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DIVERSITY OF CYANOPHYCEAE MEMBERS IN AND AROUND AHMEDNAGAR REGION (M.S.)

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Fifty three taxa of fresh water Cyanophyceae were collected from different water bodies in and around Ahmednagar region Maharastra. These taxa belong to nineteen genera viz. *Microcystis, Merismopedia, Dactylococcopsis, Gloecapsa, Chroococcus, Aphanocapsa, Gomphosphaeria, Spirulina, Arthrospira, Oscillatoria, Phormidium, Lyngbya, Anabaenopsis, Cylindrospermum, Nostoc, Anabaena, Nodularia, Aulosira, Gloeotrichia*. All these taxa are being reported for the first time from the given area.

Key words : Ahmednagar region, Cyanophyceae,

Publications on blue-green algae were restricted to Indian paddy fields (Venkataraman 1975, Santra 1983, Anand 1989, Devi *et al.* 1999, Nayak *et al.* 2001) an enumeration of blue-green algae from the present study area is available in a few published papers (Shinde 195, Pingle and Deshmukh 2005, Auti and Pingle 2006). But the fresh water Cyanophycean members from, in and around Ahmednagar region (Pimpalgaon malvi-talav, Dongargan sacred grove stream, and Sina rivber) not have been explored fully. Therefore, present investigation was taken to study the diversity of Cyanophyceae members from, in and around Ahmednagar region.

MATERIALS AND METHODS

Ahmednagar region lies between 73° 41' and 75° 43' east longitude and 18° 20' and 19° 59' north latitude. Algal samples were collected from different localities of water bodies in and around Ahmednagar region, viz. Pimpalgaon malvi-talav, Kapurwadi-talav, Dongargan sacred grove stream water, and Sina river. Collections were made from May 2007 to April 2009. After initial observation, the samples were fixed in Lugol's solution, and then 4% formalin. Microphotograph (40 x) of each specimen was taken using Sony model no. DSC-W1 digital camera, and edited in Adobe Photoshop cs2. Identification of Cyanophycae members were carried out with the help of Prescott 1951, Desikachary 1959 and Anand 1989.

Morphotaxonomic Descriptions

Cyanophyceae
Chroococales
Chroococcaceae

Microcystis Protocystis Crow (Pl. 1, fig. 1) T.V. Desikachary 1959: 91 (Pl. 20, Fig. 4) Colonies irregular, spherical 3.5-6.5 µ in diam. with gas-vacuoles. Locality : Kapurwadi, Pimpalgaon, December to March 2007-2008.

Merismopedia convoluta Breb. (Pl. 1, fig. 2) T.V. Desikachary 1959: 152 (Pl. 29, Fig. 8, 12, 13) Cells spherical to oblong, 4-5.2µ broad, blue-green. Locality : Kapurwadi, Pimpalgaon. February to April 2008.

Merismopedia elegans var. *major* G.M. Smith (Pl. 1, fig. 3) G.W. Prescott, 1982: 459 (Pl. 100, Figs. 18) Cell 10-11 µ in diameter, 12-

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17µ long, cells spherical to oblong. Locality : Pimpalgaon, March to April 2008.

Merismopedia minima Beck. (Pl. 1, fig. 4) T.V. Desikachary 1959: 154 (Pl. 29, Fig. 11) Cells pale blue-green 4 to many in small colonies, 0.5-0.6 µ broad, free swimming, groups of four cells 2-3µ. Locality : Kapurwadi, July 2008.

Merismopedia punctata Meyen (Pl. 1, fig. 5) T.V. Desikachary 1959: 155 (Pl. 23, Fig. 5 & Pl. 29, Fig. 6) Colonies small, 4-64 cells, about 60µ broad, cells not closely packed, spherical or avoid, 2.5-3.5µ broad, pale blue-green. Locality : Pimpalgaon, February-March 2008, 2009.

Merismopedia tenuissima Lemm. (Pl. 1, fig. 6) T.V. Desikachary 1959: 154 (Pl. 29, Fig. 7 & Pl. 30, Figs. 8, 9) Cells pale blue-green closely packed in colonies of 16-100 cells, subspherical, 1.3-2µ broad. Locality : Pimpalgaon, October-November 2008.

Dactylococcopsis fascicularis Lemm. (Pl. 1, fig. 7) T.V. Desikachary 1959: 158 (Pl. 29, Fig. 3) Cells spindle-shaped with a long narrow pointed apex many together in a free-swimming bundle, 1µ broad, upt 55µ long, blue-green. Locality : Kapurwadi, Pimpalgaon, February to April 2008.

Gloeocapsa calcarea Tilden (Pl. 1, fig. 8) T.V. Desikachary 1959: 115 (Pl. 24, Fig. 6) Cells 6-9µ diam. blur-green; sheath colorless often thin; colonies 25-50µ. Locality : Sina origin, August-October 2007.

Chroococcus cohaerens (Breb.) Nag. (Pl. 1, fig. 9) T.V. Desikachary 1959: 111 (Pl. 26, Figs. 3, 9) Cells single or up to 2-8 in groups, without envelope 2-5 (–7) µ diam. & with sheath 2.5-7 µ diam. colony 7-15µ; sheath thin, colorless. Locality : Kapurwadi, Pimpalgaon March, April 2008, 2009.

Chroococcus giganteus West, W. (Pl. 1, fig. 10) T.V. Desikachary 1959: 101 (Pl. 26, Fig. 1) Cells three together in groups, bright blue-green with sheath 67-70 µ broad, sheath 5.4-6µ thick, lamellated (2-3 layers), colorless. Locality : Sina Origin, January, February 2008.

Chroococcus minutes (Kutz.) Nag. (Pl. 1, fig. 11) T.V. Desikachary 1959: 103 (Pl. 24, Fig. 4 & Pl. 26, Fig. 4, 15) Cells spherical in groups of mostly 2-4, light blue-green with sheath 6-15µ diam. colorless. Locality : Kapurwadi, Pimpalgaon. January, February, March 2008.

Chroococcus turgidus (Kutz.) Nag. (Pl. 1, fig. 12) T.V. Desikachary 1959: 101 (Pl. 26, Fig. 6) Cells ellipsoidal in groups of mostly 2-4, olive green, with sheath 13-25 µ diam. sheath colourless. Locality : Sina origin. January, February, March 2008, 2009.

Chroococcus turgidus (Kutz.) Nag. Var. *maximus* Nygaard (Pl. 1, fig. 13) T.V. Desikachary 1959: 102 (Pl. 24, Fig. 2 & Pl. 26, Fig. 8) Cells in groups 2-4, 22-45µ diam. blue-green, sheath colorless 5-10µ diam. two-celled colonies 44-51 x 56-65µ. Locality : Pimpalgaon, September, October 2007.

Aphanocapsa roeseana de Bary (Pl. 1, fig. 14) T.V. Desikachary 1959: 131 Cell 5-8µ diam. nearly oval, pale blue-green, mucilage sheath homogeneous. Locality : Pimpalgaon, January, February 2008, 2009.

Gomphosphaeria aponina Kutz. Pl. 1, fig. 15) T.V. Desikachary 1959: 150 (Pl. 28, Figs. 1-3) Cells pyriform 4-14µ broad & 8-20µ long, yellowish mostly with a distinct mucilaginous envelope, colonies large 50-90µ diam. Locality : Kapurwadi, August, September 2007.

Nostocales
Family-Oscillatoriaceae

Spirulina gigantea Schmidle (Pl. 1, fig. 16)

T.V. Desikachary 1959: 197 (Pl. 36, Figs. 12, 14-17) Trichome 3-4µ broad deep blue-green, regularly spirally coiled, spirals 11-16µ broad. Locality : Kapurwadi, Pimpalgaon January, February, March 2008, 2009.

Spirulina labyrinthiformis (Menegh.) Gomont (Pl. 1, fig. 17) T.V. Desikachary 1959: 195 (Pl. 36, Fig. 11 & Pl. 49, Fig. 1) Trichome 1µ broad, very regularly coiled forming a dirty, dark-green thallus; spirals close to each other, spirals 2-2.7µ broad. Locality : Kapurwadi, October, November 2007.

Spirulina laxissima forma major (Pl. 1, fig. 18) T.V. Desikachary 1959: 196 (Pl. 36, Fig. 6) Trichoe 1.3µ broad, spirals not close, about 6.6µ broad; 5.2-6.5µ distant from each other. Locality : Kapurwadi, January, February, March 2008.

Arthrospira jenneri Stizenb. ex Gomont (Pl. 1, fig. 19) Thallus blue-green; 5-8µ broad, regularly spirally coiled, spirals 9-15µ broad, distance between two spirals 21-31µ. Locality : Pimpalgaon, January, February, March 2008.

Arthrospira platensis (Nordst.) Gomont f. gramulata (Pl. 1, fig. 20) T.V. Desikachary 1959: 190 (Pl. 35, Figs. 5, 6) Trichome light blue-green, 6.6-7.9µ broad, slightly less broad at the ends, spirally coiled, spirals at the ends being narrower than the middle spirals 19.3-35.4µ. Locality : Dongargan, October, November 2007, 2008.

Oscillatoria curviceps Ag. ex Gomont (Pl. 1, fig. 21) T.V. Desikachary 1959: 209 (Pl. 38, Fig. 2) Thallus dark blue-green; trichomes more or less straight, bent at then end, not constricted at the cross-walls, 10-17µ broad, cells 1/3-1/6 as long as broad, 2-5µ long. Locality : Pimpalgaon Sina, March, April 2008.

Oscillatoria limosa Ag. ex Gomont (Pl. 1, fig. 22) T.V. Desikachary 1959: 205 (Pl. 42, Fig. 11) Trichome straight, dull blue-green 13-16µ broad; cells 1/3-1/6 as long as broad, end cell flatly rounded. Locality : Pimpalgaon January, February, March 2008, 2009.

Oscillatoria margaritifera (Kutz.) Gomont (Pl. 1, fig. 23) T.V. Desikachary 195: 202 (Pl. 42, fig. 8) Trichome olive-green, 17-29µ broad, fragile, straight, cells 1/3-1/7 as long as broad, 3-6µ long, cross walls granulated. Locality : Kapurwadi, February 2008.

Oscillatoria princeps Vaucher ex Gomont (Pl. 1, fig. 24) T.V. Desikachary 1959: 210 (Pl. 37, Fig. 1, 10, 11, 13, 14) Trichomes blue-green to dirty green, brownish 16-60µ slightly attenuated at the apices and bent. Locality : Pimpalgaon September, October 2007, 2008.

Oscillatoria proboscidea Gomont (Pl. 1, fig. 25) T.V. Desikachary 1959: 211 (Pl. 38, fig., 9) Trichomes 12-15µ broad, at the ends distinctly attenuated, slightly curved or sometimes spirally coiled, brightly blue-green; cells 1/3-1/6 times as long as broad, 2-4µ long, end-cells flatly rounded, capitate, with slightly thickened membrane. Locality : Sina October, November 2008.

Oscillatoria quadripunctulata Bruhl et Biswas (Pl. 1, fig. 26) T.V. Desikachary 1959: 227 (Pl. 37, fig. 5) Trichomes curved, 1-1.5µ in diam. Cells 3.5-5µ long. Locality : Kapurwadi February, March 2008.

Oscillatoria rubescens DC ex Gomont (Pl. 1, fig. 27) T.V. Desikachary 1959: 235 (Pl. 42, Fig. 12) Trichome straight, 6-8µ broad, not constricted at the cross walls, cells 1/2-1/3 as long as broad, 2-4µ long. Locality: Kapurwadi, Sina October, November 2007, 2008.

Oscillatoria sancta (Kutz.) Gomont (Pl. 1, fig. 28) T.V. Desikachary 1959: 203 (Pl. 42, Fig. 10) Trichomes bent, ends briefly attenuated, 10-20µ broad, dull blue-green cells 1/3-1/6 times as long as broad, 2.5-6µ long, End-cell flattened, hemispherical, slightly capitate. Locality : Pimpalgaon September, October 2007, 2008.

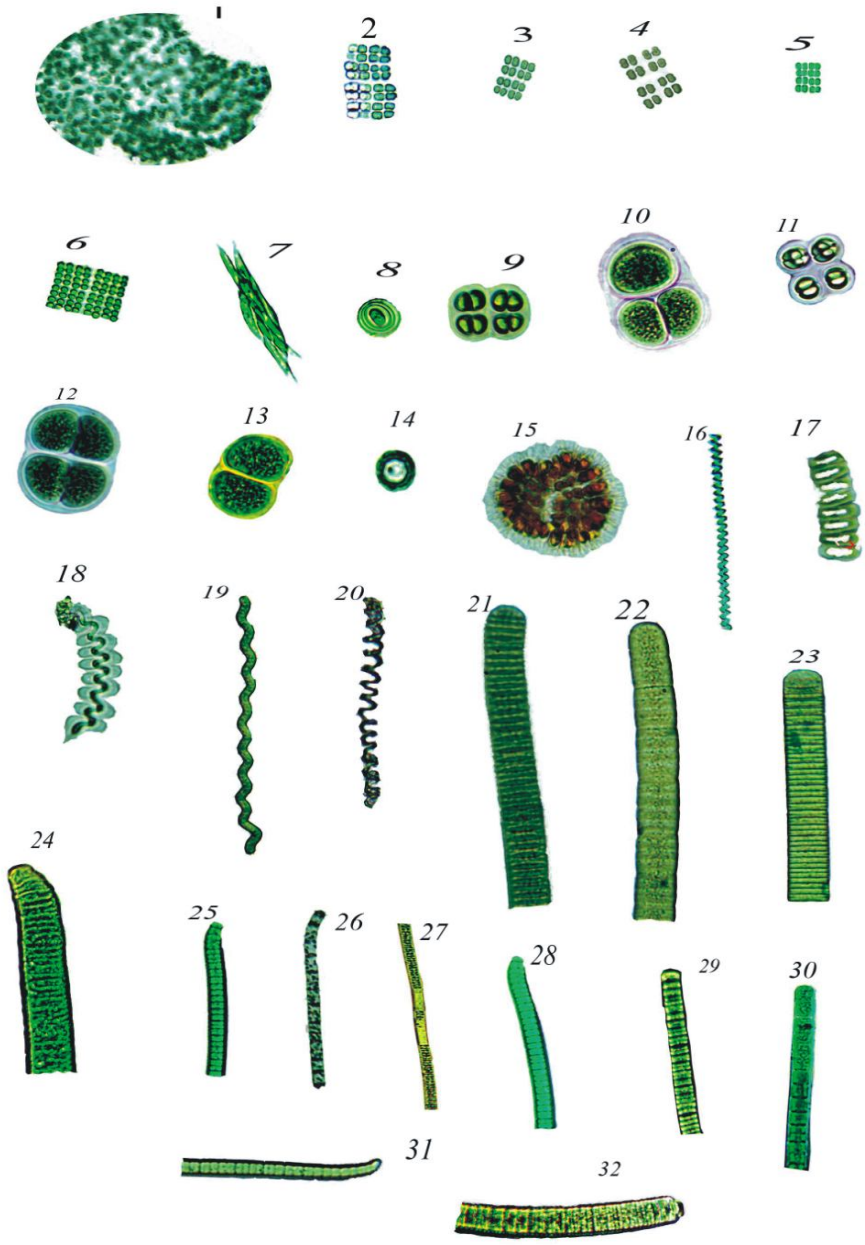

PLATE-1

Figure 1-32. 1 *Microcystis Protocystis* Crow, 2. *Merismopedia convoluta* Breb., 3. *Merismopedia elegans* var. *major G.M. Smith*, 4. *Merismopedia minima Beck*, 5. *Merismopedia punctata* Meyen, 6. *Merismopedia tenuissima* Lemm., 7. *Dactylococcopsis fascicularis* Lemm., 8. *Gloeocapsa calcarea* Tilden, 9. *Chroococcus cohaerens* (Breb.) Nag., 10. *Chroococcus giganteus* West, W., 11. *Chroococcus minutes* (Kutz.) Nag., 12. *Chroococcus turgidus* (Kutz.) Nag., 13. *Chroococcus turgidus* (Kutz.) Nag. Var. maximus (Nygaard), 14. *Aphanocapsa roeseana* de Bary, 15. *Gomphosphaeria aponina* Kutz., 16. *Spirulina gigantea* Schmidle, 17. *Spirulina labyrinthiformis* (Menegh.) Gomont, 18. *Spirulina laxissima* forma major, 19. *Arthrospira jenneri* Stizenb. ex Gomont, 20. *Arthrospira platensis* (Nordst.) Gomont f. granulate, 21. *Oscillatoria curviceps* Ag. ex Gomont, 22. *Oscillatoria limosa* Ag. ex. Gomont, 23. *Oscillatoria margaritifera* (Kutz.) Gomont, 24. *Oscillatoria princeps* Vaucher ex Gomont, 25. *Oscillatoria proboscidea* Gomont, 26. *Oscillatoria quadripunctulata* Bruhl et Biswas, 27. *Oscillatoria rubescens* DC ex Gomont, 28. *Oscillatoria sancta* (Kutz.) Gomont, 29. *Oscillatoria simplicissima* Gomont, 30. *Oscillatoria subbrevis* Schmidle, 31. *Oscillatoria tenuis* Ag. ex Gomont, 32. *Oscillatoria vizagapatensis* Rao, C.B.

Oscillatoria simplicissima Gomont (Pl. 1, fig. 29) T.V. Desikachary 1959: 224 Trichome straight, yellowish blue-green, 8-9µ broad, not attenuated at the apices, not capitate, cells 1/4-1/2 as long as broad, 2-4µ long, end-cells hemispherical. Locality : Pimpalgaon August, September 2008.

Oscillatoria subbrevis Schmidle (Pl. 1, fig. 30) T.V. Desikachary 1959: 208 (Pl. 37, Fig. 2 & Pl. 40, Fig. 1) Trichomes single, 5-6 µ broad, nearly straight, cells 1-2 µ long, end cell rounded. Locality: Kapurwadi, February, March 2008.

Oscillatoria tenuis Ag. ex Gomont (Pl. 1, fig. 31) T.V. Desikachary 1959: 222 (Pl. 42, Fig. 15) Trichome 4-10 µ broad, blue-green, sometimes bent at the ends, not attenuated at the apices, not capitate, cells up to 1/3 as long as broad, 2.6-5 µ long, at the septa mostly granulated, Locality Pimpalgaon February, March 2008.

Oscillatoria vizagapatensis Rao, C.B. (Pl. 1, fig. 32) T.V. Desikachary 1959: 205 (Pl. 39, Figs. 16, 18) Trichomes straight, or bent, pale blue-green, uniformly broad except at the extreme apex, 8-10 µ broad, cells much shorter than broad, 1.6-2 µ long, contents granular; end-cell broadly rounded forming a cap with a slightly thickened outer wall. Locality Kapurwadi February, March 2008.

Phormidium ambiguum Gomont (Pl. 2, fig. 1) T.V. Desikachary 1959: 266 (Pl. 44, Fig. 16 & Pl. 45, Figs. 5-8) Trichomes slightly constricted at the cross walls, at the ends not attenuated, not capitate, 4-6 µ broad, blue-green; cells shorter than broad, 1.5-2.7 µ long; ends-cells rounded, Locality Kapurwadi, October, November 2007.

Phormidium calcicola Gardner (Pl.. 2, fig. 2) T.V. Desikachary 1959: 267 (Pl. 43, Figs. 4, 5) Filaments 7-8 µ broad; trichomes 5.8-6.4 µ broad, cells quadratic or slightly longer than broad, or shorter, blue-green; end-cells truncated rounded, Locality Kapurwadi, October, November 2008.

Phormidium retizii (Ag.) Goment (Pl. 2, fig. 3) T.V. Desikachary 1959: 267 (Pl. 44, Figs. 13-15) Filament straight, 4.5-12 µ broad, dull blue-green; cells shorter or longer than broad, 4-9 µ long; septa not granulated; end scarcely attenuated, end-cells truncated, Locality Kapurwadi January, February, March 2008.

Phormidium tenue (Menegh.) Gomont (Pl. 2, fig. 4) T.V. Desikachary 1959: 259 (Pl. 43, Figs. 13-15 & Pl. 44, Figs. 7-9) Trichome straight 1-2 µ broad, pale blue-green 2.5-5 µ long, Locality Kapurwadi January, February, March 2008.

Lyngbya lachneri (Zimmermann) Geitler (Pl. 2, fig. 5) T.V. Desikachary 1959: 281 Filaments single nearly straight, apparently without sheath, but with a hyaline sheath visible under high magnification, seldom longer than 100 µ; trichomes 2.5-3.5 µ broad, cells 1.5-3 µ long; end-cells rounded, Locality Kapurwadi August, September 2007.

Lyngbya limnetica Lemmermann (Pl. 2, fig. 6) T.V. Desikachary 1959: 294 (Pl. 50, Fig. 11) Filaments straight or slightly curved or coiled, single, free floating, 1-2 µ broad, sheath thin or narrow, colourless, cells 1-1.5 µ broad, quadrate to 1/3 rarely 1/8 as long as broad, 1-3 µ long, Locality Pimpalgaon August, September 2007, 2008.

Lyngbya Taylori Drouet and Strickland in Strickland (Pl. 2, fig. 7) G.W. Prescott, 1982: 503 (Pl. 113, Fig. 3) Trichome 4-7 µ in diameter, terminal cell broadly convex, filaments long, 6-9 µ in diameter, terminal cell broadly convex, filaments longs, 6-9 µ in diameter Locality, Kapurwadi January, February, March 2008.

PLATE-2

Figures1-23. 1. *Phormidium ambiguum* Gomont, 2. *Phormidium calcicola* Gardner, 3. *Phormidium retizii* (Ag.) Goment, 4. *Phormidium tenue* (Menegh.), 5. *Lyngbya lachneri* (Zimmermann) Geitler, 6. *Lyngbya limnetica* Lemmermann, 7. *Lyngbya Taylori* Drouet & Strickland in Strickland, 8. *Anabaenopsis tanganyikae* (West, G.S.) Wolosz.et Miller, 9. *Cylindrospermum majus* Kutzing ex Born. et Flah, 10. *Cylindrospermum stagnale* (Kutz.) Born. et Flah, 11. *Nostoc carneum* Ag. ex Born. et Flah., 12. *Nostoc spongiaeforme* Agardh ex Born. et Flah. Var. Tenue Rao, C.B., 13. *Anabaena aphanizomenoides* Forti, 14. *Anabaena constricta* (Szafer) Geitler, 15. *Anabaena subcylindrica*, Borge, 16. *Nodularia spumigena* Mertens ex Born. et Flah, 17. *Aulosira fertilissima* Ghose, 18. *Gloeotrichia echinulata* Var. berhampurense Rao, C.B., 19. Gl*oeotrichia intermedia* (Lemm.) Geitler, 20, 21. *Gloeotrichia pisum* Thuret ex Born. et Flah, 22, 23. *Gloeotrichia raciborskii* Woloszynska Var. kashiense Rao C.B.

Family Nostocaceae

Anabaenopsis tanganyikae (West, G.S.) Wolosz. et Miller (Pl. 2, fig. 8) T.V. Desikachary 1959: 354 (Pl. 63, Figs. 4, 8) Trichomes free-swimming, very short, spirally coiled, 1-2 (-3) µ mostly 1-1/2 spirals, without sheath; cross-walls 2.4-2.6 µ broad; cells cylindrical, 2-3 times longer than broad, 3.8-8.5 µ long, heterocysts ellipsoidal, 3 x 5.5 µ, Locality; Kapurwadi, August, September 2007, 2008.

Cylindrospermum majus Kutzing ex Born. et Flah. (Pl. 2, fig. 9) T.V. Desikachary 1959: 360 (Pl. 80, Fig. 1) Trichomes 4-5 µ broad, light blue-green; cells cylindrical, 5-6 µ long; heterocysts oblong; somewhat broader than the tricome, up to about 10 µ long; Locality Pimpalgaon February, March 2008.

Cylindrospermum stagnale (Kutz.) Born. et Flah. (Pl. 2, Fig. 10) T.V. Desikachary 1959: 363 (Pl. 65, Fig. 9) Trichomes 3.8-4.5 µ broad, cells nearly quadrate, or cylindrical, and often 3-4 times as long; heterocysts subspherical or oblong, 6-7 µ broad, 7-16 µ long, Locality Pimpalgaon February, March 2008.

Nostoc carneum Ag. ex Born. et Flat. (Pl. 2, fig. 11) T.V. Desikachary 1959: 381 (Pl. 69, Fig. 6) Sheath indistinct, colourless; trichomes (3-) 3.5-4 µ broad, cells oblongo-cylindrical, upto twice as long as broad; heterocysts oblong, 6 µ broad; Locality Pimpalgaon October, November 2007.

Nostoc spongiaeforme Agardh ex Born. et Flah. Var. tenue Rao, C.B. (Pl. 2, fig. 12) T.V. Desikachary 1959: 380 (Pl. 68, fig. 2) Plant mass small, gelatinous, thin, expanded, trichomes densely entangled, 3-3.8 µ broad, cells spherical, heterocysts spherical, 4-6 µ broad and 5.5-9 µ long, Locality. Kapurwadi January, February, March 2008.

Anabaena aphanizomenoides Forti (Pl. 2, fig. 13) T.V. Desikachary 1959: 405 (Pl. 71, Fig. 4) Trichome single, straight or slightly bent, 1-2 mm long, 4-5 µ broad, cells barrel-shaped, cylindrical, 1-3 times as long as broad, heterocysts subspherical or ellipsoidal, 5.5-7 µ broad, 6-7.5 µ long; spores single or a few near the heterocysts, spherical, 8-14 µ broad, Locality, Kapurwadi October, November 2007.

Anabaena constricta (Szafer) Geitler (Pl. 2, fig. 14) T.V. Desikachary 1959: 419 Trichomes blue-green, cells cylindrical 3-4 µ broad, 3-5 µ long, cnstricted at middle, heterocyst single, intercalary. Locality Pimpalgaon February, March 2008.

Anabaena subcylindrica, Borge (Pl. 2, fig. 15) G.W. Prescott 1982: 518 (Pl. 118, figs. 6-8) Trichome straight cells short cylindric, 4-4.5 µ in diameter, 5.5-8 µ long, heterocyst cylindrical 5.5-8 µ in diameter, 15-18 µ long. Locality Kapurwadi January, February, March 2008, 2009.

Nodularia spumigena Mertens ex Born. et Flah. (Pl. 2, fig. 16) T.V. Desikachary 1959: 423 (Pl. 80, Figs. 13, 14) Filaments single, straight, bent or spirally coiled, 8-12 µ broad, sheath him or thick, colourless; cells short, discoid, 1/3-¼ as long as broad; heterocysts somewhat broader than the vegetative cells; Locality, Kapurwadi January, February, March 2008.

Aulosira fertilissima Ghose (Pl. 2, fig. 17) T.V. Desikachary 1959: 431 (Pl. 80, fig. 6) Trichomes straight or a little flexuous, cells (4-) 6-11 µ broad, and (5-) 7-10 µ long, cylindrical when young, later barrel-shaped, heterocysts intercalary, oblong or elliptical, 8-9 µ broad and 10-14 µ long; Locality Pimpalgaon February March 2008, 2009.

Family Rivulariaceae

Gloeotrichia echinulata Var. *berhampurense* Rao, C.B. (Pl. 2, fig. 18) T.V. Desikachary 1959:

556 (Pl. 118, Figs. 12, 13) Trichomes 6-9 µ broad, up to 400 µ long, cells at the base barrel-shaped and 4-10 µ long, higher up quadrati or cylindrical and 4-8 µ long, at the apex long cylindrical and 9.8-12.2 µ long; heterocysts single, spherical, subspherical, 9-12.2 µ broad; Locality Kapurwadi October, November 2007.

Gloeotrichia intermedia (Lemm.) Geitler (Pl. 2, fig. 19) T.V. Desikachary 1959: 560 (Pl. 116, Fig. 8) Filaments less densely packed, slightly pressed together; sheath close to the trichome, colourless; trichome ending in a hair which is many times coiled or bent 5.5-8 µ broad; cells longer than broad, blue-green; heterocysts spherical, or elongate, (8-) 9.5-14 (-16) µ broad, Locality Kapurwadi January, February, March 2008.

Gloeotrichia pisum Thuret ex Born. et Flah. (Pl. 2, fig. 20, 21) T.V. Desikachary 1959: 555 (Pl. 116, Figs. 4, 5) Filaments densely arranged, closely adpressed; trichomes 4-7 µ broad, ending in a long hair; olive to blue-green; heterocysts more or less spherical, 7-15 µ broad; Locality Kapurwadi January, February, March 2008.

Gloeotrichia raciborskii Woloszynska Var. *kshiense* Rao, C.B. (Pl. 2, figs, 22, 23) T.V. Desikachary, 1959: 562 (Pl. 117, Figs. 2, 6) Thallus large, 2-10 cm in diam. trichomes with constriction at the joints, 8.4-10 µ broad at base, higher up 4.8-6.4 µ broad, at the apex up to 3.5 µ broad; heterocysts single, spherical or ellipsoidal, 8-12.8 (-13.2) µ broad and 8.4-15 (-16.5) µ long; Locality Kapurwadi November December 2007.

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