

TAXONOMIC STUDIES ON *NITZSCHIA* (BACILLARIOPHYTA) FROM KASUR AND LAHORE DISTRICTS OF PAKISTAN

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Abstract: Specimens of algal genus *Nitzschia* Hassall (Nitzschiaceae, Bacillariales, Bacillariophyceae, Bacillariophyta) were collected from different freshwater habitats at Kasur and Lahore districts of the Punjab Province of Pakistan during May 2004 and January 2005. Nine species of the diatom were taxonomically determined and have been described for the first time from these areas.

Keywords: Algae, diatoms, Bacillariophyta, *Nitzschia*, taxonomy, freshwater

Introduction

After synoptical taxonomic study of Bacillariophyta from Peshawar Valley of Pakistan [1], several species of diatoms have been described from various areas of N. W. F. P., Punjab and Azad Kashmir [2-12]. A few species of freshwater diatoms have also been reported from Sindh Province [13-22]. However no detailed taxonomic investigation has yet been made on diatoms from any area of the country. During the recent research program, which was started in March 2003 [23], a large collection of diatoms was made from freshwater habitats of various districts of the Punjab, certain areas of N. W. F. P. and Azad Kashmir. As a result of that some species of *Cymbella* C. A. Agardh and *Navicula* Bory de Saint-Vincent, were taxonomically described [24,25]. In the present study, taxonomic descriptions of nine species of *Nitzschia* Hassall (Nitzschiaceae, Bacillariales, Bacillariophyceae, Bacillariophyta; according to the recently proposed classification [26]) have been presented.

Materials and Methods

The specimens were picked using a dropper

from the samples collected at various freshwater habitats (lakes, streams, stagnant water ponds, submerged stones) of Kasur and Lahore districts of the Punjab Province of Pakistan during May 2004 and January 2005. They were carefully washed, preserved in plastic bottles containing 3% formalin and taxonomically investigated according to the techniques as described earlier [24,25]. The diatom species were placed in 10% glycerin mounts and studied under a Zeiss (Germany) stereoscope. Identification of the specimens down to species level was carried out with the help of authentic literature [1, 27-30]. Drawings were made with the help of camera lucida. Most of the specimens were collected in vegetative condition and hence no information could be recorded on sexual reproduction. The voucher specimens are kept in the Phycology & Phycochemistry Lab. (Room No. 18), MAH Qadri Biological Research Centre, University of Karachi, where this study was carried out.

Results and Discussion

Nine species of *Nitzschia* Hassall were identified. They were taxonomically described

for the first time from the areas of collection in Pakistan. Their taxonomic enumerations are as follows.

***Nitzschia* Hassall 1845: 435, nom. cons.**

Frustules solitary and free floating; girdle straight, elongate or sigmoid with truncate ends; valve straight, linear or elliptical, attenuated to acute or subrostrate ends; carinal dot conspicuously present; striae transverse, punctate, coarse or fine; chromatophores one or two, elongate, with irregular margins. Its following species have been obtained from the collected samples which may be distinguished as follows (numbers in parenthesis below refer to the species shown in Fig. 1).

1. Valve minute *N. subtilis* (8)
Valve otherwise 2
2. Frustules up to 300 µm long *N. obtusa* (5)
Frustules less than 300 µm long 3
3. Valve up to 9 µm broad 4
Valve more than 9 µm broad 5
4. Frustules up to 170 µm long
..... *N. vermicularis* (9)
Frustules less than 170 µm long 6
5. Valve lanceolate *N. angustata* (1)
Valve otherwise 7
6. Frustules up to 78 µm long ... *N. regula* (7)
Frustules less than 78 µm long 8
7. Ends of valve rounded *N. punctata* (6)
Ends of valve slightly attenuated to obtuse
..... *N. communis* (2)
8. Valve up to 29 µm long .. *N. frustulum* (3)
Valve up to 70 µm long *N. linearis* (4)

1. *N. angustata* (W. Smith) Grunow, References: [3: 246, 27: 284, 28: 504].

General characters

Valve linear, lanceolate, swollen centrally

towards the keel side, ends blunt; keel marginal, carinal dots continued into striae; striae lineate, parallel; cell length 65-105 µm and breadth 8-12 µm; striae 5-9 within 10 µm; chromatophores one or two, elongated with irregular margins (Fig. 1).

Locality: Lahore District: Shalimar Garden (17-5-2004).

Geographical distribution: Afghanistan, Tibet, Poland, Faeröes (Denmark).

Remarks: The specimens were collected from fountain of Shalimar Garden at Lahore during summer. The material was obtained in vegetative form.

2. *N. communis* Rabenhorst 1860, References: [27: 284, 28: 525, 31: 302].

General characters

Frustules linear, slightly attenuated at obtuse ends; valve elliptical, lanceolate, attenuated towards obtuse ends; keel punctate; striae more than 30 within 10 µm; cell length 35-38 µm and breadth 7-10 µm; chromatophores one or two, elongated with irregular margins (Fig. 1).

Locality: Sheikhpura District: between Mureedke and Narang Mundi (19-9-2004).

Geographical distribution: U.S.A.: Philadelphia, Poland, Faeröes (Denmark).

Remarks: The material was obtained from paddy fields between Mureedke and Narang Mundi during autumn. The specimens were collected in vegetative form only, hence sexual reproduction could not be observed.

3. *N. frustulum* (Kützing 1844) Grunow in Cleve et Grunow 1880: 98, References: [27:284, 28: 521, 30: 83], **Basionym:** *Synedra*

frustulum Kützing 1844.

General characters

Valves 22-29 μm in length and 5-9 μm in breadth; chromatophores one or two (Fig. 1).

Geographical distribution: Afghanistan, Japan, Libya, Poland, Faeröes (Denmark).

Remarks: The specimens were collected from village of Jhulkey during winter. Sexual reproduction was not observed, and the material was obtained in vegetative form only.

4. *N. linearis* (C.A. Agardh) W. Smith 1853: 39, References: [1: 58, 2: 2, 28: 514, 29: 108, 30: 84, 31: 302].

General characters

Valve straight, linear; ends slightly acuminate; striae obscure; cell length 66-70 μm and breadth 7-8 μm ; chromatophores one or two (Fig. 1).

Locality: Lahore District: Mahmood Booti (2-1-2005).

Geographical distribution: Pakistan: Peshawar, Lahore; Libya, Poland.

Remarks: The specimens were obtained from pools near Mahmood Booti. The material was collected in vegetative form, hence sexual reproduction was not observed in them.

5. *N. obtusa* W. Smith 1853: 39, References: [28: 531, 30: 86].

General characters

Frustules sigmoid, rounded at the end; keel somewhat excentric, inflexed in the middle; the two medium puncta distinct, keel puncta 5-6 within 10 μm ; striae 26 within 10 μm ; cell length

300 μm ; chromatophores one or two (Fig. 1).

Locality: Lahore District: Minar-e-Pakistan (10-5-2004).

Geographical distribution: United States, Libya, Poland.

Remarks: The material was collected from the fountain of Minar-e-Pakistan at Lahore during summer. Sexual reproduction was not observed, and the specimens were obtained in vegetative form only.

6. *N. punctata* (W. Smith 1853) Grunow 1880: 68, Reference: [28: 502], **Basionym:** *Tryblionella punctata* W. Smith 1853.

General characters

Valve linear, elliptical, rounded at the ends; striae transverse, parallel, punctate; cell length 69-71 μm and breadth 11 μm ; chromatophores one or two (Fig. 1).

Locality: Lahore District: Mahmood Booti (3-10-2004).

Geographical distribution: Pakistan, Poland.

Remarks: The specimens were obtained from pools near Mahmood Booti during autumn. The material was collected in vegetative form, but sexual reproduction was not observed in them.

7. *N. regula* Hustedt 1922

General characters

Valve length 70-78 μm and breadth 7-9 μm ; chromatophores one or two (Fig. 1).

Locality: Kasur District: Jhulkey Village (22-12-2004).

Geographical distribution: Afghanistan, Europe.

Remarks: The material was collected from the village of Jhulkey at Kasur during winter. Sexual reproduction could not be observed in the specimens, which were collected in vegetative form only.

8. *N. subtilis* Grunow, Reference: [28:522].

General characters

Valve minute, linear, lanceolate; keel present; striae obscure or absent; chromatophores one or two (Fig. 1).

Locality: Kasur District: Kasur (22-12-2004).

Geographical distribution: India, Pakistan, Poland.

Remarks: The material was obtained from roadside puddles of Kasur during winter. The specimens were collected in vegetative form, hence sexual reproduction was not observed in them.

9. *N. vermicularis* (Kützing) Hantzsch in Rabenhorst 1860: 60, References: [1: 56, 4: 360, 8: 79, 10: 43, 13: 123, 14: 1967, 22, 186, 27: 283, 28: 527, 30: 89].

General characters

Frustules solitary; girdle sigmoid with truncate ends; valve sigmoid, linear, slightly attenuated towards the end; keel punctate; cell length 90-170 μm and breadth 6-9 μm ; chromatophores one or two (Fig. 1).

Locality: Lahore District: Shalimar Garden (29-7-2004).

Geographical distribution: Pakistan: Peshawar; Libya, Poland, Faeröes (Denmark).

Remarks: The specimens were collected from

the fountain of Shalimar Garden at Lahore during summer. Sexual reproduction could not be observed. The material was obtained in vegetative form only.

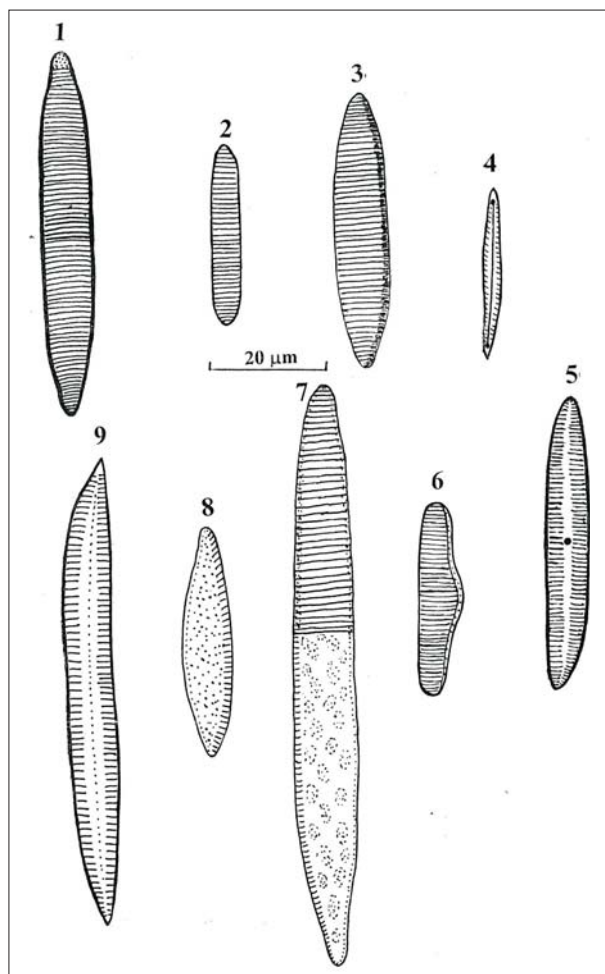


Fig. 1. Species of *Nitzschia* from Pakistan. (1) *N. angustata*, (2) *N. communis*, (3) *N. frustulum*, (4) *N. linearis*, (5) *N. obtusa*, (6) *N. punctata*, (7) *N. regula*, (8) *N. subtilis* and (9) *N. vermicularis*.

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