

# NEW CARBONIFEROUS MEGASPORES FROM THE ZONGULDAK AND AMASRA COAL BASIN

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## INTRODUCTION

The stratigraphical distribution and values of Megaspores in the Zonguldak and Amasra Carboniferous areas were studied. As a result of these studies one new genus and twelve new species were discovered. They are described below.

## DESCRIPTION

1 — *Foveolatisporites dijkstrai* sp. n.

Pl. I, Figs. 1-8; holotype Fig. 6

*Diagnosis.* — Spores generally nearly rounded in outline, flattened in proximal-distal as well as in lateral direction. Diameter of the Megaspores varying from 990-1110 microns (the mean being 1090 microns; 15 specimens measured). Triradiate ridges about  $2/3$  of the radius of the spore in length. The borders of the contact areas and the arcuate ridges are hardly distinguishable, therefore contact faces are not different from the remainder of proximal surface. Around the triradiate ridges and on the contact faces there are many cavities (foveoles), 40-50 microns in diameter. The proximal and distal parts of the spore unornamented. Spore coat light-brown, smooth, plicated and about 20-25 microns thick.

*Occurrence.* — Amasra, Boring No. 32, 265 m.

*Age.* — Westphalian D.

2 — *Tuberculatisporites kozliensis* sp. n.

Pl. I, Fig. 9

*Diagnosis.* — Diameter of the spherical spore 1020 microns (1 specimen), compressed in dorso-ventral directions. Triradiate ridges straight,  $1/2$  of the radius of the spore in length, 25 microns wide and 40 microns high. Arcuate ridges not clearly visible. Only the proximal part of the spore densely covered with 30-40 microns long, 20-25 microns wide spines. These spines are red, sharp-pointed and transparent. The contact faces and distal area are smooth and unornamented. Spore wall is black, matte, smooth and rather thick, about 20-25 microns.

*Remarks.* — In some respects this new species resembles *Tuberculatisporites apiculatus*, from which it can be distinguished by having no spines on its distal area and contact faces.

*Occurrence.* — Zonguldak (Kozlu), Boring No. 20 A, 500 m.

*Age.* — Westphalian A.

3 — *Tuberculatisporites microspinuliferus* sp. n.

Pl. II, Fig. 10

*Diagnosis.* — Spore circular in outline, flattened in proximal-distal direction. Diameter of the spore 330 microns (1 specimen). Triradiate ridges thin, straight, 90 microns in length, 2-3 microns in width, about the same in height. Splits scarcely visible. Coat of the spore — contact faces excepted — densely covered with 3-5 microns long, pointed, red and translucent microspines. Contact faces finely granulate. Arcuate ridges scarcely distinct. Exospore brown to red, semi-translucent and 10 microns in thickness.

*Remarks.* — This species slightly resembles *Triletes microgranulatus* DIJKSTRA, but differs from it by larger size, contact sculpture, and by semi-translucent spore coat.

*Occurrence.* — Amasra, Boring No. 28, 375.70 m.

*Age.* — Namurian.

4 — *Tuberculatisporites mediupapillarius* sp. n.

Pl. II, Figs. 11, 12; holotype Fig. 11

*Diagnosis.* — Megaspore of round shape 1200 microns in diameter, but the oval ones 1050 microns in length, 600 microns in width (3 specimens); generally flattened in proximal-distal direction. Triradiate ridges about 3/4 of the radius of the spore in length; at the apex 40 microns wide and high but to the periphery of the spore they are broader (90 microns) and higher (70 microns). The proximal and distal area of the spore covered with 30-40 microns long and same in width, blunt-ended papillae. The papillae on the contact faces are smaller than on the other parts and about 15-20 microns in diameter. Contact faces are visible and swollen.

*Remarks.* — This species a little resembles *Tuberculatisporites brevispiculus*, but it can be distinguished from it by its swollen contact faces and triradiate ridges.

*Occurrence.* — Amasra, Boring No. 32, 556.74 m, Kö. 3.

*Age.* — Westphalian A-B.

5 — *Tuberculatisporites simplexipiculus* sp. n.

Pl. II, Fig. 13

*Diagnosis.* — Spore oval to subtriangular in outline, 840 microns in length and 600 microns in width, compressed in dorso-ventral. direction. Triradiate ridges conspicuous, undulate, typically 800 microns long, 60 microns high and 40 microns wide, but normally folded over sideways by compression. Contact faces

distinguishable, arcuate ridges scarcely visible. The proximal and distal parts of the spore (excluding the contact faces) very densely covered with sharp-pointed or broken off, red and translucent spines, 30-45 microns long, 7-8 microns wide at the base and at the top. These spines are simple and do not show any branches on the tips. The entire spore coat, triradiate ridges included, finely granulate (diameter of granules about 0.5-1 micron). Spore wall dark-brown, rather thick, about 30-35 microns.

*Remarks.* — This species — of which only one specimen could be found — resembles *Setosporites hirsutus* from which, however, it can be easily distinguished by the absence of the top vesical (Gula) projection and by the spines which are only of simple form.

*Occurrence.* — Zonguldak (Kandilli), Boring No. A, 380.45 m.

*Age.* — Namurian.

6 — *Zonalesporites crassiletes* sp. n.

Pl. II, Fig. 14

*Diagnosis.* — The shape of the spore rounded to subtriangular, flattened in proximal-distal direction. Diameter of the spore, cingulum included, 900 microns; only spore body, 500 microns in diameter (1 specimen). Around the spore there is a cingulum, 180-210 microns in width; bright black, thin and semi-translucent. Triradiate ridges straight, very coarse, 180-200 microns wide and same in height, and cylindrical in shape. The top of the triradiate ridges is pointed like a bird's beak. Trilete mark extending to the cingulum continues in the same height and width. The proximal and distal surface of the spore is smooth and without any sculpture. Spore coat is smooth, in proximal brown, but in distal black-colored, about 50-80 microns in thickness.

*Remarks.* — In some respects this species resembles *Zonalesporites brasserti*, but more important are the differences in the shape of the triradiate ridges.

*Occurrence.* — Amasra, Gallery E.K.İ., seam of Etemağa, Kö. 6.

*Age.* — Westphalian C.

7 — *Bentzisporites cingulatus* sp. n.

Pl. II, Fig. 15

*Diagnosis.* — Megaspore (1 specimen) flattened in dorso-ventral direction, oval in outline. Diameter—cingulum included—510 microns long and 340 microns wide. Around the spore there is a massive cingulum, 55-65 microns in width, and it forms a rounded corner on one of the trilete rays. The border of the spore body with the cingulum is clearly distinguishable; both of them are made of the same material, but cingulum is more or less thicker than the spore coat. Triradiate ridges are straight, thin, 8 microns wide and high, extending as long as the spore radius. The proximal and distal area of the spore, cingulum excluded, are evenly swollen in every direction. Exospore black, smooth and 15-20 microns thick.

*Occurrence.* — Zonguldak (Kireçlik) Gallery —100, seam of Hasanefendi.

*Age.* — Namurian.

8 — *Cystosporites striatus* sp. n.

Pl. III, Fig. 16

*Diagnosis.* — Spore oval in equatorial outline, 7.5 mm long and 2.8 mm wide. Probably flattened in lateral direction (1 specimen). Triradiate ridges, contact faces and arcuate ridges not visible. Entire spore coat is striated with very densely transversal lines and with rarer longitudinal lines. Spore coat striate, light-yellow, translucent and wrinkled.

*Occurrence.* — Amasra, Boring No. 32, 265 m.

*Age.* — Westphalian D.

9 — *Cystosporites semitranslucens* sp. n.

Pl. III, Figs. 17, 18; holotype Fig. 17

*Diagnosis.* — Megaspores compressed in longitudinal direction, oval in outline, 1170-1800 microns long and 570-870 microns wide (2 specimens). Triradiate ridges thin, short, 60-70 microns long, 6-8 microns wide and high; arcuate ridges and contact faces not, or scarcely, visible; contact faces relatively small. All ornamentation on the spore is lacking; only longitudinally-running folds are present. Spore coat shining red, smooth, semi-translucent and 15 microns thick.

*Occurrence.* — Amasra, Boring No. 32, 858 m, Kö. 7.

*Age.* — Westphalian A.

10 — *Loevigatisporites inconformitus* sp. n.

Pl. IV, Fig. 19

*Diagnosis.* — Subtriangular in outline, flattened in proximal-distal direction; in long diameter 540 microns, in short diameter 450 microns (1 specimen). Triradiate ridges extending to the equator, towards the apex of the spore 30 microns wide and about the same in height, but to the periphery a little wider, 45 microns. At the top of the triradiate ridges a knot is visible, 30-35 microns wide and high. Contact faces are elevated and reach the equator, the distal and proximal surfaces of the spore are unconformable and therefore the three angles of the distal area are seen from the proximal part. Distal surface cavity, showing radially-running folds. Spore wall bright black, smooth, without any sculpture, 15-20 microns thick.

*Occurrence.* — Amasra, Boring No. 32, 265 m.

*Age.* — Westphalian C.

Sub-division *LAGENOTRILETES* POT. und KR., 1954

Series Gulati BHARDWAJ, 1957

Genus *Anatolisporites* gen. n.

Megaspores generally of large size, triradiate ridges are conspicuous and increase rapidly in height towards the apex of the spore, forming a characteristic elevation which is called Gula. Arcuate ridges sometimes inconspicuous sometimes clearly visible. Every ornamentation is lacking; spore coat is thick.

11 — *Anatolisporites amasriensis* sp. n.  
Pl. IV, Figs. 20 - 22; Holotype Fig. 22

*Diagnosis.* — Spores generally oval, sometimes spherical in outline, flattened in lateral as well as in proximal-distal direction. Diameter of the oval spore 1040-1155 microns long, 750-840 microns wide (the mean being 1100-780 microns, 7 specimens measured). Triradiate ridges extending as far as the radius of the spore in length, or nearly so; at the apex 35-50 microns in width and same in height, but to the periphery of the spore wider and higher (about 80-90 microns).

Laterally flattened specimens show a small prominent nozzle, (Gula) 120-140 microns high and wide, which is chiefly built by the swollen triradiate ridges. Arcuate ridges are visible; 25 - 30 microns; in width and same in height. Contact faces clearly distinguishable. Spores without any sculpture; spore coat black, smooth and thick, 50-70 microns.

*Remarks.* — By having Gula this new species most resembles *Setosisporites praetextus*, but differs from it by its smooth spore coat and by swollen triradiate ridges.

*Occurrence.* — Amasra, Boring No. 32, 556-559 m.

*Age.* — Westphalian A-B.

PLATE I

- Figs. 1-8 — *Foveolatisporites dijkstrai* sp. n. x 23  
Fig. 9 — *Tuberculatisporites kozliensis* sp. n. x 22

PLATE II

- Fig. 10 — *Tuberculatisporites microspinuliferus* sp. n. X 70  
Figs. 11,12 — *Tuberculatisporites mediupapillarius* sp. n. X 50  
Fig. 13 — *Tuberculatisporites simplexispiculus* sp.n. x 50  
Fig. 14 — *tynalesporites crassiletes* sp. n. x 50  
Fig. 15 — *Bentziaporites cingulatus* sp. n. x 50

PLATE III

- Fig. 16 — *Cystosporites striatus* sp. n. x 12  
(There is some foreign matter on the spore)  
Fig. 16a — Structure of the spore coat X 150  
Figs. 17,18 — *Cystosporites semitranslucens* sp. n. x 50

PLATE IV

- Fig. 19 — *Laevigatisporites inconfonitus* sp. n. x 50  
Figs. 20-22 — *Anatolisporites amasriensis* sp. n. x 50  
Figs. 23,24 — *Anatolisporites subamasriensis* sp. n. x 50

PLATE V

- Figs. 25-27 — *Anatolisporites subamasriensis* sp. n. x 50

12 — *Anatolisporites suhamasriensis* sp. n.  
Pl. IV, V, Figs. 23-27; holotype Fig. 23.

*Diagnosis.* — The shape of the Megaspores rounded or oval in outline; flattened in dorso-ventral, and sometimes a little in lateral direction. Diameter varying from 1180-1500 microns (the mean being 1350 microns, 10 specimens measured). Triradiate ridges straight representing 1/2 or a little longer than the length of the radius of the spore, 30-40 microns wide, about same in height. Apical prominence (Gula) is 120-135 microns wide and high. The border of the contact faces and arcuate ridges not distinguishable, or sometimes scarcely visible, therefore contact faces not different from the remainder of the proximal part of the spore; in some cases splits are observed; ornamentation lacking. Spore coat black, smooth, sometimes plicate, rather thick (about 30-40 microns).

*Remarks.* — This species most resembles *Anatolisporites amasriensis*, but differs from it by its straight triradiate ridges and by obscure arcuate ridges.

*Occurrence.* — Amasra, Boring No. 32, 556-559 m.

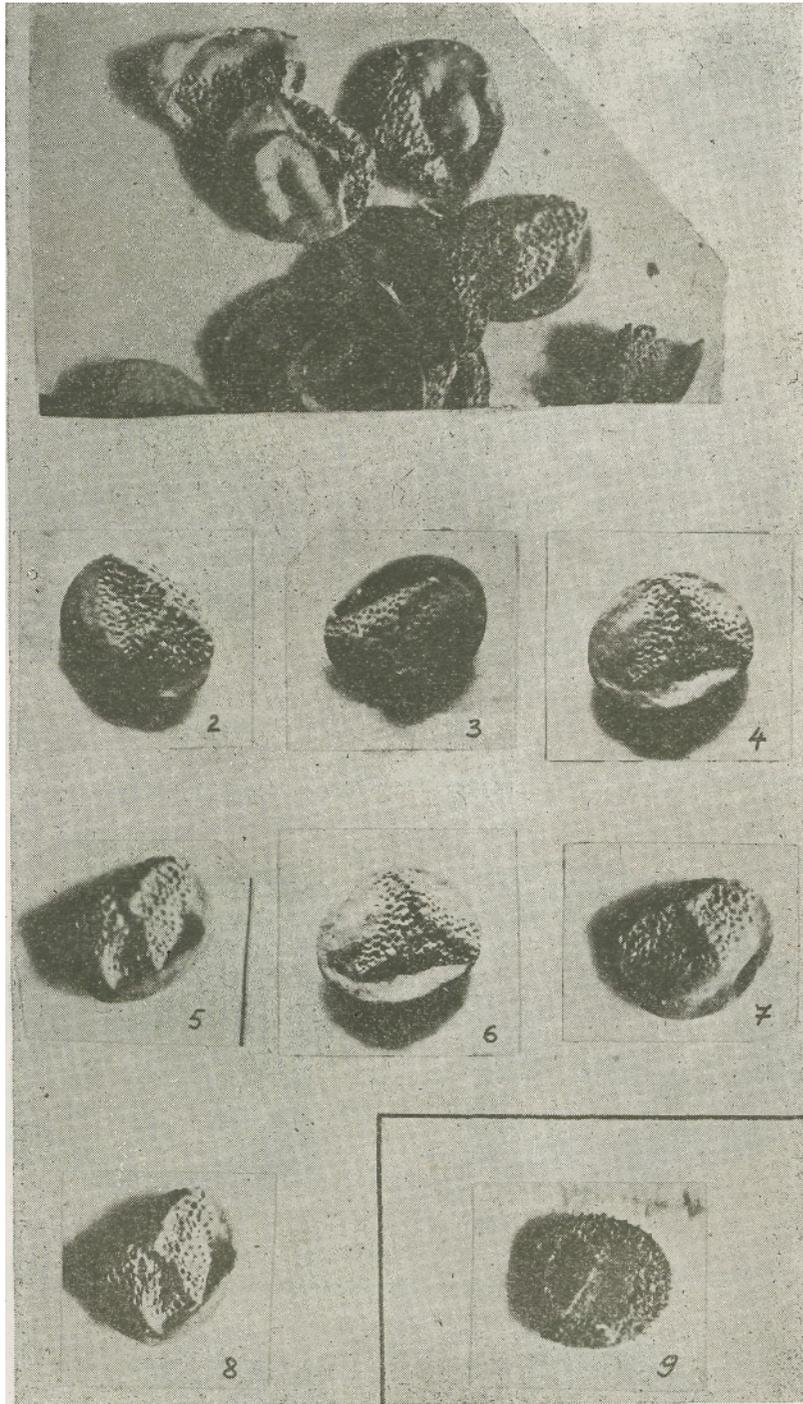
*Age.* — Westphalian A-B.

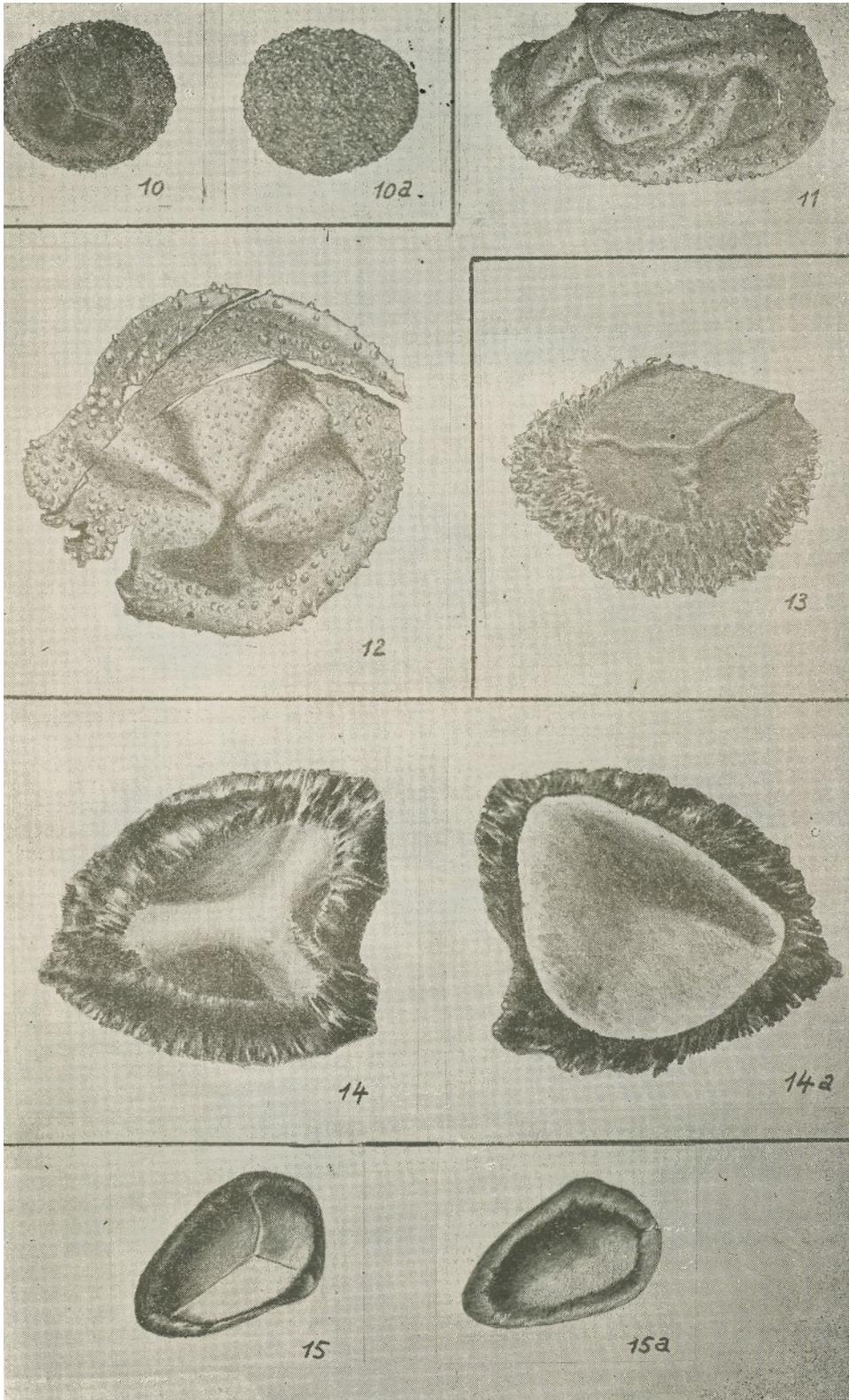
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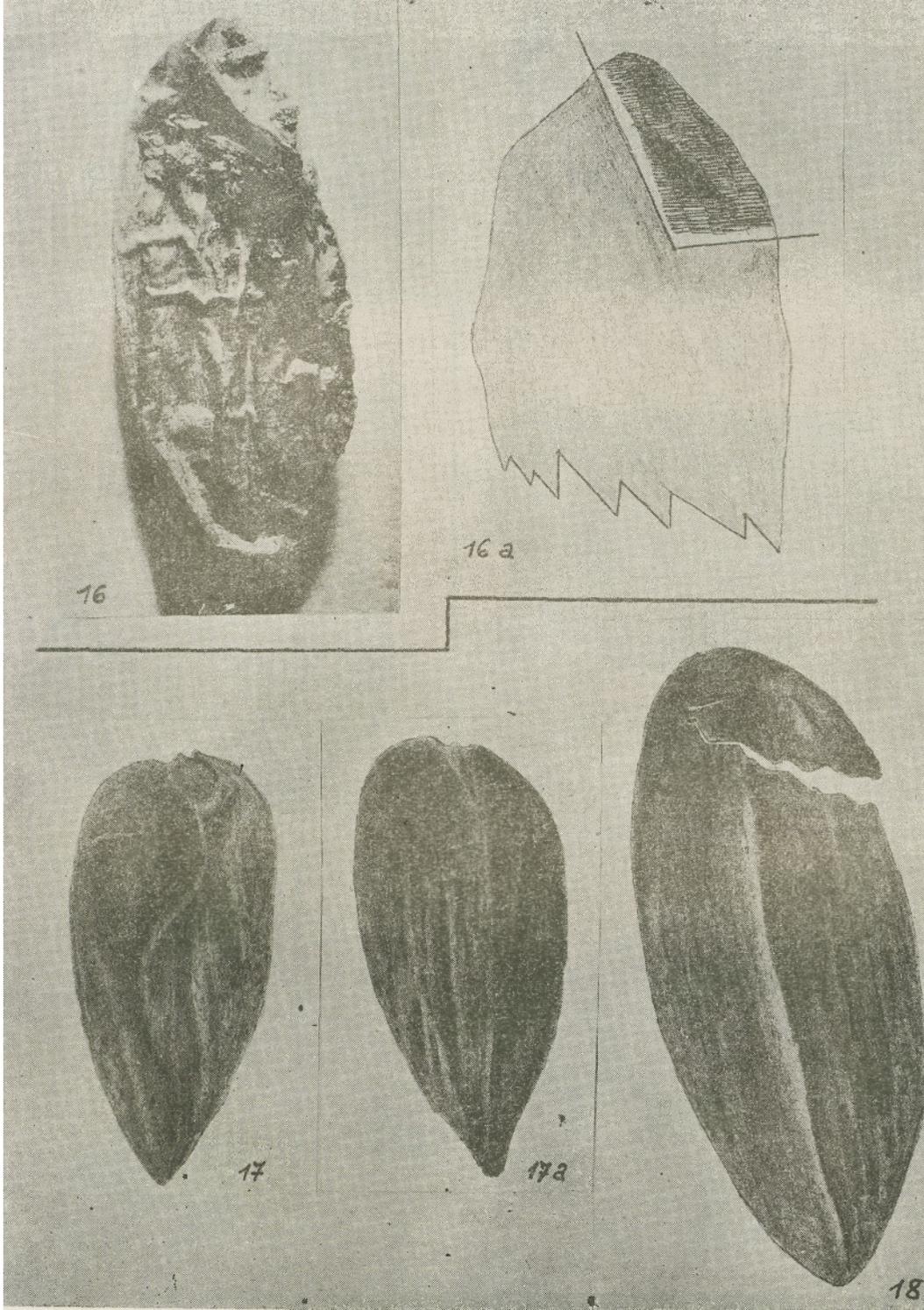
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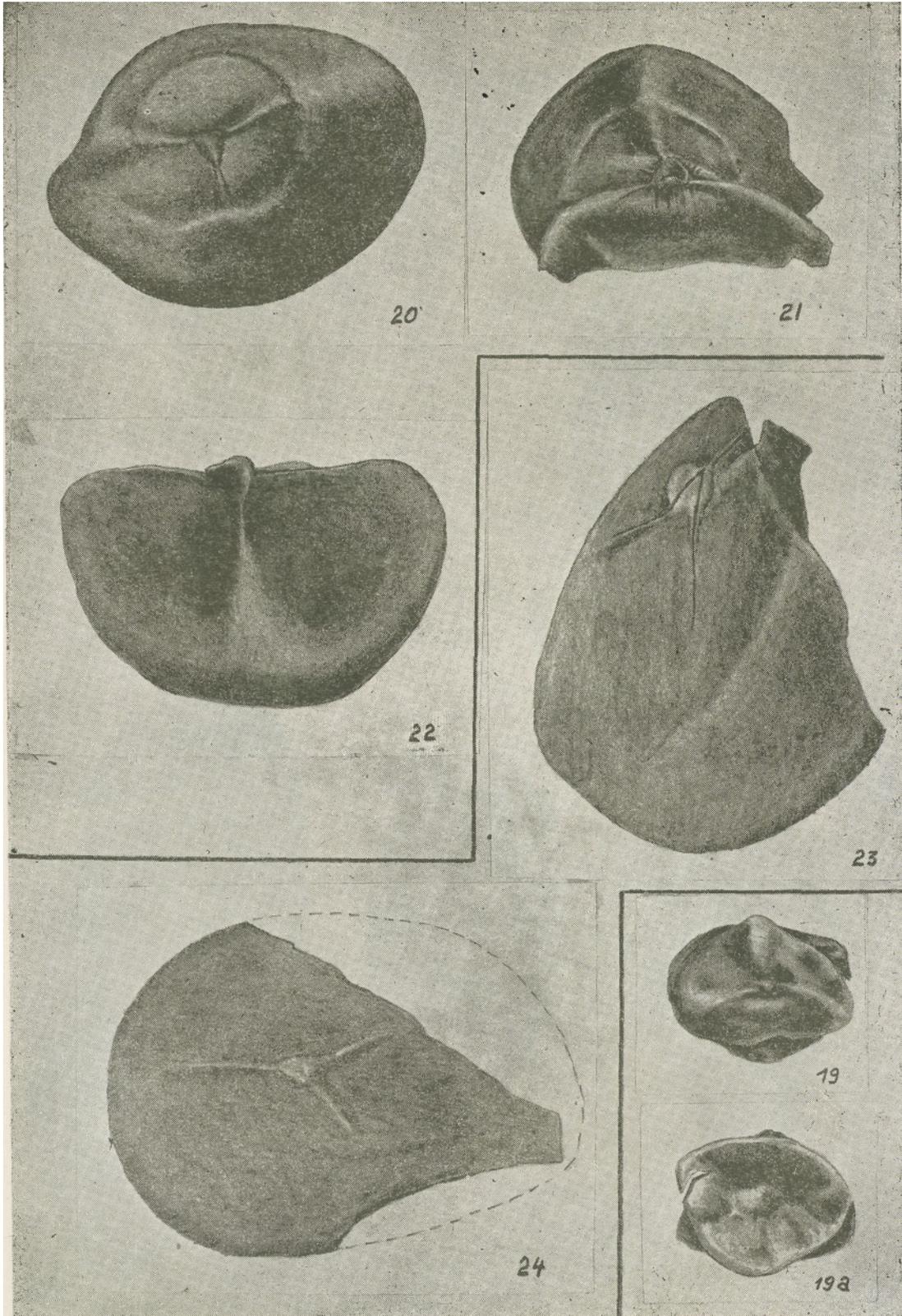
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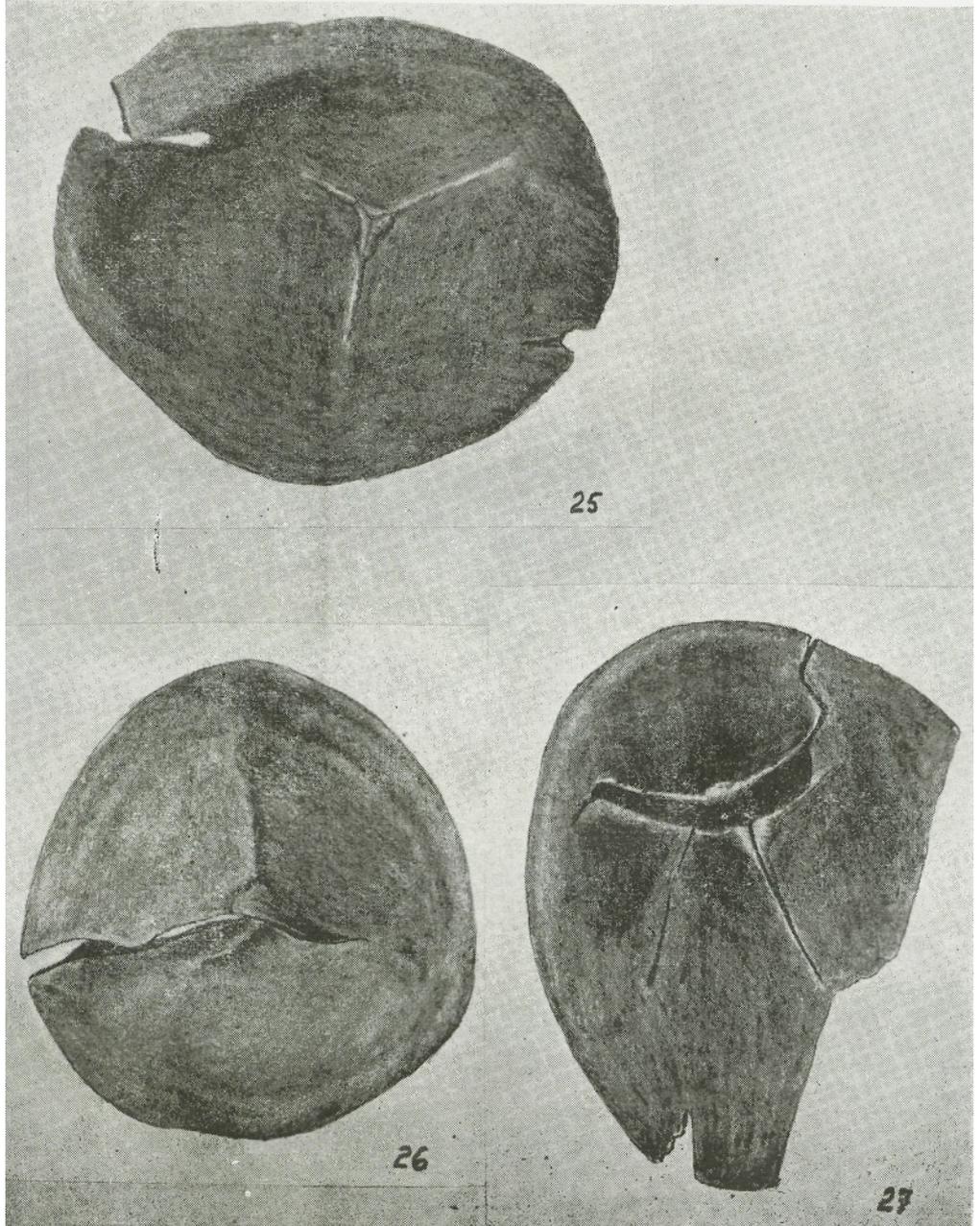




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