

ented concerning shape, size, striation density, and the 'obviousness' of the poroids (see Cleve-Euler 1952). Whether this hitherto unrecognised variation has much classificatory significance is a question which must remain unanswered until it has been possible to study many more of the vast array of varieties and forms which have been described by previous authors. It is interesting that the larger forms, i.e. the Bigsweir and Sea Mills 2 cells, are also those which possess marginal ridges, the most strongly deflected external central raphe endings, and the most massive transapical costae. The last is elsewhere associated with large size, e.g. in H. spectabilis, Nitzschia sigmoidea.

The characters found to vary within H. amphioxys are listed in Table 9, together with those which vary in H. virgata or H. marina.

4.5.8 The identity of 'Hantzschia sp.A'

Throughout this thesis the epithet 'sp.A' has been used to refer to a species of Hantzschia found at Sandbay in the Severn Estuary, and at Borth (see also Mann 1977). This diatom agrees with none of the Hantzschia or Nitzschia species listed by Hendey (1974) as occurring on British coasts, although both sites given above are more or less marine. It is, for example, quite distinct from H. virgata in the construction of the valve, in the presence of a well-developed subraphe canal raised above the general level of the valve, and in the spacing of the fibulae (1.79 units): the fibulae are frequently separated, one from the next, by only one stria (F.108-9, 697). It appears, therefore, to be a species of Hantzschia new to Britain.

An examination of illustrations of Hantzschia species reveals that there is one diatom which closely resembles Hantzschia sp.A. Hustedt (in A.Schmidt Atlas) figured a new species of Hantzschia, which he named H. distinctepunctata (probably the same as Grunow's H. amphioxys var. amphilepta - see Grunow 1880, Pl.12 f.8). Hustedt's

illustrations (op. cit., T.329 f.21-22) show forms which might easily belong in the same species as Hantzschia sp.A, but the situation is much confused by the existence of another illustration by Hustedt (1938, T.40 f.4) which purports to be of the same species. In general, Hustedt's drawings in the later paper are of a much higher quality than those in T.329 of the Atlas (published in 1921), and show a much greater understanding of the valve structure in Hantzschia. This may be seen by comparing the rather poor illustrations of H. amphioxys in the Atlas with those of, for example, H. mirabilis in the 1938 paper: in the former it is difficult to determine what is meant to be solid and what is not (see also Mann 1977), since Hustedt has used the 'wrong' focus to draw subraphe structure, but from the latter paper it is clear that each fibula consists of several fused subraphe costae, that the central interspace is larger than the others both trans-apically and apically, etc. It is, perhaps, not surprising that there is this inconsistency in Hustedt's work since, in the period intervening between the publication of these works, Hustedt (1928) had undertaken a thorough and painstaking study of raphe and subraphe structure in several species of Hantzschia. Thus, one naturally has a greater faith in Hustedt's later illustration of H. distinctepunctata than in the earlier. But the 1938 drawing shows a diatom with broad fibulae, each consisting of more than one fused subraphe costae, whereas the earlier figure shows a form which possesses slender, rib-like fibulae, each representing but a single subraphe costa, just as in Hantzschia sp.A

For a long time, therefore, I believed that the earlier drawings by Hustedt were inaccurate and that Hantzschia sp.A was a hitherto unrecognized species. This did seem unlikely, however, in view of its relatively large size and the fact that it is not uncommon. Examination of Hustedt's type material of H. distinctepunctata revealed that the

Hantzschia sp.A specimens are closely allied to that species. The Voifluss sample from which Hustedt (1921, as 'H. amphioxys var. distinctepunctata') first described H. distinctepunctata, contains forms which are very similar to those from Sandbay and Borth, except that the linear density of the transapical costae is rather higher in my specimens than in his (compare F.108-9, 113-4 with 110-2, 115). In both are the biarcuate raphe system (F.113-5), a well-marked subraphe canal (F.113-5, 118-20), transapical costae which project externally (F.113-5, 119-21), and a submarginal thickening of the valve at the pole (F.113-7); there are, moreover, two transverse rows of poroids in each of the first two bands of H. distinctepunctata (F.121), just as in Hantzschia sp.A. In Hustedt's specimens there is again the common occurrence of interspaces which each 'contain' only one transapical stria (F.110-2), although the mean fibula spacing, with a value of 1.68 (8 valves), is significantly lower (t at 1%) than in the Sandbay cells (1.79, 15 valves).

There can be little question that Hantzschia sp.A is in fact synonymous with H. distinctepunctata. Examination of Hustedt's Sumatran material (used during preparation for the 1938 paper) reveals that this too is true H. distinctepunctata. One explanation for Hustedt's 1938 figure is that the drawing may have been completed well after microscopic examination of the specimens and an interpretation included in it which is not supported by the facts. Perhaps a memory of his earlier paper (1921), where the taxon was described as a variety of H. amphioxys, led Hustedt to draw the species in 'H. amphioxys-fashion'.

The linear density of the transapical costae varies widely within the species. In the Voifluss material there are forms with only 8.5 costae in 10 μ m., whereas the Borth cells have 18 or so. It is too early to say whether there is a continuum of variation in this character, but as in H. virgata, H. marina and H. amphioxys, it appears

that there is a good deal of infraspecific variation. There are differences in the size and spacing of the poroids - those of the coarse Voifluss specimens are especially large (F.112). There is also variation in the degree of development of the transapical costae.

H. distinctepunctata is found in waters of very different salinities. Thus, it occurs at truly marine sites (Borth), in brackish habitats (see Kamijo & Watanabe 1974; these authors also supply a good illustration), and apparently also in freshwaters: Hustedt (1938) described it as a littoral form of alkaline lakes. It is interesting that Hustedt originally described it (1921) from a place which, from the occurrence of Cyclotella meneghiniana, Synedra ulna, Cocconeis placentula, Cymbella turgida, Nitzschia linearis and others, would seem to be a freshwater habitat, yet where there occurred in addition several brackish or marine forms, e.g. Achnanthes brevipes var. intermedia, Pleurosigma delicatulum, N. obtusa var. scalpelliformis, Bacillaria paxillifer (= Hustedt's 'B. paradoxa'). It would be useful to know more about the type locality than that the diatoms were on algae 'aus dem Voifluss unweit der Station Voi der Ugandabahn'! (Hustedt 1921).

With the finding of cells such as those from Borth and Sandbay it will be necessary to extend the presently accepted limits of H. distinctepunctata and an emended description will have to be developed.

4.5.9 Discussion

Mann (1977) considered that subgenera should be erected within Hantzschia in order to reflect the pattern of variation present, but these were not then described and no indication was given as to where the taxonomic boundaries were to be drawn. It is suggested here that two subgeneric groupings are present, one containing H. amphioxys and the majority^{of} Hantzschia species, the other containing, so far, only H. marina.