

Koshalia, an *Incertae sedis* fossil from the Subathu Formation (Late Ypresian), Himachal Pradesh, India

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ABSTRACT

Sarkar S & Prasad V 2003. *Koshalia*, an *Incertae sedis* fossil from the Subathu Formation (Late Ypresian), Himachal Pradesh, India. Palaeobotanist 52(1-3) : 113-116.

A new form genus *Koshalia* has been instituted from the Subathu Formation (Late Ypresian) of Shimla Hills, Himachal Pradesh. This taxon is represented by only one species viz., *K. enigmata* and possess subsphaerical, multilayered, shield-shaped thyrrothecia. The exact affinity of the recorded fossil is not known, it may probably a fruiting body of some unknown affinity.

Key-words—*Koshalia*, Fruiting body, Subathu Formation (Late Ypresian), Himachal Pradesh, India.

भारत के हिमाचल प्रदेश प्रान्त के सुबाथू शैलसमूह (अन्तिम वायप्रीज़ियन) से प्राप्त *कोशलिया* नामक एक *इनसर्टाइ सेडिस* पादपाशम

समीर सरकार एवं वन्दना प्रसाद

सारांश

हिमाचल प्रदेश की शिमला पर्वत श्रेणियों के सुबाथू शैल समूह (अन्तिम वायप्रीज़ियन) से एक नवीनतम वंश प्ररूप *कोशलिया* खोजा गया है। यह वर्गक मात्र एक प्रजाति के *एनिग्माटा* द्वारा निरूपित है तथा इसमें उपगोलीय, बहुस्तरीय, ढाल की आकार का थाइरियोथीशिया विद्यमान है। अंकित पादपाशम की सुनिश्चित बन्धुता ज्ञात नहीं हो सकी है, परन्तु यह सम्भवतः कुछ अज्ञात बन्धुता का फल काय हो सकता है।

संकेत शब्द—*कोशलिया*, फल काय, सुबाथू शैलसमूह (अन्तिम वायप्रीज़ियन), हिमाचल प्रदेश, भारत.

INTRODUCTION

DURING the course of palynological investigation of the Palaeogene sediments of Shimla Hills, Himachal Pradesh, a large number of specimens of fruiting bodies of unknown affinity were recovered from the Late Ypresian sediments of

the Subathu Formation, exposed along the *Koshalia* Nala near Koti in the Sirmaur District, Himachal Pradesh (Fig. 1).

The fruiting body referred to the newly established form genus *Koshalia* is distinctive and morphologically different from the known form genera of fruiting body. In morphological character *Koshalia* has subsphaerical, multilayered, shield-

shaped thyriothecia, 9-10 cells arranged in compact rings around a small ostiole. *Koshalia* is an important constituent of the *Cordosphaeridium* spp. Assemblage Zone which identifies the Late Ypresian-Early Lutetian transition in the section (Sarkar & Prasad, 2000).

GEOLOGICAL SETTING

The Palaeogene succession of Shimla Hills consists of Subathu, Dagshai and Kasauli formations in ascending order of stratigraphy. About 110 m thick succession of the Subathu Formation are exposed along the Koshalia Nala near Koti in the Sirmaur District of Himachal Pradesh (Fig. 2). The Late Ypresian sediments of the Koshalia Nala has been dated using larger foraminifera and calcareous nannofossils (Bagi, 1992, Jafar & Singh, 1992). The basal part of the Late Ypresian sequence comprises mostly grey splintery shales with few thin storm sand layers. The middle horizons contain mostly hard splintery shales, intercalated with thin sandstones layers. The Early Lutetian sequence is about 20 m thick. It is characterised by a thick limestone bed (1-2 m) at the base. It contains mostly green splintery shales. The overlying red bed sequence mostly comprises siltstones. The fruiting body yielding horizon consists of light grey calcareous shale just below *Assilina Spira Abradi* band. The type material and the slides are housed in the Museum of the Birbal Sahni Institute of Palaeobotany, Lucknow.

KOSHALIA gen. nov.

Type Species—*Koshalia enigmata* sp. nov.

Generic Diagnosis—Thyriothecia subsphaerical, multilayered, 90-150 μm in diameter, 9-10 cells arranged in compact rings around an ostiole, marginal cells extremely large, Size 35-45 x 65-85 μm , inner cells small, subcircular, size 8-15 x 10-20 μm .

Generic Description—Thyriothecia subsphaerical, multicellular, multilayered, cells arranged in compact rings, number of rings three, ostiolate, ostiole centric, circular, 6-10 μm in diameter, 3-4 dark coloured cells present around the ostiole, individual cells radially arranged, interconnected to form a shield-shaped body, marginal cells extremely large, broader than long, cell wall thickened on the ventral surface, cell wall scabrate to infra punctate. Perforation in individual cells absent.

Comparison—*Koshalia* gen. nov. is distinguished from any other known form genera of fruiting body in having multilayered, subsphaerical, shield-shaped thyriothecia, 9-10 cells arranged in compact rings and possess extremely large marginal cells.

Etymology—The genus has been named after the Koshalia Nala, the geographic location from where it has been recorded.

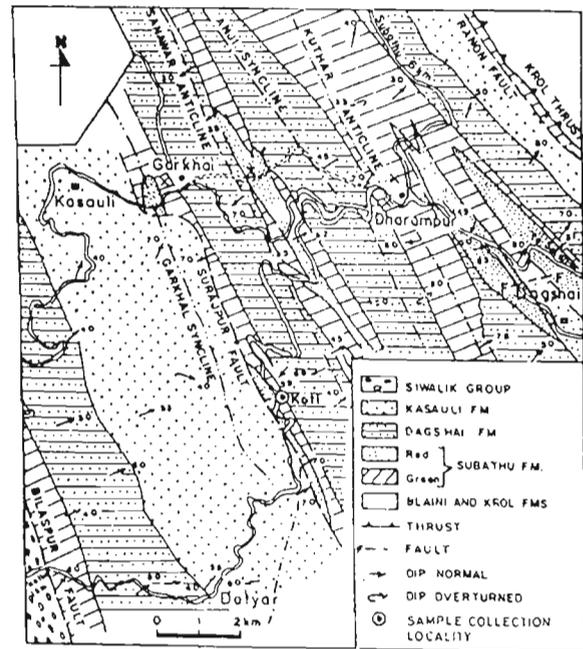


Fig. 1—Shows the geological map of the area of investigation (after, Mathur & Juyal, 2000).

Affinity—The affinity of this genus is not definitely known, however, overall morphology points towards fruiting body of some unknown affinity.

Remarks—Apparently, the recovered fruiting bodies show close resemblance with microthyraceous ascostromata as well as foraminiferal test. However, careful observations have revealed that they neither belong to fungi nor to foraminifera because of its characteristic cell arrangement. Morphological variability is also very prominent among the recovered specimens.

KOSHALIA ENIGMATA sp. nov.

(Pl. 1:1-4)

Holotype—Fig. 2, Slide No. BSIP 12243, co-ordinates 54 x 104.

Dimensions (Holotype)—Size of thyriothecia 100 μm in diameter, Size of the marginal cells 38-40 x 65-70 μm ; Size of the inner cells 8-12 x 10-15 μm .

Type Locality—Koshalia Nala near Koti, Shimla Hills, Himachal Pradesh, India.

Horizon & Age—Subathu Formation, Late Ypresian.

Diagnosis—Thyriothecia subsphaerical, multicellular, multilayered, 9-10 cells arranged in compact rings, 3-4 cells in each layer, ostiolate, marginal cells extremely large, overall size range 90-150 μm in diameter.

Description—Thyriothecia subsphaerical, multilayered, overall size range 90-150 μm in diameter, multicellular, 9-10 cells arranged in compact rings to form a shield-shaped body, 3-4

cells arranged radially around an ostiole in each layer, ostiole centric, 6-10 μm in diameter, margin thickened, inner cells subcircular, small, thick walled, marginal cells extremely large, cell wall thin, scabrate to infrapunctate. Perforation absent in individual cells.

Erymology—The affinity of the specimens is not known so it has been named as enigmata.

Remarks—Most of the specimens are very thick walled, therefore cell structures are visible only in over macerated samples.

DISCUSSION

The present study shows that *Koshalia* is mainly associated with land derived palynofossils especially with palm pollen viz., *Neocouperipollis* spp., *Palmidites* spp. and microthyraceous ascostromata in the Late Ypresian sediments of the Subathu Formation. The association with palm pollen indicates that present fruiting bodies are terrestrial in origin and were transported from near by coastal areas during regressive phase of the Subathu Sea. Microthyraceous fossil

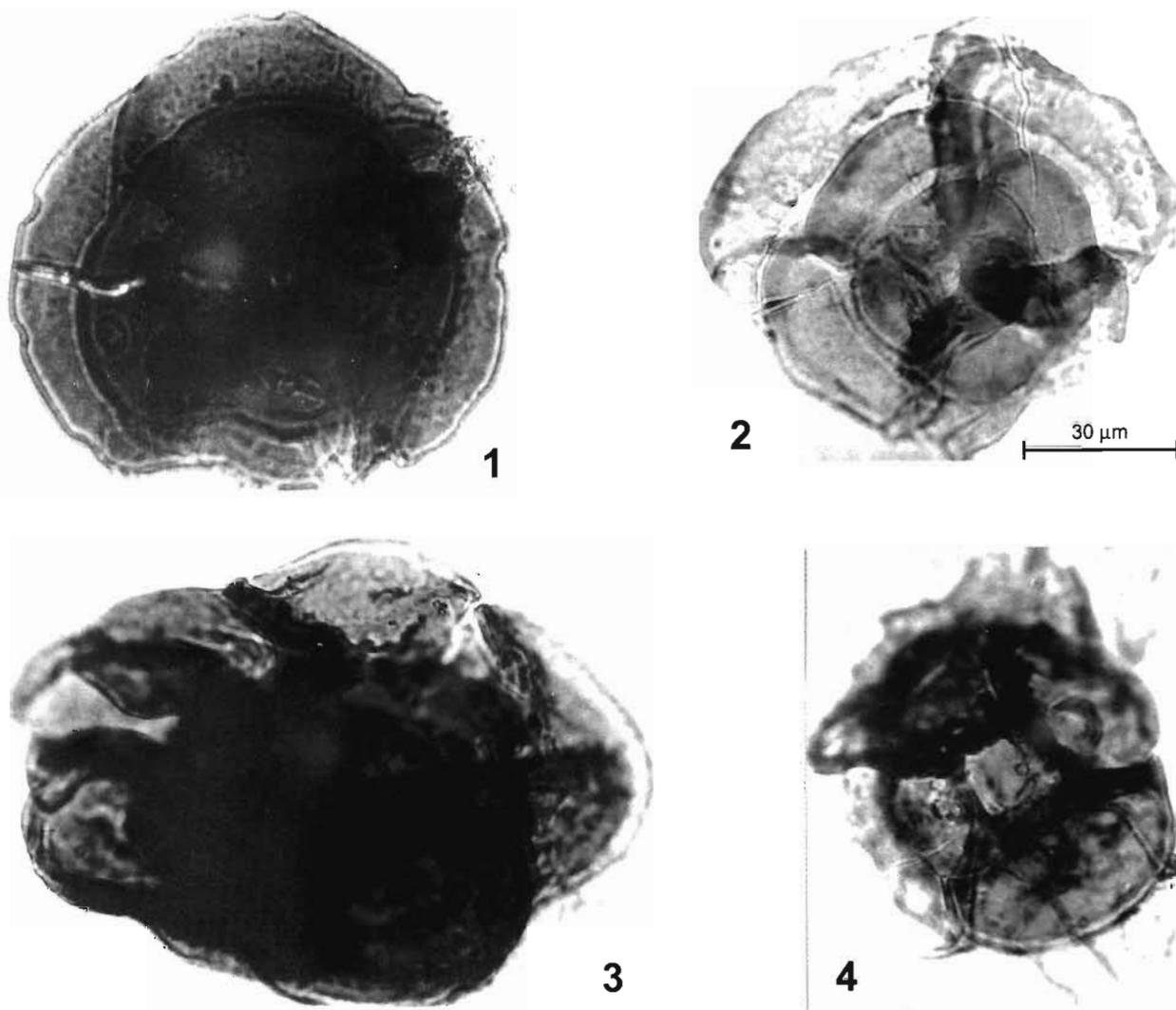


PLATE 1

(All photomicrographs are magnified x ca.700. Co-ordinates of specimens in slides refer to the stage of Laborlux Microscope No. 402040)

Koshalia enigmata gen. et sp. nov.

- 1 Slide No. BSIP 12242, co-ordinates 30 x 106 (Young fruiting body, dorsal view).
2. Slide No. BSIP 12243, co-ordinates 54 x 104 (Holotype, ventral view).

3. Slide No. BSIP 12243, co-ordinates 57 x 103 (Mature fruiting body, dorso-lateral view).
4. Slide No. BSIP 12243, co-ordinates 49 x 112 (Showing ostiole, ventral side).

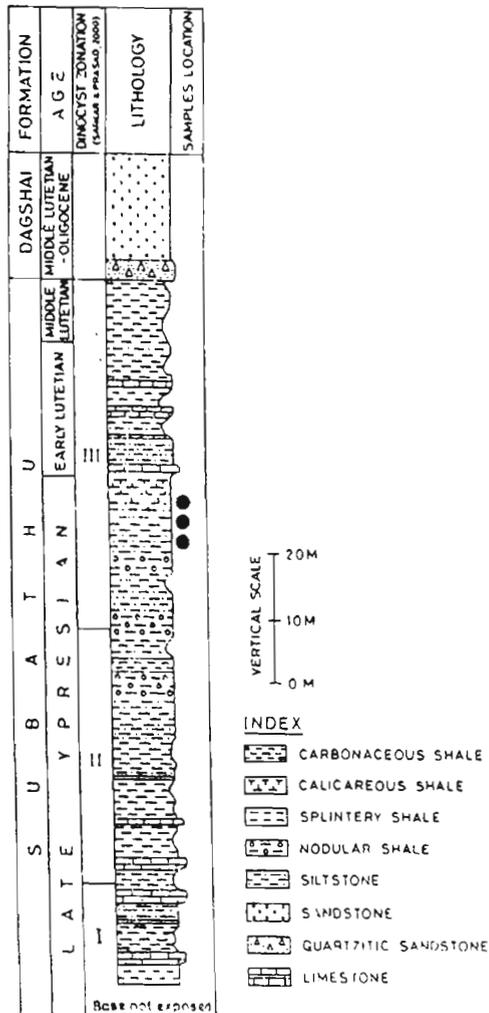


Fig. 2—Shows the location of samples in the litholog (modified after, Bhatia & Singh, 1991).

fungi are generally considered to be a good indicator of warm and humid climate. The members of the microthyriaceae are epiphyllous parasites in tropics, subtropics and warm temperate regions (Ram Ratan & Chandra, 1982) and found generally in the tropical evergreen and deciduous forest. The occurrence of these fruiting bodies with microthyraceous ascostromata clearly suggests that the prevalent climate was very warm and humid.

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REFERENCES

- Bagi H 1992. Contribution to the Ostracode and smaller foraminiferal fauna of the Subathu Formation of parts of Shimla Hills - Unpublished Ph.D. Thesis, Panjab University, Chandigarh : 1-265.
- Bhatia SB & Singh RY 1991. Workshop on SEM Applications in Micropalaeontology. Guide to Field Excursion to Koshalia Nala, Indian Geologist Association, Panjab University, Chandigarh : 1-3.
- Jafar SA & Singh OP 1992. K/T boundary species with Early Eocene nannofossils discovered from Subathu Formation, Shimla Himalaya, India. *Current Science* 62 : 409-413.
- Mathur NS & Juyal KP 2000. Atlas of Early Palaeogene invertebrate fossils of the Himalayan foothills belt. *Wadia Institute of Himalayan Geology Monograph 1* : pp257.
- Ram Ratan & Chandra A 1982. Isolated thyrtothecia from the surface (Bottom) sediments of the Arabian Sea. *Geophytology* 12 : 260-263.
- Sarkar S & Prasad V 2000. Palaeoenvironmental significance of dinoflagellate cysts from the Subathu Formation (Late Ypresian–Middle Lutetian) of Koshalia Nala section, Shimla Hills, India. *Himalayan Geology* 21 : 167-176.