

RESEARCH ARTICLE

Report of *Rodeites* sporocarp from Deccan Intertrappean Beds of Bhutera (M.P.) India

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Manuscript details:	ABSTRACT
<p>Date of publication 18.10.2014</p> <p>Available online on http://www.ijlsci.in</p> <p>ISSN: 2320-964X (Online) ISSN: 2320-7817 (Print)</p> <p>Editor: Dr. Arvind Chavhan</p> <p>Cite this article as: Kapgate DK and Ukey RW (2014) Report of <i>Rodeites</i> sporocarp from Deccan Intertrappean Beds of Bhutera (M.P.) India. <i>Int. J. of Life Sciences</i>, Special Issue, A2 : 95-98.</p> <p>Acknowledgement: The authors are thankful to Principal V.P. Dhomne, J.M. Patel College-Bhandara for providing necessary research facilities.</p> <p>Copyright: © Author(s), This is an open access article under the terms of the Creative Commons Attribution-Non-Commercial - No Derives License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.</p>	<p>The petrified pteridophytic sporocarp of <i>Rodeites</i> was collected from new fossiliferous locality- Bhutera (Lat. 22°06.582'N; Long. 79°08.402'E) of Chhindwara district, M.P. It is 30 km from Chhindwara on Seoni road and 10 km from north of Jhilmily Railway station. So far, only three species of <i>Rodeites</i> have been reported from these beds, such as <i>Rodeites dakshini</i> sporocarp present on a curved stalk, <i>Rodeites polycarpa</i> in a row attached to petiole, <i>Rodeites intertrappeana</i> on a branched pedicel. Present sporocarp shows some differences from above mentioned sporocarps of <i>Rodeites</i>. It is bilaterally symmetrical sporocarp of about 5 mm X 9 mm in size with very thick and multi-layered sporocarp wall approximately 454 µm. It contains 20-25 megaspores fully packed in the midst of microspores. Megaspores are spherical and 430µm to 500µm in diameter. Megaspore wall is about 43µm thick and complex in structure having intine or endospore, epispore, prismatic zone and outermost layer. Microspores are very numerous, spherical, 40-60µm in diameter. Microspore wall with two layers: a relatively smooth, dark inner layer and much thicker spongy looking layer outside it. A distinct triradiate mark observed from apical surface of microspore. As it show close similarities with <i>Rodeites dakshini</i> Sahni, (1943), it is kept under the genus <i>Rodeites bhuteri</i> sp. nov. The specific name after the locality Bhutera.</p> <p>Keywords: Fossil, Pteridophyte, Sporocarp, Deccan Intertrappean, Maastrichtian.</p>
	<p>INTRODUCTION</p> <p>This paper describes petrified pteridophytic, a sporocarp of <i>Rodeites</i> collected from new Bhutera. The genus <i>Rodeites</i> was described by Sahni (1943). Further contributions to its knowledge were made by Mahabale (1956) and by Surange (1966). Later on a series of papers by Chitaley and Paradkar (1971, 1972) and Paradkar and Barlinge (1981) provided information for its reconstruction. So far, only three species of <i>Rodeites</i> have been reported from the Deccan Intertrappean beds of India such as <i>Rodeites dakshini</i> Sahni (1943) a single sporocarp on a curved stalk, <i>Rodeites polycarpa</i> Chitaley and Paradkar (1971) five sporocarps in a row attached to petiole, <i>Rodeites intertrappeana</i> Paradkar and Barlinge (1981) 3-4 sporocarps on a branched pedicel. Present specimen described here shows single sporocarps along with some differences from above mentioned reported <i>Rodeites</i>.</p>

MATERIALS AND METHODS

A black silicified fossiliferous chert had been collected from Deccan Intertrappean beds of Bhutera, M.P., India. After breaking the chert and etching with hydrofluoric acid the specimen carefully observed by using hand lens, it appears elongated to elliptical body which cut in oblique longitudinal plane. Then serial peel sections were taken through its exposed plane with Cellulose Acetate peel technique.

RESULTS AND DISCUSSION

Present specimen from a piece of Deccan Inertrappean Chert of Bhutera, which is about 15 km away from well-known fossiliferous locality Mohgaonkalan, shows another Pteridophytic sporocarp cut in oblique longitudinal plane with mega, microsporangia and spores. Preservation of spores and the sporocarp is good. On closer study it has been found to be the sporocarp of *Rodeites*, which includes following parts:-

Sporocarp: It is bilaterally symmetrical, elliptical to elongate in shape of about 5mmX 9 mm in size. (Plt., Fig. 1) having a well preserved wall and bisporangiate type i.e. two kinds of spores i.e. smaller microspores and larger megaspores.

Sporocarp Wall: Sporocarp wall is very thick approximately 454 μm , multi-layered (Plt., Fig. 2); epidermis 94 μm next is a layer 172 μm broad, the prismatic layer, of elongated palisade-like cells. After this there is middle, 2-3layers thick-walled cells of 111 μm thick and parenchymatous inner layer 77 μm thick.

Spores: The sporocarp contains 20-25 megaspores fully packed in the midst of microspores in several sori/patches laterally extended towards center. Soral chambers are not distinctly seen and hence attachment of sori is unknown.

Megaspores: Megaspores are spherical and 430 μm to 500 μm in diameter. (Plt., Fig.3 to 7) Megaspore wall is about 43 μm thick (Plt., Fig. 8 and 9) and complex in structure showing following four layers-

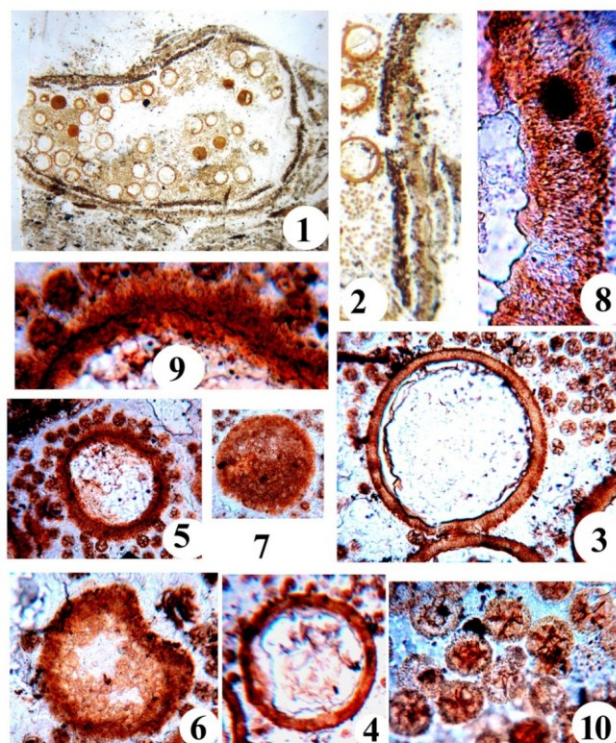
i. **Intine or Endospore:** Innermost thin dark layer which invests the cavity and only distinguishable in few place.

ii. **Epispore:** It is second thin membrane, darker and closely applied to intine.

iii. **Prismatic zone:** Epispore is covered by prismatic zone, at least 35-40 μm thick. It is marked by radial striations which are seen to follow a sinus coarse.

iv. **The Outermost layer:** It is composed of the minute papillae 6-8 μm tall, which terminate the prism and give the external surface a minutely tuberculate appearance.

Microspores: Microspores are very numerous, spherical, 40-60 μm in diameter. Integument or microspore wall shows clearly preserved two layers: a relatively smooth, dark inner layer 1.5 μm thick and much thicker 5 μm spongy looking layer outside it, sometime forming loose covering and the 'prisms' end in minute tubercles or papillae give the very characteristic mosaic surface to the spore. Microspore shows a distinct tri-radiated mark from apical surface view (Plate, Fig.10).



Explanation of plate

Fig. (1): Complete sporocarp showing megaspores and microspores 45X

(2): Sporocarp wall 45X

(3 to 7): Megaspore at different stage of appearance 90X *

(8 and 9): Megaspore wall 90X

(10): Megaspore showing triradiate mark 90X.

From the above description following important features are conformed:

- Sporocarp is bilaterally symmetrical, elliptical to elongate in shape.
- Bisporangiate type i.e. two kinds of spores i.e. smaller microspores and larger megaspores.
- Sporocarp wall is very thick and multi-layered.
- The sporocarp contains 20-25 megaspores fully packed in the midst of microspores.
- Several patches of spore laterally extended towards center and attachment of sori is unknown.
- Megaspores are spherical with four layered wall.
- Microspores are very numerous, spherical.
- Microspore wall shows clearly preserved two layers, dark inner layer and much thicker spongy outer layer.
- Microspore shows a distinct triradiated mark.

From the above features the present described pteridophytic specimen conformed as Sporocarp of *Rodeites*.

IDENTIFICATION

For identification of above described sporocarp, it is compared with living sporocarps of Marsiliaceae

family as well as reported *Rodeites* from the Deccan Intertrappean beds of India.

Comparison with Modern Species:

The living genera of Marsileaceae considered for the comparison of this fossil sporocarp are *Marsilea*, *Pilularia* and *Regnellidium*. It shows some common features with many variations.

*Resemblance to *Marsilea* are- attachment of sori inside the sporocarp, the bilateral nature of sporocarp.

*The sporocarp of *Pilularia*, with just four sori, is very different.

**Regnellidium diphyllum* also contains numerous megaspores packed in the midst of microspores, but sporocarp is round in shape.

*The spore size and ornamentation are more or less similar.

*The sporocarp wall and sporodermis less thick than above living genera.

*The mode of dehiscence seems to have been somewhat similar but intermediate between that in sporocarp of *Pilularia* and present day species of *Regnellidium*.

*There is a great deal of resemblance of present sporocarp and spores with those of the living *Regnellidium*.

Comparison with Reported Species:

Table 1: This fossil sporocarp is compared with following reported fossil *Rodeites* sporocarps given table below:

Sr. No.	1	2	3	4
Genus	<i>Rodeites</i>			
Species	<i>R. dakshini</i>	<i>R. polycarpa</i>	<i>R. intertrappeana</i>	<i>Present species</i> <i>R. bhuteri</i>
Author	Sahni, 1943	Chitale and Paradkar, 1971	Barlinge and Paradkar, 1980	
Imp. features and affinity	Single sporocarp on curved stalk. Size of sporocarp 10 mm dia. Megaspore- 600µm in dia. Microspore- 47 µm in dia.	5 sporocarp in a row attached to petiole. Size of sporocarp 8-12 x 12-16 mm dia. Megaspore- 450-600µm in dia. Microspore- 45-70 µm in dia.	3-4 sporocarps on a branched pedicel.	Single sporocarp, stalk is not seen, soral chambers are not distinctly seen, megaspores observed in different view. Size of sporocarp 5mm X 9 mm dia. Megaspore- 430µm to 500µm in dia. Microspore- 40-60µm in dia.
Remarks	Rhizome, roots, leaves, petiole number of sporocarps and internal structure of both kinds of spores.		A reconstruction of plant has been done on the basis of observed facts.	

From this table it is clear that the present specimen does not exhibit any exact similarities with the reported fossil *Rodeites* except *Rodeites dakshini* Sahni, (1943) and with modern pteridophytes except *Regnellidium* a member of Marsileaceae. As it showed close similarities with *Rodeites dakshini* Sahni, (1943), it is kept under the genus *Rodeites* and named as *R. bhuteri* sp. nov. The specific name after the locality Bhutera.

Chitale SD Paradkar SA (1972) *Rodeites* Sahni-Reinvestigated II. *Palaeobotanist* 20 (3): 293 - 296.

Paradkar SA and Barlinge SG (1981) *Rodeites* Sahni reinvestigated III. *Geophytology*, 11(1): 16-24.

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DIAGNOSIS

Rodeites bhuteri sp. nov. : Bilaterally symmetrical, elliptical to elongate in shaped sporocarp of about 5mmX 9 mm in size with very thick and multi-layered sporocarp wall approximately 454 µm. It contains 20-25 megaspores fully packed in the midst of microspores. Megaspores are spherical and 430µm to 500µm in diameter. Megaspore wall is about 43µm thick and complex in structure having intine or endospore, Epispore, prismatic zone and outermost layer. Microspores numerous, spherical, 40-60µm in diameter. Microspore wall with two layers: a relatively smooth, dark inner layer 1.5µm thick 5µm spongy on outside. A distinct triradiated mark from apical surface view of microspore.

Holotype : RWU/Pte./Sp.N.5/Deposited at Dept. of Botany, J. M. Patel College, Bhandara.

Horizon : Deccan Intertrappean Series of Madhya Pradesh.

Locality : Bhutera of Chhindwara district.

Age : Late Cretaceous (Maastrichtian).

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