

CYANOBACTERIA FROM TWO PREHISTORIC CAVES OF INDIA

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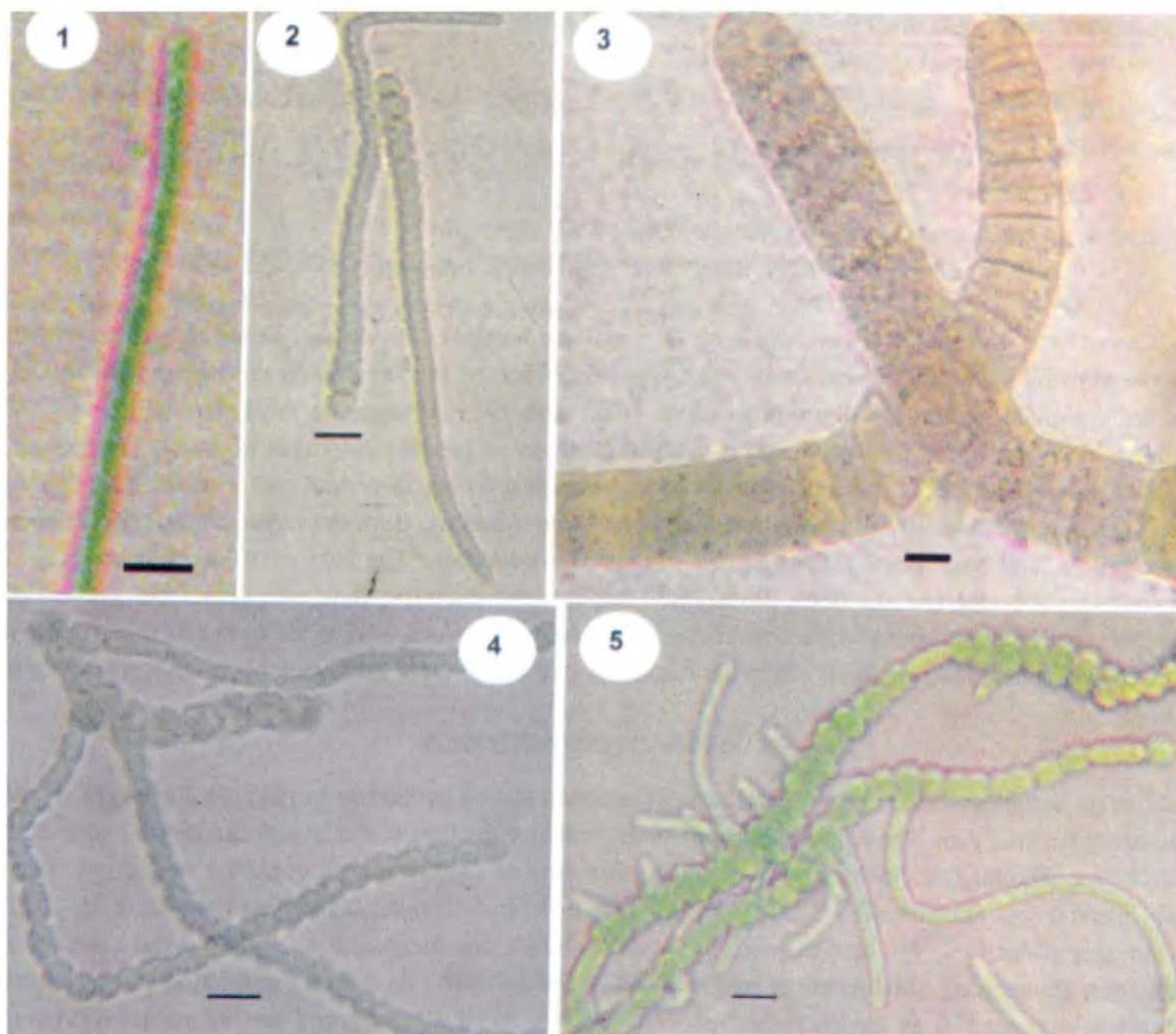
Caves are generally considered to be aphotic habitat. However, several photosynthetic microorganisms including cyanobacteria are frequently observed in many caves through out the world, and are dominant in the less illuminated zones (Hofmann 1989, Pantazidou 1998, Dor & Dor 1999). Nothing is known about the composition of cyanobacteria in pre-historic caves of India. The present paper reports epilithic and chasmoendolithic cyanobacteria growing in natural and / or artificial lighted parts of Kotumsar cave (Chattisgarh) and Gupteswar cave (Orissa). Both the caves are terrestrial, open to the public, and bear a rich stalactitic and stalagmitic decoration. The later cave has been developed for tourism; the interior has been illuminated for visiting purpose, thus encourage the growth of blackish crust of phototrophic microorganisms. Samples were collected from the cave entrance, twilight zone and darkened zone of these caves for occurrence of micro-algal and cyanobacterial forms, if any.

MATERIALS AND METHODS

Crusts samples were scraped using sterile scalpel, stored in Tarson bottles, and brought to the laboratory for analysis. These crusts sample were wetted with sterile water and examined under light microscope. Within few hour of wetting, living filament of cyanobacteria could be visualized. Each crust material was transferred to BG-11 medium with or without combined nitrogen (Rippka & al. 1979) and to agar plates (1% w/v agar-agar in the same medium), and incubated at $25\pm 1^{\circ}\text{C}$ under continuous light from flourescent tube at an intensity of 7.5 W/m^2 up to 60 days to identification purpose. The organisms appeared in an enriched culture were morpho metrically analyzed and identified following Desikachary (1959). Microphotographs were taken in a MELJI ML-TH-05 trinocular microscope using Nikon coolpix camera. Voucher number was assigned to each sample together with date of collection and deposited at the Department of Botany, Utkal University

RESULTS AND DISCUSSION

Five species of cyanobacteria were isolated from the crusts sample collected from Gupteswar and Kotumsar caves. Of these, *Calothrix marchia* and *Fischerella tenius* were isolated from the sample collected from darkned zone on the stalagmitic formations of Kotumsar cave. In Gupteswar cave also a branched cyanobacteria under stigonematales, *Westiellopsis prolifica* was isolated from the darkened zone. In the entrance of the same cave *Phormidium retzii* formed a bluish green crusts in twilight zone. The species was prominently growing inside the cave which received artificial illuminated from



Plate, 1, Fig. 1-4 : 1. *Phormidium retzii* (Ag.) Gom; 2. *Calothrix marchia* Lemm.
3. *Scytonema coactile* (Mont.) ex Born. et Flah; 4. *Fischerella tenius* (Marten.) Forti;
5. *Westiellopsis prolifica* Janet.

sodium lamp, whereas *Scytonema coactile* occurs as a crust of the wall of cave entrance in the lightened zone. Detail systematic enumeration of these organisms is presented below.

1. *Phormidium retzii* (Ag.) Gom. (Pl. 1, fig. 1).

Desikachary, T.V. 1959, p. 268, pl. 44, fig. 13.

Thallus blue-green, filament less straight, not attenuated at the ends, cells 4 - 9 μ m long, 4.5 - 12 μ m broad; sheath thin; calyptra absent.

Crust on the wall in the twilight zone at cave entrance; collection site: Gupteswar cave, Koraput, Orissa (Voucher no. 250, Date: 22-05-2004).

2. **Calothrix marchia** Lemm. (Pl. 1, fig. 2).

Desikachary, T.V. 1959, p. 543, pl. 114, fig. 4.

Filament slightly bent, single, 5–6 μm broad with a close thin colourless sheath; trichome blue green, distinctly constricted cross walls at the base, 4–5 μm broad; cells nearly as long as broad; heterocyst single, hemispherical, 5.5–6.6 μm broad; end cell conical.

Crust on wall in the darkened zone; collection site: Kotumsar, cave, Chattisgarh (Voucher No. 249, Date: 29-04-2003).

3. **Scytonema coactile** (Mont.) ex Born. & Flah. (Pl. 1, fig. 3).

Desikachary, T.V. 1959, p. 455, pl. 90, fig. 2.

Thallus brownish; filament 10–18 μm broad, false branches long, erect; sheath thin, cell shorter than broad, 10–13.2 μm length, 16.5–19.8 μm broad; quadrate heterocyst, yellowish, 12–16.5 μm length and 11.8–16.5 μm broad.

Crust on all in the lighted zone at cave entrance; collection site: collection site: Gupteswar cave, Koraput, Orissa (Voucher no. 250, Date: 22-05-2004).

4. **Fischerella tenuis** (Marten.) Forti (Pl. 1, fig. 4).

Desikachary, T.V. 1959, p. 602,

Thallus greenish, spongy, filamentous, heterocystous and branched, cells rectangular, 2.5–7.5 μm broad, 5–12.5 μm long; heterocyst oval or cylindrical, 2.5–6.3 μm broad, 7.5–15 μm long.

Crust on wall in the darkened zone; collection site: Kotumswar cave, Chattisgarh (Voucher no. 249, Date: 29-04-2003).

5. **Westiellopsis prolifica** Janet (Pl. 1, fig. 5).

Desikachary, T.V. 1959, p. 596, pl. 131, fig. 4.

Thallus bluish green, spongy; one side branching, short rectangular cells, thinner than main filament; cells spherical to elliptical in main filament, 3.9–5.6 μm broad, 5.2–6.9 μm long; heterocyst intercalary, 4.4–5.6 μm broad, 6.5–7.5 μm long.

Crust on the wall of the darkened zone; collection site: Gupteswar cave, Koraput, Orissa (Voucher no. 251, Date: 22-05-2004).

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