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DIATOMS (PART IV): IDENTIFICATION

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Introduction

Previous articles in this series (Vol. 15(3); 1978) (Vol. 16(3); 1979) (Vol. 19(1); 1982) discussed the collection and preparation of diatoms for laboratory study. This article will deal with the identification of diatoms.

Identification

Under microscopic examination, diatoms are often confused with desmids. However, desmids are green while diatoms have a yellow-brown appearance. In addition, the cell walls of diatoms consist of two overlapping valves which fit together like the parts of a Petri dish. These walls are glasslike and variously ornamented with dots and ridges. In contrast, the symmetrical halves of desmids do not overlap and are not glasslike. The various markings on diatoms are small and require good lighting and high magnification (970X) for microscopic examination. A number of diatom species are polymorphic, forming different shapes in response to different growing conditions.

The identification of diatoms is based on the shape, symmetry and markings of the cell wall. Looking at a diatom from the top is seeing it in a *valve view* (v), while observing it from the side is a *girdle view* (g). These two views are so distinctly different that the two views may appear to represent different species. Due to the reproductive modes of diatoms, identical species come in many different size classifications.

Diatoms are often grouped into two different morphological categories, (1) centric diatoms and (2) pennate diatoms. Centric diatoms (Plate I) have valves with concentric or radiating sculpture emanating from a point or points. Pennate diatoms (Plates II, III, and IV) possess markings arranged with respect to a longitudinal line. Pennate diatoms often possess an axial groove-like slit (*raphe*) in the main axis of the valve. The outline of pennate diatoms is often rod or boatlike, but can be cuneate, sigmoid or crescent shaped.

The plates in this article depict some representative genera of diatoms occurring in Iowa. For more detailed assistance in diatom identification appropriate for beginners, consult, *A Guide to Common Diatoms of Water Pollution Surveillance Systems*, 1966, United State Department of Interior, Federal Water Pollution Control Administration, 1014 Broadway, Cincinnati, Ohio 45202.

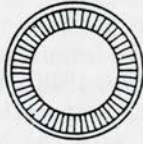
Plate I

Common Genera of Centric Diatoms



(g)

Melosira

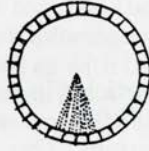


(v)



(g)

Cyclotella



(v)



(g)

Stephanodiscus

Plate II

Common Genera of Pennate Diatoms



(v)

Epithemia



(g)

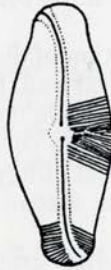


(v)

Gomphonema



(g)



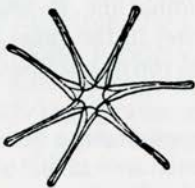
(v)

Achnanthes



(v)

Navicula



Asterionella



Fragilaria



(v)

Cocconeis

Plate III

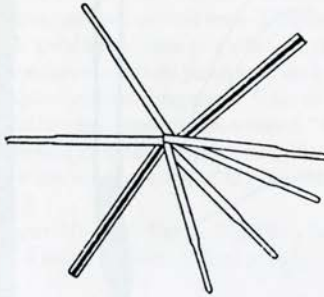
Common Genera of Pennate Diatoms



(v)

(g)

Tabellaria



colony

Synedra



(g)

individual



(v)

Pinnularia



Cymbella



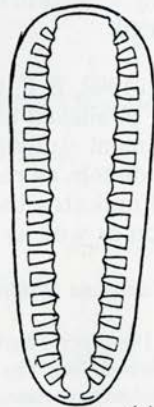
(v)

Nitzschia



(v)

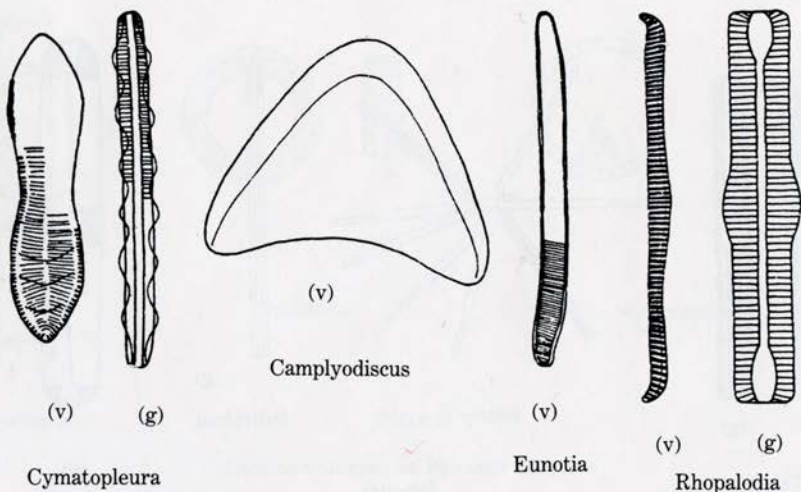
Hantzschia



(v)

Surirella

Plate IV
Common Genera of Pennate Diatoms



New Species

It is not unusual to find diatoms that have yet to be identified. Unusual or deformed frustules are not uncommon. If an unclassified form persists in high numbers in a population, it should be described and named.

In 1963, E.F. Stoermer found a recurring diatom that did not fit into any published classification. I found the same diatom in a lacustrine sediment study (Hungerford 1972). Stoermer described and published the diatom as required by international rules. The description follows and indicates the observations that must be made and published, in Latin as well as in English.

Mastogloia Doddii (Stoermer)

Description from unpublished thesis "Post-Pleistocene Diatoms From Lake West Okoboji, Iowa" by Eugene Filmore Stoermer, Iowa State University of Science and Technology, Ames, Iowa 1963.

Latin Description: Longae valve ellipticales et lanceolate terminis capitalis. Longitudo 28-42 u, latitudo 10-11 u. Striae crassae 12-14 in 10 u parts medium valvae, parallelae apiculu radiant. Punctae distinctae; 14-16 in 10 u in ordine singula. Area axialis angusta, media area moderta, plusant minus rectangula. In quoque lateris areae axialis angusta plus and minus denset. Hoc Vrnytslrm unam aut duas punctas utrique

latenis dissimiliter apparere facit. Raphe undulate, fissurae terminalis valve hamatae in eadem ordine. Locultes 6-7 in 10 u rectangulare. Locules iterum divisal costa longitudinate quae totam longitudinem area loculatae sepi extendit, propion medis loculibns quam apicibus.

English Description: Valves long elliptic lanceolate with capitate ends. 28-42 u long. 10-11 u broad. Striae coarse, 12-14 ends. Punctae distince, 14-16 in 10 u, forming a single row. Axial area narrow, central area of moderate size, more or less rectangular. On each side of the axial area there is a narrow, more or less thickened region. This feature cause the median one or two punctae of each row to have a different appearance from the rest. Raphe undulate; terminal fissures hook strongly in same direction. Locules strongly in the same direction. Locules 6-7 in 10 u rectangular. The locules are subdivided by a fine longitudinal rib which runs the entire length of the loculate area of the septum, nearer the median edge of the locules than the margin.

This species is near *M. yenii* Vorgt. It differs from that entity however, in having coarser striae and a much smaller central area.

Type Locality, Lake West Okoboji Dickinson County, Iowa. Fossil material from core Holotype: #468 Stoermer Collection, 6 August, 1961.

Voucher Specimens: slide 200-210-5 Pillsbury Sediment 1967, Hungerford Collection and 190-200 H₂O₂ Pillsbury Sediment 1967, I.S.U. Diatom Herbarium.

Conclusion

In your studies of diatoms, you too may discover new species. The identification of diatoms is both challenging and interesting. Many species remain to be discovered. The next article will feature the ecology of the diatom genera depicted in this article.

References

- Hungerford, J.J. 1972. Some diatoms in lacustrine sediments of Pillsbury and Sylvan lake beds in Northwest Iowa. *Proc. Ia. Acad. Sci.* 78(3, 4):57-62.
- Vinyard, W.C. 1979. *Diatoms of North America*. Mad River Press. 120 pp.