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BY T. HARVEY JOHNSTON

Summary

The outstanding contributor to the study of Australian free-living and plantparasitic nematodes was the late N. A. Cobb, who was for many years associated with the Department of Agriculture in New South Wales. Most of his work relating to our subject appeared in the Agricultural Gazette of that State (1890- 1902) ; the Proceedings of the Linnean Society of New South Wales (1890- 1898) ; and in the Macleay Memorial Volume (1893), published by the latter Society. Many of Cobb's articles in the Gazette were re-issued as Miscellaneous Publications by the Department, as also was his important paper on "Nematodes, mostly Australian and Fijian" from the Macleay Volume (Misc. Publ. No. 13).

A CENSUS OF THE FREE-LIVING AND PLANT-PARASITIC NEMATODES RECORDED AS OCCURRING IN AUSTRALIA

By T. HARVEY JOHNSTON, M.A., D.Sc., University of Adelaide

[Read 9 June 1938]

The outstanding contributor to the study of Australian free-living and plant-parasitic nematodes was the late N. A. Cobb, who was for many years associated with the Department of Agriculture in New South Wales. Most of his work relating to our subject appeared in the *Agricultural Gazette* of that State (1890-1902); the *Proceedings of the Linnean Society of New South Wales* (1890-1898); and in the *Macleay Memorial Volume* (1893), published by the latter Society. Many of Cobb's articles in the *Gazette* were re-issued as *Miscellaneous Publications* by the Department, as also was his important paper on "Nematodes, mostly Australian and Fijian" from the *Macleay Volume* (Misc. Publ. No. 13). It was in the publications of the Department that Cobb made known his "nematode formula" (1890, 1893, 1898, 1902), and described his differentiator (1890, 1898) which has since been used so extensively as part of a technique for staining, dehydrating and clearing minute and delicate objects, including free nematodes. His papers included several in the *Proceedings of the Linnean Society of New South Wales* dealing with free nematodes, chiefly marine, from Arabia, Ceylon, the Mediterranean and Western Europe (1890, 1891, 1894). His main article on Australian marine species appeared in 1898. In some of his accounts of plant-parasitic forms (*Agr. Gaz. N.S.W.*; *Macleay Volume*), information is given regarding many species which were not then known to occur in Australia.

In the *Agricultural Gazette*, New South Wales, for 1898 (296-321, 419-454, figs. 1-127), there appeared his "Extract from M.S. Report on the Parasites of Stock." This abundantly illustrated article devotes a great deal of space to free-living species, but, unfortunately, though well figured, there is usually no indication of locality regarding them. Many are known to occur elsewhere than in Australia and, consequently, in the present census there are included only references to the figures of such as are known from information published elsewhere to belong to Australian free-living or plant-parasitic species. Cobb's report was re-published as *Miscellaneous Publication No. 215*, Department of Agriculture, New South Wales (62 pp.), under the same title, but the cover bears the legend, "Nematode Parasites, their Relation to Man and Domesticated Animals." Two new figures were interpolated and numbered 40 and 47; consequently there is an alteration in the numbering of all figures from figure 40 onwards, when compared with that of the original article. In this census, the original pagination and numbering of figures are quoted.

In 1917 (1918) Miss Irwin-Smith published an excellent anatomical paper dealing with some species of Chaetosomatidae from the coast in the vicinity of

Sydney. Allgen (1927) described a number of Tasmanian marine species from the Derwent River, near Hobart (Brown's River), from material collected during the visit of Larsen's Antarctic (Ross Sea) whaling expedition of 1923-4. Michaelsen and Hartmeyer, in their collecting trip to south-western Australia in 1905, obtained very few free nematodes, judging from Steiner's brief account of them (1916). Most of the remaining references relate to observations by various workers concerning a few species of great economic importance, *e.g.*, some of those belonging to *Tylenchus* or *Heterodera* or allied genera.

Many parasitic nematodes (*e.g.*, Strongylata) have a free-living larval stage, while certain others, such as *Rhabdias* and *Strongyloides*, are heterogamic and have a free stage represented by males and females. Reference is made to the few Mermitidae recorded from the Commonwealth, since maturity is attained in the free-living stage. Though the Gordiacea are regarded as only distantly related to true nematodes, the few references to the occurrence of representatives in Australia are included. Plant-parasitic nematodes have received considerable attention from Goodey in his recent book on the group (1933).

The classification utilized in this paper is based mainly on the recent contributions of Filipjev (1934) and of Chitwood and Chitwood (1937). The earliest reference to the presence of free-living nematodes in Australia appears to be that by Whitelegge (Proc. Roy. Soc. N.S.W., 23, 1889, 307), who in his "List of the Marine and Freshwater Invertebrate Fauna of Port Jackson and the Neighbourhood," stated that numerous species of Anguillulidae occurred in the local fresh waters. The earliest records of plant-parasitic species in the Commonwealth seem to be that of Crawford (1881) relating to ear cockle of wheat in South Australia, and that by Bancroft, whose account of a nematode attacking roots of grape vines and bananas in Queensland, led Cobb (1890, 166) to state that the figures seemed to represent *Tylenchus arenarius*. The latter is a synonym of *T. radiculicola* (of authors), more correctly known as *Heterodera marioni*.

Some changes in nomenclature have been made in this paper. *Anguillulina* (*Fergusobia*) *tumifaciens* Currie 1937, pre-occupied by *A. tumefaciens* (Cobb 1932) Goodey, is renamed *A. (F.) curriei*; *Rhabditis allgeni* is proposed for *R. australis* Allgen 1932, nec Cobb 1893; *Monhystera pacifica* for *M. australis* Cobb 1893 (1894), nec Cobb 1893; *Monhystera gracilior* for *M. gracillima* Man 1921, nec Cobb 1893; *M. kreisi* for *M. gracillima* Kreis 1929, nec Cobb 1893, nec Man 1921; *Dorylaimus steinerianus*, for *D. steineri* Thorne and Swanger 1936, nec Micoletzky 1921; *Chromadora cobbiana* for *C. dubia* Cobb 1930, nec Bütschli; *Epsilonematina* for *Epsilonema* Steiner 1931, nec Steiner 1926 (a renaming of *Rhabdogaster* pre-occ.), with type *E. steineri* (Chitwood 1935); *Prochaetosoma* Baylis and Daubney 1926 is pre-occupied by *Prochaetosoma* Micoletzky 1921, and accordingly is replaced by *Epsilonema* Steiner 1926 nec 1931, and the family name Prochaetosomatidae is replaced by Epsilonematidae; Drepanonematidae nom. nov. replaces Chaetosomatidae; *Chaetosoma haswelli* Irwin-Smith and *C. falcatum* Irwin-Smith are transferred to *Tristichoachaeta*.

RHABDITIDAE

Anguillula aceti (Mueller), the vinegar eel-worm. Peters (1927) proposed *Turbatrix* to receive it, but Filipjev (1934) doubted the propriety of the change. Though apparently unrecorded from the Commonwealth, it occurs in Brisbane, Sydney, Melbourne and Adelaide, and probably in other parts of Australia.

Rhabditis australis Cobb, Macleay Volume, 1893, 278, from grass, Sydney, New South Wales. Micoletzky, 1921, 252. In 1932 Allgen described *R. australis* n. sp. (Nyt. Mag., Oslo, B, 70, 1932, 192-4), from Campbell Island; but as the specific name is pre-occupied, *R. allgeni* is now proposed for it.

Rhabditis cylindrica Cobb, Agr. Gaz., N.S.W., 9, 1898, 448, fig. 125. No details are given other than those indicated in Cobb's formula and figure. No locality is mentioned, but it is presumably New South Wales. Micoletzky (1921, 258) stated that Cobb's species was possibly only a variety of *R. strongyloides* Schn.

Rhabditis filiformis Bütschli? Cobb, Macleay Vol., 1893, 276-7, pl. 36, from grass, Sydney; Agr. Gaz., N.S.W., 4, 1893, 832-3, fig. 46, from soil around moss roots, Clarence River. Micoletzky (1921, 263) included Cobb's two queried identifications under *R. filiformis*, but pointed out that the figure in the former publication apparently belonged to the species, whilst that in Agr. Gaz., 1893, fig. 46, is that which Cobb had utilized in the Macleay Volume to illustrate *R. monhystera*. Man (Cap. Zool., 1 (1), 1921, 32) stated that Cobb's species was probably distinct from, though closely related to, Bütschli's, because of differences in the sizes of the eggs and of the genital ducts in the two cases. The Australian species requires re-examination.

Rhabditis minuta Cobb, Agr. Gaz., N.S.W., 4, 1893, 831-2, fig. 45, from roots of sugar cane, Clarence River, New South Wales. Micoletzky, 1921, 257.

Rhabditis monhystera Bütschli. Cobb, Macleay Vol., 1893, 278-9, pl. 38, from grass and celery, Australia. Micoletzky, 1921, 253 (syn. *R. simplex* Cobb), 263 (pointing out that Cobb had in error used his figures of this species to illustrate another species, *R. filiformis*, in Agr. Gaz., N.S.W., 1893, fig. 46).

Rhabditis pellioides Bütschli. Cobb, Macleay Vol., 1893, 277, pl. 38, from fresh grass and dead sheaths of banana plants, Australia and Fiji. Micoletzky, 1921, 257.

Rhabditis simplex Cobb, Agr. Gaz., N.S.W., 4, 1893, 830-1, from soil, Clarence River. Micoletzky, 1921, 253, syn. of *R. monhystera*.

Rhabditis sp. Cobb, Macleay Vol., 1893, 256, from celery. See *R. monhystera*.

Rhabditis spp. Heydon and Green, Med. Jour. Austr., 1931, (1), 626, from cultures made from human faeces, North Queensland; one of these coprophilic species was stated to be near *R. hominis*.

RHABDIASIDAE

Some Australian frogs, especially *Hyla aurea* in New South Wales and Victoria, harbour lung worms, *Rhabdias* sp., which pass through a free-living generation with distinct males and females.

STRONGYLOIDIDAE

Strongyloides stercoralis (Bavay) has been reported from Australian localities, especially in coastal Queensland, the references having been collected in a recent paper by Johnston and Cleland (Tr. Roy. Soc. S. Aust., 61, 1937, 276). *S. papillosus* (Wedl.) has been recorded from sheep, etc., in New South Wales by Ross and his colleagues, and in Queensland by Roberts. It occurs also in sheep in South Australia. The free-living generation of these two species has not received particular attention in the Commonwealth. Heydon and Green (Med. Jour. Austr., 1931, (1), 626) pointed out the probability of the earlier published infection rates for humans in North Queensland being inaccurate because of the common presence of coprophilic *Rhabditis* spp. in stale faeces.

DIPLOGASTERIDAE

Diplogaster australis Cobb, Macleay Vol., 1893, 269, from grass, Sydney. Perhaps synonymous with *D. graminum*. Micoletzky, 1921, 406.

Diplogaster graminum Cobb, Macleay Vol., 1893, 270, from grass, Sydney. perhaps synonymous with *D. australis*. Micoletzky, 1921, 406.

Diplogaster trichuris Cobb, Macleay Vol., 1893, 271-2, fig. 3, from grass, Sydney; p. 256, from celery, Sydney. Cobb, Agr. Gaz., N.S.W., 9, 1898, 311, fig. 28, no locality. Tidswell and Johnston, Rep. Bur. Microbiol., N.S.W., 1909, 71. ? *D. trichuris*, banana, N.S.W. Micoletzky, 1921, 405.

CYLINDROGASTERIDAE

Myctolaimus pellucidus Cobb, Contrib. Sci. Nematology, 9, 1920, 276, from sheep dung, Moss Vale, N.S.W.; genus stated to be near *Cephalobus*; no specimens preserved. Micoletzky (1921, 209-10), as well as Baylis and Daubney (1926), placed the genus in *Cylindrolaiminae*. Filipjev (1934) regarded it as a synonym of *Aulolaimus* (*Diplogasterinae*). Chitwood (Jour. Wash. Acad. Sci., 1933, 512) placed it under *Cylindrogasteridae*.

CEPHALOBIDAE

Acrobeles sp., found in garden soil, Reedbeds, Adelaide.

Cephalobus cephalatus Cobb, Agr. Gaz. N.S.W., 9, 1901, 115-7, fig. 1, roots of passion fruit, Sackville, New South Wales.

Cephalobus multicinctus Cobb, Agr. Gaz. N.S.W., 4, 1893, 829-30, fig. 44, about roots of sugar cane, Clarence River, New South Wales. Micoletzky, 1921, 272, probable syn. of *C. oxyuroides* Man.

Cephalobus similis Cobb, Macleay Vol., 1893, 288-9, lettuce, Sydney. Micoletzky, 1921, 273.

Cephalobus sp. Heydon and Green, Med. Jour. Austr., 1931, (1), 626, from stale human faeces, North Queensland.

ANGUILLULINIDAE (ANGUINIDAE syn. TYLENCHIDAE)

Anguillulina tritici (Steinb.), more commonly known as *Tylenchus tritici*, q.v., also *T. scandens*. Chitwood (1935) has indicated that *Anguina* Scopoli has priority over *Anguillulina*, but Stiles (Nature, 138, 1936, 34; Zool. Anz., 115, 1936, 110) has suggested that in this case priority should be waived.

Anguillulina dipsaci (Kühn), more commonly known as *Tylenchus devastatrix*, q.v. Millikan, Jour. Agr. Vict., 33, 1935, 563-6, bulbs, Victoria. Filipjev (1934) has assigned the species to *Ditylenchus*. Syn., *Tylenchus dipsaci*, q.v.

Anguillulina radiculicola Greef, more commonly known as *Heterodera radiculicola* or *Tylenchus rad.*, q.v. Goodey (1932; 1933) has indicated that the specific name should be restricted to the eel-worm known as *Tylenchus hordei*, whereas the species generally called *T. radiculicola* should be known as *Heterodera marioni* q.v.

Anguillulina (Fergusobia) tumefaciens Currie, Pr. Linn. Soc., N.S.W., 72, 1937, 158-163, figs. 26-28, pl. 6-7, from Eucalyptus galls, associated with an Agromyzid fly, *Fergusonia carteri*, N.S.W. Type of subgenus. Currie has given an excellent account of the nematode, which passes through a free-living stage, with males and females, in leaf galls of *Eucalyptus Stuartiana* and *E. macro-rhyncha* in the vicinity of Canberra. Then there follows a parasitic female generation in the body cavity of the gall flies. Currie also referred to this "symbiotic association between flies and nematodes in galls of eucalypt trees" in Nature, 136, 1935, 263. Unfortunately, the specific name (which should be amended to *tumefaciens*) is pre-occupied in the genus by *A. tumefaciens* (Cobb, 1932) Goodey, 1933, syn. *Tylenchus tumefaciens* Cobb, from galls in the grass, *Cynodon*, in South Africa. Dr. Currie's attention was drawn to this fact, but he has requested the author to undertake renaming, if considered necessary. In recognition of the excellent account of the biology of the species, the latter is here renamed *A. (F.) curriei*.

Anguillulina (Fergusobia) curriei nom. nov. Type of subgenus. See *A. (F.) tumefaciens*.

Aphelenchoides fragariae (Ritzema-Bos), the cause of "cauliflower disease" of strawberry, "red plant," or "strawberry bunch" (Cobb, 1891). Cobb, Agr. Gaz., N.S.W., 2, 1891, 390-400; unnamed nematodes reported as the cause of the disease in New South Wales, the species being described in the same year by Ritzema-Bos as *Aphelenchus fragariae*. Goodey (1933) transferred it to *Aphelenchoides*. The disease occurs in South Australia.

Aphelenchus fragariae. See *Aphelenchoides fragariae*.

Aphelenchus microlaimus Cobb, Agr. Gaz., N.S.W., 2, 1891, 395; Macleay Vol., 1893, 302-3, fig. 10, common in grass, Sydney. Micoletzky, 1921, 588, 590, 591 (synonym of *A. parietinus*).

Aphelenchus spp. Cobb (Jour. Parasit., 8, 1921, 95) referred to the presence of twenty-six species of nematodes, including four new (unnamed) species of *Aphelenchus*, collected from material about the roots of *Kentia* palms.

Aphelenchus sp. Samuel, Jour. Dept. Agr., S. Austr., 32, 1928, 43, wheat and oats, South Australia. See *Heterodera schachtii*.

Entylenchus setiferus (Cobb 1893) Cobb 1913. Originally described by Cobb, Agr. Gaz., N.S.W., 4, 1893, 813, figs. 32-33, as *Tylenchus setiferus*, from soil, Clarence River; transferred by him to *Entylenchus* in 1913 (Jour. Wash. Acad. Sci., 1913, 437). Micoletzky, 1921, 577. Baylis and Daubney (1926) regarded the genus as a synonym of *Anguillulina*, but Micoletzky (1921), Goodey (1933), Filipjev (1934) and Rauther (1930) considered it valid.

Caconema radiculicola (Greef). Pittman, Jour. Agr. West. Aust., ser. 2, 6, 1929, 436-46 (many host plants in W.A.). See *Heterodera radiculicola*.

Heterodera marioni (Cornu). Goodey (1933) indicated that the eelworm referred to by authors as *H. radiculicola* is not Greef's species, but belongs to Cornu's. Pittman, Jour. Agr. West. Aust., 14, 1937, 289, potatoes, W.A.

Heterodera radiculicola (Greef). See *H. marioni*, *Caconema radiculicola* and *Tylenchus radiculicola*. Tryon, Queensl. Agr. Jour., 11, 1902, 406; 13, 1903, 463; banana roots, Cairns; 22, 1909, 100-2, various plant roots, presumably Queensland; also in Ann. Reports Queensland Dept. Agr. Wood, Qld. Agr. Jour., 27, 1911, 38-40, root gall, soil treatment, North Queensland. Laidlaw, Jour. Agr. Vict., 12, 1914, 370-7, potatoes, onions, Vict.; Harris, Jour. Agr. Vict., 20, 1922, onions, Vict.; Noble, Agr. Gaz. N.S.W., 39, 1928, 546-8, N.S.W.; Manuel, Agr. Gaz. N.S.W., 35, 1924, 581-8, grape roots, N.S.W. Johnston, Rep. Bur. Microbiol., N.S.W., 1909, 57, tomato roots, N.S.W. Darnell-Smith, *ibid.*, 1910-11, 1912, 169, passion vine roots, N.S.W. It occurs on the roots of garden plants in light soils in Adelaide.

Eggs of *Oxyuris incognita* Kofoid have been recorded as found in human excreta in North Queensland. Sandground showed that such eggs belonged to *H. radiculicola* ingested along with vegetables. Heydon and Green (Med. Jour. Austr., 1926, (2), 42) referred to these occurrences and reported finding *H. radiculicola* in carrots and radishes grown in Townsville.

Heterodera schachtii Schmidt. Spafford, Jour. Agr. S. Aust., 26, 1922-3, 535, cereals, S.A. Davidson, *Ibid.*, 34, 1930, 378-85, cereals, S.A. Hickenbotham, *Ibid.*, 34, 1930, 386-92, "no growth patches" in wheat fields, Roseworthy, S.A. Garrett, *Ibid.*, 37, 1934, 984-7, S.A. Spafford, *Ibid.*, 35, 1932, 836; 39, 1936, 1006, eelworms attacking cereals, S.A. Johnston, W., *Ibid.*, 37, 1934, 705-6, eelworms attacking cereals and grasses, S.A.

Tylenchulus semipenetrans Cobb, Jour. Agr. Res., 2, 1914, 218-30, roots of citrus trees, Gosford, N.S.W. Goodey, 1933, 123, citrus roots, Australia and elsewhere.

Tylenchus arenarius Neale. Cobb, Agr. Gaz., N.S.W., 1, 1890, 121-2, roots, Glen Innes, N.S.W.; 1, 1890, 155-184, figs. 1-8, pl. 4, "root gall" in N.S.W., —p. 166, from Queensland, based on Bancroft's published account of worms attacking roots of grape and banana—p. 166, worm may be *T. (Het.) radiculicola* or

T. (H.) javanicus. Cobb, Agr. Gaz. N.S.W., 1901, 1041, identified it as *T.* (or *Heterodera*) *radic.* q.v.

Tylenchus davainii Bast. Cobb, Agr. Gaz. N.S.W., 1, 1890, 175, Australia.

Tylenchus dihystrera Cobb, Agr. Gaz. N.S.W., 4, 1893, 814-5, about roots of sugar-cane, Clarence River. Micoletzky, 1921, 551.

Tylenchus dipsaci Kühn. Noble, Agr. Gaz. N.S.W., 36, 1925, 827, lucerne, Hunter River; *ibid.*, 39, 1928, 548-9, lucerne, N.S.W. Edwards, Agr. Gaz. N.S.W., 43, 1932, 305-14, 345-56, bulbs, lucerne, etc., N.S.W. See *Tylenchus devastatrix*, *Anguillulina dipsaci*.

Tylenchus devastatrix Kühn. Cobb, Agr. Gaz. N.S.W., 1, 1890, 173, *T. dipsaci* quoted as syn.—“there is reason to believe that [the species] exists also in Australia”; Macleay Vol., 1893, 299-300, fig. 9, no localities mentioned; Agr. Gaz. N.S.W., 4, 1893, 812, fig. 31; *Ibid.*, 13, 1902, 1031-3, “from various parts of Australia,” Richmond River, N.S.W.; *Ibid.*, 9, 1898, 425, fig. 86; *Ibid.*, 2, 1891, 678-82, quoted a report by A. N. Pearson (p. 678-9) on the presence of eel-worm in Victorian onion fields, specimens determined by Cobb (p. 679) as *T. devastatrix*; Yearbook U.S. Dept. Agr., 1914 (1915), 485, Australia. Johnston, Pr. Linn. Soc. N.S.W., 34, 1909, 417, N.S.W., Tasmania. Tidswell and Johnston, Agr. Gaz. N.S.W., 20, 1909, 1011-12, N.S.W.; Farmers’ Bull., 31, 1909, 22-25 (Dept. Agr. N.S.W.); Rep. Bur. Microbiol. 1909, 62-3. Darnell-Smith, Rep. Bur. Microbiol. N.S.W., for 1910, 1911 (1912), 168, roots grape vine (apparently an error for *T. radiculicola*). Laidlaw and Price, Jour. Agr. Vict., 8, 1910, 163-171; onion, Vict. Laidlaw, *ibid.*, 8, 1910, 87-90, 508-11, potato, Vict. Holmes, *ibid.*, 8, 1910, 570-82, potato, Vict. Seymour, *ibid.*, 8, 1910, 360-4, Vict. Editor, *ibid.*, 9, 1911, 845, onions, Vict. Harris, *ibid.*, 20, 1922, 104, onions, Vict. Noble, Agr. Gaz. N.S.W., 39, 1928, 549, daffodils and jonquils, N.S.W. Editor, Jour. Agr. West Austr., 18, 1909, 351, extract from Kirk’s N.Z. report on *T. devastatrix* in potatoes. Pittman, *ibid.*, ser. 2, 14, 1937, 289, potatoes, W.A. See also *T. dipsaci*, *Anguillulina dipsaci*.

Tylenchus emarginatus Cobb, Agr. Gaz. N.S.W., 4, 1893, 814, soil, Clarence River. Micoletzky, 1921, 551.

Tylenchus minutus Cobb, Agr. Gaz. N.S.W., 4, 1893, 815, roots of sugar-cane, Clarence River. Micoletzky, 1921, 552.

Tylenchus radiculicola Greef (of authors). Cobb, Macleay Vol., 1893, 297-9, gallworm, “a veritable pest in many parts of New South Wales, Queensland and Victoria,” also long list of host plants; Agr. Gaz. N.S.W., 8, 1897, 235-244, figs. 48-55, Bundaberg to Adelaide, in all parts of Australia, except Tasmania; *ibid.*, 12, 1901, 1041-52 (*T. arenarius* Cobb 1890 is syn.); *ibid.*, 13, 1902, 1031-33, fig. 1. Magee, Agr. Gaz., N.S.W., 42, 1931, 429, tomato root-gall, N.S.W.; Magee and Morgan, *ibid.*, 43, 1932, 431, tomato eel-worm galls, N.S.W. Editor, Jour. Agr. S. Austr., 1, 1897-8, 142, Port Augusta, S.A. See also *Tylenchus* sp., *Heterodera radiculicola*, *H. marioni* and *Caconema radiculicola*.

Tylenchus scandens Schn. Nicholls, Tasm. Jour. Agr., 4, 1933, 104-7, wheat, Tasmania. Syn. of *T. tritici*.

Tylenchus setiferus Cobb, Agr. Gaz. N.S.W., 4, 1893, 813, figs. 32-3, soil, Clarence River. Transferred to *Entylenchus* by Cobb in 1913.

Tylenchus sp. Tryon, Queensl. Agr. Jour., 11, 1902, 406; 13, 1903, 463; Ann. Reports Queensl. Dept. Agr., banana roots, Cairns. Lea, Agr. Gaz. Tasm., 13, 1905, 136; 16, 1908, 15, potato gall-worm, Tasmania. Kirk, Agr. Gaz. Tasm., 17, 1909, 189, potato, no locality, reprint of New Zealand report.

Tylenchus tritici (Steinb.), the cause of ear-cockle of wheat. Crawford, Proc. Roy. Agr. Hort. Soc. South Aust., 1881, 190-11, Koolunga, S.A. Cobb, Agr. Gaz. N.S.W., 1890, 173, referred to its presence in Europe, but was apparently unaware of its recorded occurrence in Australia. Editor, Jour. Agr. S. Aust., 3, 1899, 273, 407, 431-2, 477, wheat, Murray Flats, S.A. Helms, Producers' Gaz., W. Aust., 1898, wheat, W. Aust.; Jour. Agr., W. Aust., 1, 1900, 22-30; 7, 1903, 190-4; 10, 1904, 34, wheat, W. Aust. Carne, Jour. Agr., W. Aust., ser. 2, 3, 1926, 508-11, W. Aust.

Tylenchus uniformis Cobb, Agr. Gaz. N.S.W., 4, 1893, 815-6, soil around roots, sugar-cane, Clarence River. Micoletzky, 1921, 551.

PLECTIDAE

Plectus agilior Cobb, Pr. Linn. Soc. N.S.W., 23, 1898, 398, on grass, Sydney.

Plectus cephalatus Cobb, Agr. Gaz. N.S.W., 4, 1893, 828, fig. 42, from soil, moss roots, Clarence River; Cobb, Agr. Gaz. N.S.W., 9, 1898, 423, fig. 84, no locality. Micoletzky, 1921, 214, 241-2, synonym of *P. (Wilsonema) auriculatus* Bütschli. Baylis and Daubney (1926, 56) quoted *P. cephalatus* as type of *Wilsonema*, apparently an error for *P. capitatus*, a species from the United States.

Plectus insignis Cobb, Macleay Vol., 1893, 38-9, from soil, Moss Vale, N.S.W. Micoletzky, 1921, 217.

Plectus intermedius Cobb, Agr. Gaz. N.S.W., 4, 1893, 827, from soil at roots of sugar-cane, Clarence River. Micoletzky, 1921, 216.

Plectus minimus Cobb, Agr. Gaz. N.S.W., 4, 1893, 826, from soil, Clarence River. Micoletzky, 1921, 217.

Plectus parietinus Bast. Cobb, Macleay Vol., 1893, 256, from celery stalks, Sydney; Agr. Gaz. N.S.W., 4, 1893, 826 (apparently from the Clarence River district); Agr. Gaz. N.S.W., 9, 1898, 436, fig. 93, no locality. Micoletzky (1921, 216, 219, 221) regards it as a variety of *P. cirratus* Bast.

Plectus parietinus var. *australis* Cobb, Pr. Linn. Soc. N.S.W., 23, 1898, 397-8, from grass and celery, Sydney. Micoletzky 1921, 216 (synonym of *P. cirratus* var. *parietinus*).

Plectus pusillus Cobb, Agr. Gaz. N.S.W., 4, 1893, 826-7, from soil around moss roots, Clarence River. Micoletzky, 1921, 216 (probably only a form of *P. cirratus*).

CAMACOLAIMIDAE

Bastiana (i.e., *Bastiania*) *australis* Cobb, Agr. Gaz. N.S.W., 4, 1893, 824, from soil, Clarence River. Micoletzky, 1921, 141 (possibly syn. of *B. longicaudata* Man).

AXONOLAIMIDAE

Araeolaimus spectabilis Dittl. Allgen, Zool. Anz. 73, 1927, 197-8, fig. 1, from low tide zone, Derwent River, Tasmania.

Axonolaimus sp. Man, in his account of the free-living nematodes of Zuider-Zee (1922-232), stated that a species of the genus had been described from South Victoria, Australia. He must have confused Cobb's species, *A. polaris* (1914) from Cape Royds, South Victoria Land, collected by Shackleton's Antarctic Expedition. The same species was identified by Cobb (1930) from material obtained by the Australasian Antarctic Expedition from Commonwealth Bay. Coninck and Stekhoven (1933) transferred the species to *Odontophora*.

COMESOMATIDAE

Comesoma heterura Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 386-7, Port Jackson.

Comesoma jubata Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 389-90, Port Jackson.

Comesoma similis Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 387-9, Port Jackson.

MONHYSTERIDAE

Monhystera australis Cobb, Agr. Gaz. N.S.W., 4, 1893, 824, from soil, Harwood, Clarence River; nec *M. australis* Cobb, Proc. Linn. Soc. N.S.W., 18, 1893 (1894). 408-9, marine, Port Jackson. According to Steiner (Zool. Anz., 47, 1916, 63) and Micoletzky (1921, 170, 181) the former is a synonym of *M. villosa* Bütschli. The latter is renamed in the present paper as *M. pacifica*.

Monhystera brevicollis Cobb, Proc. Linn. Soc. N.S.W., 18, 1893, 403-4, Port Jackson.

Monhystera diplops Cobb, Proc. Linn. Soc. N.S.W., 18, 1893, 401-3, fig. 8, Port Jackson. Agr. Gaz. N.S.W., 1898, 318, fig. 40, no locality. Micoletzky (1921, 169), who did not know of the original account, stated that Cobb's 1898 figure of *M. diplops* indicated the species to be a synonym of *M. stagnalis* Bast. Cobb's early account (1893) relates to a marine species, but in 1904 (Proc. Cambridge Philos. Soc., 12, 1904, 366) he recorded a species under the same name from fresh water in New Zealand.

Monhystera filiformis Bast. See *M. rustica*.

Monhystera gracillima Cobb, Proc. Linn. Soc. N.S.W., 18, 1893, 406-8, Port Jackson; nec *M. gracillime* Man, Capita Zool., 1 (1), 1921, 5-6, from soil in Holland; nec *M. gracillima* Kreis, Capita Zool., 2 (7), 1929, 63-4, marine, from the north-west coast of France. Man's species is here renamed *M. gracilior*, and Kreis' species as *M. kreisi*.

Monhystera insignis Cobb, Agr. Gaz. N.S.W., 4, 1893, 823, from soil around roots of sugar-cane, Harwood, Clarence River. Micoletzky, 1921, 172.

Monhystera lata Cobb, Proc. Linn. Soc. N.S.W., 18, 1893, 404-5, Port Jackson.

Monhystera pacifica, nom. nov. for *M. australis* Cobb, 1893 (1894), 408, nec Cobb, Agr. Gaz. N.S.W., 4, 1893, 824. See *M. australis*.

Monhystera pratensis Cobb, Agr. Gaz. N.S.W., 4, 1893, 823-4, from soil about roots of sugar-cane. Harwood, Clarence River. Micoletzky, 1921, 172.

Monhystera rustica Bütschli. Cobb, Agr. Gaz. N.S.W., 4, 1893, 822-3, fig. 40, from moss roots, Clarence River; Macleay Vol., 1893, 279-80, pl. 37, from "many parts of Australia." Micoletzky (1921, 178) placed the species as a synonym of *M. filiformis* Bastian.

Monhystera setosissima Cobb, Proc. Linn. Soc. N.S.W., 18, 1893, 405-6, Port Jackson. The name was mis-spelt as *sesotissima* by Micoletzky (Kgl. Dansk. Vid. Selsk. Skr., 10 (2), 1925, 228).

Monhystera tasmaniensis Allgen, Zool. Anz., 73, 1927, 198-200, fig. 2, Tasmania.

Monhystera villosa Bütschli. See *M. australis*.

SIPHONOLAIMIDAE

Chromagaster purpurea Cobb, Proc. Linn. Soc. N.S.W., 18, 1893, 417-9, fig. 12, North Arm, Port Adelaide. In a footnote to the same paper (p. 419) Cobb stated that the genus (which he had just erected) would probably have to be united with *Siphonolaimus*. Cobb, Agr. Gaz. N.S.W., 1898, 318, fig. 41 (no locality given). Steiner (1921), Allgen (1930), Rauther (1930), and Filipjev (1934) regarded the genus as a synonym of *Siphonolaimus*. It may be mentioned that Allgen in 1932 and 1933 described new species from Norway and Sweden, apparently regarding the genus as valid.

Siphonolaimus purpurens (Cobb, 1893) Allgen, 1930; see *Chromagaster purpurea*.

LINHOMOEIDAE

Cryptolaimus pellucidus Cobb, Jour. Parasit., 20, 1933, 86, from mud, North Arm, Port Adelaide.

Siphonolaimus purpureus (Cobb, 1893) Allgen, 1930; see *Chromagaster* Port Jackson.

Terschellingia exilis Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 392-3, Port Jackson.

CHROMADORIDAE⁽¹⁾

Chromadora conicaudata Allgen, Zool. Anz., 73, 1927, 208-10, fig. 6, Tasmania.

⁽¹⁾ In 1930 Cobb described *Chromadora dubia* from marine material collected by the Australasian Antarctic Expedition. The specific name is pre-occupied by *C. dubia* Bütschli, 1873. The name *C. cobbiana* is now proposed for the former.

Chromadora macrolaima Man. Allgen, Zool. Anz., 73, 1927, 204, Tasmania.
See *Chromadorina macrolaima*.

Chromadora macrolaimoides Steiner. Allgen, Zool. Anz., 73, 1927, 204-7, fig. 5, Tasmania.

Chromadora microlaima Man. Allgen, Zool. Anz., 73, 1927, 208, Tasmania.
See *Chromadorina microlaima*.

Chromadora minima Cobb, Agr. Gaz. N.S.W., 4, 1893, 820-1, fig. 38, from soil around roots of sugar-cane, Harwood, Clarence River, and from Moss Vale, New South Wales. Micoletzky, 1921, 378 (= *Cyatholaimus minimus*). Cobb (Jour. Wash. Acad. Sci., 1913, 441) made the species the genotype of *Achromadora* q.v. (under Cyatholaimidae).

Chromadora minor Cobb, Proc. Linn. Soc. N.S.W., 18, 1893, 394-9, fig. 6, Port Jackson. Cobb, Agr. Gaz. N.S.W., 1898, 299, fig. 9 (no locality).

Chromadora wallini Allgen, Zool. Anz., 73, 1927, 210-12, fig. 7, Tasmania.

Chromadorina macrolaima (Man) Coninck and Stekhoven, 1933, syn. *Chromadora macrolaima*, q.v.

Graphonema vulgaris Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 406-7, coast of New South Wales and Victoria. The genus has been regarded as a synonym of *Chromadora*, but Filipjev (1934) listed it as valid. Cobb (1935) has stated that it is a synonym of *Euchromadora*, hence its genotype, *G. vulgaris*, becomes *E. vulgaris* (Cobb).

Graphonema pachyderma Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 406. Nomen nudum. Cobb stated that the species would be described later, but apparently did not do so. Some features contrasting it with *G. vulgaris* were mentioned. No locality was given, but was presumably Australian.

Euchromadora vulgaris (Cobb, 1898). Syn. *Graphonema vulgaris*, q.v.

Euchromadora pachyderma (Cobb, 1898). Syn. *Graphonema pachyderma*, q.v.

Hypodontolaimus minor Allgen, Zool. Anz., 73, 1927, 212-14, fig. 8, Tasmania.

Spilophora (or *Spiliphora*) *loricata* Steiner. Allgen, Zool. Anz., 73, 1927, 200-2, fig. 3, Tasmania.

Spilophorella tasmaniensis Allgen, Zool. Anz., 73, 1927, 202-3, fig. 4, Tasmania.

CYATHOLAIMIDAE

Achromadora minima (Cobb, 1893) Cobb, 1913. Syn. *Chromadora minima*, q.v. Cobb (1933) and Filipjev (1934) placed the genus in Cyatholaiminae. Micoletzky (1921, 378) considered the genus to be a synonym of *Cyatholaimus* in 1921, but later (1925) placed Cobb's species as a synonym of *A. ruricola* (Man).

Achromadora ruricola (Man). See *A. minima*.

Cyatholaimus brevicollis Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 403-4, Port Jackson.

Cyatholaimus exilis Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 400, Port Jackson.

Cyatholaimus heterurus Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 400-2, Port Jackson.

Cyatholaimus minimus (Cobb) Micoletzky. See *Achromadora minima*.

Cyatholaimus minor Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 402-3, Port Jackson.

Cyatholaimus proximus Bütschli. Allgen, Zool. Anz., 73, 1927, 214-5, fig. 9, Tasmania. Genus quoted, in error, as *Cyatholaismus*.

Cyatholaimus trichurus Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 398-400, Port Jackson.

Halichoanolaimus australis Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 404-6, Port Jackson.

Neonchus longicauda Cobb, Agr. Gaz. N.S.W., 4, 1893, 819-20, fig. 37, from soil at roots of sugar-cane, Harwood, and at roots of moss, Maclean, Clarence River. Genotype. Micoletzky (1921, 419) and Cobb (1935) placed the genus as a synonym of *Odontolaimus*, the former (p. 420) regarding the species as *O. chlorurus* Man.

Odontolaimus chlorurus Man. Syn. *Neonchus longicauda*, q.v.

TRIPYLOIDIDAE

Bathylaimus australis Cobb, Proc. Linn. Soc. N.S.W., 18, 1893, 409-10, Port Jackson; Agr. Gaz. N.S.W., 9, 1898, 432, fig. 91, no locality.

DESMODORIDAE

Laxus longus Cobb, Proc. Linn. Soc. N.S.W., 18, 1893, 415-6, fig. 11, Port Jackson.

Spira similis Cobb, Proc. Linn. Soc. N.S.W., 18, 1893, 390-2, Port Jackson. Perhaps the same as *S. parasitifera* Bast. See *Spirina similis*.

Spirina similis (Cobb, 1898); syn., *Spira similis*, q.v.

EPSILONEMATIDAE

In 1926 Steiner erected *Epsilonema* to replace *Rhabdogaster* Metchnikoff (pre-occupied), basing its characters on a species which he believed to be the genotype, *R. cygnoides*. Baylis and Daubney (1926) had, a few months previously, proposed *Prochaetosoma* for it. Steiner (1931) recognised the latter as valid, gave a diagnosis, and named *P. holocricum* Steiner, 1931 (an Antarctic species which was not an original member of the genus) as type. He reported that the diagnosis given in 1926 was based on a species distinct from Metchnikoff's and that, consequently, he retained Epsilonematidae rather than Prochaetosomatidae as the family name. In addition to *P. cygnoides*, he referred to many new species or varieties found in Antarctic and Subantarctic waters by the "Gauss" Expedition (1931, 312, 316-7, etc.). *Ep. cyrtum* Steiner, which was not an original species, was named as type.

Steiner (1931) indicated in his key, as also did Cobb (1935), that *Prochaetosoma* and *Epsilonema* Steiner, 1931, were not congeneric because of differences in the structure of the cuticular annulations. Numerous species or varieties were described as belonging to the latter genus. Chitwood (Proc. Helm. Soc., Wash., 2, 1935, 54) designated *Ep. steineri*, a new name proposed for *Rhabdogaster cygnoides* Steiner nec Metchnikoff, as type of *Epsilonema* Steiner.

From the foregoing it is obvious that Steiner's generic name has been applied to two different groups. In the first place it was a renaming of *Rhabdogaster* (Steiner, Jour. Parasit., 14, 1927, 65), as also was *Prochaetosoma* B. and D., the type of this group being *R. cygnoides* Metchnikoff. Then, later, the name was deliberately retained for an allied group, including *R. cygnoides* Steiner nec Metchnikoff, renamed *Ep. steineri* by Chitwood. The second group is admittedly not congeneric with the former and should be renamed. *Epsilonematina* is now proposed for it, with *Ep. steineri* (Chitwood) as its type, all the species described by Steiner in 1931 as belonging to *Epsilonema* being included under it. As *Prochaetosoma* B. and D., 1926, is pre-occupied, the name having been used by Micoletzky (1921, 416), *Epsilonema* Steiner, 1926, remains as the valid generic names for the species included by Steiner (1931) under *Prochaetosoma*, B. and D.⁽²⁾

Epsilonematina spp. Species occur in the littoral zone near Adelaide and Port Willunga (South Australia); Portland and Port Phillip (Victoria); Derwent River (Tasmania); Port Jackson, Broken Bay and Long Reef (New South Wales).

DREPANONEMATIDAE nom. nov.

The new name, Drepanonematidae, is given to the group of nematodes to which the following terms have been applied:—Chaetosomatiden by Schepotieff 1908; Chaetosomidae by Southern 1914, Chaetosomatidae by Steiner 1916, Micoletzky 1921, Baylis and Daubney 1926, Allgen 1932, and by later authors generally; Chaetosomatinae by Rauther 1930; Draconematidae by Cobb 1929, Steiner 1931,

⁽²⁾ Under *Epsilonematina* would be included the following species and varieties described under *Epsilonema* by Steiner:—*Epsilonematina ateles*, *allohystera*, *antarctica*, *aphana*, *brachycraspedota*, *colobathrophora*, *cyclophora*, *cyrtia*, *camptocrica*, *campta*, *corynodes*, *dictyotocrica*, *dichotoma*, *dicrocrica*, *desmocrica*, *eucraspedota*, *frigida*, *homalocrica*, *herpeta*, *homoicrica*, *hexastocha*, *heterocrica*, *ilyspastica*, *leptothorax*, *leptomeres*, *leptotricha*, *metchnikoffi*, *mixta*, *nanna*, *oligechon*, *oligoschista*, *poicilothrix* and its varieties *strongylota* and *macra*, *primitiva*, *polycrica*, *philopsychra*, *pneumatica*, *rhogmacrica*, *rhabdota*, *simoloma*, *signatoides*, *sphalera*, *symbiotica*, *semeionoides*, *trachelogaster*, *thinophila*, *trachelota*, *thyridocrica* and *tricola*, as well as *steineri* (Chitwood).

Under *Epsilonema* should be included the following species and varieties described by Steiner under *Prochaetosoma*:—*Ep. apionipherum*, *aschistocricum*, *atechnum* with varieties *heterocrica* and *lophocrica*, *cosmetocricum*, *characterocricum*, *dacidocricum*, *dynatocricum*, *cumecum*, *eucalobates*, *custegum*, *geometroides*, *glaphyrum*, *glottocricum*, *hygrum*, *holocricum*, *hadroctegum* with varieties *asymmetrica* and *epsilononides*, *leptotrachelum*, *labidurum*, *monadicum* and varieties *conocephala*, *microctenium*, *oligistocricum*, *oligostegum*, *placipherum*, *polyschistum*, *penionoides*, *pachymerum*, *sphenostegum*, *striatum*, *stenocricum*, *sterrurum*, *stolidotum*, *tenuis* and *tegocricum*, as well as *cygnoides* (Metchnikoff nec Steiner).

Allgen 1932, Schuurmans-Stekhoven 1935, and by Chitwood and Chitwood 1937; and Draconematinae by Filipjev 1934. The correct name is, of course, linked with that of the type genus, originally *Chaetosoma* Claparède, 1863 (pre-occupied). *Tristicochaeta* Panceri, 1878, is commonly regarded as a synonym, and if so, would be the valid name, but Southern (1914) pointed out that they were distinct. Irwin-Smith (1917) grouped the two under the former name. In 1913 Cobb erected *Draconema*. Micoletzky (1921, 416) listed the latter as a synonym of *Chaetosoma*, considered *Notochaetosoma* Irwin-Smith as valid, and proposed *Prochaetosoma*, with *P. primitivum* (Steiner) as type, as an additional genus in the Chaetosomatidae. In 1929 Cobb regarded *Draconema* as distinct from *Chaetosoma* and stated that the latter name should be replaced by *Notochaetosoma*, which he regarded as synonymous, and that if the family be considered as containing only one genus, then the name of the latter would be *Draconema*, family Draconematidae. In 1933 Cobb proposed *Drepanonema* to replace Claparède's name, the Zoological Record incorrectly quoting the date as 1922. In 1926 Baylis and Daubney (1926) regarded *Tristicochaeta* and perhaps *Draconema*, as synonymous with *Chaetosoma*. Rauther in 1930 considered *Draconema* a synonym. In 1934 Filipjev erected *Claparediella* to replace *Chaetosoma*, and referred to the differences between *Draconema* and *Notochaetosoma*. In 1935 Cobb quoted *Draconema* as synonymous with *Tristicochaeta*, and listed *Notochaetosoma* as valid. Schuurmans-Stekhoven (1935, 100) considered Filipjev's name to be the correct one, and placed *Chaetosoma tristichochaeta* Panceri under *Draconema* (p. 101).

From the foregoing discussion it will be seen that the correct name for *Chaetosoma* is *Drepanonema* Cobb, with *Claparediella* as a synonym, and that the family should be known as Drepanonematidae nom. nov. (or Drepanonematinae, if only subfamily rank be accorded).

Chaetosoma falcatum Irwin-Smith, Proc. Linn. Soc. N.S.W., 42, 1917 (1918), 766-782, figs. 1-24, pls. 44-45, Port Jackson. See *Tristicochaeta falcata*.

Chaetosoma haswelli Irwin-Smith, Proc. Linn. Soc. N.S.W., 42, 1917 (1918), 782-798, figs. 25-47, pls. 46-47, Port Jackson and Broken Bay, New South Wales. Cobb (Jour. Wash. Acad. Sci., 19, 1929, 260; Contrib. Sci. Nematol., 22, 1929 418) regarded the species as a synonym of *Draconema cephalatum*. See *Tristicochaeta haswelli*.

Tristicochaeta falcata (Irwin Smith). Syn. *Chaetosoma falcatum*, q.v.

Tristicochaeta haswelli (Irwin-Smith). Syn. *Chaetosoma haswelli*, q.v.

Notochaetosoma cryptocephalum Irwin-Smith, Proc. Linn. Soc. N.S.W., 42, 1917 (1918), 808-811, figs. 57-9, pl. 50, Port Jackson.

Notochaetosoma tenax Irwin-Smith, Proc. Linn. Soc. N.S.W., 42, 1917 (1918), 798-808, figs. 48-56, pls. 47-49, Port Jackson.

Drepanonema spp. Drepanonematids occur in the littoral zone at Marino and Port Willunga, South Australia; Portland and Port Phillip, Victoria; Derwent River, Tasmania.

DESMOSCOLECIDAE

Desmoscolex spp. occur in the marine littoral zone in South Australia, Victoria, New South Wales and Tasmania.

Tricoma sp. occurs sparingly in the marine littoral zone in South Australia, Victoria, New South Wales and Tasmania.

GREEFFIELLIDAE

Greeffiella sp. occurs very sparingly in the marine littoral zone in South Australia, Victoria, New South Wales and Tasmania.

ENOPLIDAE

Anticoma lata Cobb, Proc. Linn. Soc., N.S.W., 23, 1898, 384-5, Port Jackson.

Anticoma similis Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 383-4, Port Jackson.

Anticoma trichura Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 385-6, Port Jackson.

Leptosomatum australe Linstow, 1905. Stiles and Hassall (Index Cat. Med. Vet. Zool. Roundworms, 1920, 564) stated, in error, that Linstow in 1907 had recorded the presence of the species at Hut Point, Australia. The locality is in South Victoria Land, Antarctica (Linstow, Nematoda, Nat. Antarctic Exp. Nat. Hist., 3, Zool. Bot., 1907).

Oxystoma pellucida Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 395-7, Port Jackson. Man (1907) stated that it was probably a synonym of *O. elongata* Bütschli. See *Oxystomina pellucida*.

Oxystomina pellucida (Cobb). Syn., *Oxystoma pellucida*, q.v.

ONCHOLAIMIDAE

Enchelidium sp. Cobb, Misc. Publ. No. 215, Dept. Agr. N.S.W., 1898, 22, fig. 40; no locality. The figure does not appear in the original paper in Agr. Gaz. N.S.W., 1898. The reference may not be to an Australian species.

Monocholaimus elegans Kreis var. *tasmaniensis* Allgen, Zool. Anz., 73, 1927, 215-6, fig. 10, Tasmania. Kreis (Cap. Zool., 4, (5), 139-41, fig. 81) regards it as a species, *M. tasmaniensis*.

Mononcholaimus tasmaniensis Allgen. Syn. *M. elegans* var. *tasmaniensis*.

Oncholaimus pellucidus Cobb, Proc. Linn. Soc. N.S.W., 23, 1898, 394-5, Port Jackson. Kreis (Cap. Zool., 4, (5), 1934, 168, 169) to *Viscosia*.

Oncholaimus viridis Bast. Allgen, Zool. Anz., 73, 1927, 216, fig. 11, Tasmania.

Symplocostoma longicolle Bast. Allgen, Zool. Anz., 73, 1927, 217, Tasmania.

Viscosia pellucida (Cobb) Kreis. Syn., *Oncholaimus pellucidus*, q.v.

IRONIDAE

Cephalonema longicauda Cobb, Agr. Gaz. N.S.W., 4, 1893, 825, fig. 41, from soil around roots of sugar-cane, Clarence River. Genotype, generic name pre-

occupied and replaced by *Nanonema* Cobb, 1905 (in Stiles and Hassall, Bull. 79, U.S.D.A., B.A.I., 1905, 122). Micoletzky (1921, 323) placed *Cephalonema* as a synonym of *Ironus*.

Cephalonema sp. Cobb, Agr. Gaz. N.S.W., 4, 1893, 825, Moss Vale, New South Wales, not described.

Nanonema longicauda (Cobb, 1893) Cobb, 1905. Syn., *Cephalonema longicauda*, q.v. Micoletzky (1921, 325) stated it was a synonym of *I. ignavus* Bast.

Ironus longicauda (Cobb, 1893). Syn., *Nanonema longicauda*, q.v.

Ironus ignavus Bast. See *Nanonema longicauda*.

TRILOBIDAE

Tripyla tenuicauda Cobb, Macleay Vol., 1893, 285-6, from "mud of a brook, Sydney." Micoletzky (1921, 150) called it *T. tenuicaudata* Cobb.

Prismatolaimus australis, Cobb, Macleay Vol., 1893, 287, about roots, Moss Vale, New South Wales. Micoletzky (1921, 197, 198) regarded it as a synonym of *P. dolichurus* Man.

MONONCHIDAE

Mononchus intermedius Cobb, Agr. Gaz. N.S.W., 4, 1893, 817-8, about roots of sugar-cane, Clarence River. Micoletzky, 1921, 341.

Mononchus longicaudatus Cobb, Macleay Vol., 1893, 256, 261, fig. 2, from celery stalks, Sydney; Agr. Gaz. N.S.W., 4, 1893, 818, fig. 36. Micoletzky (1921, 355) stated that it was a synonym of *M. macrostoma*.

Mononchus macrostoma Bast. See *M. longicaudatus*.

Mononchus major Cobb, Macleay Vol., 1893, 260-1, damp soil, Moss Vale; Agr. Gaz. N.S.W., 9, 1898, 319, fig. 44, no locality given. Micoletzky, 1921, 341.

Mononchus similis Cobb, Agr. Gaz. N.S.W., 4, 1893, 818-9, about roots of sugar-cane, Clarence River. Transferred to subgenus *Iotonchus* by Micoletzky, 1921, 343—Not *M. (M.) similis* Cobb, 1917, renamed *M. cobbi* by Micoletzky, 1921, 344.

Mononchus sp. Cobb, Macleay Vol., 1893, 256, from celery stalks, Sydney.

Mononchus sp. Tidswell and Johnston, Rep. Bur. Microbiol., N.S.W., 1, 1909, 71, in diseased bananas, New South Wales.

ALAIMIDAE

Alaimus minor Cobb, Agr. Gaz. N.S.W., 4, 1893, 824, soil, Clarence River. Micoletzky (1921, 136) regards it as a synonym of *A. primitivus* Man.

Alaimus tasmaniensis Allgen, Nyt. Mag., Oslo, 67, 1929, 212-4, fig. 1, from moss, Tasmania.

DORYLAIMIDAE

Dorylaimus bastiani Bütschli. Cobb, Agr. Gaz. N.S.W., 9, 1898, 427, fig. 88; no locality. Steiner, Zool. Anz., 46, 1916, 326-7, fig. 7, from moss roots, Boorabin, South-western Australia. Micoletzky (1921, 446, 449, 468) regarded it as a variety of *D. filiformis* Bast., and considered (p. 475-6) Steiner's form from Western Australia to belong to a distinct variety which he named *steineri*. The

latter invalidates the name *D. steineri* Thorne and Swanger (1936, 116), which is here renamed *D. steinerianus* nom. nov. Thorne and Swanger (p. 65) included Steiner's figures of the Australian nematode under *D. bastiani*.

Dorylaimus gracilis Man. Steiner, Zool. Anz., 46, 1916, 326, fig. 6, from moss roots, Bridgetown, South-western Australia.

Dorylaimus latus Cobb, Proc. Linn. Soc. N.S.W., 16, 1891, 150-1, from grass roots, Sydney. Micoletzky, 1921, 451, probable synonym of *D. carteri* var. *brevicaudata* forma *minuta*. Thorne and Swanger, 1936, 110-111, pl. 25, fig. 148.

Dorylaimus minimus Steiner, Arch. Hydrobiol. u. Planktonk., 1914, 437-8, renaming of *D. minutus* Cobb nec Bütschli. Thorne and Swanger, 1936, 117, pl. 27, fig. 158.

Dorylaimus minutus Cobb, Agr. Gaz. N.S.W., 4, 1893, 810, around roots of sugar-cane, Clarence River. Name pre-occupied by *D. minutus* Bütschli, 1873, and renamed *D. minimus* by Steiner, 1914.

Dorylaimus pusillus Cobb, Agr. Gaz. N.S.W., 4, 1893, 810-11, around roots of sugar-cane and moss, Clarence River. Micoletzky, 1921, 446, 459, syn. of *D. longicaudatus* Bütschli. Thorne and Swanger (1936, 39) regard it as a valid species (pl. 5, fig. 24).

Dorylaimus spiralis Cobb, Macleay Vol., 1893, 293-4, from base of carrot leaves, Sydney. Micoletzky, 1921, 453, 519-20. Thorne and Swanger, 1936, 125-6, transferred to *Aporcelaimus*; *D. spiralis* Cobb of Micoletzky, 1921, regarded as a different species and renamed *D. paraspiralis*.

Dorylaimus subsimilis Cobb, Agr. Gaz. N.S.W., 4, 1893, 810, about roots of sugar-cane, Clarence River. Micoletzky, 1921, 455. Thorne and Swanger, 1936, 120.

Dorylaimus spp. Cobb, Macleay Vol., 1893, 256, from celery stalks, Sydney.

Aporcelaimus spiralis (Cobb) Thorne and Swanger, 1936, 125-6, pl. 28, fig. 169. Syn., *Dorylaimus spiralis*, q.v.

Brachynema obtusum Cobb, Agr. Gaz. N.S.W., 4, 1893, 811, from soil, Clarence River. Genotype, generic name pre-occupied, renamed *Brachynemella* by Cobb, Jour. Parasit., 20, 1933, 81. Micoletzky (1921, 131) stated that it was probably related to *Tylencholaimus*.

Brachynemella obtusa (Cobb, 1893) Cobb, 1933. Syn., *Brachynema obtusum*, q.v. Filipjev (1934) regarded the genus as a synonym of *Tylencholaimus*, but Cobb (1935) and Thorne (1935) considered it valid.

DIPHATHEROPHORIDAE

Chaolaimus pellucidus Cobb, Agr. Gaz. N.S.W., 4, 1893, 821, fig. 39, about roots of sugar-cane, Clarence River. Genotype. Micoletzky (1921, 421), Baylis and Daubney (1926) and Filipjev (1934) stated that the genus was a synonym of *Diphtherophora*, the first-named author (p. 422) listing the species as *D. communis* Man. Cobb (1935) accepted the generic synonymy.

Diphtherophora pellucida (Cobb). Probably syn. of *D. communis* Man.

MERMITIDAE

Australian members of this family have not been studied. The adults are free-living, and the young stages parasitic. Wheeler (Psyche, 40, 1932, 20-32) referred to *Mermis* parasitism in some Australian ants. I have seen adults of *Mermis* sp. collected from a claypan in the Bordertown district of South Australia.

MISCELLANEOUS REMARKS

Cobb (Agr. Gaz. N.S.W., 1898, 421, fig. 65) illustrated the anterior end of a nematode, apparently a free-living form, "*Labyrinthostoma* n. gen.," but gave no description, nor did he mention any species or locality. It must be regarded as a nomen nudum. The figure suggests an *Enoplolaimus* near *E. caput-medusae*.

In the same publication Cobb (p. 320, fig. 45) figured *Streptogaster papillatus* n. gen., n. sp. without any information regarding habit or locality. Baylis and Daubney (1926) quoted the habitat as "not mentioned (presumably free-living)" and placed the genus in an appendix to Rhabditidae. Travassos (1919) allotted it to Hystrignathinae. Artigas stated that the species was based on the male of *Heth* and was, therefore, a synonym of the latter. If this be correct, *Streptogaster* must be a parasite of a millipede, and since Cobb in the same article (1898, 299, fig. 10) figured *Heth juli* (female) from *Julus* sp., from Moss Vale, New South Wales, *S. papillatus* probably came from that locality and perhaps from the same host species. Artigas and Travassos (1929) both placed the genus in Ransomnemiinae (Atractidae), as also did Filipjev (1934). Cobb (1935) did not mention the genus in his key to the genera of free-living nematodes. The species can be placed definitely amongst the parasitic forms.

GORDIACEA

The Nematomorpha may be referred to in this paper, though they are not true nematodes. Only a few species have been described from Australia. The group is represented in all Australian States. Though some of the following references relate to the parasitic stage, they are included, since the worms pass through a free-living adult phase. No attempt has been made to allocate species to their proper genera or families.

Chordodes undulatus Linstow, Arch. Naturg., 1906, (1), 257-8, fig. 20, from *Mantis* sp., Sydney.

Chordodes caledoniensis Villot, 1874, from *Mantis*, New Caledonia, was stated by Camerano (1897) to have been taken in New Caledonia, "New Olanda," the latter being a misplaced locality.

Gordius incertus Villot, 1874, Tasmania. Camerano, 1886; 1897.

Gordius flavus Linstow, Mitt. Zool. Mus., Berlin, 3, 1906, 243, fig. 1, from New Britain and (?) Adelaide.

Gordius tuberculatus Villot, 1874, from Rockhampton, "New Holland."

Gordius spp. Whitelegge, Proc. Roy. Soc. N.S.W., 23, 1889, 307, swamps, Botany, New South Wales; Bailey, Vict. Nat., 1, 1884, 2, from *Carabus* (presumably from Victoria); Cobb, Agr. Gaz. N.S.W., 2, 1891, 213-4, Glen Innes,

New South Wales; Tryon, Ann. Rep. Dept. Agr. Queensland, 1910-11, 73, Eudlo, Beaudesert and Rockhampton, Queensland; Froggatt, Proc. Linn. Soc. N.S.W., 1909, 216, from stomach of trout, along with larva of a water-beetle, Cooma, New South Wales.

Parachordodes annulatus Linstow, Mitt. Mus. Berlin, 1906, 246, Queensland.

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