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The terrestrial arthropod fauna of the Byers Peninsula, Livingston Island, South Shetland Islands – Collembola

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Abstract As an addendum to a recent publication on the terrestrial arthropod fauna of the Byers Peninsula Site of Special Scientific Interest (SSSI), which included preliminary identification of four Collembola, we now present detailed information on Collembola occurring within the SSSI. Five species were recorded [*Friesea grisea* (Schaffer), *Tullbergia mixta* Wahlgren, *Isotoma (Folsomotoma) octooculata* (Willem), *Cryptopygus antarcticus* Willem, and *Cryptopygus* sp. nov.]. Species occurrence and abundance differed between samples collected from poorly vegetated stony ground and vegetation cores. *F. grisea* was both the commonest (58% of individuals) and the most widely distributed (18/19 samples) springtail in the former habitat. *Cryptopygus* sp. nov. was recorded only in the vegetation core samples. All five species were more evenly distributed in vegetation samples, although *C. antarcticus* and *Cryptopygus* sp. nov. were again the least abundant. A list of the terrestrial arthropods of the SSSI is presented.

Introduction

Recently, Richard et al. (1994) described a survey of the terrestrial arthropod fauna of the Byers Peninsula SSSI, listing 16 arthropod taxa (10 Acari, 4 Collembola, 2 Diptera). This represents an important and diverse arthropod community within the maritime Antarctic biogeographic zone. The four Collembola they identified were *Friesea grisea*, *Tullbergia mixta*, *Isotoma* sp.

and *Cryptopygus antarcticus*. Richard et al. (1994) highlighted the preliminary nature of these species identifications with respect to Collembola, in part due to taxonomic uncertainties within the group. Examination of this Byers Peninsula material by P. Greenslade now enables an accurate description of the collembolan fauna to be made.

Materials and methods

Micro-arthropod samples were collected and preserved during January and February 1991 as described by Richard et al. (1994). Twenty-five, predominantly stony, sites were sampled by hand, and samples were obtained from six vegetated sites by heat extraction of vegetation cores (it is accepted that hand-searching is likely to result in under-representation of smaller individual arthropods; however this is unlikely to affect the general conclusions of either Richard et al. (1994) or this study). This study reports the results of a re-examination of the preserved specimens from 19 stony and 5 vegetated sites, concentrating specifically on Collembola. Taxonomic information on the species considered here is given by Greenslade (1995).

Results and discussion

Five species of Collembola were identified. Their distribution and abundance in stone samples and vegetation core extractions are summarised in Table 1. Comparison of these data with Table 5 in Richard et al. (1994) allows correction of shortcomings in the preliminary data. Most importantly, although the presence of the smaller species, *T. mixta*, was noted previously, its occurrence in preserved samples was seriously underestimated due to confusion with juveniles of the other species. The occurrence of individuals of each species as a proportion of the total Collembola examined (Table 1) has improved accuracy. *Cryptopygus* sp. nov. is described from this material (Greenslade 1995), and was previously included with *C. antarcticus*.

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Table 1 Collembolan distribution and abundance in preserved samples collected from stony ($n = 19$) and vegetated ($n = 5$) sites on the Byers Peninsula, Livingston Island, South Shetland Islands. The percentage of sites from which each species was recorded is given, along with the number of specimens and percentage contribution to the total of Collembola collected

Species	Stone sites		Vegetated sites	
	% sites species occurred	N individuals recorded (% of total Collembola)	% sites species occurred	N individuals recorded (% of total Collembola)
<i>Cryptopygus antarcticus</i>	16	140 (10.3%)	80	84 (10.9%)
<i>Cryptopygus</i> sp. nov.	0	0 (0%)	80	92 (11.9%)
<i>Friesea grisea</i>	95	782 (57.7%)	80	195 (25.2%)
<i>Isotoma (Folsomotoma) octooculata</i>	67	197 (14.5%)	80	226 (29.3%)
<i>Tullbergia mixta</i>	78	237 (17.5%)	100	175 (22.7%)

These new results largely support the conclusions of Richard et al. (1994), but illustrate a previously unrecognised difference in community composition between stony and vegetated sites. As previously described, *F. grisea* is the dominant collembolan species in samples hand-collected from under stones, being 3–6 times more abundant than the other three species recorded. However, this dominance is not found in samples heat-extracted from vegetation, with three species occurring in similar proportions [*F. grisea*, *Isotoma (F.) octooculata*, *T. mixta*] and all species, including the rarer *C. antarcticus* and *Cryptopygus*, sp. nov., being found in most samples. The relative rarity of *Cryptopygus* species in this study contrasts with their dominance in other studies of maritime Antarctic micro-arthropod communities (e.g. Block 1982; Usher and Booth 1984; Usher and Edwards 1986).

Nothing is known of the biology of *Cryptopygus* sp. nov., and how this may differ from that of *C. antarcticus*. In addition to the type material collected in this study, specimens have now been identified in preserved invertebrate samples collected from several sites on Alexander Island and in northern Marguerite Bay (Greenslade 1995). These sites are on the western side of the Antarctic Peninsula, also within the maritime Antarctic but, lying at 68–72°S, they are separated from the Byers Peninsula (ca. 62°S) by at least 600 km. The distribution of *Cryptopygus* sp. nov. is therefore likely to be much wider than is currently known, although it may not extend to the South Orkney Islands (no specimens have yet been found in preserved Collembola samples from the island group), and may necessitate re-examination of material from the Antarctic Peninsula that has been assigned to *C. antarcticus* and used in a variety of studies.

The identification of *Cryptopygus* sp. nov. increases to five the number of Collembola recorded from the Byers Peninsula in the current study. Usher and Edwards (1986) identified 5 species, including 1

Table 2 Free-living terrestrial arthropods (Collembola, Diptera, Acari) recorded from the Byers Peninsula SSSI (References: 1 Usher and Booth 1986 2 Richard et al. 1994 3 This study 4 Block and Stary 1996; note that “new records” for Livingston Island in the latter publication refer to the collections reported in Richard et al. 1994)

Species	Reference
Collembola	
<i>Cryptopygus antarcticus</i> Willem	1, 3
<i>Cryptopygus</i> sp. nov.	3
<i>Friesea grisea</i> (Schaffer)	1, 3
<i>F. woyciechowskii</i> Weiner	1
<i>Isotoma (Folsomotoma) octooculata</i> (Willem)	1 ^a , 3
<i>Tullbergia mixta</i> Wahlgren	1, 3
Diptera	
<i>Belgica antarctica</i> Jacobs	1, 2
<i>Parochlus steinenii</i> (Gerke)	1, 2
Acari (Cryptostigmata)	
<i>Alaskozetes antarcticus</i> (Michael)	1, 2, 4
<i>Edwardzetes dentifer</i> Hammer	2, 4
<i>Halozetes belgicae</i> (Michael)	2, 4
<i>Magellozetes antarcticus</i> (Michael)	2, 4
<i>Globoppia loxolineata</i> (Wallwork)	1, 2, 4
Acari (Mesostigmata)	
<i>Gamasellus racovitzae</i> (Trouessart)	1, 2
Acari (Prostigmata)	
<i>Bakerdania antarcticus</i> (Mahunka)	1
<i>Ereynetes macquariensis</i> Fain	1
<i>Eupodes minutus</i> (Strandtmann)	1
<i>Eupodes parvus</i> Booth et al.	1
<i>Nanorchestes berryi</i> Strandtmann	1
<i>N. gressitti</i> Strandtmann ^b	1
<i>Ptretiophydeus tilbrookii</i> (Strandtmann)	1
<i>Rhogidia gerlachei</i> (Trouessart) ^c	2
<i>Stereotydeus villosus</i> (Trouessart)	1, 2

^a As *Parisotoma octooculata* (Willem)

^b The record for *Nanorchestes antarcticus* Strandtmann mentioned in Richard et al. (1994) is reduced to *Nanorchestes* sp., as no specimens were preserved for critical examination

^c *R. gerlachei* was not separated from *R. leechi* (Strandtmann)

not recorded in this study (*Friesea woyciechowskii* Weiner), which contributed ca. 0.5% of almost 7700 Collembola collected in funnel extractions of vegetation samples obtained on the Byers Peninsula during a single day in late March 1981. Usher and Edwards's specimens were collected ca. 7 km from the present study sites, along the southern coast of the Peninsula in the general region of Negro Hill (see Richard et al. 1994, Fig. 2). The species abundances recorded by Usher and Edwards (1986) differ dramatically from those of our study: *C. antarcticus* was dominant, with 91.4% of individuals, followed by *T. mixta* (6.3%), *F. grisea* (1.8%), *F. woyciechowskii* (0.5%) and *I. (F.) octooculata* (single individual). Although it is not possible to separate the influences of different sampling techniques, sample sites and dates of collection on the samples obtained, it is clear that collembolan population composition may vary significantly over a relatively small area.

Combining the records given by Usher and Edwards (1986), Richard et al. (1994), Block and Sary (1996) and the present study gives a total of 23 species of free-living terrestrial arthropods known to occur on the Byers Peninsula (Table 2). Comparison of this figure with other published studies on terrestrial arthropod diversity within the maritime Antarctic (Goddard 1979; Block 1982; Usher and Booth 1984; Usher and Edwards 1984, 1986) indicates both an increase in the known diversity of the Byers Peninsula fauna and that the diversity of this fauna is now greater than at any other documented Antarctic site. Even allowing for the fact that the fauna of this and other sites are likely to increase with further sampling, particularly of the less known or collected groups such as the

smaller Prostigmata and Astigmata, these studies highlight the position of the Byers Peninsula as an area of biological importance, strengthening the arguments supporting its designation as a Site of Special Scientific Interest.

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