SBORNÍK NÁRODNÍHO MUZEA V PRAZE
Řada B – Přírodní vědy • sv. 64 • 2008 • čís. 2–4 • s. 133–138

ACTA MUSEI NATIONALIS PRAGAE
Series B – Historia Naturalis • vol. 64 • 2008 • no. 2–4 • pp. 133–138

SPESOVICORNEA PACLTOVAE GEN. NOV. ET SP. NOV., A NEW ELATEROID SPOROMORPH FROM THE BOHEMIAN CENOMANIAN (CZECH REPUBLIC)

MARCELA SVOBODOVÁ
Institute of Geology, Academy of Sciences of the Czech Republic, v.v.i., Rozvojová 269, 165 00 Praha 6

MILADA VAVRDOVÁ
Institute of Geology, Academy of Sciences of the Czech Republic, v.v.i., Rozvojová 269, 165 00 Praha 6

Svobodová, M., Vavrdová, M. (2008): Spesovicornea pacltovae gen. nov. et sp. nov., a new elateroid sporomorph from the Bohemian Cenomanian (Czech Republic). – Acta Mus. Nat. Pragae, Ser. B, Hist. Nat., 64(2–4): 133–138. Praha. ISSN 0036-5343.

Abstract. The main objective of this paper is to present the description of a new elater-bearing sporomorph genus and species from the Cenomanian of southeastern tip of the Blansko Graben (Bohemian Cretaceous Basin). Morphological features of the genus, such as solid horn-like exinal projections, resemble elaters. If their presence is confirmed, this occurrence would represent the northernmost locality of the morphotype, which characterizes the low-latitude ASA floral bioprovince.

■ Elater-bearing sporomorph, new genus, new species, Bohemian Cretaceous Basin, Cenomanian.

Received June 30, 2008
Issued December 2008

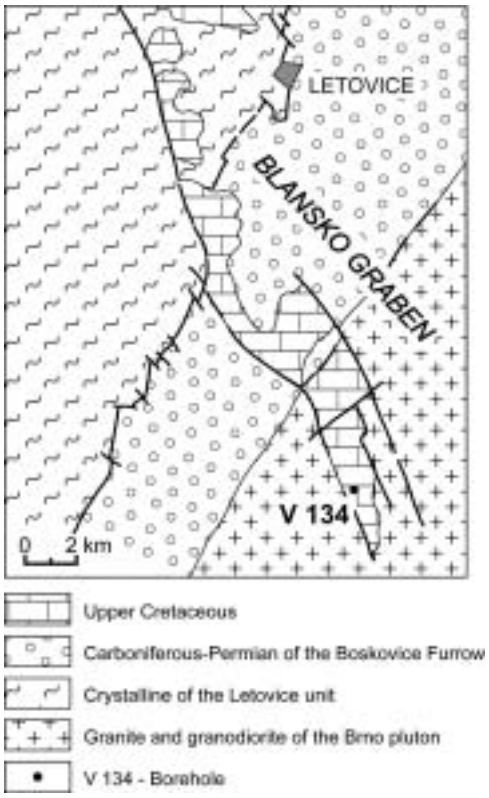
Introduction and geological framework

The Blansko Graben represents the SE tip of the Bohemian Cretaceous Basin (Text-figs 1 and 2). According to Röhlich (1958), Vachtl et al. (1968) and Čech (unpublished report) the Blansko Graben is a tectonic zone which extends in a NW-SE direction with an average width of 4 km and a length of about 30 km, in which sediments of the Cenomanian-Lower Turonian were preserved. The graben is characterized by cyclic facies development in which silty claystones grade into fine-grained sandstones. The lithological composition points to a fluvial to estuarine environment.Transgressive-regressive facies in the SE part of the graben document the development of a sedimentary environment during the Cenomanian- early Turonian. The clastic material coming from the Bohemian Massif was transported from the north, while marine ingressions from the Tethyan realm penetrated in three pulses in the opposite direction. Borehole V-134 was situated on the top of the hills between the villages of Spešov and Dolní Lhota near Blansko, Moravia (Text-fig. 2). The analysed samples yielded well preserved and varied associations of terrestrial plant microfossils including pteridophyte spores, gymnosperm and angiosperm pollen grains and non-marine microplankton.

The present report deals with palynomorphs limited to a relatively short interval (depth 151.1 m) in one borehole, V-134, from 7 boreholes examined (Svobodová 1992, 1997) in the area of Spešov near Blansko (Text-fig. 3).

Morphological features of the described palynomorphs include elater-like appendages presumably used for spore dispersal.

Text-fig. 1. Map of the Bohemian Cretaceous Basin showing the area of borehole V-134 studied (hatched).



Text-fig. 2. Structure division of the Blansko Graben with position of the borehole V-134 (modified after Čech, unpublished report).

Material and methods

The analysed sediments consist of light grey to dark grey silty to sandy micaceous claystones interbedded with greyish black lignitic claystones to thin coals. Organic matter is abundant in the clays as well as frequent carbonized plant remains and fossil amber (valchovite). The newly described genus appears only in the dark grey claystones of continental origin.

The samples were processed using standard palynological preparation methods by Mrs. Tichá in the Laboratory of the Czech Geological Survey. A crushed core sample was treated with 30% HCl, 40% HF, 10% KOH and sieved. For light microscope (LM) analyses, residues were mounted in glycerine-jelly and covered with No. 0 coverslips. Photomicrographs were taken under oil immersion using either Amplival Zeiss or Opton light microscopes. The slides are housed in the collection of the Laboratory of Paleobiology and Paleoecology of the Institute of Geology of the Academy of Sciences of the Czech Republic, v.v.i.

Systematical descriptions

Spesovicornea gen. nov.

Derivation of name: after the village of Spešov near Blansko designated here.

Type: *Spesovicornea pacltovae* sp. n.

Diagnosis: Inaperturate palynomorph of markedly variable shape, bearing conspicuous solid exinal projections (knob-like, horn-like to filamentous), mostly situated in the thickened equatorial area.

Generic description: Outline of the body varies from circular to oval, triangular with rounded apices or trilobate with shallow interradial depressions. Solid exinal projections extending from the equatorial margin range from conical horns to bulbous hemispherical knobs or club-shaped outgrowths. Less frequently, the projections are arranged in rows, forming irregular wings. Rarely, one or more processes are situated in the centre. The exine is equatorially thickened, polar areas variously sculptured (i.e., verrucate). The surface of thickenings and projections is smooth. Germinal apparatus was not ascertained, possibly colpate (?).

Remarks: The genus is characterized by irregular development of appendages and by short radial ribs and other columellar elements on the equatorial margin. Variations in shape and sculpture such as folded down solid exinal projections, may be attributable to different stages of maturity of the grain (Pl. 1, figs. 9, 10).

Spesovicornea pacltovae sp. n.

Pl. 1, figs 1-16; Text-figs 4 a-d

1992 ? elateroid pollen gen. et sp. indet, Svobodová M., pl. 1, fig. 17

Derivation of name: Named in honour of Prof. Blanka Pacltová in recognition of her contribution to Central-European palynology.

Holotype: Designated here, specimen figured in Pl. 1 figs 1-3, Text-fig. 4 a.

Repository: Coll. Institute of Geology ASCR, v.v.i., Prague, Czech Republic; No. SV 10.

Type locality and horizon: Borehole V-134, Unit G, depth 151.5 m, Spešov near Blansko; Peruc-Korycany Formation, Blansko Graben, Cenomanian

Description: Outline variable: circular, trilobate, triangular with shallow interradial depressions, rarely ellipsoidal, oval or polygonal with rounded apices.

Surface psilate, granulate or with irregularly distributed flat verrucae.

Body encircled in places by a narrow equatorial zone, which is indicated on the body by short parallel columns. Columns gradually change from short finger-like thickenings to more massive jointed (moniliform) elements.

Solid exinal extensions of variable size and shape: bulbous, horn-like or knob-like, resemble elaters. Larger projections are usually perpendicular to the polar axis, slightly curved or hooked to the base. Distal terminations of processes are rounded, blunt or occasionally widened. Surface of extensions smooth. Small circular pits can be present in widened areas. In places, projections are developed in rows or piled up, forming fan-like wings. Polar projections may be present. Distribution of outgrowths tends to be symmetrical, with main projections in three corners and less conspicuous ones in the spaces between.

In places, the exine is differentiated into two or three poorly defined layers.

Germinal apparatus is not clearly developed, however, the presence of a colpus cannot be excluded. Irregular meridional ruptures were observed on some specimens.

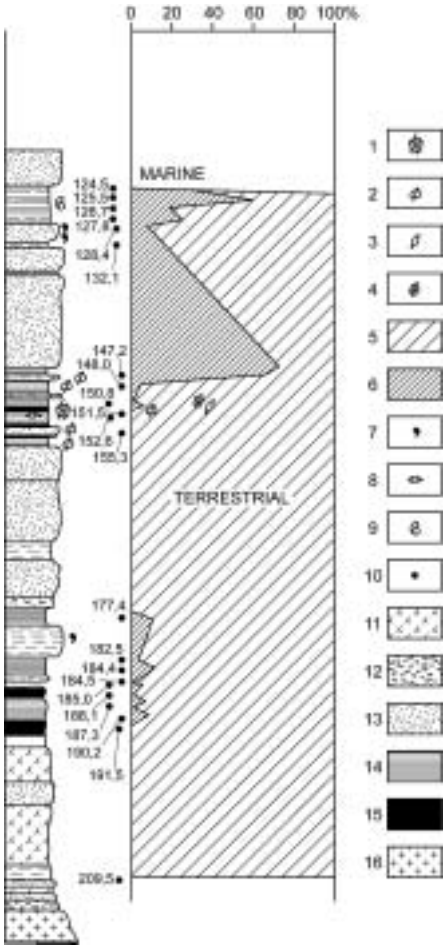
D i m e n s i o n s : (12 specimens measured): length of body 30 (35) 40 µm; width 25 (30) 38 µm; maximum length of processes 3-22 µm, width of processes 3-10 µm, exine thickness 1,5-5 µm

I l l u s t r a t i o n s : Pl. 1, figs 1-16.

G e o g r a p h i c d i s t r i b u t i o n : Moravia, Bohemian Cretaceous Basin.

M a t e r i a l : 12 specimens.

R e m a r k s : Most of the elaterate pollen grains are distinguished by a smooth exine (i.e., *Alaticolpites*, *Elateroplicites*, *Galeacornea*, and *Sofrepites*) and the presence of colpi. Elaters are generally developed more conspicuously, their length can exceedthe width of the body several times .



Text-fig. 3. Borehole section in the Blansko Graben with lithology, distribution of palynomorphs, macroflora and macrofauna (modified after Čech, unpublished report). 1 – *Spesovicornea pacltovae*, 2 – *Platanus* sp., 3 – *Myrtophyllum angustum* (VEL.) KNOBOCH, 4 – *Gleichenia* sp.), 5 – percentage of land-derived palynomorphs, 6 – percentages of marine palynomorphs, 7 – glauconite, 8 – pyrite nodules, 9 – macrofauna, 10 – productive palynological samples, 11 – carbonized roots, 12 – conglomerate, 13 – sandstone, 14 – claystone, 15 – coal, 16 – granite and granodiorite of the Brno pluton.

The species which is most similar to the forms described here is *Elaterosporites verrucatus* (JARDINÉ et MAGLOIRE) JARDINÉ 1967, illustrated in Dino et al. (1999, pl. 5, fig. 2). Spoon and club-shaped processes resemble *Elaterocolpites castelainii* JARDINÉ et MAGLOIRE 1965 which differs in uniform processes and exinal surface. A low number of projections and a similar columnar exinal differentiation in the equatorial area connect the described form with the species *Galeacornea clavis* Stover 1963.

Spesovicornea pacltovae differs in its remarkably irregular shape, size and position of exinal elater-like adaptations. Scupture on the surface in the central area is less prominent than in *Elaterosporites verrucatus* (JARDINÉ et MAGLOIRE) JARDINÉ 1967 and *Elaterosporites spicatus* (STOVER) JARDINÉ 1967.

Botanical affinity

Botanical affinity unclear, possible gnetalean nature is often suggested for the elaterate forms (Herngreen 1974; Dino et al. 1999).

Discussion

Elaters are specific exinal adaptations used for effective spore dispersal. The morphotype is confined to a relatively short interval, ranging mostly from late Albian to early Cenomanian (Jardiné et Magloire 1965; Brenner 1968; Herngreen 1973; Herngreen and Duenas Jimenez 1990).

Stover (1963) firstly recorded elater-bearing forms from the Middle Cretaceous of West Africa and instituted the genus *Galeacornea.* Jardiné and Magloire (1965) described the genera *Elaterocolpites* and *Senegalosporites* from Senegal and the Ivory Coast. Jardiné (1967) revised elater-bearing palynomorphs from South America and West Africa and recognized the genera *Galeacornea*, *Elaterosporites*, *Elaterocolpites*, *Sofrepites*, and *Senegalosporites*. Herngreen (1974) instituted two more elater-bearing genera, *Elateropollenites* and *Elateroplicites* from Brazil.

Elaterate pollen grains are not known *in situ* from fossil plants and do not resemble spores and pollen of extant taxa (Dino et al., 1999). Gnetalean affinity (*Ephedra, Welwitschia*) has been considered by Elsik (1974)// in Dino//, who also suggested their possible connection with early angiosperms.

The affinity of the genera *Galeacornea* and *Elaterosporites* was discussed by Stover (1963) and Jardiné (1967) who suggested an affinity with spores, particularly of *Equisetum.* Srivastava (1984) endorsed the idea of angiosperm affinity with the genera *Elaterocolpites* and *Elateropollenites*. Jardiné (1967) attributed the thickened equatorial ring surrounding the corpus of certain elaterates to the immature status of the pollen grains.

Floral provinces – late Albian/ early Cenomanian

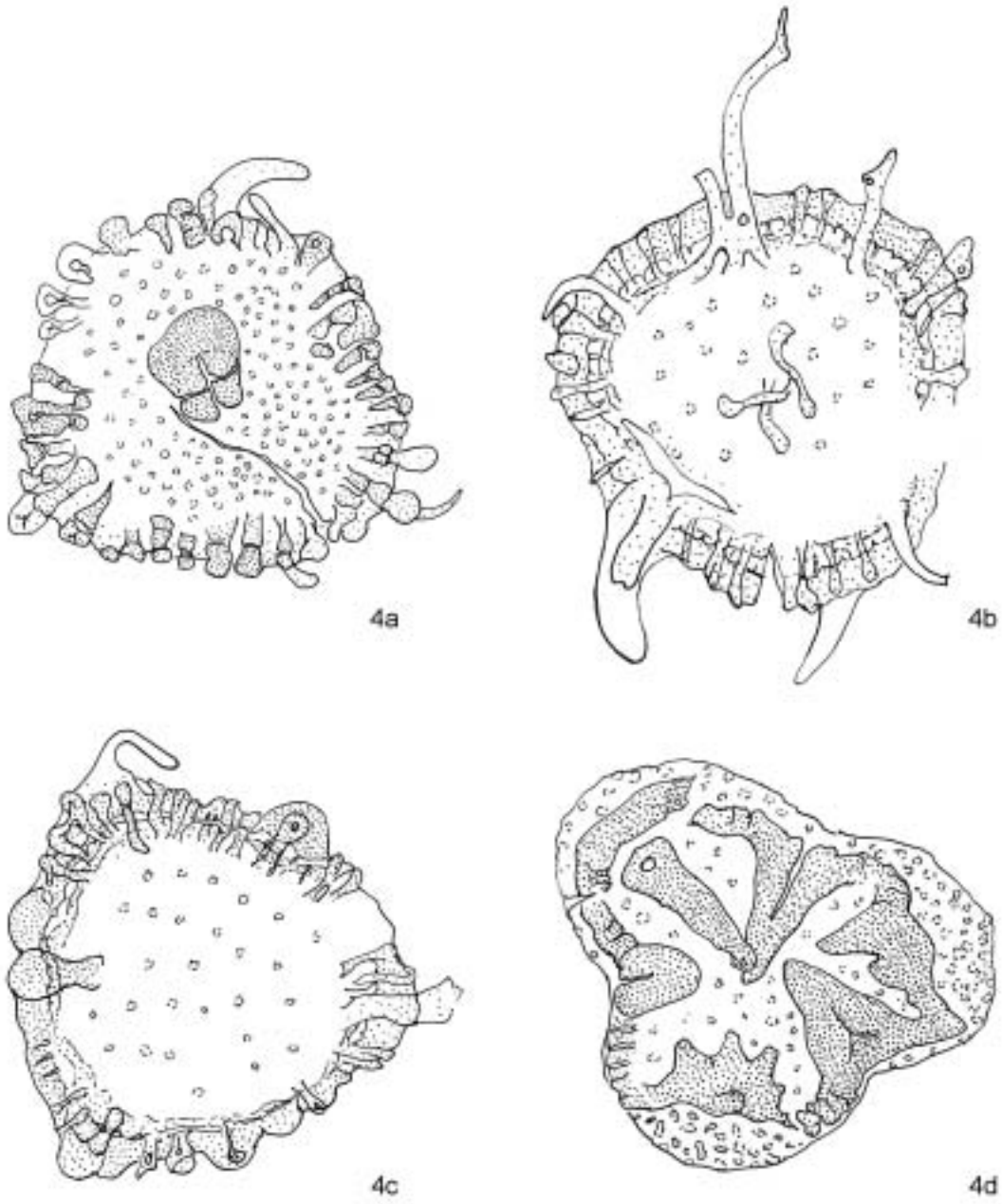
Elaterate pollen grains sometimes occur in high abundance in northern parts of South America (Brazil, Venezuela, Peru) and North Africa (Ivory Coast, Morocco, Tuni-

sia, Egypt, Senegal) extending up to the southern Alps in the north and to the Arabian Gulf in the east

The Middle Cretaceous elater-bearing forms can be used to define the area of their distribution as a distinct phytogeoprovince (e.g. Srivastava 1978, Herngreen and Chlonova 1981) .

For the middle Cretaceous, Herngreen (1975) defined an African/South American (ASA) microfloral province which encompasses the sporomorph assemblages from low latitudes of Albian and Cenomanian age, characterized by the occurrence of peculiar pollen types of the *Elaterosporites/ /Galeacornea* group. Brenner (1976) defined four floral provinces for the middle Cretaceous. The concept of Cretaceous microfloral provincialism was further developed by Herngreen et al. (1996) who renamed the former ASA Province as the Albian-Cenomanian Elaterates Province. The low-latitude ASA province consists mostly of *Ephedripites*, *Classopollis* and angiosperm pollen. The middle part (late Albian-early Cenomanian) of the palynomorph succession is marked by increase in elater-bearing species. The northernmost known occurrence of elater morphotypes was recorded in the Southern Alps (Switzerland and Italy) by Hochuli (1981), although boreal elements, such as bisaccate gymnosperm as well as a high diversity of spores predominated.

The occurrence of the new elateroid genus described herein does not connect the Bohemian Cretaceous Basin with the palynofloral ASA province, but rather suggests the northward penetration of warm elements restricted to the low-latitude ASA microfloral province into the transitional area of the Blansko Graben. The finding of ephedroid flora may coincide with the presumed global warming in the late Albian/early Cenomanian and/or a low global thermal gradient in this period.



Text-fig. 4 a-d. ***Spesovicornea pacltovae*** **gen. nov. et sp. nov., V-134, GLI AS CR, v.v.i., SV 10.**

Conclusions

An extremely variable new genus and a new species are described. The morphology of the genus is marked by the presence of variously developed projections and appendages which morphologically resemble elaters. The occurrence of these peculiar elements would represent the northernmost distribution of the morphotype.

Acknowledgements

A new genus and species described herein were discovered during the survey for the project

GA ČR 205/06/1823 "Record of tectonic processes and sea-level change during inception of an intracontinental basin: Cenomanian of the Bohemian Cretaceous Basin" and further supported by the research program AV0Z30130516 of the Institute of Geology, AS CR, v.v.i., Prague. We acknowledge Dr. S. Čech (Czech Geological Survey, Prague) for providing the samples and useful advice .

References

Brenner , G. J. (1968): Middle Cretaceous spores and pollen from northeastern Peru. – Pollen et Spores, 10: 341-383.

Brenner, G. J. (1976): Middle Cretaceous floral provinces and early migration of Angiosperms. – In: C. B. Beck (ed.), Origin and early evolution of angiosperms, pp. 23-44, Columbia University Press, New York.

Dino, R., Pocknall, D. T., Dettmann, M. E. (1999): Morphology and ultrastructure of elater-bearing pollen from the Albian to Cenomanian of Brazil and Ecuador: implications for botanical affinity. – Review of Palaeobotany and Palynology, 105: 201-235.

Elsik, W. C. (1974): Fossil auriculate pollen. – Pollen et Spores, 16 (4): 507-534.

Herngreen, G. F. W. (1973): Palynology of Albian-Cenomanian strata of borehole 1-QS-1-MA, state of Maranhão, Brazil. – Pollen et Spores, 15, 3-4: 515-555.

Herngreen, G. F. W. (1974): Middle Cretaceous palynomorphs from Northeastern Brazil. – Sciences Géologiques Bulletin, 27 (1-2): 101-116.

Herngreen, G. F. W. (1975): Palynology of Middle and Upper Cretaceous strata in Brazil. – Mededelingen Rijks Geologische Dienst , N. S., 26 (3): 39-91.

Herngreen, G. F. W., Chlonova, F. (1981): Cretaceous microfloral provinces. – Pollen et Spores, 23: 441-555.

Herngreen, G. F. W., Duenas Jimenez, H. (1990): Dating of the Cretaceous Une Formation, Colombia and the relationship with the Albian-Cenomanian African-South American microfloral province. – Review of Palaeobotany and Palynology, 66: 345-359.

Herngreen, G. F. W., Kedves, M., Rovnina, L. V., Smirnova, S. B. (1996): Cretaceous palynolofloral provinces: a review. – In: Jansonius, J., McGregor, D. C. (eds), Palynology: pronciples and applications, 3: 1157-1188.

Hochuli, P. A. (1981): North Gondwanan fossil elements in Lower to Middle Cretaceous sediments of the Southern Alps (Southern Switzerland, Northern Italy). – Review of Palaeobotany and Palynology, 35: 337-358.

Jardiné, S. (1967): Spores à expansions en forme d´élatčres du Crétacé Moyen d´Afrique occidentale. – Review of Palaeobotany and Palynology, 1: 235-258.

Jardiné, S., Magloire, L. (1965): Palynologie et stratigraphique du Crétacé des basins du Senegal et du Côte d´ Ivoire. – Mémoires du Bureau de Recherches Géologiques et Minières, 32: 187-245.

Röhlich, P. (1958): Tektonika křídy v blanenském prolomu mezi Křetínem a Kunštátem na Moravě. – Časopis pro mineralogii a geologii, 3(4): 435-444.

Srivastava, S. K. (1978): Cretaceous spore-pollen floras: a global evaluation. – Biological Memoirs, 3: 1-130.

Srivastava, S. K. (1984): A new elater-bearing Late Albian pollen species from offshore eastern Saudi Arabia. – Botanical Journal of the Linnean Society, 89: 231-238.

Stover, L. E. (1963): Some Middle Cretaceous palynomorphs from West Africa. – Micropaleontology, 9 (I): 85-94.

Svobodová, M. (1992): Earliest Upper Cretaceous palynomorphs of basal (transgressive) strata in the Blansko Graben (Morava, Czechoslovakia). – In: Kovar-Eder, J. (ed.), Proceedings of the Pan-European Palaeobotanical Conference Vienna 1991, pp. 313-323. Natural history Museum, Vienna.

Svobodová, M. (1997): Mid-Cretaceous palynomorphs from the Blansko Graben (Czech Republic): affinities to both Tethyan and Boreal bioprovinces. – Mededelingen Nederlands Institut voor Toegepaste Geowetenschappen TNO, 58: 149-155.

Vachtl, J., Malecha, A., Peloušek, J., Pelikán, V., Franče, J., Ryšavý, P. (1968): Ložiska cenomanských jílovců v Čechách a na Moravě. – Geotechnica, 32(4): 87-96.

Explanations to the plate

PLATE 1

Spesovicornea pacltovae, gen. nov. et sp. nov., borehole Spešov, V-134, depth 151.5 m, photomicrographs by M. Svobodová.

1-3. Optical photomicrograph of holotype, in three foci showing polar distribution of elater-like projections, body size 35 µm, projections length 2-15 µm.

4, 8. Optical photomicrograph, showing sporomorph in polar view, body 32 µm, projections 2-8 µm.

5-7. Optical photomicrograph showing sporomorph in polar view, body 40 µm, projections 2-8 µm.

9-10. Optical photomicrograph showing sporomorph in polar view, body 30 µm, projections 2-17µm.

11, 12. Optical photomicrograph showing sporomorph in oblique view, body 35 µm, projections 2-15 µm.

13. Optical photomicrograph showing sporomorph in oblique view, body 30 µm, projections 2-8 µm.

14. Optical photomicrograph showing sporomorph in oblique view, body 33 µm, projections 2-22 µm.

15, 16. Optical photomicrograph showing sporomorph in equatorial view, body 33 µm, projections 2-15 µm.

PLATE 1