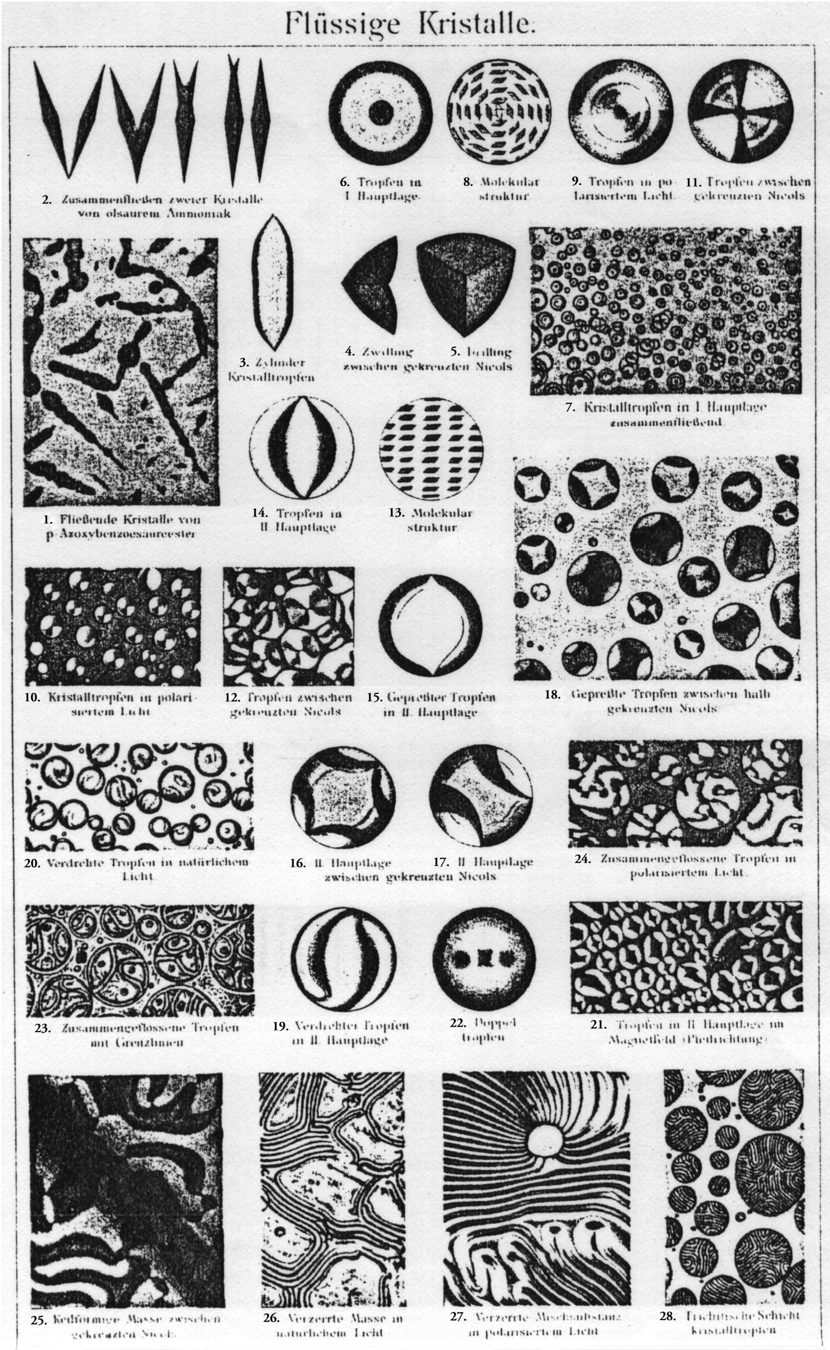

Flüssige Kristalle.
2. Zusammenfließen zweier Kristalle von ölsaurem Ammoniak
6. Tropfen in I. Hauptlage.
8. Molekular struktur
9. Tropfen in polarisiertem Licht.
11. Tropfen zwischen gekreuzten Nicols
3. Zylinder Kristalltropfen
4. Zwilling
5. Drilling
zwischen gekreuzten Nicols
7. Kristalltropfen in I. Hauptlage zusammenfließend.
1. Fließende Kristalle von p-Azoxybenzoesäureester
14. Tropfen in II. Hauptlage
13. Molekular struktur
10. Kristalltropfen in polarisiertem Licht
12. Tropfen zwischen gekreuzten Nicols
15. Gepreßter Tropfen in II. Hauptlage
18. Gepreßte Tropfen zwischen halb gekreuzten Nicols
20. Verdrehte Tropfen in natürlichem Licht.
16. II. Hauptlage
17. II. Hauptlage
zwischen gekreuzten Nicols
24. Zusammengeflossene Tropfen in polarisiertem Licht.
23. Zusammengeflossene Tropfen mit Grenzlinien
19. Verdrehter Tropfen in II. Hauptlage
22. Doppel tropfen
21. Tropfen in II. Hauptlage im Magnetfeld (Plettrichtung)
25. Keilförmige Masse zwischen gekreuzten Nicols
26. Verzerrte Masse in natürlichem Licht
27. Verzerrte Mischsubstanz in polarisiertem Licht
28. Trichitische Schicht Kristalltropfen

Title plate.

Explanation of the title plate. “Liquid crystals” (after Professor Otto Lehmann, Karlsruhe)
The coloured title plate is designed to show most clearly some of the most important optical properties which the “living crystals” or “*rheo-crystals*” show with the application of polarised light using the “crystallisation microscope”. The coloured figures have been painted in their true colours by the discoverer Professor Otto Lehmann himself and have been attached to the article “liquid crystals” for Meyer’s large encyclopaedia (6th. Ed. 1905, Vol. 11, p. 708), in which he briefly described the most important among his significant discoveries. The Bibliographic Institute in Leipzig, which has also published my “Art Forms in Nature”, has kindly permitted the reproduction of this plate here, and also the figures of Radiolaria and diatoms used later from this work; this includes also the associated description.

Fig. 1. *Spindle crystals of azoxybenzoate*. The uniaxial “liquid crystals” show sometimes straight, extended cylindrical or spindle-like shapes, sometimes multiple or pearl-necklace chains and sometimes myelin-like droplets.

Fig. 2. *Copulation of two living spindle crystals* of ammonium oleate. If two such spindle-shaped (fusiform) “liquid crystals” by chance touch each other, they lay themselves side by side and flow completely together; at the right, the new “double pyramid” which results.

Fig. 3. *A soft spindle crystal* of ammonium oleate, cylindrical, with at each pole of the axes a rounded end; the edges and corners of the double pyramid are rounded by surface tension.

Fig. 4. *A soft twin crystal* of cholesteryl benzoate. The two egg-shaped rheo-crystals, which have grown together, show different colours between crossed polarisers, corresponding to their different orientations.

Fig. 5. *A soft triplet crystal* of cholesteryl benzoate. The three rheo-crystals show different colours as in Fig. 4.

Figs. 6–28. *Soft sphere-shaped crystals of para-azoxyanisole* in polarised light with various conditions of illumination.

Fig. 7. *Sphero-crystals with a central nucleus*, a thickened smear (in the first principal orientation). Like an “artificial cell”.

Fig. 8. *Molecular structure of the same sphero-crystal*. The spindle-shaped molecules appear in concentric sheets ordered around the central nucleus (in the first principal orientation).

Figs. 9 and 10. The *sphero*-crystal of Figs. 6 and 7 in polarised light, in the first principal orientation, when the crystal axies lies in the direction of observation.

Figs. 11 and 12. The same *sphero*-crystal between crossed polarisers; because of the rotation of the plane of polarisation a coloured axial cross appears.

Figs. 13–18. The same *sphero*-crystal in the second principal orientation (the symmetry axis of the crystal is perpendicular to the direction of observation. Fig. 13. Molecular structure (compare Fig. 6); Fig. 14. With spindle-shape smears; Fig. 15. With two poles; strongly compressed under high pressure. Figs. 16 and 17. Between crossed polarisers. Fig. 18. Compressed, between partially crossed polarisers.

Figs. 19 and 20. *Spiral rotation of the crystal nucleus* as a consequence of heating.; the *sphero*-crystal begins to rotate and the spindle-shaped smear (Figs. 14 and 15) rotates to become S-shaped or spiral.

Fig. 21. *The arrow direction of the crystal nucleus in a magnetic field.* With magnetisation of the crystal nucleus the molecules, those further from the surface and the symmetry axis, position themselves, so that they make an extinction direction with the lines of force (in the second principal orientation).

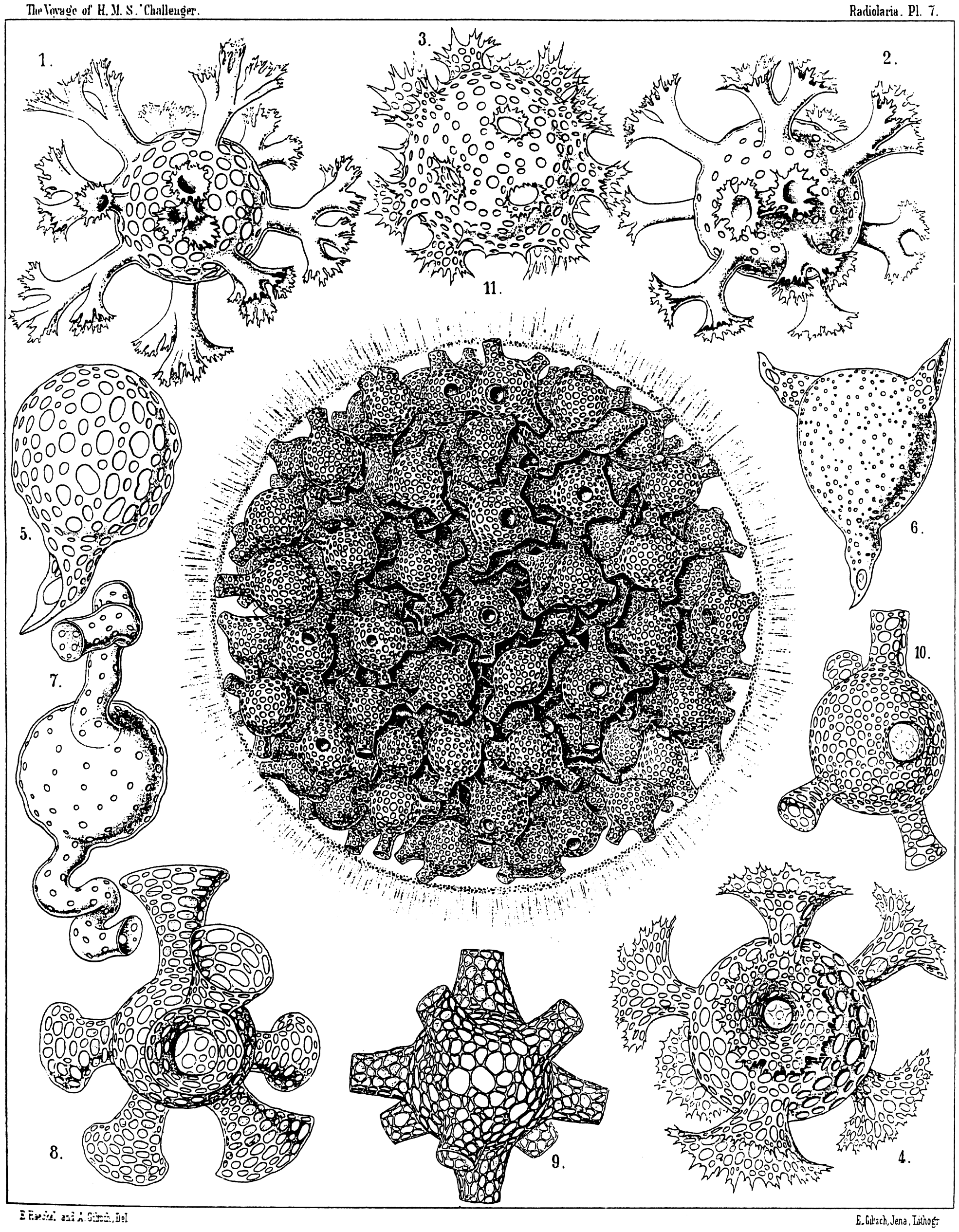
Fig. 22. *Copulation of two sphero-crystals* in the first principal position. Before the two rounded nuclear points of the sphero-crystals which have flowed together touch and melt, a four-cornered smear comes between the two; this convergence point indicates the borderline between the two growing drops.

Figs. 23–25. *Aggregates of nucleus-containing sphero-crystals* which have melted together, with the borderline of the pair-wise melted rounded droplets (Fig. 22); Fig. 24 in polarised light; Fig. 25 between crossed polarisers, with wedge-shaped masses.

Figs. 26 and 27. *Distortion of the nuclei and convergence points* (Fig. 22) by the mixing of liquid and labile crystal masses. (Fig. 26 in natural light, Fig. 27 in polarised light). If an aggregate of the round *rheo-crystals* which have flowed together (Figs. 23 and 24) is made to stream, bands set in which separate the isotropic and anisotropic parts.

Fig. 28. *Spherical sheet crystals with lamellar structure*, result from the mixing of liquid and labile *rheo*-crystals; the flowing sheet crystals often copulate and show a sharp cross-hatching, like the formation of hairs (trichites) in solid crystals.

The Voyage of H. M. S. "Challenger." Radiolaria. Pl. 7.



E. Haeckel and A. Giltsch, Del. E. Giltsch, Jena, Lithogr.

1, 2. CAMINOSPHAERA , 3, 4. CORONOSPHAERA , 5, 6. OTOSPHAERA .

7–11. SOLENOSPHAERA .

Plate 1.

Plates 1–4. Radiolaria and other marine organisms, sketched by E. Haeckel from collections of the famous "Challenger" expedition (1873–1876) and etched by A. Giltsch (reproduced from "Report on the Scientific Results of the Voyage of H.M.S Challenger", published by Her Majesty's Government, 1887).

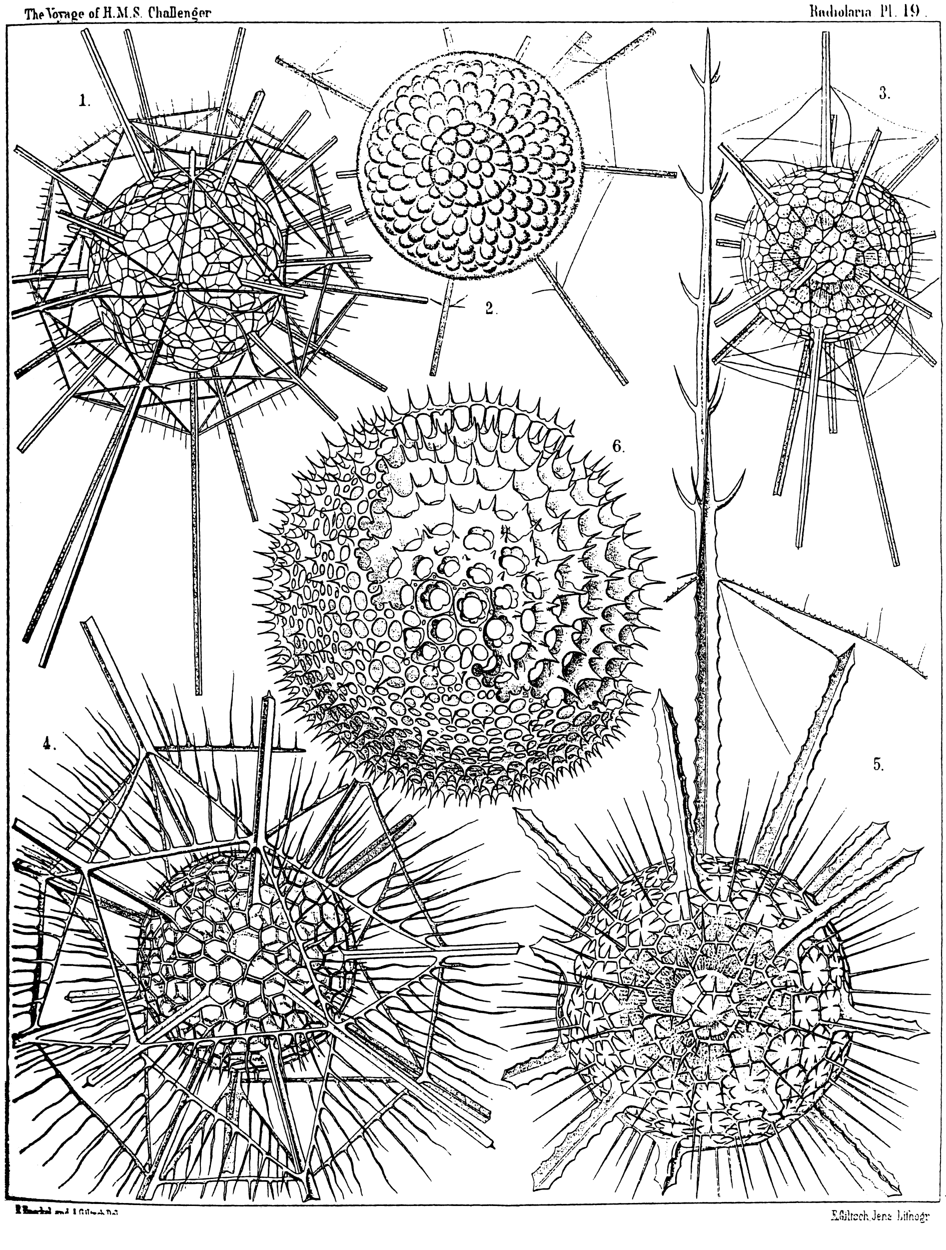

The Voyage of H.M.S. Challenger
Radiolaria Pl. 19.
1.
2.
3.
4.
5.
6.
E.Giltsch Jena Lithogr.

Plate 2.

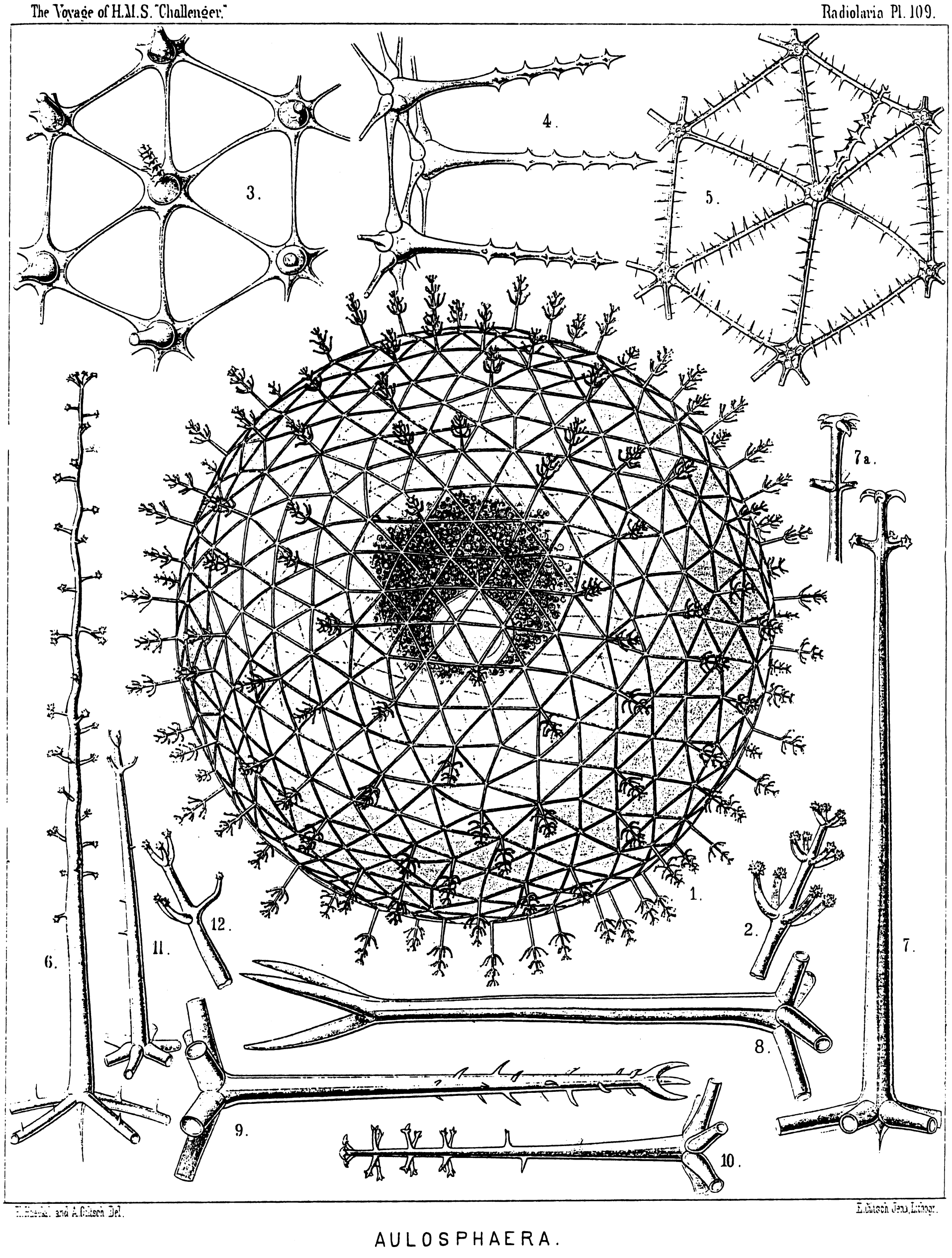
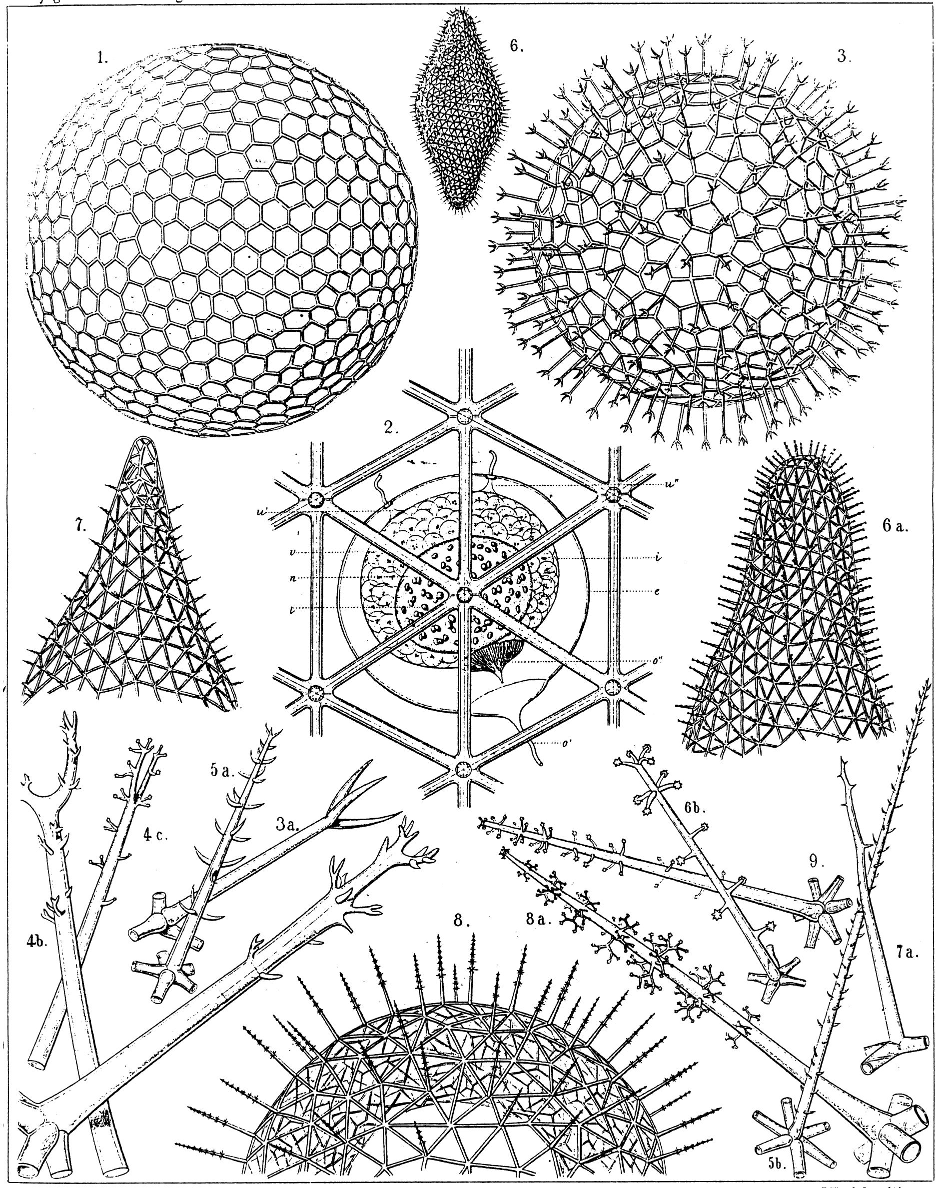

The Voyage of H.M.S. "Challenger."
Radiolaria Pl. 109.
3.
4.
5.
1.
2.
6.
7.
7a.
8.
9.
10.
11.
12.
AULOSPHAERA.

Plate 3.

Voyage of H.M.S. "Challenger." Radiolaria Pl. III.



Haeckel and A. Giltsch Del. E. Giltsch, Jena, Lithogr.

1. AULONIA, 2–5. AULOSPHAERA, 6. 7. AULATRACTUS, 8. AULOPLEGMA.

Plate 4.

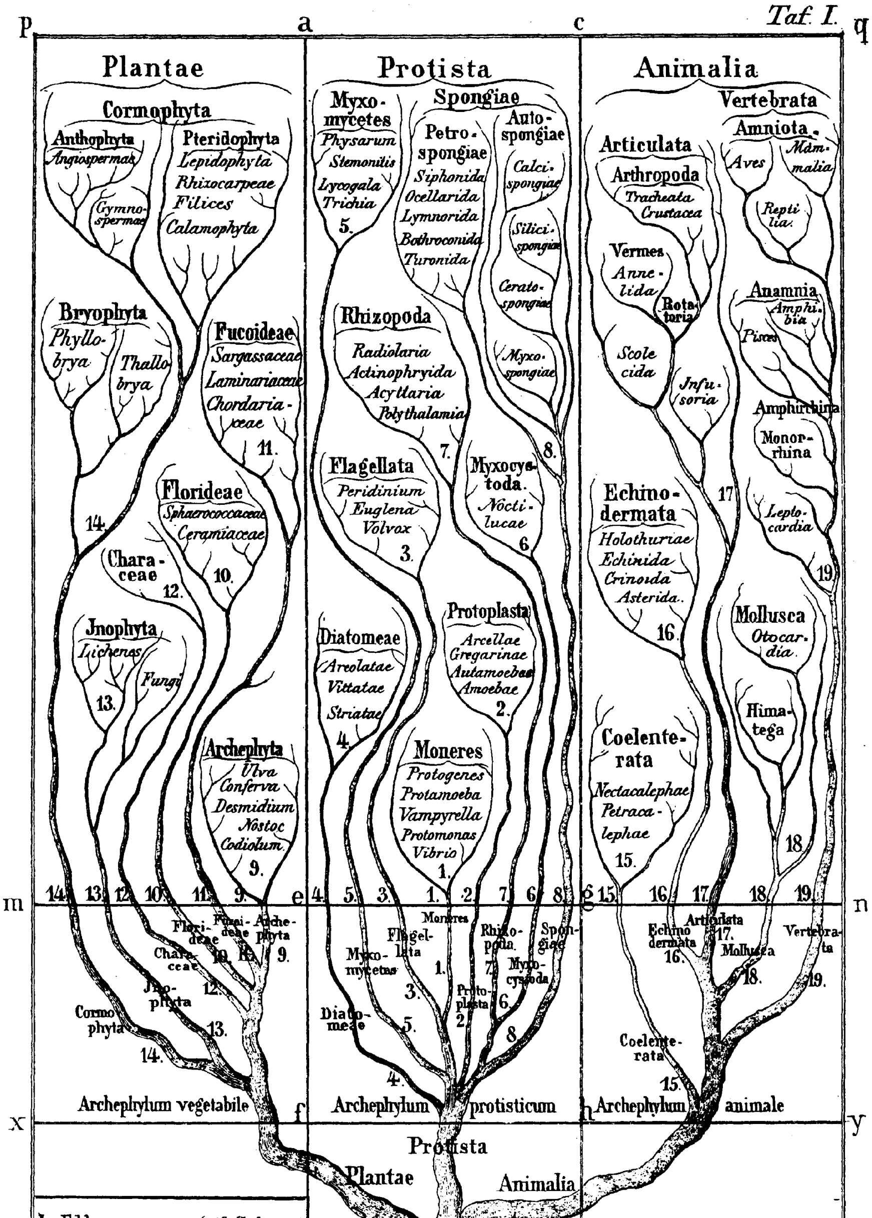


Plate 5. The first ‘monophyletic tree’ of organism drawn by Ernst Haeckel (from Haeckel, 1866).