

Palynology of Kamthi Formation from Chelpur Area, Godavari Graben, Andhra Pradesh, India

Suresh C. Srivastava & Neerja Jha

Srivastava, Suresh C. & Jha, Neerja (1987). Palynology of Kamthi Formation from Chelpur Area, Godavari Graben, Andhra Pradesh, India. *Palaeobotanist* 35(3) : 342-346.

Palynofossil assemblages recovered from the subsurface sediments of Chelpur area in the Godavari Graben of Kamthi Formation have been studied. It is deduced that the palynoflora is characterised by the dominance of striate-disaccate pollen. *Densipollenites* is nearly absent. The palynoflora has been compared with the known Lower Kamthi palynoflora in Ramagundam area of Godavari Graben and also with Raniganj palynoflora of Damodar Valley coalfields. The recovered palynoflora indicates Late Permian age.

Key-words—Palynology, Striate-disaccate pollen, Kamthi Formation, Late Permian (India).

Suresh C. Srivastava & Neerja Jha, Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow 226 007, India.

सारांश

आंध्र प्रदेश (भारत) में गोदावरी द्रोणिका के चेलपुर क्षेत्र से कामथी शैल-समूह का परागाणविक अध्ययन

सुरेश चन्द्र श्रीवास्तव एवं नीरजा झा

कामथी शैल-समूह की गोदावरी द्रोणिका में स्थित चेलपुर क्षेत्र के उपसतही अवसादों से उपलब्ध परागाणविक समुच्चयों का अध्ययन किया गया है। यह निष्कर्ष निकाला गया है कि परागाणुवनस्पतिजात रेखीय-द्विकोष्ठीय परागकणों से प्रभावी है। डेन्सीपोलिनाइटिस करीब-करीब अनुपस्थित है। उपलब्ध परागाणुवनस्पतिजात की तुलना गोदावरी द्रोणिका में रामागुंडम क्षेत्र से ज्ञात अधिर कामथी वनस्पतिजात तथा दामोदर घाटी के कोयला-क्षेत्रों से उपलब्ध रानीगंज परागाणुवनस्पतिजात से की गई है। उपलब्ध परागाणुवनस्पतिजात अनन्तम परमी आयु इंगित करता है।

KAMTHI Formation was named by Blanford (1868) after the military station Kamthi (20° 10' : 79° 15') close to Nagpur. These rocks are exposed extensively in Wardha-Godavari Valley in Maharashtra and Andhra Pradesh. In Godavari Graben these sediments are present in subsurface in Chelpur, Ramagundam, Mantheni, Indaram, Kundaram, Jaipuram, Ramkrishnapuram, Manuguru and near Siripuram areas.

A brief report of the presence of pteridophytic spores and striate-disaccate pollen was made by Ramanamurty (1979). Thereafter, the palynofloras of Kamthi Formation have been studied in detail from Ramagundam area (Bharadwaj *et al.*, 1984; Bharadwaj *et al.*, in press). In the same pursuit, the present investigation has been extended to Chelpur area of Godavari Graben.

LITHOLOGY OF KAMTHI FORMATION

On the basis of lithological attributes the Kamthi Formation has been divided into three members—Lower, Middle and Upper. The Lower Member consists of medium-grained greyish white, calcareous sandstone and a few coal seams. The Middle Member consists of alternating sequence of medium-grained grey white sandstone and shales/variegated clays. The sandstone and shales exhibit greenish tint at places. This member is devoid of coal seams. The Upper Member comprises coarse-grained sandstone and bands of ferruginous sandstones and brick-red siltstone. The sandstone is characterised by bands of pebble or conglomerates. In Chelpur area (borehole GJ-3) the Lower Member (± 231.93 m) consists of medium to coarse-grained white sand-

stone including black shale, grey shales and a number of coaly horizons at various levels. The overlying Middle Member is developed to a limited extent (36.65 m) and includes greenish coarse-grained ferruginous sandstone. The underlying Barren Measures Formation shows a gradational contact.

MATERIAL AND METHOD

The material (bore-hole no. GJ-3) for the present study was supplied by Geological Survey of India from Chelpur area of Godavari Graben. The bore-hole penetrates the Kamthi Formation and closes at 417.60 m in Barren Measures Formation. In all, 14 samples were macerated and heavy liquid solution was used to remove silica wherever needed. The details of samples are given in Histogram 1.

PALYNOFOSSIL ASSEMBLAGES

The quantitative and qualitative distribution of miospore genera shows following assemblage in the bore-hole GJ-3.

Assemblage-A

Only one assemblage is present in bore-hole GJ-3 between 272.00 to 84.50 m (sample nos. 4-9). The assemblage is characterised by the dominance of striate-disaccates like *Faunipollenites* and *Striatopodocarpites* while *Scheuringipollenites* marks the subdominance. Appearance of *Lunatisporites*, *Corisaccites*, *Guttulapollenites*, *Crescentipollenites*, *Verticypollenites*, *Alisporites*, *Falcisporites*, *Vitreisporites*, *Chordasporites*, *Gondisporites*, *Osmundacidites* and *Polypodiidites* is the characteristic feature of this assemblage. *Densipollenites* is very rare. In some samples *Striatopodocarpites* is dominant while in others *Faunipollenites* is the dominant element, but as a whole striate-disaccate forms the dominant component of the assemblage. Few triletes like *Brevitriletes*, *Microbaculispora*, *Calamospora*, *Lophotriletes*, *Osmundacidites*, *Microfoveolatispora*, *Indotriradites*, *Gondisporites*, *Verrucosiporites* are present but their percentage gradually decreases upwards. Taeniate genera vary from 1.5 per cent. Monosaccates are very rare in occurrence. A detailed list of species present in this assemblage is as follows:

Indotriradites sparsus Tiwari 1965

I. korbaensis Tiwari 1964

Gondisporites sp.

Lophotriletes rectus Bharadwaj & Salujha 1964

Horriditriletes ramosus (Balme & Hennelly) Bharadwaj & Salujha 1964

H. rampurensis Tiwari 1968

H. concavus Maheshwari 1969

Brevitriletes unicus (Tiwari) Bharadwaj & Srivastava emend. Tiwari & Singh 1981

B. communis (Tiwari) Bharadwaj & Srivastava emend. Tiwari & Singh 1981

Microbaculispora tentula Tiwari 1965

Microfoveolatispora foveolata Tiwari emend. Tiwari & Singh 1981

Calamospora exila Bharadwaj & Salujha 1964

Osmundacidites indicus (Singh, Srivastava & Roy) Srivastava & Jha (MS)

Verrucosiporites surangei Maheshwari & Benerji 1974

Laevigatosporites colliensis (Balme & Hennelly) Venkatachala & Kar 1968

Polypodiidites perverrucatus Couper 1953

Densipollenites indicus Bharadwaj 1962

D. densus Bharadwaj & Srivastava 1969

D. invisus Bharadwaj & Salujha 1964

Weylandites circularis Bharadwaj & Srivastava 1969

W. minutus Bharadwaj & Srivastava 1969

W. obscurus Bharadwaj & Srivastava 1969

Cabeniasaccites distinctus (Lele & Makada) Srivastava & Jha (Ms)

Parasaccites diffusus Tiwari 1965

Virkkipollenites orientalis Tiwari 1968

Trochosporites sp.

Lueckisporites crassus Sinha 1972

L. microgranulatus Klaus 1963

Lueckisporites sp.

Guttulapollenites hannonicus Goubin 1967

Lunatisporites diffusus Bharadwaj & Tiwari 1977

L. pellucidus (Goubin) Maheshwari & Banerji 1974

L. ovatus (Goubin) Maheshwari & Banerji 1974

Corisaccites alutus Venkatachala & Kar 1966

Striatites rhombicus Bharadwaj & Salujha 1964

S. solitus Bharadwaj & Salujha 1964

S. communis Bharadwaj & Salujha 1964

S. tentulus Tiwari 1965

S. obliquus Srivastava 1979

Lahirites levicarpus Tiwari 1968

L. rarus Bharadwaj & Salujha 1964

Faunipollenites varius Bharadwaj 1962

F. singrauliensis Sinha 1972

F. parvus Tiwari 1965

F. bharadwajii Maheshwari 1967

F. copiosus Bharadwaj & Salujha 1965

Striatopodocarpidites diffusus Bharadwaj & Salujha 1964

S. rotundus (Maheshwari) Bharadwaj & Dwivedi 1981.

S. decorus Bharadwaj & Salujha 1964

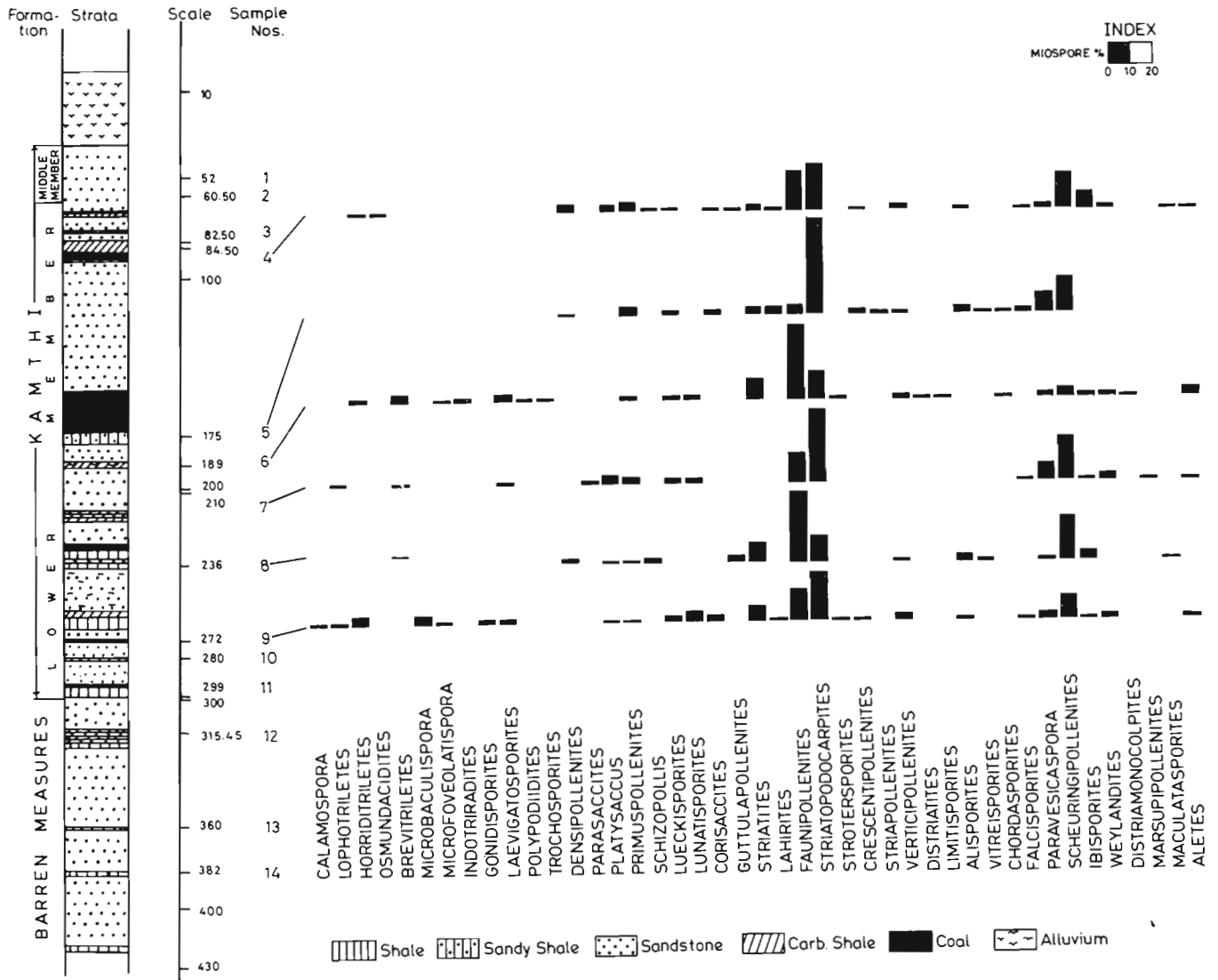
S. labrus Tiwari 1965

S. subcircularis Sinha 1972

S. tiwarii Bharadwaj & Dwivedi 1981

S. globosus (Maheshwari) Bharadwaj & Dwivedi 1981

Strotersporites sp.



Histogram 1—Showing percentage frequency of various miospore genera in bore-hole GJ-3, Chelpur Area, Godavari Graben.

Crescentipollenites gondwanensis (Maheshwari) Bharadwaj, Tiwari & Kar 1974

C. fuscus (Bharadwaj) Bharadwaj, Tiwari & Kar 1974

C. implicatus (Bose & Maheshwari) Tiwari & Rana 1980

Schizopollis extremus Venkatachala & Kar 1964

Striapollenites saccatus Bharadwaj 1962

Verticipollenites crassus Bharadwaj & Salujha 1964

V. secretus Bharadwaj 1962

V. gibbosus Bharadwaj 1962

Distriatites insolitus Bharadwaj & Salujha 1964

Marsupipollenites fasciolatus Balme & Hennelly 1956

Limitisporites rectus Leschik 1956

Scheuringipollenites maximus (Hart) Tiwari 1973

S. minutus (Sinha) Bharadwaj & Dwivedi 1981

S. tentulus (Tiwari) Tiwari 1973

Ibisporites diplosaccus Tiwari 1968

I. jhingurdabiensis Sinha 1972

Platysaccus plicatus Bharadwaj & Dwivedi 1981

P. papilionis Potonié & Klaus 1954

Primuspollenites levis Tiwari 1964

P. distinctus Sinha 1972

P. obscurus Tiwari 1965

Paravesicaspora brevis (Sinha) Bharadwaj & Dwivedi 1981

P. ovata (Balme & Hennelly) Bharadwaj & Dwivedi 1981

Falcisporites nutballensis (Clark) Balme 1970

F. stabilis Balme 1970

Chordasporites australiensis de Jersey 1962

Vitreisporites pellidus (Reissinger) Balme 1970

Alisporites indarraensis Segroves 1969

Maculatasporites gondwanensis Tiwari 1965

Leiosphaeridia talchirensis Lele & Karim 1971

Pilasporites sp.

COMPARISON

The present assemblage compares well with Assemblage 1 of bore-holes GGK-20 and GGK-27 in Ramagundam area within the basin (Bharadwaj, Srivastava, Ramanamurty & Jha, in press) in almost all respect, i.e. in the dominance of striate-disaccate pollen, subdominance of *Scheuringipollenites* and presence of some younger forms like *Falcisporites*, *Vitreisporites*, *Lunatisporites*, *Alisporites*, *Chordasporites* and *Crescentipollenites*.

Assemblage-A compares with the palynoflora of Jhingurdah seam in Singrauli Coalfield (Tiwari & Srivastava, 1984) in the occurrence of younger elements like *Falcisporites*, *Gondisporites*, *Lunatisporites* and *Corisaccites* besides the dominant striate disaccates. *Densipollenites* is characteristically sporadic in both the assemblages. Assemblage-A of bore hole GJ-3 can also be compared with the Raniganj palynoflora of Auranga Coalfield (Lele & Srivastava, 1979), Assemblage 1 of bore-hole RAD-2 (Singh & Tiwari, 1982), Assemblage 2 of bore-hole RNM-3 (Rana & Tiwari, 1980) and Assemblage II of bore hole RNM-2 (Tiwari & Rana, 1984) from East Raniganj Coalfield in having dominant striate-disaccates. However, some younger forms which appear in Lower Kamthi Member of Godavari Graben are absent in Raniganj palynoflora of Raniganj and Auranga coalfields. Also *Densipollenites* is better represented in Assemblage 2 of RNM-3 and Assemblage II of RNM-2 in East Raniganj Coalfield.

The presence of *Scheuringipollenites* in higher percentages in association with striate-disaccates simulates a Barakar-like affinity but such occurrence has also been observed in bore-hole GGK-27 in Ramagundam Area. However, the presence of *Lunatisporites* (1.5%), *Guttulapollenites* (1.3%), *Falcisporites* (1.2%), *Vitreisporites* (1%), *Chordasporites* (1%), *Osmundacidites* (1%), *Gondisporites* (2%) suggests a younger aspect to the present assemblage. *Verrucosiporites surangei*, *Lunatisporites pellucidus* and *L. ovatus* present in Maitur Formation of Damodar Valley (Maheshwari & Banerji, 1974) are also present in the Assemblage A of Chelpur.

COMPARISON OF PALYNODATA WITH LITHODATA

The older samples of the bore-hole GJ-3, i.e. at the level of 382.298.90 m, are lithologically of Barren Measure Formation. These have not yielded miospores in countable percentage. Lower Kamthi Member has been marked lithologically at the levels of 280.33-67.45 m, while Middle Kamthi Member above the level of 67.45 m. But the palynoflora found in the samples supposed to be from Middle

Kamthi Member is the same as in Lower Kamthi Member. Thus, only one palynological assemblage of Lower Kamthi Member has been found in the bore-hole. Hence, the palynodata do not correspond with the lithodata. The non-correspondence between the two parameters may be due to the well recognised fact that lithologically the transition between succeeding formations are often not clearly demarcated, being mostly gradational.

DISCUSSION

The samples from the bore-hole GJ-3 have yielded good results. There are a number of miospore genera in high percentage which would apparently suggest a Barakar affinity, but the presence of striate-disaccate grains alongwith younger forms alienates the present samples more closer to the Kamthi palynoflora as has been found in bore-hole GGK-20 and GGK-27 by Bharadwaj, Srivastava, Ramanamurty and Jha (in press).

Thus, the palynoflora characterised by the dominance of striate-disaccate (*Faunipollenites* & *Striatopodocarpites*), subdominance of *Scheuringipollenites* and appearance of younger forms like *Guttulapollenites*, *Falcisporites*, *Alisporites*, *Vitreisporites*, *Chordasporites*, *Lunatisporites*, *Crescentipollenites*, *Verticypollenites*, *Gondisporites*, *Osmundacidites* and *Polypodioidites* is dated to be equivalent to Lower Kamthi Member. The palynoflora of Middle Kamthi Member has not been obtained in this bore-hole. When compared with the known Kamthi mioflora in Ramagundam area of Godavari Graben and also with the Raniganj palynofloras of Damodar Valley coalfields, a Late Permian age is suggested for the levels under study.

CONCLUSION

The existence of Lower Kamthi palynoflora in Chelpur area of Godavari Graben has been established on the basis of dominance of striate-disaccates and subdominance of nonstriate-disaccates. Late Permian age has been suggested for Lower Kamthi Member on the basis of palynological studies.

ACKNOWLEDGEMENT

The authors are thankful to Dr B. V. Ramanamurty, Superintendent Geologist, Singareni Collieries Co. Ltd. for providing the samples for the present study.

REFERENCES

- Bharadwaj, D. C., Srivastava, Suresh, C., Ramanamurty, B. V & Jha, N. 1984. Kamthi Formation—A palynological appraisal. *Geophytology* 14(2) : 246-247

- Bharadwaj, D. C., Srivastava, Suresh, C., Ramanamurty, B. V. & Jha, Neerja (in Press). Palynology of Kamthi Formation from Ramagundam-Mantheni area, Godavari Graben Andhra Pradesh, India. *Palaeobotanist* **35**(3) : 318-330.
- Blanford, W. T. 1868. Coal near Nagpur. *Rec. geol. Surv. India* **1**(2) : 23-54.
- Lele, K. M. & Srivastava, A. K. 1979. Lower Gondwana (Karharbari to Raniganj Stage) miofloral assemblages from the Auranga Coalfield and their stratigraphical significance. *IV int. palynol. Conf., Lucknow* **2** : 152-164.
- Maheshwari, H. K. & Banerji, Jayasri 1974. Lower Triassic palynomorphs from the Maitur Formation, W. Bengal, India. *Palaeontographica* **B152** : 149-190.
- Ramanamurty, B. V. 1979. Report on the occurrence of coal seam in the Kamthi Formation from Ramagundam area of Godavari Valley coalfields. and its stratigraphic significance. *Geological Survey of India. Misc. Pub. No.* **45** : 89-93.
- Rana, Vijaya & Tiwari, R. S. 1980. Palynological successions in Permian-Triassic sediments in bore hole RNM-3, East Raniganj Coalfield, W. Bengal. *Geophytology* **10**(1) : 108-124.
- Singh, Vijaya & Tiwari, R. S. 1982. Pattern of miofloras through Permo-Triassic transition in bore hole RAD-2, East Raniganj Coalfield, W. Bengal, *Geophytology* **12**(2) : 181-186.
- Tiwari, R. S. & Rana, Vijaya 1984. Palyno-dating of Permian and Triassic sediments in two bore-holes from the eastern limits of Raniganj Coalfield, West Bengal. Proceedings of the Symposium on Evolutionary Botany and Biostratigraphy, A. K. Sharma *et al.* (eds)—*A. K. Ghosh Commemoration Volume, 1979 : Current Trends in Life Sciences* **10** : 425-449.
- Tiwari, R. S. & Srivastava, Suresh C. 1984. Palynological dating of Jhingurdah Seam, Singrauli Coalfield—A reappraisal. *Palaeobotanist* **31**(3) : 263-269.