

GENUS *NITZSCHIA* FROM JAMMU (J&K)

V. K. ANAND

Department of Botany, University of Jammu, Jammu-180001, India.

During the present study 24 species of *Nitzschia* were recorded for the first time from the province Jammu. *N. communis* has been recorded for the first time from India (Ladakh, J&K State).

Keywords : Algal diversity; Bacillariophyceae; Chlorophyceae; *Nitzschia*.

Jammu, the winter capital of J&K State is situated at a longitude 74° to 76°-15E and latitude 32°-15' to 30°-30' from 304.8 to 365.5 mt above the mean sea level having 6 districts i.e., Jammu, Udhampur, Rajouri, Poonch, Doda and Kathua. All these districts are bestowed with numerous lotic and lentic water bodies represented by ponds, pools, ditches, springs, lakes, marshy lands, streams and nallahs situated at different altitudes. These water bodies of Jammu province harbour a great deal of algal diversity, of which Bacillariophyceae is the most dominating. Perusal of literature reveals that a few references have appeared in the past on the diatom flora of Jammu¹⁻⁴. Thus, keeping in mind the paucity of the work done on this group of algae a detail study has been carried out under U.G.C. sponsored Research Project in order to collect information on taxonomy, ultra-structure and ecology on the interesting genera.

Present communication puts on record 24 species of *Nitzschia* for the first time from the province Jammu. Samples were cleaned, washed, acid treated and prepared permanent mounts following Brun's method. Identifications have been made using relevant standard literature⁵⁻¹².

Following is the list of species of *Nitzschia* alongwith ecological notes.
Nitzschia acicularis W. Smith, (Plate II, fig. 16)

Planktonic; uncommon, usually found in flowing waters, rarely in stranded water; associated with the species of *Spirulina*, *Oscillatoria*, *Spirogyra*, *Pediastrum*, *Cosmarium*, *Scenedesmus*, *Closterium*, *Surirella* & *Cymbella*. This species constitutes 1% of the total flora, other algal constituents are Bacillariophyceae 90%, Chlorophyceae 5% and Cyanophyceae 2%.

N. amphibia Grun; (Plate I, figs. 4-6)

Planktonic; common, found in clear lotic & lentic waters; associated with the species *Spirogyra*, *Closterium*, *Gyrosigma*, *N. spectabilis*, *N. grandershemiensis* Krasske. This species alone constitutes 25% of the total diatom flora; Chlorophyceae &

Cyanophyceae contribute 3.0% and 1.5% respectively.

N. clausii Hantzsch., (Plate I, fig. 9)

Planktonic, rare, collected only from lentic water bodies; associated with the species of *Oscillatoria*, *Spirogyra*, *Cosmarium*, *Synedra*, *Caloneis*, *Frustulia*, *Navicula*, *Pinnularia*, *Amphora* and *Surirella*. This species contributes about 1% but Bacillariophyceae is 85-90%; Cyanophyceae & Chlorophyceae contribute 2-3% and 5-6% respectively.

N. closterium (Ehr.) W. Smith., (Plate I, fig. 3)

Species uncommon, found in lentic waters, forms associations with the species of *Spirogyra*, *Synedra*, *Achnanthes*, *Navicula*, *Ghomphonema*, *Cymbella*. This species contributes 0.25%, Bacillariophyceae 95% and Chlorophyceae 2.5%.

N. communis Rabenhorst., (Plate II, fig. 14)

Planktonic, uncommon, found in lotic waters, usually associated with the species of *Oscillatoria*, *Spirogyra*, *Synedra*, *Anomoeoneis*, *Navicula*, *Pinnularia*, *Denticula*, *Nitzschia*; constitutes 0.25%, Bacillariophyceae 95%, Chlorophyceae 2%, and Cyanophyceae 1%.

This species has been recorded for the first time from India (Ladakh, J&K State).

N. grandershemiensis Krasske., (Plate I fig. 8 & Plate II fig. 17)

Planktonic, epilithic, common in lotic & lentic waters, associated with *Oscillatoria*, *Spirogyra*, *Synedra*, *Gyrosigma*, *Navicula*, *Cymbella*, *Nitzschia* and *Surirella*; constitutes 3-4%, Bacillariophyceae 90%, Chlorophyceae 3%, and Cyanophyceae 1-2%.

N. heufleriana Grun. var. *elongata* Pant., (Plate I, fig. 2)

Planktonic, uncommon, found in lentic water bodies; associated with *Spirogyra*, *Pediastrum*, *Synedra*, *Achnanthes*, *Navicula*, *Ghomphonema*, *Pinnularia*, *Surirella*; constitutes 0.15%, Bacillariophyceae 95%, Chlorophyceae 2-3%, Cyanophyceae 0.05%.

N. holsatica Hust., (Plate II, fig. 13)

Planktonic, rare, mostly present in lotic water bodies, associated with *Oscillatoria*, *Closterium*, *Synedra*, *Gyrosigma*, *Navicula* and *Cymbella*, constitutes 0.25%, Bacillariophyceae 90%, Chlorophyceae 5%, and Cyanophyceae 1.5%.

N. ignorata Krasske., (Plate I, fig. 12)

Planktonic, uncommon, collected from lotic water bodies only, associated with species of *Oscillatoria*, *Spirogyra*, *Closterium*, *Synedra*, *Rhopalodia*, *Navicula*, *Cymbella*; constitutes 0.8-1.9% Bacillariophyceae 90%, Chlorophyceae, 2.5-3.0%, Cyanophyceae 3.0%.

N. intermedia Hantzsch., (Plate II, Fig. 18)

Planktonic, rare, in lotic water bodies, associated with species of *Oscillatoria*, *Spirullina*, *Spirogyra*, *Cosmarium*, *Closterium*, *Synedra*, *Pinnularia*, *Nitzschia*, *Rhopalodia*, *Navicula*, *Cymbella*; constitutes 0.1%, Bacillariophyceae 85-90%, Chlorophyceae 4.5-5%, Cyanophyceae 2-3.0%.

N. jugata Gandhi., (Plate II, fig. 20)

Planktonic, rare collected only from lotic water bodies, forms association with the species of *Spirogyra*, *Synedra*, *Pinnularia*, *Cymbella*, *Nitzschia* and some submerged macrophytes; constitutes 0.2%, Bacillariophyceae 95%, Chlorophyceae 2-3%.

N. lorenziana Grun. var. *subtilis* Grun., (Plate III, fig. 26)

Planktonic, abundant in lotic waters, usually associated with *Oscillatoria*, *Spirogyra*, *Closterium*, *Synedra*, *Gyrosigma*, *Caloneis*, *Navicula*, *Cymbella*, *Pinnularia*, *Nitzschia*; constitutes 0.3-2.5%, Bacillariophyceae 95%, Chlorophyceae 1-2.5%, and Cyanophyceae 2.5%.

N. microcephala Grun., (Plate II fig. 19)

Planktonic, common in lotic water bodies, usually associated with the species of *Spirogyra*, *Synedra*, *Navicula*, *Pinnularia*, *Cymbella*, *Nitzschia* and submerged macrophytes; constitutes 0.3-3.5%, Bacillariophyceae 95%, Chlorophyceae 1-2.5%, and Cyanophyceae 2.5%.

N. obtusa W. Smith., (Plate II, fig. 21)

Planktonic, very common in lotic water bodies, forms associations with the species of *Oscillatoria*, *Spirullina*, *Closterium*, *Cosmarium*, *Synedra*, *Navicula*, *Pinnularia*, *Cymbella*, *Nitzschia* and *Surirella*; constitutes 2.5-30%, Bacillariophyceae 70%, Chlorophyceae 2.5-23% and Cyanophyceae 2-2.5%.

N. obtusa W. Smith var. *scalpelliformis*

Grun. f. parva Hust., (Plate I, fig. 10)

Planktonic, abundant in lentic waterbodies, forms associations with *Spirogyra*, *Navicula*, *Rhopalodia*, *Cymbella*; constitutes 2.5-30%; Chlorophyceae 5-6% and Bacillariophyceae 50-60%.

N. palea (Kutz.) W. Smith., (Plate III, fig. 22).

Planktonic, very common in lentic & lotic water bodies, forms associations with the species of *Oscillatoria*, *Closterium*, *Cosmarium*, *Synedra*, *Caloneis*, *Navicula*, *Pinnularia*, *Cymbella*, *Nitzschia* and *Surirella*; constitutes 15-20.0%, Bacillariophyceae 70%, Chlorophyceae 2-3% and Cyanophyceae 2-2.5%.

N. sigma (Kutz.) W. Smith., (Plate I, fig. 1)

Planktonic, uncommon, only in lotic water bodies, forms associations with the species of *Oscillatoria*, *Spirogyra*, *Closterium*, *Cosmarium*, *Hydrodictyon*, *Synedra*, *Navicula*, *Pinnularia*, *Cymbella*, *Nitzschia* and *Surirella*; constitutes 0.2-0.3%, Bacillariophyceae 90%, Chlorophyceae 2.5-3% and Cyanophyceae 0.5-1%.

N. sigmoidea (Ehr.) W. Smith., (Plate III, fig. 25)

Planktonic, very common, found in lotic water bodies only, forms associations with the species of *Spirogyra*, *Synedra*, *Navicula*, *Cymbella*, and *Gamphonema*; constitutes 0.2-0.5%, Bacillariophyceae 50% and Chlorophyceae 2-5%.

N. sinuta (W. Smith) var. *tabellaria* Grun., (Plate I, fig. 11)

Planktonic, common, only in lotic water bodies, forms association with the species of *Oscillatoria*, *Spirullina*, *Spirogyra*, *Hydrodictyon*, *Pediastrum*, *Closterium*, *Cosmarium*, *Synedra*, *Navicula*, *Pinnularia*, *Cymbella*, *Gyrosigma*, *Nitzschia* and *Surirella*; constitutes 0.2-0.3%, Bacillariophyceae 90-95%, Chlorophyceae 2.5-3% and Cyanophyceae 1.5-2.0%.

N. spectabilis (Ehr.) Ralfs., (Plate III, fig. 27)

Planktonic, rare, only in lotic water bodies, forms associations with the species of *Oscillatoria*, *Nostoc*, *Spirogyra*, *Closterium*, *Cosmarium*, *Synedra*, *Navicula*, *Ghomphonema*, *Nitzschia*; constitutes 0.1-0.2%, Bacillariophyceae 85-90%, Chlorophyceae 2.2-2.3% and Cyanophyceae 1.5-2.0%.

N. sublinearis Hustedt., (Plate III, fig. 24)

Planktonic, very rare, only in lotic & lentic water bodies, forms associations with

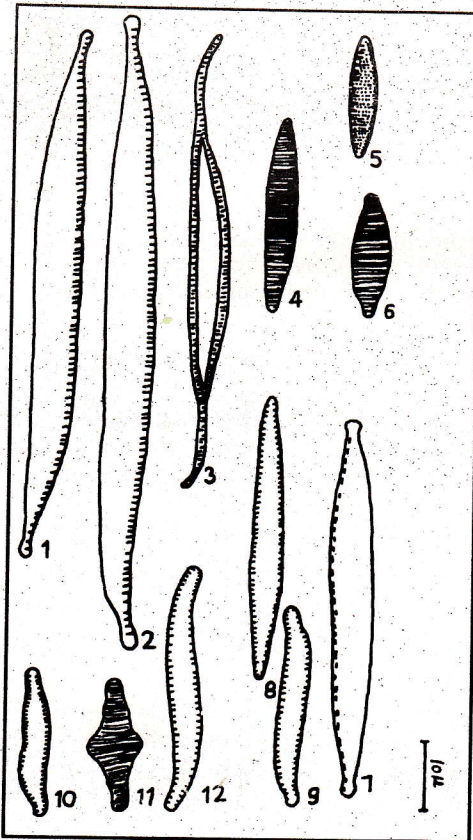


Plate-I (Figs. 1 to 12)

Fig. 1. *Nitzschia sigma* (Kutz.) W. Smith; Fig. 2. *N. heufleriana* Grun. var. *elongata* Pant.; Fig. 3. *N. Closterium* (Ehr.) W. Smith; Figs. 4-6. *N. amphibia* Grun.; Fig. 7. *N. vasnaii* Gandhi; Fig. 8. *N. grandershemiensis* Krasske.; Fig. 9. *N. clausii* Hantzsch.; Fig. 10. *N. obtuse* (W. Smith) var. *scalpelliformis* Grun. f. *parva* Hust.; Fig. 11. *N. sinuta* (W. Smith) var. *tabellaria* Grun.; Fig. 12. *N. ignorata* Krasske.

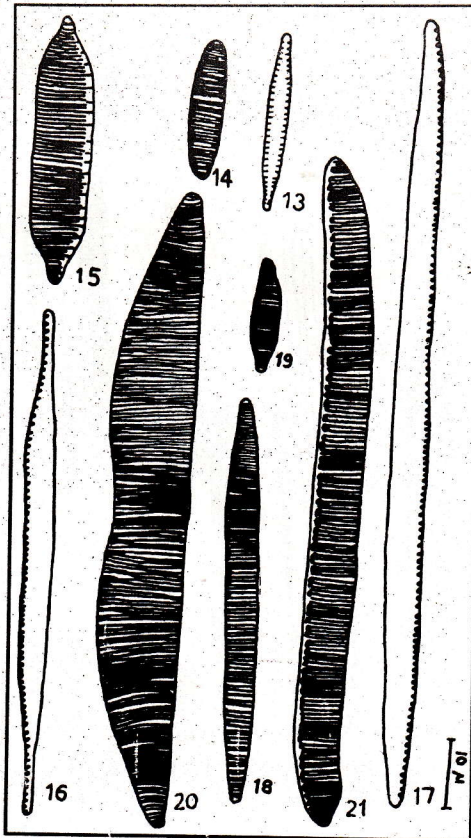


Plate-II (Figs. 13 to 21)

Fig. 13. *N. holsatica* Hust.; Fig. 14. *N. communis* Rabenhorst.; Fig. 15. *N. tryblionella* (Hantzsch.) var. *levidensis* (W. Smith) Grun.; Figs. 16. *N. acicularis* W. Smith; Fig. 17. *N. grandershemiensis* Krasske.; Fig. 18. *N. intermedia* Hantzsch.; Fig. 19. *N. microcephala* Grun.; Fig. 20. *N. jugata* Gandhi; Fig. 21. *N. obtuse* W. Smith.

the species of *Oscillatoria*, *Spirogyra*, *Cosmarium*, *Synedra*, *Navicula*, *Pinnularia*, *Amphora*, *Cymbella*, *Gyrosigma*, *Nitzschia* and *Surirella*; constitutes 0.2-0.3%, Bacillariophyceae 85-90%, Chlorophyceae 1.5-2.0% and Cyanophyceae 1.5%.

N. tryblionella (Hantzsch) var. *levidensis* (W. Smith) Grun., (Plate. II, fig 15.)

Planktonic, very rare, only in lentic water bodies, forms associations with the species of *Oscillatoria*, *Spirogyra*,

Cosmarium, *Synedra*, *Navicula*, *Frustulia*, *Amphora*, *Cymbella*; constitutes 1 or 2 specimens in the sample; Bacillariophyceae 85-90%, Chlorophyceae 2-3% and Cyanophyceae 1.5-2.0%.

N. umblicata Hustedt., (Plate. III, fig. 23)

Planktonic, not common, in lotic & lentic water bodies, forms associations with the species of *Oscillatoria*, *Spirullina*, *Spirogyra*, *Pediastrum*, *Synedra*, *Navicula*, *Pinnularia*, *Caloneis*, *Cymbella*, *Gyrosigma*, *Hantzschia*, *Cymatopleura*,

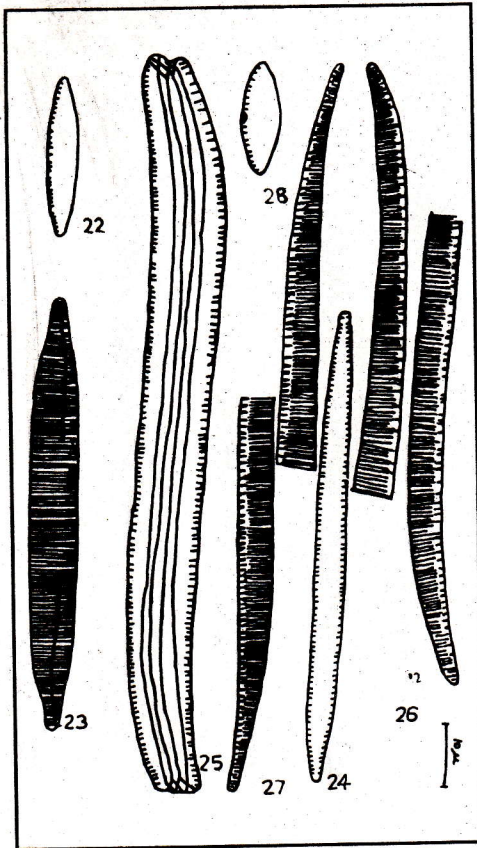


Plate-III (Figs. 22 to 27)

Fig. 22. *N. palea* (Kutz.) W. Smith; Fig. 23. *N. umblicata* Hustsedt.; Fig. 24. *N. sublinearis* Hustsedt.; Fig. 25. *N. sigmoidea* (Ehr.) W. Smith; Fig. 26. *N. lorenziana* Grun. var. *subtilis* Grun.; Fig. 27. *N. spectabilis* (Ehr.) Raifs.

Nitzschia and *Surirella*; constitutes 1 or 2 specimens in the sample, Bacillariophyceae 90%, Chlorophyceae 2.5-3.5% and Cyanophyceae 1.5-2.0%.
N. vasnaii Gandhi., (Plate I, fig. 7)

Planktonic, rare, only in lotic water bodies, forms associations with the species of *Oscillatoria*, *Spirullina*, *Spirogyra*, *Pediastrum*, *Closterium*, *Cosmarium*,

Synedra, *Navicula*, *Pinnularia*, *Cymbella*, *Gyrosigma*, *Nitzschia* and *Surirella*; constitutes 1-2 specimens in the samples, Bacillariophyceae 95%, Chlorophyceae 2.0-2.5% and Cyanophyceae 1.5-2.0%.

Acknowledgement

Author is thankful to the H.O.D., for providing the necessary facilities and to U.G.C. New Delhi, for financial support in the form of a major research project.

References

1. Anand V K 1977, Limnological studies of stream Gadigarh (Miran Sahib, Jammu) with special referenece to producers inhabiting the stream. *Ph.D. Thesis, University of Jammu, Jammu*, pp514.
2. Anand V K and Kant S, 1976, *Geobio*, 3 34
3. Langer G 1987, Eco-Morphological studies on some charophytes of Jammu (J&K State) *M. Phil. Dissertation, University of Jammu, jammu*.
4. Sharma S 1994, Productivity studies on submerged macrophytes in relation to physico-chemical characteristics of Lakes-Mansar & Surinsar, Jammu. *Ph.D. Thesis, Univ. of Jammu, Jammu*.
5. Hustadt V F 1930, Bacillariophyta (Diatomeae), *In a Pascher's Die Surswasser flora Mitteleuropas*. 10.
6. Foged N 1971, Fresh water diatoms in Thailand. *Nova Hedwigia*, 22 267-369.
7. Sarode P T and N D Kamat. 1984, Fresh water Diatoms of Maharashtra. *Publ. Saikripa Prakashan 299 N.I.C. CIDCO Aurangabad (M.S.)*, pp338.
8. Prasad B N and P N Srivastava 1992, Fresh water algal flora of Andaman & Nicobar Islands. *Vol. I. Publ. Bishen Singh Mahendra Pal Singh, Dehradun, U.P.*
9. Gandhi H P 1955, A contribution to our knowledge of the fresh water diatoms of Pratabgarh, Rajasthan. *J. Indian Bot. Soc.*, 34 304-338.
10. Gandhi H P 1960a, The diatom flora of Bombay & Salsette Islands. *J. Bombay Nat. Hist. Soc.*, 57(1) 78-123.
11. Gandhi H P 1960b, On the diatom flora of some ponds around Vasna Village near Ahmedabad. *J. Indian Bot. Soc.*, 39 558-567.
12. Gandhi H P 1998, Fresh Water Diatoms of central Gujarat-with a review and some others. *Publ. Bishen Singh Mahendra Pal Singh, DehraDun. U.P.*