

## CHARACTERISTIC SPOROMORPHS OF THE ELATERATES PROVINCE IN THE CENOMANIAN OF BOHEMIA (CENTRAL EUROPE) – COMPARISON WITH THE MID-CRETACEOUS OF EGYPT (NORTHERN EAST AFRICA)

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**ABSTRACT.** Herngreen *et al.* (1996) characterized the Albian-Cenomanian Elaterates Province and reviewed the literature data dealing with this question. They did not mention the records already published by Pacltová (1990) and Svobodová (1991) from the Peruc Member of the Bohemian Mid-Cenomanian (*Afropollis jukesbrownei* Zone). The record of Elaterates in North Italy (Hochuli 1981) was interpreted by Herngreen and Duenas Jimenez (1990) as indicative of northward plate movement.

Comparing the palynospectra of the Bohemian Mid-Cenomanian with the Egyptian Mid-Cretaceous of the North Western Desert (Lashin Thesis, unpublished data) we have recorded in the Peruc and Korycany Member not only Elaterates (*Elaterocolpites*, *Elaterosporites*, *Galeacornea*) but also some more Gondwana elements, as *Afropollis*, *Cretacaeiporites* etc.

During the palynological study of both regions regarding palaeoecology and palaeogeography we have found both comparable as well as distinguishing features of palynospectra. The records of Gondwana elements in the Peruc and Korycany Member demonstrate that the northernmost part of the Elaterates Province interfered as far as into the Middle Europe. This is in agreement with the view of Batten and Li (1987), Herngreen and Duenas Jimenez (1990), that the geographic extent of the floral province characterised by elater-bearing species was much greater than originally estimated.

**KEY WORDS:** Albian-Cenomanian, elater-bearing taxa, provinces

### INTRODUCTION

The provinciality of the palynoflora of the Middle and Upper Cretaceous was studied by many authors (Herngreen & Chlonova 1981, Srivastava 1981, Batten & Li 1987). The last review was done by Herngreen *et al.* (1996). In this paper we would like to call attention to some new records of the Gondwana elements, namely Elaterates (Herngreen *et al.* 1996) which were recorded during last years in sediments of the Bohemian Cenomanian – *Afropollis jukesbrownei* and *Cretacaeiporites. naviculare* Zone (Fig. 1, A). The samples of Albian-Cenomanian profiles from the North Western Desert of Egypt were studied for comparison material (Fig. 1, B).

### ELATERATES IN THE BOHEMIAN CENOMANIAN

The discovery of elater-bearing species in the Cretaceous sediments of the southern Alps (Hochuli 1981) and in the Bohemian Middle and Late Cenomanian Peruc-Korycany Formation (Pacltová 1990, Svobodová 1991 and Lashin, unpublished thesis as well as other new unpublished data) confirm the opinion of Batten and Li (1987) and Herngreen and Duenas Jimenez (1990), that the geographic extent of the floral provinces character-

ised by elater-bearing species is much greater than originally thought. For comparison we studied the palynospectra (Pl. 2) of the Cenomanian profiles (Salam16 and Salam17, Fig. 1, B) of the Bahariya Formation, North Western Desert of Egypt, which are partly comparable from the palaeoecologic and sedimentologic point of view (Dominik 1985 and Hantar 1990). For the Bohemian Cenomanian it is very characteristic that the elater-bearing sporomorphs appear in all profiles studied in the tide influenced facies of the uppermost part (parasequence 4, Uličný & Špičáková 1996) of the Peruc Member immediate by preceding the Late Cenomanian marine transgression (*C. naviculare* Zone). The youngest record of the small Elaterates (Pl. 1, fig. 8) was documented in the sediments of the transgressive system tract at the base of the Pecínov Member, *M. geslinianum* Zone (Uličný 1992). The palynospectra of elater-bearing species are characterised by predominance of terrestrial sporomorphs with *Ephedripites* and *Classopollis* and also by the presence of inshore phytoplankton and microforaminifera (Pacltová & Svobodová 1992 and Svobodová, Méon & Pacltová, in press). Comparing the palynospectra of the Bohemian Middle Cenomanian with the Egyptian Middle Cretaceous of the North Western Desert (Lashin thesis, unpublished data) we have re-

corded in the Peruc Member not only Elaterates (*Elaterocarpites*, *Elaterosporites*, *Galeacornea*) but also some other Gondwana elements as *Afropollis*, *Cretaceiporites*, *Dichastopollenites*, etc.

The palaeoenvironmental changes during the time of the Peruc-Korycany Formation, stepwise marine transgression during the late-Middle (*A. jukesbrownii* Zone) and the early-Late Cenomanian (*C. naviculare* Zone) and rapid sea-level rise coeval with the ZC, 2.4 transgression of Haq *et al.* (1988) caused changes and diversification of the floral character and probably also climate changes. Function morphology of some sporomorphs-thick walled exine, polypliate and cicatricose sculpture together with elaters might indicate arid/semi-arid climate conditions during deposition of the section studied. This is in agreement with the results of cuticular analysis (Uličný *et al.* 1997a).

Fluvial, estuarine and coastal deposits (Uličný & Špičáková 1996) tidal flats, lagoons and marine near shore environment were occupied by characteristic vegetation (Uličný *et al.* 1997b and Svobodová, Méon & Pacltová, in press) which produced specific palynospectra.

The characteristic angiosperm index fossils of the Peruc-Korycany transition zone are: *Perucipollis minutus* Pacltová, *Complexiopollis* div. sp., *Atlantopollis* div. sp., *Tricolpites barrandei* Pacltová, *Tricolporites bohemicus* Pacltová, *T. nêmejci* Pacltová, *Psilatricolporites complanatus* Laing, *Bohemiperiporis zaklinskai* Pacltová, *Krutzschiperipollis* div. sp., etc.

The taxonomic composition of the palynospectra differs according to facies and characterises changes of palaeoecologic and palaeoclimatologic conditions in time.

## CONCLUSION

We believe that the above data will open the consideration about the boundary of the floral provinces during this time. There were namely sea-level changes-transgressions and regressions which caused the palaeoecologic and palaeoclimatic conditions and caused also the changes of the boundary of the floral provinces. The record of Elaterates in marine sediments of the Bohemian Cenomanian documented their existence in the Middle European region.

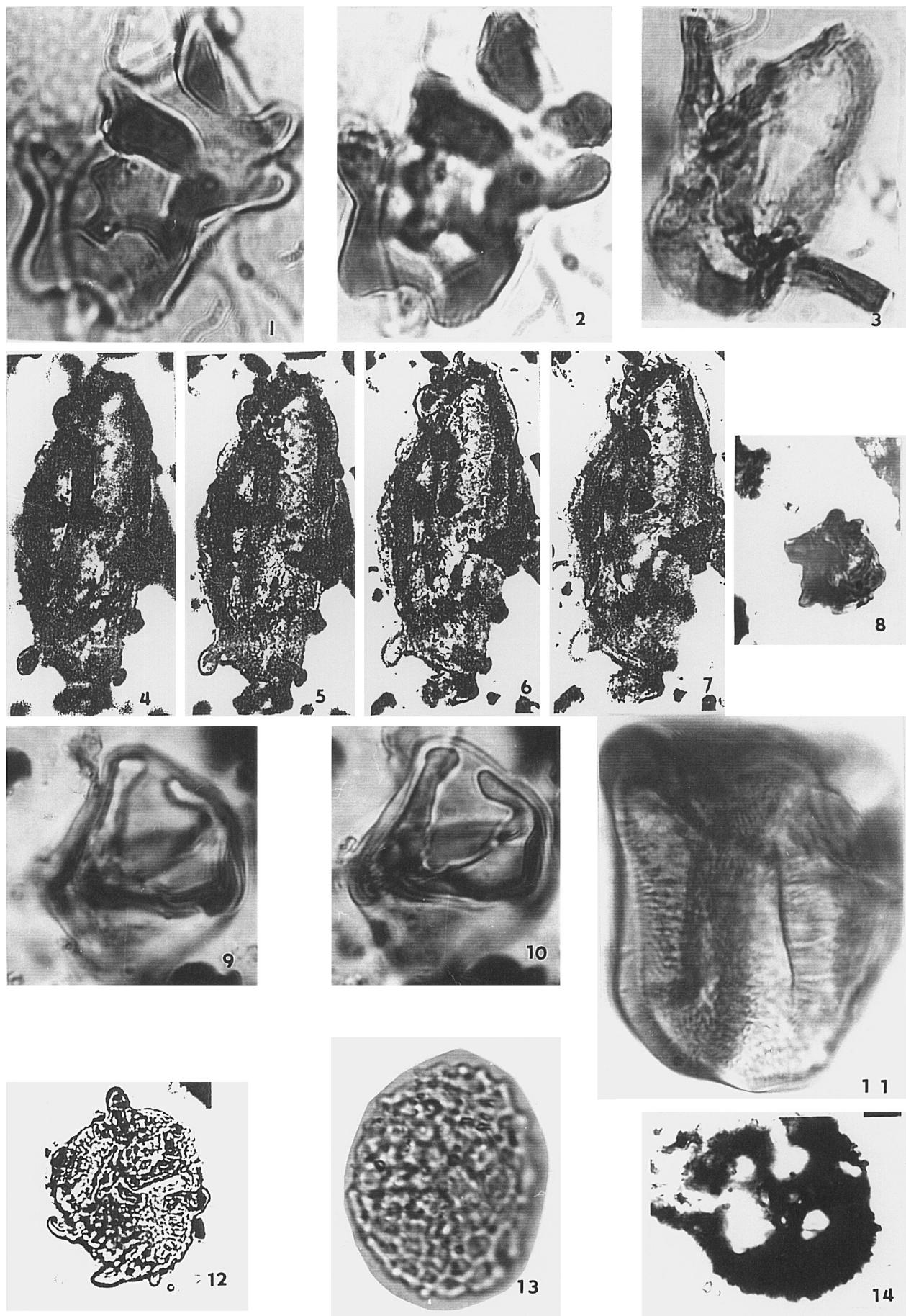
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# P L A T E S

## Plate 1

- 1, 2. *Elaterocolpites* sp., borehole Ln-1 (44.8 m) Peruc-Korycany Formation (Pacltová 1990), 30 µm
3. cf. *Sofrepites* sp., borehole Ln-1 (44.8 m) Peruc-Korycany Formation, 32 µm
- 4–7. *Galeacornea* sp., Pecínov quarry, Korycany Member (*C. naviculare* Zone), 70 µm
8. cf. elateroid pollen gen. et sp. indet., Pecínov quarry, base of Pecínov Member (*M. geslinianum* Zone), 25 µm
- 9, 10. *Galeacornea clavis* Stover, Brník quarry (II-1-E), 22 µm
11. cf. *Galeacornea* sp., Horoušany quarry (I-12-C), 40 µm
12. *Elaterocolpites* cf. *castelainii* Jardiné et Magloire, Blansko Graben borehole V-134 (151.5 m), 35 µm, Peruc-Korycany Formation (Svobodová 1991)
13. *Afropollis jardinus* (Brenner) Doyle, Jardiné et Doerenkamp, Brník quarry (II-2-C), 25 µm
14. cf. *Cretaceiporites* sp., Horoušany quarry (I-15-B), 23 µm



## Plate 2

- 1, 11. *Sofrepites legouxiae* Jardiné, Salam 17 (6160 ft.), 1 = 26 µm, 11 = 39 µm
- 2, 5, 8. *Elaterocolpites castelainii* Jardiné et Magloire, Salam 17 (5802–5838 ft.), 2 = 26 µm, 5 = 23 µm, 8 = 28 µm
- 3, 6. *Elaterosporites klaszii* (Jardiné et Magloire) Jardiné, Salam 16 (6230–6560 ft.), 3 = 40 µm, 6 = 26 µm
- 4, 7. *Galeacornea clavis* Stover, Salam 17 (5838 ft.), 4 = 43 µm, 7 = 40 µm
- 9, 10. *Galeacornea causea* Stover, Salam 17 (6570 ft.) and Salam 16 (6400 ft.), 9 = 39 µm, 10 = 54 µm
12. *Cretacaeiporites densumurus* Schrank et Ibrahim, Salam 16 (6170 ft.), 39 µm
13. *Afropollis jardinus* (Brenner) Doyle, Jardiné et Doerenkamp, Salam 16 (6500 ft.), 39 µm
14. *A. operculatus* Doyle, Jardiné et Doerenkamp, Salam 16 (6040–6640 ft.), 43 µm
15. *Cretacaeiporites scaberratus* Herngreen, Salam 16 (6040 ft.), 54 µm
16. *Elaterosporites acuminatus* (Stover) Jardiné, Salam 16 (6500 ft.), 46 µm

