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## Nomenclatural Changes for Some Diatoms Found in Iowa

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Nomenclatural revisions for four diatom taxa found in Iowa, two of which are presently maintained in the Loras College Freshwater Diatom Culture Collection (FDCC), are necessary because of systematic interpretations of the Division Bacillariophyta. *Achnantheidium hauckianum* (Grun.) Czarnecki *comb. nov.* was originally assigned to the genus *Achnanthes* Bory. Three taxa were previously assigned to the morphologically diverse genus *Navicula* Bory. These are *Cavimula weinzierlii* (Schimanski) Czarnecki *comb. nov.*, *Craticula cuspidata* var. *major* [(Meist.) Czarnecki *comb. nov.* and] *Craticula halophila* var. *subcapitata* (Østr.) Czarnecki *comb. nov.* INDEX DESCRIPTORS: Diatoms, *Achnantheidium hauckianum*, *Cavimula weinzierlii*, *Craticula cuspidata* var. *major*, *Craticula halophila* var. *subcapitata*, Diatom Cultures, Taxonomy, Bacillariophyta, *Navicula*, *Achnanthes*.

Taxonomy and systematics are dynamic and historical disciplines associated with all major groups of organisms. For diatoms (Division Bacillariophyta), significant revisions in nomenclature and perceived generic phylogenies have occurred, especially during the past fifteen years. Reasons for this are doubtless related to increased resolution afforded by computer aided classification tools, scanning electron microscopy (SEM), and new optical methods (e.g., differential interference contrast [DIC]). Diatoms have been increasingly used as indicator organisms in applied ecological studies, especially of acid precipitation (e.g., Battarbee 1984), global warming (e.g., Fritz *et al.* 1991) and water quality (e.g., Stoermer *et al.* 1985). Thus the need for their accurate identification and consistent nomenclature is imperative.

While the revised systematic literature associated with diatoms remains scattered, several treatments, all European, warrant mention here, especially those of Simonsen (1979), Krammer and Lange-Bertalot (1986, 1988, 1991a, 1991b) and Round *et al.* (1990). Unfortunately, these works are not monographic and appear to be somewhat restricted to nominate varieties or varieties more common in Europe. Hence many varieties, or nominate taxa which are uncommon in Europe but more frequently observed in North America, have not received comparable nomenclatural attention. Until such time as there is a resurgence in North American diatom floristics, nomenclatural revisions will apparently be restricted to taxa available through museum and/or other collections (e.g., Hamilton *et al.* 1992, Czarnecki 1987). This paper provides nomenclatural revisions for four diatom taxa presently maintained in the Loras College Freshwater Diatom Culture Collection (Czarnecki 1993; 1994) and/or encountered by the author in floristic studies of Iowa streams.

### TAXONOMIC REVISIONS

*Achnantheidium hauckianum* (Grun.) Czarnecki *comb. nov.* Basionym: *Achnanthes hauckiana* Grunow in Cleve & Grunow 1880, pp. 21-22.

An epilithic population of this diatom was collected on 11 December 1992 from Bloody Run Creek, site 2 riffle [E 1/2, SE 1/4, SE 1/4, NW 1/4, Sec. 28, T-90N, R2E, Dubuque Co., IA] (Cawley and Czarnecki 1993). Based on numeration of 500 valves, this taxon was present in a relative frequency of 0.08. Attempts by the author to isolate and culture this taxon have been unsuccessful.

*Cavimula weinzierlii* (Schimanski) Czarnecki *comb. nov.* Basionym: *Navicula weinzierlii* Schimanski 1973, pp. 281-282, Pl. 7, figs. 1, 3.

An epipellic population of this diatom was collected on 10 May 1993 from Bloody Run Creek, site 1 pool [SE 1/4, NW 1/4, SW 1/4, SW 1/4, Sec. 21, T-90N, R2E, Dubuque Co., IA] (Cawley and Czarnecki 1993). Based on numeration of 500 valves, this taxon was present in a relative frequency of 0.01. Attempts by the author to isolate and culture this taxon have been unsuccessful.

*Craticula cuspidata* var. *major* (Meist.) Czarnecki *comb. nov.* Basionym:

*Navicula cuspidata* var. *major* Meister 1912, p. 134, Pl. 20, fig. 10. non *Navicula cuspidata* var. *major* Frenguelli 1924, p. 77, Pl. 7, figs. 8, 12 [1993/1924, p. 236, Pl. 7, figs. 8, 12].

A single cell of this diatom was successfully isolated on 20 November 1991 from an epipellic sample of algae collected from Bloody Run Creek, site 3 pool [NW 1/4, SE 1/4, NW 1/4, SE 1/4, Sec. 28, T-90N, R2E, Dubuque Co., IA] and is currently maintained as clonal, unialgal culture L652 (Czarnecki 1993).

*Craticula halophila* var. *subcapitata* (Østr.) Czarnecki *comb. nov.* Basionym: *Navicula halophila* var. *subcapitata* Østrup 1910, p. 29, Pl. 1, fig. 22.

A single cell of this diatom was successfully isolated on 10 November 1991 from an epipellic sample of algae collected from Rush Lake [SE 1/4, NW 1/4, SE 1/4, Sec. 36, T-100N, R40W, Osceola Co., IA] and is currently maintained as clonal, unialgal culture L606 (Czarnecki 1993).

### DISCUSSION

The diatom genus *Achnantheidium* was first proposed by F.T. Kützing (1844) to include more or less linear (in valve view), finely striated, isopolar, heterovalvar (containing one raphe valve and one rapheless valve), and geniculate (in girdle view) frustules, but distinct from a similar, previously described genus, *Achnanthes* (Bory 1822). Kützing (1844) also considered that cells of *Achnantheidium* were "free swimming" and grow as one or possibly two cells, while those of *Achnanthes* were stipitate, growing in "bands" yet often observed as one or two cells. The genus *Microneis* was subsequently proposed by Cleve (1895) to include similarly shaped diatoms with extremely fine pores. Various authors (e.g., Cleve-Euler 1953, Hustedt 1933, Krammer and Lange-Bertalot 1991b) have favored using some or all of these taxa as subgenera under a more broadly interpreted genus *Achnanthes*. However, I concur with the systematic arrangement in Round *et al.* (1990) on the recognition of two distinct genera, *Achnanthes* and *Achnantheidium*, with the later including what has been previously referred to as *Microneis*. In this regard, *Achnanthes hauckiana* warrants transfer to the genus *Achnantheidium*, based on the simple pore structure found on its valves and the non-porous nature of its girdle bands. I do not however concur with Krammer and Lange-Bertalot (1991a) in regarding this diatom as a subspecies of *Achnantheidium delicatulum* Kütz.

The genus *Cavimula* was erected by Mann and Stickle in Round *et al.* (1990) to include some diatoms, formerly assigned to the genus *Navicula*, which possess finely punctate uniseriate, radiate striae, and relatively small, rhombic-lanceolate to elliptical valves with flat surfaces. Commonly encountered members of this genus (transferred by Mann and Stickle, *op. cit.*) include *Navicula cocconeiformis* Greg., *N. lacustris* Greg., *N. pseudoscutiformis* Hust. and *N. scutiformis* Grun. *ex.*

A.S. Based on similar characteristics, *Navicula weinzierlii* Schimanski warrants transfer to *Cavinula*.

The genus *Craticula* was erected by Grunow (1867) for members of the genus *Navicula* with internal transverse siliceous thickenings about a longitudinal midrib [= craticulae]. According to Van Heurck (1896), Grunow later abandoned the genus *Craticula*, after deciding that frustules with these structures were simply anomalies. Although subsequent taxonomists (e.g., Hustedt 1961, Patrick in Patrick and Reimer 1966) variously figured these internal siliceous thickenings, particularly in *N. cuspidata* (Kütz.) Kütz. [= *C. cuspidata* (Kütz.) D.G. Mann]; they did not consider them to be of particular systematic value at the generic level. Schmid (1979) demonstrated that craticulae develop in response to moderate hyperosmolarity and are the result of an amitotic division; further increased hyperosmolarity results in induction of yet another amitotic internal frustule, historically regarded as a taxon at the varietal or form level of the particular species. Schmid (pers. comm.) is opposed to using the genus name *Craticula* since it is based on the name of a structure, although she concurs that naviculoid diatoms with the ability to generate craticulae should be placed in a separate genus. I am not aware of any provision in the International Code of Botanical Nomenclature which specifically excludes the names of structures from consideration for generic names and therefore prefer to follow Mann (in Round *et al.* 1990) by retaining *Craticula* as originally used by Grunow (1867). Since Mann (*op. cit.*) has already transferred the nominate taxa, *N. cuspidata* (Kütz.) Kütz. and *N. halophila* (Grunow ex V.H.) Cl., to the genus *Craticula*, the following two names, *Craticula cuspidata* var. *major* (Meist.) Czarnecki *comb. nov.* and *Craticula halophila* var. *subcapitata* (Østr.) Czarnecki *comb. nov.* are warranted.

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