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Taxonomy & Inventories

Terrestrial nematodes from the Maritime Antarctic

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Abstract

Background

Soil nematodes are one of the most important terrestrial faunal groups in Antarctica, as they are a major component of soil micro-food webs. Despite their crucial role in soil processes, knowledge of their species diversity and distribution is still incomplete. Taxonomic studies of Antarctic nematodes are fragmented, which prevents assessment of the degree of endemicity and distribution of the species, as well as other aspects of biogeography.

New information

The present study is focused on the nematode fauna of one of the three Antarctic sub-regions, the Maritime Antarctic and summarises all findings published up to April 2023. A species list that includes 44 species, belonging to 21 genera, 16 families and eight orders is provided. A review of the literature on terrestrial nematodes inhabiting the Maritime Antarctic showed that the sites are unevenly studied. Three islands (Signy, King George and Livingston Islands) revealed highest species richness, probably due to the highest rates of research effort. Most species and four genera (*Antarctenchus*, *Pararhyssocolpus*, *Amblydorylaimus* and *Enchodeloides*) are endemic, proving that nematode fauna of the Maritime Antarctic is autochthonous and unique. Several groups of islands/sites have been revealed, based on their nematode fauna. The study showed that species with a limited

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distribution prevailed, while only two species (*Plectus antarcticus* and *Coomansus gerlachei*) have been found in more than 50% of the sites. Based on the literature data, details on species localities, microhabitat distribution, plant associations and availability of DNA sequences are provided.

Keywords

endemics, distribution, DNA sequences, species

Introduction

Soil nematodes are one of the most important groups of the terrestrial fauna in Antarctica (Maslen and Convey 2006) as they are abundant, taxonomically and functionally diverse and occupy a central position in the soil micro-food webs (Adams et al. 2014) and may have an impact on nutrient cycling and carbon dioxide emission, when soils thaw for a longer period of the year under climate change (van den Hoogen et al. 2019). In the challenging environmental conditions of the Antarctic, their distribution is limited to ice-free areas, where they have evolved throughout millions of years of climatic fluctuations in refugia (Ebach et al. 2008, Convey et al. 2020, Stevens and Mackintosh 2023). The glaciations, long-term isolation, harsh climate and the patchy distribution of ice-free areas (present today where at least partially ice-free throughout repeated glacial maxima (Newman et al. 2009)) are the main factors affecting the Antarctic nematode fauna origin/ genesis (i.e. the formation of fauna under the influence of multiple factors - historical, geographic and ecological) (Andrássy 1998, Convey and Peck 2019). In order to survive in the extreme environments, nematodes have developed exceptional cryptobiotic adaptations to manage freezing and desiccation stress (e.g. Pickup (1988), Wharton (1995), Treonis and Wall (2005), Kagoshima et al. (2019)).

Knowledge of the impact of climate change on nematode communities from extreme habitats and how they respond to these changes is insufficient (Freckman and Virginia 1997, Nielsen et al. 2011a). One of the main problems in predicting the effects of climate change in Antarctica is the limited knowledge on the diversity of terrestrial fauna, especially nematodes and the lack of comprehensive long-term studies (Gantait 2014). Data on species distribution and biogeography are not enough and the taxonomic information still remains confused or scarce (Andrássy 1998, Maslen and Convey 2006, Adams et al. 2014 , Kagoshima et al. 2019). Nematodes possess high indicator potential for assessing various environmental changes in the soil environment because they are abundant, ubiquitous, utilise diverse trophic and live strategies and, thus, occupy key positions in soil micro-food webs (Neher 2001, Ferris et al. 2001, Neher 2010, Chauvin et al. 2020, Taylor et al. 2020, Ara Khanum et al. 2022, Du Preez et al. 2022). This highlights the need for research on the fauna of nematodes and their communities in extreme environments in view of the already occurring global change.

Antarctica represents three distinct climatic regions: the Sub-Antarctic, Maritime and Continental Antarctic (Holdgate 1977), with the Sub-Antarctic being the most favourable (mean air temperatures of most islands are low, but positive during the whole year), with the Continental Antarctic having the harshest conditions (the average monthly temperatures remain below freezing) (Convey 2017). The Continental Antarctic covers the territories of the continent, the Balleny Islands and the eastern side of the Antarctic Peninsula (Convey 2017). The Sub-Antarctic is the boundary zone that lies north of 56°S (Chown and Brooks 2019). The flora and fauna in this region are rather typical of temperate latitudes. In this paper, we focused on terrestrial nematodes from the Maritime Antarctic. This is a region with a strong influence of the Southern Ocean; it includes the western coast of the Antarctic Peninsula to ca. 72°S, the South Shetland, South Orkney and South Sandwich Islands and the isolated Bouvetøya and Peter I Øya (Convey 2006, Convey 2017). The Maritime Antarctic is characterised by more favourable conditions compared with the Continental Antarctic: mean air temperatures are positive for 1–4 months of the year (Convey 2017), the vegetation is predominantly cryptogamic (algae, mosses, liverworts, lichens); higher plants are represented by two species, *Deschampsia antarctica* Desv. (Poaceae) and *Colobanthus quitensis* Bartl. (Caryophyllaceae) (Greene 1970, Longton 1979, Smith 1984).

Studies on nematodes in the Maritime Antarctic started at the beginning of the 20th century, with the contribution of the Romanian biologist Emil Racoviță during the first scientific Antarctic expedition in winter (Andrássy 1998). This resulted in a description of the first Antarctic nematode species, *Mononchus gerlachei* (= *Coomansus gerlachei* (de Man 1904) Jairajpuri and Khan 1977), followed by three other species, *Plectus antarcticus de Man 1904*, *P. belgicae* de Man 1904 and *Dorylaimus* sp. Following these first data, targeted investigations on the terrestrial nematode fauna from this part of Antarctica started from the early 70s of the 20th century (Spaull 1972, Spaull 1973a, Spaull 1973b, Spaull 1973c, Loof 1975, Maslen 1979a, Maslen 1979b, Caldwell 1981, Maslen 1981, Spaull 1981, Pickup 1988, Shishida and Ohyama 1989, Tsalolikhin 1989, Pickup 1990, Janiec 1996, Peneva et al. 1996, Andrássy 1998, Peneva and Chipev 1999, Convey et al. 2000, Nedelchev and Peneva 2000, Peneva et al. 2002, Convey and Wynn-Williams 2002, Holovachov and Bostrom 2006, Maslen and Convey 2006, Nedelchev and Peneva 2007, Kito 2009, Peneva et al. 2009, Nielsen et al. 2011b, Velasco-Castrillón and Stevens 2014, Velasco-Castrillón et al. 2014a, Russell et al. 2014, Elshishka et al. 2015a, Elshishka et al. 2015b, Elshishka et al. 2017, Kagoshima et al. 2019, Newsham et al. 2020). Antarctic nematodes have been studied mainly in easy to access areas near to the research bases/stations; therefore, there are still many remote locations never sampled for nematodes which raise questions on how widespread the species are (Adams et al. 2014, Convey et al. 2020).

According to Andrássy (1998), numerous studies have reported species as new records with no morphological description making it impossible to confirm identifications, especially when the collected material is no longer available for subsequent examination. Further, this has an impact on the potential to assess fauna endemicity, which is critical for examining Antarctic biogeography within a global context (Andrássy 1998). There are numerous cases of misclassification and underestimation of the diversity for most microfaunal groups

in Antarctica, likely due to poor taxonomic resolution caused by insufficient sampling and their difficult identification (Adams et al. 2006, Iakovenko et al. 2015, Carapelli et al. 2017, Short et al. 2022, Collins et al. 2023), as well as the low degree of the development and application of molecular taxonomy.

In recent years, molecular studies have become more important in these marginal habitats, as a powerful toolkit to complement the traditional taxonomy, species identification and descriptions and to assess biodiversity and biogeography (Courtright et al. 2000, Velasco-Castrillón et al. 2014b, Elshishka et al. 2015b, Elshishka et al. 2017, Czechowski et al. 2017, Velasco-Castrillón et al. 2018, Kagoshima et al. 2019).

The integrative approach (combining morphological and molecular data) is an effective way to understand the scale of endemism, evolution and distribution of the Antarctic nematode fauna. However, the main problem of not linking molecular data with morphology still remains for the vast majority of Antarctic nematode species.

The present paper aims to summarise all records of nematode species occurrence in the Maritime Antarctic between the years of 1904 and April 2023 as a basis for further studies and to present a snapshot of nematode species diversity in this part of the Antarctic.

Materials and methods

The nematode species list has been composed, based on literature data and refers to the Maritime Antarctic. This list includes all species recovered in the Maritime Antarctic, as well as the islands and sites from where each species was reported, along with data on microhabitats and plant associations, accession numbers of published sequences in GenBank also included, if available. The type of microhabitat is reported as in the original paper, the scientific names of the plants being adapted according to the current systematics (Ochyra 1998). Geographical coordinates are presented additionally for each site if missing in the original paper. For the literature search, online bibliography search engine Google Scholar and the academic databases Scopus, Web of Science and CABI were used with search keywords “terrestrial nematode species*” and “Maritime Antarctic*”. We focused on studies reporting nematode species (see Holovachov (2014a)) from the Maritime Antarctic and omitted those that provide data only at the generic or family level.

Several papers recording multiple unidentified taxa at generic level (Maslen and Convey 2006, Nielsen et al. 2011b) probably contain many undescribed nematode species from those regions suggesting that the nematode diversity there might be underestimated to a great extent. Overall, nematodes from 37 sites (34 islands and three localities on the Antarctic Peninsula) are included in the review. The taxonomic position of the Antarctic species was presented according to the current nematode nomenclature. Classification follows Andrássy (2005), Andrássy (2007) and Andrássy (2009); only for order Plectida classification follows Holovachov (2014b). The analyses are based on species presence/absence data and Wizard > Matrix display function in PRIMER v.7.0 software (Clarke and Gorley 2015). The Matrix display wizard performs a sequence of sample and species

resemblance calculations and clustering and seriation steps resulting in a shade plot which visualises the species presence/absence data and sites similarity.

Checklist of terrestrial nematodes from the Maritime Antarctic

Order Dorylaimida

Family Nordiidae

Enchodeloides signyensis (Loof, 1975) Elshishka, Lazarova, Radoslavov, Hristov, Peneva, 2017

Nomenclature:

Enchodelus signyensis Loof, 1975

Family Qudsianematidae

Eudorylaimus coniceps Loof, 1975

Eudorylaimus pseudocarteri Loof, 1975

Eudorylaimus spaulli Loof, 1975

Eudorylaimus verrucosus Loof, 1975

Eudorylaimus cf. *carteri* Andrassy, 1959 (Bastian, 1865)

Family Pararhyssocolpidae

Pararhyssocolpus paradoxus (Loof, 1975) Elshishka, Lazarova, Radoslavov, Hristov, Peneva, 2015

Nomenclature:

Eudorylaimus paradoxus Loof, 1975|Rhyssocolpus paradoxus (Loof, 1975) Andrássy, 1986

Family Dorylaimidae

***Calcaridorylaimus signatus* (Loof, 1975) Andrássy, 1981**

Nomenclature:

Mesodorylaimus signatus Loof, 1975

***Mesodorylaimus antarcticus* Nedelchev and Peneva, 2000**

***Mesodorylaimus chipevi* Nedelchev and Peneva, 2000**

***Mesodorylaimus imperator* Loof, 1975**

***Mesodorylaimus masleni* Nedelchev and Peneva, 2000**

Family Aporcelaimidae

***Amblydorylaimus isokaryon* (Loof, 1975) Andrássy, 1998**

Nomenclature:

Eudorylaimus isokaryon Loof, 1975

Order Aphelenchida

Family Aphelenchoididae

***Aphelenchoides haguei* Maslen, 1979**

***Aphelenchoides vaughani* Maslen, 1979**

***Laimaphelenchus helicosoma* (Maslen, 1979) Peneva and Chipev, 1999**

Nomenclature:

Aphelenchoides helicosoma Maslen, 1979

Order Alaimida

Family Amphidelidae

***Paramphidelus antarcticus* Tsalolikhin, 1989**

Order Monhysterida

Family Monhysteridae

***Eumonhystera filiformis* (Bastian, 1865) Andrássy, 1981**

***Eumonhystera vulgaris* (de Man, 1880) Andrássy, 1981**

***Geomonhystera villosa* (Bütschli, 1873) Andrássy, 1981**

Order Plectida

Family Plectidae

***Plectus antarcticus* de Man, 1904**

***Plectus* cf. *antarcticus* de Man, 1904**

***Plectus belgicae* de Man, 1904**

***Plectus cf. belgicae* de Man, 1904**

***Plectus insolens* Andrássy, 1998**

***Plectus tolerans* Andrássy, 1998**

***Plectus* cf. *tolerans* Andrássy, 1998**

***Plectus meridianus* Andrássy, 1998**

***Plectus* cf. *meridianus* Andrássy, 1998**

***Plectus armatus* Bütschli, 1873**

Nomenclature:

Ceratoplectus armatus (Bütschli, 1873) Andrássy, 1984

Order Tylenchida

Family Psilenchidae

***Antarctenchus hooperi* Spaull, 1972**

Family Anguinidae

***Ditylenchus parcevivens* Andrássy, 1998**

Order Rhabditida

Family Teratocephalidae

***Teratocephalus tilbrooki* Maslen, 1979**

***Teratocephalus pseudolirellus* Maslen, 1979**

***Teratocephalus rugosus* Maslen, 1979**

Family Cephalobidae

***Acrobeloides arctowskii* Holovachov and Boström, 2006**

***Cervidellus* cf. *vexilliger* (de Man, 1880) Thorne, 1937**

Family Rhabditidae

***Cuticularia firmata* Andrássy, 1998**

***Rhabditis krylovi* Tsalolikhin, 1989**

***Rhabditis marina*-group**

Family Peloderidae

Pelodera teres-group

Pelodera strongyloides-group

Pelodera parateres-group

Order Mononchida

Family Mononchidae

Coomansus gerlachei (de Man, 1904) Jairajpuri and Khan, 1977

Nomenclature:

Mononchus gerlachei de Man, 1904|*Clarkus gerlachei* (de Man, 1904) Jairajpuri, 1970

Analysis

Results

To date, 44 species of terrestrial nematodes, belonging to 21 genera, 16 families and eight orders have been recorded in the Maritime Antarctic (Table 1, Fig. 1). Nematodes have been reported from 34 islands and three sites on the Antarctic Peninsula (Fig. 2). Several groups of islands/sites have been revealed, based on their nematode fauna. Those groups form a gradient from north (the group of Livingston, King George and Signy Islands) to south (the group of Adelaide, Charcot, Alexander, Leonie and Alamode Islands).

The order Dorylaimida is the best represented order in this Antarctic Region with five families, six genera and 13 species. The order Mononchida is represented by only one family (one genus and species).

The families Aphelenchoididae, Cephalobidae, Monhysteridae, Plectidae, Qudsianematidae, Peloderidae and Rhabditidae have a cosmopolitan distribution and, in the Maritime Antarctic, they are represented by one to two genera and two to ten species. The family Plectidae is the most diverse (10 species). Seven families (Amphidelidae, Anguinidae, Aporcelaimidae, Mononchidae, Nordiidae, Pararhyssocolpidae and Psilenchidae) are represented by only one species each.

Almost all species and four genera (*Antarctenchus*, *Pararhyssocolpus*, *Amblydorylaimus* and *Enchodeloides*) are endemic. Four species generally known as cosmopolitan are reported in some ecological studies in the Maritime Antarctic: *Eumonhystera vulgaris* (de Man 1880) Andrássy (1981), *E. filiformis* (Bastian 1865) Andrássy (1981), *Geomonhystera*

villosa (Bütschli 1873) Andrássy (1981) and *Plectus armatus Bütschli 1873*. Of these, a description and illustrations were provided only for *E. vulgaris (Tsalolikhin 1989*).

Table 1.

Distribution of terrestrial nematodes in the Maritime Antarctic.

* Taxonomic paper; ** Paper with molecular data; ***Paper with molecular and morphologica data

Terrestrial reference sites (SIRS) at Signy Island for long-term monitoring of the various biotic and abiotic components of Antarctic moss-peat communities (for full descriptions, see Tilbrook (1973)). These sites no longer exist and no studies have been done since the late 1980s.

SIRS 1 (*Polytrichastrum alpinum* (Hedwig), *Chorisodontium aciphyllum* (Hook. f. & Wilson) Broth. (60°43.5'S, 45°35.6'W))

SIRS 2 (*Sanionia uncinata* (Hedw.), *Warnstorfia sarmentosa* (Wahlenb.), *Warnstorfia laculosa* (Müll. Hal.), *Cephaloziella varians* (Gottsche) Steph. (60°43.7'S, 45°36'W))

[1] Geographical coordinates according to original paper. [2] Geographical coordinates additionally added.

Nematode species	**Locality / Coordinates**	**Microhabitat and plant species**	**DNA / Accesion number in GenBank**	**Reference**
Enchodeloides signyensis	Signy Island (type locality) [1,2] 60°43’S, 45°38’W	*Syntrichia filaris* (Müll. Hal.) (type habitat); *D. antarctica*; *C. quitensis*		Loof (1975) *
				Maslen (1979b)
		SIRS 1; SIRS 2		Caldwell (1981)
		SIRS 1; SIRS 2		Maslen (1981)
	Alamode Island [1,2] 68°43'S, 67°32'W	*S. uncinata*		Loof (1975)*
				Maslen (1979b)
		Moss		Maslen and Convey (2006)
	Alexander Island [2] 71°0′0″S, 70°0′0″W	Moss, lichen, soil, microbial mat		Maslen and Convey (2006)
	Alexander Island[1] 71°52’40”S, 68°15’57”W			Convey and Wynn-Williams (2002)
	Blaiklock Island [1,2] 67°33’S, 67°00’W	*P. alpinum*, *Pohlia nutans* (Hedw.)		Loof (1975) *

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
				Maslen (1979b)
	Coronation Island [1,2] 60°38'S, 45°35'W	*D. antarctica*		Loof (1975)*
				Maslen (1979b)
	Charcot Island [1,2] 69°45'S, 75°15'W	Soil, moss clumps, algae, various lichens		Convey et al. (2000)
		Moss, lichen, soil		Maslen and Convey (2006)
	Dream Island [2] 64°44′0″S, 64°14′0″W	Moss mats with green algae		Shishida and Ohyama (1989)*
	Elephant Island [1,2] 61°10'S, 55°14'W	*D. antarctica*; *Polytrichum* sp.		Loof (1975)*
				Maslen (1979b)
	Galindez Island [1,2] 65°15'S, 64°15'W	*D. antarctica*		Loof (1975)*
				Maslen (1979b)
	King George Island [1] 62°09'32"S, 58°27'58"W	*D. antarctica*, *C. quitensis*, *Sanionia* sp., *S. filaris*, *Syntrichia magellanica* (Mont.)		Russell et al. (2014)
	King George Island [2] 62°2′S, 58°21′W	Moist brown soil without vegetation, surrounded by moss	18S rDNA KY881720.1 28S rDNA KY881719.1	Elshishka et al. (2017)***
	Livingston Island [2] 62°36′S, 60°30′W	*D. antarctica*; *D. antarctica*+*S. uncinata*; *D. antarctica*+*S. uncinata*+*C. quitensis*; *P. alpinum*; *S. uncinata*; *Bryum* sp.; *Usnea* sp.+*P. alpinum*; *Cladonia* sp.+*S. uncinata*+*P. alpinum*; *Polytrichum juniperinum* Hedw.+*S. uncinata*; *S. uncinata*+*Bartramia patens* Brid.		Peneva et al. (2002)*
				Elshishka et al. (2015a)
		Moss; Soil under moss crust; Soil		Elshishka et al. (2017)*

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
Eudorylaimus coniceps	Signy Island (type locality) [1,2] 60°43'S, 45°38'W	*S. filaris* (type habitat); *Andreaea gainii* Card.; *C. quitensis*; *W. laculosa* and *W. sarmentosa*		Loof (1975)*
		SIRS 1		Maslen (1979b)
		SIRS 2		Maslen (1981)
		Andreaea sp.		Pickup (1988)
				Wharton and Block (1993)
	Alexander Island [2] 71°0′0″S, 70°0′0″W	Moss, lichen, soil, microbial mat		Maslen and Convey (2006)
	Ardley Island [1] 62°12‘38“S, 58°56‘40“W			Russell et al. (2014)
	Charcot Island [1,2] 69°45'S, 75°15'W	Soil, moss clumps, algae, various lichens		Convey et al. (2000)
		Moss, lichen, soil		Maslen and Convey (2006)
	Coronation Island [1,2] 60°38'S, 45°35'W	*D. antarctica*		Loof (1975)*
				Maslen (1979b)
	Elephant Island [1,2] 61°10'S, 55°14'W	*D. antarctica*		Loof (1975)*
				Maslen (1979b)
	Emperor Island [1,2] 67°52'S, 68°43'W	*S. uncinata* and *Bryum pseudotriquetrum* (Hedw.)		Loof (1975)*
				Maslen (1979b)
	Guebriant Island [2] 67°48′S, 68°25′W			Maslen (1979b)
	Halfmoon Island [1] 62°35‘45“S, 59°54‘06“W			Russell et al. (2014)
	King George Island [2] 62°2′S, 58°21′W	Mosses		Kito (2009)
	King George Island [1]62°11‘48“S, 58°59‘28“W; 62°11‘50“S, 58°56‘33“W; 62°11‘53“S, 58°56‘47“W			Russell et al. (2014)

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	Leonie Island [2] 67°36′S, 68°21′W	Mixture of soil, moss, lichen, liverworts, algae and cyanobacteria	18S rDNA LC457670.1 LC457669.1 LC457668.1 LC457667.1 LC457666.1 LC457665.1 LC457664.1 LC457663.1 LC457662.1 LC457647.1 LC457646.1 LC457645.1	Kagoshima et al. (2019) **
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
E. pseudocarteri	Signy Island (type locality) [1] 60°43'S, 45°38'W	*A. gainii* (type habitat); *W. laculosa* and *W. sarmentosa*; *D. antarctica*		Loof (1975)*
				Maslen (1979b)
		SIRS 1; SIRS 2		Maslen (1981)
		Andreaea sp.		Pickup (1988)
				Wharton and Block (1993)
	Adelaide Island [2] 67°15′S, 68°30′W	Moss, lichen		Maslen and Convey (2006)
	Alexander Island [2] 71°0′0″S, 70°0′0″W	Moss, lichen, soil, microbial mat, freshwater		
	Ardley Island [1] 62°12‘38“S, 58°56‘40“W			Russell et al. (2014)
	Charcot Island [1,2] 69°45'S, 75°15'W	Moss, lichen, soil		Maslen and Convey (2006)
	Coronation Island [1,2] 60°38'S, 45°35'W	*D. antarctica*		Loof (1975)*
				Maslen (1979b)
	Elephant Island [1,2] 61°10'S, 55°14'W	*Polytrichum* sp.		Loof (1975)*
				Maslen (1979b)
	King George Island [2] 62°2′S, 58°21′W	Puddle		Tsalolikhin (1989)*

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	King George Island [1]62°09‘32“S, 58°27‘58“W; 62°11‘48“S, 58°59‘28“W; 62°11‘50“S, 58°56‘33“W			Russell et al. (2014)
	Livingston Island [1] 62°39‘14“S, 60°36‘39“W			
E. spaulli	Alamode Island (type locality) [1,2] 68°43'S, 67°32'W	Soil around *S. uncinata* (type habitat)		Loof (1975)*
		Moss, lichen, soil, microbial mat		Maslen and Convey (2006)
				Maslen (1979b)
	Adelaide Island [2] 67°15′S, 68°30′W	Moss, lichen		Maslen and Convey (2006)
	Alexander Island [2] 71°0′0″S, 70°0′0″W	Moss, lichen, soil, microbial mat		
	Anchorage Island [2] 67°36′14.01″S, 68°12′32.78″W	Moss, grass, lichen, soil, microbial mat, freshwater		
	Blaiklock Island [1,2] 67°33’S, 67°00’W	*P. alpinum*, *Pohlia nutans*		Loof (1975)*
				Maslen (1979b)
	Charcot Island [1,2] 69°45'S, 075°15'W	Soil, moss clumps, algae, various lichens		Convey et al. (2000)
		Moss, lichen, soil		Maslen and Convey (2006)
	Coronation Island [1,2] 60°38'S, 45°35'W	*D. antarctica*		Loof (1975)*
				Maslen (1979b)
	Deception Island [2] 62°58′37″S, 60°39′0″W			Maslen (1979b)
	Elephant Island [1,2] 61°10’S, 55°14’W	*D. antarctica*; *Polytrichum* sp.		Loof (1975)*
				Maslen (1979b)
	Leonie Island [2] 67°36′S, 68°21′W	Moss, grass, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)
	Limpet Island [1,2] 67°38'S, 68°19'W	*S. uncinata*		Loof (1975)*

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
				Maslen (1979b)
	Pourquoi pas Island [2] 67°41S, 67°28′W			Maslen (1979b)
	Signy Island [1,2] 60°43'S, 45°38'W	*S. filaris* *B . pseudotriquetrum*; *D. antarctica*; *W. laculosa* and *W. sarmentosa*		Loof (1975)*
				Wharton and Block (1993)
		Andreaea sp.		Pickup (1988)
				Maslen (1979b)
		SIRS 2		Maslen (1981)
E. verrucosus	Elephant Island (type locality) [1,2] 61°10'S, 55°14'W	*D. antarctica* (type habitat)		Loof (1975)*
				Maslen (1979b)
	Adelaide Island [2] 67°15′S, 68°30′W	Moss, lichen, soil, microbial mat		Maslen and Convey (2006)
	Signy Island [1] 60°43'S, 45°38'W			Maslen (1979b)
		SIRS 1; SIRS 2		Maslen (1981)
				Wharton and Block (1993)
Eudorylaimus cf. *carteri*	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
Pararhyssocolpus paradoxus	Signy Island (type locality) [1] 60°43'S, 45°38'W	*A. gainii* (type habitat); *S. filaris*		Loof (1975)*
				Maslen (1979b)
		SIRS 1; SIRS 2		Maslen (1981)
	Adelaide Island [2] 67°15′S, 68°30′W	Moss, lichen, soil, microbial mat		Maslen and Convey (2006)
	Adelaide Island [1] 67°34.429'S, 68°07.284'W	*C. varians* and S. *uncinata*		Newsham et al. (2020)

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	Anchorage Island [2] 67°36′14.01″S, 68°12′32.78″W	Moss, grass, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)
	Blaiklock Island [1,2] 67°33'S, 67°00'W			Maslen (1979b)
	Coronation Island [1,2] 60°38'S, 45°35'W	*D. antarctica*		Loof (1975)*
				Maslen (1979b)
	Elephant Island [1,2] 61°10'S, 55°14'W	*S. uncinata*		Loof (1975)*
				Maslen (1979b)
	Galindez Island [1, 2] 65°15'S, 64°15'W	*D. antarctica*		Loof (1975)*
				Maslen (1979b)
	Guebriant Island [2] 67°48′S, 68°25′W			Maslen (1979b)
	Intercurrence Island [1,2] 63°55'S, 61°24'W	*Brachythecium* sp.		Loof (1975)*
				Maslen (1979b)
	King George Island [2] 62°2′S, 58°21′W			Kito (2009)
		Soil	18S rDNA KM092521.1 28S rDNA KM092522.1	Elshishka et al. (2015b) ***
	King George Island [1]62°09‘32“S, 58°27‘58“W; 62°11‘48“S, 58°59‘28“W; 62°11‘50“S, 58°56‘33“W; 62°11‘53“S, 58°56‘47“W			Russell et al. (2014)
	Leonie Island [2] 67°36′S, 68°21′W	Moss, grass, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)
	Limpet Island [1,2] 67°38'S, 68°19'W	*S. uncinata*		Loof (1975)*
				Maslen (1979b)
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
		Sanionia sp.; *C. quitensis*, *D. antarctica*, moss; *D. antarctica*, *C. quitensis*; *D. antarctica*, moss		Elshishka et al. (2015b)*

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	Nelson Island [2] 62°18′S, 59°3'W	Moss		Elshishka et al. (2015b)*
Calcaridorylaimus signatus	Signy Island (type locality) [1] 60°43'S, 45°38'W	*S. filaris* (type habitat); *B. pseudotriquetrum*; *C. quitensis*; *D. antarctica*; *Prasiola crispa* (Lightfoot)		Loof (1975)*
				Maslen (1979b)
		SIRS1		Caldwell (1981)
		SIRS 1; SIRS 2		Maslen (1981)
		Soil, moss, lichen, liverworts, algae and cyanobacteria	18S rDNA LC457654.1 LC457653.1 LC457652.1 LC457651.1 LC457650.1 LC457649.1 LC457648.1	Kagoshima et al. (2019) **
	Alamode Island [2] 68°43'S, 67°32'W	Moss, lichen, soil		Maslen and Convey (2006)
	Alexander Island [2] 71°0′0″S, 70°0′0″W	Moss, lichen, soil, microbial mat		
	Anchorage Island [2] 67°36′14.01″S, 68°12′32.78″W	Moss, grass, lichen, soil, microbial mat, freshwater		
	Anvers Island, Biscoe Point [2] 64°49′6.85″S, 63°46′32.29″W	Soil around roots of *D. antarctica*		Shishida and Ohyama (1989)*
	Coronation Island [1,2] 60°38'S, 45°35'W	*D. antarctica*		Loof (1975)*
				Maslen (1979b)
	Dream Island [2] 64°44′0″S, 64°14′0″W	Moss mats with green algae		Shishida and Ohyama (1989)*
	Galindez Island [1,2] 65°15'S, 64°15'W	*D. antarctica*		Loof (1975)*
				Maslen (1979b)
	Leonie Island [2] 67°36′S, 68°21′W	Moss, grass, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
Mesodorylaimus antarcticus	Livingston Island (type locality) [1] 62°39'22''S, 60°21'13''W	*Sanionia* sp. (type habitat); *D. antarctica*; *D. antarctica-Polytrichum* sp.; A small moss tuft *Sanionia* sp.; A mix grass-moss spot *D. antarctica+Sanionia* sp.		Nedelchev and Peneva (2000)*
	King George Island [1]62°09‘32“S, 58°27‘58“W; 62°11‘48“S, 58°59‘28“W; 62°11‘50“S, 58°56‘33“W			Russell et al. (2014)
	Neko Harbour, Antarctic Peninsula [1] 64°50‘41“S, 62°31‘53“W			
M. chipevi	Livingston Island (type locality) [1] 62°34'48''S, 60°20'42''W	*D. antarctica* on the top of flat rock near sea (type habitat); Shallow soil with cover of green algae amongst grass on a rock; Small tuft of *D. antarctica*; *Polytrichum* sp.+*S. uncinata+D. antarctica*; A mix grass-moss spot *D. antarctica+Sanionia* sp.; A large pure grass spot *D. antarctica*		Nedelchev and Peneva (2000)*
	Livingston Island [1] 62°38'52''S, 60°22'24''W	*S. georgico-uncinata* Müll. Hal. + *D. antarctica*		Nedelchev and Peneva (2007)*
	King George Island [1] 62°09‘32“S, 58°27‘58“W			Russell et al. (2014)
M. imperator	Emperor Island (type locality) [1,2] 67°52'S, 68°43'W	*S. uncinata* and *B. pseudotriquetrum* (type habitat)		Loof (1975)*
				Maslen (1979b)
	Adelaide Island [2] 67°15′S, 68°30′W	Moss, lichen, soil		Maslen and Convey (2006)
	Alamode Island [2] 68°43'S, 67°32'W	Moss		
	Alexander Island [2] 71°0′0″S, 70°0′0″W	Moss, grass, lichen, soil, microbial mat, freshwater		
	Anchorage Island [2] 67°36′14.01″S, 68°12′32.78″W	Moss, grass, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)
	Charcot Island [1,2] 69°45'S, 075°15'W	Soil, moss clumps, algae, various lichens		Convey et al. (2000)
	Cone Island [1,2] 67°41'S, 69°10'W	*S. uncinata*		Loof (1975)*

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
				Maslen (1979b)
	Killinbeck Island [2] 67°34′S, 68°5′W	Moss, lichen, soil		Maslen and Convey (2006)
	Leonie Island [2] 67°36′S, 68°21′W	Moss, grass, lichen, soil, microbial mat, freshwater		
M. masleni	Livingston Island (type locality) [1] 62°39'46''S, 60°23'29''W	A large area of *D. antarctica* (type habitat); A mix grass-moss spot *D. antarctica* + *Sanionia* sp.		Nedelchev and Peneva (2000)*
Amblydorylaimus isokaryon	Elephant Island (type locality) [1,2] 61°10'S, 55°14'W	*D. antarctica* (type habitat); *Polytrichum* sp.		Loof (1975)*
				Maslen (1979b)
	Galindez Island [1,2] 65°15'S, 64°15'W	*D. antarctica*		Loof (1975)*
				Maslen (1979b)
	Intercurrence Island [1,2] 63°55'S, 61°24'W	*Brachythecium* sp.		Loof (1975)*
				Maslen (1979b)
	King George Island [2] 62°2′S, 58°21′W			Kito (2009)
		Soil		Elshishka et al. (2015b)*
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
		Grass spot (*D. antarctica)*; a moss- grass (*D. antarctica-Polytrichum* sp.) community; *S. georgico-uncinata* and *D. antarctica*; *C. quitensis* and *D. antarctica*, moss; *D. antarctica* and *C. quitensis*		Elshishka et al. (2015b)*
	Nelson Island [2] 62°18′S, 59°3′W	Moss	18S rDNA KM092519.1 28S rDNA KM092520.1	Elshishka et al. (2015b) ***
Aphelenchoides haguei	Signy Island (type locality) [1] 60°43'S, 45°38'W	SIRS 1 (type habitat); SIRS 2		Maslen (1979a)*
		SIRS 1; SIRS 2		Maslen (1981)

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	Adelaide Island [2] 67°15′S, 68°30′W	Moss, lichen		Maslen and Convey (2006)
	Adelaide Island [1] 67°34.429'S, 68°07.284'W	*C. varians* and *S. uncinata*		Newsham et al. (2020)
	Alamode Island [2]68°43'S, 67°32'W	Moss		Maslen and Convey (2006)
	Alexander Island [2] 71°0′0″S, 70°0′0″W	Moss, lichen, soil, microbial mat		
	Anchorage Island [2] 67°36′14.01″S, 68°12′32.78″W	Moss, grass, lichen, soil, microbial mat, freshwater		
	Ardley Island [1] 62°12‘38“S, 58°56‘40“W			Russell et al. (2014)
	Deception Island [1] 62°58‘42“S, 60°33‘29“W			
	King George Island [1]62°09‘32“S, 58°27‘58“W; 62°11‘48“S, 58°59‘28“W; 62°11‘50“S, 58°56‘33“W; 62°11‘53“S, 58°56‘47“W			Russell et al. (2014)
	Leonie Island [2] 67°36′S, 68°21′W	Moss, grass, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)
	Livingston Island [1] 62°39‘14“S, 60°36‘39“W	Soil		Russell et al. (2014)
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
A. vaughani	Signy Island (type locality) [1] 60°43’S, 45°38’W	SIRS 1; SIRS 2		Maslen (1979a)*
		SIRS 1; SIRS 2		Maslen (1981)
	Alexander Island [2] 71°0′0″S, 70°0′0″W	Moss, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
Laimaphelenchus helicosoma	Signy Island (type locality) [1] 60°43’S, 45°38’W	SIRS 1 (type habitat); SIRS 2		Maslen (1979a)*
		SIRS 1		Maslen (1981)

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	Adelaide Island [2] 67°15′S, 68°30′W	Moss, lichen		Maslen and Convey (2006)
	Adelaide Island [1] 67°34.429'S, 68°07.284'W	*C. varians* and *S. uncinata*		Newsham et al. (2020)
	Ardley Island [1] 62°12‘38“S, 58°56‘40“W			Russell et al. (2014)
	King George Island [1] 62°09‘32“S, 58°27‘58“W 62°11‘48“S, 58°59‘28“W 62°11‘50“S, 58°56‘33“W			Russell et al. (2014)
	Livingston Island, [1] 62°38'S, 60°20'W	Primitive soil around roots of *D. antarctica*		Peneva and Chipev (1999)*
Paramphidelus antarcticus	King George Island (type locality) [2] 62°2′S, 58°21′W	Lichen (type habitat)		Tsalolikhin (1989)*
Eumonhystera filiformis	King George Island [1] 62°09’S, 58°29'W	Thaw ponds, with the bottom inhabited by *W. sarmentosa*		Janiec (1996)
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
E. vulgaris	King George Island [1] 62°09’S, 58°29'W	Puddle		Tsalolikhin (1989)*
		Moraine ponds, their shores are inhabited mainly by *S. uncinata*, *W. sarmentosa* and *B. pseudotriquetrum*; Moss banks of *W. sarmentosa* and *W. laculosa*; Thaw ponds, with the bottom inhabited by *W. sarmentosa*; Nearshore ponds, colonised by *W. laculosa* and *W. sarmentosa*		Janiec (1996)
	King George Island [1]62°09‘32“S, 58°27‘58“W; 62°11‘48“S, 58°59‘28“W; 62°11‘50“S, 58°56‘33“W; 62°11‘53“S, 58°56‘47“W			Russell et al. (2014)
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
Geomonhystera villosa	Coronation Island [1,2] 60°38'S, 45°35'W			Maslen (1979b)
	Ardley Island [1] 62°12‘38“S, 58°56‘40“W			Russell et al. (2014)

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	Elephant Islan [1,2] 61°10'S, 55°14'W			Maslen (1979b)
	Galindez Island [1,2] 65°15'S, 64°15'W			
	Intercurrence Island [1,2] 63°55'S, 61°24'W			
	King George Island [1] 62°09'S, 58°29'W	*W. sarmentosa* and *W. laculosa*		Janiec (1996)
	King George Island [1] 62°11'48"S, 58°59'28"W 62°11'50"S, 58°56'33"W 62°11'53"S, 58°56'47"W			Russell et al. (2014)
	Livingston Island [1] 62°39'14"S, 60°36'39"W			
	Neko Harbour, Antarctic Peninsula [1] 64°50'41"S, 62°31'53"W			
	Signy Island [1] 60°43'S, 45°38'W			Maslen (1979b)
		SIRS 1		Caldwell (1981)
		SIRS 1; SIRS 2		Maslen (1981)
		Mixture of soil, moss, lichen, liverworts, algae and cyanobacteria	18S rDNA LC457677.1 LC457676.1 LC457675.1 LC457674.1 LC457673.1 LC457672.1 LC457671.1	Kagoshima et al. (2019)
Plectus antarcticus	Danco Land coast, Beneden Head, Antarctic Peninsula (type locality) [2] 64°46'S, 62°42'W	Freshwater algae (type habitat)		de Man (1904)*
				Maslen (1979b)
		Moss from rock		Andrássy (1998)*
	Adelaide Island [1] 67°34′S, 68°07′W	Moss, lichen, soil, microbial mat		Maslen and Convey (2006)

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
		Cephaloziella varians (Gottsche)	18S rDNA LC457559.1 LC457558.1 LC457557.1 LC457556.1 LC457555.1 LC457554.1	Kagoshima et al. (2019) **
	Adelaide Island [1] 67°34.429'S, 68°07.284'W	*C. varians* and *S. uncinata*		Newsham et al. (2020)
	Alamode Island [2] 68°43'S, 67°32'W			Spaull (1973a)
				Maslen (1979b)
		Moss		Maslen and Convey (2006)
	Alexander Island, [1] 71°52'40''S, 68°15'57''W			Convey and Wynn-Williams (2002)
	Alexander Island [2] 71°0′0″S, 70°0′0″W	Moss, lichen, soil, microbial mat		Maslen and Convey (2006)
	Anchorage Island [2] 67°36′14.01″S, 68°12′32.78″W	Moss, grass, lichen, soil, microbial mat, freshwater		
	Avian Island [2] 67°46"S, 68°54"W			Spaull (1973a)
				Maslen (1979b)
	Blaiklock Island [1,2] 67°33'S, 67°00'W			
	Charcot Island [1,2] 69°45'S, 075°15'W	Soil, moss clumps, algae, various lichens		Convey et al. (2000)
		Moss, lichen, soil		Maslen and Convey (2006)
	Cone Island [1,2] 67°41'S, 69°10'W			Maslen (1979b)
	Coronation Island [1,2] 60°38'S, 45°35'W			
	Deception Island [2] 62°58′37″S, 60°39′0″W	Moss from basalt debris		Andrássy (1998)*
				Maslen (1979b)

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	Deception Island [1] 62°58‘43“S, 60°33‘24“W	Only erratic patches of mosses, lichens and algae		Russell et al. (2014)
	Devil Island [1] 63°47‘54“S, 57°17‘24“W	Soil substrates of the very sandy with embedded gravel		
	Elephant Island [1,2] 61°10’S, 55°14’W			Spaull (1973a)
				Maslen (1979b)
		S. uncinata		Andrássy (1998)*
	Emperor Island [2] 67°52'S, 68°43'W			Spaull (1973a)
	Galindez Island [1,2] 65°15'S, 64°15'W			Maslen (1979b)
	Guebriant Island [2] 67°48′S, 68°25′W			
	Intercurrence Island [1,2] 63°55'S, 61°24'W			Spaull (1973a)
				Maslen (1979b)
	Killingbeck Island [2] 67°34′S, 68°5'W	Moss, lichen, soil		Maslen and Convey (2006)
	King George Island [2] 62°2′S, 58°21′W	Soil around rhizosphere of grasses and under lichen		Tsalolikhin (1989)*
	King George Island [1] 62°09‘S, 58°29'W	Moraine ponds, their shores are inhabited mainly by *S. uncinata*, *W. sarmentosa* and *B. pseudotriquetrum*; Moss banks of *W. sarmentosa* and *W. laculosa*		Janiec (1996)
	King George Island [1]62°09‘32“S, 58°27‘58“W; 62°11‘48“S, 58°59‘28“W	Mosses, lichens, *D. antarctica*		Russell et al. (2014)
	Leonie Island [2] 67°36′S, 68°21′W	Moss, grass, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)
	Limpet Island [1,2] 67°38'S, 68°19'W			Maslen (1979b)
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
	Pourqoui pas Island [2] 67°41'S, 67°28′W			Maslen (1979b)

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	Signy Island [1] 60°43'S, 45°38'W			Spaull (1973a)
				Spaull (1973b)
				Spaull (1973c)
				Maslen (1979b)
		SIRS 1; SIRS 2		Maslen (1981)
		SIRS1; SIRS2		Caldwell (1981)
		Andreaea sp.		Pickup (1988)
				Wharton and Block (1993)
		Acrocladium sp.; *D. antarctica*		Andrássy (1998)*
Plectus cf. *antarcticus*	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
	Signy Island [2] 60°43'S, 45°36'W	Mixture of soil, moss, lichen, liverworts, algae and cyanobacteria	18S rDNA LC457687.1 LC457686.1	Kagoshima et al. (2019)
P. belgicae	Cap Beneden, Danco Land, Antarctic Peninsula (type locality) [2] 64°46"S, 62°42"W	Algae fresh water (type habitat)		de Man (1904)*
	Adelaide Island [1] 67°34′S, 68°07′W	Moss, lichen, soil, microbial mat		Maslen and Convey (2006)
		C. varians	18S rDNA LC457565.1 LC457564.1 LC457563.1 LC457562.1 LC457561.1 LC457560.1	Kagoshima et al. (2019)
	Adelaide Island [1] 67°34.429'S, 68°07.284'W	*C. varians* and *S. uncinata*		Newsham et al. (2020)
	Anchorage Island [2] 67°36′14.01″S, 68°12′32.78″W	Moss, grass, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	Charcot Island [1, 2] 69°45'S, 075°15'W	Moss, lichen, soil		
	Elephant Island [1, 2] 61°10'S, 55°14'W	*P. juniperinum*; *S. uncinata*		Andrássy (1998)*
	King George Island [2] 62°2′S, 58°21′W	*B. pseudotriquetrum* and *Bartramia patens*	18S rDNA LC457638.1 LC457637.1 LC457636.1	Kagoshima et al. (2019)
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
	Rhyolite Island, [2] 69°40′S, 68°35′W	Moss, grass		Maslen and Convey (2006)
	Signy Island [2] 60°43'S, 45°36'W	*Acrocladium* sp.; *Usnea* sp.; SIRS 2		Andrássy (1998)*
Plectus cf. *belgicae*	Ardley Island [1] 62°12'38"S, 58°56'40"W			Russell et al. (2014)
	Deception Island [1]62°58'43"S, 60°33'24"W; 62°58'42"S, 60°33'29"W			
	King George Island [1]62°09'32"S, 58°27'58"W; 62°11'48"S, 58°59'28"W; 62°11'50"S, 58°56'33"W; 62°11'53"S, 58°56'47"W			
	Livingston Island [1] 62°39'14"S, 60°36'39"W			
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
	Petermann Island [1] 65°10'29"S, 64°08'10"W			Russell et al. (2014)
P. insolens	Signy Island (type locality) [2] 60°43'S, 45°36'W	Thin soil on rock covered with *Acrocladium* sp. (type habitat); roots of *D. antarctica*		Andrássy (1998)*
	Ardley Island [1] 62°12'38"S, 58°56'40"W	Soils, *Sanionia* sp., *W. sarmentosa* and *Andreaea regularis* Müll. Hal.		Russell et al. (2014)
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
P. tolerans	Emperor Island (type locality) [2] 67°52'S, 68°43'W	*S. uncinata* (type habitat)		Andrássy (1998)*
	Alexander Island [2] 71°0′0″S, 70°0′0″W	Moss, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	Anchorage Island [2] 67°36′14.01″S, 68°12′32.78″W	Moss, grass, lichen, soil, microbial mat, freshwater		
	Charcot Island [1,2] 69°45'S, 075°15'W	Moss, lichen, soil		
	King George Island [2] 62°2′S, 58°21′W			Kito (2009)
	Leonie Island [2] 67°36′S, 68°21′W	Moss, grass, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
	Rhyolite Island [2] 69°40′S, 68°35′W	Moss, grass		Maslen and Convey (2006)
Plectus cf. *tolerans*	Ardley Island [1] 62°12‘38“S, 58°56‘40“W			Russell et al. (2014)
	King George Island [1]62°09‘32“S, 58°27‘58“W; 62°11‘48“S, 58°59‘28“W; 62°11‘50“S, 58°56‘33“W; 62°11‘53“S, 58°56‘47“W			
	Livingston Island [1] 62°39‘14“S, 60°36‘39“W			
P. meridianus	Terra Firma Island (type locality) [2] 68°42′S, 67°32′W	Lichen (type habitat)		Andrássy (1998)*
	Emperor Island [2] 67°52’S, 68°43’W	A carpet of *S. uncinata*		
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
	Signy Island [2] 60°43’S, 45°36’W	Roots of *D. antarctica*		Andrássy (1998)*
Plectus cf. *meridianus*	Signy Island [2] 60°43’S, 45°36’W	Soil, moss, lichen, liverworts, algae and cyanobacteria	18S rDNA LC457691.1 LC457690.1 LC457689.1 LC457688.1	Kagoshima et al. (2019)
P. armatus	Ardley Island [1] 62°12‘38“S, 58°56‘40“W			Russell et al. (2014)
	Coronation Island [2] 60°38'S, 45°35'W			Maslen (1979b)
	Elephant Island [2] 61°10’S, 55°14’W			

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	Galindez Island [2] 65°15'S, 64°15'W			
	King George Island [1] 62°11‘48“S, 58°59‘28“W			Russell et al. (2014)
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
	Signy Island [1] 60°43’S, 45°38’W	*D. antarctica*; *C. quitensis*; mosses		Spaull (1973b)
				Spaull (1973c)
				Maslen (1979b)
Antarctenchus hooperi	Signy Island (type locality) [1,2] 60°43'S, 45°38'W	*A. gainii* (type habitat); *Brachythecium* sp., *Calliergon* sp., *S. filaris*, *Grimmia antarctici* Card., *Ch. aciphyllum*, *P. juniperinum* and *D. antarctica*		Spaull (1972)*
		Sanionia sp.+ *Calliergon* sp.+ *Calliergidium* sp.; *Polytrichum* sp.; *Bryum* sp. + *Syntrichia* sp. + *Andreaea* sp.; *D. antarctica*		Spaull (1973a)
		A. gainii, *S. filaris*, *Calliergon-Calliergidium*		Spaull (1973b)
				Spaull (1973c)
				Maslen (1979b)
		SIRS 1; SIRS 2		Maslen (1981)
		S. uncinata		Caldwell (1981)
				Wharton and Block (1993)
	Coronation Island [1,2] 60°38'S, 45°35'W	*D. antarctica*		Spaull (1972)*
		D. antarctica		Spaull (1973a)
				Maslen (1979b)
Ditylenchus parcevivens	Signy Island (type locality) [2] 60°43’S, 45°38’W	Fine silt (type habitat)		Andrássy (1998)*

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	King George Island [1]62°09‘32“S, 58°27‘58“W; 62°11‘48“S, 58°59‘28“W; 62°11‘50“S, 58°56‘33“W; 62°11‘53“S, 58°56‘47“W			Russell et al. (2014)
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
Teratocephalus tilbrooki	Signy Island (type locality) [1,2] 60°43’S, 45°38’W	SIRS 1 (type habitat); SIRS2		Maslen (1979a)*
		‘Swamp’ moss carpets		Maslen (1979b)
		SIRS 1; SIRS 2		Maslen (1981)
		Andreaea sp.		Pickup (1988)
				Wharton and Block (1993)
		Usnea sp.		Andrássy (1998)*
	Adelaide Island [2] 67°15′S, 68°30′W	Moss, lichen		Maslen and Convey (2006)
	Ardley Island [1] 62°12‘38“S, 58°56‘40“W			Russell et al. (2014)
	Charcot Island [1, 2] 69°45'S, 075°15'W	Moss, lichen, soil		Maslen and Convey (2006)
	Halfmoon Island [1] 62°35‘45“S, 59°54‘06“W	Soil		Russell et al. (2014)
	King George Island [1]62°09‘32“S, 58°27‘58“W; 62°11‘48“S, 58°59‘28“W; 62°11‘50“S, 58°56‘33“W; 62°11‘53“S, 58°56‘47“W	Soil		
	Leonie Island [2] 67°36′S, 68°21′W	Moss, grass, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)
T. pseudolirellus	Signy Island (type locality) [1] 60°43’S, 45°38’W	*S. filaris* (type habitat)		Maslen (1979a)*
	Alexander Island [2] 71°0′0″S, 70°0′0″W	Moss, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)
	Charcot Island [2]69°45'S, 075°15'W	Moss, lichen, soil		

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	King George Island [2] 62°2′S, 58°21′W			Kito (2009)
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
T. rugosus	Signy Island (type locality) [2] 60°43'S, 45°38'W	SIRS 1; SIRS 2		Maslen (1979a)*
				Maslen (1979b)
		SIRS 1; SIRS 2		Maslen (1981)
	Ardley Island [1] 62°12‘38“S, 58°56‘40“W			Russell et al. (2014)
	Deception Island [1] 62°58‘42“S, 60°33‘29“W			
	Devil Island [1] 63°47‘54“S, 57°17‘24“W			
	Halfmoon Island [1] 62°35‘45“S, 59°54‘06“W			
	King George Island [1]62°09‘32“S, 58°27‘58“W; 62°11‘48“S, 58°59‘28“W; 62°11‘53“S, 58°56‘47“W			
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
Acrobeloides arctowskii	King George Island (type locality) [1] 58°29'30"W, 61°05'S	Soil around roots of *D. antarctica* (type habitat)		Holovachov and Bostrom (2006)*
	King George Island [1] 62°09‘32“S, 58°27‘58“W			Russell et al. (2014)
	Deception Island [1]62°58‘43“S, 60°33‘24“W; 62°58‘42“S, 60°33‘29“W	Soil devoid of vegetation or with *P. crispa*		
Cervidellus cf. *vexilliger*	King George Island [1] 62°09‘32“S, 58°27‘58“W			Russell et al. (2014)
Cuticularia firmata	Signy Island (type locality) [2] 60°43'S, 45°36'W	Fine mud (type habitat); SIRS 2		Andrássy (1998)*
Rhabditis krylovi	King George Island (type locality) [2] 62°2′S, 58°21′W	Flowing lake (type habitat)		Tsalolikhin (1989)*
Rhabditis marina-group	Deception Island [1] 62°55‘43“S, 60°40‘48“W			Russell et al. (2014)

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
Pelodera teres group	Deception Island [1]62°58‘43“S, 60°33‘24“W; 62°58‘42“S, 60°33‘29“W			Russell et al. (2014)
	Livingston Island [1] 62°39‘14“S, 60°36‘39“W			
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
	Neko Harbour, Antarctic Peninsula [1] 64°50‘41“S, 62°31‘53“W			Russell et al. (2014)
	Paulet Island [1] 63°34‘30“S, 55°46‘59“W	Ornithogenic soils		
Pelodera strongyloides group	Devil Island [1] 63°47‘54“S, 57°17′24“W			Russell et al. (2014)
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
	Livingston Island [1] 62°39‘14“S, 60°36‘39“W			Russell et al. (2014)
	Neko Harbour, Antarctic Peninsula [1]64°51‘45“S, 62°26‘47“W; 64°50‘41“S, 62°31‘53“W			
Pelodera parateres group	Deception Island [1] 62°58‘42“S, 60°33‘29“W			Russell et al. (2014)
	King George Island [1] 62°09‘32“S, 58°27‘58“W			
Coomansus gerlachei	Danco Land coast, Beneden Head Antarctic Peninsula (type locality) [2] 64°46"S, 62°42"W	Algae fresh water (type habitat)		de Man (1904)*
				Maslen (1979b)
				Andrássy (1998)*
	Caleta Cierva, Antarctic Peninsula [1] 64°10’S, 60°57’W	Soil around roots of *D. antarctica*		Chaves (1990)*
	Antarctic Peninsula			Jiménez Guirado et al. (1998)*
	Adelaide Island [1] 67°34.429'S, 68°07.284'W	*C. varians and S. uncinata*		Newsham et al. (2020)

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	Anchorage Island [2] 67°36′14.01″S, 68°12′32.78″W	Moss, grass, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)
	Anvers Island, Biscoe Point [2] 64°49′6.85″S, 63°46′32.29″W	Soil around roots of *D. antarctica*		Shishida and Ohyama (1989)*
	Anvers Island, Old Palmer [2] 64°45′48″S, 64°5′12″W	Moss mats		
	Avian Island [2] 67°46"S, 68°54"W	*Sanionia* sp., *Bryum* sp.		Spaull (1973a)
				Maslen (1979b)
		S. uncinata, *B. pseudotriquetrum*		Spaull (1981)
	Coronation Island [1,2] 60°38'S, 45°35'W	*D. antarctica*		Spaull (1973a)
				Maslen (1979b)
	Charcot Island [1,2] 69°45'S, 75°15'W	Soil, moss clumps, algae, various lichens		Convey et al. (2000)
	Deception Island [2] 62°58′37″S, 60°39′0″W	*Sanionia* sp.; *Polytrichum* sp.		Spaull (1973a)
				Maslen (1979b)
		Melting snow moisten mosses in a shingle field		Andrássy (1998)*
	Dream Island [2] 64°44′0″S, 64°14′0″W	Moss mats with green algae		Shishida and Ohyama (1989)*
	Elephant Island [1,2] 61°10'S, 55°14'W	*Brachythecium* sp.; *D. antarctica*; *Sanionia* sp.		Spaull (1973a)
				Maslen (1979b)
		Soil bellow *D. antarctica*		Spaull (1981)
	Galindez Island [1,2] 65°15'S, 64°15'W	*Brachythecium* sp.; *D. antarctica*; *Bryum* sp.; *Sanionia* sp. + *Pohlia* sp.		Spaull (1973a)
				Maslen (1979b)

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
		Brachythecium austrosalebrosum (C. Muell.) Par.		Spaull (1981)
	Guebriant Island [2] 67°48′S, 68°25′W	*Brachythecium* sp., *Bryum* sp., *Sanionia* sp.		Spaull (1973a)
				Maslen (1979b)
	Intercurrence Island [1,2] 63°55'S, 61°24'W	*Brachythecium* sp., *Bryum* sp., *Sanionia* sp.		Spaull (1973a)
				Maslen (1979b)
	Halfmoon Island [1] 62°35‘45“S, 59°54‘06“W			Russell et al. (2014)
	King George Island [1] 62°09’S, 58°29'W	Moraine ponds, their shores are inhabited mainly by *S. uncinata*, *W. sarmentosa* and *B. pseudotriquetrum*		Janiec (1996)
	Leonie Island [2] 67°36′S, 68°21′W	Moss, grass, lichen, soil, microbial mat, freshwater		Maslen and Convey (2006)
		Mixture of soil, moss, lichen, liverworts, algae and cyanobacteria	18S rDNA LC457644.1 LC457643.1 LC457642.1 LC457641.1 LC457640.1 LC457639.1	Kagoshima et al. (2019) **
	Limpet Island [1,2] 67°38'S, 68°19'W	*Brachythecium* sp., *Bryum* sp., *Sanionia* sp.		Spaull (1973a)
				Maslen (1979b)
	King George Island [2] 62°2′S, 58°21′W			Kito (2009)
	King George Island [1]62°09‘32“S, 58°27‘58“W; 62°11‘48“S, 58°59‘28“W; 62°11‘50“S, 58°56‘33“W; 62°11‘53“S, 58°56‘47“W			Russell et al. (2014)
	Litchfield Island [2] 64°46′S, 64°6′W	Decaying moss mats with blue-green algae		Shishida and Ohyama (1989)*
	Livingston Island [2] 62°36′S, 60°30′W	Soil under crisp of green algae; *D. antarctica-S. uncinata*; *D. antarctica*, *P. alpinum*		Peneva et al. (1996)*

Nematode species	Locality / Coordinates	Microhabitat and plant species	DNA / Accesion number in GenBank	Reference
	Livingston Island [1] 62°39‘14“S, 60°36‘39“W			Russell et al. (2014)
	Livingston Island [2] 62°36′S, 60°30′W			Elshishka et al. (2015a)
	Nelson Island [2] 62°18′S, 59°3W	Moss	18S rDNA KM092523.1 28S rDNA KM092524.1	Elshishka et al. (2015b)**
	Signy Island [1,2] 60°43’S, 45°38’W	*Sanionia* sp.+ *Calliergon* sp.+ *Calliergidium* sp.; *Polytrichum* sp.; *Bryum* sp. + *Syntrichia* sp. + *Andreaea* sp.; *D. antarctica*		Spaull (1973a)
				Spaull (1973b)
				Spaull (1973c)
				Maslen (1979b)
		S. uncinata and *W. sarmentosa*		Caldwell (1981)
		SIRS 1; SIRS 2		Maslen (1981)
		P. crispa from melt stream		Spaull (1981)
		Sanionia sp.		Pickup (1988)
		P. crispa; *S. uncinata*		Pickup (1990)
		Calliergon sp.		Wharton and Block (1993)
		Mixture of soil, lichen, liverworts, algae and cyanobacteria	18S rDNA LC457661.1 LC457660.1 LC457659.1 LC457658.1 LC457657.1 LC457656.1 LC457655.1	Kagoshima et al. (2019) **

Most species (27) have limited distribution registered in up to five islands of the Maritime Antarctic. *Cuticularia firmata* *Andrássy 1998*, *Cervidellus* cf. *vexilliger*, *Rhabditis krylovi* *Tsalolikhin 1989*, a species of the *Rhabditis marina*-group, *Mesodorylaimus masleni* Nedelchev and Peneva 2000, *Eudorylaimus* cf. *carteri* and *Plectus* cf. *meridianus* are recorded from one island only. Six species occurred in more than 30% of the sites (*C.*

gerlachei, *P. antarcticus*, *Pararhyssocolpus paradoxus* (Loof 1975), *Eudorylaimus spaulli Loof 1975*, *E. coniceps* Loof 1975, *Enchodeloides signyensis* (Loof 1975)) with *C. gerlachei* and *P. antarcticus* being the most widespread (reported from more than half of the sites) (Figs 3, 4, 5). There are no particular trends in the distribution of most common species (occurring in more than 22% of the sites, 1/4 of the species) related to longitude or latitude, only *P. paradoxus* and *Mesodorylaimus imperator* Loof 1975 have not been reported from the most southern sites, whereas *G. villosa* – from the most northern localities.

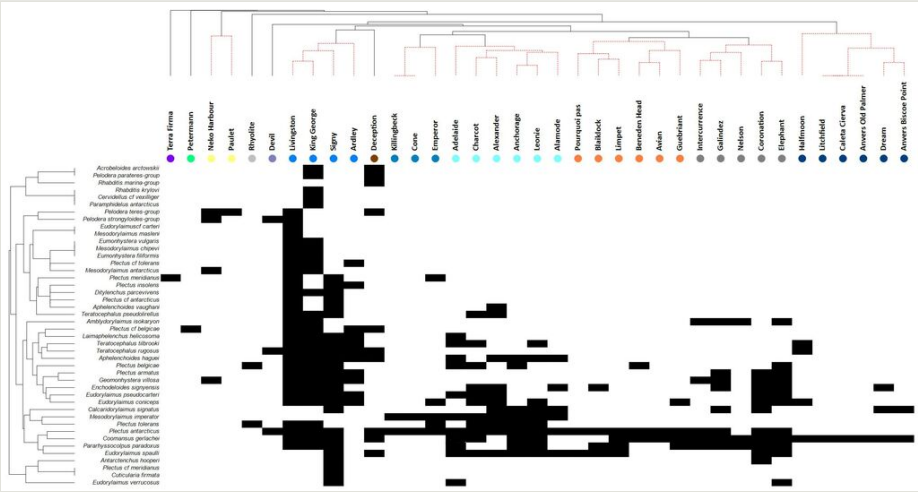

Figure 1. doi

Terrestrial nematodes from the Maritime Antarctic - visual representation of the data matrix (shade plot): in the columns are the 37 sites and in the rows – 44 species. White and black spaces denote absence or presence of a particular species at a given site; sites and species are arranged according to the groups derived by the clustering analyses. Significant clusters were identified with SIMPROF test and visualised in red dashed lines and a range of coloured dots. Each colour represents a group of sites/islands with similar nematode fauna.

In most of the literature sources, there are data on the microhabitats in which nematode species occurred. The nematodes have been recorded from various microhabitats: bare soil, microbial mats, moss, lichens and algae and soil around the two species of higher plants occurring in the Maritime Antarctic (Fig. 6).

DNA data have been generated for 11 species, but sequences for only three of them (*Amblydorylaimus isokaryon* (Loof 1975), *P. paradoxus* and *E. signyensis*) are supported by full morphological descriptions as per the modern taxonomic standards (Elshishka et al. 2015b, Elshishka et al. 2017, Kagoshima et al. 2019).

The review of the literature related to terrestrial nematodes from the Maritime Antarctic showed that the different parts are unevenly studied and three islands, Livingston (31 species), King George (28 species) and Signy (25 species) exhibited the richest nematode fauna (Fig. 7). Signy Island is the best studied Antarctic island with 12 new species

described. This is due to the intensive studies on the nematode fauna in the 1970s and 1980s undertaken by the British Antarctic Survey (*Spaull 1973a, Spaull 1973b, Spaull 1973c, Loof 1975, Maslen 1979a, Maslen 1979b, Caldwell 1981, Maslen 1981, Pickup 1988, Pickup 1990* etc.).

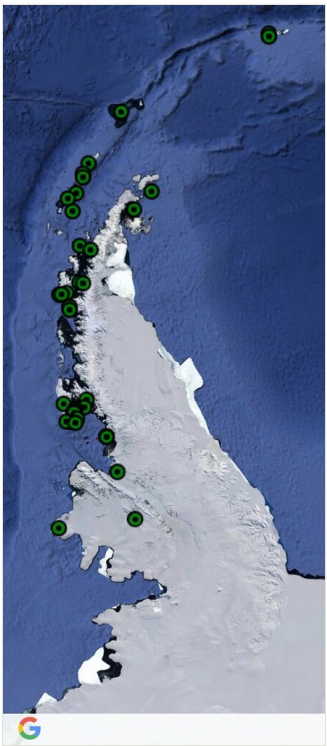

Figure 2. doi

Distribution of terrestrial nematodes in the Maritime Antarctic. In green are presented the sites with records of terrestrial nematodes.

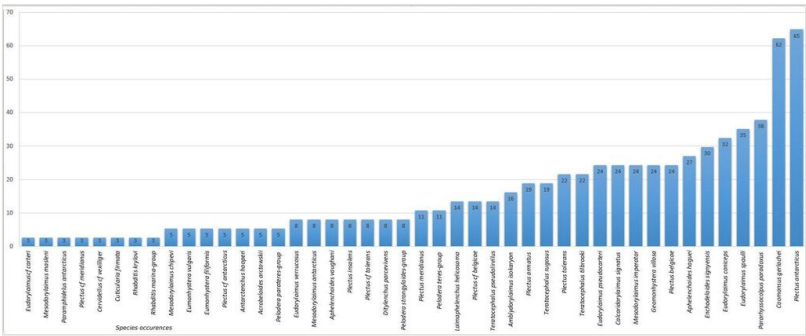

Figure 3. doi

Described species and their occurrences presented as percentages.

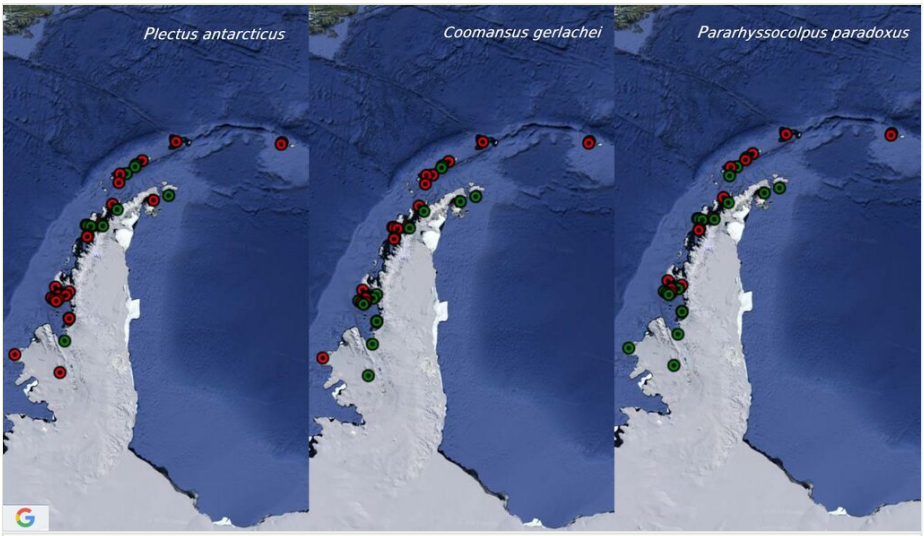

Figure 4. doi

Distribution of *P. antarcticus*, *C. gerlachei* and *Pararhyssocolpus paradoxus* in the Maritime Antarctic. In red are presented the sites with records of these species, in green are presented the sites with records of the other Antarctic terrestrial nematodes.

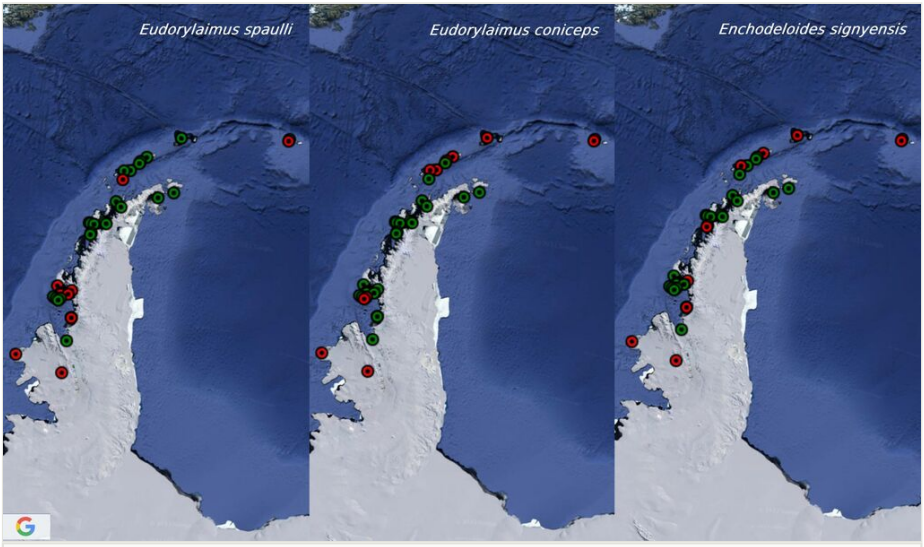

Figure 5. doi

Distribution of *Eudorylaimus spaulli*, *E. coniceps* and *Enchodeloides signyensis* in the Maritime Antarctic. In red are presented the sites with records of these species, in green are presented the sites with records of the other Antarctic terrestrial nematodes.

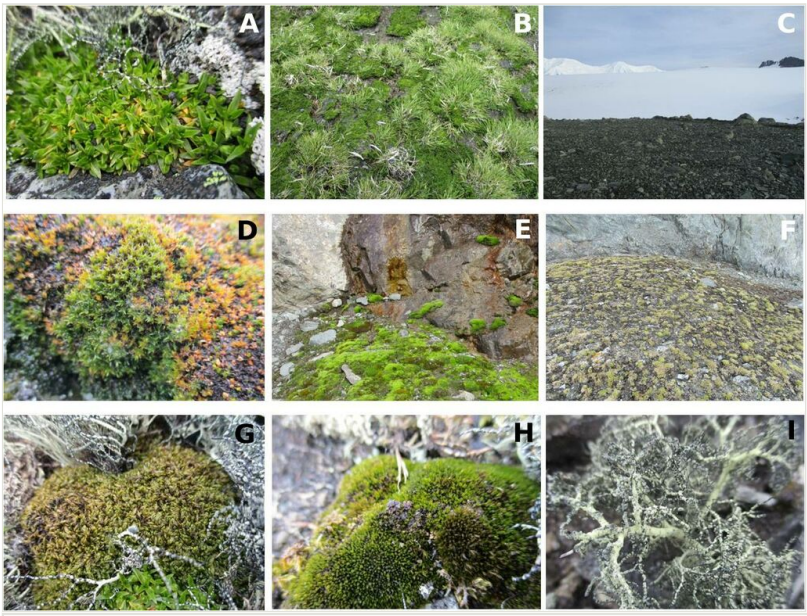

Figure 6. doi

Some microhabitats in the Maritime Antarctic. **A** *Colobanthus quitensis* **B** *Deschampsia antarctica* **C** Bare soil **D** *Syntrichia* sp. **E** *Bryum* sp. **F** *D. antarctica*, *C. quitensis*, mosses **G** *Sanionia* sp. **H** *Polytrichum* sp. **J** *Usnea* sp. Photographs by M. Elshishka (Livingston Island).

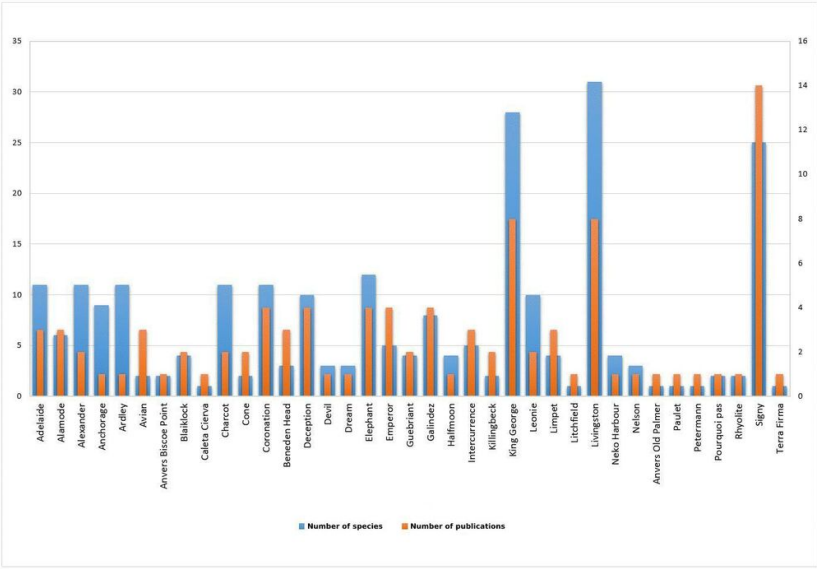

Figure 7. doi

Bar chart visualising the described species (left axis) and literature sources (right axis) per each island/site.

Discussion

Our knowledge of the nematode species diversity in the Maritime Antarctic is still insufficient and fragmented. The different study efforts at the various sites do not allow gaining a clear picture of trends in the diversity and distribution of nematode species in the target Antarctic Region. Yet, the analysis provided on the basis of species presence/absence data revealed several groups of sites with similar nematode fauna forming a latitudinal gradient (Fig. 1). The high level of endemism at both the species and genus level is a characteristic feature of the nematode fauna of the region as was mentioned above. This high degree of endemism can be explained by the long-term isolation and the harsh conditions of the region (Convey et al. 2008, Nielsen et al. 2011a). It has been suggested that the Antarctic terrestrial fauna might have survived glaciation in ice-free areas and some species might be remnants of the fauna of the Gondwana super-continent (Andrássy 1998, Maslen and Convey 2006, Chown and Convey 2016, Convey et al. 2020).

The physical isolation and harsh environment of Antarctic terrestrial ecosystems is the major reason for the difficult colonisation by non-native biota (Convey and Peck 2019). In recent decades, human visits and activities in the Antarctic have provided ways (e.g. cargo, vehicles, scientific equipment, fresh food, clothing, people) to overcome these barriers (Lee and Chown 2009, Hughes et al. 2010, Chwedorzewska et al. 2013, Adams et al. 2014). So far, the probability that introduced invertebrates will become established and spread is considered to be quite low; most of them are not able to complete the life cycle and establish a stable population outside the station (Chwedorzewska et al. 2013). Although these organisms cannot survive outside at present, they are potential colonisers, which could be established in the future following the climate warming (Convey and Peck 2019). The four cosmopolitan nematode taxa (*E. vulgaris*, *E. filiformis*, *G. villosa* and *P. armatus*) also reported from the Maritime Antarctic are considered to be of non-native origin by Andrássy (1998). Due to the absence or scarcity of data on the morphology of these species, at present, their origin cannot be confirmed. Future studies using an integrated taxonomic approach (i.e. simultaneous molecular and morphological characterisation) of materials obtained from pristine areas may help clarify their status. The gap in knowledge of nematode diversity, both in terms of taxonomy and distribution, is essential when assessing the introduction of non-native species. Nematode species richness in the Maritime Antarctic, which is underestimated (Nielsen et al. 2011b) may be compromised with increasing human impact in Antarctica.

The risk to Antarctic biodiversity is not limited to the transfer of alien species originating from other regions of Earth, but also concerns the transfer of native or endemic species from one part of Antarctica to another where they are not part of the indigenous biota (Convey 2008, Hughes et al. 2019, Hughes et al. 2020). This risk is greater because such species are likely to adapt well to the new location, unlike most non-native species that have been transferred to Antarctica from elsewhere (Convey 2015). The transfer of species across natural biogeographic boundaries can affect endemism in these areas. Antarctica is one of the few regions on the Planet where such boundaries still exist (Convey 2008). The nematode faunas of the Maritime and the Continental Antarctic are characterised by their

uniqueness, as no overlap at the species level of the two local faunas exists (Andrássy 1998, Maslen and Convey 2006, Convey et al. 2020). This is indicative of an ancient geographical divide between these areas (Andrássy and Gibson 2007) and led Chown and Convey (2006) to define the Gressitt Line, which is located across the base of the Antarctic Peninsula.

So far, there is no evidence for the transfer and establishment of nematode species from the Continental to the Maritime Antarctic. Some nematological reports have included data on the presence of species that are emblematic of the Continental Antarctic (*Plectus murrayi* Yeates 1970 and *P. frigophilus* Kirjanova 1958) in the Maritime part, without morphological data (see Velasco-Castrillón et al. (2014a)). In our study, these records are not included as they are most likely due to misidentification.

Regarding the biotope/microhabitat distribution of the species, the incomplete and insufficient data do not allow a definite conclusion, taking into account also the lack of research in the more inaccessible areas of the Antarctic Peninsula and the islands. Most likely the micro biotope distribution pattern is similar to that shown in the study of the nematode fauna of Cape Chelyuskin in the Arctic (Chernov et al. 1979), where species show very low biotopic associations and most of them inhabit all possible microhabitats (i.e. the majority of species are polytopic); this is also a characteristic feature of other groups of organisms in the polar regions (Chernov et al. 1979).

The major life strategy of organisms living in extreme environments is the development of tolerance and plasticity and not lack of competition and specialisation, which is typical of other biomes (Convey 1996, Chernov et al. 2011).

Comparing the two parts of the Antarctic shows that the nematode studies in the Maritime Antarctic are less represented, whereas investigations in the Continental Antarctic have been more intensive. However, the latter are primarily related to ecology (Adams et al. 2014, Velasco-Castrillón et al. 2014a, Velasco-Castrillón et al. 2018) and have identified to date 34 species of soil nematodes (Velasco-Castrillón et al. 2014a). The smaller number of species in the Continental Antarctic is associated with the harsher and more unfavourable environmental conditions. This zone includes ecosystems with the simplest terrestrial fauna on the Planet, where even nematodes are absent (Convey and McInnes 2005, Convey 2017).

The two opposite polar regions of the Earth are unevenly studied with respect to soil nematodes (Peneva et al. 2009, Holovachov 2014a). Despite the fewer taxonomic studies of terrestrial nematodes in the Arctic, 391 species have been recorded there (Holovachov 2014a). Key geographical and ecological features of both regions, such as geological history, climate, landscape, dispersal barriers and vegetation are responsible for the lower nematode diversity in the Antarctic than in the Arctic (Nielsen and Wall 2013).

Studies that include molecular data for the nematodes in the Maritime Antarctic are too rare to provide valuable information regarding nematode diversity, phylogenetics and endemism (Elshishka et al. 2015b, Elshishka et al. 2017, Kagoshima et al. 2019). The taxonomic

position of only three Antarctic dorylaimid species, *A. isokaryon*, *P. paradoxus* and *E. signyensis*, was reconsidered on the basis of morphological and molecular characteristics of 18S rDNA (SSU rDNA) and the D2-D3 expansion fragments of 28S rDNA (LSU rDNA) (*Elshishka et al. 2015b, Elshishka et al. 2017*) and two new endemic genera were proposed (*Pararhyssocolpus* and *Enchodeloides*).

To advance the understanding of phylogeny and phylogeography of Antarctic nematodes, studies are required of other genes with higher evolutionary rates than 18S rDNA, such as 28S rDNA, the internal transcribed spacer (ITS in the ribosomal RNA locus) or the mitochondrial cytochrome c oxidase subunit I (COI). These genes should be included in future taxonomic analyses of Antarctic nematodes (Kagoshima et al. 2019).

The application of integrated taxonomy and DNA barcoding will substantially assist in nematode diversity studies, phylogenetics and especially the recognition of cryptic species. Further, comprehensive molecular studies will provide valuable information on the patterns of species distribution and for gaining additional knowledge on evolutionary processes and biogeography of Antarctic nematodes.

The scant studies of polar regions, in particular of the Maritime Antarctic, demand more intensive sampling and research, especially in the territories that have so far remained unexplored, in order to give a clearer and more adequate view of species diversity and trends in their microhabitat and geographical distribution. Therefore, further efforts aiming at targeted and systematic integrative studies are needed.

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