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Otto Müller's names of diatoms (*Bacillariophyceae*) and extant original material at the Botanical Museum Berlin-Dahlem (B)

Abstract

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This paper, listing all of Otto Müller's 200 diatom names, the full protologue citations as well as the sample number of the original material at B, is a background study for the taxonomy and biogeography of the past and present East African diatom flora. Short accounts of Müller's life, work, taxonomy and the possible whereabouts of other original material are given; and an extensive bibliography of his papers is included.

Introduction

The rediscovery, at B, of East African freshwater samples with algae collected about 100 years ago triggered a thorough literature search for names that were based on this material. The history and geography of the samples, the literature as well as the names of the non-diatoms (mostly published by Schmidle) were treated in an earlier paper (Jahn 1996).

The diatoms of these East African collections were studied by Otto Müller (1895b-c, 1899-1900, 1903b, 1904a-b, 1905, 1910; Ostenfeld 1908), who described many new taxa on this basis. His main focus was on the genera *Melosira* (now mostly *Aulacoseira*), *Surirella*, *Navicula* (*Sellaphora*) and *Rhopalodia*. The latter genus plus *Gomphocymbella* he established as new. He also described taxa from non-African sites (Müller 1890, 1898a, 1903a, 1906, 1909a, 1912); since they are few as compared to those from East Africa, their names will also be included in the following list.

Otto Müller

Georg Ferdinand Otto Müller (1837-1917) lived in Berlin and was a book publisher by profession. He ran his father's company until 1901 but in his spare time and after retirement he did research on diatoms. As a self-taught botanist he published 41 papers on diatoms and six papers in the field of publishing (Butterfass 1987). As author and publisher he did a book (Fritsch &

Müller 1870) including 12 microscopical photographic plates based on diatom slides by J. D. Möller from Wedel (among others "Diatomeen-Typenplatten"); these and more original glass photographic plates are still kept at B.

In 1861 he became a member of the Gesellschaft Naturforschender Freunde zu Berlin, and from 1870 to 1881 he contributed his first seven papers to the "Sitzungsberichte" of this society (Karsten 1918). He started his work at a time when Christian Gottfried Ehrenberg was still in the society's chair (Jahn 1998). Müller served as the first treasurer of the newly founded Deutsche Botanische Gesellschaft for 25 years, from 1882-1907 (Lorenzen 1987). The second publication in the "Berichte der Deutschen Botanischen Gesellschaft" was by him. By 1912 he had published 21 papers in this journal. His findings in the field of diatomology resulted in an honorary doctorate from the Friedrich-Wilhelms-Universität zu Berlin in 1897; in 1907 he was awarded the title professor (Karsten 1918).

Müller was interested in many fields of diatomology. Besides describing about 200 new taxa, his papers on the locomotion of diatoms (1893, 1894, 1896a-b, 1897, 1908, 1909b), on division in *Aulacoseira* (as *Melosira*) species (Müller 1883a-b, 1903a, 1906, 1909a) and his light-microscopical observations of the intricate morphological features of the diatom valve (1886, 1889, 1898b, 1899, 1900, 1901) merit special attention. It was Müller who invented the terms for valve symmetry that are basic for diatom study until today (1895a).

Original material

No microscopic slides are extant at B; if they were ever preserved, they must have been lost during the war (Stafleu & Cowan 1981). However, most of the original material from "Nyassaland" – Lake Malawi, tributary rivers and diverse other water bodies in today's Tanzania and Malawi – has been rediscovered (Müller 1903b, 1904a, 1905, 1910; see Jahn 1996). Four pages of Müller's handwritten notes accompanying samples "Nyassa Nr. 1-5" (now B: 2.0001-5) have also been found; some lines are reproduced as Fig. 1.

Schweinfurth's material from El Kab and Lake Timsah, Egypt (Müller 1899-1900), is missing, and some material from Lake Victoria for Müller's first publication on *Rhopalodia* is ambiguous (Müller 1895c). Since Müller mentions these names again later (Müller 1903b, 1904a, 1905, 1910), epitypes could be chosen from this extant material.

In his African papers Müller sometimes described taxa that are not based on this material. Apparently in order to understand the morphological spectrum of a taxon he consulted additional material for comparison. Especially when studying *Melosira* (Müller 1903a, 1904a) he compared the specimens with material from the lake "Müggelsee" in Berlin, and more particularly with a study he did on the diatoms of this lake from April to October 1894 (Müller 1895d). At B we found a sample with Otto Müller's handwriting from Müggelsee, of June 1895 (sample no. 0.0053, studied on 18.8.1898), which contains many specimens of *Aulacoseira granulata* and *A. ambigua*.

Original material that he did not collect himself or was not received by the Botanical Museum Berlin-Dahlem might be found in institutions where the sender worked. Ostenfeld's material of *Melosira islandica* O. Müll. (1906) from freshwater lakes in Iceland is at the Botanical Museum Copenhagen (C), and four slide labels of his five listed samples even show his initials O.M. (pers. comm. R. Nielsen). Original material from South Patagonia (South America), collected by Nordenskiöld and Borge in 1899 (Müller 1909a), is at the Riksmuseet in Stockholm (S) (see Spaulding & Stoermer 1997).

In contrast, material collected by Zacharias in the mountain lakes of the "Riesengebirge" (Karkonosze / Krkonoše, mountain range in the border region of Poland and Czechia) (Müller 1898a) was not found at the Max-Planck-Institute of Limnology in Plön (pers. comm. B. Meyer). The original material for one species collected by Tschirch from "Badeplatz bei Buitenzorg und Bach bei Tjibodas" (Bogor and Cibodas) Java, Indonesia (Müller 1890), has not been located, and the same holds true for the paleontological material ("Turonschicht") from which Müller described one marine diatom genus (Müller 1912).

Rhopalodia gibba (Ehr) O. M.
Rhop. gibba var. *paranellata* (Grun) Oth.
Lumicella lineavis W. Sm. = Schmitt,
 Atlas t. 23 Fig. 32. 33.

Neu.

Synedra Ulua var. *struonosa* O. Müll.
 Valvarseite vor den Apices kuppel-
 artig gewölbt. Übrigens wie
Syn. Ulua var. *splendens*. Lg.
 387 – 473 μ .

Lumicella splendida var. *Füllebornii* O. M.

Valvarseite eiförmig, Apices rund,
 Femur spitzer als Kuppel. Rippen 1 μ
 breit, ca 3,5 auf 10 μ , bidorsal von
 knäueligen Punkten (Poren) begrenzt; zwischen
 den Rippen
~~einzelne~~ einzelne gestaute Punkte. Rippen

Nyassa Nr. 2.

Cymbella cymbiformis (Ehr). (Lewin).
Cymbella ventricosum (Kütz).
Gomphonema dichotomum W. Sm.
Rhopalodia ascoides O. Müll.
Stephanodiscus Astroca (Ehr.) Grun.

Fig. 1. Portion of Müller's handwritten notes accompanying samples "Nyassa Nr. 1-5".

In the list of Otto Müller's diatom names, see below, the origin of the material, the herbarium and collector, and, if extant, the sample number at B is added. In case the original material is missing or ambiguous and Müller mentioned the name again in a later publication, the reference and the sample number from which epitypes might be chosen, is added. Concerning the numbering system, the numbers of the first 60 samples correspond to Müller's numbering (1903b: 10-13) added by the prefix '2.' for the collection from Africa.

Nomenclature and taxonomy

Otto Müller was very unhappy when he had to describe species from preserved material (1903b) since he believed that the delimitation of species and varieties should in the first place be decided on living organisms. His second premise was the careful sighting of much material to note all possible intermediate and transitional forms in order to avoid splitting of species (Müller 1899-1900). Müller's taxonomic concept of species and the hierarchy of infraspecific taxa (Müller 1899-1900) can be summarized as follows. To determine species, similar looking specimens of the same locality are grouped together, and this group is enlarged by specimens of different geographical origin. Within the same species morphological groups are differentiated as varieties when they show similar morphological characters; within these varieties specimens are grouped as formae when they show minor morphological deviation. Independent geographical occurrence is the basis to establish a variety instead of a form (Müller 1903b).

This taxonomic concept resulted in an atomizing of morphological differences within species. Many of his formae, especially those termed *minor* and *major*, seem to be only morphological extremes of the same taxon. But not in all his papers and for all groups of taxa he was consistent in naming every morphological form and providing them with a figure. Even contradictory nomenclature can be seen in his papers when he interpreted different valves in the filaments of *Melosira ambigua* (Grunow) O. Müll., *M. granulata* (Ehrenb.) Ralfs and *M. nyassensis* O. Müll. as "spontaneous mutation" (Müller 1903a), giving them separate names on the subspecies level; this resulted even in the same figure for the two subspecies of *M. argus* O. Müll. (1904a: 290, fig. IV 18). In his later paper (1906) he had realized that he had seen pleomorphism instead of mutation and correspondingly called these different valves of one filament "status" and kept the subspecies level for other taxa.

These few examples show how difficult it is to decide on Müller's names and taxa until lectotypes have been chosen from the available original material and his taxonomic concept evaluated. Some of his subspecies and formae are not taxonomically sound, and some of his nomenclature is in conflict with the Code (Greuter & al. 2000) especially where it concerns trinomials. Nevertheless, it is important to study his detailed morphological descriptions as they are the record of the ecological conditions for these organisms at the time of collecting (Geissler & Jahn 1986, Cox 1997). This compilation of Müller's diatom names is therefore a list of his basionyms. It does not include his many recombinations of names and the many recombinations and synonymizations of his names.

Conclusion

In the last decade there has been a dramatic change in the understanding of diatom taxonomy and biogeography (Edlund & Jahn 2001). Many new genera were created from within the already well studied taxa of Europe and North America, whereas diatoms of tropical regions received much less attention. The account of 365 diatom taxa just for the Northern Basin of Lake Tanganyika (Cocquyt 1998) hints at the rich diatom diversity of tropical East African water bodies. Already in the check-list of the algal flora of the East African Great Lakes, Cocquyt & al. (1993) state that taxonomic revisions are desperately needed for tropical taxa and especially for tropical populations of so-called cosmopolitan species. Detailed SEM studies on East African species of the genera *Gomphonema* Ehrenb., *Gomphocymbella* O. Müll. (Kociolek & Stoermer

1991, 1993), *Surirella* (Cocquyt & Vyverman 1993) and *Stephanodiscus* Ehrenb. (Klee & Casper 1996) support the idea of considerable endemism in East Africa (Ross 1983).

Almost one hundred years ago, Otto Müller was well aware of regional differences both within and outside the East African diatom flora. He described many new taxa, but many of his names do not show up in recent studies of Lake Malawi/Nyassa (i.e. Vyverman & Cocquyt 1993). A reinvestigation and reevaluation of his material will show if these taxa have disappeared from the flora or just been differently identified.

List of O. Müller's names of new diatoms, with reference to the protologue

The origin of the material, the herbarium and collector, and, if extant, the sample number at B is added to the name and protologue reference.

Achnanthes inflata var. *sigmata* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 9, fig. I 9. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.

A. lanceolata var. *capitata* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 8, fig. I 6, 7. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.

Actinoclava O. Müll. in Ber. Deutsch. Bot. Ges. 29: 661. 1912.

A. frankei O. Müll. in Ber. Deutsch. Bot. Ges. 29: 661, fig. XXVI 1. 1912. – Original material: “Turonschichten der Kreide, Rilmerich, Westfalen, Germany, at Paläobotanische Abteilung der Königlichen Geologischen Landesanstalt”.

Anomoeoneis sphaerophora [var. *elliptica*] f. *curta* O. Müll. in Hedwigia 38: 300, fig. XII 11. 1900. [Homonym of *A. sphaerophora* [var. *navicularis*] f. *curta* O. Müll. in Hedwigia 38: 302, fig. XII 10. 1900.] – Original material from El Kab, Egypt: not located at B.

A. sphaerophora [var. *navicularis*] f. *curta* O. Müll. in Hedwigia 38: 302, fig. XII 10. 1900. [Homonym of *A. sphaerophora* [var. *elliptica*] f. *curta* O. Müll. in Hedwigia 38: 300, fig. XII 11. 1900.] – Original material from El Kab, Egypt: not located at B. Also mentioned by Müller in Bot. Jahrb. Syst. 45: 90. 1910; material from “Nyassaland”: B-2.0043.

[*Anomoeoneis sphaerophora* var. *elliptica* O. Müll. in Hedwigia 38: 300. 1900, nomen nudum].

Anomoeoneis sphaerophora [var. *elliptica*] f. *elongata* O. Müll. in Hedwigia 38: 300, fig. XII 12. 1900. [Homonym of *A. sphaerophora* [var. *navicularis*] f. *elongata* O. Müll. in Hedwigia 38: 301-302, fig. XII 13. 1900]. – Original material from El Kab, Egypt: not located at B.

A. sphaerophora [var. *navicularis*] f. *elongata* O. Müll. in Hedwigia 38: 301-302, fig. XII 13. 1900. [Homonym of *A. sphaerophora* [var. *elliptica*] f. *elongata* O. Müll. in Hedwigia 38: 300, fig. XII 12. 1900.] – Original material from El Kab, Egypt: not located at B.

A. sphaerophora var. *guentheri* O. Müll. in Hedwigia 38: 302, fig. XII 6-7. 1900.

Comment: Müller called the nominate form: f. α . – Original material from El Kab, Egypt: not located at B.

Also mentioned by Müller in Bot. Jahrb. Syst. 45: 90. 1910; this material from “Nyassaland”: B-2.0032, 2.0035, 2.0043, 2.0058, 2.0059.

[*A. sphaerophora* var. *navicularis* O. Müll. in Hedwigia 38: 301. 1900, nomen nudum].

A. sphaerophora [var. *guentheri*] f. *truncata* O. Müll. in Hedwigia 38: 302, fig. XII 8-9. 1900. – Original material from El Kab, Egypt: not located at B.

Also mentioned by Müller in Bot. Jahrb. Syst. 45: 90. 1910; this material from “Nyassaland”: B-2.0030.

- Caloneis silicula* var. *brevistriata* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 11, fig. I 13. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- C. silicula* var. *patagonica* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 11, fig. I 11. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- C. silicula* [var. *patagonica*] f. *semiaperta* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 11, fig. I 10. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- Cymatopleura solea* var. *clavata* O. Müll. in Bot. Jahrb. Syst. 34: 22, fig. 1. 1903. – Original material from “Nyassaland”: B- 2.0009, 2.0028, 2.0037-39. Additional figures in Schmidt's Atlas Diatomaceenkunde, pl. 245, fig. 1. 1904.
- C. solea* var. *laticeps* O. Müll. in Bot. Jahrb. Syst. 34: 22, fig. 2. 1903. – Original material from “Nyassaland”: B-2.0024-25, 2.0010, 2.0017, 2.0013. Additional figures in Schmidt's Atlas Diatomaceenkunde: pl. 245, fig. 1. 1904.
- C. solea* [var. *subconstricta*] f. *major* O. Müll. in Bot. Jahrb. Syst. 34: 23. 1903. – Original material from “Nyassaland”: B- 2.0037-39, 2.0053.
- C. solea* [var. *subconstricta*] f. *minor* O. Müll. in Bot. Jahrb. Syst. 34: 23, fig. 4. 1903. – Original material from “Nyassaland”: B- 2.0037-39, 2.0053. Additional figure in Schmidt's Atlas der Diatomaceenkunde: pl. 245, fig. 3. 1904.
- C. solea* [var. *clavata*] f. *minor* O. Müll. in Schmidt's Atlas Diatomaceenkunde: pl. 246, fig. 10. 1904, nom. illeg. [Later homonym of *C. solea* [var. *subconstricta*] f. *minor* O. Müll. in Bot. Jahrb. Syst. 34: 23. 1903]. – Original material from “Nyassaland”: B-2.0038-41.
- C. solea* var. *rugosa* O. Müll. in Bot. Jahrb. Syst. 34: 23, fig. 3. 1903. – Original material from “Nyassaland”: B-2.0039, 2.0041. Additional figure in Schmidt's Atlas der Diatomaceenkunde: pl. 245, fig. 4. 1904.
- C. solea* var. *subconstricta* O. Müll. in Bot. Jahrb. Syst. 34: 21, 23. 1903.
- Cymbella nordenskiöldii* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 25, fig. I 18. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- C. scabiosa* O. Müll. in Bot. Jahrb. Syst. 36: 153, fig. I 11. 1905. – Original material from “Nyassaland”: B-2.0052.
- C. borgei* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 26, fig. I 21. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- C. grossestriata* O. Müll. in Bot. Jahrb. Syst. 36: 154, fig. I 13. 1905. – Original material from “Nyassaland”: B-2.0018 (missing).
- C. grossestriata* var. *obtusiuscula* O. Müll. in Bot. Jahrb. Syst. 36: 154, fig. I 12. 1905. – Original material from “Nyassaland”: B-2.0041.
- C. turgida* var. *obtusa* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 25, fig. I 19. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- C. wittrockii* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 26, fig. I 20. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- Diploneis linearis* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 13, fig. I 15. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- D. patagonica* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 13, fig. I 14. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.

- Epithemia argoidea* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 29, fig. I 23-25. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- E. argus* var. *cuneata* O. Müll. in Bot. Jahrb. Syst. 36: 160, fig. I 14. 1905. – Original material from “Nyassaland”: B-2.0052.
- Eunotia kocheliensis* O. Müll. in Plöner Forschungsber. 6: 61, fig. III 23, 24. 1898. – Original material from Riesengebirge / Karkonosze, Poland: not located.
- E. pectinalis* var. *crassa* O. Müll. in Plöner Forschungsber. 6: 59, fig. III 28. 1898. – Original material from Riesengebirge / Karkonosze, Poland: not located.
- E. pectinalis* var. *impressa* O. Müll. in Plöner Forschungsber. 6: 59. 1898. – Original material from Riesengebirge / Karkonosze, Poland: not located.
- E. pectinalis* [var. *undulata*] f. *triundulata* O. Müll. in Bot. Jahrb. Syst. 45: 117. 1910. – Original material from “Nyassaland”: B- 2.0033-35.
- E. sudetica* O. Müll. in Plöner Forschungsber. 6: 59, fig. III 25, 26. 1898. – Original material from Riesengebirge / Karkonosze, Poland: not located.
- E. tschirchiana* O. Müll. in Ber. Deutsch. Bot. Ges. 8: 328-329, fig. XIX 14-17. 1890. – Original material from Bogor, Java, Indonesia: not located.
- Fragilaria istvanffyi* var. *tenuirostris* O. Müll. in Bot. Jahrb. Syst. 45: 109, fig. 1. 1910. – Original material from “Nyassaland”: B-2.0053.
- F. patagonica* var. *rostrata* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 5, fig. I 1. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- F. virescens* var. *lata* O. Müll. in Plöner Forschungsber. 6: 56, fig. III 32, 1898. – Original material from Riesengebirge / Karkonosze, Poland: not located.
- Gomphocymbella* O. Müll. in Bot. Jahrb. Syst. 36: 145-146. 1905.
- G. aschersonii* O. Müll. in Bot. Jahrb. Syst. 36: 150, fig. I 1. 1905. – Original material from “Nyassaland”: B-2.0023, 2.0038-41.
- Gomphonema brachyneura* O. Müll. in Bot. Jahrb. Syst. 36: 145, fig. I 7. 1905. – Original material from “Nyassaland”: B-2.0001, 2.0031, 2.0033-35.
- G. frickei* O. Müll. in Bot. Jahrb. Syst. 36: 145, fig. I 5-6. 1905. – Original material from “Nyassaland”: B-2.0001, 2.0031.
- G. lanceolata* var. *acutuscula* O. Müll. in Plöner Forschungsber. 6: 78, fig. III 31. 1898. – Original material from Riesengebirge / Karkonosze, Poland: not located.
- G. navicella* O. Müll. in Bot. Jahrb. Syst. 36: 142, fig. I 10 1905. – Original material from “Nyassaland”: B-2.0018 missing.
- G. sparsistriatum* O. Müll. in Bot. Jahrb. Syst. 36: 144, fig. I 8. 1905. – Original material from Santos, Brasilia: Cleve & Möller Diat. N. 213.
- Hantzschia amphioxys* f. *capitata* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 34, fig. II 26. 1909, nom. illeg. [Later homonym of *H. amphioxys* var. *capitata* Pant. Balaton Kovamosz.: 104, pl. IX: fig. 243. 1901.] – Original material from South Patagonia: S-Borge/Nordenskiöld.
- H. amphioxys* [var. *hyperborea*] f. *crassa* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 35, fig. II 29. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- H. amphioxys* var. *recta* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 34, fig. II 27. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.

- H. borgei* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 36, fig. II 31, 32. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- H. borgei* var. *rostellata* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 36, fig. II 33. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- H. elongata* var. *linearis* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 34, fig. II 30. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- Melosira ambigua* subsp. *puncticulosa* O. Müll. in Ber. Deutsch. Bot. Ges. 11: fig. XVII 5. 1903. – Original material from “Nyassaland”: B-2.0019, 2.0024, 2.0033-36, 2.0037-39. Additional data by Müller in Bot. Jahrb. Syst. 34: 284, fig. III 5, IV 8. 1904.
- M. ambigua* subsp. *variata* O. Müll. in Ber. Deutsch. Bot. Ges. 11: fig. XVII 4. 1903. – Original material from “Nyassaland”: B-2.0019, 2.0024, 2.0033-36, 2.0037-39. Additional data by Müller in Bot. Jahrb. Syst. 34: 283, fig. III 4. 1904.
- M. areolata* O. Müll. in Bot. Jahrb. Syst. 34: 288, fig. IV 19. 1904. – Original material from “Nyassaland”: B-2.0043, 2.0057.
- M. argus* O. Müll. in Bot. Jahrb. Syst. 34: 289, fig. IV 15. 1904. – Original material from “Nyassaland”: B-2.0025.
- M. argus* f. *minor* O. Müll. in Bot. Jahrb. Syst. 34: 289, fig. IV 16, 17. 1904. – Original material from “Nyassaland”: B-2.0025, 2.0035, 2.0037-39, 2.0043.
- M. argus* subsp. *granulosa* O. Müll. in Bot. Jahrb. Syst. 34: 290, fig. IV 18. 1904. – Original material from “Nyassaland”: B-2.0025, 2.0039.
- M. argus* subsp. *trimorpha* O. Müll. in Bot. Jahrb. Syst. 34: 290, fig. IV 18. 1904. – Original material from “Nyassaland”: B-2.0025, 2.0039.
- M. distans* var. *africana* O. Müll. in Bot. Jahrb. Syst. 34: 293, fig. IV 32-33. 1904. – Original material from “Nyassaland”: B-2.0033-35, 2.0045, 2.0047, 2.0054.
- M. distans* var. *limnetica* O. Müll. in Bot. Jahrb. Syst. 34: 294. 1904. – Original material from “Nyassaland”: B-2.0045.
- M. goetzeana* O. Müll. in Bot. Jahrb. Syst. 34: 290, fig. IV 20. 1904. – Original material from “Nyassaland”: B-2.0034-35, 2.0042-43, 2.0057-58.
- M. goetzeana* f. *tenuior* O. Müll. in Bot. Jahrb. Syst. 34: 291, fig. IV 21. 1904. – Original material from “Nyassaland”: B-2.0034-35, 2.0042-43, 2.0057-58.
- M. goetzeana* var. *tubulosa* O. Müll. in Bot. Jahrb. Syst. 34: 291, fig. IV 22. 1904. – Original material from “Nyassaland”: B-2.0039, 2.0042-43, 2.0057.
- M. granulata* var. *angustissima* O. Müll. in Hedwigia 38: 315, fig. XII 28. 1900. – Original material from El Kab, Egypt: not located at B.
- M. granulata* subsp. *mutabilis* O. Müll. in Ber. Deutsch. Bot. Ges. 11: 331, fig. XVII 8. 1903. – Original material from Lake Müggelsee, Berlin: B-0.0053? Additional data by Müller in Bot. Jahrb. Syst. 34: 269, fig. III 8. 1904.
- M. granulata* subsp. *punctata* O. Müll. in Ber. Deutsch. Bot. Ges. 11: 331, fig. XVII 9. 1903. – Original material from Lake Müggelsee, Berlin: B-0.0053? Additional data by Müller in Bot. Jahrb. Syst. 34: 270, fig. III 9. 1904.
- M. granulata* [subsp. *punctata*] f. *subtilissima* O. Müll. in Ber. Deutsch. Bot. Ges. 11: fig. 17, 10. 1903. – Original material from Lake Müggelsee, Berlin: B-0.0053? Additional data by Müller in Bot. Jahrb. Syst. 34: 270, fig. III 10. 1904.

M. ikapoensis O. Müll. in Bot. Jahrb. Syst. 34: 281, fig. IV 2. 1904. – Original material from “Nyassaland”: B-2.0047.

M. ikapoensis var. *minor* O. Müll. in Bot. Jahrb. Syst. 34: 281, fig. IV 3. 1904. – Original material from “Nyassaland”: B-2.0047, 2.0027, 2.0034.

M. ikapoensis var. *procera* O. Müll. in Bot. Jahrb. Syst. 34: 281, fig. IV 1. 1904. – Original material from “Nyassaland”: B-2.0047.

M. irregularis O. Müll. in Bot. Jahrb. Syst. 34: 292, fig. IV 27. 1904. – Original material from “Nyassaland”: B-2.0037-39.

M. islandica O. Müll. in Jahrb. Wiss. Bot. 43: 56, fig. I 5-6. 1906.

Comment: In this publication Müller also mentions *M. islandica* status β (p. 58, fig. I 4) and *M. islandica* status γ (p. 60). Although “status” is marked as “n. stat.,” it is not meant as a nomenclatural rank but as a pleomorphic habit (p. 55 f). – Original material from Iceland: C-Ostenfeld.

M. islandica f. *curvata* O. Müll. in Jahrb. Wiss. Bot. 43: 56, fig. I 1. 1906.

Comment: In this publication Müller also mentions *M. islandica* f. *curvata* status β (p. 58, fig. I 2.). Although “status” is marked as “n. stat.,” it is not meant as a nomenclatural rank but as a pleomorphic habit (p. 55 f). – Original material from Iceland: C-Ostenfeld.

M. islandica subsp. *helvetica* O. Müll. in Jahrb. Wiss. Bot. 43: 67, fig. I 8-11. 1906. – Original material from Züricher See, Switzerland: not located.

M. islandica f. *recta* O. Müll. in Jahrb. Wiss. Bot. 43: 56. 1906.

Comment: In this publication Müller also mentions *M. islandica* f. *recta* status β (p. 58, fig. I 3). Although “status” is marked as “n. stat.,” it is not meant as a nomenclatural rank but as a pleomorphic habit (p. 55 f). – Original material from Iceland: C-Ostenfeld.

M. italica [var. *bacilligera*] f. *angusta* O. Müll. in Bot. Jahrb. Syst. 34: 282, fig. IV 6. 1904. – Original material from “Nyassaland”: B-2.0034, 2.0043, 2.0057, 2.0037-39.

M. italica var. *bacilligera* O. Müll. in Bot. Jahrb. Syst. 34: 282, fig. IV 5. 1904. – Original material from “Nyassaland”: B-2.0027, 2.0035, 2.0043, 2.0057-58.

M. italica [subsp. *subarctica*] f. *curvata* O. Müll. in Jahrb. Wiss. Bot. 43: 79. 1906.

Comment: In this publication Müller also mentions *M. italica* subsp. *subarctica* f. *curvata* status β (p. 80, fig. II 8). Although “status” is marked as “n. stat.,” it is not meant as a nomenclatural rank but as a pleomorphic habit (p. 55 f). – Original material from Iceland: C-Ostenfeld.

M. italica var. *plicatella* O. Müll. in Bot. Jahrb. Syst. 34: 283, fig. IV 7. 1904. – Original material from “Nyassaland”: B-2.0033-35.

M. italica [subsp. *subarctica*] f. *recta* O. Müll. in Jahrb. Wiss. Bot. 43: 79, fig. II 9. 1906.

Comment: In this publication Müller also mentions *M. italica* subsp. *subarctica* f. *recta* status β (p. 80, fig. II 7). Although “status” is marked as “n. stat.,” it is not meant as a nomenclatural rank but as a pleomorphic habit (p. 55 f). – Original material from Iceland: C-Ostenfeld.

M. italica subsp. *subarctica* O. Müll. in Jahrb. Wiss. Bot. 43: 78, fig. II 10-11. 1906.

Comment: In this publication Müller also mentions *M. italica* subsp. *subarctica* status β (p. 80) and *M. italica* subsp. *subarctica* status γ (p. 80). Although “status” is marked as “n. stat.,” it is not meant as a nomenclatural rank but as a pleomorphic habit (p. 55 f). – Original material from Iceland: C-Ostenfeld.

M. kondeensis O. Müll. in Bot. Jahrb. Syst. 34: 281, fig. IV 30, 31. 1904. – Original material from “Nyassaland”: B-2.0033-35, 37, 2.0039, 2.0047, 2.0057.

M. lineolata var. *patagonica* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 2. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.

M. magnusii O. Müll. in Bot. Jahrb. Syst. 34: 293, fig. IV 29. 1904. – Original material from “Nyassaland”: B-2.0042-43, 2.0057-58.

M. mbasiensis O. Müll. in Bot. Jahrb. Syst. 34: 293, fig. IV 28. 1904. – Original material from “Nyassaland”: B-2.0033-35.

M. nyassensis O. Müll. in Ber. Deutsch. Bot. Ges. 11: 331, fig. XVII 3. 1903. – Original material from “Nyassaland”: B-2.0010, 2.0013-14, 2.0017, 2.0024-26, 2.0028, 2.0037-39, 2.0040-41, 2.0053.

Additional data by Müller in Bot. Jahrb. Syst. 34: 285, fig. III 3. 1904.

M. nyassensis subsp. *bacillosa* O. Müll. in Ber. Deutsch. Bot. Ges. 11: 332. 1903. – Original material from “Nyassaland”: B-2.0009-10, 2.0012-14, 2.0016-17, 2.0024, 2.0040.

Additional data by Müller in Bot. Jahrb. Syst. 34: 287, fig. III 1. 1904.

M. nyassensis subsp. *devriesii* O. Müll. in Ber. Deutsch. Bot. Ges. 11: 332, fig. XVII 1. 1903. – Original material from “Nyassaland”: B-2.0009, 2.0012-14, 2.0016-17, 2.0019, 2.0024, 2.0026, 2.0035, 2.0037-39.

Additional data by Müller in Bot. Jahrb. Syst. 34: 286, fig. III 1. 1904.

M. nyassensis [subsp. *devriesii*] f. *minor* O. Müll. in Ber. Deutsch. Bot. Ges. 11: fig. XVII 2. 1903. – Original material from “Nyassaland”: B-2.0038-41.

Additional data by Müller in Bot. Jahrb. Syst. 34: 286, fig. III 2. 1904.

M. nyassensis [subsp. *bacillosa*] f. *minor* O. Müll. in Bot. Jahrb. Syst. 34: 288, fig. III 2. 1904, nom. illeg. [Later homonym of *M. nyassensis* [subsp. *devriesii*] f. *minor* O. Müll. in Ber. Deutsch. Bot. Ges. 11: fig. XVII 2. 1903.] – Original material from “Nyassaland”: B-2.0037-41, 2.0017.

M. nyassensis var. *peregrina* O. Müll. in Bot. Jahrb. Syst. 34: 288, fig. IV 14. 1904. – Original material from “Nyassaland”: B-2.0037-42, 2.0057, 2.0053.

M. nyassensis [var. *peregrina*] f. *procera* O. Müll. in Bot. Jahrb. Syst. 34: 288, fig. IV 13. 1904. – Original material from “Nyassaland”: B-2.0037-39, 2.0057.

M. nyassensis var. *victoriae* O. Müll. in Bot. Jahrb. Syst. 41: 338. 1908. – Original material from Lake Victoria, Kenya: B-2.0123-2.0126.

M. pyxis O. Müll. in Bot. Jahrb. Syst. 34: 291, fig. IV 23-25. 1904. – Original material from “Nyassaland”: B-2.0035, 2.0038-39, 2.0042-43, 2.0057-58, 2.0047, 2.0052.

M. pyxis var. *sulcata* O. Müll. in Bot. Jahrb. Syst. 34: 292, fig. IV 26. 1904. – Original material from “Nyassaland”: B-2.0028, 2.0042.

M. striata O. Müll. in Bot. Jahrb. Syst. 34: 292, fig. IV 18. 1904. – Original material from “Nyassaland”: B-2.0057, 2.0030, 2.0039.

[*Navicula bacillaris* var. *cruciata* O. Müll. in Hedwigia 38: 313, 1900, nomen nudum].

N. bacillaris [var. *cruciata*] f. *lanceolata* O. Müll. in Hedwigia 38: 313, fig. XII 24, 26-27. 1900. – Original material from El Kab, Egypt: not located at B.

N. bacillaris [var. *cruciata*] f. *linearis* O. Müll. in Hedwigia 38: 313, fig. XII 25-27. 1900. – Original material from El Kab, Egypt: not located at B.

N. bacillaris [var. *cruciata*] f. *subrostrata* O. Müll. in Hedwigia 38: 314, fig. XII 23, 26-27. 1900. – Original material from El Kab, Egypt: not located at B.

[*N. el-kab* O. Müll. in Hedwigia 38: 311. 1900, nomen nudum].

Also mentioned by Müller in Bot. Jahrb. Syst. 45: 76, 1910; material from “Nyassaland”: B-2.0037, 2.0052.

[*N. el-kab* f. *lanceolata* O. Müll. in Hedwigia 38: 311, fig. XII 19. 1900, nom. inval. (Greuter & al. 2000: Art. 43.1). – Original material from El Kab, Egypt: not located at B].

[*N. el-kab* f. *subcapitata* O. Müll. in Hedwigia 38: 311, fig. XII 20, 21, 22. 1900, nom. inval. (Greuter & al. 2000: Art. 43.1). – Original material from El Kab, Egypt: not located at B].

N. exigua var. *lanceolata* O. Müll. in Bot. Jahrb. Syst. 45: 98, fig. II 25. 1910. – Original material from “Nyassaland”: B-2.0007, 2.0032, 2.0037-39.

N. exigua [var. *lanceolata*] f. *stigmata* O. Müll. in Bot. Jahrb. Syst. 45: 98, fig. II 26. 1910. – Original material from “Nyassaland”: B-2.0020 missing.

N. gastrum [var. *turgida*] f. *stigmata* O. Müll. in Bot. Jahrb. Syst. 45: 97, fig. II 24. 1910. – Original material from “Nyassaland”: B-2.0014, 2.0033.

N. gastrum var. *turgida* O. Müll. in Bot. Jahrb. Syst. 45: 97, fig. II 23. 1910. – Original material from “Nyassaland”: B-2.0009, 2.0024, 2.0034, 2.0039.

N. malombensis O. Müll. in Bot. Jahrb. Syst. 45: 84, fig. I 13. 1910. – Original material from “Nyassaland”: B-2.0037-39.

N. mereschkowskii O. Müll. in Bot. Jahrb. Syst. 45: 83, fig. I 10. 1910. – Original material from “Nyassaland”: B-2.0033, 2.0035, 2.0041, 2.0053.

N. mereschkowskii f. *minor* O. Müll. in Bot. Jahrb. Syst. 45: 84. 1910. [Homonym of *N. mereschkowskii* [var. *recta*] f. *minor* O. Müll. in Bot. Jahrb. Syst. 45: 84. 1910.] – Original material from “Nyassaland”: B-2.0026, 2.0029, 2.0034, 2.0036.

N. mereschkowskii [var. *recta*] f. *minor* O. Müll. in Bot. Jahrb. Syst. 45: 84. 1910. [Homonym of *N. mereschkowskii* f. *minor* O. Müll. in Bot. Jahrb. Syst. 45: 84. 1910.] – Original material from “Nyassaland”: B-2.0024, 2.0036, 2.0039.

N. mereschkowskii var. *recta* O. Müll. in Bot. Jahrb. Syst. 45: 84, fig. I 11. 1910. – Original material from “Nyassaland”: B-2.0040, 2.0053.

N. nyassensis O. Müll. in Bot. Jahrb. Syst. 45: 83, fig. I 5. 1910. – Original material from “Nyassaland”: B-2.009, 2.0034.

N. nyassensis var. *capitata* O. Müll. in Bot. Jahrb. Syst. 45: 83, fig. I 7. 1910. – Original material from “Nyassaland”: B-2.0001, 2.0009, 2.0019, 2.0037-39, 2.0041, 2.0053.

N. nyassensis var. *elliptica* O. Müll. in Bot. Jahrb. Syst. 45: 83, fig. I 9. 1910. – Original material from “Nyassaland”: B-2.0034.

N. nyassensis var. *longirostris* O. Müll. in Bot. Jahrb. Syst. 45: 83, fig. I 8. 1910. – Original material from “Nyassaland”: B-2.0019, 2.0024, 2.0026, 2.0039.

N. nyassensis f. *minor* O. Müll. in Bot. Jahrb. Syst. 45: 83, fig. I 6. 1910. – Original material from “Nyassaland”: B-2.004, 2.0019, 2.0028, 2.0032-34, 2.0035, 2.0037-39, 2.0041, 2.0053.

N. obesa O. Müll. in Bot. Jahrb. Syst. 45: 84, fig. I 27. 1910. – Original material from “Nyassaland”: B-2.0024, 2.0034.

N. platycephala O. Müll. in Bot. Jahrb. Syst. 45: 84, fig. I 12. 1910. – Original material from “Nyassaland”: B-2.0036, 2.0037-39, 2.0041.

N. pupula var. *major* O. Müll. in Bot. Jahrb. Syst. 45: 82, fig. I 3. 1910. – Original material from “Nyassaland”: B-2.0037-40, 2.0053.

N. rhynchocephala var. *permagma* O. Müll. in Bot. Jahrb. Syst. 45: 92, fig. II 19. 1910. – Original material from “Nyassaland”: B-2.0034, 2.0037-39, 2.0053.

- Nitzschia acicularis* f. *angustior* O. Müll. in Bot. Jahrb. Syst. 36: 177, fig. II 11. 1905. – Original material from “Nyassaland”: B-2.0019.
- N. acicularis* var. *major* O. Müll. in Bot. Jahrb. Syst. 36: 177, fig. II 13-14. 1905. – Original material from “Nyassaland”: B-2.0004, 2.0017.
- N. asterionelloides* O. Müll. in Bot. Jahrb. Syst. 36: 175, fig. II 1-3, 12. 1905. – Original material from “Nyassaland”: B-2.0004, 2.0015, 2.0019.
- N. epiphytica* O. Müll. in Bot. Jahrb. Syst. 36: 176, fig. II 17-18. 1905. – Original material from “Nyassaland”: B-2.0014, 2.0017, 2.0019.
- N. falcata* O. Müll. in Bot. Jahrb. Syst. 36: 171, fig. II 19. 1905. – Original material from “Nyassaland”: B-2.0051 (missing).
- N. goetzeana* O. Müll. in Bot. Jahrb. Syst. 36: 176, fig. II 20. 1905. – Original material from “Nyassaland”: B-2.0051 (missing).
- N. lancettula* O. Müll. in Bot. Jahrb. Syst. 36: 175, fig. II 15. 1905. – Original material from “Nyassaland”: B-2.0026, 2.0034, 2.0037-39, 2.0053.
- N. lancettula* f. *minor* O. Müll. in Bot. Jahrb. Syst. 36: 175. 1905. – Original material from “Nyassaland”: B-2.0037-39, 2.0053.
- N. linearis* f. *minuta* O. Müll. in Bot. Jahrb. Syst. 36: 172, fig. II 4. 1905. – Original material from “Nyassaland”: B-2.0051 (missing).
- N. ngoziensis* O. Müll. in Bot. Jahrb. Syst. 36: 170, fig. II 16. 1905. – Original material from “Nyassaland”: B-2.0044.
- N. nyassensis* O. Müll. in Bot. Jahrb. Syst. 36: 177, fig. II 5-9. 1905. – Original material from “Nyassaland”: B-2.0004, 2.0009, 2.0019, 2.0013-14, 2.0017, 2.0046.
- N. pelagica* O. Müll. in Bot. Jahrb. Syst. 36: 176, fig. II 10. 1905. – Original material from “Nyassaland”: B-2.0010, 2.0019.
- N. vermicularis* var. *minima* O. Müll. in Bot. Jahrb. Syst. 36: 171. 1905. – Original material from “Nyassaland”: B-2.0044.
- Pinnularia borealis* f. *stauroneiformis* O. Müll. in Bot. Jahrb. Syst. 45: 102. 1910. – Original material from “Nyassaland”: B-2.0054.
- P. brebissonii* [var. *linearis*] f. *curta* O. Müll. in Plöner Forschungsber. 6: 72, fig. III 3. 1898. – Original material from Riesengebirge / Karkonosze, Poland: not located.
- P. brebissonii* var. *linearis* O. Müll. in Plöner Forschungsber. 6: 72, fig. III 2. 1898. – Original material from Riesengebirge / Karkonosze, Poland: not located.
- P. microstauron* [var. *biundulata*] f. *angusta* O. Müll. in Plöner Forschungsber. 6: 72, fig. III 8. 1898. – Original material from Riesengebirge / Karkonosze, Poland: not located.
- P. microstauron* var. *biundulata* O. Müll. in Plöner Forschungsber. 6: 72. 1898. – Original material from Riesengebirge / Karkonosze, Poland: not located.
- P. microstauron* [var. *biundulata*] f. *lata* O. Müll. in Plöner Forschungsber. 6: 72, fig. III 7. 1898. – Original material from Riesengebirge / Karkonosze, Poland: not located.
- P. subcapitata* [var. *hilseana*] f. *subundulata* O. Müll. in Plöner Forschungsber. 6: 67, fig. III 15. 1898. – Original material from Riesengebirge / Karkonosze, Poland: not located.
- Rhopalodia* O. Müll. in Bot. Jahrb. Syst. 22: 57. 1895.

Rh. ascoidea O. Müll. in Bot. Jahrb. Syst. 22: 66, fig. I 31-33, II 8-9. 1895. – Original material from Lake Victoria, Kenya: B-2.0102, 2.0100-101?, 2.0103?

Also mentioned by Müller in Bot. Jahrb. Syst. 36: 163, 1905; this material from “Nyassaland”: B-2.0001, 2.0012, 2.0009, 2.0013-14, 2.0024-26, 2.0032, 2.0038, 2.0048, 2.0057, 2.0058.

Rh. asymmetrica O. Müll. in Bot. Jahrb. Syst. 22: 68, fig. I 49,50, II 12,13,20. 1895. – Original material from Lake Victoria, Kenya: B-2.0100-101?

Also mentioned by Müller in Bot. Jahrb. Syst. 36:167, 1905; this material from “Nyassaland”: B-2.0034.

Rh. gibberula var. *aegyptica* O. Müll. in Hedwigia 38: 288, fig. X 5-6. 1899.

Comment: Müller splits up this variety into two unnamed formae: f. α (p. 288, fig. X 5) and f. β (p. 289, fig. X 6). – Original material from El Kab, Egypt: not located at B.

Also mentioned by Müller in Bot. Jahrb. Syst. 36: 165, 1905; this material from “Nyassaland”: B-2.0052.

Rh. gibberula var. *baltica* O. Müll. in Hedwigia 38: 287, fig. XI 3-4. 1899. – Original material from Kieler Hafen, Baltic Sea, Germany: not located.

Rh. gibberula [var. *rupestris*] f. *crassa* O. Müll. in Hedwigia 38: 286, fig. X 20. 1899. – Original material from El Kab, Egypt: not located at B.

Rh. gibberula var. *magnusii* O. Müll. in Hedwigia 38: 288, fig. X 2. 1899. – Original material from El Kab, Egypt: not located at B.

Rh. gibberula var. *minuens* O. Müll. in Hedwigia 38: 289. 1900.

Comment: Müller splits up this variety into two unnamed formae: f. α (p. 289, fig. X 7) and f. β (p. 289, fig. X 8). – Original material from Ischia & El Kab, Egypt: not located at B.

Also mentioned by Müller in Bot. Jahrb. Syst. 36: 165, 1905; this material from “Nyassaland”: B-2.0052.

Rh. gibberula var. *pedicinoi* O. Müll. in Hedwigia 38: 287, fig. X 3-4. 1899.

Comment: Müller splits up this variety into two unnamed formae: f. α (p. 287, fig. X 4) and f. β (p. 288, fig. X 3). – Original material from Ischia, Italy and El Kab, Egypt: not located at B.

Also mentioned by Müller in Bot. Jahrb. Syst. 36: 165. 1905; this material from “Nyassaland”: B-2.0037.

Rh. gibberula var. *schweinfurthii* O. Müll. in Hedwigia 38: 291, fig. X 12-15. 1900.

Comment: Müller splits up this variety into four unnamed formae: f. α (p. 291, fig. X 12), f. β (p. 291, fig. X 13), f. χ (p. 292, fig. X 14) and f. δ (p. 292, fig. X 15). – Original material from El Kab, Egypt: not located at B.

Rh. gibberula var. *vanheurckii* O. Müll. in Hedwigia 38: 292-293, fig. XI 6-7, 11. 1900.

Comment: Müller splits up this variety into three unnamed formae: f. α (p. 292, fig. X 11), f. β (p. 293, fig. XI 6) and f. χ (p. 293, fig. XI 7). – Original material from (a) El Kab, Egypt: not located at B, (b) from Kilimanjaro, Tanzania: B-2.0109-2.0111.

Also mentioned by Müller in Bot. Jahrb. Syst. 36: 166, 1905; this material from “Nyassaland”: B-2.0004, 2.0009, 2.0015, 2.0017, 2.0019, 2.0023, 2.0026, 2.0035, 2.0039, 2.0042-45, 2.0047-49, 2.0052-53, 2.0056-57.

Rh. gibberula var. *volkensii* O. Müll. in Hedwigia 38: 293, fig. XI 5. 1900. – Original material from Kilimanjaro, Tanzania: B-2.0109-111.

Rh. gracilis O. Müll. in Bot. Jahrb. Syst. 22: 63, fig. I 8-12, II 5-6. 1895. – Original material from Lake Victoria: B-2.0102 & 2.0100-101?)

Also mentioned by Müller in Bot. Jahrb. Syst. 36: 163, 1905; this material from “Nyassaland”: B-2.0003, 2.0009, 2.0013, 2.0017, 2.0023, 2.0026, 2.0031-32, 2.0036, 2.0053, 2.0057.]

Rh. gracilis var. *linearis* O. Müll. in Bot. Jahrb. Syst. 36: 163. 1905. – Original material from “Nyassaland”: B-2.0023, 2.0032, 2.0036, 2.0053.

Rh. gracilis [var. *impressa*] f. *perlonga* O. Müll. in Bot. Jahrb. Syst. 36: 164, fig. I 18. 1905. – Original material from “Nyassaland”: B-2.0039, 2.0053.

Rh. gracilis var. *orculaeformis* O. Müll. in Bot. Jahrb. Syst. 36: 163. 1905. – Original material from “Nyassaland”: B-2.0023, 2.0032, 2.0036.

Figure by Müller in Bot. Jahrb. Syst. 22, fig. I 11. 1895.

Rh. gracilis var. *undulata* O. Müll. in Bot. Jahrb. Syst. 36: 163, fig. I 17. 1905. – Original material from “Nyassaland”: B-2.0006?

Rh. hirudiniformis O. Müll. in Bot. Jahrb. Syst. 22: 67, fig. I 40-46, 51-52, II 15-17. 1895. – Original material from Lake Victoria, Kenya: B-2.0102 & 2.0100-2.0101?

Also mentioned by Müller in Bot. Jahrb. Syst. 36 163, 1905 ; this material from “Nyassaland”: B-2.0009, 2.0014, 2.0016-17, 2.0023-24, 2.0026-27, 2.0029, 2.0031-34, 2.0036-40, 2.0053, 2.0057.

Rh. hirudiniformis var. *capiticonstricta* O. Müll. in Bot. Jahrb. Syst. 22: 68, fig. I 47. 1895. – Original material from Lake Victoria, Kenya: B-2.0100-101?

Rh. hirudiniformis var. *parva* O. Müll. in Bot. Jahrb. Syst. 22: 68, fig. I 26-30, II 18,19. 1895. – Original material from Lake Victoria, Kenya: B-2.0100-101?

Also mentioned by Müller in Bot. Jahrb. Syst. 36 167, 1905; this material from “Nyassaland”: B-2.0009, 2.0023, 2.0027, 2.0032.

Rh. hirudiniformis var. *pediconstricta* O. Müll. in Bot. Jahrb. Syst. 22: 68, fig. I 48. 1895. – Original material from Lake Victoria, Kenya: B-2.0100-101?

Rh. impressa O. Müll. in Bot. Jahrb. Syst. 22: 64, fig. I 22-25, II 7. 1895. – Original material from Lake Victoria, Kenya: B-2.0102, 2.0100-101?

≡ *Rh. gracilis* var. *impressa* (O. Müll.) O. Müll. in Bot. Jahrb. Syst. 36: 164. 1905.

Rh. musculus var. *timsahensis* O. Müll. in Hedwigia 38: 294, fig. XI 8, 16. 1900. – Original material from Timsah, Egypt: not located at B.

Rh. stuhlmannii O. Müll. in Bot. Jahrb. Syst. 22: 63, fig. I 1-4, II 1-2. 1895. – Original material from Lake Victoria, Kenya: B-2.0100-101?

Also mentioned by Müller in Bot. Jahrb. Syst. 34: 162, 1904; this material from “Nyassaland”: B-2.0023, 2.0032.

Rh. stuhlmannii var. *helminthoides* O. Müll. in Bot. Jahrb. Syst. 36: 162, fig. I 16. 1905. – Original material from “Nyassaland”: B-2.0053.

Rh. uncinata O. Müll. in Bot. Jahrb. Syst. 22: 63, fig. I 5-7, II 3,4. 1895. – Original material from Lake Victoria, Kenya: B-2.0100-101?

Also mentioned by Müller in Bot. Jahrb. Syst. 36: 163, 1905; this material from “Nyassaland”: B-2.0003, 2.0006, 2.0024, 2.0026.

Rh. vermicularis O. Müll. in Bot. Jahrb. Syst. 22: 67, fig. I 34-39, II 10-11, 14. 1895. – Original material from Lake Victoria, Kenya: B-2.0102 & 2.0100-101?

Also mentioned by Müller in Bot. Jahrb. Syst. 36: 163, 1905; this material from “Nyassaland” at B-2.0009, 2.0023, 2.0026, 2.0029, 2.0032.

Schizostauron crucicula f. *gracilior* O. Müll. in Bot. Jahrb. Syst. 45: 88, fig. I 15. 1910. – Original material from “Nyassaland”: B-2.0060, 2.0036.

S. crucicula f. *obtusa* O. Müll. in Bot. Jahrb. Syst. 45: 88, fig. I 16. 1910. – Original material from “Nyassaland”: B-2.0029 missing.

S. karstenii O. Müll. in Bot. Jahrb. Syst. 45: 88, fig. II 17-18. 1910. – Original material from “Nyassaland”: B-2.0009, 2.0019, 2.0024-26, 2.0032, 2.0034, 2.0037-39, 2.0040-41, 2.0053.

S. karstenii var. *oculaeformis* O. Müll. in Bot. Jahrb. Syst. 45: 89. 1910. – Original material from “Nyassaland”: B-2.0031, 2.0037-39.

Stauroneis schinzii var. *nyassensis* O. Müll. in Bot. Jahrb. Syst. 45: 86, fig. II 28. 1910. – Original material from “Nyassaland”: B-2.0029 missing.

Surirella bagualensis O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 37, fig. II 37. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.

S. bifrons var. *intermedia* O. Müll. in Bot. Jahrb. Syst. 34: 27, fig. I 1. 1903. – Original material from “Nyassaland”: B-2.0041, 2.0058.
Additional figure in Schmidt’s Atlas Diatomaceenkunde: pl. 245, fig. 8. 1904.

S. bifrons var. *tumida* O. Müll. in Bot. Jahrb. Syst. 34: 27, fig. I 2. 1903. – Original material from “Nyassaland”: B-2.0025, 2.0040-42, 2.0053.
Additional figure in Schmidt’s Atlas Diatomaceenkunde: pl. 245, fig. 9. 1904.

S. bifrons [var. *tumida*] f. *minor* O. Müll. in Bot. Jahrb. Syst. 34: 28, fig. I 3. 1903. – Original material from “Nyassaland”: B-2.0025, 2.0053.
Additional figure in Schmidt’s Atlas Diatomaceenkunde: pl. 245, fig. 10. 1904.

S. brevicostata O. Müll. in Bot. Jahrb. Syst. 34: 34, fig. II 9. 1903. – Original material from “Nyassaland”: B-2.0035, 2.0028, 2.0039, 2.0053.
Additional figure in Schmidt’s Atlas Diatomaceenkunde: pl. 246, fig. 11. 1904.

S. constricta var. *africana* O. Müll. in Bot. Jahrb. Syst. 34: 32, fig. II 1. 1903. – Original material from “Nyassaland”: B-2.0040-41.
Additional figure in Schmidt’s Atlas Diatomaceenkunde: pl. 246, fig. 12. 1904.

S. constricta var. *maxima* O. Müll. in Bot. Jahrb. Syst. 34: 32, fig. II 2. 1903. – Original material from “Nyassaland”: B-2.0018 missing.
Additional figure in Schmidt’s Atlas Diatomaceenkunde: pl. 245, fig. 18. 1904.]

S. engleri O. Müll. in Bot. Jahrb. Syst. 34: 28, fig. I 4. 1903. – Original material from “Nyassaland”: B-2.0016, 2.0036-39, 2.0032.
Additional figure in Schmidt’s Atlas Diatomaceenkunde: pl. 245, fig. 13. 1904.

S. engleri f. *angustior* O. Müll. in Bot. Jahrb. Syst. 34: 28, fig. I 5. 1903. – Original material from “Nyassaland”: B-2.0014, 2.0016, 2.0040, 2.0036-39, 2.0053.
Additional figure in Schmidt’s Atlas Diatomaceenkunde: pl. 245, fig. 14. 1904.

S. engleri var. *constricta* O. Müll. in Bot. Jahrb. Syst. 34: 29, fig. I 7-8. 1903. – Original material from “Nyassaland”: B-2.0035, 2.0039-41.
Additional figures in Schmidt’s Atlas Diatomaceenkunde: 245, fig. 16-17. 1904.

S. engleri f. *subconstricta* O. Müll. in Bot. Jahrb. Syst. 34: 28, fig. I 6. 1903. – Original material from “Nyassaland”: B-2.0016, 2.0037-39, 2.0053.
Additional figure in Schmidt’s Atlas Diatomaceenkunde: pl. 245, fig. 15. 1904.

S. engleri [var. *constricta*] f. *sublaevis* O. Müll. in Bot. Jahrb. Syst. 34: 29 & fig. I 9. 1903. – Original material from “Nyassaland”: B-2.0039-41.
Additional figure in Schmidt’s Atlas Diatomaceenkunde: pl. 245, fig. 18. 1904.

S. fasciculata O. Müll. in Bot. Jahrb. Syst. 34: 36, fig. I 14. 1903. – Original material from “Nyassaland”: B-2.0045.
Additional figure in Schmidt’s Atlas Diatomaceenkunde: pl. 246, fig. 13. 1904.

- S. fuellebornii* O. Müll. in Bot. Jahrb. Syst. 34: 30. 1903. – Original material from “Nyassaland”: B-2.0040-41.
- S. fuellebornii* var. *constricta* O. Müll. in Bot. Jahrb. Syst. 34: 30, fig. I 12. 1903. – Original material from “Nyassaland”: B-2.0032, 2.0040.
Additional figure in Schmidt's Atlas Diatomaceenkunde: pl. 246, fig. 4. 1904.
- S. fuellebornii* var. *elliptica* O. Müll. in Bot. Jahrb. Syst. 34: 31, fig. I 13. 1903. – Original material from “Nyassaland”: B-2.0036, 2.0032, 2.0058.
Additional figure in Schmidt's Atlas Diatomaceenkunde: pl. 246, fig. 5. 1904.
- S. fuellebornii* f. *subconstricta* O. Müll. in Bot. Jahrb. Syst. 34: 30, fig. I 11. 1903. – Original material from “Nyassaland”: B-2.0040-41, 2.0038, 2.0032.
Additional figure in Schmidt's Atlas Diatomaceenkunde: pl. 246, fig. 3. 1904.
- S. linearis* f. *lata-subconstricta* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 37, fig. II 35. 1909.
Original material from South Patagonia: S-Borge/Nordenskiöld.
- S. linearis* var. *elliptica* O. Müll. in Bot. Jahrb. Syst. 34: 30, fig. I 10. 1903. – Original material from “Nyassaland”: B-2.0032, 2.0037-39.
Additional figures in Schmidt's Atlas Diatomaceenkunde: pl. 245, fig. 11-12. 1904.
- S. malombae* O. Müll. in Bot. Jahrb. Syst. 34: 34, fig. II 5-6. 1903. – Original material from “Nyassaland”: B-2.0039.
Additional figures in Schmidt's Atlas Diatomaceenkunde: pl. 246, fig. 6-7. 1904.
- S. malombae* f. *acuta* O. Müll. in Bot. Jahrb. Syst. 34: 34, fig. II 7. 1903. – Original material from “Nyassaland”: B-2.0039-40.
Additional figure in Schmidt's Atlas Diatomaceenkunde: pl. 246, fig. 8. 1904.
- S. margaritacea* O. Müll. in Bot. Jahrb. Syst. 34: 37, fig. II 12. 1903. – Original material from “Nyassaland”: B-2.0036, 2.0059.
Additional figure in Schmidt's Atlas Diatomaceenkunde: pl. 245, fig. 7. 1904.
- S. nyassae* O. Müll. in Bot. Jahrb. Syst. 34: 33, fig. II 3. 1903. – Original material from “Nyassaland”: B-2.0013-14, 2.0016-17, 2.0010, 2.0019, 2.0024-25.
Additional figure in Schmidt's Atlas Diatomaceenkunde: pl. 246, fig. 2. 1904.
- S. nyassae* var. *sagitta* O. Müll. in Bot. Jahrb. Syst. 34: 33, fig. II 4. 1903. – Original material from “Nyassaland”: B-2.0013.
Additional figure in Schmidt's Atlas Diatomaceenkunde: pl. 246, fig. 1. 1904.
- S. ovalis* var. *apiculata* O. Müll. in Bot. Jahrb. Syst. 34: 36, fig. II 10. 1903. – Original material from “Nyassaland”: B-2.0052.
Additional figure in Schmidt's Atlas Diatomaceenkunde: pl. 246, fig. 14. 1904b.
- S. ovalis* var. *excelsa* O. Müll. in Hedwigia 38:315, fig. X 1. 1900. – Original material from El Kab, Egypt: not located at B.
- S. ovalis* [var. *apiculata*] f. *minor* O. Müll. in Bot. Jahrb. Syst. 34: 36, fig. II 11. 1903. – Original material from “Nyassaland”: B-2.0058.
Additional figures in Schmidt's Atlas Diatomaceenkunde: pl. 246, fig. 15. 1904.
- S. panganiensis* O. Müll. in Bot. Jahrb. Syst. 34: 257, fig. 3-4. 1904. – Original material from “Nyassaland”: B-2.0051 missing.
- S. patagonica* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 39, fig. II 36. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.
- S. striatula* f. *punctata* O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 38, fig. II 37. 1909. – Original material from South Patagonia: S-Borge/Nordenskiöld.

S. tuberosa O. Müll. in Bot. Jahrb. Syst. 43, Beibl. 100: 39, fig. II 37, 38. 1909.

Comment: Müller splits up this variety into two unnamed formae: f. α (p. 39, fig. 38) and f. β (p. 39, fig. 37). – Original material from South Patagonia: S-Borge/ Nordenskiöld.

S. turbo O. Müll. in Bot. Jahrb. Syst. 34: 34, fig. II 8 1903. – Original material from “Nyassaland”: B-2.0025.

Additional figure in Schmidt’s Atlas Diatomaceenkunde: pl. 246, fig. 9 1904.

Synedra dorsiventralis O. Müll. in Bot. Jahrb. Syst. 45: 114, fig. 3. 1910. – Original material from “Nyassaland”: B-2.0019, 2.0023-25, 2.0031-32, 2.0036, 2.0048, 2.0059.

S. dorsiventralis var. *cymbelliformis* O. Müll. in Bot. Jahrb. Syst. 45: 115, fig. II 29. 1910. – Original material from “Nyassaland”: B-2.0031-32, 2.0034, 2.0036, 2.0060.

S. dorsiventralis var. *sinuata* O. Müll. in Bot. Jahrb. Syst. 45: 114, fig. 4, 5. 1910. – Original material from “Nyassaland”: B-2.0024, 2.0036.

S. dorsiventralis var. *subundulata* O. Müll. in Bot. Jahrb. Syst. 45: 115, fig. II 31. 1910. – Original material from “Nyassaland”: B-2.0032.

S. dorsiventralis var. *undulata* O. Müll. in Bot. Jahrb. Syst. 45: 115, fig. II 30. 1910. – Original material from “Nyassaland”: B-2.0032.

S. ulna f. *strumosa* O. Müll. in Bot. Jahrb. Syst. 45: 111. 1910. – Original material from “Nyassaland”: B-2.0013, 2.0019, 2.0059.

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