

EVIDENCES ON THE AGE OF JABALPUR FORMATION EXPOSED AT THE CONFLUENCE OF HARD AND SAKKAR RIVERS, NARSINGHPUR DISTRICT, MADHYA PRADESH

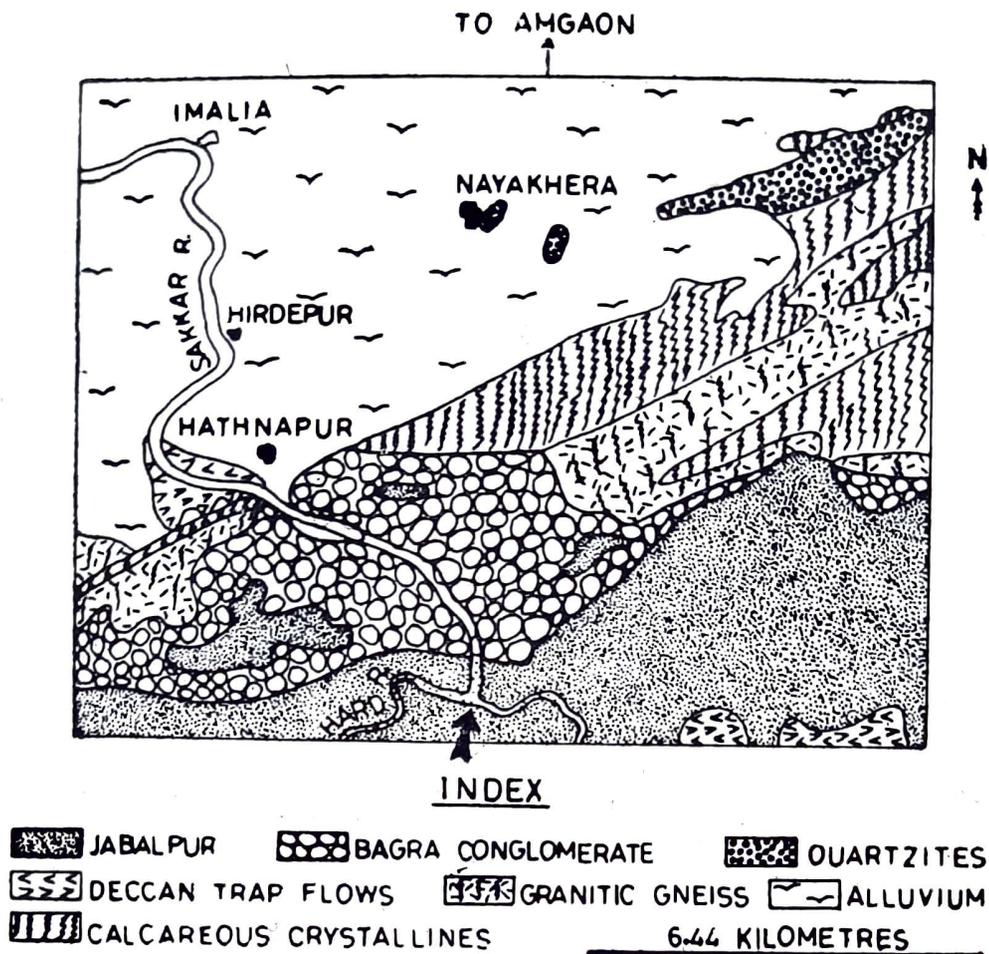
In Madhya Pradesh, the Upper Mesozoic sediments are exposed in a number of small patches in Jabalpur, Narsinghpur and Shahdol districts falling within the confines of Narmada (Satpura) and Son grabens. These sediments, collectively called as the Jabalpur Group, are sometimes classified into three formations, viz., Chaugan, Jabalpur and Bansa in ascending order (Maheshwari, 1974). Of late, there has been some doubts about the advisability of maintaining separate identity of the Chaugan and Jabalpur formations of Satpura Basin, Narmada Graben, as both are reported to have a more or less similar megafloora. It is not sure if similarity in contained megaflooras could be a compelling reason to merge both lithounits. Often the Bansa Formation is also not recognised and the Upper Mesozoic sediments around Bansa and Chandia in Shahdol District, Son Graben (South Rewa Gondwana Basin) are placed under the all encompassing Jabalpur Formation/"Stage."

When little or no palynological data was available about these sediments, the evidence from contained plant megafossils was taken to be indicative of Early Cretaceous (Neocomian) age, particularly for the beds around Bansa, which have *Weichselia* and *Onychiopsis* (Bose & Dev, 1959). *Onychiopsis* has also been found in Jabalpur beds near Sehora-on-Sher (Bose, 1960). The Chaugan Formation *sensu stricto* exposed in Hathidoba Nala near Parsapani and in Morand River near Morghat was palynologically dated to be of Late Jurassic age (Maheshwari, 1973; Maheshwari & Kumar, 1979). Bansa Formation is strongly aged Lower Cretaceous on the basis of presence of mega remains of *Weichselia reticulata* and *Onychiopsis paradoxus* (Maheshwari & Jana, 1983), though its palynological study shown no Lower Cretaceous marker palynofossil. Bharadwaj and Kumar (1974) palynologically dated it as Upper Jurassic. Maheshwari (1975) postulated a palynological continuity in the continental Upper Jurassic to Lower Cretaceous of India.

There are several controversial views about the age of Jabalpur Formation as it is variously aged as Late Jurassic or Early Cretaceous. Early palynological work of Singh (1966, 1970) supports Early Cretaceous age. However, Bharadwaj, Kumar and Singh (1972) dated it to be Late Jurassic. Recently, the investigators have also started dating the Jabalpur Formation as Late Jurassic. Singh again favoured Lower Cretaceous age (see Singh, 1974; Singh & Venkatachala, 1987).

To test this postulate a reinvestigation on palynological content of the Jabalpur Formation was undertaken (Maheshwari & Gupta, 1983) and 22 new samples from the section already worked out were collected and examined. This section is exposed at the confluence of Hard and Sakkar rivers (Text-fig. 1 position marked by arrow), south of Hathnapur Village, in Narsinghpur District, Madhya Pradesh. The sequence comprises mostly sandstone and shales with a few thin bands of low grade coal. The succession of samples is shown in Text-fig. 2.

Microfossils recovered from these samples have been studied critically and found that the spore and pollen contents of the assemblage may be attributed to about 64 genera and 118 species. Since a detailed list of the palynotaxa of this section has already been published earlier by Bharadwaj *et al.* (1972, pp. 233-235) so not being repeated here, but



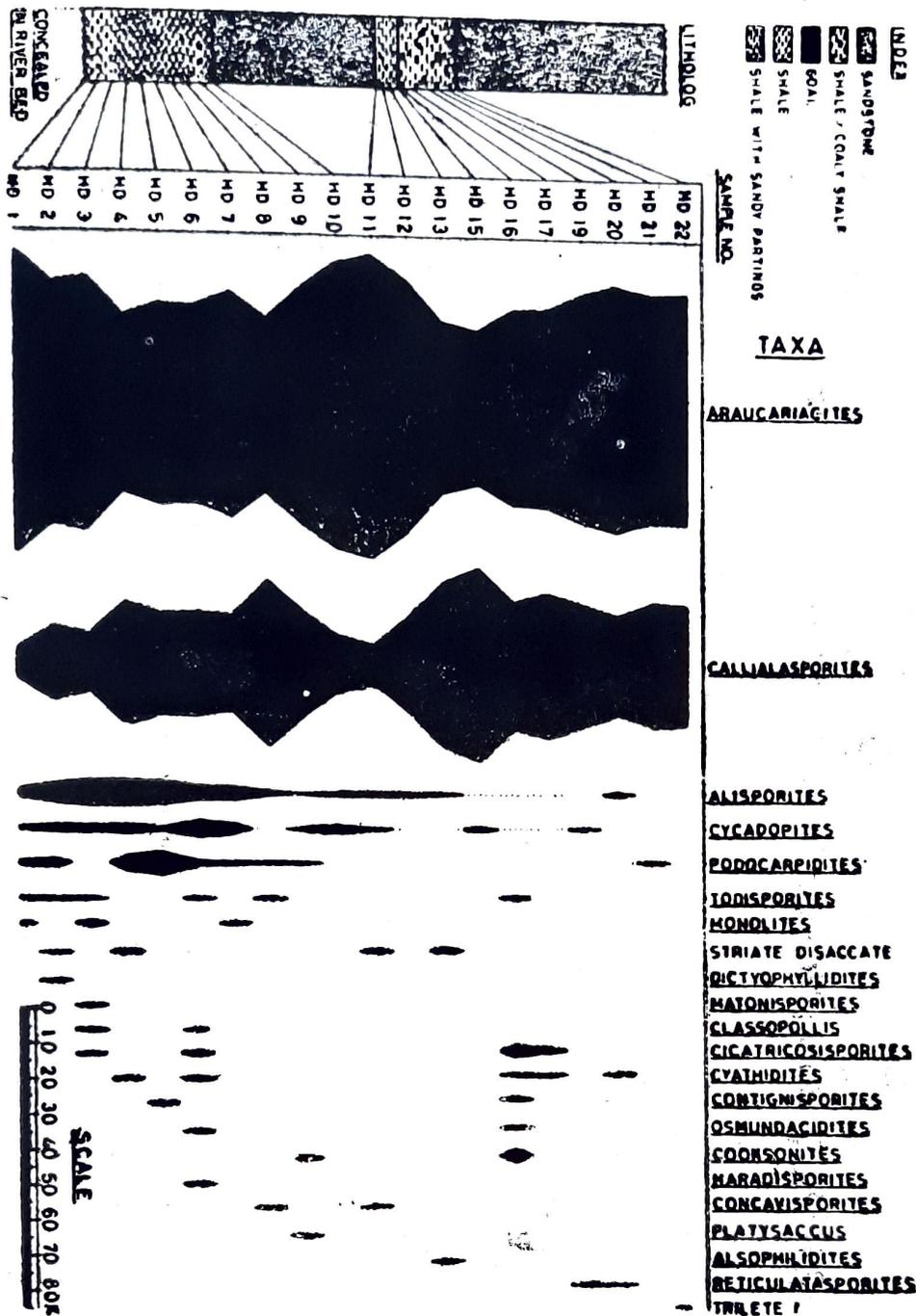
(AFTER CROOKSHANK, H., 1936)

Text-figure 1—Geological map of a portion of Narsinghpur District showing confluence of Hard and Sakkar rivers at the lower side (see arrow).

there are several more taxa which were not recorded in the list. These are *Aequitriradites spinulosus* (Cookson & Dettmann) Cookson & Dettmann 1961, *A. verrucosus* (Cookson & Dettmann) Cookson & Dettmann 1961, *Cooksonites variabilis* Pocock 1962, *Cingitriletes* sp., *Todisporites major* Couper 1958, *Cerebropollenites* sp., a new species of *Cicatricosisporites* (MS), a biliete bryophytic spore type (MS) and some fungal forms. The presence of majority of these taxa at the generic level was, however, mentioned by earlier workers.

Quantitative analysis of microfossils has shown that *Araucariacites*—*Callialasporites* complex accounts 85 to as much as 99 per cent of the total assemblage. Other genera which show one per cent to more representation in one sample or the other are: *Cicatricosisporites* Potonié & Gelletich 1933, *Cooksonites* Pocock emend. Dettmann 1963, *Monolites* Cookson ex Potonié 1956, *Alisporites* Daugherty 1941, *Podocarpidites* Cookson emend. Potonié 1958 and *Cycadopites* (Wodehouse) Wilson & Webster 1946. Text-Fig. 2 shows the per cent frequency of the palynotaxa of 20 samples at the generic level which was calculated from a count of 200 specimens per sample except HD 17 which is based on 150 grains. Microfossils from remaining two samples (i. e. HD 14 & HD 18) are inadequate, so not mentioned in the per cent count.

Presence of genus *Cicatricosisporites* indicates Early Cretaceous age. Recent studies have conclusively proved that the appearance of *Cicatricosisporites* marks the beginning of



Text-figure 2—Showing per cent frequency of palynofossils in different samples of Jabalpur Formation exposed at the confluence of Hard and Sakkar rivers.

Lower Cretaceous (Srivastava, 1978). The first occurrence of this genus has been observed at the basal Cretaceous of Canada (Pocock, 1967) and Europe (Herngreen *et al.*, 1980; Hughes, 1981), etc. Though there are reports of this genus from Jurassic also but most of these have been found unreliable, e.g., *C. durobinensis* Couper 1958 from Liassic is a *Contignisporites* Dettmann 1963 spore (Schulz, 1967). *Cicatricosisporites* sp. Couper & Hughes 1963 (Couper & Hughes, 1963) is a *Duplexisporites* Deák 1962 spore (Srivastava, 1978).

Qualitative analysis has shown several taxa supporting Early Cretaceous age. These are species belonging to genera *Cooksonites*, *Coptospora* Dettmann 1963, *Crybelosporites* Dettmann 1963, *Triporoletes* Mchedlishvili 1960 (*Rouseisporites* Pocock

1962), *Densoisporites* Weyland and Krieger emend. Bharadwaj & Kumar 1972 and *Aequitriradites* (Delcourt & Sprumont) Delcourt, Dettmann & Hughes 1963 beside *Cicatricosisporites*. *Aequitriradites*, of course, appears in upper most Jurassic. Presence of these taxa coupled with marked decline in disaccate pollen grains collectively favour Early Cretaceous. Thus the palynological assemblage recovered from Hathnapur Section is Early Cretaceous in age.

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References

- BHARADWAJ, D. C. & KUMAR, P. (1974). Palynostratigraphy of Mesozoic sediments from Machrar Nala, Bansa, M. P., India. *Geophytology*, **4** : 147-152.
- BHARADWAJ, D. C., KUMAR, P. & SINGH, H. P. (1972). Palynostratigraphy of coal deposits in Jabalpur Stage, Upper Gondwana, India. *Palaeobotanist*, **19** : 225-247.
- BOSE, M. N. (1960). The fossil flora of the Jabalpur series—2. Filicales. *Palaeobotanist*, **7** : 90-92.
- BOSE, M. N. & DEV, S. (1959). Occurrence of Two Characteristic Wealden Ferns in the Jabalpur Series. *Nature*, **183** : 130-131.
- COUPER, R. A. & HUGHES, N. F. (1963). Jurassic and Lower Cretaceous palynology of The Netherlands and adjacent areas. *Verh. K. ned. geol. mijnb. Genoot., geol. Ser.*, **21-2** : 105-108, 275-277.
- HERNGREEN, G. F. W., HOEKEN—KLINCKENBERG, P. M. J. VAN & DE BOER, K. F. (1980). Some remarks on selected palynomorphs near the Jurassic—Cretaceous boundary in The Netherlands. *Proc. IV int. palynol. Conf., Lucknow (1976-77)*, **2** : 357-367.
- HUGHES, N. F. (1981). Jurassic—Cretaceous boundary palynology in Europe. *Palaeobotanist*, **28-29** : 316-323.
- MAHESHWARI, H. K. (1973). Mioflora from Parsapani, Satpura Gondwana Basin—Preliminary report. *Geophytology*, **3** : 42-44.
- MAHESHWARI, H. K. (1974). Lower Cretaceous palynomorphs from the Bansa Formation, South Rewa Gondwana basin, India. *Palaeontographica*, **B146** : 21-55.
- MAHESHWARI, H. K. (1975). Palynology of the Athgarh Formation, near Cuttack, Orissa. *Palaeobotanist*, **22** : 23-28.
- MAHESHWARI, H. K. & GUPTA, A. (1983). New palynological evidence on the age of the Jabalpur Formation exposed at the Confluence of Hard and Sakkar rivers. *V. Indian Geophytol. Conf.—Abstr.*
- MAHESHWARI, H. K. & JANA, B. N. (1983). Cretaceous spore pollen complexes from India. In H. K. Maheshwari (Ed.)—*Proc. Sem. Cretaceous of India, Lucknow, 1982* : 158-192.
- MAHESHWARI, H. K. & KUMAR, P. (1979). A Jurassic mioflora from the Jabalpur Group exposed in Morand River near Morghat, Hoshangabad District, Madhya Pradesh. *Geophytology*, **9** : 47-51.
- POCOCK, S. A. J. (1967). The Jurassic-Cretaceous boundary in northern Canada. *Rev. Palaeobot. Palynol.*, **5** : 129-136.
- SCHULZ, E. (1967). Sporenpalaontologische Untersuchungen ratoliassischer Schichten im Zentralteil des germanischen Beckens. *Palaeont. Abh. B*, **2** : 541-633.
- SINGH, H. P. (1966). Reappraisal of the mioflora from the Jabalpur series of India with remarks on the age of the beds. *Palaeobotanist*, **15** : 87-92.
- SINGH, H. P. (1970). On some species of *Rouseisporites* Pocock occurring in the Jabalpur Series (Lower Cretaceous) of India. *Palaeobotanist*, **18** : 8-11.
- SINGH, H. P. (1974). Jurassic-Lower Cretaceous mioflora. In K. R. Surange et al. (Eds)—*Aspects and Appraisal of Indian Palaeobotany, B. S. I. P., Lucknow*, pp. 299-305.
- SINGH, H. P. & VENKATACHALA, B. S. (1987). Upper Jurassic—Lower Cretaceous spore-pollen assemblages in the Peninsular India. *Concept, Limit, extension Indian Gondw.—Abstr.* : 70-74.
- SRIVASTAVA, S. K. (1978). Cretaceous spore-pollen floras: A global evaluation. *Biol. Mem.*, **3** : 2-130.

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