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Submicroscopic Structure of Silica Scales in some *Mallomonas* and *Mallomonopsis* Species

Submikroskopická struktura křemitých šupin u některých druhů *Mallomonas* a *Mallomonopsis*

Tomáš Kalina

Department of Botany, Caroline University of Prague, Benátská 2, Praha 2

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Abstract — A new variety of the species *Mallomonas leboimii* Bourelly, var. *corcontica* nov. var. (*Chrysophyceae*) is described from small peat bogs in the Krkonoše mountains, Czechoslovakia. The species *Mallomonopsis ouradion* (Harris et Bradley) Harris from a small bog called "Swamp" is also described. Electron micrographs of scales and bristles are used in both descriptions.

Recently I had occasion to study some interesting species of *Chrysomonads* and to examine them by means of the electron microscope. The scales of the genera *Mallomonas* and *Mallomonopsis* in particular, when studied electron microscopically, yield patterns that can be used for species identification. All species under study were pictured living as seen in the light microscope and then investigated in the electron microscope. For electron micro-scope examination the flagellates were prepared like diatoms by boiling in suplhuric acid and the clean material dropped on the formvar film without any shadowing. The electron microscope used for this study is the model SEM-2 with an acceleration potential of 75 KV. I am indebted to Ing. V. Pokorný for technical assistance.

1. *Mallomonas leboimii* Bourrelly var. *corcontica* Kalina var. nov.

(Pl. XVII. : a—d; Pl. XIX. : a—e)

Cellulae ovales, 18—21 μm longae, 11—14 μm latae. Squamae tripartitae cum saetis, in cupolam, scutum et marginem divisiae, 4—6 μm latae, 3—4 μm longae. Cupola satis magna, quarta tenus parte longitudinis squamae. Scutum costis laevibus parallelodromis. Setae arcuatae, 9—12—14 μm longae, attenuatae ad finem, dentes acutos ferrentes. Cystae ignotae.

Cells oval, 18—21 μm long, 11—14 μm broad, flagellum longer then the cell. Chromatophore parietal, often divided into two lobes. Nucleus spherical in the anterior part of the cell. A system of 4—6 contractile vacuoles is situated in the posterior part of the cell as well as a big drop of chrysolaminarin. Cytoplasm hyaline, with very fine granulation. The cell is covered by an envelope containing tripartite imbricated scales, arranged in transverse spiral rows. The majority of scales bear one bristle. Scales are 4—6 μm long, 3—4 μm broad. They are perforated by fine pores, dispersed irregularly over the whole area at the scales. The dome of the scale is large, occupying about 1/4 of the scale length. It is separated from the shield by a curved keel with some radial branches protruding on the surface of the shield. On the shield a massive V-rib is placed in the usual position. Across the shield are situated 7—9—11 smooth, parallel, not anastomosing ribs. The scale flange is thickened in the lower half of the outer rim. The inner part of the rim is thin and in the lower half re-inforced with short, usually radially arranged struts. Their

form, number and length varies. Scales with long bristles, measuring 9—14 μm, bristles slightly curved, sharply serrate in their whole length. Cysts unknown.

Occurrence: Krkonoše, Úpská rašelina; in the small peat bogs at the pH 4.5—5; June 1967.

Note: The described variety differs from *M. leboimii* BOURRELLY var. *leboimii* by the cell size. The size of the cells in var. leboimii is given 60 × 15 μm in BOURRELLY (1947), 35—85 μm (the length only) in ASMUND (1959), 35—40 μm in FOTT (1962). The body of the new variety *corcontica*, however, is smaller, measuring only 18—21 μm × 11—12 μm. Similarly, the dimensions of scales are smaller: 9—10 μm × 5 μm in var. *leboimii*, 4—5 μm × 2—4 μm in var. *corcontica*. The main features separating the new variety from var. *leboimii* are the short struts radiating from the keel surrounding the dome. These struts going down towards the shield are missing both in the electron micrographs of ASMUND, and in the those of FOTT 1962. On the other hand, the short struts connecting the transverse ribs as seen in the electron micrographs of ASMUND and FOTT (1962, Tab. VI.) are missing in my photos.

2. *Mallomonopsis ouradion* (HARRIS et BRADLEY) HARRIS

(Pl. XVIII. : d—i; Pl. XIX. : f—g)

Mallomonopsis ouradion (HARRIS et BRADLEY) HARRIS, J. gen. Microbiol. 42 : 180—182, pls. 5—7, 1966; *Mallomonas ouradion* HARRIS et BRADLEY, J. gen. Microbiol. 18 : 72—74, fig. 1—5, pl. I : 1—7, 1958.

Cells oval or rounded, 11—16—22 μm long, 7—10—12 μm broad, with two flagella: the longer one twice as long as the cell, the shorter same length as the cell. Chromatophore parietal, single, divided in two parts, connected by a narrow bridge. The spherical nucleus is situated in the anterior part; 2—3 contractile vacuoles are situated in the posterior part of the cell as well as a big drop of chrysolaminarin. Cell covered by imbricated scales. Scales 5—6 μm long, 2,5—3 μm broad, oval, with a big shield, forming 2/3 of the scale length, dome not present. Each scale with 1—5 bristles. Bristles 6 to 10 μm long, slightly curved, at the base broader and sharply bent. Distal end forked. Cysts spherical, smooth, 16—19 μm in diameter, with a small pore 1,5 μm in diameter.

Occurrence: Doksy, in a small bog called "Swamp", pH 5; June 1967.

Note: Cells of *M. ouradion* collected in the "Swamp" differ from the original description (HARRIS et BRADLEY 1960) only by somewhat smaller size. HARRIS et BRADLEY found the cell size 20—25 μm × 11—15 μm, the dimensions of scales 5—7 μm × 3—4 μm and the length of bristles 4—12 μm.

Souhrn

V článku je popsána nová varieta druhu *Mallomonas leboimii* BOURRELLY var. *corcontica* nov. var. (*Chrysophyceae*) z rašelinných tůní v Krkonoších. Dále je popsán druh *Mallomonopsis ouradion* (HARRIS et BRADLEY) HARRIS z tůňky v přírodní reservaci „Swamp", pozorovaný v ČSSR poprvé. Oba popisy jsou doplněny elektronovými snímky šupin a ostnů.

Literature

ASMUND B. (1959): Electron microscope observations on Mallomonas species, and some remarks on their occurrence in Danish ponds and lakes III. — Dansk bot. Ark. 18 : 7—50.

BOURRELLY P. (1947): Algues rares et nouvelles des mares de la Forêt de Fontainebleau. — Rev. gen. Bot. 54 : 309—310.

FOTT B. (1962): Taxonomy of Mallomonas based on electron micrographs of scales. — Preslia 34 : 69—84.

HARRIS K. (1966): The genus Mallomonopsis. — J. gen. Microbiol. 42 : 175—184.

HARRIS K. et BRADLEY D. E. (1958): Some unusual Chrysophyceae studied in the electron microscope. — J. gen. Microbiol. 18 : 71—83.

Recensent: B. Fott

See also plates XVII. — XIX. in the appendix

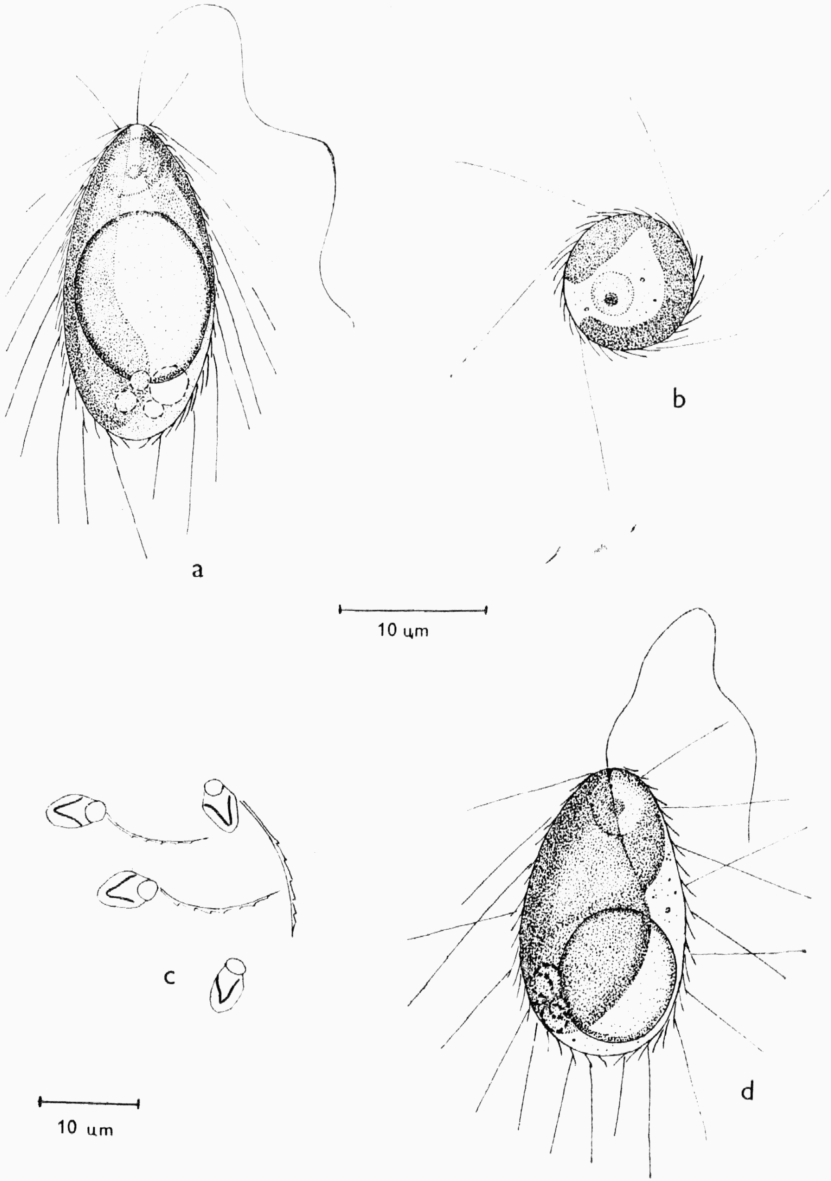

Plate XVII. *Mallomonas leboimii* BOURRELLY var. *corcontica* nov. var. — a, b, d — vegetative cells; c — scales and bristles as seen in the light microscope.

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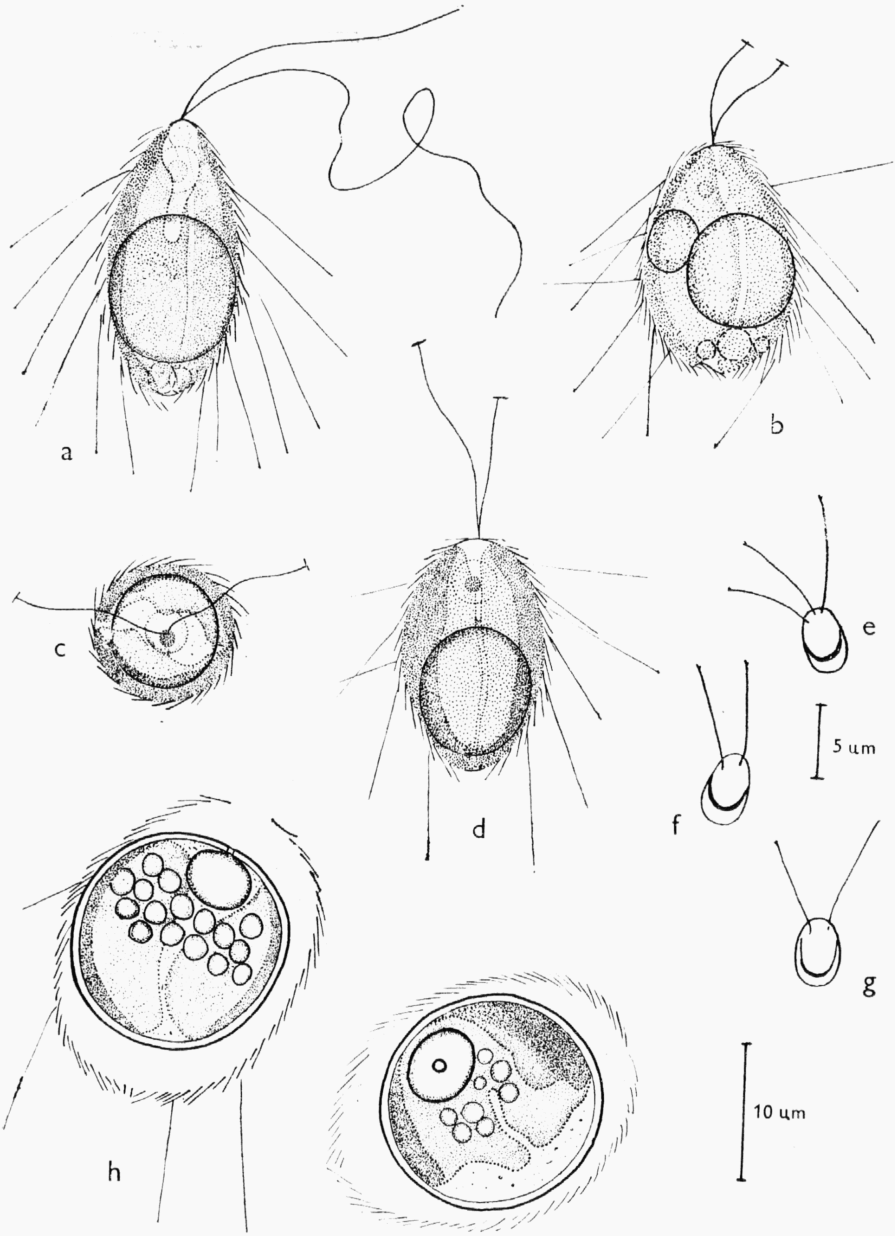

Plate XVIII. *Mallomonopsis ouradion* (Harris et Bradley) Harris. — a, b, c, d — vegetative cells; e, f, g — scales and bristles as seen in the light microscope; h, i — cysts.

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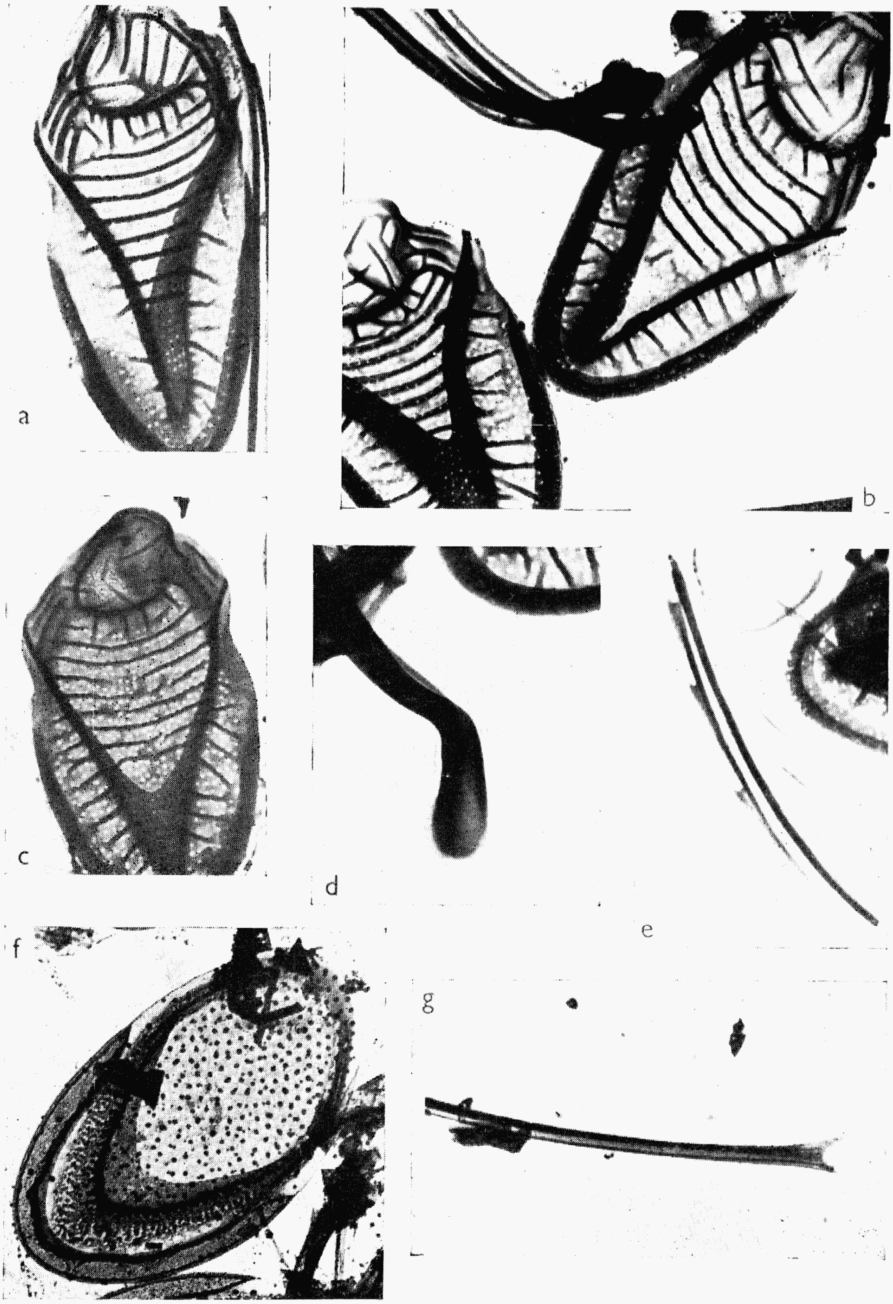

Plate XIX. *Mallomonas leboimii* BOURRELLY var. *corcontica* nov. var. — a, b, c — direct electron micrographs of scales, × 9000; d — direct electron micrographs of the basal end of a bristle, × 12 000; e — apical end of a bristle, × 9 000; *Mallomonopsis ouradion* (HARRIS et BRADLEY) HARRIS. — f — direct electron micrograph of a scale, ×8000; g — direct electron micrograph of a bristle, × 9000.

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