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LOWER DEVONIAN SPORES FROM PIONKI IN THE RADOM DISTRICT (CENTRAL POLAND)

Dolnodewońskie spory z wiercenia Pionki koło Radomia

ABSTRACT. Palynological analysis was made on one of the samples from a borehole drilled at Pionki near Radom. The method employed for processing the rock to isolate palynomorphs is outlined. Selected taxa are described in the systematic part of the paper. Nine dispersed spore species are recorded. The whole assemblage is regarded as representing Lower Devonian age.

INTRODUCTION

Spores of Devonian age have been described from Polish territory by Eisenack (1944), Górka (1974), Jachowicz (1973), Kicùla & & Żakowa (1966), Konior & Turnau (1973), and Turnau (1974, 1975, 1978).

The spores described here were contained in core samples from a borehole drilled at Pionki, near Radom. The Devonian sediments are included to the Givetian (1372.6—1755 m), Eifelian (1755—1920 m), Emsian and Siegenian (1920—2770.6 m), and also to the Upper Gedinnian (2770.6—3036.4 m) (Brzyski 1976). Sediments ascribed to the Emsian and Siegenian are variegated sandstones, cross-bedded, and lacking invertebrate fossils, this making it possible to separate the two stages.

This investigation was begun by Turnau in three samples from depths of 1862.5 m, 2061.3 m, and 2283.3 m (Brzyski 1976). In the present work the spores described are from one of the samples from a depth of 2002 m.

The author wishes to express her sincere gratitude to all those who cooperated in any way in the preparation of this manuscript, especially to Doc. Dr. E. Turnau from the Institute of Geological Sciences of the Polish Academy of Sciences in Kraków, for valuable comments and for the opportunity to examine specimens.

PREPARATION OF SPORES

The specimens were washed, crushed, and treated with muriatic acid, and the samples then treated with cold hydrofluoric acid. After a few days the supernatant liquid was decanted, the remaining sediment being washed several times by the addition of water and decanted after the sediment had been allowed to settle. The samples were then treated once again with muriatic acid and boiled. The minerals which survived the HF treatments were in such concentration that heavy liquid separation was necessary. Potassium iodide (KJ — 9 parts weight) and cadmium iodide (CdJ — 10 parts weight) S.G.2.2 was used, the preparation being centrifuged for 20 minutes at 1.800 r/min. The liquid with spores was transferred with a pipette and weakened. Specimens were mounted in glycerine jelly following the method described by P a u t s c h (1957).

Specimens selected for scanning electron microscopy were mounted dry on coverslips, which in turn were secured to holders with colloidal silver cement. Dry spore material was dusted with coal and gold. The micrographs were made at the Institute of Zoology of the Jagellonian University using a Jeol JSM — 35 microscope.

SYSTEMATIC DESCRIPTIONS

The system of classification used in this paper is that introduced by P o t o n i é & K r e m p (1954, 1955, 1956) and P o t o n i é (1956, 1958, 1960, 1970) revised and altered by R i c h a r d s o n (1965).

Turma *Triletes* — *Azonales* Potonié 1970

Subturma *Azonotriletes* (Lubber 1935) Dettmann 1963

Infraturma *Retusotriliti* Streel 1974

Genus *Retusotriletes* (Naumova) Richardson 1965

Retusotriletes warringtonii Richardson, Lister 1969

(Pl. I, fig. 1)

D e s c r i p t i o n. Trilete miospores, amb triangular to subtriangular. Trilete mark reaches the equator, nearly equals the spore radius, and is accompanied by lips tapering from the pole towards the equator. Curvaturae perfectae coincide with the equator for most of their length. Exine smooth, homogeneous, 1.5—2.0 μm thick.

D i m e n s i o n. Diameter 23—32 μm (3 specimens measured).

Retusotriletes cf. *minor* Kedo 1963

(Pl. I, fig. 2)

Description. Trilete miospores, amb circular to triangular with convex sides and rounded apices. Exine 0.5—1.5 μm thick, smooth, and homogeneous. Contact areas frequently slightly depressed, occasional specimens show a thinner area at the proximal pole; triradiate lips 0.5—2 μm high, 5/6 to nearly equal the spore radius, lips merge into curvaturae, which sometimes coincide with the equatorial outline.

Dimension. Diameter 17—37 μm (5 specimens measured).

Infraturma *Apiculati* (Bennie & Kidston) Potonié 1956

Genus *Apiculiretusispora* Streel 1964, 1967

Apiculiretusispora plicata (Allen) Streel 1967

(Pl. I, fig. 3)

Description. Trilete miospores, ovate to subcircular in polar view; sutures 3/4 or more of the spore radius in length, simple or with labra, commonly accompanied by exinal folds that may obscure the sutures. Two walls of the exine present. Outer wall with minute very densely spaced sculptural elements about 0.25—0.5 μm high, probably best described as scabrate. Limit of sculptured zone on proximal side forms indistinct curvaturae that may mark outer limit of smooth contact area of outer wall.

Dimension. Diameter 40—70 μm (27 specimens measured).

Apiculiretusispora brandtii Streel 1964

(Pl. I, figs. 4—7)

Description. Trilete miospores, amb round to subcircular; sutures 1/2 to 4/5 of the spore radius in length, without labra. Two walls of the exine are sometimes visible. Ornamentation consisting of closely spaced coni or bacula 1 μm long and variable up to 1 μm width. Limit of sculptured zone in equatorial region of proximal side forms curvaturae that mark outer limit of smooth contact area.

Dimension. Diameter 45—80 μm (46 specimens measured).

Genus *Dibolisporites* Richardson 1965

Dibolisporites eifeliensis (Lanninger) McGregor 1973

(Pl. II, figs. 1—3)

Description. Trilete miospores with more or less rounded to subtriangular amb. The trilete mark extends up to 2/3 of the spore radius. Exine about 1 μm thick. Proximal surface punctate or scabrate. Distal and equatorial regions bearing tubercles 1 to 6 μm long, about 1 to 2.5 times as long as basal width, baculate 0.5—2 μm wide, on well-preserved specimens commonly expanded at the tip. Tubercles 2—5.5 μm apart.

Dimension. Diameter 40—73 μm (3 specimens measured).

Genus *Emphanisporites* McGregor 1961

Emphanisporites annulatus McGregor 1961

(Pl. II, figs. 4, 5)

Description. Trilete miospores, amb broadly triangular to subcircular. Sutures distinct, straight, extending almost to the equator, simple or with labra tapering from about 8 μm total width at the pole to interradial ridges. Distal hemisphere unornamented; proximal face bears on each interradial sector from 3—7 radiating ribs that may be 5 μm wide and 3 μm high at the equator. Proximal ridges may be divided near the equator. In the equatorial region of the distal hemisphere there is a thickened ring (cingulum) 2—5.5 μm wide. A second concentric ring of exinal thickening (annulus) 4 μm wide occurs 1/4 to 1/3 of the way from the equator toward the distal pole.

Dimension. Diameter 45—60 μm (26 specimens measured).

Emphanisporites erraticus (Eisenack) McGregor 1973

(Pl. II, figs. 6, 7)

Description. Trilete miospores, amb subcircular. Sutures extending near to the margin of the equator, with labra or darkened borders 1 μm or less wide, commonly bordered by thickened exinal bands that extend from the equator about 2/3 of the way to the proximal pole. Distal wall smooth. Proximal face bears on each interradial sector thickened ridges of exine that radiate from a focus situated about 1/4 of the way

toward the equator from the pole; the ridges that run toward the equator and the outer extremities of the sutures number 3 to 5 in each sector, are about 4—7 μm wide and up to 3.5 μm high at the equator; they may be divided near the equator; the ribs that run toward the polar and apical region appear narrower. The ridges are separated by grooves of width equal to or less than that of the ridges. At the equatorial edge of the distal surface there is a thickened ring 2.5—6 μm wide (cingulum). The region on the distal surface immediately adjacent to the cingulum is thinner, followed by a thicker zone, then again thinner near the distal pole.

Dimension. Diameter 40—70 μm (7 specimens measured).

Emphanisporites rotatus McGregor 1961 emend. McGregor 1973

(Pl. III, figs. 1—4)

Description. Trilete miospores, amb broadly subtriangular to circular. Sutures simple or with low, narrow labra, extending to or nearly to the equator. Distal hemisphere unsculptured; proximal face with 4—10 radial, spoke-like ridges on each interradial sector. Ridges widest toward the equator, narrowing proximally and commonly fused to form a thick, slightly darker zone around the proximal pole. Ridges bifurcate or trifurcate toward the equator. Laesura commonly flanked by ridges. Wall about 1—2.5 μm thick. Curvature were detected on some specimens, but they are usually not evident because the rays are long and the spore is seldom compressed laterally.

Dimension. Diameter 32—80 μm (45 specimens measured).

Emphanisporites robustus McGregor 1961

(Pl. III, figs. 5, 6)

Description. Trilete miospores, with prominent radiating ridges that extend from the proximal pole as far as, but not over, the equator. Ridges widen to as much as 9 μm near the equator and may be up to 3 μm high. Distal wall laevigate. Laesura extend almost to the equator, but are often obscured by the strongly developed radial bands. Wall up to 5 μm thick equatorially, exclusive of ridge thickness.

Dimension. Diameter 58—80 μm (5 specimens measured).

DISCUSSION OF RESULTS

In the samples from a depth of 2002 m at Pionki 9 species of miospores were described: *Retusotriletes warringtonii* Richardson, Lister, *Retusotriletes* cf. *minor* Kedo, *Apiculiretusispora plicata* (Allen) Streel, *A. brandtii* Streel, *Dibolisporites eifeliensis* (Lanninger) McGregor, *Emphanisporites annulatus* McGregor, *E. erraticus* McGregor, *E. rotatus* McGregor, *E. robustus* McGregor. Turnau (Brzyski 1976), when causing out analysis of 3 samples from a depth of 1862.5 m, 2061.3 m, 2283.3 m found: *Emphanisporites rotatus* McGregor, *E. annulatus* McGregor, *Dibolisporites echinaceus* (Eisenack) Richardson, *Apiculiretusispora brandtii* Streel. In the lowest sample she also found *Emphanisporites robustus* McGregor. However, in the sample from a depth of 2002 m described in the present work *Dibolisporites echinaceus* (Eisenack) Richardson was not present, while 5 taxa not found by Turnau were determined (Brzyski 1976). Nevertheless, the present analysis fully confirms the age of the Emsian sample. This being in agreement with the stratigraphy given by Brzyski (1976).

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STRESZCZENIE

DOLNODEWOŃSKIE SPORY Z WIERCENIA PIONKI KOŁO RADOMIA

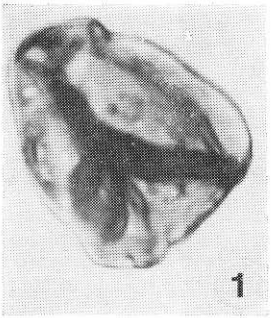
Badania nad sporami z wiercenia Pionki koło Radomia zaczęła Turnau (Brzyski 1976). W obecnej pracy oznaczono spory z próby pochodzącej z głębokości 2002 m. Stwierdzono obecność 9 gatunków:

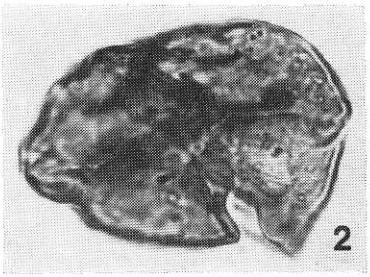
Retusotriletes warringtonii Richardson, Lister, *R.* cf. *minor* Kedo, *Apiculiretusispora plicata* (Allen) Streel, *A. brandtii* Streel, *Dibolisporites eifeliensis* (Lanninger) McGregor, *Emphanisporites annulatus* McGregor, *E. erraticus* McGregor, *E. rotatus* McGregor, *E. robustus McGregor.* Potwierdzają one w pełni dolnodewoński wiek próby.

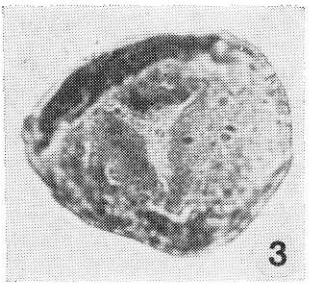
PLATES

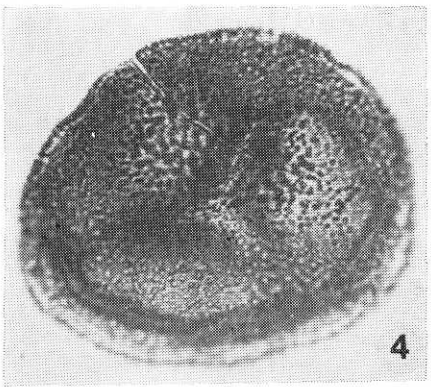
Plate I

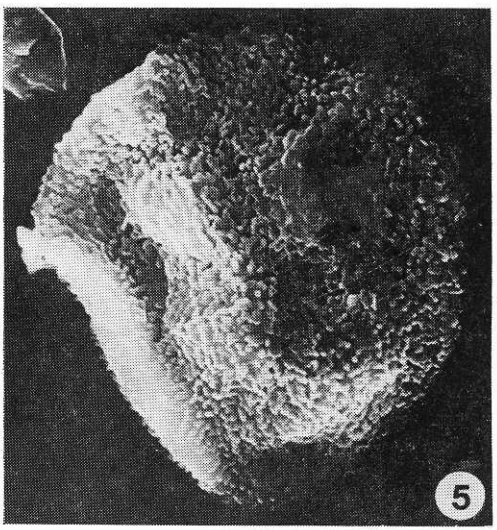
1. *Retusotriletes warringtonii* Richardson, Lister 1969, ×980
2. *R.* cf. *minor* Kedo 1963, ×980
3. *Apiculiretusispora plicata* (Allen) Streel, ×610
4—7. *A. brandtii* Streel 1964, figs. 4,7 ×610, figs. 5, 6 ×710

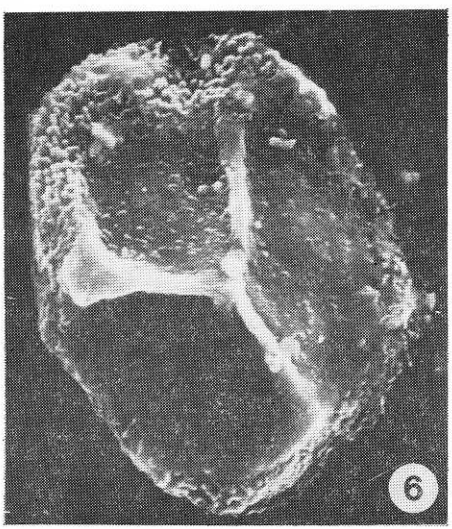












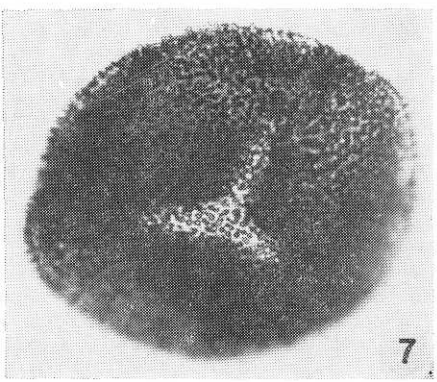
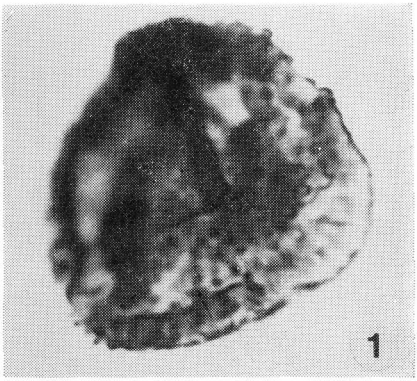
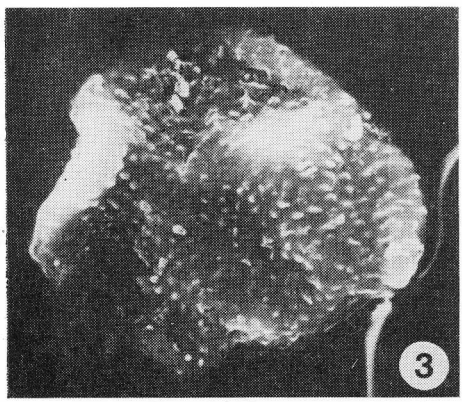
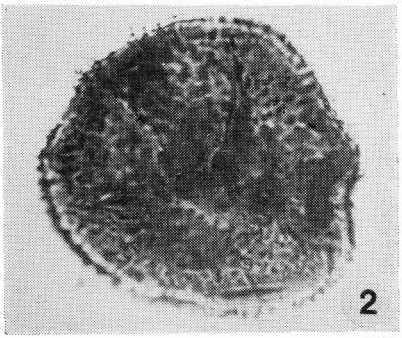


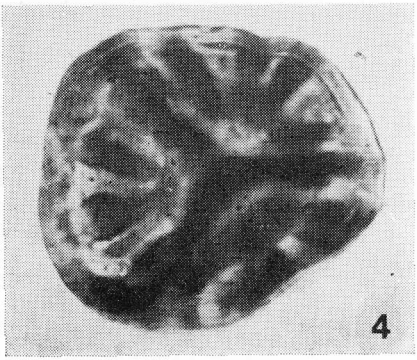
Plate II

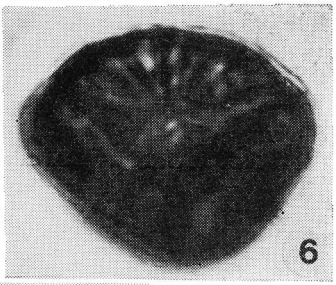
1—3. *Dibolisporites eifeliensis* (Lanninger) McGregor 1973, figs. 1,2 ×610, fig. 3 ×710
4, 5. *Emphanisporites annulatus* McGregor 1961, ×610
6, 7. *E. erraticus* (Eisenack) McGregor 1973, ×610

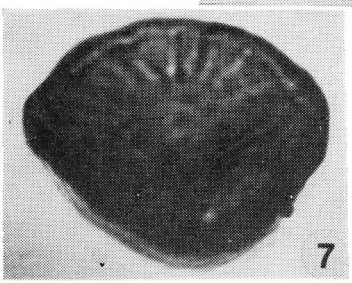












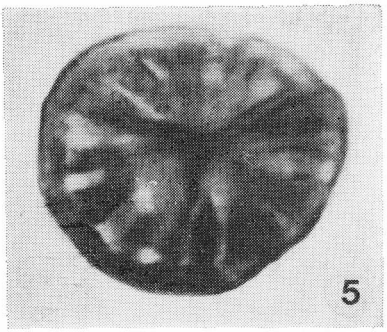


Plate III

1—4. *Emphanisporites rotatus* McGregor 1961 emend. McGregor 1973, fig. 1 ×710, figs. 2—4 ×610

5, 6. *E. robustus* McGregor 1961, ×610.