TABLE I. CHARACTERISTICS OF SAMPLE SITES

Habitat and sample site number	*Locality*	*Date collected*	*Index of humidity*	*pH*	*Number and depth of sample units*
1. *Calliergon sarmentosum* (Wahlenb.) Kindb. and *Calliergidium austro-stramineum* (C. Muell.) Bartr.	Slope south-east of Factory Cove. Moss sometimes waterlogged	Feb. 1969	9·6	4·65	8 cores 6 cm.
2. *Drepanocladus uncinatus* (Hedw.) Warnst.	Slope south-east of Factory Cove. Moss sometimes waterlogged	Mar. 1968	9·9	NR*	4 cores 6 cm.
3. *Andreaea gainii* Card.	Observation Bluff, well drained and exposed	Feb. 1969	1·9	4·96	4 cores 3 cm.
4. *Chorisodontium aciphyllum* (Hook. f. et Wils.) Broth.	Level ground east of Factory Cove	Dec. 1968	4·3	NR	8 cores 6 cm.
5. *C. aciphyllum* and *Polytrichum alpestre* Hoppe	Slope south-east of Factory Cove	Feb. 1969	4·0	4·08	4 cores 6 cm.
6. *P. alpestre*	Bluffs south of Factory Cove, steep slope, well drained	Dec. 1968	4·2	NR	8 cores 6 cm.
7. *Calliergon* sp.	North-east of Spindrift Rocks. Wet habitat	Dec. 1969	10·3	6·00	8 cores 6 cm.
8. *Deschampsia antarctica* Desv.	Observation Bluff. Steep slope, well drained. Soil resembles the "brown earth" soils of temperate regions	Apr. 1968	2·1	5·00	4 cores 6 cm.
9. *D. antarctica*	Bluffs south of Factory Cove. Below nesting cape pigeons (*Daption capensis* Linn.). Soil similar to temperate "brown earths"	Jan. 1970	1·9	3·92	8 cores 6 cm.
10. *Colobanthus quitensis* (Kunth) Bartl.	Observation Bluff. Steep slope, well drained. Soil similar to temperate "brown earths"	Feb. 1970	1·3	4·52	8 cores 6 cm.
11. *Grimmia antarctici* Card.	Marble knoll, east of Lake 6, Three Lakes Valley. Well drained	Feb. 1969	2·6	6·82	8 cores 3 cm.
12. *Tortula excelsa* Card.	Marble knoll, east of Lake 6, Three Lakes Valley	Jan. 1970	3·1	5·44	8 cores 3 cm.
13. *Bryum algens* Card.	Marble knoll, east of Lake 6, Three Lakes Valley	Feb. 1969	2·4	NR	8 cores 2·2 cm. (average)
14. *Prasiola crispa* Meneghini (cape pigeon)	Bluffs south of Factory Cove. Immediately below nesting cape pigeons	Feb. 1968	2·8	NR	3 × 50 g. 2 cm.
15. *P. crispa* (elephant seal)	"Cemetery Flats", area contaminated by elephant seals (*Mirounga leonina* (Linn.))	Apr. 1968	1·2	NR	3 × 50 g. 2 cm.
16. Elephant seal wallows	"Cemetery Flats". Coarse sand mixed with hair and excretory products of seals	Feb. 1968	0·4	6·98	4 × 100 g. 2 cm.
17. Chinstrap penguin rookery	North point. Brown-coloured rich-smelling soil heavily contaminated with excretory products and feathers of chinstrap penguins (*Pygoscelis antarcticus* (Forster))	Feb. 1969	1·0	7·02	8 × 100 g. 2 cm.
18. *P. crispa* (melt stream)	From melt stream, Berntsen Point	Feb. 1968	5·5	NR	3 × 50 g. 2 cm.
19. *P. crispa* (melt stream)	From melt stream east of Factory Cove	Feb. 1968	6·7	NR	3 × 50 g. 2 cm.

* NR pH not recorded.

QUALITATIVE AND QUANTITATIVE DISTRIBUTION OF SOIL NEMATODES OF SIGNY ISLAND, SOUTH ORKNEY ISLANDS

By V. W. SPAULL

ABSTRACT. Sampling from a variety of habitats at Signy Island revealed 30 species of 19 genera of soil nematodes. Summer population densities ranged from $0 \cdot 48 \times 10^6/\text{m.}^2$ in the surface 6 cm. of a moss turf to $7 \cdot 47 \times 10^6/\text{m.}^2$ in a brown earth type of soil beneath the grass *Deschampsia antarctica*. Species of *Plectus* and *Teratocephalus* were the most abundant and had a widespread distribution. Other species were limited to particular habitats, notably *Caenorhabditis* sp. and *Panagrolaimus* sp. which were only found in soils contaminated by birds and seals. Neither the horizontal nor the vertical distribution of the nematodes was directly related to water content of the sample sites. However, nematode density appeared to be related to the C/N ratio of the soil, maximum numbers occurring in soils with the lowest ratio.

RELATIVELY little attention has been given to non-parasitic soil and fresh-water nematodes, especially those occurring in Antarctic regions. Ten species of six genera have been identified from the Antarctic continent (Timm, 1971) and on Signy Island (lat. 60°43′S., long 45°38′W.), South Orkney Islands, a further nine genera were recorded (Spaull, 1973). Some data on the ecology of the soil nematodes of Signy Island, including their abundance and seasonal variation in numbers, have been given by Spaull (1973) and Tilbrook (1967*a*, *b*, 1970). The present paper describes the qualitative and quantitative distribution of the soil nematodes of Signy Island.

METHODS

Over a period of three summers, soil and vegetation samples were taken from 19 different habitats on Signy Island to determine the horizontal distribution of the nematodes. The samples were obtained by using a simple soil corer, 4·2 cm. in diameter, equal to $1/721 \cdot 5$ m.². In the cushion-forming mosses, samples were taken to a depth of 3 cm. or less, as this type of moss rarely exceeded that depth. In other mosses and in the vascular plant sites the underlying peat and soil often exceeded 10 cm. in depth but, since preliminary sampling had shown that the majority of the nematodes occurred in the surface 6 cm., samples taken to establish their horizontal distribution were limited to the 0–6 cm. layer. When coring was not possible the samples were taken on a weight basis. The nematodes were extracted by using a modified Baermann funnel and the numbers of the different genera were counted as previously described (Spaull, 1973). After the counts had been made, large numbers were heat killed, fixed in F.A. 4 : 1 or T.A.F. (Hooper, 1970) and mounted in glycerine for identification of the species. Although the numbers of the individual species in a genus were not recorded, information on their distribution was obtained from the collection of fixed specimens.

A brief description of the sample sites is given in Table I, together with the number of sample units, date collected, depth to which they were taken, their pH and index of humidity $\left(\text{I.H.} = \frac{\text{water content}}{\text{dry weight}}\right)$. Detailed descriptions of the soils and vegetation of Signy Island have been given by Holdgate and others (1967) and Gimingham and Smith (1970), respectively.

On seven occasions between July 1968 and November 1969, four 4·2 cm. diameter cores from a mixed community of *Calliergon sarmentosum* and *Calliergidium austro-stramineum* (sample site 1) were taken to a depth of 12 cm. to ascertain the vertical distribution of the nematodes. A modified corer, consisting of a hardened steel toothed cylinder attached to a modified carpenter's brace (Baker, 1970), was used to obtain the samples during the winter. The cores were divided into 0–3, 3–6, 6–9 and 9–12 cm. depths and the nematodes were extracted and counted.

RESULTS

Sampling revealed 30 species belonging to 19 genera. Most of the genera and some of the species have been identified and are listed in Table II.

TABLE II. GENERA AND SPECIES IDENTIFIED FROM SIGNY ISLAND

Ditylenchus sp.	*Prismatolaimus* sp.
Tylenchus sp.	*Amphidelus* sp.
Antarctenchus hooperi Spaull, 1972	*Cervidellus* sp.
Aphelenchoides spp. A and B	*Rhabdolaimus* sp.
Plectus antarcticus de Man, 1904	*Panagrolaimus* sp.
P. parietinus Bastian, 1865	*Caenorhabditis* sp.
P. armatus Butschli, 1873	Rhabditid genus A sp.
Plectus spp. A, B and C	*Eudorylaimus* spp. A, B and C
Teratocephalus near *lirellus* Anderson, 1969	*Mesodorylaimus* sp.
Teratocephalus spp. A and B	*Enchodelus* sp.
Monhystera spp. A and B	*Clarkus gerlachei* (de Man, 1904) Jairajpuri, 1970
Monhysterid genus A sp.	

The distribution and abundance of the nematode genera in the 19 sample sites are shown in Table III. In the surface 6 cm. total numbers varied from $0 \cdot 48 \times 10^6$/m.^{2} in the *Chorisodontium–Polytrichum* community to $7 \cdot 47 \times 10^6$/m.^{2} in *Deschampsia antarctica* growing near a cape pigeon's nest. Densities were also high in other areas contaminated by birds. In the top 2 cm. of soil from a chinstrap penguin rookery there were an estimated $4 \cdot 04 \times 10^6$/m.^{2}, and in *Prasiola* from the vicinity of nesting cape pigeons there were an estimated $2 \cdot 30 \times 10^6$/m.^{2}.

The genera *Teratocephalus*, *Plectus* and *Eudorylaimus* had a widespread distribution, being found in all 13 bryophyte and vascular plant sites (Table III). In six of these sites *Teratocephalus* was the most abundant genus, and in five of the remaining sites *Plectus* was the most abundant. Together they constituted over 50 per cent of the nematode population in nine of the 13 sites. However, in the cushion-forming mosses, *Andreaea* and *Grimmia*, *Plectus* comprised less than 3 per cent of the nematode fauna and in *Bryum*, *Teratocephalus* had a similar low percentage abundance.

Of the component species of the common genera, *Plectus antarcticus*, *P. parietinus* and *Teratocephalus* sp. A were found in nearly all the bryophyte and vascular plant sites. *P. antarcticus* seemed to be the most abundant species of the genus. Other widespread species were *Tylenchus* sp., *Ditylenchus* sp. and monhysterid genus A sp. Although numbers of *Monhystera* spp. and *Prismatolaimus* sp. were not counted separately, it was noted that they were both present in most of the vegetated sites.

In contrast to these common species, others showed a restricted distribution; *Cervidellus* sp., *Rhabdolaimus* sp. and *P. armatus* were only found in soil associated with the two vascular plants and in mosses growing on base-rich soil. *Mesodorylaimus* sp. and *Enchodelus* sp. had a similar distribution, although small numbers also occurred in a few other sites; *Mesodorylaimus* sp. was the most abundant nematode in two of the vascular plant sites (Table III). *Eudorylaimus* sp. C was relatively abundant in the cushion-forming mosses *Andreaea*, *Grimmia* and *Tortula*, comprising in *Andreaea* approximately 45 per cent of the *Eudorylaimus* species; in all the other sites it was either rare or absent. *Antarctenchus hooperi* was common in *Andreaea* and *Tortula* and in the carpet-forming moss community of *Calliergon–Calliergidium*, but it was rare or absent from the other sites.

Panagrolaimus sp. and *Caenorhabditis* sp. were completely restricted to areas contaminated by birds and seals. Besides occurring in the sites given in Table III, these two species were also found in the moist organic nest material of a sheathbill; an unidentified rhabditid, genus A, also occurred in this site but it was not found elsewhere on Signy Island. Apart from a few isolated specimens of *Panagrolaimus*, samples taken over a period of 2 years showed that *Caenorhabditis* sp. was the only nematode that occurred in soil from the chinstrap penguin rookery, where it was present in very large numbers.

Clarkus gerlachei, a large predatory nematode, was numerically unimportant in all but two of the habitats examined.

When the sample sites are grouped according to the vegetation sub-formation to which they belong (Gimingham and Smith, 1970), certain trends relating to the distribution of the nematodes become apparent (Table IV). The tylenchids, *Tylenchus*, *Ditylenchus*, *Antarctenchus* and *Aphelenchoides*, are together proportionally more abundant in moss turf than elsewhere. Conversely, the monhysterids, *Monhystera*, *Prismatolaimus* and the unidentified genus, are comparatively less numerous in this sub-formation. *Eudorylaimus* forms a larger part of the

TABLE III. DISTRIBUTION OF NEMATODE GENERA (MEAN NUMBER PER SAMPLE UNIT, TO THE NEAREST WHOLE NUMBER)

Genus / Sample site	*Calliergon* and *Calliergidium*	*Drepanocladus*	*Andreaea*	*Chorisodontium*	*Chorisodontium* and *Polytrichum*	*Polytrichum*	*Calliergon*	*Deschampsia*	*Deschampsia*	*Colobanthus*	*Grimmia*	*Tortula*	*Bryum*	*Prasiola* (cape pigeon)	*Prasiola* (elephant seal)	Seal wallow	Penguin rookery	*Prasiola* (melt stream)	*Prasiola* (melt stream)
Sample site number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Teratocephalus	1,361	482	1,582	691	293	1,782	1,232	1,298	1,700	1,302	2,052	451	36	3	18	–	–	27	–
Plectus	1,433	1,965	80	305	130	561	1,077	3,532	3,207	1,947	63	762	778	101	13	14	–	235	–
Eudorylaimus	834	245	896	10	38	46	337	260	88	112	634	404	57	18	3	–	–	302	450
Monhystera/*Prismatolaimus*	973	138	232	3	2	8	186	253	467	1,034	6	205	541	–	–	–	–	2	–
Monhysterid genus A	260	57	180	1	–	5	42	3	10	6	171	12	–	–	–	–	–	21	6
Tylenchus/*Antarctenchus*	256	17	68	50	106	31	8	230	115	262	16	35	–	–	3	–	–	–	–
Ditylenchus	97	59	–	1	8	195	3	19	2	13	21	19	–	6	–	–	–	–	–
Aphelenchoides	49	–	–	51	78	1,039	36	11	50	2	–	1	–	18	–	–	–	–	–
Amphidelus	70	52	76	–	–	–	4	2	–	1	30	1	–	–	–	–	–	–	–
Clarkus	78	63	–	–	1	–	9	–	1	13	–	6	1	60	48	–	–	209	3,456
Mesodorylaimus	–	–	–	–	–	–	12	630	4,626	2,936	6	451	280	206	–	–	–	–	–
Enchodelus	–	–	–	–	13	16	–	53	37	225	–	1	–	–	–	–	–	–	–
Cervidellus	–	–	–	–	–	–	–	192	–	105	96	8	–	–	–	–	–	–	–
Rhabdolaimus	–	–	–	–	–	–	–	150	–	78	1	–	–	–	–	–	–	–	–
Panagrolaimus	–	–	–	–	–	–	–	–	45	–	–	–	–	11,035	4,064	–	–	–	–
Caenorhabditis	–	–	–	–	–	–	–	–	–	–	–	–	–	36	3,437	4,552	32,314	–	–
Unidentified	–	3	–	–	–	–	23	–	2	45	1	82	–	–	–	15	–	–	–
TOTAL	5,411	3,081	3,114	1,112	669	3,684	2,973	6,633	10,353	8,087	3,097	2,445	1,693	11,483	7,586	4,581	32,314	796	3,912

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TABLE IV. MEAN PERCENTAGE ABUNDANCE OF THE MORE COMMON GENERA IN FOUR VEGETATION SUB-FORMATIONS

Genus	*Sub-formation*	*Moss turf*	*Moss cushion*	*Moss carpet*	*Vascular plants*
	Sample number	4, 5 and 6	3, 11, 12 and 13	1, 2 and 7	8, 9 and 10
Tylenchus, *Antarctenchus*, *Ditylenchus*, *Aphelenchoides*		28·5	1·5	4·6	2·8
Eudorylaimus		1·7	19·2	12·4	1·8
Mesodorylaimus		–	7·1	0·1	32·7
Plectus		18·2	16·3	39·0	34·6
Teratocephalus		50·6	39·8	26·8	17·1
Monyhstera, *Prismatolaimus*, Monhysterid genus A		0·3	13·0	14·4	7·1

nematode fauna in the carpet and cushion sub-formations than in the others, while the related genus, *Mesodorylaimus*, is only important in the vascular plant sub-formation. The percentage abundance of *Plectus* is greater in the moss-carpet and vascular plant sub-formations, whereas *Teratocephalus* forms a much larger proportion of the nematode fauna in the moss-turf sub-formation than in the other communities.

The vertical distribution of the total nematode fauna in the *Calliergon-Calliergidium* site is shown in Fig. 1. During the summer and first half of the winter the majority of the nematodes occurred in the surface 3 cm., the numbers decreasing with increase in depth. In the second half of the winter maximum numbers occurred in the 3–6 cm. layer. The vertical distribution of the nematodes does not appear to be related to the moisture content of the moss (Fig. 1).

Of the component genera, *Ditylenchus* and *Aphelenchoides* were both largely restricted to the surface 3 cm. throughout the year (Table V). Conversely, apart from one or both of the two sampling occasions in the summer, there were greater numbers of *Teratocephalus*, *Eudorylaimus* and *Amphidelus* in the 3–6 cm. layer than in the 0–3 cm. layer. In fact, on some occasions there were even greater numbers of these three genera in the 6–9 cm. layer than the 0–3 cm. layer. Monhysterid genus A, *Clarkus* and especially *Plectus* showed a distinct gradient of vertical distribution, the highest numbers occurring in the 0–3 cm. layer (Table V).

The two most numerous genera, *Plectus* and *Teratocephalus*, showed contrasting gradients of relative abundance in the four depths. For example, in October 1968, while the number of *Teratocephalus* increased from 33 per cent of the total number of nematodes in the 0–3 cm. layer to 74 per cent in the 9–12 cm. layer, that of *Plectus* fell from 49 per cent in the 0–3 cm. layer to 7 per cent in the 9–12 cm. layer.

DISCUSSION

The species diversity of the nematode fauna of Signy Island is lower than that of Arctic regions; 30 species of 19 genera have been found on Signy Island compared with 89 species of 45 genera from Spitzbergen (Loof, 1971) and 75 species of 40 genera from Ellesmere Island in the Canadian high Arctic (Mulvey, 1963, 1969*a*, *b*, *c*; Das, 1964; Anderson, 1969; Wu, 1969). An even greater difference exists between the insect faunas of the Antarctic and Arctic (Downes, 1964). Low species diversity is a feature of the terrestrial fauna of isolated areas (Holdgate, 1960); the above difference probably results primarily from the greater degree of isolation, and the correspondingly greater barrier to dispersal, of the Antarctic compared with the Arctic.

The seasonal variation in numbers of nematodes in sample sites 1, 3 and 5 has been given by Spaull (1973); marked changes in the size of the nematode populations may occur during

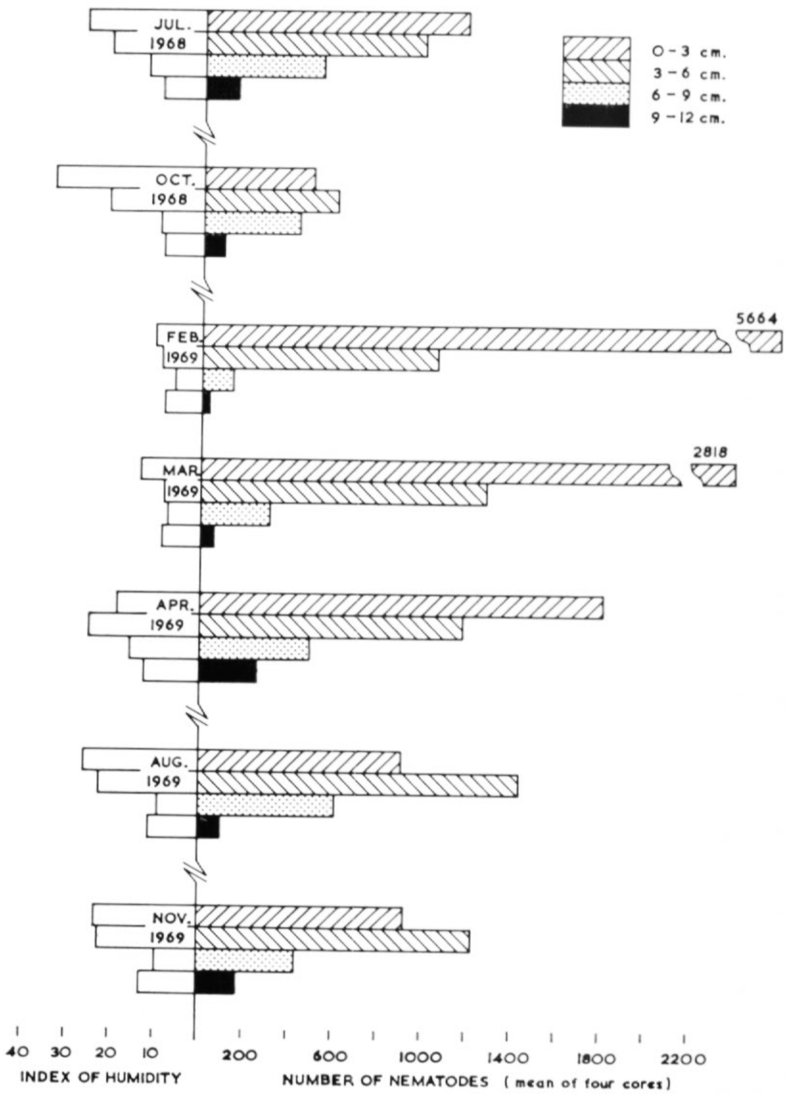

Fig. 1. Vertical distribution of nematodes and moisture content in the *Calliergon–Calliergidium* site.

the year and there may be twice as many nematodes present in the moss during one summer than in another. Since the habitats examined in the present study were not all sampled at the same time, differences in numbers may be due to differences in the time of sampling. However, samples taken in the same month of the same year (e.g. February 1969; see Tables I and III) demonstrate that there are real differences in the size of the nematode faunas in the various habitats.

Previous studies at Signy Island indicated that the nematodes were more numerous in the wetter mosses (Tilbrook, 1967*a*, *b*). Sampling from a wider variety of habitats has shown that while this is true, there is no direct correlation between water content of the moss and the total numbers of nematodes (Table VI).

Reduced aeration, as a result of waterlogging, was thought to be an important factor affecting the distribution of the nematodes in moorland soils (Banage, 1960). The sites studied

TABLE [illegible]. VERTICAL DISTRIBUTION OF NEMATODE GENERA IN THE *Calliergon-Calliergidium* SITE
(Each figure is the mean of four 4·2 cm. diameter cores, to the nearest whole number)

(cm.)

Teratocephalus		*0–3*	*3–6*	*6–9*	*9–12*
1968	July	302	403	354	88
	Oct.	159	274	274	70
1969	Feb.	1438	405	62	19
	Mar.	585	295	99	21
	Apr.	583	595	318	111
	Aug.	427	1018	460	70
	Nov.	319	652	287	120

Eudorylaimus		*0–3*	*3–6*	*6–9*	*9–12*
1968	July	45	119	68	17
	Oct.	26	41	42	5
1969	Feb.	884	346	45	4
	Mar.	117	279	79	5
	Apr.	21	69	50	24
	Aug.	9	97	62	4
	Nov.	7	65	69	23

Monhysterid genus A		*0–3*	*3–6*	*6–9*	*9–12*
1968	July	74	55	4	2
	Oct.	18	8	9	1
1969	Feb.	276	10	1	–
	Mar.	145	12	1	–
	Apr.	99	46	4	–
	Aug.	75	40	6	1
	Nov.	100	68	5	1

Ditylenchus		*0–3*	*3–6*	*6–9*	*9–12*
1968	July	20	–	–	–
	Oct.	7	–	–	–
1969	Feb.	166	–	–	–
	Mar.	162	6	4	–
	Apr.	94	–	1	–
	Aug.	103	4	1	1
	Nov.	66	5	–	–

Amphidelus		*0–3*	*3–6*	*6–9*	*9–12*
1968	July	5	9	6	–
	Oct.	2	7	14	3
1969	Feb.	80	28	3	1
	Mar.	14	25	12	3
	Apr.	4	6	1	8
	Aug.	4	15	11	3
	Nov.	1	2	4	4

(cm.)

Plectus	*0–3*	*3–6*	*6–9*	*9–12*
July	667	320	74	21
Oct.	240	250	67	7
Feb.	1446	92	8	2
Mar.	1267	301	54	7
Apr.	726	393	72	34
Aug.	233	220	32	2
Nov.	391	385	47	16

Monhystera/Prismatolaimus	*0–3*	*3–6*	*6–9*	*9–12*
July	–	–	–	–
Oct.	–	3	11	5
Feb.	830	143	14	3
Mar.	300	258	21	6
Apr.	–	6	3	4
Aug.	1	4	4	1
Nov.	–	4	2	–

Tylenchus/Antarctenchus	*0–3*	*3–6*	*6–9*	*9–12*
July	46	73	18	13
Oct.	4	11	8	2
Feb.	384	32	5	1
Mar.	106	82	30	3
Apr.	130	40	36	69
Aug.	23	21	22	6
Nov.	15	20	15	8

Aphelenchoides	*0–3*	*3–6*	*6–9*	*9–12*
July	–	–	–	–
Oct.	1	1	–	–
Feb.	96	–	1	–
Mar.	48	–	–	–
Apr.	129	4	–	–
Aug.	5	1	–	–
Nov.	4	–	–	–

Clarkus	*0–3*	*3–6*	*6–9*	*9–12*
July	19	13	3	–
Oct.	29	4	4	–
Feb.	64	1	1	–
Mar.	73	18	4	–
Apr.	15	18	2	–
Aug.	23	11	2	–
Nov.	10	25	6	3

TABLE VI. CHARACTERISTICS OF VEGETATION SUB-FORMATIONS AND ABUNDANCE OF NEMATODES

Sub-formation	*Moss turf*	*Moss cushion*	*Moss carpet*	*Vascular plants*
Sample number	4, 5 and 6	3, 11, 12 and 13	1, 2 and 7	8, 9 and 10
Index of humidity	4·0–4·3	1·9–3·1	9·6–10·3	1·3–2·1
pH	4·1	4·9–6·8	4·6–6·0	3·9–5·0
C/N ratio (from Allen and others, 1967)	31–79	23–45	24–32	15–24
Number of nematodes per m.^{2} × 10^6	0·48–2·66	1·22–2·25	2·15–3·90	4·79–7·47

at Signy Island were all fairly well drained except for the carpet-forming mosses. However, the abundance of nematodes in this habitat suggests that excess water is not a limiting factor. Precipitation contains high levels of dissolved oxygen and, although small in amount, is frequent at Signy Island (approximately 336 days/yr.; Holdgate and others, 1967). Possibly, as suggested by Bunt (1954), this may prevent the development of anaerobic conditions in the surface layer at least.

Certain species, namely *Cervidellus* sp., *Rhabdolaimus* sp., *Plectus armatus* and possibly *Mesodorylaimus* sp., appeared to be restricted to soils with a relatively high pH. However, the effect of pH on these and other species of nematodes may be secondary as it affects the distribution of the soil micro-flora, which in turn affects the distribution of the nematodes that feed on them. Fungi are generally more tolerant of low pH than many bacteria (Clark, 1967). It is therefore of interest to note that the tylenchids, which probably feed on Fungi, are proportionately more numerous in the acid peats than in the other sites (Table IV).

The carbon/nitrogen ratio of a soil is generally related to the activity of the soil micro-organisms (Pearsall, 1950). Normally, soils containing a high proportion of nitrogen have a larger microbial population than soils with a small proportion. The soils associated with the four vegetation sub-formations studied on Signy Island show a gradation in C/N ratios (Allen and others, 1967), and possibly also microbial populations (Heal and others, 1967). Soil micro-organisms are the food source of a great many different types of nematode (Banage, 1963) and it is perhaps not surprising, therefore, that maximum nematode populations were found in the vascular plant soil, which has the lowest C/N ratio, and minimum populations in the moss turf which has the highest C/N ratio (Table VI). Bunt (1954), Winslow (1964) and Yeates (1967), amongst others, have postulated that food supply is an important factor controlling the number of nematodes in soil; it appears that a similar situation may exist on Signy Island.

The summer pattern of nematode vertical distribution, with maximum numbers in the surface layers, is similar to that recorded by Banage (1966) and Yuen (1966). Wallace (1963, chapter 7) has pointed out that aggregation of nematodes at a certain depth may result from migration to, or increased reproduction in, a certain zone in response to differences in such factors as oxygen and moisture content, temperature, soil texture and availability of suitable food at different depths. Mean monthly air temperatures on Signy Island never exceed +1·5° C and it has been suggested that to a large extent the activity of the moss-dwelling invertebrates is dependent on the warming effect of solar radiation on the moss (Holdgate, 1964). This may be quite considerable but its influence decreases with depth (Longton and Holdgate, 1967; Cameron and others, 1970). Thus, while the interaction of all the above-mentioned factors may influence the summer vertical distribution of nematodes of Signy Island, the primary factor is probably temperature.

The change to maximum numbers in the 3–6 cm. layer of the moss during the winter results from a partial downward autumn migration, together with a greater decline in numbers in the 0–3 cm. layer compared with the 3–6 cm. layer during the winter (Spaull, 1973); the downward migration was thought to be in response to slightly higher daytime temperatures in the lower layer that may occur in the autumn, and the differential decline in numbers was thought to be caused by autumn freeze-thaw cycles that are more frequent in the surface 3 cm.

Complete dominance of a single species, as occurs with *Caenorhabditis* in the chinstrap penguin rookery soil, is unusual in free-living nematodes. Overgaard (1948) suggested that such a phenomenon only occurs near the extremes of the ecological range of a certain animal group; possibly the very high levels of ammonia which are found in the penguin rookery soil (approximately 0·7 g. ammonia/100 g. dry weight of soil; Holdgate and others, 1967) limit the survival of other nematode species. Bunt (1954) and Covarrubias (1966) both reported the occurrence of large numbers of nematodes in penguin rookery soil but they made no mention of the numbers of species present.

The abundance of the genera *Plectus* and *Eudorylaimus* in the moss on Signy Island is typical of the nematode fauna of such vegetation (Overgaard, 1948; Brzeski, 1962*a*, *b*; Gadea, 1964; Eliava, 1966), but it is unusual for *Teratocephalus* to be so common. Loof (1971) found that *Teratocephalus* was one of several genera that were more abundant on Spitzbergen than in temperate regions. Presumably this genus is well adapted to a cold environment, although it has not been found on the Antarctic continent (Timm, 1971).

In his review of the soil and fresh-water nematodes that have been collected from the Antarctic continent, Timm (1971) included *Plectus grahami* Allgén, 1951. However, the single female specimen to which he referred was collected at a depth of 400 m. off the coast of the Antarctic Peninsula (Allgén, 1951).

Some of the species found on Signy Island may be endemic, or at least have a very restricted distribution. For example, *Antarctenchus hooperi* has only been recorded from Signy Island and Coronation Island (Spaull, 1972). Also *Enchodelus* sp., *Mesodorylaimus* sp. and *Eudorylaimus* spp. A, B and C are considered new to science (personal communication from P. A. A. Loof.) Furthermore, *Amphidelus* sp., *Teratocephalus* spp. A and B and the three unidentified species of *Plectus* are thought to be undescribed.

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