



The genus *Oscillatoria* Vaucher (Oscillatoriales: Cyanoprokaryota) from Jalgaon District, (MS) India

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DOI: <https://doi.org/10.66856/ijbs.2026.11.2.11131>

Abstract

The present communication deals with the taxonomic enumeration of Genus *Oscillatoria* from Jalgaon district of Maharashtra. Author visited to different freshwater habitats of Jalgaon district and recorded 19 taxa of genus *Oscillatoria* Vaucher of these 19 taxa, 16 species and 3 varieties of *Oscillatoria* were explored. All the taxa are systematically described with illustrations.

Keywords: Fresh water, *Oscillatoria*, *Cyanobacteria*, taxa, Jalgaon District

Introduction

The genus *Oscillatoria* Vaucher belonging to the order Oscillatoriales within the Cyanoprokaryota, a group of filamentous, photosynthetic autotrophs, prokaryotes widely distributed in terrestrial, free floating, epiphytic or growing on surface of rocks and are survive in extreme environmental conditions and nitrogen fixing algae on earth. *Oscillatoria* is characterized by unbranched trichomes composed of cylindrical cells, true heterocysts and akinetes are absent. Its name derives from the characteristic oscillatory or gliding movement of its trichomes, which enables the filaments to orient toward light or move within their substrate. They are growing in various climatic conditions such as fresh water, marine water, hot springs, epiphytic, endophytic and halophytic.

The significant work on genus *Oscillatoria* Vaucher of Maharashtra has been studied by several workers like Kamat (1962) ^[11], Thomas and Gonzalves (1965) ^[26], Barhate and Tarar (1983) ^[2], Bhoge and Ragothaman (1986) ^[4], Mahajan (1986, 1989) ^[14, 15] Mahajan and Mahajan (1988) ^[16], Deore and Patil (1999), Kumawat and Jawale (2006) ^[13], Talekar *et. al* (2010) ^[23], Patil (2013) ^[17], Behere Patil and Deore (2014) ^[3], Jain (2015) ^[8], Patil and Patil (2015), Jaiswal (2017) ^[9], Jaiswal and Gavit (2019) ^[10], Shejul and Sawant (2019) ^[22], Patil *et.al.* (2021) ^[18], Yadav (2021) ^[18], Patil and Nandan (2022) ^[19] Dhande (2023) ^[6] and Andhale *et.al.* (2025) ^[1].

Methodology

The present research work was carried out during August, 2017 to July, 2019. Algal samples were collected fortnightly or monthly intervals from the various fresh water bodies of Jalgaon district through plankton net or by hand or scrapping from other objects in water between 7.30 to 9.00 am in plastic vials. Collected samples were tagged and labelled, then preserved with 4% formalin solution on the spot. Morpho taxonomy was performed in the Research Laboratory, Department of Botany, S. V. P, Arts and Science College, Ainpur. Morphological details were studied by using Labomed make Trinocular Research Microscope (Labomed Lx 400). Camera lucida drawings were made with the help of mirror type of camera lucida from fresh as well as preserved material. The measurement of taxa was taken with the help of stage ocular micrometer. Identification of the taxa was based on standard literatures and other relevant research publications.

Result and Discussions

Systematic Enumeration

Order: Nostocales

Family: Oscillatoriaceae

Genus *Oscillatoria* Vaucher, 1803

***Anagnostidinema acutissimum* (Kufferath) Strunecky, Bohunicka, J. R. Johansen & J. Komarek Pl. 1, Fig.1**

Synonym: *Oscillatoria acutissima* Kufferath

G. W. Prescott, 1982 ^[21], P. 484, Pl. 109, Fig. 1; B. N. Prasad and M. N. Srivastava, 1992 ^[20], P.60, Pl. 8, Fig. 6.

Trichomes solitary, light blue-green, almost straight, gradually attenuated towards sharply pointed and curved apex; cells usually shorter than broad but very rarely slightly longer than broad, not constricted at septa, 2.7–3.1 µm in diameter, 1.8–2.7 µm long; cell contents light blue green homogenous without granules and gas vacuoles; end cells somewhat acute-conical, not capitate, calyptra absent; cell wall thick, smooth.

Habitat: Road side ditches near Nimbhora Railway station. July, 2018(JD-118).

***Microcoleus amoenus* (Gomont) Strunecky, Komarek & J. R. Johansen Pl. 1, Fig. 2**

Synonym: *Oscillatoria amoena* (Kuetz.) Gomont

G. W. Prescott, 1982 ^[21], P. 484, Pl. 109, Figs. 2-4

Cell 6.1 µm broad, 5.3 µm long, usually slightly constricted at the cross walls, which are granular; trichomes usually forming a thin, submerged, weft-like, blue green mass; usually straight but not rigid, slightly tapering toward the apex, apical cell broad, capitate, with a cone-shaped calyptra.

Habitat: Road side ditches near Garbardi Village, Pal. January, 2019(JD-144).

***Oscillatoria amphibia* var. *bigranulata* Playfair Pl. 1, Fig. 3**

Synonym: *Oscillatoria bigranulata* Dhande

J. S. Dhande, 2007 ^[5]. P. 228, Pl. 47, Fig. 11

Thallus blue green, trichome straight, constricted at cross wall, 2.6 µm broad; cells 2.6–3 µm long, two granules on one side of septa only, end cells obtuse rounded.

Habitat: Tapi river near Nimgvhan Village, Chopda. November, 2018(JD-129).

***Phormidium chalybeum* (Mertens ex Gomont) Anagnostidis & Komarek Pl. 1, Fig. 4**

Synonym: *Oscillatoria chalybea* (Mertens) Gomont Komarek J. and Anagnostidis K., 2005, P.422, Fig. 604
Trichome straight or lightly spirally coiled, constricted at the cross walls, apex bent, 5.9–7.2 µm broad; cells 4–4.5 µm long, end cell obtuse, not capitate, without calyptra.
Habitat: Tapi river near Nimgvhan Village, Chopda. November, 2018(JD-129).

***Kamptonema chlorinum* (Kützing ex Gomont) Strunecky, Komarek & J. Smarda Pl. 1, Fig. 5**

Synonym: *Oscillatoria chlorina* Kuetz. ex Gomont T. V. Desikachary, 1959^[7], P. 215, Pl. 40, Fig. 4
Trichome curved, slightly constricted at the cross walls, 5.4 µm broad; cells 3.6–4.5 µm long, quadrate, end cells rounded, calyptra absent; cell wall thick, smooth.
Habitat: Aner river near Galangi Village, Chopada. July, 2018(JD 132).

***Kamptonema formosum* (Bory ex Gomont) Strunecky, Komarek & J. Smarda Pl. 1, Fig. 6**

Synonym: *Oscillatoria formosa* Bory ex Gomont G. W. Prescott, 1982^[21], P. 487, Pl. 109, Figs. 10,11
Trichome elongated, aggregated to form a dark blue-green plant mass; straight or somewhat curved, especially at the apex, slightly attenuated, may or may not be constricted at the cross walls, which are granular, 3.4–3.8 µm in diameter; cells quadrate 3–4.6 µm long; apical cell conical, not capitate, without a calyptra.
Habitat: Road side ditches near Mothe Waghode, Raver. August, 2018(JD-204).

***Phormidium granulatum* (N. L. Gardner) Anagnostidis. Pl. 1, Fig. 7**

Synonym: *Oscillatoria granulata* Gardn M. M. Watanabe, M. Watanabe and T. Yamagishi, 1979^[27], P.82, Figs.5, 6
Cells 4–7.2 µm in diameter, non-constricted at the cross walls which are distinctly granular; trichome straight or somewhat curved, especially at the apex, which is slightly attenuated; apical cell not capitate and without a calyptra.
Habitat: Road side ditches near Nimbhora Railway station. July, 2018(JD-118).

***Kamptonema laetevirens* (H. M. Crouan & P. L. Crouan ex Gomont) Strunecky, Komarek & J. Smarda Pl. 1, Fig. 8**

Synonym: *Oscillatoria laete-virens* (Crouan) Gomont B. N. Prasad and M. N. Srivastava, 1992^[20], P. 64, Pl. 9, Fig. 10
Trichome fragile, thin, solitary, straight, gradually attenuated towards undulate or bent apex, distinctly constricted at the cross-walls, 3 µm broad; cells 2.3 µm long, cells almost quadrate or shorter than broad, cell without granules and gas vacuoles, calyptra absent, cell wall thick, smooth.
Habitat: Mangrul Dam, Raver, December, 2018(JD 182).

***Oscillatoria limosa* Ag. ex Gomont var. *major* var. nov. Pl. 1, Fig. 9**

Thallus dark blue green, trichome straight, constricted at the cross walls, 34.5–38.1 µm broad, not attenuated at the apex; cells 3.6–4.5 µm long, apical cell flatly capitate with thickened membrane.
Oscillatoria limosa Ag. ex Gomont var. *major* var. nov. close to *Oscillatoria limosa* Ag. ex Gomont and *Oscillatoria*

limosa Ag. ex Gomont var. *maxima* Kumawat et Jawale (Desikachary, 1959^[7], Prasad and Srivastava, 1992^[20], Kumawat and Jawale, 2006)^[13] in having dimensions of trichome as 13-16 µm in diameter; 10-12 µm in diameter; 30-35 µm in diameter, but differs from it having trichome larger in size (34.5 – 38.1 µm in diameter) than those reported by Desikachary, Prasad and Srivastava and Kumawat and Jawale.

Habitat: Tapi river near Nimgvhan Village, Chopda., November, 2018(JD-129).

***Oscillatoria limosa* Ag. ex Gomont var. *maxima* Kumawat et Jawale Pl. 1, Fig. 10**

D. A. Kumawat and A. K. Jawale, 2006^[13], P. 100, Fig. 17.
Thallus dark blue green, trichome straight, constricted at the cross walls, 23.6 µm broad, not attenuated at the apex; cells 4-5.9 µm long, apical cell flatly capitate. 5 granules on either side of septa.

Habitat: Road side ditches near Mothe Waghode, Raver. August, 2018(JD-204).

***Phormidium nigroviride* (Thwaites ex Gomont) Anagnostidis & Komarek Pl. 1, Fig. 11**

Synonym: *Oscillatoria nigro-viridis* Thwaites ex Gomont B. N. Prasad and M. N. Srivastava, 1992^[20], P. 66, Pl. 9 Figs. 13, 15.

Thallus expanding, dark green; trichome curved, attenuated, constricted at the cross-walls, cross wall granulated, 7.2–22.7 µm in diameter; cells much shorter than broad, 5.4 µm long, without gas vacuoles; granules present, distributed irregularly or towards septa; end cells somewhat capitate with slightly thickened convex outer membrane.

Habitat: Mangrul Dam, Raver. December, 2018(JD 182).

***Kamptonema okenii* (C. Agardh ex Gomont) Strunecky, Komarek & J. Smarda Pl. 1, Fig. 12**

Synonym: *Oscillatoria okeni* Ag. ex Gomont A. Tiwari and S. V. S. Chauhan, 2006^[24], P. 113, Pl. 1, Fig. 16

Filaments blue green, trichome straight, fragile, distinctly constricted at the cross walls, 5.4 µm broad, attenuated at the apex, granulated cells, slightly bent, 2.7 µm long; end cells obtuse or subconical not capitate, without calyptra.

Habitat: Road side ditches near Nimbhora Railway station. July, 2018(JD-118).

***Oscillatoria ornata* Kuetz. ex Gomont Pl. 1, Fig. 13**

T. V. Desikachary, 1959^[7], P. 206, Pl. 37, Fig. 12, Pl. 40, Fig. 3

Trichome spirally coiled at the ends, constricted at the cross-walls 10.9 µm broad, dull blue green; cells 5.4 µm long, cross-walls granulated; apices slightly attenuated; end cells rounded not capitate, without thickened membrane.

Habitat: Tapi river near Nimgvhan Village, Chopda. November, 2018(JD-129).

***Oscillatoria perornata* Skuja Pl. 1, Fig. 14**

Komarek J. and Anagnostidis K, 2005^[12], P. 586, Fig. 873
Trichome single, erect, flexuous, apices briefly attenuated and bent or curved, well constricted at the cross-walls, 11.8–13.6 µm broad, cells shorter than broad, 3.6–5.4 µm long; cells finely granular, septa more or less granulated, end cell humilis depressed hemispherical, calyptra absent.

Habitat: Tapi river near Nimgvhan Village, Chopda. November, 2018(JD-129).

***Oscillatoria princeps* Vaucher ex Gomont Pl. 1, Fig. 15**

T. V. Desikachary, 1959 ^[7], P. 210, Pl. 37, Fig. 1, 10, 11, 13, 14;

B. N. Prasad and M. N. Srivastava, 1992 ^[20], P. 67, Pl. 8, Figs. 8, 10;

Trichome solitary, almost straight or slightly curved at apex, rigid, very slightly tapering towards the apices, not constricted at the cross-walls, 24.5–29 µm broad, 3.6–5.4 µm long; cell without gas vacuoles, granules may or may not be present; end cells somewhat truncate with or without wavy margins, slightly capitate with thickened outer membrane.

Habitat: Tapi river near Nimgvhan Village, Chopda. November, 2018(JD-129).

***Jaaginema quadripunctulatum* (Bruhl & Biswas) Anagnostidis & Komarek Pl. 1, Fig. 16**

Synonym: *Oscillatoria quadripunctulata* Bruhl et Biswas

T. V. Desikachary, 1959 ^[7], P. 227, Pl. 37, Fig. 5

Trichome curved or straight not constricted at the cross-wall, wall indistinct; cells 3–3.2 µm broad, 3–3.4 µm long; contents minutely granular, transverse walls rather obscure marked by a pair of somewhat large granules on either side.

Habitat: Tapi river near Nimgvhan Village, Chopda. November, 2018(JD-129).

***Oscillatoria variabilis* C. B. Rao Pl. 1, Fig. 17**

Synonym: *Oscillatoria raoi* De Toni

T. V. Desikachary, 1959 ^[7], P. 223, Pl. 42, Figs. 16-19

Trichomes straight usually of uniform thickness and only rarely slightly tapering at the ends, without constrictions at the joints, 4.6–6.1 µm broad, septa indistinct, but with distinct granules closely arranged on either side; cells 3.4–6.1 µm long, end cells rounded rarely conical, sometimes with constrictions at the septum, without any calyptra.

Habitat: Tapi river near Nimgvhan Village, Chopda. November, 2018(JD-129).

***Oscillatoria sancta* Kutzing ex Gomont Pl. 1, Fig. 18**

Oscillatoria sancta Kuetzing ex Gomont

T. V. Desikachary, 1959 ^[7], P. 203, Pl. 42, Fig. 10

Komarek J. and Anagnostidis K, 2005, P. 594, Fig. 890

Trichome straight or bent, distinctly constricted at the cross-walls; ends briefly attenuated, 22.7–24.5 µm broad; cells 2.7–4.5 µm long, granulated at the cross-walls, end cell flattened, hemispherical, slightly capitate, with a thickened membrane.

Habitat: Tapi river near Nimgvhan Village, Chopda. November, 2018(JD-129).

***Phormidium tergestinum* (Rabenhorst ex Gomont) Anagnostidis & Komarek Pl. 1, Fig. 19**

Oscillatoria tenuis Ag. ex Gomont var. *tergestina* (Kuetz.) Rabenh.

G. L. Tiwari, 1975 ^[25], P. 772, Pl.4, Fig.1

Komarek J. and Anagnostidis K, 2005 ^[12], P. 587, Fig. 87

Trichome free, straight, fragile, slightly constricted at the cross-walls, 4.9 µm broad, not attenuated at the ends, cells quadratic 3.8 µm long; end cell with broadly rounded apex, more or less hemispherical with thickened outer membrane.

Habitat: Tapi river near Nimgvhan Village, Chopda. November, 2018(JD-129).

Conclusion

During the present study author recorded 19 taxa of genus *Oscillatoria* Vaucher belonging to 16 species and 3 varieties. The genus *Oscillatoria* Vaucher have been found dominant during winter season.

Acknowledgements

Author is thankful to Principal and Head, Department of Botany, Sardar Vallabhbai Patel Arts and Science College Ainpur for extending laboratory facilities. I also thankful to K. B. C. North Maharashtra University, Jalgaon for financial assistance under the Vice Chancellor research motivation scheme (VCRMS) head.

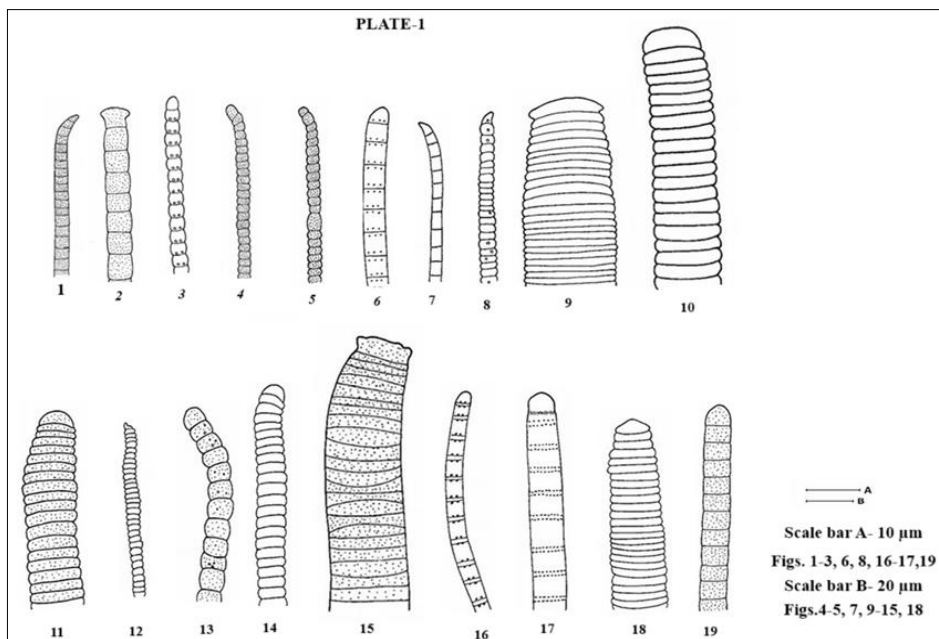


Fig 1-19: 1. *Anagnostidinema acutissimum* 2. *Microcoleus amoenus* 3. *Oscillatoria amphibia* var. *bigranulata* 4. *Phormidium chalybeum* 5. *Kamptonema chlorinum* 6. *Kamptonema formosum* 7. *Phormidium granulatum* 8. *Kamptonema laetevirens* 9. *Oscillatoria limosa* var. *major* var. *nov.* 10. *Oscillatoria limosa* var. *maxima* 11. *Phormidium nigroviride* 12. *Kamptonokenii* 13. *Oscillatoria ornata* 14. *Oscillatoria perornata* 15. *Oscillatoria princeps* 16. *Jaaginema quadripunctulatum* 17. *Oscillatoria variabilis* 18. *Oscillatoria sancta* 19. *Phormidium tergestinum*

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