WHAT CONSTITUTES A STIGMA? A REVIEW OF ISOLATED PORE STRUCTURES IN RAPHID DIATOMS

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The presence of isolated pores near the central raphe endings has long been known for several raphid genera such as *Cymbella*, *Didymosphenia*, *Gomphonema* and *Luticola*. Since its original designation in 1894 by Cleve for "the peculiar punctum or pore" in some *Cymbella* species, the term 'stigma' has been used to refer to any isolated pore near the central area, although the ultrastructure of such pores varies. Recently, several other names have been proposed, such as 'fistula' (in *Fistulifera*) or 'buciniportula' in *Olifantiella*) for particular types of isolated pore, and it is clear that a revision of the terminology for such structures is needed.

Using high resolution scanning and transmission electron microscopy, the structure and diversity of isolated pores in a range of raphid diatom genera have been investigated. The results of the observations indicate that two types of isolated pore can be recognised, unoccluded and occluded, although there are sub-types within each group.

Unoccluded pores are found in genera of the Cymbellales (*Cymbella*, *Brebissonia*, *Didymosphenia*, *Gomphonema*, *Oricymba*, *Placoneis*) and in *Geissleria*. These isolated pores are characterized by an unoccluded internal foramen with a rounded to slit-like external opening. The most complex type is found in *Cymbella* and *Didymosphenia*, whereas in other genera the isolated pore is reduced to a simple pore through the valve wall. Therefore, we propose to restrict the use of the term 'stigma' to the complex type ass found in*Cymbella,* and 'stigmoid' for the simpler type, as found in *Gomphonema*.

Internally occluded isolated pores can be found in the marine, brackish or terrestrial genera, *Fistulifera, Labellicula*, *Luticola*, *Olifantiella*, *Parlibellus*, and *Proschkinia*. In *Fistulifera*, *Labellicula* and *Proschkinia*, the isolated pore has an internal domed hymenate occlusion, whereas *Luticola* and *Olifantiella* have an internally collared hymenate occlusion. The published terms fistula and buciniportula apply respectively. *Parlibellus* has an isolated pore that splits into two internally, for which the term cuniculus was coined and can be retained.

This study is part of the DIATERM working group programme, which is collating and revising the terminology used to describe the morphology of the diatom valve.