LEAF EPIDERMIS STRUCTURE IN CYDONIA OBLONGA MILL. (ROSACEAE)

Tsveta Ganeva
Sofia University “St. Kliment Ohridski”, Faculty of Biology, Department of Botany, 8 Dragan Tsankov blvd., Sofia
Correspondence to: Tsveta Ganeva
E-mail: tsveta_ganeva@yahoo.com

ABSTRACT
The leaf epidermis structure of Cydonia oblonga Mill. has been studied by light and scanning electron microscopy. Cuticle ornamentation and waxes have been observed. Simple single trichomes and cyclocytic stomatal type are determined. An attempt to estimate all features of taxonomic value is made and some relationships within subfamily Maloideae are discussed.

Keyword: cuticle, Cydonia, epidermis structure

Introduction
Cydonia Mill. is a monotypic genus traditionally referred to subfam. Maloideae, Rosaceae (6). The Maloideae species are an economically significant group of woody plants cultivated for their valuable fruit crops, as well as for their ornamental beauty. The pome fruit is the most distinctive characteristic of the Maloideae and has been defined both taxonomically and morphologically (7). Cydonia oblonga Mill. has southwestern and Central Asia origin (6) but now is widespread and cultivated species.

According to the latest classification of Rosaceae, subfamily Maloideae is included in Spiraeoideae as subtribe Pyrinae (5; 1). Despite the considerable amount of taxonomic features used for the complete clarification of the phylogenetic relationships among the genera, they are not sufficient. According Stace (9) the cuticular patterns can provide reliable applications in identification, taxonomic research and phylogenetic investigations.

The aim of this study is to determine the epidermal structure of leaves using light and scanning electron microscopy (SEM) and to estimate all features of taxonomic value.

Materials and methods
Preparations were made from herbarium specimens preserved in the collections of the Institute of Botany of the Bulgarian Academy of Sciences (SOM), the Botanical Department, Biological Faculty of Sofia University (SO) and the authors’ collection.

Results and Discussion
The cuticle of the upper epidermis under SEM observation has dense parallel striations which disguise the outlines of the epidermal cells (fig 1.). The areolae are conspicuous. The cells above veins are elongated with straight anticlinal walls. The epidermal cells are polygonal in form with undulate anticlinal walls (figs. 3, 4). Two varieties of simple single trichomes have been observed under SEM – thick-walled trichomes with wide lumen and trichomes with very thick walls and narrow lumen (fig. 5). The trichome foot is peg-like (following Stace) (fig. 6). After maceration procedure the lost trichomes leave pores in the cuticular preparation. The trichome-base cells surround the pores and their poral cell walls are considerably thickened known as poral rim (fig. 4) (9).

The stomata are with elliptical form, distributed in groups in the areolae (fig. 4). The guard cells have prominent outer
stomatal rims. The stomatal type is cyclocytic. The subsidiary cells are 5-7 (fig. 4).

Stomata twins and stomata above veins also have been observed.

**Fig. 1** *Cydonia oblonga* – upper epidermis - cuticular ornamentation (SEM)

**Fig. 2** *Cydonia oblonga* – upper epidermis - epidermal cells (LM x 400)

**Fig. 3** *Cydonia oblonga* – lower epidermis – epidermal cells and stomata (SEM)

**Fig. 4** *Cydonia oblonga* – lower epidermis – epidermal cells and stomata (LM x 400)

**Fig. 5** *Cydonia oblonga* – lower epidermis – trichomes (SEM)

**Fig. 6** *Cydonia oblonga* – lower epidermis – trichome peg-like foot (SEM)
Using different taxonomical features for cladistic analysis, *Cydonia* is included in one clade along with *Pseudocydonia*, *Chaenomeles* Lindley and *Docynia* Decaisne because of the higher numbers of seeds per fruit (1). Although according to Rohrer (8) *Cydonia* appears unrelated to the other three multiovulate genera. On the other hand the free styles that pass throughout a pit at the top of the hypanium and sclereids in dense clusters indicate that *Cydonia* has close relationships with *Pyrus* L. (8). However, relationships of *Cydonia* differ strongly between cpDNA and nuclear data. This conflict between genomes may be a record of past gene flow (1).

The leaf epidermis structure of *Cydonia oblonga* shows mesomorphic features. The premature leaves are thick hairy. The indumentum of the adaxial mature leaf surface fall off while this of the abaxial one is permanent. On the upper epidermis the cuticle is dense striated. This ornamentation protects the leaves after the loss of indumentum. The cuticle of the lower epidermis is smooth. The trichome type is the same recorded for other species from Maloideae subfamily – simple single non-glandular, but two variations have been observed. The stomatal type is cyclocytic which also have been established for the genera *Pyrus* (3), *Pyracantha* Roem. (10) and *Crataegus* L. (in press.). However, along with the subsidiary cells forming a narrow ring round the stomata, there are some stomata which have subsidiary cells elongated radially. This stomatal type is termed actinocytic (9) or atinocytic (2). Metcalfe and Chalk (4) described only anomocytic (ranunculaceous) stomatal type for the Rosaceae family.

The observed epidermis structure of the investigated species shows mesomorphic features such as cuticle ornamentation, undulated anticlinal cell walls of the epidermal cells, low trichome frequency.

The premature leaves, calyx, hypanium (8) and fruits at maturity (7) of *Cydonia oblonga* are densely hairy. This thick indumentum appears to protect the plants from the annual change of temperature amplitude in spring and autumn. Also the multiovulate pomes of *Cydonia* seem to increase the probability that at least some of the seeds of these large fruits will emerge from the frugivore gut in viable condition (7). All this contributes to nowadays cosmopolitan distribution of the species.

REFERENCES