FAUNA AQUATICA AUSTRIACA

PORIFERA: SPONGILLIDAE
(Freshwater Sponges)

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Quotation note

Dröscher, I., Waringer, J., Mildner J. & P. Mildner (2017): Spongillidae. In Moog, O. & A. Hartmann (Eds.): Fauna Aquatica Austriaca, 3. Edition 2017. BMLFUW, Wien.

Freshwater sponges (Spongillidae) belong to the phylum of Porifera and the divsion of Parazoa. According to Pronzato & Manconi (1994a), their high plasticity, the somatic origin of sperms and eggs and the lack of specialised tissue types are typical for Parazoa. Based on molecular studies, Porifera and the phyla of Metazoa are monophyletic (Müller, 2003). Porifera are divided into three morphological groups: Calcarea, Hexactinellida and Demospongiae. Freshwater sponges, along with 95% of all sponge taxa, belong to the latter group where silicious spicules are present, or spicula are totally lacking. Besides Spongillidae, there are two other families with species inhabiting freshwaters: Potamolepidae und Lubomirskiidae (Gruner, 1993). The former group consists of few endemic species inhabiting the large streams and lakes of Central Africa whereas Lubomirskiidae are restricted to lake Baikal, lake Ohrid and the Beringean sea. Mono- or polyphyly of the three freshwater sponge groups is still discussed (Pronzato & Manconi, 1994b).

The extant number of Porifera species is well above 6000 (Berquist, 1978), with less than 300 species known from freshwaters (Frost, 1991). The European Spongillidae inventory is up to 18 species (Simon, 1978; Fauna Europaea, 2017). In addition to the six Austrian species (Mildner, 1999; Dröscher & Waringer, 2007), there are two further species known from Germany (*Heteromeyenia baileyi* Bowerbank 1863 and *Eunapius carteri* Bowerbank 1863; Eggers & Eiseler, 2007), one species from the British Isles, Norway and the Faroer isles (*Racekiela ryderi* Potts 1882), from Bulgaria (*Radiospongilla cerebellata* Bowerbank 1863), from Sardinia and Corsica (*Sanidastra yokotonensis* Volkmer-Ribeiro & Watanabe 1983), from Northern Russia (*Spongilla arctica* Annandale 1915), from Macedonia and Poland (*Spongilla stankovici* Arndt 1938), from Croatia (*Eunapius subterraneus* Sket & Velikonja 1984), and 4 species from Macedonia, including 3 endemic species of family Malawispongiidae (*Spongilla prespensis* Hadzische 1953, *Ochridaspongia* spp. *Ochridospongilla* sp.; Fauna Europaea, 2017).

Freshwater sponges are variable in shape, consisting of masses of specialised cells. They filter large volumes of water through the porous network of their body, capturing suspended particles for food. Sponges are often referred to as ‘colonies’ (Jaffé, 1912; Kilian, 1964). However, as their body cannot be divided into exact numbers of morphologically distinct entities, for practical purposes single patches should be considered as individuals (Gruner, 1993). The matrix of freshwater sponges is supported by siliceous structures (spicules) which are important for identification and, according to their size, are divided into macroscleres and microscleres. In addition to body spicules, microscleres are also present in the outer layer of the spherical hibernating structures called gemmulae, which develop towards the end of the vegetation period in late summer and autumn. For preparation, the siliceous spicules of sponges and gemmulae are isolated using 10% sodium dichloroisocyanurate, transferred to slides, embedded and examined under a microscope (Dröscher & Waringer, 2007).
Despite the holarctic distribution of many species, Spongillidae generally is a neglected group in routine sampling and often overlooked due to their crust-like colonies (Eggers & Eiseler, 2007). In addition, the preparation of spicules and the collection of gemmulae, which typically do not develop before late summer but are necessary for identification to species, is time consuming (Hooper, 2000). On the other hand, sponges may be quite abundant: up to 58 individuals per site were collected within 30 minutes in Danubian floodplain waterbodies in Austria, covering up to 151 cm^2 per specimen. However, the presence of hard substratum was essential for the growth of sponges: timber stands near the water and drifting dead wood, but also stony substrata, significantly increased sponge abundance, whereas smaller fractions were collected from macrophytes such as *Phragmites* (Dröscher & Waringer, 2007). They are also valuable bioindicators: environmental stress such as water pollution or heavy metal contamination causes spicule anomalies. The three most abundant anomalies are forks (bifurcated, x- or cross-shaped), centrotylotes (one or more globular swellings approximately double the width of the intact spicule) and hooks (sharply bent at obtuse, right or even acute angles) with spicule anomalies

being used to assess water pollution (e.g. Konopacka, 1983/1984; Richelle-Maurer et al., 1994b; Richelle et al., 1995; Mysing-Gubula & Poirrier, 1981). Besides their important ecological role as filtering collectors, sponges quickly respond to environmental changes and are quite mobile: *Trochospongilla horrida* (Weltner 1893) was only seldom collected in the Rhine River before 1980, but has become very abundant since 1992 (Gugel, 2000). Although sponges have disappeared from many waterbodies due to pollution, destruction of macrophyte stands and ever-increasing loads of suspended solids, they may be favoured by increases in temperature caused for instance by cooling water outlets and by the creation of artificial hard substrata such as locks, sheet pilings and riprap.

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Species inventory

Family Spongillidae

Genus Ephydatia LAMOUROUX, 1816

Ephydatia fluviatilis (LINNAEUS, 1759)
Ephydatia mülleri (LIEBERKÜHN, 1856)

Genus Eunapius GRAY,1867

Eunapius fragilis (LEIDY, 1851)

Genus Heteromeyenia POTTS, 1881

Heteromeyenia stepanowii (DYBOWSKY, 1884) single find

Genus Spongilla LAMARCK, 1816

Spongilla lacustris (LINNAEUS, 1759)

Genus Trochospongilla VEJDOVSKY, 1883

Trochospongilla horrida WELTNER, 1893

Saprobic valencies

	x	o	ß	a	p	W	SI
Ephydatia							
Ephydatia fluviatilis	-	-	7	2	1	3	2,4
Ephydatia mülleri	-	1	7	2	-	3	2,1
Eunapius							
Eunapius fragilis	-	-	10	-	-	5	2,0
Heteromeyenia							
Heteromeyenia stepanowii	-	-	10	-	-	5	2,0
Spongilla							
Spongilla lacustris	-	2	7	1	-	3	1,9
Trochospongilla							
Trochospongilla horrida	-	-	10	-	-	5	2,0

Longitudinal distribution

	EUC	HYC	ER	MR	HR	EP	MP	HP	LIT	PRO
Ephydatia										
Ephydatia fluviatilis	-	-	-	-	1	1	1	1	6	-
Ephydatia mülleri	-	-	-	-	1	2	2	-	4	1
Eunapius										
Eunapius fragilis	-	-	-	-	-	2	3	-	5	-
Heteromeyenia										
Heteromeyenia stepanowii	-	-	-	-	-	-	-	-	10	-
Spongilla										
Spongilla lacustris	-	-	-	-	1	1	1	1	5	1
Trochospongilla										
Trochospongilla horrida	-	-	-	-	1	2	3	1	3	-

	Functional feeding guilds									
	SHR	GRA	AFIL	PFIL	DET	MIN	XYL	PRE	PAR	OTH
Ephydatia										
Ephydatia fluviatilis	-	-	10	-	-	-	-	-	-	-
Ephydatia mülleri	-	-	10	-	-	-	-	-	-	-
Eunapius										
Eunapius fragilis	-	-	10	-	-	-	-	-	-	-
Heteromeyenia										
Heteromeyenia stepanowii	-	-	10	-	-	-	-	-	-	-
Spongilla										
Spongilla lacustris	-	-	10	-	-	-	-	-	-	-
Trochospongilla										
Trochospongilla horrida	-	-	10	-	-	-	-	-	-	-