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Palynology of the Talchir Formation from Betul Coalfield, Satpura Basin, India

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The palynoflora recovered from the sediments of Talchir Formation of Mura-Kuppa area in Betul Coalfield, Satpura Basin is rich in *Plicatipollenites*, followed by *Parasaccites* and *Virkkipollenites*. *Potonieisporites* and *Rugasaccites* occur consistently but in low percentages. This palynoflora is closely comparable with the known older palynofloras of the Talchir Formation of India.

Key-words—Palynology, Betul Coalfield, Talchir Formation, Satpura Basin (India).

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सारांश

सतपुड़ा द्रोणी (भारत) में बेतुल कोयला-क्षेत्र के तलचीर शैल-समूह का परागाणविक अध्ययन

सुरेश चन्द्र श्रीवास्तव, आनन्द प्रकाश एवं ओमप्रकाश शिवदास सराटे

सतपुड़ा द्रोणी के बेतुल कोयला-क्षेत्र में स्थित मुरा-कुप्पा क्षेत्र के तलचीर अवसादों से उपलब्ध परागाणुवनस्पतिजात में **प्लिकेटिपोलिनाइटिस** की बाहुल्यता है, इसके पश्चात **पेरासेक्काइटिस** तथा **विर्किपोलिनाइटिस** की बाहुल्यता आती है। **पोतोनियेस्पोराइटिस** एवं **रुगासेक्काइटिस** हालाँकि निरन्तर मिलते हैं परन्तु इनकी प्रतिशत मात्रा कम है। इस समुच्चय से उपलब्ध यह परागाणुवनस्पतिजात तलचीर शैल-समूह से ज्ञात अन्य प्राचीनतर परागाणुवनस्पतिजातों से घनिष्ठ तुलनीय है।

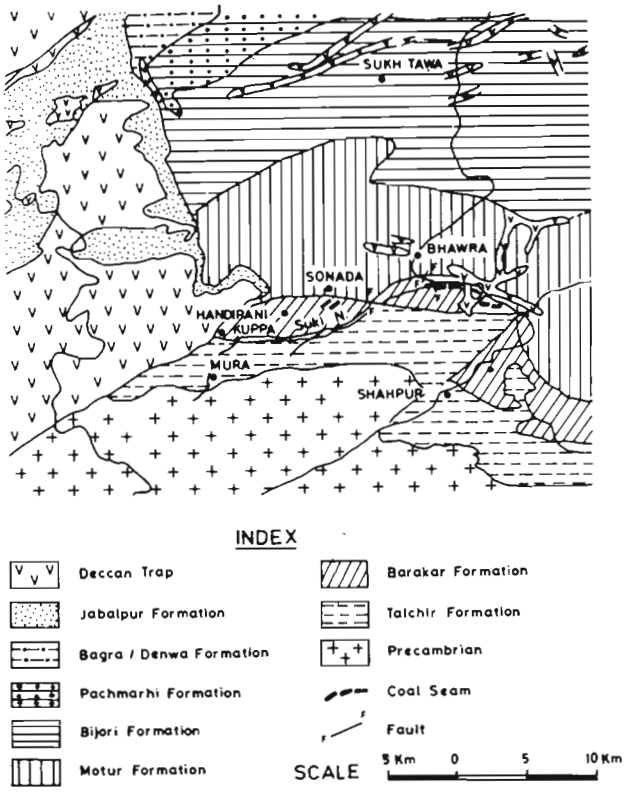
TALCHIR Formation occurs in the southern part of the Satpura Basin as a continuous stretch from Junardeo in the east to Mura Village in the west. They also occur in patches on the northern fringes of the basin, south of Piparia, east of Gotitoria (Mohpani Coalfield) and at the confluence of Anjan and Pathapani streams. The general palynology and the succession of palynofloras within the Talchir sediments from northern part of Satpura Basin have been studied by Bharadwaj and Anand-Prakash (1972) from Mohpani Coalfield. Bharadwaj, Navale and Anand-Prakash (1974) studied palynoflora from Talchir sediments exposed on Kanhan River Section in Pench-Kanhan Coalfield in the southern part of the basin. Bharadwaj, Tiwari and Anand-Prakash (1978) described another palynoflora from the Talchir sediments exposed at the confluence of Anjan-Pathapani streams in northern part of the Satpura Basin. So far, no information is available about the palynology of Talchir sediments from south-western part of the basin where these sediments occupy a large area and comprise a significant part of the Lower Gondwana Sequence. In the present investigation Talchir sediments from Mura-Kuppa area (Table 1) have been analysed for palynofossils to fill the gap in the knowledge of Talchir palynostratigraphy of the Satpura Basin.

In Betul Coalfield (Shahpur Coalfield) almost all the lithological units of Lower Gondwana Sequence (Talchir, Barakar, Motur and Bijori formations) are exposed around Shahpur Village. The metamorphic rocks form the basement for the Gondwana sediments in the Betul Coalfield and are well exposed south of Mura Village forming a chain

Table 1—Showing details of samples collected from Mura-Kuppa area of Betul Coalfield, Satpura Basin

Sample no.	Lithology	Palyno-fossils Present (+) Absent (-)
T-1	Basal boulder bed (Bottom)	-
T-2	Sandstone	-
T-3	Shaly green sandstone	-
T-4	Sandstone	-
T-5	Greenish needle shale	-
T-6	Needle shale	-
T-7	Needle shale	-
T-8	Needle shale	-
T-9	Khaki green shaly sandstone	-
T-10	Fine laminated sandstone	-
T-11	Greenish mudstone	-
T-12	Greenish needle shale	-
T-13	Mudstone	-
T-14	Khaki green shale (Top)	+

of small hillocks. The sediments of the Talchir Formation overlie the basement metamorphic rocks and extend as a continuous patch from Mura Village in the west to Shahpur in the east (Map 1). The basal unit (boulder bed) of the Talchir Formation comprises dispersed clasts of various kinds exposed in a small stream near Mura Village. This is overlain by greenish, fine-grained sandstones. Succeeding this member is a thick succession of turbidite facies forming small mounds north of Mura Village, a feature unique of Talchir Formation seen in this coalfield. The Talchir sediments are also affected by a N-S trending dyke near Kuppa Village. At one place ripple marks have been observed in the Talchir sandstones near Handipani Village.



Map 1—Geological map of western part of the Satpura Basin, Madhya Pradesh.

PALYNOLOGY

The following genera and species have been recorded from the Talchir Formation exposed around Mura-Kuppa area :

Callumispora tenuis Bharadwaj & Srivastava 1969
Leiotriletes conspicuous Saksena 1971
Parasaccites diffusus Tiwari 1965
Parasaccites densicorpus Lele 1975
Parasaccites talchirensis Lele & Makada 1972
Plicatipollenites indicus Lele 1964
Plicatipollenites densus Srivastava 1970
Plicatipollenites trigonalis Lele 1964
Plicatipollenites gondwanensis (Balme & Hennelly) Lele 1964
Caheniasaccites elongatus Bose & Kar 1966
Caheniasaccites densus Lele & Karim 1971
Potonieisporites crassus Lele & Chandra 1973
Rugasaccites orbiculatus Lele & Maithy 1969
Virkkipollenites sp.
Faunipollenites sp.
Crescentipollenites amplus (Balme & Hennelly) Tiwari & Rana 1980
Crescentipollenites globosus Maithy 1965
Leiosphaeridia sp.
Foveofusa sp.

The palynoflora is rich in radial monosaccate pollen grains (86.5%), chiefly *Plicatipollenites* (43.0%) and *Parasaccites* (30.5%). *Virkkipollenites, Potonieisporites* and *Rugasaccites* follows next in the order of dominance (Histogram 1). Trilete spores and disaccate pollen grains are poorly represented.

DISCUSSION

The palynoflora from Talchir Formation of Mohpani Coalfield (Bharadwaj & Anand-Prakash, 1972) is characterised by the dominance of radial monosaccate pollen genus *Parasaccites* followed by *Virkkipollenites* and *Plicatipollenites* and thus differs from the present assemblage. *Rugasaccites, Crescentipollenites, Leiosphaeridia, Foveofusa* recorded in the present investigation are absent in Mohpani assemblage.

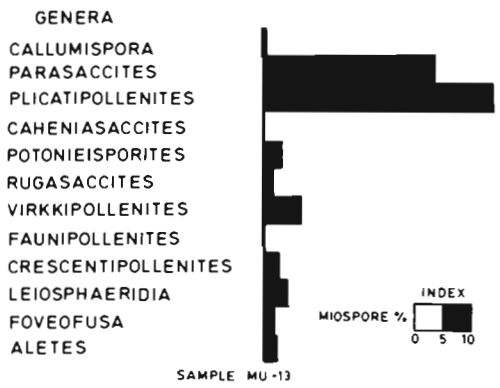
The palynoflora of Talchir Formation from Kanhan River Section (Bharadwaj, Navale & Anand-Prakash, 1974) is also dominated by *Parasaccites*. Here the subdominance is attained by *Plicatipollenites* followed by *Virkkipollenites* and *Pilasporites*. The palynological resemblance between these assemblages and Mura-Kuppa assemblage is only superficial since the nature of overall dominance is almost inverse. Moreover, *Rugasaccites, Crescentipollenites* and *Leiosphaeridia* are absent in the assemblage of Kanhan River Section.

Bharadwaj, Tiwari and Anand-Prakash (1978) described an assemblage from the Talchir sediments exposed in the northern part of Satpura Basin (6 km south of Fatehpur at the confluence of Anjan-Pathapani streams). In this assemblage the radial monosaccates are in very small amounts and the bulk of percentage is shared by *Foveofusa* and *Leiosphaeridia* and thus differs from the Mura-Kuppa assemblage.

Thus the Talchir sediments of Mura-Kuppa Village of Betul Coalfield show older aspects in the Talchir sequence. Amongst the Talchir palynofloras described so far from the Satpura Basin, the assemblage recorded from Anjan-Pathapani River Section appears to be stratigraphically older to the present assemblage while those described from Mohpani Coalfield and Kanhan River Section are younger than the Mura-Kuppa assemblage.

Tiwari (1975) made a comparative study of the known Talchir palynofloras and concluded that *Plicatipollenites* dominance has an older tendency, while *Parasaccites* dominance has a younger tendency. The palynoflora in the present investigation is dominated by *Plicatipollenites* associated with *Parasaccites* and is thus comparable with the *Plicatipollenites* dominant T-1 and T-2 palynozones of Tiwari (1975).

Lele (1975) also observed the possibility of occurrence of two palynofloras in the Talchirs. Chandra and Lele (1979) studied the Talchir palynoflora from South Rewa Gondwana Basin and concluded that *Plicatipollenites* dominance is associated with older sediments while *Parasaccites* is dominant in the younger Talchir sediments. A similar conclusion was also drawn simultaneously by Bharadwaj, Srivastava and Anand-Prakash (1979) in a sequential study of a measured section from Hasia Nala of Manendragarh area. Almost a similar association is observed in the present investigation of Mura-Kuppa Talchir sediments. However, *Jayantisporites* and *Divarisaccus* recorded from Hasia Nala Section of Manendragarh are absent in the present assemblage. *Leiosphaeridia, Crescentipollenites* and *Foveofusa* which are present in Betul Coalfield assemblage are absent in the palynofloral assemblage of Hasia Nala section of Manendragarh.



Histogram 1—Percentage distribution of pollen and spores from Talchir Formation of Mura-Kuppa Area, Betul Coalfield, Satpura Basin.

The palynoflora recorded from Jayanti Coalfield (Lele & Karim, 1971) is also dominated by *Plicatipollenites* (sample nos. D14-B & D10-B) and is much closer to the present palynofloral assemblage. In sample nos. D10-D and D10-E (Jayanti Coalfield), though *Plicatipollenites* is a dominant genus, the subdominance is marked by *Virkkipollenites*. The palynoflora of Jayanti Coalfield also contains pollen grains like *Tuberisaccus, Divarisaccus, Vestigisporites, Limitisporites* which are absent in the present assemblage. *Leiosphaeridia, Rugasaccites, Crescentipollenites* and *Foveofusa* which are recorded in the present assemblage are absent in the palynological assemblage recovered from Jayanti Coalfield.

Lele and Shukla (1980) have recently described a palynoflora from Talchir Formation of Hutar Coalfield which shows the dominance of *Parasaccites* over *Plicatipollenites* and thus differs from the present assemblage. The Talchir assemblage described from Jharia Coalfield (Tiwari *et al.*, 1981) also contains a palynoflora similar to that of Hutar Coalfield and thus does not compare with the present assemblage of Betul Coalfield.

The palynoassemblage recovered from Korba Coalfield by Bharadwaj and Srivastava (1973, histogram 1, p. 146; bore-hole NCKB-19; sample no. 140, depth 684.63-681.51 m) closely compares with the present findings. The assemblage here is dominated by *Plicatipollenites* and subdominant *Parasaccites*. The other associated forms are *Callumispora, Platysaccus, Cabeniasaccites, Scheuringipollenites* and *Faunipollenites* (1 to 2%).

The palynological study shows that the sediments investigated here represent the older

Talchir sediments in the Satpura Basin. The field studies also indicate a similar possibility, as in other areas of the Satpura Basin. The Talchir sediments have not been found resting directly on the basement metamorphics except in the Anjan-Pathapani Section. In Anjan-Pathapani Section the basal Talchir sediments are highly crushed and metamorphosed due to the intense faulting along the northern margins of the basin and do not yield palynofossils. Therefore, the palynoflora represents a comparatively younger part in the Talchir sequence. In Mohpani area the basement rocks are not exposed, thus it is believed that the basal part of the Talchir sediments is also not exposed and whatever palynoflora is known represents a younger part of the Talchir sequence. Similarly, in Kanhan River Section the palynoflora does not represent the base of the Talchir Formation. In the light of these facts it becomes clear that the sediments of Mura-Kuppa area represent the basal part of the Talchir sequence in Satpura Basin. The palynological investigation further substantiates that the younger sediments of the Talchir Formation are probably missing due to the faulted contact of the Talchir and Barakar formations.

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