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Research Article

DESMIDS AND DINOFLAGELLATES FROM CHANDGAD TAHSIL OF KOLHAPUR DISTRICT OF MAHARASHTRA (INDIA)

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ABSTRACTS
The present investigation was conducted to study the occurrence of Dinoflagellates and Desmids in twelve fresh water lakes from Chandgad Tahasil of Kolhapur district. There are 58 species of desmids recorded of which 41 are species of *Staurastrum*, 12 of *Cosmarium*, 3 of *Euastrum* and 2 of *Closterium*. Dinoflagellates are 11 from 4 genera.

Key Words: *Desmids, Dinoflagellates, Alkalinity, Hardness, pH, Electrical Conductivity, Total Nitrogen, Total Phosphorus*

INTRODUCTION

Desmids are exclusively fresh water algae (Brook, 1981). The name is because of the fact that their pair of cells is joined together, for which Greek word ″desmes″ is meaning a bond or chain. Desmids were considered as cell pairs of two half cells or semicells but later it became clear that number of desmid species are unicellular. Desmids do exhibit chains of cells. The unicellular desmids were studied by a microscopist, Ralfs (1848). According to Brook (1981) more than 6000 species of desmids have been described from fresh waters in all over the world. The distribution of desmids is characterized by low electrical conductivity of water body. The literature on dinoflagellates is scanty.

MATERIALS AND METHODS

Water samples were collected from selected sites from Chandgad Tahasil namely, Here, Jelugade, Patane, Ambewadi- I, Ambewadi-II, Karanjgaon, Sundi, Kitwad-I, Kitwad-II, Nitture-I, Nitture-II and Lakikate for the study of desmids, dinoflagellates as well as physico-chemical parameters such as EC, pH, total alkalinity, total hardness, total nitrogen and total phosphorus using the standard methods (APHA, 1989).

Water samples were collected from the lakes by filtering 50 liters of water through plankton net to obtain 50 ml of sample. The samples were preserved by adding formalin to yield 0.4% preservative. Subsequently samples were observed under light microscope and microphotographs were taken on Nikon L-20 camera and identification was carried out using monographs, books and related research papers. The source of identification is indicated along with the species in the table. Source books referred in Table 3 are Biswas (1980), Brook (1981), Nygaard (1976), Prescott (1982), West and West (1978), Internet, Indian Hydrobiology, Volume 8-13.

RESULTS AND DISCUSSIONS

The results are presented in Tables 1 – 3. Table 1 records some parameters of water which gives idea about aquatic environment at different sites. It shows that maximum pH is recorded at site Sundi as 7.89 where as minimum is at site Kitwad-I as 7.13. Highest EC is recorded at site Lakikate as 2.1 mS/cm and lowest at site Ambewadi-II as 0.02 mS/cm. The maximum total alkalinity is recorded at site Kitwad-I as 190 mg/L, where as minimum is at site Patane as 110 mg/L. Hardness is highest at Karanjgao as 200 mg/L and lowest at Jelugade as 132 mg/L. Table 2 records total phosphorus and total nitrogen contents in water bodies of Chandgad Tahasil. The values of total nitrogen range from 0.12 to 2.52 mg/L. Total phosphorus ranges from 0.003 to 0.12 mg/L.

Table 3 records the species of which *Telingia granulata* Bourrelly and *Streptonema trilobatum* Wallich are unique to Karanjgao. All the species of *Staurastrum* found from three districts under present study are recorded from Chandgad Tahsil. Dinophyceae members are also abundant in this Tahsil. Occurrence of diatoms is almost nil.

Figure 1: Desmids

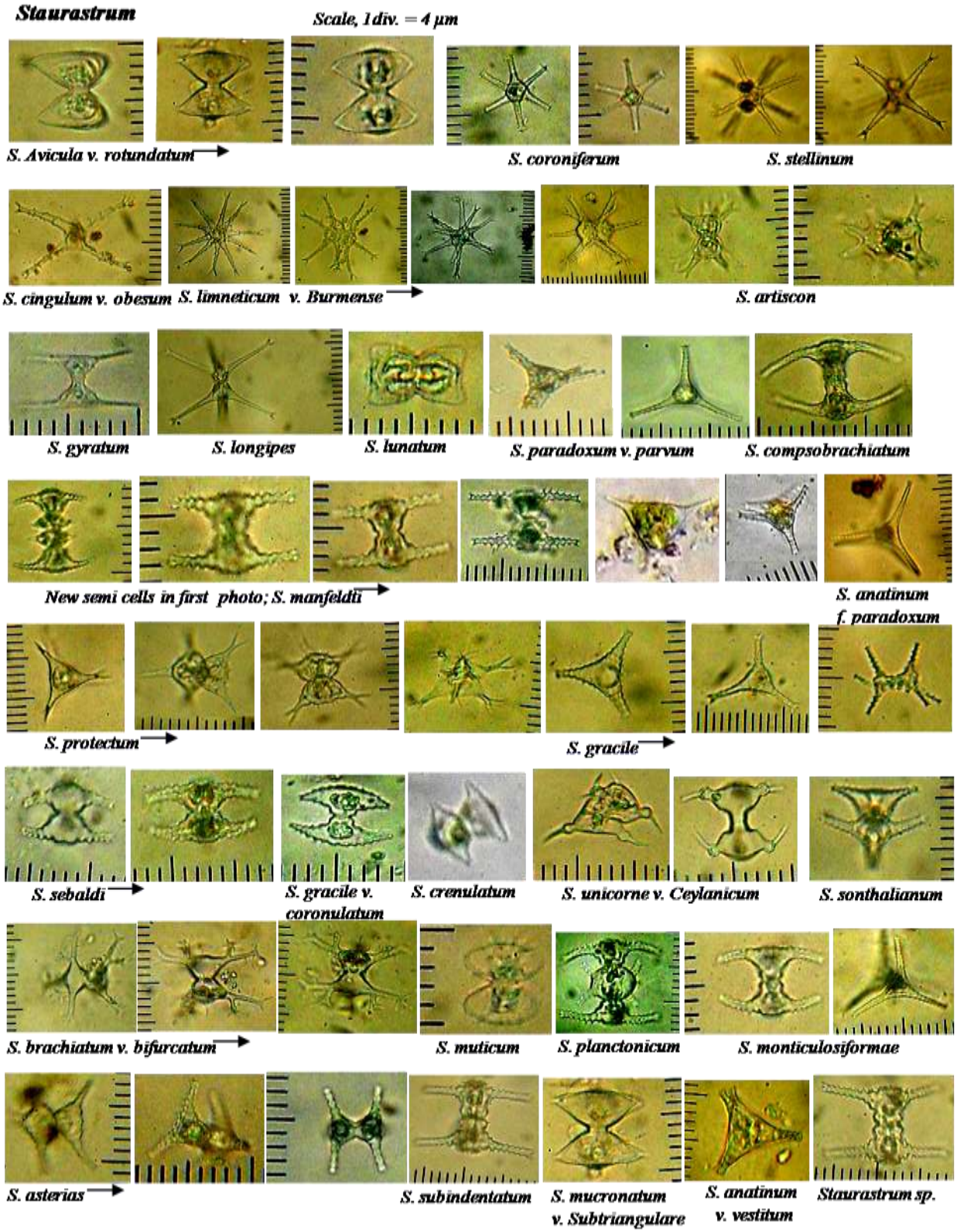

Figure 2: Dinophyceae

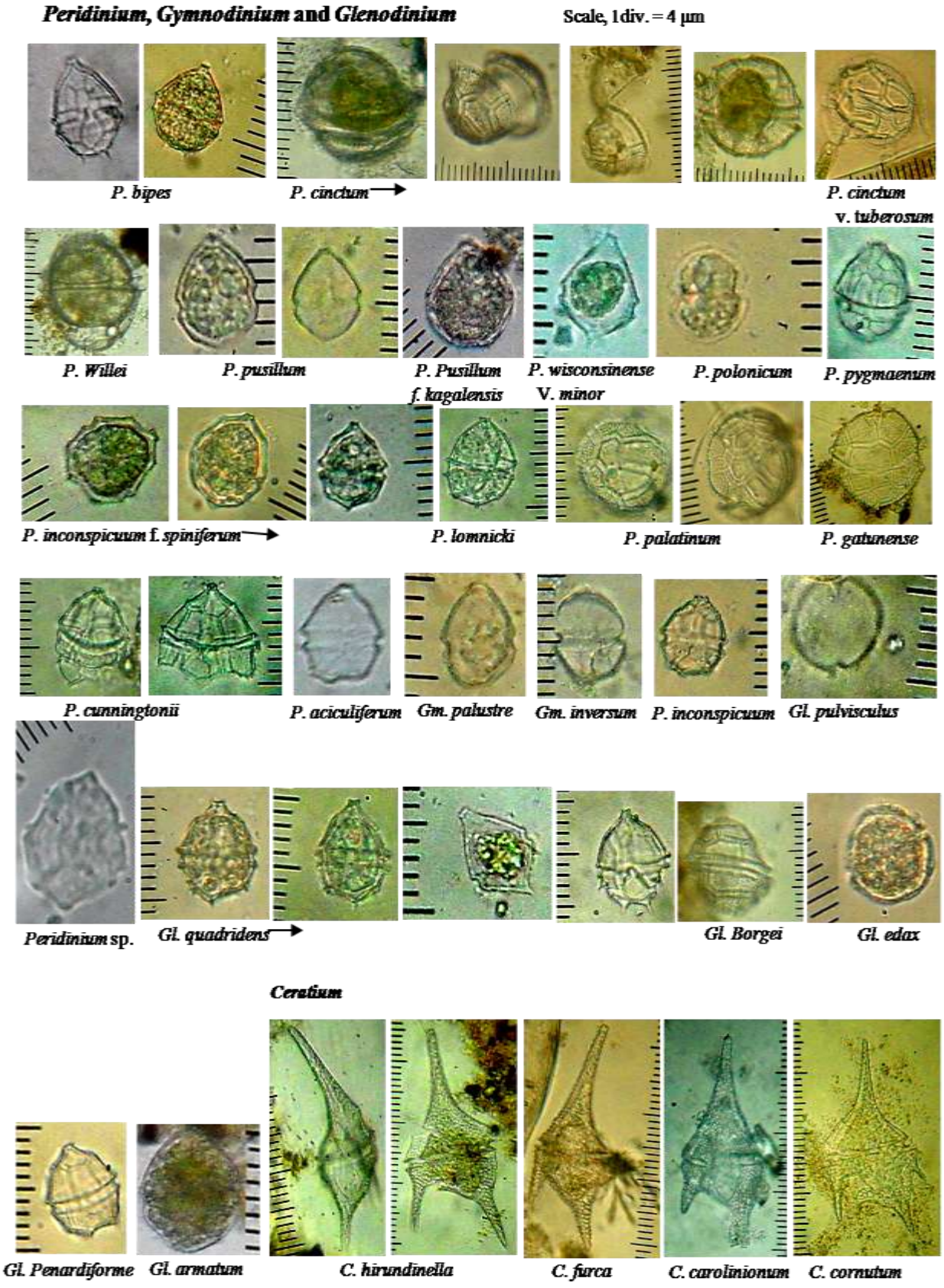

Table 1: Physico chemical properties of water bodies (Lakes) from Chandgad Tahsil of Kolhapur district

Sites	pH	EC mS/cm	Alkalinity mg/L			Hardness mg/L
			CO_3^-	HCO_3^-	TA	
Here	7.68	0.2	0.0	0.0	160	172.0
Jelugade	7.46	0.03	0.0	0.0	145	132.0
Patane	7.67	0.03	0.0	0.0	110	176.0
Ambewadi – I	7.50	0.05	0.0	0.0	155	156.0
Ambewadi –II	7.75	0.02	0.0	0.0	130	180.0
Karanjgao	7.47	0.03	0.0	0.0	140	200.0
Sundi	7.89	0.07	0.0	0.0	120	136.0
Kitwad – I	7.13	0.12	20.0	170.0	190	172.0
Kitwad – II	7.17	2.0	20.0	160.0	180	192.0
Nitture – I	7.48	1.7	20.0	160.0	180	196.0
Nitture – II	7.42	1.75	10.0	160.0	170	152.0
Lakikate	7.52	2.1	20.0	145.0	165	148.0

CO_3^- – Carbonate; HCO_3^- -Bicarbonate; TA - Total

Table 2: Total Phosphorus and total Nitrogen contents in the water bodies of Chandgad Tahsil

Site	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)
Here	0.84	0.034
Jelugade	0.84	0.02
Patane	3.36	0.006
Ambewadi-I	0.84	0.006
Ambewadi-II	0.12	0.024
Karanjgao	0.84	0.12
Sundi	1.12	0.015
Kitwad-I	2.52	0.05
Kitwad-II	0.28	0.02
Nitture-I	0.56	0.012
Nitture-II	0.84	0.003
Lakikate	11.2	0.014

Table 3: Occurrence of phytoplankton species in Chandgad Tahsil of Kolhapur district

Sr. No.	Species/Sites	D (Lx b/d µm)	H	J	P	A I	A II	Kj	S	Kt I	Kt II	N I	N II	L k
01	*Closterium acutum* v. *variabile* Brebisson (03)	90 x 4	+	–	–	–	+	–	–	+	–	+	–	–
02	*C. setaceum* Ehrenb. ex. Ralfs (06)	80 x 4	–	–	–	–	–	–	–	–	–	–	+	–
03	*Cosmarium bireme* Nordst. (05)	10 x 10	–	–	–	–	–	–	–	–	–	+	–	–
04	*C. botrytis* Meneghini ex Ralfs (06)	12 x 10	–	+	–	–	–	–	–	–	–	–	–	–
05	*C. contractum* O. Kirchner (02)	20 -28 x 15-16	–	+	+	+	–	+	–	–	–	–	–	+
06	*C. contractum* v. *ellipsoideum* West and G.S.West (06)	30 x 18	–	+	–	–	–	–	–	–	–	–	–	–
07	*C. ellipsoideum* Elfving (06)	15 x 12	–	–	–	–	–	+	–	–	–	–	–	–
08	*C. hians* Borge (06)	25 x 20	–	–	–	–	–	+	–	–	–	–	–	–
09	*C. moniliforme* (Turp.) Ralfs. (02)	16 – 22 x 12 - 13	–	–	–	–	+	–	–	+	–	–	–	–
10	*C. monolifome* f. *moniliforme* (06)	16 – 22 x 12 - 13	–	–	–	–	+	–	–	–	–	–	–	–
11	*C. pachydermum* Lundell (07)	36 x 28	+	–	–	–	–	–	–	–	–	–	–	–
12	*C. thangaicum* Bruhl and Biswas (06)	16 x 11	–	–	–	–	+	–	–	–	–	–	–	–
13	*C. trilobatum* Reinsch (06)	14 x 12	–	–	–	–	–	–	–	–	+	–	–	–
14	*C. venustum* (Brébisson) W. Archer (06)	22 x 18	+	–	–	–	–	–	–	–	–	–	–	–
15	*Euastrum dubium* Nageli v. *tritum* West et G. S. West (06)	36 – 38 x 16	–	+	–	–	–	+	–	–	–	–	–	–
16	*E. pulchellum* v. *simplicissimum* Bruhl et Biswas (02)	24 x 20	+	–	–	–	–	–	–	–	–	–	–	–
17	*Euastrum* sp.	32 x 28	–	–	+	–	–	–	–	–	–	–	–	–
18	*Staurastrum anatinum* f. *paradoxum* A. J. Brook (02)	56 x 56	–	+	–	–	–	–	–	–	–	–	–	–
19	*S. anatinum* Cooke and Wills. v. *vestitum* (J. Ralfs) (02)	40 x 40	–	–	–	+	–	–	–	–	–	–	–	–
20	*S. arctiscon* (Ehr.) Lund. (02)	36 x 28	–	+	–	–	–	–	–	–	–	–	–	–
21	*S. asterias* Nygaard (06)	32 x 28	–	–	–	–	–	–	–	–	–	–	–	+
22	*S. Avicula* Breb. v. *rotundatum* West et West (05)	38 x 30	–	–	–	+	+	–	–	–	–	–	–	–

23	*S. brachiatum* Ralfs (03)	28 x 25	–	–	–	–	–	+	–	–	–	–	–	–
24	*S. cingulum* v. *obesum* G. M. Smith. (03)	40 x 60	–	+	–	–	–	–	–	–	–	–	–	–
25	*S. coroniferum* W. B. Turner (07)	32 x 32	+	+	–	–	–	–	–	–	–	–	–	–
26	*S.crenulatum* (Nageli) *Delponte*	44 x 56	–	–	–	+	–	+	–	–	–	–	–	–
27	*S. gracile* Ralfs (06)	30 x 24	–	+	+	+	+	+	–	–	–	+	–	–
28	*S. gracile* v. *coronulatum* Boldt.	27 x 18	–	–	–	–	+	–	–	–	+	–	–	–
29	*S. gyratum* W. West et G. S. West (05)	40 x 20	–	–	–	–	+	–	–	–	–	–	–	–
30	*S. limneticum* Schmidle v. *Burmense* G. S. West (05)	76 – 80	+	–	–	–	–	–	–	–	–	–	–	–
31	*S. longipes* (Nordstedt.) Teiling. (06)	52 x 52	–	+	–	–	–	–	–	–	–	–	–	–
32	*S. lunatum* Ralfs (03)	26-30 x 16-18	–	+	–	–	–	–	–	–	–	–	–	–
33	*S. manfeldti* Delponte. (03)	42-57 x 12-15	+	–	+	–	–	–	+	–	–	+	–	+
34	*S. manipurense* Bruhl and Biswas (01)	44 x 24	–	–	+	+	+	–	–	–	–	–	–	–
35	*S. mucronatum* Ralfs. (05)	34 x 28	–	–	–	+	–	–	–	–	–	–	–	–
36	*S. mucronatum* Ralfs. v. *subtriangulare* W. West and G. S. West.(05)	34 x 24	–	–	–	+	–	–	–	–	–	–	–	–
37	*S. muticum* Brebisson ex Ralfs (03)	42 x 24	–	–	–	+	–	+	–	–	–	–	–	–
38	*S. monticulosiformae* West et West (05)	44 x 14	–	–	+	–	–	–	–	–	–	–	–	–
39	*S. paradoxum* Meyen (03)	48 x 20	–	–	+	–	–	–	–	–	–	–	–	–
40	*S. paradoxum* Meyen v. *parvum* West (03)	58-60 x 24	–	–	+	–	+	–	–	–	–	–	–	–
41	*S. planctonicum* Teiling (06)	28 x 20	–	–	–	–	+	+	–	–	–	–	–	–
42	*S. protectum* West et G. S. West (05)	36 x 28	–	+	–	–	+	–	–	–	–	–	–	–
43	*S. sebaldi* Reinsch (05)	56 x 44	–	–	+	+	+	+	–	–	+	–	–	–
44	*S. Sonthalianum* Turn (05)	36 x 12	+	–	–	–	–	–	–	–	–	–	–	–
45	*S. stellinum* WB Turner (07)	38 x 20	+	–	–	–	–	–	–	–	–	–	–	–
46	*S. subindentatum* West et West (05)	60 x 24	–	–	–	+	–	–	–	–	–	–	–	–
47	*S. tetracerum* Ralfs. (03)	24 x 14	+	–	+	+	+	+	–	–	–	–	+	–
48	*S. tetracerum* Ralfs. v. *trigranulatum* West et West (05)	28 x 18	–	–	–	–	–	–	–	–	–	–	+	–

49	*S. uniseriatum* Nygaard (03)	40 x 26	–	+	+	+	–	–	–	–	–	–	–	+
50	*S. unicorne* Turn. v. *Ceylanicum* W. and G. S. West (05)	40 x 32	–	–	–	–	+	+	–	–	–	–	–	–
51	*Staurastrum sp.* 1	28 x 20	–	–	–	+	–	–	–	–	–	–	–	–
52	*Staurastrum sp.* 3	44 x 48	–	–	+	+	–	–	–	–	–	–	–	–
53	*Staurastrum sp.*4	28	–	–	–	–	+	–	–	–	–	–	–	–
54	*Staurastrum sp.*7	36	–	–	–	+	+	–	–	–	–	–	–	–
55	*Staurastrum sp.*8	36	+	–	–	–	–	–	–	–	–	–	–	–
56	*Streptonema trilobatum* Wallich. (02)	48 x 24	–	–	–	–	–	+	–	–	–	–	–	–
57	*Telingia granulata* Bourrelly (03)	8 – 11 x 8 - 11	–	–	–	–	–	+	–	–	–	–	–	–
	Close to species													
58	*Staurastrum brachiatum* (03)v. *bifercatum* v. nov.	60 x 16	–	–	–	–	–	+	–	–	–	–	–	–
59	*S. sundi* sp. nov.	70-82x 60-70	–	+	–	–	–	–	+	–	–	–	–	+
E	**Dinophyceae**													
60	*Ceratium cornutum* (Ehrenb.) Claparede and Lachmann. (04)	78	–	–	–	–	–	–	+	–	–	–	–	–
61	*C. furca* (Ehrenberg) Claparede and Lachmann (06)		–	–	–	–	–	–	–	–	+	–	–	–
62	*C. hirundinella* (O.F.Muell.) Dujardin (04)	144 x 78	–	–	–	–	–	–	+	–	–	+	–	–
63	*Glenodinium Borgei* (Lemm.) Schiller (04)	40 x 36	–	–	+	–	–	–	–	–	–	–	–	–
64	*G. quadridens* (Stein) Schiller (04)	34 x 27	–	–	–	–	–	–	–	–	–	+	–	–
65	*Gymnodinium palustre* Schilling (04)	22 – 24 x 16 - 20	+	–	–	–	–	–	–	–	–	–	–	–
66	*Peridinium cinctum* (Muell.) Ehrenberg. (04)	60 x 52	+	–	+	–	+	–	–	+	–	+	–	–
67	*P. polonicum* Woloszynska (03)	38 x 32	–	–	–	–	–	–	–	–	–	–	+	–
68	*P. pusillum* (Penard) Nygaard Lemmermann (04)	80 x 74	–	–	–	–	–	–	–	–	–	+	–	–
69	*P. pygmaeum* Lindemann (06)	30-32 x 24	–	–	–	–	–	–	–	–	+	–	–	–
70	*P. willei* Huitfeld – kaas (04)	60 x 50	–	–	+	–	–	+	+	–	–	–	–	–

(L – Length; B – Breadth; D – Diameter; Number in Bracket Refers to Source of Identification) H – Here; J – Jelugade; P – Patane; Ab I – Ambewadi – I; Ab II – Ambewadi – II; Kj – Karanjgaon; S – Sundi; Kt I – Kitwad – I; Kt II – Kitwad – II; N I – Nitture – I; N II – Nitture II; Lt – Lakikate

Works in late 20th century by Brook (1965), Moss (1973), Bland and Brook (1974), Woekerling (1976) and Gough (1977) have indicated that the diversity of desmid species is highest in alkaline or hard water. The present sites show slightly alkaline water which is moderately hard. Our results parallel with earlier observations. It seems that the conditions favoring occurrence of desmids, especially, *Staurastrum*, also favour the growth of dinoflagellates. The present work is a part of our study over three districts covering 75 sites. Among these sites Chandgad Tahsil is notable for desmids and dinoflagellates. Plate 1 and Plate 2 represent some of the *Staurastrum* species and dinoflagellates, respectively.

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REFERENCES
APHA (1985). American Public Health Association. *Standard Methods for Examination of Water and Waste Waters* (Washington DC) (16) 1193.
Biswas K (1980). Common Fresh and Brackish Water Algal Flora of India and Burma. *Botanical Survey of India* (Govt. Of India) X 105-110.
Bland RD and Brook AJ (1974). The Spatial Distribution of Desmids in Lakes Innorthern Minnesota USA. *Freshwat Biology* **4** 543-56.
Brook AJ (1965). Planktonic Algae as Indicators of Lake Types with Special Reference to the Desmidiaceae. *Linnol Oceanogr* **10** 403-411.
Brook AJ (1981). The Biology of Desmids. *Botanical Monographs* (Blackwell Melbourne) **16** 276p.
Gough SB (1977). The Growth of Selected Desmid Taxa at Different Calcium and PH Levels. *Amer Journal Botany* **64** 1297-1299.
Moss BW (1973). The Influence of Environmental Factors on the Distribution of Fresh Water Algae an Experimental Study II, the Role of PH and Carbon Dioxide-Bicarbonate System. *Journal Ecology* **61** 157-177.
Nygaard G (1976). Tavlerne Fra Dansk Planteplankton. *Gyldendal* 25.
Prescott GW (1982). Algae of Western Great Lakes Areas. *Otto Koeltz Science Publishers* (Germany) 977.
Ralfs J (1848). *The British Desmidieae* (London) 226.
West W and West GS (1978). Fresh Water Algae from Burma, Including a Few Forms, Bengal and Madras. *Periodical Experts* (Book Agency New Delhi and International Book, Distributors Dehradun Pl X–XVI and 176–260.
Woelkerling WJ (1976). Wisconsin Desmids i Aufwuchs and Plankton Communities of Selected Acid Bogs. *Hydrobiologia* **48** 209-232.