

ARTHROPODS FROM FOREST LITTER UNDER LODGEPOLE
PINE INFECTED WITH THE COMANDRA BLISTER RUST

BY

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ABSTRACT

Thirty samples of surface litter (L-F-H horizon) material were collected from under lodgepole pine infected by Comandra blister rust Cronartium comandrae Peck at six locations in southwestern Alberta. Ten samples were collected in April, 1969, and 20 in September, 1970. A total of 327 taxa of arthropods was collected, representing 16 orders. The principal orders were the Acarina, Diptera, Hymenoptera, Araneida, Coleoptera and Collembola. More than two-thirds of the arthropods collected, however, belonged to the Acarina. Most (94%) of the mites belonged to the sub-order Cryptostigmata. Forty-two of the arthropod taxa collected had previously been recorded as associated with Comandra blister rust cankers. The most important of these species were the nitidulid beetle Epuraea obliquus and the flies, Mycodiplosis spp., Paracacoxenus guttatus, and Bradysia spp. The first three species had earlier been determined to be mycetobiont. Several of the taxa collected are undescribed and others represent new records for North America, Canada, or Alberta.

RESUME

Ont été recueillis 30 échantillons, dont 10 en avril 1969 et 20 en septembre 1970, de la litière de surface (horizons L-F-H) sous des pins de Murray infectés par la Rouille-Tumeur Cronartium comandrae Peck, dans six stations situées dans le sud-ouest de l'Alberta. Ces échantillons

contenaient au total 327 taxa d'arthropodes, représentant 16 ordres dont les principaux sont les Acariens (77 taxa), les Diptères (64 taxa), les Hyménoptères (60), les Aranéides (39), les Coléoptères (29) et les Collembolés (24). Cependant plus de 2/3 des Arthropodes recueillis appartenait aux Acariens. La plupart des mites (94%) appartenait au sous-ordre des Cryptostigmates. Quarante-deux des taxa d'Arthropodes recueillis avaient été au préalable enregistrés comme associés aux chancres de la Rouille-Tumeur *C. comandrae*. Les espèces les plus importantes de ces Arthropodes étaient *Eपुरaea obliquus* et les mouches *Mycodiplosis* spp., *Paracacoxenus guttatus* et *Bradysia* spp. On avait au début qualifié les trois premières comme mycétobiontes. Plusieurs des taxa recueillis n'étaient pas encore décrits et d'autres étaient nouveaux pour l'Amérique du Nord, le Canada ou l'Alberta.

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INTRODUCTION

The arthropods found associated with the comandra blister rust *Cronartium comandrae* Peck on jack pine (*Pinus banksiana* Lamb), lodgepole pine (*P. contorta* Dougl. var *latifolia* Engelm.), and on bastard-toadflax (*Comandra umbellata* (L.) Nutt. ssp. *pallida* (A.DC.) Piehl), have been reported earlier (Powell 1971, 1972; Powell *et al.* 1972). Arthropods collected from other pine stem rusts in western Canada were reported by Powell *et al.* (1972). Powell (1971) indicated that a few of these associated arthropods were mycetobionts and many were mycetophiles. Some of these arthropods overwinter in the rust cankers, but a large proportion of them undoubtedly spends part of the life cycle in soil or surface litter. A study was therefore undertaken in southwestern Alberta to establish which of these arthropods could be found in the litter at the base of rust-infected trees. Numerous other arthropods encountered are in no way associated with the rust. However, as many of these as possible were collected and identified because of the little known about the general fauna found in such habitats (Kevan 1960), and because of their value from the standpoint of distribution records.

MATERIALS AND METHODS

Samples of forest litter and other organic debris in various stages of decomposition were collected by hand for 15-30 cm around the base of *C. comandrae*-infected lodgepole pine. A total of 30 litter (L-F-H horizons) collections was made from six locations

in southwestern Alberta (Table 1), ten from snow-free trees on April 17, 1969, and 20 on September 21 and 22, 1970. Three locations were sampled in the Bow River Forest (The Wedge, Marmot Creek and "Watershed Road"), two in the Kananaskis Research Forest ("Dump Road" and near the Research Station), and one in Banff National Park (Saskatchewan River Crossing). The average dry weight of the samples was 164 g, with a range of 45-450 g. The volume of each sample differed because of the varying sample depths (5-10 cm), different radial areas, and different basal diameters of the pine trees. All the lodgepole pine were alive in the year of collection and were currently infected with *C. comandrae*. At the three sampling locations in the Bow River Forest and at Saskatchewan River Crossing all trees were between 20 and 25 years old in a typical even-aged stand after fire. The one tree sampled near the Research Station was 35 years old. At the "Dump Road" location the three trees were naturally regenerated 8- to 10-year old lodgepole pine growing in a 2-ha opening within a 40-year old lodgepole pine stand.

The April collections, which were transported to the laboratory in sealed polyethylene bags, were first examined for adult arthropods and then placed in containers in a rearing room (20-22°C, 50-55% relative humidity) and examined at regular intervals through the summer for any further emergence. The material was occasionally sprayed with a fine water mist to maintain adequate

moisture. In the fall any remaining live and dead arthropods in the litter material were pinned, mounted, or placed in alcohol. The September collections were transported to the laboratory in sealed bags and placed in rearing containers. After a few days the containers were put into a cool environment ($4-5^{\circ}\text{C}$) for two months before being placed in the rearing room where they were maintained for several months. During the last portion of the rearing program the containers were inverted over Berlese-type funnels with lamps which greatly assisted the extraction of arthropod groups such as mites. Finally the litter material was screened, and live and dead arthropod material remaining was sorted, pinned, or placed in alcohol. The number of specimens of each species from the spring and fall collections was tallied and the specimens were submitted to specialists for identification. However, because it was not always feasible to separate the great volume of mite material into species, only a representative sample was submitted to specialists for identification. It is possible, therefore, that some species of mites not listed may be present.

Most of the material has been deposited in the insect collection of the Northern Forest Research Centre. Some material has been retained for the Canadian National Collection in Ottawa, or by specialists who identified material. In most of the tables the taxa have been arranged taxonomically, although in Table 2 the families and genera of some orders have been arranged alphabetically.

RESULTS

A list of the species obtained at the individual locations is presented in Table 2. The total of 327 taxa is probably not exact because of the identification of certain specimens above the species level which may duplicate some species already listed, and because the "species group" may include two or more species.

Table 3 gives the number of taxa in the 16 arthropod orders represented. The four orders most commonly represented were Acarina (77 taxa in 37 families), Diptera (64 taxa in 15 families), Hymenoptera (60 taxa in 17 families), and the Araneida (39 taxa in 11 families). The Coleoptera (29 taxa in 10 families), Collembola (24 taxa in 4 families), and the Thysanoptera (12 in 3 families) were also fairly well represented. Table 3 also shows that many of the orders were well represented in the collections from the individual locations; this was especially so for the Wedge and Marmot Creek areas where collections were made in both years (Table 1). However, even the single collection made at the Research Station yielded 56 taxa, including 31 mites. Tables 4, 5, and 6 give a breakdown of taxa by family for the insect orders Coleoptera, Diptera, and Hymenoptera. In the Coleoptera (Table 4), the Carabidae, Curculionidae, and Staphylinidae were the most frequently represented families, although only the Nitidulidae, represented by the species *Epyraea obliquus* Hatch, was present at each location. The Cecidomyiidae were represented by 31 taxa, amounting to nearly half of all the

Diptera taxa (Table 5); some Cecidomyiidae were found at each location. The Chironomidae and Sciaridae were both represented by 5 taxa and the Chamaemyiidae by 4 taxa. In the Hymenoptera (Table 6), the Ichneumonidae, Pteromalidae, and Ceraphronidae were the best represented of the 17 families recorded.

Eleven families of spiders were represented, with the most taxa in the Erigonidae (11) and Salticidae (9). Thirty-seven families of mites were found, usually with only one or two taxa in each family. Table 7 shows the distribution of taxa and individuals among the four sub-orders of mites represented. Members of the Cryptostigmata (Oribatei) were most common, with 40 taxa in 20 families.

As the number of collections from each location and the season of collection varied, the relative distribution and occurrence of taxa are not comparable. However, the nitidulid beetle *Epuraea obliquus* was collected at all six locations. The spider *Clubiona* sp., the cecidomyiid fly *Lestodiplosis* sp., the drosophilid fly *Paracacoxenus guttatus* H. & W., and the ceraphronid wasp *Aphanogmus* sp. were collected at five locations, as were the mites *Dentizetes rudentiger* Hammer, *Epidamaeus* sp., *Eremaeus* sp., *Oppiella* sp., and an undetermined ? Eutegeidae species. Species collected at four locations included the following: the mites *Bryobia* sp., *Camisia* sp., *Cepheus* sp., *Diapterobates principalis* (Berlese), *Suctobelba* sp. and a Parasitoidea species; the springtail *Entomobrya* sp.; sciarid flies *Bradysia* spp.; cecidomyiid flies *Dasineura* sp., and *Lestodiplosis*

grassator (Fyles); chamaemyiid fly *Leucopis* sp. 15; a mymarid wasp *Alaptus* sp.; and the ant *Leptothorax* (*Mychothorax*) *canadensis* Prov.

The most common insect genus collected was the sciarid fly *Bradysia* spp. (at least 4 species) with a total of 803 individuals. Ninety-five individuals of the mymarid wasp *Alaptus* sp., 57 individuals of the drosophilid fly *Paracacoxenus guttatus*, 53 immature springtails of *Tomocerus* sp., and 38 springtails of the *Tomocerus vulgaris* Tull. group were the next most common insect genera, followed by the coccid *Heliococcus osborni* (Sanders) (40), the thrip *Chilothrips pini* Hood (30) and the nitidulid beetle *Epuraea obliquus* (28). The common mites, however, occurred in much larger numbers than insects and other arthropod groups. The most abundant mite was an undetermined genus of the family Eutegeidae with 1607 individuals. Other mite genera represented by a large number of individuals were the following: *Eremaeus* spp. (790), *Dentizetes rudentiger* (767), *Cepheus* spp. (128), *Epidameus* sp. (102), and *Diapterobates principalis* (81).

Table 8 gives the total number of individuals of each order collected in the spring 1969 and fall 1970 samplings. In the spring collection a greater number of Collembola, Coleoptera, and Diptera were present. In the fall collection more spiders, mites, thrips, Homoptera (mainly coccoids), and Hymenoptera were collected, although it must be remembered that twice as many samples were collected on this occasion. Similar numbers of Diplopoda, Psocoptera, Hemiptera, and Lepidoptera were taken on both occasions. These orders were

represented by only a few individuals, as were Chilopoda, Symphyla, Thysanura and Neuroptera, which were collected during only one of the sampling periods. In the spring 1969 collection, Diptera accounted for two-thirds of the individuals. Acarina accounted for over 87% of the total number of individuals collected in the fall 1970 collection, but only 10% of the spring 1969 collection. The use of Berlese-type funnels in the spring 1969 collection could account for much of this difference.

DISCUSSION

The primary objective of the study was to show which of the species of arthropods associated with comandra blister rust (Powell 1971) could be found in the litter at the base of rust-infected lodgepole pine. Of the 160 taxa of arthropods found on the rust canker, 42 were also collected from the litter. The most important of those found in the two habitats were the nitidulid beetle *Epuraea obliquus* and the Diptera *Mycodiplosis* spp., *Paracoxenus guttatus*, and *Bradysia* spp. Unfortunately no control collections of litter were made from other areas, but the first three of these taxa were indicated as mycetobiont species in the earlier study. It is unlikely that these would occur normally in litter around uninfected pine trees, whereas the several species of *Bradysia* would probably be found generally in litter samples, as would most of the other species commonly found in the two habitats, such as the mites *Dentizetes rudentiger*, *Diapterobates principalis*, the spider *Clubiona* sp., and the springtails belonging to the genera *Entomobrya*

and *Tomocerus*. The number of individuals of other species found in the two habitats was generally low in one of the habitats, indicating that one or both are not their normal habitats.

A study of the fauna of forest litter and soils was initiated at the Kananaskis Forest Experiment Station area in 1949, but only two short notes were published from this study (McGuffin 1950a, 1950b). A 0.09-m² sample of forest litter from an aspen stand yielded 748 organisms, of which 62% were mites and 30% Collembola. In a second note five species of Collembola were listed, four taken from soil and litter from beneath lodgepole pine (McGuffin 1950b). Three of these genera were represented among the ten genera of Collembola collected in the present study. Recently, Mitchell (1974) undertook a detailed study of the ecology of oribatid mites in an aspen woodland soil near the Kananaskis Forest Experiment Station. His Appendix A lists at least 35 taxa (5 taxa are indicated as spp. and each is counted as at least 2 species in this tally) of oribatids in 22 families. The present study shows a similar number, 40 taxa in 20 families. Taxa from 14 families were common to both studies, but only 12 genera. Hammer (1952, 1953) lists 10 Oribatidae mites and 7 Collembola collected in August near Jasper, Banff, and Mount Robson. Five of the Collembola belonged to genera collected in the present study but only three of the oribatids were common to the two studies.

In a study of arthropods inhabiting litter and soil after prescribed burning in Northern Idaho, Fellin and Kennedy (1972)

found the mites to account for 46% and Collembola for 33% of the individuals found on a 2-year-old burnt area. On fresh and 1-year-old burns, mites accounted for about 90% of the organisms collected. They found 16 orders of arthropods, the same number represented in the present study. Oswald and Minty (1970) studied the acarine fauna of forest soils in southeastern Manitoba extensively, covering 12 sites at four weekly intervals from April through January. They reported 70 species of mites, compared with 77 taxa for the present report. Only 15 genera were common to the two studies. With the exception of the *Trachytes* and possibly the *Belba* and *Eremaeus* the other genera common to the two studies were found in their pine sites. Twelve of the 33 oribatid families recorded by Marshall (1968) from woodland humus in southern Quebec were represented in the present study. Few of the families or genera of the Mesostigmata (4), Prostigmata (5) and Astigmata (1) were common to the two studies (Marshall and Kevan 1964; Marshall 1968). A few of the arthropod genera represented in the present study, mainly Araneida, Collembola and Coleoptera, were collected by Martin (1965) in a study of the soil-surface fauna in red pine plantations in Ontario. His study (which excluded the Acarina) included many Araneida, Orthoptera and a large number of Coleoptera, especially carabids, scarabids, and staphylinids, which were either absent (scarabids) or represented by only 4-6 species in the present forest litter study.

Arthropod faunas dominated by large numbers of small species such as mites and Collembola are typical of coniferous forests with

their characteristic mor humus formation (Raw 1967). Numerically the Collembola usually take second place only to the mites and have their highest densities in the upper layers of the soil. This distribution is mainly governed by humidity (Hale 1967). Larvae of Coleoptera and Diptera are usually the dominant larger arthropods (Raw 1967). Four orders of the Acari are represented in most soil fauna (Wallwork 1967). Numerically the most abundant are the Cryptostigmata (Oribatid) mites which require humid conditions. Wallwork (1967) indicated that the Cryptostigmata may represent as much as 75% of the total acarine fauna. In the present study they represented over 94%. The Prostigmata and Mesostigmata, many of which are predators, respectively represented about 2% and 3% of the acarine fauna. They are usually more active, ranging freely through the soil and not being restricted to it. The Astigmata were not important, representing only 0.8% of the acarine fauna. They are more commonly associated with drier environments.

The Cryptostigmata are most typically found in the organic layers associated with the surface of the soil (hemiedaphic zone) and especially the fermentation zone, the intergradation between litter and humus (Wallwork 1967), where they are important in the breakdown of organic matter. Wallwork also mentions that smaller species may become relatively more abundant with increasing depth because of smaller soil interstices. Species showing a preference for the litter layer include the large predatory species which are

able to migrate more easily when the upper portions of the litter layer are subject to unfavorable extremes of temperature and desiccation.

Some of the species found in this study have not previously been reported from Canada and several may be new to science. The spider *Dictya* sp., the mites of the genus *Zercon*, the Psocoptera *Liposcelis* sp., the two chironomid flies of the genus *Bryophaenocladus*, the three cecidomyiid flies, *Thecodiplosis* sp., *Lestodiplosis* sp. and *Odontodiplosis* sp., and the chamaemyiid fly *Leucopis* sp. 15 are new. Among the Hymenoptera *Diaeretus* sp. is a new genus of Braconidae for North America, which has been known previously in Europe and Japan. The specimens placed in the Exothecini group of the braconids appear to be a new genus. Similarly the specimen placed close to *Sarothrus* is possibly new, as is the *Conistigmus* sp. and two species in the *Trimorus*. The *Chlorocyclus* sp. is a new record for North America. The mycetophilid fly, *Coelosia* sp. 1. has been collected in northeastern Canada and in British Columbia but is new to Alberta. Among the spiders, *Lethyphantes pollicaris* is new to Canada, having previously been recorded only from Utah and Wyoming; and *Sisicus longitarsi* has not been collected previously in western Canada, although known from Alaska, Labrador and Quebec. Leech (personal communication 1975) also indicated that *S. longitarsi* (Chamerlin & Ivie 1947) is a synonym of *Maro apertus* Holm 1939, and suggested that *Sisicus apertus* (Holm) should be established as the correct combination. This opinion was confirmed by Saaristo (1971 p. 467). The springtail *Isotoma violacea* is a widespread

arctic and northern species new to Alberta (McAlpine 1965). Among the thrips, *Oedaleothrips* sp. nr. *jacksoni* is new to Canada. Its most northern report was previously from Colorado. The collection of *Chilothrips pini* is the largest from anywhere and has only recently been found in Alberta. The records for *Thrips* sp. and *Haplothrips subtilissimus* are new for Alberta, although a specimen of *Haplothrips* nr. *subtilissimus* was recorded in the earlier related study (Powell 1971). Reports of the Thysanura family Japygidae are rare in Canada, although Leech (personal communication 1975) indicates they are not uncommon. Kevan (1960) mentions that the only record for Canada 15 years ago was one found by Saunders (1946) on Vancouver Island. Other species collected in this study are also probably undescribed, but await specialists to study the groups.

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TABLE 1. Location, date, and number of forest litter collections

<u>LOCATION NUMBER</u>	<u>LOCATION</u>	<u>LATITUDE</u>	<u>LONGITUDE</u>	<u>ELEVATION M (FT)</u>	<u>DATE COLLECTED</u>	<u>NO. OF TREES SAMPLED</u>
1.	"Dump Road"	51°02'N	115°01'W	1397(4580)	17-IV-1969	3
2.	Marmot Creek	50°57'N	115°09'W	1609(5280)	17-IV-1969	6
3.	The Wedge	50°53'N	115°09'W	1530(5020)	17-IV-1969	1
4.	Research Station	51°02'N	115°02'W	1402(4600)	21-IX-1970	1
2.	Marmot Creek	50°57'N	115°09'W	1609(5280)	21-IX-1970	4
5.	"Watershed Road"	50°56'N	115°09'W	1524(5000)	21-IX-1970	3
3.	The Wedge	50°53'N	115°09'W	1530(5020)	21-IX-1970	5
6.	Saskatchewan River Crossing	51°58'N	116°44'W	1463(4800)	22-IX-1970	7

TABLE 2. Arthropods collected at six locations from forest litter under *Pinus contorta* infected with *Cronartium comandrae*.

	LOCATIONS*					
	1	2	3	4	5	6
<u>DIPLOPODA</u>						
CASEYIDAE						
Undetermined sp. imm.**	0	1	0	0	0	0
CONOTYLIDAE						
Undetermined sp. imm.	0	1	3	4	0	1
<u>CHILOPODA</u>						
GEOPHILIDAE						
Undetermined sp.	0	0	2	0	0	0
<u>SYMPHYLA</u>						
Undetermined sp.	0	2	1	0	0	0
<u>ARACHNIDA</u>						
ARANEIDA						
AGELENIDAE						
<u>Cybaeus</u> sp. imm.	0	0	0	1	0	0
AMAUROBIIDAE						
<u>Arctobius agelenoides</u> (Emerton) imm.	0	0	0	1	0	0
CLUBIONIDAE						
<u>Clubiona</u> sp. imm.	2	3	2	3	0	5
DICTYNIDAE						
<u>Dictyna</u> sp. nov.	1	0	0	0	0	0
ERIGONIDAE						
<u>Ceraticelus fissiceps</u> (O. Pickard-Cambridge)	0	7	0	0	0	0
<u>Cornicularia directa</u> (O. Pickard-Cambridge)	0	1	0	0	0	0
<u>Diplocentria bidentata</u> (Emerton)	0	4	2	0	0	0
<u>Microneta</u> sp.	0	1	0	0	0	0
? <u>Oedothorax</u> sp.	0	1	0	0	0	0
<u>Pelecopsis</u> sp. nr. <u>moestum</u> (Banks)	0	0	0	0	0	1
<u>Pocadicnemis pumila</u> (Blackwall)	0	0	1	0	0	1
<u>Sciastes truncatus</u> (Emerton)	0	1	0	0	0	0
<u>Sisicus apertus</u> (Holm)	2	0	1	0	0	0
<u>Zornella cultrigera</u> (Koch)	0	0	0	0	0	1
Undetermined spp. (mainly imm.)	4	2	3	0	1	5
GNAPHOSIDAE (=DRASSIDAE)						
<u>Gnaphosa</u> sp. imm.	0	0	1	0	0	1
<u>Haplodrassus</u> sp. imm.	0	0	1	0	0	0

TABLE 2. (continued)

	LOCATIONS*					
	1	2	3	4	5	6
LINYPHIIDAE						
<u>Lepthyphantes alpinus</u> (Emerton)	0	0	0	1	0	0
<u>Lepthyphantes complicatus</u> (Emerton)	0	1	0	0	0	1
<u>Lepthyphantes pollicaris</u> Zorsch	0	1	0	0	0	0
<u>Lepthyphantes</u> sp. imm.	0	1	0	0	0	1
<u>Meioneta</u> sp. imm.	1	1	0	0	0	0
LYCOSIDAE						
<u>Pardosa</u> sp. imm.	0	1	0	0	1	0
<u>Tarentula</u> sp. imm.	0	1	0	0	0	0
SALTICIDAE						
<u>Ballus</u> sp. imm.	1	0	0	0	0	0
<u>Metaphidippus flavus</u> (Peckham)	0	0	0	0	1	0
<u>Metaphidippus</u> sp.? imm.	0	0	0	0	0	1
<u>Neon</u> sp. imm.	1	0	0	0	0	0
<u>Paraphidippus</u> sp.	0	0	1	0	0	0
<u>Paraphidippus</u> sp.? imm.	0	0	0	0	0	2
<u>Pellenes hoyi</u> (Peckham)? imm.	0	0	0	0	0	2
<u>Sitticus</u> sp. imm.	0	0	0	0	0	1
<u>Talavera minuta</u> (Banks)? imm.	0	0	3	0	2	1
THERIDIIDAE						
<u>Ctenium</u> sp. poss. <u>fusca</u> (Emerton) imm.	2	0	0	0	0	0
<u>Ctenium</u> sp. imm.	0	0	1	0	0	0
THOMISIDAE						
<u>Córiarachne</u> sp. imm.	0	0	0	0	0	1
<u>Oxyptila</u> sp. imm.	0	0	1	0	0	3
<u>Tibellus oblongus</u> (Walckenaer) imm.	0	0	0	0	0	1
<u>Xysticus</u> sp. imm.	0	0	0	0	1	3
ACARINA - ASTIGMATA						
ACARIDAE						
<u>Tyrophagus putrescentiae</u> (Schrank)	0	0	0	0	0	1
ARCTACARIDAE						
<u>Arctacarus</u> sp.	0	31	0	0	0	0
ACARINA - PROSTIGMATA						
BDELLIDAE						
<u>Bdella muscorum</u> (Ewing)	0	1	0	3	3	0
<u>Bdella</u> sp. ? <u>muscorum</u> (Ewing)	0	1	0	5	0	2
<u>Bdella</u> sp.	0	0	1	0	0	0
<u>Bdellodes longirostris</u> (Hermann)	0	0	1	0	0	0
<u>Cyta latirostris</u> (Hermann)	0	2	3	0	0	1
BRYOBIIDAE						
<u>Bryobia</u> sp. imm.	0	5	5	0	1	9
ERYTHRAEIDAE						
<u>Abrolophus</u> sp.	0	0	0	0	0	1
<u>Bochartia</u> sp. imm.	0	10	4	1	0	0
<u>Erythraeus</u> sp.	1	0	2	0	0	0
<u>Leptus</u> sp. imm.	0	0	0	1	0	0

TABLE 2. (continued)

	LOCATIONS*					
	1	2	3	4	5	6
EUPODIDAE						
<u>Eupodes</u> sp.	0	0	1	0	0	0
PACHYGNATHIDAE						
<u>Bimichælia</u> sp.	0	1	0	0	0	0
RHAGIDIIDAE						
<u>Rhagidia</u> sp. nr. <u>terricola</u> (Koch)	0	2	1	0	0	0
STIGMAEIDAE						
<u>Mediolata</u> sp. nr. <u>pini</u> Cănestrini	0	0	0	1	0	0
<u>Mediolata</u> sp.	0	0	3	0	0	2
<u>Stigmaeus</u> sp.	0	0	0	1	0	1
TROMBIDIIDAE						
<u>Microtrombidium</u> sp. nr. <u>spiniferum</u> (Thor.)	0	7	1	0	0	0
<u>Microtrombidium</u> sp.	0	0	0	0	1	0
? <u>Ianaupodus</u> sp.	0	0	0	1	0	0
ACARINA - MESOSTIGMATA						
ASCIDAE						
<u>Proctolaelaps</u> <u>robustus</u> Evans	0	1	1	3	0	0
<u>Proctolaelaps</u> sp.	0	3	2	0	1	0
<u>Zerconopsis</u> sp.	0	0	20	12	7	0
PARASITIDAE						
Undetermined sp.	0	1	0	0	0	0
PARASITOIDEA						
Fam & Gen. undetermined	0	1	22	9	0	6
PHYTOSEIIDAE						
<u>Amblyseius</u> sp. nr. <u>inak</u> Chant & Hansell	0	0	1	0	0	0
<u>Amblyseius</u> <u>tundra</u> Chant & Hansell	0	0	1	0	0	0
<u>Amblyseius</u> sp.	0	0	0	0	0	1
TRACHYTIDAE						
<u>Polyaspinus</u> sp.	0	0	0	1	0	0
<u>Trachytes</u> sp.	0	1	0	3	0	0
UROPODIDAE						
? <u>Leiodinychus</u> sp. imm.	0	1	6	0	0	1
<u>Pseudouropoda</u> sp.	0	4	2	0	0	0
ZERCONIDAE						
<u>Zercon</u> sp. nov. 1	0	1	0	0	3	0
<u>Zercon</u> sp. 2	0	0	6	1	0	0
<u>Zercon</u> sp. 3	0	0	1	0	0	0
<u>Zercon</u> sp. 4	0	0	0	1	0	0
ACARINA - CRYPTOSTIGMATA						
BELBIDAE						
<u>Belba</u> sp.	0	3	0	0	0	1
BELBODAMAEIDAE						
<u>Hungarobelba</u> sp.	0	0	0	0	0	3

TABLE 2. (continued)

	LOCATIONS*					
	1	2	3	4	5	6
CAMISIIDAE						
<u>Camisia biurus</u> (Koch)	0	5	2	0	0	0
<u>Camisia horrida</u> (Hermann)	0	2	3	0	0	0
<u>Camisia</u> sp. imm.	0	5	1	1	4	0
CARABODIDAE						
<u>Carabodes</u> sp.	0	0	0	21	10	0
CEPHEIDAE						
<u>Cepheus</u> sp. nr. <u>corae</u> Jacot	0	2	0	0	0	0
<u>Cepheus</u> sp.	0	24	0	92	9	1
<u>Eupterotegaeus</u> sp.	0	6	0	0	0	0
Gen. undetermined imm.	0	3	0	0	0	0
CERATOZETIDAE						
<u>Dentizetes rudentiger</u> Hammer	0	77	307	68	173	142
<u>Diapterobates principalis</u> (Berlese)	0	48	20	12	1	0
<u>Trichoribates</u> sp. nr. <u>lamellata</u> (Ewing)	0	2	0	0	0	0
<u>Trichoribates</u> sp.	0	0	3	0	0	1
DAMAEIDAE						
<u>Epidamaeus</u> sp.	0	10	16	2	16	58
EREMAEIDAE						
<u>Eremaeus</u> sp. nr. <u>grandis</u> Hammer	0	5	0	0	0	0
<u>Eremaeus</u> sp. 1	0	2	2	0	1	0
<u>Eremaeus</u> sp. 2	0	0	0	0	0	1
<u>Eremaeus</u> sp.	0	84	354	68	21	252
?EUTEGEIDAE						
Undetermined sp.	0	702	331	33	531	10
GYMNODAMAEIDAE						
<u>Gymnodamaeus bicostatus</u> (Koch)	1	0	0	0	0	0
<u>Gymnodamaeus gildersleeveae</u> Hammer	0	0	2	0	0	0
<u>Gymnodamaeus</u> sp.	0	0	3	0	2	3
LIACARIDAE						
<u>Dorycranosus</u> sp.	0	0	0	2	0	0
METRIOPIIIDAE						
<u>Ceratoppia bipilis</u> (Hermann)	0	2	0	0	0	0
<u>Ceratoppia quadridentata artica</u> Hammer	0	2	0	0	0	0
<u>Ceratoppia</u> sp.	0	1	0	4	0	6
OPPIIDAE						
<u>Oppiella</u> sp.	0	9	2	1	3	6
Undetermined sp.	0	1	6	3	1	0
ORIBATELLIDAE						
<u>Oribatella</u> sp.	0	0	0	0	5	0
ORIBATULIDAE						
<u>Scheloribates</u> sp.	0	0	0	0	1	0
? <u>Scheloribates</u> sp.	0	1	4	0	1	0
<u>Zygoribatula</u> sp.	0	6	0	0	0	5
PHTHIRACARIDAE						
Undetermined sp.	0	0	0	2	0	0
SUCTOBELBIDAE						
<u>Suctobelba</u> sp.	0	5	6	4	0	2
<u>Suctobelbella</u> sp.	0	0	2	1	1	0
TECTOCEPHEIDAE						
<u>Tectocepheus</u> sp.	0	1	0	0	1	1

TABLE 2. (continued)

	LOCATIONS*					
	1	2	3	4	5	6
TENUIALIDAE						
<u>Hafenrefferiella</u> sp.	0	11	22	5	0	0
? THYRISOMIDAE						
Undetermined sp.	0	0	1	0	0	0
Fam. & Gen. undetermined (many imm.)	0	18	90	2	33	19
INSECTA						
THYSANURA						
LEPISMATIDAE						
Undetermined sp.	0	3	0	0	0	0
JAPYGIDAE						
Undetermined sp.	0	0	1	0	0	0
COLLEMBOLA						
PODURIDAE						
<u>Hypogastrura</u> sp. imm.	0	0	1	0	0	0
<u>Pseudochorutes</u> sp.	0	0	2	0	0	0
<u>Onychiurus</u> sp. nr. <u>armatus</u> Tullberg	0	5	0	0	0	0
<u>Onychiurus</u> <u>subtenuis</u> Folsom	0	0	0	1	0	0
<u>Onychiurus</u> sp.	0	3	0	0	0	0
ISOTOMIDAE						
<u>Isotoma</u> (<u>Mesisotoma</u>) <u>grandiceps</u> (Rueter)	0	0	1	0	0	0
<u>Isotoma</u> <u>violacea</u> (Tullberg)	0	1	3	0	0	0
<u>Isotoma</u> <u>viridis</u> (Bourlet)	0	9	0	0	0	0
<u>Isotoma</u> sp. imm.	0	0	5	0	0	0
ENTOMOBRYIIDAE						
<u>Entomobrya</u> sp.? <u>nivalis</u> (L.) (1 imm.)	0	1	0	1	0	0
<u>Entomobrya</u> sp. prob. <u>triangularis</u> Schött ♀	0	0	3	0	0	0
<u>Entomobrya</u> sp. (7 imm.)	2	2	3	3	0	0
<u>Entomobryoides</u> sp. nr. <u>dissimilis</u> (Moniez)	1	1	0	0	0	0
<u>Entomobryoides</u> sp. imm.	1	0	0	0	0	0
<u>Tomocerus</u> <u>flavescens</u> Tullberg	0	0	0	1	0	0
<u>Tomocerus</u> sp. prob. <u>flavescens</u> Tullberg imm.	1	0	0	2	0	0
<u>Tomocerus</u> <u>flavescens</u> Tullberg grp.	0	8	0	0	0	0
<u>Tomocerus</u> <u>vulgaris</u> Tullberg grp.	0	33	5	0	0	0
<u>Tomocerus</u> sp. imm.	4	31	18	0	0	0
<u>Orchesella</u> sp. nr. <u>ainslei</u> Folsom	0	1	0	0	0	0
<u>Orchesella</u> sp. (1 imm.)	0	1	0	0	0	1

TABLE 2. (continued)

	LOCATIONS*					
	1	2	3	4	5	6
SMINTHURIDAE						
<u>Dicyrtoma</u> sp. nr. <u>hageni</u> Folsom	1	2	0	0	0	0
<u>Dicyrtoma</u> sp.	2	0	0	0	0	0
<u>Ptenothrix</u> sp. nr. <u>marmorata</u> (Packard)	0	2	0	0	0	0
PSOCOPTERA						
LIPOSCELIDAE						
<u>Liposcelis</u> sp. undescribed	0	0	1	0	0	0
PSOCIDAE						
<u>Caecilius</u> sp.	0	1	0	0	0	0
PSEUDOCAECILIIDAE						
<u>Peripsocus</u> sp.	0	1	0	0	0	0
THYSANOPTERA						
THRIPIDAE						
<u>Anaphothrips</u> <u>obscurus</u> (Müller) grp.	0	3	0	0	0	0
<u>Anaphothrips</u> <u>secticornis</u> (Trybom)	0	3	21	1	0	0
<u>Chilothrips</u> <u>pini</u> Hood	0	2	13	0	0	18
<u>Chilothrips</u> sp. nr. <u>pini</u> (Hood)	0	1	0	0	0	0
<u>Chilothrips</u> sp.	0	2	0	0	0	0
<u>Chirothrips</u> sp.	0	2	0	0	0	0
<u>Oxythrips</u> sp. prob. <u>ajugae</u> Uzel	0	0	0	0	1	0
<u>Taeniothrips</u> <u>vulgatissimus</u> (Haliday)	0	0	1	0	0	0
AEOLOTHRIPIDAE						
<u>Aeolothrips</u> <u>fasciatus</u> complex	0	0	3	0	0	0
PHLAEOTHRIPIDAE						
<u>Haplothrips</u> sp. nr. <u>subtilissimus</u> Hal.	1	0	0	0	0	0
<u>Haplothrips</u> sp.	0	0	0	0	0	3
<u>Oedaleothrips</u> sp. nr. <u>jacksoni</u> Hood	3	0	0	0	0	0
HEMIPTERA						
MIRIDAE						
Undetermined sp. imm.	1	0	1	1	0	0
LYGAETIDAE						
<u>Sphragisticus</u> <u>nebulosus</u> (Fallen)	1	0	0	0	0	0
Undetermined sp. imm.	0	0	0	0	0	1
PENTATOMIDAE						
<u>Sciocoris</u> <u>microphthalmus</u> Flor.	2	0	0	0	0	0
HOMOPTERA						
APHIDIDAE						
<u>Cinara</u> <u>medispinosa</u> (G. & P.)	13	0	0	0	0	0
COCCOIDEA						
Undetermined sp. ♂	0	0	0	8	0	18
COCCIDAE						
<u>Puto</u> sp. prob. <u>cupressi</u> Coleman imm.	0	0	0	4	0	3
<u>Helicococcus</u> <u>osborni</u> (Sanders) (many imm.)	0	9	12	0	0	19

TABLE 2. (continued)

	LOCATIONS*					
	1	2	3	4	5	6
NEUROPTERA						
CONIOPTERYGIDAE						
Undetermined sp.	0	0	2	1	0	1
COLEOPTERA						
CARABIDAE						
<u>Notiophilus directus</u> Csy.	0	2	1	0	0	0
<u>Notiophilus sylvaticus</u> Esch.	0	0	1	0	0	0
<u>Notiophilus borealis</u> Harr.	0	1	0	0	0	0
<u>Calathus ingratus</u> Dej.	0	2	0	0	0	0
<u>Metabletus americanus</u> Dej.	3	0	0	0	0	0
Carabid imm.	1	0	0	0	0	0
STAPHYLINIDAE						
<u>Oxytelus nitidulus</u> Grav.	2	0	0	0	0	0
<u>Bledius annularis</u> complex	1	0	0	0	0	0
<u>Stenus</u> sp.	0	1	0	0	0	0
Aleocharinae	1	0	1	0	0	0
Staphylinid imm.	1	0	0	0	0	0
PTILIIDAE						
Undetermined sp.	0	6	0	0	0	0
ELATERIDAE						
<u>Drasterius debilis</u> LeC.	0	1	0	0	1	0
CRYPTOPHAGIDAE						
<u>Cryptophagus pilosus</u> Gyll	0	0	0	0	0	2
<u>Cryptophagus</u> sp.	0	0	1	0	0	0
NITIDULIDAE						
<u>Epuraea obliquus</u> Hatch	4	7	8	1	6	2
<u>Thalycra mixta</u> Howden	0	1	0	0	0	0
LATHRIDIIDAE						
<u>Corticaria</u> sp.	0	0	1	0	0	0
<u>Melanophthalma</u> sp.	0	1	1	0	0	0
Lathridiid sp.	0	0	0	1	0	0
COCCINELLIDAE						
<u>Scymnus</u> sp.	0	0	1	0	0	0
<u>Coccinella transversoguttata</u> <u>richardsoni</u> Brown	0	1	0	1	0	0
CURCULIONIDAE						
<u>Brachyrhinus ovatus</u> (L.)	1	0	1	1	0	0
<u>Lepyryus</u> sp.	0	0	1	0	0	0
<u>Pissodes schwarzi</u> Hopk.	1	1	0	0	0	0
<u>Tychius</u> sp. prob. <u>tectus</u> Lec.	1	0	0	0	0	0
<u>Cylindrocopturus deleoni</u> Buchanan	1	1	0	0	0	0
<u>Rhyncolus</u> sp.	0	6	0	0	0	0
SCOLYTIDAE						
<u>Hylurgops porosus</u> (Lec.)	0	1	0	0	0	0

TABLE 2. (continued)

	LOCATIONS*					
	1	2	3	4	5	6
LEPIDOPTERA						
NOCTUIDAE						
Noctuid sp. imm.	0	0	0	0	1	0
TORTRICIDAE						
<u>Laspeyresia</u> sp.	1	0	0	0	0	0
Tortricid sp. imm.	0	0	1	0	0	0
GELECHIIDAE						
<u>Eucordylea starki</u> Free.	2	0	0	0	0	0
DIPTEERA						
TIPULIDAE						
<u>Tipula sarta</u> Lw.	0	0	1	0	0	0
<u>Tipula</u> sp. imm.	1	2	0	0	0	0
CHIRONOMIDAE						
<u>Bryophaenocladus</u> sp. nov. 1	1	0	0	0	0	0
<u>Bryophaenocladus</u> sp. nov. 2	1	44	0	0	0	0
<u>Smittia</u> spp. (at least 2)	0	8	8	0	0	0
Undetermined sp.	0	1	1	0	0	0
MYCETOPHILIDAE						
<u>Coelosia</u> sp. 1. nov. sp.	0	3	0	0	0	0
Undetermined sp.	0	0	1	0	0	0
SCIARIDAE						
<u>Bradysia</u> spp. (at least 4)	98	287	417	0	1	0
<u>Phyxia scabiei</u> (Hopk.)	0	1	0	0	0	0
CECIDOMYIIDAE						
Lestremiinae	0	1	1	0	0	0
Micromyini	0	0	1	0	0	0
<u>Micromya</u> sp.	0	0	1	0	0	0
<u>Bryomyia producta</u> (Felt)	0	1	0	0	0	0
<u>Bryomyia</u> sp.	0	1	0	0	0	0
<u>Winnertzia fungicola</u> Felt	0	2	0	0	0	0
<u>Porricondyla unidentata</u> Parnell	0	0	1	0	0	0
<u>Porricondyla</u> sp.	1	4	2	0	0	0
? <u>Porricondyla</u> sp.	0	1	0	4	0	0
Porricondylini	0	0	0	0	2	0
Oligotrophini	0	2	0	0	0	0
<u>Dasineura</u> sp.	1	1	1	0	0	2
<u>Rhopalomyia</u> sp.	0	0	1	0	0	0
<u>Contarinia</u> sp.	0	0	0	0	0	1
<u>Thecodiplosis</u> sp.	0	0	1	1	0	3
<u>Thecodiplosis</u> sp. prob. new	0	4	1	0	0	0
<u>Aphidoletes thompsoni</u> Møhn	0	0	1	0	0	0
<u>Karschomyia</u> sp.	0	1	0	0	0	0
<u>Clinodiplosis pucciniae</u> Pritchard	0	7	0	0	0	0

TABLE 2. (continued)

	LOCATIONS*					
	1	2	3	4	5	6
<u>Clinodiplosis</u> sp.	1	0	0	0	0	0
<u>Mycodiplosis fungiperda</u> (Felt)	0	0	2	0	0	0
<u>Mycodiplosis</u> sp. nr. <u>tsugae</u> Felt	0	0	1	0	0	0
<u>Arthrocnodax filicis</u> (Felt)	0	1	0	0	0	0
<u>Lestodiplosis cerasi</u> (Felt)	0	6	0	0	0	0
<u>Lestodiplosis grassator</u> (Fyles)	0	9	6	0	1	5
<u>Lestodiplosis tsugae</u> (Felt)	0	2	2	0	0	0
<u>Lestodiplosis</u> sp. prob. new	0	0	1	0	0	0
<u>Lestodiplosis</u> sp.	0	5	6	1	1	1
Lestodiplosini	0	2	0	0	0	0
<u>Odontodiplosis</u> sp. prob. new	0	0	1	0	0	0
Cecidomyiidi	0	6	10	1	1	1
EMPIDIDAE						
<u>Hilara</u> sp.	1	0	0	0	0	0
<u>Rhamphomyia</u> sp.	1	0	0	0	0	0
DOLICHOPODIDAE						
<u>Chrysotus</u> sp.	0	0	0	0	0	1
PHORIDAE						
<u>Phora</u> sp.	0	1	0	0	0	0
<u>Megaselia</u> (<u>Megaselia</u>) sp.	0	3	0	0	0	0
<u>Megaselia</u> (<u>Aphiochaeta</u>) sp.	1	1	1	0	0	0
PIPUNCULIDAE						
<u>Pipunculus</u> sp.	0	0	1	0	0	0
SYRPHIDAE						
<u>Carposcalis</u> sp.	0	0	1	0	0	0
SCIOMYZIDAE						
<u>Pherbellia albocostata</u> (Fall.)	0	0	1	0	0	0
CHAMAEMYIIDAE						
<u>Leucopis argenticollis</u> Zett.	0	0	0	0	0	3
<u>Leucopis</u> sp. nr. <u>argenticollis</u> Zett.	0	0	0	0	0	1
<u>Leucopis</u> sp. 15 (n.sp. nr. <u>atrifacies</u> Aldrich)	0	1	1	0	1	3
<u>Leucopis</u> sp.	0	0	0	0	0	1
DROSOPHILIDAE						
<u>Paracacoxenus guttatus</u> (H. & W.)	4	18	8	0	11	16
CHLOROPIDAE						
<u>Tricimba brunnicollis</u> (Becker)	1	1	0	0	0	0
<u>Tricimba</u> sp. prob. <u>trisulcata</u> (Adams)	3	0	0	0	0	0
MUSCIDAE						
<u>Spilogona</u> sp.	0	2	1	0	0	0
<u>Hydrotæa scambus</u> (Zett.)	0	1	0	0	0	0
<u>Lasiops septentrionalis</u> (Stein)	0	0	1	0	0	0
HYMENOPTERA						
TENTHREDINIDAE						
<u>Tenthredo</u> sp. imm.	0	0	0	1	0	0

TABLE 2. (continued)

	LOCATIONS*					
	1	2	3	4	5	6
BRACONIDAE						
<u>Diaeretus</u> nov. sp.	0	3	0	0	1	4
<u>Apanteles</u> sp.	0	0	0	1	0	0
Exothecini gp. nov. gen., nov. sp.	0	0	3	0	0	0
ICHNEUMONIDAE						
<u>Mastrus</u> sp.	0	1	0	0	0	0
? <u>Mastrus</u> sp.	0	1	0	0	0	0
<u>Charitopes</u> sp.	0	2	0	0	1	0
<u>Gelis</u> sp.	0	1	1	0	0	0
<u>Aclastus</u> sp.	0	0	1	0	0	0
<u>Platylabus divisatae</u> Heinr.	0	0	1	0	0	0
<u>Ichneumon</u> sp.	0	0	0	0	1	0
<u>Lissonota</u> sp.	0	0	0	0	1	0
Microcleptinae	0	0	1	0	0	0
Porizontinae	0	1	0	0	0	0
<u>Ophion</u> sp.	0	0	1	0	0	1
MYMARIDAE						
<u>Gonatocerus</u> sp.	0	1	0	0	0	0
<u>Alaptus</u> sp.	0	6	28	0	9	62
TRICHOGRAMMATIDAE						
<u>Paracentrobia</u> sp.	0	0	1	0	0	0
EULIOPHIDAE						
<u>Tetrastichus</u> sp.	1	0	1	0	0	0
<u>Elachertus</u> sp.	0	0	1	0	0	0
<u>Chrysocharis</u> (<u>Chrysocharis</u>) <u>clarkae</u> Yoshm.	0	0	1	0	0	0
<u>Pediobius</u> sp.	0	4	0	0	0	0
ENCYRTIDAE						
? <u>Aphycus</u> sp.	1	0	0	0	0	0
<u>Stemmatosteres</u> sp. nr. <u>kuchari</u> Yoshm.	0	0	1	0	0	0
<u>Rhinoencyrtus</u> sp.	0	0	0	0	0	1
? <u>Rhinoencyrtus</u> sp.	0	0	1	0	0	0
PIEROMALIDAE						
<u>Asaphes vulgaris</u> Walker	0	1	6	0	0	0
<u>Pachyneuron</u> sp.	0	0	0	0	0	1
<u>Metacolus</u> sp.	0	0	0	0	1	5
<u>Chlorocytus</u> sp.	0	1	0	0	0	0
<u>Sceptothelys</u> sp.	0	0	0	0	0	1
<u>Semiotellus</u> sp.	0	0	1	0	0	0
<u>Thektogaster</u> sp.	0	0	0	0	0	1
<u>Seladerma</u> sp.	0	0	0	0	1	0
EURYTOMIDAE						
<u>Eurytoma</u> sp.	3	0	0	0	0	0
FIGITIDAE						
close to <u>Sarothrus</u> , poss. new	0	1	0	0	0	0
CYNIPIDAE						
<u>Charips</u> sp.	1	0	2	0	0	1
<u>Alloxysta</u> sp.	0	1	1	0	0	0
<u>Phaenoglyphis</u> sp.	0	0	1	0	1	0

TABLE 2. (continued)

	LOCATIONS*					
	1	2	3	4	5	6
CERAPHRONIDAE						
<u>Ceraphron</u> sp.	0	1	0	0	0	0
<u>Aphanogmus</u> sp. nr. <u>fumipennis</u> Thoms.	0	4	0	0	0	0
<u>Aphanogmus</u> sp.	0	1	3	1	1	1
<u>Lygocerus</u> sp.	0	1	0	0	0	0
<u>Conostigmus</u> sp.	0	1	0	0	0	3
<u>Trichosteresis</u> sp.	0	0	1	0	0	0
<u>Dendrocerus</u> sp.	0	0	1	0	2	4
DIAPRIIDAE						
<u>Spilomicrus</u> sp.	0	0	0	0	1	0
<u>Zygotia</u> sp.	1	0	0	0	0	0
<u>Polypeza</u> <u>pergandei</u> Ashm.	0	0	1	0	0	0
SCELIONIDAE						
<u>Telenomus</u> sp.	0	0	0	0	0	4
<u>Gryon</u> <u>misellus</u> Haliday	0	0	0	0	1	2
<u>Trimorus</u> <u>bervicarinatus</u> Fouts	0	0	2	0	0	0
<u>Trimorus</u> sp. A.	0	2	5	0	0	0
<u>Trimorus</u> sp. B.	0	0	5	0	0	0
PLATYGASTERIDAE						
<u>Platygaster</u> sp. nr. <u>coloradenis</u> (Ashm.)	0	0	1	0	0	0
<u>Platygaster</u> sp.	0	0	0	0	0	2
FORMICIDAE						
<u>Leptothorax</u> (<u>Mychothorax</u>) <u>canadensis</u> Prov.	2	4	1	0	0	2
<u>Leptothorax</u> (<u>Mychothorax</u>) <u>canadensis</u> <u>yankee</u> Emery	1	0	0	0	0	0
<u>Lasius</u> <u>alienus</u> (Forst.)	22	0	0	0	0	0
DRYINIDAE						
Undetermined sp.	0	0	2	0	0	0

- * 1 - Dump Road
 2 - Marmot Creek
 3 - The Wedge
 4 - Research Station
 5 - Watershed Road
 6 - Saskatchewan River Crossing

** imm. = immature stage

TABLE 3. Number of taxa of arthropods according to order and locations.

<u>ORDER</u>	<u>ALL AREAS</u>	<u>LOCATIONS</u>					
		1	2	3	4	5	6
DIPLOPODA	2	0	2	1	1	0	1
CHILOPODA	1	0	0	1	0	0	0
SYMPHYLA	1	0	1	1	0	0	0
ARANEIDA	39	8	14	11	4	5	17
ACARINA	77	2	44	40	31	24	24
THYSANURA	2	0	1	1	0	0	0
COLLEMBOLA	24	7	14	9	5	0	1
PSOCOPTERA	3	0	2	1	0	0	0
THYSANOPTERA	12	2	6	4	1	1	2
HEMIPTERA	4	3	0	1	1	0	1
HOMOPTERA	4	1	1	1	1	0	3
NEUROPTERA	1	0	0	1	1	0	1
COLEOPTERA	29	11	14	10	4	2	2
LEPIDOPTERA	4	2	0	1	0	1	0
DIPTERA	64	15	37	35	4	7	12
HYMENOPTERA	60	8	20	28	3	12	17
TOTAL TAXA	327	59	156	146	56	52	81
NO. OF COLLECTIONS	30	3	10	6	1	3	7

TABLE 4. Number of taxa of Coleoptera according to family and collection area.

TAXA COLEOPTERA	ALL AREAS	LOCATIONS					
		1	2	3	4	5	6
Carabidae	6	2	3	2	0	0	0
Staphylinidae	5	4	1	1	0	0	0
Ptiliidae	1	0	1	0	0	0	0
Elateridae	1	0	1	0	0	1	0
Cryptophagidae	2	0	0	1	0	0	1
Nitidulidae	2	1	2	1	1	1	1
Lathridiidae	3	0	1	2	1	0	0
Coccinellidae	2	0	1	1	1	0	0
Curculionidae	6	4	3	2	1	0	0
Scolytidae	1	0	1	0	0	0	0
TOTAL	29	11	14	10	4	2	2

TABLE 5. Number of taxa of Diptera according to family and collection area.

TAXA DIPTERA	ALL AREAS	LOCATIONS					
		1	2	3	4	5	6
Tipulidae	2	1	1	1	0	0	0
Chironomidae	5	2	4	3	0	0	0
Mycetophilidae	2	0	1	1	0	0	0
Sciaridae	5	3	5	4	0	1	0
Cecidomyiidae	31	3	18	18	4	4	6
Empididae	2	2	0	0	0	0	0
Dolichopodidae	1	0	0	0	0	0	1
Phoridae	3	1	3	1	0	0	0
Pipunculidae	1	0	0	1	0	0	0
Syrphidae	1	0	0	1	0	0	0
Sciomyzidae	1	0	0	1	0	0	0
Chamaemyiidae	4	0	1	1	0	1	4
Drosophilidae	1	1	1	1	0	1	1
Chloropidae	2	2	1	0	0	0	0
Muscidae	3	0	2	2	0	0	0
TOTAL	64	15	37	35	4	7	12

TABLE 6. Number of taxa of Hymenoptera according to family and collection area.

TAXA	ALL AREAS	LOCATIONS					
		1	2	3	4	5	6
<u>HYMENOPTERA</u>							
Tenthredinidae	1	0	0	0	1	0	0
Braconidae	3	0	1	1	1	1	1
Ichneumonidae	11	0	5	5	0	3	1
Mymaridae	2	0	2	1	0	1	1
Trichogrammatidae	1	0	0	1	0	0	0
Eulophidae	4	1	1	3	0	0	0
Encyrtidae	4	1	0	2	0	0	1
Pteromalidae	8	0	2	2	0	2	4
Eurytomidae	1	1	0	0	0	0	0
Figitidae	1	0	1	0	0	0	0
Cynipidae	3	1	1	3	0	1	1
Ceraphronidae	7	0	5	3	1	2	3
Diapriidae	3	1	0	1	0	1	0
Scelionidae	5	0	1	3	0	1	2
Platygasteridae	2	0	0	1	0	0	1
Formicidae	3	3	1	1	0	0	1
Dryinidae	1	0	0	1	0	0	1
TOTAL	60	8	20	28	3	12	17

TABLE 7. Number of taxa of Acarina according to sub-order and the number of individuals from each collection area.

<u>SUB-ORDER</u>	<u>NO. OF TAXA</u>	<u>NO. OF INDIVIDUALS BY LOCATION</u>						<u>TOTAL</u>
		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	
Astigmata	2	0	31	0	0	0	1	32
Prostigmata	19	1	29	22	13	5	16	86
Mesostigmata	16	0	13	62	30	11	8	124
Cryptostigmata	40	1	1037	1177	319	814	511	3359
TOTAL	77	2	1110	1261	362	830	533	4101

TABLE 8. Number of individuals found of each arthropod order in the spring of 1969 and fall of 1970 and total for study.

<u>ORDER</u>	<u>COLLECTIONS</u>		
	<u>SPRING</u> <u>1969</u>	<u>FALL</u> <u>1970</u>	<u>TOTAL</u>
DIPOLOPODA	5	5	10
CHILOPODA	0	2	2
SYMPHYLA	3	0	3
ARANEIDA	36	64	100
ACARINA	148	3,953*	4,101*
THYSANURA	4	0	4
COLLEMBOLA	148	13	161
PSOCOPTERA	2	1	3
THYSANOPTERA	12	73	85
HEMIPTERA	4	3	7
HOMOPTERA	13	73	86
NEUROPTERA	0	4	4
COLEOPTERA	54	27	81
LEPIDOPTERA	3	2	5
DIPTERA	981	110	1,091
HYMENOPTERA	61	207	268
<hr/>			
TOTAL	1,474	4,534*	6,011*
<hr/>			
NO. OF COLLECTIONS	10	20	30

* Some smaller mites not counted.