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Taxonomic Diversity of *Pediastrum simplex* in Andhra Pradesh

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Abstract

Freshwater algal samples have been collected from four districts of Andhra Pradesh and screened for the Genus ***Pediastrum.*** The examination of 40 samples collected revealed a number of rare and noteworthy ***Pediastrum*** taxa. In the present paper six varieties of ***Pediastrum simplex*** Mayen are depicted and discussed. These are ***Pediastrum simplex*** Mayen variety **simplex** Komarek, Var. ***clathratum*** (Schrot) Chod, var. ***psuedoglabrum*** Parra, var. ***sturmii*** (Reinch) Wolle, var. ***echinulatum*** Wittr. Var. ***biwaense*** Fukush . Of these former two were more frequent with different morphotypes in all samples and later three were rare in distribution. The taxonomic key is provided and all taxa are described with microphotographs. ***Pediastrum simplex*** var. ***psuedoglabrum*** Parra, var. ***sturmii*** (Reinch) Wolle, var. ***echinulatum*** Wittr. Var. ***biwaense*** Fukush are reported as first distributional records to the state of Andhra Pradesh.

Keywords: Fresh water algae, *Pediastrum simplex,* Taxanomic diversity, Andhra Pradesh

INTRODUCTION

Exploration and documentation on the occurrence and distribution of ***Pediastrum*** in Andhra Pradesh is very minimal. Occurrence of ***Pediastrum mayen*** proper and ***P.simplex*** var.***duodenarium*** (***clathratum***) from Visakhaptnam and Andhra were cited by Philipose(1967) [1]. There was no mention of the occurrence of ***P.simplex*** by NarasimhaRao et al., (2010), Jyothi Kaparapu and Mohan Narasimha Rao Geddada (2013), Jyotsna et al., 2015) [2-4]. Hence this study gains importance. In the present study, fresh water algal samples were collected from four districts of Andhra Pradesh .viz. Ananthapuramu, Chittoor, Kurnool and Kadapa and examined for ***Pediastrum simplex*** Mayen.

During taxonomic investigations, six varieties of P.simplex Mayen were identified. They are ***Pediastrum simplex*** Mayen variety *simplex* Komarek, Var.***clathratum*** (Schrot) Chod, var. ***psuedoglabrum*** Parra, var.***sturmii*** (Reinch) Wolle, var.***echinulatum*** Wittr. Var.***biwaense*** Fukush. ***Pediastrum simplex*** var. ***psuedoglabrum*** Parra, var.***sturmii*** (Reinch) Wolle, var.***echinulatum*** Wittr. Var.***biwaense*** Fukush are reported as first distributional records to the state of Andhra Pradesh. Similar reports were reported by many researchers in fresh alage in India [5-11].

MATERIAL AND METHODS

A total of 40 samples were collected from different freshwater habitats of four districts (Ananthapuramu, Chittoor, Kurnool and Kadapa) of Andhra Pradesh. They are preserved in Formaldehyde (4% v/v) and deposited in the department of Botany, SSBN Degree College, Ananthapuramu. Algae were stained with Aniline blue or Potassium Iodide solution and observed by using Olympus HI20 Trinocular Microscope. Photographs were taken with Olympus E-PL3 camera. The organisms were identified with the help of Mayen(1829), Philipose(1967) and followed Komarek.J and Jankovaska.V (2001) in the present article [12, 1, 13].

RESULTS AND DISCUSSION

SYSTEMATIC ENUMERATION

Pediastrum simplex Meyen Nova Acta Phys.Med.Acad.Caes.Leop.Carol.Nat.Cur.14:772, 1829 (Fig.1 A-F, Plate 7)

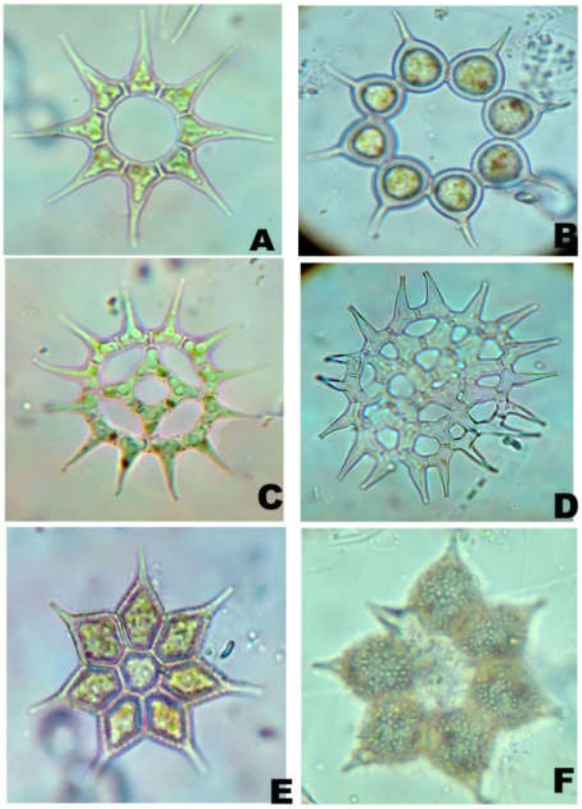

Plate 1: Pediastrum simplex Mayen : A. Var. simplex B. var. psuedogla-brum Parra C. Var.clathratum (Schrot) Chod D. Var.biwaense Fukush E. var. echinulatum Wittr F. var.sturmii (Reinch) Wolle

Fig 1: Six varieties of *P. simplex Mayen* identified in samples

Coenobia flat, 4-32 celled, with only one larger central opening or with many perforations or without intercellular spaces, usually circular in outline but slightly quadrate in 4 celled colonies. Cells conical, ovate or angular in shape; Marginal cells always only with one conically narrowed lobe, terminating with long narrow, cylindrical processus; the lobe is situated in the middle of the outer margin of a marginal cell; processus 6-12.5 um long. Cell walls smooth or variously ornamented.

Key to the varieties of *Pediastrum* ***simplex*** Mayen

1. Coenobium with distinct and large intercellular spaces	2
1. Coenobium without or very small intercellular spaces	5
2. Lobes of marginal cells straight	3
2. Lobes of marginal cells arcuate	var.***biwaense***
3. Coenobium with a large central space or intercellular spaces smaller or larger than cell diameter	4
3. Intercellular spaces always larger than cell diameter, cells narrow	var.***clathratum***
4. Cells conical, lateral and inner side of cells straight or concave	var. ***simplex***
4. Cells ovate, lateral and inner side of cells convex	var. ***pseudoglabrum***
5. Lateral and inner side of cells convex, walls densely granular	var. ***sturmii***
5. Margins of cells otherwise, walls echinulate	var. ***echinulatum***

1. Variety *simplex* Komarek 1983 (Plate 1-A)
Pediastrum simplex Meyen 1829.I.c. P.772. Monactinus *ovatus* Kutz.1849.p.194.
Philipose.M.T.1967.P.114.Fig.36 d,e.

Coenobium with a central large space or intercellular spaces less than the diameter of cell. Cells triangular, lobes conical, gradually narrowed and terminated into a long, cylindrical process which is truncated at end; lateral sides of cells straight, inner side of cell concave or straight. Coenobium up to 60 um in diameter, cell 20 um long, 10um wide, process 10um long.
Common in all samples,
Distribution in A.P.: Palakonda, Kadapa Dt., Ahobilum,Kurnool Dt., Tirumala hills,Chittoor Dt. Visakhapatnam

2. Variety *psuedoglabrum* Parra Bibl.Phycologica 48.p.115.1979 (Plate 1.B)
Coenobium with a central large space or many intercellular spaces, vary in diameter in comparison to cell. Lobes of cells not much prolonged, processus cylindrical, truncated at end. Cells conical to ovate, lateral and lower margins convex. Coenobium up to 90um in diameter ells 18um long,10um wide, process 7.5 um long, distribution in Andhra Pradesh: Rare in distribution. Penna ahobilum, Gundla palle Cross, Anantapur Dt. First report from Andhra Pradesh.

3. Variety *clathratum* (Schrot) Chod .Alg.vert Suisse.p.226.1902. (Plate 1. C)
***Pediastrum simplex f. clathratum* Schrot.1883.p.1883.**

Coenobium with larger circular or elliptical intercellular spaces whose diameter is always larger than cell diameter. Cells and lobes narrow; inner cells with distinct lobes, lobes cylindrical. Inner side of cells convex, lateral sides' straight, lobe narrow and prolonged, process truncated.
Common in all samples.
Distribution in A.P.: Tirumala hills,Chittoor Dt. Gooty forte, Anantapur Dt.Palakonda,Kadapa Dt. Andhra region.

4. Variety *biwaense* Fukush. J. Yokohama. Munic.Univ.Ser.C.13 (46)1956. (Plate 1 D)
***Pediastrum biwae* Negoro 1954.p.135.**

Coenobium circular in outline with many intercellular spaces, which are variously shaped and smaller. Inner cells with prominent lobes; marginal cells convex on inner side; lobes narrow, neighboring lobes arcuate one to another. Coenobium 110um in diameter, cells 22.5um long.
Rare in distribution

Distribution in Andhra Pradesh: Summer storage tank, Anantapuramu.
First report from Andhra Pradesh

5. Variety *echinulatum* Wittr.Algae aq.dulc.exs, fasc.5.n0.235.1883. (Plate 1 E)
***Pediastrum sturmii v.echinulaum* Lemm.1897.P.180.**
Coenobium circular, without intercellular spaces, with one or two small perforations. Inner cells spherical, many angled; marginal cells conical, angular, and broader; lobes terminated into a cylindrical process; lateral sides straight, inner side straight or concave. Coenobium up to 50 um diameter, cells 17 um long, 10um wide, process 7.5um long.
Distribution in A.P.: Tirumala hills,Chittoor Dt. Gundla pallecross, Bhatrepalle waterfalls, Anantapur Dt.
First report from Andhra Pradesh.

6. Variety *sturmii* (Reinch) Wolle FreshW.Algae U.S., p.153.1887. (Plate 1 F)
***Pediastrum sturmii* Reinch 1867.p.90.**

Coenobium circular, without intercellular spaces. Inner cell spherical; marginal cells ovate, sides convex; processes short, cylindrical. Colony around 70 um wide, cells 25 um long, 15 um wide, process 7.5 um long.
Distribution in A.P.: Vemana Dam, Mudigubba, Anantapur Dt.

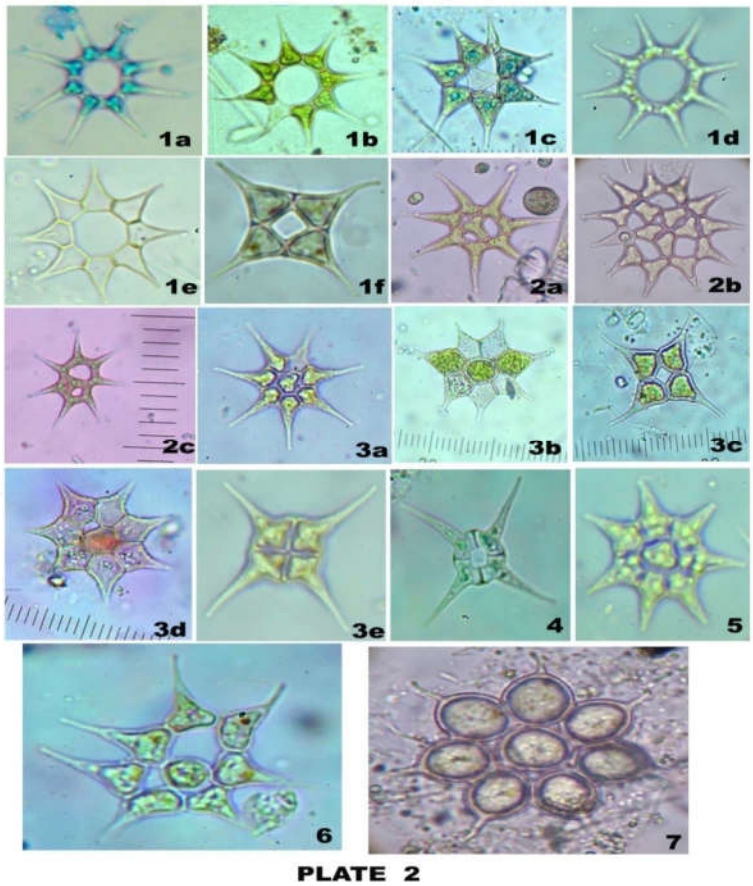

Fig 2: Morphological identification of P.simplex Mayen varieties identified in samples.

CONCLUSION

Taxonomic variations of varieties of Pediastrum simplex Mayen are depicted in Plate 2. Figures 1.a-f representing var.***simplex***, Fig.2.a-c var.***clathratum*** and Fig.3.a-e var.***echinulatum***. Var.***pseudoglabrum*** in Fig. 7.with glands at the tips of processes is a distinct variation. Figure 5 resemble var. simplex but without perforations. Taxon in Figure 6 is an **intermediate form** between var. ***simplex*** and ***Pediastrum assymetricum*** Hegew.et Yamag. Ovate inner cell, irregular perforations, some cells of colony being asymmetrical in shape is noteworthy characters. Taxon in Fig.4 is worth of reexamination and confirmation. Coenobium 4 celled, slightly elliptic. Perforation is rhombus shaped. Outer wall of cells convex, lobes and processes are long, lateral margins straight, inner wall with inverted 'v' shaped incision. It resembles Var. ***simplex***. But in var. ***simplex***, perforation is circular or quadrate. Inner wall of cells concave or straight. Outer walls not convex.

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