

ABSTRACT

In 1971, the algal class Eustigmatophyceae, Stramenopiles, was detached by Hibberd and Leedale from the class Xanthophyceae, Stramenopiles, on the basis of prominent ultrastructural differences in vegetative cells and more importantly in zoospores, such as the presence of big extraplastidial stigma. The class was divided into four families, six genera and twelve species.

It seems so far, that there is a deep dichotomy within the class. Eliáš et al. (unpublished) recommend to establish two orders based on molecular sequencing of 18S rDNA and *rbcL*: Eustigmatales (sensu Eustigmatophyceae described by Hibberd) and Goniochloridales (order containing *Goniochloris*, *Pseudostaurastrum* and undescribed relatives). The order Eustigmatales is divided into three separate lineages, most likely families: Eustigmataceae (A1), Monodopsidaceae (A2) and a new family Pseudellipsoidionaceae (A3).

In this study the ultrastructure of 10 eustigmatophycean strains from three separate lineages was investigated. The typical characteristics of this class as chloroplast without a girdle lamella, a reddish globule and lamellate vesicles were found in all strains studied. The appearance of the lamellate vesicles was found to change during the life cycle.

My research indicates that other characteristics, formerly assigned to the whole class, are unique within the separate lineages (families).

Polyhedral pyrenoid projecting out of the plastid was observed only in *Eustigmatos magnus* CCMP 387, BogD 9/21 T-2d and E4f, family Eustigmataceae (A1). The pyrenoid evolves during the life cycle. A continuum of the nuclear and plastid envelopes was not found.

On the other hand, only a pyrenoid situated inside the chloroplast was observed in family Monodopsidaceae (A2). It appears as a bright area in the plastid not transversed by thylakoids. In *Monodus unipapilla* SAG 8.83 and *Pseudotetraëdriella kamillae* SAG 2056 a continuum of nuclear and plastid envelopes was found. In „*Monodus*“ *guttula* CCALA 826 the presence or absence of the continuum still needs to be examined.

Thirdly, the strains from the new lineage Pseudellipsoidionaceae (A3), „*Pseudocharaciopsis*“ *ovalis* CAUP Q301, „*Pseudocharaciopsis*“ *ovalis* CAUP Q302, *Pseudellipsoidion edaphicum* CAUP Q401 and Mary 8/18 T-3d show no pyrenoid at all. A continuum of the nuclear and plastid envelopes was not seen in any of the investigated strains.

The absence or presence of pyrenoid plus its type together with the absence or presence of zoospores and its number of flagella are the main characteristics to distinguish the families within the class Eustigmatophyceae.

Key words: Eustigmatophyceae, ultrastructure, phylogeny, taxonomy, Stramenopiles