but not as much so as in some other sections (e.g. Lanceolatae, Fragilariopsis), and is interrupted centrally. The height of the valve usually alters over the length of the diatom, being least at the centre and poles: thus the frustule or valve appears constricted centrally in girdle view. In most cases the fibulae are equivalent to single subraphe costae (see Table 14).

There are some species, however, which differ from the majority, and these in particular require further study and may require transference elsewhere. Thus, N. kittlii (Hustedt 1930, f.776), N. dippelii (see Hustedt 1930), and N. scherffeliana (Krenner 1926, T.11 f.84) all have large, square or rectangular fibulae (as seen in girdle view) like those of N. vitrea (see Nitzschia sect. Lineares), although otherwise they seem to resemble N. dubia etc. quite closely. N. pretoriensis (Cholnoky 1957b) also has large fibulae, but shows a further similarity to N. vitrea in that the raphe is unbroken centrally (op. cit., T.4 f.110): it seems likely that these two species are more closely related to each other than either is to any member of the sect. Dubiae.

N. commutata is also of uncertain position: preliminary observations indicate, however, that its subraphe structure is unlike that of typical sect. Dubiae species.

On the whole, however, the sect. Dubiae, sensu Hustedt (1955), seems to be a most satisfactory grouping of species: there is no obvious break in the spread of variation which might indicate the need for subdivision or division.

4.6.6.4 The section Pseudoamphiprora

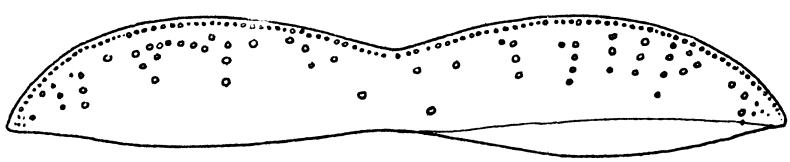
Grunow founded this section (in Cleve & Grunow 1880) to include N. ocellata and N. amphiprora (Cleve's 'Amphiprora nitzschioides' of 1873). Cleve (1883), Schütt (1896), Peragallo & Peragallo (1897-1908),

Boyer (1927) and Karsten (1928) all retain the grouping, but after this the sect. Pseudoamphiprora is not mentioned: no doubt, had the species included within it been commoner, this section would have fallen victim to the reforming zeal of Hustedt!

Neither species of the sect. Pseudoamphiprora (for no further species have been added since Grunow's time) is known to me except from the literature. Information is available, however, from the papers by Cleve & Grunow (1880), Cleve (1881), Peragallo & Peragallo (1897-1908), Boyer (1927) and Heiden & Kolbe (1928), and thus it is possible to draw a few conclusions concerning the taxonomy of the group.

N. ocellata was first described in Cleve & Grunow's (1880) monograph on Arctic diatoms. In this it was ascribed to Cleve, yet the particular section of this work in which N. ocellata appears was written by Grunow. As a consequence, the authorship of this species is difficult to determine (see I.C.B.N. 1972, especially Recs.46C, D); however, this problem will receive no further attention here. Cleve (1881) provided some extra detail concerning the valve morphology, and gave illustrations (Pl.4 f.47a, b). M.Peragallo (in Peragallo & Peragallo, op. cit.) also illustrated N. ocellata, but his figure (Pl.70 f.32) adds little to Cleve's.

As Grunow (in Cleve & Grunow 1880) noted, the frustule of N. ocellata is similar in shape to that of N. bilobata. The cincture is quite broad and this, coupled with the acute angling of each valve at the raphe, means that frustules or valves will usually lie in girdle view.



N. ocellata - valve, in girdle view (after Cleve 1881).

The valve probably has a type 1 construction. The striae 'are fine, 22 in 0.01 mm. composed of small, elongate puncta': unfortunately the puncta are not shown in Cleve's illustrations and so it is not known whether the long axes of these puncta are transapically or apically orientated.

The raphe, which lies along the midline of the valve, is interrupted centrally (judging by the presence of a central nodule - see Cleve & Grunow 1880, p.80).

The subraphe structure is remarkable for Nitzschia, being paralleled only in some species of the sect. Perrya. Immediately below the raphe is a row of small fibulae, which in 'girdle view' appear like round or oval beads (Cleve 1881, Pl.4 f.47a, b). In addition, however, 'die Schaalen sind mit grösseren und kleineren runden Punkten ... bedeckt, welche bisweilen unregelmässige Querreihen bilden, bisweilen aber nur in einer einzigen Längsreihe vorhanden sind' (Cleve & Grunow 1880). Grunow (ibid.) also noted that these 'Punkte' looked like the 'Kielpunkte' (i.e. the row of small fibulae immediately below the raphe) and that they appeared to join the two sides of the raphe. Thus it seems clear that both the 'Kielpunkte' and 'Punkte' are fibulae. This sets N. ocellata apart from most other Nitzschia species, since in these the fibulae within a single valve are all at more or less the same distance from the raphe, whereas in N. ocellata, while one group of fibulae (Grunow's 'Kielpunkte') are so positioned, the remainder are scattered at various distances from the raphe. Moreover, it seems that a single transapical costa can bear more than one fibula, since the 'Punkte' sometimes occur in short transapical rows, as noted by Grunow (op. cit.) and illustrated by Cleve (1881, Pl.4 f.47a). This phenomenon occurs also in Nitzschia sect. Perrya and in Amphiprora.

The structure of N. amphiprora is more 'orthodox'. Again, it is likely that a type 1 valve construction is present. The valve is sharply

angled at the raphe (which is central) and the raphe is again interrupted centrally (Heiden & Kolbe 1928, T.7 f.146). In contrast to N. ocellata, the fibulae are arranged in a single row which runs at a constant distance from the raphe; in girdle view the fibulae appear as 'kurze Striche' (Cleve & Grunow 1880). The subraphe construction would seem, therefore, to be like that of, for example, N. bilobata.

There seems no good reason for classifying N. ocellata and N. amphiprora in the same group, except for their common possession of central raphe systems and very acutely angled valves. Neither of these characters, however, provides grounds for a satisfactory separation from the sect. Dubiae, and I consider that N. amphiprora would be better placed in that group. N. ocellata, however, with its curious subraphe structure and elongate poroids, seems to belong elsewhere, possibly in a section of its own, possibly in the sect. Perrya, or perhaps in a new genus.

4.6.6.5 The section Perrya

In 1874 Kitton described several new species of diatom from a dredging made off the Panama coast. Among these was one which 'somewhat resembles Nitzschia' but which Kitton considered to be sufficiently distinct from that genus to warrant the erection of a new genus, which he called Perrya. Since Kitton originally described only one species under Perrya, this species, P. pulcherrima, must be the type of the genus.

Four years later Cleve (1878) published the descriptions of two other species which he placed in Nitzschia, while noting, however, that these forms, N. weissflogii and N. grundleri, were close to Kitton's P. pulcherrima: the descriptions themselves were supplied by Grunow, and hence the citation should be 'Grunow in Cleve' or simply 'Grunow'