

PENNATE DIATOM FLORA OF A COLDWATER MOUNTAIN RIVER, THE ALAKNANDA : SUBORDER RAPHDIOIDEAE AND MONORAPHIDEAE

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The Raphidiod and Monoraphid diatom flora of the Himalayan river Alaknanda were represented by 5 and 24 taxa, respectively. While *Eunotia* was the sole Raphidiod genera, the Monoraphids included *Cocconeis*, *Achnanthes* and *Rhoicosphenia*. *Achnanthes* alone accounted for 21 taxa while *Rhoicosphenia* and *Cocconeis* were represented by 2 and 1 taxa, respectively.

Key Words : Pennate diatoms, Alaknanda, Raphidioideae, Monoraphideae.

Freshwater diatoms have been extensively studied in some parts of India. According to Sarode and Kamat (1984), Gonzalves (1947), Gandhi (1956b, 1957a,c, 1958b, 1959c, 1960b, 1962a,b) and Thomas and Gonzalves (1965) have contributed immensely to diatom flora of Maharashtra. He has also enumerated a number of other authors (Ehrenberg 1854, Dickie 1882, Skvortzov 1935, Singh 1939, 1961, 1962, 1963) who have contributed variously to freshwater diatom flora of India. However, the Himalayan rivers have been scantily investigated for their diatom flora, especially in case of the Ganga river system. The results presented herein pertain mainly to the Raphidiod and Monoraphid diatom flora of the coldwater river Alaknanda.

The samples for study were collected from 3 different locations within a 2 Km. stretch of the Alaknanda during 1991-92. Collections were preserved in 4% formalin. Brun's method described by Sarode and Kamat (1984) was adopted for processing the sample and permanent mounts were prepared in canada balsam for microscopic examination. Identifications were made according to Sarode and Kamat (1984) and Hustedt and Jensen (1985).

RESULTS

Sub-order - Raphidioideae
Genus - *Eunotia* Ehrenberg, 1837

1. *Eunotia arcus* Ehrenberg, 188
Hustedt & Jensen 1985, p. 255, f. 748 (a-c).
Valves 27-46 μm long and 4-6 μm wide, striae 14-15 in 10 μm .

2. *Eunotia exigua* (Breb.) Rabenhorst, 1864
Hustedt & Jensen 1985, p. 258, f. 751 (a-r).
Valves 20-25 μm long and 3 μm wide; striae 18-20 in 10 μm .
3. *Eunotia pectinalis* var. *minor* (Kutzing) Rabenhorst 1864
Hustedt & Jensen 1985, p. 268, f. 763 (d-f).
Valves 23 μm long and 4 μm wide; striae 19-20 in 10 μm .
4. *Eunotia praerupta* var. *bidens* (W. Sm.) Grunow, Van Heurck 1896 Hustedt & Jensen 1985, p. 253, f. 747 A (i-m).
Valves 34-43 μm long and 6 μm wide; striae 8-9 in 10 μm .
5. *Eunotia tenella* (Grun.) Hustedt, 1913
Hustedt & Jensen 1985, p. 256, f. 749.
Valves 20-21 μm long and 4-4.5 μm wide; striae 16-18 in 10 μm .
Sub-order - Monoraphideae
Genus - *Cocconeis* Ehrenberg, 1838.
6. *Cocconeis placentula* var. *euglypta* (Ehr.) Cleve
Hustedt & Jensen 1985, p. 308, f. 802 (c).
Valves 15-32 μm long and 8-16 μm wide; striae 23-24 in 10 μm .
Genus - *Achnanthes* Bory, 1822
7. *Achnanthes austriaca* Hustedt, 1922
Hustedt & Jensen 1985, p. 335, f. 831.
Valves 17-25 μm long and 5-6 μm wide; striae 9-11 in 10 μm .

9. *Achnanthes Clevei* var. *rostrata* Hustedt
Hustedt & Jensen 1985, p. 341, f. 839 (c,d).
Valves 15-23 μm long and 5-8 μm wide; striae 12-20 in
10 μm .
10. *Achnanthes delicatula* (Kutz.) Grunow, 1880
Hustedt & Jensen 1985, p. 339, f. 836.
Valves 10.5-32 μm long and 5-7 μm wide; striae
17-20 in 10 μm .
11. *Achnanthes exigua* Grunow, 1880
Hustedt & Jensen 1985, p. 336, f. 832 (a,b).
Valves 14-15 μm long and 4-6 μm wide; striae 23-
24 in 10 μm .
12. *Achnanthes exilis* Kutzing, 1833
Hustedt & Jensen 1985, p. 330, f. 822.
Valves 13-16 μm long and 3.5-4 μm wide; striae
19-20 in 10 μm .
13. *Achnanthes fragilarioides* Petersen, 1924
Hustedt & Jensen 1985, p. 353, f. 862.
Valves 8-18 μm long and 4-5 μm wide; striae 11-
15 in 10 μm .
14. *Achnanthes Grimmei* Krasske, 1925
Hustedt & Jensen 1985, p. 347, f. 851.
Valves 13 μm long and 4 μm wide; striae 19 in 10
 μm .
15. *Achnanthes Hauckiana* Grunow, 1880
Hustedt & Jensen 1985, p. 338, f. 834.
Valves 14-30 μm long and 5-6 μm wide; striae 11-
15 in 10 μm .
16. *Achnanthes kryophila* Petersen, 1929
Hustedt & Jensen 1985, p. 349, f. 854.
Valves 10-20 μm long and 3-5 μm wide; striae 19-
20 in 10 μm .
17. *Achnanthes lanceolata* (Breb.) Grunow, 1880
Hustedt & Jensen 1985, p. 345, f. 863 (a-d).
Valves 14-33 μm long and 5-8 μm wide; striae 13-
17 in 10 μm .
18. *Achnanthes lanceolata* forma *capitata* O. Muller,
1909
Hustedt & Jensen 1985, p. 335, f. 863 (g, h).
Valves 16-18 μm long and 3-6 μm wide; striae 15-
17 in 10 μm .
19. *Achnanthes lanceolata* var. *elliptica* Cleve, 1891
Hustedt & Jensen 1985, p. 356, f. 863 (n, o).
Valves 7-25 μm long and 4-6 μm wide; striae 13-
18 in 10 μm .
20. *Achnanthes lanceolata* var. *rostrata* (Ostrup)
Hustedt, 1911.
Hustedt & Jensen 1985, p. 356, f. 863 (i-m).
Valves 10-28 μm long and 3.5-7 μm wide; striae
13-17 in 10 μm .
21. *Achnanthes lanceolata* forma *ventricosa* Hustedt,
1914.
Hustedt & Jensen 1985, p. 355, f. 863 (e.f.).
Valves 13-31 μm long and 5-8 μm wide; striae 13-
15 in 10 μm .
22. *Achnanthes linearis* (W. Sm.) Grunow, 1880
Hustedt & Jensen 1985, p. 329, f. 821 (a,b).
Valves 10-25 μm long and 3-6 μm wide; striae 22-
28 in 10 μm .
23. *Achnanthes minutissima* Kutzing, 1833
Hustedt & Jensen 1985, p. 329, f. 820 (a-c).
Valves 8-31 μm long and 2-4 μm wide; striae 27-
28 in 10 μm .
24. *Achnanthes rupestris* Krasske, 1932
Hustedt & Jensen 1985, p. 352, f. 859.
Valves 7-9 μm long and 4 μm wide; striae 17-18 in
10 μm .
25. *Achnanthes saxonica* Krasske, nov. spec.
Hustedt & Jensen 1985, p. 350, f. 854 B.
Valves 10-14 μm long and 3.5-4.5 μm wide; striae
14-15 in 10 μm .
26. *Achnanthes Suchlandti* Hustedt, nov. spec.
Hustedt & Jensen 1985, p. 352, f. 859 B.
Valves 9-12 μm long and 3-5 μm wide; striae 20-
23 in 10 μm .
27. *Achnanthes trigibba* Hustedt, Gandhi 1970
Sarode & Kamat 1984, p. 59, pl. 5, f. 125 a,b.
Valves 9-2 μm long and 2-2.5 μm wide; striae 23-
24 in 10 μm .
28. *Rhoicosphenia curvata* (Kutz.) Grunow 1867
Hustedt & Jensen 1985, p. 373, f. 879.
Valves 13-25 μm long and 3.5-6 μm wide; striae
14-18 in 10 μm .
29. *Rhoicosphenia Vanheurcki* Grunow, 1881
Hustedt & Jensen 1985, p. 375, f. 881.
Valves 6-9 μm long and 2-3.5 μm wide; striae 14-
15 in 10 μm .

DISCUSSION

The present study was a part of maiden attempt to record the diatom flora of a coldwater Himalayan river,

the Alaknanda. In all, 173 pennate taxa of 23 genera, belonging to 7 families of 4 suborders were recorded. Of these, 30 taxa belonged to 5 genera of sub-order Araphideae, family Fragilarioideae, 5 taxa to 1 genus of sub-order Raphidioideae, family Eunotioideae and 24 taxa to 3 genera of sub-order Monoraphideae, family Achnantheoideae, thus amounting to 59 taxa of 9 genera. Rest 114 taxa belonged to 14 genera of sub-order Biraphidae.

This contribution deals specifically with Raphidiod and Monoraphid diatom taxa. In case of the former only 5 taxa (3 species, 2 varieties) of the genus *Eunotia* were recorded during the study. Among the latter represented by 3 genera, *Achnanthes* was the only genera with largest number of taxa (15 spp, 4 var, 3 forms). The other 2 Monoraphid genera *Cocconeis* and *Rhoicosphenia* were represented by 1 var. and 2 spp. As far as India and neighbouring countries are concerned, a large number of freshwater Raphidiod and Monoraphid species have been reported (Sarode and Kamat 1984, Foged 1971, 1976). In the Himalayan river Alaknanda only *Achnanthes* was well represented, other genera being very few. However, all the taxa recorded during this study have been reported from European freshwater (Hustedt and Jensen 1985).

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