



## Desmid *Euastrum* Ehrenberg from the Kole lands of Thrissur (part of Vembanad - Kol, Ramsar Site), Kerala

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**Abstract:** The paper deals with *Euastrum* Ehrenberg from Kole lands of Thrissur, which is a part of Vembanad - Kol, a declared Ramsar site of Kerala. Twenty two taxa of *Euastrum* have been collected and are described with their distribution in India. *E. acanthophorum* Turn. fa. *minus* Scott & Prescott, *E. sinuosum* Lenorm. var. *parallelum* Krieg. and *E. sinuosum* Lenorm. var. *reductum* West & West. are recorded for the first time from Kerala. Among these *E. sinuosum* Lenorm. var. *parallelum* Krieg. is a new report from India. The seasonal analysis of *Euastrum* at different stations revealed that 11 taxa were observed throughout the year irrespective of the seasonal changes, 13 taxa were found during pre-monsoon, 20 taxa during monsoon and 18 taxa were recorded during post-monsoon seasons in the study area.

**Keywords:** Desmid, *Euastrum*, Kerala, Kole lands of Thrissur, Vembanad - Kol

### Introduction

The Kole lands of Thrissur form a unique aquatic ecosystem and are part of one of the largest wetland systems on the southwest coast of India, namely Vembanad-Kol, which is a declared Ramsar site of India (<http://www.ramsar.org>). The Kole lands geographically distributed in Mukundapuram, Chavakkad and Thrissur taluks of Thrissur district of Kerala are designated as 'Thrissur Kole' [1].

*Euastrum* Ehrenberg comes under the family Desmidiaceae of the order Zygnematales and the class Chlorophyceae. Only little information is available on the *Euastrum* species from Kerala [2-10]. *Euastrum* species are reported from different parts of India and they are distributed in Andhra Pradesh [11], Maharashtra [12-15], Madhya Pradesh [16-19], Tamil Nadu [20-23], Karnataka [24-26], Uttar Pradesh [27-29], Bihar [30], Bengal and East India [35].

### Material and methods

The present investigation is based on the collections of water samples from the Kol wetlands of Thrissur district, Kerala. The surface water samples were collected monthly from ten stations namely Pullur (PR), Muriyad (MD), Nambiankavu (NK), Mapranam (MM), Chemmunda (CM), Cherpu (CP), Palakkal (PL), Chettupuzha (CT), Anthikkad (AK) and Enamavu (EM) during February 2005 to January 2006. The samples collected were preserved in 4% formalin solution. The

*Euastrum* taxa were identified with the help of monographs and research publications [2, 4, 31 - 36]. The Camera Lucida drawings were prepared and the microphotographs of some taxa were also taken.

### Results and discussion

*Euastrum* cells are longer than broad, compressed, deeply constricted in the middle, one chloroplast in each semicell, often irregularly lobed, central pyrenoid in the small species, and a number of scattered ones in the large species [36]. During the present investigation twenty two taxa of *Euastrum* have been identified from the Kole lands of Thrissur, Kerala and are described systematically with their distribution in India. Of these *E. sinuosum* Lenorm. var. *parallelum* Krieg. is a new report to India, *E. acanthophorum* Turn. fa. *minus* Scott & Prescott, *E. sinuosum* Lenorm. var. *parallelum* Krieg. and *E. sinuosum* Lenorm. var. *reductum* West & West. are recorded for the first time from Kerala. The details regarding the locality and month of collection are given at the end of the description of each taxon. The measurements of length (L), breadth (B) and isthmus (I) are given in microns ( $\mu\text{m}$ ).

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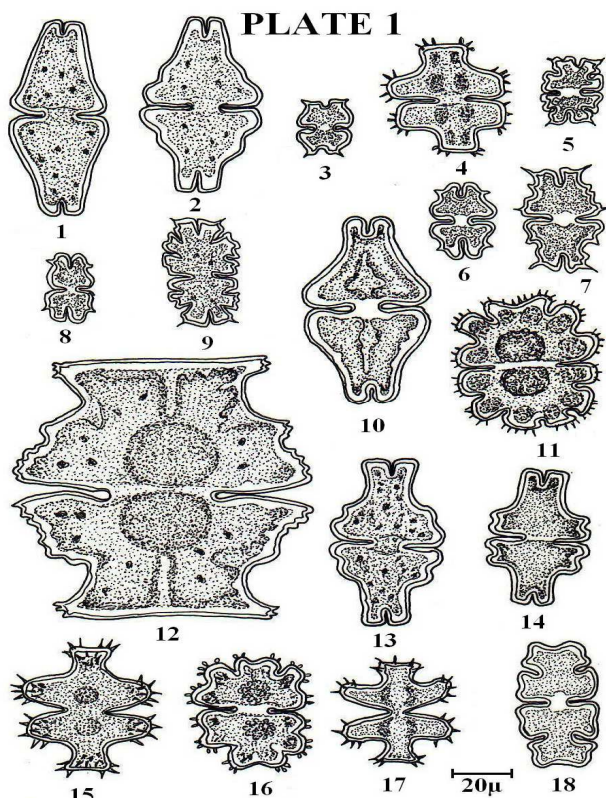


Plate 1 (Figs. 1-18):

1. *Euastrum ansatum* Ralfs 2. *E. ansatum* Ralfs var. *pyxidatum* Delp. 3. *E. binale* (Turp.) Ehr. 4. *E. ceylanicum* (West & West) Krieg. 5. *E. denticulatum* (Kirchn.) Gay var. *quadrifarum* Krieg. fa. *incisum* Scott & Prescott 6. *E. elegans* (Breb.) Kuetz. var. *compactum* (Wolle) Krieg. 7. *E. elegans* (Breb.) Kuetz. var. *nudum* Turn. 8. *E. elegans* (Breb.) Kuetz. var. *pseudoelegans* (Turn.) West & West 9. *E. radiatum* Turn. 10. *E. obesum* Joshua 11. *E. inermius* (Nordst.) Turn. 12. *E. moebii* (Borge) Scott & Prescott var. *burmense* West & West 13. *E. sinuosum* Lenorm. 14. *E. sinuosum* Lenorm. var. *parallelum* Krieg. 15. *E. spicatum* Turn 16. *E. spinulosum* Delp. 17. *E. substellatum* Nordst. 18. *E. truncatum* Joshua

**Systematic description of genus *Euastrum*:**

1. *Euastrum acanthophorum* Turn. fa. *minus* Scott & Prescott (pl. 2, fig. 1) Scott and Prescott, 1961. p. 22, pl. 13, figs. 6, 7. L: 19.5-27.2 µm with spines, B: 14.6-18.5 µm, I: 4-5.8 µm. Locality/Month: CM/Jun, Aug, Oct; CT/Sep, Oct. Distribution: U.P. [27].

2. *Euastrum ansatum* Ralfs (pl. 1, fig. 1 & pl. 2, fig. 2) West and West, 1905. vol. 2, p. 27, pl. 36, figs. 10-13. L: 81.7-93.4 µm, B: 35-42.8 µm, I: 14.6-17.5 µm. Locality/Month: PL/Jun, Sep. Distribution: Kerala [7, 9]; Karnataka [26]; T.N. [21].

3. *Euastrum ansatum* Ralfs var. *pyxidatum* Delp. (pl. 1, fig. 2) West and West, 1905. vol. 2, p. 29, pl. 36, figs. 14, 15.

L: 74-77.8 µm, B: 35-39µm, I: 11.7-14.6 µm. Locality/Month: NK/Jul; CM/Mar, Jun. Distribution: Kerala [2, 9]; Karnataka [24].

4. *Euastrum binale* (Turp.) Ehr. (pl. 1, fig. 3)

West and West, 1905. vol. 2, p. 51, pl. 38, figs. 28-29.

L: 20.4-28.2 µm, B: 13.6-17.5 µm, I: 3-5.8 µm. Locality/Month: PL/Jan. Distribution: Kerala [7]; East India [35]; Maharashtra [15].

5. *Euastrum ceylanicum* (West & West) Krieg. (pl. 1, fig. 4 & pl. 2, fig. 3)

Scott and Prescott, 1961. p. 24, pl. 11, figs. 3-5.

L: 45.7-50.6 µm, B: 39-46.7 µm, I: 9.7-11.7 µm. Locality/Month: NK/Feb; CM/Jan. Distribution: Kerala [5]; Maharashtra [13]; T.N. [21, 22]; U.P. [29]; Bihar [30].

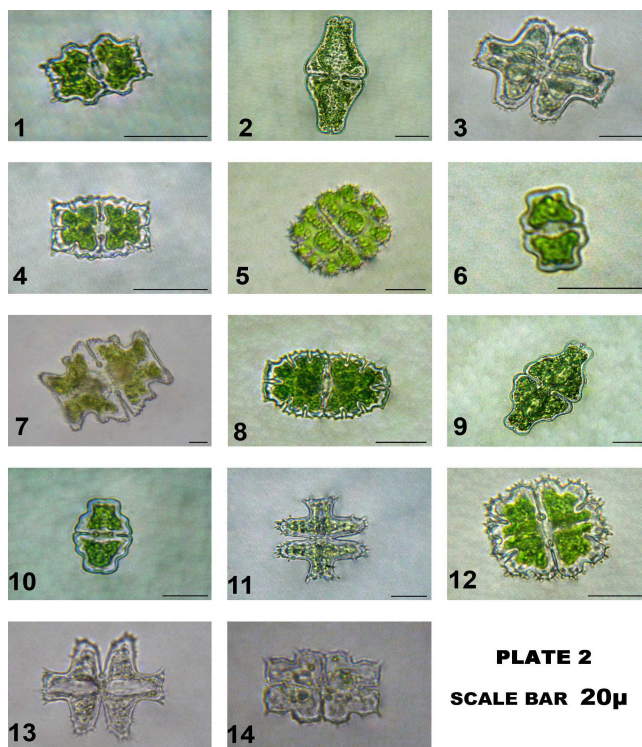


Plate 2 (Figs. 1-14):

1. *Euastrum acanthophorum* Turn. fa. *minus* Scott & Prescott 2. *E. ansatum* Ralfs 3. *E. ceylanicum* (West & West) Krieg. 4. *E. denticulatum* (Kirchn.) Gay var. *quadrifarum* Krieg. fa. *incisum* Scott & Prescott 5. *E. inermius* (Nordst.) Turn. 6. *E. insulare* (Wittr.) Roy 7. *E. moebii* (Borge) Scott & Prescott var. *burmense* West & West 8. *E. radiatum* Turn. 9. *E. sinuosum* Lenorm. 10. *E. sinuosum* Lenorm. var. *reductum* West & West. 11. *E. spicatum* Turn. 12. *E. spinulosum* Delp. 13. *E. substellatum* Nordst. 14. *E. turneri* West var. *bohemicum* (Lutkem) Krieg.

6. ***Euastrum denticulatum*** (Kirchn.) Gay var. ***quadrifarium*** Krieg. fa. ***incisum*** Scott & Prescott (pl. 1, fig. 5 & pl. 2, fig. 4) Scott and Prescott, 1961. p. 25, pl. 13, fig. 12.  
L: 25.3-27.2  $\mu\text{m}$ , B: 19.5-22.4  $\mu\text{m}$ , I: 6.8-7.8  $\mu\text{m}$ . Locality/Month: MD/Jun, Aug, Oct, Dec; NK/Feb, Jun, Aug, Oct-Dec; MM/May, Jul, Oct, Jan; CM/Feb, Mar, Aug-Oct, Jan; PL/Feb, Nov; CT/Aug, Sep; EM/Oct. Distribution: Kerala [4]; Karnataka [24].
7. ***Euastrum elegans*** (Breb.) Kuetz. var. ***compactum*** (Wolle) Krieg. (pl. 1, fig. 6) Shaji *et al.*, 1989. pl. 1, fig. 8  
L: 27.2-31  $\mu\text{m}$ , B: 19.5-21.4  $\mu\text{m}$ , I: 4-5  $\mu\text{m}$ . Locality/Month: MD/Aug, Oct; MM/Jan; CM/Feb, May. Distribution: Kerala [2, 9]; A.P. [11].
8. ***Euastrum elegans*** (Breb.) Kuetz. var. ***nudum*** Turn.(pl. 1, fig. 7) Turner, 1892. p. 84, pl. 11, fig. 14.  
L: 42.8-45.7  $\mu\text{m}$ , B: 28.2-31  $\mu\text{m}$ , I: 9.7-11.7  $\mu\text{m}$ . Locality/Month: PL/Sep; CT/Jul. Distribution: Kerala [9]; Bengal [35].
9. ***Euastrum elegans*** (Breb.) Kuetz. var. ***pseudoelegans*** (Turn.) West & West (pl. 1, fig. 8) West and West, 1905. vol. 2, p. 49, pl. 38, figs. 22-23.  
L: 28.2-31  $\mu\text{m}$ , B: 18.5-21.4  $\mu\text{m}$ , I: 3-4  $\mu\text{m}$ . Locality/Month: PR/Jul, Aug; MD/Sep; NK/Oct; CM/Jun, Sep, Nov. Distribution: Kerala [4]; Maharashtra [13].
10. ***Euastrum inermius*** (Nordst.) Turn. (pl. 1, fig. 11 & pl. 2, fig. 5) Turner, 1892. p. 86, pl. 10, fig. 51.  
L: 49.6-54.5  $\mu\text{m}$ , B: 46.7-49.6  $\mu\text{m}$ , I: 13.6-16.5  $\mu\text{m}$ . Locality/Month: PR/Apr, May, Jul, Oct-Dec; MD/Sep, Oct; NK/Sep, Dec; MM/Jun-Aug; CM/Mar, Apr, Aug, Sep, Jan; CP/Aug; CT/Dec; EM/Aug. Distribution: Kerala [7, 9]; Bengal [35].
11. ***Euastrum insulare*** (Wittr.) Roy (pl. 2, fig. 6) West and West, 1905. vol. 2, p. 68, pl. 40, figs. 11-13.  
L: 21.4-25.3  $\mu\text{m}$ , B: 15.6-17.5  $\mu\text{m}$ , I: 3-4.8  $\mu\text{m}$ . Locality/Month: PR/Jul; MD/May; CP/Oct; EM/Oct. Distribution: Kerala [10]; A.P. [11]; M.P. [16-18]; Maharashtra [13]; Karnataka [24]; Bihar [30]; T.N. [23].
12. ***Euastrum moebii*** (Borge) Scott & Prescott var. ***burmense*** West & West (pl. 1, fig. 12 & pl. 2, fig. 7) Scott and Prescott, 1961. p. 33, pl. 12, fig. 1.  
L: 112.8-128.4  $\mu\text{m}$ , B: 97.3-116.7  $\mu\text{m}$ , I: 31-38  $\mu\text{m}$ . Locality/Month: PR/Jul, Aug; CM/Jun. Distribution: Kerala [8].
13. ***Euastrum obesum*** Joshua (pl. 1, fig. 10) West and West, 1905. vol. 2, p. 29, pl. 36, figs. 16, 17.  
L: 77.8-89.5  $\mu\text{m}$ , B: 35-46.7  $\mu\text{m}$ , I: 15.6-17.5  $\mu\text{m}$ . Locality/Month: PR/Apr; MD/Sep, Dec; NK/Jul; MM/Aug, Dec; CM/Mar, Jul-Oct, Dec, Jan; PL/May, Sep. Distribution: Kerala [5, 6]; East India [35]; T.N. [20]; M.P. [17]; Karnataka [24].
14. ***Euastrum radiatum*** Turn. (pl. 1, fig. 9 & pl. 2, fig.8) Turner, 1892. p. 83, pl. 10, figs. 54, 55  
L: 48.6-53.5  $\mu\text{m}$ , B: 26.3-31  $\mu\text{m}$ , I: 6.8-8.8  $\mu\text{m}$ . Locality/Month: PR/Aug-Nov, Jan; MD/Aug, Oct; NK/Oct; MM/Jul. Distribution: Kerala [9]; East India [35]; Karnataka [25].
15. ***Euastrum sinuosum*** Lenorm. (pl. 1, fig. 13 & pl. 2, fig. 9) West and West, 1905. vol. 2, p. 20, pl. 36, fig. 1.  
L: 74-77.8  $\mu\text{m}$ , B: 39-42.8  $\mu\text{m}$ , I: 11.7-14.6  $\mu\text{m}$ . Locality/Month: PR/Jul, Aug, Sep, Nov; MD/Jun, Dec; NK/Aug; MM/Jun, Aug-Oct; CM/Feb, Mar, May, Jun, Aug-Oct; CP/Jul; CT/Sep; PL/Jul, Aug. Distribution: Kerala [6, 9]; Maharashtra [15]; T.N. [20].
16. ***Euastrum sinuosum*** Lenorm. var. ***parallelum*** Krieg. (pl. 1, fig. 14) Scott and Prescott, 1961. p. 40, pl. 9, fig. 7.  
L: 46.7-54.5  $\mu\text{m}$ , B: 30-35  $\mu\text{m}$ , I: 13.6-16.5  $\mu\text{m}$ . Locality/Month: MD/Jun, Oct.
17. ***Euastrum sinuosum*** Lenorm. var. ***reductum*** West & West. (pl. 2, fig. 10) West and West, 1905. vol. 2, p. 22, pl. 36, figs. 2-3.  
L: 42.8-51.5  $\mu\text{m}$ , B: 23.3-30  $\mu\text{m}$ , I: 6.8-7.8  $\mu\text{m}$ . Locality/Month: PR/Feb, May, Jul, Sep; MD/Apr, May, Jul, Aug, Oct, Dec; NK/Mar, Apr, Jul-Sep; CT/Aug, Dec. Distribution: Karnataka [24].
18. ***Euastrum spicatum*** Turn. (pl. 1, fig. 15 & pl. 2, fig. 11) Turner, 1892. p. 87, pl. 10, fig. 43.  
L: 54.5-59.3  $\mu\text{m}$ , B: 50.6-52.5  $\mu\text{m}$ , I: 7.8-9.7  $\mu\text{m}$ . Locality/Month: MD/Jul-Oct, Dec;

MM/Aug, Oct; CM/Feb, May-Jul, Sep.  
Distribution: Kerala [3]; East India [35].

19. ***Euastrum spinulosum*** Delp. (pl. 1, fig. 16 & pl. 2, fig. 12)

Scott and Prescott, 1961. p. 40, pl. 10, fig. 3.

L: 42.8-58.4 µm, B: 39-43.8 µm, I: 10.7-12.6 µm. Locality/Month: PR/Aug, Oct-Jan; MD/Aug, Dec; MM/Feb, Aug, Oct; CM/Sep; PL/Feb, Jun, Sep-Nov; CT/Jul. Distribution: Kerala [9]; Maharashtra [12-15]; M.P. [18]; T.N. [21]; Karnataka [24]; U.P. [28].

20. ***Euastrum substellatum*** Nordst. (pl. 1, fig. 17 & pl. 2, fig. 13)

Scott and Prescott, 1961. p. 44, pl. 11, figs. 1, 2.

L: 46.7-52.5 µm, B: 39-45.7 µm, I: 10.7-12.6 µm. Locality/Month: PR/May, Sep, Nov-Jan; NK/Mar, Aug; MM/Sep; CP/Jul, Sep; CT/Aug. Distribution: Kerala [2]; Maharashtra [12]; T.N. [20]; M.P. [18, 19]; Karnataka [24].

21. ***Euastrum truncatum*** Joshua (pl. 1, fig. 18)

Shaji and Patel, 1991. pl. 1, fig. 7

L: 51.5-54.5 µm, B: 21.4-28.2 µm, I: 3.8-5 µm. Locality/Month: PR/Sep; CT/Sep, Oct. Distribution: Kerala [4]; Karnataka [24].

22. ***Euastrum turneri*** West var. ***bohemicum*** (Lutkem) Krieg. (pl. 2, fig. 14)

Kouwets, 1987. pl. 8, fig. 9

L: 25.3-27.2 µm, B: 19.5-23.3 µm, I: 4-5 µm. Locality/Month: PR/Apr, Jul-Jan; NK/Jul, Aug. Distribution: Kerala [9].

Seasonal and spatial variation of genus *Euastrum* Ehrenberg in Thrissur Kol wetlands were given in Table 1. More diversity of *Euastrum* was observed in stations 1, 2, and 5 with twelve taxa each. The seasonal analysis of *Euastrum* at different stations revealed that 11 taxa were observed throughout the year irrespective of the seasonal changes, 13 taxa were found during pre-monsoon (Feb-May), 20 taxa during monsoon (Jun-Sep) and 18 taxa during post-monsoon (Oct-Jan) seasons in the study area. The diversity of the algae in the Kole lands was affected by the rainfall, salinity, hardness, magnitude of the flood dictated by the Karuvannur River and the conversion of the area into paddy fields during summer.

**Table.1:** Seasonal and spatial variation of *Euastrum* in Thrissur Kole lands, Kerala

Sl. No:	Name of taxa	Seasons			Stations									
		S i	S ii	S iii	1	2	3	4	5	6	7	8	9	10
1	<i>E. acanthophorum</i> fa. <i>minus</i>	-	+	+	-	-	-	-	+	-	-	+	-	-
2	<i>E. ansatum</i>	-	+	-	-	-	-	-	-	-	+	-	-	-
3	<i>E. ansatum</i> var. <i>pyxidatum</i>	+	+	-	-	-	+	-	+	-	-	-	-	-
4	<i>E. binale</i>	-	-	+	-	-	-	-	-	-	+	-	-	-
5	<i>E. ceylanicum</i>	+	-	+	-	-	+	-	+	-	-	-	-	-
6	<i>E. denticulatum</i> var. <i>quadrifarium</i> fa. <i>incisum</i>	+	+	+	-	+	+	+	+	-	+	+	-	+
7	<i>E. elegans</i> var. <i>compactum</i>	+	+	+	-	+	-	+	+	-	-	-	-	-
8	<i>E. elegans</i> var. <i>nudum</i> Turn.	-	+	-	-	-	-	-	-	-	+	+	-	-
9	<i>E. elegans</i> var. <i>pseudoelegans</i>	-	+	+	+	+	+	-	+	-	-	-	-	-
10	<i>E. inermius</i>	+	+	+	+	+	+	+	+	+	-	+	-	-
11	<i>E. insulare</i>	+	+	+	+	+	-	-	-	+	-	-	-	+
12	<i>E. moebii</i> var. <i>burmense</i>	-	+	-	+	+	-	-	+	-	-	-	-	+
13	<i>E. obesum</i>	+	+	+	+	+	+	+	+	-	+	-	-	-
14	<i>E. radiatum</i>	-	+	+	+	+	+	+	-	-	-	-	-	-
15	<i>E. sinuosum</i>	+	+	+	+	-	-	-	+	-	-	-	-	-
16	<i>E. sinuosum</i> var. <i>parallelum</i>	-	+	+	-	+	-	-	-	-	-	-	-	-
17	<i>E. sinuosum</i> var. <i>reductum</i>	+	+	+	+	+	+	-	-	-	-	+	-	-
18	<i>E. spicatum</i>	+	+	+	-	+	-	+	+	-	-	-	-	-
19	<i>E. spinulosum</i>	+	+	+	+	+	-	+	+	-	+	+	-	-
20	<i>E. substellatum</i>	+	+	+	+	-	+	+	-	+	-	+	-	-
21	<i>E. truncatum</i>	-	+	+	+	-	-	-	-	-	-	+	-	-
22	<i>E. turneri</i> var. <i>bohemicum</i>	+	+	+	+	-	+	-	-	-	-	-	-	-
	No: of taxa	13	20	18	12	12	11	9	12	4	7	9	0	3

+ Present, - Absent, S i Pre-monsoon season (Feb-May), S ii Monsoon season (Jun-Sep), S iii Post-monsoon season (Oct-Jan).

Stations: 1) Pullur, 2) Muriyad, 3) Nambiankavu, 4) Mapranam, 5) Chemmanda, 6) Cherpu, 7) Palakkal, 8) Chettupuzha, 9) Anthikkad, 10) Enamavu

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