



<https://www.biodiversitylibrary.org/>

Proceedings of the Linnean Society of New South Wales

Sydney Linnean Society of New South Wales

<https://www.biodiversitylibrary.org/bibliography/6525>

v.42=no.165-168 (1917-1918):

<https://www.biodiversitylibrary.org/item/30101>

Page(s): Page 633, Page 634, Page 635, Page 636, Page 637, Page 638, Page 639, Page 640, Page 641, Page 642, Page 643, Page 644, Page 645, Page 646, Page 647, Page 648, Page 649, Page 650, Page 651, Page 652, Page 653, Page 654, Page 655, Page 656, Page 657, Page 658, Page 659, Page 660, Page 661, Page 662, Page 663, Page 664, Page 665, Page 666, Page 667, Page 668, Page 669, Page 670, Page 671, Page 672, Page 673, Page 674, Page 675, Pl. XXXIV, Pl. XXXV, Pl. XXXVI, Pl. XXXVII, Pl. XXXVIII, Pl. XXXIX, Pl. XL, Pl. XLI

Holding Institution: MBLWHOI Library

Sponsored by: MBLWHOI Library

Generated 26 July 2026 12:30 PM

<https://www.biodiversitylibrary.org/pdf4/1943497i00030101.pdf>

This page intentionally left blank.

RHIZOPODS OF SYDNEY AND LISMORE.

BY G. I. PLAYFAIR, SCIENCE RESEARCH SCHOLAR OF THE
UNIVERSITY OF SYDNEY.

(Plates xxxiv.-xli., and seven Text-figures).

The summer of 1916-17, with its alternate rain and shine at Lismore, was highly favourable to every form of pond- and swamp-life, and among a host of interesting organisms that came to light, was a varied assortment of Rhizopods. I thought it a good opportunity, therefore, to write up this group, particularly as I had reason to believe that the species were to be found in considerable variety in my gatherings. A microscopical survey of the latter was accordingly made, with very satisfactory results.

Samples.—Out of about 340 gatherings, not made for the collection of Rhizopods, but principally for *Desmidiaceæ* and *Protococcaceæ*, 90 were found to contain tests of the *Rhizopoda* to a greater or less extent; 43 of these were from Sydney, and 47 from Lismore. The localities and numbers of the samples are given in the notes on the various species, but as very few gatherings are out of *Sphagnum* (the chief haunt of the *Rhizopoda*), a note here on the character of the various habitats may be useful.

Sphagnum:—all marked Coogee. Weeds (*Myriophyllum*, *Elodea*, &c.) in pond, creek, or river:—Botany 50, 151; Lismore 181, 188-197, 273-278, 303; Woodlawn 225; Casino 189; all those marked Botanic Gardens, Guildford, Centennial Park, and Clyde, Duck Creek. Plankton:—Sydney Water-Supply 66, 100; Grafton 265. Swamp:—all others marked Botany,* Auburn, Rookwood, Wyrallah, Kyogle, Byron Bay; and Lismore 223-263, 285, 292, 298, 307-340. By "swamp" should be understood all ground-collections.

* Of these, Nos. 15, 17, 37, 51, and 152 are from the water-reserve, which is an old *Sphagnum*-bog; patches of *Sphagnum* may still be met with here and there.

Results.—Altogether 174 forms have been listed (including a few *Heliozoa*), representing 118 species belonging to 40 genera, a very fair result considering the character of the habitats, and that, with the exception of Lismore, the gatherings in each locality are mostly from one and the same spot. Of these, 80 are here described as new, 30 being accorded specific, and 50 varietal rank. Three new genera are proposed.

Amœbina.

Genus AMŒBA Ehr.

AMŒBA PROTEUS v. NOBILIS (Penard) mihi.

Syn., *Amœba nobilis* Penard, Faune Rhiz., p.65. In a gathering out of a mere on grass-land, I came across this immense form, equal in size to ten ordinary specimens, which, though in motion and spread out in front in a palmate-digitate shape, measured no less than 950μ long and 350μ broad, more than twice as large as Cash's var. *granulosa*. Nor was it a solitary example; with a Coddington lens, I noted many others on the sides of the glass phial. Passing under a filament of *Spirogyra*, the tail-end, the size of an ordinary specimen and containing three empty tests of *Lesquereusia*, got caught, and the main body broke away from it. The deserted portion exhibited slight amœboid movements for a time, but did not move from its place or throw out any pseudopodia.

Lismore (254).

AMŒBA VERRUCOSA v. QUADRILINEATA (Carter) Playf.

Biol. Richm. R., p.144, Pl. viii., f.17, 19. Syn., *A. quadrilineata* Carter, in Ann. Nat. Hist., 1856, p.243, T. v., f.3; *A. striata* Penard, Mém. Soc. Phys. Genève, 1890, p.127, T. ii., ff.31-34. Var. *maxima* Playf., l.c., must be included here, as the type appears to run to vastly greater dimensions in Europe. The usual size here is about $50-60\mu$ long; the largest, I have seen, reached only double that amount. If this form is to be raised to specific rank, Carter's name has priority, unless it can be proved identical with *A. striolata* Perty; Kleinst. Lebensf., 1852, p.188, T. viii., f.15. *A. limax* Duj., which seems to me a form of *A. verrucosa*, I have also noted here.

Genus DACTYLOSPHÆRIUM Hertw. & Less.

D. RADIOSUM var. MINUTISSIMUM Playf.

Syn., *Amœba radiosa* v. *minutissima* Playf., Biol. Richm. R., p.144, Pl. viii., f.20. The diameter of the body, which Cash gives as "usually about 30μ " for the type, is only $4-8\mu$ in this minute form, with pseudopodia extending to $20-30\mu$.

Var. STELLATUM Playf.

Syn., *Amœba radiosa* v. *stellata* Playf., l.c., p.145, Pl. viii., f.21. Diam. of the body about 50, pseudopodia to 150μ . With the type.

Genus MASTIGAMÆBA Schulze.

MASTIGAMÆBA LONGIFILUM Stokes.

Length of body, 10-30, flagellum about 40μ .

Stokes, Proc. Amer. Phil. Soc., xxiii., No.124, 1886; Infus. U.S., p.72, Pl. i., f.1-4. (?)Syn., *M. reptans* Stokes, New Frw. Infus., l.c., 1890, p.74, f.1-5. A minute, smooth form, generally with relatively long flagellum, the body irregularly amœboid.

Botany; Lismore, Richmond R.

Genus PELOMYXA Greeff.

PELOMYXA ECHINULATA Playf.

The entire body is clothed all over with short, slightly curved spines. Syn., *P. palustris* v. *echinulata* Playf., Plankt. Syd. Water-Supply, p.548, Pl.57, f.16, 17.

Length of body about 100, spines $8-20\mu$.

Pott's Hill, pond; Botanic Gardens, tank; Lismore, swamp.

PELOMYXA HIRSUTA, n.sp.

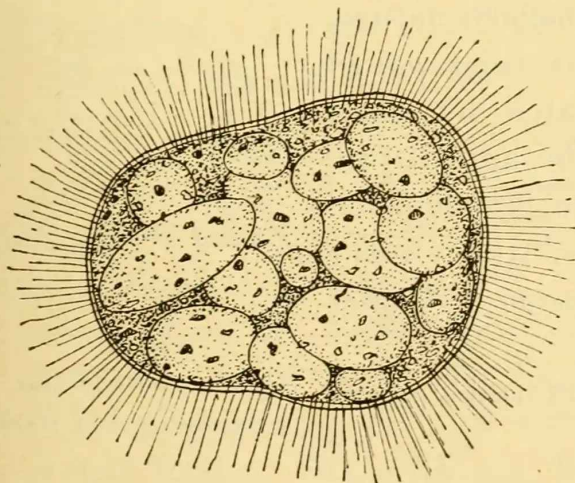


Fig.1.—*Pelomyxa hirsuta*, n.sp.; ($\times 500$).

Body densely clothed all over with fine, bristle-like hairs. The hairs are blunt, straight or very slightly curved, a mere line in thickness even under a high magnification; nor could I, even with a $\frac{1}{12}$ oil imm. obj., detect any bacillar structure. As in all forms of *Pelomyxa*, the margin showed a double line in

optical section. The specimens, I saw, were stuffed full of tests of *Euglena*, *Lepocinclis*, *Trachelomonas*, &c.

Length of body 70, breadth 60, hairs 15μ .

Lismore (328, 337).

Genus CHLAMYDOMYXA Archer.

(?)CHLAMYDOMYXA LABYRINTHULOIDES Archer.

In a gathering of a miscellaneous character from a small piece of swampy ground, I came across a number of specimens of a Rhizopod, which can only, I think, be identified as above, *cf.* Cash, Brit. Frw. Rhiz., i., Pl. xiv., f.1. Our specimens agree with his figure, but not too well with the description. The cysts were apparently of a tough, mucous nature, pale yellow, of irregular shape and large size. The plasma, which entirely filled the capsule and protruded slightly beyond it, was of a dark purple colour from the presence of quantities of minute purple granules. None of the creatures were active, save for a few sluggish, amœboid movements. The cysts seemed to have been pedunculate.

Length of cyst 120-280, breadth 130-140 μ .

Auburn (140). (Pl. xxxix., f.12, 13).

Incertæ sedis.

Genus CYSTAMÆBA, gen.nov.

CYSTAMÆBA DIGITATA, gen.nov. et sp.

Living creature of an amœboid nature, inhabiting an oval, chitinous, thick-walled cyst. The cyst is perforated by small foramina, through which the animal protrudes short, blunt, digitate pseudopodia. Plasma hyaline, refractive, reminiscent of *Dactylosphaerium radiosum* (*Amœba radiosa*).

Length of cyst 20, breadth 16, pseudopod. about 10 long, $1\frac{1}{2}$ -2 μ broad.

Lismore (233).

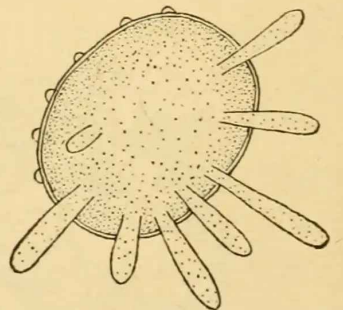


Fig.2.

Cystamæba digitata,
gen.nov. et sp.; ($\times 1000$)

CONCHULINA.

Arcellina.

Genus ARCELLA Ehr.

ARCELLA VULGARIS Ehr.

Cash, Brit. Frw. Rhiz., i., Pl. xv., gives two entirely different forms for the type (figs. 1 and 14). The latter, with the turned-up base, is the one given by Penard, Faune Rhiz., p. 398; and I have, therefore, considered it to be Ehrenberg's type. In the arrangement of a maze of polymorphic forms such as we have in the Rhizopoda, the only hope of producing any order is that every distinct form, which retains its characteristics in many localities, shall have a distinct name. This rule, I have endeavoured to follow out here. *A. vulgaris* is extremely rare in my gatherings; in ten years, I have seen only three specimens.

Diam. 137-140, alt. 60-63; orif. 30-38, alt. 23μ .

Lismore.

ARCELLA ROTUNDATA, nom. nov. (Pl. xxxiv., f. 1).

Test with a depressed dome in side-view, expanded at the sides above the base-line. No basal angles, the margin of the dome merging into the base in a single, broadly rounded curve. Syn., *A. vulgaris* Cash, *partim*, l.c., Pl. xv., f. 1-3.

Diam. 47-54, alt. 25-30; orif. 17, alt. $8-9\mu$.

Lismore (197) Richmond R.; Wyrallah.

Var. ALTA, n. var. (Pl. xxxiv., f. 2).

Test with a high, arched dome, everywhere evenly rounded.

Diam. 36-53, alt. 22-32; orif. 10-15, alt. $4-9\mu$.

Botany (152); Lismore (337).

Var. SCROBICULATA, n. var. (Pl. xxxiv., f. 3).

Test devoid of the usual markings, but covered with coarse, closely set scrobiculations having the appearance of rough granules irregularly disposed.

Diam. 38-60, alt. 23-35; orif. 12-28, alt. $8-9\mu$.

Lismore (197, 263, 292, 307, 327, 328); Wyrallah (310).

I have never observed this scrobiculation in any except this rounded form. The markings do not show at the edge in

tangential view and seem to be, therefore, excavations or granules on the inner side of the test, or else chitinous deposits actually within the substance of the test itself. Curious colours are sometimes met with in this form; a dull green is not uncommon, and I have met with a specimen rose-pink.

ARCELLA CRENATA, n.sp. (Pl. xxxiv., f.4, 5).

Test in side-view with a high, arched dome, sometimes very much inflated, and as broad as the base, the margin showing sometimes smooth, but generally crenate. The surface dented-in, all over the dome, with small, equal-sized pits. Base sometimes with a rolled edge in side-view. Many forms of this type are found, but the pitted test and high, arched dome are characteristic.

Diam. 50-84, alt. 31-53; orif. 15-20, alt. 8-11 μ .

Everywhere, common.

ARCELLA HEMISPHERICA Perty. (Pl. xxxiv., f.6).

Cf. Penard, *Faune Rhiz.*, p.400. Cash, *Br. Frw. Rhiz.*, i., p.120, makes this a synonym of *A. vulgaris*, but the shape is quite distinct. Many varieties may be noted, but a more or less hemispherical dome, with sides running evenly down at nearly right angles to the base, is characteristic.

Diam. 38-68, alt. 23-37; orif. 10-20, alt. 8-9 μ .

Everywhere, common.

Var. *DEPRESSA*, n.var. (Pl. xxxiv., f.7).

Test with the dome in side-view somewhat depressed above.

Diam. 34-57, alt. 21-36; orif. 10-15, alt. 4-8 μ .

Botany (152); Wyrallah (310); Lismore.

ARCELLA DISCOIDES v. *SCUTELLIFORMIS*, n.var.

Test much smaller than the type, with somewhat higher dome, and much more rounded, basal angles. The orifice projects about half-way into the interior, and is relatively very wide.

Diam. 44-95, alt. 15-25; orif. 14-34, alt. 7-11 μ .

Auburn (139, 159); Wyrallah (310); Lismore (337).

The type, as given by Penard and by Cash, is extremely rare here. I have seen but a single specimen. (Pl. xxxiv., f.8).

Var. FOVEOSA, n.var. (Pl. xxxiv., f.9).

Dome of the test covered with small, shallow indentations of equal size, evenly disposed. The margin of the dome, however, is often not crenate.

Diam. 53-61, alt. 16-23; orif. 20-24, alt. 8-11 μ .

Lismore (316, 337).

ARCELLA DENTATA Ehr.

Syn., *A. stellaris* Perty. Extremely rare; I have seen only one example, diam. overall 200 μ , out of weeds in a small pool at Auburn. In outline, it was exactly as given by Penard, Faune Rhiz., p.411, and by Cash, *l.c.*, i., p.127, f.21.

ARCELLA MEGASTOMA Penard. (Pl. xxxiv., f.10).

Test with a low dome, regularly arched in an even curve from one side to the other, not angled nor flattened above. Base the full breadth of the test, sides of the dome meeting the base at an acute angle, only the extreme tip of which is rounded off. No constriction above the base.

Diam. 51-106, alt. 19-32; orif. 17-42, alt. 8-15 μ .

Auburn (159); Botany (144); Wyrallah (310); Lismore (192, 225).

Var. ALTA, n.var. (Pl. xxxiv., f.11).

Test with a dome more highly arched, but having the same regular and even curve as in the type. This curve and the sharp basal angles are characteristic of the species.

Diam. 95-160, alt. 42-53; orif. 32-42, alt. 15-21 μ .

Auburn (57, 104); Botany; Wyrallah (310); Lismore (260, 316, 327).

A larger size, diam. 300-306 μ , was noted out of the Richmond River, but this is exceptional; and whether the specimens belonged to the type or the variation, I cannot say, as they were too broad to get on edge. The species is common and widespread in this country; any large specimen of *Arcella* is almost sure to belong to it. *Cf.* Wailes, Rhiz. fr. N. and S. America, p.204, Pl.15, f.1, 2.

ARCELLA CATINUS Penard. (Pl. xxxiv., f.12).

Etudes s.l. Rhiz., p.154, Pl. v., f.87. Incorrectly identified with *A. artocrea* Leidy, by Penard in Faune Rhiz., p.405, f.3, which is quite a different shape. Syn., *A. vulgaris* v. *compressa* Cash, l.c., i, p.138, f.28.

Diam. 90, alt. 25; orif. 31, alt. 12 μ .

Lismore (192).

Var. AUSTRALIS, n.var. (Pl. xxxiv., f.13).

Test with lateral angles much more elevated above the base, the dome less angular.

Diam. 122, alt. 46; orif. 40, alt. 12 μ .

Lismore (316).

Both type and variation extremely rare, only one specimen of each observed. The two just cover the range of dimensions as laid down by Penard, l.c. In var. *australis*, the basal angles have become lateral, their elevation above the base in the specimen measured being 17 μ . Penard considers this a *Sphagnum*-form, but I have the type from the river, and the variation from a swamp.

ARCELLA COSTATA Ehr. (Pl. xxxiv., f.14).

End-view circular. Diam. 64, alt. 44; orif. 17 μ .

Lismore (337).

Var. ANGULOSA (Perty) mihi. (Pl. xxxiv., f.15).

End-view angular. Syn., *A. angulosa* Perty.

Diam. 60-63, alt. 32, ap. 39; orif. 11, alt. 8 μ . Lismore (337).

Var. CONICA, n.var. (Pl. xxxiv., f.16, 17).

Test in side-view broader above than in the type, with sides more vertical. The apex, instead of being flat,

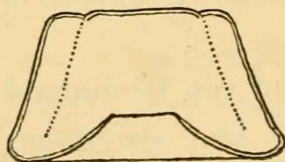


Fig. 3.

Arcella costata var.
angulosa (Perty)
mihi; ($\times 400$).

rises from the shoulder into a peak, giving the test the shape of a marquee-tent. The peaked apex is sometimes shaped like the roof of a house, showing as an angle from one point of view, as a ridge from another. End-view generally circular, with 7-10 irregular-sized panels within the margin, formed by as many costæ. The orifice is always remarkably small.

Diam. 50-80, alt. 31-48; orif. 13-20, alt. 6-10 μ .

Auburn (57); Lismore (260, 308, 327, 337); Woodlawn (225).

The type, and var. *angulosa* Perty, are very rare; I have seen but one or two specimens. Var. *conica* seems to be very rare round Sydney, but fairly common in the Lismore district.

ARCELLA MITRATA var. DEPRESSA, n.var.

Test in side-view inflated above the base, but not so much as in the type, dome often much depressed above. Sides diverging from the base at a decided angle. Sometimes very slightly constricted above the base, enough to form a rectangular neck, as in the type. (Pl. xxxiv., f.18, 19).

Diam. 32-42, alt. 20-30; orif. 9-12, alt. 4-6 μ .

Botany (37, 152); Lismore (337); Wyrallah (310).

Var. ANGULATA, n.var. (Pl. xxxiv., f.20).

Dome in side-view angular at intervals, by reason of a series of wide, shallow depressions, which cover the surface.

Diam. 72, alt. 59; base 65 μ . Lismore, very rare.

Genus LEPTOCYSTIS, gen.nov.

LEPTOCYSTIS ARCELLOIDES, n.sp.

Test minute, spherical, truncate below; orifice central, the whole width of the base, shortly invaginate, the inner rim strongly everted. Membrane pink, transparent, smooth, without a trace of structure.

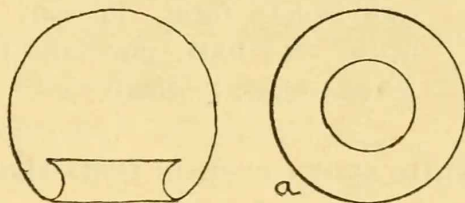


Fig.4.

Diam. 20, alt. 19, base 12 $\frac{1}{2}$; orif. 12 $\frac{1}{2}$ (rim), alt. 4 μ .

Guildford (77).

Leptocystis arcelloides, gen. nov.
et sp.; (a) end-view; ($\times 900$).

I have seen only the empty test, but its minute size, the character of the orifice, and, above all, the structureless, transparent membrane, which shows no markings even under the $\frac{1}{12}$ oil imm. obj., seem to mark it off from the genus *Arcella*.

Genus PYXIDICULA Ehr.

PYXIDICULA SCUTELLA, n.sp.

Test minute, very depressed, almost saucer-shaped; dome very slightly arched above, rounded at the sides, slightly broader

than the base. Orifice very wide, nearly as broad as the base, not at all invaginate nor re-entrant, not furnished with any dependent membrane. Membrane of the test pale yellow-red, always showing at least a faint punctulation, sometimes very distinctly and coarsely scrobiculate.

Diam. 16-22, alt. 8; orif. 13-17 μ .

Sydney Water-Supply (100); Lismore (195, 316, 333); Woodlawn (225).

Var. ALTA, n.var.

Test with a more arched dome, otherwise like the type.

Diam. 20, alt. 10; orif. 16 μ .

Botanic Gardens (150); Lismore (195, 196).

This species is a lover of weeds, and is generally found in gatherings shaken out of *Myriophyllum* and *Elodea*.

Var. *alta* is something like *P. operculata* Ehr., but the mouth is never invaginate, nor is there any dependent membrane. Scrutiny with the $\frac{1}{12}$ oil imm. obj. shows that the scrobiculæ, which are so much in evidence in some specimens, are present as faint

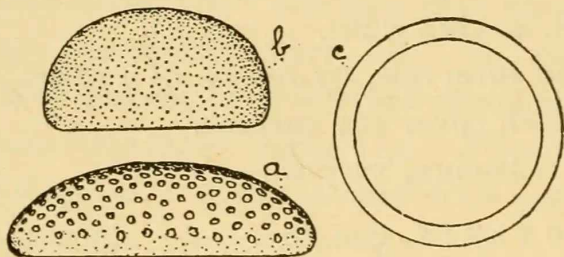


Fig. 5.

- (a) *Pyxlicula scutella*, n.sp., ($\times 1330$), scrobiculate form; (b) var. *alta*, n.var., ($\times 1000$, punctate form; (c) end-view, ($\times 1000$).

white spots, even in tests that appear quite clear.

Genus PSEUDOCHLAMYS Cl. & Lachm.

PSEUDOCHLAMYS PATELLA C. & L.

Diam. 45-48, alt. 10 μ . Grafton (265); Nymboidia R.; Lismore (328).

Genus CENTROPYXIS Stein.

CENTROPYXIS ARCELLOIDES Penard.

Diam. 59, alt. 42; orif. 27, alt. 4 μ . Botany (152).

CENTROPYXIS LÆVIGATA Penard.

Diam. 65-70, alt. 42-51, base 53; orif. 17-20, alt. 10 μ . Lismore (190).

Two rare species noted here; *C. aculeata* and *v. ecornis* common everywhere.

Diffugina.

Genus DIFFLUGIA Leclerc.

DIFFLUGIA OVIFORMIS Cash.* (Pl. xxxv., f.1-3).

Length 70-100, breadth 48-68, orif. 25-34 μ .

Botany (15, 37, 144, 145, 152); Botanic Gardens (150); Centennial Park (6, 11, 72, 133); Lismore (188, 260, 285).

Cash, *l.c.*, ii., p.52, Pl. xx., f.8-12; *not* Leidy, Rhiz. U.S., Pl. xv., f.16, 17, as given by Cash (= *D. lobostoma* forma). Only known hitherto from a single locality in England, but one of our most common and wide-spread Diffugiæ here. The figure given by Cash leaves nothing to be desired, except that he does not figure the plating of the test, which he gives as "elongated rectangular scale-like particles." In our specimens, the test is almost always formed of a mosaic of small, irregularly-shaped, angular plates embedded in a cement, which gives the test a reticulate character, like the skin of a rock-melon. The test also has a tendency to be more cuneate than ovate, with sides flattened towards the mouth. The orifice is always 3-lobed; I have never seen it otherwise; rim entirely chitinous, ($\times 3\mu$) broad. Very rarely, specimens may be seen with a rim uncoloured, not projecting, and inconspicuous; and sometimes the points of the three lobes of the orifice project upwards. (Pl. xxxv., f.3).

Forma. (Pl. xxxvii., f.1).

Test composed of grains and rectangular spicules, with a number of large, circular, transparent, nebeloid plates, some distance apart, towards the hinder part of the test. The general substance of the test seems to resemble the British specimens. An unusual form. Size 63 $\times$ 55, orif. 21 μ . Lismore (337).

Var. MOLLIS, n.var. (Pl. xxxv., f.4).

Test delicate, apparently entirely chitinous, without plates or

* I am morally certain that this is *D. tricuspis* Carter (*cf.* Cash, *l.c.*, p.48, f.64), but, as the very distinct, chitinous collar has been omitted from his figure, it is impossible to prove it. It is the only *Diffugia* of its size, which is transparent enough to show the details of the body within.

reticulations, just slightly rough with irregular granulations, ridges and minute depressions, shape very often irregular.

Length 72-74, breadth 47-58, orif. 25-27 μ .

Botany (17); Botanic Gardens (3); Centennial Park (133); Lismore (308).

Var. SUBGLOBOSA, n.var. (Pl. xxxv., f.5).

Test proportionately very short, subglobose. Size 57 $\times$ 44; orif. 25 μ . Lismore (333).

DIFFLUGIA LOBOSTOMA Leidy.

Length 60-100, breadth 40-82; orif. 15-38 μ .

Auburn (47); Guildford (23); Botany (144, 152); Casino (189); Lismore (188).

Var. TRUNCATA, n.var. (Pl. xxxv., f.6, 7).

Test smaller than usual, ovate or subglobose, truncate below, the orifice being invisible in side-view and generally a little smaller than the base. Orifice, as in the type, slightly and often irregularly 3-4 lobed.

Length 55-67, breadth 49-59, base 23-38 μ .

Everywhere, common.

Var. GLOBULUS, n.var. (Pl. xxxv., f.8, 9).

Test almost exactly spherical, with truncate base turned out into a slight rim. Orifice, as in the type, of 3 or 4 irregular lobes; the margin, however, often with a regular edging of flints.

Length 63-76, breadth 59-72, base 32-36 μ .

Botany (152); Lismore (337).

Cf. *D. lobos'oma* b, Levander, Wasserfauna, p.16, T. i., f.10, 11 (out of sea-water). This beautiful form counterfeits the best specimens of *D. globulus* Ehr. The test, as also in the type (but not, I think, in var. *truncata*), is often just a clear, chitinous bubble, with segregated flints studding the surface. Orifice never more than 4-lobed.

DIFFLUGIA GRAMEN Penard. (Pl. xxxv., f.10).

Length 53-68, breadth 42-60, base 21-38; orif. 19-22 μ .

Clyde, Duck Creek (74); Botany (50); Lismore (308, 316, 333).

Our specimens are small, ovate or subglobose, truncate in

front, not pointed, agreeing exactly with the type in Penard, Faune Rhiz., p.282; but the orifice has the irregular, pentagonal lobes shown by Cash, *l.c.*, ii., Pl.22, f.1-2, whose form should stand as a variation.

DIFFLUGIA VARIANS Penard, forma. (Pl. xxxv., f.11).

Length 133, breadth 76, orif. 34, thick 70, processes 16-20 μ long. Kyogle (219); Lismore (335).

Cf. Penard, Faune Rhiz., p.241, f.4. Known hitherto only from the neighbourhood of Lake Geneva, in Switzerland.

DIFFLUGIA LITHOPLITES v *PULCHERRIMA*, n.var.

Test much smaller than the type, perfectly spherical, as a rule, but very rarely somewhat ovate. Orifice always beautifully 6- or 7-lobed, the margin edged with small plates side by side, with the chitin darkened towards the edge just as in the type; occasionally, also, the angles are tipped with the clear, sharp-pointed flint mentioned by Penard, but this is not the rule. Generally, there is no turned-up edge to the orifice, but sometimes a very slight rim is present, and very rarely a decided collar, as much as 6 μ high. The test is strengthened with minute, flat plates of irregular shape, but about equal size (2-3 μ). The processes are usually wanting, and, when present, very small and inconspicuous.

Length 70-100, breadth 60-90; orif. 27-42 μ .

Lismore (308, 311, 322). (Pl. xxxv., f.12, 13).

Cf. Penard, Faune Rhiz., p.284. A very beautiful species, which is plentiful locally. The lobes of the orifice are not always quite regular, though more so than in the type. A pretty test was noted, composed entirely of circular, nebeloid plates (Pl. xxxv., f.14); sometimes, also, thickened, circular plates, apparently with a slight depression in the centre, are interspersed among the small angular ones (Pl. xxxv., f.15).

DIFFLUGIA LISMORENSIS, n.sp. (Pl. xxxvi., f.1).

Test broadly ovate or subglobose, composed of coarse flints closely disposed, or of flat plates of irregular shape (not so small, however, as in the preceding species). Dome broadly rounded,

without processes. Orifice 6-lobed, without any distinct, regular edging of flints or plates, lobes very deep, ovate, narrowed within, rounded or somewhat flattened behind, the angles between the lobes thrust forward into the orifice as broad, blunt processes, leaving only a clear space equal to about one-third of the diameter of the orifice. The tips of these processes are chitinous, and so darkened that, if they are composed of small flints or plates, the latter cannot be seen.

Length 120-150, breadth 110-120; orif. 42-63 μ .

Lismore (335).

Var. CRUCIFERA, n.var. (Pl. xxxvi., f.2).

Test as in the type, but orifice 4-lobed. The lobes are occasionally nearly the same as in the type, rounded behind (sometimes with a slight angle at the back) and narrowed in front, but generally they are much deeper, cuneate in shape, the central aperture being only about 10 μ wide.

Length 120-137, breadth 105-123; orif. 32-53 μ .

Fairfield; Lismore (260, 335).

Var. TRILOBULATA, n.var. (Pl. xxxvi., f.3).

Test smaller, as far as my observations go, globose or very broadly ovate. Orifice 3-lobed, lobes deep, cuneate, flat behind, narrowed a little inwardly, angles between the lobes merely broad, triangular wedges.

Length 85-90, breadth 78-90; orif. 32-42 μ .

Lismore (327).

DIFFLUGIA BREVICOLLA Cash. (Pl. xxxvi., f.4).

Length 112, breadth 106; orif. 47 μ . Lismore (308).

Cash, *l.c.*, ii., p.38, Pl. xix., f.12, 13. I have noted one specimen which, though a little larger, seems to agree very well with the figures given by Cash. It is spherical, inflated immediately above the narrow neck, the test composed of circular, fusiform, bacillar, or irregularly rectangular plates filled in with fine granules. At the same time, I think this species doubtfully distinct from the next; my specimen of each is from the same piece of swamp.

DIFFLUGIA HELVETICA var. *LITHOPHILA* (Penard) mihi.

Length 60, breadth 55; orif. 34μ . Syn., *D. hydrostatica* Zach., v. *lithophila* Penard, Faune Rhiz., p.274. The latter identifies *D. hydrostatica* Zach., with *D. urceolata* v. *helvetica* Heuscher, the priority of which he recognises, but without adopting the name. Penard gives 100-140 long for Swiss specimens; the only example I have seen agreed in size more with *D. brevicolla* Cash, whose likeness to this species I have already remarked on, cf., Cash, l.c., p.38, f.55. According to Penard, *D. cyclotellina* Garbini, differs only in a test garnished entirely with *Cyclotella* frustules; it is not improbable, therefore, that *D. Casinoensis* Playf., Biol. Richm. R., p.142, Pl. viii., f.9, may be identical with that form; I have not seen Garbini's figure or description. (Pl. xxxvi., f.5). Lismore (327).

DIFFLUGIA CONSTRICTA (Ehr.) Leidy.

Length 55-72, breadth 39-57; orif. $21-31\mu$ high.

Coogee (14); Botany (17, 155).

Var. *SPINIFERA*, nom.nov. (Pl. xxxvi., f.6).

The spinous form. Length 87, breadth 72, spines 20μ .

Coogee (14).

DIFFLUGIA URCEOLATA Carter.

Length 180-210, breadth 150-152; orif. 95μ .

Auburn: Wyrallah; Lismore (314, 335).

Var. *AMPHORA* Leidy.

Rhiz. U.S.A., Pl. xvi., f.54. *D. amphoralis* Hopkinson in Cash, ii., p.43, Pl.21, f.13. It is impossible to draw any specific distinction between forms that are rounded behind and those that are acuminate.

Length 200, breadth 158; orif. 116μ . Lismore (311).

Var. *SPHÆRICA*, n.var. (Pl. xxxvi., f.7).

Test spherical, not oval or ovate, orifice furnished with the usual collar.

Length 275, breadth 275, collar 200, constr. 175, neck 50μ high.

Lismore (260).

DIFFLUGIA CORONA Wallich.

Length of body 144, breadth 156, orif. 84, proc. $64 \times 36\mu$.

Auburn; Wyrallah.

Var. FOLEYANA, n.var. (Pl. xxxvi., f.8).

Test mitriform, expanded above, crown flattened, sides arching to the orifice, which, as usual, is without any rim or constriction. Dome furnished with four, long, conical, diverging processes. End-view compressed. Length 133, breadth 140, proc. 38μ long.

Lismore, swamp near Foley's.

DIFFLUGIA TUBERCULATA v. SPHÆRICA, n.var. (Pl. xxxvi., f.9,10).

Test of the same character as the type, but spherical, with a very decided collar. Orifice 6 or 7-lobed, with the usual angular lobation, sides of lobules straight.

Length 115-127, breadth 104-118, orif. 32-52, collar $8-12\mu$ high.

Auburn (68); Lismore (332, 337).

Cf. Penard, Faune Rhiz., p.293, where he says of the test, "*toujours ovoid*"; ours, on the contrary, are globose, with a much deeper collar. The test in this species cannot be mistaken, being covered all over with very low swellings of equal size, which are best seen when the surface is a little out of focus. The bases of these swellings seem to be outlined with flinty plates and grains formed into distinct rows. The whole of the test is composed of a conglomeration of minute, flinty grains, spicules, rectangles and irregular plates, the largest of which, as a rule, are not over 10μ , and these rare.

Var. NODOSA, n.var. (Pl. xxxvi., f.11).

Test as in var. *sphærica*, but furnished behind with four, low, rounded tumours set crosswise. Breadth across the four tumours $\frac{1}{2}$ to $\frac{2}{3}$ diam. of the test. Tumours about 20μ broad, $8-10\mu$ high.

Length 100-132, breadth 90-120, orif. 32-48, collar $8-12\mu$ high. Lismore (337, 340); Coogee.

Var. CORONATA, n.var. (Pl. xxxvi., f.12).

Test as in var. *sphærica*, but with four conical processes set crosswise behind. Breadth across the processes about $\frac{1}{2}$ to $\frac{2}{3}$ diam. of the test.

Length 127, breadth 127, orif. 63μ . Lismore (335).

DIFFLUGIA BACILLARIARUM Perty. (Pl. xxxvii., f.2, 3).

Length 90-200, breadth 57-84, orif. 34-61 μ .

Botany (144); Coogee (58); Lismore (188, 337, 338).

Syn., *D. acuminata* var. *bacillifera* Playf., Biol. Richm. R., p.142, Pl. viii., f.11. I give a figure, among others, of Perty's type as found here, cf. Cash, ii., p.26, f.45. The type itself seems to be symmetrical, but the specimens met with are quite asymmetrical, except from one point of view.

Var. AUSTRALIS, n.var. (Pl. xxxvii, f.4, 5).

Test broadly ovate, with rounded dome and convex sides converging right down to within a very short distance of the orifice, at which point they diverge suddenly into a slight rim. The test is very often more or less asymmetrical, one side being more inflated than the other, and the tail slanting. Orifice circular, simple. Crown furnished with a tail-like appendage. Test smooth, composed of flat, siliceous plates of irregular shape and size, mixed with fine grains; collar of very small plates of equal size.

Length 100-120, breadth 57-72, orif. 23-36, tail 12-19, collar 6 μ high.

Botany (51, 152); Coogee (58); Lismore (254, 308, 311, 327).

One of our commonest and most widespread types, with very characteristic shape and, even when asymmetrical, its lines are always the same. It is a finer, broader form than *D. bacillarium* v. *elegans* (*D. elegans* Penard, Faune Rhiz., p.237, f.1; Cash, l.c., ii., p.29, f.48), from which it differs also in shape, being ovate and not urceolate-pyriform, and having a very narrow and distinctive collar. The type here has the same form, with a wider mouth, and the same tendency to be asymmetrical. The test is always smooth and plated, not rough with coarse flints. One very beautiful test was noted, formed entirely (except the collar) of oval, nebeloid plates (Text-fig.6). One example of var. *elegans* (Penard) Cash, was noted,

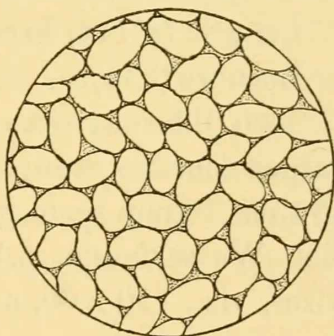
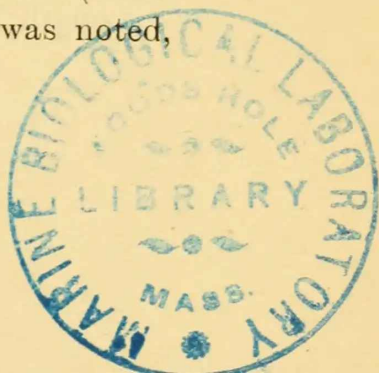


Fig.6.

Diffugia bacillarium
var. *australis*, with
nebeloid plates.



102 × 70, orif. 34 μ ; and one of var. *teres* (Penard) Cash, length 250 μ , both composed of exceedingly coarse flints.

Forma. (Pl. xxxvii., f.6).

Test asymmetrical, with merely a point behind, not a tail. Collar sometimes wanting. Test inclined to be chitinous, with small, detached flints or minute grains. Length 97-100, breadth 70-72, orif. 27 μ .

Guildford (23); Lismore (185).

DIFFLUGIA PENARDI Hopkinson. (Pl. xxxvii., f.7).

Length 74, breadth 48, orif. 30 μ . Lismore (335).

Syn., *D. fallax* Penard, Faune Rhiz., p.245; cf. Hopkinson in Cash, *l.c.*, ii., p.14. Penard gives 65-80 μ long, but no breadth. Cash gives the breadth as 30 μ . The only example I have noted was half as broad again. This is perhaps the *D. acuminata* b, of Levander, Wasserfauna, p.14, T. i., f.8 (60 × 30 μ).

DIFFLUGIA LEVANDERI, n.sp. (Pl. xxxvii., f.8, 9).

Test lanceolate or mitriform, short and broad; dome shaped like a pointed arch, the sides arched and converging right down to the orifice. Orifice wide, circular, simple, without rim or collar. Test rough with large flints, or chitinous with very small granules, orifice not specially margined.

Length 78-116, breadth 51-78, orif. 32-42 μ .

Lismore (335).

Two different sizes are combined in the dimensions above, the larger coarsely stony, the smaller chitinous, with small, scattered grains. They seem to be identical with *D. acuminata* c, Levander, Wasserfauna, p.15, T. i., f.9, who also gives two distinct sizes, viz., 110 × 60, and 70 × 40; orif. 24 μ .

DIFFLUGIA AMPULLULA, n.sp. (Pl. xxxvii., f.10, 11).

Test broadly ovate, with a hemispherical dome, and sides gradually converging in almost straight lines to the broadly truncate base, where the test is suddenly constricted into a narrow, slightly everted collar. Dome sometimes capped with a minute, pointed, apiculate process. Orifice circular, simple.

Length 72-89, breadth 52-65, orif. 21-30, collar 4-8 μ high.

Guildford (23); Lismore (337).

Syn., *D. tuberculata* forma, Penard, Faune Rhiz., p.295 (70-80 μ long). The test is composed of rectangular plates, splinters, and fine grains, the collar of fine grains only.

DIFFLUGIA ACUMINATA Ehr.

Length 170-252, breadth 52-120, orif. 30-50 μ .

Guildford; Lismore (327, 337).

Very rare here, as is also *D. pyriformis* Perty. Only two examples of the latter noted, from the Sydney Water-Supply (66), and Kyogle (217); length 82-250, breadth 52-175, orif. 23-90 μ .

Var. LEVANDERI Playf.

Length 190, breadth 60, orif. 48 μ ; Biol. Richm. R., Pl. viii., f.10; Levander, Wasserfauna, T. i., f.7. This has some likeness to *D. curvicaulis* Penard, Faune Rhiz., p.243.

DIFFLUGIA GIBBEROSA, n.sp. (Pl. xxxvii., f.12, 13).

Test very asymmetrical, irregularly ovate; dome broadly rounded, sides converging almost up to the orifice, just above which the test is constricted slightly to form a collar, at one side a short, conical process. Orifice circular, simple.

Length 82-100, breadth 72-84, orif. 23-28 μ .

Coogee (58); Lismore (338).

This might appear simply a monstrous form, but its occurrence in two widely separated districts forbids this view. The test in both instances was plated, in the one, of angular plates of irregular shape and size; in the other, a very beautiful test, of large, clear, more or less rectangular plates, the interspaces filled with smaller, irregular pieces, and the angles filled in with minute grains.

DIFFLUGIA GLOBULUS (Ehr.) Hopkinson.

Syn., *D. globulosa* (of various authors, not *D. globulosa* Duj.); *D. globularis* Wallich. Cf. Leidy, Rhiz. U.S.A., Pl. xvi., f.1-10; Penard, Faune Rhiz., p.258, f.1.

Var. CASHII, n.var. (Pl. xxxvii., f.14, 15).

Test globular, very small and chitinous, studded with very fine grains, which are generally widely scattered. Orifice circular,

simple, sharp-edged, as a rule not margined with flints, sometimes smaller than the base.

Length 21-30, breadth 19-31, base (= orif.) 6-18; or base 11-21, orif. 6-16 μ .

Auburn (68); Botany (17); Coogee (14, 93); Lismore (181, 273, 274, 316).

This is the very small, chitinous form figured by Cash, *l.c.*, ii., Pl. xxi., f.8, 9, whose figure works out at 30 μ broad. It is very common and widespread here, while I have never met with a specimen anything near the size of the type (30 $\times$ 34, my largest) which Penard gives as 70-100 μ , and Leidy 65-260 μ . The latter mentions these small, chitinous tests at about 24 $\times$ 32 μ . Their very small size, delicate test, and orifice smaller than the truncate base give them a claim to be set apart as a distinct variation.

DIFFLUGIA PULEX Penard. (Pl. xxxvi., f.13).

Length 24-42, breadth 16-24, orif. 7-13 μ .

Auburn (139*b*, 159); Clyde, Duck Creek (26); Guildford (23); Lismore (185).

Var. *CUNEATA*, nom.nov. (Pl. xxxvi., f.14).

Test cuneate, not pyriform; sides straight; rounded behind.

Length 30-42, breadth 15-25, orif. 9-15 μ .

Auburn (139*b*); Clyde, Duck Creek (26).

Penard, *Faune Rhiz.*, p.230, f.4, who gives length 22-30 μ ; ours were all above 30 μ , except one specimen, which was of doubtful identity.

DIFFLUGIA MITRATA, n.sp. (Pl. xxxvii., f.16).

Test small, mitriform, broadly ovate, with hemispherical dome, and sides converging almost straight to the truncate base. Orifice full breadth of the base, circular, simple, sharp-edged. Test chitinous, studded with small flints, orifice not margined, as a rule.

Length 21-24, breadth 19-26, orif. 8-12 μ .

Botany (17, 109); Lismore (308).

Var. *MAJOR*, n.var.

Test twice as large; orifice, however, not proportionately so.

Length 42, breadth 36, orif. 11μ .

Lismore (308).

I have not seen the living creature, and, therefore, this species might possibly be a *Pseudodiffugia*.

Genus CUCURBITELLA Penard.

CUCURBITELLA AUSTRALICA, n.sp. (Pl. xxxvii., f.17).

Test minute, hyaline, transparent, in shape ovate, circular in section, rounded behind; sides arched, becoming more or less straight near the orifice, towards which they converge rapidly. Orifice circular, surrounded by an everted collar, smooth, structureless, transparent. Tests without scales or flints, structureless, covered with coarse, papilliform granules.

Length 19, breadth 15, collar $8\frac{1}{2}$, constriction $6\frac{1}{2}\mu$.

Lismore (308).

I have not seen the living creature, but contents, exactly resembling those of a rhizopod, were noted in preserved specimens.

Genus LESQUEREUSIA Schlumberger.

LESQUEREUSIA SPIRALIS Ehr.

Test rough with coarse flints. Syn., *Lesquereusia modesta* of various authors, not *L. modesta* Rhumbler. The editorial note in Cash, Brit. Frw. Rhiz., ii., p.66, leaves no doubt at all that Ehrenberg's species is the rough, flint-covered one, and that the species with vermiform pellets is *L. jurassica* Schlumberger. Cf. Leidy, Rhiz. U.S.A., p.127 (under *D. spiralis*), who quotes Schlumberger's words with regard to the test being composed of a paste of minute, bacillar bodies. Again, *L. modesta* Rhumbler, is not the sandy form. I have not been able to obtain Rhumbler's memoir, but Penard, Faune Rhiz., p.329, quotes that author's own words, "le plus souvent composé de plaques arrondies irrégulières qui dans certains cas montrent une zone intérieure plus fortement réfringente. Leidy a sans aucun doute représenté un exemplaire appartenant à cette espèce. . . . (Pl. xix., fig.23)." The latter then, an excellent figure, is the type of *L. modesta*. I have not met with the species, but I know well the class of plating to which Rhumbler refers, which is found also in

Diffugia lithoplites v. *pulcherrima* (Pl. xxxv., f.15), thickened plates or cushions with, apparently, a hollow in the centre, which causes the outer zone to appear specially refringent. Small plates of this description sometimes entirely compose the test, both in *Diffugia* and *Lesquereusia*. Cf., *L. carinata*, infra.

Var. CAUDATA, n.var. (Pl. xxxviii., f.1).

Test very regular, with an almost circular outline; orifice circular, simple, placed somewhat on the slant, tube projecting beyond the body for about half the diameter of the orifice. Dome furnished with a conical process set somewhat obliquely, eccentrically below the orifice. Test composed always of rough flints, orifice not specially margined.

Length 127-174, breadth 106-123, orif. 38-48, tail 17-21 μ .

Coogee (58); Lismore (308, 314).

Both *L. spiralis* and *L. jurassica*, as determined above, are common here, and widespread. This form is not uncommon. I have never seen a similar test of *L. jurassica*.

Var. INÆQUALIS, n.var. (Pl. xxxviii., f.2).

Test very much smaller than usual, dome flattened above, and humped towards the side of the orifice. Cf., *L. inæqualis* Cash, ii., p.72, Pl.23, f.12.

Length 91, breadth 91 μ . Lismore (316).

LESQUEREUSIA CARINATA, n.sp. (Pl. xxxviii., f.3).

Test smooth, beautifully regular in curvature. Orifice circular, simple, tube projecting for about one-third the diameter of the orifice. Dome furnished with a slight, concave keel, or conical projections connected by a keel, tangential to the surface, equal to about three-fourths the diameter of the test. Test entirely composed of minute, round, cushion-like pellets, 2-3 μ in diameter, orifice edged with a level series.

Length 133, breadth 100, orif. 36, keel 72 broad, 13 μ high.

Lismore.

The plating in this species is something of the same character as in *L. modesta* Rhumbler, but the thickened plates are here mere pellets.

LESQUEREUSIA SPICULOSA, n.sp. (Pl. xxxviii., f.4).

Test broader than long, the tube very straight and distinct, and much to one side, the body with beautifully circular outline. Test smooth, and apparently rather more chitinous than usual, studded with small, straight spicules disposed confusedly, here and there a few coarse flints, especially towards the centre of the test. The spicules do not appear to be diatoms.

Length 108, breadth 127, orif. 42μ . Lismore.

Genus PHRYGANELLA Penard.

PHRYGANELLA ACROPODIA (Hertw. & Less.) Hopkinson.

Diam. 38-54, alt. 21-30; orif. $21-24\mu$.

Lismore (278, 321). (Pl. xxxviii., f.5).

Syn., *Pseudodiffugia hemisphaerica* Penard, Etudes s.l. rhiz., p.169; *Phryganella hemisphaerica* Penard, Faune Rhiz., p.421. I find it difficult to make out the type of this species, and, in the synonymy, have simply followed Hopkinson. Three different forms occur here (Pl. xxxviii., f.5-7). Cash gives no figure of the side-view, and Penard two different figures. I have adopted the later of these as the type.

Var. AUSTRALICA, n.var. (Pl. xxxviii., f.6).

Test in side-view subtriangular, depressed; basal angles sharper; base almost equal to the diameter of the test; orifice, as in the type, narrower than the base, not visible in side-view.

Diam. 42-63, alt. 28-33; orif. $34-36\mu$.

Botanic Gardens (3); Lismore (273, 308).

Var. DEPRESSA, n.var. (Pl. xxxviii., f.7).

Test in side-view depressed, very little arched above, often nearly flat, very broadly rounded at the sides, sides running down at an angle to the base, orifice the full breadth of the base, not tucked under the test as in the other two forms, the margin visible in side-view.

Diam. 40-46, alt. 23-31; orif. $27-34\mu$.

Auburn (46); Coogee (58); Guildford (23); Lismore (185).

The type is rarer here than the other two forms.

Genus CRYPTODIFFLUGIA Penard.

CRYPTODIFFLUGIA OVIFORMIS Penard. (Pl. xxxviii., f.8).

Length 17-23, breadth 13-17; orif. 4-8 μ .

Lismore (185, 197, 316).

Only known from a single locality in Switzerland, and one in Wales. Plentiful in sample 197.

CRYPTODIFFLUGIA COMPRESSA Penard. (Pl. xxxviii., f.9).

Length 19-21, breadth 18-21, orif. 6-8, thick 10 μ .

Auburn(104); Botany(17, 37); Clyde, Duck Creek(26); Coogee (93); Guildford (45, 77, 88, 173).

Penard, Faune Rhiz., p.428. Only found hitherto in the neighbourhood of Lake Geneva. Widespread in this country, though I have never seen it in quantity. Like all the Cryptodiffugiæ, it is a lover of pondweeds such as *Myriophyllum* and *Elodea*. Our specimens very often have a minute, darker-coloured collarette, or thickening of the rim, which gives the appearance of one. Some error has crept into Penard's side-view, *l.c.*, f.2; the orifice, being circular, must be the same breadth in side- and end-views as in front.

Var. AUSTRALIS, n.var. (Pl. xxxviii., f.10).

Test broader than long, drawn out somewhat at the sides.

Length 16-19, breadth 18-21, orif. 6-7 $\frac{1}{2}$ μ .

Lismore (191, 308).

Var. OVATA, n.var. (Pl. xxxviii., f.11).

Test narrower and more ovate than the type, without a thickened rim.

Length 19, breadth 17-18, orif. 5 μ .

Guildford (173); Lismore (308, 314).

CRYPTODIFFLUGIA MINUTA, n.sp. (Pl. xxxviii., f.12, 13).

Test minute, ovate, circular in section, rounded behind, sides converging to a very narrow base. Orifice very narrow, often a mere foramen, with thickened rim, or sometimes a very narrow but distinct collarette. Membrane thick, smooth, inclined to be rufescent.

Length 10-13, breadth 8-9, rim of the orif. $2-3\mu$.

Auburn (159); Lismore (258).

CRYPTODIFFLUGIA ANGULATA, n.sp. (Pl. xxxviii., f.14).

Test ovate, rather angular at the sides, conically rounded behind; sides converging strongly, and turned in at the orifice, which is very small. Membrane smooth. Length 13-14, breadth 10μ . Guildford (77).

CRYPTODIFFLUGIA SACCULUS Penard, formæ.

Length 23-30, breadth 17-22, neck 10-12, orif. 12-14, rim $4-8\mu$ high.

Centennial Park (72, 133); Clyde, Duck Creek (26).

Another very rare form recorded only from Switzerland. Our specimens, while exhibiting a general likeness, are very variable in shape (Pl. xxxviii., f.15).

CRYPTODIFFLUGIA VALIDA, n.sp. (Pl. xxxviii., f.16).

Test ovate, circular in section; dome circular; sides arched, rapidly converging to the abruptly truncate base; no neck, constriction or collarete. Orifice circular. Membrane pale rufescent, smooth, no markings, thickened at the orifice, where it has the appearance of being doubled over.

Length 55, breadth 40, orif. 15μ . Botany (151).

I have seen only the empty test, but it agrees in character with other species of this genus.

CRYPTODIFFLUGIA CRENULATA, n.sp. (Pl. xxxviii., f.17, 18).

Test ovate, with truncate base, above which it is sometimes slightly constricted to form an obscure neck, end-view circular, crenulate. Membrane smooth, thick, chitinous, hyaline or pale yellow, indented all over so as to appear broadly crenulate in optical section, both front and end. Orifice circular, simple, slightly smaller than the base.

Length 17-20, breadth 14-16, base $6-9\mu$. Lismore (1956).

Cf. *Platoum* sp., Penard, Faune Rhiz., p.430. Obtained in quantity out of weeds in the Richmond River. A nucleus ($\times 4\mu$) was noted in one specimen, containing a granule ($\times 1\frac{1}{2}\mu$). The

membrane is perfectly smooth and free from flints, and observation with $\frac{1}{12}$ oil imm. obj. failed to show any trace of plates or of structure.

Var. GLOBOSA, n.var. (Pl. xxxviii., f.19).

Test subglobose. Length 17-20, breadth 15-18, base 7-8 μ . With the type.

CRYPTODIFFLUGIA PUSILLA, n.sp. (Pl. xxxviii., f.20).

Test minute, subquadrate, as broad as high, with broadly rounded dome, straight sides almost vertical, base full width of the test or nearly so. End-view circular, simple, almost as broad as the base. Membrane smooth, thick, chitinous, structureless, without flinty particles.

Length = breadth = 10 μ . Guildford (23).

Var. CONICA, n.var. (Pl. xxxviii., f.20a).

Test longer than broad, conical or truncate-oval; dome rounded; sides arched; base equal or almost equal to the breadth of the test.

Length 12, breadth 10 μ With the type.

Nebelina.

Genus HYALOSPHENIA Stein.

HYALOSPHENIA NOBILIS v. COMPRESSA, n.var. (Pl. xxxix., f.1).

Body of the test compressed somewhat, neck circular in section, orifice circular. Cf. Cash, l.c., ii., p.92, Pl.25, f.1 3.

Length 154-175, breadth 70, orif. 27-30, thick 50 μ .

Coogee.

HYALOSPHENIA COOGEANA, n.sp. (Pl. xxxix., f.2).

Test the shape of a soda-water bottle, body broadly elliptical, conical behind, contracted in front into a long, distinct neck with nearly parallel sides. Orifice with slight everted rim. Neck three times suddenly constricted as if with string, at its junction with the body, immediately below the orifice and at the anterior third below. Membrane smooth, structureless, apparently chitinous, faintly rufescent. End-view circular(?), compressed(?).

Length 157, breadth 70, orif. 23 μ . Coogee.

These are the only two members of the genus I have seen. They are old finds, known to me only as well-drawn figures, and I have not been able to unearth even one specimen, from my preserved samples, for further information. Of the genus *Heleopera*, I have seen no form at all.

Genus N E B E L A Leidy.

NEBELA MILITARIS v. TUBULATA Brown. (Pl. xxxix., f.3).

Test lageniform, with a very distinct neck having straight, parallel sides, the least bit wider at the orifice, the margin of which is thickened and strongly arched. Side-view as in the type. Test composed of small, round plates.

Length 60-64, breadth 26-30, orif. 9-14 μ .

Coogee (14); Botany (17).

J. M. Brown, Frw. Rhiz. Eng Lake Distr., p.365, Pl.50, f.9, 10.

Cf. Penard, Faune Rhiz., p.369, where he gives two distinct forms for the type; from both of these, ours may be distinguished by the parallel sides of the neck. In a specimen 64 μ long, they extend to 24 μ from the centre of the orifice.

NEBELA CAUDATA Leidy. (Pl. xxxix., f.4).

Length of body 76, breadth 58, orifice 21, tails 12 μ long.

Botany (17).

The shape of the test and the slight crenulation of the orifice by a distinct series of marginal plates remind one very much of *N. dentistoma*. Walls of the test composed of small, circular plates. This species seems to be a great rarity. It is one of the few recorded as absentees by Penard in his monumental work, Faune Rhizopodique du bassin du Léman, p.572, f.5 (after Leidy). Cash also, *l.c.*, p.125, f.99, could only reproduce Leidy's figures. An Australian example is shown in Pl. xxxix., f.4.

NEBELA DENTISTOMA v. LAGENIFORMIS, n.var. (Pl. xxxix., f.5).

Test broadly ovate as in the type, but drawn out and constricted above the orifice into a short neck. Orifice minutely crenulate by a regular series of marginal plates. Wall of the test formed of minute, irregular, angular plates (diam. about 6 μ).

Length 126, breadth 90, orif. 38 μ .

Auburn (149).

Besides those mentioned above, the only forms of the genus, that I have met with, are *N. tubulosa* Penard, and *N. lageniformis* Penard (Coogee, 14); also *N. carinata* in the Sydney Water-Supply, and *N. sinuosa* Cash, from Coogee.

Genus QUADRULA Schultze.

QUADRULA SYMMETRICA v. LONGICOLLIS Taránek.

Form with the plates in very regular, exactly vertical and transverse, series.

Length 95-130, breadth 48-72, orif. 22-30, thick 32 μ .

Coogee (14, 24, 58); Botany (17).

Cf. Taránek, Monog. d. Nebeliden, p.48, T.10, f.19. The European type is ovate, with sides arched right down to the orifice, *see* Cash, *l.c.* ii., Pl.29, f.1-3. Ours are pyriform, sometimes even clavate. (Pl. xxxix., f.6, 7).

Genus COCHLIOPODIUM Hertw. & Less.

COCHLIOPODIUM ASPERUM, n.sp. (Pl. xxxix., f.8).

Test hemispherical, slightly drawn in at the base; dome arched; sides at the base nearly vertical. Substance chitinous, strengthened with flint-grains, large and small, scattered. End-view circular.

Diam. 13-15, dome 10 μ high. Lismore.

There are plenty of these tests in sample 248a, out of a ditch on the Wyrallah road. I have not seen the living creature, so cannot be quite certain of the genus. *C. bilimbosum* is also found here.

Euglyphina.

Genus EUGLYPHA Dujardin.

EUGLYPHA AUSTRALICA, n.sp. (Pl. xl., f.1).

Test ovate, or broadly oval, broadest about one-third in from the fundus; dome rounded, somewhat narrowed, not semicircular; sides arching gently down to the orifice, but occasionally slightly flattened; orifice narrow, surrounded by two rows of ovate plates (5-7 visible), pointed in front, with serrated edges. Body-plates very characteristic, being recessed both front and back, with a central, projecting spike in each recess. Tests may be found

smooth or armed behind with a circle of spines, in number 1 to 5, generally 2 or 3.

Length 64-137, breadth 32-72, orif. 16-36, spines up to 45μ long.

Everywhere, common.

This species is liable to be confounded, at first sight, with *Eu. acanthophora*, in company with which it is often found. The test is, however, more robust and siliceous, and the segregated plates are unmistakable. It is impossible to discern the shape of the plates in the unbroken test, yet specimens may be recognised with a lens of even small definition by one point alone. With the objective a little out of focus, a dark slot, or a pair of minute, circular spots, appears at the top and bottom of each plate; the body-scales are recessed at each end, and only the two minute spikes overlap, leaving a minute foramen on either side. The cement-marks also are not thin and fusiform as in *Eu. acanthophora*, but broad, rectangular slabs. The species is our most common *Euglypha*. It has a wide range of dimensions, but a regular series is found connecting its extreme sizes. Body-scales 10×8 , 11×7 , $11\frac{1}{2} \times 10\frac{1}{2}$, $12 \times 10\mu$. I have never seen this species encysted. Cf. *Eu. crenulata* Wailes, Frw. Rhiz. fr. the States, p.147, Pl.12, f.34-37.

Var. ELEGANS, n.var. (Pl. xl., f.2).

Test elliptical or long-ovate, narrowed behind, not hemispherical; sides slightly arched, sometimes a little flattened towards the orifice. Otherwise as in the type.

Length 67-137, breadth 32-72, orif. 19-36, sp.long 10-45 μ .

Auburn (149); Botany (152); Coogee (58); Lismore (308, 312, 327).

In this form, the test is elliptical rather than ovate or oval, and the breadth about half the length, the orifice again being about half the breadth.

Var. CYLINDRACEA, n.var. (Pl. xl., f.3).

Test slightly cuneate, nearly cylindrical; dome semicircular; sides straight from dome to mouth, very slightly converging.

Orifice proportionately wider than in the type. Generally armed with a circle of spines behind, 1 to 10 in number, generally 3 or 4. Scales as in type.

Length 65-133, breadth 30-76, orif. 15-38, spines up to 60μ long.

Lismore (185, 308, 312, 327, 337); Botany (155).

Apparently much rarer than the type, though common enough locally at Lismore; even the Botany specimen is not exact. It has the same range of dimensions as the type, but is of quite a distinct shape. Body-scales 8×6 , 10×8 , 11×8 , $11\frac{1}{2} \times 10\frac{1}{2}\mu$.

EUGLYPHA ACANTHOPHORA (Ehr.) Perty. (Pl. xl., f.4).

Length 49-70, breadth 30-45, orif. 12-19, spines up to 27μ long. Everywhere, common. (*Eu. alveolata* Duj.).

Var. ELLIPTICA, n.var. (Pl. xl., f.5).

Test narrow, elliptic, almost cylindrical, rounded behind; sides very slightly arched, in general direction parallel, slightly turned in at the mouth. Generally without spines.

Length 70-90, breadth 30-47, orif. 13-19 μ .

Guildford (45, 60); Auburn (146); Lismore (185, 308, 337).

This form, not uncommon where the type is found, is exactly like *Eu. tuberculata* v. *minor* (Taránek) Wailes in Cash, *l.c.*, iii., Pl.35, f.3, but more than twice the size. I do not see how *Eu. tuberculata* is to be identified from Dujardin's figure and description, the shape of the body-scales not being given. The form that I figure certainly belongs to *Eu. acanthophora*, as I have noted it with the typical encystment figured by Penard (under *Eu. brachiata*), Faune Rhiz., p.505.

Var. GRACILLIMA, n.var. (Pl. xl., f.6).

Test slender, almost exactly cylindrical, generally spineless but noted with spines; dome hemispherical; sides flat, running straight down to the mouth.

Length 70-76, breadth 25-32, orif. 13-15, spines 26μ long.

Auburn (68); Guildford (84); Lismore (338).

A very beautiful but very rare form. There seems to be considerable doubt about the characteristics of *Eu. acanthophora*

Ehr. (= *Eu. alveolata* Duj.). What Ehrenberg's form exactly is, I have no means of knowing. Dujardin, however, shows, in his figure, the criss-cross cement-marks forming diamond-shaped lozenges. These, running together almost to a point above and below, indicate a test with oval plates close together, side by side. In our forms, there is a minute dot in the focus of the cement-marks, and, in broken specimens, this shows as a minute bead of cement at the extreme end of the plate, giving the latter very often a pointed appearance. Wailes, in Cash, *l.c.*, iii., gives a figure with widely separated scales, almost circular, though in description he says "body-scales elliptical." Penard (under *Eu. brachiata*) gives broadly oval scales, widely separated, and with a gap at top and bottom. Again the species gets the credit (Wailes, *l.c.*, p.5) of being the most spinous form of its class but our specimens are generally without spines, which, when present, are nearly always weak or little developed.

EUGLYPHA CRISTATA Leidy.

Length 52-63, breadth 13-19, orif. $7\frac{1}{2}$ - $11\frac{1}{2}\mu$, spines up to 20μ long.

Coogee (24); Botany (109); Lismore (185, 337); Byron Bay.

Var. MAJOR Wailes. (Pl. xl., f.7).

Length 74-84, breadth 21-23, orif. $13\frac{1}{2}$, spines up to 30μ long.

Coogee (14).

Var. LANCEOLATA, n.var. (Pl. xl., f.8).

Test lanceolate, slightly acuminate behind, not constricted at all in front; sides almost straight, converging very slightly to the orifice. Apical scales blunt, square-ended.

Length 44, breadth 17, orif. $8\frac{1}{2}\mu$.

Coogee (14).

This form shows a probable connection between *Eu. cristata* and *Eu. laevis*. It has the shape of *Eu. laevis* v. *lanceolata*; and the blunt, square-ended, apical plates are also found in forms of *Eu. laevis*.

EUGLYPHA FILIFERA v. ELEGANS, n.var. (Pl. xl., f.9).

Test slender, elliptic rather than ovate, with a slight tendency

to be pointed behind, decidedly compressed. Orifice circular or subcircular, apical scales three-lobed, not serrate. Body-scales typical. Spines always seven in full complement, three on one side, 4 on the other, the odd one never terminal.

Length 57-66, breadth 25-26, orif. 10-13, thick 18, sp. 17-20 μ long.

Coogee (24); Centennial Park (11); Botany (151).

Cf. Wailes in Cash, Brit. Frw. Rhiz., iii., Pl.34, f.6-8. Our forms differ from Penard's type, Faune Rhiz., p.510, in general shape of the test, in the spines, and in the apical plates, which here are invariably obscurely three-lobed, not serrate. Body-scales (hexagons) $7 \times 3\frac{1}{2}$, $8 \times 4\mu$. Four or five apical plates visible.

Var. PYRIFORMIS Wailes. (Pl. xl., f.10).

Length 68, breadth 25, orif. $10\frac{1}{2}$, sp. 20 long, plates $8 \times 6\mu$.

Coogee (14).

Var. CYLINDRACEA, n.var. (Pl. xl., f.11).

Test slender, almost cylindrical, rounded or slightly pointed behind; sides almost straight to the orifice. Apical plates three-lobed, four visible; body-scales as in the type. Spines 7 in full complement.

Length 65-68, breadth 23-24, orif. $9\frac{1}{2}$ -10, sp.21-23 μ long.

Botany (155); Lismore (337).

Var. CUNEATA, n.var. (Pl. xl., f.12).

Test cuneate, rounded behind; sides straight, converging rapidly to the orifice. Scales and spines as above, four apical plates visible.

Length 57, breadth 25, orif. $8\frac{1}{2}$, sp. 17 μ long.

Rookwood (107); Botany (155).

In all these forms of *Eu. filifera*, the apical scales are gradually thickened towards the tip, the end being almost knobby.

EUGLYPHA COMPRESSA Carter.

Length 50-80, breadth 43-55, thick 18, orif. 18-25, sp. 9-23 μ long.

Botany (17); Coogee (14, 24); Byron Bay (325).

Var. OBSCURA, n.var. (Pl. xl., f.13).

Test smaller than the type, ovate, compressed, broadly rounded behind; sides arching gradually down to the mouth. Orifice elliptical, surrounded by pointed, obscurely three-lobed scales, five visible in front. Wall of the test apparently chitinous, very slightly silicified; no scales or cement-marks are to be seen. The only markings are a series of broad, longitudinal striae faintly indicated. With the $\frac{1}{12}$ oil imm. obj., these break up into series of faint, brick-shaped marks separated by short, transverse lines. No spines noted.

Length 42-54, breadth 25-35, thick 18, orif. 10-13 μ .

Botany (17).

Seems to be a low form of *Eu. compressa*; found in company with the type. In size, it is, as might be expected, just a little smaller, and they agree in general shape, compression, and apical plates. It is hardly to be expected that spines should be present; they were exhibited very sparingly by the specimens of the type. Cf. *Eu. denticulata* Brown, in Cash, *l.c.*, iii., p.41, Pl.36, f.7-13, for a similar form.

EUGLYPHA LAEVIS Perty. (Pl. xl., f.14-16).

Length 30-55, breadth 15-30, orif. 8-15 μ .

Everywhere.

Eu. alveolata v. *laevis* (Perty) Playf., Biol. Richm. R., p.143, Pl. viii., f.14. The type is oval, or oval-cylindrical, the former Penard's, the latter Perty's type, according to the figure given by Wailes in Cash, *l.c.*, iii., p.27. All that can be seen of the apical scales is a row of four or five refringent beads across the orifice, the tips of these scales being much thickened. Specimens are not infrequent here, however, in which the apical plates are broad and square in front (Pl. xl., f.16).

Var. LANCEOLATA, n.var. (Pl. xl., f.17).

Test smaller than the type, more slender, compressed, lanceolate, pointed behind, the sides running slightly arched, sometimes nearly straight, to the orifice. In side-view, narrowly lanceolate. Scales as in the type(?).

Length 24-34, breadth 12-16, thick 12-13, orif. 6-10 μ .

Everywhere, common.

Penard, Etudes s.l. rhiz., p.182, Pl. ix., f.97-104, has described a var. *minor* (long. 15-25 μ) which is a small form of the type. I have not met with that form; it is replaced by var. *lanceolata*, which here almost invariably accompanies the type. On the face of the tests, five or six, broad, longitudinal striæ are often faintly indicated, which break up, on examination, into series of broad dashes, as in *Eu. compressa* var. *obscura*. These are the optical expression of the body-scales.

EUGLYPHA DENTATA v. ELONGATA, n.var. (Pl. xli., f.1, 2).

Test elongate, elliptical or subcylindrical, often asymmetrical, circular in section, rounded behind; sides gently arched, often nearly parallel, converging to the orifice. Orifice chitinous, fimbriated, rarely angular or straight-edged. Body-scales always perfectly circular, quincuncially arranged, very slightly overlapping and equally on all sides.

Length 44-51, breadth 21-25, orif. 8-10 $\frac{1}{2}$, scales 6 μ .

Lismore (187, 188, 195*b*, 197); Coogee (14).

This form is abundant in the Lismore samples noted, out of weeds (*Myriophyllum*) in the river (deep water). Both in shape and in the body-scales, it differs entirely from the descriptions and figures of Penard, Faune Rhiz., p.524, and Wailes in Cash, iii., pp.63-65, Pl.43, f.14, 15. In details of the dimensions and character of the nucleus, however, they agree perfectly. Nucleus distinct ($\times 10\mu$), always containing 3-8 dark granules towards the centre. Described originally by Moniez as a *Euglypha*, I cannot see any reason why this species should ever have been placed under *Sphenoderia*. The orifice is peculiar certainly, but does not in the least recall the characteristic orifice of the latter genus; and the general character of both test and body-scales is that of *Euglypha*. Moreover, mixed with it here, I find specimens with distinct, angular, apparently siliceous, apical plates, see var. *hamulifera*, below. The asymmetrical character of the test leads me to consider the fimbriation of the orifice as an accidental occurrence in a soft, chitinous form, due to the tests

(in division) being drawn apart before silicification was complete. The exact formation of the orifice, I found very difficult to make out, and only achieved it with the $\frac{1}{12}$ oil imm. obj., aided by the condenser.

Var. HAMULIFERA Playf. (Pl. xli., f.4).

Syn., *Euglypha alveolata* var. *hamulifera* Playf., Biol. Richm. R., p.143, Pl. viii., f.13. Test ovate (rarely elliptical?), broadly rounded behind; sides arched, converging rapidly to the mouth. Apical scales distinct, angular, pointed, apparently siliceous, but edges not serrate, 4 visible. Body-scales circular, same size, character and overlap exactly as in var. *elongata* above; a minute foramen showing in this form, however, at the intersection of every three scales.

Length 45-60, breadth 24-38, orif. $10\frac{1}{2}$ - $13\frac{1}{2}\mu$. Lismore (197).

In sample 195b, along with var. *elongata*, is found more rarely an ovate form, in shape agreeing with Wailes' figure, *l.c.*, Pl.43, f.15, but all other details as in our Australian specimens, size 44×25 , orif. 9μ ; (Pl. xli., f.3).

Genus SPHENODERIA Schlumberger.

SPHENODERIA AUSTRALIS, n.sp. (Pl. xli., f.5, 6).

Test very broadly ovate or subglobose, very slightly compressed if at all, broadly rounded behind; sides strongly arched, converging to the orifice. Orifice a mere slit at the apex of a structureless collar. Body-scales of varying sizes and shapes in the same test, and without any regular arrangement, overlapping slightly. Side-view ovate.

Length 57-70, breadth 32-60, collar 17-28, $5\text{-}6\mu$ high.

Coogee; Centennial Park (6, 11); Guildford (77); Lismore (298, 308).

This is the common *Sphenoderia* of this country; *Sph. lenta* I have never seen. Our form is sufficiently distinguished from the latter by the irregular disposition of the scales, and their varying size and shape. At their best, they exhibit a tendency to be circular.

SPHENODERIA FOVEOSA, n.sp. (Pl. xli., f.7).

Test broadly ovate, rounded everywhere, slightly compressed,

side-view ovate, and broadly oval. Orifice a mere slit at the summit of a structureless collar; collar conical in side-view. Body-scales very ill-defined and lacking cement-marks at the overlap, irregular in shape and size, oval or circular, mixed in the same test, irregularly disposed. Each scale is furnished with a depressed centre of similar outline, and these depressions are often all the markings that can be seen on the test.

Length 48-63, breadth 35-45, thick 34; collar 18-21, 5-7 μ high.

Coogee (24); Auburn (68); Botany (155); Lismore (185, 240, 307, 308).

Var. *TENUIS*, n.var. (Pl. xli., f.8).

Test ovate, much more slender than the type, rounded behind; sides straight, or nearly so, towards the collar. Collar just a mere constriction of the test, rectangular. No body-scales visible, surface covered with large, shallow depressions, which are really the depressed centres of the scales.

Length 60, breadth 42, collar 23 μ . Botany (17).

SPHENODERIA SPHÆRICA, n.sp. (Pl. xli., f.9).

Test almost spherical, very slightly compressed, side-view ovate-subglobose, end broadly oval. In front-view circular, truncate anteriorly. Orifice a mere slit at the end of an invaginate, structureless collar. Body-scales distinct, oval, about five across the face, overlapping, all about the same size but irregularly disposed.

Length 57-63, breadth 57, thick 53; collar 21-23, scales $20 \times 13\mu$.

Coogee (58).

A rare species, found only in sample 58 (from *Sphagnum* at Coogee) in which it is fairly plentiful. The collar is invaginate in every specimen.

SPHENODERIA MACROLEPIS Leidy, forma.

Length 32, breadth 23, orifice 13 μ . A single specimen noted from Byron Bay.

Test ovate, no neck at all, abruptly truncate in front, rim not everted. The same three large scales in front-view, but broadly rounded at the sides, not angular as in the type. (Pl. xli., f.10).

SPHENODERIA FISSIROSTRIS Penard, forma.

Test with relatively large scales, but the latter are irregularly disposed in front-view. End-view circular. Length 40, breadth 19, thick 19, orif. $10\frac{1}{2}\mu$. Botany (17). (Pl. xli., f.11).

Var. SPLENDIDA, n.var. (Pl. xli., f.14).

Test covered with small, oval body-scales in a regular imbrication, about six series vertical, and six horizontal.

Length 40-49, breadth 22-28, collar 15-16 μ . Coogee (14).

This is the only form of *Sphenoderia* I have noted with a regular imbrication. *Assulina muscorum* Greeff (*A. minor* Penard), *Cyphoderia ampulla* (Ehr.) Leidy, and *Corythion dubium* Taránek, are also found here.

Genus CYPHODERIOPSIS, gen.nov.

Test in shape like a *Cyphoderia*, but with scales as in *Trinema* or *Nebela*.

CYPHODERIOPSIS LONGICOLLIS, sp.unica. (Pl. xli., f 12).

Test smooth, hyaline, very like *Cyphoderia ampulla*, but with a long, curved neck. Orifice circular(?), simple, with or without a narrow, projecting, chitinous collar. Body-scales nebeloid, circular, of various sizes, smaller on the neck, contiguous but not overlapping, fastened at the edges by little dots of cement.

Length 76-78, breadth 29-32, orifice 11-12 $\frac{1}{2}$, scales up to 6 μ .

Coogee (14, 24).

A rare form out of *Sphagnum*. It is possible that the collar becomes invaginate sometimes, but I have not seen it so. In its characteristics, the test combines the features of *Cyphoderia*, *Nebela*, and possibly also *Trinema*.

Genus TRINEMA Dujardin.

TRINEMA CAUDATUM, n.sp. (Pl. xli., f.13).

Test in front-view subcylindrical, a little narrowed towards the mouth, conical behind, where it is drawn out into a very decided tail, slightly constricted near the centre and below the mouth. Orifice circular, strengthened with a palisade of short, wick-like rods (or plicæ) about a diameter apart. Body-scales

circular, of equal size, showing slightly curved at the margin, neither contiguous nor overlapping (in the specimen observed) but a slight distance apart, the interspaces marked with little flecks of cement(?). Tail without plates, chitinous, rough-surfaced. Test in side-view somewhat like a *Cyphoderia* with pointed fundus, mouth projecting, oblique, evaginate.

Length 100, breadth 25, orif. 15, tail 27×4 , scales $\times 5\mu$.

Botany (155).

Cf. *Pareuglypha* Penard, Faune Rhiz., p.492. Only one specimen seen, and the test was empty. I was in doubt whether the species should not go under *Cyphoderiopsis*, but if the mouth were invaginate, and it looks as if it might be, there would be a very great likeness to *Trinema*. *Tr. enchelys* Ehr., and *Tr. lineare* Penard, are, of course, common everywhere.

Gromiina.

Genus PSEUDODIFFLUGIA Schlumberger.

PSEUDODIFFLUGIA GRACILIS Schlumb.

Length 27-47, breadth 18-34, base 8-15 μ .

Coogee (14); Botany (37); Lismore (308, 333).

PSEUDODIFFLUGIA FULVA (Arch.) Penard.

Length 15-23, breadth 11-19, base 4-10 μ .

Auburn (139b); Guildford (23-77); Lismore (321).

The only difference, that I can see, between these two species is that one is smaller than the other. I have made, here, 25 μ long the dividing line between them.

PSEUDODIFFLUGIA MICROSTOMA, n.sp. (Pl. xxxix., f.9).

Test chitinous, with fine, scattered grains, sometimes with coarser flints. In shape ovate, rounded behind; sides gently arched, converging rapidly down to a very small, indefinite orifice not specially margined. Test not compressed, section circular.

Length 30-31, breadth 17-23, orif. 4 μ .

Guildford (173); Lismore (333).

Var. OBESA, n.var. (Pl. xxxix., f.10).

Test very broadly ovate, almost globose, section circular, orifice very small.

Length 44, breadth 38, orif. 8μ . Lismore (327).

This species recalls *Ps. compressa* Schultze, but the test is smaller and not compressed. *Ps. fascicularis* Penard, I have noted here once.

Genus DIAPHOROPODON Archer.

DIAPHOROPODON PYRIFORME, n.sp. (Pl. xxxix., f.11).

Test membranous, flexible, dark smoky colour, with small grains here and there. Varying in shape, but generally to some extent pyriform. It seems to have an orifice like the opening of a purse, capable of being drawn together. Pseudopodia filose.

Length 67-82, breadth $53-59\mu$. Lismore (339).

There were plenty in this sample, and all alive, but the indistinct, membranous test, and the plasma with which it was filled, made it very difficult to get any definite observations.

Genus FRENZELINA Penard.

FRENZELINA GLOBOSA, n.sp.

Body globose, throwing out long, filose pseudopodia from a slight, central protuberance. Test apparently chitinous, covered to a varying thickness with fine floccose and minute flint-grains, transparent, however, and permitting a view of the creature within; close-fitting all round, but with a slight space between it and the body. Body-plasma very refractive, a small nucleus at the back.

Diam. 21-25, height 17-19; body $15-17 \times 12\frac{1}{2}-14\frac{1}{2}\mu$.

Lismore.

Cf. *Frenzelina reniformis* Penard, Faune Rhiz., p.464. Obtained in some quantity from a waterhole, alive, in company with *Diplophrys Archeri* Barker, and others. I have a single record of what looks like an empty test of *Amphitrema flavum* (Arch.) Penard, also from Lismore.

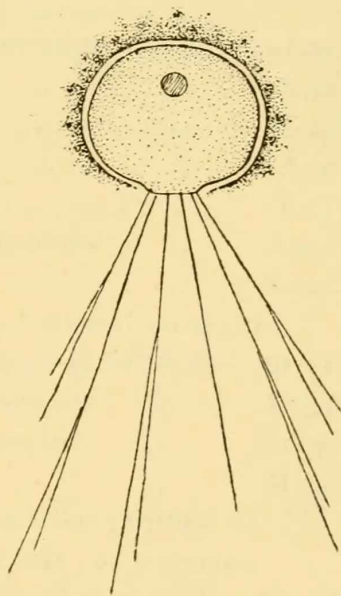


Fig.7.

Frenzelina globosa, n.sp.;
($\times 800$).

EXPLANATION OF PLATES XXXIV.-XLI.

Plate xxxiv.

- Fig. 1.—*Arcella rotundata*, nom. nov.; ($\times 660$).
 Fig. 2. ,, ,, var. *alta*, n. var.; ($\times 660$).
 Fig. 3. ,, ,, var. *scrobiculata*, n. var.; ($\times 660$).
 Fig. 4. ,, *crenata*, n. sp.; ($\times 600$).
 Fig. 5. ,, ,, forma; ($\times 500$).
 Fig. 6. ,, *hemisphaerica* Perty; ($\times 660$).
 Fig. 7. ,, ,, var. *depressa*, n. var.; ($\times 600$).
 Fig. 8. ,, *discoides* v. *scutelliformis*, n. var.; ($\times 660$).
 Fig. 9. ,, ,, var. *foveosa*, n. var.; ($\times 660$).
 Fig. 10. ,, *megastoma* Penard; ($\times 400$).
 Fig. 11. ,, ,, var. *alta*, n. var.; ($\times 400$).
 Fig. 12. ,, *catinus* Penard; ($\times 500$).
 Fig. 13. ,, ,, var. *australis*, n. var.; ($\times 350$).
 Fig. 14. ,, *costata* Ehr.; *a*, end-view; ($\times 400$).
 Fig. 15. ,, ,, var. *angulosa* (Perty) mihi, end-view; ($\times 400$).
 Figs. 16, 17.—*Arcella costata* var. *conica*, n. var.; *a*, end-view; (16) $\times 500$,
 (17) $\times 400$.
 Figs. 18, 19.—*Arcella mitrata* var. *depressa*, n. var.; (18) $\times 500$, (19) $\times 660$.
 Fig. 20.—*Arcella mitrata* var. *angulata*, n. var.; ($\times 400$).

Plate xxxv.

- Fig.1.—*Diffugia oviformis* Cash, forma; ($\times 500$).
Fig.2. ,, ,, encysted, outline only; ($\times 400$).
Fig.3. ,, ,, with angles of the lobes projecting; ($\times 500$).
Fig.4. ,, ,, var. *mollis*, n.var.; ($\times 500$).
Fig.5. ,, ,, var. *subglobosa*, n.var.; ($\times 500$).
Figs.6, 7 ,, *lobostoma* var. *truncata*, n.var.; ($\times 500$).
Figs.8, 9 ,, ,, var. *globulus*, n.var.; (8) from Lismore ($\times 330$),
 (9) from Botany ($\times 400$); *a*, end-view ($\times 660$).
Fig.10.—*Diffugia gramen* Penard, ($\times 330$); *a*, end-view ($\times 500$).
Fig.11. ,, *varians* Penard, forma; *a*, side-view ($\times 330$).
Fig.12. ,, *lithoplites* v. *pulcherrima*, n.var.; ($\times 250$).
Fig.13. ,, ,, ,, ,, orifice; *a*, with blunt angles
 ($\times 500$); *b*, with angles tipped by a sharp flint ($\times 500$); *c*, the latter
 enlarged; *d*, another form of angle ($\times 660$).
Fig.14.—*Diffugia lithoplites* v. *pulcherrima*, forma; ($\times 400$).
Fig.15. ,, ,, another form; ($\times 400$).

Plate xxxvi.

- Fig.1.—*Difflugia Lismorensis*, n.sp., ($\times 330$); a, orifice ($\times 660$).
 Fig.2. ,, var. *crucifera*, n.var., ($\times 250$); a, b, orifice
 ($\times 660$).
 Fig.3. ,, var. *trilobulata*, n.var., orifice; ($\times 330$).

- Fig.4.—*Diffugia brevicolla* Cash, forma; ($\times 270$).
 Fig.5. ,, *helvetica* v. *lithophila* (Penard) mihi, forma; ($\times 500$).
 Fig.6. ,, *constricta* var. *spinifera*, nom.nov.; ($\times 330$).
 Fig.7. ,, *urceolata* var. *sphaerica*, n.var.; ($\times 130$).
 Fig.8. ,, *corona* var. *Foleyana*, n.var.; ($\times 230$).
 Figs.9, 10. ,, *tuberculata* var. *sphaerica*, n.var., orifice; (9) $\times 300$, (10) $\times 660$. For shape of the test, take Figs. 11 or 12 without the processes.
 Fig.11.—*Diffugia tuberculata* var. *nodosa*, n.var.; ($\times 330$).
 Fig.12. ,, ,, var. *coronata*, n.var.; ($\times 240$).
 Fig.13. ,, *pulex* Penard; ($\times 660$).
 Fig.14. ,, ,, var. *cuneata*, nom.nov.; ($\times 1000$).

Plate xxxvii.

- Fig.1.—*Diffugia oviformis* Cash, forma; ($\times 500$).
 Fig.2. ,, *bacillariarum* Perty, type; ($\times 400$).
 Fig.3. ,, ,, unsymmetrical form, more common; ($\times 400$).
 Fig.4. ,, ,, var. *australis*, n.var.; ($\times 400$).
 Fig.5. ,, ,, ,, unsymmetrical form; ($\times 400$).
 Fig.6. ,, ,, ,, forma; ($\times 330$).
 Fig.7. ,, *Penardi* Hopkinson; ($\times 330$).
 Figs.8, 9. ,, *Levanderi*, n.sp.; (8) stony test $\times 330$; (9) chitinous $\times 400$.
 Figs.10, 11.—*Diffugia ampullula*, n.sp.; (11) with deeper collarette; ($\times 500$).
 Figs.12, 13. ,, *gibberosa*, n.sp.; (12) from Coogee, (13) from Lismore; ($\times 400$).
 Figs.14, 15. ,, *globulus* var. *Cashii*, n.var., (14) from Auburn, *a*, end-view; (15) from Lismore; ($\times 660$).
 Fig.16.—*Diffugia mitrata*, n.sp.; *a*, end-view; ($\times 1000$).
 Fig.17.—*Cucurbitella australica*, n.sp.; ($\times 1000$).

Plate xxxviii.

- Fig.1.—*Lesquereusia spiralis* var. *caudata*, n.var.; ($\times 250$).
 Fig.2. ,, ,, var. *inequalis*, n.var.; ($\times 330$).
 Fig.3. ,, *carinata*, n.sp.; ($\times 300$).
 Fig.4. ,, *spiculosa*, n.sp.; ($\times 300$).
 Fig.5.—*Phryganella acropodia* (Hertw. & Less.) Hopkinson, ($\times 500$); *a*, end-view ($\times 400$).
 Fig.6. ,, ,, var. *australica*, n.var.; ($\times 500$).
 Fig.7. ,, ,, var. *depressa*, n.var.; ($\times 660$).
 Fig.8.—*Cryptodiffugia oviformis* Penard, encysted; ($\times 1000$).
 Fig.9. ,, *compressa* Penard; *a*, end-view; *b*, side-view; ($\times 1000$).
 Fig.10. ,, ,, var. *australis*, n.var.; *a*, end-view; *b*, side-view; ($\times 1000$).
 Fig.11. ,, ,, var. *ovata*, n.var.; ($\times 1000$).

Figs. 12, 13.—*Cryptodiffugia minuta*, n.sp.; (12) from Auburn, (13) from Lismore; ($\times 1330$). The little bubble and streamer are the preserved remains of the pseudopodium.

Fig. 14.—*Cryptodiffugia angulata*, n.sp.; ($\times 1000$).

Fig. 15. ,, *sacculus* Penard, formæ; *a*, *b*, from Centennial Park; *c*, from Duck Creek, Clyde; ($\times 660$).

Fig. 16. ,, *valida*, n.sp., ($\times 500$); *a*, orifice much enlarged.

Figs. 17, 18. ,, *crenulata*, n.sp.; ($\times 1330$).

Fig. 19. ,, ,, var. *globosa*, n.var.; ($\times 1000$).

Fig. 20. ,, *pusilla*, n.sp.; *a*, var. *conica*, n.var.; ($\times 1000$).

Plate xxxix.

Fig. 1.—*Hyalosphenia nobilis* var. *compressa*, n.var.; *a*, side-view ($\times 330$).

Fig. 2. ,, *Coogeeana*, n.sp.; ($\times 330$).

Fig. 3.—*Nebela militaris* var. *tubulata* Brown; *a*, side-view outline; ($\times 660$).

Fig. 4. ,, *caudata* Leidy; ($\times 500$).

Fig. 5. ,, *dentistoma* var. *lageniformis*, n.var.; ($\times 300$).

Figs. 6, 7.—*Quadrula symmetrica* var. *longicollis* Taránek; ($\times 500$).

Fig. 8.—*Cochliopodium asperum*, n.sp.; *a*, end-view; ($\times 1000$).

Fig. 9.—*Pseudodiffugia microstoma*, n.sp.; ($\times 660$).

Fig. 10. ,, ,, var. *obesa*, n.var.; ($\times 500$).

Fig. 11.—*Diaphoropodon pyriforme*, n.sp.; ($\times 400$).

Figs. 12, 13.—(?) *Chlamydomyxa labyrinthuloides* Archer; (12) $\times 270$, (13) $\times 200$.

Plate xl.

Fig. 1.—*Euglypha australica*, n.sp.; ($\times 400$).

Fig. 2. ,, ,, var. *elegans*, n.var., ($\times 440$); *a*, body-scale ($\times 1330$).

Fig. 3. ,, ,, var. *cylindracea*, n.var., with surface a little out of focus, showing the twin foramina at the ends of the body-scales. The points of the two scales overlap between them; ($\times 400$).

Fig. 4.—*Euglypha acanthophora* Ehr.; ($\times 660$).

Fig. 5. ,, ,, var. *elliptica*, n.var.; ($\times 600$).

Fig. 6. ,, ,, var. *gracillima*, n.var.; ($\times 660$).

Fig. 7. ,, *cristata* var. *major* Wailes; ($\times 600$).

Fig. 8. ,, ,, var. *lanceolata*, n.var.; ($\times 660$).

Fig. 9. ,, *filifera* var. *elegans*, n.var.; ($\times 660$).

Fig. 10. ,, ,, var. *pyriforme* Wailes; ($\times 660$).

Fig. 11. ,, ,, var. *cylindracea*, n.var.; ($\times 660$).

Fig. 12. ,, ,, var. *cuneata*, n. var.; ($\times 660$).

Fig. 13. ,, *compressa* var. *obscura*, n.var.; the left side shows all the markings to be made out with the $\frac{1}{8}$ in., on the right with a $\frac{1}{2}$ in. oil imm. obj.; *a*, side-view outline; ($\times 880$).

Fig. 14.—*Euglypha lavis* Perty, type; ($\times 660$).

Fig. 15. „ „ Penard's form, encysted; ($\times 660$).

Fig. 16. „ „ Penard's form, with square-ended, apical plates, quite smooth sides, and no apparent markings; ($\times 660$).

Fig. 17.—*Euglypha lavis* var. *lanceolata*, n.var.; markings as in Fig. 13; *a*, side-view outline; ($\times 1000$).

Plate xli.

Figs. 1, 2.—*Euglypha dentata* var. *elongata*, n.var.; (1) with preserved body of the creature ($\times 660$); (2) empty test ($\times 1000$).

Fig. 3.—*E. dentata*, ovate form, in shape more like the type; ($\times 1000$).

Fig. 4.—*E. dentata* var. *hamulifera* Playf., ($\times 1000$); *a*, circular body-scale slightly overlapping six others, showing the foramina, one at the intersection of every three plates, much enlarged.

Figs. 5, 6.—*Sphenoderia australis*, n.sp.; (5) $\times 500$, (6) $\times 660$.

Fig. 7. „ „ *foveosa*, n.sp.; ($\times 660$).

Fig. 8. „ „ var. *tenuis*, n.var.; ($\times 530$).

Fig. 9. „ „ *sphaerica*, n.sp.; *a*, side-view of orifice; *b*, end-view; ($\times 500$).

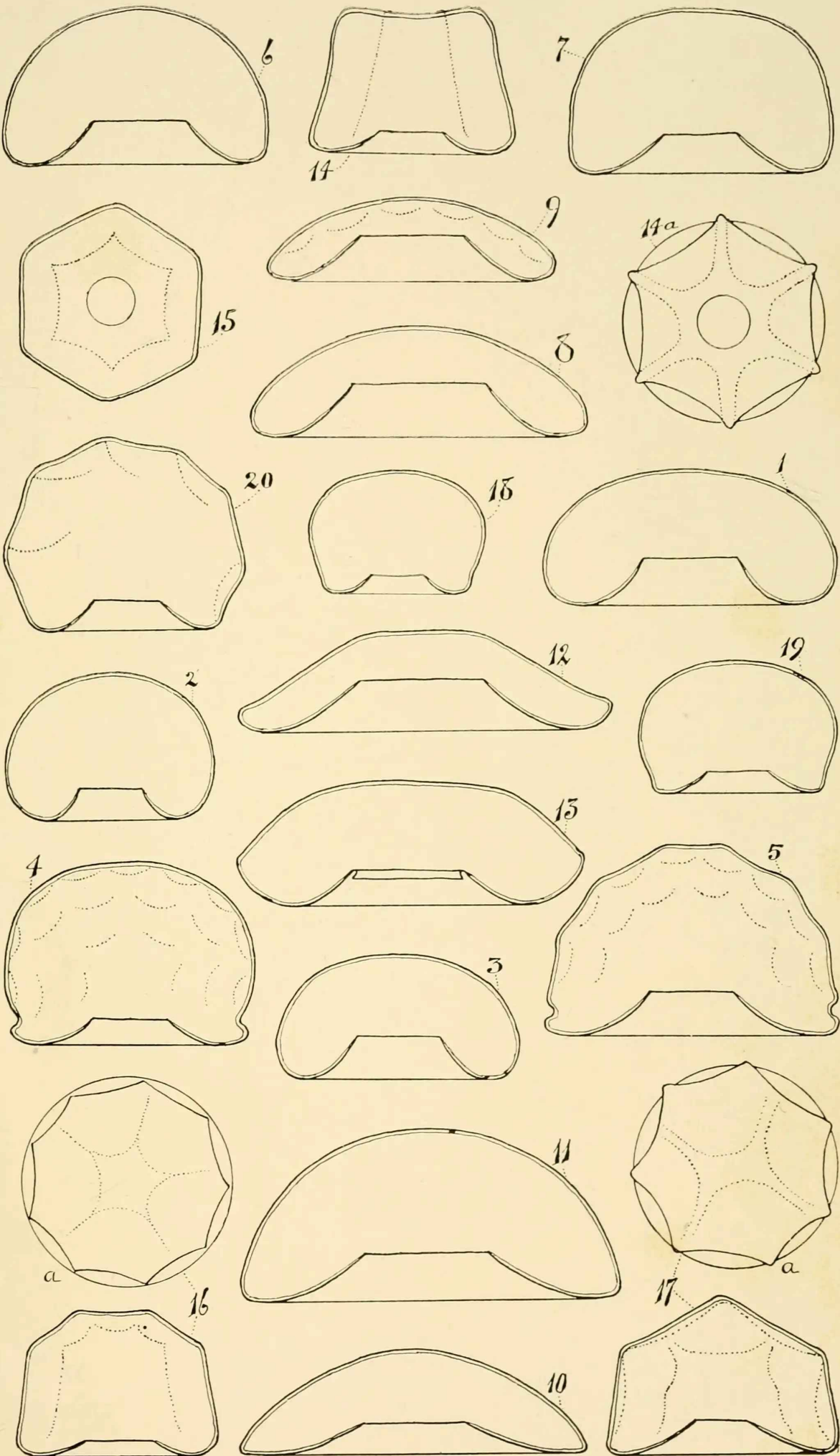
Fig. 10. „ „ *macrolepis* Leidy, forma; ($\times 800$).

Fig. 11. „ „ *fissirostris* Penard, forma, ($\times 800$); *a*, side-view.

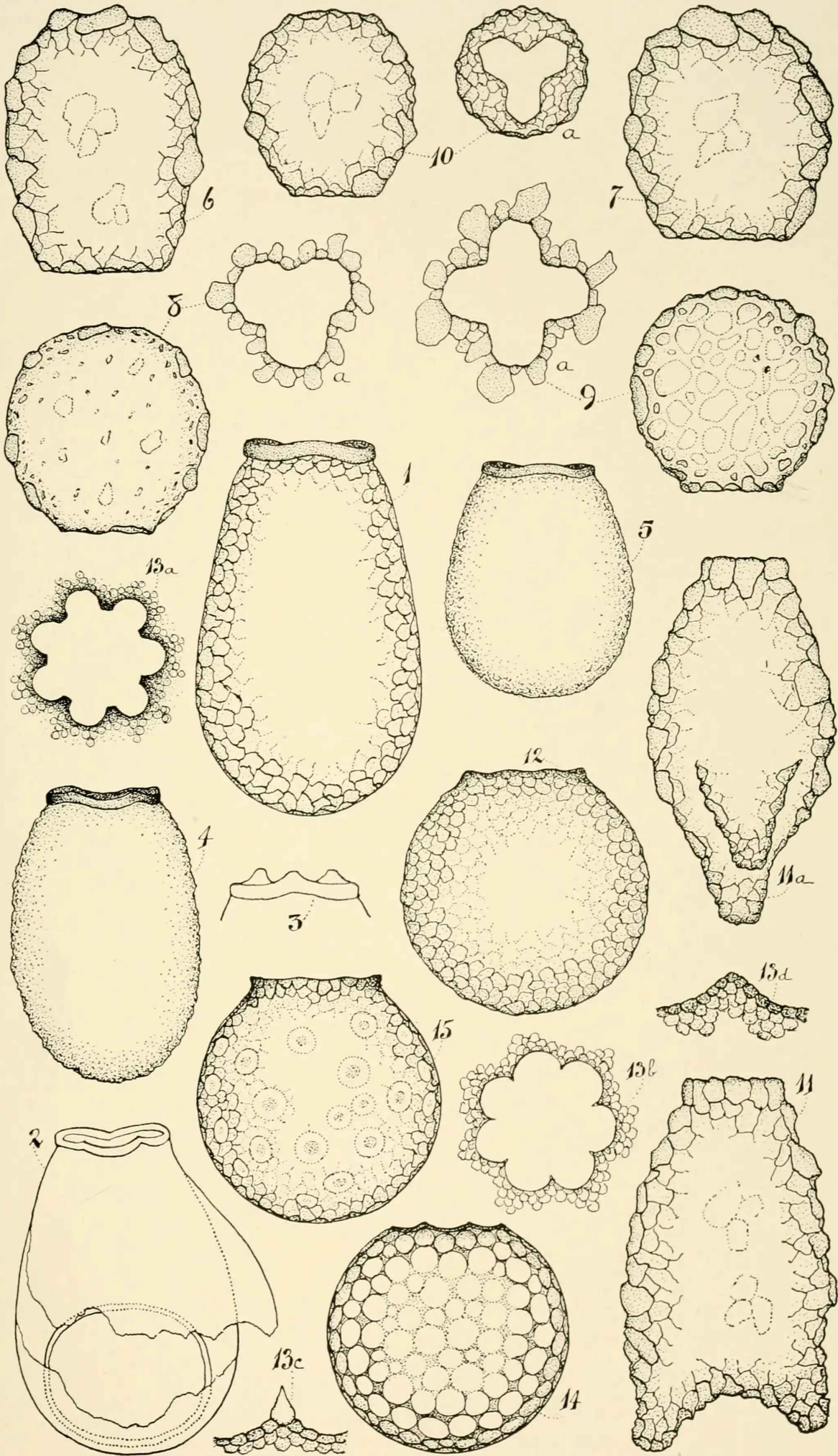
Fig. 12.—*Cyphoderiopsis longicollis*, gen.nov. et sp.; *a*, another form of orifice; ($\times 660$).

Fig. 13.—*Trinema caudatum*, n.sp.; *a*, side-view; ($\times 660$).

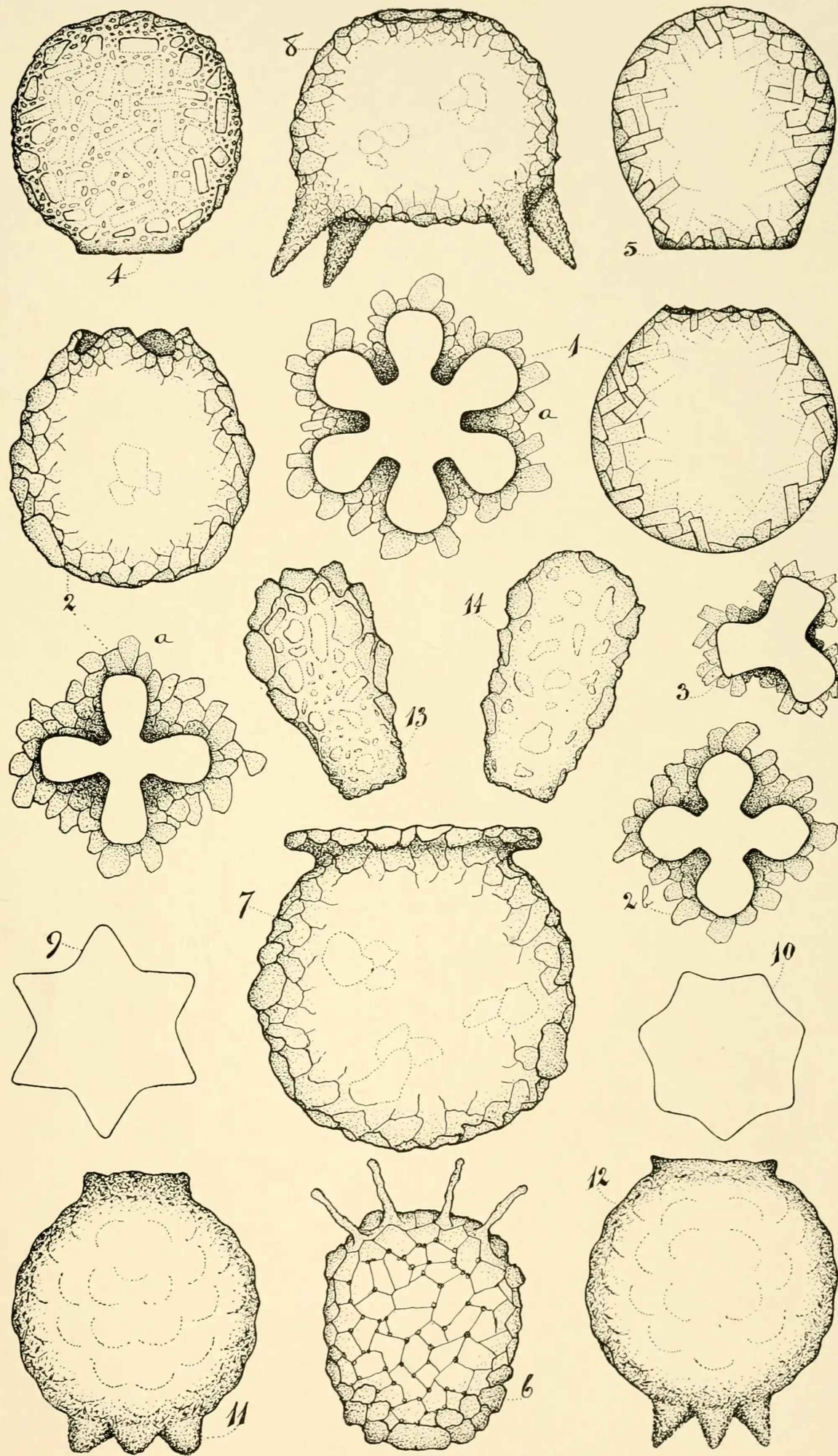
Fig. 14.—*Sphenoderia fissirostris* var. *splendida*, n.var.; ($\times 660$).



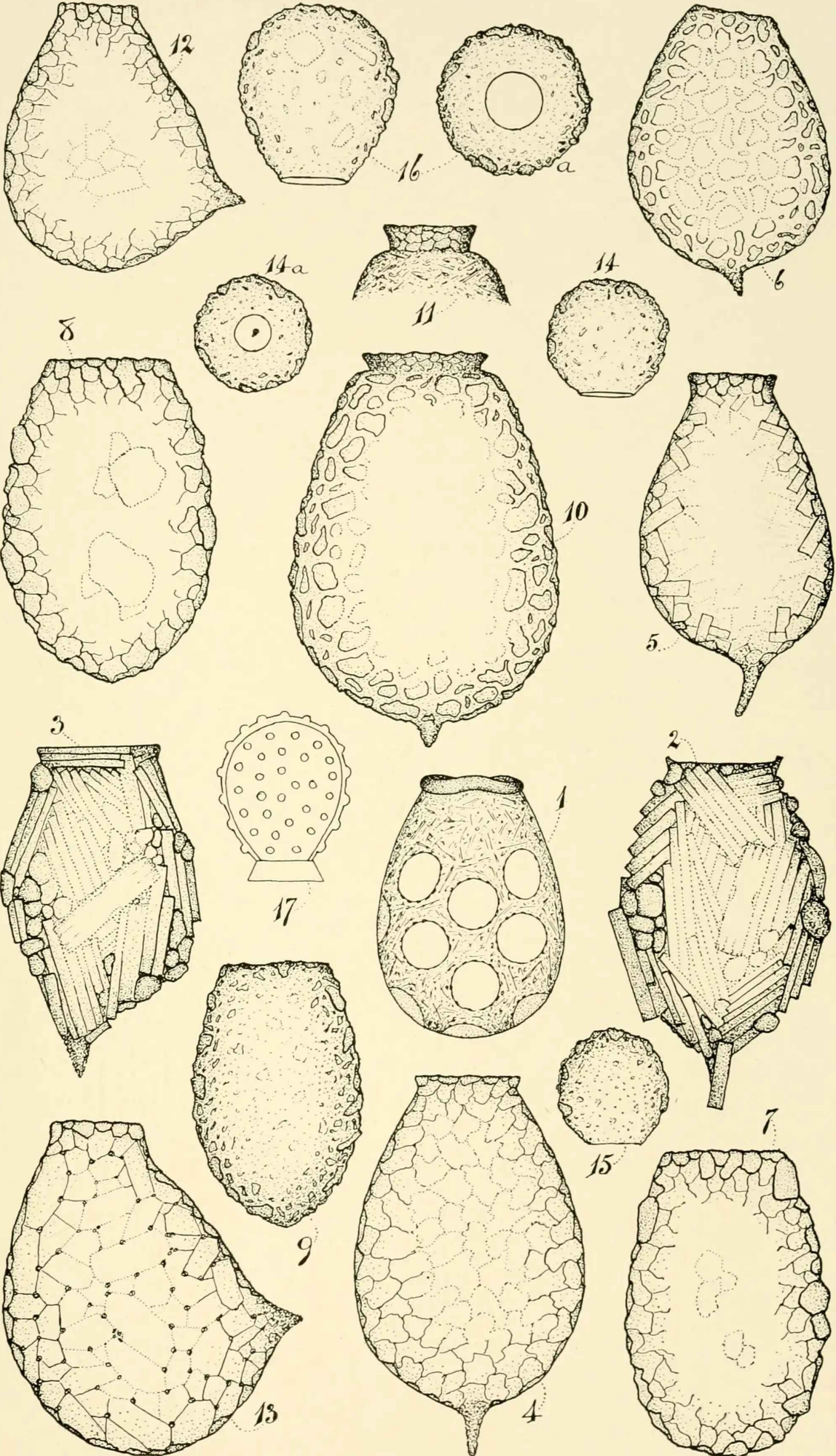
Rhizopods of Sydney and Lismore, N.S.W., (*Arcella*).



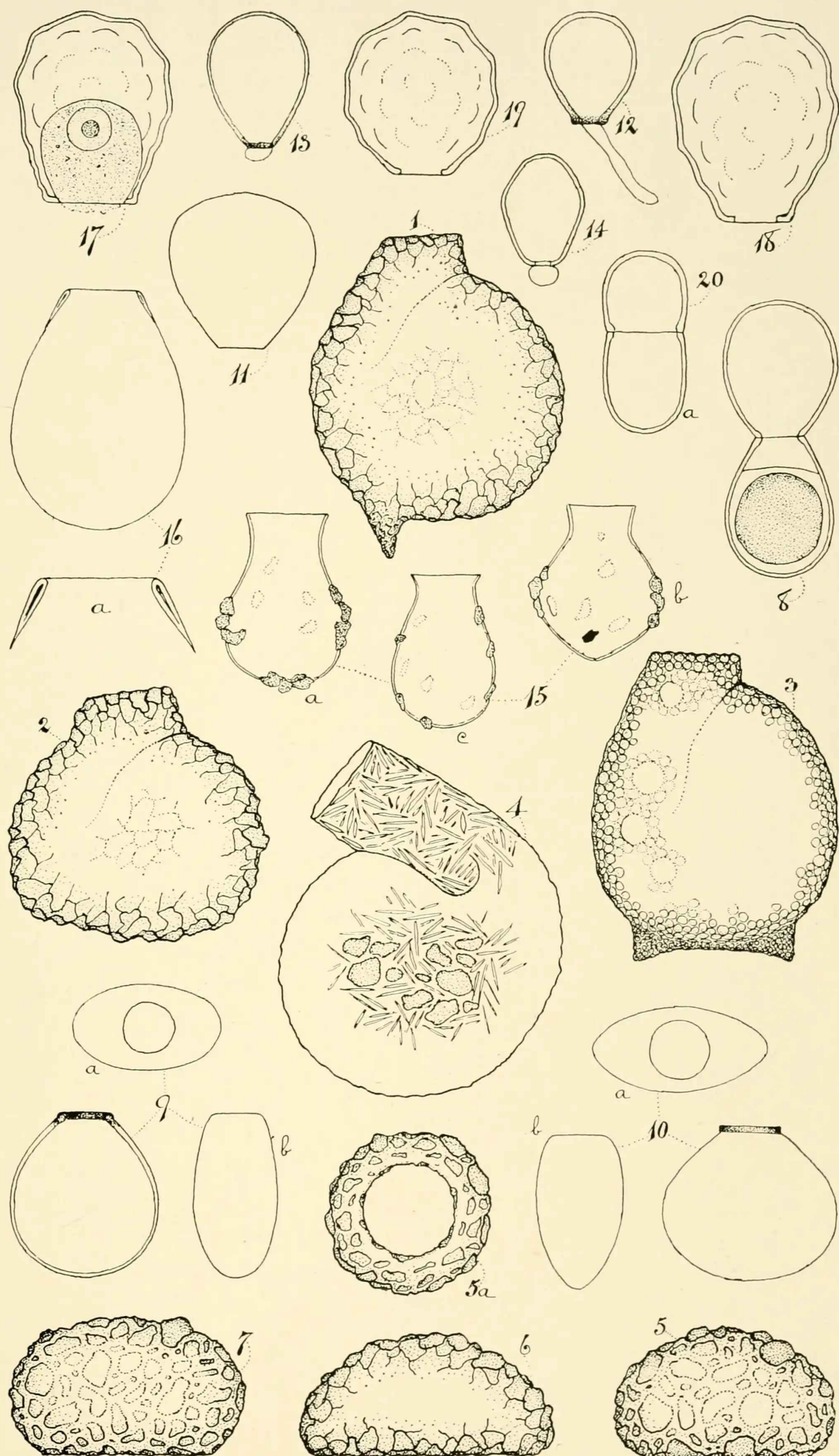
Rhizopods of Sydney and Lismore, N S.W., (*Diffugia*).

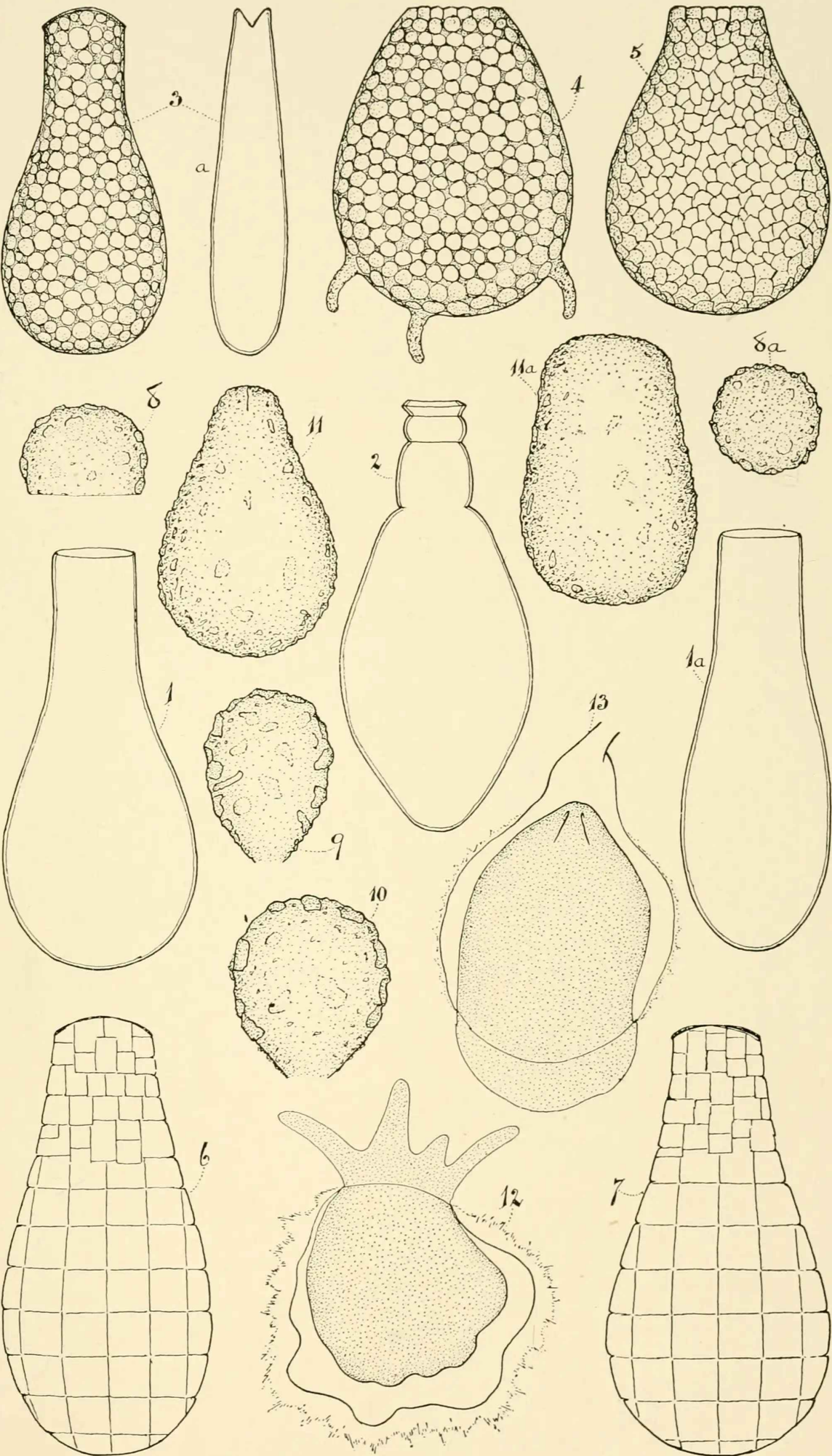


Rhizopods of Sydney and Lismore, N.S.W., (*Diffugia*).

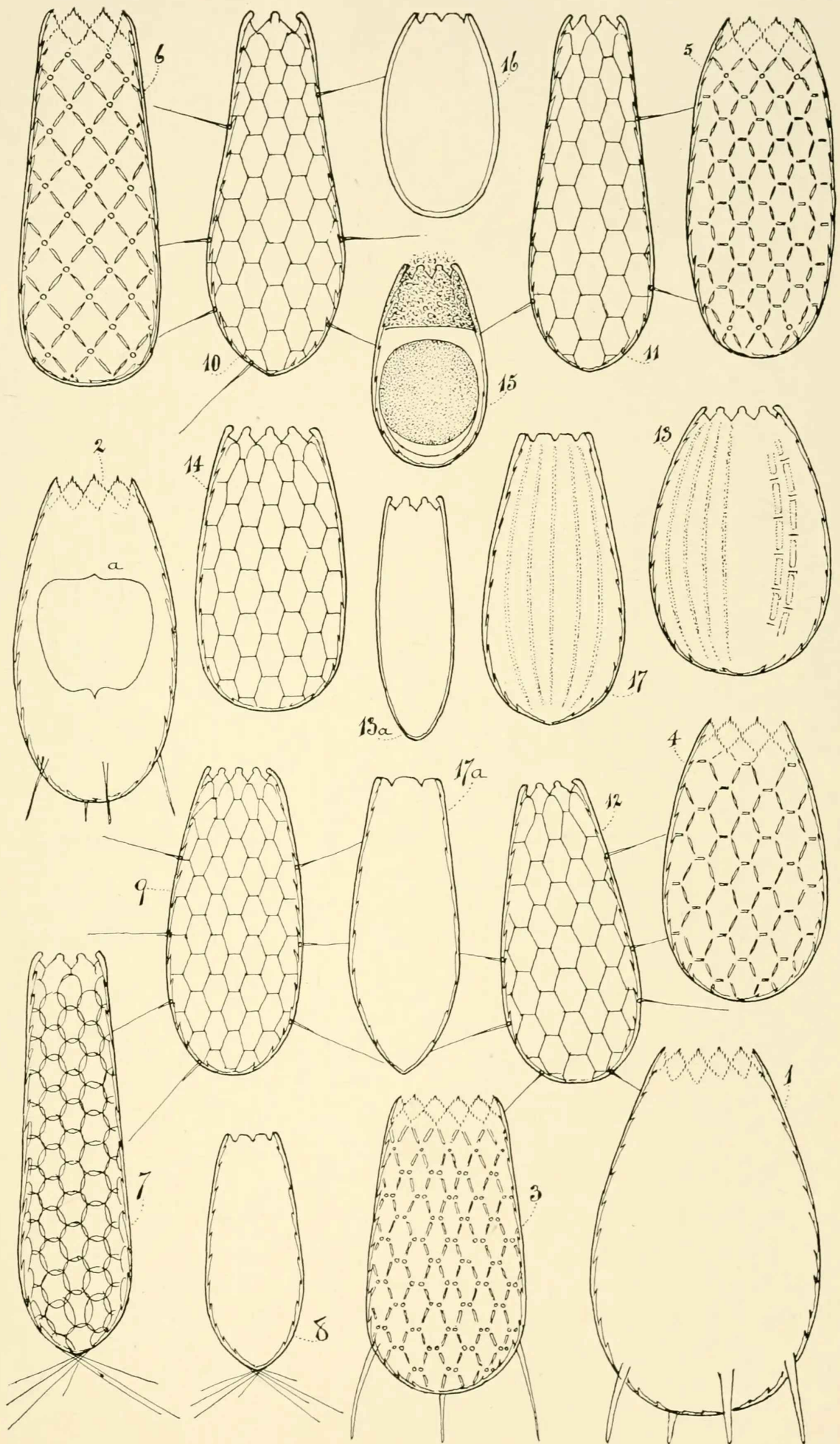


Rhizopods of Sydney and Lismore, N.S.W., (*Diffugia*, *Cucurbitella*).

Rhizopods of Sydney and Lismore, N.S.W., (*Lesquereusia*, *Phryanella*, *Cryptodiffugia*).



Rhizopods of Sydney and Lismore, N.S.W., (various genera).



Rhizopods of Sydney and Lismore, N.S.W., (*Euglypha*).

