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ON *STAUSTRUM BOTROPHILUM* WOLLE, A RARE AND INADEQUATELY DESCRIBED DESMID

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This paper provides a new and much more complete description than that previously published, with line drawings and photomicrographs, of the rare desmid *Staurastrum botrophilum* Wolle. Two new British localities, one in Cumbria, the other in Leicestershire, are added to the one Scottish (Cairngorm) record for this species.

Staurastrum botrophilum Wolle

The desmid *Staurastrum botrophilum*, found only once previously in the British Isles (Roy & Bissett, 1893) has now been discovered in two localities in England; in a pond near Grace Dieu, Leicestershire, and a bog near Devoke Water, south of Wastwater in the English Lake District. Both are "soft" water habitats, the pH of the Grace Dieu pond being around 5.4, and although we do not have pH measurements of the Devoke bog water, that of the nearby Devoke Water is about 5.5. In both localities, specimens of *S. botrophilum* were rare.

Staurastrum botrophilum was first described from the United States by Wolle (1881), but as stated by West & West (1912, p. 166) his "figures (are) poor", and with this we are in full agreement. Wests' much better illustrations of *S. botrophilum* were made from one of Wolle's original American specimens, and although giving a reasonable "impression" of this taxon, it is inaccurate in certain details, and the description accompanying it is barely adequate. Unfortunately, the Wests did not find the desmid in Britain, despite their extensive collecting, the only recorded discovery being that of Roy & Bissett (1893) "at 3500 ft on the Cairngorm, Invernesshire, Scotland", and their paper provides no figures. Thus it seems that our illustrations (Figs 1 and 2) and description presented below are the first for British material.

The semicells are truncated pyramids with broadly rounded corners and slightly convex sides. Eight to 10 small granules, which tend to become smaller towards the apex, are visible along each lateral margin from apex to sinus, though those on the apex may be quite prominent [see below and Fig. 1 (c) and (e)]. Thus the outline of each semicell appears undulate down the sides and almost smooth on the apex.

Although the general appearance of the apex is truncate, a different impression may be gained by focusing up or down on the semicell. Thus on focusing up, the apex appears convex, due to the rounded upper margin of the outward-

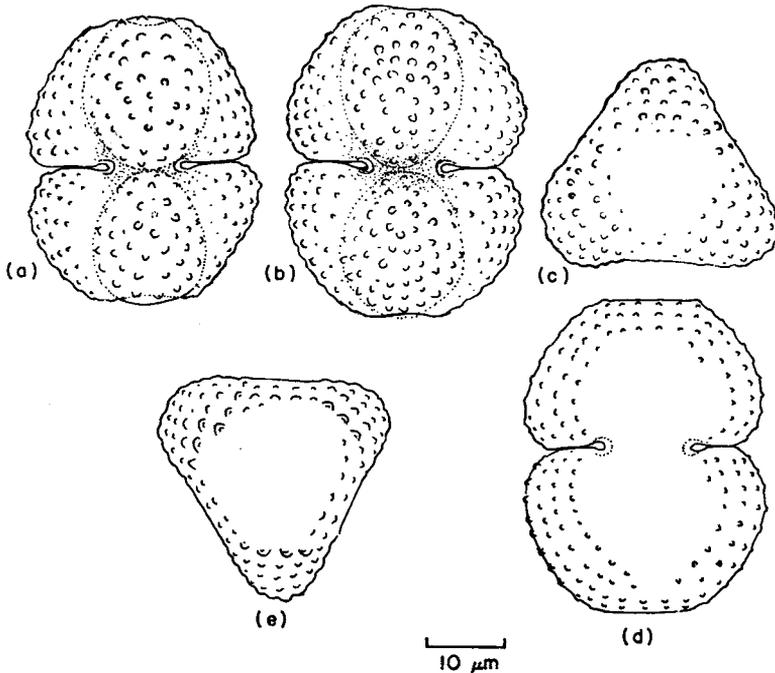


FIG. 1. *Staurastrum botrophilum* Wolle. (a), (b) Side views of cells with one angle facing upwards. (c), (e) Apical views of semicells with (e) especially showing differences in development of granules. (d) Side view of cell showing one of the sides opposite an angle.

facing angle [Figs 1 (a), (b); 2 (b)]. Because of this, the apex on focusing down, may appear as a shallow depression [Fig. 2 (a), (c)].

Normally the sinus is deep, linear and closed, and when the upward facing angle is brought increasingly into focus, the adjacent broadly rounded basal surfaces meet so closely that they virtually obscure the isthmus. The semicell angle in surface view is obovate, as shown by the dotted line in the centre of Fig. 1 (a), (b).

The granules on the cell wall are arranged in concentric series round the angles, extending from the semicell apex to the centre of each angle. In the many specimens which have been examined, there would seem to be six such rings. It should be emphasized that the development of the granules over the semicell surface is somewhat variable. Thus over the central areas of the sides of the body of each semicell, the granules are so poorly developed that these areas appear to be almost smooth [Fig. 1 (d)]. The semicells in vertical view are triangular with broadly rounded angles and margins either faintly concave, convex, or straight. The six rings of granules, mentioned in the description of the side view, can be seen circling the angles in vertical view [Fig. 1 (c), (e)]. However, the central section of each margin is virtually devoid of granules so that the cell outline in this region is straight. Similarly, in the centre of the semicell apex, granules are greatly reduced or absent [Fig. 1 (c), (e)]. It has also been noticed in apical view that some rows of granules on the apex tend to be more prominent than others.

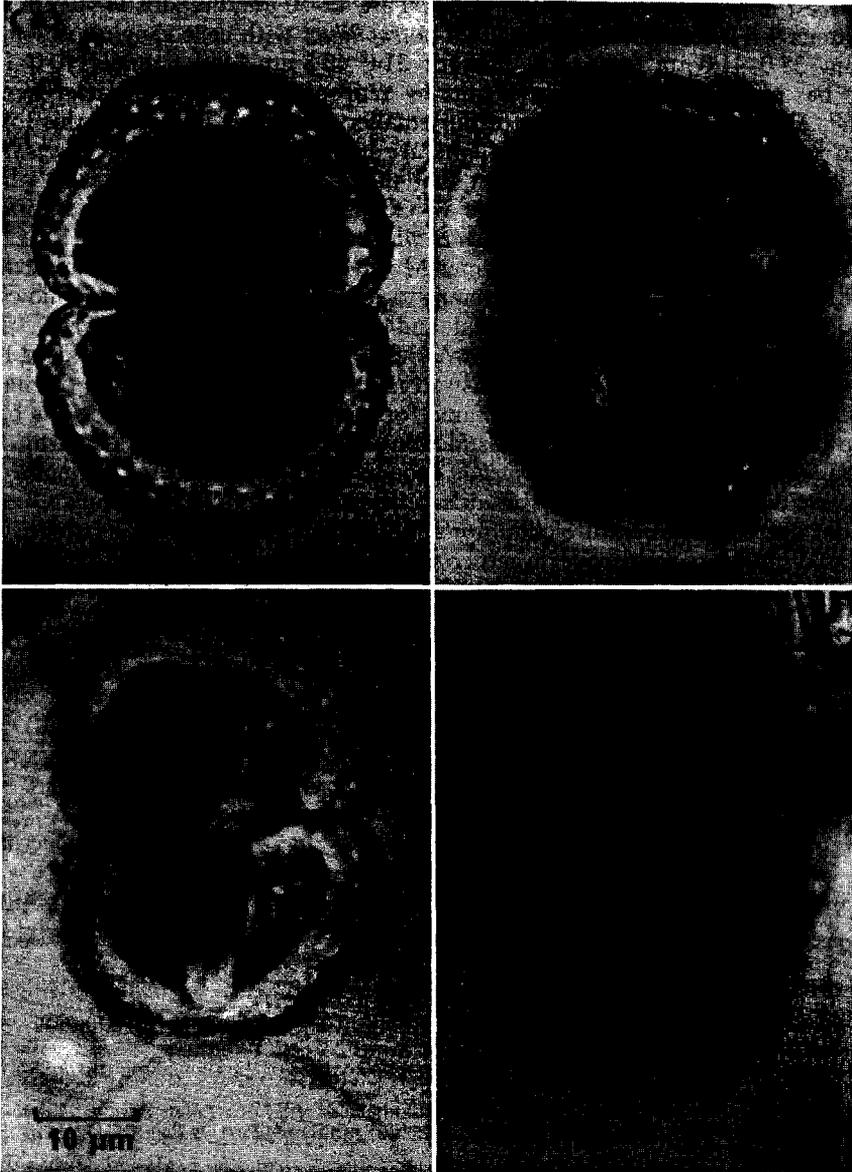


FIG. 2. *Staurastrum botrophilum* Wolle. (a) Side view opposite an angle showing apical depression of semicells. (b) Side view with one angle facing upwards. (c) Oblique side view showing on right of upper semicell the nature of the apical depression. (d) Apical view of semicell showing some of the rings of granules encircling the angles.

From 15 specimens from the two localities that have been measured we find that the desmid ranges in length from 41.6–53.3 μm (average 48.4 μm) and in breadth from 31.6–43.0 μm (average 37.6 μm). The range of width of the isthmus was found to be 10.0–15.5 μm (average 13.0 μm). The dimensions given

by West & West (1912) for *S. botrophilum* are 46–50 μm , breadth 34–40 μm and isthmus 9–11 μm . A var. *minus* of *S. botrophilum* with cells ranging in length from 37.0–41.0 μm (45.5 μm), breadth 31.0–40.8 μm , and isthmus 10.0–13.0 μm has been described in a brief note by Woronichin (1938) from near Leningrad, U.S.S.R. Although some of our smaller specimens fall within this lower size range, we suggest that his plants are in fact specimens of *S. muricatum* Bréb. We are also fairly confident that the specimens from Labrador which Taylor (1935), and later Croasdale & Grönblad (1964), named as *S. botrophilum*, should also be referred to as *S. muricatum*.

It has been suggested by Palamar-Mordventseva (1976) (see also Brook, 1981, p. 22 and fig. 13.5) in an attempt to resolve some of the taxonomic confusion associated with the artificial and unwieldy genus *Staurastrum*, that tri-radiate desmids which are *Cosmarium*-like in side view should be placed in a new genus—*Cosmoastrum*. Previously, Fritsch (1953) had suggested the name *Cosmostaurastrum* as the generic name for such forms. Moreover, it has been shown experimentally that the distinction at least for some taxa is arbitrary (Brandham, 1965), in that *Cosmarium botrytis* (Menegh.) Ralfs for example, can form either *Cosmarium*-like (biradiate) or *Staurastrum*-like (tri-radiate) cells under different temperature conditions. With this in mind, we have perused the desmid literature to discover whether any *Cosmarium* species could possibly be the biradiate expression of *S. botrophilum*, or vice-versa. The one species which could fit into this category is *C. vexatum* West (see West, 1892, pl. 9, fig. 33; West & West 1908, pl. XCII, fig. 4).

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