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RESEARCH ARTICLE

A SYSTEMATIC ACCOUNT OF THE FRESH WATER DIATOM FROM KAYLANA LAKE OF JODHPUR DISTRICT, RAJASTHAN (INDIA)

Prakash Narayan and G. K. Barupal

Department of Botany, Govt. Dungar College, Bikaner (Rajasthan)

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ABSTRACT

In the present paper fresh water diatom of Kaylana lake, Jodhpur were investigated between July, 2013 to June, 2014. Thirty two species of diatom were identified. These species are represented by 15 genera viz. *Amphora* (1), *Navicula* (4), *Diadesmus* (1), *Gyrosigma* (2), *Stauronies* (1), *Gomphonema* (6), *Cymbella* (3), *Eunotia* (1), *Fragilaria* (3), *Synendra* (3), *Ctenophora* (1), *Nitzschia* (2), *Achnanthes* (1), *Cocconies* (1) and *Cyclotella* (2). All the taxa were recorded for the first time from the study area.

Key words:

Systematic, Fresh water,
Diatom, Kaylana Lake

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INTRODUCTION

Diatoms are ubiquitous, unicellular algae that form the basic bulk of planktonic population in the fresh water characterized by having a cell wall of silica. The wall consists of two valves that have more or less flat surface, held together by a girdle. Diatom from different region of India has been described by a various workers. Pascher (1930) described the large number of diatoms belonging to the central and pannaes group in his monograph "Die Süsswasserflora". Venkataraman (1939, 1956) gave a systematic account of South Indian Diatoms.

Krishnamurthy (1952) made a contribution to the diatom flora of South India. Gonzalves and Gandhi (1952, 1953) have given a systematic account of the diatoms of the Bombay and Salsette. Gandhi (1955, 1956, 1960, 1961) made extensive studies on the fresh water diatomaceae of India. Sarode and Kamat (1983) studied on fresh water diatoms of Vidarbha. Jena *et al.* (2006) reported the diatoms from Orissa state and its neighbouring region. Patil and Kumawat (2007) worked on the centric diatom of Abhora Dam, Jalgaon, Maharashtra. Jadhwar and Papdiwal (2012) studied the diatom diversity of Nath Sagar water reservoir, Maharashtra

Our information regarding the diatom of Rajasthan is known through the work of Gandhi (1955), Trivedi (1982), Jakhar *et al.* (1992), Dadheech *et al.* (2000), Kumar *et al.* (2009), Barupal (2009, 2011). Singh *et al.* (2010) and Pareek *et al.*

(2011). But no work has been done on the diatoms of Kaylana Lake. Hence, the present study is an attempt to fill this gap.

MATERIALS AND METHODS

Kaylana Lake is situated about 8 km in the west of Jodhpur city. It lies at 26°29' N latitude and 72°96' E longitude. It receives water from Hathinahar which is further connected to the Indira Gandhi Canal. The depth of this lake varies from 5 feet to 50 feet with maximum towards south-west, and it has a capacity of 191 mcft. of water. The lake is spread over 84 square km. This lake retains water throughout the year and also a main source of water for drinking purpose in Jodhpur city.

In the present investigation, shallow water zone and deep water zones of Kaylana lake were selected. Samples were collected at monthly intervals for a period of one year from July 2013 to June 2014.

For detailed study of diatom, diatom valve were cleaned with concentrated hydrogen peroxide to eliminate organic matter and later with HCl to dissolve calcium carbonates. After washing with distilled water, samples were mounted on a slide with Naphrox.

Clean frustules were examined for their morphological investigations. Using light microscope (1000 magnification) at least 500 valves (per slide) were counted and identified to species. Identification of diatom up to species level was made

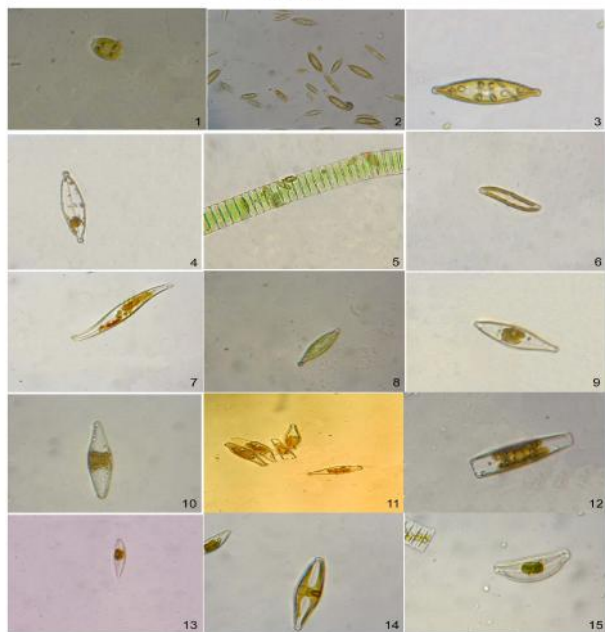
*Corresponding author: Prakash Narayan

Department of Botany, Govt. Dungar College, Bikaner (Rajasthan)

following the key characters suggested by Gonzalves and Gandhi (1953), Gandhi (1955, 1960), Prescott (1975), Sarode and Kamat (1983), Desikachary (1989), Round (1990), Taylor *et. al.* (2005) and Karthick *et al.*(2010).

RESULTS AND DISCUSSION

PLATE – 1



1. *Amphora ovalis* 2. *Navicula amphirhynchus* 3. *Navicula cuspidata* 4. *Navicula rhynchocephala*
5. *Diadesmus confervacea* 6. *Gyrosigma scalproides* 7. *Gyrosigma acuminatum* 8. *Stauronion*
anceps 9. *Gomphonema subventricosum* 10. *Gomphonema lanceolatum* 11. *Gomphonema*
parvulum var. *micropus* 12. *Gomphonema parvulum* var. *lanceolatum* 13. *Gomphonema*
subclavatum 14. *Gomphonema gracile* var. *lanceolatum* 15. *Cymbella tumida*

Systematic account

Order : Naviculales

Family : Catenulaceae

Genus: *Amphora* Ehrenberg ex Kutzing

Amphora ovalis Kutz. [Plate – 1(1), Fig. – 1F]

Frustule has more excentric axial field, raphe gibbous, central nodules close to concave margin of the valve, cells elliptical in girdle view with truncate ends, intercalary bands ornamented with punctae or striae, Frustule 12-20 μ broad, 33-52 μ long.

Family : Naviculaceae

Genus: *Navicula* Bory

Navicula elegans Wm. Smith [Fig. – 1 B]

Cells solitary, valve elliptical-lanceolate with sub rostrate apices, axial area narrow, straight, central area large orbicular or quadrate, valve sriate radiate at middle and curved middle, raphe clear, number of striae in 10 μ 15-16, Frustule 28-32 μ broad, 75-95 μ long.

Navicula amphirhynchus Ehrenberg [Plate – 1(2)]

Frustules broadly elliptic- lanceolate with quitenarrowly rostrate apices, apices constructed to form truncate, longer than broad, striation barely visible in fresh material, Frustule 10-20 μ broad, 50-100 μ long.

Navicula cuspidate Kutz. [Plate – 1(3)]

Valve rhombic-lanceolate with slightly produced rounded ends, longitudinal striae 18-20 in 10 μ m and transverse striae 16 in 10 μ m, somewhat coarse and perpendicular to the middle line. Frustule 27-30 μ broad, 110-130 μ long.

Navicula rhynchocephala Kutzing [Plate – 1(4)]

Valve 47.5 μ long 10 μ broad, transverse striations medianly radial, polarly convergent, 11-12 in central part, and 8-9 in 10 μ m at the ends, Frustule 10 μ broad, 47.5 μ long.

Genus: *Diadesmus* Kutzing

Diadesmus confervacea Kutzing [Plate – 1(5)]

Frustules attached side by side to form ribbon shaped colony, filamentous, gelatinous, rectangular in girdle view, truncate flat, slightly gap between the valves at the middle striation not distinct, Frustule 6-14 μ broad, 10-30 μ long

Genus: *Gyrosigma* Hassal

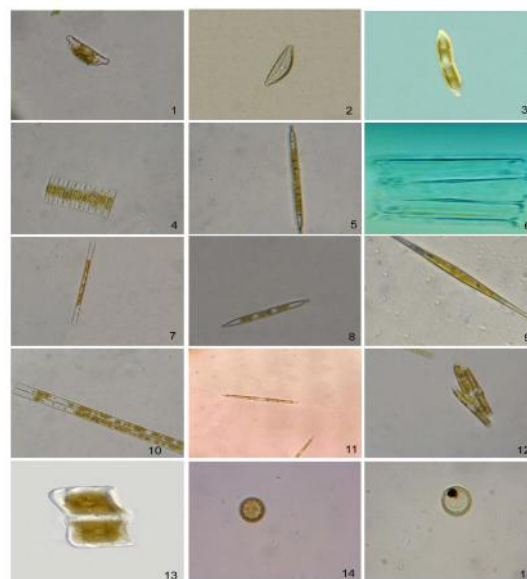
Gyrosigma acuminatum (Kutz.)Rabh. [Plate – 1(7)]

Valve linear, solitary, sigmoid toward end with obtuse ends, arial area narrow, raphe sigmoid, central area elliptical, striae equidistant, number of striae 17-18 in 10 μ m, Frustule 14-18 μ broad, 120-135 μ long.

Gyrosigma scalproides (Rabh.) Cleve [Plate – 1(6), Fig. – 1C]

Valve linear, sigmoid toward end with obtuse ends, arial area narrow, central area not clear. Frustule 6-7 μ broad, 50-65 μ long.

PLATE – 2



1. *Cymbella tumida* f. *ventricosa* 2. *Cymbella cymbiformis* 3. *Eunotia amphioxys*
4. *Fragilaria crotonensis* 5. *Fragilaria virescens* 6. *Fragilaria construens* 7. *Synedra ulna*
8. *Synedra ulna* var. *amphirhynchus* 9. *Synedra acus* 10. *Ctenophora pulchella* 11.
Nitzschia acicularis 12. *Nitzschia obtusa* var. *scalpelliformis* 13. *Achmanthes inflata* 14.
Cyclotella bodanica 15. *Cyclotella kutzingiana*

Genus : Stauronies Ehrenberg

Stauronies anceps Ehrenberg [Plate – 1(8)]

Valve lanceolate to linear lanceolate, apices protracted and narrowly rostrate, axial area moderately wide and linear, expanding slightly near the central area, central area narrow rectangular striae, hardly expanded toward valve margin, raphe lateral, striae radiate throughout, areolae 20-28 in 10µm, Frustule 12-15 µ broad, 48-76 µ long.

Family : Gomphonemaceae

Genus : Gomphonema Ehrenberg

Gomphonema parvulum (Kutz.) Grun. [Plate – 1(11)]

Valve clavate with sub-cuneate apices, valve surface striate, striae clearly separated, parallel, axial area narrow, central area clear orbicular, number of striae 10-11 in 10 µ, raphe straight Frustule 12-16 µ broad, 38-42 µ long.

Gomphonema parvulum var. *micropus* (Kutz.) Cleve [Plate – 1(12)]

Frustule small linear-cuneate, asymmetrical, end truncate, both base obtuse, striation distinct, marginal, parallel, striae 8-10 in 10 µ, Frustule 5-10 µ broad, 10-30 µ long.

Gomphonema lanceolatum Ehr. [Plate – 1(10), Fig. – 1E]

Valves are found in mucous on higher algae or on hydrophytes, valve weakly clavate with rounded apices, valve surface punctate, Striae well separated, distinct, radiate at centre and convergent at apex, number of striae 11-13 in 10 µ, axial area wide, clear, linear, raphe straight, Frustule 38-45 µ broad, 8-12.5 µ long.

Gomphonema subventricosum Hustedt [Plate – 1(9)]

Valve 44 µ long, 12 µ broad, striae 11 in 10 µ.

Gomphonema gracile var. *lanceolatum* (Kutz.) Cleve [Plate – 1(14)]

Valve linear, clavate with capitate rostrate end on upper part while cuneate at lower part, axial area narrow clear, linear, central area not distinct, valve surface striate, parallel throughout valve, raphe straight with central nodules somewhat curved at poles, Frustule 8-11 µ broad, 31-49 µ long.

Gomphonema subclavatum Grunn. [Plate – 1(13)]

Valve linear-clavate with rounded apices, axial area narrow, indistinct at apex, central area clear, linear, lanceolate, valve surface striate, striae radiate at middle and parallel at poles, Frustule 7-10 µ broad, 24-32 µ long.

Family : Cymbellaceae

Genus : Cymbella Agardh

Cymbella tumida (Breb.) Van Heurck. [Plate – 1(15)]

Valve semi-lanceolate with rostrate apices, axial area narrow, central area rounded, clear, valve surface finely punctate, striae

sharply radiated, number of striae 12-13 in 10 µ, ventral margins slightly concave, Frustule 21 µ broad, 65-85 µ long.

Cymbella tumida f. *ventricosa* Gandhi [Plate – 2(1)]

This specimen differs from type specimen by size, rounded apices, slightly convex ventral margin and wide central area, number of striae 10-12 in 10 µ, Frustule : 14-18 µ broad, 45-72 µ long.

Cymbella cymbiformis (Kutzing) Brebisson [Plate – 2(2)]

Valves naviculoid, strongly curved, dorsally convex, ventrally near straight, with slight median expansion, raphe excentric, broad, area narrow, somewhat medianly widened, transverse striations radiate. number of striae 8 in 10 µ, Frustule 10 µ broad, 50 µ long.

Family : Eunotiaceae

Genus : Eunotia Ehr.

Eunotia amphioxys Ehrenberg [Plate – 2(3)]

Frustules boat shaped, at the middle lower valve depressed with punctate keel, upper valve slightly convex, pectinated at the ends, Frustule 5-12 µ broad, 50-90 µ long.

Order : Achnanthales

Family : Achnanthaceae

Genus : Achnanthes Bory

Achnanthes inflata Kutzing [Plate – 2(13)]

Valve lanceolate to rod shaped with rounded or cuneately rounded ends, valves joined side by side to form a ribbon shaped structure, striation not visible, Frustule 10-15 µ broad, 30-50 µ long.

Family : Cocconiedaceae

Genus : Cocconies Ehrenberg

Cocconies pediculus Ehrenberg [Fig. – 1A]

Frustules ovoid to elliptical, with marginal bend, lanceolate outline, rounded end, striation not visible in fresh material, Frustule 10-17 µ broad, 20-25 µ long.

Order : Fragilariales

Family : Fragilariaceae

Genus : Fragilaria Lyngbye

Fragilaria crotonensis Kitton. [Plate – 2(4)]

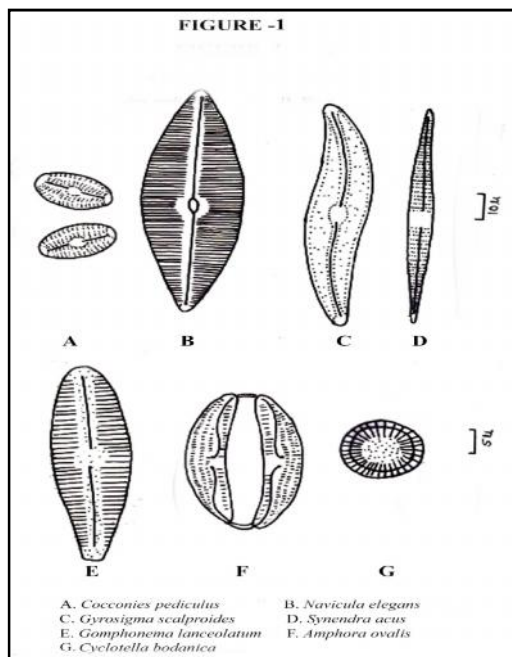
Valve broadly elliptical, bilaterally symmetrical frustules, number of striae 14-15 in 10 µ, Frustule 5 µ broad, 90 µ long.

Fragilaria virescens (Ralfs) D.M. Williams & Round [Plate – 2(5)]

Frustules in girdle view linear rectangular, united together to form long bands, ribbon shapes colonies, valve linear with parallel sides. Unilateral central area, pseudoraphe, striation distinct but absent in middle region, Frustule 5-15 µ broad, 70-120 µ long.

Fragilaria consrtuens (Ehr.) Grunow [Plate – 2(6)]

Cell rectangular in girdle view, bound into long lightly closed ribbon, girdle side crossed by broad band on account of transapical inflation. Striae 18 in 10 μ , Frustule 8 μ broad, 19 μ long.



Genus : Synendra Ehrenberg

Synendra acus Kutzing [Plate – 2(9), Fig. – 1D]

Valve end capitates, valve not inflated at middle, long, central area clear, linear, number of striae 15 in 10 μ , Frustule 4-7 μ broad, 90-100 μ long.

Synendra ulna (Nitz.) Ehr. [Plate – 2(7)]

Valve linear with constricted, produces ends, Striae 9-10 in 10 μ , Frustule 6-8 μ broad, 96-145 μ long.

Synendra ulna var. *amphirhynchus* (Ehrenberg) Grunow [Plate – 2(8)]

Frustules slender, linear, straight, at the end narrow and slightly constricted to form rounded end, longer than broad, striation distinct, parallel, absent at the middle striae 9-12 in 10 μ , Frustule 8-10 μ broad, 100-200 μ long

Genus : Ctenophora Kutzing

Ctenophora pulchella (Ralfs ex Kutzing) D.M. Williams & Round [Plate – 2(10)]

Elongated frustules, with truncate apices, valve surface striae, striae transverse, punctuate, striae 12-13 in 10 μ , Frustule 10-14 μ broad, 150-170 μ long.

Order : Bacillariales

Family : Bacillariaceae

Genus : Nitzschia Hassal

Nitzschia acicularis W. Smith. [Plate – 2(11)]

Frustule small, needle like extremities, presence of rapidity in movement. Valve long, linear with parallel margins and broadly cuneate, slightly constricted rounded apices, striae very fine, lineate, delicate parallel throughout the valve, Frustule 4.5 μ broad, 65-70 μ long.

Nitzschia obtusa var. *scalpelliformis* Grunow [Plate – 2(12)]

Valve 65 μ long, 9 μ broad, carnial dots 7 in 10 μ in diameter.

Order : Thalassiosirales

Family : Stephanodiscaceae

Genus : Cyclotella Kutzing

Cyclotella bodanica Eulenstein ex Grunow [Plate – 2(14), Fig. – 1G]

Marginal zone with 11 striae in 10 μ , finely lineate, 2-3 isolated punta in 10 μ , intermediate zone covered by irregular rows of puncta, central zone covered with sparse puncta, Frustule 23 μ Diameter.

Cyclotella kutziangiana Thwaites

Width of frustules 7.2-8.6 μ [Plate – 2(15)]

In the present investigation, 32 diatom taxa belonging to 15 genera of different orders were systematically enumerated. Out of 30 taxa, Naviculales order represents 19 species of 8 genera followed by Fragilariales with 7 species of 3 genera, Achnanthales with 2 species of 2 genera, Bacillariales with 2 species of 1 genera and Thalassiosirales with 2 species of 1 genera. In this group, *Gomphonema diatom* was observed dominant with many species.

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