

THE ALGAL SPECIES OF A GRAVEL STREAM "OBERER SEEBACH", LUNZ

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ABSTRACT

Based on information obtained from several studies, a compilation list is given of the phytobenthic algal species (mainly epilithic) inhabiting both the surface and the upper sediment layers down to the light discontinuity layer of the alpine gravel stream 'Oberer Seebach', Lower Austria. A total of 253 algal taxa was found during an investigation period of nearly 80 years (1922-1997). The results show a clear dominance of diatoms and cyanophytes, a situation typical for alpine mountain streams. The diatoms form the richest group in species.

Key words: Cyanophyta, Rhodophyta, Chlorophyta, Heterokontophyta, diatoms, mountain stream, phytobenthos, algae.

INTRODUCTION

The precise taxonomical investigation of all occurring algal taxa is a fundamental basis for the overall description of the phytobenthos within the pilot study of an ecosystem. The temporal-spatial distribution of different algal groups is an additional aspect which is based on the results of this work and will be discussed elsewhere (Müllner & Schagerl in prep., Müllner & Bretschko in prep., Müllner & Kusel-Fetzmann in prep.).

The number of comprehensive taxonomical-floristical investigations on periphytic algae in non-polluted mountain streams is very low. Works dealing with the entire spectrum of the occurring algae are e.g. those by Geitler (1927a), Budde (1928), Fritsch (1929), Butcher (1932), Jaag (1938) and more recent investigations by Backhaus (1968, 1976), Kann (1978), Kawecka (1981) and Pfister (1992ab).

The region of Lunz, Lower Austria, has a rich algal flora due to many different freshwater habitat types. This was responsible for several well-known algal taxonomists to investigate the periphytic communities, among other things those of the mountain streams in the region. The result was a number of new discoveries respectively descriptions especially in the cyanophyta (e.g. Geitler 1925, 1927bc; Kann 1978) which have kept their validity till now (compare the latest manual on cyanoprokaryota/Chroococcales by Komárek & Anagnostidis 1999). A

compilation of algological research carried out in the gravel stream 'Oberer Seebach' between 1922 and 1988 is given by Müllner (1995).

The present work is intended to be an additional contribution to the knowledge of the algal flora of non-polluted streams in the alpine zone and compiles all algal species found in the gravel stream 'Oberer Seebach'.

MATERIALS AND METHODS

The study compiles the algal species which inhabit the alpine lime stream 'Oberer Seebach' in Lower Austria (47°51'N, 15°04'E, 610m a.s.l.). The Seebach is a coldwater gravel stream (mean maximum water temperature 10.2°C). The stream sediments have a medium grain size composition of 23.1 mm, the photic zone goes down to a depth that corresponds to Schwoerbel's (1964) postulated size of layer of about four to five times the mean grain size diameter (Müllner 1998). A full description of the study site is given by Bretschko (1983, 1991, 1998).

There have been used four investigations on the algal flora of the 'Oberer Seebach' as main information sources: Hustedt (1922), Kann (1978), Müllner (1998), and the hand-written card-index of the Biological Station Lunz, hence evaluated respectively published for the first time, which consists of taxa lists by Geitler, Hustedt and Kann, compiled in the course of their investigations in Lunz between the

1920's and 1970's. Whereas Hustedt (1922), Kann (1978) and the card-index comprise taxa of the entire length of the 'Oberer Seebach', the investigations of Müllner (1998) are restricted to the 100m research area 'Ritrodat' in the stream. For the qualitative analysis the algae were removed from their substrates by a razor-blade and subsequently investigated by light microscopy (Leitz, Reichert-Jung). For the analysis of diatoms the sampling was done by a modified Douglas-Sampler (Douglas 1958). The permanent slide preparations were made by using the synthetic resin Naphrax (refraction index 1.7). For more details on the sampling and preparation techniques see Müllner (1998). The following literature was used for determination of algal taxa: Anagnostidis & Komárek 1988, Backhaus 1976, Geitler 1925, 1927bc, 1985, Heering 1914, Kann 1966, 1972, 1973, 1978, Kann & Komárek 1970, Kawecka 1981, Komárek & Anagnostidis 1999, Komárek & Hindák 1989, Komárek & Kann 1973, Komárek & Kováčik 1987, Krammer & Lange-Bertalot 1986, 1988, 1991ab, Pfister 1992ab, Starmach 1985.

RESULTS AND DISCUSSION

The taxa recorded from the 'Oberer Seebach' are listed in the Appendix. A total of 253 algal taxa have been identified between 1922 and 1998. The number of taxa found is remarkably high, compared e.g. to late investigations in two fast flowing mountain streams in Tyrol (199[207] taxa in 'Isar' and 'Gschnitzbach' together; Pfister 1992ab). In the 'Oberer Seebach', the diatoms form the richest group in species. 136 out of 253 taxa belong to the Heterokontophyta (4 Chrysophyceae, 3 Xanthophyceae, 136 Bacillariophyceae), 84 to the Cyanophyta, 24 to the Chlorophyta and two taxa to the Rhodophyta (Fig. 1).

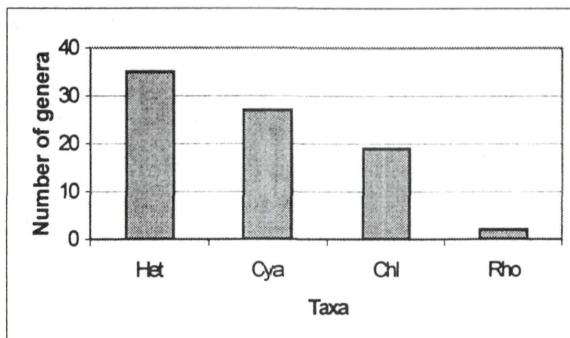
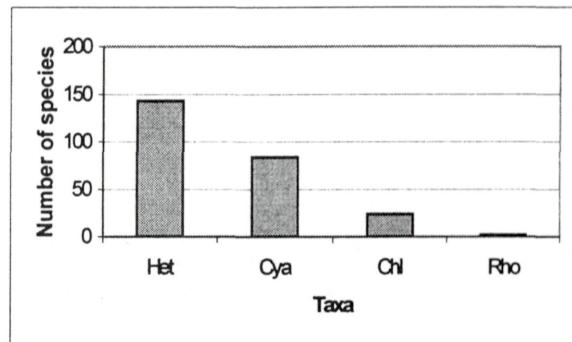


Fig. 1: Number of genera and species of the four algal divisions found in the 'Oberer Seebach' from 1922 to 1998. Het = Heterokontophyta; Cya = Cyanophyta; Chl = Chlorophyta; Rho = Rhodophyta.



The most abundant species within the different algal groups (according to the latest investigation by Müllner 1998) were found to be:

Cyanophyta:

- Homoeothrix varians*
- Chamaesiphon polonicus*
- Chamaesiphon geitleri*

Rhodophyta:

- Chantransia sp.*

Chlorophyta:

- Gongrosira sp.*

Heterokontophyta:

- +Bacillariophyceae -
- Achnanthes minutissima*
- Gomphonema angustum*
- Cymbella minuta*
- Cocconeis placentula*
- +Chrysophyceae -
- Phaeodermatium rivulare*
- Hydrurus foetidus*
- +Xanthophyceae: -

The results show a dominance of diatoms and cyanophytes, a situation typical for alpine mountain streams (Kann 1978, Kawecka 1981, Pfister 1992ab), comprising together 87 % of all phytobenthic taxa. This may be due to the high number of specialists within the cyanophytes and diatoms that are able to cope with extreme conditions such as low temperatures, high water velocities and frequent saltatory movements of the upper sediment layers driven by water

discharge. The observed differences in species composition between different sample sites will be discussed separately (Müllner & Schagerl in prep.).

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Appendix: The periphytic algal species composition found in the 'Oberer Seebach' (1922-1998).

TAXON	AUTHOR	SOURCE
CYANOPHYTA		
<i>Aphanothece saxicola</i>	Näg. 1849	K
<i>Calothrix braunii</i>	Born. et Flah. 1886	B
<i>Calothrix fusca</i>	Born. et Flah. 1886	K,B
<i>Calothrix orsiniana</i>	Thuret nova comb. Bourrelly 1970	K
<i>Calothrix parietina</i>	Thuret 1825	K,B
<i>Chamaesiphon confervicolus</i>	A. Braun in Rabenhorst 1865	M,K,B
<i>Chamaesiphon fuscus</i>	(Rostaf.) Hansg. 1888	M
<i>Chamaesiphon geitleri</i>	Luther 1954	M,K,B
<i>Chamaesiphon incrustans</i>	Grunow in Rabenh. 1865	M,K,B
<i>Chamaesiphon investiens</i>	Skuja 1964	M
<i>Chamaesiphon investiens</i> var. <i>roseus</i>	Skuja 1964	M,K,B
<i>Chamaesiphon oncobyrsoides</i>	Geitler 1925	K,B
<i>Chamaesiphon polonicus</i>	(Rostaf.) Hansg. 1892	M,K,B
<i>Chamaesiphon polymorphus</i>	Geitler 1925	M,K,B
<i>Chamaesiphon pseudopolymorphus</i>	F.E. Fritsch 1929	M,K,B
<i>Chamaesiphon rostafinskii</i>	Hansg. 1887	B
<i>Chamaesiphon</i> sp.	A. Braun et Grunow 1865	M
<i>Chamaesiphon starmachii</i>	Kann 1978	K,B
<i>Chamaesiphon subglobosus</i>	(Rostaf.) Lemm. 1910	K,B
<i>Chlorogloea microcystoides</i>	Geitler 1925	K,B
<i>Chlorogloea</i> sp.	Wille 1900	M
<i>Clastidium rivulare</i>	Hansg. 1892	M,K,B
<i>Clastidium setigerum</i>	Kirchner 1880	M,K,B
<i>Dermocarpa kerneri</i>	(Hansg.) Bourrelly 1970	M,K,B
<i>Dermocarpa rivularis</i> *	(Hansg.) Kann 1978	K,B
<i>Desmonema wrangelii</i>	(Ag.) Born. et Flah. 1887	B
<i>Gloeocapsa dermochroa</i>	Näg. 1849	M,K
<i>Gloeocapsa</i> sp.	Kütz. 1843	M
<i>Homeothrix crustacea</i>	Woronichin 1923	K,B
<i>Homeothrix nordstedtii</i>	(Born. et Flah.) Kann 1978	K,B
<i>Homeothrix rivularis</i>	(Hansg.) Kann 1978	M,B
<i>Homoeothrix varians</i>	Geitler 1927	M,K,B
<i>Hydrococcus cesatii</i>	Rabenh. 1860	M,K,B
<i>Hydrococcus rivularis</i>	Kütz. 1833	M,K,B
<i>Hydrococcus</i> sp.	Kütz. 1833	M
<i>Hydrocoleum brebissonii</i>	Kütz. ex Gom. 1892	K,B
<i>Hydrocoleum homeotrichum</i>	Kütz. ex Gom. 1892	K
<i>Hyella fontana</i>	Huber et Jadin 1892	M,K
<i>Hyella fontana</i> var. <i>maxima</i>	Geitler 1928	K,B
<i>Leptolyngbya foveolarum</i>	(Rabenh. ex Gom.) Anagn. et Kom. 1988	M,K,B
<i>Leptolyngbya frigidum</i>	(Fritsch) Anagn. et Kom. 1988	B
<i>Leptolyngbya perforans</i>	(Geitl.) Anagn. et Kom. 1988	M,K,B
<i>Lyngbya epiphytica</i>	Hieron. Engler et Prantl 1898	B
<i>Lyngbya kützingii</i>	Schmidle 1897	M,K,B
<i>Lyngbya martensiana</i>	Menegh. ex Gom. 1892	M,K,B
<i>Lyngbya nigra</i>	Ag. 1824	K,B
<i>Lyngbya</i> sp.	Agardh 1824	M
<i>Merismopedia glauca</i>	(Ehrenb.) Näg. 1849	K,B

<i>Microcoleus vaginatus</i>	Gom. 1892	M,K,B
<i>Microcystis anodontae</i> var. <i>rivulorum</i>	(Hansgirg) Elenkin 1938/(Geitler) Hollerbach 1953	K,B
<i>Microcystis fonticola</i>	(Hansg.) Kann 1978	M,K,B
<i>Microcystis pulverea</i>	(Wood) Forti 1907	B
<i>Microcystis parasitica</i>	Kütz. 1843	B
<i>Microcystis</i> sp.	Kütz. ex Lemm. 1907 nom. cons.	M
<i>Nostoc verrucosum</i>	Vaucher 1803	K,B
<i>Oscillatoria cortiana</i>	Menegh. 1837	B
<i>Oscillatoria limosa</i>	Ag. 1812	K
<i>Oscillatoriaceae</i>	(Gray) Kirchner 1900	M
<i>Phormidium autumnale</i>	(Ag.) ex Gom. 1892	M,K,B
<i>Phormidium corium</i>	Gom. 1890	M,K,B
<i>Phormidium retzii</i>	(Ag.) Gom. 1890	K
<i>Phormidium</i> sp.	Kützing 1843	M
<i>Phormidium subfuscum</i>	(Kütz.) ex Gom. 1892	K,B
<i>Phormidium uncinatum</i>	Gom. 1890	B
<i>Plectonema phormidioides</i>	Hansgirg 1887	M,K,B
<i>Plectonema radiosum</i> *	(Schiederm.) Gomont 1892	K,B
<i>Plectonema tomasinianum</i>	Born. 1889)	M,B
<i>Plectonema wollei</i> f. <i>gracilis</i>	Farlow 1875	K,B
<i>Pleurocapsa aurantiaca</i>	Geitler 1932	M,K,B
<i>Pleurocapsa fluviatilis</i>	Lagerh. 1888	M,B
<i>Pleurocapsa minor</i>	Hansgirg em. Geitler 1925, 1890	M,K,B
<i>Pleurocapsa polonica</i>	Raciborski	M,K,B
<i>Pseudanabaena catenata</i>	Lauterb. 1914-1917	B
<i>Pseudanabaena galeata</i>	Böcher 1949	M,B
<i>Rivularia dura</i>	Roth 1802	B
<i>Rivularia haematites</i>	(D.C.) Ag. 1824	K,B
<i>Schizothrix fasciculata</i>	(Näg.) Gom. 1892	K
<i>Schizothrix fasciculata</i> f. <i>semiglobosa</i>	Geitl. 1927	K,B
<i>Schizothrix heufleri</i> *	Grun. 1865	K,B
<i>Schizothrix lacustris</i>	A. Br. Kütz. 1849	K
<i>Schizothrix lateritia</i>	(Kütz.) Gom. 1892	B
<i>Schizothrix tinctoria</i>	Gom. 1890	M,K,B
<i>Siphononema polonicum</i>	(Raciborski) Geitler 1925	M,B
<i>Tolypothrix distorta</i>	Kütz. 1843	K

RHODOPHYTA

<i>Batrachospermum moniliforme</i>	(Roth) Sirodot	K
<i>Chantransia</i> sp.	Bory de ST. VINCENT 1823	M,K

CHLOROPHYTA

<i>Cladophora glomerata</i>	(L.) Kützing ampl. Brand	K
<i>Coleochaete scutata</i> *	Bréb.	K
<i>Cosmarium</i> sp.	Corda ex Ralfs 1848	M,K
<i>Ectochaete endophytum</i> *	(Möb.) Wille	K
<i>Gongrosira debaryana</i>	Rabenh.	M,K
<i>Gongrosira incrustans</i>	(Reinsch) Schmidle 1901	M,K
<i>Gongrosira</i> sp.	Kützing	M
<i>Haematococcus pluvialis</i>	Flotow em. Wille	K
<i>Hormidium rivulare</i>	Kütz. 1845	K
<i>Jaagiella</i> sp.	Vischer 1960	M
<i>Microspora</i> sp.	Thuret 1850	M
<i>Mougeotia</i> sp.	Agardh. Sp. 1824	K
<i>Oedogonium</i> sp.	Link 1820	M,K

<i>Palmella mucosa*</i>	Kütz.	M,K
<i>Sphaerobotrys fluvialis</i>	Butcher 1932	M,K
<i>Spirogyra</i> sp.	(Link 1820) sp.	K
<i>Stigeoclonium</i> sp.	Kützing 1843	M,K
<i>Tetraspora lubrica/gelatinosa</i>	(Roth) Agardh 1824/(Vaucher 1803) Desvaux 1818	M
<i>Ulothrix</i> sp.	Kütz. 1836	M,K
<i>Ulothrix tenuissima</i>	Kützing	M
<i>Ulothrix tenerrima</i>	Kützing	M
<i>Ulothrix zonata</i>	Kützing	M
<i>Ulvella frequens</i>	Butcher 1932	K
<i>Zygnema</i> sp.	(Agardh. 1824) sp.	K

HETEROKONTOPHYTA/Chrysophyceae

<i>Apistonema commutatum</i>	Pascher 1925	B
<i>Hydrurus foetidus</i>	(Vill.) Trév.	M,K,B
<i>Phaeodermatium rivulare</i>	Hansg. 1889	M,K,B
<i>Phaeoplaca thallosa</i>	Chod. 1925	M,K

HETEROKONTOPHYTA/Xanthophyceae

<i>Tribonema</i> sp.	Derbés et Solier	K
<i>Vaucheria sessilis</i>	(Vaucher) de Candolle 1805	K
<i>Vaucheria terrestris</i>	Götz 1897	K

HETEROKONTOPHYTA/Bacillariophyceae

<i>Achnanthes bioretii</i>	Germain 1957	M
<i>Achnanthes cf. laevis</i>	Oestrup	M
<i>Achn. lanceolata</i> ssp. <i>lanceolata</i>	(Brébisson) Grunow 1880	M
<i>Achn. lanceolata</i> ssp. <i>lanceolata</i> var. <i>lanceolata</i>	(Brébisson) Grunow 1880	M
<i>Achn. lanceolata</i> ssp. <i>lanceolata</i> var. <i>haynaldii</i>	(Schaarschmidt) Cleve 1894	M,H,B
<i>Achn. lanceolata</i> ssp. <i>dubia</i>	(Grunow) Lange-Bertalot 1991	M,H
<i>Achnanthes minutissima</i>	Kützing 1833	M,K,H,B
<i>Amphipleura pellucida</i>	(Kützing) Kützing 1844	M,K,H,B
<i>Amphora inariensis</i>	Krammer 1980	M
<i>Amphora libyca</i>	Ehrenberg 1840	M,H,B
<i>Amphora ovalis</i>	(Kützing) Kützing 1844	H,B
<i>Amphora pediculus</i>	(Kützing) Grunow 1880	M
<i>Aulacoseira granulata</i>	(Ehrenberg) Simonsen 1979	K
<i>Aulacoseira</i> sp.	Thwaites 1848	M
<i>Caloneis alpestris</i>	(Grunow) Cleve 1894	H,B
<i>Caloneis bacillum</i>	(Grunow) Cleve 1894	M,H,B
<i>Caloneis silicula</i>	(Ehrenberg) Cleve 1894	H,B
<i>Campylodiscus noricus</i>	Ehrenberg 1841	H,B
<i>Cocconeis disculus</i>	(Schum.) Cleve 1882	K
<i>Cocconeis pediculus</i>	Ehrenberg 1838	M,K
<i>Cocconeis placentula</i>	Ehrenberg 1838	M,K,H,B
<i>Cocconeis placentula</i> var. <i>klinoraphis</i>	Geitler 1927	M,B
<i>Cocconeis placentula</i> var. <i>lineata</i>	(Ehrenb. 1843) Van Heurck 1880-1885	M,H,B
<i>Cocconeis placentula</i> var. <i>pseudolineata</i>	Geitler 1927	M,B
<i>Cyclostephanos dubius</i>	(Fricke) Round 1892	M
<i>Cyclotella glabriuscula/comta</i>	(Grunow) Hakansson 1988	M,H,B
<i>Cyclotella ocellata</i>	Pantocsek 1901	M
<i>Cymatopleura solea</i> var. <i>apiculata</i>	(W. Smith) Ralfs 1861	H,B
<i>Cymbella affinis</i>	Kützing 1844	M,K

<i>Cymbella amphicephala</i>	Naeg. 1849	H,B
<i>Cymbella aspera</i>	(Ehrenberg) Peragallo 1849	H,B
<i>Cymbella cistula</i>	(Ehrenberg) Kirchner 1878	M
<i>Cymbella ehrenbergii</i>	Kützing 1844	M,H
<i>Cymbella mesiana</i>	Cholnoky 1955	M
<i>Cymbella minuta</i>	Hilse ex Rabenhorst 1862	M,K,H,B
<i>Cymbella prostrata</i>	(Berkeley) Cleve 1894	H,K
<i>Cymbella silesiaca</i>	Bleisch 1864	M,K,H,B
<i>Cymbella sinuata</i>	Gregory 1858	M,K,H,B
<i>Denticula tenuis</i>	Kützing 1844	M,K,H,B
<i>Denticula tenuis</i> var. <i>frigida</i>	(Kützing) Grunow 1880-1885	H,B
<i>Denticula tenuis</i> var. <i>inflata</i>	Grunow	H,B
<i>Diatoma ehrenbergii</i>	Kützing 1844	M,H
<i>Diatoma hyemalis</i>	(Roth) Heiberg 1863	M,K
<i>Diatoma mesodon</i>	(Ehrenberg) Kützing 1844	M
<i>Diatoma tenuis</i>	Agardh 1812	M
<i>Diatoma vulgaris</i>	Bory 1824	M,K,B
<i>Diatoma vulgaris</i> Morphotyp <i>linearis</i>	Bory 1824/Grunow 1881	M
<i>Diatoma vulgaris</i> Morphotyp <i>vulgaris</i>	Bory 1824	M
<i>Diatoma vulgaris</i> var. <i>brevis</i>	Bory/Grunow 1862	H,B
<i>Diploneis elliptica</i>	(Kützing) Cleve 1891	H,B
<i>Diploneis elliptica</i> var. <i>elliptica</i>	(Kützing) Cleve 1891	M
<i>Diploneis</i> sp.	Ehrenberg 1844	M
<i>Epithemia argus</i> var. <i>argus</i>	(Ehrenberg) Kützing 1844	M
<i>Epithemia</i> sp.	Brébisson ex Kützing 1844	M
<i>Fragilaria arcus</i> var. <i>arcus</i>	(Ehrenberg) Cleve 1898	M,H,B
<i>Fragilaria capucina</i>	Desmazières 1925	H,B
<i>Fragilaria capucina</i> var. <i>vaucheriae</i>	(Kützing) Lange-Bertalot 1980	M
<i>Fragilaria capucina</i> var. <i>capucina</i>	Desmazières 1925	M
<i>Fragilaria capucina</i> var. <i>rumpens</i>	(Kützing) Lange-Bertalot 1991	M,K
<i>Fragilaria construens</i>	(Ehrenberg) Grunow 1862	M,H
<i>Fragilaria pinnata</i>	Ehrenberg 1843	H
<i>Fragilaria pinnata</i> var. <i>elliptica</i>	(Schum.) Carls.	H
<i>Fragilaria pinnata</i> var. <i>pinnata</i>	Ehrenberg 1843	M
<i>Fragilaria</i> sp.	(O.F. Müller) Lyngbye 1819	M
<i>Fragilaria ulna</i> - complex	(Nitzsch) Lange-Bertalot 1980	M
<i>Gomphonema angustatum</i>	(Kützing) Rabenhorst 1864	M,K
<i>Gomphonema angustum</i>	Agardh 1831	M,K,H
<i>Gomphonema clavatum</i>	Ehrenberg 1832	M,K
<i>Gomphonema clevei</i>	Fricke 1902	M,K
<i>Gomphonema olivaceum</i>	(Hornemann) Brébisson 1838	M
<i>Gomphonema olivaceum</i> var. <i>olivaceum</i>	(Hornemann) Brébisson 1838	M
<i>Gomphonema parvulum</i>	Kützing 1849	M
<i>Gomphonema truncatum</i>	Ehrenberg 1832	K
<i>Gomphonema ventricosum</i>	Gregory 1856	M,K,H,B
<i>Gyrosigma acuminatum</i>	(Kützing) Rabenhorst 1853	H,B
<i>Gyrosigma attenuatum</i>	(Kützing) Rabenhorst 1853	M,H
<i>Gyrosigma nodiferum</i>	(Grunow) Reimer 1966	H,B
<i>Mastogloia smithii</i>	Thwaites 1856	M
<i>Mastogloia</i> sp.	Thwaites 1856	M
<i>Melosira varians</i>	Agardh 1827	M
<i>Meridion circulare</i>	(Greville) C.A. Agardh 1831	M,K,H,B
<i>Navicula bacillum</i>	Ehrenberg 1843	H,B
<i>Navicula capitata</i> var. <i>capitata</i>	Ehrenberg 1838	M
<i>Navicula cryptocephala</i>	Kützing 1844	M,H,B
<i>Navicula cryptotenella</i>	Lange-Bertalot 1985	M
<i>Navicula gregaria</i>	Donkin 1861	M

<i>Navicula lanceolata</i>	(Agardh) Ehrenberg 1838	M,H,B
<i>Navicula menisculus</i>	Schumann 1867	M
<i>Navicula minuscula</i> var. <i>muralis</i>	(Grunow) Lange-Bertalot 1981	H,B
<i>Navicula pelliculosa</i>	(Breb. ex Kütz.) Hilse 1863	H
<i>Navicula radiosa</i>	Kützing 1844	H,B
<i>Navicula reinhardtii</i>	(Grunow) Grunow 1877	M
<i>Navicula similis</i>	Krasske 1929	M
<i>Navicula slesvicensis</i>	Grunow 1880	M
<i>Navicula sp.</i>	Bory de St. Vincent 1822	M
<i>Navicula splendicula</i>	Van Landingham 1975	M
<i>Navicula striolata</i>	(Grunow) Lange-Bertalot 1985	H,B
<i>Navicula tripunctata</i>	(O.F. Müller) Bory 1822	M
<i>Navicula trivialis</i>	Lange-Bertalot 1980	M
<i>Navicula viridula</i>	(Kützing) Ehrenberg 1838	K,H,B
<i>Navicula viridula</i> var. <i>rostellata</i>	(Kützing) Cleve 1895	K
<i>Navicula viridula</i> var. <i>viridula</i>	(Kützing) Ehrenberg 1838	K
<i>Navicula vulpina</i>	Kützing 1844	H
<i>Neidium affine</i>	(Ehrenberg) Pfitzer 1871	H,B
<i>Neidium binodis</i>	(Ehrenberg) Hustedt 1945	H,B
<i>Neidium dubium</i>	(Ehrenberg) Cleve 1894	H
<i>Neidium iridis</i>	(Ehrenberg) Cleve 1894	H
<i>Nitzschia acicularis</i>	(Kützing) W. Smith 1853	M,H
<i>Nitzschia angustata</i>	(W. Schmitt) Grunow 1880	K
<i>Nitzschia dissipata</i>	(Kützing) Grunow 1862	M,K,H
<i>Nitzschia fonticola</i>	Grunow 1879	M,K,H
<i>Nitzschia gracilis</i>	Hantzsch 1860	M
<i>Nitzschia linearis</i>	(Agardh) W. Smith 1853	M
<i>Nitzschia palea</i>	(Kützing) W. Smith 1856	M
<i>Nitzschia paleacea</i>	Grunow 1881	M
<i>Nitzschia pura</i>	Hustedt 1954	M
<i>Nitzschia recta</i>	Hantzsch 1861-1879	M,K,H
<i>Nitzschia sigmoidea</i>	(Nitzsch) W. Smith 1853	H,B
<i>Nitzschia spp.</i>	Hassall 1845 nom. cons.	M
<i>Nitzschia sublinearis</i>	Hustedt 1930	M
<i>Nitzschia vermicularis</i>	(Kützing) Hantzsch 1860	H,B
<i>Rhoicosphenia abbreviata</i>	(C. Agardh) Lange-Bertalot 1980b	M,K
<i>Stauroneis anceps</i>	Ehrenberg 1843	H,B
<i>Stauroneis phoenicenteron</i>	(Nitzsch) Ehrenberg 1843	H
<i>Stauroneis smithii</i>	Grunow 1860	H
<i>Stephanodiscus alpinus</i>	Hustedt 1942	M
<i>Stephanodiscus minutulus</i>	(Kützing) Cleve & Möller 1878	M
<i>Stephanodiscus sp.</i>	Ehrenberg 1846	M
<i>Surirella angusta</i>	Kützing 1844	M
<i>Surirella biseriata</i>	Brebisson 1836	H,B
<i>Surirella brebissonii</i> var. <i>kützingii</i>	Krammer & Lange-Bertalot 1987	M
<i>Surirella linearis</i>	W. Smith 1853	H,B
<i>Surirella minuta</i>	Brébisson 1849	M,H,B
<i>Surirella ovalis</i>	Brébisson 1838	H,B
<i>Surirella sp.</i>	Turpin 1828	M
<i>Tabellaria flocculosa</i>	(Roth) Kützing 1844	M,H,B

Taxa marked with * were only found
as epiphytes.

B = card-index Biol. Stn. Lunz

H = Hustedt (1922)

K = Kann (1978)

M = Müllner (1998)

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