Observations and typification of two diatoms described by Grunow from Blankenberghe, Belgium: *Nitzschia elegantula* Grunow and *Craticula halophila* (Grunow) D.G.Mann (*Bacillariophyceae*)

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It is well known that Albert Grunow (1826–1914) collaborated closely with Henri Van Heurck (1837–1909). A number of diatom slides in the Grunow collection at the herbarium of the Naturhistorisches Museum in Vienna (**W**, Austria) was made from material collected by Van Heurck from different localities in Belgium. Most of the raw material for these slides and several copies of the slides are conserved in the Van Heurck collection (Meise Botanic Garden, Belgium, **BR**) in the form of unmounted and often also untreated samples. Grunow organised his collection of samples by designating his own numbers to any material collected by him or others, which we refer to as 'Grunow sample number', and this is also the case for the material received from Van Heurck. Several diatom species described by Grunow were based on observations made from these slides. Two of these species, *Nitzschia elegantula* Grunow (in Van Heurck 1881: pl. 69: fig. 22 a), and *Navicula cuspidata* var. *halophila* Grunow (in Van Heurck 1885: 100, suppl. pl. B, fig. 30) were first observed in Grunow sample 2534 (Fig. 1). This sample number was determined by analysis of the original drawings Grunow made of each taxon, a copy of Van Heurck's *Synopsis des Diatomées de Belgique Atlas* (1880–1883), which Grunow annotated with his sample numbers that were the basis for the drawings published there, and the *Synopsis des Diatomées de Belgique Texte* by Van Heurck (1885). The first two resources are kept in the Grunow collection at **W** (Figs 1 & 2). Based on Grunow's accession books, i.e. his catalogue of all his samples (also kept in **W**), sample 2534 is equivalent to Van Heurck's sample 152 (Fig. 2) (not to be confused with Van Heurck's *Types du Synopsis* n°152). Sample 152 was collected from Blankenberghe (currently Blankenberge), a popular Flemish coastal resort. Van Heurck cited this material as his *Type du Synopsis* slide n°12, labelled "*Amphora hybrida* Grunow". The unmounted material of Type n°12 is conserved in **BR** and the label on the flask references Van Heurck sample 152 from Blankenberghe (Figs 3 & 4). In the present analysis we therefore treat the slide of Grunow sample 2534, the slide of Van Heurck sample 152, and the untreated material of Van Heurck Type n°12 as one and the same sample. Thus, the unmounted material for Van Heurck Type n°12 can be used for both light and scanning electron microscopy observations of the two species under discussion. This is important, as Grunow's type slide is broken (Fig. 2) and cannot be examined with ease.

Nitzschia elegantula Grunow was originally described in Van Heurck (1881, plate LXIX [69]: fig. 22a) as *Nitzschia* (*microcephala* var.?) *elegantula* Grunow. In 1885, Van Heurck considered the taxon to be a variety of N. *microcephala* Grunow as *N. microcephala* var. *elegantula* (Grunow) Van Heurck (1885, p. 183) adding a short description: Valves plus régulièrement linéaires; 12 points carénaux et 26 stries en 1 c.d.m. [valves more regularly linear; 12 fibulae and 26 striae in 10 µm]. He also indicated that the species was typical for brackish water (eaux saumâtres) and gave Blankenberghe as the collection locality. Van Heurck (1885) also added *Synopsis Type* n°12 as 'type' slide, although it was unclear whether this was also meant for *N. microcephala* var. *elegantula*, as the slide number was added for the nominate species but not explicitly for the variety. In the treatments of other species, for instance *N. palea* (Kützing) W.Smith, Van Heurck assigned a different type slide for the nominate variety and its var. *debilis* (see Van Heurck 1885:

183). However, an analysis of *Synopsis Type* slide n°12 did not yield any valves of the nominate *N. microcephala*, but a large population of var. *elegantula*.

Schoeman & Archibald (1976) discussed the taxonomic relationships of *N. elegantula* with a species from Tibet described as *Nitzschia iugiformis* Hustedt (1922: 149, X [10]: figs 60, 61). After an analysis of *N. elegantula* on Grunow's slide 2534 and Hustedt's type slide W 2,64 for *N. iugiformis*, they concluded that the taxa were conspecific and the latter name was an earlier, heterotypic synonym of *N. elegantula*. Lange-Bertalot & Simonsen (1978: 38) agreed with this conclusion. Another similar species, *N. osmophila* Cholnoky (1963: 247, figs 29–31) was illustrated with three drawings (figs 29–31), of which fig. 31 showed similarity with *N. elegantula*. An analysis of Cholnoky's type slide for *N. osmophila* did not yield any specimens like fig. 31 (Schoeman & Archibald 1976), but instead solely contained specimens referable to *N. palea*. Further analysis of Cholnoky's notes led to the conclusion that *N. osmophila* from fig. 31 in Cholnoky (1963) should be considered a synonym of *N. elegantula*, but that the other two drawings represent *N. palea*. However, the quality of the illustrations in Schoeman & Archibald (1976) is inadequate to determine potential conspecificity of the South African population they observed and *N. elegantula*. Most of the illustrated valves lack the typical central constriction of *N. elegantula* and appear longer than the lectotype population, suggesting that the South African population belongs to a different species. This can only be confirmed after analysis of the original Schoeman & Archibald slide that was used in their *N. elegantula* contribution (Sunday River, Cape Province, Schoeman & Archibald 1976, figs 5a–c).

The second species treated here, *Craticula halophila* (Grunow) D.G.Mann, was originally described in Van Heurck (1885, p. 100, suppl. pl. B: fig. 30) as *Navicula cuspidata* var. *halophila* Grunow and later transferred to the genus *Craticula* (in Round & al. 1990). Van Heurck (1885: 100) added a short description: "Etroit, très petit: environ 5 c.d.m.; stries délicates, 16 environ en 1 c.d.m., radiantes vers la partie moyenne, convergentes aux extrémités". [straight, very small, about 50 µm, striae delicate, ca 16 in 10 µm, radiate near the center, convergent at the apices.]. The taxon was illustrated by a single line drawing in the supplementary plate B in Van Heurck (1885). Van Heurck also added *Synopsis Type* n°12 as the sample in which he observed it. Cleve (1894: 109) raised the taxon to species level and emended the description stating that it had a rhombic-lanceolate, subacute outline with a maximum length of 50 µm and a width of 10–12 µm. The striae are described as being convergent at the apices, but parallel at the centre (Cleve 1894: 109). Later authors, such as Hustedt (1930, 1961) and Krammer & Lange-Bertalot (1986) followed this taxonomic change. Hustedt (1930: 268) modified the valve dimensions to a length of 25–140 µm and a width of 8–16 µm, much larger than the original population, since he considered many infraspecific taxa split from the nominate taxon to be synonymous with it. The list of synonyms was later added in Hustedt (1961: 64). Some of these most likely do represent the variability of this species, although the material for each of them should be reanalysed to confirm or reject conspecificity. In this context, several others should also be looked at more closely. Héribaud (1902: 89) described *Navicula cuspidata* var. *major* from the Ceyssac deposit in the Auvergne (France) as it was more than double the length (up to 120 µm) of the nominate taxon. Hustedt (1927: 244, pl. 7: fig. 26) described *Navicula halophila* f. *minor* Hustedt from the Loa basin in the Atacama Desert in Chile. He based his taxon on the smaller valve dimensions (length 30–35 µm, width 7 µm). Lange-Bertalot (2001: 114) questioned whether this form should be considered conspecific with *C. halophila* or whether it was a synonym of *Craticula buderi* (Hustedt) Lange-Bertalot. Based on a comparison of the illustrations of the type in Simonsen (1987, pl. 167: figs 17–19) with the observations of the type of *C. halophila* (this paper), they are not conspecific. The f. *minor* has more convex margins and rostrate apices and is narrower. Similarly, conspecificity of *N. halophila* f. *minor* with *C. buderi* is also unlikely when compared with the images of the type of *C. buderi* in Simonsen (1987, pl. 599: figs 4–6). Another infraspecific taxon, *Navicula halophila* f. *robusta* Hustedt, described from the

Neusiedler See, Austria, should also be excluded as a synonym (Hustedt 1959: 401, figs 1–3). The latter, transferred by Czarnecki (1994:157) to *Craticula* as *C. halophila* f. *robusta* (Hustedt) Czarnecki, is larger (up to 65 µm in length and 14 µm in width) and with more punctate striae compared to the type of *C. halophila*. The longest specimen observed in the type slide of *C. halophila* did not exceed 50 µm in length and had a width of 9 µm. Although there is an overlap in dimensions, we do not consider both taxa to be conspecific because of the punctate striae and the longer valves. Further analysis of the type of *Navicula halophila* f. *robusta* will be necessary to determine its correct taxonomic position. A conclusion based on the four illustrated valves in Simonsen (1987, pl. 687: figs 1–4) would be premature, as only figs 1 & 2 were taken from the holotype and differ in outline and dimensions from figs 3 & 4. Therefore, a complete analysis of the cell division series in the sample should be documented, before making any taxonomic changes.

In this contribution, we detail observations on specimens of both *Nitzschia elegantula* and *Craticula halophila* from Van Heurck's sample 152 from Blankenberghe using light and scanning electron microscopy. We also designate Van Heurck sample *Types du Synopsis* n°12 'Blankenberghe' kept in **BR** as lectotype for both species in accordance with ICN Art. 9.3 (Turland & al. 2025). Seeing as Grunow's slide 2534 (W0164967, kept at **W**!, Naturhistorisches Museum Wien), on which Grunow based his description, is broken, we designate the slide at **BR** as lectotype.

Nitzschia elegantula Grunow (Figs 9–34)
≡ *Nitzschia microcephala* var. *elegantula* (Grunow) Van Heurck 1885: 183
Lectotype (here designated): BR-4866 (**BR**!, Meise Botanic Garden). Fig. 15 illustrates the lectotype specimen.
Registration (of lectotypification): http://phycobank.org/105448
Type locality: Blankenberghe, Belgium, Van Heurck *Types du Synopsis* n°12, sample and slides kept at **BR**.
Description: Valves lanceolate (Figs 10,11) to linear-lanceolate with convex margins, usually with a central, often asymmetrical constriction. Apices protracted, rostrate to weakly capitate. Valve dimensions (n=25): length 12–24 µm, width 3–3.5 µm. Keel round, slightly elevated from the valve face and mantle. Raphe filiform, eccentrically placed on one side to the valve, continuously running from one apex to another. Terminal raphe fissures hooked. Internally, terminal raphe ends on small helictoglossa. Fibulae equidistant throughout, small, square to rectangular, connected to 2–3 striae, 11–14 in 10 µm. Striae coarse, uniseriate, composed of irregularly transapically elongated areolae, 23–28 in 10 µm. Internally, areolae are occluded with a fine poroid hymen plate.

Craticula halophila (Grunow) D.G.Mann (Figs 35–49)
Basionym: *Navicula cuspidata* var. *halophila* Grunow, in Van Heurck, 1885, *Synopsis des Diatomées de Belgique, Texte*, p. 100, suppl. pl. B, fig. 30.
≡ *Navicula halophila* (Grunow) Cleve (1894, p. 109)
≡ *Schizonema halophilum* (Grunow) Kuntze (1898, p. 553)
Lectotype (here designated): BR-4866 (**BR**!, Meise Botanic Garden). Fig. 41 illustrates the lectotype specimen.
Registration (of lectotypification): http://phycobank.org/105452
Type locality: Blankenberghe [Blankenberge], Belgium, Van Heurck *Types du Synopsis* n°12, sample and slides kept at **BR**.
Description: Valves rhombic to rhombic-lanceolate with straight, not convex valve margins. Apices acutely rounded, not protracted. Valve dimensions (n=15): length 30–48 µm, width 8–10 µm. Axial area narrow, linear. Central area small, elliptical. Raphe straight, filiform. Central raphe endings simple, straight. Terminal raphe fissures unilaterally bent. Internally central raphe endings located on a very weakly raised central nodule. Distal raphe endings terminating

internally onto very small helictoglossae. Striae uniseriate, parallel to very weakly radiate in the middle, becoming convergent at the apices, 19–20 in 10 µm. Near the central area, striation pattern slightly irregular with occasionally one smaller stria inserted. Areolae apically elongated, rectangular, rather small, ca 40 in 10 µm. Virgae as broad as the striae.

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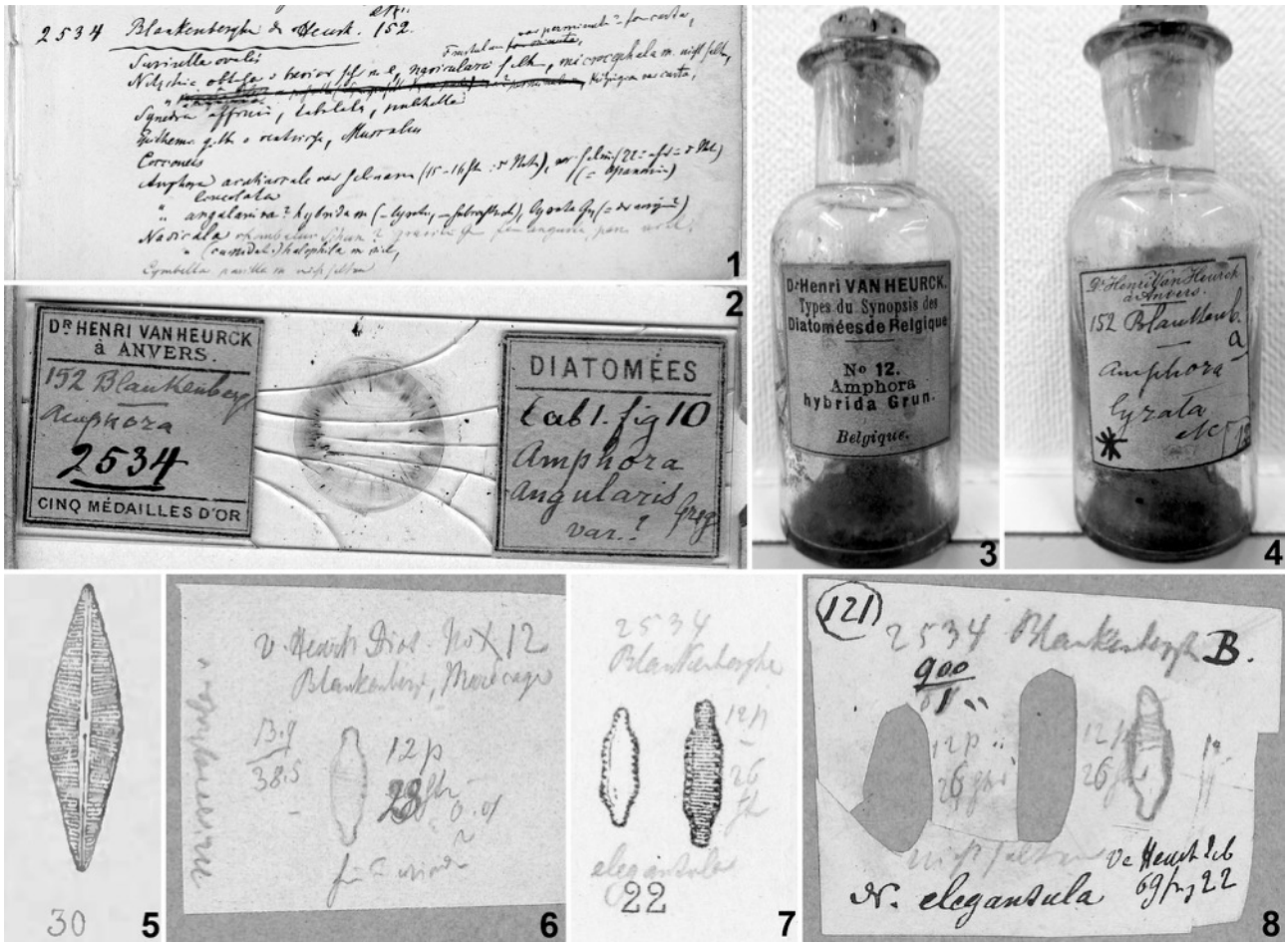
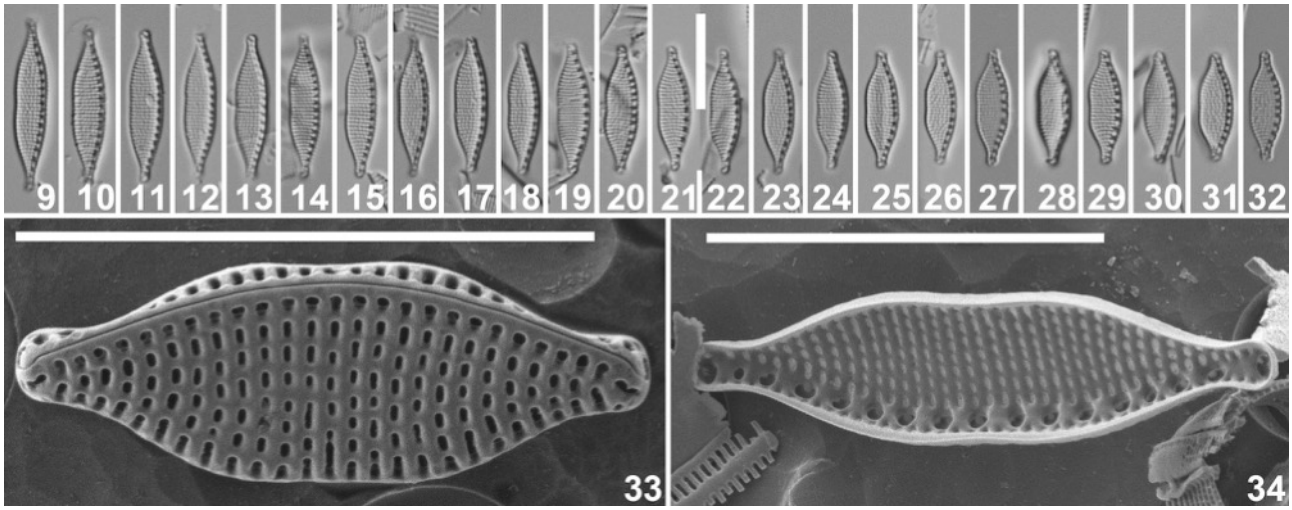
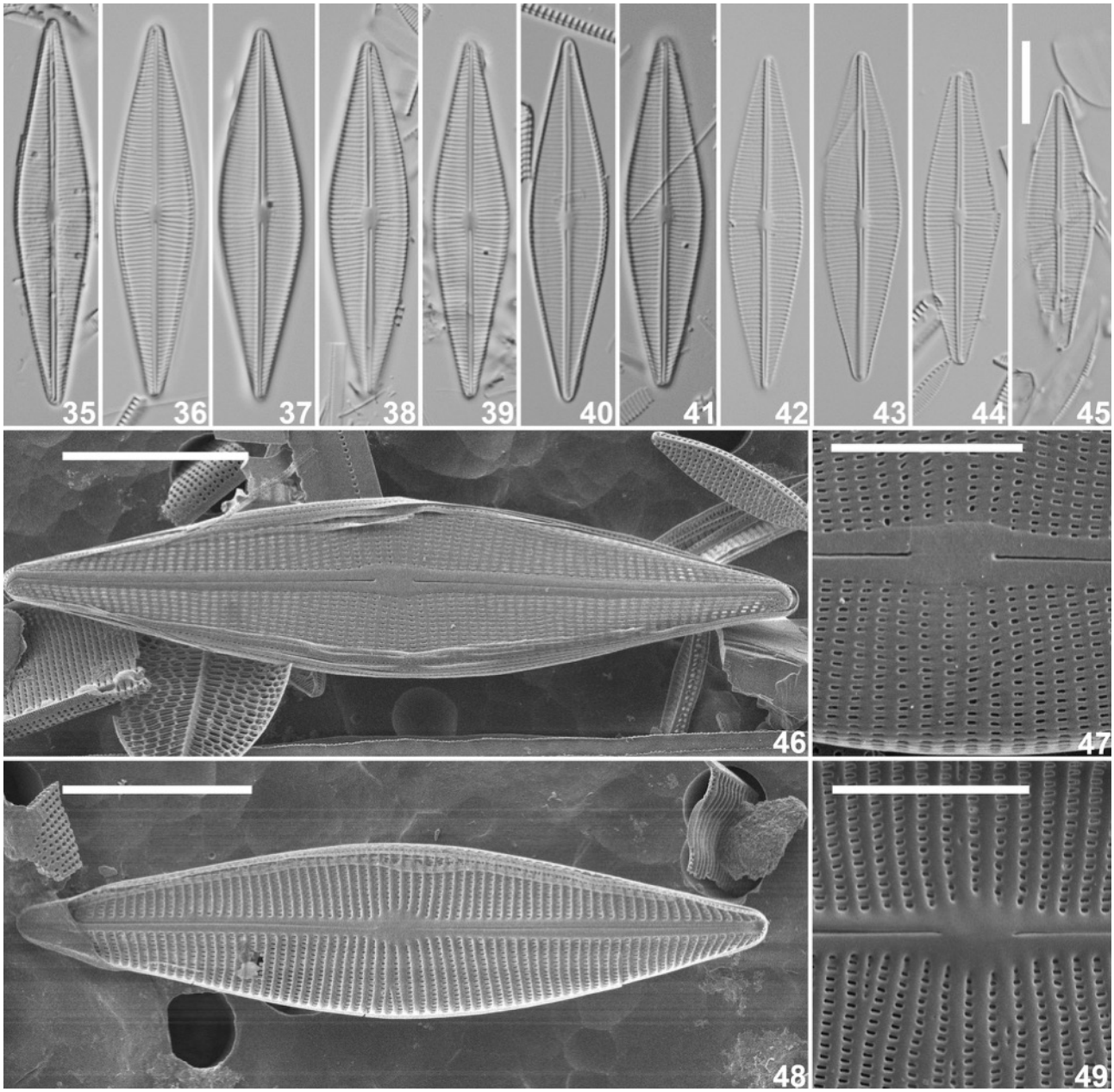


Figs 1–8. Historic materials related to the lectotype sample. **Fig. 1.** Grunow's notes in his catalogue for his sample 2534 citing Van Heurck sample 152. **Fig. 2.** Grunow's original (broken) slide for his sample 2534 (**W**0164967), indicating [Van Heurck's] 152 and the locality Blankenberghe. **Figs 3 & 4.** Original sample flask of Van Heurck *Types du Synopsis* n°12 showing its two labels (Figs 3 & 4). Note mention of 152 Blankenberghe in Fig. 4. **Fig. 5.** Published drawing of *Navicula cuspidata* var. *halophila* Grunow (in Van Heurck 1885, suppl. plate B, fig. 30). **Fig. 6**. Grunow's original drawing of *N. microcephala* kept at **W** and made from Van Heurck *Types du Synopsis* n° 12. **Fig. 7.** Published drawing of *Nitzschia elegantula* Grunow (in Van Heurck 1881, plate 69, fig. 22a) with annotations by Grunow in his copy of the *Atlas* indicating that he used his sample 2534 to prepare the drawing. Also note that the correct locality is in Grunow's hand. **Fig. 8**. Original drawings of *N. elegantula* by Grunow kept in **W** and made from Grunow sample 2534 with the citation of Van Heurck tab. 69, fig. 22. The missing clippings are those drawings used by Van Heurck in his Synopsis.



Figs 9–34. *Nitzschia elegantula* Grunow. LM and SEM pictures taken from the lectotype material (**BR**-4866, Blankenberghe, slide made from Van Heurck sample *Types du Synopsis* n°12, housed at **BR**). **Figs 9–32.** LM valve face views showing a cell diminution series. **Fig. 33.** SEM external view of an entire valve. **Fig. 34.** SEM internal view of an entire valve. Scale bars = 10 µm.



Figs 35–49. *Craticula halophila* (Grunow) D.G.Mann. LM and SEM pictures taken from the lectotype material (**BR**-4866, Blankenberghe, slide made from Van Heurck sample *Types du Synopsis* n°12, housed at **BR**). **Figs 35–45.** LM valve face views showing a cell diminution series. **Fig. 46.** SEM external view of an entire valve. **Fig. 47.** SEM external detail of the central area. **Fig. 48.** SEM internal view of an entire valve. **Fig. 49.** SEM internal detail of the central area. Scale bars = 10 µm but 5 µm for Figs 47 & 49.