Freshwater sponges (Porifera: Spongillidae) in the Faroe Islands

Feskvatns svampar (Porifera: Spongillidae) í Føroyum

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Úrtak

Tvey sløg av feskvatns svampum, *Racekiela ryderi* (Potts, 1882) og *Spongilla lacustris* (Linne, 1758) eru skrásett í Føroyum, tað seinna skrásett fyri fyrstu ferð. Ein kjarni tikin í Skálafjørðinum hevði sporahylki við *R. ryderi,* sum eru frá umleið ár 8.600 áðrenn okkara tíð. Hetta er ein ábending um, at feskvatns soppar vóru millum tey fyrstu dýr at seta seg niður aftaná síðstu ístíð.

Abstract

Two species of freshwater-sponges, *Racekiela ryderi* (Potts, 1882) and *Spongilla lacustris* (Linne, 1758) are recorded from the Faroes, the latter as new to the islands. Gemmules of *R. ryderi* from a core in Skálafjørður have been dated to about 8600 years B.P., an indication that freshwater sponges were among the early immigrants after the last deglaciation.

Introduction

Early investigations on the freshwater fauna of the Faroe Islands were sporadic, Svabo (1783, but not published until 1959), Landt (1800), Mørch (1868, 1869), Willemoes-Suhm (1873), Richard (1898) and Collinge (1904) listing only few species, and among them no freshwater sponges. The group was for the first time reported by Arndt (1928), who identified and described material of *Racekiela ryderi* (Potts, 1882), collected in 1912 by the entomologists A. Dampf and K. von Rosen. Despite comprehensive sampling of freshwater fauna during the 1920's no further material of sponges had turned up, when Spärck elaborated on the same record in the series The Zoology of the Faroes (1934), and no recent finds have since been brought to attention (Tendal, 1967; Simon, 1978). Postglacial material has been reported from a core as "Spongillidae" by Bennike *et al.* (1998).

Recent investigations provided three samples, one taken by the author, the others by F. Jensen and H.T. Rapp, respectively.

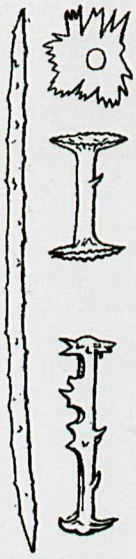

Fig. 1. Spicules of Racekiela ryderi *(After Arndt, 1928).*

Postglacial material was put at disposal by O. Bennike.

Results

Order HAPLOSCLERIDA

Family Spongillidae

Genus *Racekiela* Volkmer-Ribeiro, 1998

Racekiela ryderi (Potts, 1882)

Good general descriptions: Penney & Racek (1968: 117, pl. 10), Poirrier (1977: 63, Figs. 1-4) and Økland and Økland (1989:180, Figs. 3-6), Pronzato and Manconi (2001:32, Figs. 23-24.

Previous records: Southern end of Sørvágsvatn, Vágar, on a plant stem and a small stone (A. Dampf and K. von Rosen, 02.09.1912) .

New records: About10 gemmules from a core taken at 62°09.4'N, 6°45.8'W in Skálafjørður, Eysturoy. The gemmules were extracted from a lacustrine layer 93 cm below the present sea bottom. The layer is dated to about 8560 years B.P.

Material deposition: Museum für Naturkunde der Humboldt Universität, Berlin, and Zoological Museum, University of Copenhagen.

Description of the material (Fig.1): The single recent sample is a small crust 1 cm thick, and measuring 2 x 2 cm. It is of loose consistency and very soft. The colour in preserved condition is greyish brown. Dermal membrane and oscules are not visible, the outer layer probably missing. The skeleton is a network of thin fibers with little spongin. Megascleres are spiny, slightly curved oxea, 272-338 µm long, on average 315 µm, and 9-15 µm thick. Gemmule spicules are amphidiscs of two size categories. The larger are 40-50 µm long with the endplates about 20 µm in diameter and divided into 4-8 teeth. The shaft is 6-6.5 µm thick and provided with up to 10 strong spines. The smaller amphidisc category is 20-30 µm long with the endplates 19-23 µm in diameter and divided into 15-25 teeth. The shaft is 3-5 µm thick and smooth or provided with 1-2 spines.

The gemmules from the core are in a bad state compared to recent gemmules, but after some search the two categories of amphidiscs were found in the wall and both appearence and size fit *R. ryderi*. Large amphidiscs are 42 µm long, with disc about 18 µm in diamter; small amphidiscs are 26-30 µm long, with disc about 20 µm in diameter.

Geographical distribution: *R. ryderi* is a highly variable amphiatlantic species with main distribution in eastern North America, from Nova Scotia to Texas, with a single record from Belize, and from the Atlantic coast inland into the Mississippi basin. The distribution in western Europe is, on the other hand, restricted to scattered records from coastal areas and islands: Sherkin Island south of Ireland (Tendal, unpubl.), Clare Island west of Ireland (Stephens, 1912), parts of the coasts of Ireland (Hanitsch, 1895; Stephens, 1920), the Island of Mull west of Scotland (Annandale, 1908), the outer Hebrides (Forrest, 1936; Waterston, 1981), the Faroe Islands (Arndt, 1928) and western Norway (Økland and Økland, 1989; 1991).

Remarks: Reinvestigation of Arndts material confirmed the details of his description (1928) of which Spärck's (1934) account seems to have been a mere reiteration.

The gemmules from the core were deposited in a lake after the deglaciation about 10,000 years ago. Around 8000 years B.P. what is now the treshhold of the fjord was overflown by the sea and Skálafjørður came into existence (Bennike *et al.*, 1998).

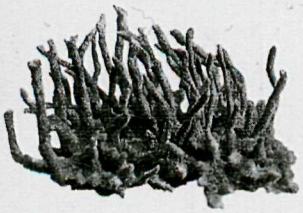

Fig. 2. Spongilla lacustris. *Basically encrusting growth-form with branches (After Wesenberg-Lund, 1937). Bottom photograph from Mýrarnar (H.T. Rapp).*

Genus *Spongilla* Lamarck, 1816

Spongilla lacustris (Linné, 1758)

Good general description: Penney and Racek (1968: 9, pl. 1), Pronzato and Manconi (2001: 38, Figs. 29-31).

Previous records: none.

New records: Bøsdalafossur, Vágar (F. Jensen, 16.07.1978); Leynavatn, 0.5 m, Stremoy (O.S. Tendal, 28.09.1991); Mýranar, 3-10 m, Stremoy (H.T. Rapp, 23.09.1997).

Material deposition: Natural History Museum, Aarhus and Zoological Museum, Copenhagen.

Description of the material (Figs. 2 and 3): The specimen from Bøsdalafossur is a small rounded lump, 2 cm in maximum diameter. There are no gemmules and no trace of substrate. The smooth megascleres measure 250-325 µm in length (average 291 µm). The spiny microscleres measure 70-110 µm in length (average 86 µm).

The material from Leynavatn is encrusting, up to 1 cm thick and 20 cm in diameter. In life it was green, soft and had the characteristic freshwater sponge smell. The substrate was a stone in the bottom of a small stream. The smooth megascleres measure 200-325 µm in length (average 241 µm). The spiny microscleres measure 70-100 µm in length (average 81 µm). The spiny gemmoscleres measure 50-90 µm in length (average 72 µm).

The material from Mýranar near Vestmanna has a well developed basal encrusting part from which grow up to 6 cm (according to diver's report 25 cm) long undivided branches, about 0.5 cm in diameter. It was soft and the live colour was yellowish to light brown. The substrate seems to have been large sand grains or small pebbles scattered in the mud on the bottom of the lake. The smooth megascleres measure 275-375 in length (average 341 µm). The spiny microscleres

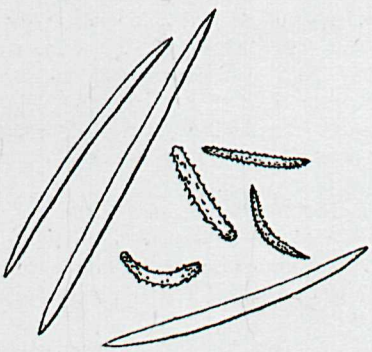

Fig. 3. Spicules of Spongilla lacustris *(After Weltner, 1909).*

measure 70-115 µm in length (average 92 µm). The spiny gemmoscleres measure 50-90 µm in length (average 68 µm).

Geographical distribution: *S. lacustris* is widely recorded from North America, Asia and Europe, mainly in the cold-temperate parts.

Discussion

It is surprising that freshwater sponges have not been recorded from more localities on the Faroes; the most reasonable explanation is that they are mostly small and not very obvious, and even if a number of investigations have been carried through, also in recent years, nobody looked for them. The two species recorded, *Racekiela ryderi* and *Spongilla lacustris*, are those that could be expected when considering records elsewhere from near-coast localities and small islands off the coast (Annandale, 1908; Stephens, 1920; Waterston and Lyster, 1979; Økland and Økland; 1996). A third species, *Ephydatia muelleri* (Lieberkühn, 1851) could occur in some places since it has been found scattered in coastal areas of western Norway (Økland and Økland, 1996), and in Iceland (Tendal, 1976) and southern Greenland (Tendal, unpubl.). *E. muelleri* seems not to tolerate pH lower than 5.7 and avoids localities with low calcium concentration (Jewell, 1939; Økland and Økland, 1996).

The characters of the Faroese material fall well within the known large variation of the two species (Arndt, 1928; Stephens, 1920; Penney and Racek, 1968; Poirrier, 1977; Økland and Økland, 1989; Pronzato and Manconi, 2001).

Because *R. ryderi* has a wider geographical distribution range and larger ecological tolerance in eastern USA than in western Europe, it is considered an American species in origin. Since the discovery in Europe several theories have been offered to explain the amphiatlantic distribution, both with respect to the time of the presumed arrival from America, and as to the mechanism behind it (Hanitsch, 1895, summarized in Økland and Økland, 1989). Although later reintroduction might have occurred, the hypotheses claiming *R. ryderi* to be a recent invader in Europe can in principle be ruled out after the find of postglacial, 8,560 years old, gemmules of the species in a former freshwater lake in the Faroes.

Ideas about ice free refugia in the Faroes during the last ice-age (Spärck, 1934) are not supported since, until about 10,000 years ago, the Faroes were, except for the highest peaks, covered by an own ice-cap (Jørgensen and Rasmussen, 1986), and no traces of a local freshwater fauna of that age or older have been recorded.

R. ryderi reached the islands soon after the deglaciation. Experience, although with other species of fresh-water sponges, from other Scandinavian areas indicates that such fast colonization of "empty" areas is a general phenomenon (Wesenberg-Lund, 1896; Arndt, 1932a, b; Økland and Økland, 1996).

Where the species came from and by what means are open questions. Considering the extent of the still existing ice-caps and the harsh climate at the time northwest of the Faroes it seems most likely that the relationships are with more southern populations, maybe in Ireland. The spreading device must have been the gemmules which

in both species are quite tolerant to environmental changes (Fell and Bazer, 1990; Fell and Levasseur, 1991). They were in all probability carried along by birds.

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