

WILLIAMSONIA FRUCTIFICATIONS FROM THE JURASSIC OF
RAJMAHAL HILLS—THEIR PRESERVATION AND
PLAN OF CONSTRUCTION

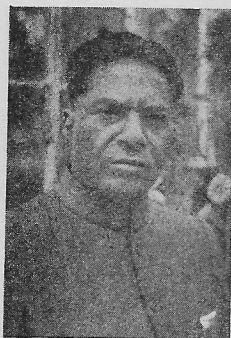
BY

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ABSTRACT.—Giving an old picture of the studies of the Jurassic flora of the Rajmahal Hills by late Prof. B. Sahni, F.R.S., quarter of a century ago, the author describes the past and present position of our knowledge of the Indian *Williamsonias* and classifies them broadly into two categories—closed and open types of flowers.

SOON after the discovery of a petrified *Williamsonia*, *W. seawardiana* (Sahni, 1932), the late Prof. B. Sahni, F.R.S. led



an excursion to the Rajmahal Hills in the year 1931. A small party of post-graduate students including the author accompanied him and had the privilege of watching the Professor's great and active personality at close quarters, as well as his lighter moods. He would

keep himself busy all the time with his chisel and the hammer; and how he used even the few moments of rest in the field is amply borne out by the snaps taken by the students without the Professor's knowledge.

A thorough search of Hobson's precise locality, namely, 'between two knolls forming a low ridge running N. W. from mile 31

on the Amarapara-Pachaibera road' was made but we failed to find more *Williamsonias*. However, the excursion was a grand success for Hobson's locality Nipania, now famous for its fossil flora, was rediscovered by the author, and the first collection of petrified fossil plants which yielded the various genera of the Pentoxyleae was made. This was later supplemented by the author's two subsequent visits in 1934 when he had the pleasure of introducing both Dr. H. S. Rao and the late Prof. B. P. Srivastava to this locality. The research work on the Nipania flora by late Prof. B. P. Srivastava, Dr. A. R. Rao, Prof. Sahni and latterly by Dr. Vishnu Mittre is well known. Out of these old collections, the author had also described some *Williamsonias* and other fossil plants (Gupta, 1943 and 1954).

As time rolled on and progress of palaeobotanical research advanced at a rapid pace under the inspiring guidance of that doyen of the Indian botanists, large collections of *Williamsonia* were also made,

EXPLANATION OF PLATE 44

- FIG. 1—Oblique longitudinal fracture of *Williamsonia* cf *W. Seawardiana* from Chilgajri. ca. 1½.
2—Female flower of *Williamsonia* of an open type. Nat. Size.
3—Impression of linear type of bracts characteristic of a closed type of flower. Slightly enlarged.
4—Peduncle of a *Williamsonia* flower with clear bases of bracts. ca. Nat. Size.
5—A fruit of *Williamsonia* cut into two. Seeds not well preserved. Slightly reduced.
6—Upper part of a petrified closed type of *Williamsonia* flower showing transverse fracture. Nat. size.
7—Same in L. S. showing a tapering type of receptacle; otherwise preservation poor. Slightly reduced.



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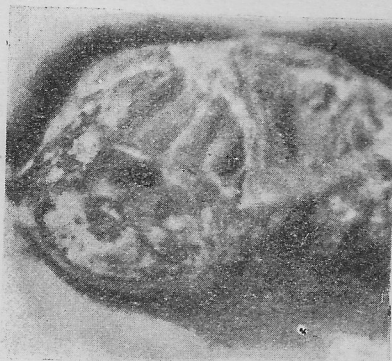
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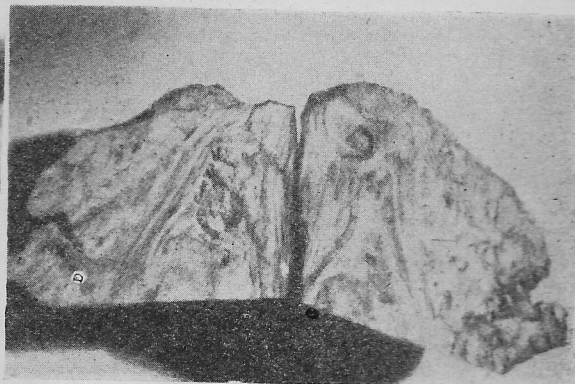
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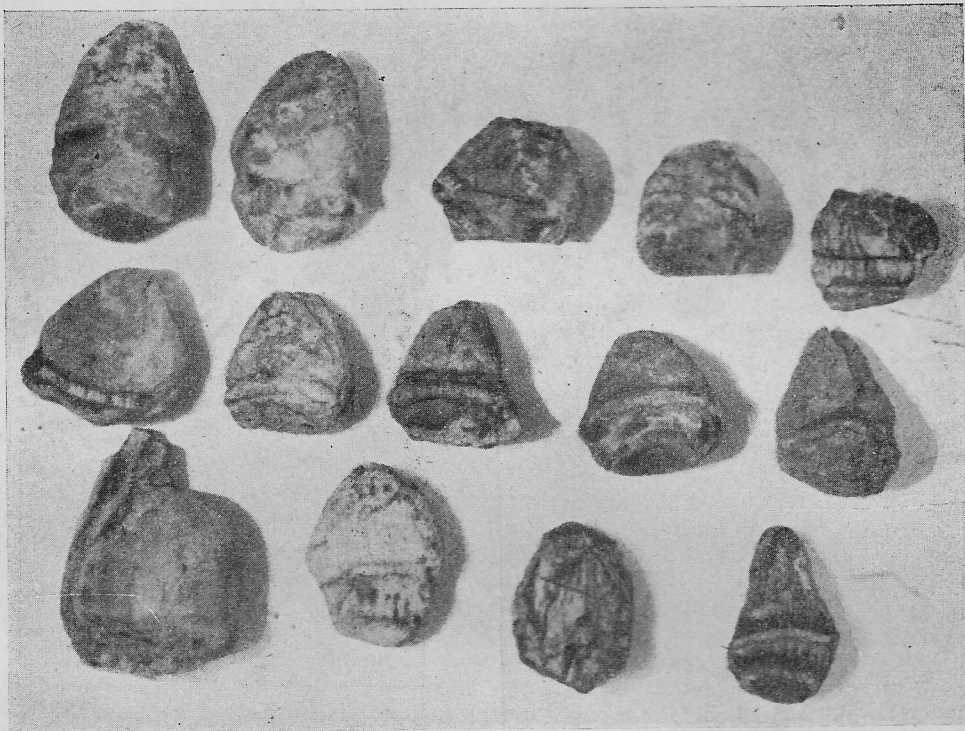
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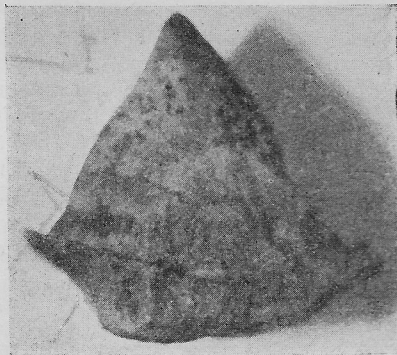
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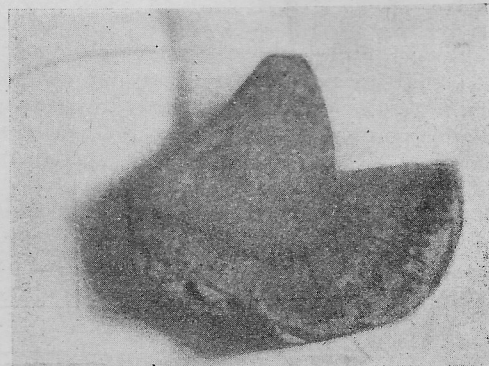
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specially from two now fairly well known localities, Amerjola and Chilgijri near Amrapara, not far from Hobson's original locality which had yielded the two specimens of *W. seawardiana*. *Williamsonia* and its associated stems and leaves of *Bucklandia* and *Ptilophyllum*, respectively are very common Rajmahal fossils. Some recently described species of *Williamsonia* like *W. sahnii* (Gupta, 1943) and *W. santalensis* (Sitholey and Bose 1953) come from other areas near Sahibganj, namely Khairbani and Sakrigalighat.

The mode of preservation of these *Williamsonias* is fundamentally of two types—impressions or petrifications. Unfortunately none of the two types have yet yielded perfect specimens inspite of hundreds of specimens collected, though the preservation in some is fairly good, as in *W. seawardiana* and some others to be described in the future by workers at the Birbal Sahni Institute of Palaeobotany, Lucknow or in the author's laboratory at Government College, Ajmer. The impressions may be in the form of casts or moulds, usually of some parts only like bracts, receptacles, ovules or scales and almost never of the entire specimens. As is well known one always finds in a fossil that part missing which one desires to see most. The petrifications are usually silicified but generally there is over silicification as one finds in the specimens from Chilgijri. The specimens from Amerjola on the other hand are very fragile and soft. The inorganic matrix penetrates inside and makes the preservation of the organic tissues of the plants difficult.

An examination of the small collection of the author from these two places, Amerjola and Chilgijri near Amrapara, besides the published work on the Indian *Williamsonias* leads him to think that there seem to be two main plans of construction in this flower: a closed type and an

open type. They are represented by *W. seawardiana* Sahni on the one hand and *W. sahnii* Gupta on the other. Perhaps it does not matter whether the flower is male, female or hermaphrodite, although the possibility is that the open type was generally male or hermaphrodite and the closed one indicated the female variety. The fact that *Williamsonia* flowers were usually unisexual is well represented by the known female flowers but the Indian types showed other varieties also cannot be ruled out.

The closed type (pl. 44, figs. 1, 3, 6, 7) usually has narrow linear bracts enveloping the fertile parts, seminiferous and interseminiferous scales borne at the base of the receptacle. The receptacles, (pl. 45, figs. 8-10;) all belonging to the closed type of flowers, are constricted at the base, broadened in the middle and become narrow towards their distal ends. The surface area of these receptacles ranges from 7 sq. cm. to 14 sq. cm. approximately; naturally the number of ovule bearing seminiferous scales will vary on the individual receptacle and that will further depend upon the number and nature of the interseminiferous scales surrounding the former; as also on the fact whether the entire surface of the receptacles is fertile. This closed type of flower might have opened in nature only partially to allow pollination and fertilization and ultimately formed a closed fruit (pl. 44, figs. 5, ; pl. 45, figs. 11, 12). The preservation of seeds in these specimens is very poor; although the details have not been examined in thin sections.

The open type of flower on the other hand was perhaps bigger in size and seemed to possess generally broad spreading bracts as described in *W. sahnii* (Gupta, 1943) or *W. santalensis* (Sitholey & Bose, 1953). The specimen figured here (pl. 44, fig. 2) may have been such a type of flower. It seems the bracts here open wide to allow

EXPLANATION OF PLATE 45

- FIG. 8—Fourteen different casts of receptacles showing different size and shape. Marks of fertile parts seen at the bases. Slightly reduced.
 9-10—Casts showing conical receptacles of *Williamsonia* with seminiferous and interseminiferous scales still attached on these. Slightly enlarged.
 11—A fruit of *Williamsonia* cut into two. Seeds poorly preserved at places marked by an arrow. Slightly reduced.
 12—Another fruit similar to the above, fig. 11. ca. 1½.

pollination and fertilization. It seems that this flower had fallen from the tree after the bracts had opened completely. It is possible that these open type of flowers were either male or hermaphrodite and had to open widely by spreading their bracts for the purpose of cross pollination and it may be that the bracts of such flowers did not take any part in the formation of the fruits as in the closed type (?).

No attempt has been made to describe any of the flowers mentioned and figured here except to indicate the two main types of the plan of construction in the Indian *Williamsonias*, the closed and the open type of flowers. The classification and the specific diagnoses of the various specimens, however, will depend upon the details of the form of the bracts, the nature of the hairs or scales or both on these, as well as the stomatal structures and their comparison with the similar features on the associated leaves of *Ptilophyllum*. The species will also differ from each other upon the shape and size of the receptacle and perhaps on the anatomical structure of the peduncle. The detailed structures of the fertile parts will further provide other important criteria for any definite diagnosis of the species. It is hoped that the recent collection of *Williamsonias* from the Rajmahal Hills will stimulate this work and useful data will be collected and thus contribute to our knowledge of the fossil flora of this classical Indian locality.

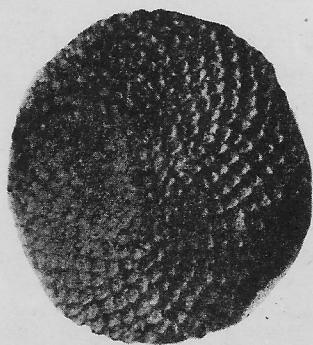
As one of the earlier pupils of Prof. Birbal Sahni, I deem it a great privilege to be given this opportunity to write this brief note for the Birbal Sahni Memorial Number of the Palaeontological Society of India and that too on a subject in which my Professor of revered memory was deeply interested and whose contribution to the investigation of the jurassic flora of Rajmahal Hills was eminent in every way.

In the end I wish to record my gratitude to the authorities of the Birbal Sahni Institute of Palaeobotany, Lucknow, for their always willing help in the preparation of any fossil material for study. During my

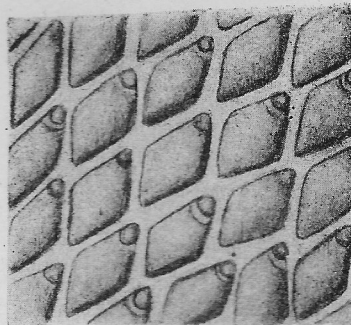
recent visit to Lucknow, I have had the benefit of fruitful discussion with Dr. R. V. Sitholey and Dr. M. N. Bose on this subject of Indian *Williamsonias*. To Dr. M. R. Sahni, the distinguished President of the Palaeontological Society of India, the author is deeply indebted for the honour accorded him by the acceptance of this article for inclusion in the Birbal Sahni Memorial Number to be published by the society.

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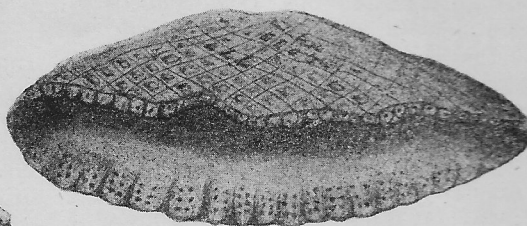
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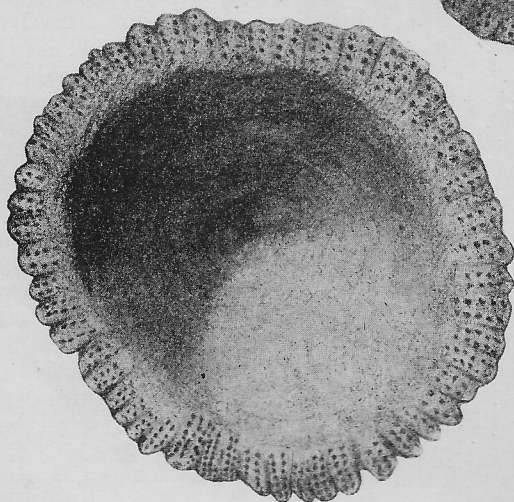
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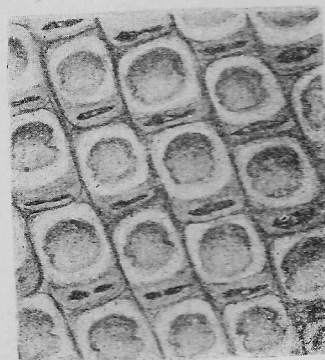
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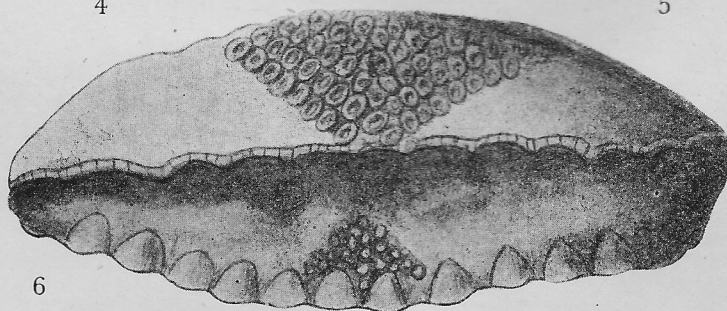
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TEWARI *ET AL* : CHEILOSTOME BRYOZOA FROM KUTCH.