

Three new species of green algae (*Chlorophyceae*)

Tri nové druhy zelených rias (*Chlorophyceae*)

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Three new species of green algae are described, pertaining to the order *Tetrasporales* (*Chlamydocapsa mucifera* HIND.) and *Chlorococcales* (*Granulocystopsis calyptrata* HIND., *Micractinium parvum* HIND.). The taxonomic position of these algae and the morphological variability of significant diagnostic features are discussed.

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Three algal species have been studied that differ, by their features, from species hitherto known. It is hence considered appropriate to describe them as new taxa. The first, *Chlamydocapsa mucifera*, has formed large macroscopic mucilaginous masses attached to the walls of the concrete basin of a fountain; it stands out by cells having two contractile vacuoles throughout their life-cycle, this being characteristic of the order *Tetrasporales*. The other two species, *Granulocystopsis calyptrata* and *Micractinium parvum*, occur in the plankton of stagnant waters; they regenerate by autospores just as other species of these chlorococcal algae.

Chlamydocapsa mucifera HINDÁK, sp. nova

Figs. 1, 2

Coloniae macroscopicae, affixae, in involucri mucosis; tegumentum gelatinosum homogeneum, hyalinum, laminosum, circa cellulas 4—15 μm latum vel latius. Cellulae sphaericae usque oblongae, interdum asymmetricae, 5—10—(15) μm , singulae; cellulae filiales saepe regulatiter dispositae (in tetraëdros). Membrana cellularis levis, hyalina. Chromatophorum parietale, poculiforme, cum pyrenoid. Vacuolis contractilibus binis ad apicem. Propagatio 4 vel 16, raro 2 hemizosporis vel zosporis, ruptura vel productione mucilaginis e membrana matricali liberantur. Zosporae sphaericae usque oblongae, saepe asymmetricae, 5—10—(15) $\times$ 5—10 μm , flagellis binis, usque 20 μm longae, stigmate rubro rotundi mediore media cellula ad latus disposito, vacuolis contractilibus binis ad apicem, sine papilla.

Habitatio: In periphyto (muro) aquarum emicantium in Bratislava-Patrónka, Slovacia occidentalis.

Iconotypus: Figura nostra 1: i

Colonies macroscopic, mucilaginous, affixed or secondarily free, with cells singular or by 2—4—8—16 without any definite order; tetrads of cells are tetrahedrally grouped. The colonial mucilage relatively tough, colourless, layered, 4—15 μm wide around cells, sometimes even wider. Cells spherical, spherical-oval to widely oval, sometimes slightly asymmetrical, 5—10 to (15) μm in diameter. Cell wall smooth, hyaline. Chloroplast parietal, cup-shaped, with one basal pyrenoid. In the apical part of the protoplast there

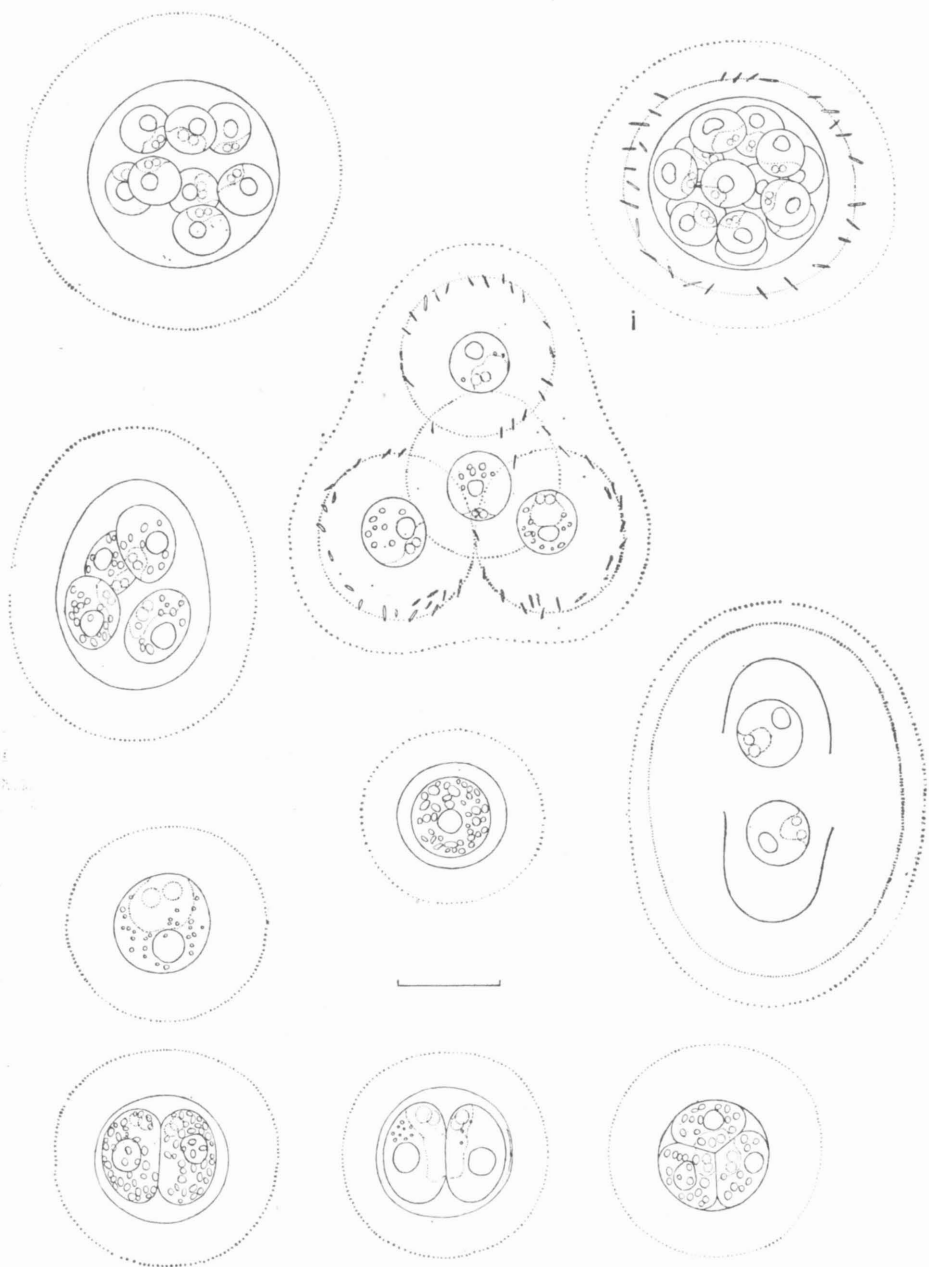


Fig. 1. — *Chlamydocapsa mucifera* HIND., specimens from the fountain in Bratislava-Patrónka; i — iconotype. Scale: 10 μ m.

are two relatively large contractile vacuoles and numerous granules of different size, the stigma is missing. Reproduction by 2—4—8—16 spherical to oval, sometimes asymmetrical hemizoospores or zoospores which are released by the widening and rupture of the mother cell wall. Hemizoo-



Fig. 2. — *Chlamydocapsa mucifera* HIND., 1 — specimens from the fountain in Bratislava-Patrónka; 2 — cultivated material (subculture) from free habitat. Scale: 10 μ m.

spores with two apical contractile vacuoles, without stigma, zoospores with two flagella up to 20 μm long, two apical vacuoles, a small stigma in the upper portion of the chloroplast, papilla not formed, $5-10-(15) \times 5-10 \mu\text{m}$.

Occurrence: Affixed to the walls of a shallow concrete basin (fountain) in the area of the Institutes of the Slovak Academy of Sciences in Bratislava, Dúbravská street, April–May 1979, in masses.

Apart from the type species *Ch. ampla* (Kütz.) FOTT, two other species were included by FOTT into the genus *Chlamydocapsa* FOTT (1972a, b): *Ch. bacillus* (TEILING) FOTT and *Ch. planctonica* (W. et G. S. WEST) FOTT. The first two species undoubtedly belong to the order *Tetrasporales* because the cells have contractile vacuoles present throughout the entire ontogenetic cycle; on the other hand, the taxonomic position of *Ch. planctonica* (W. et G. S. WEST) FOTT is unclear (see HINDÁK 1978) (Fig. 4:8).

The new species *Ch. mucigera* differs from *Ch. ampla* and *Ch. bacillus* mainly by the spherical to spherico-oval cell shape as well as by smaller dimensions, from the planctonic *Ch. bacillus* also by affixed macroscopic colonies.

Granulocystopsis calyptrata HINDÁK, sp. nova

Fig. 3

Cellulae libere natantes, singulae aut 2–4–8-cellulares colonias in dilatata membrana matriciali formantes, cum calyptra aut polis crassis raro cum granulis etiam in parte aequatoria cellulae. Cellulae ovaliter cylindricae usque ovals, apicibus rotundatis, $4-10 \times 2-6 \mu\text{m}$. Membrana cellularis haecula, cum tegumento gelatinoso homogeneo, circa cellulas $3-5 \mu\text{m}$ latum. Chromatophorum parietale, cum pyrenoide. Propagatio 2–4–8 autosporis; autosporae post visibilem dilatationem membrana matricialis liberantur.

Habitatio: In plancto piscinae Stávek II in Stupava apud Bratislava, Slovacia occidentalis.

Iconotypus: Figura nostra 3: i.

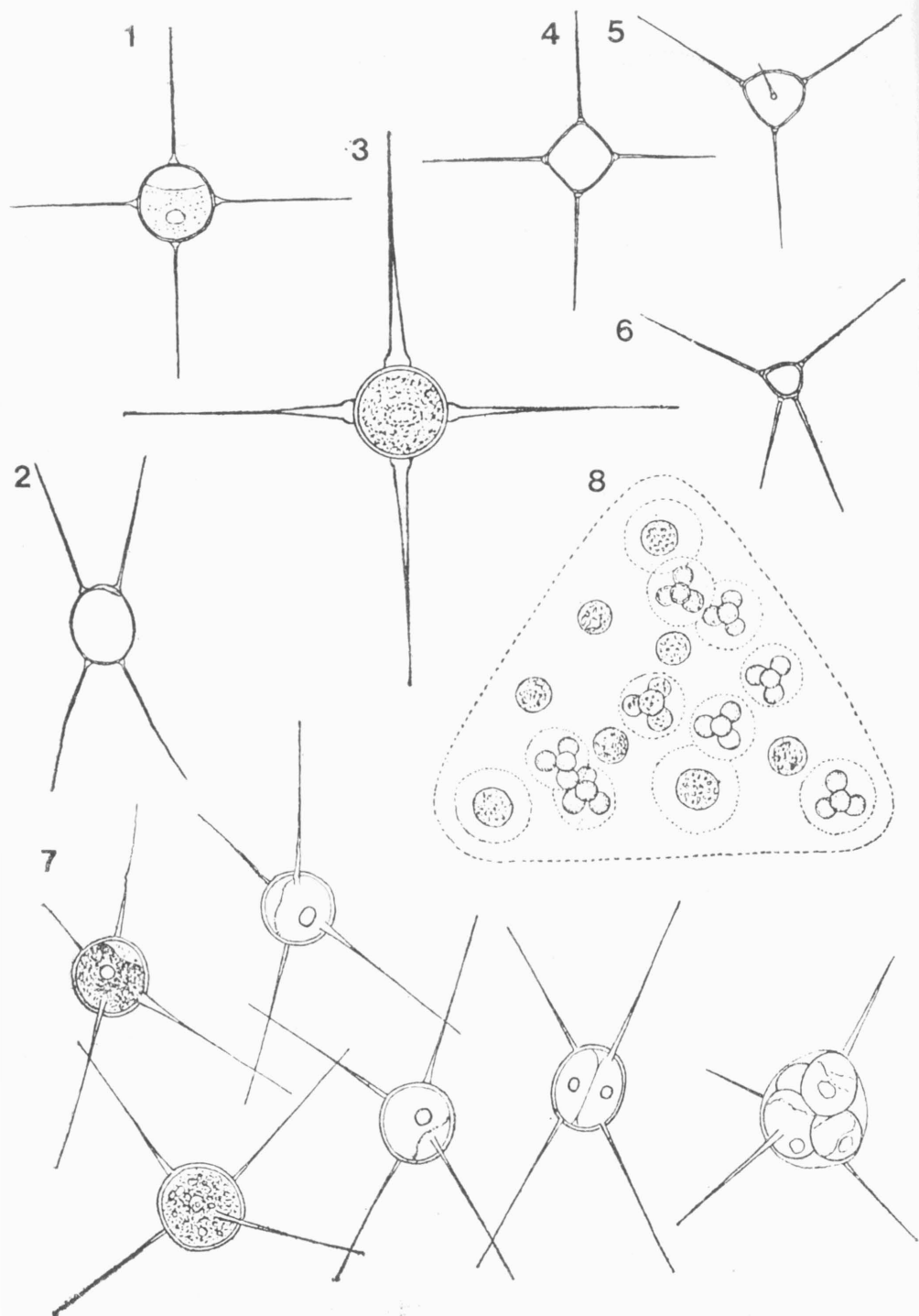
Cells free-floating, singular. Colonies 2–4–8-celled are temporarily formed in the process of reproduction. Cells elongately cylindrical to cylindrically oval with both ends widely rounded, $4-10 \times 2-6 \mu\text{m}$. Cell wall smooth, hyaline, at the cell ends with large brown to dark-brown semi-spherical to cap-shaped incrustations. Mucilaginous envelope hyaline, structureless, around cells $3-5 \mu\text{m}$ wide. The polar incrustations have a smooth, usually uneven surface, the lower margins are even, crenate or finger-like excised, $1-5 \times 1.5-4 \mu\text{m}$. Chloroplast parietal, troughy, with one pyrenoid in the medium part. Reproduction by 2–4–8 autosporis released by extension and rupture of the mother cell wall in the medium part. Autosporangia $8-16 \times 4.5-10 \mu\text{m}$, with mucilage up to $22 \times 15 \mu\text{m}$.

Occurrence: In the spring and summer plankton of the small fishpond Stávek II at Stupava near Bratislava, Western Slovakia.

The present author (HINDÁK 1977) removed species with a surface cell incrustation from the genus *Oocystis* and referred them to two new genera: *Granulocystis* is marked by granulation $\pm$ over the entire cell surface, *Granulocystopsis* exhibits localized granulation. The new species *Granulocystopsis calyptrata* differs from the two hitherto known species *G. pseudocoronata* (KORŠ.) HIND. and *G. coronata* (LEMM. in MARSS.) HIND. having a wreath of granules at the cell poles, by continuous massive cap-shaped incrustations, while the shape of cells and chloroplast as well as the way of reproduction are the same. Incrustations in *G. calyptrata* are formed very sporadically



Fig. 3. — *Granulocystopsis calyprata* HIND., specimens from the small fish-pond Stávek II;
i — iconotype. Scale: 10 μ m.



also subpolarly or in the medium portion of cells in form of granules or irregular wide belts. Little brown caps start their formation already in autospores inside the mother cell wall. They have the shape of rough granules that get linked up, with the passage of time, into a cap-shaped incrustation sometimes reminiscent of the cap shape of mushrooms. The remnants of the cell wall or the independent caps are well visible for a time in the colonial mucilage or they remain sporadically in the neighbourhood or young cells. The little caps are very pronounced, with young cells always wider than the cell. In the process of autosporangia formation the cells gradually become wider than the caps and the mother cell wall extends markedly following protoplast division, as it is in other representatives of the genus *Oocystis*, *Granulocystis*, *Granulocystopsis* or of other genera of the family *Oocystaceae*. In the plankton of the small fish-pond Stávek II the species *G. coronata* (for a survey of morphological variation, see HINDÁK 1980) was present at the same time.

***Micractinium parvum* HINDÁK, sp. nova**

Fig. 4 : 7, 5

! Syn.: *Lagerheimia chodatii* BERN. sensu KOMÁREK Acta Sci. Nat. Mus. Bohem. Merid. 14, p. 168, fig. 18, 1974.

Cellulae libere natantes, singulae aut 2—4—(8)-cellulares colonias formantes, sphaericae, sphaerice ovals usque sphaerice tetraedricae, 3—6 μm . Spinae 4, raro 1—3, rectae, in tetraedros, 10—25 μm longae. Membrana cellularis hyalina, sine tegumento gelatinoso. Chromatophorum parietale, cum pyrenoide. Propagatio 4, raro 2 vel 8 autosporis; autosporae e membrana divisione in partes 4 (vel 2?) liberantur.

Habitatio: In plancto lacus inundavus apud flumen Moravia in Bratislava-Devín, Slovacia occidentalis.

Iconotypus: Figura nostra 5: 1,2 (i).

Cells singular or in the process of reproduction forming 2—4—8-celled colonies, free-floating, spherical, spherico-oval to slightly tetrahedral, 3—6 μm in diameter, on the surface with 4 tetrahedrally arranged spines (number of spines less frequently 1—3) that are hyaline, gradually attenuating toward the ends, 10—25 μm long. Cell wall hyaline, smooth, without mucilage. Chloroplast cup-shaped with one basal pyrenoid. Reproduction by 2—4—8 autospores released by the rupture of the mother cell wall usually in 4 parts.

Occurrence: In the plankton of the inundation gravel-pit lake at the river Morava at Devín, Bratislava, Western Slovakia (according to Komárek in the South-Bohemia fish-ponds sub *Lagerheimia chodatii* Bern.?).

Micractinium parvum stands closest to the species *M. pusillum* FRES., from which it differs, as a rule, by singularly living cells of usually smaller dimensions (most often 4—5 μm) and of 4 tetrahedrally arranged spines. To demonstrate the difference between these two species our observations are presented of the species *M. pusillum* from the small fish-pond Stávek III at Stupava near Bratislava (Fig. 5 : 7—9). Cells with the species *M. pusillum*

Fig. 4. — 1—3. *Lagerheimia chodatii* BERN. (1, 2, after G. M. SMITH 1926 from FOTT 1948; 3, after SVIRENKO from KORŠÍKOV 1948). 4—6. *Lagerheimia tetraedrica* ROLL (4, 5, after FOTT 1948 as *L. tetraedriensis* ROLL; 6, after ROLL from KORŠÍKOV 1953). 7. *Micractinium parvum* HIND. (after KOMÁREK 1974 as *Lagerheimia chodatii* BERN.). 8. *Coenochloris planctonica* (W. et G. S. WEST) HIND. (after W. et G. S. WEST from Lemmermann 1915).

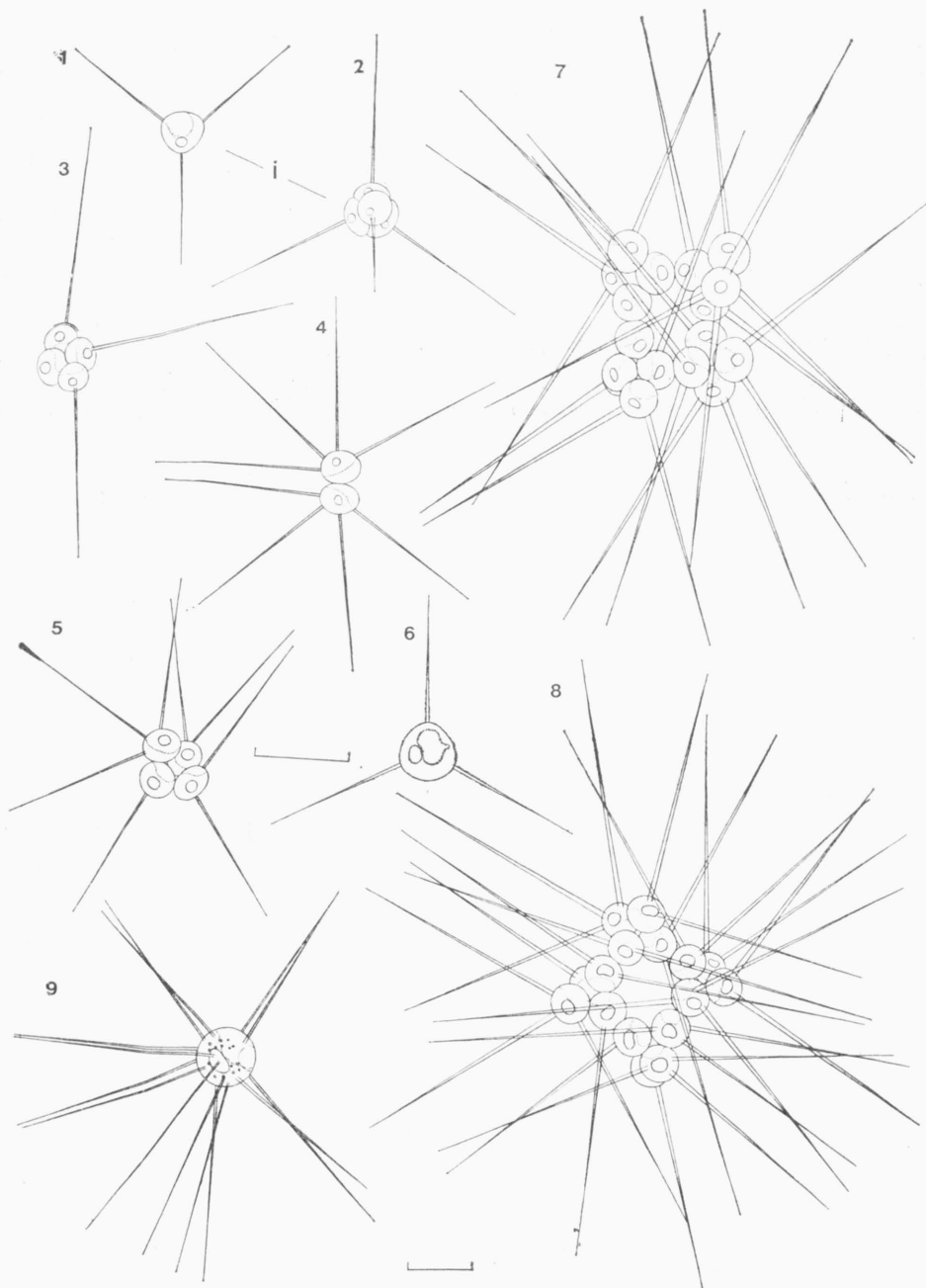


Fig. 5. — 1–5. *Micractinium parvum* HIND., specimens from the inundation lakes in Bratislava-Devín; i — iconotype. 7–9. *Micractinium pusillum* FRES., specimens from the small fish-pond Stávek III at Stupava near Bratislava. Scale: 10 μ m.

are usually larger in the plankton of our waters (6–10 μm in diam., sporadically even more) and have a larger number of spines, up to 30–40 in solitarily living cells (see also HINDÁK 1980 where the genus *Micractinium* is dealt with in more detail). Colonies of 16 cells are rather frequent in *M. pusillum*, while in *M. parvum*, they are usually 4-celled, only sporadically 8-celled.

The cell shape in *M. parvum* is spherical, often slightly tetrahedral, reminiscent of the species *Lagerheimia tetraedriensis* ROLL (Fig. 4 : 4–6). The spines in *M. parvum*, however, are not widened at the base, as in *L. tetraedriensis* and *L. chodatii* (Fig. 4 : 1–3). KOMÁREK (1974) reports *L. chodatii* from South-Bohemian fish-ponds (Fig. 4 : 7) but the specimens depicted had spines without a distinct tubercule at the base so that they do not tally with the original diagnosis for *L. chodatii*. KOMÁREK's data are in good agreement with our investigated material of the species *M. parvum* both as to cell shape and dimensions and the number, shape and arrangement of spines on the surface of cells.

In the species of the genus *Micractinium*, the number of spines and their arrangement depend, to a certain degree, on whether the autospores get detached from one another following release from the mother cell wall or continue to be connected, thus forming a colony. In *M. parvum* solitary cells usually have 4 tetrahedrally arranged spines and often also a spherical-tetrahedral shape (Fig. 5 : 1, 2, 6). Cells in the colony, in contrast, are spherically oval, having 1–4 spines at the free- (outward) side of cells, as in other species of the genus (see also HINDÁK 1980). In the process of autospore release the mother wall is torn open, by growth, into 4 portions, each portion having one spine (Fig. 5 : 3). The number of autospores is most frequently 4, less often 8, only sporadically do two cells occur side by side; this, of course, may possibly be also a remnant from the original 4-celled colony.

SÚHRN

Opisujú sa tri nové druhy zelených rias (*Chlorophyceae*) patriace do radu *Tetrasporales* (*Chlamydocapsa mucifera* HIND.) a *Chlorococcales* (*Granulocystopsis calyptata* HIND., *Micractinium parvum* HIND.). Diskutuje sa taxonomická pozícia týchto rias a variabilita významných morfológických znakov.

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