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Observation of the type materials for *Eunotia pectinalis* (Kütz.) Rabenh. var. *pectinalis* and *Eunotia pectinalis* var. *undulata* (Ralfs) Rabenh.

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Abstract

Morphological variation of *Himantidium pectinale* (=*Eunotia pectinalis*) and *Fragilaria pectinalis* var. *undulata* (=*Eunotia pectinalis* var. *undulata*) were examined using type slides in BM. The lectotype of *Fragilaria pectinalis* var. *undulata* is designated using a slide BM67796 from Ralfs' collection in BM. *Eunotia pectinalis* var. *undulata* should be a synonym of *Eunotia pectinalis* var. *pectinalis*.

Key index words : *Eunotia pectinalis* (Kütz.) Rabenh., *Eunotia pectinalis* var. *undulata*, *Fragilaria pectinalis* var. *undulata*, *Himantidium pectinale*, isotype, lectotype

Introduction

The original author of *Eunotia pectinalis* was confused. Rabenhorst (1864) described it thus "**E. pectinalis** Dillw. Himantidium pectinale *Ktz*. Bac. p.39. T. 16. F. XI. ..."; Dillwyn was the authority. However, Rabenhorst did not cite Dillwyn's description or figures but instead cited Kützing's (1844) description and figures of *Himantidium pectinale*. The confusion as to the identity of *Himantidium pectinale* was caused by Kützing's (1844) description, where he included "Conferva pectinalis *Dillw*." and "Fragilaria pectinalis *Ralfs*" as synonyms. Kützing (1844) also included "Conferva pectinalis *Müll*." as a synonym of *Fragilaria capucina* Desm. However, Dillwyn (1803 in 1802-1809) clearly cited Müller (1788). The confusion has been evident in many diatom papers. VanLandingham (1978), in the *Catalog of Diatoms*, for example, included this taxon as "PECTINALIS (Dillwyn 1809?; Kützing 1844) Rabenhorst 1864, p. 73"; Krammer & Lange-Bertalot (1991) in their European Flora also wrote of this taxon as "**Eunotia pectinalis** (Dillwyn ?, O.F.Müller ?, Kützing) Rabenhorst 1864". However, *Himantidium pectinale* should be recognized as a new taxon described by Kützing (1844) and the basionym of *Eunotia pectinalis* should be *Himantidium pectinale* Kütz. 1844 not *Conferva pectinalis* Dillw. 1803 (Tuji & Williams 2006).

In this paper, the morphological variation of *Eunotia pectinalis* is presented using the type slide of *Himantidium pectinale* Kütz. and *Fragilaria pectinalis* var. *undulata* Ralfs.

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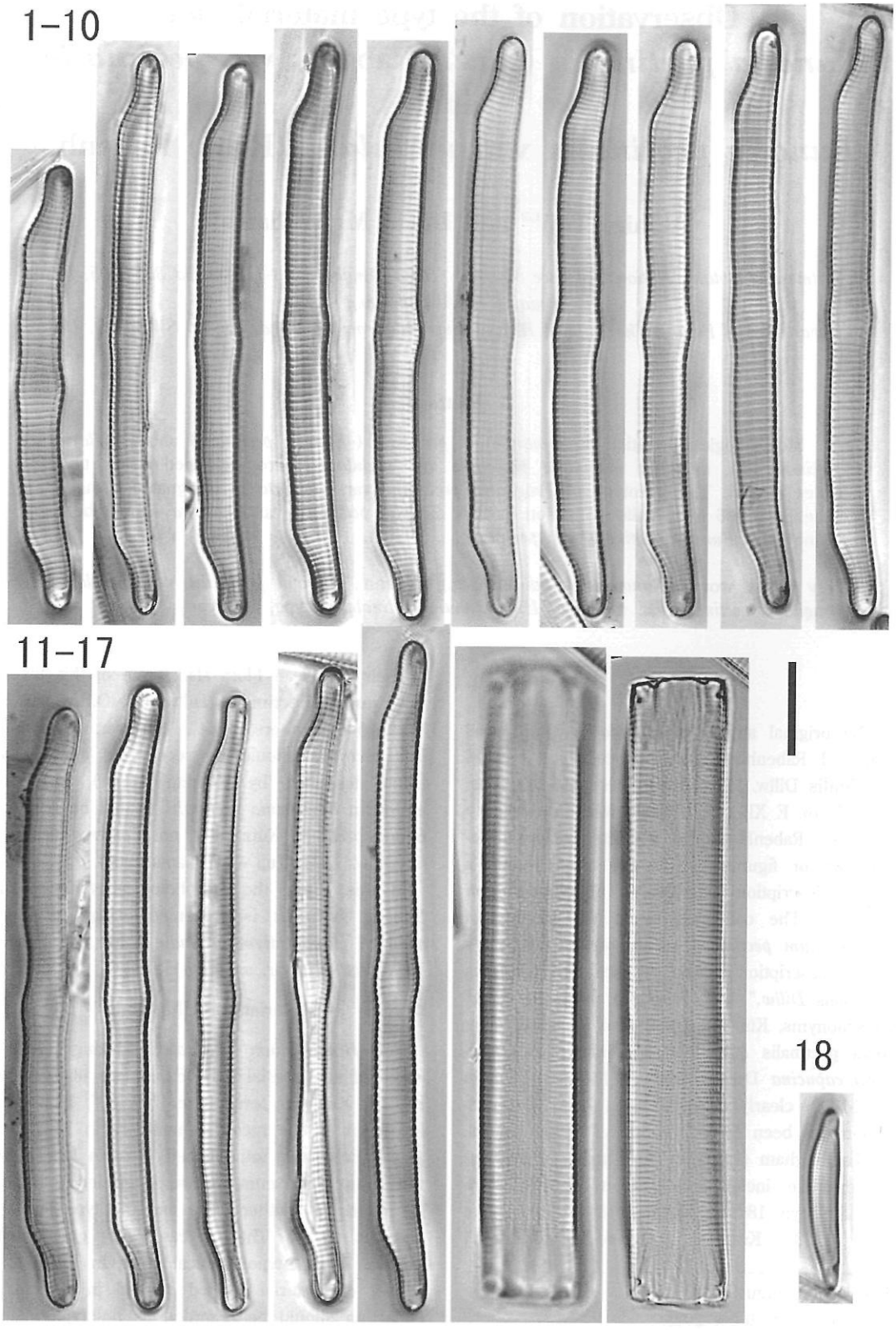
Materials and Methods

For *Himantidium pectinale*, Kützing (1844) wrote of its material that "Exemplare übersandte Hr. Dr. Koch in Jever unter No. 23". However, inspection of the recorded numbers in Kützing's index (Eulenstein unpublished) kept in Dr. Henri van Heurck Museum, Antwerp revieled that no. 23 relates to another place and the type locality Jever is no. 28. Thus, it can easily guess that the no. 23 is a typographical error. In AWH, the packet of material labeled no. 28 in Kützing's collection should be regarded as holotype mate-


1-10
11-17
18

rial. The slide BM17856 in BM (Department of Botany, Natural History Museum, London), which we observed in this study, was prepared from packet no. 28, hence it is isotype slide.

Only one slide, numbered BM 67796, was found in Ralfs' collection in BM with specimens of *Fragilaria pectinalis* var. *undulata* Ralfs. This slide was used for the reexamination of this taxon.

Results and Discussion

***Eunotia pectinalis* (Kütz.) Rabenh.** Fl. Eur. Alg. **I**: 73, 1864.

Basionym : *Himantidium pectinale* Kütz. Kies. Bacill. Diat. 39, *pl. 16. f. XI*. 1844.

Synonym : *Eunotia pectinalis* var. *undulata* (Ralfs) Rabenh. Fl. Eur. Alg. **I**: 74, 1864.
Fragilaria pectinalis var. *undulata* Ralfs Ann. Mag. Nat. Hist. **12**: 107. *pl. 2. f. 3d.*

Non *Conferva pectinalis* O.F.Müll. Nov. Acta Acad. Sci. Imp. Petropol. **3**: 91, *f. 4-7.* 1788.

Non *Conferva pectinalis* Dillwyn Brit. Conferv. 24, *pl. 24. f. 1-2.* 1809.

Holotype : "Jever unter No. 28." Kützing packet 28 in AWH.

Isotype slide : Slide BM 17856 in BM from Kützing packet 28 in BM (isotype).

Figs 1-17

Type locality : Jever.

***Eunotia pectinalis* var. *undulata* (Ralfs) Rabenh.** Fl. Eur. Alg. **I**: 74, 1864.

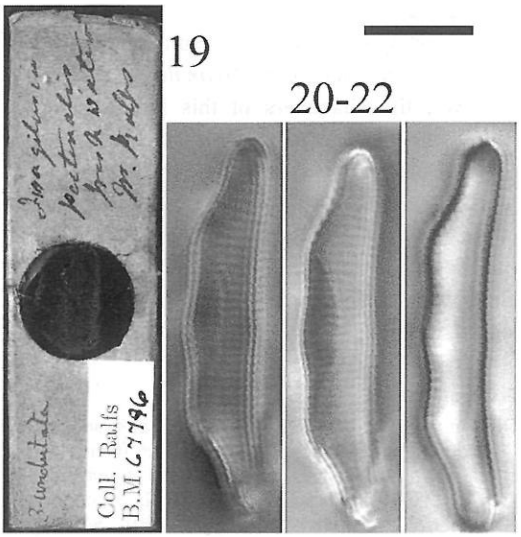
Basionym : *Fragilaria pectinalis* var. *undulata* Ralfs Ann. Mag. Nat. Hist. **12**: 107. *pl. 2. f. 3d.*

Lectotype (designated here) : Slide BM67796 in BM.

Figs 19-22

Type locality : Ardudwy near Barmouth, North Wales, UK.

The isotype of *Eunotia pectinalis* (Kütz.) Rabenh. is virtually a gathering of this species alone (Figs 1-17). There is also a small species of *Eunotia* on this slide (Fig. 18) but the relative abundance of the latter species is extremely low and it is easily distinguished from *E. pectinalis*. The size variation, 35-54 μm in length, and form variation of the isotype slide (Figs 1-17) of *E. pectinalis* is small.



Figs 19-22. Slide BM 67796 and a specimen mounted, lectotype for *Fragilaria pectinalis* var. *undulata* Ralfs, bar = 10 μm.

Individual valves of *E. pectinalis* on this slide have many, slight undulations along the dorsal margin and a central swelling to the ventral margin (Figs 1-15). These characters are used to distinguish the variety *E. pectinalis* var. *undulata* (Ralfs) Rabenh. from its nominate variety (Patrick & Reimer 1986, Krammer & Lange-Bertalot 1991).

Only one slide from Ralfs' collection was found to have specimens of *Fragilaria pectinalis* var. *undulata* Ralfs (=*E. pectinalis* var. *undulata* (Ralfs) Rabenh.) (Fig. 19). Since the label on this slide only has the taxonomic name and habitat ("freshwater"), it is difficult to judge whether this slide is type material. However, it is the only material for this taxon.

Most specimens of *Eunotia* on this slide form colonies, and are only observed in girdle view. We found only one individual which corresponds with the specimen in the original figure of Ralfs (1843). This specimen is designated as lectotype

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Figs 1-18. Specimens from slide BM17856, material from Kützing packet no. 28 in BM (isotype); bar = 10 μm. **Figs 1-17.** *Eunotia pectinalis* (Kütz.) Rabenh. var. *pectinalis*. **Fig. 18.** *Eunotia* sp.

(Figs 20-22).

The lectotype individual is smaller than those in the isotype slide of *E. pectinalis* var. *pectinalis*. However, the characters of this individual agree with those of *E. pectinalis* var. *pectinalis*, hence *E. pectinalis* var. *undulata* should be a synonym of *E. pectinalis* var. *pectinalis*. Since the outline of the valve of this taxon is quite variable (Patrick & Reimer 1986), *E. pectinalis* var. *pectinalis* illustrated by them may be within its morphological variation.

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