Catalogue of testate amoebae (Protozoa) recorded from Australia

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Abstract

All published reports of testate amoebae (Protozoa: Rhizopoda *s.l.*) free-living in Australia have been compiled into a taxonomic catalogue and cross-referenced bibliography. Records were extracted from 52 publications and are listed (with taxonomic authorities, synonyms, sizes, habitats and geographic locations) for ~240 testate species belonging to 52 genera in 18 families in 2 classes (Lobosea and Filosea). Studies on testacea in Australia have been fragmentary and limited in scope considering the size and diversity of the continent, thus testatecean species richness is considered to be seriously under-estimated.

Introduction

Amoebae are microscopic single-celled organisms belonging to the kingdom Protista which exhibit locomotion by means of pleomorphic pseudopodia (false feet) – temporary extensions of the cell that facilitate the characteristic amoeboid crawling motion. Amoeboid movement is also used by many species to engulf and ingest food items (process of phagocytosis). The actual mechanisms by which amoeboid movement is produced are still being determined but involve cytoskeletal microtubular-microfibrillar protein networks which contract and relax. Rhizopod amoebae form pseudopodia which may be lobose (broad, cylindrical and flattened), filose (filamentous, thread-like and often branched), or reticulose (forming anastomosing networks). Actinopod amoebae form radial axopodia arising from a microtubule-organizing centre.

Amoebae may be testate or naked, depending on the presence or absence, respectively, of an external shell-like covering (test or tectum) made from secreted or gathered materials (idiosomes or xenosomes). Test materials may be proteinaceous, agglutinate, siliceous, calcareous or various combinations. The tests provide protection against adverse environmental conditions (especially dessication), camouflage and refuge from predators, lairs for hunting (amoebae phagocytose prey) and even disperal (some tests are bouyant).

Testate amoebae are free-living species, inhabiting aquatic and terrestrial environments, including mosses ("pseudo-aquatic"). They are most frequently seen in areas of high organic matter and low nutrient turnover, such as peat bogs and acid soils.They are vital to ecosystem health as they are actively involved in food webs (as both producers and consumers), nutrient recycling, and soil/water quality (by preying on other microbes). Some 2,000 species of testate amoebae have been described worldwide; many are presumed to be cosmopolitan but varying degrees of endemism have been recorded between and within continents.

All amoebae were previously classified in the phylum Rhizopoda, but recent studies have recognized many diverse assemblages with few unifying features. Testate amoebae are currently grouped within two phyla: the majority with lobose pseudopodia (over 30 genera classified in 12 families) being placed within the phylum Amoebozoa, and the remainder with filose pseudopodia (some 15 genera classified in 6 families) being retained within the ammended phylum Rhizopoda. The taxonomic classification scheme used in this document follows that of:

Meisterfeld, R. 2000a. Order Arcellinida Kent, 1880. In: Lee, J.J., Leedale, G.F. & Bradbury, P. (eds), *An Illustrated Guide to the Protozoa*. Second Edition, Society of Protozoologists, Allen Press Inc., Lawrence, Kansas, Vol. II, pp. 827-860.

Meisterfeld, R. 2000b. Testate amoebae with filipodia. In: Lee, J.J., Leedale, G.F. & Bradbury, P. (eds), *An Illustrated Guide to the Protozoa*. Second Edition, Society of Protozoologists, Allen Press Inc., Lawrence, Kansas, Vol. II, pp. 1054-1084.

This catalogue lists all species of testate amoebae previously recorded from Australia. All records provided have the following format: Taxon + authority [synonyms]; size; habitat; region; reference. Where information is unavailable, the abbreviation NR indicates Not Recorded. All taxa are listed as genus and species names, immediately followed by their taxonomic authorities (where, by convention, brackets indicate revision by the subsequent authority). Synonyms are given where appropriate within square brackets (complete synonymy given by abbreviation 'syn.'; partial synonymy indicated by symbol '='). When provided in the description, test size is given as length (range) by breadth (range) in micrometers. The habitat is listed for each record as freshwater, salt lake, marine, soil, leaf-litter, tree-bark or moss. The site of occurrence in Australia is given as the zoogeographic region: R1-R12 being terrestrial drainage divisions, and R13-R30 being coastal/oceanic regions (Fig. 1). The publication from which each entry was extracted is then given by number corresponding to the listed references. All records are derived from published material (perceived to have been peer-reviewed) prior to 2010 (constituting books, book chapters, research papers, published conference proceedings and abstracts, expedition reports and society records).

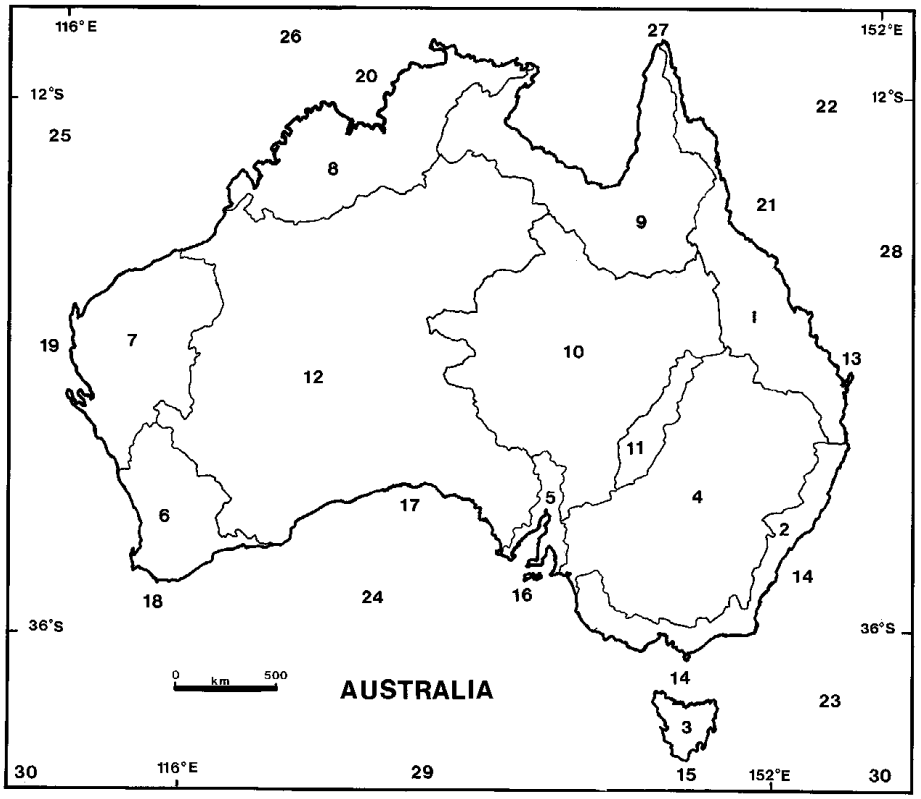

Figure 1. Regions of Australia given for each entry in checklist: R1, North-east drainage; R2, South-east drainage; R3, Tasmanian drainage; R4, Murray-Darling drainage; R5, South Australian drainage; R6, South-west drainage; R7, Far-west drainage; R8, North-west drainage; R9, Carpentarian drainage; R10, Lake Eyre drainage; R11, Bulloo-Bancannia drainage; R12, Western plateau drainage; R13, North-east coast; R14, South-east coast and Bass Strait; R15, Tasmanian coast; R16, South Australian Gulf; R17, Bight coast; R18, South-west Coast; R19, Far west coast; R20, Timoresian coast; R21, Great Barrier Reef; R22, Coral Sea; R23, Tasman Sea; R24, Great Australian Bight; R25, Indian Ocean; R26, Timor Sea/Arafura Sea; R27, Gulf of Carpentaria/Torres Strait; R28, Pacific Ocean; R29, Antarctic Region; R30, Southern Ocean.

Taxonomic catalogue

Class: Lobosea [amoebae with lobose pseudopods]
Subclass: Testacealobosa [testate lobosea, with test (shell) enclosing body]
Unspecified 'shelled amoebae'; NR; freshwater; R4; 38
Order: Arcellinida Kent, 1880 [test proteinaceous or agglutinated]
Suborder: Arcellina Haeckel, 1894 [test membranous or chitinoid; pseudopodia digitate]
Family: Microcoryciidae de Saedeleer, 1934 [proteinaceous flexible test, no areoles]
Microcorycia Cockerell, 1911
Microcorycia flava (Greef, 1866) Penard, 1902; NR; soil; R10 (33)
Family: Microchlamyiidae Ogden, 1985 [proteinaceous flexible test, areolate surface]
Microchlamys Cockerell, 1911
Microchlamys patella (Claparede & Lachmann, 1859) Cockerell, 1911; NR; freshwater; R4 (26)
Pseudochlamys Claparede & Lachmann, 1960 [= *Microchlamys*]
Pseudochlamys patella Claprede & Lachmann, 1859; 45-48 x 45-48 x 10 μm; freshwater; R1 (30)
Family: Arcellidae Ehrenberg, 1843 [proteinaceous rigid test, areolate surface]
Arcella Ehrenberg, 1832; NR; freshwater, soil; RU, R2, R3, R4 (1, 2, 19, 31, 39, 45, 50, 53)
Arcella angulosa Perty, 1852; NR; freshwater; R1 (14)
Arcella arenaria Greef, 1866; NR; freshwater, moss, soil; R3, R4, R10 (6, 26, 33)
Arcella artocrea Leidy, 1879; NR; freshwater; R1 (15)
Arcella catinus Penard, 1890; 73-200 x 73-200 x 22-46 μm; freshwater; RU, R1, R3 (6, 26, 28, 30, 41)
Arcella catinus australis Playfair, 1918; 122 x 122 x 46 μm; freshwater; R1 (30)
Arcella conica (Playfair, 1918) Deflandre, 1926; 50-80 x 50-80 x 31-66 μm; freshwater; RU (8, 28)
Arcella costata Ehrenberg, 1847; 64 x 64 x 44 μm; freshwater; R1 (8, 30)
Arcella costata angulosa (Perty, 1852) Playfair, 1918; 60-92 x 60-692 x 32-58 μm; freshwater; R1 (8, 30)
Arcella costata conica Playfair, 1918 [= *Arcella conica* (Playfair, 1918) Deflandre, 1926 cf. Grospietsch (1972)]; 50-80 x 50-80 x 31-48 μm; freshwater; R1 (30)
Arcella crenata Playfair, 1918; 50-84 x 50-84 x 31-53 μm; freshwater; R1 (8, 30)
Arcella dentata Ehrenberg, 1830; 200 μm; freshwater; R1, R2 (30, 34, 51, 52)
Arcella discoides Ehrenberg, 1830 [= *A. discoidea*]; NR; freshwater, soil; RU, R1, R2 (2, 14, 15, 29, 47, 51, 52)
Arcella discoides foveosa Playfair, 1918; 53-61 x 53-61 x 16-23 μm; freshwater; R1 (8, 51)
Arcella discoides scutelliformis Playfair, 1918; 44-95 x 44-95 x 15-25 μm; freshwater; RU, R1 (8, 30)
Arcella gibbosa Penard, 1890; NR; freshwater; R4 (41)
Arcella gibbosa mitriformis Deflandre, 1928 [= *Arcella mitrata angulata*]; 60-88 x 60-88 x 52-72 μm; freshwater; RU (8)
Arcella hemisphaerica Perty, 1852; 38-68 x 38-68 x 23-42 μm; freshwater, moss; RU, R1, R4 (26, 28, 30)
Arcella hemisphaerica depressa Playfair, 1918; 34-57 x 34-57 x 21-36 μm; freshwater; R1 (8, 30)
Arcella hemisphaerica playfairiana Deflandre, 1928 [= *Arcella mitrata depressa*]; 32-42 x 32-42 x 20-30 μm; freshwater; RU (8)

Arcella megastoma Penard, 1902 [= *Arcella polypora?*]; 51-106 x 51-106 x 19-32 μm; freshwater; R1 (30)
Arcella megastoma alta Playfair, 1918 [= *Arcella megastoma*]; 95-160 x 95-160 x 42-53 μm; freshwater; RU, R1, R4 (8, 26, 30)
Arcella mitrata Leidy, 1879; NR; freshwater; R1, R2 (15, 21)
Arcella mitrata angulata Playfair, 1918 [= *Arcella angulata* (Playfair, 1918) Deflandre, 1951 cf. Grospietsch (1972)]; 72 x 72 x 59 μm; freshwater;R1 (30)
Arcella mitrata depressa Playfair, 1918; 32-42 x 32-42 x 20-30 μm; freshwater; R1 (30)
Arcella papyracea Playfair, 1914; 60-80 x 60-80 x 32 μm; freshwater; RU, R1 (8, 29)
Arcella rotundata Playfair, 1918; 47-54 x 47-54 x 25-30 μm; freshwater; RU, R1 (8, 30)
Arcella rotundata alta Playfair, 1918; 36-53 x 36-53 x 22-32 μm; freshwater; RU, R1 (8, 30)
Arcella rotundata scrobiculata Playfair, 1918; 38-60 x 38-60 x 23-35 μm; freshwater; RU, R1 (8, 30)
Arcella rotundata stenostoma Deflandre, 1928; NR; moss; R4 (26)
Arcella vulgaris Ehrenberg, 1830; 72-145 x 100-145 x 46-73 μm; freshwater, moss; RU, R1, R2, R3, R4 (3, 4, 14, 15, 22, 28, 29, 30, 32, 34, 36, 37, 41, 46, 51, 52)
Arcella vulgaris depressa Playfair, 1918; NR; freshwater, moss; R4 (26)
Arcella vulgaris discoides Leidy, 1879; NR; freshwater; RU (34)
Arcella sp. a; NR; freshwater; R4 (41)
Arcella sp. b; NR; freshwater; R4 (41)
Leptocystis Playfair, 1918
Leptocystis arcelloides Playfair, 1918; 20 x 20 x 19 μm; freshwater; R1 (30)
Pyxidicula Ehrenberg, 1838
Pyxidicula operculata (Agardh, 1827) Ehrenberg, 1838; NR; moss; R3 (6)
Pyxidicula scutella Playfair, 1918; 16-22 x 16-22 x 8 μm; freshwater; R1 (30)
Pyxidicula scutella alta Playfair, 1918; 20 x 20 x 10 μm; freshwater; R1 (30)

Suborder: Difflugina Meisterfeld, 2000 [agglutinated tests with xenosomes or idiosomes; pseudopodia digitate]

Family: Difflugidae Wallich, 1864 [test composed mainly of mineral particles]

Cucurbitella Penard, 1902; NR; freshwater; R4 (4)
Cucurbitella australica Playfair, 1918; 19 x 15 μm; freshwater; RU, R1 (13, 30)
Cucurbitella tricuspis Carter, 1856; NR; freshwater; R2 (5)
Difflugia Leclerc, 1815; NR; freshwater, moss, soil; RU, R2, R3, R4 (1, 2, 6, 18, 19, 20, 21, 31, 39, 50, 53)
Difflugia aculeata Ehrenberg, 1832; NR; freshwater; RU (34)
Difflugia acuminata Ehrenberg, 1838; 100-300 x 35-120 μm; freshwater, soil; RU, R1, R2, R4, R10 (14, 21, 26, 28, 30, 33, 34, 41, 51, 52)
Difflugia acuminata bacillifera Playfair, 1914; 110 x 70 μm; freshwater; R1 (29)
Difflugia acuminata levanderi Playfair, 1914; 190 x 60 μm; freshwater; R1 (29, 30)
Difflugia ampullula Playfair, 1918; 72-89 x 52-65 μm; freshwater; R1 (30)
Difflugia arcula Leidy, 1879; NR; moss; RU (32)
Difflugia australis (Playfair, 1918) Gauthier-Lievre & Thomas, 1958 [= *Difflugia bacillariarum australis*]; NR; freshwater; RU (12)
Difflugia bacillariarum Perty, 1849 [= *Difflugia acuminata bacillifera*]; 67-200 x 40-84 μm; freshwater; RU, R1 (28, 30)

Difflugia bacillariarum australis Playfair, 1918; 100-120 x 57-72 μm; freshwater; R1 (30)
Difflugia bicornis Penard, 1890; NR; freshwater; R4 (41)
Difflugia brevicolla Cash & Hopkinson, 1909; 112 x 106 μm; freshwater; R1 (30)
Difflugia casinoensis Playfair, 1914; 48 x 40 μm; freshwater; R1 (29)
Difflugia constricta (Ehrenberg, 1841) Leidy, 1879; 55-72 x 39-57 μm; freshwater, moss; RU, R1 (30, 32)
Difflugia constricta spinifera Playfair, 1918; 87 x 72 μm; freshwater; R1 (30)
Difflugia corona Wallich, 1864; 144 x 156 μm; freshwater; R1, R2, R4, R8 (5, 21, 27, 30, 39, 40, 46, 49, 51, 52)
Difflugia corona foleyana Playfair, 1918; 133 x 140 μm; freshwater; R1 (30)
Difflugia distenda Ogden, 1983; NR; freshwater; R4 (41)
Difflugia elegans Penard, 1890; NR; freshwater; R8 (49)
Difflugia gibberosa Playfair, 1918; 82-100 x 72-84 μm; freshwater; R1 (30)
Difflugia globulosa Dujardin, 1837; NR; freshwater, moss, soil; R1, R2, R3, R4 (14, 26, 32, 34, 35, 41, 51, 52)
Difflugia globulus cashii Playfair, 1918; 21-30 x 19-31 μm; freshwater; R1 (30)
Difflugia gramen Penard, 1902; 53-98 x 42-95 μm; freshwater; RU, R1, R2, R4 (21, 26, 28, 30)
Difflugia helvetica (Heuscher, 1885) Playfair, 1918; NR; freshwater; RU (12)
Difflugia helvetica lithophila (Penard, 1902) Playfair, 1918; 60 x 55 μm; freshwater; R1 (30)
Difflugia labiosa Wailes, 1919; NR; freshwater; R4 (41)
Difflugia lacustris Penard, 1890; NR; freshwater; R4 (26)
Difflugia lebes Penard, 1890; NR; freshwater; R4 (41)
Difflugia levanderi Playfair, 1918; 78-140 x 51-95 μm; freshwater; RU, R1 (12, 30)
Difflugia linearis Penard, 1890; NR; NR; R4 (26)
Difflugia lismorensis Playfair, 1918; 115-150 x 100-133 μm; freshwater; RU, R1, R2, R4 (12, 21, 27, 30, 40)
Difflugia lismorensis crucifera Playfair, 1918; 120-137 x 105-123 μm; freshwater; R1 (30)
Difflugia lismorensis trilobulata Playfair, 1918; 85-90 x 78-90 μm; freshwater; R1 (30)
Difflugia lithophilia (Penard, 1902) Gauthier-Lievre & Thomas, 1958 [= *Difflugia helvetica lithophila*]; NR; freshwater; RU (12)
Difflugia lithoplites pulcherrima Playfair, 1918; 70-100 x 60-90 μm; freshwater; R1 (30)
Difflugia lobostoma Leidy, 1874; 60-100 x 40-82 μm; freshwater, moss, soil; R1, R3 (14, 30, 34, 35)
Difflugia lobostoma globulus Playfair, 1918; 63-125 x 59-110 μm; freshwater; RU, R1 (12, 30)
Difflugia lobostoma truncata Playfair, 1918; 55-67 x 49-59 μm; freshwater; R1 (30)
Difflugia lucida Penard, 1890; NR; freshwater, moss, soil; R4, R10 (26, 33)
Difflugia manicata Penard, 1902; 80 x 55 μm; moss, soil; R3 (35)
Difflugia mitrata Playfair, 1918; 21-24 x 19-26 μm; freshwater; R1 (30)
Difflugia mitrata major Playfair, 1918; 42 x 36 μm; freshwater; R1 (30)
Difflugia oblonga Ehrenberg, 1832; NR; freshwater; R1, R2, R4 (5, 14, 41)
Difflugia oviformis Cash & Hopkinson, 1909; 65-120 x 30-90 μm; freshwater; RU, R1 (12, 28, 30)
Difflugia oviformis mollis Playfair, 1918; 72-74 x 47-58 μm; freshwater; R1 (30)

Difflugia oviformis subglobosa Playfair, 1918; 57-100 x 44-90 μm; freshwater; RU, R1 (12, 30)
Difflugia penardi Cash & Hopkinson, 1909; 60-94 x 30-54 μm; freshwater; RU, R1, R4 (26, 28, 30, 41)
Difflugia pulcherrima (Playfair, 1918) Gauthier-Lievre & Thomas, 1958 [= *Difflugia lithoplites pulcherrima*]; 85 x 74 μm; freshwater; RU (12)
Difflugia protaeiformis Lamarck, 1816; NR; freshwater; R2 (5)
Difflugia pulex Penard, 1906; 24-42 x 16-24 μm; freshwater; R1 (30)
Difflugia pulex cuneata Playfair, 1918; 30-42 x 15-25 μm; freshwater; R1 (30)
Difflugia pyriformis Perty, 1848; NR; freshwater, moss; R1, R2 (3, 22, 32, 34, 37; 51, 52)
Difflugia pyriformis compressa Carter, 1864; NR; freshwater; R1 (34, 51)
Difflugia pyriformis cornuta Leidy, 1879; NR; freshwater; R1 (34, 51)
Difflugia pyriformis vas Leidy, 1879; NR; freshwater; R1 (34, 51)
Difflugia richmondiae Playfair, 1914; 14 x 12 μm; freshwater; R1 (29)
Difflugia tuberculata (Wallich, 1864) Archer, 1867; 102-140 x 98-140 μm; freshwater; RU, R3 (4, 28)
Difflugia tuberculata coronata Playfair, 1918; 127 x 127 μm; freshwater; R1 (30)
Difflugia tuberculata nodosa Playfair, 1918; 100-132 x 90-120 μm; freshwater; R1 (30)
Difflugia tuberculata sphaerica Playfair, 1918; 115-127 x 104-118 μm; freshwater; R1 (30)
Difflugia urceolata Carter, 1864; 180-394 x 150-426 μm; freshwater; RU, R1, R2, R4 (5, 28, 30, 34, 39, 51, 52)
Difflugia urceolata amphora Leidy, 1874; 200 x 158 μm; freshwater; R1 (30)
Difflugia urceolata minor Stepanek, 1963; NR; moss; R3 (6)
Difflugia urceolata sphaerica Playfair, 1918; 250-300 x 250-300 μm; freshwater; RU, R1 (12, 30)
Difflugia varians Penard, 1902; 133 x 76 μm; freshwater; R1, R4 (30, 41)
Difflugia sp. a; NR; freshwater; R4 (41)
Difflugia sp. b; NR; freshwater; R4 (41)
Lagenodifflugia Medioli & Scott, 1983
Lagenodifflugia vas (Leidy, 1874) Medioli & Scott, 1983; NR; freshwater; R4 (26)
Pontigulasia Rhumbler, 1896; NR; moss; R2 (18)
Pontigulasia compressa (Carter, 1864) Cash, 1905; NR; freshwater; R2 (5)
Schwabia Jung, 1942
Schwabia terricola thomasi Bonnet, 1976; NR; soil; R10 (33)
Zivkovicia Ogden, 1987; NR; freshwater; R3 (50)
Zivkovicia compressa (Carter, 1864) Cash & Hopkinson, 1909; NR; freshwater, moss; R4 (26, 41)

Family: Centropyxidae Jung, 1942 [subterminal invaginated aperture, plagiostomy]
Centropyxis Stein, 1857; NR; freshwater, moss, soil; R2, R3, R4 (16, 21, 31, 39, 50, 53)
Centropyxis aculeata (Ehrenberg, 1830) Stein, 1859; NR; freshwater, moss; R1, R2, R4 (5, 14, 26, 29, 30, 32, 37, 46, 51, 52)
Centropyxis aculeata ecornis (Ehrenberg, 1841) Leidy, 1879; NR; freshwater; R1 (29, 30)
Centropyxis aerophila Deflandre, 1929; NR; moss, soil; R3, R4 (6, 26, 42)
Centropyxis aerophila constricta Decloitre, 1962; NR; moss; R3 (6)
Centropyxis aerophila sphagnicola Deflandre, 1929; NR; moss; R3 (6)
Centropyxis arcelloides Penard, 1902; 59 x 59 x 42 μm; freshwater; R1 (30)
Centropyxis cassis (Wallich, 1864) Deflandre, 1929; NR; freshwater, moss; R3 (6, 41)

Centropyxis cassis spinifera (Playfair, 1918) Deflandre, 1929 [= *Difflugia constricta spinifera*]; 87 x 72 μm; freshwater; RU (9)
Centropyxis constricta (Ehrenberg, 1841) Penard, 1902; NR; freshwater, moss; R2, R3 (5, 6, 26)
Centropyxis constricta gigas (Ehrenberg, 1841) Decloitre, 1978; 250 μm; moss; RU, R3 (6, 7)
Centropyxis cryptostoma Bonnet, 1959; 42-48 x 28-35 x 20-27 μm; soil; R1 (23)
Centropyxis deflandriana Bonnet, 1959; NR; moss, soil; R4 (26)
Centropyxis ecornis (Ehrenberg, 1841) Leidy, 1879; 191-262 x 182-254 x 82-116 μm; freshwater, moss; RU, R1, R2, R4 (14, 26, 28, 46)
Centropyxis elongata (Penard, 1890); NR; soil; R4 (26)
Centropyxis laevigata Penard, 1890; 65-70 x 65-70 x 42-51 μm; freshwater; R1 (30)
Centropyxis minuta Deflandre, 1929; NR; moss; R3 (6)
Centropyxis orbicularis Deflandre, 1929; NR; moss, soil; R3 (6, 16)
Centropyxis plagiostoma Thomas & Bonnet, 1955; NR; soil; R4 (26)
Centropyxis sphagnicola Deflandre, 1929; NR; freshwater, moss, soil; R4 (26)
Centropyxis sylvatica Deflandre, 1929; NR; freshwater, moss, soil; R3 (6, 26)
Centropyxis sp. a; NR; freshwater; R4 (41)
Centropyxis sp. b; NR; freshwater; R4 (41)
Echinopyxis Claparede & Lachmann, 1860
Echinopyxis australis Lendenfeld, 1885; NR; freshwater; R2 (3, 22)

Family: Trigonopyxidae Loeblich & Tappan, 1964 [invaginated lobed aperture]
Cyclopyxis Deflandre, 1929; NR; freshwater; R3 (50)
Cyclopyxis aplanata minima Decloitre, 1964; NR; moss; R3 (6)
Cyclopyxis arcelloides (Penard, 1902) Deflandre, 1929; NR; moss, soil; R3, R10 (6, 33)
Cyclopyxis eurystoma Deflandre, 1929; NR; moss, soil; R3 (6)
Cyclopyxis eurystoma aplanata Decloitre, 1964; NR; moss, soil; R3 (6)
Cyclopyxis kahli (Deflandre, 1929) Deflandre, 1929; NR; freshwater, soil; R4 (26)
Cyclopyxis plattum Decloitre, 1964; NR; moss; R3 (6)
Ellipsopyxella Bonnet, 1975; 55 x 35 x 20 μm; moss, soil; R3 (35)
Trigonopyxis Penard, 1912
Trigonopyxis arcula (Leidy, 1879) Penard, 1912; NR; moss, soil; R3, R4 (6, 26, 35)
Trigonopyxis arcula major Chardez, 1960; NR; moss; R3 (6)

Family: Plagiopyxidae Bonnet & Thomas, 1960 [invaginated slit-like aperture]
Bullinularia Deflandre, 1953; NR; freshwater; R3 (50, 53)
Bullinularia foissneri Meisterfeld, 2008; 143-207 x 141-200 x 108-161 μm; humus; R4 (25)
Bullinularia gracilis Thomas, 1959; 112-169 x 128-192 x 83-118 μm; moss, soil; R1, R3 (16, 23)
Bullinularia indica (Penard, 1907) Deflandre, 1953; NR; freshwater, moss; R2, R3 (5, 6)
Bullinularia sp.; NR; soil; R4 (26)
Plagiopyxis Penard, 1910; NR; freshwater, moss, soil; R3 (35, 50)
Plagiopyxis callida Penard, 1910; 67-84 x 73-87 μm; moss, soil; RU, R3, R4 (16, 26, 48)
Plagiopyxis declivis Bonnet & Thomas, 1955; NR; soil; R4 (26)
Plagiopyxis intermedia Bonnet, 1959; NR; soil; R4 (26)
Plagiopyxis labiata Penard, 1910; 66-78 x 66-78 μm; moss, soil; RU, R3, R4 (6, 26, 48)

Family: Lesquereusiidae Jung, 1942 [test with siliceous rods or plates, asymmetric neck]

Lesquereusia Schlumberger, 1845 [= *Lecquerensia* = *Lecquereusia*]; NR; freshwater; R3 (50, 53)
Lesquereusia carinata Playfair, 1918; 133 x 100 μm; freshwater; R1 (30)
Lesquereusia modesta Rhumbler, 1895; NR; freshwater, moss; R4 (26, 41)
Lesquereusia spiculosa Playfair, 1918; 108 x 127 μm; freshwater; R1 (30)
Lesquereusia spiralis (Ehrenberg, 1840) Butschli, 1880; 89-120 x 86-109 x 62-84 μm; freshwater; RU, R2, R4, R8 (3, 4, 19, 22, 28, 34, 40, 46, 49)
Lesquereusia spiralis caudata Playfair, 1918; 127-174 x 106-123 μm; freshwater; R1 (30)
Lesquereusia spiralis inaequalis Playfair, 1918; 91 x 91 μm; freshwater; R1 (30)
Lesquereusia sp.; NR; freshwater; R4 (41)
Netzelia Ogden, 1979; NR; freshwater; R3 (50)
Netzelia oviformis (Cash & Hopkinson, 1909) Ogden, 1979; NR; freshwater; R4 (26, 41)
Netzelia tuberculata (Wallich, 1864) Netzel, 1983; NR; freshwater; R2 (21)
Quadrulella Cockerell, 1909 [= *Quadrula*]
Quadrulella symmetrica (Wallich, 1863) Schulze, 1875; NR; freshwater, moss; R4 (26)
Quadrulella symmetrica longicollis Taranek, 1882; 95-130 x 48-72 μm; freshwater; R1, R4 (26, 30)

Family: Hyalospheniidae Schultze, 1877 [organic proteinaceous test, round aperture]
Hylaosphenia Stein, 1859; NR; freshwater; R3 (50)
Hyalosphaenia subflava Cash & Hopkinson, 1909; NR; moss; R4 (26)
Hyalosphenia coogeana Playfair, 1918; 157 x 70 μm; freshwater; R1 (30)
Hyalosphenia nobilis compressa Playfair, 1918; 154-175 x 70 μm; freshwater; R1 (30)
Hyalosphenia subflava Cash & Hopkinson, 1909; 45-87 x 30-90 x 24-26 μm; freshwater; RU (28)

Family: Heleoperidae Jung, 1942 [terminal slit-like aperture]
Heleopera Leidy, 1879; NR; freshwater; R3 (50)
Heleopera humicola Bonnet & Thomas, 1955; NR; soil; R10 (33)
Heleopera rosea Penard, 1890; NR; moss; R4 (26)
Heleopera sphagni (Leidy, 1874) Cash & Hopkinson, 1909; 80-145 x 50-120 x 42-51 μm; freshwater; RU (28)
Heleopera sylvatica Penard, 1890; 59-70 x 39-48 μm; freshwater, moss, soil; R2, R4, R10 (23, 26, 33)

Family: Nebelidae Taranek, 1882 [test with collected round-oval plates]
Alocodera Jung, 1942; NR; freshwater; R3 (50)
Apodera Loeblich & Tappan, 1961; NR; freshwater; R3 (50)
Apodera vas Certes, 1888 [syn. *Nebela vas*]; NR; freshwater, moss, soil; RU, R3, R4 (11, 26, 35, 43, 44)
Argynnia Vucetich, 1974; NR; freshwater; R3 (50)
Argynnia antarctica Grospietsch, 1971; NR; moss; R4 (26)
Argynnia vitraea sphagni Penard, 1911; 95 x 75 μm; moss, soil; R3, R4 (26, 35)
Argynnia dentistoma Penard, 1890; NR; moss; R4 (26)
Certesella Loeblich & Tappan, 1961; NR; freshwater; R3 (50)
Certesella certesi Penard, 1911; NR; moss, soil; R3, R4 (26, 35)
Certesella martiali Certes, 1889; 147-175 x 75-100 μm; moss, soil; R3 (35)
Nebela Leidy, 1874; NR; freshwater; R3 (50)
Nebela barbata psilonota Jung, 1942; NR; freshwater; R4 (26)
Nebela bohemica Taranek, 1882; NR; NR, moss; R3 (6, 42)
Nebela bursella Vejdovsky, 1882; NR; moss; RU (32)

Nebela caudata Leidy, 1879; 76-90 x 58-70 μm; freshwater, moss; RU, R1 (10, 30)
Nebela certesi Penard, 1911; 145-150 μm; moss, soil; RU, R2, R3 (6, 10, 42, 47)
Nebela cockayni (Penard, 1910) Wailes, 1913; 89-115 x 45-55 μm; moss, soil; RU, R2 (10, 47)
Nebela collaris (Ehrenberg, 1848) Leidy, 1879; NR; moss; RU, R3 (6, 32)
Nebela dentistoma Penard, 1890; 81-115 x 58-90 x 40-59 μm; freshwater, moss; RU, R3 (6, 28, 42)
Nebela dentistoma hesperia Wailes, 1913; NR; moss; R3 (6)
Nebela dentistoma lageniformis Playfair, 1918; 126 x 90 μm; freshwater; R1, R3 (30, 42)
Nebela griseola Penard, 1911; 70-88 x 50-69 x 45-51 μm; freshwater, moss; RU (10, 28)
Nebela lageniformis Penard, 1890; NR; freshwater, moss, soil; R3, R4 (6, 26, 35)
Nebela martiali Certes, 1889; 155-170 x 95-91 μm; moss; RU, R3 (6, 10, 42)
Nebela militaris Penard, 1890; 70 x 35 μm; moss, soil; R3 (35)
Nebela militaris tubulata Brown, 1911; 60-64 x 26-30 μm; freshwater; R1 (30)
Nebela minor Penard, 1902; 95 x 62 μm; moss, soil; R3 (35)
Nebela parvula Cash, 1908; 80 x 60 μm; moss, soil; R3 (35)
Nebela speciosa Deflandre, 1936; NR; moss; R4 (26)
Nebela tincta major Penard, 1902; 112 x 70 μm; moss, soil; R3 (35)
Nebela tubulata Brown, 1911; 55-74 x 28-48 x 15-17 μm; freshwater, moss, soil; RU, R3, R4 (26, 28, 35)
Nebela tubulosa Penard, 1902; NR; NR, moss; R3 (6, 42)
Nebela vas Certes, 1889; 150-170 x 85-103 μm; moss; RU, R3 (6, 10, 32, 42)
Nebela wailesi Deflandre, 1936; 75-100 x 52-58 μm; moss; RU (10)
Nebela wellingtonia Decloitre, 1964; NR; NR, moss; R3 (6, 42)
Porosia Jung, 1942; NR; freshwater; R3 (50)
Porosia bigibbosa Penard, 1890; NR; moss, soil; R3 (35)
Schoenbornia Decloitre, 1964
Schoenbornia humicola (Schonborn, 1964) Decloitre, 1964; moss, soil; R3 (35)

Suborder: Phryganellina Bovee, 1985 [agglutinated tests; pseudopodia conical]

Family: Cryptodifflugidae Jung, 1942 [hyaline tests, aperture terminal or eccentric]

Cryptodifflugia Penard, 1890; NR; moss, soil; R3 (35)
Cryptodifflugia angulata Playfair, 1918; 13-14 x 10 μm; freshwater; RU, R1 (17, 30)
Cryptodifflugia compressa Penard, 1890; 13-21 x 9-21 μm; freshwater, moss, soil; RU, R1, R3 (17, 30, 33, 35)
Cryptodifflugia compressa australis Playfair, 1918; 16-19 x 18-21 μm; freshwater; RU, R1 (17, 30)
Cryptodifflugia compressa ovata Playfair, 1918; 19 x 17-18 μm; freshwater; RU, R1 (17, 30)
Cryptodifflugia crenulata Playfair, 1918; 17-20 x 14-16 μm; freshwater; R1 (30)
Cryptodifflugia crenulata globosa Playfair, 1918; 17-20 x 15-18 μm; freshwater; R1 (30)
Cryptodifflugia minuta Playfair, 1918; 10-13 x 8-9 μm; freshwater; R1 (30)
Cryptodifflugia oviformis Penard, 1890; 13-26 x 8-18 μm; freshwater, moss, soil; RU, R1, R3 (28, 30, 35)
Cryptodifflugia pusilla Playfair, 1918; 10 x 10 μm; freshwater; R1 (30)
Cryptodifflugia pusilla conica Playfair, 1918; 12 x 10 μm; freshwater; R1 (30)
Cryptodifflugia sacculus Penard, 1902; 23-30 x 17-22 μm; freshwater, moss; R1, R4 (26, 30)
Cryptodifflugia valida Playfair, 1918; 55 x 40 μm; freshwater; R1 (30)

Difflugiella Cash, 1904 [syn. *Cryptodifflugia*]; NR; freshwater; R3 (53)
Difflugiella crenulata globosa (Playfair, 1918) Grospietsch (1964); 17-20 x 15-18 μm; freshwater; RU (17)
Difflugiella crenulata (Playfair, 1918) Grospietsch (1964); 17-20 x 14-16 μm; freshwater; RU (17)
Difflugiella minuta (Playfair, 1918) Grospietsch (1964); 10-13 x 8-9 μm; freshwater; RU (17)
Difflugiella oviformis fusca (Penard, 1890) Bonnet & Thomas, 1955; NR; soil; R10 (33)
Difflugiella oviformis Penard, 1890; NR; soil; R10 (33)
Difflugiella pusilla conica (Playfair, 1918) Grospietsch (1964); 12 x 10 μm; freshwater; RU (17)
Difflugiella pusilla (Playfair, 1918) Grospietsch (1964); 10 x 10 μm; freshwater; RU (17)
Difflugiella sacculus (Penard, 1890) Deflandre, 1902; 16-30 x 15-22 μm; soil; RU, R10 (17, 33)
Family: Phryganellidae Jung, 1942 [agglutinated tests, mineral particles in organic matrix]
Phyrganella Penard, 1902; NR; moss, soil; R3, R10 (33, 35)
Phryganella acropodia (Hertwig & Lesser, 1874) Cash & Hopkinson, 1909; 38-54 x 21-30 μm; freshwater, moss, soil; R1, R3, R4, R10 (6, 26, 30, 33, 35)
Phryganella acropodia australica Playfair, 1918; 42-63 x 28-33 μm; freshwater; R1 (30)
Phryganella acropodia depressa Playfair, 1918; 40-46 x 23-31 μm; freshwater; R1, R4 (26, 30)
Phryganella acropodia penardi Decloitre, 1955; NR; freshwater, moss, soil; R4 (26)
Incertae sedis [in order Arcellinida]
Pseudawerintzewia Bonnet, 1959
Pseudawerintzewia calcicola Bonnet, 1959; NR; soil; R10 (33)

Class: Filosea [amoebae with filose pseudopodia]
Subclass: Testaceafilosia de Saedeleer, 1934 [testate filosea, with test (shell) enclosing body]
Family: Chlamydophoridae de Saedeleer, 1934 [flexible test or inner flexible sac]
Chlamydophrys Cienkowsky, 1876
Chlamydophrys sp.; NR; soil; R10 (33)
Diaphoropodon Archer, 1869
Diaphoropodon pyriforme Playfair, 1918; 67-82 x 53-59 μm; freshwater; R1 (30)
Lecythium Hertwig & Lesser, 1874; NR; freshwater; R3 (53)
Family: Pseudodifflugiidae de Saedeleer, 1934 [terminal aperture]
Pseudodifflugia Schlumberger, 1845
Pseudodifflugia fascicularis Penard, 1902; NR; soil; R10 (33)
Pseudodifflugia fulva (Archer, 1870) Penard, 1901; 15-36 x 11-30 μm; freshwater; RU, R1 (28, 30)
Pseudodifflugia gracilis Schlumberger, 1645; 27-47 x 18-34 μm; freshwater; R1 (30)
Pseudodifflugia microstoma Playfair, 1918; 30-31 x 17-23 μm; freshwater; R1, R4 (26, 30)
Pseudodifflugia microstoma obesa Playfair, 1918; 44 x 38 μm; freshwater R1 (30)
Pseudodifflugia senartensis Couteaux, 1972; NR; soil; R10 (33)
Family: Psammonobiotidae Golemansky, 1974 [aperture funnel-like or with discoid collar]
Edaphonobiotus Schonborn *et al*., 1983
Edaphonobioticus campascoides Schonborn, Foissner & Meisterfield, 1983; NR; freshwater, moss; R4 (26)
Incertae sedis [in subclass Testaceafilosia]

Frenzelina Penard, 1902

Frenzelina globosa Playfair, 1918; 21-25 x 21-25 x 17-19 μm; freshwater; R1 (30)

Order: Euglyphida Copeland, 1956 [siliceous test composed of secreted plates]

Family: Euglyphidae Wallich, 1864 [round-elliptical plates; terminal aperture]

Assulina Leidy, 1879; NR; freshwater; R3 (53)

Assulina muscorum Greef, 1888; 38-53 x 26-45 x 16-22 μm; freshwater, moss, soil; R1, R3 (6, 23, 26, 35)

Assulina seminulum (Ehrenberg, 1848) Leidy, 1879; NR; freshwater, moss, soil; R3 (6)

Assulina seminulum scandinavica Penard, 1890; NR; freshwater, moss, soil; R3 (6)

Euglypha Dujardin, 1841; NR; freshwater, moss, soil; R2, R3, R4 (6, 16, 20, 21, 31, 35, 41, 50, 53)

Euglypha acanthophora (Ehrenberg, 1841) Perty, 1849; 53-84 x 28-46 μm; freshwater; RU, R1, R4 (26, 28, 30)

Euglypha acanthophora elliptica Playfair, 1918; 70-90 x 30-47 μm; freshwater; R1 (30)

Euglypha acanthophora gracillima Playfair, 1918; 70-76 x 25-32 μm; freshwater; R1 (30)

Euglypha alveolata Dujardin, 1841; NR; freshwater, moss, R1, R2 (14, 24, 32, 34, 51, 52)

Euglypha alveolata hamulifera Playfair, 1914; 44 x 24 μm; freshwater; R1 (29)

Euglypha alveolata laevis (Perty, 1849) Playfair, 1914; 30-34 x 16 μm; freshwater; R1 (29)

Euglypha anodonta Bonnet, 1960; NR; moss; R4 (26)

Euglypha australica Playfair, 1918; 64-137 x 32-72 μm; freshwater, moss, soil; R1, R3, R4 (26, 30, 35)

Euglypha australica cylindracea Playfair, 1918; 65-133 x 30-76 μm; freshwater; R1 (30)

Euglypha australica elegans Playfair, 1918; 67-137 x 32-72 μm; freshwater; R1 (30)

Euglypha brachiata Leidy, 1878; NR; freshwater; R8 (49)

Euglypha ciliata (Ehrenberg, 1848) Leidy, 1878; 70 x 36 μm; freshwater, moss, soil; RU, R2, R3 (6, 26, 32, 34)

Euglypha ciliata glabra Wailes, 1915; NR; moss; R3 (6)

Euglypha compressa Carter, 1864; 50-132 x 38-80 x 18-35 μm; freshwater, moss, soil; RU, R1, R3, R4 (6, 23, 26, 28, 30, 35)

Euglypha compressa glabra Cash *et al.*, 1915; NR; moss; R4 (6, 26)

Euglypha compressa obscura Playfair, 1918; 42-54 x 25-35 x 18 μm; freshwater, moss, soil; R1, R3 (30, 35)

Euglypha cristata Leidy, 1874; 33-70 x 12-23 μm; freshwater, moss, soil; RU, R1, R3, R4, R10 (14, 26, 28, 30, 33, 35)

Euglypha cristata lanceolata Playfair, 1918; 44 x 17 μm; freshwater; R1 (30)

Euglypha cristata major Wailes, 1911; 74-84 x 21-23 μm; freshwater; R1 (12)

Euglypha cuspidata Bonnet, 1959; NR; soil; R10 (33)

Euglypha dentata Playfair, 1918; NR; soil; R10 (33)

Euglypha dentata elongata Playfair, 1918; 44-51 x 21-25 μm; freshwater; R1 (30)

Euglypha dentata hamulifera Playfair, 1918; 45-60 x 24-38 μm; freshwater; R1 (30)

Euglypha dentisecara Decloitre, 1976; NR; moss; R3 (6)

Euglypha dentisecara glabra Decloitre, 1976; NR; moss; R3 (6)

Euglypha filifera Penard, 1890; 53-70 x 25-35 μm; freshwater, moss, soil; RU, R3, R4 (26, 28, 35)

Euglypha filifera cuneata Playfair, 1918; 57 x 25 μm; freshwater; R1 (30)

Euglypha filifera cylindracea Playfair, 1918; 65-68 x 23-24 μm; freshwater; R1 (30)
Euglypha filifera elegans Playfair, 1918; 57-66 x 25-26 x 18 μm; freshwater; R1 (30)
Euglypha filifera pyriformis Wailes, 1915; 68 x 25 μm; freshwater; R1 (30)
Euglypha laevis (Ehrenberg, 1845) Perty, 1849; 30-55 x 15-30 μm; freshwater, moss, soil; R1, R3, R4, R10 (6, 26, 30, 33, 35)
Euglypha laevis lanceolata Playfair, 1918; 24-34 x 12-16 x 12-13 μm; freshwater; R1 (30)
Euglypha lanceolata [binomen unknown; possibly *E. laevis lanceolata*]; NR; soil; R10 (33)
Euglypha polylepis (Bonnet, 1959) Bonnet & Thomas, 1960; NR; soil; R10 (33)
Euglypha rotunda Wailes & Penard, 1911; NR; freshwater, moss, soil; R3, R4, R10 (6, 26, 33)
Euglypha seminulum (Ehrenberg, 1845) Leidy, 1878; NR; moss; RU (32)
Euglypha strigosa (Ehrenberg, 1871) Leidy, 1878; 45-100 x 30-60 μm; freshwater, moss, soil; RU, R3, R4 (6, 26, 28, 35)
Euglypha strigosa glabra Wailes, 1898; NR; soil; R10 (33)
Euglypha strigosa heterospina (Penard, 1890); NR; freshwater, moss; R4 (26)
Euglypha tuberculata Dujardin, 1841; 45-100 x 24-51 μm; freshwater, moss, soil; RU, R3, R10 (6, 28, 33)
Placocista Leidy, 1879
Placocista ventricosa Thomas & Gauthier-Lievre, 1959; NR; freshwater, moss; R4 (26)
Sphenoderia Schlumberger, 1845; NR; moss, soil; R3 (35)
Sphenoderia australis Playfair, 1918; 57-70 x 32-60 μm; freshwater; R1 (30)
Sphenoderia fissirostris Penard, 1890; 40 x 19 x 19 μm; freshwater, moss, soil; R1, R3, R4 (6, 26, 30, 35)
Sphenoderia fissirostris splendida Playfair, 1918; 40-49 x 22-28 μm; freshwater; R1 (30)
Sphenoderia foveosa Playfair, 1918; 48-63 x 35-45 x 34 μm; freshwater; R1 (30)
Sphenoderia foveosa tenuis Playfair, 1918; 60 x 42 μm; freshwater; R1 (30)
Sphenoderia lenta Schlumberger, 1845; NR; freshwater, moss; R4 (26)
Sphenoderia macrolepis Leidy, 1879; 32 x 23 μm; freshwater, moss, soil; R1, R3 (30, 35)
Sphenoderia sphaerica Playfair, 1918; 57-63 x 57 x 53 μm; moss; R1 (30)
Sphenoderia splendida Playfair, 1918; NR; moss; R4 (26)
Trachelocorythion Bonnet, 1979
Trachelocorythion pulchellum (Penard, 1890) Bonnet, 1979; moss, soil; R3 (35)
Tracheleuglypha Deflandre, 1928
Tracheleuglypha acolla Bonnet & Thomas, 1955; NR; soil; R10 (33)
Tracheleuglypha dentata (Vejdovsky, 1882) Deflandre, 1928; NR; freshwater, moss, soil; R3, R4, R10 (26, 33, 35)
Tracheleuglypha pulchellum [binomen unknown; possibly *Trachelocorythion pulchellum*]; NR; moss; R4 (26)
Valkanovia Valkanov, 1962
Valkanovia delicatula (Valkanov, 1962) Tappan, 1966; NR; freshwater, moss; R4 (26)

Family: Trinematidae Hoogenraad & De Groot, 1940 [ecentric aperture, bordered by denticular plates]

Corythion Taranek, 1881; NR; freshwater, moss, soil; R3 (35, 50)
Corythion aerophila (Decloitre, 1950) Decloitre, 1964; NR; moss; R3 (6)
Corythion aerophila gigas Decloitre, 1964; NR; moss; R3 (6)
Corythion asperulum Schonborn, 1988 in: Schonborn & Peschke, 1988; 32-48 x 23-36 x 13-22 μm; soil; R1 (23)

Corythion constricta (Certes, 1888) Certes, 1889 [= *Trinema constricta* Certes, 1889]; NR; soil; R4 (26)
Corythion dubium Taranek, 1882; NR; moss, soil; R3, R4 (6, 26, 35)
Corythion dubium aerophila Decloitre, 1950; NR; freshwater, soil; R4 (26)
Corythion dubium gigas Thomas, 1955; NR; moss; R3 (6)
Corythion dubium orbicularis Penard, 1910; NR; moss; R3 (6)
Corythion dubium pyriformis Decloitre, 1964; NR; moss; R3 (6)
Playfairina Thomas, 1961; NR; NR; RU (11)
Playfairina caudata (Playfair, 1918) Thomas, 1961 [= *Trinema caudatum*]; NR; freshwater, moss, soil; R3, R4 (26, 35)
Playfairina valkanovi Golemansky, 1966; NR; freshwater, moss, soil; R3, R4 (26, 35)
Trinema Dujardin, 1841; NR; freshwater; R3 (50, 53)
Trinema caudatum Playfair, 1918 [syn. *Playfairina caudata*]; 100 x 25 μm; freshwater; R1 (30)
Trinema complanatum Penard, 1890; NR; freshwater, moss, soil; R3, R4, R10 (6, 26, 33, 35)
Trinema enchelys (Ehrenberg, 1838) Leidy, 1878; 28 x 12 μm; freshwater, moss, soil; R1, R2, R3, R4, R10 (6, 14, 26, 33, 34, 35, 51, 52)
Trinema enchelys gigas Chardez, 1960; NR; moss; R3 (6)
Trinema galeata Penard, 1890; NR; moss, soil; R3, R4 (6, 26)
Trinema grandis Chardez, 1960; NR; freshwater, moss; R4 (26)
Trinema lineare Penard, 1890; 18-35 x 7-19 μm; freshwater, moss, soil; RU, R3, R4, R10 (6, 26, 28, 33, 35)
Trinema lineostoma Decloitre, 1964; NR; moss; R3 (6)
Trinema plenum [binomen unknown: possibly *Trinema enchelys* var. *plenum* Kufferath, 1932]; NR; soil; R10 (33)

Family: Cyphoderiidae de Saedeleer, 1934 [eccentric aperture; curved neck]
Cyphoderia Schlumberger, 1845; NR; freshwater; R2, R3 (21, 53)
Cyphoderia trochus Penard, 1899; NR; freshwater; R4 (41)
Cyphoderiopsis Playfair, 1918
Cyphoderiopsis longicollis Playfair, 1918; 76-78 x 29-32 μm; freshwater; R1 (30)

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include all published reports of testate amoebae in Australia in this catalogue (by cross-referencing and reiterative database searches), should readers identify any missing articles, could they please kindly forward the citation to the author for inclusion in the electronic version of the catalogue.