Anheteromeyenia ornata* (Bonetto & Ezcurra de Drago): 3, longer gemmoscleres; 4, one long and one short gemmoscleres; 5, shorter gemmoscleres with middle inflation of the shaft and double or triple rotules.

specimens, which may be 5 - 7 cm in diameter. Main skeleton an irregular network of short and thin spicule fibers, spongin rather abundant, ectosome thick, irregularly incrustated with megascleres and hispid from the piercing of the upper spicule fibers. Oscula small, conspicuous.

Megascleres slender to stout, sparsely to strongly spined, straight to slightly curved abruptly pointed anfiroxa, spines straight or turned to the sclere extremities, sometimes one or a few large spines turned to different angles are present.

Microscleres absent. Gemmoscleres as in the genus diagnosis.

Gemmules abundant, white, from small to large, distributed from the base to the top of the sponge, gemmoscleres radially embedded in the thick pneumatic coat. Foraminal tube cylindrical, short, straight. Inner gemmular coat three-foliated, pneumatic coat with large polyedrical air spaces, outer gemmular coat thick and granular. The short spool-shaped anfidiscs contained in the pneumatic coat, the long class umbonate anfidiscs projecting beyond the level of the pneumatic coat.

Distribution. Palearctic, Neartic and Neotropical.

Habitat. Seasonal ponds behind the dune belt along the northwestern border of the Palearctic Region and the eastern border of the Neartic and the Neotropical regions.

Key to the species of *Acanthodiscus*

1. Rotules of the short class gemmoscleres serrated and bearing a conical shaft projection or shaft projection missing; rotules of the long class gemmoscleres composed of long recurved hooks, with bifid or lanceolated extremities, shaft spines in this class curved *A. ryderi*
- Rotules of the short class gemmoscleres deeply incised, daisy-shaped and bearing a rounded shaft projection; rotules of the long class gemmoscleres composed of thick, short recurved rays ending in small, curved spines, shaft spines in this class straight *A. sheilae*

***Acanthodiscus ryderi* (Potts, 1882) comb. n.**

(Figs. 7, 8)

Heteromeyenia ryderi POTTS, 1882: 13; 1887: 242, pl. XI, figs. IV, V, VI, type locality Cobbs Creek, Delaware River, Philadelphia, Pennsylvania, USA, E. Potts leg., 1881.

Anheteromeyenia ryderi; PENNEY & RACEK, 1968: 117, pl. 10, fig. 1 (and synonymy); POIRRIER, 1977: 62, figs. 1-4; VOLKMER - RIBEIRO & TRAVESET, 1987: 233, fig. 7 (lectotype ANSP - PO 4536); VOLKMER - RIBEIRO et al., 1988: 86; figs. 13 - 17; OKLAND & OKLAND, 1989: 179, figs. 3-6; FROST, 1991: 116, fig. 4.10; RICCIARDI & REISWIG, 1993: 667, fig. 2 (and synonymy).

Redescription. Sponge light green when exposed to light, otherwise white or brown. Sponge forming from small, compact, hemispherical crusts to large, thick irregular crusts 5 cm high and 5 to 7.5 cm long growing into lobose, palmate or branching terminations on or around submerged vegetation, timber or, more rarely, on stones. Surface smooth, oscules conspicuous. Skeleton non fasciculated or irregularly fasciculated or skeleton forming at the branches and lobes; "many slender, nearly parallel lines of slightly fasciculated spicules, the network being completed by crossing lines of single or nearly solitary spicules" (POTTS, 1887: 246).

Megascleres from stout and short to longer and slender, from straight to slightly curved, from heavily to sparsely spined, from abruptly to gradually pointed anfiroea, the spines at the middle part of the spicules straight, from there on the spines are turned towards each extremity.

Gemmoscleres birotulates of two classes distinct in shape and size. Long birotulates with domeshaped small rotules composed of an irregular number of dissimilar, recurved hooks with bifid or lanceolated ends, shafts cylindrical, stout, spined, their spines equal in length and curvature with the hooks of the rotules, singly or irregularly grouped along the shaft, rarely only at the middle of shaft. Short birotulates spool shaped, with slender usually smooth shafts abruptly enlarging towards the rotules, sometimes with a few, dissimilar, conical microspined spines at middle shaft; rotules large, flat, thick, microgranulated, with crenulated or serrated borders and containing the conical projection of the shaft, outer rotule sometimes smaller than the inner one (fig. 8).

Gemmules abundant, whitish, hemispherical, distributed from base to top of the sponge, foraminal tube inconspicuous, cylindrical, standing not higher than the layer of the shorter gemmoscleres; outer gemmular coat thick, granulated, pneumatic coat thick, alveolar, the outer alveoli larger than the inner ones; inner gemmular coat three-foliated; gemmoscleres radially embedded in the pneumatic coat the shorter class completely concealed in the pneumatic coat, the longer class with the outer rotules projecting free beyond the level of the outer coat. The number of the longer gemmoscleres varies from gemmule to gemmule (fig. 7).

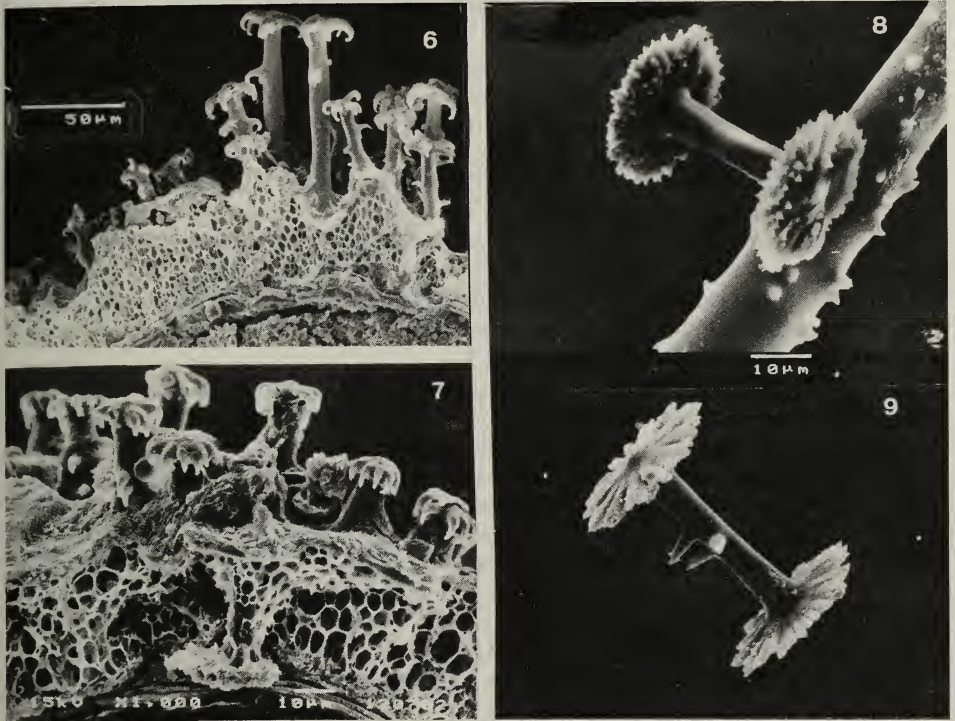
Dimensions. Megascleres length 296 - 431, width 12 - 26; long class gemmoscleres length 47 - 92, width 5 - 10; short class gemmoscleres length 33 - 49, width 5 - 8, diameter of rotules 25 - 29; diameter of gemmules 300 - 800.

Distribution. An amphiatlantic distribution in the northern hemisphere with its main range along the eastern coast of North America and Canada, one record from Central America and records from the western coast of the British Islands, the Faroes and southwestern Norway (OKLAND & OKLAND, 1989).

Habitat. Small lakes and ponds with fresh, brown waters, not far from the sea border.

Examined material. USA. **Philadelphia**: Coobs Creek, Delaware River, 1881, E. Potts, leg., fragment with gemmules from the lectotype (ANSP-PO 4536).

Remarks. Several authors presented arguments in favor of the idea that not four species of the *A. ryderi* group instead four ecomorphs of *A. ryderi* were involved. POTTS (1887) himself relegated *A. pictouensis* to the subspecific rank. STEPHENS (1920) and OKLAND & OKLAND (1989) extensively studied the many specimens of *A. ryderi* registered from western Europe and found all variants between *A. ryderi* and *A. pictouensis* thus considering the second species an ecomorph and synonym of the first one. POIRRIER (1977) synonymized *A. conigera* (Old, 1931) with *A. ryderi* on grounds of his observation of the *A. conigera* gemmoscleres in gemmules produced in the laboratory from *A. ryderi* specimens which lacked gemmules and were provenient from waters with presumably low dissolved silica. HARRISON (1977) synonymized *A. biceps* with *Ephydatia mülleri* (Lieberkhün, 1855).



Figs. 6-9. Gemmular coat with "in situ" longer and shorter gemmoscleres: 6, *Anheteromeyenia argyrosperma* (Potts); 7, *Acanthodiscus ryderi* (Potts); 8, short gemmosclere and part of megasclere in *A. ryderi* (Potts); 9, short gemmosclere in *A. sheilae* (Volkmer-Ribeiro et al.).

Acanthodiscus sheilae (Volkmer-Ribeiro, De Rosa-Barbosa & Tavares, 1988) comb. n.

(Fig. 9)

Anheteromeyenia sheilae VOLKMER-RIBEIRO et al., 1988: 85, figs. 3-12, 18, holotype, seasonal pond behind the dunes, not far from Parque Nacional da Lagoa do Peixe, Tavares, Rio Grande do Sul, Brazil, 12.XI.1984, Sheila M. Pauls leg. (MNRJ, examined).

Redescription. Sponge forming small, irregular crusts on hardened nodules of clay on the bottom of shallow seasonal ponds. Living sponge whitish. Skeleton devoid of spicule fibers and consisting of an irregular tangential deposition of the megascleres around and on top of the abundant gemmules. Spongin abundant gluing together megascleres, gemmules and sand grains. Ectosome conspicuous at places with small oscular orifices. Surface irregular and hispid from the projection of single spicules. Dry sponge fragile and brittle.

Megascleres straight to slightly curved, sparsely spined oxea with smooth, gradually pointed extremities, spines small (VOLKMER-RIBEIRO *et al.*, 1988, fig. 5). Young spicules grading from thin, curved or sinuous oxeas to the large adult ones.

Gemmoscleres birotulates of two very distinct classes. (VOLKMER-RIBEIRO *et al.*, 1988, figs. 4, 6-11); long class birotulates fewer in number and with stout, cylindrical shafts, bearing at middle part a group of irregular, large, straight spines and terminally with small, thick, umbonate rotules composed of an irregular number of stout, short, recurved rays abruptly slendering into small recurved spines; the short class gemmoscleres predominate in the gemmular coat, they are spool-shaped birotulates about three fourths the length of the long ones, shafts thinner at the middle part and there provided with a group of large, irregular, straight spines or shafts smooth, terminally with large, flat, granulated daisy-shaped rotules bearing a central umbonate projection of the shaft, borders deeply, irregularly cut into straight rays, rotules equal or outer rotule smaller than the inner one (fig. 9).

Gemmules abundant, whitish, spherical or hemispherical, foraminal tube conspicuous straight with outcurved bord, contained into the thick pneumatic coat, outer coat thick, granular, pneumatic coat alveolar, the outer alveoli larger than the inner ones, inner gemmular coat thick, three-foliated, gemmoscleres radially embedded in the pneumatic coat, the longer gemmoscleres projecting their outer rotules beyond the outer coat in those gemmules where the pneumatic coat has not attained its full thickness.

Dimensions. Megascleres length 259 - 462, width 4 - 17; long class gemmoscleres 41 - 70, width 2 - 10; short class gemmoscleres length 35 - 54, width 4 - 8, diameter of rotules 26 - 33; diameter of gemmules 370 - 543.

Distribution. Eastern part of Rio Grande do Sul State, Brazil.

Habitat. Seasonal, shallow ponds behind the settled, shrubby dunes along the coast-line or seasonal ponds farther inland.

Examined material. BRAZIL. **Rio Grande do Sul:** Tavares, 12. XI. 1984, Sheila M. Pauls leg. (Paratype MCN 1128); Bagé, 27. XI. 1981, R. de Rosa Barbosa leg. (MCN 1030).

DISCUSSION

Genus *Anheteromeyenia*, redefined shares with genus *Radiospongilla* Penney & Racek, 1968, the common possession of quite similar short gemmoscleres with abundantly spined shafts and small rotules, each composed of an irregular arrangement of incurved spines. Other characteristics shared by the two genera are the slim, spined, abruptly pointed oxea megascleres with spines turned to the sclere ends, the absence of microscleres, the rather radial setting of the gemmoscleres in the pneumatic coat, the presence of a foraminal tubule and the abundance of gemmules. The two genera show however clear cut definitions since in genus *Radiospongilla* the longer gemmosclere is missing, the gemmules have a long foraminal tubule (MASUDA *et al.*, 1981: figs. 2, 3) and a pneumatic coat with reticulate fibers (MASUDA & SATOH, 1984: figs. 12a, b, c) instead of the polyedrical alveoli of the pneumatic coat and the short foraminal tubule in *Anheteromeyenia* gemmules. In genus *Radiospongilla* there is also an abundant production

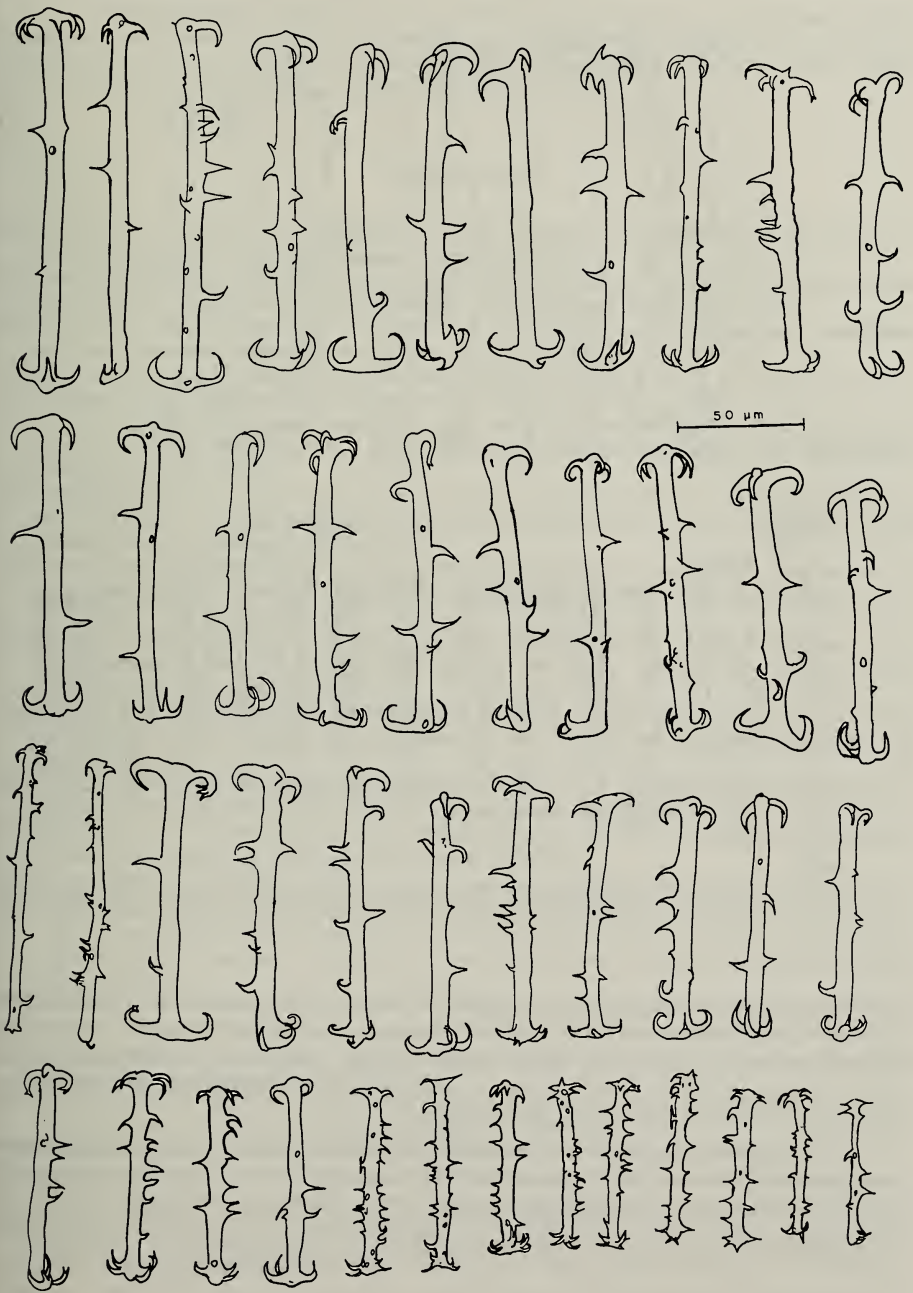


Fig. 10: *Anheteromeyenia argyrosperma* (Potts), gradual size variation of the gemmoscleres.

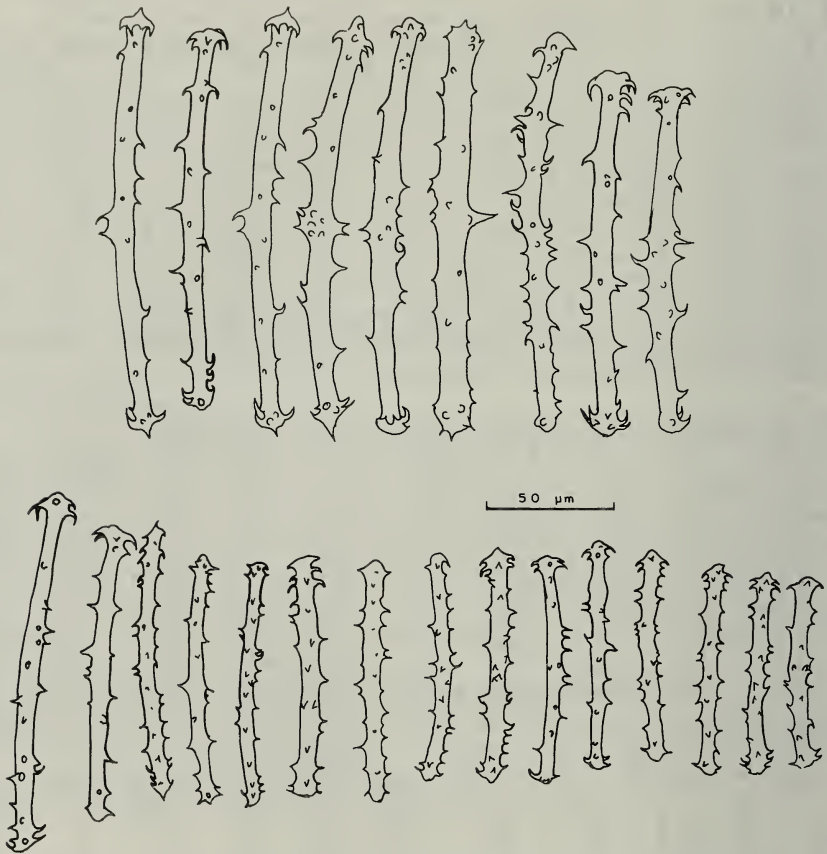


Fig. 11: *Anheteromeyenia ornata* (Bonetto & Ezcurra de Drago), gradual size variation of the gemmoscleres.

of skeletal fibers and spongin. The author foresees as necessary a revision of genus *Radiospongilla* Penney & Racek, 1968 in the search of other species which may exhibit *Anheteromeyenia* characteristics as seems, for instance, to be the case with *Radiospongilla sendai* (Sasaki) (SASAKI, 1936). That would eventually extend the distribution of genus *Anheteromeyenia* to other geographical regions.

No evidences could be perceived supporting the hypothesis of the transformation of the gemmoscleres in *Anheteromeyenia argyrosperma* and *A. ornata* into the regular dome-shaped longer birotulate gemmosclere of *Acanthodiscus* new genus end less yet into its also regular spool-shaped shorter gemmosclere. The proposition of the new genus *Acanthodiscus* comes to shed light on a group of species with characteristics of its own. No other genus of birotulate freshwater sponges missing microscleres has two so sharply different class of gemmoscleres.

Acknowledgments. To Dr. Ines Ezcurra de Drago, Instituto Nacional de Limnologia, Santa Fé, Argentina, for the donation of a fragment of the holotype of *Radiospongilla ornata*; to Dr. George P. Davis (ANSP) for loan of material of *Spongilla argyrosperma* and of *Heteromeyenia ryderi*; to Mr. Cleodir J. Mansan (MCN) with the operation of the Museum JEOL-5200 SEM equipment.

REFERENCES

- BONETTO, A. A. & EZCURRA DE DRAGO, I. 1970. Esponjas de los Afluentes del Alto Parana en la Provincia de Misiones. *Acta zool. lilloana*, Tucumán, (27): 37-61.
- DE-ROSA-BARBOSA, R. 1984. Reavaliação da fauna espongiológica continental do Estado do Rio Grande do Sul, Brasil, frente a novas coletas. *Iheringia*, Sér. Zool., Porto Alegre, (64): 127-148.
- FROST, T. M. 1991. Porifera. In: THORP, J. H. & COVICH, A. P. **Ecology and classification of North American freshwater invertebrates**. New York, Academic, p. 95-124.
- HARRISON, F. W. 1974. Sponges (Porifera: Spongillidae). In: HART Jr., C. W. & FULLER, S.L.H., ed. **Pollution ecology of freshwater invertebrates**. New York, Academic, p. 29-66.
- _____. 1977. The taxonomic and ecological status of the environmentally restricted spongillid species of North America. II. *Anheteromeyenia biceps* (Lindenschmidt, 1950). *Hydrobiology*, The Hague, 55 (2): 167-169.
- LAUBENFELS, M. W. de. 1936. A discussion of the sponge fauna of the Dry Tortugas in particular and the West Indies in general, with material for a revision of the families and orders of the Porifera. **Publs Carnegie Instn.**, Washington, (467): 34-37.
- MASUDA, Y. & SATOH, K. 1984. Scanning electron microscopic observation on gemmule coats of freshwater sponges. *Kawasaki Igakkai Shi Liberal Arts & Science Course*, Kurashiki, (10): 55-56.
- MASUDA, Y.; TAKAHASHI, Y. & SATOH, K. 1981. Scanning Electron Microscopic Observation on Micropyles and Spicules of the Fresh-water Sponges. *Kawasaki Igakkai Shi Liberal Arts & Science Course*, Kurashiki, (7): 65-77.
- OKLAND, K.A. & OKLAND, J. 1989. The amphiatlantic freshwater sponge *Anheteromeyenia ryderi*. (Porifera, Spongillidae) taxonomic-geographic implications of records from Norway. *Hydrobiology*, Den Haag, (17): 177-188.
- PENNEY, J. T. & RACEK, A.A. 1968. Comprehensive revision of a worldwide collection of freshwater sponges (Porifera: Spongillidae). *Bull. U. S. natn. Mus.*, Washington, (272): 1-184.
- POIRRIER, M. A. 1977. Systematic and ecological studies of *Anheteromeyenia ryderi* (Porifera: Spongillidae) in Louisiana. *Trans. Amer. Microsc. Soc.*, Lancaster, (96):62-67.
- POTTS, E. 1880. On freshwater sponges. *Proc. Acad. nat. Sci. Philad.*, Philadelphia, (1881): 356-357.
- _____. 1882. Three more freshwater sponges. *Proc. Acad. nat. Sci. Philad.*, Philadelphia (1882):12-14.
- _____. 1887. Contribution towards a synopsis of the American forms of freshwater sponges with descriptions of those named by other authors and from all parts of the world. *Proc. Acad. nat. Sci. Philad.*, Philadelphia (1887): 158-279.
- RICCIARDI, A. & REISWIG, H. M. 1993. Freshwater sponges (Porifera: Spongillidae) of eastern Canada: taxonomy, distribution and ecology. *Can. J. Zool.*, Ottawa, (71):665-682.
- SASAKI, N. 1936. The fresh-water sponges obtained in Northeast Honshû, Japan. *Saito Ho-On Kai Museum Research Bulletin*, Sendai, (9): 1-29.
- SCHRÖDER, K. 1927. Über die Gattungen *Carterius* Petr. *Astromeyenia* Annandale und *Heteromeyenia* Potts (Porifera: Spongillidae). *Zool. Anz.*, Leipzig, 73: 101-112.
- STEPHENS, J. 1920. The freshwater sponges of Ireland. *Proc. R. Ir. Acad.*, Dublin, (35):204-254.
- VOLKMER - RIBEIRO, C. & TRAVESET, A. 1987. Annotated Catalog of the Type Specimens of Potts Species of Freshwater Sponges. *Proc. Acad. nat. Sci. Philad.*, Philadelphia, (139): 223-242.
- VOLKMER - RIBEIRO, C.; DE-ROSA-BARBOSA, R. & TAVARES, M. C. M. 1988. *Anheteromeyenia sheilae* sp. n. e outras esponjas dulceaquícolas da região costeira do Rio Grande do Sul. *Iheringia*, Sér. Zool., Porto Alegre, (68): 83-98.