

A FOSSIL RESEMBLING *PEDIASTRUM* FROM THE BARREN MEASURES SEQUENCE OF JHARIA COALFIELD, BIHAR, INDIA

R. K. KAR

Birbal Sahni Institute of Palaeobotany, Lucknow

ABSTRACT

A fossil resembling *Pediastrum* from the Barren Measures Sequence (Permian) of Jharia Coalfield, Bihar, is described. It is compared with the other known fossil *Pediastrum* and also with the extant forms.

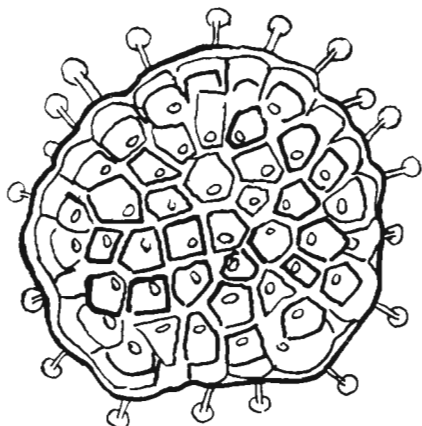
INTRODUCTION

THE presence of fossil algae and allied organisms are frequently met with in maceration residues of sedimentary rocks. Tyler and Barghoorn (1954) reported microbiological remains from Pre-Cambrian. Wedl (1958) described algal remains from various geological ages while Kolliker (1859) referred some of those organisms as fungal bodies. Recently, Moore (1963) reported the occurrence of algal bodies on the spores and pollen from the Upper Oil Shale Groups (Carboniferous) of the Calciferous Sandstone Series of Scotland; while Marshal and Smith (1965) described *Botryococcus* from the Coal Measures of Yorkshire (Westphalian). Traverse (1955) opined that *Botryococcus* has a stratigraphic range from the Lower Carboniferous to recent. Rao and Varma (1953) described Solenoporacean algae from the Tertiary marine beds of Salt Range, West Pakistan. Wilson and Hoffmeister (1953) described four new species of fossil *Pediastrum* from the Lower Formation (Lower Tertiary) of Sumatra. Mathur (1963) reported the occurrence of *Pediastrum* in Subathu formation (Eocene) of Himachal Pradesh, India. The present note concerns with the occurrence of a fossil resembling *Pediastrum* from the Barren Measures Sequence (Permian) of Jharia Coalfield, Bihar. The specimen was recovered from a bore-hole-core at a depth of 452 feet. The location of the bore-core is 23°44' N: 86°19'28" E and numbered as J. K. 5 by the Geological Survey of India. The fine grained sandstone from which the organism recovered was treated with Hydrofluoric acid (40 per cent) for two days. The material was washed with water and treated with Potassium

hydroxide (5 per cent) solution for five minutes. The slides were prepared in glycerine jelly.

Description — The colony is \pm subcircular in overall shape measuring $92 \times 101 \mu$ excluding the processes. It is compact and without any internal spaces in between the cells. Cells in the central region of the colony are \pm similar in size and shape; they are, however, somewhat dissimilar in outer margin and mostly semilunar in outline on the outer side. Central cell is hexagonal, $13 \times 18 \mu$, walls are \pm straight; adjacent cells are also of \pm same size and also possessing \pm straight walls so that they join together without any space in between them. Thickness of the wall of inner cells is $2-4 \mu$ while of the outer cells it is $6-10 \mu$. Hyaline layer is also generally found on the cell walls and it is more conspicuous on the outer cells. Each outer cell possesses a hyaline process. The processes are uniformly broad except at the top where they are pin-headed, $15-23 \mu$ long, $3-6 \mu$ broad at base and $6-10 \mu$ at top. The colony is arranged in single layer. The outer cells of the colony are however found overlapping in some parts to the next inner cells. One surface of the colony is laevigate while the other surface seems to be minutely sculptured. The colony comprises 44 cells and they have been arranged as $1+7+15+21$. Some of the outer cells are ill-developed and whether they should be regarded as true cells may easily be questioned. The cells which are prominent, distinct and well defined have only been counted here. A hyaline spot is present in each cell (TEXT-FIG. 1).

Comparison — *Pediastrum kajaites* Wils. & Hoffm. (1953) resembles the present specimen in size range but is distinguished in possessing smaller number of coenobia, internal spaces and distinct bifid processes. *P. palaeogeneites* Wils. & Hoffm. (1953) is a two-layered coenobium, the processes are unifid but without pinheaded top. *P.*



TEXT-FIG. 1 — Showing the overall shape and general organization of the colony. $\times 500$.

bifidites Wils. & Hoffm. (1953) resembles the present specimen in possessing one-layered, hexagonal compact colony but is differentiated by its straight and pointed processes. In *P. delicatites* Wils. & Hoffm. (1953) the colony is not compact and the processes are bifid. The *Pediastrum* reported by Mathur (1953) is smaller in size and also having bifid processes on the outer cells.

The present specimen also resembles the living *Pediastrum* in size and general organization. The number of cells in *Pediastrum*

is generally in multiple of two. In this character the present colony differs from the extant one. Harper (1916, 1918a, 1918b), however, reported *Pediastrum* which are not exactly in multiplication of two. The process that emerges at least from each outer cell is also found in some of the present day *Pediastrum* and according to Fritsch (1948) they are an additional equipment for planktonic life. In the living forms they are generally bifid (e.g. *Pediastrum duplex* Meyen var. *clathratum*) though Petersen (1921) reported the presence of tufts of rigid gelatinous bristles on the apices of the processes of the marginal cells.

The *Pediastrum* of today are found only in fresh water and the present material is also presumed to be of fresh water in origin.

ACKNOWLEDGEMENT

Sincere appreciation is expressed to the Geological Survey of India for kindly supplying the bore-core for investigation. The author is also highly indebted to Dr. B. S. Venkatachala of Birbal Sahni Institute of Palaeobotany for critically going through the manuscript and valuable suggestions. The author is also thankful to Drs. B. N. Prasad and P. N. Srivastava of Lucknow University for helping in identification of the present specimen.

REFERENCES

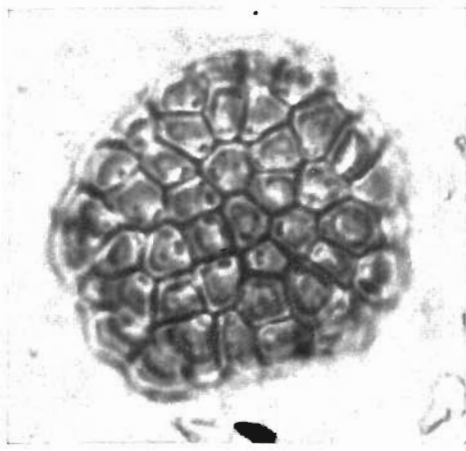
- FRITSCH, F. E. (1948). The structure and reproduction of the Algae. 1: 166-173.
- HARPER, R. A. (1916). On the nature of types in *Pediastrum*. *Mem. N. Y. bot. Gdn.* 6: 91-104.
- Idem (1918a). Organization, reproduction and inheritance in *Pediastrum*. *Proc. Am. phil. Soc.* 57: 375-439.
- Idem (1918b). The evolution of cell types and contact and pressure responses in *Pediastrum*. *Mem. Torrey. bot. Club.* 17: 210-240.
- KOLLIKER, A. W. (1859). On the frequent occurrence of vegetable parasites in the hard structures of animals. *Proc. R. Soc.* 10: 95-100.
- MARSHAL, A. E. & SMITH, A. H. V. (1965). Assemblages of miospores from some Upper Carboniferous coals and their associated sediments in the Yorkshire coalfield. *Palaeontology.* 7(4): 656-673.
- MATHUR, K. (1963). Occurrence of *Pediastrum* in Subathu formation (Eocene) of Himachal Pradesh, India. *Sci. Cult.* 29: 250.
- MOORE, L. R. (1963). Microbiological colonization and attack on some Carboniferous miospores. *Palaeontology.* 6(2): 349-372.
- PETERSEN, J. B. (1921). On "pseudoflagella" and tufts of bristles in *Pediastrum*, especially *Pediastrum clathratum* (Schroter) Lemm. *Bot. Tidsskr.* 37: 199-204.
- RAO, S. R. N. & VARMA, C. P. (1953). Fossil algae from the Salt Range. *Palaeobotanist.* 2: 19-23.
- TRAVERSE, A. (1955). Occurrence of the oil forming algae *Botryococcus* in lignite and other Tertiary sediments. *Micropaleontology.* 1: 343-350.
- TYLER, S. A. & BARGHOORN, E. S. (1954). Precambrian fossils. *Science.* 119: 606-608.
- WEDL, C. (1858). Über die Bedeutung der in den Schalen von manchen Acephalen und gasteropoden vorkommenden Canale. *Sber. Akad. Wiss. Wien.* 33: 451.
- WILSON, L. R. & HOFFMEISTER, W. S. (1953). Four new species of fossil *Pediastrum*. *Am. J. Sci.* 251: 753-760.

EXPLANATION OF PLATE

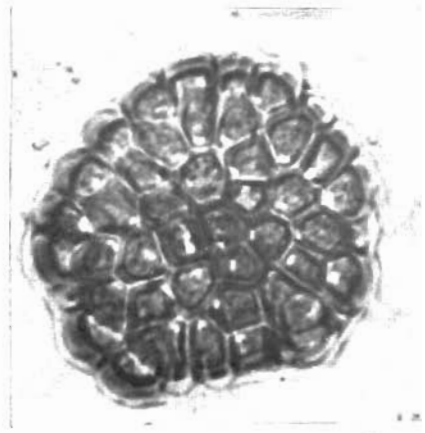
(The slide has been deposited in the repository of the Birbal Sahni Institute of Palaeobotany, Lucknow, India).

PLATE 1

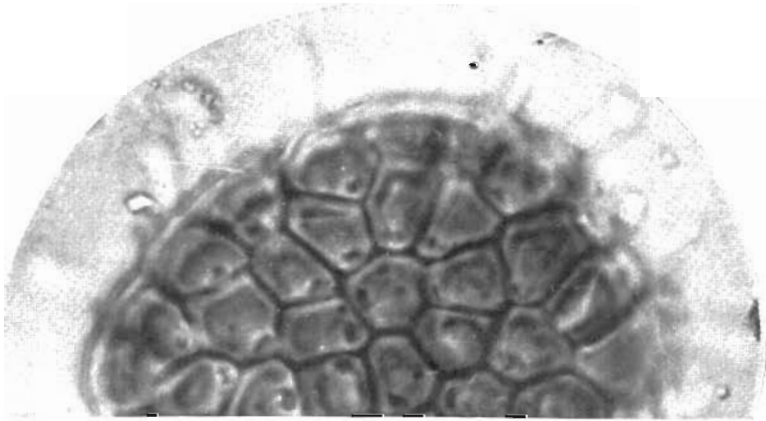
- 1 & 4. Fossil resembling *Pediastrum* showing overall shape and hyaline spot in each cell. $\times 500$.
2. Other surface of the same specimen. $\times 500$.
3. Showing hyaline process from each outer cell. $\times 1000$.
5. Middle part of the specimen showing central cells. $\times 1000$.



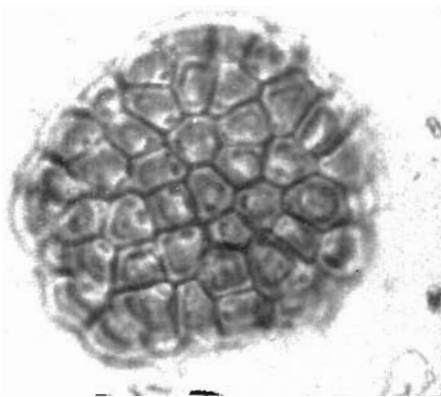
1



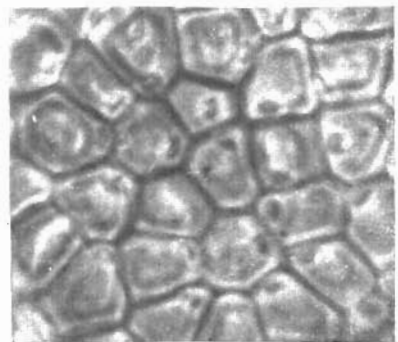
2



3



4



5