

A PRELIMINARY REPORT ON TERRESTRIAL INVERTEBRATES IN THE ASUKA STATION AREA, ANTARCTICA

Shin-ichi HIRUTA¹ and Yoshikuni OHYAMA²

¹*Biological Laboratory, Kushiro Campus, Hokkaido University of Education,
15-55, Shiroyama 1-chome, Kushiro 085*

²*National Institute of Polar Research, 9-10, Kaga 1-chome, Itabashi-ku, Tokyo 173*

Abstract: As one of the main projects of the Japanese Antarctic Research Expedition, 1989 and 1990 surveys on terrestrial ecology were carried out in the Sør Rondane Mountains, Dronning Maud Land. During the 1990 survey, one springtail, four mites and some tardigrades and one nematode-species were discovered in the mountain regions. The relation between soil properties and distribution of soil animals is briefly discussed.

1. Introduction

The present paper deals with terrestrial invertebrates in the Asuka Station area, Antarctica, which were found in the course of ecological research in the inland nunataks of the Sør Rondane Mountains, Dronning Maud Land during the summer of 1990 (JARE-31: the 31st Japanese Antarctic Research Expedition). The background and aims of this study were outlined in a preceding paper (OHYAMA *et al.*, 1991).

2. Materials and Methods

The study area (Fig. 1) and sampling methods are described by OHYAMA *et al.* (1991). In order to elucidate the relationship between distribution of soil animals and nutrients, chemical properties (pH, total nitrogen (T-N), total carbon (T-C), Troug P₂O₅, exchangeable Ca, Mg, and K) of the soils collected from the study area were measured. Air temperatures and surface temperatures of the bare ground were recorded using data loggers during 2 or 3 days at each of several nunataks.

3. Results and Discussion

3.1. Distribution and environmental conditions (Table 1)

It was confirmed by the JARE-30 survey that one springtail and several mite species were living in the western part of the Sør Rondane Mountains (MORIKAWA *et al.*, 1989; OHYAMA *et al.*, 1991; HIGASHI and SUGAWARA, 1992). The JARE-31 expedition also found these animals in the western part (Tanngarden and Vengen) and Mefjell in the central part of the mountains. Neither springtails nor mites were

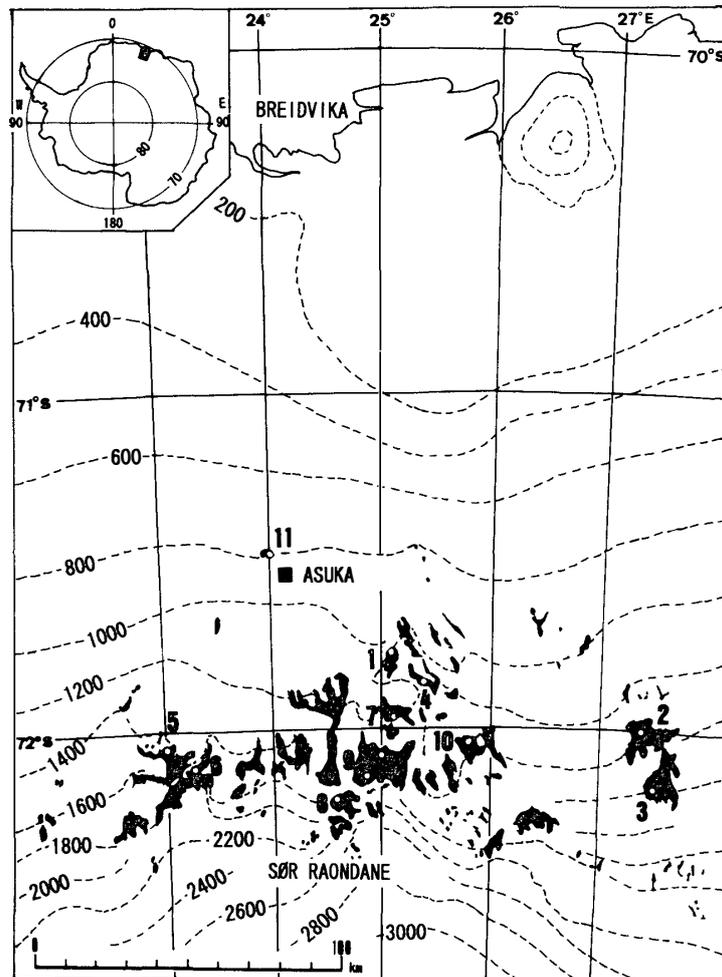


Fig. 1. Location of sampling sites in nunataks surveyed by JARE-31. 1. Austkampane; 2. Balchenfjella Nord; 3. Balchenfjella Sor; 4. Austkampane (SE), 5. Tanngarden; 6. Vengen; 7. Menipa; 8. Dufekfjellet; 9. Mefjell; 10. Bergersenfjellet; 11. Romnaesfjellet.

collected from elsewhere in the central and eastern parts of the mountains. The collection site at Mefjell, at which soil animals were discovered, was located at the bottom of a U-shaped valley facing the north. The Tanngarden and Vengen areas supported rookeries of snow petrel (*Pagodroma nivea*) on their northern facing cliffs, and their plant communities are well developed in comparison with the eastern and central areas including Mefjell. This shows that these two areas receive nutrients from snow petrel droppings. The chemical properties of the soil samples from these areas prove this (Table 1). For example, T-N and Trough P_2O_5 values at moss and lichen communities in Tanngarden were almost the same as those of moss communities near Syowa Station (see YAMANAKA and SATO, 1977). In areas without the influence of snow petrels, the values of T-N were very low (around or less than 0.01%). Similar relationships among the snow petrel rookeries, plant communities, and soil animals were found in the Tottanfjella and Heimefrontfjella in western part of Dronning Maud Land (BOWRA *et al.*, 1966).

Figure 2 shows the air and soil surface temperatures during sunny weather at

Table 1. Soil animals and chemical properties of the soils from Tanngarden, Vengen, and Mefjell.

	<i>Cryptopygus sverdrupi</i>	<i>Maudheimia wilsoni</i>	<i>Eupodes angardi</i>	<i>Tydeus erebus</i>	<i>Nanorchestes bifurcatus</i>	pH	T-C (%)	T-N (%)	Trough P ₂ O ₅ (mg/100 g)	Exchangeable base (mg/100 g)		
										K	Ca	Mg
[Tanngarden]												
Bare ground						7.91	0.51	0.029	4.0	9.8	29	3.0
Under snow patch						8.05	0.66	0.008	3.0	11.8	63	3.1
Under boulder					⊙	7.61	0.23	tr	2.3	7.1	37	2.2
Nest of snow petrel	⊙		⊙	⊙		5.58	3.10	0.275	278.2	11.4	136	4.3
Moss community	⊙			⊙		7.61	0.69	0.045	15.8	11.3	49	2.4
Lichen community	⊙	⊙	⊙	⊙	⊙	7.05	0.60	0.056	25.6	9.7	56	2.9
Guano of snow petrel						—	46.29	7.996	(519.1)*	—	—	—
[Vengen]												
Under boulder						5.88	0.33	0.030	11.7	7.5	7	0.6
Bare ground	⊙			⊙		6.21	0.40	0.027	17.2	5.3	9	0.5
Nest of snow petrel	⊙					5.47	2.04	0.315	144.5	15.2	39	6.8
Algal community	⊙			⊙		4.93	2.46	0.266	92.9	17.8	37	4.5
Guano of snow petrel	⊙		⊙	⊙		—	—	—	—	—	—	—
[Mefjell]												
Bare ground						7.78	0.21	0.008	4.6	26.9	151	6.2
Under boulder	⊙			⊙		7.50	0.19	0.018	2.1	12.3	70	3.9
Under snow patch	⊙		⊙	⊙		7.55	0.15	0.018	7.4	13.6	396	1.7

⊙ present; — no data; * T-P₂O₅.

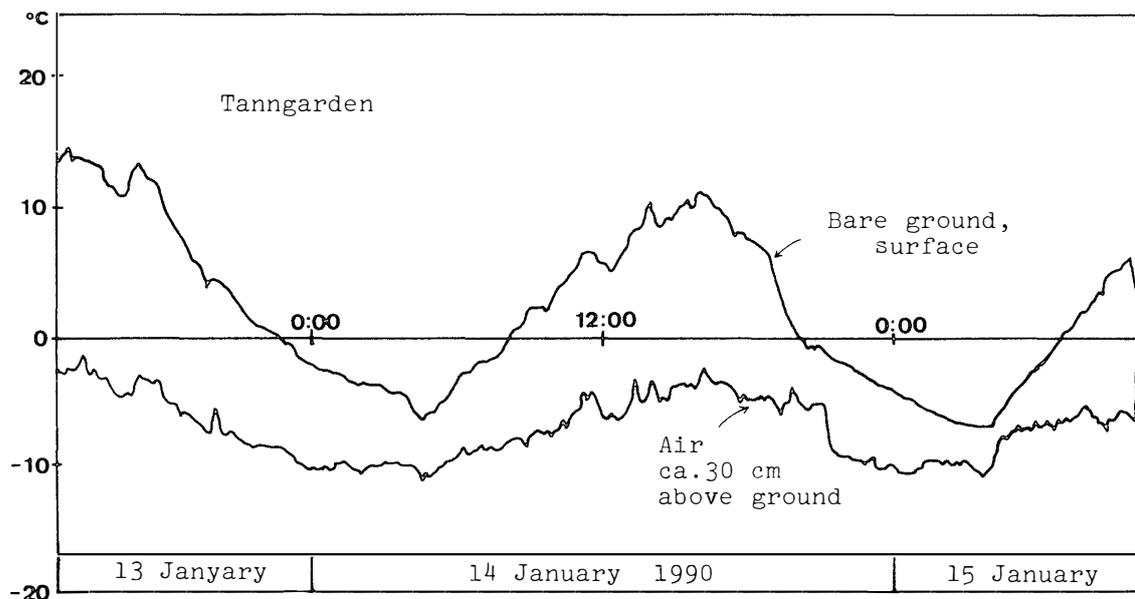


Fig. 2. Air and soil surface temperatures at Tanngarden.

Tanngarden during January 13–15, 1990. Though air temperatures constantly remained below 0°C, soil temperature rose above 0°C for about 12 hours and reached more than 10°C at the peak. Similar results were obtained in other parts of

the mountains during the present survey. This means that water is supplied in the daytime even on the inland nunataks.

3.2. Species found in the study areas

Acari: Three Prostigmata species (*Tydeus erebus*, *Eupodes angardi*, and *Nanorchestes bifurcatus*) and one Cryptostigmata-species (*Maudoheimia wilsoni*) were found in the Sør Rondane Mountains. Since the former three species have been reported from the western part of Dronning Maud Land (BOWRA *et al.*, 1966; STRANDTMANN and SOMME, 1977) and the latter has also been found in the same area (DELENIUS and WILSON, 1958), the occurrence of these species in the Sør Rondane Mountains has been predicted.

Collembola: One species, *Cryptopygus sverdrupi* was found. This species is also found in the western part of Dronning Maud Land (LAWRENCE, 1978; SOMME, 1986).

In addition to the xerophytes mentioned above, the following hydrobionts have

Table 2. Number of individual springtails and mites per sample: Quantitative 100 cm³ sand or semiquantitative (asterisked) sand samples, algae, moss, and guano samples.

	Sample	Springtails	Mites		Sample	Springtails	Mites
[Tanngarden]	1	221	0	[Vengen]	1	40	1
Nest of snow	2	107	2	Bare ground	2	21	0
petrel	3	859	3		3	16	0
	4	232	1		4	23	0
	5	196	0		5	20	0
Under boulder	1	0	2	Nest of snow	1	54	0
	2	0	1	petrel	2	9	0
					3	4	0
Moss community	1	96	0		4	31	0
(*)	2	457	0		5	8	0
	3	481	5				
Lichen community	1	44	3	Algal community	1	0	1
(*)	2	4	0	(*)	2	0	1
	3	18	120				
Stones near the	1	26	45	Algae (*)	1	0	365
nest of snow	2	192	6		2	3	321
petrel (*)	3	123	31		3	3	59
					4	0	202
[Mefjell]	1	7	13	Stones with mites	1	0	346
Under boulder	2	1	172	(*)	2	0	50
	3	3	77		3	0	50
	4	0	44				
	5	0	33	Guano of snow	1	1	13
Under snow patch	1	0	2	petrel (*)	2	9	3
	2	0	2		3	45	1
	3	0	25				
	4	3	5				
	5	2	11				

been found in some samples by using a Baermann apparatus.

Tardigrada: Three species, *Macrobiotus harmsworthi* (or *M. montanus*), *Diphascion conjungens*, and *D. chilensis*, were detected from lichen and algal communities at Romnaesfjellet near Asuka Station and Tanngarden.

Nematoda: A number of individuals of *Panagrolaimus davidi* were found from an algal community at Tanngarden (K. KITO, pers. commun.). In this connection, rotifers were also found in the same sample.

3.3. Abundance

Table 2 shows the numbers of individual mites and springtails per 100 cm³ of sand or semiquantitative sand, moss, algae, etc.

It is apparent that in the mountains, especially at Tanngarden, springtail, *Cryptopygus sverdrupi* was abundant (859 ind./100 cm³ at maximum) in association with the snow petrel rookeries and plant communities. Of four mite species, *Tydeus erebus* was collected from Tanngarden, Vengen, and Mefjell, and more than 93% of the total number of mites collected were of this species. *Maudheimia wilsoni* was found only from the lichen community at Tanngarden (119 individuals). Only six individuals of *Nanorchestes bifurcatus* were collected from the soil under boulders [3] and in the lichen community [3] at Tanngarden. A total of ten individuals of *Eupodes angardi* were collected from Tanngarden (nest of snow petrel [1], lichen community [2], and stones near the nests of snow petrels [5]), the guano of snow petrels at Vengen [1], and under a snow patch at Mefjell [1].

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