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Research Article

SOME NEW RECORDS OF THE SPECIES OF THE GENERA *APHANOTHECE* NAG *AND MERISMOPEDIA* MEYEN FROM HOOGHLY DISTRICT, WEST BENGAL, INDIA

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ABSTRACT
The present communication dealt with morpho-taxonomic enumeration of 8 taxa that includes 2 genera *Aphanothece* Nag. and *Merismopedia* Meyen and six species of family Chroococcaceae under the order Chroococcales of Cyanophyta for the first time from Hooghly district, West Bengal, India. The species are *Aphanothece pallida* **(**Kutz.**)** Rabenh., *Aphanothece saxicola* Nag., *Aphanothece microscopica* Nag, *Aphanothece castagnei* **(**Breb.) Rabenh., *Aphanothece stagnina* (Spreng.) A. Br., *Aphanothece nageli* Wartm., *Merismopedia convoluta* Bréb., *Merismopedia punctata* Meyen. One species *Aphanothece saxicola* Nag. is new report from West Bengal.

Key Words: *Freshwater, Cyanophyta, Chroococcaceae, Hooghly District, West Bengal*

INTRODUCTION
Hooghly district (N.latitude 20°30'32″- 23°1'20″ & E. longitude 87°30'20″ – 80°30'15″) is a central district of the state West Bengal in India and is pre-dominantly occupied a land of the Gangetic alluvial soil. This district is *C*a 40 km away from Kolkata and situated on the West bank of the river Ganga. The total area of this district is 3137.55 sq km.

The Altitude of this district is lower with no place having more than an elevation of 200 meter and land type is generally flat. This district is enriched with different types of aquatic ecosystems viz. rivers, ponds, moats, flood plain wetlands etc.

Blue green algae are able to grow in diverse aquatic ecosystems. Tropical climatic conditions accelerate their luxuriant growth. Earlier works of Bruhl and Biswas (1922), Biswas (26), Banerjee (36, 38), Gupta (65, 75), Laloraya and Mitra (74a), Sinha and Mukherjee (75), Mukhopadhya and Chaterjee (81), Pal and Santra (82, 85). Maity and Santra (85), Mitra and Gupta (94), Sen and Gupta (93), Sen (2006), Roy *et al.*, (2012), Barinova *et al.,* (2012) on blue green algae from West Bengal may be mentioned. All the works done so far from different parts of the state except Hooghly district.

From this view, an attempt has been made to explore and enumerate the blue green algal species of the said district.

MATERIALS AND METHODS
Study Area
The study area include pond water of different places of Hooghly district like Khamargachi, Diara, Guptipara, Tribeni, Bansberiai, Mogra, Goghat II and Kamarkundu (Figure 1).

Collection of algal sample
Algal samples were collected in sterilized plastics and glass containers from different places of the Hooghly district.

Detailed study was made by examining specimens under Olympus microscope (Model-CH20i) for identification of species. Samples were preserved in 4% formalin. Identifications of different taxa were accomplished with the help of authentic literatures (Geitler, 1932; Desikachary, 1959).

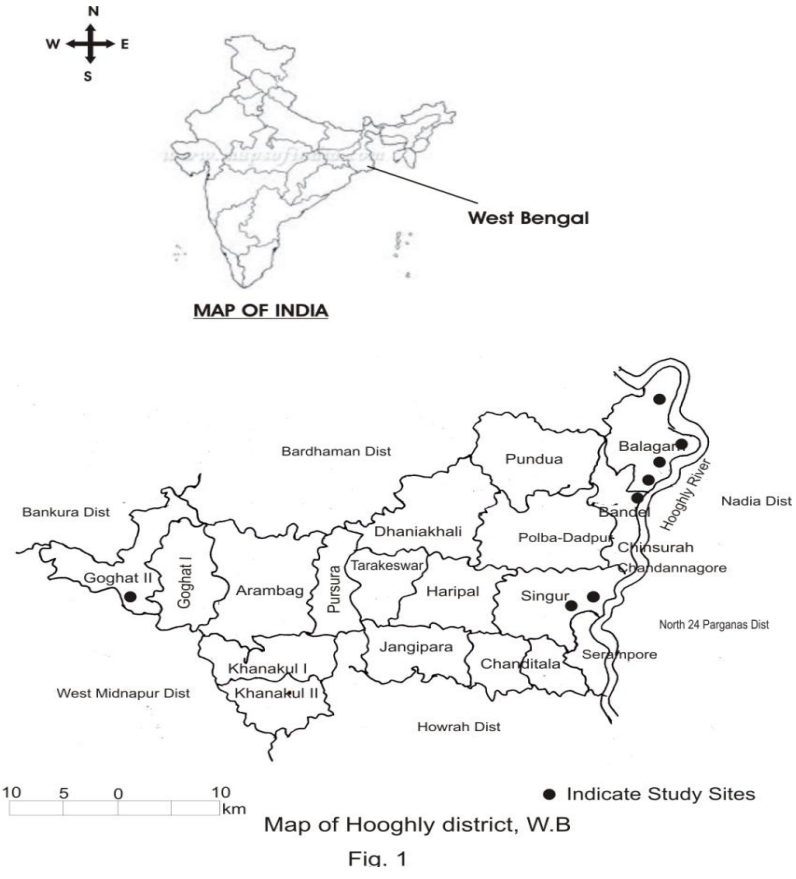

Fig. 1

RESULTS AND DISCUSSION

A total number of **8** blue green taxa namely *Aphanothece pallida* **(**Kütz.**)** Rabenh., *Aphanothece saxicola* Näg., *Aphanothece microscopica* Näg, *Aphanothece castagnei* **(**Bréb.) Rabenh., *Aphanothece stagnina* (Spreng.) A.Br., *Aphanothece nageli* Wartm., *Merismopedia convoluta* Bréb., *Merismopedia punctata* Meyen belonging to family Chroococcaceae, of the order Chroococcales under Cyanophyta have been described with ecological note and significance for the first time from Hooghly district, West Bengal. Each currently accepted name has been provided with its author(s)'name. Asterisk mark (*) indicates new record from West Bengal. All parameters in ecological notes are expressed in mg/l. except pH and temperature.

Morphotaxonomic Description

Key to genera

1a. Cells without any definite arrangement and ellipsoid to sub-cylindrical with rounded ends; colonies macroscopic---------- 1. *Aphanothece*

b. Cells arranged in definite transverse and longitudinal rows; colonies flat and microscopic---------- ---------- 2. *Merismopedia*

Genus: 1. *Aphanothece* Näg.

Key to species

1a. Colony firm, gelatinous, spherical or hemispherical; cells 3-6.5µ broad --5. *Aphanothece stagnina*

b. Colony mucilaginous, expanded and amorphous---------- (**2)**

2a. Cells up to 2.0- 2.5µ ---------- 2. *A. saxicola*

b. Cells broader---------- (**3)**

3a. Cells granulated, longer and of various sizes---------- 4. *A. castagnei*

b. Cells not granulated---------- (**4)**

4a. Sheath diffluent in the inner part but very distinct in the peripheral part of the colony---------- ---------- 1. *A. pallida*
b. Sheath not very distinct in the peripheral part of colony---------- (**5)**
5a. Colony sub-aerial; cells 3.5-4.5µ broad---------- 6. *A. nageli*
b.Colony submerged; Cells 4- 6.0µ broad; cell wall thick---------- 3. *A.microscopica*

Order : Chroococcales
Family : Chroococcaceae
Genus : *Aphanothece* Näg.
1.*Aphanothece pallida* **(**Kütz.**)** Rabenh., (**Plate 1, Figure 1; Plate 2, Figure 1**) in Fl. Eur. Alg. 2 : 64, 1865.
Krypto.Fl. Sachsen, 1: 76, 1863.
Forti in De Toni, Sylloge Algarum 5: 83, 1907.
Frémy, Myxo. d' Afr. équat. franc. 29, fg.31, 1929.
Geitler, Kryptogamenflora 171, fg.78, 1932.
Desikachary, Cyanophyta 140. plate 22. figure 3. 1959.
Description: Colony slight blackish or brown, expanded, gelatinous; cells oblong, elliptical or cylindrical; 14-16.0µ long and 7-9.0µ broad with sheath; 6.5-10.0µ long and 6.5µ broad without the sheath; cell content blue green or olive green; sheath diffluent in the inner part but very distinct in the peripheral part of the colony.
Habitat: Free floating in pond at Diara.
Collection No: 1232
Date: 29.08.12
Ecological Notes: Free floating, brown, mucilaginous; Diara, at water temperature: 31ºC; pH: 7.6; $N0_3$-N0: 0.42; $P0_4$: 0.46; D.0: 7.6; B.0.D: 7.2; $S0_4$: 7.0
Significance: Primary producer and a component of food chain in aquatic habitat.
***2.** *Aphanothece saxicola* Nag. (**Plate1, Figure 2; Plate 2, Figure 2**)
Gatt.einzell. Algen 60, 1849.
Forti in De Toni, Sylloge Algarum 5: 81, 1907.
Frémy, Myxo. d' Afr. équat. franc. 28, fg.28, 1929.
Geitler, Kryptogamenflora 169, 1932.
Desikachary, Cyanophyta 138. Plate 22. figure 11, 1959.
Description: Colony light blue green, mucilaginous, expanded with many minute cells; cells without individual sheath; 4-6.0µ long and up to 2-2.5µ broad; individual cells cylindrical with rounded ends, loosely arranged within amorphous mucilage; cell content homogeneous and pale blue green.
Habitat: Free floating in pond at Tribeni and Bansberia.
Collection No: 690
Date: 26.10.10
Ecological Notes: Free floating, blue green, mucilaginous colony; Tribeni, at water temperature: 28ºC; pH: 8.0; $N0_3$-N0: 0.06; $P0_4$: 0.16; D.0: 9.4; B.0.D: 6.5; C.O.D: 70.
Significance: Primary producer and a component of food chain in aquatic habitat.
3. *Aphanothece microscopica* Nag. (**Plate 1, Figure 5; Plate 2, Figure 6**)
Gatt.einzell. Algen 59, plate1, H, 1849.
Forti in De Toni, Sylloge Algarum 5: 83, 1907.
Frémy, Myxo. d' Afr. équat. franc. 28, fg.30, 1929.
Geitler, Kryptogamenflora 172, fg.79, 1932.
Desikachary, Cyanophyta 142. plate 22. figure 4, 5, 9, 1959.
Description: Colony olive blue green, expanded, gelatinous, soft, amorphous; cells ovate, oblong or cylindrical; 7.5-9.0µ long and 4.5µ broad; cells without the individual sheath; cell wall thick, smooth.

Habitat: Submerged in a pond at Khamargachi.
Collection No: 568
Date: 16.08.09
Ecological Notes: Free floating, submerged, olive blue green, mucilaginous colony; Khamargachi, at water temperature: 30ºC; pH: 7.4; $N0_3$-N0:0.35; $P0_4$: 0.25; D.0:6.8; B.0.D:2.4; Alkalinity: 120; $S0_4$:1.0.
Significance: Primary producer and component of aquatic food chain in freshwater ecosystems.
4. *Aphanothece castagnei* **(**Bréb.) Rabenh. (**Plate 1, Figure 4; Plate 2, Figure 5**)** in Fl. Eur. Alg. 2: 64, 1865.
Geitler, Kryptogamenflora 171, 1932.
Desikachary, Cyanophyta 140. Plate 21. Figure 8, 1959.
Anacystis marginata Menegh. 1837.
Description: Colony gelatinous, without any definite shape, bluish green; cells without individual envelope and with granules; ellipsoid to cylindrical or polygonal, of various size; densely crowded; cells 8.0-9.8µ long and 3.5-7.0µ broad; cell contents without gas vacuoles; sheath diffluent or yellowish.
Habitat: Planktonic in a pond at Khamargachi.
Collection No: 569
Date: 16.08.09
Ecological Notes: Free floating, blue green, mucilaginous colony. Khamargachi, at water temperature: 30ºC; pH: 7.4; $N0_3$-N0:0.35; $P0_4$:0.25; D.0:6.8; B.0.D: 2.4; Alkalinity: 120; $S0_4$:1.0.
Significance: Primary producer and component of aquatic food chain in freshwater ecosystems.
5. *Aphanothece stagnina* (Spreng.)A.Br. (**Plate1, Figure 6; Plate 2, Figure 4**)
in Ranenh., Fl. Eur.Alg. 2: 66, 1865.
Forti in De Toni, Sylloge Algarum 5 :76, 1907.
Frémy, Myxo. d' Afr. équat. franc. 26, fg.26, 1929.
Geitler, Kryptogamenflora 137. Plate 21. Figure 10, 1959.
Desikachary, Cyanophyta 137. Plate 21. Figure 10, 1959.
Anacystis rupestris (Lyngb.) Drouet and Daily.
Description: Colony blue green, gelatinous, spherical to ellipsoidal, often with calcareous crystal inside the colony; cells ovoid or cylindrical with rounded ends; 4.5-11.0µ long and 4.0-6.5µ broad; generally densely arranged; cell content blue green.
Habitat: Pond at Mogra
Collection No: 140
Date: 20.03.06
Ecological Notes: Colonial, spherical, blue green, occurs as free floating balls; Mogra at water temperature: 29ºC; pH: 7.2.0; $N0_3$-N0:0.2; $P0_4$:0.8; D.0:7.2.
Significance: Primary producer and a component of food chain in aquatic habitat.
6. *Aphanothece nageli* Wartm. (**Plate 1, Figure 3; Plate 2, Figure 3**) in Rabenh., Fl.Eur.Alg. 2: 65, 1865.
Forti in De Toni, Sylloge Algarum 5: 77, 1907.
Geitler, Kryptogamenflora 172, 1959.
Desikachary, Cyanophyta 141-42, plate 22. Figure 7, 1959.
Description: Colony gelatinous, yellow brown; cells oval shaped, after cell division spherical; cell content blue green, cells 6.5-8.0µ long and 3.5- 4.5µ broad, sheath diffluent.
Habitat: Pond at Goghat II.
Collection No: 150
Date: 28.03.09
Ecological Notes: Sub-aerial, Colonial, yellow brown; Goghat II, at water temperature: 30ºC; pH: 7.1; $N0_3$-N0: 0.1; $P0_4$: 0.06; D.0: 6.4; B.0.D: 3.4; $S0_4$:6.0
Significance: Primary producer and a component of food chain in aquatic habitat.
Genus: 2. *Merismopedia* Meyen

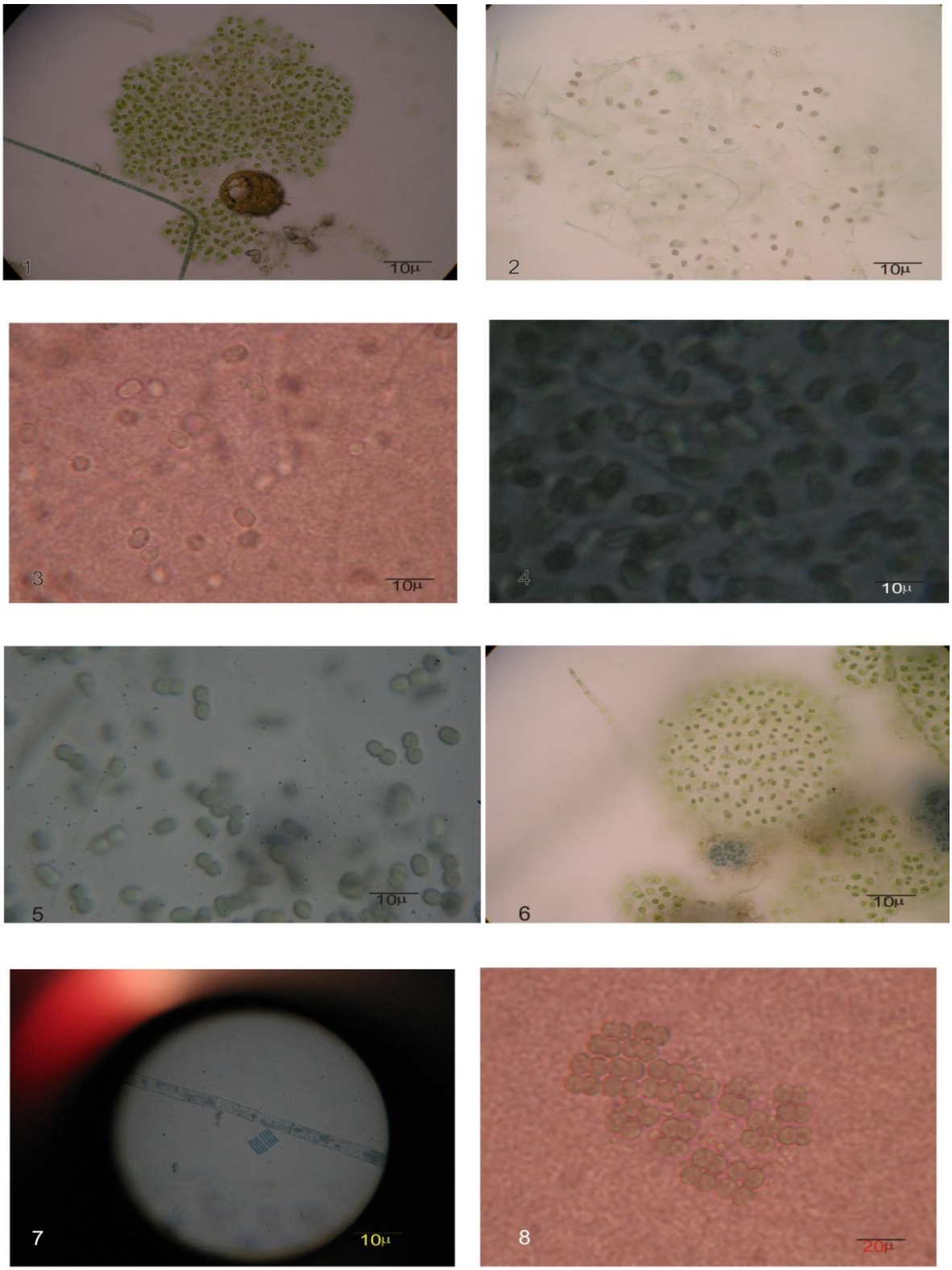

Figure1: Figures 1-8: 1. Aphanothece pallida 2. A. saxicola 3. A. nageli 4. A. castagnei 5. A. microscopica 6. A. stagnina 7. Merismopedia glauca 8. M. punctata

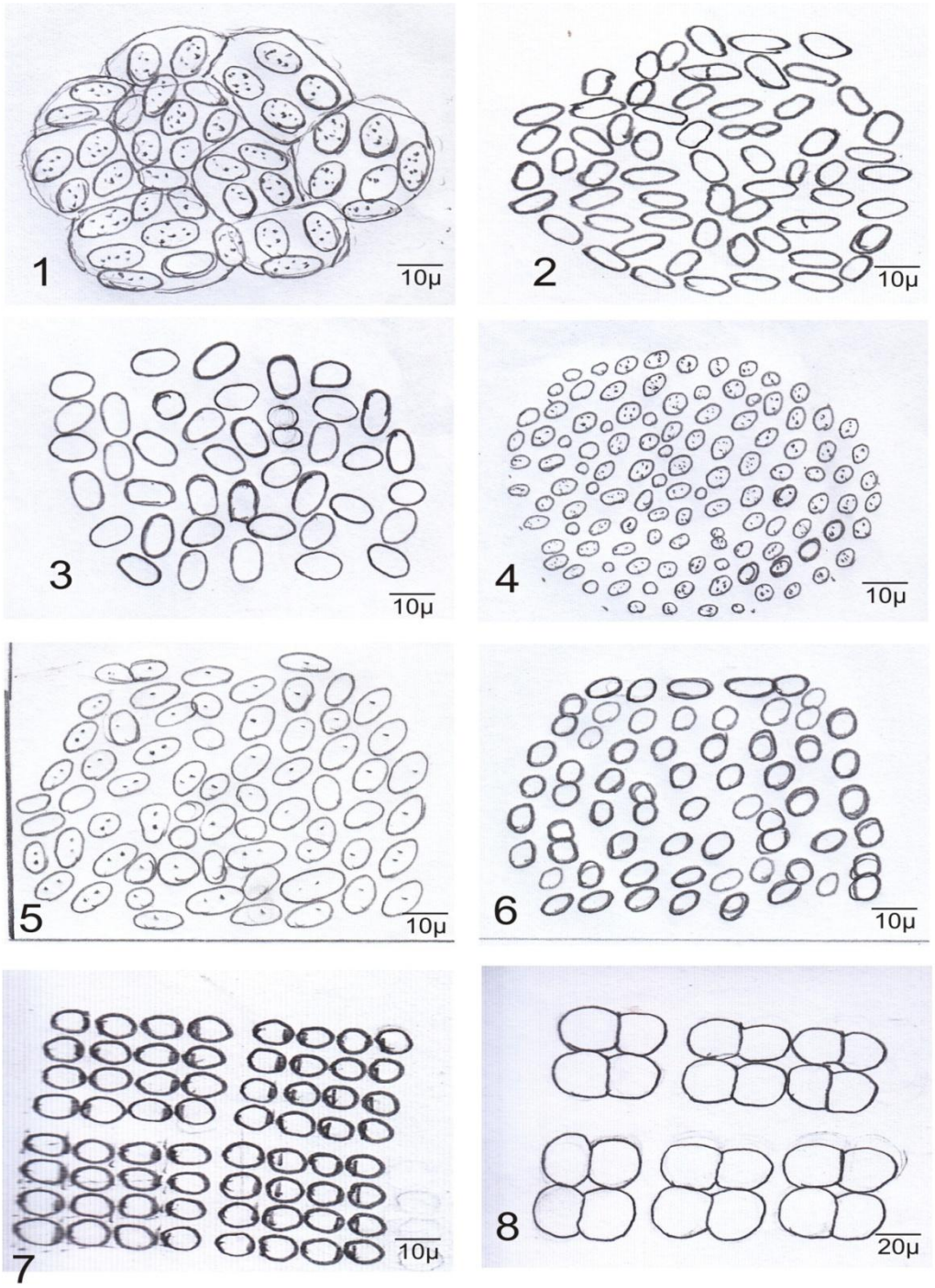

Figure2: Figures 1-8: 1. Aphanothece pallida 2. A. saxicola 3. A. nageli 4. A. stagnina 5. A. castagnei 6. A. microscopica 7. Merismopedia glauca 8. M. punctata

Order: Chroococcales
Family: Chroococcaceae
Genus: *Merismopedia* Meyen
Key to species

1a. Colonies showing convolute margins---------- **1.***Merismopedia glauca*
b. Colonies not showing convolute margins---------- **2.** *M. punctata*

1. *Merismopedia glauca* **(**Ehr.)Nag. (**Plate 1, Figure 7; Plate 2, Figure 7**)
Gatt.einzell. Algen, 55, pl.1D, fg. 1, 1849.
Forti in De Toni, Sylloge Algarum, 5 :105, 1907.
Frémy, Myxo. d' Afr. équat. franc.,13, fg.9, 1929.
Geitler, Kryptogamenflora, 264, fg.129d,1932.
Desikachary, Cyanophyta 155. plate 29. figure 5. 1959.
Description: Plant colonial; colony light blue green, almost rectangular with slightly sinuate-crenate margins and with 16-64-128 cells; colony 50-150.0µ wide; cells oval or hemispherical; side view ellipsoidal; cells regularly and closely arranged in multiple of four to form quadrangular colony; 2.0-3.0µ in diameter; cell content blue green, homogenous, without granules but each cell have distinct centrally located gas vacuole; cell wall smooth and thick.
Habitat: Pond at Guptipara.
Collection No: 429
Date: 01.01.09
Ecological Notes: Planktonic, Guptipara, water temperature: 21ºC; pH: 7.3; $N0_3$-N0:0.12; $P0_4$:0.07; D.0:6.9; B.0.D:3.4
Significance: Primary producer and a component of food chain in aquatic ecosystems.

2. *Merismopedia punctata* Meyen, (**Plate 1, Figure 8; Plate 2, Figure 8**) in Wiegmann, Archiv. 2: 67, 1839.
Kutzing, Tab. Phycologicae, 5: plate 38, figure 5, 1855.
Forti in De Toni, Sylloge Algarum, 5: 106, 1907.
Frémy, Myxo. d' Afr. équat. franc., 12, fg.8, 1929.
Geitler, Kryptogamenflora, 263, fg.129c,1932.
Desikachary, Cyanophyta 155. plate 23. figure 5.& plate 29, figure 6, 1959.
Description: Plant planktonic, colonial, light blue green; colony plate like consisting of 4 individual rectangular sheets each containing 32 cells; cells spherical or oval, loosely arranged in both rows, transversely and longitudinally; cell content homogeneous; each sheet of 32 cells measures 10.0µ long and 5.0µ broad; individual cell 2.0-2.5µ long and 2.5µ broad; individual cell sheath is indistinct.
Habitat: Pond at Kamarkundu.
Collection No: 641
Date: 18.04.10
Ecological Notes: Attached with submerged cement packet, mucilaginous, soft; Kamarkundu, at water temperature: 30ºC; pH: 7.5; $N0_3$-N0:0.4; $P0_4$:0.5; D.0:6.0; B.0.D:4.0
Significance: Primary producer and a component of food chain in aquatic ecosystems.

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