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FIGURES OF REMARKABLE FORMS

OF

POLYCYSTINS,

OR

ALLIED ORGANISMS,

IN THE

Barbados Chalk Deposit,

(CHIEFLY FROM THAT COLLECTED BY DR. DAVY, AND WHICH HE HAD
NOTICED IN A LECTURE DELIVERED TO THE AGRICULTURAL
SOCIETY OF BARBADOS, IN JULY, 1846.)

DRAWN BY MRS. BURY,

AS SEEN IN HER MICROSCOPE, ON SLIDES PREPARED BY
CHR. JOHNSON, ESQ., OF LANCASTER,
1860 AND 1861.

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FIGURES

OF REMARKABLE

Microscopic Forms of Polycystins

AND ALLIED ORGANISMS,

OF

THE BARBADOS CHALK DEPOSIT,

Photographed from the Original Drawings by Mrs. Bury.

12 Photographed quarto Plates,

Containing 72 Figures; with descriptive references to the Works of Professors Johannes Müller, Ehrenberg, &c.

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POLYCYSTINS.

PREFACE.

“BUT WHAT ARE POLYCYSTINS” is the constant exclamation. — So little is yet known of these curious organisms that Naturalists have not yet decided on their exact place. They belong however, to the sub-kingdom “PROTOZOA,” and Mr. Reay Greene in his “Manual” places them between “RHIZOPODA” (of which the type is *Amœba*, so commonly found in fresh water as little gelatinous lumps, of the very lowest form of animal life) and SPONGES, which form flinty interior skeletons, called Spicules, to support the Spongiöse web, and the animal mass of jelly, called SARCODE, with which they are invested. The *Polycystins* are also masses of *Sarcodæ*, but they appear to form both internal spicular-like supports radiating from the Nucleus, and also external shells of a network of flint, through the interstices of which they are said to protrude Pseudopodian threads (perhaps analogous to the Tentacles of Sea-anemones and Star-fishes or arms of Hydra) by means of which they are supposed to imbibe nourishment, and to have some powers of locomotion. A careful observation of the larval changes of the Echinoderms, and the Pupæ states of other young things, can make one understand how the protean forms of the Polycystins need not all designate distinct species, but that many grotesque differences of shape, and of spinous ornamentation may, in reality belong to the same object, in different stages or under different circumstances of development, such as more or less pressure, abundance or scarcity of the siliceous material in the surrounding water, &c. Perhaps there may be said to be four classes of form: — 1st., the discoidal or planorbian flattened spheres, variously winged or bordered; 2nd., the Orbicular, with or without spines; 3rd., the vase or bellshaped, consisting often of repeated globes growing out of each other, sometimes with a re-duplication of parts, that might seem to indicate a tendency towards increase by fission; 4th., the plane or straight-sided forms.

Dr. Wallich promises a full history of the structure and mode of development of Polycystins in his forthcoming work, having obtained living specimens in his recent deep-sea soundings: some in association with those wondrous benighted star-fishes from two miles deep.

Professor Johannes Müller fished them up frequently in the Mediterranean, near Cette and St. Tropez; always from great depths, and under very clear pure sea water, but from their

great delicacy it was most difficult to obtain really *living* subjects, as even the passing through the water, in hauling up the apparatus used in dredging them caused death, and when that occurred the Pseudopodia immediately collapsed, the Sarcodæ substance became flaccid, and little more of the vital economy of the organisms could be observed.

The late Professor W. J. Bailey also records some specimens as occurring among his deep-sea soundings in the Sea of Kamschatka; he speaks of their "organic contents" but does not state whether obtained in a living state.

In the stomachs of the Salpæ, which form so large a portion of the food of the whales, shoals of Polycystins are found, which have in their turn served as food to the Salpæ. In a fossil state Polycystins have been found in many parts of the world; those figured in the accompanying Monograph, are from a sort of chalky earth found in various localities in Barbados, where Sir Robert Schomburgk describes it as having been forced up by volcanic action, through the coral reefs of which the island is formed, from the deep bottom of some ancient ocean, where countless ages ago they may have enjoyed their gift of the power of abstracting pure Siliceous matter from the water, and, while in a plastic state, weaving it into their elegant glass corselets,—then laying down their skeletons to form part of that incalculably vast bed of Ocean-deposits, of which some infinitesimally small fraction occasionally comes under the microscopic ken of Man,—to shew us how the minutest and humblest atoms have yet their allotted part in fulfilling the Laws of the Great Creator.

Professor Ehrenberg, in a discourse delivered before the Berlin Royal Academy of Sciences, says, speaking of these fossils from the rocks of Barbados (which he calls *Siliceous Polygastrica*) "for these organisms constitute part of a chain which, though in the individual link it be microscopic, yet in the mass is a mighty one, connecting the *Life-phenomena* of distant ages of the earth, and proving that the dawn of organic nature co-existent with us, reaches farther back in the history of the earth than had hitherto been suspected. The microscopic organisms are very inferior in individual energy to lions and elephants, but in their united influences they are far more important than all these animals."

Professor Owen (in his "Palæontology," 1860,) further remarks "if it be ever permitted to man to penetrate the mystery which enshrouds the origin of organic force in the wide-spread mud beds of fresh and salt waters, it will be, most probably, by experiment and observation on the atoms which manifest the simplest conditions of Life."

Croft Lodge,
January, 1862.

BURY'S FIGURES OF POLYCYSTINEÆ.

PLATE I.

- FIG.
1 & 6.—Varieties of *Eucyrtidium Acuminatum* of Ehrenberg.
5.—*Podocyrtis Schomburgkii*. Ehrenberg.
2, 3, 4.—Varieties of the same.

PLATE II.

- 1.—*Stylodictya Graeilis*. Ehrenberg.
2.—A *Dictyospiris* (?) of Ehrenberg, highly developed in slide Z₁₈²⁵ Cambridge, Barbados.
3.—*Dictyospiris* (?) or perhaps *Petalospiris* (?) May they not possibly be the same organisms in different states of development? *Ceratospiris*, *Mikrogeologie*, Pl. XXII, fig. 37, also resembles these shapes which occur in great variety in the Barbados deposits.
4.—*Rhabdolithes Pipa*. spined stem var. Ehrenberg places *Rhabdolithes* in the family of *Geolithen*.
5.—*Stephanolithes Nodosa*.; also a *Geolithen* of Ehrenberg.
6.—*Acanthodesmia* of J. Müller (*Mittelmeeres*, p. 30) *Stephanolithes Spineseens* (?) of Ehrenberg. It occurs in double and single circlelets, and with varying number of spines in the Barbados deposits.

PLATE III.

- 1.—A Polycystinous nucleus, with one spire running through it, and attached at each end to a plain circle of *Silex*.—(In slide B. VI. Cambridge, Barbados) *Lithocircus*, *Mesoecua* (?)
2.—A similar nucleus with four *Acanthometrum* shaped spines (see Müller's *Mittelmeeres*, &c., Pl. X.) attached to it, the hooks of which describe part of a circle. *Actiniscus* (?) in slide T. Cambridge, Barbados.
3.—A Hyaline wand, spirally twisted.
4.—*Rhabdolithes Pipa*. var. Ehrenberg.

PLATE IV.

- 1.—*Stephanastrum*. Ehrenberg.
2.—*Astromma Aristoteles*. Ehrenberg.
3.—*Stylosphaera*. Ehrenberg.
4.—*Haliomma* with four spines.
5.—*Lychnocanium falseiferum*. Ehrenberg.
6.—*Stylosphaera* var. (?) with outer web (?)

PLATE V.

- 1.—*Astromma* (?) finely developed with part of outer web adhering between the arms.
2.—*Eucyrtidium Mongolfieri*. Ehrenberg.

FIG.

- 3.—*Podocyrtis Mitra*. Ehrenberg.
4.—A state of *Rhopalocanium* (?)
5.—*Pterocodon Campana*. Ehrenberg.
6.—..... an *Astromma* partially developed (?)

PLATE VI.

- 1, 2, 3, 4, 5.—*Rhopalocanium Ornatum* in different states.
6.—*Spiele* of (?)

PLATE VII.

- 1 & 2.—*Surirella* (?) from Cambridge, Barbados. Fig. 1 possibly a young, less developed, form of fig. 2. The slide from which the fig. 2 was drawn was returned to Mr. Johnson, and by him sent to Mr. Ralfs. Professor W. C. Williamson saw it when in Mrs. Bury's hands (October, 1860), and kindly suggested it might possibly be a *Surirella*.
3 & 4.—Varieties of *Dictyospiris* (?) Ehrenberg.
5.—*Actiniscus* (?) of Ehrenberg and Pritchard; a triangular net, like a *Dictyochea*, but with a "solid centre," which centre (or nucleus) gives the idea of being capable of stretching up into a *Podocyrtis*-like form; sides of triangle measure .0065; there are nine outer and six inner cells, arranged round a solid-lobed and punctured nucleus, which bears one long and two short spines.
6.—A *Desmidia*-like, but silicious, clear, transparent plate, with wavy edges, and a perforated centre. Appears to resemble, in some degree, *Lithodesmium undulatum*, of Ehrenberg's "Kreidebildung," page 76. Dr. Wallich suggested (from sketch) that it might be a *part* only of some polycystinous form.
7.—The upper part like Ehrenberg's *Podocyrtis Cothurnata*, but with a tubulous prolongation of the base.

PLATE VIII.

- 1, 2, 3, & 4.—Varieties of *Haliomma*. *Haliomma Humboldtii* (?) of Ehrenberg, from Cambridge, Barbados, numerous and variable. Although there are sometimes indications of spines radiating from the centre, as in *Stylodictya*, yet the points round the edge appear to be merely "marginal appendages."—Diameters, including spines, from .0077 to .0085.
5, & 6.—Müller describes these as stages of growth of the *Haliomma*, where the outer web is spinning itself over and round the central nucleus, and the silicious rafters or supports extending like a framework from the nucleus to the exterior covering. Page 21 'Thalassicollen Polycystinen, &c., des Mittelmeeres.'
7 & 8.—Spines or Spicules in Barbados deposit.

PLATE IX.

- FIG.
1.— *Petalospiris foveolata* — var. Ehr., Mikrogeologie, Taf. XXXVI, 14. .0075 high, spines included, .0031 dia. of ball.
2.— The same without the central spike through it.
3.— A *Podocyrtis* (?) of Ehrenberg.
4.— A *Podocyrtis* (?) nearly akin to *podocyrtis* Egles. Mik. Taf. XXXV. B. 18.; measures .0106 high, .0052 broad.
5.— A *Podocyrtis* (?) without the usual surmounting spine.
6.— A *Lithomelissa* (?) These beautiful little shapes, like crystal tea-pots, or coffee-pots, for some primeval world's *Queen Mab*, are frequent in the Barbados deposit.

PLATE X.

- 1.— Transparent cross, with tubular canals running through the arms and united by a central ring,— a structure resembling an object figured in Professor J. W. Bailey's "Microscopic forms in the Sea of Kamshatka," under the name "Spongolithes orthogona," but which he says he has referred with some hesitation to *Spongolithis*. Measures .01125 high, .008 broad, with a slightly warted or rugose surface.
2.— An *Eueyrtidium* form bearing tubular spinous projections, arranged in the pattern of the perforations in *Eueyrtidium elegans*; appears to be enclosed in a transparent egg-shaped sheath or envelope, .00362 long — *Lithobotrys adpersa*, Ehr. Mik. Taf. XXXVI, fig. 5, has the appearance of a wing or fin extending round the object in a somewhat similar way, and so has *Carpocanium Solitarium*, Taf. XXII, fig. 28. This specimen is in Slide No 6¹⁸ Springfield, Barbados.
3.— *Eueyrtidium* (?) *elegans*, in an unconstricted state, .604 long, .0012 broad; 23 rows of nearly equi-distant perforations; from Chimborazo, Barbados.
4.— A *Podocyrtis* (?) *Mitra* or *Papalis*, var. (?) the lower part devoid of perforations, and with a thickening of the *Silex* round the boundary of the plain part, — two spines from the apex.
5.— *Podocyrtis Papalis*, Ehr. Mik. XXXVI, 23, .00687 high, .00375 broad. In numerous specimens the outline of the base varies considerably, but there always appears to be an internal ring or ledge.

PLATE XI.

- 1.— A magnificent *Polycystin*, from Cambridge, Barbados. It measures .0214 in height, viz., the ball .0028, and .0186 from the ball to the base, where several more squares appear to have been broken off, — about 18 to 20 rows of squares, like windows; inside some of them a very fine internal network is seen; through others appear a faint reflection of the bars on the opposite side of the object: the effect of this, viewed in the Binocular (half-inch objective), is very striking.

FIG.

- 2.— *Eueyrtidium Tubulosum*, Ehr., measures .01 feet long, .0028 broad, from Peak of Teneriffe, Barbados. Quarter-inch objective.
3.— *Stylosphaera* (?) Ehr., measures .01 high, curiously beset with sharp, spear-like spines, and covered apparently with pointed knobs or warts. Some of the Barbados *Polycystins* suggest an idea as if their perforations either may have been, or might have become occupied by these sort of projections, which, when broken off, leave holes, and being hollow, would still permit the protrusion of the so-called *Pseudopodian* threads, which Professor J. Müller says "one may conjecture (*Vermuthën*)" to be the means by which the *Polycystins* imbibe nourishment, although their connexion with the *Sarcode* substance of the bodies, requires more clear elucidation. In the *Thalassicollen* and *Polycystena*, they can only be traced as far as the skin-like *Capsule* of the flabby part lying under the flint corselet.
4.— *Dietyospiris* (?) probably the same object as fig. 2, on plate II; turned on the reverse side. Ehrenberg calls this "Rueksseite," and the other with the larger openings, "Mouthside;" from Cambridge, Barbados.
5.— *Spongolithis Acicularis*, Mik. Taf., XXXVI, fig. 47, a *Phytolitharien* of Ehrenberg.
6.— *Amphidiscus Verticillatus*, Mik. Taf., XXXVI, fig. 45, classed by Ehrenberg as "*Phytolitharia*," — of plant growth.

PLATE XII.

- 1.— A spinous variety of *Eueyrtidium Ampullis*, (?) the narrow end prolonged into a tubulous spine, — diam. of bulb, .00275. Chimborazo, Barbados.
2.— *Podocyrtis* (?) whole height, .0112; breadth, .0055; height of cupola, .0027. Professor J. Müller says, "in all the flask and bell-shaped *Polycystins*, the first joint (*glied*) of the reticulation begins from the top, and the number of the increasing links progresses with growth in a definite ratio." The links of the lower part in this fossil skeleton seem running into each other irregularly, like dropped stitches in a stocking, or bursting bubbles in a gelatinous film while solidifying.
3.— A further variation of *Podocyrtis Schomburgkii*, as shewn on plate I, fig. 3.
4.— A modification of fig. 2, on plate I.
4 & 6.— The reticulations progressing further towards the "*Ladder*," or Lattice-shape. In fig. 6, the inner net is very plainly seen, its reticulations are also square, with quarter-inch objective magnifying power used, about 470 linear. Springfield, Barbados. In another slide is a broken-off top of one of these *Ladder-Pyramids*, with the narrow neck swelling out into the surmounting ball nucleus (?)

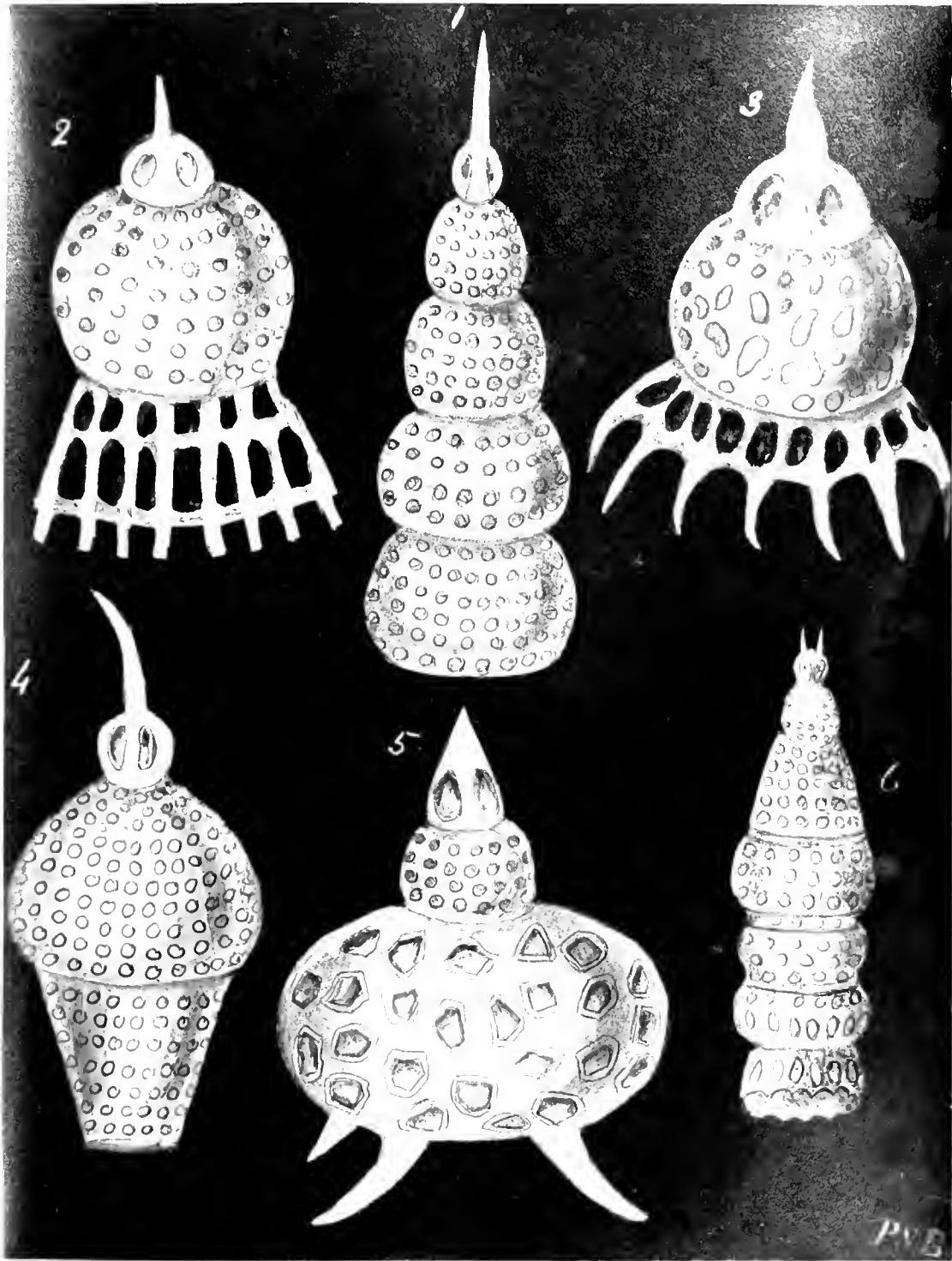


PLATE 1.



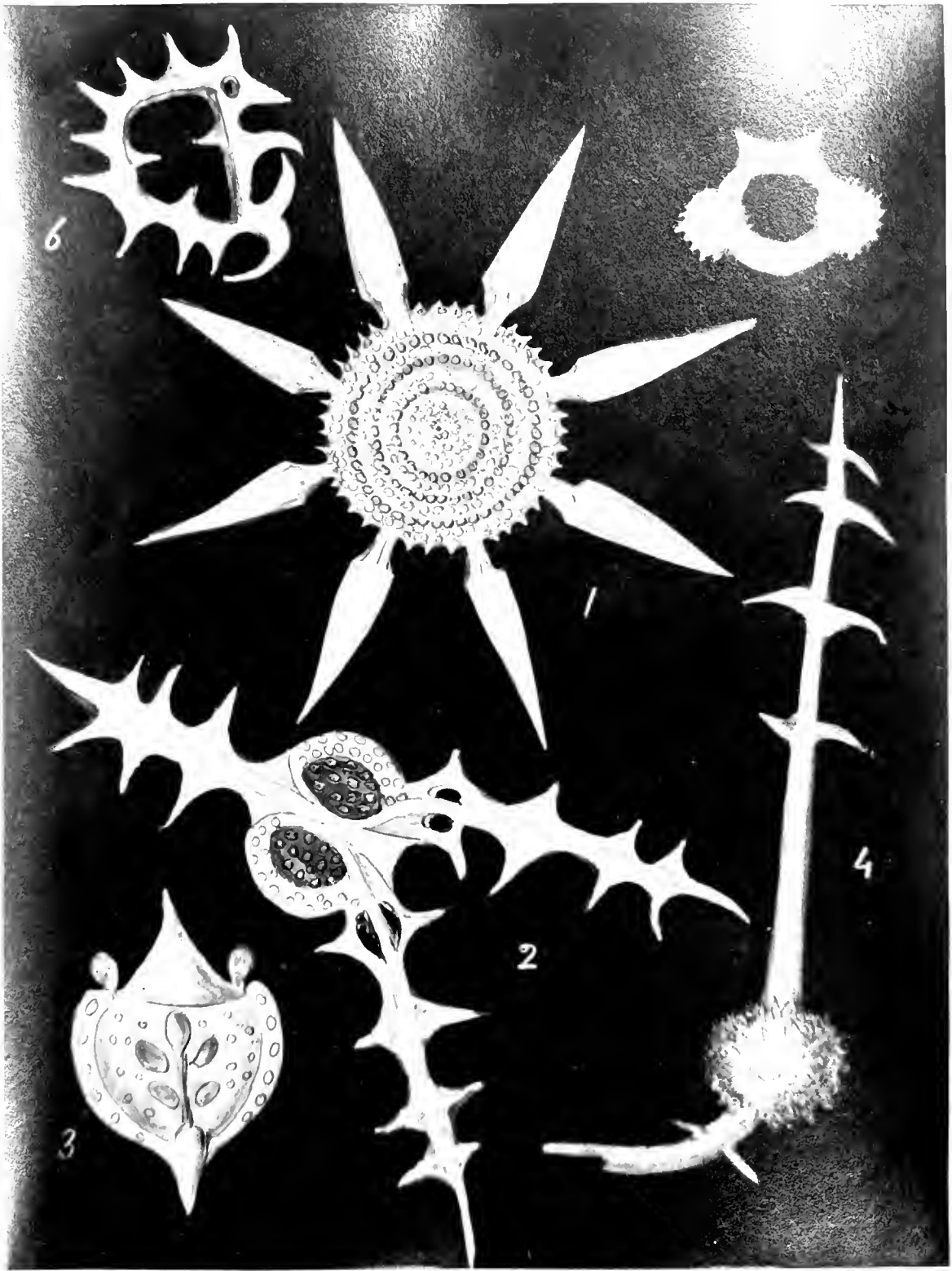


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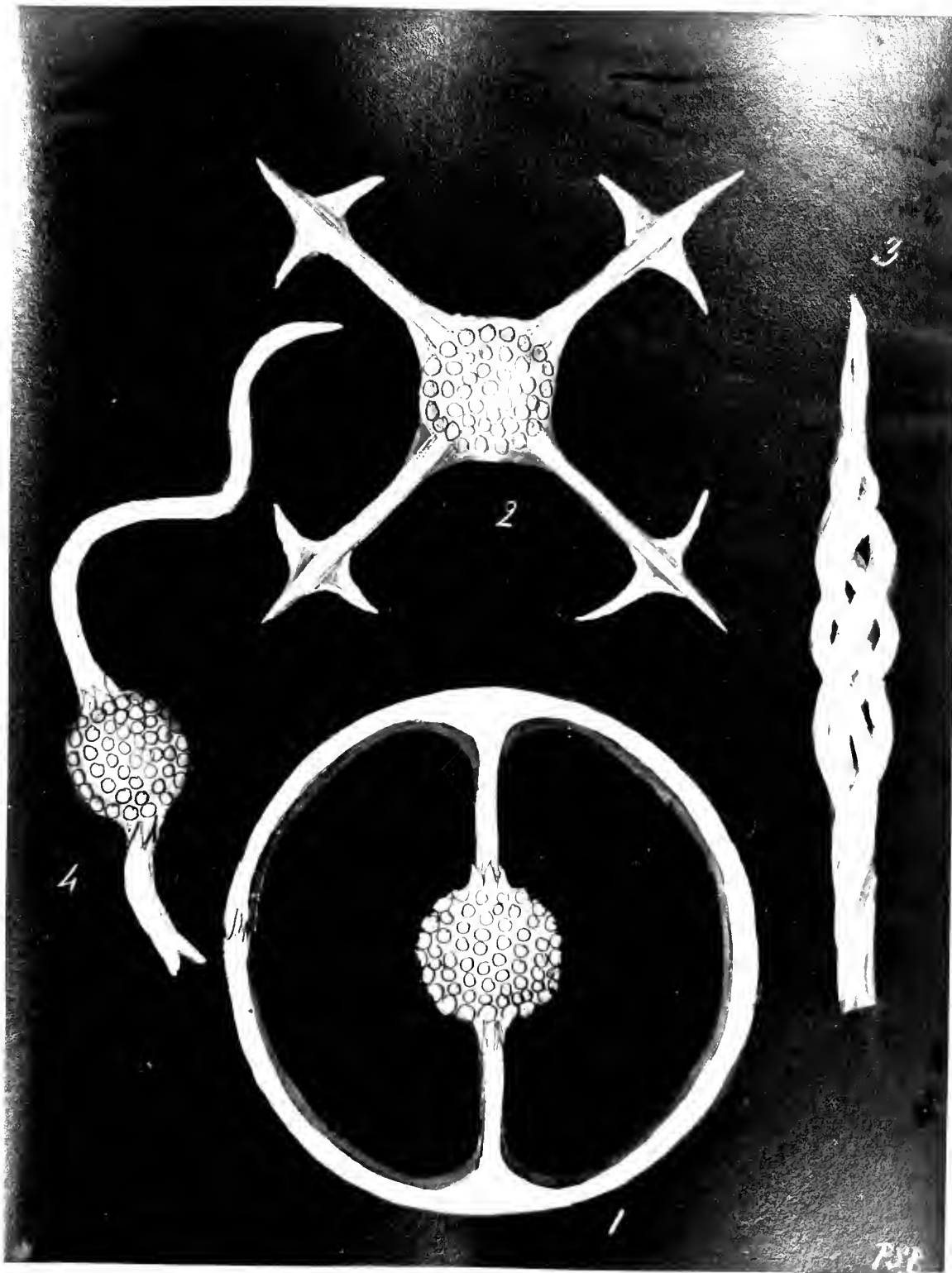


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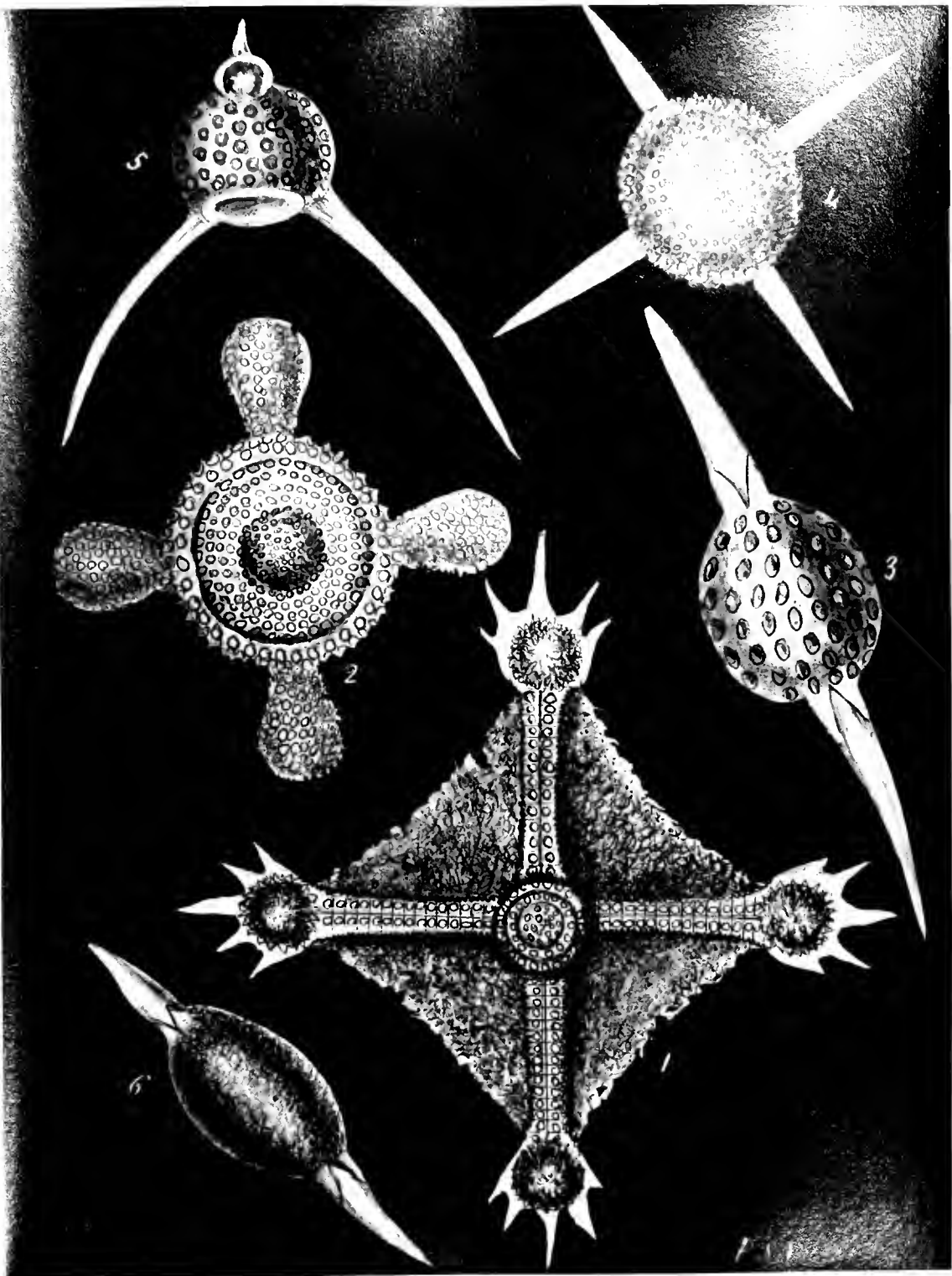


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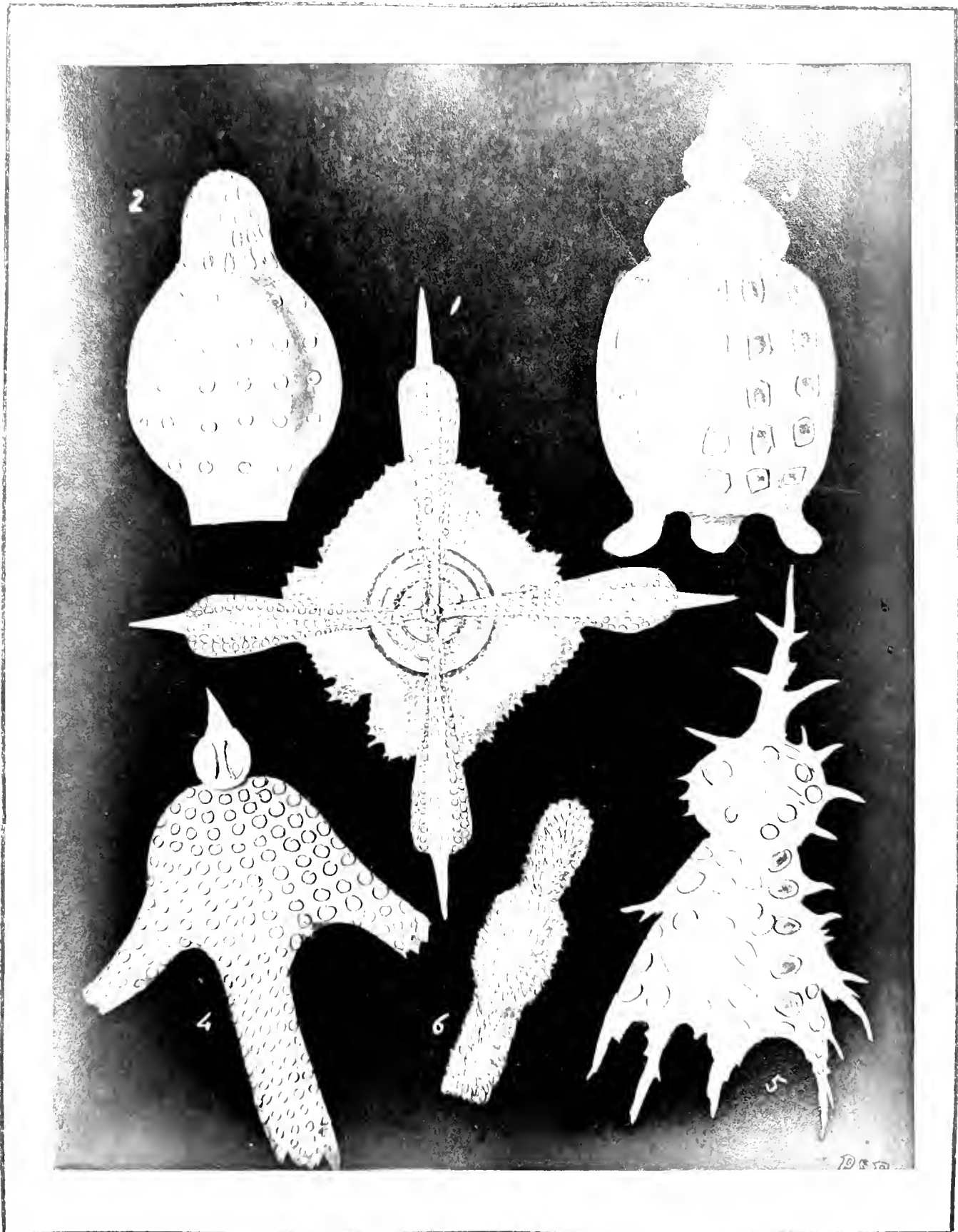


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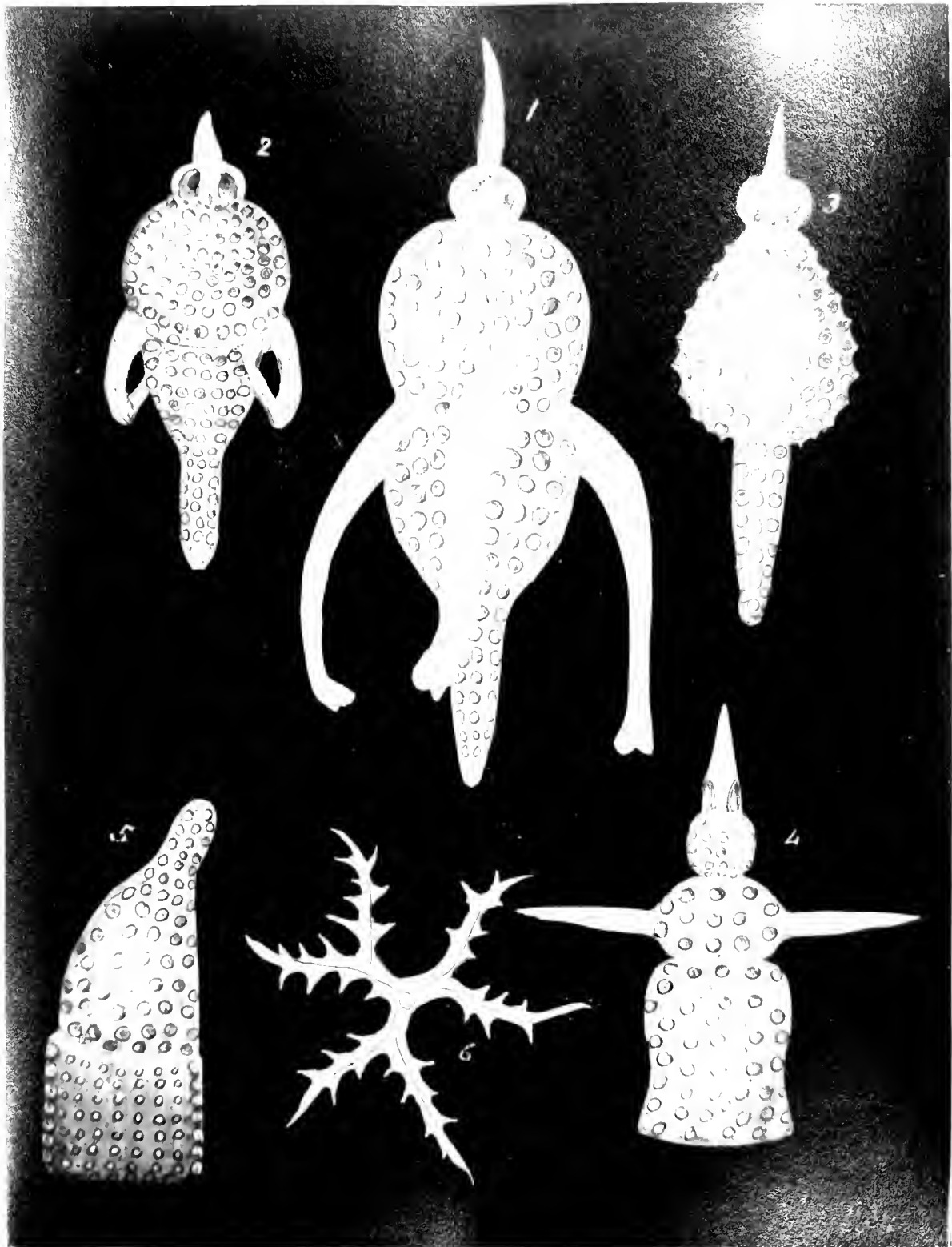


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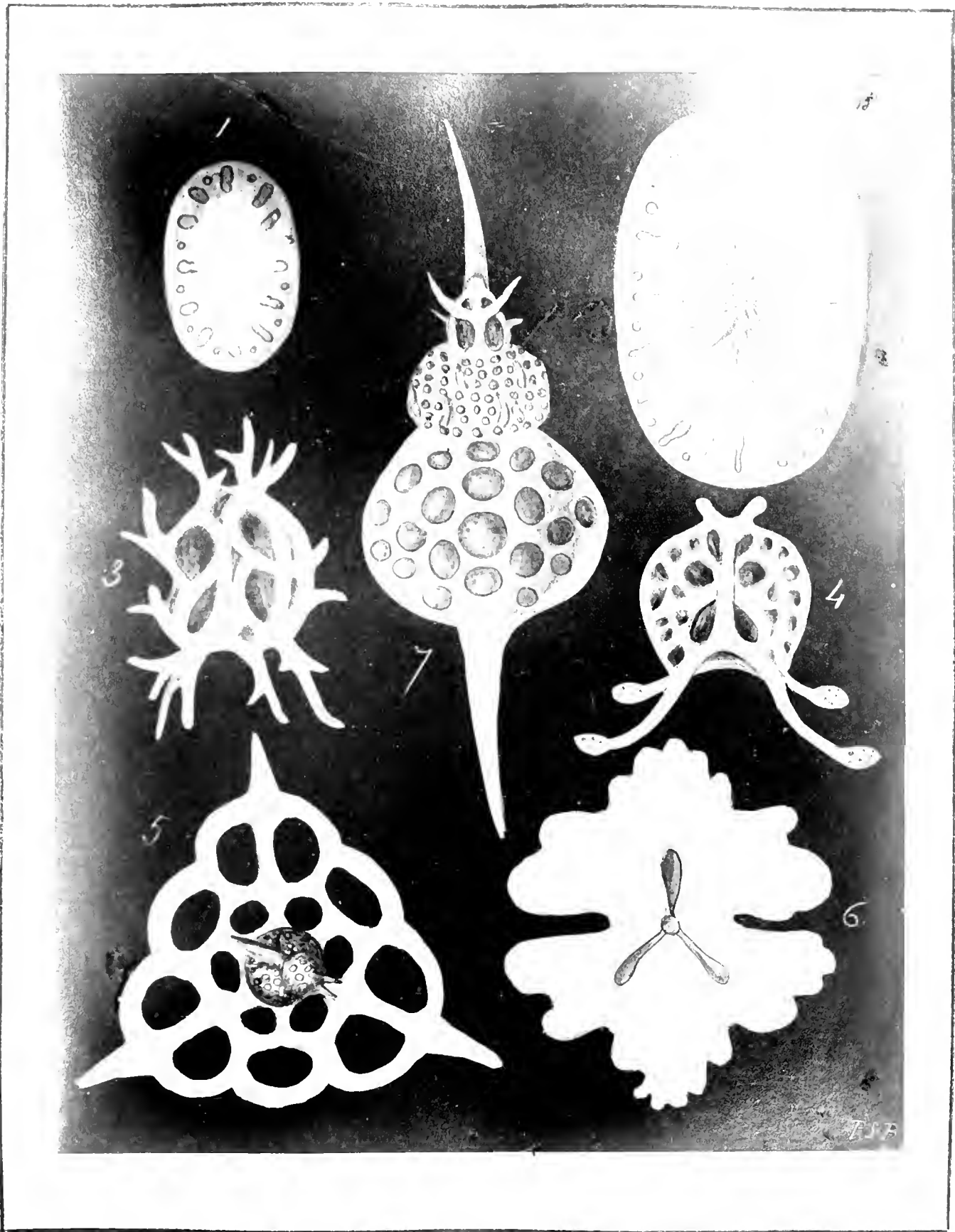


PLATE 7.

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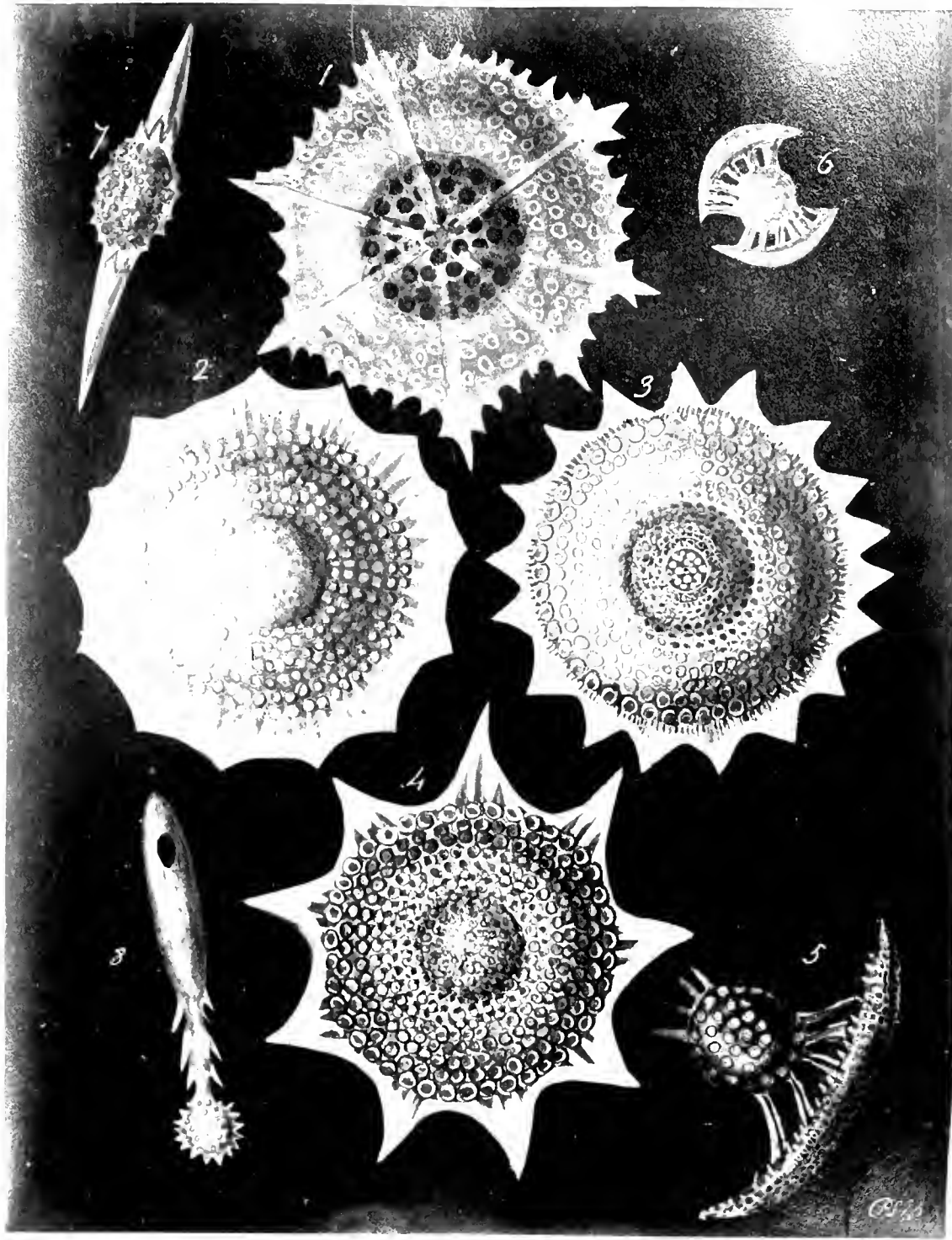


PLATE 8.

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CAMBRIDGE, MA USA

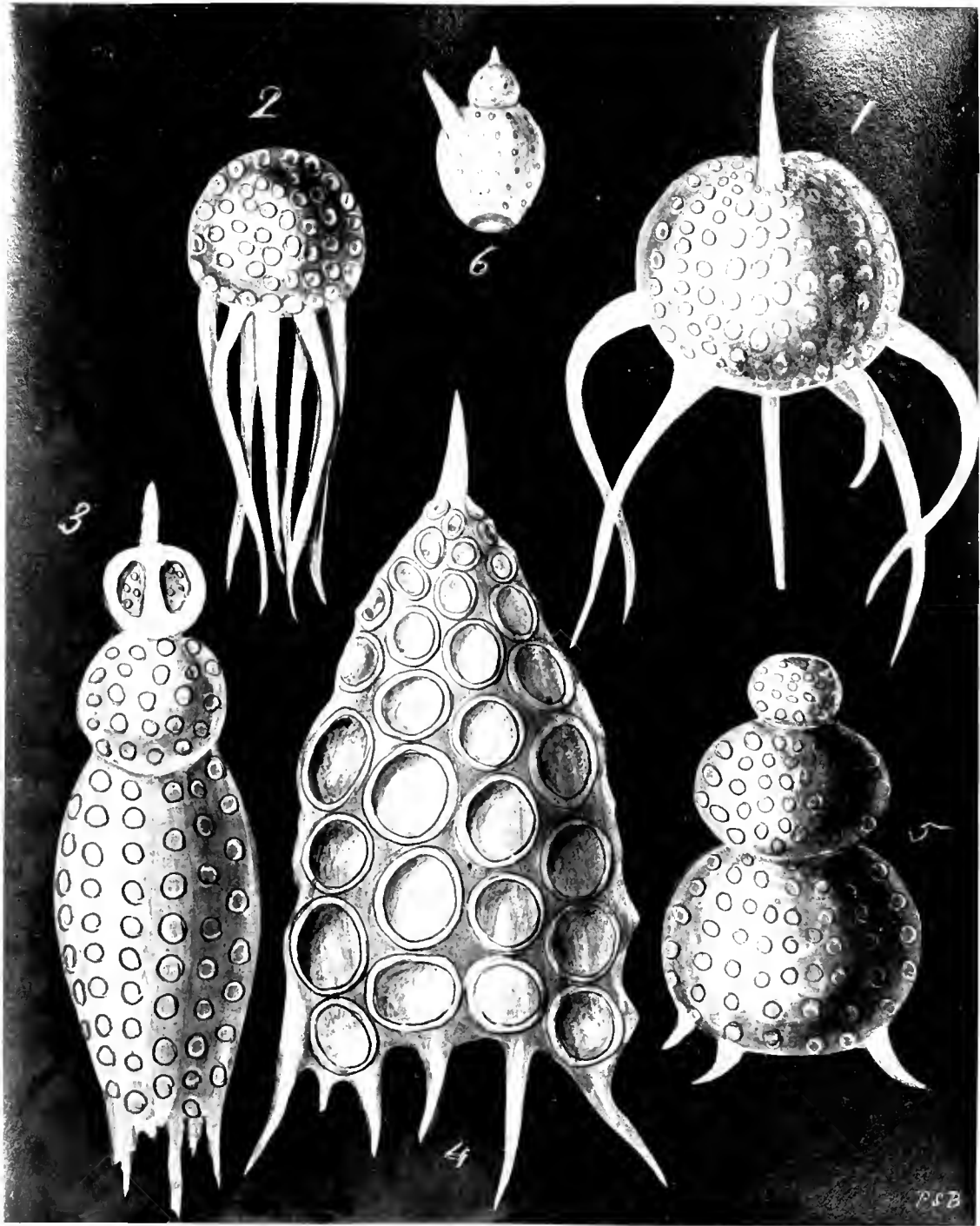


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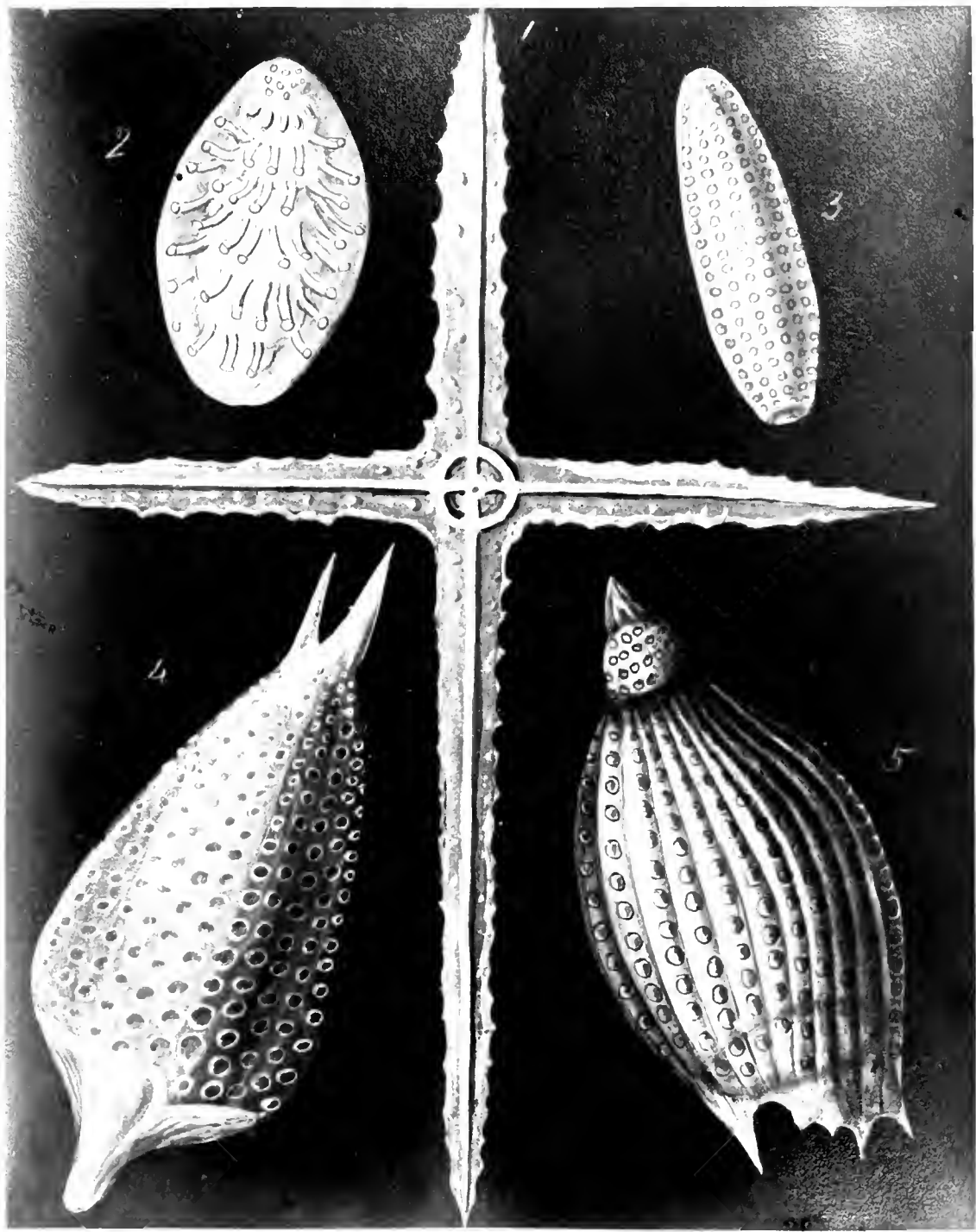


PLATE 10.

1000 UNIVERSITY
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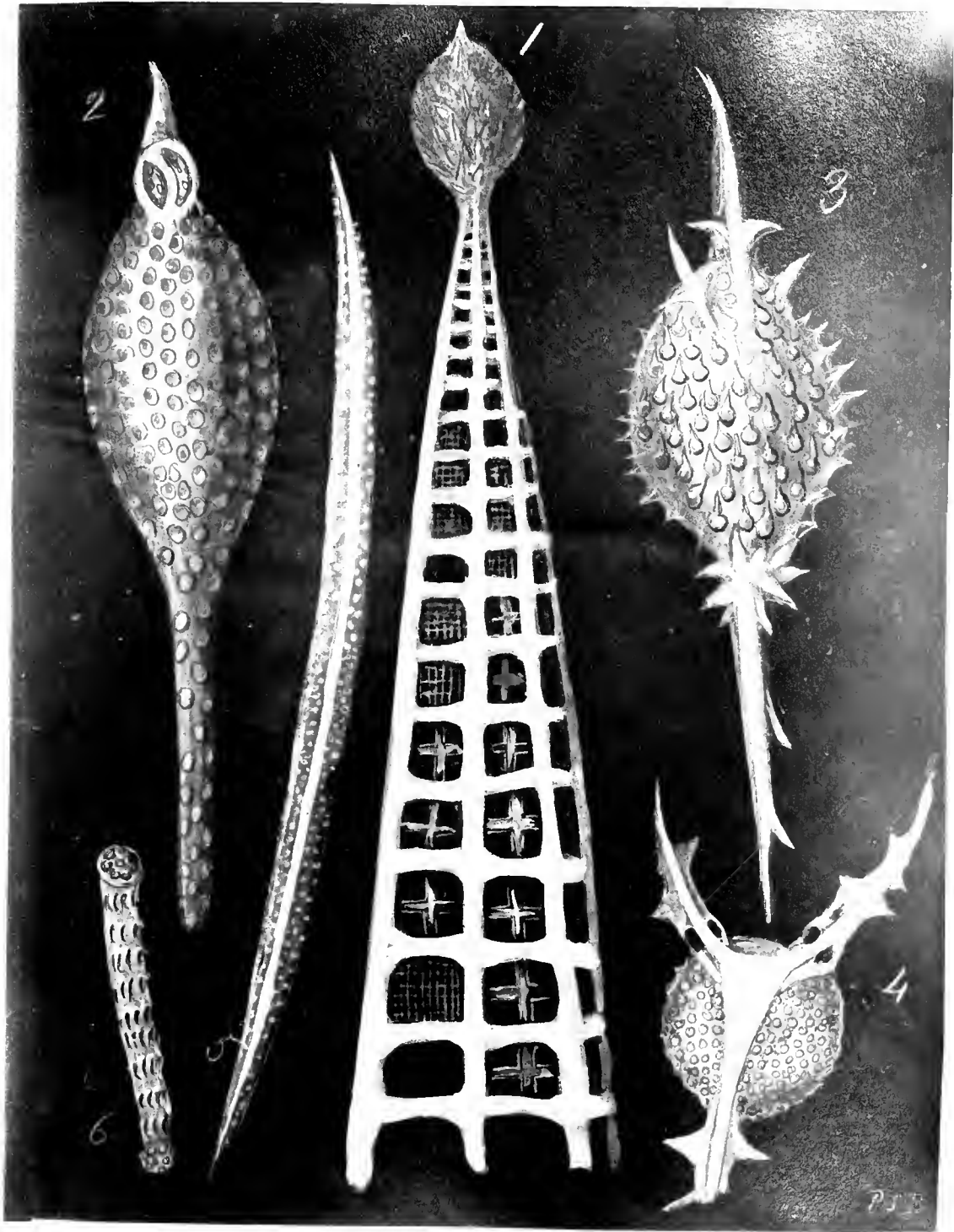


PLATE I.

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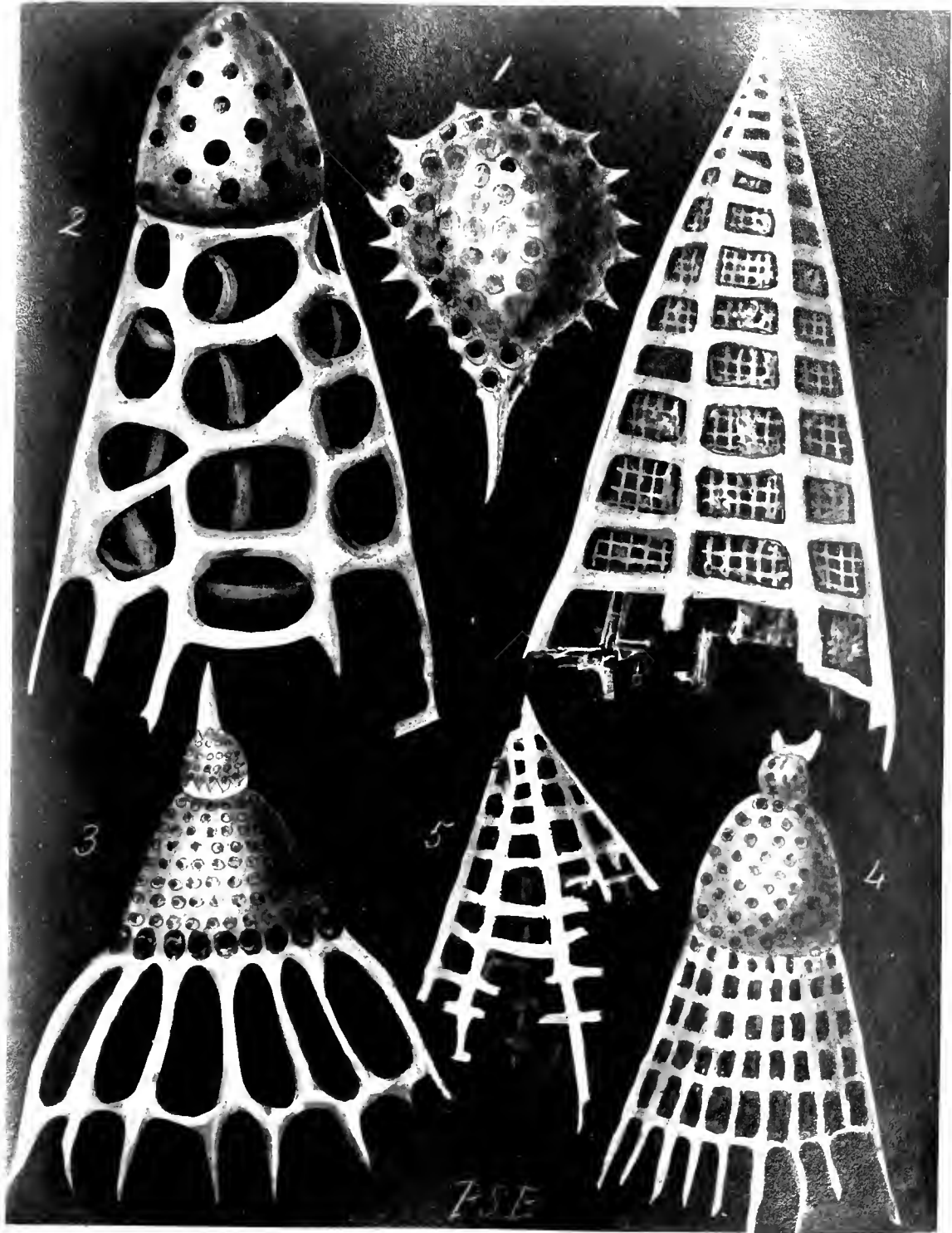


PLATE 12.

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