

Asterocapsa aerophytica (Cyanobacteria, Chroococcales), a new species from the Triglav National Park (Julian Alps, Slovenia)

BY FILIP LEDERER

University of West Bohemia, Department of Biology, Plzeň, Czech Republic

With 3 figures in the text

Abstract: A new species of the genus *Asterocapsa* CHU 1952 (Cyanobacteria, Chroococcales), *Asterocapsa aerophytica* is described from mountainous aerophytic habitats in central Europe, from the Julian Alps (Triglav National Park) in Slovenia. This species conforms to the description of the genus *Asterocapsa* given by Chu (1952) and later revised by KOMÁREK (1993). This species is the first of genus *Asterocapsa* to be described in Europe.

Key words: Cyanobacteria, Cyanoprokaryota, new species, *Asterocapsa aerophytica*, Julian Alps, Slovenia, aerophytic species

Introduction

The Chroococcales are the most diverse among the other orders of cyanobacteria. Their complicated life cycles, process of division (KOVÁČIK 1988, KOMÁREK & ANAGNOSTIDIS 1986) have been subjected to extensive studies. New approaches to the taxonomy of cyanobacteria resulted in a new system (KOMÁREK & ANAGNOSTIDIS 1998) based primarily on type of propagation.

The genus *Asterocapsa* CHU 1952 has recently been revised by KOMÁREK (1993). So far, all species described are non-European (KOMÁREK & ANAGNOSTIDIS 1998), most of these from China (CHU et al., ed., 1991) – *Asterocapsa atrata* LIANG 1987, *A. changbaishanensis* WANG 1985, *A. fujianica* LIANG 1985, *A. gloeotheceformis* CHU 1952, *A. hyalina* CHU 1958, *A. longipapilla* CHU 1985, *A. purpurea* WANG 1986, *A. sinica* LIANG et CHEN 1985 and *A. trochiscioides* (JAO) CHU 1952. Two species described are from the Himalayas (KOMÁREK 1993) – *A. badia* KOMÁREK 1993, *A. masayuki-watanabei* KOMÁREK 1993, two species from Porto Rico (KOMÁREK 1993) – *A. pulchra* (GARDNER) KOMÁREK 1993, *A. magnifica* (GARDNER) KOMÁREK 1993 and one species from Mexico (KOMÁREK 1993) – *A. divina* KOMÁREK 1993. Several species are unrevised (KOMÁREK & ANAGNOSTIDIS 1998). The type we describe here corresponds to the characteristics of the genus *Asterocapsa*, but not to any of the species as yet described.

Material and methods

Localities: Samples were taken at the Triglav National Park (Julian Alps, Slovenia) during a botanical excursion of the University of West Bohemia in June 1997 from aerophytic biotopes – from the bark of *Pinus mugo*. The described species was discovered in samples taken from the mountain Jalovec (altitude 2645 m), above the bus parking area Dom v Tamariu (altitude 1400 m) and at the foot of mountain Triglav.

Sampling: All samples were taken and observed live under a light microscope (Meopta – CZ), microphotography was done with a microscope Amplival (ZEISS, D). Samples were preserved dry and unfixed in paper packets.

Results and discussion

Asterocapsa aerophytica sp. nova

(Fig. 1)

Diagnosis: Cellulae rare solitariae, plerumque in coloniis microscopicis, rare macroscopicis. Coloniae multicellulares (2-60 utque maior numerus cellulorum), irregulare globulares, cum capsula mucosa robusta, discolor usque ad fuscorubra, cum superficie verrucoso. Cellulae irregulare ovaes ad globulares, 3,5-5 (8) μm diam., azureo-virides, saepe excidentes de capsula rupta.

Divisio cellularum irregulariter in planitiis multis, rare nanocytogenesis in numero 4-8 in capsula mucosa commune, nanocyta irregulare globosa, 1-2 μm diam.

Observata stadia tuta describentur – status arthrocytosus, status nanocytosus et status familiaris.

Iconotypus: Figura nostra 1.

Habitatio: mons Jalovec, Alpinum Julianum (Slovinia), epiphytice in *Trentepohlia* cf. *uncinata* et *Pinus mugo*.

Etymologia: aerophytica – nomen deductum a localisatione.

Description: The cells are rarely single, more often in microscopic, rarely macroscopic colonies. A multicellular colony (with 2-60 or even more cells) is irregularly spherical with a strong mucous envelope, from colorless to red-brown and granular on the surface. The cells are irregularly oval to spherical, 3,5-5 (8) μm in diameter, blue-green, often escape from the colony after breaking through the mucilage envelopment.

Cell division irregularly in several planes, seldom forming 4-8 nanocytes in a common mucilage; nanocytes are irregularly spherical, 1-2 μm in diameter. All the following described stages (KOMÁREK 1993) were observed - status arthrocytosus, status nanocytosus and status familiaris.

Comments

Asterocapsa aerophytica sp. nova (Figs 1, 2) is the first species of the genus *Asterocapsa* to be discovered in Europe. It was found only in aerophytic habitats, mainly epiphytically on green filamentous alga *Trentepohlia* cf. *uncinata*, which forms thick macroscopic cotton wool-like growths from golden-yellow to yellowish green color on *Pinus mugo*. *Asterocapsa aerophytica* was found also, but only seldom directly on the bark of the pine. This species commonly occurs in Triglav National Park at a height of over 1000 m above sea level.

All studied and mentioned material was collected in June and this material contained all presented stages together. In the samples, all the stages of the life cycle, described by KOMÁREK (1993) and KOMÁREK & ANAGNOSTIDIS (1998) were observed pertaining to the genus *Asterocapsa*, but as a basis for observation the supposition was made that the life cycle differs in some aspects (Fig.3). In most cases, the "occasional" status (after KOMÁREK 1993, see Fig.3) was observed in collected material – cells formed from one to many celled spherical colonies (Figs 1: f, h; 2: 11, 12, 13, 14, 20, 21), which turned into status familiaris (see Fig. 3, Figs 1: g; 2: 18, 19). These colonies gave the origin of status arthrocytosus (Figs 1: a-d; 2: 1-9). The "occasional" status represented the main vegetative stages of *Asterocapsa aerophytica*. Status nanocytosus was observed too. The formation of nanocytes was observed in cells originating from disintegrated colony, but these cells do not necessarily form nanocytes, more often create a new colony.

Our described and documented life cycle eliminates confusion with the genus *Gloeocapsa* KÜTZING 1843, because typical gloeocapsoid stages with spherical cells dividing regularly in three perpendicular planes (GOLUBIC 1967) never originated during the whole life cycle.

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The author's address:

Filip Lederer, Ph.D.,

University of West Bohemia,

Department of Biology,

Klatovská 51,

CZ-320 13 Plzeň, Czech Republic.

E-mail: Flederer@kbi.zcu.cz

Figure legends

Fig. 1. *Asterocapsa aerophytica* (from Jalovec Mt., Julian Alps, Slovenia, leg. 5. VI. 1997):
a, b, c, d – unicells, two and few-celled colonies, e – liberation of a cell from the envelope, f, g – large colonies (status familiaris), h – young unicells and few-celled colonies and nanocytes epiphytically on green filamentous alga, i – nanocyte formation

Fig. 2. *Asterocapsa aerophytica* (from Jalovec Mt., Julian Alps, Slovenia, leg. 5. VI. 1997):
1-9 – unicells, two and few-celled colonies, 10-13 – large colonies of different age, 14, 20, 21 – young unicells, few-celled and large colonies on green filamentous alga *Trentepohlia* cf. *uncinata*, 15, 16 – nanocyte formation, 17 – liberation of a cell from the envelope, 18, 19 – old large colonies with colored envelope (status familiaris before disintegration)
[scalebar = 10 μm]

Fig. 3. Scheme of the life cycle of *Asterocapsa aerophytica*.

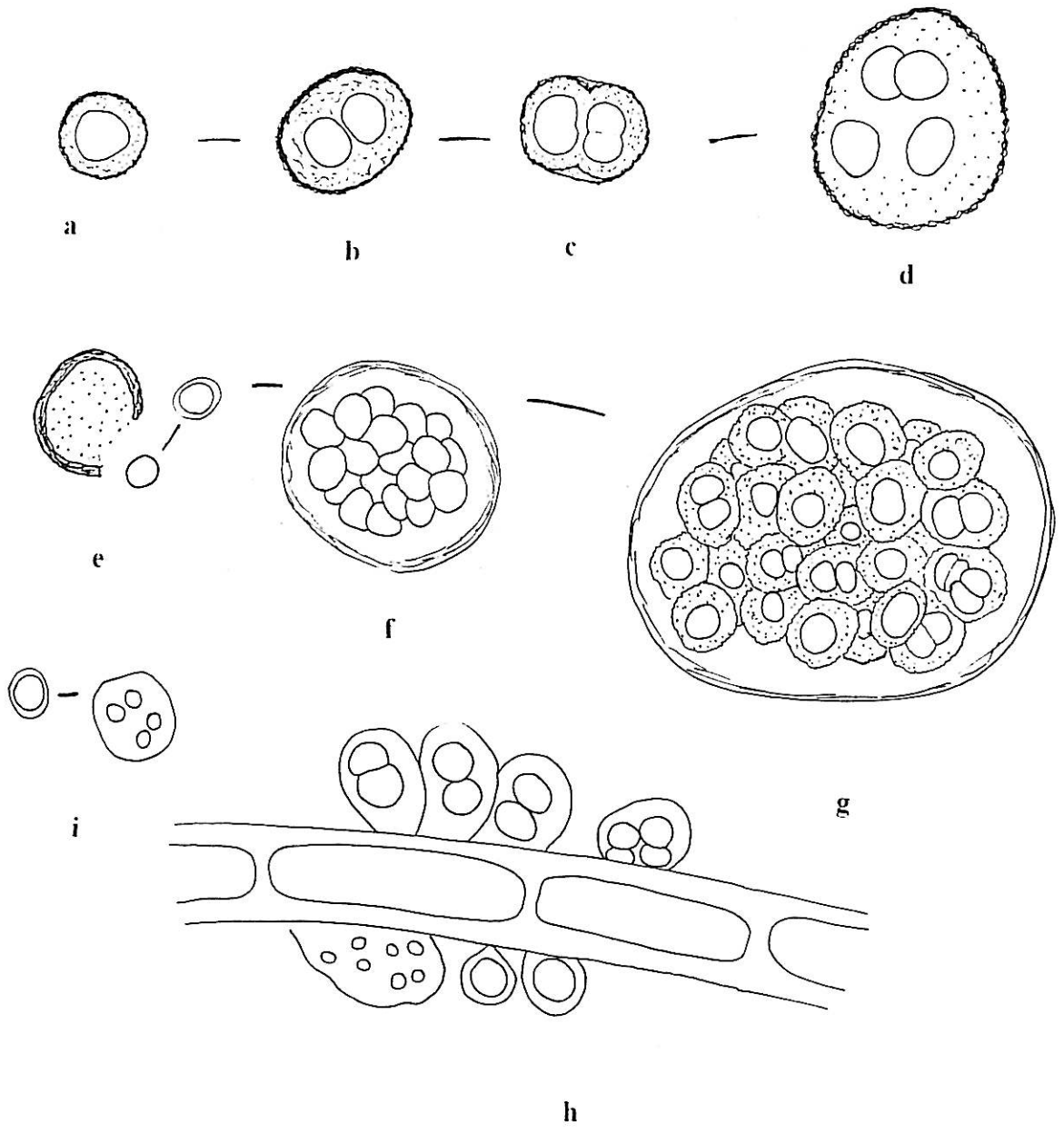
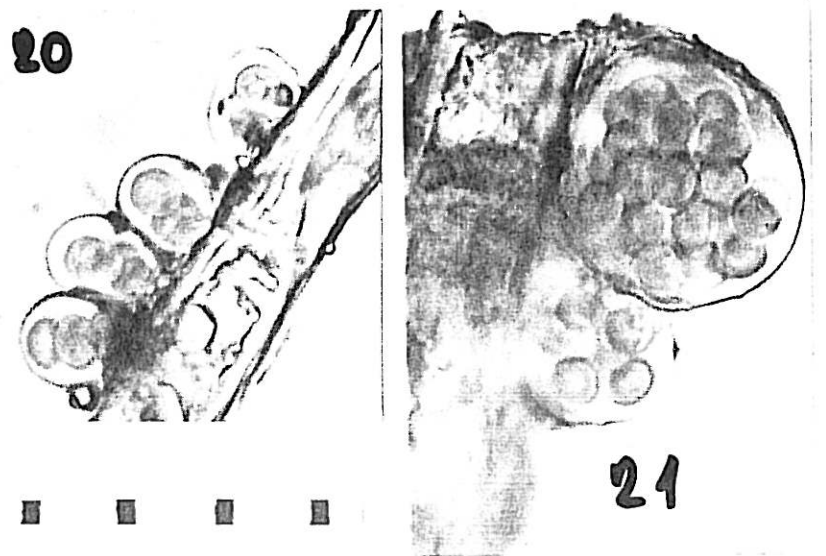
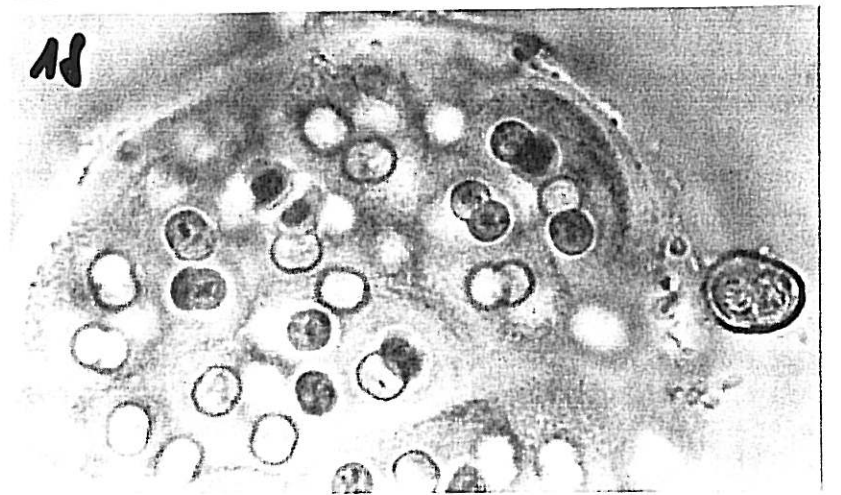
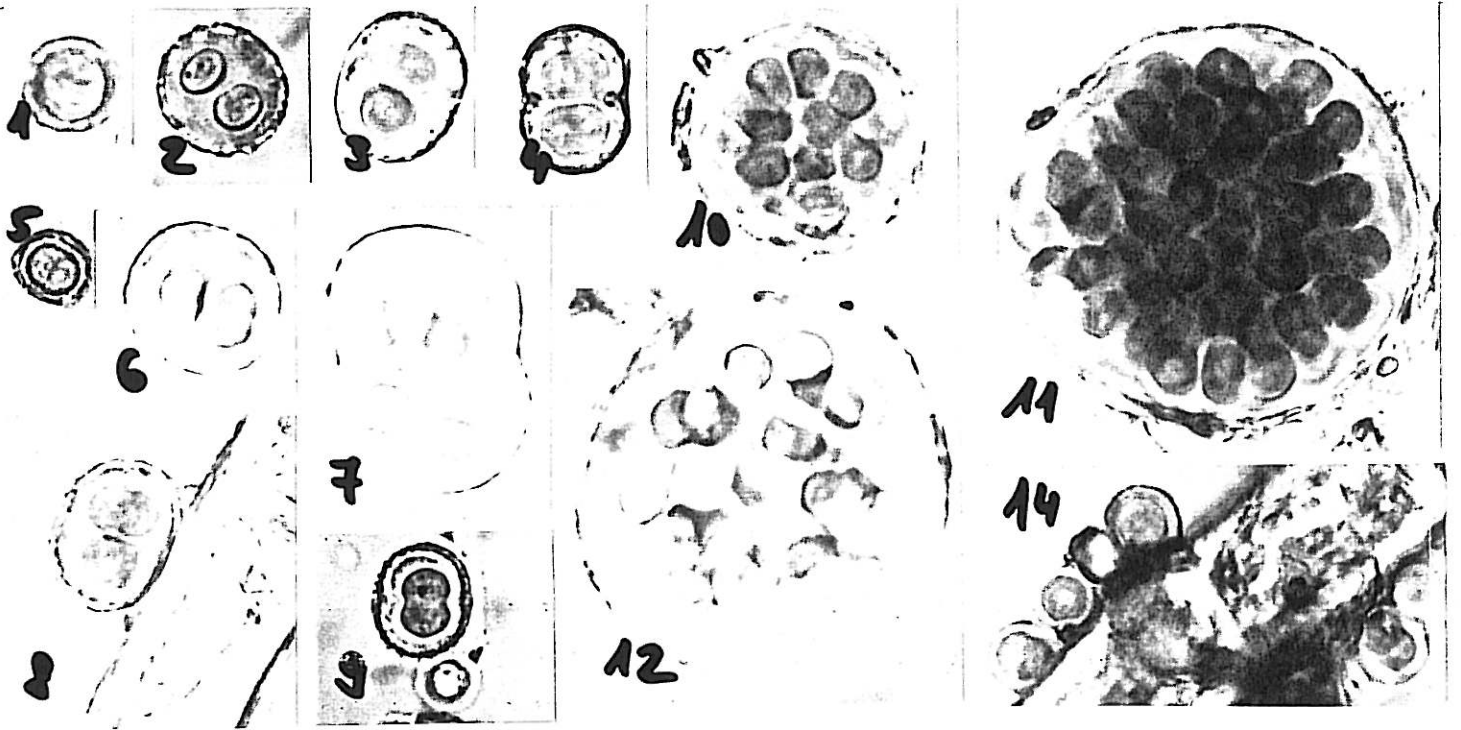


Fig. 1.



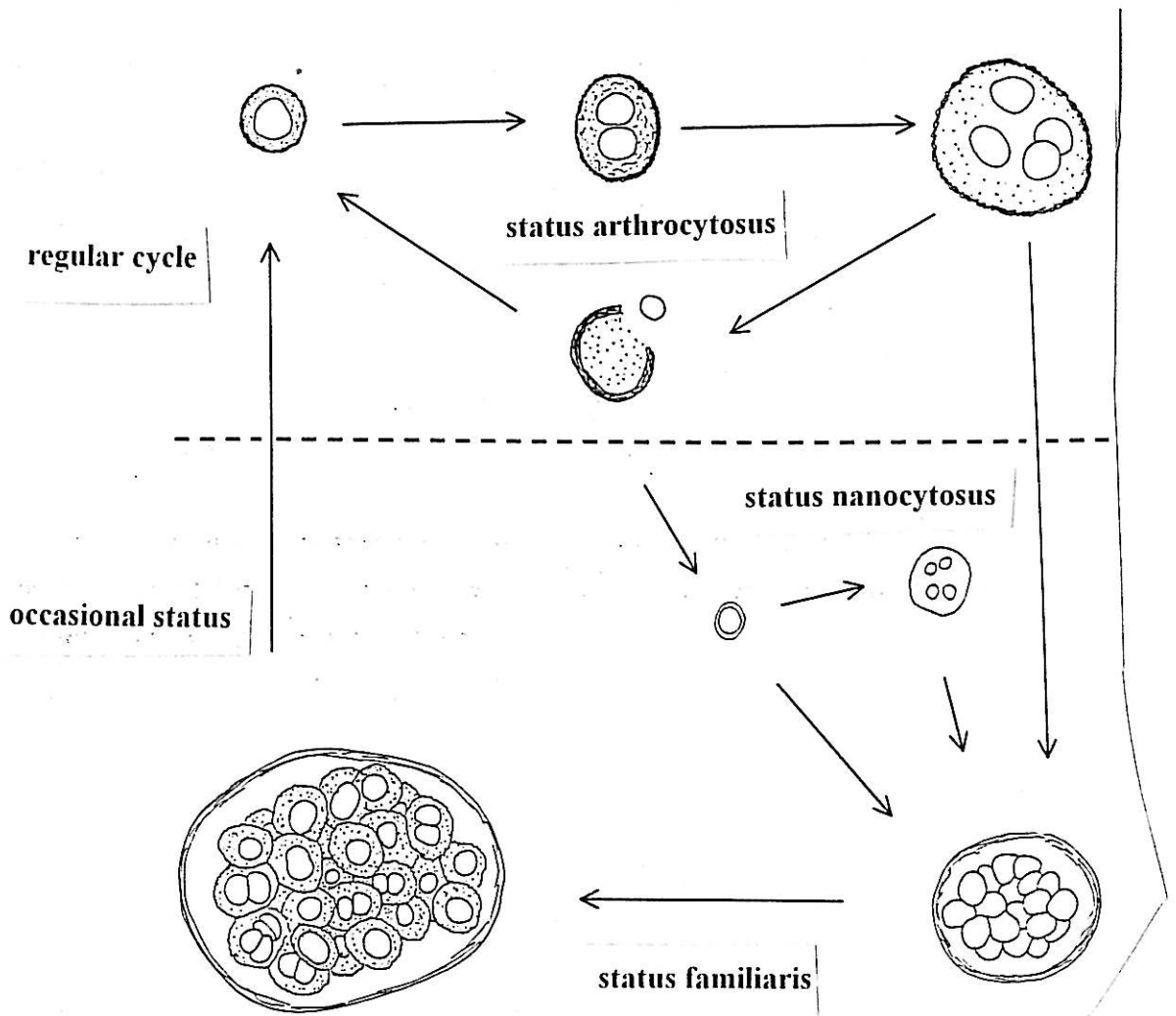


Fig. 3