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TAXONOMIC STUDY OF SOME DIATOMS FROM JAUHARABAD DISTRICT

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Abstract

Four species of algae, belonging to 4 different genera of pinnate diatoms (phylum Bacillariophycota Shameel) were collected from freshwater habitats in the Jauharabad District, Punjab Province of Pakistan during February and April 1995 and taxonomically investigated. This is the first report of their occurrence from this area.

Introduction

Several studies were made on the taxonomy of pinnate diatoms from various areas of the Punjab Province of Pakistan during previous years (Shahida *et al.,* 2006; Tariq-Ali *et al.,* 2006, 2007, 2008; Husna *et al.,* 2007; Chughtai *et al.,* 2011). This initiated great interest in the understanding of diatom flora from this area. As a result of that preserved material, which was collected from Jauharabad District, was brought to Karachi and taxonomically investigated.

Materials and Methods

Specimens were collected from various freshwater habitats in Jauharabad District, Punjab Province of Pakistan during February and April 1995. They were preserved in 4% formaline in small vials and brought to the lab at Karachi. The temperature of water was noted with the help of thermometer and pH was observed by using pH paper. The preserved material was taxonomically investigated, and the microscopic studies were carried out as described earlier (Tariq-Ali *et al.,* 2006). The individual species were identified with the help of authentic literature (Østrup, 1908; Kolbe & Krieger, 1942; Hendey, 1951; Starmach, 1964; Foerster & Schlichting Jr., 1965; Simonsen, 1974; Nizamuddin 1984; Cooper, 2001; Miho & Witkowski, 2005; Zalack *et al.,* 2006; 2008; Hamed, 2008; Şahin *et al*., 2010; Sevindik, 2010). Most of the observations were made in temporary mounts in water. Sketches were made with the help of camera lucida and measurements were taken with the help of calibrated ocular micrometer. The voucher specimens are kept in the Phycology & Phycochemistry Lab. (Room No. 18), MAH Qadri Biological Research Centre, University of Karachi, where this research work was undertaken.

Results and Discussion

The collected specimens revealed the presence of four species, belonging to four different genera of the order Bacillariales, class Bacillariophyceae, phylum Bacillariophycota (*fide* Shameel, 2001, 2008, 2012). The taxonomic enumerations of various taxa are given below.

Family Bacillariaceae

Unique motile colonies, cells linked to each other via a rige and groove arrangement of their raphe system, able to move over each other, fiber-like configuration; cells seen in valve or girdle view. Only following genus of this family was found in the present collection.

Bacillaria J. F. Gmelin *in* Linnaeus 1791: 3903

Frustules isopolar; valves shallow, bilaterally symmetrical, linear or linear-lanceolate; pointed, rounded, cuneate to slightly rostrate poles; striae transverse, appearing as simple lines; raphe system fibulate, central; two chloroplasts per cell, one towards each pole. The present collection included only following species.

1. *B. paxillifer* (O.F. Müller) T. Marsson 1901: 254

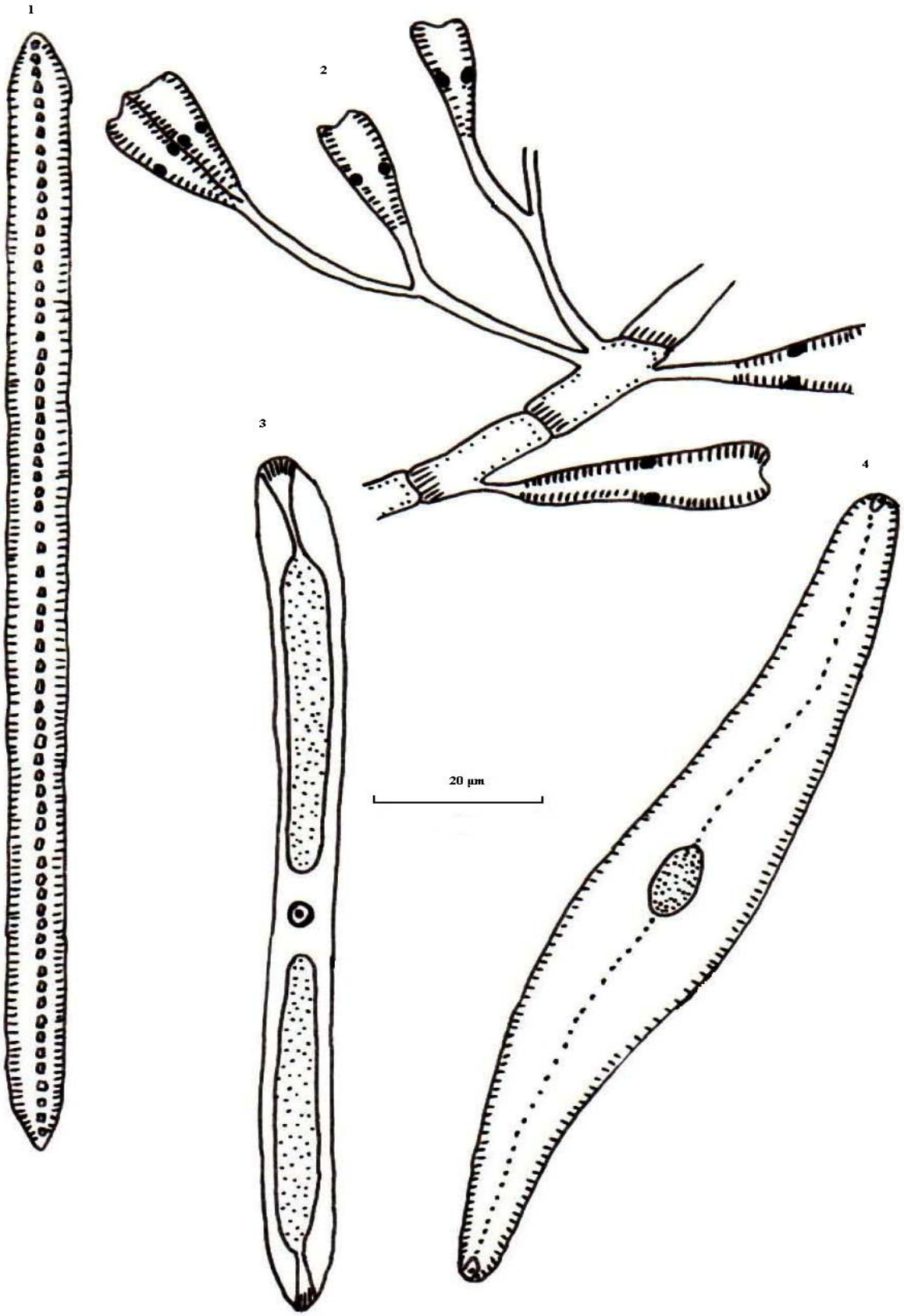
Basionym: *Vibrio paxillifer* O.F. Müller.
Synonymy: *Bacillaria paradoxa* J. F. Gmelin 1788: 3903, *Oscillaria paxillifera* (O.F. Müller) Schrank 1823: 539, *Nitzschia paxillifer* (O.F. Müller) Heilberg 1863: 113, *Nitzschia paradoxa* (J. F. Gmelin) Grunow 1880:85, *Oscillatoria paxillifera* (O.F. Müller) Schrank *ex* Gomont 1892: 239, *Homeocladia paxillifer* (O.F. Müller) Elmore 1921:143.
References: Hendey, 1951: 74; Simonsen, 1974: 49; Nizamuddin, 1984: 28; Tariq-Ali *et al.,* 2008: 120.
General characters: Cells forming a colony, 197-200 µm long; breadth of the cell at the centre 12.9 µm while at the tip 6-12 µm broad; keels central; costae 20 within 10 µm (Fig. 1).
Locality: Jauharabad (16-2-1995).
Geographical distribution: Previously collected from Europe and U. S. A.
Remarks: Specimens were collected from a freshwater pond.

Family Gomphonemaceae

Frustules are longitudinal in symmetry in valve view but transversely asymmetrical, they are broader at one end. The dendroid colonial habit is sometimes given as a secondary character, auxospores are formed. The following genus of this family was present in this collection.

Gomphonema Ehrenberg 1832: 87

Frustules solitary or in groups; sessile or borne in gelatinous stalks, girdle cuneate; valve lanceolate, ends obtuse or capitate; striae lineate or punctate, delicate or bead like; raphe straight with polar and central nodules; axial area narrow, inflexed in the middle, containing an isolated, unilateral puncta; chromatophores one or more, broadly lobed, extending over the entire valve face. Its following species has been identified.



Figs. 1-4. Diatoms from Jauharabad: 1. *Bacillaria paxillifer*, 2. *Gomphonema ghosea*, 3. *Nitzschia vermicularis*, 4. *Gyrosigma acuminatum*.

2. *G. ghosea* Abdul-Majeed

References: Inam *et al.,* 1986: 2; Leghari & Sultana, 1993: 15; Leghari *et al.,* 2004: 42; Tariq-Ali *et al.,* 2008: 135.
General characters: Frustules epiphytic, girdle straight, cuneate; valve clavate, attenuated towards the base and gibbous towards the upper part with pin-head like apex; striae lineate or closely punctuate; axial area narrow, linear with an isolated punctum on one side of the central nodule; length 30-40 µm with 10-16 µm at tip and 7-9 µm at the base; striae 10-12 within 10 µm; chromatophores two, elongated with irregular lobes (Fig. 2).
Locality: Jauharabad (16-4-1995).
Geographical distribution: Previously reported from India.
Remarks: Material was obtained from a freshwater pond.

Family Nitzschiaceae

Single, excentric, keel next to the lateral margin of valve and a raphe adjacent to small dot in the region of keel. The valves are symmetrical with respect to longitudinal axis. Frustules may be rectangular, auxospores are formed. The following, typical genus of this family has been collected.

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

Frustules solitary and free-floating or in group; girdle straight, elongate or sigmoid with truncate ends; valve straight, linear or elliptical, attenuated to acute or subrostrate ends; keel (with raphe) of the 2 valves diagonally opposite, carinal dot conspicuously present; striae transverse, punctate, coarse or fine; chromoatophores one or two, elongate, with irregular margins. The present collection included only following species.

3. *N. vermicularis* (Kützing) Hantzsch *in* Rabenhorst 1848: 60

References: Østrup, 1908: 283; Salim & Khan,1960: 56; Starmach, 1964: 527; Nizamuddin, 1984: 89; Daudpota & Leghari, 1993: 123; Jahangir *et al.,* 2000: 190; Leghari *et al.,* 2004: 43; Shahida *et al.,* 2006: 179; Tariq-Ali *et al.,* 2006: 154; Husna *et al.,* 2007: 61.
General characters: Frustules solitary; girdle sigmoid with truncate ends; valve also sigmoid, linear, slightly attenuated towards the ends; frustule length 197-200 µm and breadth 8-9 µm (Fig. 3).
Locality: Jauharabad (25-4-1995).
Geographical distribution: Previously collected from Libya, Poland and Faeröes (Denmark).
Remarks: Specimens were collected from a freshwater pond.

Family Pinnulariaceae

Frustules solitary and free-floating; girdle linear, rectangular or broadly elliptical; valve linear or lanceolate, sublunate; raphe straight, arcuate, with central and polar nodules; striae transverse, punctate, parallel or radiate; chromatophores two or more with pyrenoids. The following genus of this family was collected.

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

Frustules solitary and free-floating, lanceolate; girdle straight and linear, oblong; valve convex, sigmoid, gradually attenuated towards acute or broadly rounded poles; striae in two delicate sets crossing one another at right angles; median line (raphe) with curvature; central and polar nodules present; chromatophores two or more, elongated with irregular outline and lie on opposite sides of the girdle. Collected material included only following species.

4. *G. acuminatum* (Kützing) Rabenhorst 1853: 47

Basionym: *Frustulia acuminata* Kützing 1833.
Synonymy: *Sigmatella acuminata* (Kützing) Brébisson *et* Godey 1835, *Navicula acuminata* (Kützing) Kützing 1844, *Pleurosigma acuminatum* (Kützing) W. Smith 1852, *Pleurosigma acuminatum* (Kützing) Grunow 1860.
References: Østrup, 1908: 262; Kolbe & Krieger, 1942: 344; Salim & Khan, 1960: 38; Hirano, 1964: 189; Starmach, 1964: 412; Foerster & Schlichting Jr., 1965: 491; Nizamuddin, 1984: 60; Masud-ul-Hasan & Yunus, 1989: 121; Daudpota & Leghari, 1993: 122; Cooper, 2001: 609; Miho & Witkowski, 2005: 143; Shahida *et al.,* 2006: 180; Zalack *et al.,* 2006: 310, Tariq-Ali *et al.,* 2007: 1802; Begum, 2008: 15; Hamed, 2008: 11; El-Seekh *et al.,* 2010: 2629; Şahin *et al.,* 2010: 444; Sevindik, 2010: 300; Yilmaz & Güleçal, 2012: 1137.
General characters: Frustules solitary but in large masses; valve sigmoid, gradually tapering from middle towards obtuse ends; striae not distinct, median line, central nodule and plastids clear; length of cell 119-121 µm, breadth in middle of the cell 15-17 µm and at the end 3-4 µm (Fig. 4).
Locality: Jauharabad (16-4-1995).
Geographical distribution: Previously reported from Afghanistan, India, Libya, Ontario (Canada) and Poland.
Remarks: Material was obtained from a freshwater pond.

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