NEW SPORE FLORA FROM THE AMASRA COAL BASIN

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INTRODUCTION

The material on which this investigation is made was collected from the coal borings carried out by the M. T. A. Institute in the Amasra district during the year 1959-1960. The practice of coal maceration, applied here, has already been published by S.J. Dijkstra (1946). These new Megaspore species are referred to spore genera as defined by R. Potonie and G. Kremp (1954) and by C. D. Bhardwaj (1955). As a result of the study of the flora in the Amasra Coal Basin, 14 new species of spores had been found and they are individually and stratigraphically described below.

SPECIFIC DESCRIPTIONS

Bentzisporites imberbis sp. n.

Pl. I, Fig. 1

Description. — Spore is circular in equatorial outline, flattened in dorso-ventral or a litlle in lateral direction. Diameter of the spore 520x416 microns (only one specimen was found). Triradiate ridges distinct, straight, half-cylindrical in shape, radii about 50 microns high and same in width and two thirds of the body length. Triradiate ridges are hollow in height towards the apex of the spore. Contact faces are fairly large, swollen and protruding past the body margin on one side. Proximal surface is characterized by the structure of the equatorial thickening, which consists of an opaque portion (60-75 microns wide) with a regular border. This thickening is called cingulum. Distal area without equatorial thickening, but showing many secondary folds. Extrema lineamenta and the surface is levigate, exospore (exine) smooth, black, plicated, rather thick and approximately 35 microns, on both cingulum and spore body.

Locality. — Amasra, Boring No. 35, 550 m in depth.

Occurrence. — Westphalian D.

Laevigatisporites ? sensilis sp. n.

Pl. I, Fig. 2

Description. —Megaspore is radial, generally subrounded in equatorial outline, 598x525 microns in diameter (only one specimen was observed with a broken portion of one of the sectors). Compressed in dorso-ventral direction. Triradiate ridges distinct, prominent, slightly large and wavy; they are longer than

the contact areas, reaching the equator of the spore and about 40-50 microns in height, 15-20 microns in width. Arcuate ridges, which are seen in the middle, thin and 7-8 microns high and wide. Contact faces distinct; these occupy about 70 % of the proximal half of the flattened spore by planimetric measurements. Two folds are seen on the distal surface of the spore, not flattened but prominent; about 60-70 microns in height. Spore coat appears levigate, although it obviously is minutely granular when critically examined. Exine plicate, homogeneous, dark-brown, thin and 10-15 microns in thickness.

Locality. — Amasra, Boring No. 33, 639 m.

Occurrence. — Upper Westphalian C.

Tuberculatisporites subereglіensis sp. n.

Pl. I, Fig. 3

Description. — The shape of the spore is mostly rounded in transverse plane, compressed in proximal-distal direction. Diameter 1000x1200 microns (only one specimen was seen). Triradiate marking conspicuous, radii straight, about 1/2 or more of the radius of the spore in length and 25-30 microns in breadth, about the same in height. Arcuate lamellae clearly visible, prominent, and 25-30 microns in breadth and height. Contact facets fairly distinguished and occupying about two thirds of the area of the proximal half of the spore. The proximal part and the periphery of the spore partially and sparsely ornamented with slightly pointed papillae, 20-25 microns high and 30-35 microns wide. Distal area as well as the contact faces of the spore are free of papillae. Exine homogeneous, dark-brown, slightly thick, approximately 25-30 microns.

Comparison. — This new specimen is very similar—especially by its shape—to *T. eregliensis* Dijkstra 1952, but differs from it by smaller size and by absence of papillae on both distal and contact areas; moreover *T. eregliensis* is found in Westphalian D, while *Tuberculatisporites subereglіensis* sp. n. occurs in Namurian.

Locality. — Kireçlik, seam of Hasan Efendi No. 8.

Occurrence. — Namurian.

Triletisporites bellus sp. n.

Pl. I, Fig. 4

Description. — Spore is oval in transverse plane. Flattened in dorso-ventral direction. The holotype measures 1560 ?x 832 microns (only one half specimen has been observed). Triradiate lamellae very high and conspicuous, at the apex 215 microns high and 55 microns broad, to the auriculae of the spore becoming a little lower and normally folded over sideways by compression. Auriculae, together with the flattened arcuate ridges, builds a large cingulum on which are seen three tubercles; Contact faces entirely wrinkled. Distal area sparsely distributed with nine tubercles, 125 microns in diameter and 85 microns in height. Exine black, thick and about 40-45 microns.

Locality. - Amasra, Boring No. 34, 463 m.

Occurrence. — Westphalian D.

Triletisporites subtuberculatus sp. n.

Pl. II, Figs. 5, 6; holotype Fig. 5

Description. — The shape of the spore is wavy, triangular in outline, flattened in dorso-ventral direction. Diameter of the spores 740x1100 and 520x700 microns. Triradiate ridges conspicuous, as long as the spore radius, 115 microns high and 85 microns broad. Arcuate ridges distinct, wavy and provided with 3-4 tubercles. Contact facets are smooth. Distal portion sparsely covered with 5 to 8 hollow tubercles unequal in size, 80-105 microns in diameter and about 65-80 microns high. Exine smooth, black and thick (35-45 microns).

Comparison. — This new species is closely related to *Triletisporites (Triletes) tuberculatus* (Zerndt, 1930) Pot. and Kr. 1954, but it can only be distinguished by smaller size and by pitted tubercles. By this character this specimen is separated from *T. tuberculatus*.

Locality. — Amasra, Boring No. 35.

Occurrence.— Upper Westphalian C.

Cystosporites carinatus sp. n.

Pl. II, Fig. 7

Description.— The spore is almost ewer-shaped (without handle) in outline, compressed in longitudinal direction. Length 1300 microns, breadth 325 microns (only one specimen was observed). Triradiate ridges very thin and weakly developed on the top. Arcuate ridges and the border of the contact facets not distinguishable. Extrema lineamenta and surface is levigate in all parts of the spore and is completely devoid of special ornamentation. Proximal part of the spore separated from the distal area by a longitudinal-running carina (up to 100-115 microns high, 25-30 microns broad) and by a flattened fold. This character and the shape of the spore make this specimen very distinct. Distal portion also smooth, but without any fold. Exine black, plain, partially shining and 15-20 microns thick.

Locality.— Amasra, Boring No. 34, 654 m.

Occurrence.— Westphalian C.

Cystosporites reticuloornatus sp. n.

Pl. II, Figs. 8, 9; holotype Fig. 8

Description.— Spore body ellipsoid or elongate to oval in outline (two specimens were observed; one of them was broken), one holotype measures 2500? X 1150 microns, the other is 1170x555 microns. Extrema lineamenta and the surface of the spore coat is reticulate with narrow, but elongated lacunae and very thin (like a thread) muri on both sides. The lacunae are unequal in size, up to 50-70 microns in breadth and 72-150 microns in length. The muri measures are 1 micron high and 1 micron wide. Trilete marking and contact facets not observed, may be they are covered by the muri. At some places spore coat appears thickened, especially near the top, unthickened portion of the coat looks more or

less semi-translucent. Exine surface brown to reddish, opaque to semi-translucent, thin, not plicated, or longitudinally running folds may be present; appoximately 14-18 microns thick.

Locality.— Amasra, Boring No. 35.

Occurrence.— Westphalian C.

Cystosporites reticulogranulatus sp. n.
Pl. III, Figs. 10, 11; holotype Fig. 10

Description.— Large megaspores flattened in lateral direction, elongate to sack-like in outline. Contact areas, triradiate and arcuate ridges not observed (only two specimens were found which measure 2350x1170 and 1175?x546 microns). The spore coat has two types of ornamentation : one the faintly reticulate type, and the other finely granulate on both proximal and distal. The lacunae are extremely large, vary in size, tetragonal to hexagonal in shape and 85-95 microns in width (average 75 microns). The muri (reticulate ridges) are thin and 1-2 microns high and same in breadth. Also, whole spore surface unevenly and sparsely distributed with some red, bright, round objects, 2-3 microns in diameter. Spore coat plicated only in length direction. Exine reddish to brown, reticulo-granulate, appears slightly semi-transparent and about 10-15 microns thick.

Locality.—-Amasra, Boring No. 34, 874 m.

Occurrence.— Westphalian B.

Schopfipollenites ibrahimi sp. n.
Pl. III, Figs. 12, 13; holotype Fig. 13

Description.— Pollen grains (microspores) bilateral, elongate to oval in transverse plane. Diameter is 234-286 microns. Median suture is 3/4 the length of the body, but never reaching the margin, straight, runs parallel to the longest axis and one of the ends bifurcated (only two specimens were noticed). Labra slightly developed. The proximal area ornamented with micro vermiculate-shaped ridges, but the opposite side is levigate. Exine is divisible into two definite zones, the outer reddish and semi-transparent, the inner brown to reddish, slightly thick, about 15-18 microns.

Locality.— Amasra, Boring No. 35, 603 m.

Occurrence. — Upper Westphalian C.

Schopfipollenites manifestus sp. n.
Pl.III, Fig. 14

Description.— The body is roundly, oval, but truncated angular shaped in transverse plane. The holotype measures 260x286 microns in diameter. Monolete mark is slightly like an arch, very thin, extends two thirds the length of the body. Extrema lineamenta and the surface are granulate on both sides. Exine reddish to brown, thin, semi-translucent, slightly plicated.

Locality.-- Amasra, Boring No. **34,** 463, 603 m.

Occurrence.— Lower Westphalian D.

Schopfipollenites pamiri[1] sp. n.

Pl. III, Figs. 15, 16; holotype Fig. 15

Description.— Pollen grains are irregularly oval shaped in the plane of transverse symmetry (only two specimens were found). The holotype measures 364x312 microns, and the known size variance is 364x247 microns. Median striation is thick (20-25 microns in width) nearly straight, depressed, dark-brown colored and two thirds of the total length. Extrema lineamenta and the surface of the body are levigate. Proximal portion consists of many transversal or radial-running thin fissures. The opposite area distorted from the ventral to dorsal and appearing like a cingulum. Exine light-brown, opaque, thick and approximately 25-30 microns.

Locality.— Amasra, Boring No. 34, 463 m.

Occurrence-— Lower Westphalian D.

İbrahimipollenites? kryptoreticuliformis sp. n.

Pl. IV, Fig. 17

Description.— Pollen grains bean-shaped to oval in transverse plane, flattened in dorso-ventral direction. Diameter : 338 microns in length, 286 microns in width. Monolete mark is about two thirds or more of the total length, which is not quite straight, but shows a slight angular deviation near the middle. Commisure open, labra thin, poorly developed and whose ends appear to be bifurcated. The

EXPLANATION OF PLATES

PLATE I

Fig. 1 — *Bentzisporites imberbis* sp. n. X 50
Fig. 2 — *Laevigatisporites ? sensilis* sp. n. X 50
Fig. 3 — *Tuberculatisporites subereglіensis* sp. n. X 50
Fig. 4 — *Triletisporites bellus* sp. n. X 50

PLATE II

Figs. 5, 6 — *Triletisporites subtuberculatus* sp. n. X 50
Fig. 7 — *Cystosporites carinatus* sp. n. X 45
Figs. 8,9 — *Cystosporites reticuloornatus* sp. n. X 50

PLATE III

Figs. 10,11 — *Cystosporites reticulogranulatus* sp. n. X 50
Figs. 12,13 — *Schopfipollenites ibrahimi* sp. n. X 100
Fig. 14 — *Schopfipollenites manifestus* sp. n. X 100
Figs. 15,16 — *Schopfipollenites pamiri* sp. n. X 100

PLATE IV

Fig. 17 — *Ibrahimipollenites ? kryptoreticuliformis* sp. n. X 100
Fig. 18 — *Zonalosporites orbicus* sp. n. X 100
Fig. 19 —- *Zonalosporites typicus* sp. n. X 100


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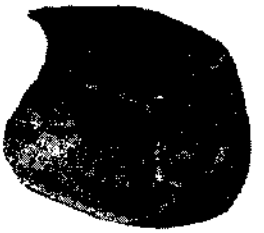
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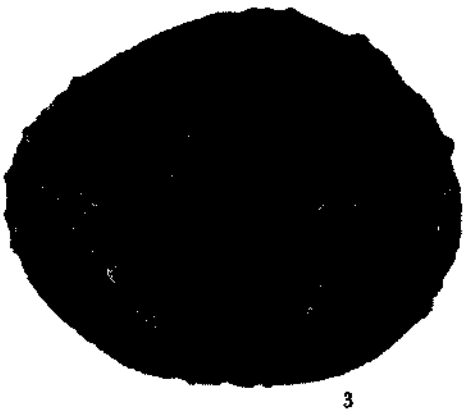
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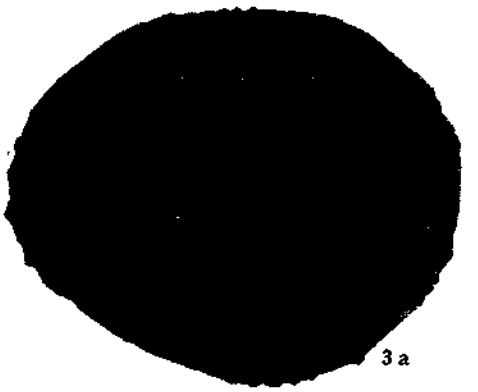
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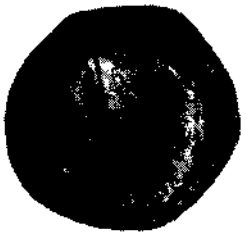

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19 a

proximal coat is obscure reticulate and also granulate, but this ornamentation is not clear. The lacunae vary in size, they are ovoid in shape and 130x65 microns in diameter. The muri arc hardly visible, with this ornamentation the proximal part looks four-celled. Distal area is only granulate. Exine brown to reddish, thin, semi-translucent, plicated and about 15 microns thick.

Locality. — Amasra, Boring No. 34, 463, 603 m.

Occurrence. — Lower Westphalian D.

Zonalosporites orbicus s*p*. *n.*

Pl. IV, Fig. 18

Description. — The shape of the pollen grain is round, flattened in dorso-ventral direction; diameter is 312 microns—including the cingulum—only one specimen was observed. The cingulum is 50-60 microns broad. It is characterized by one median longitudinal striation on the proximal face, which is thin, straight and traverses the cingulum. Labra weakly developed, ends bifurcated, runs parallel to the axis on the distal side; just opposite the monolete mark one developed umbo (ridge), which likewise runs parallel to the median suture. Extrema lineamenta and the surface is levigate-punctate and shining; the coat of the central body is opaque, dark-brown to reddish, rather thick, about 20-25 microns. Cingulum red, semi-transparent, but of the same thickness with the central body.

Locality. — Amasra, Boring No. 33, 681-683 m.

Occurrence. — Westphalian C.

Zonalosporites typicas sp. n.

Pl. IV, Fig. 19

Description. — The shape of the pollen grain is quadrangular with a rounded corner in equatorial outline, flattened in dorso-ventral direction. Whole diameter is 312 x 286 microns (including the cingulum), only the cingulum: 30-50 microns in width. On the middle of the proximal part along the polar axis is monolete mark, which is straight, well developed, depressed, large (30-35 microns) and reaches the cingulum. Labra thick (30-35 microns in breadth), well developed and perfectly bifurcated. Distal side is bounded by two distinct folds and by micro-vermiculate-shaped ridges. Central body is round, dark-brown to reddish, opaque and about 22-27 microns thick. Cingulum slightly tetragonal in shape, on the corners more broad, reddish, semi-translucent and of the same thickness with the central body. Extrema lineamenta and the surface are levigate-punctate and bright.

Locality. — Amasra, Boring No. 34, 463 m.

Occurrence. — Lower Westphalian D.

ACKNOWLEDGMENTS

I am greatly indebted to the General Director, Dr. Sadrettin Alpan, and to our Director, Dr. Melih Tokay, for their encouraging advice. I wish also to express my heartiest thanks to Dr. P. Piefart (from Bruxelles, Belgium) for his helpful suggestions and for allowing the use of two slides—one each of *T. trivedii* Dijkstra and of *T. endosporitiferus* Prem Singh—for study and comparison.

NOMENCLATURAL NOTES

(1) It has been noted that *Tuberculatisporites tuberospinosus* Yahşıman and Ergönül, 1959 (M. T. A. Bull. No. 53, 1959, p. 95, pl. III, figs. 9-13) is not a new type, but is identical with *Triletes trivedii* Dijkstra, 1955; consequently, it is joined witht the latter.

(2) *Foveolatisporites dijkstrai* Yahşıman, 1959 (M. T. A. Bull. No. 53, 1959, p. 102, pl. I, figs. 1-8) has no relation with *Foveolatisporites,* but is included in the genus of *Laevigatisporites.* Therefore the writer has changed the above genus to *Laevigatisporites (Foveolatisporites) dijkstrai* (Yahşıman, 1959) n. comb.

Manuscript received July 27, 1960

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