***Eunotia manguinii nom. et stat. nov*. (Bacillariophyceae), a new name for the sub-Antarctic *Eunotia* populations formerly identified as *E. muscicola* Krasske**

Bart Van de Vijver, *Botanic Garden Meise, Research Department, Nieuwelaan 38, 1860 Meise, Belgium & University of Antwerp, Department of Biology – ECOBE, Universiteitsplein 1, 2610 Wilrijk, Belgium (*corresponding author: bart.vandevijver@plantentuinmeise.be*)*

Ingrid Jüttner, *National Museum of Wales, Department of Natural Sciences, Cathays Park, Cardiff, CF10 3NP, UK*

One of the most commonly reported *Eunotia* Ehrenberg, 1837 (*Eunotiaceae*; T: *Eunotia arcus* Ehrenberg) species from the sub-Antarctic region is *Eunotia muscicola* Krasske 1939 (Kellogg & Kellogg 2002, Van de Vijver *et al*. 2014). Originally, the species was described from southern Chile in 1939 (Krasske 1939). Lange-Bertalot et al. (1996) lectotypified the species name with sample D III 138 (**KASSEL**). This species was later reported from almost all the sub-Antarctic islands studied to date, including South Georgia, Iles Crozet, Ile Amsterdam and Heard Island. Van de Vijver *et al.* (2014) revised all sub-Antarctic and Maritime Antarctic *Eunotia* populations, which led to the description of 12 new *Eunotia* taxa. One of these was a new subspecies found on Ile de la Possession (Iles Crozet), *E. muscicola* subsp. *polyglyphis* Van de Vijver, M. de Haan & Lange-Bertalot (Van de Vijver *et al*. 2014: 271), separated from the nominate variety because of its higher number of dorsal undulations and its longer valve length. Recently, several populations of this new variety with markedly shorter valves were found on Ile de la Possession (Van de Vijver, unpubl. obs.). Additionally, recent findings of *E. muscicola* on the Falkland Islands (Jüttner *et al*., unpubl. obs.) and a re-analysis of the type material of *E. muscicola* necessitated a reconsideration of the identification of the sub-Antarctic populations of this entity.

For the present contribution, the type slide (D III 138/3941) of *Eunotia muscicola* from the Krasske collection (**KASSEL**) was examined using light microscopy (LM). Unfortunately, in unmounted type material no valves of *E. muscicola* could be found which prevented scanning electron microscopy observations. Additionally, a large number of sub-Antarctic populations previously identified as the nominate variety and *E. muscicola* subsp. *polyglyphis* (including specimens from Iles Crozet, Iles Kerguelen, South Georgia, Ile Amsterdam and the Falkland Islands) were analysed in LM and used for comparison.

Eunotia muscicola Krasske – type slide (Figs 1–30)
Valves straight to weakly curved with slightly concave, sometimes almost straight, ventral margin and a slightly convex dorsal margin with 2–3 regularly spaced undulations. Shorter valves usually with two undulations. Apices subcapitate, rarely capitate, rounded, not or rarely dorsally deflected. Valve dimensions (n=30): valve length 11–19 µm, valve width 2.9–3.1 µm. Striae parallel, becoming slightly radiate towards the apices, 22–24 in 10 µm.

Populations previously identified as the nominate variety and *Eunotia muscicola* subsp. *polyglyphis* from the sub-Antarctic region (Figs 31–78: figs 31–61: Ile de la Possession, Iles Crozet; figs 62–78: Iles Kerguelen)
Valves curved with concave ventral margin and convex dorsal margin. Dorsal margin with 3–5 undulations (1 small valve found with only 2 undulations). Apices subcapitate (in smaller valves) or capitate, dorsally deflected in larger valves. Valve dimensions (n=100): valve length 8–35 µm, valve width 3.0–3.8 µm. Striae parallel, becoming slightly radiate towards the apices, 19–21 in 10 µm. One rimoportula present (e.g., Fig. 37, arrow), rarely discernible in LM.

All investigated sub-Antarctic populations vary little in their morphology. The populations on Ile de la Possession, especially those observed in the Vallée des Branloires, a large peat valley on the north-western side of the island, usually contained the largest valves whereas specimens of populations on South Georgia and Iles Kerguelen, both located further south than Ile de la Possession, never exceeded 25 µm in maximum valve length. Apart from these small differences in size, there is no morphological evidence that these populations are not conspecific.

It is however clear that the sub-Antarctic populations are not conspecific with the type of *Eunotia muscicola*, based on differences in valve dimensions (the valve width is larger in the sub-Antarctic populations), the number of dorsal margin undulations (2–3 in the type population of *E. muscicola*, 3–5 in the sub-Antarctic populations) and in stria density (22–24 in *E. muscicola* vs. 19–21 in 10 µm). Therefore, both are independent taxa and the species represented by the sub-Antarctic populations requires a new name.

Manguin (in Bourrelly & Manguin 1954: 18, pl.1: fig.6) described a new *Eunotia* variety, *E. polydentula* var. *mediatumida* Manguin from Iles Kerguelen to separate the clearly tumid valves from the more common (according to his notes) *E. polydentula* var. *perpusilla* (Grunow) Hustedt (1932: 293, figs 759 c-e), but he mentions the presence of a large number of intermediate forms between both ("*Fréquentes formes intermédiaires avec la variété précédente*"). We believe however that both varieties represent the same taxon. *Eunotia polydentula* Hustedt (1932: 292) was intended to be based on the illegitimate name *Himantidium polydentula* Brun (1880: 51, illegitimate as it was based on several Ehrenberg names), and *Eunotia polydentula* Hustedt included the same Ehrenberg names, and thus the Hustedt name is also illegitimate. *Eunotia muscicola* subsp. *polyglyphis* was described to distinguish populations with longer valves from the nominate variety (Van de Vijver *et al*. 2014). Since both taxa are different species '*polyglyphis'* could be elevated to species rank (although this is not absolutely necessary since a name has no priority outside the rank in which it is published; McNeill *et al*. 2012, Melbourne Code; Art. 11.2). However, the name *Eunotia polyglyphis* Grunow (in Van Heurck 1881: plate 34, fig. 33) was used by Grunow for another species (Guiry & Guiry 2018) but is illegitimate as the name was employed for a number of Ehrenberg *Eunotia* names ("*Se présente avec 4, 5, 6, et 7 dents. — Les E. tetraglyphis, pentaglyphis et hexaglyphis d'Ehrenberg rentrent dans cette espèce*"), and thus a new name in a new rank is proposed:

Eunotia manguinii* Van de Vijver & Jüttner *nom. et stat. nov.
Replaced synonym: *Eunotia muscicola* subsp. *polyglyphis* Van de Vijver, M. de Haan & Lange-Bertalot, *Plant Ecology & Evolution* 147(2): 271, fig. 10A–R, 2014.
≡ *Eunotia muscicola* Krasske *sensu* Van de Vijver et al. 2002, *Bibliotheca Diatomologica* 46: 41, 2002.
Holotype: BR-4338 (Botanic Garden Meise, **BR**), Isotype: PLP-236 (University of Antwerp, Belgium), BRM-ZU9/57 (Hustedt Collection, Bremerhaven, Germany, **BRM**)
Type locality: Vallée des Branloires, Ile de la Possession, Iles Crozet, sample W523 (coll. B. Van de Vijver, coll. date 15 Nov. 1997)
The name is proposed to acknowledge the pioneering diatom work on Iles Kerguelen of Émile Manguin (1893–1966; Bourrelly 1987).

Apart from the differences with *E. muscicola* mentioned above, several other taxa are similar to *Eunotia manguinii*. In Van de Vijver *et al.* (2014: 273), a comparison was made with several taxa such as *E. varioundulata* Nörpel-Schempp & Lange-Bertalot (in Lange-Bertalot *et al.* 1996: 68) and its variety *suecica* Lange-Bertalot, Van de Vijver & Jarlman (in Lange-Bertalot, Bak & Witkowski 2011: 240). The apices in the latter two species are clearly dorsally deflected, well separated from the central part of the valve by a clear constriction contrary to *E. manguinii* which has less

protracted apices. Additionally, the dorsal undulations in *E. manguinii* are more pronounced and less shallow than in *E. variundulata*. *Eunotia varioundulata* var. *suecica* has a lower stria density (17–18 in 10 µm). *Eunotia minutula* Grunow (1862: 336) has a higher stria density (20–25 in 10 µm) and usually has smaller and more strongly arched valves. *Eunotia paramuscicola* Krstić, Z.Levkov & Pavlov (in Krstić *et* al. 2013: 208, figs 49–83, 91–96) has a lower valve width (2.0–3.3 µm vs. 3.0–3.8 µm) and a slightly higher number of striae (20–24 vs. 19–21 in 10 µm).

We are grateful to Michael Guiry for providing corrections and careful revision of the manuscript. We thank Dr. Peter Mansfeld from the Krasske collection in Kassel for his help to retrieve the original material of *Eunotia muscicola*. Sampling on Iles Crozet and Iles Kerguelen was made possible with the logistic and financial support of the Institut Polaire Français - Paul-Emile Victor (IPEV) within the framework of the Terrestrial Ecology program 136 (Yves Frenot & Marc Lebouvier).

Bourrelly, P. (1987). Émile Manguin (1893–1966). *Bulletin de la Société Botanique de France* 114(3/4): 107-108.

Bourrelly, P. & Manguin, E. (1954). Contribution à la flore algale des Iles Kerguelen. *Mémoires de l'Institut Scientifique de Madagascar, series B* 5: 7-58.

Brun, J. (1880). Diatomées des Alpes et du Jura et de la région suisse et française des environs de Genève. pp. 1-146, 9 pls. Genève et Paris.

Ehrenberg, C.G. (1837). Über ein aus fossilen Infusorien bestehendes, 1832 zu Brod verbacknes Bergmehl von der Grenzen Lapplands in Schweden. *Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königlich-Preussischen Akademie der Wissenschaften zu Berlin* 1837: 43-45.

Grunow, A. (1862). Die österreichischen Diatomaceen nebst Anschluss einiger neuen Arten von andern Lokalitäten und einer kritischen Uebersicht der bisher bekannten Gattungen und Arten. Erste Folge. Epithemieae, Meridioneae, Diatomeae, Entopyleae, Surirelleae, Amphipleureae. Zweite Folge. Familie Nitzschieae. *Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien* 12: 315-472, 545-588.

Guiry, M.D. & Guiry, G.M. (2018). AlgaeBase. World-wide electronic publication, National University of Ireland, Galway. http://www.algaebase.org; searched on 24 April 2018.

Hustedt, F. (1932). Die Kieselalgen Deutschlands, Österreichs und der Schweiz unter Berücksichtigung der übrigen Länder Europas sowie der angrenzenden Meeresgebiete. In: L. Rabenhorst (ed.), Kryptogamen Flora von Deutschland, Österreich und der Schweiz. Akademische Verlagsgesellschaft m.b.h. Leipzig 7(Teil 2, Lief. 2): 177-320.

Kellogg, T.B. & Kellogg, D.E. (2002). Non-marine and littoral diatoms from Antarctic and sub-Antarctic locations. Distribution and updated taxonomy. *Diatom Monographs* 1: 1-795.

Krasske, G. (1939). Zur Kieselalgenfloras Südchiles. *Archiv für Hydrobiologie* 35: 349-468.

Krstić, S.S., Pavlov, A., Levkov, Z. & Jüttner, I. (2013). New *Eunotia* taxa in core samples from Lake Panch Pokhari in the Nepalese Himalaya. *Diatom Research* 28: 203-217.

Lange-Bertalot, H., Külbs, K., Lauser, T., Nörpel-Schempp, M. & Willmann, M. (1996). Dokumentation und Revision der von Georg Krasske beschriebenen Diatomeen-Taxa. *Iconographia Diatomologica* 3: 1-358.

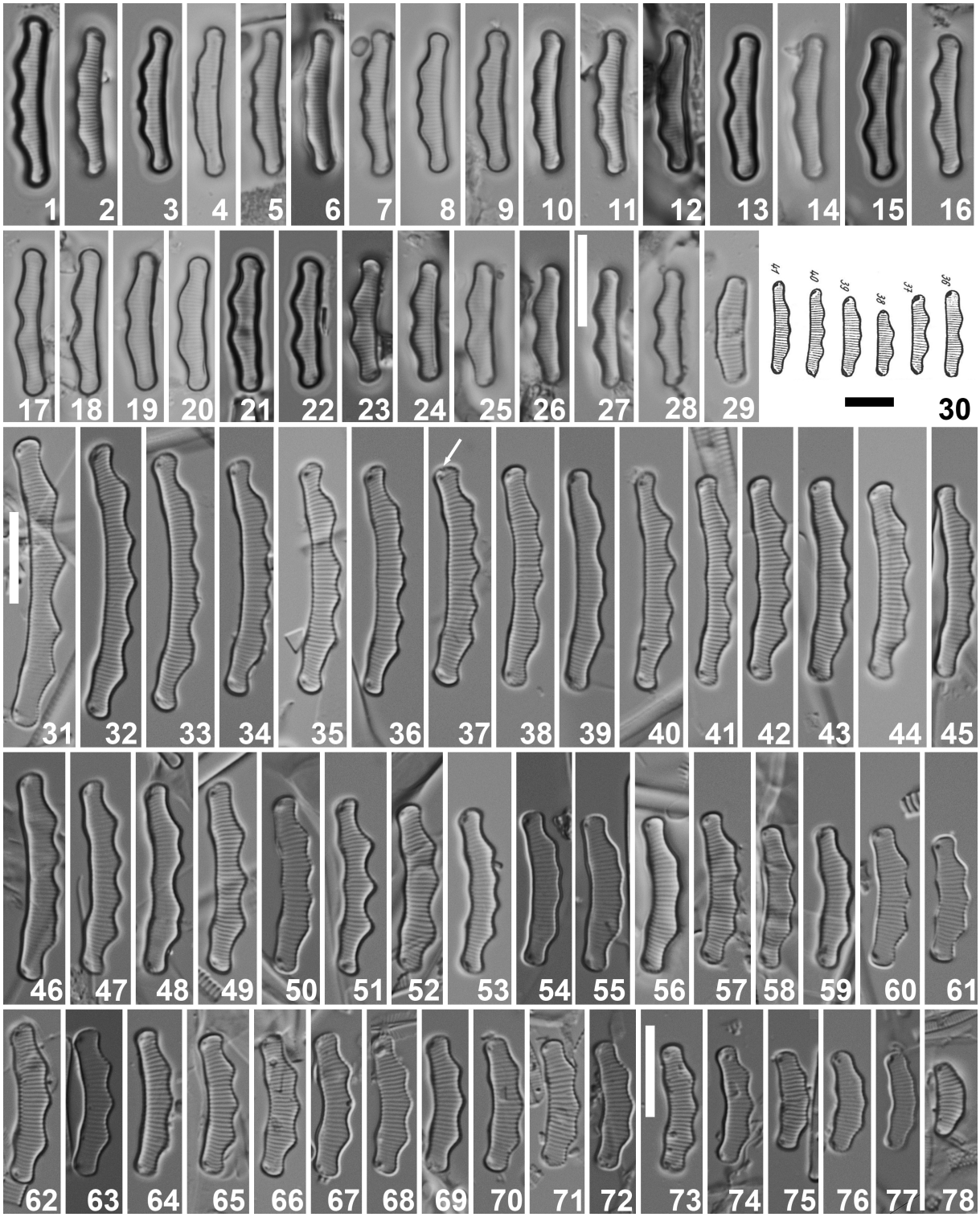
Lange-Bertalot, H., Bak, M. & Witkowski, A. (2011). *Eunotia* and some related genera. *Diatoms of Europe* 6: 1-747.

McNeill, J., Barrie, F.R., Buck, W.R., Demoulin, V., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Prado, J., Prud'homme van Reine, W.F., Smith, G.F., Wiersema, J.H. & Turland, N.J. (2012). *International Code of Nomenclature for algae, fungi and plants (Melbourne Code)* adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011. *Regnum Vegetabile*, Vol. 154. pp. [i]-xxx, 1-208. Königstein: Koeltz Scientific Books.

Van de Vijver, B., Frenot, Y. & Beyens, L. (2002). Freshwater diatoms from Ile de la Possession (Crozet archipelago, Subantarctica). *Bibliotheca Diatomologica* 46: 1-412.

Van de Vijver, B., de Haan, M. & Lange-Bertalot, H. (2014). Revision of the genus *Eunotia* (Bacillariophyta) in the Antarctic Region. *Plant Ecology & Evolution* 147: 256-284.

Van Heurck, H. (1881). Synopsis des Diatomées de Belgique. Atlas. Ducaju & Cie., Anvers. pls 31-77.



Figs 1–78. *Eunotia muscicola* Krasske (1–30) and *Eunotia manguinii* Van de Vijver & Jüttner *nom. et stat. nov.* Figs 1–29. LM micrographs of the type slide of *E. muscicola* (KASSEL D II [1]38/3941). Fig. 30. Original drawings of *E. muscicola* published in Krasske (1939, plate 10, figs 36–41). Figs 31–61. LM micrographs of *Eunotia manguinii* – population of Ile de la Possession, Iles Crozet, sample BM118). Figs 62–78. LM micrographs of *Eunotia manguinii* – population of Iles Kerguelen, sample BM357). Scale bar = 10 μm.