ADDITIONS TO THE NEMATODE FAUNA OF THE ANTARCTIC REGION WITH KEYS TO TAXA

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Abstract. The soil and fresh-water nematodes of the Antarctic region (comprising the continental, the maritime and the sub-Antarctic zones) are reviewed incorporating additions to the taxa recorded for the continental and maritime Antarctic zones. For the first time, keys and distinguishing characters are provided to the species of free-living terrestrial nematodes of a region encompassing an entire continent. The distribution of nematode taxa within and between zones, and endemism, are discussed in relation to the recent history and biogeography of the region. 40 species (34 endemic) in 19 genera (three endemic) have been recorded from the maritime Antarctic, while ten species (seven endemic) in six genera (one endemic) and 22 species (12 endemic) in at least 17 genera (none endemic) have been reported from the continental and sub-Antarctic zones, respectively. It is uncertain whether the high individual endemism of the maritime and continental Antarctic nematode faunas is related to climatic and biotic differences, to differences in geological history between East and West Antarctica, or to geographical bias in sampling programmes. The need for further investigation is stressed and proposed areas for field study are indicated.

The Antarctic region has been subdivided into three main ecological zones with distinctive climatic and biotic characteristics (Holdgate, 1970): the continental Antarctic, the maritime Antarctic and the sub-Antarctic zone. These sub-divisions are used here to describe the distribution of the free-living soil and fresh-water nematodes of this region.

Terrestrial nematodes were first described from the maritime Antarctic zone by de Man (1904) and from the sub-Antarctic zone by Jägerskjiöld (1905); and the first valid descriptions from the continental Antarctic were by Steiner (1916). During the 66 years following de Man's description, very few additional Antarctic nematodes were described or recorded at species level. Yeates (1970) reviewed the literature on soil and fresh-water nematodes of the Antarctic region and reported two previously recorded nematodes (Steiner, 1916) from the McMurdo Sound area (continental Antarctic). Timm (1971), dealing mainly with the continental Antarctic, described two new species (two genera), one new record and three previously recorded species (Steiner, 1916; Kirjanova, 1958). The taxa mentioned are listed below.

A substantial contribution to knowledge of the distribution and relative abundance of soil and fresh-water nematodes in the maritime Antarctic was made by Spaull (1973*b*), who listed 13 genera previously unrecorded from islands in this zone. Spaull (1973*a*) also gave a list of the genera and species identified from Signy Island, South Orkney Islands. Most of these taxa were undescribed and, in cases where more than one species occurred within a genus, were designated provisionally an upper-case letter to indicate the identity of each species. Where further species were found, the lettering system was extended as necessary.

Tilbrook (1970) stated: "The presence of nematodes in this maritime region has been reported on many occasions, but nothing has been published on their taxonomy." Only three species had at this time been described—from Benenden Head on the Antarctic Peninsula (de Man, 1904)—and there was an urgent need for further taxonomic investigation. However, since 1970, several more species from the maritime zone have been described.

The first new maritime zone species (also a new genus) to be described after that of de Man (1904) was *Antarctenchus hooperi* Spaull, 1972. It was also the first formally named tylenchid in this zone. The Dorylaimoidea collected by Spaull from Signy Island, and by others (on his behalf) from other islands in the maritime Antarctic, were all previously unrecorded and were described by Loof (1975). In addition to the species listed by Spaull (1973*a*), the dorylaims described by Loof (1975) included a further species of *Mesodorylaimus* (*M. imperator*) previously overlooked by Spaull and three species of *Eudorylaimus* (*E. verrucosus*, *E. isokaryon* and *E. spaulli*), which were mentioned without indicating individual identities, by Spaull (1973*b*). Further taxa from the maritime zone are in process of being described.

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The aims of this paper are to summarize the qualitative (species) distribution of all nematodes recorded in the Antarctic region and to facilitate the identification of these nematodes for ecological studies by the provision of keys to taxa. Andrássy (1976) pointed out that most nematode keys which have been produced in recent years have almost exclusively dealt only with a small systematic unit, mostly genera. He stated that keys (a "key-book") "including all the free-living nematodes, *or treating the species of one continent at least*, is simply non-existent." In using the term "free-living" (p. 22), he included both marine and terrestrial nematodes, although his observation was equally applicable to either of these groups. The keys provided in this study deal for the first time with all the currently known free-living terrestrial (soil and fresh-water) nematode taxa of one continent, the Antarctic region. It is not inappropriate that the first such keys, however simple, should deal with the Antarctic, in view of its lower biotic diversity relative to that of other continents. By indicating similarities or differences in distribution, or occurrence, of taxa within and between zones, and their respective proportions which are endemic, this will provide further information for the evaluation of the recent history of the Antarctic land fauna and the biogeography of the Antarctic region (see Brundin, 1970).

Discussing the recent invertebrate fauna in relation to the history of Antarctic land fauna, Brundin (1970) was, through lack of information, unable to include groups such as Protozoa, Rotifera, Tardigrada and Nematoda, and dealt mainly with arthropods (Acarina, Collembola and Diptera). This has also been the problem of all other workers dealing with invertebrates in the Antarctic region. Where nematodes have been included, information has been of a purely quantitative nature (e.g. Gressitt, 1965; Covarrubias, 1966; Heywood, 1967; Tilbrook, 1967*a*, *b*, 1970). The present study identifies the geographical areas where work is most urgently needed to improve our knowledge of nematode distribution in the three Antarctic zones.

Methods

In the austral summer of 1973–74, moss-core samples were collected regularly from the Signy Island terrestrial reference sites, South Orkney Islands, as part of a long-term ecological project. The composition of the moss communities and a description of the sites has been given by Tilbrook (1973). All material was extracted and processed to F.A. 4:1 and mounted in glycerine as described by Spaull (1973*b*). In addition, slides and preserved material collected by colleagues in the British Antarctic Survey, including that used by Spaull (1973*a*, *b*), were utilized to study the distribution of soil nematodes in the maritime Antarctic.

All nematodes examined were identified to species, whether formally described or designated as above. Keys to higher nematode taxa and species of the Antarctic region are given in this paper. It is hoped that these will enable nematologists to separate the taxa with more than one species per genus and to recognize possible unrecorded species, and thus enable greater consideration to be given to these ubiquitous animals in the Antarctic region.

For higher taxa, the characters used are not always specific to those of the taxon but may be relevant only to the known Antarctic representatives. Characters given for species are intended to facilitate separation and are not always the only or most notable criteria. However, the keys are intended neither as descriptions nor as a basis for the erection of new species. They are constructed primarily to include the nematodes investigated in this study, namely those of the maritime Antarctic (Table I). The characters for nematodes from the continental and sub-Antarctic zones are usually given separately.

Results and Discussion

Lists of nematodes recorded from the maritime, continental and sub-Antarctic zones are given in Tables I, II and III, respectively, together with the authors and an indication of those

Table I. List of nematodes from the maritime Antarctic

(For synonymy, etc. see Tarjan and Hopper (1974).)

Taxon	Observations		
Tylenchida			
1 *Ditylenchus* sp.	e	×	
2 *Tylenchus* sp.	e	×	
3 *Antarctenchus hooperi* Spaull 1972	e	×	g
4 *Aphelenchoides* sp. A	e	×	
5 *Aphelenchoides* sp. B	e	×	
6 *Aphelenchoides* sp. C	e	+	
Araeolaimida			
7 *Plectus armatus* Bütschli 1873		×	
8 *Plectus antarcticus* de Man 1904		×	○
9 *Plectus parietinus* Bastian 1865		×	○
10 *Plectus parvus* Bastian 1865	△	×	○
11 *Plectus* sp. A	e	×	○
12 *Plectus* sp. B	e	×	
13 *Plectus* sp. C	e	×	
14 *Plectus* sp. D	e	+	
15 *Rhabdolaimus* sp.	e	×	
Teratocephalida			
16 *Teratocephalus* near *lirellus* Anderson 1969	e	×	○
17 *Teratocephalus* sp. A	e	×	○
18 *Teratocephalus* sp. B	e	×	○
Monhysterida			
19 *Monhystera villosa* Bütschli 1873		×	N
20 *Monhystera* sp. A	e	×	○
21 *Monhystera* sp. B	e	×	○
22 *Prismatolaimus* sp.	e	×	
Rhabditida			
23 *Cervidellus* sp.	e	×	
24 *Panagrolaimus* sp.	e	×	
25 Panagrolaimid genus A sp.	e	×	Ng
26 *Rhabditis* subgenus A sp.	e	×	N
27 *Rhabditis* subgenus B sp.	e	△	+
Dorylaimida			
28 *Eudorylaimus pseudocarteri* Loof 1975	e	×	NA
29 *Eudorylaimus coniceps* Loof 1975	e	×	○NB
30 *Eudorylaimus paradoxus* Loof 1975	e	×	○NC
31 *Eudorylaimus verrucosus* Loof 1975	e	×	○ND
32 *Eudorylaimus isokaryon* Loof 1975	e	×	NE
33 *Eudorylaimus spaulli* Loof 1975	e	×	○NF
34 *Eudorylaimus* sp. G	e	+	
35 *Mesodorylaimus imperator* Loof 1975	e	△	
36 *Mesodorylaimus signatus* Loof 1975	e	×	
37 *Enchodelus signyensis* Loof 1975	e	×	
38 *Amphidelus* sp.	e	×	
39 *Coomansus gerlachei* (de Man 1904)*		×	
40 Mononchid genus A sp.	e	×	g

* Formerly referred to as *Clarkus gerlachei*. Jairajpuri and Khan (1977) have proposed that the genus *Clakus* be further divided into *Clarkus* Jairajpuri 1970 and *Coomansus* n. gen. (Family Mononchidae Chitwood, 1937).

× Previously recorded species and published by Spaull (1973*a*, *b*).

\+ Previously unrecorded species (new record and probably new to science).

○ Recorded from islands in the maritime Antarctic additional to those given by Spaull (1973*a*, *b*) and Loof (1975). The composition of species within genera with more than one representative given by Spaull (1973*b*) was determined by re-examination of his material.

N Change of name or designation from that given by Spaull (1973*a;* see text) or subsequently formally described. Other upper-case letters designate individual species, prior to formal description.

△ Collected but overlooked by Spaull (1973*b*).

e Presently regarded as an endemic species.

g Presently regarded as an endemic genus.

TABLE II. LIST OF NEMATODES FROM CONTINENTAL ANTARCTICA
(For synonymy, etc. see Tarjan and Hopper (1974).)

Taxon	Observations		
ARAEOLAIMIDA			
1 *Plectus antarcticus* de Man 1904			
2a *Plectus frigophilus* Kirjanova 1958		e	
2b *Plectus globilabiatus* Kirjanova 1958		(e)	N
3 *Plectus parietinus* Bastian 1865	○		
MONHYSTERIDA			
4 *Monhystera villosa* Bütschli 1873			
RHABDITIDA			
5 *Panagrolaimus davidi* Timm 1971		e	
6 *Scottnema lindsayae* Timm 1971	n	e	g
DORYLAIMIDA			
7 *Eudorylaimus antarcticus* (Steiner 1916)	○	e	
8 *Mesodorylaimus* sp. A	+	e	
9 *Mesodorylaimus* sp. B	+	e	
10 *Mesodorylaimus* sp. C	+	e	

+ Previously unrecorded species (new record and probably new to science).
○ Recorded from part(s) of Antarctica additional to those of previous authors.
e Presently regarded as an endemic species.
g Presently regarded as an endemic genus.
N *Nomen dubium* according to Maggenti (1961*b*).
n The specific names *S. lindsayae* and *S. lindsayi* were both used by Timm (1971). However, from the derivation of this specific name (after Mrs Kay Lindsay), it is clear that the latter was a printing error and *S. lindsayae* is the valid name.

taxa which are endemic. Fig. 1 shows the areas of the maritime Antarctic zone from which samples have been collected. Fig. 2 gives the remaining maritime Antarctic islands and the corresponding areas in the continental and sub-Antarctic zones which have been sampled, and the geographical limits of each zone. Figs 1 and 2 also indicate the areas where nothing is known concerning the composition and distribution of soil and fresh-water nematodes.

The currently known distribution of nematodes in the maritime Antarctic (Table IV), continental Antarctic (Table V) and sub-Antarctic (Table VI) has been developed from the present study and from reports of other workers.

40 species in 19 genera have been recorded from the maritime Antarctic (Table I); of these four species (in four genera) are newly recorded and are thought to be undescribed: *Aphelenchoides* sp. C, *Plectus* sp. D, *Eudorylaimus* sp. G and *Rhabditis* subgenus B sp. The names of three taxa listed by Spaull (1973*a*) have been changed following examination of original and further material:

Monhysterid genus A sp. (= *Monhystera villosa* Bütschli, 1873),
Rhabditid genus A sp. (= panagrolaimid genus A sp.) and
Caenorhabditis sp. (= *Rhabditis* subgenus A sp.).

Table IV (see also Fig. 1) shows that the diversity of nematodes in the maritime Antarctic zone increases with decrease in latitude. Some species were recorded only from the more northerly islands: *Ditylenchus* sp., *Tylenchus* sp., *Antarctenchus hooperi*, *Aphelenchoides* sp. B, *Plectus armatus* and *Plectus* species A, B, C and D. Other species occurred in all or most island sites sampled, or at least were found in the extreme north and south with records on some intermediate islands: *Aphelenchoides* spp. A and C, *Plectus antarcticus*, *P. parietinus*, *Terato-*

TABLE III. LIST OF NEMATODES FROM THE SUB-ANTARCTIC
(For synonymy, etc. see Tarjan and Hopper (1974).)

Taxon	*Observations*	
TYLENCHIDA		
1 *Tylenchus* sp.	e	
2 *Aphelenchoides* sp. (Iles Kerguelen)	e	N
3 *Aphelenchoides* sp. (Macquarie Island)	e	
ARAEOLAIMIDA		
4 *Plectus cirratus* Bastian 1865		
5 *Anaplectus granulosus* (Bastian 1865)		
TERATOCEPHALIDA		
6 *Teratocephalus terrestris* (Bütschli 1873)		
MONHYSTERIDA		
7 *Monhystera filiformis* Bastian 1865		?
8 *Monhystera vulgaris* de Man 1880		
9 *Monhystera* sp.	e	
10 *Prismatolaimus dolichurus* de Man 1880		
RHABDITIDA		
11 *Rhabditis* sp.	e	
12 *Cephalobus* sp.	e	
13a (*Cephalobus incisocaudatus* Allgén 1951) *nomen dubium*		!
13b *Cervidellus kerguelensis* Thorne 1937	e	
14 *Bunonema richtersi* Jägerskjiöld 1905		
DORYLAIMIDA		
15 *Eudorylaimus carteri* (Bastian 1865)		
16 *Eudorylaimus frigidus* (Steiner 1916)	e	
17 *Dorylaimus* sp.	e	
18 *Dorylaimus* sp.	e	
19 *Mesodorylaimus bastiani* (Bütschli 1873)		
20 *Mesodorylaimus gaussi* (Steiner 1916)	e	
21 *Alaimus* sp.	e	
22 *Coomansus gerlachei* (de Man 1904)		

e Presently regarded as an endemic species.
N *Aphelenchus minor* Cobb 1893 was placed in the genus *Aphelenchoides* by Steiner and Buhrer (1933) but was regarded as *species inquirenda* by Goodey (1960). This record is therefore regarded simply as *Aphelenchoides* sp.
? Uncertain determination (see Bunt, 1954).
! Unlikely soil and fresh-water nematode or representative of the genus *Cephalobus*.

cephalus sp. A, *T.* near *lirellus*, *Monhystera villosa*, *Eudorylaimus coniceps*, *E. paradoxus*, *E. spaulli* and *Coomansus gerlachei*. One genus, *Mesodorylaimus*, has a species, *M. signatus*, which was not recorded south of Galindez Island and another, *M. imperator*, which was not found north of Cone Island. The four most commonly recorded species from all the islands were *Plectus antarcticus* (15 islands), *Plectus parietinus* (12), *Aphelenchoides* sp. A (12) and *Coomansus gerlachei* (ten). *Aphelenchoides* spp. A and C were found as far south as the Terra Firma Islands and are therefore the most southerly tylenchids so far recorded; none is known from the continental zone. *Plectus parvus* was recorded in the present study from some more northerly islands than previously known (Spaull, 1973*b*) and a number of new records have been added to those species mentioned by Spaull (1973*b*), e.g. *Plectus antarcticus* and/or *P. parietinus* from Guébriant, Pourquoi Pas, Cone, Limpet, Blaiklock, Galindez, Deception and Coronation Islands; and by Spaull (1973*a*), e.g. *Aphelenchoides* sp. C, *Plectus* sp. D, *Eudorylaimus verrucosus* and *Eudorylaimus* sp. G. With the exception of de Man's (1904) records from Benenden

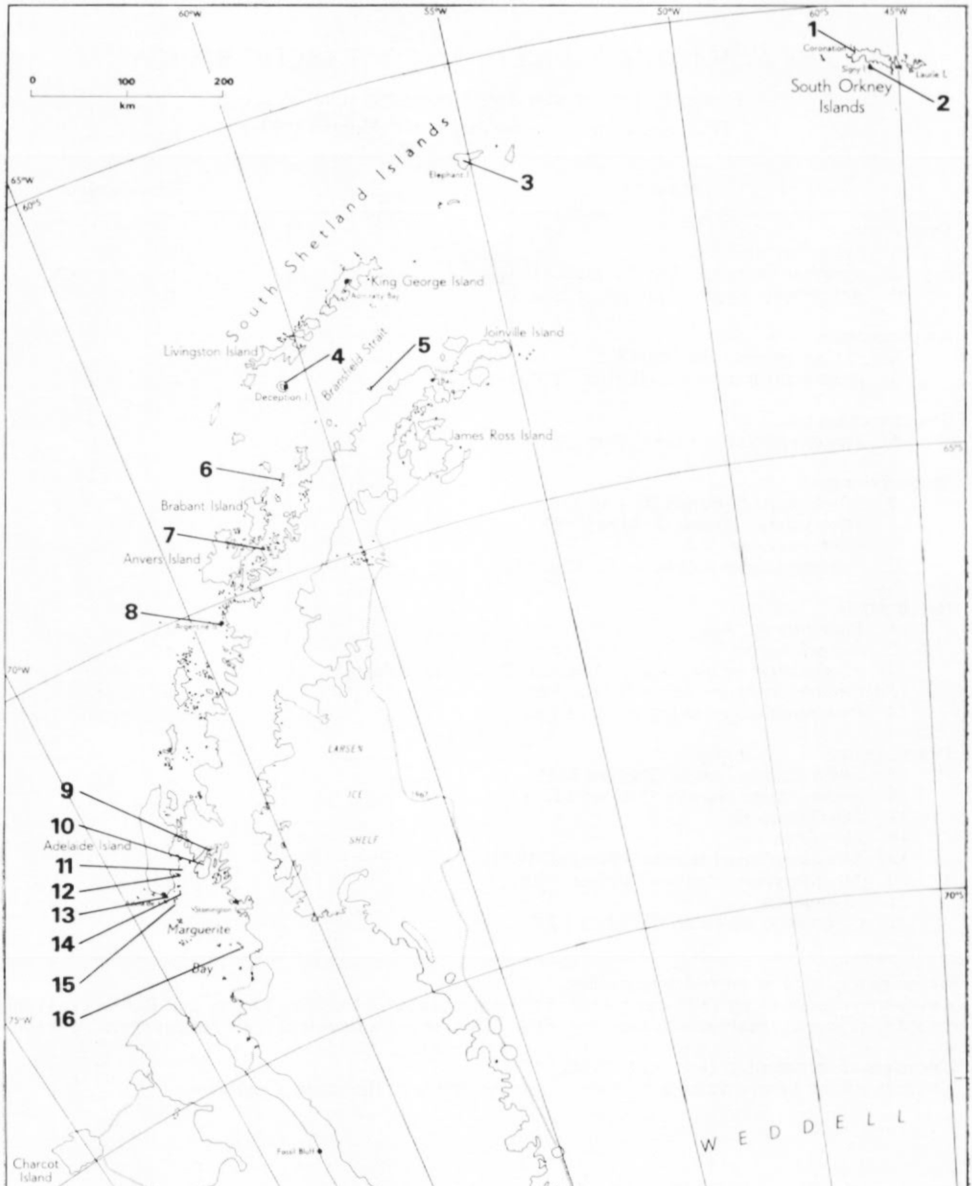

Fig. 1. Areas of the maritime Antarctic zone from which nematodes have been collected.
1. Coronation Island; 2. Signy Island; 3. Elephant Island; 4. Deception Island; 5. Astrolabe Island; 6. Intercurrence Island; 7. Benenden Head; 8. Galindez Island; 9. Blaiklock Island; 10. Pourquoi Pas Island; 11. Limpet Island; 12. Cone Island; 13. Avian Island; 14. Guébriant Islands; 15. Emperor Island; 16. Alamode Island. The remaining islands in the maritime Antarctic zone are shown in Fig. 2.

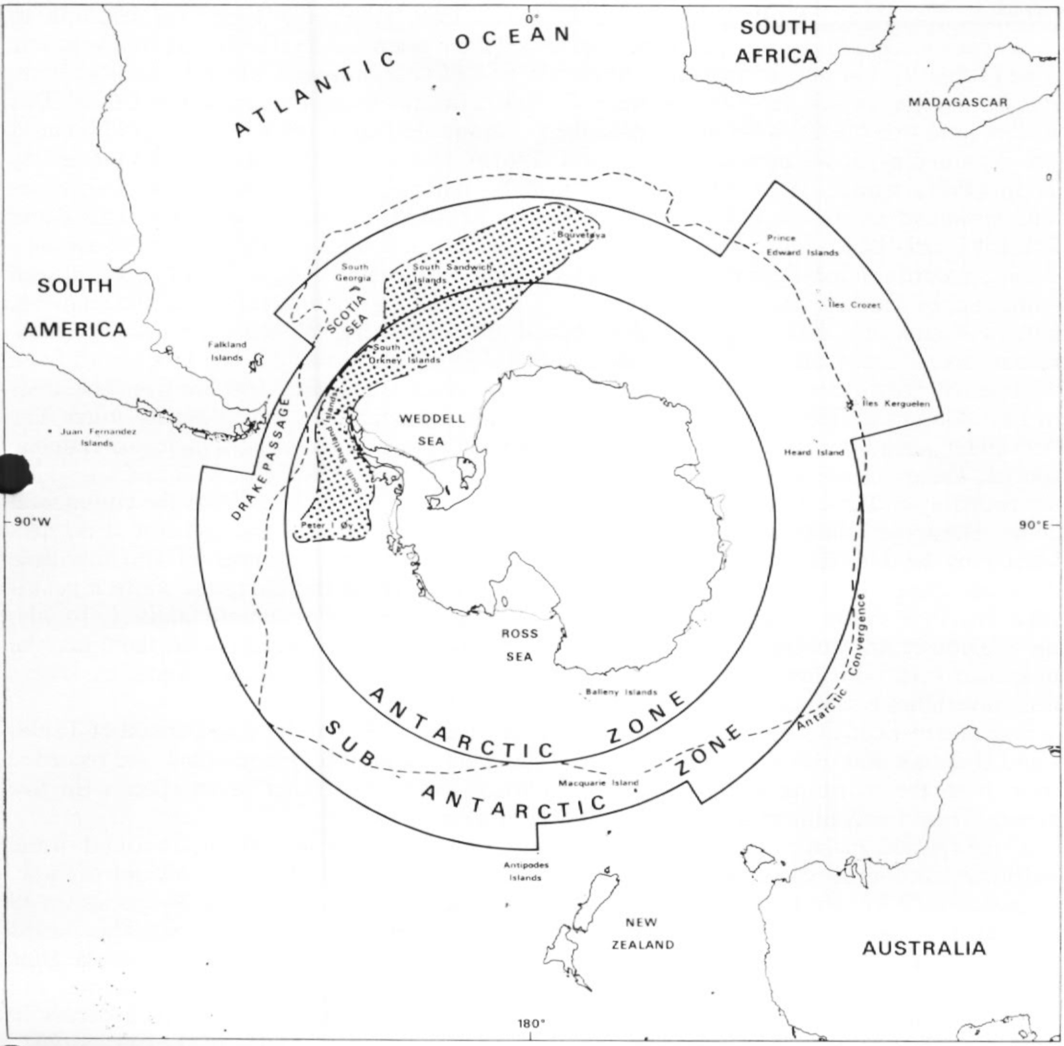

Fig. 2. The three zones of the Antarctic region: sub-Antarctic, maritime Antarctic (stippled) and continental Antarctic, showing the areas sampled for nematodes.

Head, the above additions and changes in names of taxa, the records given in Table V for species were derived through re-examination of material used by Spaull (1973*b*) for determination of generic distribution of nematodes on maritime Antarctic islands. Consequently, his observations on genera and some species, and those on diversity and dispersal are also relevant, although they are not repeated in detail here.

Table V shows the taxa which, with the exception of material collected in 1973–74 from Alexander Island by R. B. Heywood, have been recorded by other workers in the continental zone and the number of species found in each area. The areas are listed from left to right in increasing order of their distance from Alamode Island, the southernmost of the maritime Antarctic islands given in Table IV. Three previously unrecorded species of *Mesodorylaimus*

(*Mesodorylaimus* sp. A, B and C) were identified from Alexander Island, in addition to *Eudorylaimus antarcticus*, which has been recorded from elsewhere in the continental Antarctic zone (Table V), but not the maritime Antarctic, and *Plectus parietinus* which is cosmopolitan. *Plectus frigophilus* was recorded between Ross Island and Bunger Hills, Knox Coast. This species (and two others) were briefly described without illustration by Kirjanova (1958) and it was regarded as *nomen dubium* by Maggenti (1961*b*). However, its validity was confirmed by Timm (1971), who re-described this species from his material. The two rhabditids, *Panagrolaimus davidi* and *Scottnema lindsayae*, were found in the McMurdo Sound area (Ross Island and South Victoria Land) only. Ten species (11 with *Plectus globilabiatus*, which was also a *nomen dubium* according to Maggenti (1961*b*)) in six genera have been recorded from the continental Antarctic, of which seven species in five genera have been reported mainly from the relatively narrow stretch of coastline between Ross Island and Gaussberg, Wilhelm II Land. The most recent record, that from Alexander Island, is therefore of interest as it is the first record from continental West Antarctica *sensu* Holdgate (1970), which is at least 3 000 km from the areas in East Antarctica from which all other continental zone nematodes have been recorded. The Alexander Island nematodes include a cosmopolitan species, *Plectus parietinus*, an endemic species, *Eudorylaimus antarcticus* and three species of *Mesodorylaimus* (sp. A, B and C), which are probably endemic and the first members of this genus to be recorded from the continental zone. Alexander Island is of interest not only for these reasons but also because it borders what may be a climatic and biotic transition area between the continental and maritime Antarctic zones. Further sampling, both from Alexander Island and along the western peninsular coastline south of Marguerite Bay, may yield an interesting nematode fauna. Certainly, the previously unrecorded Alexander Island *Mesodorylaimus* spp. suggests that there may be unknown taxa both here and also in the remainder of continental West Antarctica, where little invertebrate sampling has been done (Gressitt, 1967).

Some further conclusions can be drawn from the results of this study. Comparison of Tables I and II shows that only *Plectus antarcticus*, *P. parietinus* and *Monhystera villosa* are recorded from both the maritime and continental Antarctic zones. The other seven species (in five genera) from the continental zone are probably endemic.

Three species, *Plectus armatus*, *P. parvus* and *Coomansus gerlachei*, which are found in the maritime but not the continental zone occur elsewhere in the world, although only one of these, *C. gerlachei*, is known from the adjacent sub-Antarctic zone. The remaining 34 species (in 18 genera) recorded from the maritime zone are at present thought to be endemic. This means that 70% of the species (10% of the genera) can be regarded as endemic in the continental zone as opposed to 85% (almost 16% of the genera) in the maritime zone. If the continental and maritime nematodes are considered collectively so that *Plectus antarcticus*, which occurs in both zones but not elsewhere, can be regarded as endemic, then over 89% of the species (20% of the genera) may be endemic. This high proportion of endemism may be reduced as our knowledge of the nematode faunas of the Antarctic region and the cool temperate zone is expanded. However, Gressitt (1967) reported an endemism of about 90% (ca. 12% of the genera) for Antarctic arthropods, which is comparable with the above.

Brundin (1970) thought that the high arthropod endemism was evidence that major components of the Acari and Collembola faunas are the most tolerant remnants of the old preglacial fauna of Antarctica. The parallel implications with respect to nematodes in both the continental and maritime zones are self-evident. However, as with arthropods, the current limited nematode records from the Antarctic region do little to elucidate their recent history. This is biased in that sampling has been restricted to a few areas within zones, and also to a disproportionate sampling effort between zones. For example, more taxa are known from many of the individual maritime Antarctic islands than from the entire continental zone.

Figs. 1 and 2 show that the areas from which nematode samples have been taken in the continental and maritime zones are restricted to the west peninsular region and the east

TABLE IV. RECORDS OF TERRESTRIAL NEMATODES OF THE MARITIME ANTARCTIC ZONE

Taxon	*Coronation Island*	*Signy Island*	*Elephant Island*	*Deception Island*	*Astrolabe Island*	*Intercurrence Island*	*Benenden Head (Antarctic Peninsula)*	*Galindez Island*	*Blaiklock Island*	*Limpet Island*	*Cone Island*	*Pourquoi Pas Island*	*Avian Island*	*Guébriant Island*	*Emperor Island*	*Alamode Island (Terra Firma Islands)*	*Number of sites*
TYLENCHIDA																	
Ditylenchus sp.	×	×	×	×	–	×	–	×	–	–	–	–	–	–	–	–	6
Tylenchus sp.	×	×	×	–	–	–	–	×	–	–	–	×	–	–	–	–	5
Antarctenchus hooperi	×	×	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Aphelenchoides sp. A	×	×	×	×	–	×	–	×	×	×	–	×	×	×	–	×	12
Aphelenchoides sp. B	×	×	×	–	–	–	–	–	–	–	–	–	–	–	–	–	3
Aphelenchoides sp. C	×	×	×	×	–	×	–	–	×	–	–	–	–	×	–	×	8
ARAEOLAIMIDA																	
Plectus armatus	×	×	×	–	–	–	–	×	–	–	–	–	–	–	–	–	4
Plectus antarcticus	×	×	×	×	–	×	×	×	×	×	×	×	×	×	×	×	15
Plectus parietinus	×	×	×	×	–	×	–	×	×	×	–	–	×	×	×	×	12
Plectus parvus	–	–	–	×	–	×	×	×	×	–	–	–	–	–	–	–	5
Plectus sp. A	–	×	–	–	–	×	–	×	–	–	–	–	–	–	–	–	3
Plectus sp. B	–	×	×	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Plectus sp. C	–	×	×	×	–	×	–	–	–	–	–	–	–	–	–	–	4
Plectus sp. D	–	×	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Rhabdolaimus sp.	×	×	×	–	–	×	–	×	–	–	–	–	–	–	–	×	6
TERATOCEPHALIDA																	
Teratocephalus near *lirellus*	–	×	–	×	–	×	–	×	–	×	–	–	–	–	–	×	6
Teratocephalus sp. A	×	×	×	×	–	–	–	–	–	–	–	–	–	×	–	×	6
Teratocephalus sp. B	×	×	×	×	–	×	–	×	–	–	–	–	–	–	–	–	6
MONHYSTERIDA																	
Monhystera villosa	×	×	×	–	–	×	–	×	–	–	–	–	–	–	–	–	5
Monhystera sp. A	×	×	×	×	–	–	–	–	–	–	×	–	–	×	–	×	7
Monhystera sp. B	×	×	×	–	–	–	–	–	–	–	–	–	–	–	–	–	3
Prismatolaimus sp.	×	×	×	–	–	–	–	–	–	–	–	–	–	–	–	×	4
RHABDITIDA																	
Cervidellus sp.	–	×	×	–	–	×	–	×	–	–	–	–	–	–	–	–	4
Panagrolaimus sp.	×	×	×	–	×	×	–	×	–	–	–	×	–	–	–	–	7
Panagrolaimid genus A	–	×	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Rhabditis subgenus A sp.	–	×	–	–	×	–	–	–	–	–	–	–	–	–	–	–	2
Rhabditis subgenus B sp.	–	×	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
DORYLAIMIDA																	
Eudorylaimus pseudocarteri	×	×	×	–	–	–	–	–	–	–	–	–	–	–	–	–	3
Eudorylaimus coniceps	×	×	×	–	–	–	–	–	–	–	–	–	–	×	×	–	5
Eudorylaimus paradoxus	×	×	×	–	–	×	–	×	×	×	–	–	–	×	–	–	8
Eudorylaimus verrucosus	–	×	×	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Eudorylaimus isokaryon	–	–	×	–	–	×	–	×	–	–	–	–	–	–	–	–	3
Eudorylaimus spaulli	×	×	×	×	–	–	–	–	×	×	–	×	–	–	–	×	8
Eudorylaimus sp. G	–	×	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Mesodorylaimus imperator	–	–	–	–	–	–	–	–	–	–	×	–	–	–	×	–	2
Mesodorylaimus signatus	×	×	–	–	–	–	–	×	–	–	–	–	–	–	–	–	3
Enchodelus signyensis	×	×	×	–	–	–	–	×	×	–	–	–	–	–	–	×	6
Amphidelus sp.	×	×	×	–	–	×	–	–	–	–	–	–	–	–	–	–	4
Coomansus gerlachei	×	×	×	×	–	×	×	×	–	×	–	–	×	×	–	–	10
Mononchid genus A	–	–	×	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Number of taxa	25	36	29	13	2	18	3	19	8	7	3	5	4	9	4	11	

× Present; – Absent.

TABLE V. RECORDS OF TERRESTRIAL NEMATODES OF THE CONTINENTAL ANTARCTIC ZONE

Taxon	Alexander Island	Ross Sea region					Bunger Hills, Knox Coast	Gaussberg, Wilhelm II Land	Number of sites
		Ross Island	Dunlop Island	South Victoria Land (Marble Point area)	South Victoria Land (Discovery Bay)	North Victoria Land (Cape Adare)			
ARAEOLAIMIDA									
Plectus antarcticus	—	—	—	×	—	×	×	×	4
Plectus frigophilus	—	×	×	×	—	×	×	—	5
(*Plectus globilabiatus*)*	—	—	—	—	—	—	(×)	—	(1)
Plectus parietinus	×	×	—	—	—	—	—	—	2
MONHYSTERIDA									
Monhystera villosa	—	—	—	×	—	—	—	—	1
RHABDITIDA									
Panagrolaimus davidi	—	×	—	×	—	—	—	—	2
Scottnema lindsayae	—	×	—	×	—	—	—	—	2
DORYLAIMIDA									
Eudorylaimus antarcticus	×	×	—	×	×	×	—	—	5
Mesodorylaimus sp. A	×	—	—	—	—	—	—	—	1
Mesodorylaimus sp. B	×	—	—	—	—	—	—	—	1
Mesodorylaimus sp. C	×	—	—	—	—	—	—	—	1
Number of taxa	5	5	1	6	1	3	2 (+1)	1	

* *Plectus globilabiatus* = *nomen dubium* according to Maggenti (1961*b*).
× Present; — Absent.

continental zone between Ross Island and Gaussberg, Wilhelm II Land. While taxa which occur in the peninsula area are well represented (Table IV), this may not be the case with those from the continental Antarctic because of the relatively small proportion of this zone which has been investigated. However, it is to be anticipated that the number of nematode taxa in the continental zone will, as with the flora (Gimingham and Smith, 1970), be lower than in the other zones because of the harsher climate and related habitat factors.

The soil and fresh-water nematodes of the sub-Antarctic have received little attention relative even to the continental zone. The most recent records were those of Bunt (1954) from Macquarie Island and they are summarized in Tables III and VI. No nematodes have been identified from Heard Island, Marion Island or the Prince Edward Islands. One species, *Cephalobus inciso-caudatus* (Allgén, 1951) from the sea off South Georgia (depth not indicated) is here regarded as *nomen dubium* and is listed for completeness in Table III but omitted from Table VI. Soil and fresh-water nematodes have yet to be described from South Georgia. From Possession Island (Iles Crozet), only four species (in four genera) are known (Jägerskjiöld, 1905; Richters, 1907; Steiner, 1916), and from Archipel de Kerguelen, five species (five genera) were recorded (Jägerskjiöld, 1905; Steiner, 1916), of which four are currently regarded as valid taxa (Table VI). The most extensive list (Bunt, 1954) gives 14 species in 11 genera, along with 12 undetermined taxa from Macquarie Island. However, only six of these species (five genera) have been formally described, whereas those from Iles Crozet and Archipel de Kerguelen are all named species.

TABLE VI. RECORDS OF TERRESTRIAL NEMATODES OF THE SUB-ANTARCTIC ZONE

Taxon	Iles Crozet (Ile Possession)	Iles Kerguelen	Macquarie Island	Number of sites
TYLENCHIDA				
Tylenchus sp.	—	—	×	1
Aphelenchoides sp.	—	×	—	1
Aphelenchoides sp.	—	—	×	1
ARAEOLAIMIDA				
Plectus cirratus	—	—	×	1
Anaplectus granulosus	—	×	—	1
TERATOCEPHALIDA				
Teratocephalus terrestris	—	—	×	1
MONHYSTERIDA				
Monhystera vulgaris	—	—	×	1
Monhystera filiformis (?)	—	—	×	1
Monhystera sp.	—	—	×	1
Prismatolaimus dolichurus	—	—	×	1
RHABDITIDA				
Cervidellus kerguelensis	—	×	—	1
Cephalobus sp.	—	—	×	1
Rhabditis sp.	—	—	×	1
Bunonema richtersi	×	×	—	2
DORYLAIMIDA				
Eudorylaimus carteri	—	—	×	1
Eudorylaimus frigidus	×	—	—	1
Dorylaimus sp.	—	—	×	1
Dorylaimus sp.	—	—	×	1
Mesodorylaimus bastiani	—	×	—	1
Mesodorylaimus gaussi	×	—	—	1
Alaimus sp.	—	—	×	1
Coomansus gerlachei	×	—	—	1
Number of taxa	4	5	14*	

* Plus 12 undetermined spp.
× Present; — Absent.

Iles Crozet and Archipel de Kerguelen are geographically close and this is reflected in the occurrence of a common species, *Bunonema richtersi*, on both islands (Table VI). *B. richtersi* is also the only recorded nematode species common to two of the sub-Antarctic islands. However, only one of the nematodes from the sub-Antarctic zone, *Coomansus gerlachei*, occurs both in the (maritime) Antarctic and north of the sub-Antarctic zone, whereas nine species which are known from the sub-Antarctic zone also occur elsewhere in the world (north of the sub-Antarctic zone): *Plectus cirratus*, *Anaplectus granulosus*, *Teratocephalus terrestris*, *Monhystera vulgaris*, *Monhystera filiformis*, *Prismatolaimus dolichurus*, *Bunonema richtersi*, *Eudorylaimus carteri* and *Mesodorylaimus bastiani*. Of the remaining 12 species, *Cervidellus kerguelensis*, *Eudorylaimus frigidus* and *Mesodorylaimus gaussi* are currently regarded as endemic and the other nine species, i.e. *Tylenchus* sp., two *Aphelenchoides* spp., *Monhystera* sp., *Cephalobus* sp., *Rhabditis* sp., two *Dorylaimus* spp. and *Alaimus* sp., which have not been formally described, must also for the time being be regarded as endemic. In addition, 12 undetermined species were recorded by Bunt from Macquarie Island.

Taking the sub-Antarctic nematode fauna collectively, the endemic species represent ca. 35%, those with a more widespread distribution are ca. 29%, and undetermined species comprise ca. 35%. If undetermined species are excluded, approximately 50% of the recorded sub-Antarctic nematodes may be endemic. Therefore, a smaller proportion of endemic nematodes are known from the sub-Antarctic zone than from the maritime or continental zones. As all but one (*Coomansus gerlachei*) of these species have been recorded only from outside the Antarctic region, it suggests that the sub-Antarctic nematode fauna may have more affinity with the surrounding northerly continents than with the maritime and continental zones. However, the sub-Antarctic zone is large and its islands vary, not only in their proximity to different continents (Fig. 2) with correspondingly different biotic influences but also in their ages and origins (van Zinderen Bakker, 1970). This would affect both the composition of the nematode fauna between islands and the proportion of non-endemic species. Certainly, the higher incidence of nematodes in the sub-Antarctic zone, which are also known from more northerly locations, indicates that a correspondingly lower (than maritime or continental zones) proportion of endemic taxa may be found on other islands in this zone.

No endemic genera are known from the sub-Antarctic zone, whereas in the continental and maritime zones 10% and nearly 16%, respectively, are endemic. If endemism and the almost discrete nature of the nematode taxa recorded from each zone are real, and not a reflection of limited sampling or paucity of records, it seems unlikely that the nematodes of the continental or maritime zones were immigrants from surrounding continents and sub-Antarctic islands after the Pleistocene glaciation. The apparent paucity of similar taxa between zones, particularly between the sub-Antarctic and the other two zones, suggests that those which are endemic may be survivors of a pre-glacial Antarctic fauna. According to Harrington (1965), Antarctica possessed a normal biota of cold-temperate and temperate forms for much of the Phanerozoic period. The high nematode endemism in the continental and maritime zones may be largely explained by Brundin (1970), who wrote: "But if Antarctica has been inhabited by a normal temperate biota from the end of the Permo-Carboniferous glaciations until the start of the last glaciation in the Mio-Pliocene, there has indeed been ample time for development of numerous local endemisms at different taxonomic levels. There is no reason whatever to suppose that a biota with about 250 million years at its disposal, and inhabiting a great continent with highly diversified topography, would behave in another way."

Owing to the lack of information and records from many islands, little can be said of the origins of the endemic elements in the sub-Antarctic nematode fauna. It is likely that differences in ages and origins of the islands will make the interpretation more difficult than in the other two zones. Yet a knowledge of the nematodes in the sub-Antarctic will be necessary to understand fully the recent history and biogeography of continental and maritime Antarctic nematodes.

East and West Antarctica are recognized as two distinct geological provinces with different histories (Adie, 1970) and it may be that, as with some of the Antarctic arthropods (Gressitt, 1967; Brundin, 1970), the nematodes of these two regions will differ by comprising two almost separate groups of largely endemic elements. The limited records from Antarctica are not inconsistent with such a division as exemplified by differences between east and west continental Antarctica: *Mesodorylaimus* species A, B and C are known only from Alexander Island, West Antarctica, while *Plectus frigophilus*, *Panagrolaimus davidi* and *Scottnema lindsayae* are recorded only from East Antarctica (Table V). Locations where future sampling will be most useful in this respect are in the transition areas between Antarctic zones, e.g. the east and west coasts of the Antarctic Peninsula, and the western peninsular coast adjacent to Alamode Island and including Alexander Island. In East Antarctica, where samples have been collected (e.g. Cape Adare), only taxa already known to occur elsewhere in the continental zone have been recorded. For the sub-Antarctic zone there is no alternative to investigating the nematode fauna of all the islands owing to the absence of a terrestrial transition area between it and the other zones.

To summarize, the areas from which nematode records are lacking can be given. In the sub-Antarctic zone these are South Georgia, Marion and Prince Edward Islands, and Heard Island, while records from Iles Crozet, Archipel de Kerguelen and Macquarie Island are inadequate. It seems that a large proportion of nematodes occurring in the maritime zone are now known, although the distribution of some taxa may prove to be wider than shown in Table IV. However, no study has been undertaken on the South Sandwich Islands and most of the western coasts of the Antarctic Peninsula south to Marguerite Bay, Bouvetøya or Peter I Øy. In the continental Antarctic, the vast interior has never been sampled. Also, the coastline of East Antarctica between the Queen Mary Coast and the tip of the Antarctic Peninsula, and West Antarctica between Alexander Island and the Ross Ice Shelf, have not been investigated. Extensive studies of the nematode faunas in the three Antarctic zones, particularly the sub-Antarctic and the continental zones, are required to elucidate their composition, distribution, recent history and biogeography.

Keys to Taxa

The illustrations (Figs. 3 and 4) provided with these keys will be helpful both to nematologists and to those less familiar or unfamiliar with nematodes. It should be understood that reference to a feature in an illustration is not necessarily intended to imply any other similarity or close taxonomic relationship, except when indicated in keys or legends. For example, the shape of the plectoid oesophagus (pharynx) in Fig. 3f is somewhat cephaloboid and is therefore used to illustrate the (cephaloboid) oesophageal shape of *Cervidellus* sp.; among others, these two groups have different valve and stomatal structures.

Most of the terminology used here is familiar to nematologists but, if necessary, it can be found in Goodey (1963) or Caveness (1974) together with drawings of respective taxa or general illustrations. However, for Antarctic Dorylaimoidea the excellent drawings of Loof (1975) are invaluable. For the genera *Teratocephalus* and *Plectus*, the papers by Anderson (1969) and Maggenti (1961*a*, *b*), respectively, are useful; for *Rhabditis* (Rhabditinae) see Sudhaus (1976).

Measurement formulae, used to designate certain body proportions or absolute measurements were reviewed by Hooper (1970). Those used here are listed together with other abbreviations used in the keys:

L	Total body length in mm or μm.
c	Body length ÷ tail length.
b	Body length ÷ oesophageal length.
LF^s	Lateral fields (= lateral alae).
VBW	Vulval body width.
ABW	Anal body width.
T/ABW	Ratio of tail length ÷ anal body width.
LGP^s	Lateral guiding pieces of (male) spicules in Dorylaimidae.
pvs	Post-vulval sac (= post-uterine sac).
mb	Median bulb of oesophagus (pharynx).

A. KEY TO ORDERS AND SUPERFAMILIES (USING CHARACTERS OF NEMATODES KNOWN TO OCCUR IN THE ANTARCTIC REGION)

1. Stoma with axial stylet (Fig. 3a and b) 7
   Stoma without (Fig. 3c–f) 2

2. Stoma a large cuticularized cavity with a large dorsal mural tooth (Fig. 3c); oesophagus cylindroid throughout and cuticle with lateral fields; very large species, all >2.3 mm in length . . . . DORYLAIMIDA : MONONCHIDAE (a)
   Stoma not as above; walled, tubular, funnel-shaped, cup-shaped (cyathiform) or obscure, with or without small teeth or denticles; if oesophagus cylindroid throughout (Fig. 3c), then cuticle without lateral fields; smaller species <2.3 mm in length 3

3. Oesophagus narrow anteriorly; the posterior one-quarter to one-third enlarged (without valvular basal bulb); amphid apertures crescentic . . . . . . DORYLAIMIDA : ALAIMOIDEA (b)

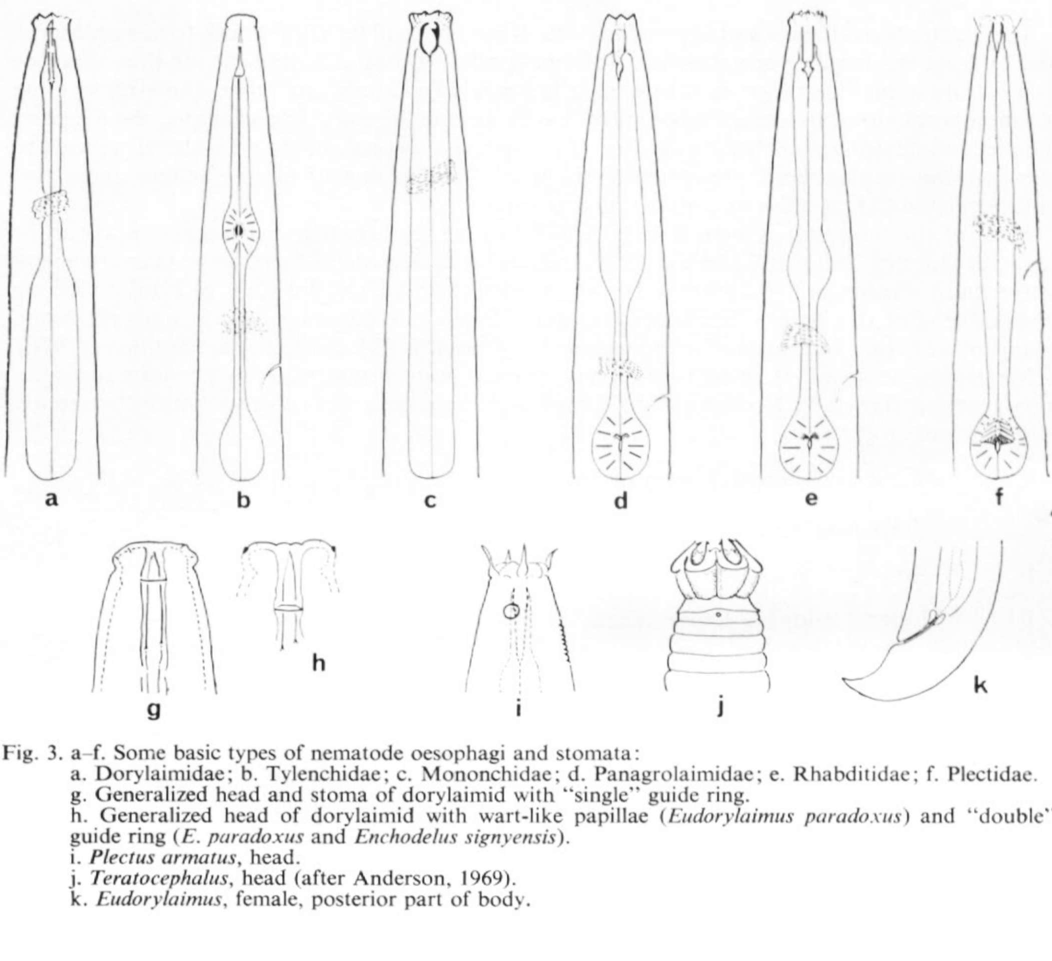

Fig. 3. a–f. Some basic types of nematode oesophagi and stomata:
a. Dorylaimidae; b. Tylenchidae; c. Mononchidae; d. Panagrolaimidae; e. Rhabditidae; f. Plectidae.
g. Generalized head and stoma of dorylaimid with "single" guide ring.
h. Generalized head of dorylaimid with wart-like papillae (*Eudorylaimus paradoxus*) and "double" guide ring (*E. paradoxus* and *Enchodelus signyensis*).
i. *Plectus armatus*, head.
j. *Teratocephalus*, head (after Anderson, 1969).
k. *Eudorylaimus*, female, posterior part of body.

Oesophagus cylindrical; if enlarged posteriorly, then usually in the form of valvular basal bulb (Fig. 3d–f); amphid apertures circular, spiral, slit-like, pore-like or obscure; not crescentic 4

4. Caudal duct and glands present (Fig. 4a) 5
Caudal duct and glands absent (Figs. 3k and 4b–e) 6

5. Excretory duct present (Fig. 3f); oesophagus with distinct valvular basal bulb (Fig. 3d–f); vulva located equatorially or sub-equatorially (46–55%) ARAEOLAIMIDA : PLECTOIDEA (c)
Excretory duct absent (Fig. 3a and c); oesophagus cylindroid, without valvular basal swelling (Fig. 3a); vulva located post-equatorially (59–84%) .. .. MONHYSTERIDA (e)

6. Head with characteristically cuticularized, extended lips (Fig. 3j); body cuticle distinctly annulated almost or completely to tail tip. Tail elongate-conoid to filiform (Fig. 4d); T/ABW >8 (8.5–21) .. .. TERATOCEPHALIDA (d)
Head simple; tail conoid (Fig. 4e); T/ABW <6 (1–5) .. .. RHABDITIDA : RHABDITOIDEA (f)

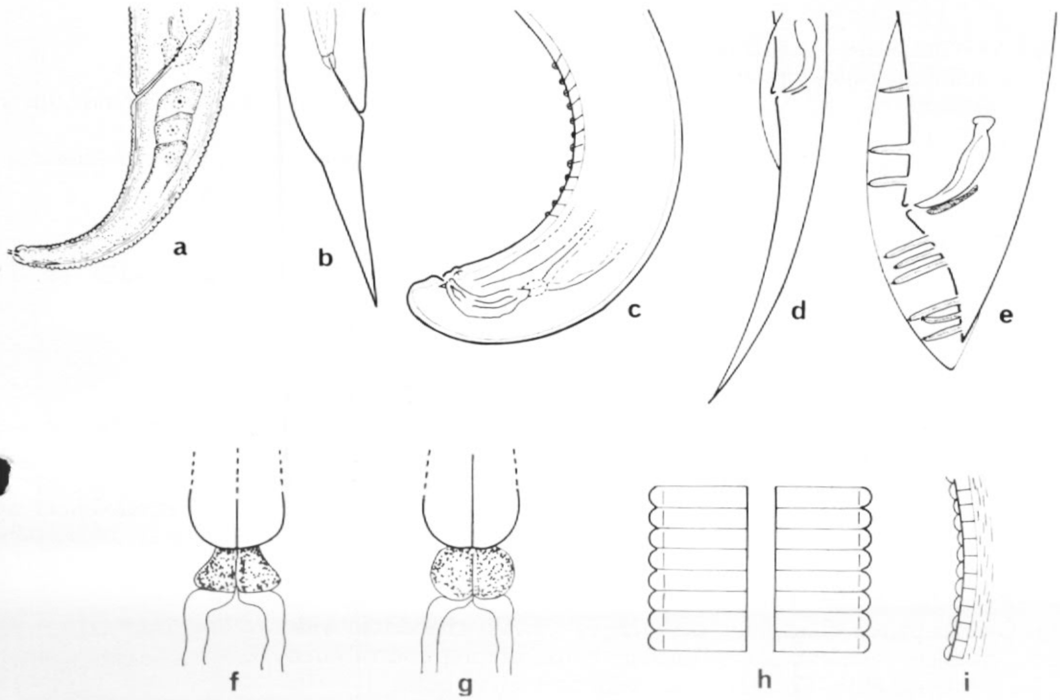

Fig. 4. a–e. Posterior part of body.
a. *Plectus parietinus*, female; b. *Mesodorylaimus*, female; c. *Mesodorylaimus signatus*, male; d. *Tylenchus*, male; e. *Rhabditis*, male.
f. *Monhystera*, oesophago-intestinal junction.
g. *Prismatolaimus* sp., oesophago-intestinal junction.
h. *Teratocephalus* sp. A., lateral view of body (with lateral fields) posterior to vulva.
i. *Eudorylaimus paradoxus*, contiguous ventro-median supplements in posterior part of body (cf. Fig. 4c).

7. Stylet (stomatostyle) with distinct basal knobs; excretory duct ventrad near nerve ring; oesophagus with valvular median bulb (Fig. 3b) .. .. TYLENCHIDA (g)
   Stylet (odontostyle) without basal knobs; excretory duct absent; oesophagus, narrow anteriorly, without valvular median bulb but with an expanded, cylindrical, muscular posterior bulb (Fig. 3a) .. DORYLAIMIDA : DORYLAIMIDAE (h)

B. KEYS TO GENERA AND SOME SPECIES (SINGLE-SPECIES GENERA)

(a) DORYLAIMIDA : MONONCHIDAE

1. Sclerotized part of stoma with apex of dorsal tooth located at ca. 77–80% of stoma length, measured from the base (Fig. 2c) ***Coomansus gerlachei***
   Dorsal tooth at ca. 47% of stoma length Mononchid genus A sp.

The latter has only been recorded from Elephant Island.

(b) DORYLAIMIDA : ALAIMOIDEA

One species in one genus is known: ***Amphidelus*** sp.

(c) ARAEOLAIMIDA : PLECTOIDEA

1. Amphid apertures circular (Fig. 3i); lateral fields (Fig. 4h) present .. .. (Plectidae) : ***Plectus*** spp. (i)
   Amphid apertures pore-like and inconspicuous; lateral fields absent .. .. (Leptolaimidae) : ***Rhabdolaimus*** sp.

(d) TERATOCEPHALIDA

One genus only: ***Teratocephalus*** spp. (ii)

(e) MONHYSTERIDA : MONHYSTERIDAE

1. Amphid apertures circular (Fig. 3i); oesophago-intestinal junction (Fig. 4f); vulva post-equatorial (58–85%) .. .. .. ***Monhystera*** spp. (iii)
   Amphid apertures slit-like and inconspicuous; oesophago-intestinal junction spherical or sub-spherical (Fig. 4g); vulva sub-equatorial (40–44%) .. .. ***Prismatolaimus*** sp.

(f) RHABDITIDA : RHABDITOIDEA

1. Ovaries paired (didelphic); oesophagus typically rhabditoid with swollen, valveless, corpus (median bulb), isthmus and valvated posterior bulb (Fig. 3e); males with copulatory bursa (Fig. 4e) .. .. (Rhabditidae : Rhabditinae) 4
   Ovary single, anterior (prodelphic); oesophagus panagrolaimoid (Fig. 3d) or cephaloboid (Fig. 3f) in shape, anterior part cylindrical, with or without median swelling/bulb; isthmus and valvated posterior bulb present. Males lacking copulatory bursa (Fig. 4c) 2

2. Lips elaborated into three characteristic slender, furcate, Y-shaped labial probolae which are situated anteriad to the six serrate cephalic probolae; procorpus of oesophagus slightly swollen, cylindroid, tapering towards isthmus (Fig. 3f); mb (Fig. 3b and e) absent (Cephalobidae) : ***Cervidellus*** sp.
   Lips simple, not furcate or serrate; procorpus tapering to narrow isthmus, with or without mb .. .. (Panagrolaimidae) 3

3. Oesophagus with slightly enlarged procorpus *and* valveless mb (Fig. 2e); lateral fields with three bands (four incisures) .. .. Panagrolaimid genus A sp.
   Oesophagus with swollen procorpus only (Fig. 2d) (i.e. typically panagrolaimoid); lateral fields with two bands (three incisures) .. ***Panagrolaimus*** sp.

4. Ovaries outstretched; copulatory bursa surrounding tail tip and with three precloacal papillae (Fig. 4e) .. .. ***Rhabditis*** subgenus A sp.
   Ovaries reflexed. Copulatory bursa not surrounding tail tip; only two precloacal papillae .. .. ***Rhabditis*** subgenus B sp.

(g) Tylenchida

1. Tail elongate-conoid to filiform (c = 3–6) (Fig. 4d) 2
   Tail conoid, short (c = 10–20) (Fig. 3k) 3

2. Larger species, length >0.9 mm (1.0–1.3 mm); vulva pre-equatorial amphidelphic; gubernaculum (Fig. 4d) exceeding (44–49%), ovary didelphic, 10 μm (13–15 μm) in length; males with copulatory bursa (Fig. 4d) .. .. .. (Tylodoridae) ***Antarctenchus hooperi***
   Smaller species, length <0.9 mm (0.5–0.8 mm); vulva post-equatorial (60–65%), ovary single, anterior (monodelphic, prodelphic); gubernaculum not exceeding 10 μm (4–6 μm); males with copulatory bursa (Fig. 4d) .. .. .. (Tylenchidae) ***Tylenchus*** sp.

3. Vulva >73% (74–80%); males with copulatory bursa; gubernaculum present (Fig. 4d) (L = 0.7–1.1 mm) .. (Tylenchidae) ***Ditylenchus*** sp.
   Vulva not >73% (66–73%); males without copulatory bursa and gubernaculum absent (L = 0.35–0.95 mm) .. .. (Aphelenchoididae) ***Aphelenchoides*** spp. (iv)

(h) Dorylaimida : Dorylaimidae

1. Guide ring "double" (Fig. 3h); aperture of odontostyle narrow, not exceeding one-fifth of its length; nerve ring surrounds oesophagus at 40–43% of its length from anterior end. Tail blunt, dorsally convex-conoid (Fig. 4c). Males not found ***Enchodelus*** (one species only, ***E. signyensis***)
   Guide ring normally "single" (Fig. 3g), except in one species (*Eudorylaimus paradoxus*); aperture of odontostyle wider, one-third to one-half of its length; nerve ring surrounds oesophagus at 27–38% of its length from anterior end. Tails variable 2

2. Male and female tails dissimilar. Females: tail proximally convex conoid, digitiform in distal one-half to two-thirds, tapering to narrowly rounded terminus (Fig. 4b); ratio of T/ABW >2.5 (2.9–5.0). Males: tail short, dorsally convex conoid with broadly rounded terminus (Fig. 4c). Odontostyle <24 μm (12–18 μm) long .. ***Mesodorylaimus*** **spp. (v)**
   Tails similar in both sexes; typically hamate, i.e. conoid-arcuate ventrad, with narrowly or broadly rounded terminus or with offset digitiform process in distal one-third (Fig. 3k); or if male tail similar to *Mesodorylaimus* males (one species only, *E. isokaryon*), then odontostyle >24 μm (29–35 μm) long; ratio of T/ABW in both sexes <2.5 (0.8–2.0) .. .. ***Eudorylaimus*** **spp. (vi)**

C. KEYS TO SPECIES

(i) *Plectus* species

The continental Antarctic species, *P. frigophilus* is included in the key with those of the maritime Antarctic.

1. Tail length $< 6 \times$ABW 2
   Tail length $\geqslant 6 \times$ABW 7

2. Anterior margins of amphids < 1.4 head widths (i.e. about one head width) behind lips (Fig. 3i).. 3
   Anterior margins of amphids 1.5–2.2 head widths behind lips .. .. ***P. parvus***

3. Small species, L < 600 μm; cephalic setae cuticular (Fig. 3i) .. .. .. ***P. armatus***
   Larger species, L > 600 μm; cephalic setae simple (Fig. 3f) 4

4. Lips and cheilostom well developed, offset from neck by a constriction 5
   Lips and cheilostom weakly developed, typically indistinct, not offset from neck by a constriction 6

5. Lips convex-conoid; tail length $< 4.5 \times$ABW (Fig. 4a); lateral fields with three incisures .. .. ***P. parietinus***
   Lips broad, flattened anteriorly; tail length $> 4.7 \times$ABW; lateral fields with four incisures .. .. ***Plectus*** **sp. D**

6. Large species, L > 1.3 mm; width of lateral alae (fields) about one-eleventh of maximum body width .. .. ***P. frigophilus***
   Smaller species, L < 1.2 mm; width of lateral alae one-seventh to one-ninth of maximum body width .. .. ***P. antarcticus***

7. L > 0.8 mm, width of lateral fields one-twelfth to one-seventeenth $\times$ maximum body width .. .. ***Plectus*** **sp. B**
   L < 0.8 mm, width of lateral fields one-seventh to one-eleventh $\times$ maximum body width 8

8. Anterior margin of amphid > 1.7 (1.75–2.2) head widths from lips; smaller species, L < 0.5 mm .. .. ***Plectus*** **sp. A**
   Anterior margin of amphids < 1.6 (1.2–1.5) head widths from lips; larger species, L > 0.5 mm .. .. ***Plectus*** **sp. C**

(ii) *Teratocephalus* species

1. Post-uterine sac short (7–17 μm), length not exceeding three-quarters vulval body diameters; metarhabdions minute (0.5–1 μm) < one-half the length of prostom or mesostom. Males unknown .. .. **Teratocephalus** near **lirellus**

   Post-uterine sac long (25–46 μm), its length equivalent to about 2 (1.5–2.5) vulval body diameters; metarhabdions of similar length to prostom or mesostom. Males common 2

2. Margins (incisures) of lateral fields strongly crenate; mid-body with 13–17 refractive longitudinal ridges which are visible in lateral view .. .. **Teratocephalus** sp. B

   Margins of lateral fields simple (Fig. 4h); longitudinal ridges absent **Teratocephalus** sp. A

Unfortunately, Bunt (1954) did not quote the authorities of most nematodes in his list of species. It is therefore uncertain whether his (sub-Antarctic) *Teratocephalus terrestris* was *T. terrestris* (Bütschli 1873) de Man 1876 or *T. terrestris* after De Coninck (1935). However, these two species were regarded as different by Anderson (1969), who re-named the latter species *T. deconincki*. *T. terrestris* differs from *T. deconincki* by possessing thinner cuticle and shallower striae; from *Teratocephalus* spp. A and B by the very short post-vulval sac (about one-half vulval body diameter); from *T.* near *lirellus* it differs by the long metastom, which is longer than the mesostom, whereas in *T.* near *lirellus* it is typically less than half the length of the mesostom. According to Anderson (1969), *T. deconincki* differs from all other species by having a median oesophageal swelling and in the position of the nerve ring near the basal bulb.

(iii) *Monhystera* species

1. Stoma armed with two or three small teeth; vulva = 57–66%; L < 800 μm; males unknown 2

   Stoma unarmed; vulva = 75–82%; L > 1 000 μm; males common **Monhystera villosa**

2. Anterior margins of amphid apertures about one head width behind lip region (Fig. 3i); distance between vulva and anus > 75% of tail length; larger (stouter) species, L > 500 μm .. .. .. **Monhystera** sp. A

   Anterior margins of amphid apertures *c.* 1.7–2.4 head widths behind lip region; distance between vulva and anus < 60% of tail length; smaller, thinner species, L < 500 μm .. .. **Monhystera** sp. B

M. vulgaris and *M. filiformis* (?), recorded from Macquarie Island, differ from *Monhystera* spp. A and B by possessing unarmed stomas; and from *M. villosa* by the more anterior position of the vulva (V < 70%). *M. filiformis* differs from *M. vulgaris* by the position of the anterior margin of the amphid aperture, posterior to the lips. In *M. vulgaris*, the amphid aperture is about one head width behind the lips; in *M. filiformis* it is 1.5 to 2.0 head widths behind the lips.

(iv) *Aphelenchoides* species

1. Lateral fields with two incisures (Fig. 4h); excretory duct located about one median bulb length behind nerve ring; body shape in both sexes typically curled when killed by heat. Males common **Aphelenchoides** sp. B

LFs with four incisures; excretory duct usually located at level of nerve ring (± one-quarter median bulb length); body shape straight or uniformly and weakly ventrally arcuate, male tails recurved 2

2. Larger species, length typically > 550 μm; vulva ⩽ 70% and pvs ca. four VBW's long; males common .. .. *Aphelenchoides* sp. A
   Smaller species, length typically < 450 μm; vulva > 70% and pvs ca. one VBW long; males unknown .. .. *Aphelenchoides* sp. C

(v) *Mesodorylaimus* species

1. Odontostyle 16–18 μm long; vulva longitudinal; spicules each with triangular flap ("flag") near apex (Fig. 4c); L = 1.30–1.70 mm .. .. ***M. signatus***
   Odontostyle 12–14 μm; vulva transverse, depressed; spicules without triangular flaps; L = 1.13–1.50 mm .. .. ***M. imperator***

The continental zone representatives from Alexander Island are best presented in a separate key (males unknown):

1. Large species, L = 1.88–2.40 mm; oesophagus short (350–380 μm) relative to body length; b = 4.9–6.6 .. .. ***Mesodorylaimus*** sp. B
   Smaller species, L = 1.17–1.64 mm; oesophagus longer (304–388 μm) relative to body length; b = 3.8–4.8 2

2. Vulva transverse, distinctly depressed; odontostyle 14.3–16.2 μm long .. .. ***Mesodorylaimus*** sp. C
   Vulva transverse, not or very weakly depressed; odontostyle 13.8–15.0 μm long .. .. ***Mesodorylaimus*** sp. A

Two species of *Mesodorylaimus* have also been recorded from the sub-Antarctic zone: *M. gaussi* and *M. bastiani*. *M. gaussi*, of which only one male was described (Steiner, 1916), was considered a doubtful species by Schneider (1939). However, it was regarded as a valid species by Andrássy (1959) and Goodey (1963). *M. gaussi* differs from *M. bastiani* and all other *Mesodorylaimus* species in the Antarctic region by having strongly offset lips and by the greater number of supplements in the male (38 as opposed to between six and 13 in other species).

Mesodorylaimus sp. B differs from all other species by its greater length, while *M. signatus* is similarly distinct in possessing a longitudinal vulva.

Of the remaining four species, *Mesodorylaimus* sp. A differs from the others by a longer oesophagus (> 370 μm); *M. bastiani* differs from *M. imperator* by having a generally longer odontostyle, by its smaller body diameter (a = 44–46 for females, 41–53 for males) and shorter spicules in males; and from *Mesodorylaimus* sp. C by a smaller body diameter and post-equatorial vulva (V = 53–60% according to the re-description by Loof (1969)). *Mesodorylaimus imperator* can be differentiated from *Mesodorylaimus* sp. C by a shorter odontostyle, and weakly depressed vulva.

(vi) *Eudorylaimus* species

Females

1. Odontostyle with "double" guide ring; lips with wart-like papillae (Fig. 3h); vulva with anterior and posterior cuticular crimping, and spear very thin (< 2.7 μm) .. .. ***E. paradoxus***

Guide ring "single" (Fig. 3g); lips without wart-like papillae (Fig. 3a); vulva simple or, if with cuticular crimping around vulva, then spear heavy (> 2.7 μm) 2

2. Odontostyle length exceeding 21 μm and width > 2.7 μm 3
Odontostyle length < 21 μm and width < 2.7 μm 4

3. Very large species, length > 2.8 mm; odontostyle > 27.5 μm (28–35 μm) long and ca. 5 μm wide; intrauterine egg, when present, smooth; vulva without cuticular crimping .. .. *E. isokaryon*
Length < 2.8 mm; odontostyle < 27.5 μm (22–27 μm) long and ca. 3.5 μm wide; intrauterine egg, when present, verrucose; vulva often with cuticular crimping .. .. *E. verrucosus*

4. Vulva longitudinal .. .. *E. pseudocarteri*
Vulva transverse 5

5. Odontostyle length $\geqslant 16$ μm (16–20 μm) 6
Odontostyle < 16 μm (12.5–15.5 μm) .. .. ***Eudorylaimus*** **sp. G**

6. Length of pre-rectum 80–150 μm; width of head = 8.5–10.5 times width of odontostyle, which $\leqslant 2.25$ μm (typically 1.6–2.0 μm) 7
Length of pre-rectum 48–69 μm; width of head = 5.5–7.5 times width of odontostyle, which $\geqslant 2.3$ μm (typically 2.4–2.7 μm) .. *E. antarcticus*

7. Lip region characteristically conoid, narrow and offset. Body width at base of oesophagus > 3.6 (3.65–5.0) times width of lip region .. .. .. *E. coniceps*
Lip region truncate and broad, distinctly offset with rounded sides. Body width at base of oesophagus < 3.6 (2.8–3.6) times width of lip region .. *E. spaulli*

Males

1. Supplements contiguous (Fig. 4i), > 20 in number; lips with large wart-like outer papillae; odontostyle with "double" guide ring (Fig. 3h) .. .. *E. paradoxus*
Supplements separate, < 20 in number (Fig. 4c); lips without large wart-like papillae; guide ring "single" (Fig. 3g) 2

2. Odontostyle long, > 22 μm (23–35 μm); spicules large, their length exceeding 90 μm; lateral guiding pieces (LGP^s) also large, exceeding 25 μm in length 3
Odontostyle < 22 μm (12–21 μm); spicules < 90 μm long; LGP^s < 25 μm long 4

3. Very large species, length > 2.8 mm; spear length > 74 μm, style > 27.5 μm (28–35 μm) long .. .. *E. isokaryon*
Length < 2.8 mm; spear length < 74 μm, style < 27.5 μm (23–27 μm) long .. .. *E. verrucosus*

4. Supplements with cuticular elevations between them; spicules > 63 μm and LGPs broad, their length < 15 μm 5
   Supplements without cuticular elevations between them, except for posterior two which are often almost contiguous; spicules < 63 μm long (if equal to 63 μm or marginally greater, LGPs length > 15 μm) 6

5. Odontostyle short, 12.5–15.5 μm .. .. ***Eudorylaimus*** **sp. G**
   Odontostyle longer, 16–18 μm .. .. ***E. coniceps***

6. LGPs length (Fig. 4c) < 15 μm; odontostyle thin, typically < 2 μm (1.5–2.2 μm) in width. Lips offset by a constriction, slightly flattened anteriorly but rounded at sides and papillae not prominent. Odontostyle width one-ninth to one-tenth width of lip region. Lips offset, rounded; papillae not protrusive .. .. ***E. spaulli***
   LGPs length > 15 μm (15.5–19 μm); odontostyle stouter, typically > 2 μm (2.3–2.8 μm) in width or about one-sixth to one-seventh width of lip region. Lips offset, contours angular, papillae protrusive .. ..

7. Width at base of oesophagus < 2.7 times that of lip region. Lips offset by a deep constriction. Tail conoid and either straight with a dorsal concavity or conoid-arcuate .. .. ***E. antarcticus***
   Width at base of oesophagus > 2.7 times that of lip region. Lips offset by a shallow constriction. Tail conoid-arcuate, with narrowly rounded terminus; never straight with dorsal concavity .. .. ***E. pseudocarteri***

The continental zone species, *E. antarcticus*, is included in the above key with those from the maritime zone. Two further species have also been recorded from the sub-Antarctic zone: *E. carteri* and *E. frigidus*; males of the latter are unknown. They can be distinguished by the longer heavier spear in *E. carteri* (length = 51–56 μm as opposed to 39.6 μm and width of odontostyle is one-fifth of head width as against one-tenth in *E. frigidus*). Differences between *E. carteri* and *E. pseudocarteri*, *E. coniceps*, *E. spaulli* and *E. antarcticus* were given by Loof (1975). *E. carteri* differs from *E. paradoxus* by lacking a "double" guide ring and wart-like papillae on the head; from *E. verrucosus* by the much shorter spear and body length; from *E. isokaryon* by the conoid-arcuate tail and shorter spear; and from *Eudorylaimus* sp. G by the much longer odontostyle. *E. frigidus* differs from all maritime and continental members of the genus by lacking an offset lip region and by the very narrow odontostyle aperture which is only one-quarter of its length (> one-third in the other species).

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