Canadian Wildlife Service
Saskatoon

ARTHROPOD COMPONENT REPORT

THE STINGING WASPS (HYMENOPTERA: CHRYSIDOIDEA, VESPOIDEA, APOIDEA) AND SPIDERS (ARANEAE)

CANADIAN FORCES BASE SUFFIELD NATIONAL WILDLIFE AREA

WILDLIFE INVENTORY

for the

Canadian Wildlife Service
Environment Canada
Prairie and Northern Region
Edmonton, Alberta

by

Albert T. Finnamore [1]
and
Don Buckle [2]

[1] Provincial Museum of Alberta, 12845 102 Avenue, Edmonton, Alberta, CANADA T5N 0M6
[2] 620 Albert Avenue, Saskatoon, Saskatchewan, CANADA S7N 1G7

1999

For copies of this report, contact:

The Canadian Wildlife Service
Room 200, 4999-98 Avenue
Edmonton, AB
T6B 2X3

Other reports prepared for the CFB Suffield National Wildlife Area wildlife inventory project include:

Vegetation Component
Vascular Flora Component
Wetlands Component
Avifauna Component
Raptor Component
Carnivore Component
Ungulate Component
Reptile and Amphibian Component
Small Mammal Component

TABLE OF CONTENTS

LIST OF TABLES

Table

LIST OF FIGURES

1.0 INTRODUCTION

Canadian Forces Base (CFB) Suffield comprises a 2,690 km^2 area northwest of Medicine Hat in the Prairies Ecozone. It remains relatively unmodified by European settlement and presently supports high proportions of native vegetation. The CFB Suffield National Wildlife Area (SNWA) was established in 1992 to protect the eastern sections of the Base. The Provincial Museum of Alberta, working with the Canadian Wildlife Service (CWS) of Environment Canada, Agriculture and Agri-Food Canada (Lethbridge Research Station), and the Department of National Defence embarked on a wildlife inventory of the environmentally sensitive eastern sections contained in the SNWA. As part of that exercise, personnel in the Invertebrate Zoology Program at the Provincial Museum of Alberta sampled the arthropod community.

Canadian Forces Base Suffield contains over 1,500 documented archaeological sites representing occupation by native cultures over the last 6,000 years or more (Brumley and Dau 1985). Native peoples on this land were entirely big game hunters subsisting on abundant populations of bison *(Bison bison* (Linnaeus)). Dau (1983) estimated the grasslands of CFB Suffield could have supported between 9,000 and 50,000 bison in any one year. Several sites, termed Bison Kills, provide evidence of communal hunts where natives would assemble into large groups and coordinate hunting to bring considerable numbers of bison to a single location for slaughter.

Indigenous societies in most of southern Alberta were largely supplanted by European settlement around the turn of the century. Excerpts from the Base Brief (Anonymous 1993) indicate that by 1900 there were 12 outfits grazing cattle on the area now occupied by the Base. In 1919, federal government policy supported a prairie settlement plan which resulted in 2,283 registered farmers on the area; only 645 remained by 1924 due to unsuitability of the land for cultivation. Only 15% of the land was broken for cultivation. Wawaskesy National Park was established in 1922 on the Middle Sand Hills in the northeastern sections of what is now the Base in response to concerns that pronghorn, *Antilocapra americana* (Ord), were in danger of extirpation. The park was closed in 1938 when Pronghorn populations stabilized.

In 1941, the land now comprising CFB Suffield was expropriated, affecting about 125 families. The Base was operated by the Defence Research Board until 1971 when it came under control of the Department of National Defence and began to serve as a training base primarily for the British army. The Department of National Defence recognized the sensitive nature of the ecosystems in the eastern portion of the base and in 1971, placed it out of bounds to all military training. Those sections now comprise the CFB Suffield National Wildlife Area; proposed in 1992 to include 458.7 km^2 that encompass the Middle Sand Hills, some mixed grassland, and the riparian zone along the South Saskatchewan River.

About 1,200 feral horses, *Equus caballus* Linnaeus, were removed from the base in 1993 because of damage caused to ecosystems in the National Wildlife Area. At that time, CFB Suffield supported about 4,000 pronghorn, 1,500 mule deer (*Odocoileus hemionus* (Rafinesque)), and 1,000 white-tailed deer (*Odocoileus virginianus* (Zimmermann)). In all, 39 species of mammals

(Reynolds 199X), 111 breeding birds (Dale *et al.* 199X), 10 herptiles (Didiuk 199X), 14 fish, and 418 vascular plants (Macdonald 199X) are known from the Base. Finnamore (1992) estimated between 6,000 and 8,000 species of arthropods could occur in the region.

It is no longer possible to find pristine examples of arid grasslands. CFB Suffield contains the largest contiguous area of surviving native grassland (> 50% native vegetation remaining) in western Canada (Patriquin and Skinner 1992), and probably in North America. Its potential role for sustaining and restoring ecosystem dynamics, and acting as a refugium for native grassland species, is invaluable and potentially a resource of national significance. Climate records and pollen cores are available from nearby sites. That information, integrated with recent anthropogenic changes, can be used to construct predictive models of biotic shifts in climate change scenarios.

2.0 METHODS

Sampling methodology was designed to extract a broad range of biota representative of size classes and functional levels in the above-ground terrestrial system. For arthropod meso- and macrofauna, triple replicate, passive samplers (e.g., pan traps) were used to obtain quantitative information on species assemblages. Pan traps and pitfall traps provided quantitative data on species abundance in the form of relative trapability. Malaise traps and occasional sweep samples were used to obtain additional qualitative information on species richness.

Traps were placed at each of four vegetation zones, based on the maximum canopy height of vegetation (approximately 8 cm, 15 cm, 30 cm, 60 cm), that crossed the surficial hydrological gradient on chernozem and eolian soil types. Each trap was assigned a unique identification number based on soil, vegetation height, and replicate. Traps were operated continuously from May to September with sampling intervals initially of about 15 days, dropping to 30 days toward the end of the season. Water, soap and salt were used as the collecting medium during the first year, but were replaced with propylene glycol in the second year to solve problems with sample desiccation in the traps. Samples were washed on site, placed in plastic bags, labelled, and preserved with 95% denatured ethyl alcohol. Samples were then transported to the Invertebrate Lab at the Provincial Museum of Alberta, Edmonton, where target groups were sorted, labelled, and sent to specialists for identification. Results were tabulated in a species checklist and a quantitative analysis was performed on the data using the Czekanovski-Dice-Sorensen index of association available on the BIODIV software (Baev and Penev 1995).

Sites selected for sampling included a transect on chernozem soil containing four mixed grassland species assemblages with different vegetation structures, a reflection of the underlying hydrological gradient. In addition, four sites on eolian soils were selected, including two stabilized dune sites - one with fine sandy soil and the other characterized by the presence of shrubs in the community, a destabilized dune site or dune blowout, and the nearly unvegetated shoreline of a saline lake. Another site was established in the riparian community adjacent to the South Saskatchewan River, but was destroyed by flooding early in the season.

2.1 Sampling Protocols

2.1.1 Pitfall Traps

The following is adapted and modified from Scudder (1996). Pitfall trapping is a frequently used method of sampling arthropods because of its simplicity and ease of operation (Greenslade and Greenslade 1971). It is an effective andinexpensive way of surveying the active ground-surface arthropods in terrestrial ecosystems, and allows for comparison of assemblages in different habitats. Pitfall traps are effective in capturing terrestrial isopods, amphipods, pseudoscorpions, scorpions, solpugids, spiders, harvestmen, ground dwelling crickets, true bugs, carabid beetles, ants, and many other taxa.

This method of trapping must be used with discretion (Greenslade 1964). It must be viewed cautiously if used to provide comparative estimates of species abundance across habitats (Greenslade 1964, Niemelä *et al.* 1990, Spence and Niemelä 1994). Unless correlated with independent measures of population numbers, pitfall trapping should not be used for population estimates. However, abundance measurements obtained from pitfall samples can be compared on the basis of the relative trapability of species within or between sites.

As the name implies, pitfall trapping involves the capture of active ground-surface arthropods that fall into a pit-like trap sunk into the ground. Plastic 450 ml "beer mugs" were used as traps. The surroundings were disturbed only minimally when first inserting traps into the ground, and they were not removed for servicing. Although pitfall traps can be emptied with a hand-operated or mechanical suction apparatus (Southwood 1978), ground disturbance was avoided in the SNWA by using two "beer mugs" nested one inside the other. The outer container was left in the ground for the duration of the sampling program, with the inner container removed periodically for sample extraction.

If pitfall traps are used for live trapping, or are baited, they must be serviced at frequent intervals to avoid spoilage or predation within the trap. Sampling over periods longer than one or two days requires that a preservative be used in the trap.Water, soap and salt were used as the collecting medium during the first year, but were replaced with propylene glycol in the second year to solve problems with sample desiccation in the traps. Three pitfall traps were installed at each of the following chernozem sites: 1.1, 1.2, 1.3. Those sites are characterized below in subsection 1.3. Each trap was numbered separately with a unique identifier on a plastic stake placed near the trap, and the number of the trap was recorded with each sample. Statistical analyses usually require that arthropods at a site have an equal chance of entering each trap. To accommodate this requirement, traps were placed fairly close together. Contents of traps were collected by straining the preservative through a fine mesh sieve and rinsing the contents of the strainer into a specimen container with ethanol.

In order to fully sample the site or habitat, trapping was continued through the whole of the

active season. Such an extended trapping period is needed to accommodate the different phenologies exhibited by the various taxa. Catches obtained immediately after a pitfall trap is placed in position are sometimes larger than those obtained after that time. These "digging-in effects" (Greenslade 1973) are evidently owing to local initial depletion of individuals.

The rate of capture of arthropods by pitfall traps depends on the activity and population density of each species captured (Mitchell 1963, Greenslade 1964). Temperature and humidity also affect activity and locomotion, and hence capture rate (Briggs 1961, Greenslade 1964). Vegetation structure can also greatly influence trap catches by influencing the mobility of arthropods, especially close to the traps (Greenslade 1964, Baars 1979). Nevertheless, pitfall trapping remains the only realistic way to survey large areas where qualitative inventory and quantitative comparison of species assemblages of ground-active arthropods are required (Spence and Niemelä 1994), and where inexpensive, and easy-to-operate methods are needed (Greenslade and Greenslade 1971).

2.1.2 Pan Traps

The method described below is modified from Masner (1996). Pan traps sample a variety of surface-active taxa including arachnids, Hemiptera, Orthoptera, Diptera, Coleoptera, and Hymenoptera among others. Trap catches are influenced by the same factors outlined for pitfall traps. Many insects are attracted to the colour yellow, especially bright yellow. Thus, yellow containers filled with water can be used to trap them. Detergent is added as a surfactant to break the surface tension of the water, causing the insects to drown, and salt is added as a preservative.

Pan traps can be made from a variety of sources including yellow garbage bags, yellow vinyl sheets, transparent food trays spray-painted with acrylic yellow on the outside, or aluminum roasting pans sprayed with yellow enamel on the inside. The type used at SNWA were aluminum roasting pans (32 cm x 25.5 cm x 6 cm) coated with yellow enamel (Safety Yellow) on the inside. The water for the traps was obtained from natural sources and was filtered through a fine mesh aquarium net to remove insects and mites. A clear, unscented detergent was used as a surfactant so as not to act as an insect repellant or attractant.

The pans were sunk into the ground with their rims level with the surface. Water, salt and detergent were then added to the trap. The traps were filled about 3/4 with water and enough salt to make a saturated solution. About 5 drops of detergent were added as a surfactant. Each trap was tagged with a unique identifier on a plastic stake placed near the trap and the number of the trap was always recorded and kept with each sample.

Traps were not removed at any point, but serviced by scooping out the contents with an aquarium net and then either reusing the old solution or replacing it with fresh water, salt and detergent. Before scooping, large objects such as leaves, twigs, small animals, etc., that had fallen into the trap were removed. Specimens were transferred to plastic specimen bags at the trap site by inverting the net contents into the specimen bag and using a squeeze bottle filled with alcohol to

gently wash contents out of the net and down the sides of the specimen bag to the bottom. The contents were then covered with alcohol and sample labels were placed inside the bag with the specimens.

2.1.3 Malaise Traps

The following is modified after Sharkey (1996). The Malaise trap is a large, open, tent-like apparatus constructed according to the specifications of Townes (1972). It is used to sample the following groups in order of greatest to least proportion of catch: Diptera, Hymenoptera, Homoptera, Coleoptera, followed by small amounts of a wide variety of other groups.

Malaise traps catch flying insects. Most flying insects that hit the central panel of the Malaise trap fly upward, presumably in an attempt to fly over the barrier. The slanted roof directs insects toward the high point of the trap where a bottle of salt water (with a drop of soap) is located, and into which they fly. Two modifications were made to the Townes-style trap used in SNWA. The first was a strip of black material about (2 m long and 15 cm wide) that was placed along each edge of the roof of the trap. This acted as a barrier to insects trying to fly out of the trap. This modification resulted in the capture of many more fast flying insects with good eyesight. The second modification was reducing the mesh size. Instead of 10 meshes per cm as suggested by Townes (1972), a mesh size of at least 24 per cm was used because the smaller mesh had been shown to increase the diversity of the catch, albeit at the expense of some of the larger specimens with better vision.

Since strong winds were a frequent occurrence in SNWA each Malaise trap was held in place by 12, 30-cm plastic tent pegs. As a result, there were no losses due to wind but several tent pegs snapped under stress. Each trap was numbered separately with a unique identifier on a plastic stake placed near the trap. Three Malaise traps were initially used at SNWA but one was destroyed by flooding shortly after it was set, and another was destroyed by deer.

2.1.4 Light Traps

Many nocturnal insects use light reflected from the moon or the horizon as a navigational aid. As a result, they can be attracted to local artificial light sources, making light trapping one of the most effective means of collecting large numbers of nocturnal and adult aquatic insects. Light traps are most effective for nocturnal members of the following groups: Lepidoptera, Diptera, aquatic Hemiptera, Coleoptera, and Hymenoptera. A number of light traps are commercially available but almost any light will work. The blacklight trap is among the most effective and was the type used at SNWA. A 58.5 cm blacklight blue, 32 watt tube was used as the light source and placed 60 cm off the ground. As a further modification for SNWA the light was placed in front of a vertical white sheet. Insects attracted to the light landed on the sheet where they were collected. A small, gas-powered generator was used as a power source.

2.1.5 Sweep Samples

Sweeping is one of the most effective methods for quickly capturing large quantities of insects in vegetation. A standard or reinforced insect net (for construction, see Martin 1977) is employed in a sweeping motion on vegetation to dislodge the arthropods. The sweeping motion concentrates arthropods and debris in the apex of the net. Arthropod samples collected with this technique are affected by time of day, moisture, temperature, mesh size of the net, and subjectivity of the collector. In the latter case, different collectors focus their collecting efforts on different aspects of the vegetation. Because of the difficulty in standardizing these variables, sweep samples, particularly for the meso- and microfauna, should be used only in qualitative comparisons. The macrofauna (> 2 cm) is relatively less affected and can be used (with caution) in quantitative comparisons.

Sweep samples were used at SNWA to quickly sample the arthropod community found in unusual habitats such as dune blowouts or bush communities like sage (*Artemesia*). Arthropods were separated from debris using a modification of the separation bag (Masner and Gibson 1979). Once in the separation bag, the positive response to light exhibited by many arthropods was used to separate them from debris. Specimens were then killed in water containing a few drops of soap as a surfactant to break the surface tension. They were then transferred to plastic specimen bags and alcohol was added as a preservative.

2.1.6 Spot Collections

Among the most traditional methods for arthropod sampling, hand collecting remains the technique of choice for many professionals. Arthropod samples collected with this technique, like sweep samples, are affected by time of day, moisture, temperature, visual acumen of the collector, and subjectivity of the collector. It was used at SNWA to examine vegetation, substrate, and other habitats of interest for arthropods. This included turning over rocks and logs (and subsequently replacing them to retain the microhabitat), and any arthropods were captured for identification. These specimens were used only to supplement the species list for a site. Specimens were killed in water with a few drops of soap added as a surfactant to break surface tension.

2.2 Data Analysis

Data were analyzed using BIODIV 5.1 (Baev and Penev 1995). Analysis of spider species assemblages was performed using the Czekanovski-Dice-Sørensen index of association. In qualitative comparisons (species presence-absence data), the Czekanovski-Dice-Sørensen index of association is the only index linearly related to a measure of absolute similarity, while in its quantitative forms it is a simple and direct measure of overlap (Baev and Penev 1995). The form of the equation used in this analysis is as follows:

$$I_{cs} = \frac{2\Sigma_i \min(n_{ij}, n_{ik})}{\Sigma_i n_{ij} + \Sigma_i n_{ik}}$$

where n_{ij} is the relative trapability (abundance) of the i-th species in the j-th site, and n_{ik} is the relative trapability of the i-th species in the k-th site. The results were clustered using the single linkage or nearest neighbour algorithm available on BIODIV.

2.3 Site Descriptions

Fish Creek Area.

Site 1.1 Traps: pan traps 1.1.1, 1.1.2, 1.1.3, and associated pitfall traps.
- Start/end dates: pan traps 01-VI-30-IX-1994, 15-V-31-VIII-1995.
  pitfalls 17-VII-15-VIII-1995.
- Location: GPS 50°23.466'N 110° 36.768'W
- Elevation: 705 m ±
- Slope: 0%-5%
- Aspect: horizontal to south.
- Soil series: Travers (stony)/Foremost.
- Soil classification: Calcareous Brown Chernozem/Orthic Brown Chernozem.
- Surface texture: Loam.
- Parent Material: Till.
- Ecological Land Classification (Adams *et al.* 1997): M1.1. Hummocky morainal - loam - Orthic Brown Chernozem.
- Moisture: wet.
- Height of plant community: 60 cm ±.
- Dominant plant cover:
  - Compositae: *Ambrosia acanthicarpa* Hook. (bur ragweed). Native.
  - Poaceae: *Hordeum jubatum* L. (foxtail barley). Native.
    *Poa palustris*L. (fowl bluegrass). Native (circumpolar).
    Poa sp.

Site 1.2 Traps: pan traps 1.2.1, 1.2.2, 1.2.3, and associated pitfall traps.
- Start/end dates: pan traps 01-VI-30-IX-1994, 15-V-31-VIII-1995.
  pitfalls 17-VII-15-VIII-1995.
- Location: GPS 50°23.466'N 110° 36.768'W
- Elevation: 705 m ±
- Slope: 0%-5%
- Aspect: horizontal to south
- Soil series: Travers (stony)/Foremost.
- Soil classification: Calcareous Brown Chernozem/Orthic Brown Chernozem.

Surface texture: Loam.
Parent Material: Till.
Ecological Land Classification (Adams *et al.* 1997): M1.1. Hummocky morainal -loam - Orthic Brown Chernozem.
Moisture: intermediate, transition between wet and dry.
Height of plant community: 30 cm ±.
Dominant plant cover:
Brassicaceae: *Descurainia sophia* (L.) Webb (flixweed). Introduced.
Chenopodiaceae: *Chenopodium pratericola* Rydb.? (goosefoot). Native.
Poaceae: *Pascopyrum smithii* (Rydb.) A. Löve (western wheat grass). Native.
Koeleria macrantha (Ledeb.) J.A. Schultes. (June grass). Native.

Site 1.3 Traps: pan traps 1.3.1, 1.3.2, 1.3.3, and associated pitfall traps.
Start/end dates: pan traps 01-VI-30-IX-1994, 15-V-31-VIII-1995.
pitfalls 17-VII-15-VIII-1995.
Location: GPS 50°23.466'N 110° 36.768'W
Elevation: 705 m ±
Slope: 0%-5%
Aspect: horizontal to south.
Soil series: Travers (stony)/Foremost.
Soil classification: Calcareous Brown Chernozem/Orthic Brown Chernozem.
Surface texture: Loam.
Parent Material: Till.
Ecological Land Classification (Adams *et al.* 1997): M1.1. Hummocky morainal - loam - Orthic Brown Chernozem.
Moisture: dry.
Height of plant community: 15 cm ±.
Dominant plant cover:
Cactaceae: *Opuntia polyacantha* Haw. (prickly-pear). Native.
Chenopodiaceae: *Chenopodium pratericola* Rydb.? (goosefoot). Native.
Poaceae: *Pascopyrum smithii* (Rydb.) A. Löve (western wheat grass). Native.
Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths (blue grama). Native.
Selaginellaceae: *Selaginella densa* Rydb. (prairie selaginella). Native.

Site 1.4 Traps: pan traps 1.4.1, 1.4.2, 1.4.3.
Start/end dates: 01-VI-30-IX-1994, 15-V-31-VIII-1995.
Location: GPS 50°23.224'N 110° 36.586'W
Elevation: 705 m ±
Slope: 0%-20%

Aspect: horizontal to northwest.
Soil series: Travers (stony)/Foremost.
Soil classification: Calcareous Brown Chernozem/Orthic Brown Chernozem.
Surface texture: Loam.
Parent Material: Till.
Ecological Land Classification (Adams *et al.* 1997): M1.1. Hummocky morainal - loam - Orthic Brown Chernozem.
Moisture: very dry hilltop - highest point of land at site 1.
Height of plant community: 8 cm ±.
Dominant plant cover:
Asteraceae: *Erigeron caespitosus* Nutt. (tufted fleabane). Native.
Gutierrezia sarothrae (Pursh) Britt. & Rusby. (broomweed). Native.
Hymenoxys richardsonii (Hook.) Cockerell (Colorado rubber plant). Native.
Liatris punctata Hook. (Blazing Star). Native.
Caryophyllaceae: *Paronychia sessiliflora* Nutt. (low whitlow-wort). Native.
Linaceae: *Linum lewisii* Pursh (wild blue flax). Native.
L. rigidum Pursh (yellow flax). Native.
Poaceae: *Stipa comata* Trin. & Rupr. (needle-and-thread). Native.
Polemoniaceae: *Phlox hoodii* J. Richardson (moss phlox). Native.
Polygonaceae: *Eriogonum flavum* Nutt. (yellow umbrella plant). Native.

Amiens Area.
Site 2.1 Traps: pan traps 2.1.1, 2.1.2, 2.1.3.
Start/end dates: 01-VI-1994/30-IX-1994.
Location: GPS 50°37.678'N 110°18.371'W
Elevation: 710 m ±
Slope: 0.
Aspect: horizontal.
Soil series: Dishpan?
Soil classification: Saline Rego Gleysol.
Surface texture: silt loam.
Parent material: Alluvial lacustrine.
Ecological Land Classification (Adams *et al.* 1997): 1W4 mostly unvegetated. Evaporite basin-saline flat.
Moisture: wet, standing water within 1 m of trap 2.1.1.
Height of plant community: 8 cm ±.
Dominant plant cover:
Chenopodiaceae: *Salicornia rubra* (A. Nels) (samphire). Native (circumpolar).

Site 3.1 Traps: pan traps 3.1.1, 3.1.2, 3.1.3

Start/end dates: 01-VI-30-IX-1994, 15-V-31-VIII-1995.
Location: GPS 50°37.678'N 110°18.371'W
Elevation: 710 m ±.
Slope: 0.
Aspect: horizontal.
Soil series: Antelope.
Soil classification: Orthic Regosol.
Surface Texture: sand.
Parent Material: eolian.
Ecological Land Classification (Adams *et al.* 1997): E1.6. Interdunal spaces with low relief. Sand. Orthic Regosol with some brown chernozem.
Moisture: dry.
Height of plant community: 40 cm ±.
Dominant plant cover:

Asteraceae: *Artemesia campestris* L. subsp. *caudata* (A. Michx.) H.& C. (plains wormwood). Native.
Artemesia cana Pursh (silver sagebrush). Native.
Artemisia frigida Willd. (pasture sagewort). Introduced.
Chenopodiaceae: *Chenopodium pratericola* Rydb. (goosefoot). Native.
Poaceae: *Elymus lanceolatus* (Scribn. & Smith) Gould (northern wheat grass). Native.
Koeleria macrantha (Ledeb.) J.A. Schultes (June grass). Native (circumpolar).
Stipa comata Trin. & Rupr. (needle-and-thread). Native.

Site 4.1 Traps: pan traps 4.1.1, 4.1.2, 4.1.3.

Start/end dates: 15-V-31-VIII-1995.
Location: 50°37.7'N 110°18.8'W.
Elevation: 700 m ±
Slope: 5%-15%
Aspect: south.
Soil Series: Antelope.
Soil classification: Orthic Regosol.
Surface texture: sand.
Parent Material: eolian.
Ecological Land Classification (Adams *et al.* 1997): E1.5. Sand dunes with parabolic shape and moderate relief. Destabilized dune blowout.
Moisture: dry.
Height of plant community: 60 cm±
Dominant plant cover:

Chenopodiaceae: *Salsola kali* L. (Russian-thistle, basket tumbleweed). Introduced.
Fabaceae: *Psoralidium lanceolatum* (Pursh) (scurf pea). Native.
Poaceae: *Calamovilfa longifolia* (Hook.) Scribn. (sand grass). Native.
Oryzopsis hymenoides (R. & S.) Ricker (indian rice grass). Native.
Polygonaceae: *Rumex venosus* Pursh (wild begonia, veined dock). Native.

Site 5.1 Traps: Malaise trap.
Start/end dates: 17-VII-31-VIII-1995.
Location: 50°38'N 110°18'W
Elevation: 700 m ±
Slope: horizontal.
Aspect: horizontal.
Soil Series: Antelope.
Soil classification: Orthic Regosol.
Surface texture: sand.
Parent Material: eolian.
Ecological Land Classification (Adams *et al.* 1997): E1.5. Sand dunes with parabolic shape and moderate relief. Stabilized dune field.
Moisture: dry.
Height of plant community: ~3.5 m
Dominant plant cover:
Rosaceae: *Prunus virginiana* L. (choke cherry). Native.

3.0 RESULTS AND DISCUSSION - ACULEATE WASPS FROM SNWA

The duration of the sampling program at SNWA spanned two years and produced about 3 million arthropod specimens. These included 237 species of aculeate Hymenoptera, collectively represented by 3,006 specimens. A synopsis of the families of aculeate wasps collected in SNWA is presented in Table 1. The 237 species represent 26% of the aculeate wasp fauna known from Canada (902 species). The high level of species richness of aculeate wasp fauna in SNWA is underscored by comparison with the aculeate wasp fauna for the entire Yukon Territory, where 153 species have recently been reported (Finnamore 1997); the aculeate wasp fauna of the McIntyre Ranch, a fescue/mixed grass prairie near Magrath, Alberta, where 93 species were recently reported (Finnamore 1996); and the fauna of the Wagner Natural Area, an extreme rich fen in central Alberta near Edmonton from which 81 species have been reported (Finnamore 1994). About 58% (137 species) of the 237 species found in SNWA are reported here for the first time from Alberta, and 15% (35 species) are reported for the first time in Canada.

The presence of several species of aculeate wasps in the SNWA is particularly noteworthy. Among these is *Pseudisobrachium persimile* Evans (Bethylidae, no. 1) known from California and suspected from British Columbia. The single specimen collected in SNWA represents the first confirmed record of the species in Canada. A single specimen of *Pseudogonatopus autoxenobius* R.C.L. Perkins (Dryinidae, no. 13) was also collected from SNWA. It is known from Arizona and New Jersey, and its presence in SNWA represents a substantial extension of its known range. Similar range extensions have been demonstrated for several other species collected in SNWA. These include *Hedychridium frugale* Bohart (Chrysididae, no. 25) previously known from California and Arizona; *Priocnemis nigriceps* (Ashmead) (Pompilidae, no. 110) a brachypterous (flightless) spider wasp previously known by a dozen specimens from Texas to Iowa; *Ammoplanops moenkopi* Pate (Sphecidae, no. 173) previously known from the southwestern United States north to Wyoming and Utah; *Pisonopsis triangularis* Ashmead (Sphecidae, no. 199) previously known from California to Colorado; *Didineis dilata* Malloch and Rohwer (Sphecidae, no. 218) previously known from Wisconsin to Nebraska; *Bembix sayi* Cresson (Sphecidae, no. 228) previously known as far north as South Dakota; *Cerceris deserta* Say (Sphecidae, no. 233) previously known from eastern Canada and eastern United States; and *Cerceris wyomingensis* Scullen (Sphecidae, no. 136) previously known from the central United States. One species of *Methocha* (Tiphiidae, no. 38), appears to be undescribed; its small size and mesosomal microsculpture differing from that of any of the four species of *Methocha* known in the Nearctic Region.

Species richness of aculeate wasps at the various sampling sites is presented in Table 2. The richest sites for aculeate wasps in SNWA were the stabilized dune sites (mean richness of 56 species), and the Malaise trap site (also on a stabilized dune). The chernozem sites demonstrated substantially less richness with a mean of 39 species in the wet sites and a mean of 34 species in the dry sites.

Table 1. Synopsis of the aculeate wasps (Hymenoptera) collected in SNWA.

Family	Number of Species	Number of Specimens
Bethylidae	5	33
Dryinidae	12	54
Chrysididae	19	150
Tiphiidae	8	63
Sapygidae	1	1
Mutillidae	11	100
Bradynobaenidae	1	1
Formicidae	37	516
Vespidae	15	208
Pompilidae	33	369
Sphecidae	95	1511
Total	237	3006

The aculeate wasp data from the traps were used in a quantitative analysis of species assemblages of the sites sampled in SNWA. Samples were pooled for two seasons and are presented in the data set in Appendix 2. Formicidae (ants) were excluded from the analysis because of a sampling bias associated with proximity of the traps to a colony of eusocial insects. Analysis of wasp species assemblages was performed using the Czekanovski-Dice-Sørensen index of association. The results were clustered using the single linkage or nearest neighbour algorithm available on BIODIV software. The resulting dendrogram is presented in Figure 1.

In this spatial analysis, the results obtained from the Czekanovski-Dice-Sørensen index of association demonstrated a strong relationship between soil type (chernozem and eolian) and species assemblages of aculeate wasps. In other words, a change in soil from chernozem to eolian types is accompanied by a substantial shift in aculeate wasp species assemblages. Moreover, aculeate wasp species assemblages also shifted within the chernozem sites, with respect to vegetation structure (vegetation height is used as a proxy for structure), although not to the degree demonstrated by spider species assemblages. The aculeate wasp assemblages in the chernozem sites clustered more or less sequentially along the transition from wet sites through increasingly arid sites, mirroring a response by vegetation to the surficial hydrological gradient in this grassland system. Again, clustering along the hydrological gradient was not as pronounced as that found with the spider data from the same sites, but nonetheless is readily evident. The surficial hydrological gradient reflected by vegetation structure in this grassland is the gradient most likely to demonstrate the greatest biotic shifts in climate change scenarios that hypothesize increasing aridity. In the eolian soil sites, there is a shift in aculeate species assemblages with respect to vegetation cover. The stabilized or vegetated dune sites (3.1.1, 3.1.2, 3.1.3) differing in species assemblages with respect to the relatively vegetation-free, destabilized dune blowout sites (4.1.1, 4.1.2, 4.1.3). The transition from stabilized dunes to active dunes is another gradient likely to demonstrate a great deal of biotic shift in climate change scenarios that hypothesize increasing aridity. Aculeate wasp assemblages in both the chernozem and eolian grassland systems in SNWA could prove valuable in assessing biotic shifts resulting from climate or human-induced changes that affect surficial hydrology (increasing aridity) or vegetation structure (grazing and fire).

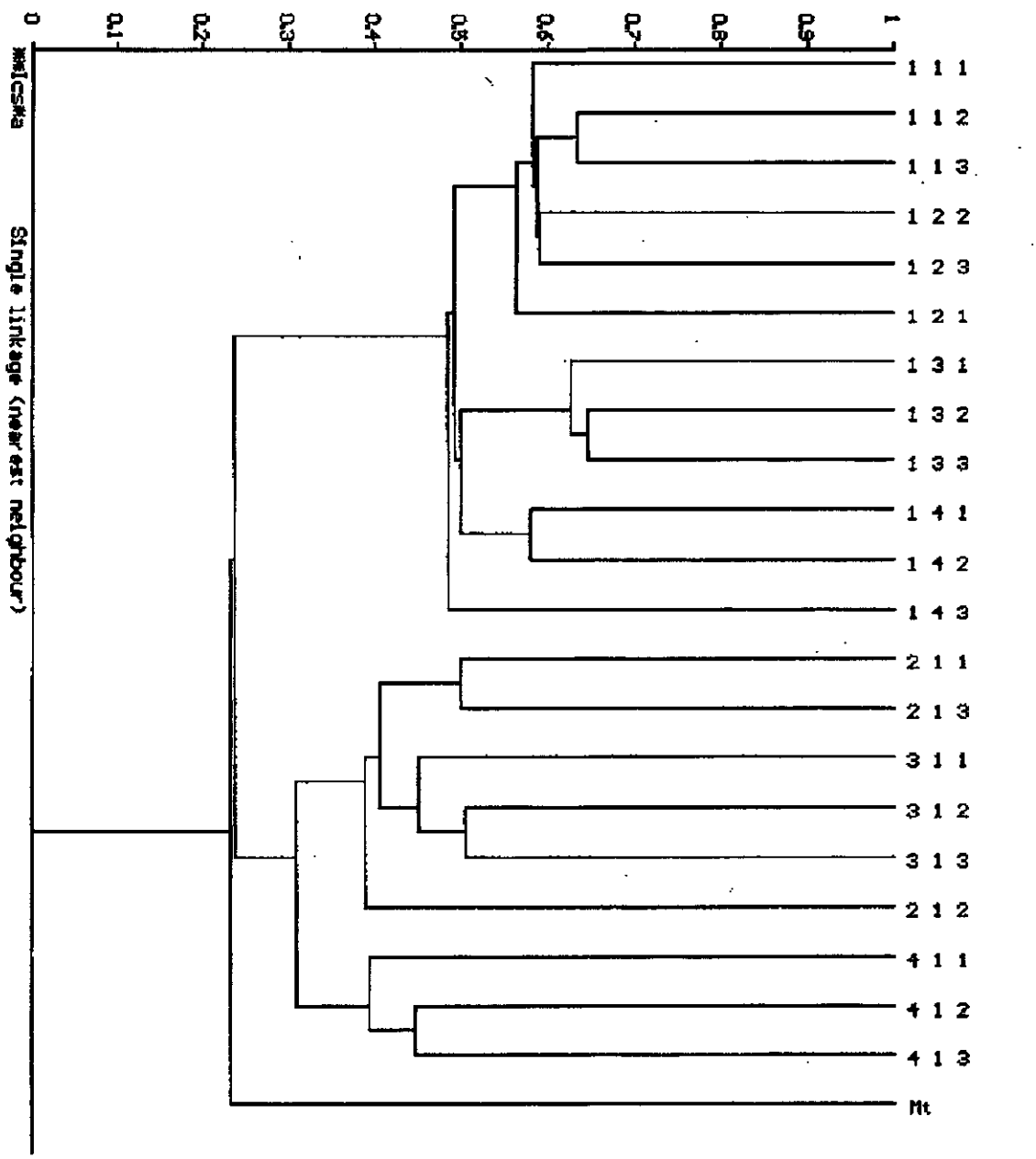


Figure 1. Cluster analysis of aculeate wasp species assemblages from SNWA.

Cluster analysis of result obtained using the Czekanovski-Dice-Sorensen index of association with 190 species and 2,739 specimens of aculeate wasps (Hymenoptera) collected from SNWA during the spring and summer of 1994 and 1995. Sites correspond to those characterized in the section on Methods. First number in the site designation corresponds to major soil type; 1 = chernozem, 2 = unvegetated margin of saline water basin, 3 = eolian with vegetation cover, and 4 = eolian sparse vegetation, if any (dune blowout). Middle number in the site designation corresponds to vegetation height; 1 = 60 cm ±, 2 = 30 cm ±, 3 = 15 cm ±, and 4 = 8 cm ±. The last number in the site designation is the replicate within the vegetation height class.

Table 2. Species richness of aculeate wasps at the SNWA sampling sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm± canopy height			Medium-high Soil Moisture 30 cm± canopy height			Medium-low Soil Moisture 15 cm± canopy height			Low Soil Moisture 8 cm± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# species	37	43	37	38	35	46	34	30	37	34	29	39

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# species	14	26	20	43	58	67	18	34	32	108

Differences between the aculeate wasp species assemblages on eolian and chernozem soils are presented in Figure 2. There are almost 1.7 times as many species restricted to the eolian grassland ecosystems as there are species restricted to the chernozem grassland ecosystems. Only about 27% (62 species) of species were present in both grassland ecosystems.

Species richness can also be considered from the perspective of vegetation height classes, a reflection of underlying soil moisture, as illustrated in Figure 3. The stabilized dune sites (3.1.1, 3.1.2, 3.13, and 5.1.1) with 96 and 108 species, respectively, were substantially richer in aculeate wasp species than any other sites sampled in the SNWA. Among the chernozem sites, the relatively wetter sites with vegetation canopy greater than 30 cm (sites 1.1.1, 1.1.2, 1.1.3, 1.2.1, 1.2.2, 1.2.3) and the relatively dryer sites with vegetation canopy up to 8 cm (sites 1.4.1, 1.4.2, 1.4.3) were about equal in richness and slightly richer in species than the moderately dry sites. Of the 227 species represented in Figure 3, 54% (122 species) were found only within single vegetation height classes, a reflection of soil moisture in the sites sampled in SNWA. These are presented in Figure 4. The stabilized dune sites again demonstrate the greatest richness in species apparently restricted to that habitat. Among the chernozem sites, the relatively wet and the driest sites show the greatest richness in species apparently restricted to a single vegetation canopy height class. The species represented in Figure 4 are of particular interest should these vegetation structures be altered through climate change or ecosystem management. For instance, if these species are to survive change they may be forced to shift to other vegetation structures. Such species shifts to other vegetation structures will result in species compaction, a gain of species in a habitat, or they may result in species displacement, a loss of species in a habitat.

Figure 2. Species richness of aculeate wasps (232 species) restricted to soil types sampled in SNWA (species collected in the riparian zone were excluded).

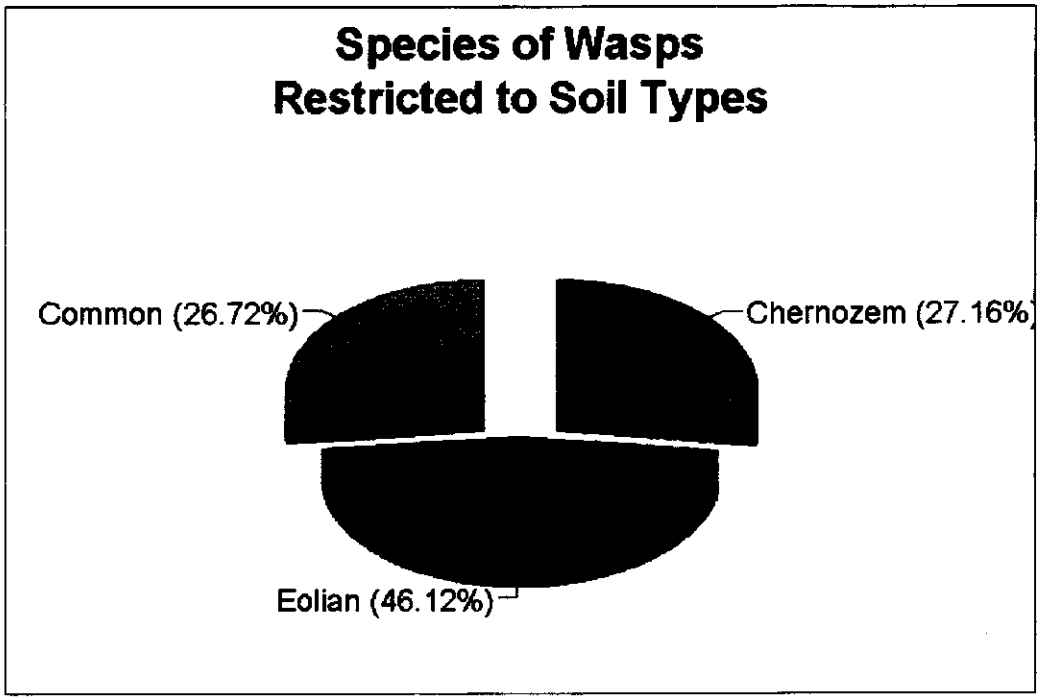


Figure 3. Species richness of aculeate wasps occurring within common soil moisture levels, a reflection of vegetation canopy height.

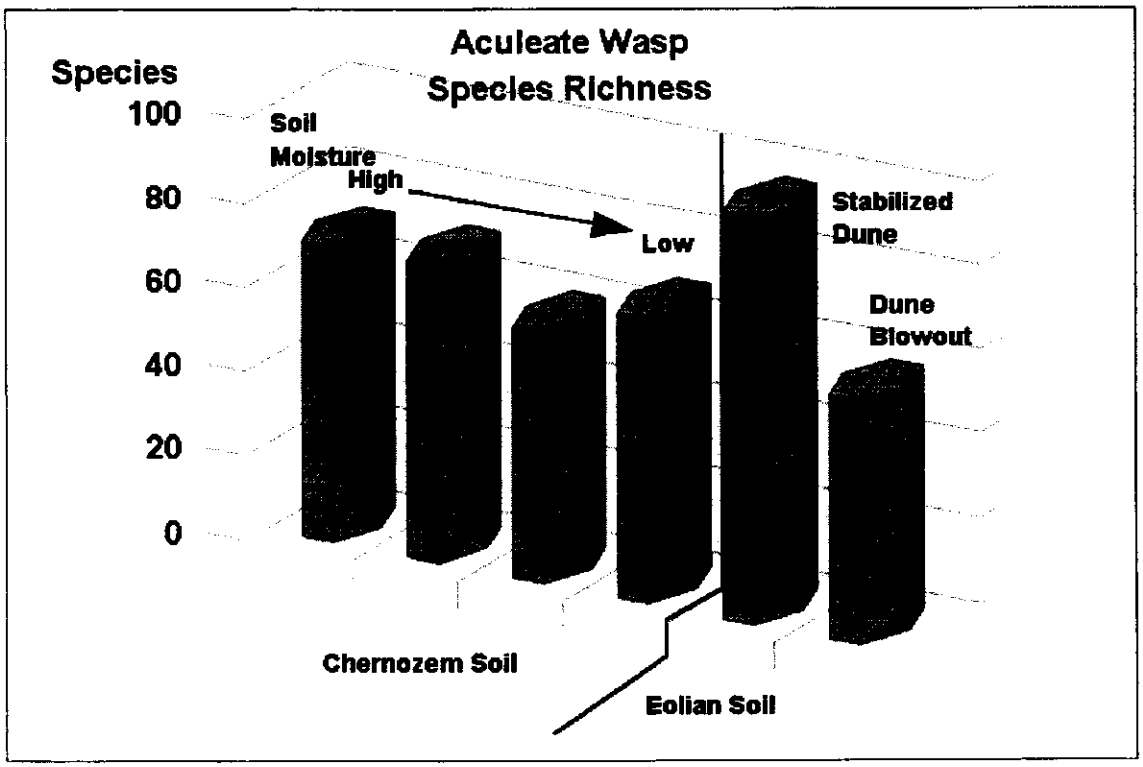
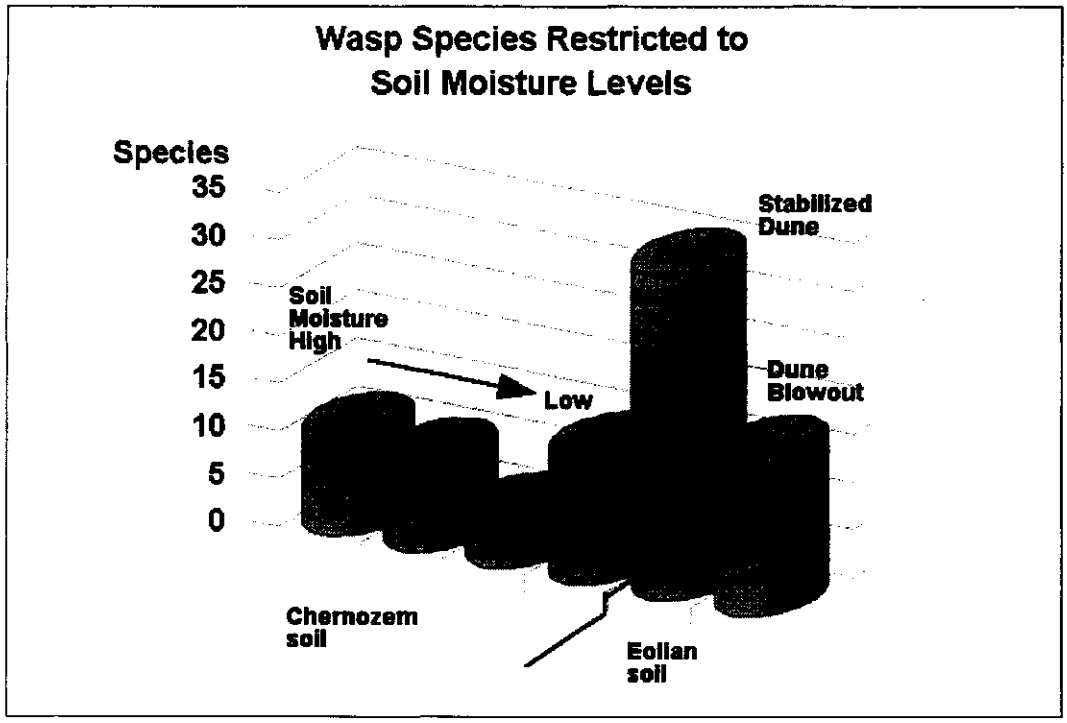


Figure 4. Species richness of aculeate wasps (122 species) restricted to single vegetation canopy height classes, a reflection of soil moisture levels.



3.1 Species Abundance and Dominance Distribution

A series of recently published papers provide evidence that higher biodiversity enhances ecosystem productivity, sustainability, and reliability (Kareiva 1996, Moffat 1966, Naeem and Li 1997, Tilman et al. 1996, and review article Culotta 1996). To briefly summarize; the higher the number of species in an ecosystem the greater the resiliency an ecosystem has to change. Most species in an ecosystem are infrequent, that is they normally occur at relatively low abundance or are sampled at relatively few sites. Relatively few species are common or dominant in most ecosystems, that is they normally occur at high populations or are sampled at a large number of sites. Changing conditions enable some of the infrequent species to replace common species as populations shift in response to change. The more infrequent species an ecosystem supports, the greater its ability to function under changing conditions. A loss or a gain of infrequent species in an ecosystem implies a reduction or increase, respectively, in the ability of an ecosystem to function in under changing conditions. The ratio of dominant to infrequent species can be used as a measure of vulnerability to change, used to assess change over time, and used to assess the impact of stress on an ecosystem.

Species richness was estimated using the EstimateS program (Colwell 1997) with pan trap and pitfall trap data (Figure 5) to determine the number of infrequent species. The ratio of dominant to infrequent species was calculated using 10 specimens as the cut off point for infrequent species. Dominant species had 11 or more specimens. Figure 6 presents the results at the site scale and also at the regional scale. The EstimateS program estimated species richness at 216 species, which when

combined with Malaise trap data (28 species were collected only in Malaise traps at CFB Suffield) brings the estimated species for the region to 244 species. Although the eolian sites demonstrated greater species richness, they had the lowest ratios of dominant to infrequent species and are therefore more vulnerable to changing conditions.

Figure 5. Species estimation of aculeate wasps at SNWA. ACE = Abundance-based Coverage Estimator, ICE = Incidence-based Coverage Estimator.

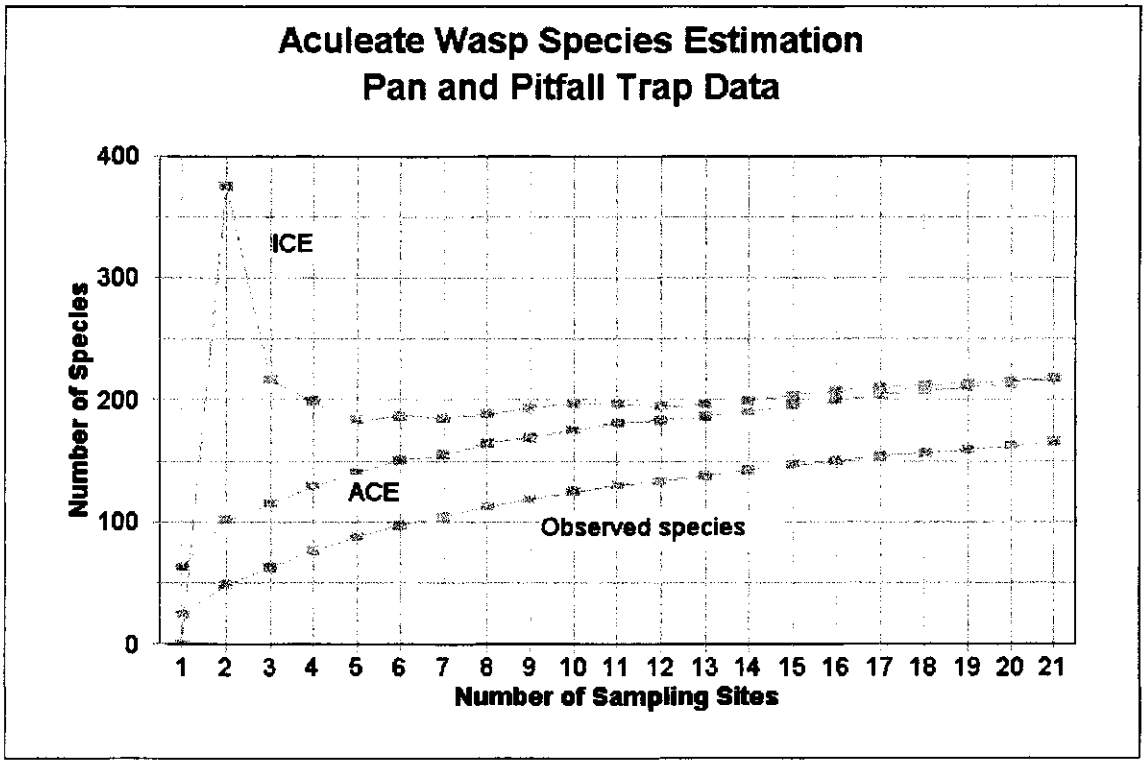
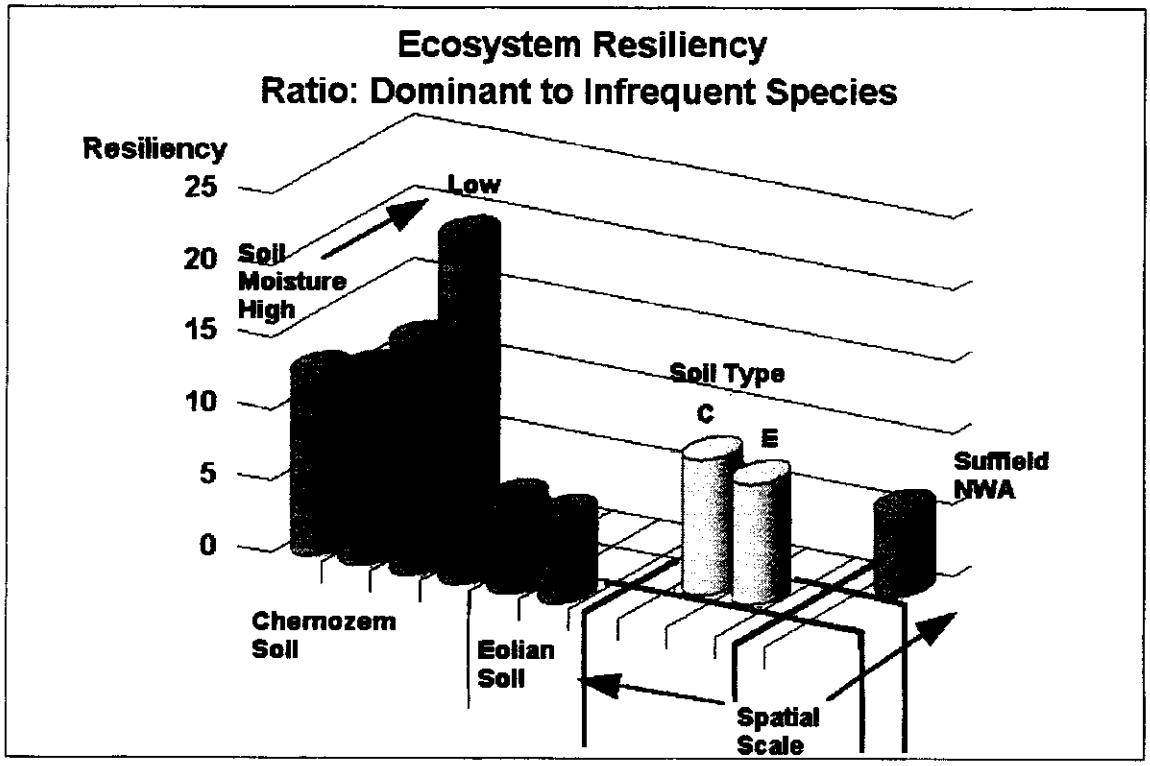
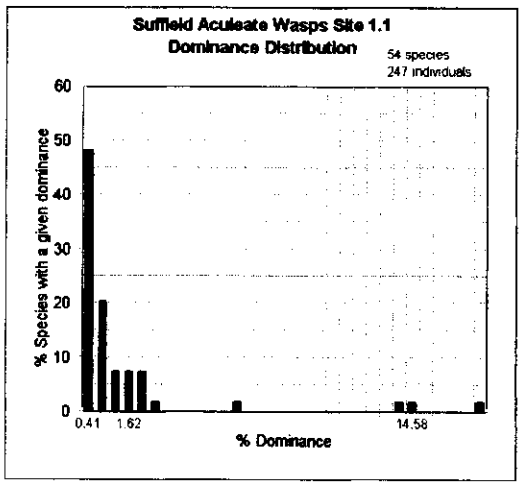


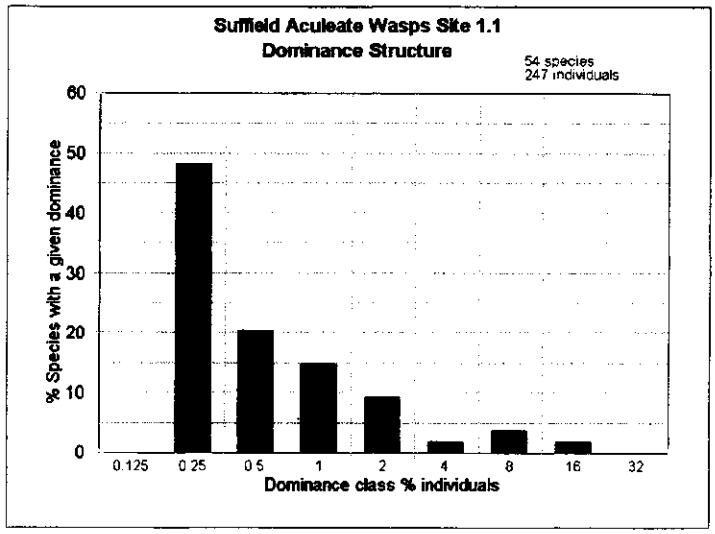
Figure 6. The ratio of dominant species to infrequent species. Based on 165 species collected by pan and pitfall traps.



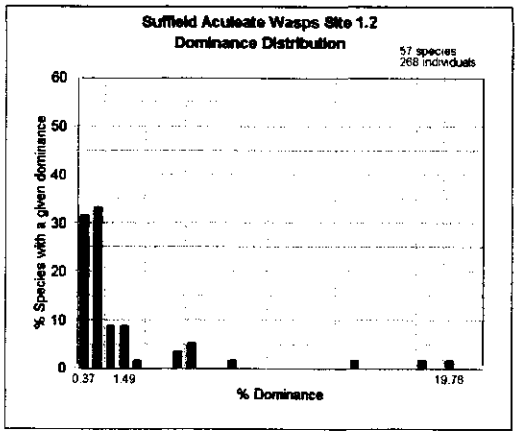
Ecosystem disturbance or stress can also be measured by following change in the distribution of species dominance. Hågvar (1994) demonstrated that the dominance structure of soil microarthropod communities shifts in response to stress. Using pan and pitfall trap data, distribution of individuals among species is presented for each site in Figures 7,9,11,13, and 15. The same data was transformed to a scale representing size classes and presented in the corresponding figures Figures 8,10,12,14,16, and 18. As surficial aridity increases across sites in chernozem soils there is a clear shift in dominance classes from a high percentage of species in the class containing 0.25-0.5% of individuals in the wetter sites to a high percentage of species in the class containing 0.5-1.0% of individuals in the relatively dryer sites. A similar shift is evident in the eolian sites. The shift in dominance classes across sites is presented in Figure 19. The use of shifts in dominance classes may prove a valuable tool in demonstrating the effects of stress induced by natural or anthropogenic activity.

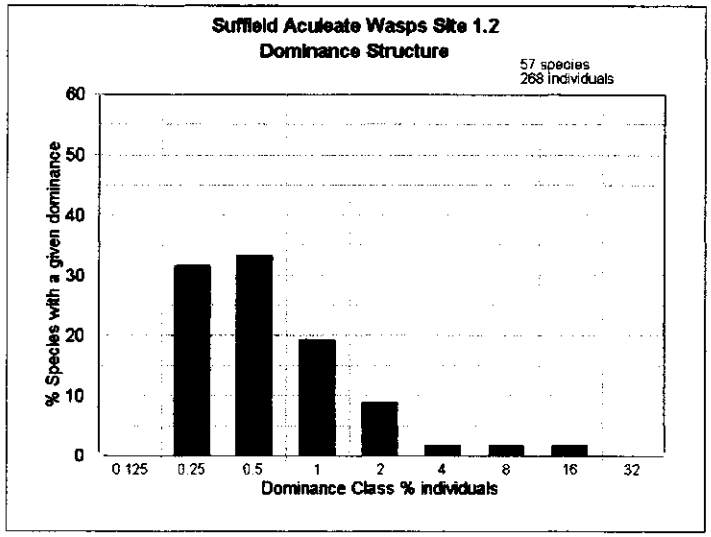
Figures 7 and 8.



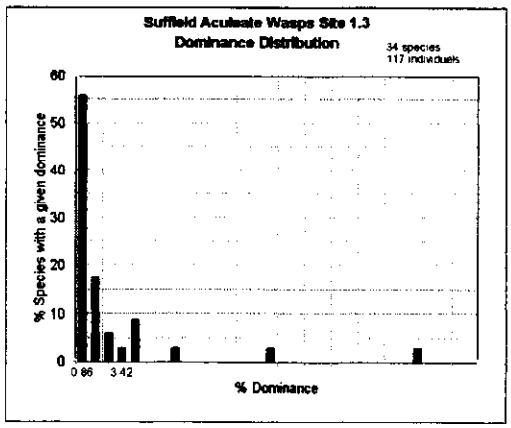


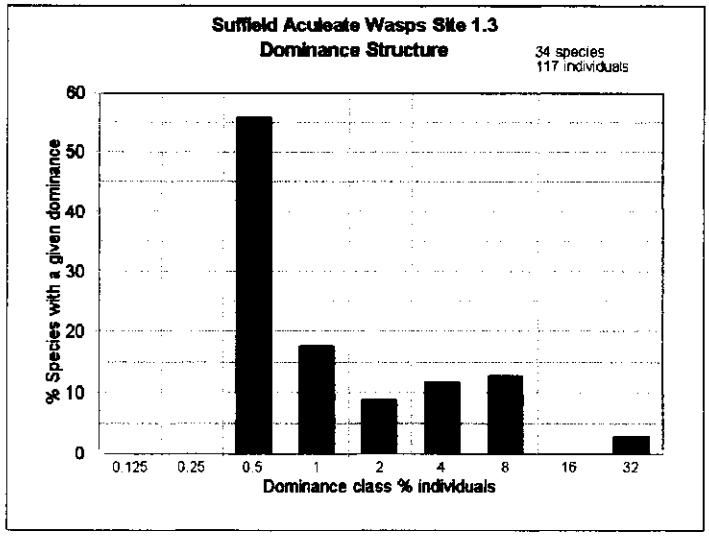
Figures 9 and 10.



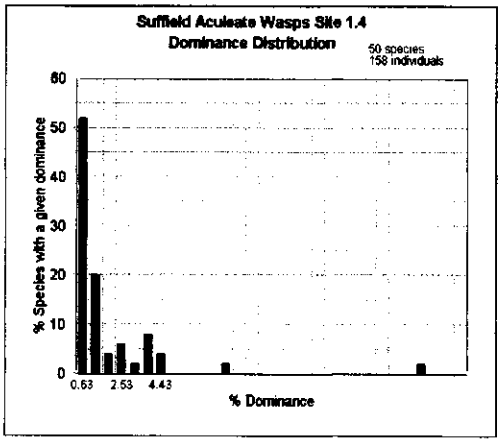


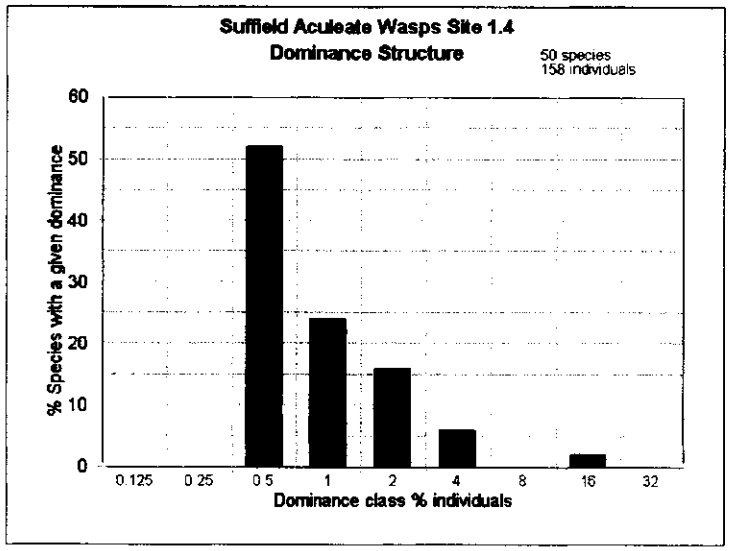
Figures 11 and 12.



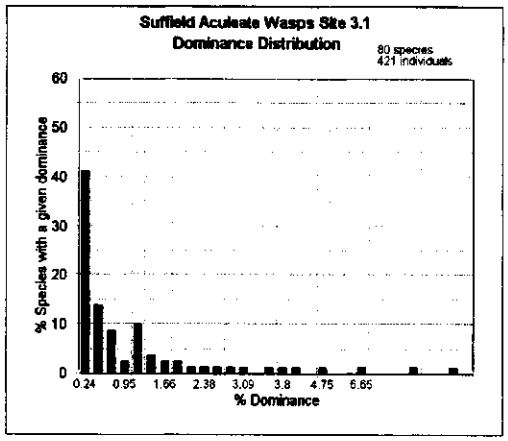


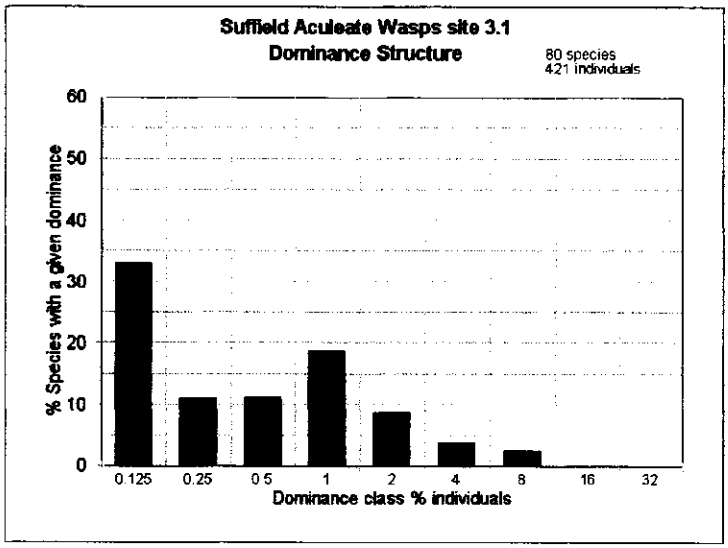
Figures 13 and 14.



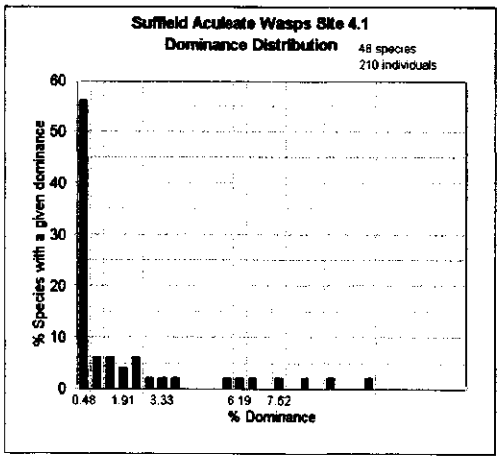


Figures 15 and 16.





Figures 17 and 18.



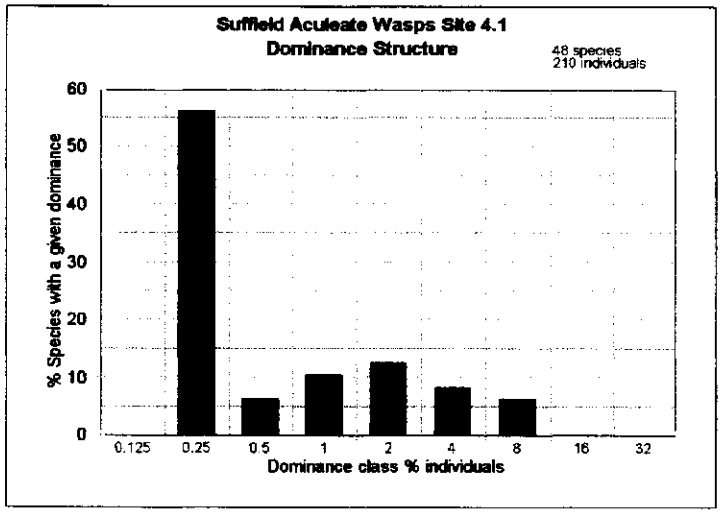
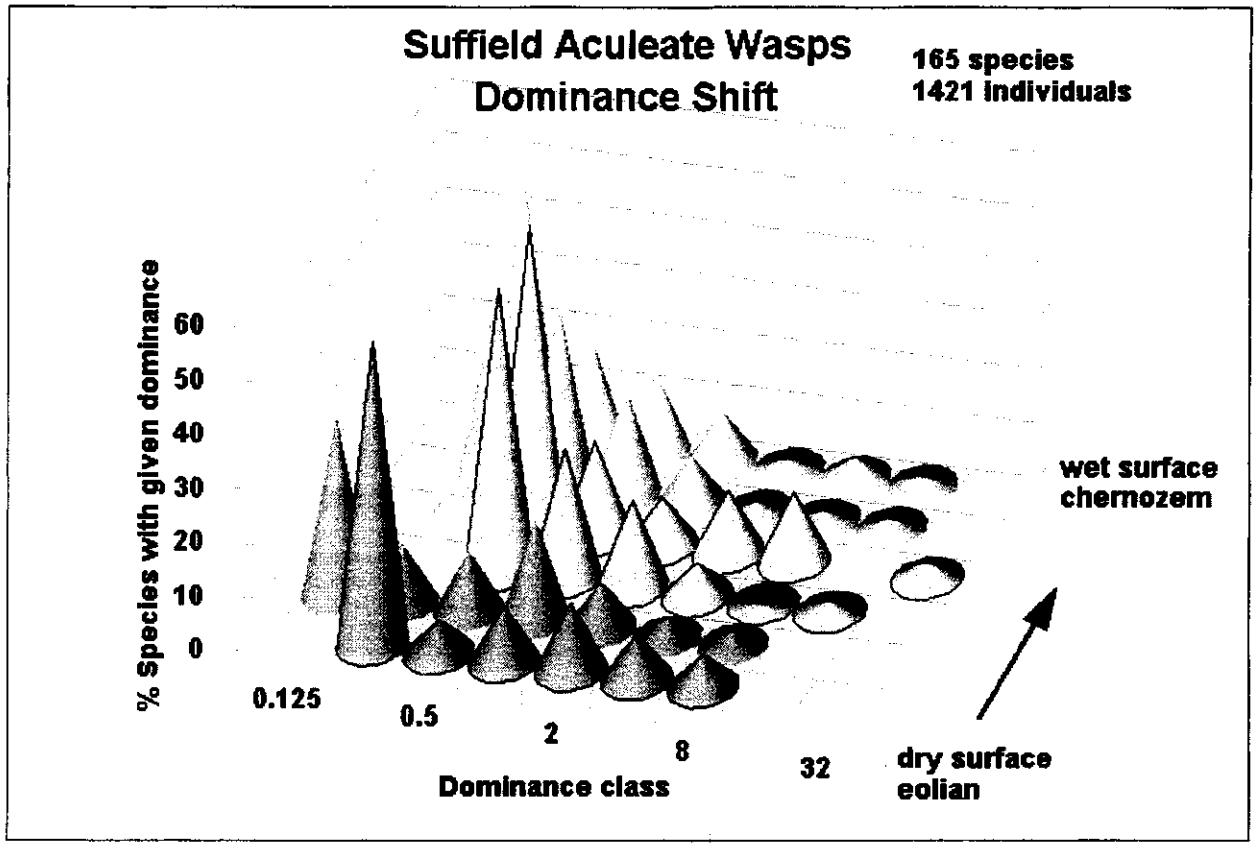


Figure 19. Shifts in dominance distribution of aculeate wasp species assemblages across moisture gradients at the CFB Suffield National Wildlife Area.



3.2 Geographic Affiliations

The aculeate wasps of SNWA can also be viewed in terms of components based on the distribution of individual species found at the sampling sites. A total of 7 faunal components were identified in the aculeate wasp species collected in SNWA (Figure 20). The Holarctic faunal component includes species that are circumpolar in distribution.They are generally northern species with ranges that dip southward in the mountains, the SNWA records represent the southern limits of many of these species in the central part of the continent. Transcontinental species are generally distributed from Alaska and California to Newfoundland and Florida. Transcontinental boreal species range from coast to coast in the ecozones spanned by the boreal forest, and also dip southward in the mountains. Transcontinental boreal species collected in SNWA usually represent the southern limits of these species in the central parts of the continent. Transcontinental southern species range from coast to coast south of the boreal forest. In many cases, collection of these species in SNWA, represents the northern limits known for many of these species. Eastern species range from the Atlantic Coast westward to the mountains. In many cases, SNWA collections represent the western limits of the range of eastern species. Western species range west of the 100th meridian (an approximate distribution boundary for, midcontinental, eastern and western species in the Nearctic Region) to the Pacific Coast, and include many grassland endemic species. Great Basin species occur in the grassland ecosystems occupying the central part of the continent, and include mostly grassland endemics.

The faunal components of the aculeate wasps found in SNWA are presented in Figure 20. Not surprising, is the low number of Holarctic species, 2.5% of the fauna in the SNWA. In comparison, the Yukon territory contains many graminoid ecosystems isolated from each other and separated from the midcontinental grasslands by the boreal forest. The Holarctic component in the Yukon fauna was 15% of species (Finnamore 1997). That study also found 70% of the Yukon fauna to be composed of generally distributed species. The generally distributed faunal component of the species in SNWA is 38%, about half of that found in the Yukon. The western and Great Basin faunal components at SNWA, which contain the grassland endemic species, comprised nearly half (47%) of the aculeate wasp fauna as compared with 26% for the same component of the Yukon fauna. These figures indicate that SNWA fauna are more typical of the midcontinental grasslands than the northern graminoid ecosystems. The high level of probable grassland endemic species in SNWA is an indication of the relatively undisturbed nature of the grassland ecosystems contained therein.

The species richness of the probable grassland endemic species at each sampling site is presented in Figure 21. The stabilized dune sites (3.1.1, 3.1.2, 3.1.3, and 5.1.1) demonstrate the greatest richness of probable grassland endemic aculeate wasps. The chernozem sites show maximum richness of these species in sites at the extremes of soil moisture.

Figure 20. Faunal components of aculeate Hymenoptera collected from SNWA (species that could not be identified beyond the generic level were excluded).

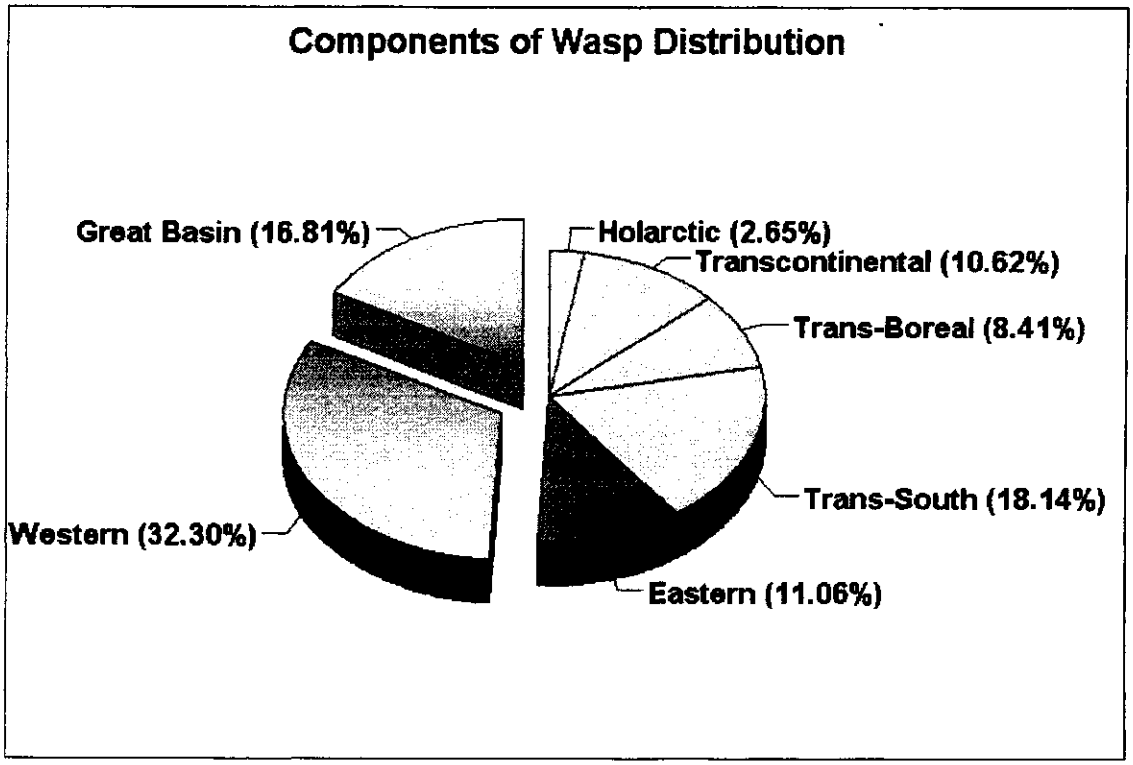
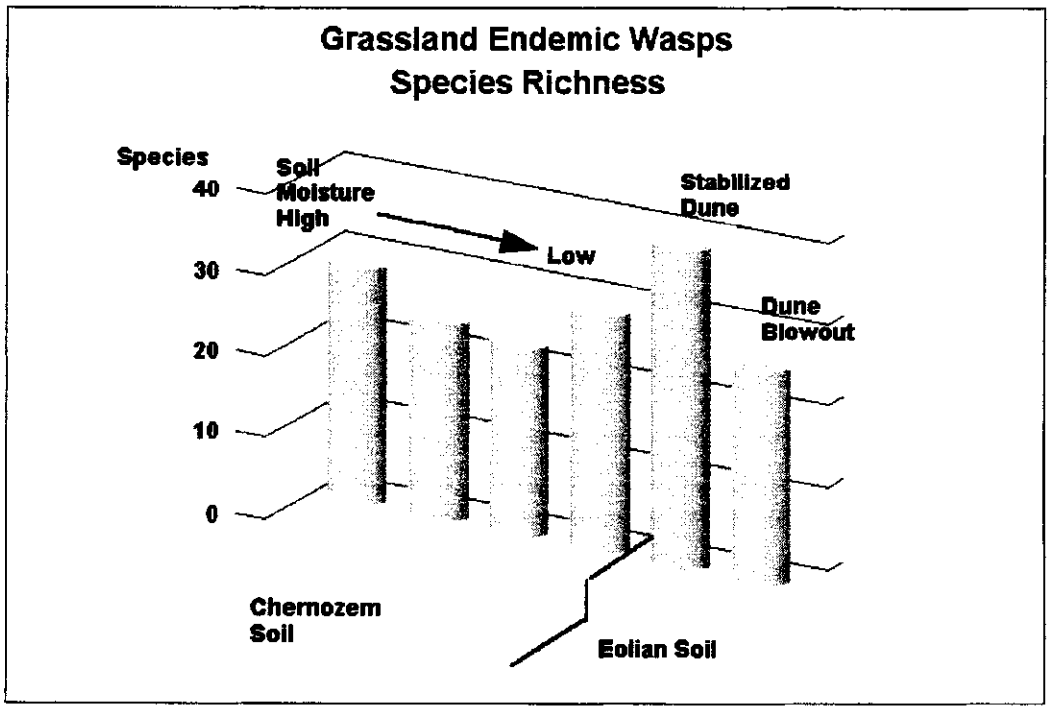
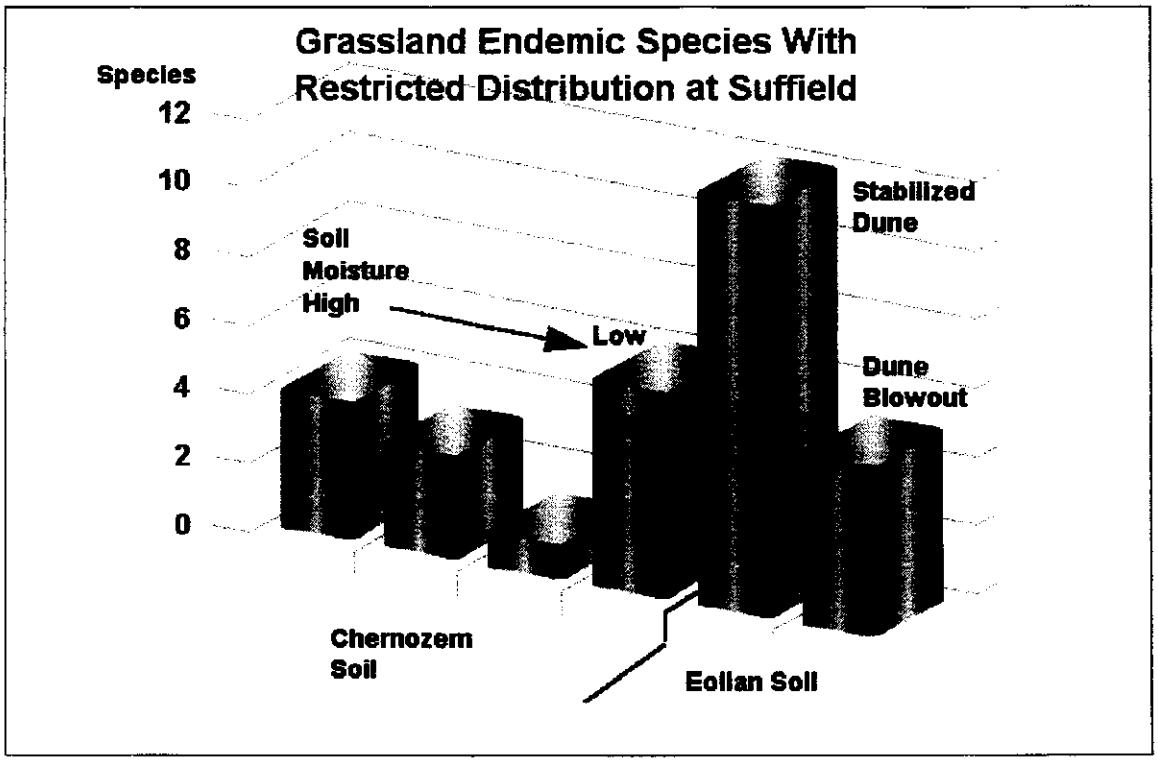


Figure 21. Species richness of probable grassland endemics (western and Great Basin) of aculeate wasps found in SNWA sampling sites (111 species). Species that could not be identified beyond generic level were excluded, as were species collected at sites other than those indicated below.



Species of probable grassland endemics that appear to be restricted to specific vegetation canopy heights are of particular interest because these species will most likely be affected by management practices that alter vegetation in SNWA. This study found 46 species of probable grassland endemic species that appear to be restricted to a single vegetation height class (Figure 22). Again, the stabilized dune sites were by far the richest with 27 (60%) of these species found only at those sites. Destabilization of the dune systems in SNWA or increasing vegetation density would almost certainly affect populations of these species.

Figure 22. Species richness of probable grassland endemic aculeate wasps that are restricted to specific vegetation canopy heights in the sites sampled in SNWA (46 species).



SNWA is the extreme northern locality known for a large number of wasp species found there. Figure 23 presents 107 species occurring in SNWA that are at or near the northern limits of their known ranges. They are almost entirely composed of western and transcontinental southern faunal components. These are species that comprise the faunal component most likely in danger of extirpation in Alberta should the grassland ecosystems be altered, particularly if those species occupy limited habitats within the grassland ecosystems. The high level of species at the northern limits of their known ranges (45% of species) is a result of the location of SNWA near the northern limit of the central continental grassland ecosystems. As a result, SNWA is almost certainly acting as a northern refugium (from agriculture) for these species, and therefore functioning as a reserve

of national significance. The stabilized dune sites again demonstrate the greatest richness of species at their northern limits in SNWA.

Species at the northern limits of their ranges that appear to be restricted to specific vegetation canopy heights are of particular interest because some are likely in danger of extirpation in Alberta should management practice or climate change alter vegetation in SNWA. There are 52 species at the northern limits of their known ranges that appear to be restricted to specific vegetation classes in SNWA (Figure 24). Of the 52 species, only a small proportion would likely be affected in the most likely climate change or management scenarios. Either increasingly arid climate patterns or grazing SNWA to the extent where a xeric shift in vegetation occurs could affect those species that appear to be restricted to the wettest sites. Those 8 species (no. 1, 13, 15, 105, 121, 145, 176, 220) occur in the relatively wet chernozem sites (1.1.1, 1.1.2, 1.1.3, 1.2.1, 1.2.2, 1.2.3). However, the greatest effects would likely be observed with destabilization of the vegetated dune systems, which could affect 27 species that appear to be restricted to the stabilized dune habitat.

Figure 23. Species richness of aculeate wasps at the northern limit of their ranges that occur at sites sampled in SNWA (107 species).

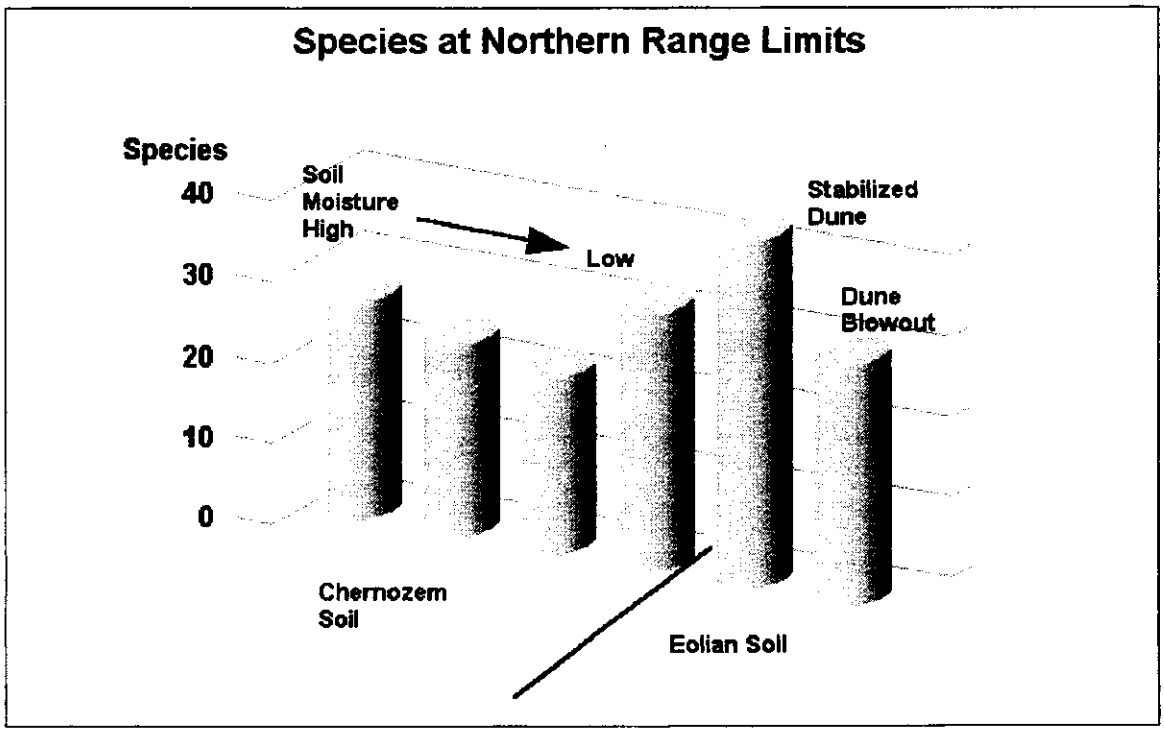
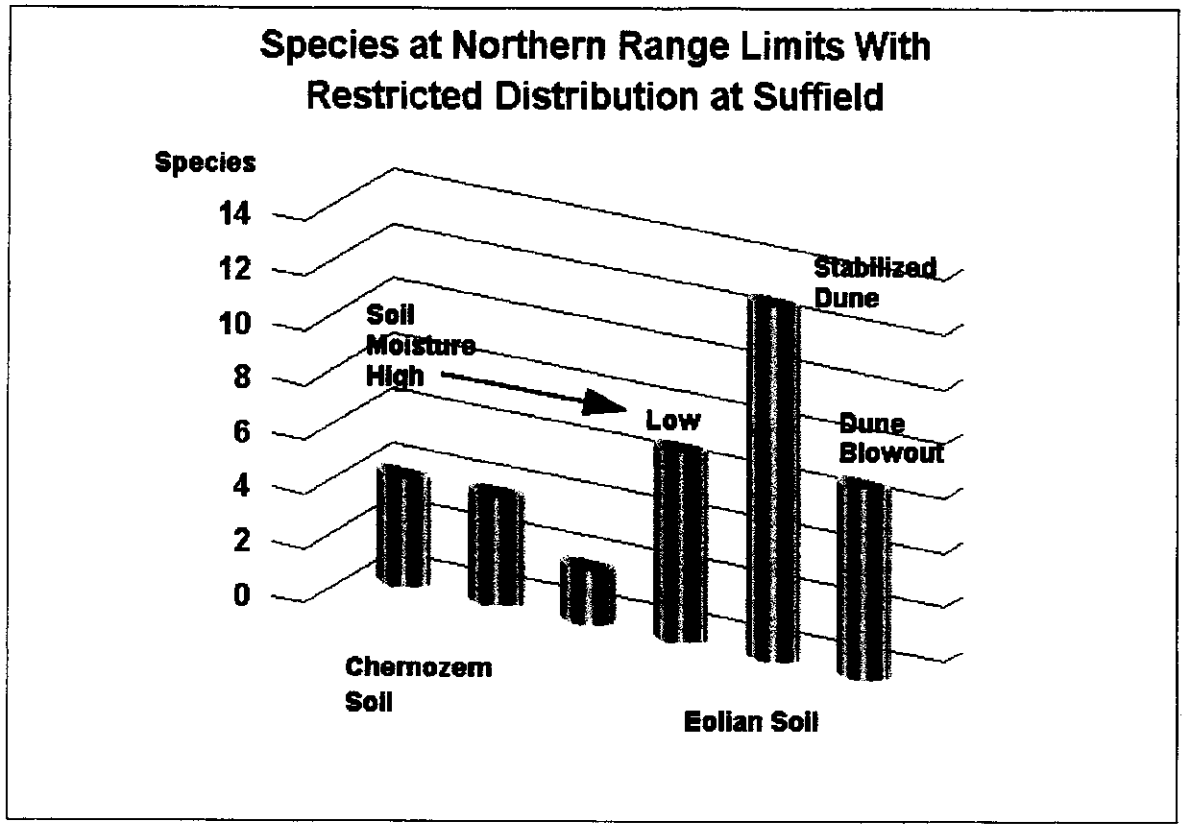


Figure 24. Species richness of aculeate wasps potentially subject to extirpation that are restricted to specific vegetation canopy heights in the sites sampled in the SNWA (52 species).



The eastern faunal component found at SNWA is also worthy of brief mention because SNWA is at or near the western range limit of 25 species. They are presented in Table 3. In contrast to the faunal components discussed above, few of these species occurred in the stabilized dune sites, the greatest species richness of eastern species was found in the medium-wet and medium-dry chernozem sites (1.2.1, 1.2.2, 1.2.3, 1.3.1, 1.3.2, 1.3.3).

3.3 Conclusion and Management Considerations

The SNWA contains 237 species of aculeate wasps, the most species-rich assemblage of aculeate Hymenoptera known from Canada. That status is largely the result of three factors – its location near the northern limits of the midcontinental grasslands, the eolian grasslands contained therein, and its relatively unaltered vegetation. Species at the northern limit of their known ranges constitute 45% of the aculeate wasp fauna known from SNWA. As a result, SNWA is acting as a northern refugium (from agriculture) for these species, and therefore functioning as a reserve of national significance. Eight species from chernozem soil sites have been identified as potentially

in danger of extirpation should climate or management practice produce a xeric shift in vegetation. A further 27 species may be adversely affected through destabilization of the dune systems at the eolian sites.

Table 3. Species richness of aculeate wasps at the western limits of their known ranges (eastern faunal component) which occur at sites sampled in SNWA (25 species).

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# species	9			11			10			7		

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# species	2			7			4			7

Analysis of aculeate wasp data of species assemblages in the sites sampled in SNWA demonstrates these assemblages are structured with respect to soil type and vegetation canopy height (a proxy for structure). Results show that 54% (122 species) of species were found within single vegetation height classes. These species are of particular interest should these vegetation structures be altered through climate change or ecosystem management. For instance, if these species are to survive change they may be forced to shift to other vegetation structures. Such species shifts to other vegetation structures will result result in species compaction, a gain of species in a habitat, or they may result in species displacement, a loss of species in a habitat.. The management implications for SNWA are such that the reduction of vegetation canopy diversity to fewer levels than present may adversely affect species diversity, particularly for those associated with specific vegetation canopy heights. Management practices or climate changes that destabilize the dune systems would almost certainly have the greatest impact on the aculeate wasp fauna in SNWA. Should destabilization occur, species apparently restricted to the stabilized (vegetated) dune systems should be monitored and used to assess the efficacy of establishing corridors to allow biota unobstructed movement out of SNWA.

4.0 ANNOTATED LIST OF THE ACULEATE WASPS (HYMENOPTERA) OF THE CFB SUFFIELD NATIONAL WILDLIFE AREA

The Aculeata or stinging wasps and bees (aculeate wasps = Aculeata minus the bees) includes an estimated 92,000 species worldwide, distributed on all continents except Antarctica. Diversity in the Aculeata is primarily tropical with reduction of species as altitude or latitude increases. Although representatives of all three superfamilies (Chrysidoidea, Vespoidea and Apoidea) occur in Canada, they amount to about 2% of the estimated world fauna and demonstrate the species reduction associated with higher latitudes.

The Aculeata, one of the three major divisions of Hymenoptera includes stinging wasps and bees. This study deals with the species of the superfamilies Chrysidoidea, Vespoidea and Apoidea (except bees) found in the National Wildlife Area on CFB Suffield. Species of the following families were encountered – CHRYSIDOIDEA: Bethylidae, Chrysididae and Dryinidae; VESPOIDEA: Tiphiidae, Mutillidae, Bradynobaenidae, Sapygidae, Formicidae, Vespidae and Pompilidae; and APOIDEA: Sphecidae.

Species in the Aculeata are united by the synapotypic feature of an ovipositor modified to transmit venom rather than functioning as an egg positioning device (Gauld and Bolton 1988). They exhibit an array of behaviour and life history that is perhaps more remarkable than that encountered in any other group of Hymenoptera. Life history strategies range from that of parasitoid to cleptoparasitic, predatory and pollen-feeding, and encompass solitary, subsocial and social behaviour. Parasitoids are insects whose larvae develop by feeding on (externally) or within (internally) an arthropod host; the host is almost invariably killed. Cleptoparasites are insects whose larvae develop by feeding on provisions sequestered for development of larvae of another insect species.

In the Hymenoptera, there are two primary parasitoid strategies termed idiobiont and koinobiont, the former arresting host development upon parasitism, the latter allowing host development to continue for a period of time after parasitism (Gauld and Bolton 1988). Predators in the aculeate Hymenoptera are extreme examples of idiobiont ectoparasitoids where one or more prey individuals are provisioned for larval development. Prey includes a variety of different hosts ranging from spiders through most of the major Orders of insects. Aculeate wasps nest in a number of different substrates including sand, soil, gravel, decaying wood, stems, twigs and galls, or they construct mud or paper nests. Pre-existing cavities in any of the preceding including abandoned insect borings in wood or abandoned mud nests, may also be used as nest sites.

4.1 Superfamily Chrysidoidea

The superfamily Chrysidoidea is, for the most part, a tropical group of seven families containing an estimated 16,000 species (Finnamore and Brothers 1993). Four families (Bethylidae, Chrysididae, Dryinidae and Embolemidae) and about 150 species are represented in Canada (Finnamore 1997). Three families and 35 species are present in the CFB Suffield National Wildlife Area. Members of this superfamily are parasitoids or cleptoparasites on other insects.

4.1.1 Bethylidae

With an estimated 6,500 species, the Bethylidae is the least known and perhaps the largest family in the Chrysidoidea. Like most other families in the Chrysidoidea, the majority of species are tropical. The Canadian fauna consists of 31 species distributed primarily across the south of the country. Bethylids are parasitoids of beetle (Coleoptera) or moth (Lepidoptera) larvae, usually in cryptic situations like soil, wood, stems or leaf mines. The female stings and paralyses the host larva before laying several eggs on it.

Bethylidae: Pristocerinae

1. *Pseudisobrachium persimile* Evans 1♂.

BIOLOGY: parasitoid. Host - unknown.

DISTRIBUTION: Evans (1978) reported this species from California and possibly from British Columbia. Its occurrence at CFB Suffield represents the first confirmed record for the species in Canada and in Alberta.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen collected at SNWA was obtained from traps placed in relatively wet chernozem soil supporting a 30 cm high vegetation canopy.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens						1♂						

Bethylidae: Epyrinae

2. *Epyris clarimontis* Kieffer 3♀.

BIOLOGY: parasitoid. Host - Coleoptera?

DISTRIBUTION: Evans (1978) reported this species from Texas to California, north to Washington, Colorado and North Dakota, south into Mexico. The Alberta records are the first for Canada and represent a substantial extension of the known range of the species.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected from relatively dry chernozem soil sites supporting a vegetation canopy no higher than 15 cm.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							1♀		1♀		1♀	

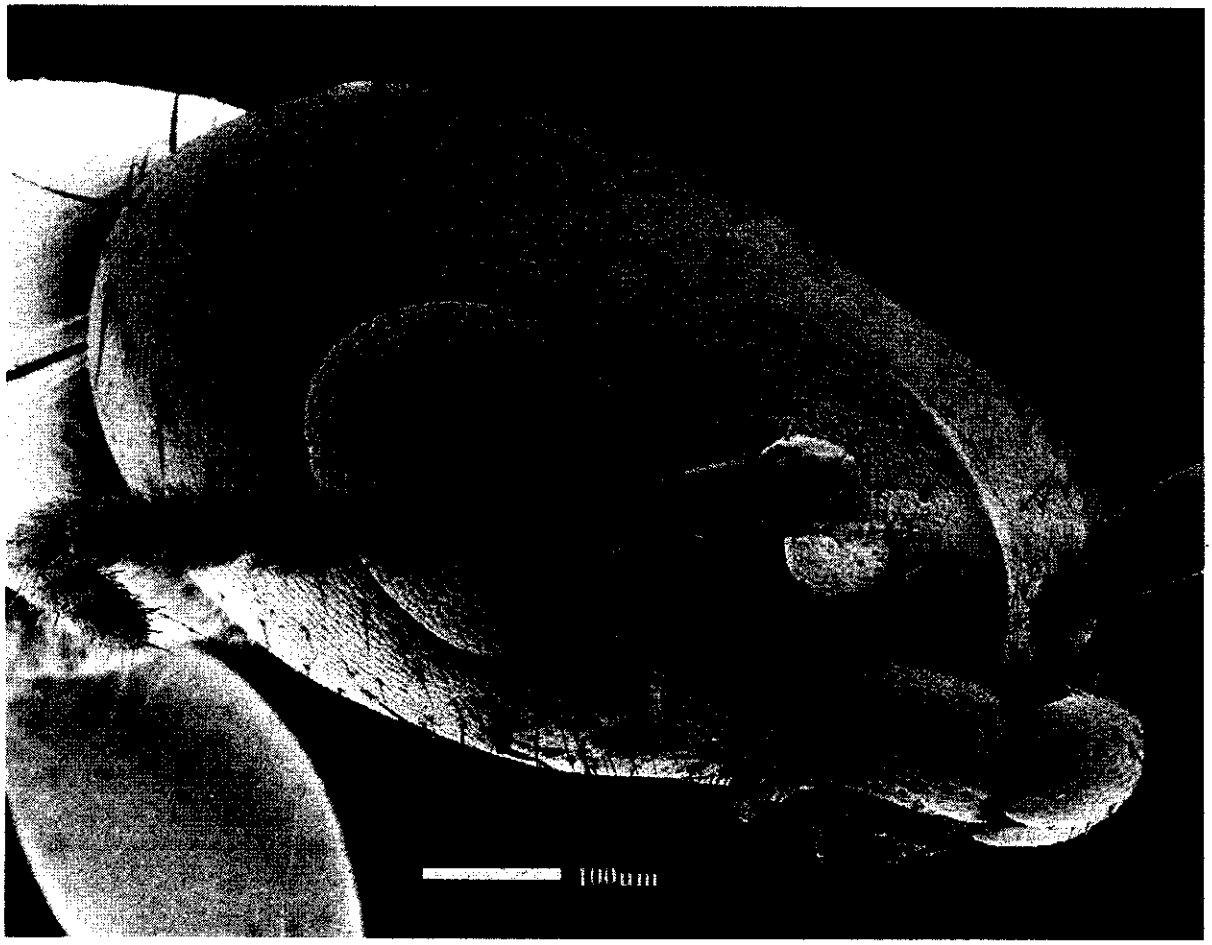


Figure 25. Head of *Bethylus amoenus* Fouts ♀ (Bethylidae: Bethylinae) no. 4.

3. *Epyris sculleni* Evans 11♂ 10♀.

BIOLOGY: parasitoid. Host - Coleoptera?

DISTRIBUTION: Evans (1978) reported this species in the United States west of the Rockies, including Mexico and western Texas as well as Alberta.

ALBERTA: McIntyre Ranch (Finnamore 1996), Medicine Hat, Writing-On-Stone Provincial Park .

CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens of this species (95%), males and females, were collected across the entire moisture gradient in the chernozem soil sites of SNWA. A single male was collected in the Malaise trap site on eolian soil.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♂	1♂1♀	1♂	1♂ 5♀	2♂			1♂	2♂	2♂	1♂2♀

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♂

Bethylidae: Bethylinae

4. *Bethylus amoenus* Fouts 3♂ 2♀.

BIOLOGY: parasitoid. Host - Lepidoptera.

DISTRIBUTION: Evans (1978) reported this species from Alaska, Northwest Territories, Saskatchewan, Ontario and Nova Scotia, south to New York, Illinois and Colorado.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996), Wagner Natural Area near Edmonton (Finnamore 1994), Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The females were collected in the wettest chernozem soil sites, while the males were swept from the riparian zone of the South Saskatchewan River (Bull Pen), also a wet habitat with high vegetation.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# sppecimens		2♀										

5. *Goniozus asperulus* Evans 3♀.

BIOLOGY parasitoid. Host - Lepidoptera.

DISTRIBUTION: Evans (1978) reported this species from California, Arizona, Texas and Florida north

to Massachusetts, Ontario, Colorado, Utah, Oregon.
ALBERTA: Writing-On-Stone Provincial Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected from the eolian soil sites in the CFB Suffield National Wildlife Area.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♀								2♀

4.1.2 Dryinidae

The Dryinidae exhibit the greatest diversity in the tropics. This family contains over 850 described species of which 40 are known from Canada. Canadian species are distributed across the southern areas of the country. The females of most species in this family have a characteristic pincher-like fore tarsus used for holding prey. Some females are wingless and ant-like in appearance and behaviour, and can be difficult to associate with their winged males. Species of Dryinidae are parasitoids usually on leafhoppers (Homoptera: Cicadellidae), the larva developing in an external sac-like structure attached to the host abdomen.

Dryinidae: Aphelopinae
6. *Aphelopus albopictus* Ashmead 2 specimens.
BIOLOGY: parasitoid. Host - Homoptera: Cicadellidae.
DISTRIBUTION: Olmi (1984) reported this species from Yukon, British Columbia, Alberta, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, Oregon, California, Arizona, Texas, Iowa, Missouri, Arkansas, Michigan, Ohio, Tennessee, South Carolina, North Carolina, Virginia, Pennsylvania, Maryland, New York, D.C., New Hampshire, and Mexico.
ALBERTA: Morley (Olmi 1984).
CFB SUFFIELD NATIONAL WILDLIFE AREA: Both specimens were collected in the Malaise trap site on eolian soil.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										2

7. *Aphelopus rufiventris* Ashmead 1 specimen.
BIOLOGY: parasitoid. Host - Homoptera: Cicadellidae.
DISTRIBUTION: Olmi (1984) reported this species from British Columbia, Alberta, Ontario, New Brunswick, Arizona, Texas, Florida, South Carolina, North Carolina, and D.C.

ALBERTA: McMurray (Olmi 1984).
CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected from a chernozem soil site with relatively low soil moisture.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens									1			

8. *Aphelopus varicornis* Brues 3 specimens.
BIOLOGY: parasitoid. Host - Homoptera: Cicadellidae.
DISTRIBUTION: Olmi (1984) reported this species from Alaska, Northwest Territories, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Oregon, Idaho, California, Montana, Colorado, Texas, Kansas, Missouri, Michigan, Tennessee, Florida, Georgia, South Carolina, North Carolina, Virginia, Maryland, New Jersey, New York, Massachusetts, Maine and New Hampshire, and south to Mexico.
ALBERTA: Olmi (1984) reported the following localities: Calgary, Elkwater Lake, Johnson Canyon in Banff National Park, Lethbridge, Medicine Hat and Waterton. Wagner Natural Area near Edmonton was also reported (Finnamore 1994).
CFB SUFFIELD NATIONAL WILDLIFE AREA: Two specimens were obtained at the sampling sites — one from a chernozem site with low soil moisture, the other from an eolian site on a stabilized dune. A single male specimen was collected in a sweep sample at 50°23.568'N 110°35.153'W.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										1		

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1					

Dryinidae: Anteoninae
9. *Lonchodryinus bakeri* (Kieffer) 4♀.
BIOLOGY: parasitoid. Host - Homoptera: Cicadellidae.
DISTRIBUTION: Olmi (1984) reported this species from Alaska, Yukon, Northwest Territories, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Labrador, Washington, Oregon, California, Nevada, Utah, Montana, Colorado, Wisconsin, Michigan, North

Carolina, Maryland, New Jersey, New York, Maine, New Hampshire, and Mexico.
ALBERTA: Olmi (1984) reported the following localities: Battle River; Cameron Lake Road, Waterton Lakes National Park; Frank; Johnson Canyon, Banff National Park; McMurray; Morley. McIntyre Ranch near Magrath was reported (Finnamore 1996) as was the Wagner Natural Area near Edmonton (Finnamore 1994); Writing-On-Stone Provincial Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were obtained from wet chernozem sites supporting a 60 cm high vegetation canopy.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♀	1♀	2♀									

10. *Anteon osborni* (Fenton) 1♀.
BIOLOGY: parasitoid. Host - Homoptera: Cicadellidae.
DISTRIBUTION: Olmi (1984) reported this species from Alaska, Yukon, British Columbia, Manitoba, Ontario, Quebec, New Brunswick, Washington, Oregon, Idaho,, California, Arizona, Colorado, Kansas, Michigan, Ohio, South Carolina, North Carolina, West Virginia, Virginia, Maryland, New Jersey, Rhode Island, New York, Masschusetts, New Hampshire, and Mexico.
ALBERTA: McIntyre Ranch near Magrath (Finnamore (1996), Writing-On-Stone Provincial Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was obtained from a relatively wet chernozem soil site.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens						1♀						

***Anteon* sp.** 4♂.
BIOLOGY: males cannot be identified beyond the generic level, but are probably the opposite sex of the preceding species.
DISTRIBUTION:
CFB SUFFIELD NATIONAL WILDLIFE AREA: The males were collected from all but the wettest chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens						1♂		1♂			1♂	1♂

Dryinidae: Bocchinae
11. *Bocchus mirabilis* (R.C.L. Perkins) 4♀.

BIOLOGY: parasitoid. Host - Homoptera: Issidae.
DISTRIBUTION: Olmi (1984) reported this species from Alberta, Ontario, Ohio, and Texas.
ALBERTA: Foremost (Olmi 1984).
CFB SUFFIELD NATIONAL WILDLIFE AREA: The specimens were collected from sites spanning the soil moisture gradient in the chernozem soil.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♀		1♀						2♀		

***Bocchus* sp.** 13♂.
BIOLOGY: Males cannot be identified beyond the generic level but are probably the opposite sex of the preceding species.
DISTRIBUTION:
CFB SUFFIELD NATIONAL WILDLIFE AREA: The males, like the preceding females, were collected from sites spanning the moisture gradient in the chernozem soils.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♂			2♂			1♂	1♂	1♂	4♂	3♂

Dryinidae: Dryininae
12. Dryininae spp. 6♂.
BIOLOGY: Males cannot be identified beyond the subfamily level but their presence is sufficient to establish the occurrence of a species of the subfamily Dryininae at the CFB Suffield National Wildlife Area.
DISTRIBUTION:
CFB SUFFIELD NATIONAL WILDLIFE AREA: The males were collected from sites spanning the moisture gradient on chernozem soil.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♂						1♂	1♂			3♂

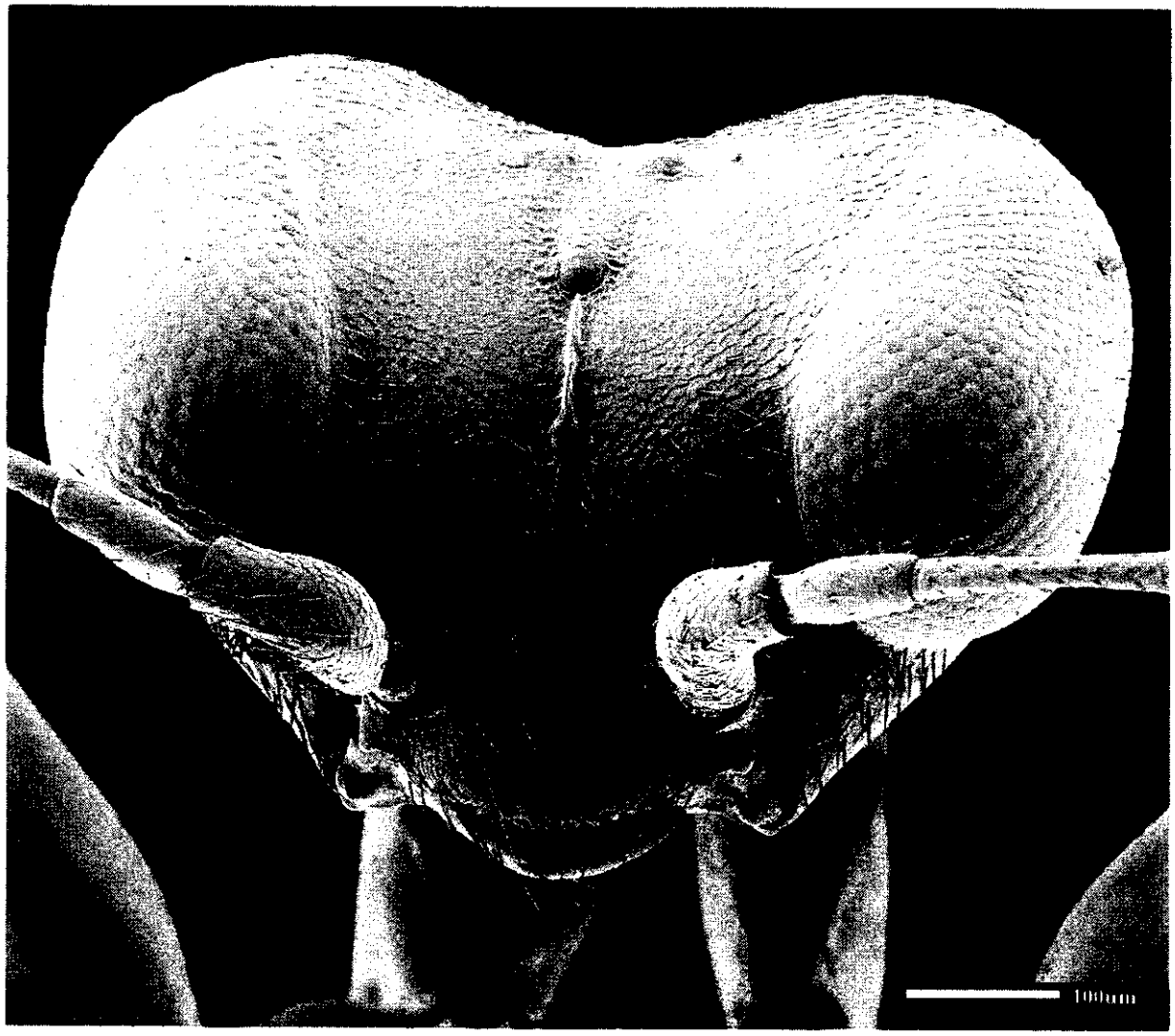


Figure 26. Head of *Tetrodontochelys peculiaris* (Brues) ♀ (Dryinidae: Gonatopodinae), no. 15.

Figure 27. Head of *Tetrodontochelys peculiaris* (Brues) ♀ (Dryinidae: Gonatopodinae), no. 15.

Dryinidae: Gonatopodinae

13. *Pseudogonatopus autoxenobius* R.C.L. Perkins 1♀.

BIOLOGY: parasitoid. Host - Homoptera: Delphacidae.

DISTRIBUTION: Olmi (1984) reported this species from Arizona and New Jersey. The presence of this species at the CFB Suffield Natural Wildlife Area represents a substantial extension of the known range of this species.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected from a wet chernozem soil site that supported a vegetation canopy about 60 cm in height.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			1♀									

14. *Pseudogonatopus canadensis* Olmi 1♀.

BIOLOGY: parasitoid. Host - Homoptera: Delphacidae.

DISTRIBUTION: Olmi (1984) reported this species from the Northwest Territories, Alberta, and California.

ALBERTA: Red Deer (Olmi 1984).

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected from a site on a stabilized dune.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1♀					

15. *Tetrodontochelys peculiaris* (Brues) 4♀.

BIOLOGY: parasitoid. Host - Homoptera: Cicadellidae.

DISTRIBUTION: Olmi (1984) reported this species from Manitoba, Ontario, California, Arizona, Texas, Iowa, and South Carolina.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected from relatively wet sites on chernozem soil supporting a 30 cm vegetation canopy.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens				2♀	2♀							

16. *Gonatopus contortulus* Patton 2♂.

BIOLOGY: parasitoid. Host - Homoptera: Cicadellidae.

DISTRIBUTION: Olmi (1984) reported this species from British Columbia, Saskatchewan, Manitoba, California, Texas, Oklahoma, Michigan, Iowa, Ohio, North Carolina, Connecticut, New York, and Mexico.

CFB SUFFIELD NATIONAL WILDLIFE AREA: One specimen was obtained from a relatively dry chernozem site; a second female specimen was collected in a sweep sample from vegetation on chernozem soil in the Fish Creek area, 50°23.355'N 110°35.794'W.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens									1♀			

17. *Gonatopus pallidiceps* (R.C.L. Perkins) 2♀.

BIOLOGY: parasitoid. Host - Homoptera: Cicadellidae.

DISTRIBUTION: Olmi (1984) reported this species from British Columbia, Nova Scotia, California, North Dakota, Kansas, Tennessee, and Florida.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Two specimens were collected in sweep samples from vegetation on chernozem soil at 50°23.355'N 110°35.794'W.

Gonatopodinae spp. 6♂.

BIOLOGY: Males cannot be identified beyond the subfamily level, but they are likely the opposit sex of one or more of the preceding 5 species.

DISTRIBUTION:

CFB SUFFIELD NATIONAL WILDLIFE AREA: Males, likely representing several species, were collected from a range of sites on chernozem and eolian soils.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			1♂		1♂	1♂					1♂	

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				2♂						

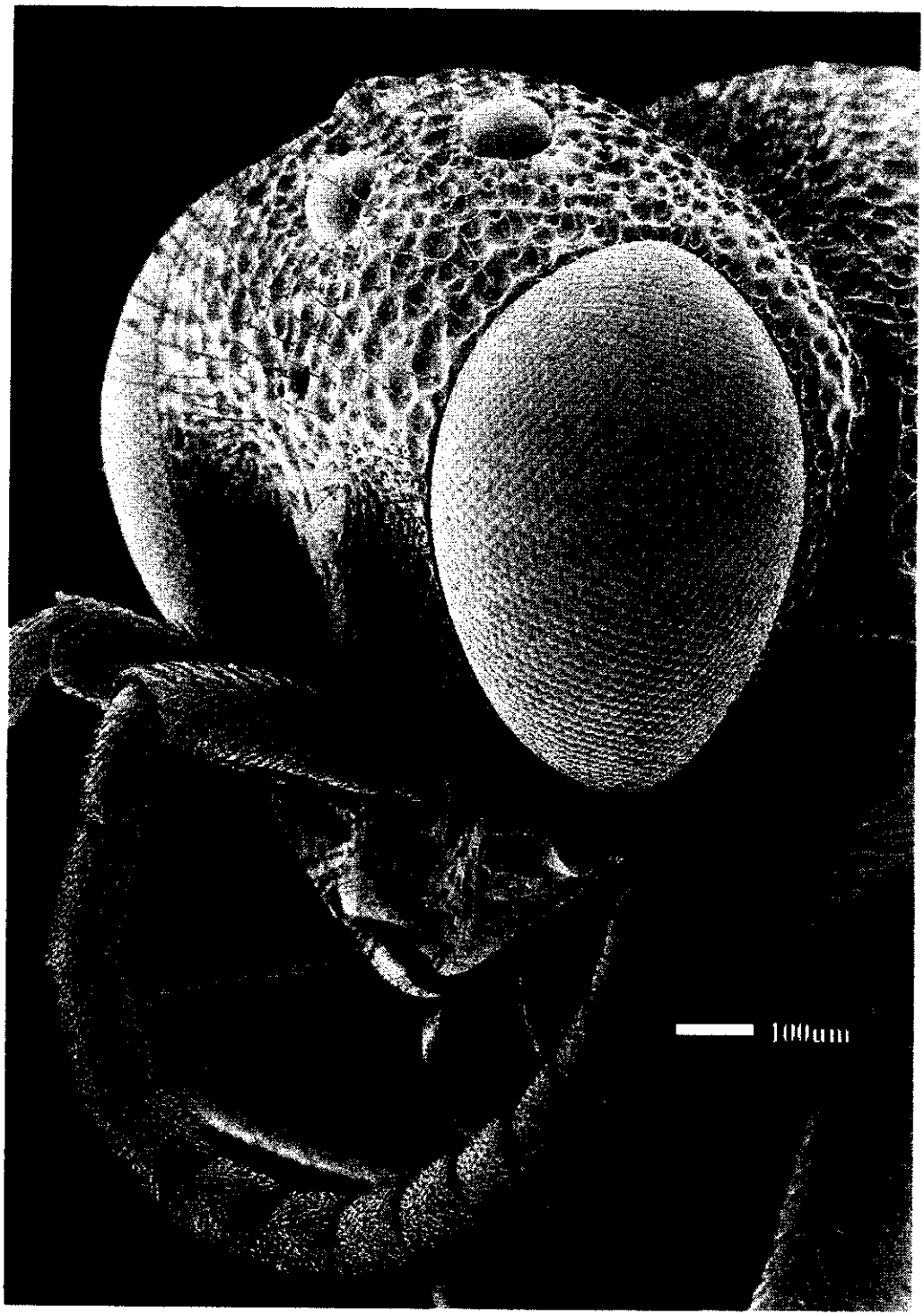


Figure 28. Head of *Hedychridium mirabile* Kimsey ♀ (Chrysididae: Chrysidinae), no. 27.

4.1.3 Chrysididae

The Chrysididae reach their greatest diversity in xeric ecosystems (Bohart and Kimsey 1982). The described world fauna (about 3,000 species) is distributed among four subfamilies, two of which (19 species) occur in the CFB Suffield National Wildlife Area. The 74 species found in Canada are restricted mainly to the extreme south, although Finnamore (1997) reported 23 species from the Yukon. Canadian species exhibit a wide range of behaviour; most are cleptoparasites on other solitary aculeate wasps and bees. Other species are parasitoids on tenthredinoid sawfly larvae (Hymenoptera: Tenthredinidae) and at least one species in southern Canada is a parasitoid attacking the eggs of stick insects (Phasmida).

Chrysididae: Cleptinae

18. *Cleptes* (*Melanocleptes*) *alienus* Patton 3♂ 2♀.

BIOLOGY: parasitoid. Host - Hymenoptera (sawfly larvae).

DISTRIBUTION: Bohart and Kimsey (1982) reported this species from California, Oregon, Washington, Colorado, Idaho, Alberta, and Georgia.

ALBERTA: Lethbridge (Bohart and Kimsey 1982); McIntyre Ranch near Magrath (Finnamore 1996); Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were all collected from relatively wet sites on chernozem and eolian soils, but most were collected from the eolian sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens				1♂								

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♂ 1♀	1♂ 1♀							

19. *Cleptes* (*Melanocleptes*) *speciosus* Aaron 1♂.

BIOLOGY: parasitoid. Host - Hymenoptera (sawfly larvae).

DISTRIBUTION: Bohart and Kimsey (1982) reported this species from California north to British Columbia, Alberta and Saskatchewan, and east to North Dakota and New York.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996); Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: A single male was collected at one of the stabilized dune sites

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♂						

Chrysididae: Elampinae

20. *Omalus plicatus* (Aaron) 6 specimens.

BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).

DISTRIBUTION: Bohart and Kimsey (1982) report this species in the east, north of 38^0, and west of the 100th meridian from Baja California to Alaska.

ALBERTA: Beaverlodge; Delia; Medicine Hat; Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were obtained from the Malaise trap site on eolian soil.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										6

21. *Omalus variatus* (Aaron) 3 specimens.

BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).

DISTRIBUTION: Bohart and Kimsey (1982) report this species west of the 100th meridian from California to Alaska and Northwest Territories.

ALBERTA: Battle River Crossing north of Castor, Beaverlodge, Bilby, Czar, Edmonton, Medicine Hat, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected from the Malaise trap site on eolian soil.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										3

22. *Elampus marginatus* (Patton) 1 specimen.

BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).

DISTRIBUTION: Bohart and Kimsey (1982) report this species throughout the United States and Canada.

ALBERTA: Beaverlodge, Bilby, Edmonton, Medicine Hat, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected on an active dune

blowout.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens								1		

23. *Hedychridium bilobatum* Bohart 17 specimens.
BIOLOGY: cleptopatasite. Host - Hymenoptera (Aculeata).
DISTRIBUTION: Bohart and Kimsey (1982) report this species west of the 100th meridian north to Oregon and Idaho.
ALBERTA: Writing-On-Stone Provincial Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens were collected at the Malaise trap site on a stabilized dune.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1						16

24. *Hedychridium fletcheri* Bodenstein 46 specimens.
BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).
DISTRIBUTION: Bohart and Kimsey (1982) report most records of this species from west of the 100th meridian in Canada and the United States.
ALBERTA: Medicine Hat; Orion.
CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected in the sites exhibiting a medium soil moisture range on either chernozem or eolian soils, but 90% of specimens were obtained from eolian sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens					1	1	1	1				

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				7	7	24				4

25. *Hedychridium frugale* Bohart 6 specimens.

BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).

DISTRIBUTION: Bohart and Kimsey (1982) report this species from California and Arizona. Its appearance at the CFB Suffield National Wildlife Area represents a substantial extension of its known range. Identification was confirmed by Dr. Lynn Kimsey, University of California, Davis.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Like the preceding species, specimens were collected in the sites exhibiting a medium soil moisture range on either chernozem or eolian soils, but most specimens were obtained from eolian sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens					1							

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					3	2				

26. *Hedychridium menkei* Bohart 19 specimens.

BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).

DISTRIBUTION: Bohart and Kimsey (1982) report this species west of the 100th meridian north to southern British Columbia and Alberta.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996); Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: About 90% of specimens were obtained from the stabilized dune sites. A single specimen was collected in a wet chernozem site and another was obtained in the Malaise trap site.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1											

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				2	9	6				1

27. *Hedychridium mirabile* Kimsey 7 specimens.

BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).

DISTRIBUTION: Bohart and Kimsey (1982) reported this species from Mexico and western United States, north to British Columbia.

ALBERTA: Medicine Hat; Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Five specimens were obtained from stabilized dune sites and another 2 specimens were collected in sweep samples.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1	4				

28. *Hedychridium politum* Bohart 6 specimens.

BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).

DISTRIBUTION: Bohart and Kimsey (1982) report this species west of the 110th meridian north to Oregon, Idaho and Wyoming.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996); Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected from the stabilized dune sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1	1					4

Chrysididae: Chrysidinae

29. *Chrysis coerulans* Fabricius 8 specimens.

BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).

DISTRIBUTION: Bohart and Kimsey (1982) report this species as transcontinental in the United States and Canada.

ALBERTA: Andrew Lake (Finnamore 1990), Banff; Bistcho Lake (Finnamore 1988), Clymont, Cypress Hills, Edmonton, George Lake, Gooseberry Lake, Gull Lake, Lethbridge, MacIntyre Ranch near Magrath (Finnamore 1996), Medicine Hat, Mildred Lake, Milk River, Wabamun, Wagner Natural Area near Edmonton (Finnamore 1994), Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected from the stabilized dune sites

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1					7

30. *Chrysis florissanticola* Rohwer 1 specimen.

BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).

DISTRIBUTION: Bohart and Kimsey (1982) reported this species from the Pacific Coast and Rocky Mountain States, Alberta, Yukon, and Alaska.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996).

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected from a dry chernozem soil site.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens												1

31. *Chrysis meta* Aaron 8 specimens.

BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).

DISTRIBUTION: Bohart and Kimsey (1982) report this species in the Great Basin west of the 100th meridian and Michigan, New York and Maine.

ALBERTA: Lethbridge, McIntyre Ranch near Magrath (Finnamore 1996), Medicine Hat, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens were collected from chernozem sites. A single specimen was collected in a sweep sample.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens				1	2	1	1					1

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1

32. *Chrysis pattoni* Aaron 1 specimen.
BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).
DISTRIBUTION: Bohart and Kimsey (1982) report this species from Rocky Mountain and Pacific Coast States, north to British Columbia and Saskatchewan.
ALBERTA: Writing-On-Stone Provincial Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected at the Malaise site on a stabilized dune formation.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1

33. *Chrysis propria* Aaron 2 specimens.
BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).
DISTRIBUTION: Bohart and Kimsey (1982) reported this species from Indiana to Lousiana west, and north to Ontario and British Columbia.
CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were obtained from the stabilized dune sites, including the Malaise trap site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1					1

34. *Chrysis serrata* Taylor 1 specimen.
BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).
DISTRIBUTION: Bohart and Kimsey (1982) reported this species from California, Nevada, Arizona, New Mexico, Idaho, Oregon, Utah, Washington, Texas, Montana, Colorado, Wyoming, Wisconsin, Kansas, Nebraska, Minnesota, Michigan, British Columbia, and Mexico.
CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected at the Malaise trap site on a stabilized dune formation.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1

35. *Chrysura sagmatis* Bohart 1 specimen.
BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).
DISTRIBUTION: Bohart and Kimsey (1982) report this species from California to New Mexico, north to Idaho and Washington.
ALBERTA: Writing-On-Stone Provincial Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected at the Malaise trap site on a stabilized dune formation.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1

36. *Ceratochrysis kansensis* (Viereck) 11 specimens.
BIOLOGY: cleptoparasite. Host - Hymenoptera (Aculeata).
DISTRIBUTION: Bohart and Kimsey (1982) report this species from every state except those along the Pacific Coast, and from southern Canada west to Alberta.
ALBERTA: Cypress Hills; Delia; Lethbridge; Medicine Hat; Writing-On-Stone Provincial Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens were obtained from the medium wet chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1			1	2	5	1					

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens						1				

4.2 Superfamily Vespoidea

The Vespoidea is a moderately large, mostly tropical superfamily of 48,000 species (Brothers and Finnamore 1993) in 10 families. All families are represented in Canada (316 species). There are 106 species in 7 families known from the CFB Suffield National Wildlife Area. The families represented in the SNWA include Tiphiidae, Sapygidae, Mutillidae, Bradynobaenidae, Formicidae, Vespidae and Pompilidae.

4.2.1 Tiphiidae

Tiphiid wasps are a diverse, cosmopolitan, but predominantly tropical family containing about 1,500 species (Brothers and Finnamore 1993). Many species exhibit extreme sexual dimorphism with winged males and brachypterous or apterous (wingless) females. Sex associations are often difficult. All species are solitary. The larvae are usually ectoparasitoids of the larvae of soil-dwelling beetles (Coleoptera). About 30 species are known from Canada of which 7 have been collected in the Suffield NWA.

Tiphiidae: Methochinae

37. *Methocha stygia* Say 19♀ 9♂.

BIOLOGY: parasitoid. Host - Coleoptera: Cicindellidae.

DISTRIBUTION: transcontinental in southern Canada and United States (Krombein et al. 1979).

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Although occurring in both soil groups, this species appears to be most abundant at the eolian sites where 85% of the specimens were obtained.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♀					1♂ 2♀					

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂	1♀		4♂ 3♀	2♀	2♀	2♀	1♀	1♂ 1♀	2♂

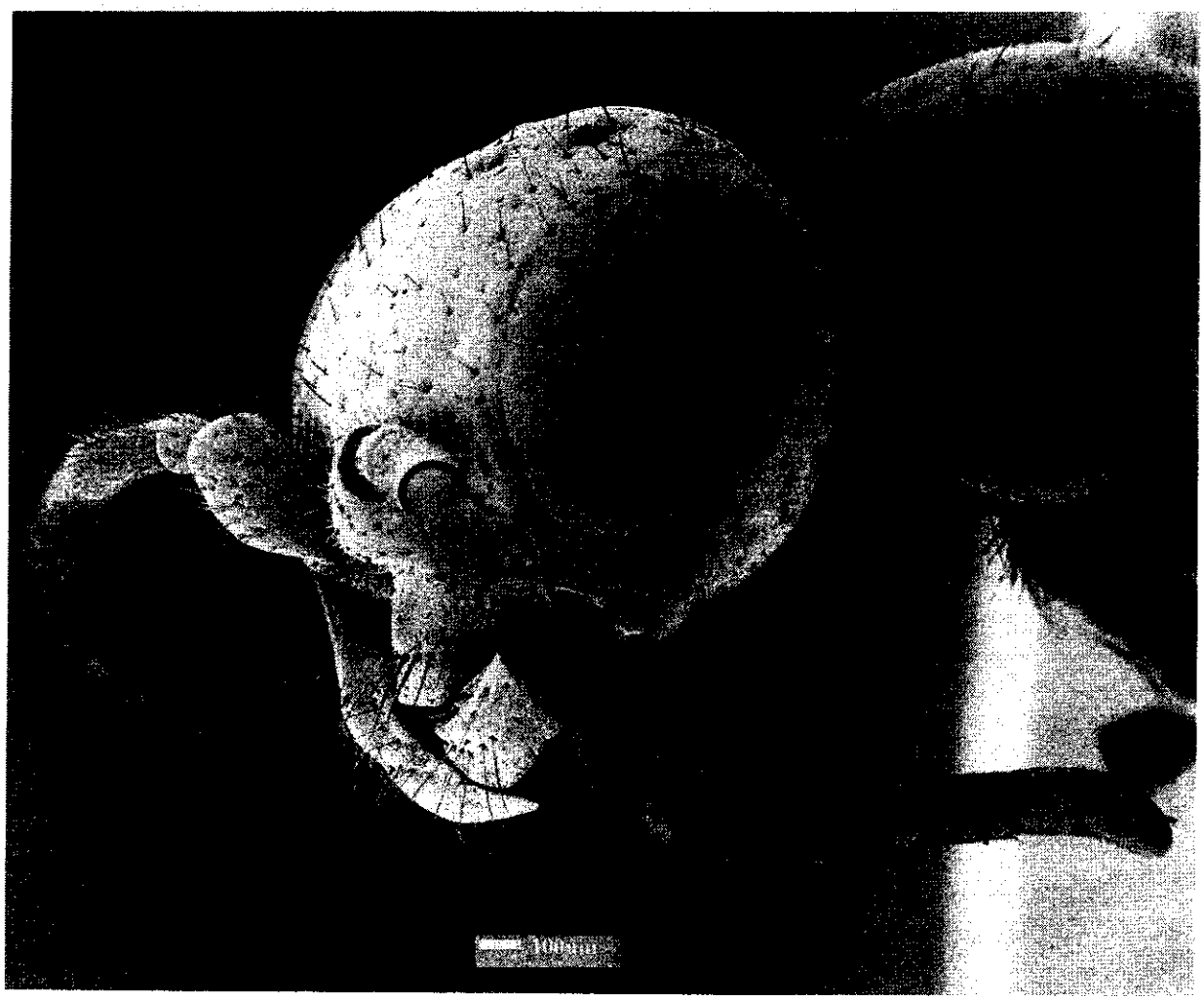


Figure 29. Head of *Methocha stygia* Say ♀ (Tiphiidae: Methochinae), no. 37.

38. *Methocha* sp. 4♀.

BIOLOGY: parasitoid. Host - Coleoptera: Cicindellidae?

DISTRIBUTION: unknown.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This tiny, unidentified species is known from 4 specimens collected at the chernozem soil sites. The species cannot be identified because the genus *Methocha*, 4 Nearctic species, is in need of revision.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens						1♀		1♀	1♀			1♀

Tiphiidae: Tiphiinae

39. *Tiphia anguis* Allen 2♀.

BIOLOGY: parasitoid. Host - Coleoptera: Scarabaeidae.

DISTRIBUTION: Allen (1971) reported this species from British Columbia, Washington, Oregon, California, and Wyoming.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species has been collected from the moderate and low soil moisture chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens									1♀		1♀	

40. *Tiphia barberi* Allen 1♀.

BIOLOGY: parasitoid. Host - Coleoptera: Scarabaeidae.

DISTRIBUTION: Allen (1971) reported this species from British Columbia, Washington, Oregon, California, and Wyoming.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was obtained from a dry chernozem site supporting a vegetation canopy of 8 cm in height.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										1♀		

41. *Tiphia canamexica* Rohwer 4♂

BIOLOGY: parasitoid. Host - Coleoptera: Scarabaeidae.

DISTRIBUTION: Allen (1971) reported this species from Montana, South Dakota, Colorado, Utah, California, Arizona, and Mexico.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was collected at sites in both soil types in the NWA.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens												1♂

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♂			1♂	1♂				

42. *Tiphia montana* Allen 1♂.

BIOLOGY: parasitoid. Host - Coleoptera: Scarabaeidae.

DISTRIBUTION: Allen (1971) reported this species from the following localities: Alberta, Saskatchewan, Montana, Utah, Arizona, and Mexico.

ALBERTA: Medicine Hat (Allen 1971).

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected in one of the stabilized dune sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens						1♂				

43. *Tiphia strangulata* Allen 16♂.

BIOLOGY: parasitoid. Host - Coleoptera: Scarabaeidae.

DISTRIBUTION: Allen (1971) reported this species from Montana and Arizona.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Twelve specimens were captured by light trap in the riparian zone of the South Saskatchewan River. All other specimens were captured at the chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens				1♂		1♂					1♂	1♂

Tiphiidae: Brachycistidinae

44. *Brachycistis alcanor* (Blake) 7♂.

BIOLOGY: parasitoid. Host - Coleoptera: Scarabaeidae?

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Alberta, Montana, and South Dakota, south to Arizona, Texas, and Mexico.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured by ultraviolet light trap at the River Sentry (50°23.382'N 110°36.156'W) on 28-VII-1994. Females are flightless and rarely collected.

4.2.2 Sapygidae

Brothers and Finnamore (1993) reported that the Sapygidae is a widespread family of about 80 species, but is absent from the Australian region. All species are soilitary, the larvae are cleptoparasites or ectoparasitoids of the larvae of bees and wasps (Hymenoptera) of the families Vespidae: Eumeninae; and Apoidea: Megachilidae, and Anthophoridae. About half the 17 North American species are known from Canada (9 species) of which 6 have been reported from Alberta. Only a single species was collected at the Suffield NWA.

Sapygidae: Sapyginae

45. *Sapyga pumila* Cresson 1♀.

BIOLOGY: parasitoid. Host - Hymenoptera: Megachilidae.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Alberta, Nebraska, Colorado, New Mexico, Utah, Nevada, and California.

CFB SUFFIELD NATIONAL WILDLIFE AREA: the single female specimen was captured at the Malaise trap site on stabilized dunes.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♀

4.2.3 Mutillidae

Brothers and Finnamore (1993) reported that the Mutillidae, or velvet ants, is a cosmopolitan, predominantly tropical family of about 5,000 species. Females are wingless and sex associations are extremely difficult. Females often have a powerful sting. The male is winged, much larger than the female which it often transports before mating. All species are solitary. The larvae are ectoparasitoids of the immatures of other insects, especially aculeate wasps; Diptera (flies), Lepidoptera (butterflies and moths), Coleoptera (beetles) and Dictuoptera (cockroaches) are also used. There are about 435 species in North America, including 27 species mostly from western Canada. Twelve species have been reported from Alberta; 11 species were captured at the SNWA.

Mutillidae: Myrmosinae

46. *Myrmosa unicolor* Say 1♀ 8♂.

BIOLOGY parasitoid. Host - Hymenoptera: Tiphiidae, Sphecidae, Halictidae.

DISTRIBUTION: Transcontinental in southern Canada and United States (Krombein *et al.* 1979).

ALBERTA: Medicine Hat; Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected from the eolian sites and the only female was collected from a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂				1♀					7♂

Mutillidae: Sphaeropthalminae

47. *Sphaeropthalma (Physetapsis) borealis* Schuster 4♂.

BIOLOGY: parasitoid. Host - Hymenoptera: Aculeata.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Saskatchewan.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected from the driest chernozem sites and from the stabilized dune sites on eolian soil.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens											1♂	1♂

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1♂	1♂				

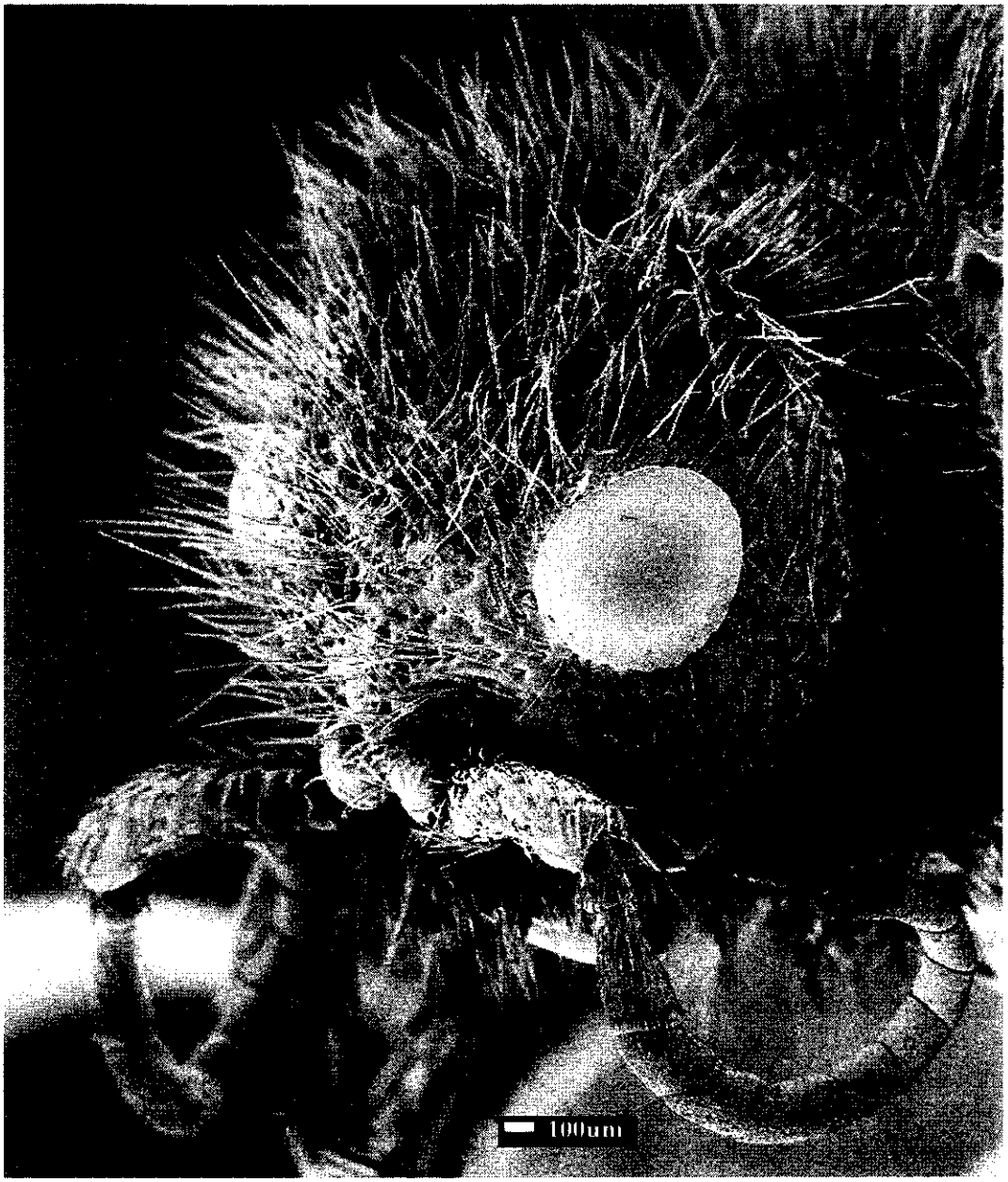


Figure 30. Head of *Dasymutilla vestita* (Lepeletier) ♀ (Mutillidae: Sphaeropthalminae), no. 55.

48. *Odontophotopsis (Odontophotopsis) obliqua* Viereck 4♂.

BIOLOGY: parasitoid. Host - Hymenoptera: Aculeata.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from British Columbia, Montana, Idaho, Washington, Nevada, California, and Mexico.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured by ultraviolet light trap at the River Sentry (50°23.382'N 110°36.156'W); 1♂ on 16-VII-1994 and 3♂ on 28-VII-1994.

Sphaeropthalmini spp. 12♀.

BIOLOGY: females cannot be identified beyond tribal level, but are likely members of one or both of the preceding 2 species.

DISTRIBUTION:

CFB SUFFIELD NATIONAL WILDLIFE AREA: Most females (66%) were collected from the medium and dry chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens						1♀		3♀	1♀	1♀	2♀	

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					2♀	2♀				

49. *Dasymutilla bioculata* (Cresson) 1♀ 1♂.

BIOLOGY: parasitoid. Host - Hymenoptera: Sphecidae.

DISTRIBUTION: Mickel (1928) reported this species from Alberta, British Columbia, Manitoba, Illinois, Mississippi, Louisiana, Texas, Oklahoma, Kansas, Nebraska, Iowa, Minnesota, South Dakota, North Dakota, Montana, Washington, Wyoming, Colorado, and New Mexico.

ALBERTA: Brooks Lethbridge, Manyberries, Medicine Hat, Orion, Tilley. Mickel (1928) reported the following localities: Lethbridge, Medicine Hat.

CFB SUFFIELD NATIONAL WILDLIFE AREA: A single male was swept from a dune blowout near the Mounted Rifles Road (Amiens 28-VII-1994). The other specimen, a female, was also collected in a dune blowout.

50. *Dasymutilla caneo* (Blake) 3♀.

BIOLOGY: parasitoid. Host - Hymenoptera: ?

DISTRIBUTION: Mickel (1928) reported this species from Alberta, British Columbia, Colorado, Kansas, Minnesota, Nebraska, New Mexico, North Dakota, South Dakota, Oklahoma, and Texas.

ALBERTA: Medicine Hat (Mickel 1928); Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: all specimens were collected from stabilized dune sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1♀	2♀				

51. *Dasymutilla macra* (Cresson) 2♂.

BIOLOGY: parasitoid. Host - Hymenoptera: ?

DISTRIBUTION: Mickel (1928) reported this species from Alberta, Missouri, Arkansas, Texas, New Mexico, Colorado, Kansas, Nebraska, Iowa, South Dakota, North Dakota, and Wyoming.

ALBERTA: Medicine Hat.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Two males were collected at the Malaise trap site on stabilized dunes.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										2♂

52. *Dasymutilla monticola* (Cresson) 7♂.

BIOLOGY: parasitoid. Host - Hymenoptera: ?.

DISTRIBUTION: Mickel (1928) reported this species from Alberta, British Columbia, Minnesota, North Dakota, Nebraska, Kansas, Colorado, and Arizona.

ALBERTA: Lethbridge (Mickel 1928), Medicine Hat, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected from stabilized dune sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				2♂		1♂				4♂

53. *Dasymutilla nigripes* (Fabricius) 2♀.

BIOLOGY: parasitoid. Host - Hymenoptera: Sphecidae.

DISTRIBUTION: Mickel (1928) reported this species from Alberta, Massachusetts, Connecticut, New York, Pennsylvania, New Jersey, Maryland, D.C., Virginia, North Carolina, Tennessee, Indiana, Michigan, Georgia, Florida, Alabama, Louisiana, Illinois, Arkansas, Mississippi, Texas, Arizona, Oklahoma, Colorado, Kansas, Oklahoma, Nebraska, Iowa, Minnesota, North Dakota, and South Dakota.

ALBERTA: Medicine Hat (Mickel 1928).

CFB SUFFIELD NATIONAL WILDLIFE AREA: The 2 specimens were collected from the driest of the chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										1♀		1♀

54. *Dasymytilla vesta* (Cameron) 21♀ 5♂.

BIOLOGY: parasitoid. Host - Hymenoptera: Sphecidae, Anthophoridae.

DISTRIBUTION: Mickel (1928) reported this species from Alberta, British Columbia, Manitoba, Ontario, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Maryland, D.C., Virginia, West Virginia, North Carolina, Georgia, Florida, Tennessee, Michigan, Indiana, Illinois, Missouri, Mississippi, Louisiana, Texas, New Mexico, Arizona, Utah, Colorado, Oklahoma, Kansas, Nebraska, Iowa, Minnesota, South Dakota, North Dakota, Wyoming, Montana, and Idaho.

ALBERTA: Edgerton, Foremost, Lethbridge, McIntyre Ranch near Magrath (Finnamore 1996), Orion, Medicine Hat, Writing-On-Stone Provincial Park. Mickel (1928) reported the following localities: Lethbridge, Medicine Hat, Whitla.

CFB SUFFIELD NATIONAL WILDLIFE AREA: One female was collected by light trap at the River Sentry (28-VII-1994). Most specimens (70%) were collected across the moisture gradient on the chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♂	1♀	1♀	2♂ 1♀	1♀	3♀	1♀	1♀	1♀	2♀	1♂ 2♀

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				3♀					2♀	1♂ 1♀

55. *Dasymutilla vestita* (Lepeletier) 4♀ 1♂.

BIOLOGY: parasitoid. Host - Hymenoptera: Anthophoridae, Megachilidae.

DISTRIBUTION: Mickel (1928) reported this species from Alberta, Texas, New Mexico, Arizona, California, Kansas, Colorado, Utah, Nevada, Nebraska, South Dakota, North Dakota, Wyoming, Idaho, Oregon, and Montana.

ALBERTA: Foremost, McIntyre Ranch near Magrath (Finnamore 1996), Medicine Hat, Milk River, Wardlow, Writing-On-Stone Provincial Park. Mickel (1928) reported the following localities: Lethbridge, Medicine Hat.

CFB SUFFIELD NATIONAL WILDLIFE AREA: One male was collected by ultraviolet light trap at the River Sentry (28-VII-1994). The females were all collected from the driest chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										1♀	1♀	2♀

Mutillidae: Mutillinae

56. *Ephuta grisea fuscosericea* Schuster 7♀ 17♂.

BIOLOGY: parasitoid. Host - Hymenoptera: ?.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Alberta, Montana, Utah, and North Dakota.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996); Writing-On-Stone Provincial Park. Schuster (1956) reported the following localities: Lethbridge, Manyberries.

CFB SUFFIELD NATIONAL WILDLIFE AREA: One male was collected in a sweep sample near the River Sentry (28-VI-1994). All females and most males (about 80% of specimens) were collected across the moisture gradient at the chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂		1♂	1♂	2♂ 2♀	6♂ 1♀	1♂ 1♀	1♀	1♂ 1♀			1♀

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										3♂

4.2.4 Bradynobaenidae

The Bradynobaenidae contains about 155 species and is found in all zoogeographic regions except the Australia Region (Brothers and Finnamore 1993). Like the Mutillidae, the females lack wings and sex associations are difficult. All species are solitary. Biological information on one atypical species indicates that the larvae are ectoparasitoids of Solifugae (windscorpiones). There are about 48 species in North America including one in western Canada.

Bradynobaenidae: Cyphotinae

57. *Cyphotes (Pitanta) albipes* (Cresson) 1♂.

BIOLOGY: parasitoid.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Alberta, British Columbia, Idaho, Washington, Oregon, California, Nevada, Utah, and Arizona.

CFB SUFFIELD NATIONAL WILDLIFE AREA: A single male specimen was collected at one of the dry chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens											1♂	

4.2.5 Formicidae

The ants are an important cosmopolitan family of aculeate wasps. All are highly social and most have a worker caste, but some are slave-makers or social parasites in which the worker caste has been lost. Ant larvae are fed by the workers on a wide variety of substances of animal or vegetable origin. The dominance of ants in ecosystems is seldom appreciated even by ecologists. Hölldobler and Wilson (1990) report an Ivory Coast savannah where ant density is 7,000 colonies and 20 million individuals per hectare.The authors point out further that few professionals realize that the modern insect fauna is predominantly social with about one-third of the entire animal biomass of the Amazonian rain forest composed of ants and termites (Isoptera). The ants dominate the aculeate wasp fauna of Canada and at the Suffield NWA are also the most abundant wasps. The world fauna of ants is estimated at 20,000 species (8,800 presently described) including 580 species in North America (Hölldobler and Wilson 1990) of which over 120 are reported from Canada. The ant fauna known from Alberta is 57 species, while that of the Suffield NWA is 37 species.

Ant diversity in the Suffield samples was processed by subsampling because of the large number of individual ants collected in the traps, and the sampling bias introduced by proximity of the traps to ant colonies. Subsampling entails scanning a sample for each ant species present and selecting several individuals of each species for identification. The following data should be treated as an indication of the presence or absence of a species at a given site and not relative trapability or abundance. In the following tables under each species, x = species present. Measures of relative trapability or relative abundance can be seriously influenced by the proximity of a sampling device to the colony.

Figure 31. Head of *Formica neoclara* Emery, worker (Formicidae: Formicinae), no. 83.

Formicidae: Myrmecinae

58. *Myrmica americana* Weber 8 workers (subsample).

BIOLOGY: predator.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Manitoba and Quebec south to North Carolina, Tennessee, Colorado, Utah, and Arizona.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was collected only on chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			x					x	x			x

59. *Myrmica emeryana* Forel 42 workers (subsample).

BIOLOGY: predator.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Newfoundland, south to Georgia, west to Manitoba, Idaho, and Colorado.

ALBERTA: Devon, Lake Cardinal, Writing-On-Stone. Sharplin (1966) reported this species from Devon, and Lake Cardinal Provincial Park west of Peace River.

CFB SUFFIELD NATIONAL WILDLIFE AREA: this species was most frequently encountered at the chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	x	x				x	x	x	x	x	x	x

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										x

60. *Myrmica hamulata* Weber 11 workers (subsample).

BIOLOGY: predator.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Iowa, Colorado, New Mexico, Arizona, and Utah.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected only from the chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							x	x	x	x		

61. ***Myrmica lobicornis fracticornis*** **Emery** 25 workers (subsample).
BIOLOGY: predator.
DISTRIBUTION: Krombein *et al.* (1979) reported this species from Newfoundland, south to Tennessee, Ohio, west to Colorado, New Mexico, Utah, and Arizona.
ALBERTA: Columbia Ice Field, Lake Louise, Sandy Lake.
CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected across the range of moisture gradients in the chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	x		x		x	x	x	x			x	

62. ***Pogonomyrmex occidentalis*** **(Cresson)** 8 workers (subsample).
BIOLOGY: herbivore/scavenger. Host - seeds.
DISTRIBUTION: Krombein *et al.* (1979) reported this species from southwestern North Dakota, western South Dakota, western Nebraska, Kansas, Oklahoma, northern Texas, southeastern Montana, Wyoming, Colorado, New Mexico, southeastern Idaho, Utah, and Arizona.
ALBERTA: Sharplin (1966) reported this species from southeastern Alberta.
CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected only from the active dune blowout sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens								x	x	

63. ***Pogonomyrmex owyheei*** **Cole** 2 workers (subsample).
BIOLOGY: herbivore/scavenger. Host - seeds.
DISTRIBUTION: Krombein *et al.* (1979) reported this species from British Columbia, Alberta, Saskatchewan, south to Montana, Wyoming, Idaho, Utah, Washington, Oregon, northern Nevada, and northeast California.
CFB SUFFIELD NATIONAL WILDLIFE AREA: Like the preceding species, it has been collected only from the active dune blowouts.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens								x	x	

64. *Monomorium minimum* (Buckley) 25 workers (subsample).

BIOLOGY: scavenger.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Quebec and Ontario, south to Florida, west to Montana, Colorado, California, and Mexico.

ALBERTA: Medicine Hat (Sharplin (1966); Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The species was most frequently encountered at the dry chernozem sites with a low vegetation canopy.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			x		x		x	x	x	x		x

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens							x			

65. *Solenopsis molesta* (Say) 5 workers (subsample).

BIOLOGY: lestobiotic (nesting in or near other ant colonies from which they steal food). Host - Hymenoptera: Formicidae.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Ontario south to Florida, west to Washington, and California.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species, which is related to the fire ant *Solenopsis invicta* Buren, has been collected from both chernozem and eolian soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens									x			x

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					x	x				

66. *Leptothorax (Myrafant) ambiguus ambiguus* Emery 4 workers (subsample).
BIOLOGY: Wheeler and Wheeler (1963) reported this species nesting in dead grass stems at the base of plants or nesting in soil.
DISTRIBUTION: Krombein *et al.* (1979) reported this species from Quebec to Virginia, west to North Dakota, South Dakota, Iowa, and Nebraska.
ALBERTA: Devona Lookout. Sharplin (1966) reported this species from Celestine Lake in Jasper National Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: This species has been collected only from the medium dry chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							x	x	x			

67. *Leptothorax (Myrafant) rugatulus rugatulus* **Emery** 5 workers (subsample).
BIOLOGY: Wheeler and Wheeler (1963) reported this is a slow-moving species nesting among grass roots or under stones.
DISTRIBUTION: Krombein *et al.* (1979) reported this species from British Columbia, California, east to North Dakota, South Dakota, Colorado, and New Mexico.
CFB SUFFIELD NATIONAL WILDLIFE AREA: It has been collected on both soil types in the SNWA.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							x		x			

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					x					

Formicidae: Dolichoderinae

68. *Tapinoma sessile* (Say) 37 workers (subsample).

BIOLOGY: host - honeydew from insects.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Nova Scotia, Quebec, south to Florida, west to Washington, and California.

ALBERTA: Devona Lookout, Writing-On-Stone Provincial Park. Sharplin (1966) reported this species from the following localities: near the Columbia Ice Field in Jasper National Park, Edmonton, Flatbush, Steveville, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was most frequently encountered in the chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		x	x	x	x	x	x		x			x

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			x							x

Formicidae: Formicinae

69. *Camponotus (Tanaemyrmex) vicinus* Mayr 1 worker (subsample).

BIOLOGY: this species nests under stones and has been reported tending aphids (Wheeler and Wheeler 1963).

DISTRIBUTION: Krombein *et al.* (1979) reported this species from British Columbia, Oregon, California, east to Manitoba, North Dakota, Colorado, and Oklahoma.

ALBERTA: (Wheeler and Wheeler 1963).

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was collected from a single site that was covered with large stones and low, scattered vegetation.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm± canopy height			Medium-high Soil Moisture 30 cm± canopy height			Medium-low Soil Moisture 15 cm± canopy height			Low Soil Moisture 8 cm± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										x		

70. *Lasius (Lasius) alienus* (Foerster) 3 workers (subsample).

BIOLOGY: nests in soil, feeds largely on small arthropods and honeydew.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Nova Scotia, New Brunswick, south to Florida, west to Manitoba, North Dakota, South Dakota, Nebraska, Kansas, Arkansas,

Mississippi, British Columbia, Montana, Idaho, Washington, California, Arizona, Mexico, and Eurasia.

ALBERTA: Drumheller, Elkwater, Kananaskis, Lake Louise, Mt. Eisenhower. Sharplin (1966) reported this species from the following localities: Cypress Hills, Drumheller, Gorge Creek; Medicine Hat, Opal, Waterton.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was collected only from the medium-dry and dry chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens									x	x		x

71. ***Lasius (Lasius) crypticus*** **Wilson** 5 workers (subsample).

BIOLOGY: nests in soil, feeds largely on small arthropods and honeydew.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Alberta, Idaho, Oregon, Utah, California, east to North Dakota, and New Mexico.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was encountered across the moisture gradient in the chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		x				x		x	x		x	

72. ***Lasius (Lasius) neoniger*** **Emery** 2 workers (subsample).

BIOLOGY: nests in soil, feeds largely on small arthropods and honeydew.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Quebec, Maine, south to Florida, west to Idaho, Wyoming, Colorado, New Mexico, and California.

ALBERTA: Medicine Hat, Steveville, Writing-On-Stone Provincial Park. Sharplin (1966) reported this species from Elkwater and Opal.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were encountered only from the stabilized dune sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					x					

73. ***Lasius (Lasius) niger*** **(Linnaeus)** 2 workers (subsample).

BIOLOGY: nests in soil, feeds largely on small arthropods and honeydew.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Colorado, New Mexico, Arizona, Utah, Montana, Idaho, Washington, Oregon, California, Mexico, and Eurasia.
CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were encountered only from the stabilized dune sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				x	x					

74. *Lasius (Lasius) pallitarsus* (Provancher) 1 worker (subsample).
BIOLOGY: nests in soil, feeds largely on small arthropods and honeydew.
DISTRIBUTION: Krombein *et al.* (1979) reported this species from Nova Scotia, Quebec, west to British Columbia, Alaska, south to New York, North Carolina, Michigan, Wisconsin, Minnesota, South Dakota, New Mexico, Arizona, Nevada, California, and Siberia.
ALBERTA: Drumheller, Edmonton, Elkwater. Sharplin (1966) reported this species from the following localities: Elkwater, Kinbrook Island Provincial Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was collected only from an unvegetated shoreline in the eolian soil sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	x									

75. *Lasius (Chthonolasius) subumbratus* Viereck 5 workers (subsample).
BIOLOGY: inquiline. Host - Hymenoptera: Formicidae, insect honeydew.
DISTRIBUTION: Krombein *et al.* (1979) reported this species from Nova Scotia, Maine, west to Saskatchewan, Washington, Oregon, south to New Mexcio, Arizona, and Nevada.
CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was encountered only in the dry chernozem sites characterized by low vegetation canopy and stony soil.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										x	x	

76. *Lasius (Chthonolasius) umbratus* (Nylander) 4 workers (subsample).
BIOLOGY: inquiline. Host - Hymenoptera: Formicidae, insect honeydew.
DISTRIBUTION: Krombein *et al.* (1979) reported this species from Nova Scotia, New Brunswick,

Quebec, south to Florida, west to Idaho, Utah, Arizona, and Eurasia.
ALBERTA: Sharplin (1966) reported this species from Lake Newell.
CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was encountered only at the wettest chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	x	x	x									

77. *Acanthomyops claviger* (Roger) 3 workers (subsample).
BIOLOGY: subterranean, rarely seen. Host - honeydew from root aphids and coccids (Homoptera).
DISTRIBUTION: Krombein *et al.* (1979) reported this species from Ontario, Massachusetts, New York, south to Florida, west to Minnesota, Nebraska, Kansas, and Mississippi.
CFB SUFFIELD NATIONAL WILDLIFE AREA: Several specimens were collected from a stabilized dune site and a medium dry chernozem soil site.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							x					

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens						x				

78. *Acanthomyops latipes* (Walsh) 2 workers (subsample).
BIOLOGY: subterranean, rarely seen. Host - honeydew from root aphids and coccids (Homoptera).
DISTRIBUTION: Krombein *et al.* (1979) reported this species from Quebec, Maine, west to British Columbia, south to South Carolina, Tennessee, Illinois, Iowa, Oklahoma, New Mexico, Arizona, and California.
CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected from stabilized dune sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens						x				

79. *Formica bradleyi* Wheeler 12 workers (subsample).

BIOLOGY: scavenger and tends Homoptera for honeydew.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Alberta, Montana, Wyoming, Colorado, east to Manitoba, Minnesota, and Iowa.

ALBERTA: Sharplin (1966) reported this species from Medicine Hat.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was most frequently encountered in stabilized dune and active dune blowouts.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		x										

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					x	x		x	x	

80. *Formica hewitti* Wheeler 3 workers (subsample).

BIOLOGY: Krombein *et al.* (1979) reported this species is found in open or semi-open woods and forests where it nests in soil under rocks or rotting wood.

DISTRIBUTION: Francoeur (1973) reported this species from Alberta, British Columbia, Manitoba, Quebec, California, Colorado, Idaho, Maine, Michigan, Minnesota, Montana, Nevada, New Mexico, and Wyoming.

ALBERTA: Sharplin (1966) reported this species from the following localities: Cypress Hills, Flatbush, Jasper National Park, Mount Edith Cavell, Mt. Eisenhower, Vimy. Francoeur (1973) reported the following localities: Cypress Hills, Flatbush, Hinton, Jasper National Park, Lake Louise, Mount Eisenhower, Vimy.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected from medium dry or dry chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens								x		x		x

81. *Formica lasioides* Emery 26 workers (subsample).

BIOLOGY: Krombein *et al.* (1979) reported this species is commonly found in grasslands where it nests under stones or openly with exposed entrances or small craters. It is often enslaved by other species of the genus *Formica*.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Nova Scotia, Quebec, west to

British Columbia, south to Massachusetts, Michigan, South Dakota, Colorado, New Mexico, Arizona, and California.

ALBERTA: Sharplin (1966) reported this species from: Cypress Hills, Lake Newell, Mount Eisenhower, Opal.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were most frequently encountered in the medium-wet chernozem sites but the species occurred in a variety of sites of chernoxem and eolian soils.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	x		x	x	x	x			x			x

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					x	x				

82. *Formica limata* Wheeler 34 workers (subsample).

BIOLOGY: Krombein *et al.* (1979) reported this species commonly nests in grasslands under stones or in crater nests, and is tolerant of dry situations. The are commonly enslaved by other species of *Formica.*

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Minnesota, North Dakota, Colorado, New Mexico, Utah, Nevada.

CFB SUFFIELD NATIONAL WILDLIFE AREA: It was collected from medium-dry chernozem sites and from stabilized dune sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							x	x	x			

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					x	x				x

83. *Formica neoclara* Emery 91 workers (subsample).

BIOLOGY: Krombein *et al.* (1979) reported this species commonly nests in grasslands or open woods where it nests in soil, usually preferring sandy soil. Nests are sometimes at the base of plants and sometimes have loose mounds of vegetable debris or excavated soil. It is a common host for slave-making species.

DISTRIBUTION: Francoeur (1973) reported this species from Alberta, British Columbia, Northwest Territories, Arizona, California, Colorado, North Dakota, South Dakota, Idaho, Iowa, Kansas, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, and Wyoming.

ALBERTA: Nordegg. Sharplin (1966) reported this species from: Calgary, Drumheller. Francoeur (1973) reported the following localities: Banff, Jasper, Drumheller, Nordegg.

CFB SUFFIELD NATIONAL WILDLIFE AREA: *Formica neoclara* is the ant most commonly encountered at Suffield.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	x	x	x	x	x	x	x	x	x			

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	x	x	x	x	x	x	x	x		x

84. *Formica neogagates* Emery 27 workers (subsample).

BIOLOGY: Krombein *et al.* (1979) reported this species commonly nests in grasslands in dry stoney situations, under stones or in the open with or without an irregular mound or crater. It is a common host for slave-making species.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Nova Scotia, Quebec, west to Alaska, south to North Carolina, Illinois, Iowa, Nebraska, New Mexico, Arizona, and California.

ALBERTA: Sharplin (1966) reported this species from Dinosaur Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: It was found in a variety of sites at Suffield.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		x			x	x	x	x	x	x	x	x

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				x	x	x		x		

85. *Formica neorufibarbis* Emery 1 worker (subsample).

BIOLOGY: Krombein *et al.* (1979) reported this species as a dominant ant in the boreal and alpine forests of North America.

DISTRIBUTION: Francoeur (1973) reported this species from Alberta, British Columbia, Yukon, Northwest Territories, Manitoba, New Brunswick, Nova Scotia, Quebec, Ontario, Newfoundland, Alaska, California, Colorado, North Dakota, South Dakota, Idaho, Maine Masschusetts, Michigan, Minnesota, Montana, New Hampshire, New Jersey, Oregon, Utah, Washington, and Wyoming.

ALBERTA: Columbia Ice Field in Jasper National Park, Sandy Lake, Tonquin Valley, Waterton. Francoeur (1973) reported the following localities: Banff, Bilby, Columbia Ice Field, Edmonton, Jasper, Lake Louise, Moraine Lake, Red Deer, Sandy Lake, Sulphur Mount in Banff, Sulphur Springs at Banff, Sylvan Lake, Tonquin Valley, Waterton.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species is a forest species that probably exists only in remnant colonies in the SNWA.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens											x	

86. *Formica obscuripes* Forel 7 workers (subsample).

BIOLOGY: Krombein *et al.* (1979) reported the nests of this species to be found in open areas where they are usually started at the base of a plant. Extensive use is made of thatching, and older nests have large mounds of debris

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Quebec, Michigan, Indiana, Manitoba, west to British Columbia, south to New Mexico, Utah, and California.

ALBERTA: Lake Newell, Lucky Strike, Medicine Hat, Steveville. Sharplin (1966) reported this species from Nordegg.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected from the chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	x	x	x	x				x				

87. *Formica obtusopilosa* Emery 26 workers (subsample).

BIOLOGY: Krombein *et al.* (1979) reported this species formed small colonies under stones or in exposed sandy soil, usually with irregular mounds or craters in meadows or graslands. It is a common host for slave-making species.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Alberta to Minnesota, south to Nebraska, New Mexcio, Utah, and Nevada.

ALBERTA: Sharplin (1966) reported this species from: Comrey, Dinosaur Provincial Park, Milk River, Steveville.

CFB SUFFIELD NATIONAL WILDLIFE AREA: It was found only on the medium-dry and dry chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							x	x	x	x	x	x

88. *Formica oreas comptula* Wheeler 3 workers (subsample).

BIOLOGY: Krombein *et al.* (1979) reported this species nesting in wooded areas or grasslands under stones or logs banked with detritus.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Saskatchewan, North Dakota, Iowa, west to Alberta, Washington, Idaho, and Utah.

ALBERTA: Sharplin (1966) reported this species from Rainbow Valley and Edmonton.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The few specimens collected were captured in the wet chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	x	x						x				

89. *Formica pergandei* Emery 1 worker (subsample).

BIOLOGY: Krombein *et al.* (1979) reported that members of this species are social parasites. Females forceably enter small host colonies and drive off or kill the host workers before rearing the host brood for their own use.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Quebec, New Hampshire, south to North Carolina, west to North Dakota, South Dakota, Iowa, and Colorado.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was captured at a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				x						

90. *Formica rubicunda* Emery 8 workers (subsample).

BIOLOGY: Krombein *et al.* (1979) reported that members of this species are social parasites. Females forceably enter small host colonies and drive off or kill the host workers before rearing the host brood for their own use. Hosts at Suffield are most likely *Formica bradleyi, F. lasioides, F. neoclara, F. neogagates*, and *F. neorufibarbis*.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Ontario south to North Carolina, Tennessee, west to Montana, Colorado, and New Mexico.

ALBERTA: Comrey, Peace River, Steveville.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens were encountered in the stabilized dune sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens									x			

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				x	x	x			x	

91. *Formica spatulata* Buren 65 workers (subsample).

BIOLOGY: Krombein *et al.* (1979) reported that members of this species are temporary social parasites of other species of *Formica*. The female is adopted by the host workers which may remain in the nest after the queen has established her brood.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from British Columbia, Montana, North Dakota, Iowa, and Minnesota.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was most frequently encountered in the wet chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	x	x	x	x	x	x		x	x			

92. *Formica subnuda* Emery 1 worker (subsample).

BIOLOGY: Krombein *et al.* (1979) reported that members of this species are social parasites. Females forceably enter small host colonies and drive off or kill the host workers before rearing the host brood for their own use. Host species at Suffield is most likely *Formica neorufibarbis*.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Newfoundland west to Yukon, Alaska, south to New York, Minnesota, North Dakota, Colorado, New Mexico, California, and Arizona.

ALBERTA: Bistcho Lake (Finnamore 1988), Elkwater, Devona Road, Edmonton, Medicine Hat, Mount Eisenhower, Waterton.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected at a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					x					

93. *Formica subsericea* Say 8 workers (subsample).

BIOLOGY: Krombein *et al.* (1979) reported this species occurs in deciduous woodlands where it nests under stones or leaf litter.

DISTRIBUTION: Francoeur (1973) reported this species from Manitoba, New Brunswick, Ontario, Quebec, Arkansas, South Carolina, Connecticut, North Dakota, South Dakota, District of Columbia, Georgia, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Minnesota, Missouri, New Jersey, New Hampshire, New York, Ohio, Pennsylvania, Tennessee, Virginia, and Wisconsin.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was collected only from wet and medium-wet chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	x	x	x	x		x						

94. *Polyergus breviceps* Emery 3 workers (subsample).

BIOLOGY: Krombein *et al.* (1979) reported that this is a true slave-making species. In founding a new colony, the female enters the nest of the host species and eventually kills the host queen and uses the host workers to tend her brood. Colonies of this species will conduct slave raids on nests of species of *Formica*. Workers of the host are taken and used to feed the *Polyergus* brood and to excavate the nest. Hosts at Suffield most likely include *Formica neoclara* and *F. neorufibarbis*.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Ontario, Michigan, west to British Columbia, south to Indiana, Illinois, Missouri, Kansas, New Mexico, Arizona, and California.

ALBERTA: Sharplin (1966) reported this species from Athabasca River bank 11.2 km west of Flatbush, Celestine Lake Trail in Jasper, Devon.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured at the dry and medium-dry

chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							x		x		x	

4.2.6 Vespidae

The Vespidae is a moderately large family, mostly tropical, although the Vespinae (hornets and yellowjackets) is northern. The Nearctic fauna contains 330 species with 62 species reported from Canada (Brothers and Finnamore 1993). This study reports 15 species from SNWA. There are four subfamilies found in Canada but only one, the Eumeninae, was present at Suffield. The Eumeninae are solitary wasps constructing a nest in the ground or in twigs. Curiously, the yellowjackets and hornets (subfamily Vespinae) were not found in samples collected from SNWA.

Eumeninae

95. *Odynerus dilectus* (Saussure) 1♂.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Alberta, Alaska, Washington, California, New Mexico, Colorado, Wyoming, Montana, Minnesota, New York.

ALBERTA: Beaverlodge, Bilby, Edmonton, Nordegg, Tilley, Wabamun.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected from a wet chernozem soil site.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂											

96. *Pterocheilus (Megapterocheilus) decorus leucotaenius* Rohwer 1♂.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Alberta, Washington, Oregon, California, Nevada, Wyoming.

ALBERTA: Lethbridge, Tilley, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected at a site on chernozem soil.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							1♂					

97. *Pterocheilus (Megapterocheilus) quinquefasciatus* Say 1♂.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from British Columbia, Alberta, Washington, Oregon, Idaho, Montana, Wyoming, South Dakota, to Texas and New Mexico.

ALBERTA: Calgary, Medicine Hat, Tilley.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected at a site on chernozem soil.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										1♂		

98. *Leptochilus rufinodus* (Cresson) 18♀.

BIOLOGY: predator. Host - Lepidoptera larvae. Krombein *et al.* (1979) reported this species nesting in twigs of *Sambucus, Foeniculum, Cirsium, Tetradymia* and *Nama.*

DISTRIBUTION: Parker (1966) reported this species from the western United States: Washington to California, Idaho, Wyoming, Colorado, Kansas, New Mexico.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured in the chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens				2♀	1♀		5♀	1♀	2♀	4♀	1♀	2♀

99. *Stenodynerus anormis* (Say) 38♂ 76♀.

BIOLOGY: predator. Host - Lepidoptera larvae. Krombein *et al.* (1979) reported this species nesting in twigs.

DISTRIBUTION: Krombein *et al.* (1979) reported this species is transcontinental in the United States and Canada.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996); Medicine Hat, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species is found across a wide variety of sites in the SNWA, but appeared most abundant in the sites with relatively high soil moisture supporting a vegetation canopy of about 30 cm.

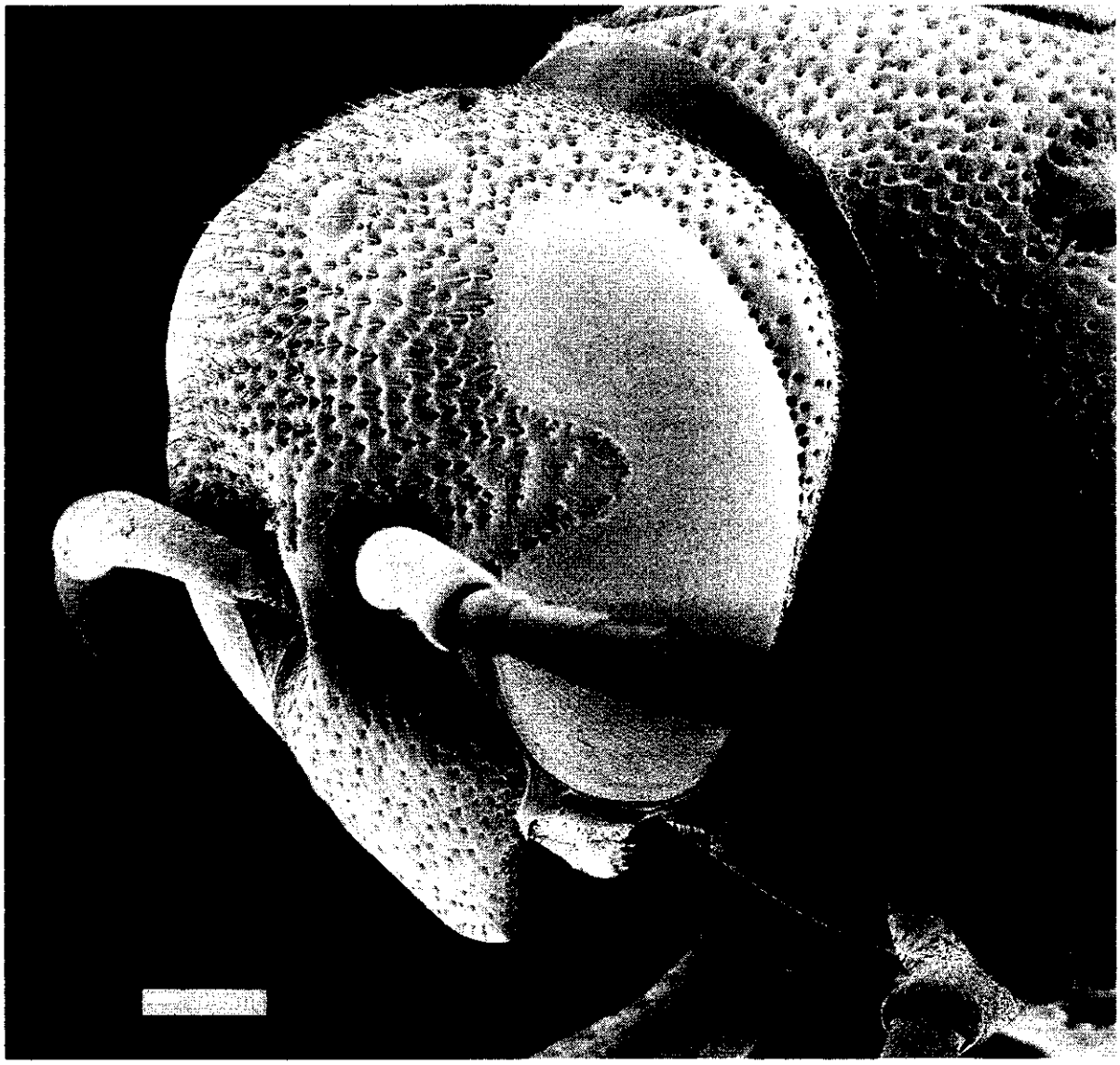


Figure 32. Head of *Stenodynerus anormis* (Say) ♀ (Vespidae: Eumeninae), no. 99.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	7♂ 11♀	4♂ 7♀	3♂ 4♀	4♀	1♂ 10♀	5♂ 6♀	2♂ 5♀	1♂ 4♀	1♂ 2♀	1♂ 1♀	2♀	1♂ 1♀

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	3♀	2♂ 1♀	1♂ 2♀		2♂ 1♀	1♂ 5♀	1♂ 2♀	1♂	1♂ 2♀	3♂ 2♀

100. *Stenodynerus kennicottianus kennicottianus* (Cameron) 1♂.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Krombein *et al.* (1979) reported this species is transcontinental in the United States and Canada, except for the southwest United States.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was captured by Malaise trap on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♂

101. *Parancistrocerus vagus vagus* (Saussure) 1♂.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Ontario, British Columbia, and the United States except the Pacific Coast states.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected in a sweep sample from an active dune blowout on Mounted Rifles Road.

102. *Pseudepipona (Pseudepipona) herrichii aldrichi* (Fox) 5♂ 9♀.

BIOLOGY: predator. Host - Lepidoptera larvae. The old world subspecies nests gregariously in firm sand (Krombein *et al.* 1979).

DISTRIBUTION: Krombein *et al.* (1979) reported this species in western North America from Alaska to New Mexico. Another subspecies occurs across the Palaearctic Region.

ALBERTA: Manyberries, McIntyre Ranch near Magrath (Finnamore 1996), Wabamun, Wainwright, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected at sites located on both soil types.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♀	1♀			1♀						

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		2♀	1♂			1♂ 2♀				3♂ 2♀

103. *Euodynerus annulatus annulatus* (Say) 2♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Alberta, Arizona, Utah, Wyoming, east to Texas, Kansas, North Dakota.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Both specimens were collected from sites on chernozem soil.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			1♀							1♀		

104. *Euodynerus auranus* (Cameron) 18♂ 16♀.

BIOLOGY: predator. Host - Lepidoptera larvae. Nests in hollow twigs (Krombein *et al.* 1979).

DISTRIBUTION: Krombein *et al.* (1979) reported this species west of the 100th meridian from Alberta south to Mexico.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was collected only from the stabilized dune and active dune blowout sites. In addition to those listed below, a female was swept from an active dune blowout on Mounted Rifles Road.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	2♂	3♂ 1♀		1♂		5♂	4♂ 1♀	1♂ 4♀	1♂ 2♀	1♂ 7♀

105. *Euodynerus tempiferus* (Viereck) 1♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Krombein *et al.* (1979) reported this species west of the 100th meridian from British Columbia and Montana south to California and New Mexico.
CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected in a sample from a wet chernozen site.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			1♀									

106. ***Ancistrocerus adiabatus adiabatus*** **(Saussure)** 1♀.
BIOLOGY: predator. Host - Lepidoptera larvae. Nests in hollow twigs (Krombein *et al.* 1979).
DISTRIBUTION: Krombein *et al.* (1979) reported this species as transcontinental and widespread in southern Canada and the United States.
ALBERTA: Banff, Claresholm, Clymont, Medicine Hat, Wabamun.
CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected in the Malaise trap on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♀

107. ***Ancistrocerus catskill albophaleratus*** **(Saussure)** 1♀.
BIOLOGY: predator. Host - Lepidoptera larvae.
DISTRIBUTION: transcontinental in Canada, south to Arizona, New Mexico and North Carolina (Krombein *et al.* 1979).
ALBERTA: Banff, Clymont, Cypress Hills, Edgerton, Edmonton, Fawcett, Gull Lake, Jasper, Manyberries, Medicine Hat, Nordegg, Oyen, Slave Lake, Wabamun, Wagner Natural Area near Edmonton (Finnamore 1994) Waterton, Writing-On-Stone Provincial Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: The single female was collected in a Malaise trap on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♀

108. ***Ancistrocerus spilogaster*** **Cameron** 5♂ 12♀.
BIOLOGY: predator. Host - Lepidoptera. Nests in twigs.
DISTRIBUTION: western United States east to Montana, Wyoming, Utah and Arizona (Krombein *et*

al. 1979).

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were captured at sites in both soil types.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♀	1♀	1♂ 1♀	1♀				1♀				

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1♀					4♂ 6♀

109. *Symmorphus albomarginatus albomarginatus* (Saussure) 1♀.

BIOLOGY: predator. Host - Coleoptera: Chrysomelidae larvae. Nests in twigs.

DISTRIBUTION: Cumming (1989) reported this species from Newfoundland, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, Northwest Territories, Yukon, British Columbia, Alabama, California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Illinois Indiana, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennesee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin, Wyoming.

ALBERTA: Bilby, Consort, Edmonton, Gull Lake, Red Deer, Wabamun. Cumming (1989) reported the species from Grande Prairie, Medicine Hat, Mildred Lake, Peace River, and Slave Lake.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected from an active dune blowout.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens							1♀			

4.2.7 Pompilidae

The Pompilidae (spider wasps) is a cosmopolitan but mostly tropical family of about 4,200 described species. All species are solitary. The larvae usually develop on a single paralysed spider in a cell constructed and provisioned by the female. A few species are cleptoparasitic on other pompilids. Brothers and Finnamore (1993) indicated there are 282 described species in North

America, of which about 114 occur in Canada, including 73 species from Alberta and 33 from SNWA.

Pompilidae: Pepsinae

110. *Priocnemis nigriceps* (Ashmead) 6♂ 3♀.

BIOLOGY: predator. Host - Araneae. The female is brachypterous (short-winged, flightless).

DISTRIBUTION: Townes (1957) reported the species from Texas, Kansas, and Iowa. It is rare, known from about a dozen specimens between Texas and Iowa. Its occurrence at the Suffield NWA represents the first record of a brachypterous pompilid in Canada. It is one of two brachypterous species known from North America. Identification of the species was confirmed by Dr. Marius Wasbauer (retired) of Brookings, Oregon.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens and all females were collected from the dry chernozem soil sites supporting a vegetation canopy of up to 8 cm.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♂							1♀	1♂	1♀	3♂ 1♀

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♂						

111. *Priocnemis notha alaskensis* 1♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Townes (1957) reported this subspecies from Northwest Territories, Yukon, and Alaska.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected from a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens						1♀				

Pompilidae: Pompilinae

112. *Evagetes crassicornis consimilis* (Banks) 4♂ 2♀.

BIOLOGY: cleptoparasite. Host - Hymenoptera: Pompilidae.

DISTRIBUTION: Evans (1950) reported this species from British Columbia, Alberta, Saskatchewan,

Manitoba, Oregon, California, Nevada, Utah, New Mexico, Colorado, Wyoming, and North Dakota.
ALBERTA: Andrew Lake (Finnamore 1990), McIntyre Ranch near Magrath (Finnamore 1996), Writing-On-Stone Provincial Park, Evans (1950) reported the following localities: Edmonton, Medicine Hat, Strathmore, Wabamun, Waterton Lake.
CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured in the eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			1♀		2♂	1♀				2♂

113. *Evagetes hyacinthinus* (Cresson) 18♂ 1♀.
BIOLOGY: cleptoparasite. Host - Hymenoptera: Pompilidae.
DISTRIBUTION: Evans (1950) reported this species from British Columbia, Alberta, Manitoba, Ontario, Quebec, New Brunswick, Prince Edward Island, Wisconsin, Arizona, New Mexico, Texas, Louisiana, Florida, and Baja California.
ALBERTA: Edgerton (Evans 1950), Opal, Slave Lake.
CFB SUFFIELD NATIONAL WILDLIFE AREA: In addition to the following, two specimens were also collected in a sweep sample of a dune blowout on Mounted Rifles Road, Amiens (1♂ 1♀ 28-VII-1994). The other specimens, entirely males, were collected at sites on both soil types.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂			4♂	3♂	1♂						1♂

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										7♂

114. *Evagetes ingenuus* (Cresson) 4♂ 3♀
BIOLOGY: cleptoparasite. Host - Hymneoptera: Pompilidae.
DISTRIBUTION: Evans (1950) reported this species from Alberta, British Columbia, Ontario, Quebec, Michigan, Minnesota, Dakota Territories, Arizona, Colorado, California, Kansas, Iowa, and Georgia.
ALBERTA: Medicine Hat (Evans 1950), Writing-On-Stone Provincial Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected from both chernozem and eolian sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♂	1♀			2♂						

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♀			1♀					1♂

115. *Evagetes padrinus minusculus* (Banks) 5♂.

BIOLOGY: cleptoparasite. Host - Hymenoptera: Pompilidae.

DISTRIBUTION: Evans (1950) reported this species from Ontario, New Hampshire, Michigan, Minnesota, South Dakota, Kansas, Texas, Louisiana, Alabama, and Georgia.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected from eolian sites. Two specimens were also collected in a sweep sample from a dune blowout on Mounted Rifles Road, Amiens area (2♂ 28-VII-1994).

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1♂	1♂		1♂		

116. *Evagetes padrinus padrinus* (Viereck) 2♂ 6♀.

BIOLOGY: cleptoparasite. Host - Hymenoptera: Pompilidae.

DISTRIBUTION: Evans (1950) reported this species from British Columbia, Alberta, Saskatchewan, Manitoba, California, Arizona, New Mexico, Texas, Colorado, and Montana.

ALBERTA: Medicine Hat (Evans 1950); Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured on stabilized dunes or active dune blowouts. One additional specimen was captured in a sweep sample on Mounted Rifles Road, Amiens region (1♀ 28-VII-1994).

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				2♀		2♀			1♀	2♂

117. *Evagetes parvus* (Banks) 9♂.

BIOLOGY: cleptoparasite. Host - Hymenoptera: Pompilidae.

DISTRIBUTION: Evans (1950) reported this species from British Columbia, Yukon, Saskatchewan, Manitoba, Ontario, Quebec, Nova Scotia, Prince Edward Island, Michigan, Wisconsin, California, Arizona, New Mexico, Texas, Missouri, and Georgia.

ALBERTA: Andrew Lake (Finnamore 1990), Golden Spike, Tofield, Wagner Natural Area near Edmonton (Finnamore, 1994), Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected at sites on both soil types sampled in the NWA.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens					1♂	1♂					1♂	

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♂		1♂				4♂

118. *Evagetes subangulatus* (Banks) 1♂.

BIOLOGY: cleptoparasite. Host - Hymenoptera: Pompilidae.

DISTRIBUTION: Evans (1950) reported this species from British Columbia, Yukon, Alberta, Manitoba, Ontario, Newfoundland, Nova Scotia, Minnesota, Michigan, California, Arizona, New Mexico, Colorado, South Dakota, Georgia, North Carolina, and New Jersey.

ALBERTA: Andrew Lake (Finnamore 1990), Edmonton (Evans 1950), McIntyre Ranch near Magrath (Finnamore 1996), Opal; Wabamun; Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected in a wet chernozem site.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			1♂									

119. *Episyron oregon* Evans 15♂ 10♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1950) reported this species from Yukon, British Columbia, Alberta, Montana, Wyoming, Washington, Oregon, and California.

ALBERTA: Andrew Lake (Finnamore 1990), Writing-On-Stone Provincial Park. Evans (1950) reported the following localities: Gull Lake, Lethbridge, Medicine Hat, Tilley.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species is present in a wide variety of habitats on the

base. Inaddition to those specimens collected at the chernozem and eolian sites, two other specimens were collected — one in a light trap at the River Sentry, Fish Creek area (1♀ 28-VII-1994); the other in a sweep sample from the Fish Creek area (1♀ 28-VI-1994, 50°23.568'N 110°35.153'W).

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♀					1♀	1♀				

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♂	1♀							14♂ 4♀

120. *Episyron quinquenotatus quinquenotatus* (Say) 2♂ 3♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1950) reported this species from British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Nova Scotia, Prince Edward Island, Montana, Wyoming, Colorado, Kansas, Texas, Arkansas, Alabama, North Carolina, and Virginia.

ALBERTA: Bilby, Fawcett, Golden Spike, Medicine Hat, Tofield, Wabamun (Evans 1950), Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was collected in the eolian sites as well as the dry, southeast-facing slopes of the South Saskatchewan River in the Fish Creek area (1♀ 28-VI-1994, 50°23.568'N 110°35.153'W).

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♀						2♂ 1♀

121. *Anoplius (Lophopompilus) aethiops* (Cresson) 2♂.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951a) reported this species from British Columbia, Ontario, Quebec, Nova Scotia, Michigan, Wisconsin, Minnesota, South Dakota, Montana, California, Texas, Alabama, Georgia, North Carolina, and Mexico.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: the two specimens were collected fro chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens						2♂						

122. *Anoplius (Arachnophroctonus) cylindricus* (Cresson) 10♂ 17♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951a) reported this species from Northwest Territories, Alberta, Manitoba, Ontario, Connecticut, New York, Michigan, Montana, Oregon, Utah, Arizona, New Mexico, Texas, Florida, and North Carolina.

ALBERTA: Ironsprings (Evans 1951a), Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were captured at a wide variety of sites in SNWA.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♀	1♀	1♀		3♀	1♂			1♀	2♀		

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				4♂ 5♀	4♂	2♀			1♂	1♀

123. *Anoplius (Arachnophroctonus) insolens* (Banks) 9♂ 2♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951a) reported this species from British Columbia, Alberta, Manitoba, Ontario, Maine, Massachusetts, New York, Michigan, Minnesota, California, Arizona, Texas, Arkansas, Kentucky, Georgia, and Mexico.

ALBERTA: Andrew Lake (Finnamore 1990), McIntyre Ranch near Magrath (Finnamore 1996), Medicine Hat (Evans 1951a).

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was collected from a wide variety of sites in the SNWA.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♂		1♂	1♀	1♀						2♂

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♂			2♂	1♂			1♂	

124. ***Anoplius (Arachnophroctonus) marginatus*** **(Banks)** 9♂ 4♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951a) reported this species from British Columbia, Alberta, Northwest Territories, Saskatchewan, Manitoba, Ontario, Quebec, Nova Scotia, Prince Edward Island, Michigan, Minnesota, Montana, Utah, Arizona, New Mexico, Texas, Louisiana, Alabama, and Florida.

ALBERTA: Medicine Hat, Tilley (Evans 1951a), Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens (85%) were encountered in the chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	2♂ 1♀	2♂		3♂			1♀			1♂		1♂

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										2♀

125. ***Anoplius (Arachnophroctonus) relativus*** **(Fox)** 4♂ 3♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951a) reported this species from British Columbia, Alberta, Manitoba, Ontario, Massachusetts, Vermont, New York, Michigan, Texas, Louisiana, and Florida.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996); Medicine Hat (Evans 1951a); Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: While males were captured at several sites on chernozem or eolian soils, females were captured only at the Malaise site on stabilized dunes.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens						1♂		1♂				

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♂				1♂				3♀

126. *Anoplius (Arachnophroctonus) splendens* (Dreisbach) 1♂.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951a) reported this species from Alberta, Manitoba, Ontario, Maine, Vermont, New York, New Jersey, Pennsylvania, Michigan, Wisconsin, Minnesota, North Dakota, South Dakota, Colorado, Arizona, Texas, Alabama, and Georgia.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996), Medicine Hat (Evans 1951a), Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single male was collected in a chernozem site.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens					1♂							

127. *Anoplius (Anoplius) imbellis* Banks 8♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951a) reported this species from British Columbia, Yukon, Northwest Territories, Manitoba, Masachusetts, New York, California, Utah, New Mexico, Kansas, Tennessee, North Carolina, and Virginia.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996), Wagner Natural Area near Edmonton (Finnamore (1994), Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected across the moisture gradient at the chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♀		1♀	1♀		2♀	2♀		1♀		

128. *Anoplius (Anoplius) ventralis* (Banks) 4♂ 5♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951a) reported this species from Manitoba, Ontario, Quebec, Nova Scotia, Minnesota, Michigan, South Dakota, Arkansas, Texas, Louisiana, Mississippi, and Florida.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were only collected in the chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		2♀			1♂ 1♀		1♂ 2♀		2♀			

129. *Ammosphex angularis angularis* (Banks) 26♂ 27♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951b) reported this species from British Columbia, Yukon, Alberta, Massachusetts, Connecticut, New Jersey, New York, Michigan, Minnesota, South Dakota, Nebraska, Texas, New Mexico, Colorado, Wyoming, Montana, and California.

ALBERTA: Writing-On-Stone Provincial Park, Evans (1951b) reported the localities of Bow Island and Drumheller.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species appears to be the most abundant pompilid (as inferred by relative trapability) in the SNWA.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	2♂ 4♀	1♂	4♂ 1♀	1♀	2♂ 4♀	1♂ 1♀		1♂		4♂ 1♀	2♂ 3♀	1♂ 1♀

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				3♀	2♀					7♂ 6♀

130. *Ammosphex dakota dakota* (Dresbach) 1♂ 5♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951b) reported this species from Montana, North Dakota, Colorado, New Mexico, and Arizona. Krombein *et al.* (1979) also reported Alaska.

ALBERTA: Edmonton, McIntyre Ranch near Magrath (Finnamore 1996), Opal, Viewpoint, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected from the stabilized dune sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♀						1♂ 4♀

131. *Ammosphex luctuosus luctuosus* (Cresson) 2♂ 15♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951b) reported this species from British Columbia, Yukon, Alberta, Northwest Territories, Quebec, Maine, Michigan, Minnesota, South Dakota, Wyoming, Colorado, New Mexico, Idaho, and California.

ALBERTA: Evans (1951b)reported this species from Drumheller, Edmonton, Lethbridge, Medicine Hat. McIntyre Ranch near Magrath (Finnamore 1996), Opal, Tawatinaw, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens were captured at the wettest of the chernozem and eolian sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♀	2♀	3♀	1♀	1♀	1♀						

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂	1♀	1♀						1♀	1♂ 3♀

132. *Ammosphex michiganensis michiganensis* (Dreisbach) 7♂ 3♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951b) reported this species from British Columbia, Yukon, Northwest Territories, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Maine, Massachusetts, New York, North Carolina, Georgia, Michigan, Minnesota, and Colorado.

ALBERTA: Evans (1951b) reported this species from Consort,Morin, St. Paul, Edmonton. Andrew Lake (Finnamore 1990), McIntyre Ranch near Magrath (Finnamore 1996), Tawatinaw, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens were encountered at the stabilized dune sites, but 2 specimens were captured on chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens					2♀							

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1♂	1♂ 1♀				5♂

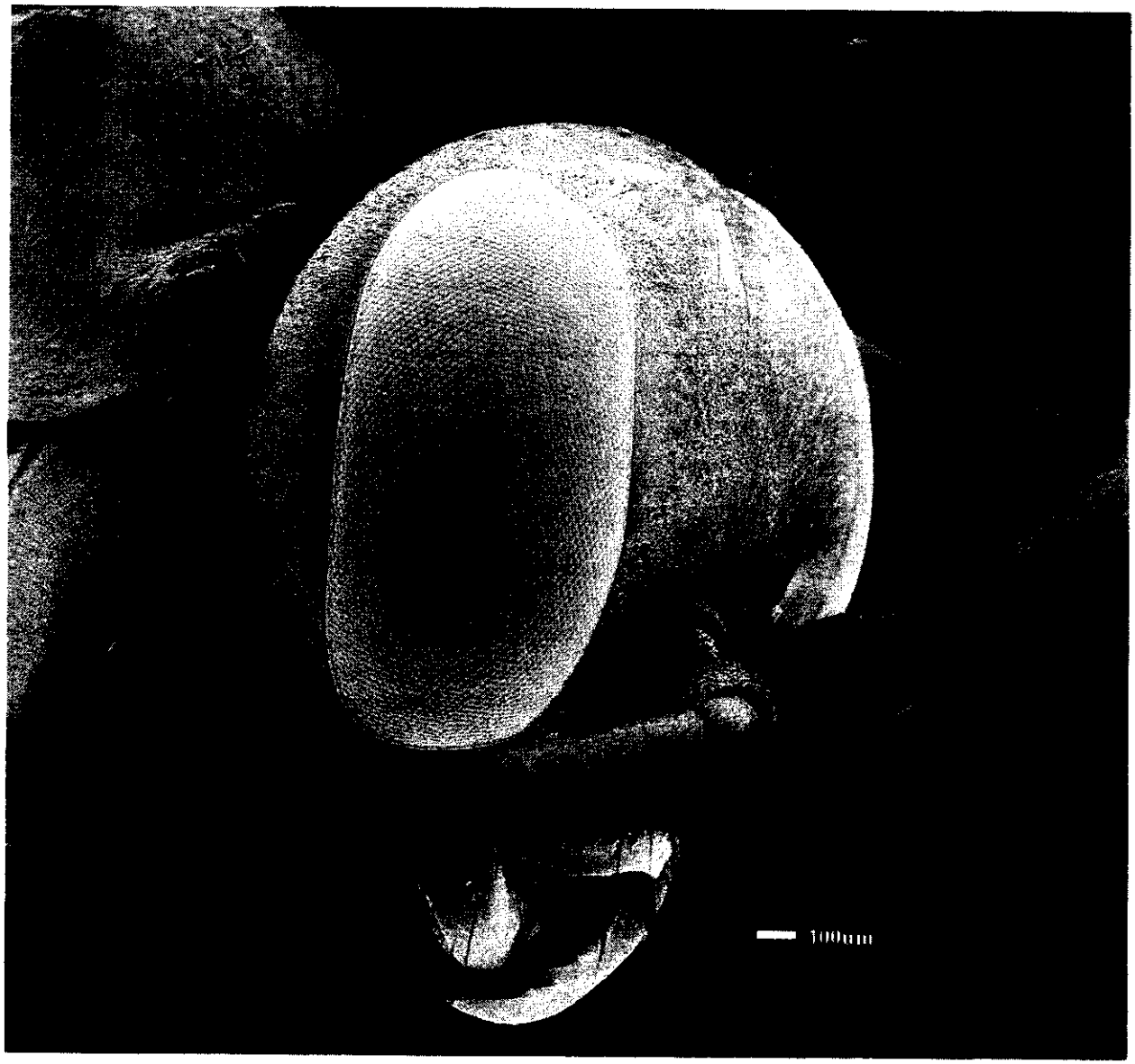


Figure 33. Head of *Ammosphex occidentalis* (Dreisbach) ♀ (Pompilidae: Pompilinae), no. 133.

133. *Ammosphex occidentalis* (Dreisbach) 16♂ 9♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951b) reported this species from British Columbia, Alberta, Montana, Colorado, New Mexico, Arizona, Nevada, California, Oregon, and Washington.

ALBERTA: Evans (1951b) reported this species from Banff and Medicine Hat. McIntyre Ranch near Magrath (Finnamore 1996), Opal, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were captured at a wide variety of sites. In addition to the following, two other specimens were collected, one by sweeping at Bull Pen, Fish Creek area (1♂ 26-V-1994); another by Malaise trap in the riparian zone near the River Sentry, Fish Creek area (1♂ 30-V-1995).

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♀		1♀			1♂ 1♀						

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♀		1♀		1♀			1♀	13♂ 2♀

134. *Arachnospila arctus* (Banks) 1♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951b) reported this species from British Columbia, Yukon, Northwest Territories, Quebec, Newfoundland, Nova Scotia. California, Arizona, New Mexico, Colorado, Nebraska, Iowa, West Virginia, and District of Columbia.

ALBERTA: Andrew Lake (Finnamore 1990); Crow's Nest Pass (Evans 1951b); Edmonton; Medicine Hat; Milk River; Wabamun; Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected from a stbilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♀						

135. *Ammosphex fumipennis eureka* (Banks) 1♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951b) reported this species from British Columbia, Montana, Wyoming, Colorado, New Mexico, Arizona, Nevada, and California.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single female specimen was collected by Malaise trap on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♀

136. *Arachnospila scelestus* (Cresson) 19♂ 5♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951b) reported this species from British Columbia, Alberta, Ontario, Quebec, New Brunswick, Nova Scotia, Michigan, Minnesota, California, Arizona, New Mexico, Texas, Kansas, Iowa, Indiana, Georgia, and North Carolina.

ALBERTA: Bilby, Cypress Hills, Czar, Edgerton (Evans 1951b), Lethbridge, McIntyre Ranch near Magrath (Finnamore 1996), Milk River, Orion, Waterton.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was found in a wide variety of sites in SNWA.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂ 1♀					1♂ 1♀						4♂

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♀		1♂			1♀		1♀		12♂

137. *Anoplochares apicatus* (Provancher) 13♂ 3♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951b) reported this species from British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Newfoundland, Washington, California, New Mexico, Texas, Louisiana, Alabama, Georgia, and North Carolina.

ALBERTA: Andrew Lake (Finnamore 1990), Edmonton (Evans 1951b), George Lake, McIntyre Ranch near Magrath (Finnamore 1996), Orion, Wabamun, Wagner Natural Area near Edmonton (Finnamore 1994), Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were encountered in chernozem sites but none were captured in the wettest sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens					1♂	7♂ 1♀	2♂			1♂	1♂ 1♀	2♂

138. *Aporinellus fasciatus* (Smith) 7♂ 16♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951b) reported this species from New York, New Jersey, Maryland, Virginia, North Carolina, Georgia, Michigan, Illinois, Iowa, Nebraska, Colorado, Utah, Wyoming, Idaho, Oregon, Nevada, California, Texas, Georgia, Florida, and Mexico. Krombein *et al.* (1979) also reported British Columbia.

ALBERTA: Medicine Hat (Evans 1951b as *Aporinellus apicatus* (Banks)), Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens (95%) were captured at the eolian sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens												1♂

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♂	2♀	2♂ 5♀		2♂ 1♀	2♀	1♂ 6♀

139. *Aporinellus taeniatus taeniatus* (Kohl) 8♂ 1♀.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Evans (1951b) reported this species from British Columbia, Alberta, Connecticut, New York, New Jersey, North Carolina, Georgia, Minnesota, South Dakota, New Mexico, Arizona, California, Louisiana, Florida, Mexico, and Guatemala.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996), Medicine Hat (Evans 1951b).

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured at the eolian sites. In addition to those indicated below another specimen was captured in a sweep sample from a dune blowout on Mounted Rifles Road, Amiens area (1♂ 28-VII-1994).

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♂		4♂	2♂	1♀		

Pompilidae: Ceropalinae

140. *Minagenia congrua* (Cresson) 2♂.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: Townes (1957) reported this species from Quebec, Massachusetts, Michigan, New York, Pennsylvania, Vermont, Virginia, and West Virginia.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The two specimens were both collected by Malaise trap on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										2♂

141. *Minagenia* sp. 3♂.

BIOLOGY: predator. Host - Araneae.

DISTRIBUTION: unknown.

CFB SUFFIELD NATIONAL WILDLIFE AREA: specimens were captured in the wetter sites on chernozem soil or in the riparian zone.In addition to thise specimens listed below, another specimen was captured in a Malaise trap placed in the riparian zone of the South Saskatchewan River at the River Sentry, Fish Creek area (1♂ 30-V-1995).

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂					1♂						

142. *Ceropales brevicornis* Patton 2♂ 4♀.

BIOLOGY: cleptoparasite. Host - Hymenoptera: Pompilidae.

DISTRIBUTION: Townes (1957) reported this species from Alberta, District of Columbia, Illinois, Indiana, Iowa, Kansas, Louisiana, Minnesota, Montana, Nebraska, New Mexico, North Dakota, Pennsylvania, South Dakota, Texas, and Virginia.

ALBERTA: Manyberries (Townes 1957).

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured at the chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			2♀	2♂		1♀					1♀	

4.3 Superfamily Apoidea

The Apoidea (bees and sphecid wasps) is represented by about 1,300 species in Canada with about 28,000 species worldwide (Finnamore and Michener 1993). The Apoidea is treated as two informal groups: the spheciformes or sphecid wasps (Sphecidae) and the apiformes or bees (Colletidae, Stenotritidae, Andrenidae, Oxaeidae, Halictidae, Melittidae, Ctenoplectridae, Fideliidae, Megachilidae, Anthophoridae, and Apidae). Only the spheciformes is considered here. The spheciformes comprise the family Sphecidae which includes about 8,000 species in 9 subfamilies. This study found 95 species in SNWA.

4.3.1 Sphecidae

Sphecid wasps include the thread-waisted wasps, mud-daubers, sand wasps and others. For the most part they are predatory and seek a wide variety of prey ranging from spiders to most groups of insects. Host groups within a genus or within some tribes remain fairly constant. Some species are cleptoparasitic on other sphecids. Nests are constructed in the ground, rotting wood or in twigs. Eight subfamilies and 283 species are found in Canada, mainly in the south, although 71 species, many associated with eolian habitats like those found in the Suffield NWA, are found in the Yukon (Finnamore 1997). Finnamore (1993) estimated the Canadian fauna at about 400 species.

Sphecidae: Sphecinae

143. *Sphex ichneumoneus* (Linnaeus) 1♀.

BIOLOGY: predator. Host - Orthoptera.

DISTRIBUTION: Bohart and Menke (1963) report this species widespread from southern Canada to Brazil, Ecuador and Peru.

ALBERTA: Medicine Hat, Orion, 6 km east of Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected by Malaise trap on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♀

144. *Prionyx canadensis* (Provancher) 4♂ 1♀.

BIOLOGY: predator. Host - Orthoptera.

DISTRIBUTION: British Columbia, Alberta, Manitoba, southern Ontario and western United States.

ALBERTA: Burdett, Commerce, Lethbridge, Manyberries (Dom. Range Sta.), McIntyre Ranch near Magrath (Finnamore 1996), Medicine Hat, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected from the eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens						1♂			1♂	2♂ 1♀

145. *Prionyx parkeri* Bohart & Menke 1♀.

BIOLOGY: predator. Host - Orthoptera.

DISTRIBUTION: British Columbia, Saskatchewan, Ontario and United States south to Mexico.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was captured in a chernozem site.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens				1♀								

146. *Podalonia argentifrons* (Cresson) 1♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Murray (1940) reported this species from Alberta, Manitoba, North Dakota, South Dakota, Nebraska, Montana, Wyoming, Colorado, New Mexico, Utah, Arizona, Idaho, Nevada, Oregon, California.

ALBERTA: Czar, Dunes, Medicine Hat.

CFB SUFFIELD NATIONAL WILDLIFE AREA: the single specimen was captured in an active dune blowout site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens									1♀	

147. *Podalonia communis* (Cresson) 5♂ 1♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Murray (1940) reported this species from Alberta, British Columbia, North Dakota, South Dakota, Nebraska, Kansas, Montana, Wyoming, Colorado, New Mexico, Utah, Arizona, Idaho, Nevada, Washington, Oregon.

ALBERTA: Banff, Brooks, Edmonton, Elkwater, Grande Prairie, Jasper, Lethbridge, McMurray, McIntyre Ranch near Magrath (Finnamore 1996), Morley 15km e., Peace River, Waterton.

CFB SUFFIELD NATIONAL WILDLIFE AREA: specimens were captured from a variety of sites on both soil types.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens				1♂		1♂	1♂					1♂

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♂				1♀				

148. *Podalonia luctuosa* (F. Smith) 1♂ 1♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Murray (1940) reported this species from Alberta, British Columbia, Yukon, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, Michigan, Wisconsin, Minnesota, North Dakota, South Dakota, Nebraska, Kansas, Montana, Wyoming, Colorado, New Mexico, Utah, Arizona, Idaho, Nevada, Washington, Oregon, California.

ALBERTA: Andrew Lake (Finnamore 1990), Banff, Beaverlodge, near Bellevue, Bilby, Bow Island, Brant, Calgary, Canmore, Champion, Coronation, Cypress Hills, Drumheller, Dunvegan, Edgerton, Edmonton, Elkwater, Gliechen, Grande Prairie, Jasper, Jasper Park, Kipp, Lethbridge, Lost River Coulee near Manyberries, McIntyre Ranch near Magrath (Finnamore 1996), McMurray, Medicine Hat, Nobleford, Radnor, Rosebud, Wainwright, Waterton, Welling, Wetaskiwin, Wildhorse, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Only two specimens of this common species were captured, both at chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							1♂			1♀		

149. *Podalonia mexicana* (Saussure) 1♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Murray (1940) reported this species from British Columbia, Alberta, Saskatchewan, North Dakota, Nebraska, Kansas, Montana, Wyoming, Colorado, New Mexico, Utah, Arizona, Idaho, Nevada, Washington, Oregon, California.

ALBERTA: Kipp, Lethbridge, Manyberries, Medicine Hat, Nobleford, Onefour, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was captured at a dry chernozem site.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens												1♀

150. *Podalonia mickeli* Murray 4♂ 5♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Murray (1940) reported this species from British Columbia, Alberta, Saskatchewan, Manitoba, North Dakota, South Dakota, Nebraska, Kansas, Montana, Georgia, Iowa, Minnesota, Wyoming, Colorado, New Mexico, Arizona, Washington, Oregon, California.

ALBERTA: Beaverlodge, Brooks, Gliechen, Lethbridge, McIntyre Ranch near Magrath (Finnamore 1996), Peace River, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were captured at sites on both soil types.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♀			1♂		1♂	1♂				1♂	

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										4♀

151. *Podalonia occidentalis* Murray 8♂.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Murray (1940) reported this species from Alberta, South Dakota, Montana, Wyoming, Colorado, New Mexico, Idaho, Utah, Arizona, Washington, Oregon, California.

ALBERTA: Delia, Manyberries, Waterton, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured by Malaise trap on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										8♂

152. *Podalonia sonorensis* (Cameron) 6♂ 1♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Murray (1940) reported this species from Alberta, Montana, North Dakota, Colorado, New Mexico, Mexico.

ALBERTA: Lethbridge, McIntyre Ranch near Magrath (Finnamore 1996).

CFB SUFFIELD NATIONAL WILDLIFE AREA: All but one specimen was collected at active dune blowout sites. n addition to those below one male specimen was collected in a sweep sample on Mounted Rifles Road (dune blowout, 28-VII-1994).

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens									5♂	1♀

153. *Podalonia valida* (Cresson) 1♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Murray (1940) reported this species from British Columbia, Alberta, Saskatchewan, Minnesota, Iowa, North Dakota, South Dakota, Nebraska, Kansas, Texas, Montana, Colorado, New Mexico, Utah, Arizona, Washington, California.

ALBERTA: Brooks, Edmonton, Lethbridge, Manyberries (Dom. Res. Sta.), Medicine Hat, Milk River, Moleb, Oyen.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single female was collected at a chernozwm site.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens				1♀								

154. *Podalonia violaceipennis* (Lepeletier) 13♂ 5♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Murray (1940) reported this species from Ontario, New Hampshire, Massachusetts, New York, New Jersey, Pennsylvania, Delaware, Virginia, North Carolina, Georgia, Alabama, Florida, Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Colorado.

ALBERTA: Beaverlodge, Bilby, Edgerton, Edmonton, Fawcett, High River, Lake Newell, Lethbridge; Medicine Hat, Nobleford, Wainwright.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens (86%) including all females were captured at chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂	2♂ 1♀	1♂			2♂	1♂	1♀	1♂	1♂ 3♀		2♂

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1♂	1♂				

155. *Ammophila azteca* Cameron 4♂ 5♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Krombein *et al.* (1979) reported this species as transcontinental, north to Yukon and Northwest Territories.

ALBERTA: Burdett, Cypress Hills, Czar, Delia, Lethbridge, Medicine Hat, New Dayton, Oyen.

CFB SUFFIELD NATIONAL WILDLIFE AREA: In addition to those specimens indicated below, two specimens were collected by sweep sample, one at Mounted Rifles Road (1♂ 28-VII-1994) and another in the Fish Creek Area (1♀ 28-VI-1994).

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♀		2♂	1♂	2♀	1♀			

156. *Ammophila ferruginosa* Cresson 36♂ 12♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Menke (1965) reported this species from the Great Basin in the western United States, north to southern Canada: Alberta, Saskatchewan, and Manitoba.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected on stabilized or active dunes. In addition to those specimens indicated below, 5 specimens were collected at a dune blowout on Mounted Rifles Road (3♂ 2♀ 28-VII-1994).

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♂ 3♀	4♂ 1♀	10♂ 1♀	2♀	5♂ 2♀	13♂	1♀

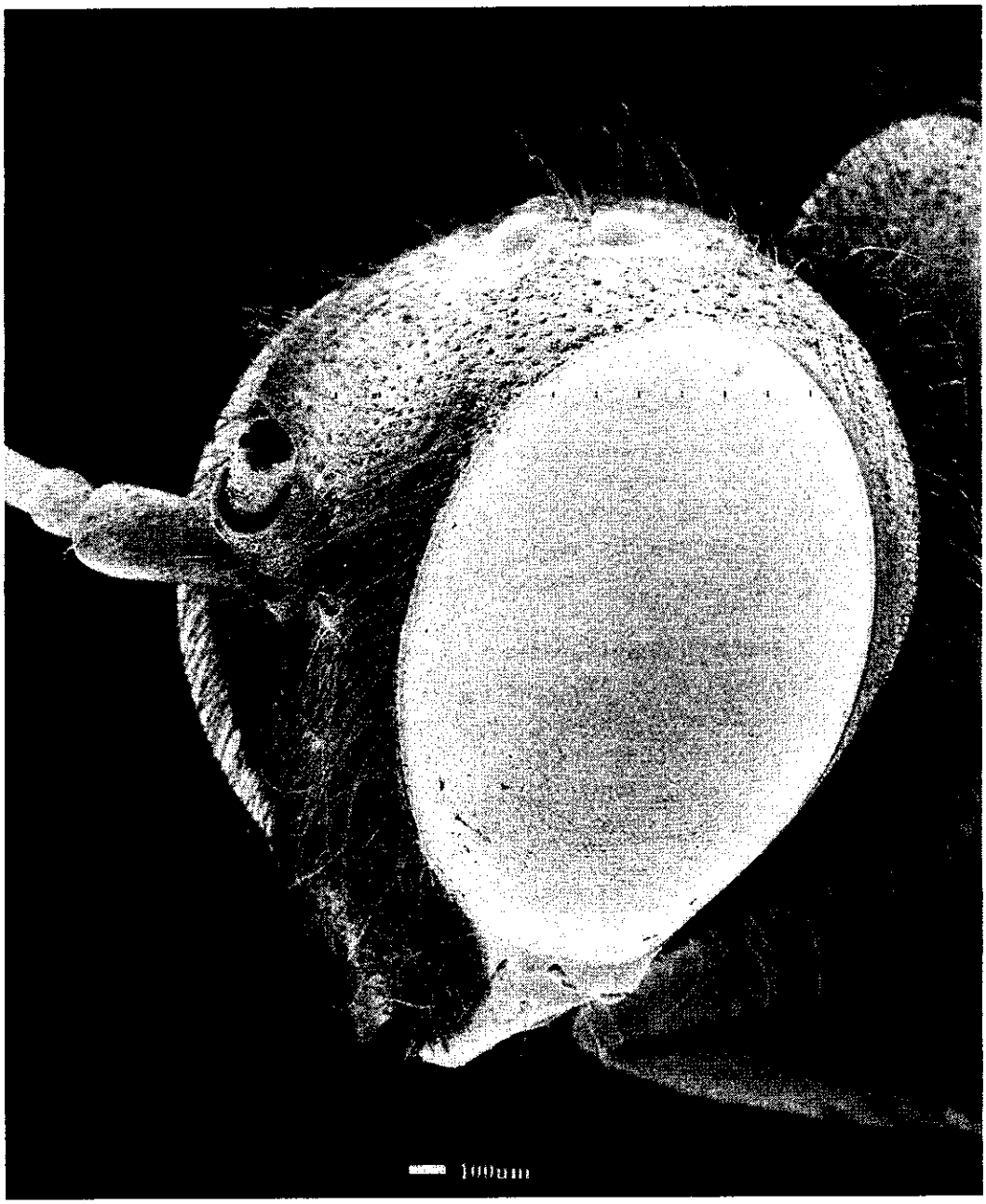


Figure 34. Head of *Ammophila kennedyi* (Murray) ♂ (Sphecidae: Sphecinae), no. 158.

157. *Ammophila harti* (Fernald) 26♂ 4♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Menke (1965) reported this species from Texas to Alberta, and eastward through the northern states and southern Canada to Vermont and Quebec.

ALBERTA: Taber.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected from active dune blowout sites. In addition to those listed below, a single specimen was collected at a dune blowout on Mounted Rifles Road (1♂ 28-VII-1994).

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens							3♂ 1♀	10♂ 2♀	12♂ 1♀	

158. *Ammophila kennedyi* (Murray) 166♂ 54♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Menke (1965) reported this species was transcontinental in the United States and southern Canada.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996); Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens (90%) were captured at the chernozem sites. This species is the most commonly trapped *Ammophila* in SNWA and one of the most common wasps encountered. In addition to those specimens listed below, a single male specimen was collected from a dune blowout near Mounted Rifles Road (28-VII-1994), and 4 specimens were swept from the Fish Creek Area (2♂ 2♀ 29-VI-1994).

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	9♂ 5♀	21♂ 4♀	19♂ 8♀	18♂ 2♀	10♂ 2♀	15♂ 6♀	11♂ 2♀	12♂ 1♀	10♂ 2♀	12♂ 5♀	7♂ 7♀	5♂ 3♀

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			1♂	2♂ 1♀	5♂ 1♀		2♂ 1♀	3♂ 1♀	1♀	1♂ 1♀

159. *Ammophila macra* Cresson 3♂ 1♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Menke (1965) reported this species from the western United States and southwestern Canada.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured at eolian sites. In addition to those listed below, two specimens were collected from a dune blowout near Mounted Rifles Road (1♂ 1♀ 28-VII-1994).

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens									1♂	1♂

160. *Ammophila parkeri* Menke 2♂.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Menke (1965) reported this species from the western United States, Montana, south to Nevada and California.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Both specimens collected were obtained from dry chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens											1♂	1♂

161. *Ammophila polita* Cresson 1♂ 1♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Menke (1965) reported this species from the great basin ranging from Nebraska to Alberta.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Both specimens were captured at eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♀			1♂					

162. *Ammophila varipes* Cresson 2♂ 1♀.

BIOLOGY: predator. Host - Lepidoptera larvae.

DISTRIBUTION: Menke (1965) reported this species from the Great Basin ranging from Minnesota to Arizona, Texas and Mexico.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected from dry and medium-dry chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens									1♂	1♂		1♀

Sphecidae: Pemphredoninae

163. *Mimesa cressonii* Packard 3♂ 3♀.

BIOLOGY: predator. Host - Homoptera: Cicadellidae (leafhoppers). Members of this genus are solitary, and construct nests in the sand.

DISTRIBUTION: Finnamore (1983) reported this species from British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Arizona, California, Connecticut, District of Columbia, Idaho, Illinois, Iowa, Kansas, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Pennsylvania, South Dakota, Texas, Utah, Virginia, Wisconsin, Wyoming.

ALBERTA: Medicine Hat.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens, 2♂ 3♀, were collected in a sweep sample from an active dune blowout on Mounted Rifles Road.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♂

164. *Mimesa granulosa* (Fox) 3♀.

BIOLOGY: predator. Host - Homoptera: Cicadellidae (leafhoppers). Members of this genus are solitary and construct nests in the sand.

DISTRIBUTION: Finnamore (1983) reported this species from Colorado, Idaho, Montana, Nebraska, New Mexico, North Dakota, Utah, Wyoming.

ALBERTA: its presence in Alberta represents a new record for Canada.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected in a sweep sample from an active dune blowout on Mounted Rifles Road.

165. *Mimesa gregaria* 1♂ 1♀.

BIOLOGY: predator. Host - Homoptera: Cicadellidae (leafhoppers). Members of this genus are solitary and construct nests in the sand.

DISTRIBUTION: Finnamore (1983) reported this species over most of western and northern North America.

ALBERTA: Finnamore (1983) reported the following localities: Eisenhower Junction, Elkwater Park, Flat Creek, Grande Prairie, Hotchkiss, Jumping Pond Creek 32 km west Calgary, Lethbridge, McMurray, Medicine Hat, Morley, Peace River, Scandia, Stettler, Wainwright.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected on both soil types sampled at SNWA.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens						1♂						

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♀

166. *Diodontus bidentatus* Rohwer 3♂ 14♀.

BIOLOGY: predator. Host - Homoptera: aphids. Members of this genus are solitary, nests are constructed in the ground.

DISTRIBUTION: Eighme (1989) reported this species from Alaska, Colorado, Idaho, Michigan, Montana, North Dakota, Pennsylvania.

ALBERTA: Calgary Bow River, McIntyre Ranch near Magrath (Finnamore 1996), Wagner Natural Area near Edmonton (Finnamore 1994); Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was collected in about equal numbers at the wet chernozem sites and the stabilized dune sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	3♀		1♀	2♀								

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			1♀			1♀				3♂ 6♀

167. *Diodontus fraternus* Rohwer 4♂.

BIOLOGY: predator. Host - Homoptera: aphids. Members of this genus are solitary, nests are constructed in the ground.

DISTRIBUTION: Eighme (1989) reported this species from Arizona, California, Colorado, Idaho, Iowa, Nebraska, Nevada, New Mexico, Utah.

ALBERTA: Calgary Bow River.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected in active dune sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens								1♂	3♂	

168. *Diodontus neomexicanus* Rohwer 4♂ 3♀.

BIOLOGY: predator. Host - Homoptera: aphids. Members of this genus are solitary, nests are constructed in the ground.

DISTRIBUTION: Eighme (1989) reported this species from Arizona, California, Colorado, Idaho, Iowa, New Mexico, Utah.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996); Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Like *Diodontus bidentatus* (162), this species was collected in both wet chernozem and stabilized dune sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂	1♂		1♂								

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♂ 3♀

169. *Diodontus occidentalis* Fox 2♂ 3♀.

BIOLOGY: predator. Host - Homoptera: aphids. Members of this genus are solitary, nests are constructed in the ground.

DISTRIBUTION: Eighme (1989) reported this species from Alaska, Arizona, California, Colorado, Idaho, Michigan, Nevada, New York, North Dakota, Utah, Wyoming.

ALBERTA: Wagner Natural Area near Edmonton (Finnamore 1994).

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected at eolian sites including a single specimen male swept from an active dune blowout on Mounted Rifles Road.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♀						1♂ 2♀

170. *Pemphredon confirtim* Fox 3♂ 15♀.

BIOLOGY: predator. Host - Homoptera: aphids. Members of this genus are solitary, nests are constructed in previously existing tubes, like hollow twigs, or constructed in decaying wood (Bohart and Menke 1976).

DISTRIBUTION: Dollfuss (1995) reported this species from British Columbia, Alberta, California, Colorado, Idaho, Nevada, Oregon, Utah, Washington, Wyoming.

ALBERTA: Empress (Dollfuss 1995), Wagner Natural Area near Edmonton (Finnamore 1994).

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured by Malaise trap on stabilized sand dunes.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										3♂ 15♀

171. *Pemphredon inornata* Say 1♂.

BIOLOGY: predator. Host - Homoptera: aphids. Members of this genus are solitary, nests are constructed in previously existing tubes, like hollow twigs, or constructed in decaying wood (Bohart and Menke 1976).

DISTRIBUTION: this is a Holarctic species, Dollfuss (1995) reported this species in North America from Alberta, British Columbia, Manitoba, New Brunswick, Northwest Territories, Nova Scotia, Ontario, Quebec, Saskatchewan, Yukon, California, Colorado, Connecticut, District of Columbia, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Soiuth Carolina, Tennessee, Utah, Vermont, Virginia, Wisconsin, Wyoming.

ALBERTA: Dollfuss (1995) reported the following localities: Andrew Lake (also Finnamore 1996), Blairmore, Bilby, Bistcho Lake, Cardinal River, Castle River, Clyde, Cowley, East Morley, Edmonton, Elkwater Park, Empress, Grande Prairie, Gooseberry Lake, Jumping Pond Creek near Calgary, Laggan, Lake Louise, Lethbridge, Lundbreck, McMurray, Peace River, Prospect Mountain, Spruce Grove, Waterton Lake National Park, Westcastle River, Winifred Lake, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was captured by Malaise trap on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♂

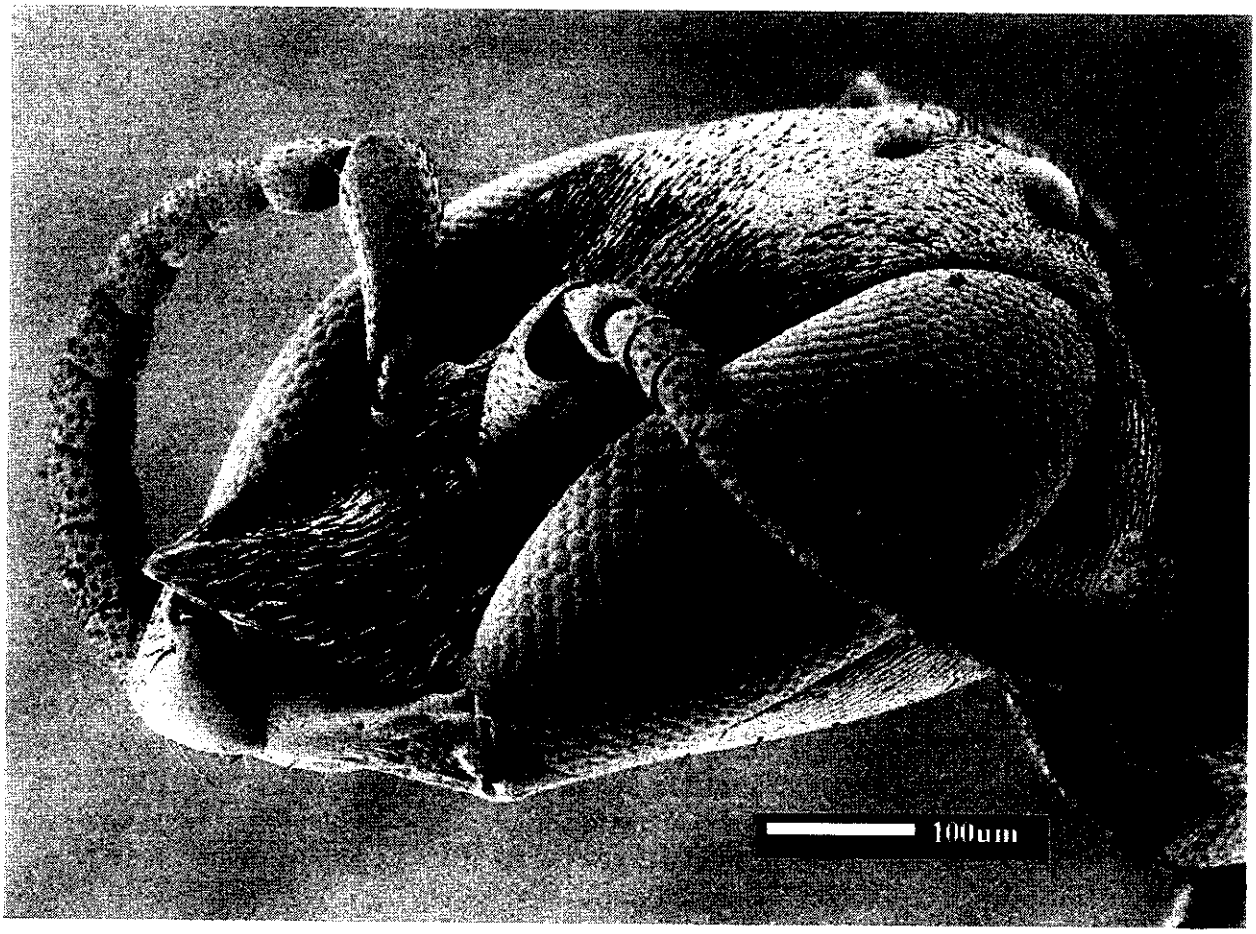


Figure 35. Head of *Ammoplanops moenkopi* Pate ♂ (Sphecidae: Pemphredoninae), no. 173.

172. *Pulverro columbianus* (Kohl) 18♂ 17♀.

BIOLOGY: predator. Host - Thysanoptera (thrips). Members of this genus construct nests in the ground.

DISTRIBUTION: Pate (1937) reported this species from southern British Columbia to Colorado.

ALBERTA: Calgary Bow River, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected on eolian soil sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				2♂ 13♀	2♂ 2♀	8♂ 1♀		5♂	1♂	1♀

173. *Ammoplanops moenkopi* Pate 21♂ 15♀.

BIOLOGY: nothing is known of the biology of the members of this genus.

DISTRIBUTION: Bohart and Smith (1978) reported this species from New Mexico, Texas, Nebraska, Wyoming, Utah, California, Arizona.

ALBERTA: The capture of specimens in Alberta represents a substantial extension of the known range of this species and a new record for Canada.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens were captured on the eolian sites. In addition to those listed below, 4♂ and 3♀ were swept from an active dune blowout on Mounted Rifles Road.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	2♀		1♀								1♀	

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			1♀	1♂	1♂	2♂ 1♀		4♂ 1♀	9♂ 4♀	1♀

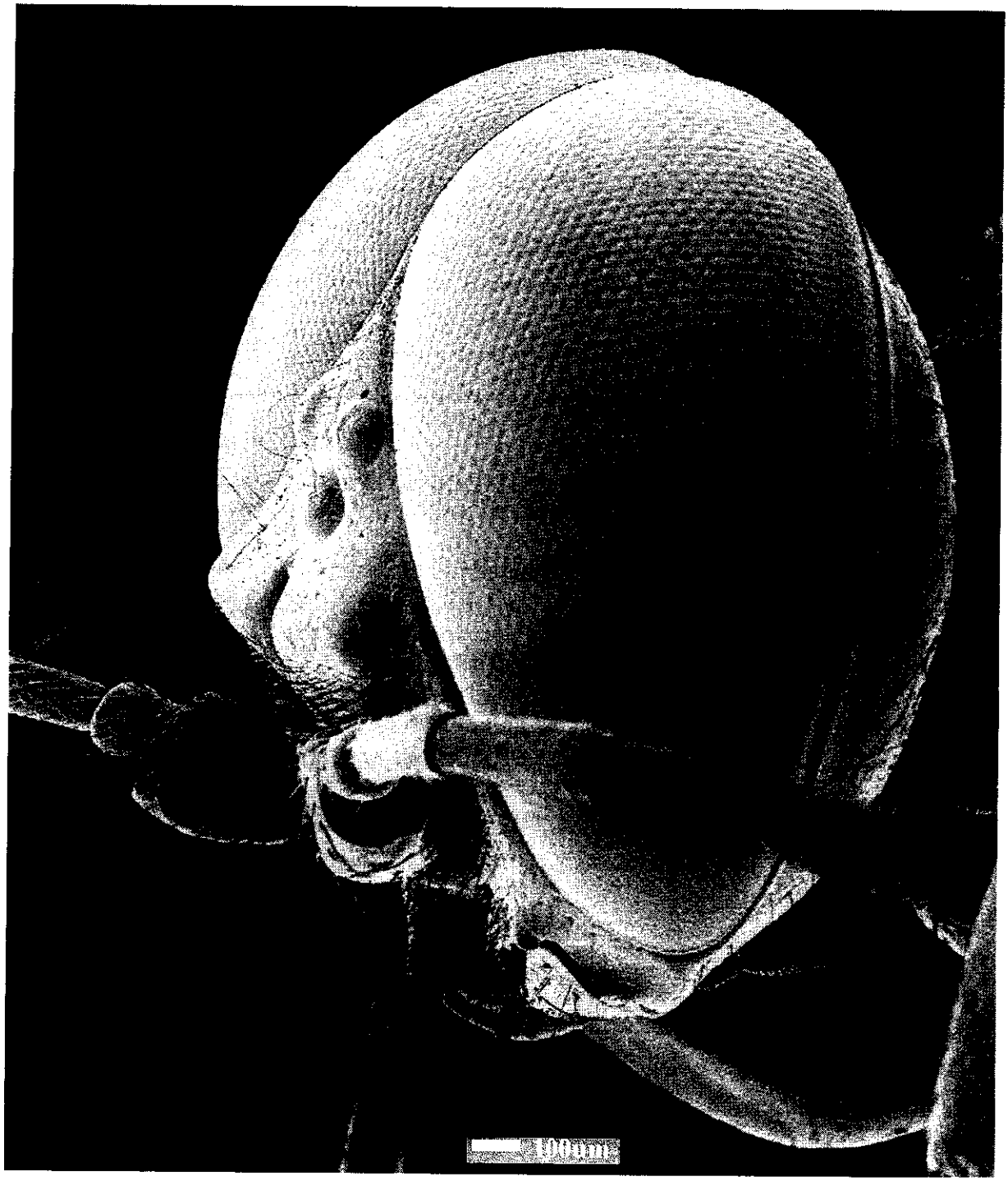


Figure 36. Head of *Dryudella montana* (Cresson) ♂ (Sphecidae: Astatinae), no. 179.

Sphecidae: Astatinae

174. *Diploplectron brunneipes* (Cresson) 13♂ 10♀.

BIOLOGY: predator. Host - Hemiptera: Lygaeidae.

DISTRIBUTION: Parker (1972) reported this species from California to Colorado, Wyoming and Idaho.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected from eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				3♀	4♂ 4♀	4♂ 1♀	1♀			5♂ 1♀

175. *Diploplectron peglowi* Krombein 3♂.

BIOLOGY: predator. Host - Hemiptera: Lygaeidae.

DISTRIBUTION: Bohart and Menke (1976) reported this species from boreal North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured from stabilized dune sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1♂	1♂				1♂

176. *Astata bechteli* Parker 5♂.

BIOLOGY: predator. Host - Hemiptera: Pentatomidae.

DISTRIBUTION: Parker (1962) reported this species from Nevada, California, Arizona, Utah, New Mexico, Wyoming, Oregon, Washington, Montana.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured from chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂	3♂	1♂									

177. *Astata nevadica* Cresson 1♂ 1♀.

BIOLOGY: predator. Host - Hemiptera: Pentatomidae.

DISTRIBUTION: Parker (1962) reported this species widely distributed over much of southwestern Canada, south to Mexico.

ALBERTA: Medicine Hat.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Both specimens were collected by Malaise trap on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♂ 1♀

178. *Astata unicolor* Say 1♂.

BIOLOGY: predator. Host - Hemiptera: Pentatomidae.

DISTRIBUTION: Parker (1962) reported this species over most of southern Canada and the United States.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected from a chernozem soil site.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♂										

179. *Dryudella montana* (Cresson) 7♂ 2♀.

BIOLOGY: predator. Host - Hemiptera

DISTRIBUTION: Parker (1969) reported this species from the western United States.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured from stabilized dune sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1♂ 1♀	4♂				2♂ 1♀

Sphecidae: Crabroninae

180. *Ancistromma aurantia* (Fox) 1♂ 1♀.

BIOLOGY: predator. Host - Orthoptera: Gryllidae.

DISTRIBUTION: Bohart and Bohart (1962) reported this species from Alberta, Montana, North Dakota, Wyoming, Colorado, New Mexico, Kansas, Nebraska, Iowa.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Both specimens were collected by Malaise trap on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♂ 1♀

181. *Ancistromma capax* (Fox) 12♂ 3♀.

BIOLOGY: predator. Host - Orthoptera: Gryllidae.

DISTRIBUTION: Bohart and Bohart (1962) reported this species from British Columbia, Alberta, Washington, Oregon, California, Utah, Idaho, Wyoming, Colorado, New Mexico, Nebraska, North Dakota.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured on eolian soil sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂									11♂ 3♀

182. *Tachytes sayi* Banks 2♂ 7♀.

BIOLOGY: predator. Host - Orthoptera.

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Washington and Nebraska, south to Texas and California. Bohart (1962) also reported British Columbia.

ALBERTA: Manyberries, Medicine Hat.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were captured from both soil types.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂		2♀	1♂ 1♀								

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens							1♀			3♀

183. *Tachysphex alpestris* Rohwer 1♂ 2♀.

BIOLOGY: predator. Host - Orthoptera.

DISTRIBUTION: Pulawski (1988) reported this species from British Columbia, Alberta, Saskatchewan, Manitoba, Northwest Territories, Arizona, California, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, Oregon, Utah, Washington.

ALBERTA: Pulawski (1988) reported the following: Drumheller, Edmonton, Lethbridge, Medicine Hat, Orion 12 km sw, Slave Lake, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured from eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens							1♂			2♀

184. *Tachysphex hurdi* R. Bohart 1♀.

BIOLOGY: predator. Host - Orthoptera.

DISTRIBUTION: Pulawski (1988) reported this species from California, Arizona, Utah, Nevada, Oregon, Idaho.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was captured at an active dune blowout.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens							1♀			

185. *Tachysphex mundus* Fox 3♂ 5♀.

BIOLOGY: predator. Host - Orthoptera.

DISTRIBUTION: Pulawski (1988) reported this species from Alberta, Saskatchewan, Alabama, Arizona, Arkansas, Colorado, District of Columbia, Florida, Georgia, Illinois, Iowa, Kansas, Maryland, Michigan, Minnesota, Mississippi, Montana, Nebraska, New Jersey, New Mexico, New York, North Carolina, North Dakota, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Virginia, Wisconsin, Mexico.

ALBERTA: Pulawski (1988) reported the following: Medicine Hat, Orion 12km sw, Picture Butte, Wardlow, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured on eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens								1♂		2♂ 5♀

186. *Tachysphex pompiliformis* (Panzer) 94♂ 38♀.

BIOLOGY: predator. Host - Orthoptera.

DISTRIBUTION: Pulawski (1988) reported this species to be Holarctic with North American records from Alberta, British Columbia, Manitoba, New Brunswick, Northwest Territories, Nova Scotia, Ontario, Prince Edward Island, Quebec, Saskatchewan, Yukon, Arizona, California, Colorado, Idaho, Massachusetts, Michigan, Minnesota, Montana, Nebraska, Nevada, New Hampshire, New Mexico, New York, North Dakota, Oregon, South Dakota, Utah, Vermont, Washington, Wisconsin,

Wyoming.
ALBERTA: Pulawski (1988) reported the following: Banff, Beaverlodge, Beverly, Brooks, Cowley, Drumheller, Elkwater Park, Empress, Frank, Jumping Pond Creek 32 km w Calgary, Laggan, Lethbridge, McMurray, Medicine Hat, Morley 24 km e, Orion 12 km sw, Raymond, Red Deer, Scandia, Taber, Turin, Wainwright, Waterton Park, Writing-On-Stone Provincial Park. McIntyre Ranch near Magrath (Finnamore 1996).
CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were captured from a variety of sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	6♂ 6♀	11♂	7♂ 1♀	20♂ 2♀	8♂	5♂ 3♀	1♂					

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			1♀	2♀	4♂	3♂ 3♀		1♂	8♂ 3♀	20♂ 20♀

187. *Tachysphex punctifrons* Fox 1♂ 4♀.
BIOLOGY: predator. Host - Orthoptera.
DISTRIBUTION: Pulawski (1988) reported this species from Alberta, Saskatchewan, Manitoba, Colorado, Connecticut, Florida, Georgia, Idaho, Illinois, Kansas, Maryland, Massachusetts, Mivhigan, Minnesota, Montana, Nebraska, New Mexico, New York, North Carolina, North Dakota, Oklahoma, South Dakota, Texas, Utah, Wisconsin, Wyoming.
ALBERTA: Haynes, Orion 12 km sw, Scandia, Writing-On-Stone Provincial Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was captured on both soil types in the NWA.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens					1♀	1♀						

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♂ 2♀

188. *Tachysphex semirufus* (Cresson) 4♀.
BIOLOGY: predator. Host - Orthoptera.

DISTRIBUTION: Pulawski (1988) reported this species from British Columbia, Alberta, Saskatchewan, Yukon, Arizona, California, Colorado, Idaho, Michigan, Nebraska, Nevada, New Jersey, Oregon, Utah, Washington, Wyoming.
ALBERTA: Andrew Lake (Finnamore 1990), Smith 8 km w (Pulawski 1988), Wabamun (Pulawski 1988).
CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured at eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens									3♀	1♀

189. *Tachysphex similis* Rohwer 9♂ 23♀.
BIOLOGY: predator. Host - Orthoptera.
DISTRIBUTION: Pulawski (1988) reported this species from Alberta, Saskatchewan, Manitoba, Northwest Territories, Ontario, Quebec, New Brunswick, Alabama, Arkansas, Colorado, Connecticut, District of Columbia, Florida, Georgia, Illinois, Iowa, Kansas, Kentuchy, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey,New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, Texas, Utah, Virginia, Mexico, Bahamas.
ALBERTA: Medicine Hat, Orion 12 km sw, Writing-On-Stone Provincial Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured at eolian sites but most were encountered on stabilized dune sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♀	1♀	1♀	1♂ 1♀	4♂ 1♀	3♂ 3♀		1♂ 1♀		14♀

190. *Tachysphex tarsatus* (Say) 16♂ 49♀.
BIOLOGY: predator. Host - Orthoptera.
DISTRIBUTION: Pulawski (1988) reported this species from British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia, Georgia, Idaho, Illinois, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Oregon, Pennsylvania, Rhode Isalnd, South Dakota, Tennessee, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming, Mexico.
ALBERTA: Pulawski (1988) reported the following localities: Drumheller, Irvine 8 km s, Lethbridge, Medicine Hat, Scandia. McIntyre Ranch near Magrath (Finnamore 1996), Tilley, Writing-On-Stone Provincial Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: Although specimens were captured at sites on both soil types, the majority of specimens (90%), including all males, were collected by Malaise trap on a

stabilized dune site. In addition, a single female was collected from the Fish Creek area 50°23.568'N 110°35.153'W.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♀		1♀								

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					3♀					42♀ 17♂

191. *Tachysphex texanus* (Cresson) 4♂ 1♀.

BIOLOGY: predator. Host - Orthoptera.

DISTRIBUTION: Pulawski (1988) reported this species from Alberta, Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Idaho, Illinois, Kansas, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Oregon, South Carolina, South Dakota, Texas, Utah Virginia, Washington, Wyoming, Mexico.

ALBERTA: Pulawski (1988) reported the following localities: Coaldale 16 km n, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was collected on both soil types.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂											

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens						1♀				3♂

192. *Tachysphex williamsi* R. Bohart 6♂.

BIOLOGY: predator. Host - Orthoptera.

DISTRIBUTION: Pulawski (1988) reported this species from Alberta, Saskatchewan, Arizona, California, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oregon, Utah, Washington, Wyoming, Mexico.

ALBERTA: Pulawski (1988) reported the following localities: Coaldale, Dunmore, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species was captured on both soil types.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♂			1♂	1♂						

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens								1♂		1♂

193. *Plenoculus davisi* Fox 2♂ 1♀.

BIOLOGY: predator. Host - Hemiptera.

DISTRIBUTION: Williams (1960) reported this species from British Columbia, Arizona, California, Colorado, Connecticut, Florida, Idaho, Indiana, Kansas, Michigan, Minnesota, Montana, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Oregon, Tennessee, Texas, Utah, Wyoming, Mexico.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured at eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1♂				1♂	1♀

194. *Solierella* sp. A 6♂ 3♀.

BIOLOGY: predator. Host - Hemiptera.

DISTRIBUTION: unknown.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured at eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♂ 2♀	1♀	2♂		1♂	2♂	

195. *Solierella* sp. B 4♂ 4♀.
BIOLOGY: predator. Host - Hemiptera.
DISTRIBUTION: unknown.
ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996).
CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured at eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				2♂ 3♀	1♀	1♂ 1♀				

196. *Solierella* sp. C 1♀.
BIOLOGY: predator. Host - Hemiptera.
DISTRIBUTION: unknown.
CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was captured at a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens						1♀				

197. *Miscophus* sp. A 1♂ 4♀.
BIOLOGY: predator. Host - Araneae (spiders).
DISTRIBUTION: unknown.
CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured on eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1♀	1♀		1♂		2♀

198. *Miscophus* sp. B 1♂.
BIOLOGY: predator. Host - Araneae (spiders).
DISTRIBUTION: unknown.
CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was captured at an active dune blowout site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens							1♂			

199. *Pisonopsis triangularis* Ashmead 2♂.

BIOLOGY: predator, nests in hollow stems.

DISTRIBUTION: Bohart and Menke (1976) reported this species from Colorado to California.

ALBERTA: Its presence in Alberta represents a substantial extension of its known range.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Both specimens were captured by Malaise trap on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										2♂

200. *Belomicrus forbesii* (Robertson) 5♂.

BIOLOGY: predator. Host - Hemiptera.

DISTRIBUTION: Pate (1940) reported this species from British Columbia, Alberta, Manitoba, North Dakota, Montana, Wyoming, Colorado, Idaho, Washington, Oregon.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996), Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: all specimens were captured at eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					2♂	3♂				

201. *Oxybelus abdominalis* Baker 5♂ 7♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Bohart and Schlinger (1957) reported this species from California, Arizona, Colorado, Idaho, Kansas, Nebraska, New Mexico, North Dakota, Texas, Utah.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured at eolian sites. In addition to those specimens listed below, 2♀ were swept from an active dune blowout on Mounted Rifles Road.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				2♂ 1♀		1♀		3♂ 1♀		2♀

202. *Oxybelus emarginatus* Say 1♂ 1♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: this species is transcontinental in southern Canada and the United States.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured from stabilized dune sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens						1♀				1♂

203. *Oxybelus sericeus* Robertson 1♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Bohart and Schlinger (1957) reported this species from Arizona, California, Florida, Illinois, Kansas, Massachusetts, Nevada, New Mexico, New York, North Carolina, Oregon, South Dakota, Utah.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was captured at an eolian site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♀								

204. *Oxybelus subulatus* Robertson 1♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Krombein *et al.* (1979) reported this species from Colorado to Massachusetts, and north to Canada.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected at an eolian site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♀									

205. *Oxybelus uniglumis* (Linnaeus) 4♂ 23♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Krombein *et al.* (1979) reported this Holarctic species as transcontinental in distribution from Alaska to Mexico.

ALBERTA: McIntyre Ranch near Magrath (Finnamore 1996), Wagner Natural Area near Edmonton (Finnamore 1994), Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All but one specimen were captured at eolian sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										1♀		

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			2♂ 4♀	2♀	1♂ 1♀	3♀			1♀	1♂ 11♀

206. *Lindenius columbianus* (Kohl) 16♂ 9♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Bohart and Menke (1976) reported this species from the United States and southern Canada.

ALBERTA: Empress, Medicine Hat, Radnor, Wardlow, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected on eolian sites. In addition to those specimens listed below, 2♀ were collected by sweep from an active dune blowout.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♂	2♂	1♂	2♂	4♂		1♂		5♂ 7♀

207. *Crossocerus (Crossocerus) maculiclypeus* (Fox) 12♂ 14♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Krombein *et al.* (1979) reported this species as transcontinental in Canada and south through the central United States to Kansas, New Mexico and California.

ALBERTA: Edgerton, Medicine Hat.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured from eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♀	1♀					1♂	8♂ 5♀	3♂ 8♀

208. *Crossocerus (Crossocerus) minimus* (Packard) 1♂.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Krombein *et al.* (1979) reported this species from New Brunswick to Ontario, Northwest Territories, Maine to North Carolina, west to South Dakota and Texas.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was swept from the riparian zone of the South Saskatchewan River, the "Bull Pen" in the Fish Creek area.

209. *Crabro denningi* R. Bohart 6♂ 25♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Bohart (1976) reported this species from Saskatchewan and North Dakota.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured from eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♀		1♀			2♀	2♀	5♂ 7♀	1♂ 12♀

210. *Crabro pallidus* Fox 2♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Bohart (1976) reported this species from British Columbia, Alberta, Saskatchewan, Wyoming, Idaho, Utah.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Both specimens were captured at eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens								1♀		1♀

211. *Crabro tenuis* Fox 1♂.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Bohart (1976) reported this species from Alberta to Quebec, south to Georgia, Oklahoma, Colorado, Utah.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was captured at a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens						1♂				

212. *Crabro veltaris* R. Bohart 2♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Bohart (1976) reported this species from Alberta, Saskatchewan, Oregon, California, Nevada, Utah, Wyoming, Colorado.

ALBERTA: Bohart (1976) listed the following: Nobleford, Chin.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured at eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♀								

213. *Ectemnius (Clytochrysis) lapidarius* (Panzer) 1♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Krombein *et al.* (1979) reported this Holarctic species to be transcontinental in Canada.

ALBERTA: Edmonton, McIntyre Ranch near Magrath (Finnamore 1996), Wagner Natural Area near Edmonton (Finnamore 1994).

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected in an ultraviolet light trap from the riparian zone of the South Saskatchewan River.

214. *Ectemnius (Hypocrabro) continuus* (Fabricius) 1♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Krombein *et al.* (1979) report this Holarctic species to be transcontinental in Canada, and extending southward into the United States.

ALBERTA: Banff, Drumheller, Edmonton, Elk Island, Fawcett, Gull Lake, Wabamun, Wagner Natural Area near Edmonton (Finnamore 1994), Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected in a sweep sample from the riparian zone of the South Saskatchewan River ("Bull Pen)".

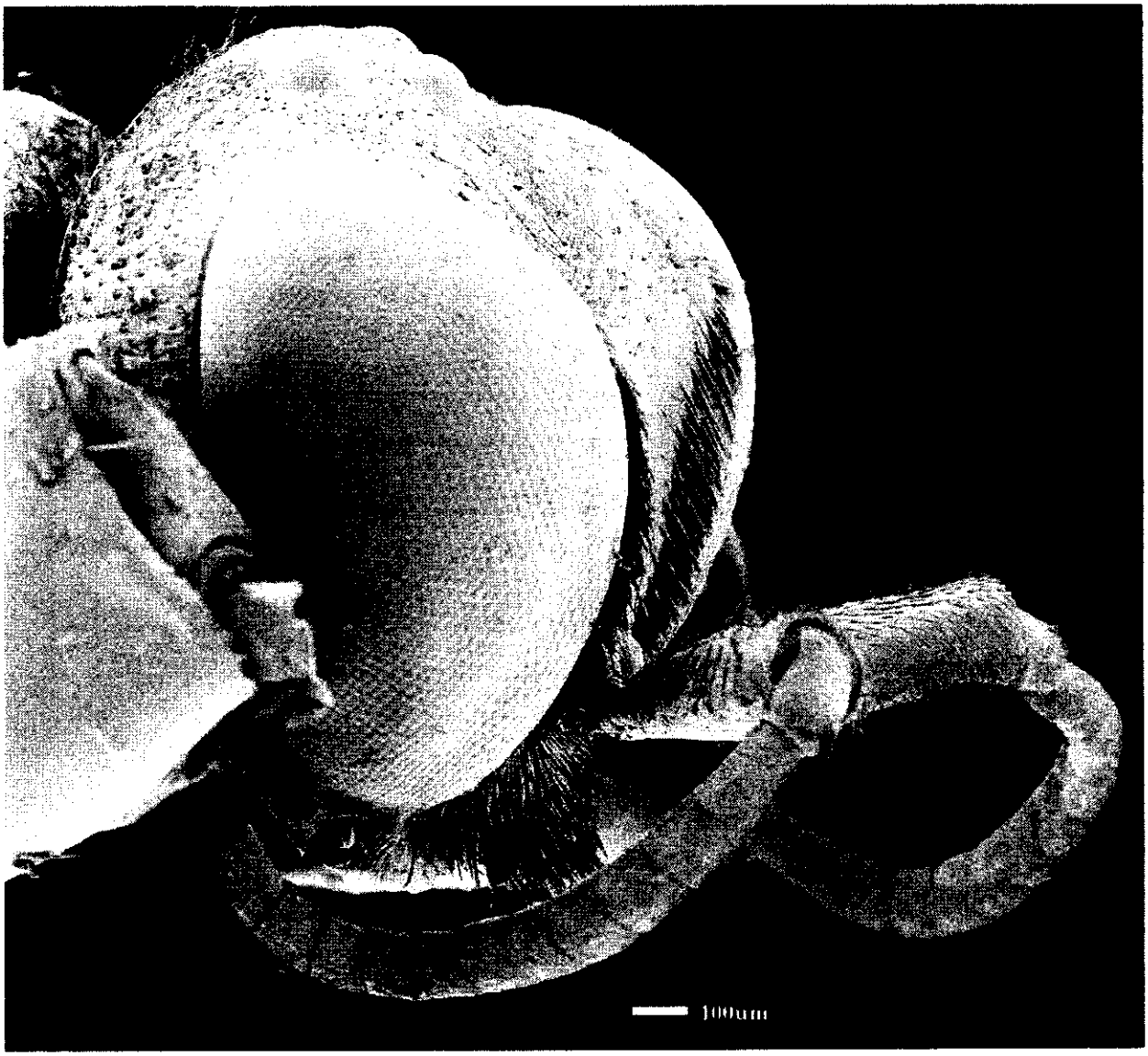


Figure 37. Head of *Crabro denningi* R. Bohart ♂ (Sphecidae: Crabroninae), no. 209.

215. *Ectemnius (Protothyreopus) dilectus* (Cresson) 7♂ 11♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Bohart and Menke (1976) reported this species over the Nearctic Region.

ALBERTA: Cypress Hills, Edgerton, Empress, Lake Newell, Lethbridge, Manyberries, McIntyre Ranch near Magrath (Finnamore 1996), Medicine Hat, One Four, Orion, Tilley, Tofield, Wardlow,Welling, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This species is found in a variety of sites in SNWA. In addition to those listed below, a single ♀ specimen was collected in a light trap from the riparian zone of the South Saskatchewan River.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♂ 4♀				2♂ 2♀			1♀			

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			1♀	1♂	1♂ 1♀	1♂ 1♀				1♂

216. *Lestica confluenta* (Say) 2♂ 2♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Bohart and Menke (1976) reported this species from southern Canada and the United States.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were collected from eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			1♂ 1♀	1♀						1♂

Sphecidae: Mellininae

217. *Mellinus abdominalis* Cresson 68♂ 306♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Siri and Bohart (1974) reported this species from Montana, Wyoming, Nebraska, and Colorado.

CFB SUFFIELD NATIONAL WILDLIFE AREA: This is the most abundant species collected at the trap sites; all specimens were captured from eolian sites. In addition, 8 ♂ specimens were collected by sweep sample near Mounted Rifles Road (28-VII-1994) at an active dune blow-out.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	6♂ 46♀	29♂ 188♀	23♂ 1♀	1♂ 3♀	1♂ 8♀	16♂ 31♀	1♀			4♂ 8♀

Sphecidae: Nyssoninae

218. *Didineis dilata* Malloch and Rohwer 2♂.

BIOLOGY: predator. Host - Homoptera: Fulgoridae, Cicadellidae (leafhoppers).

DISTRIBUTION: Bohart and Menke (1976) reported this species from Wisconsin and Nebraska. Its appearance at SNWA represents a substantial extension of its known range and a new record for Canada.

ALBERTA: Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Both specimens were collected from chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			1♂		1♂							

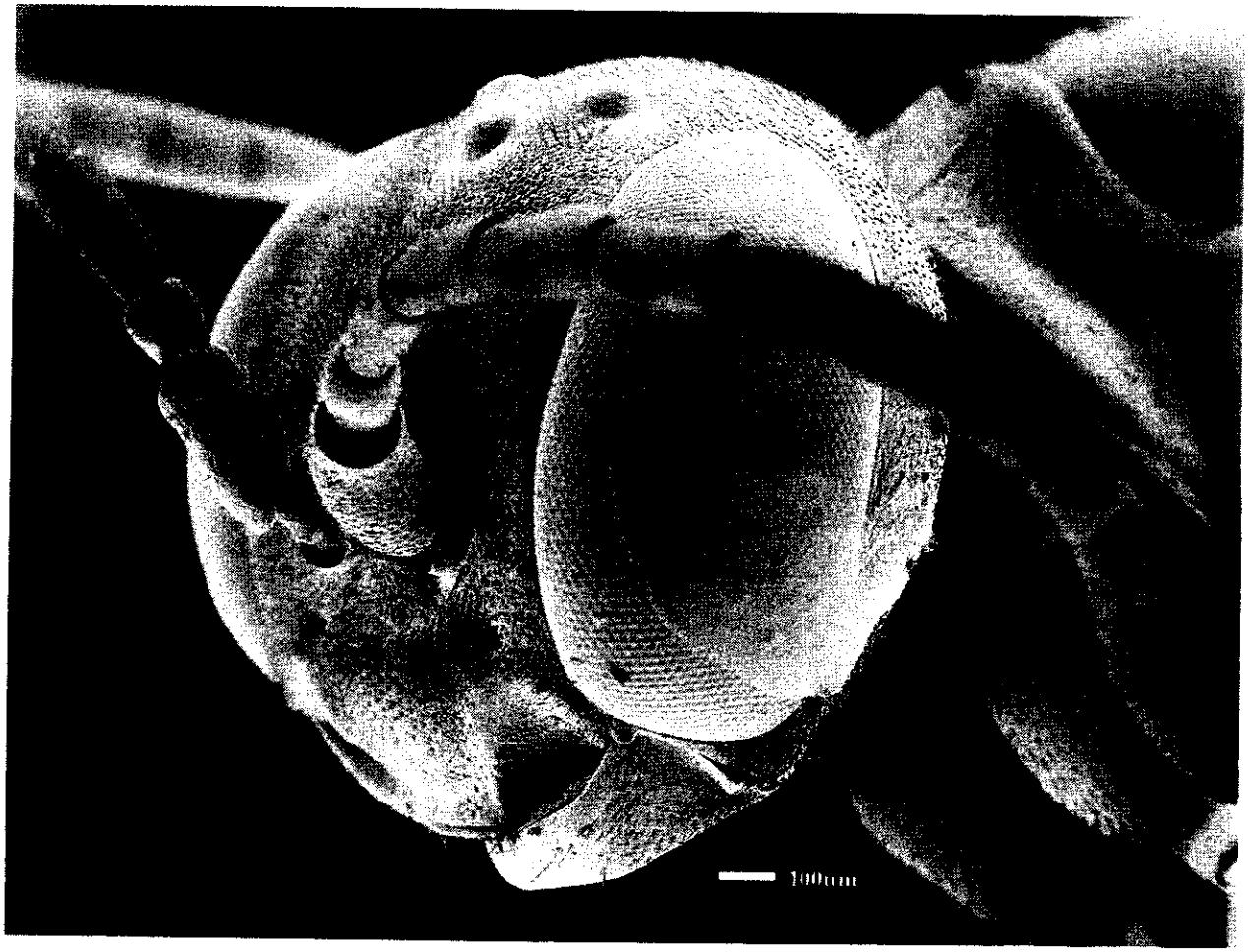


Figure 38. Head of *Mellinus abdominalis* Cresson ♂ (Sphecidae: Mellininae), no. 217.

219. *Didineis latimana* Malloch and Rohwer 5♂ 1♀.

BIOLOGY: predator. Host - Homoptera: Fulgoridae, Cicadellidae (leafhoppers).

DISTRIBUTION: Bohart and Menke (1976) reported this species from the United States.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured from eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂	1♂ 1♀						1♂	1♂	1♂

220. *Hyponysson bicolor* Cresson 1♀.

BIOLOGY: cleptoparasite. Host - unknown.

DISTRIBUTION: Bohart and Menke (1976) reported this species from the western United States. This is the first record of the species in Canada.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single female specimen was collected from a chernozem site.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♀										

221. *Nysson lateralis* Packard 1♂.

BIOLOGY: cleptoparasite. Host - Hymenoptera: Sphecidae: Gorytini.

DISTRIBUTION: Bohart and Menke (1976) report this species from the United States. It has also been reported from Quebec (Finnamore 1982).

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was captured at an eolian site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♂								

222. *Nysson rufiventris* Cresson 1♀.

BIOLOGY: cleptoparasite. Host - Hymenoptera: Sphecidae: Gorytini.

DISTRIBUTION: Bohart and Menke (1976) reported this species from the western United States.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was captured at an eolian site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens						1♀				

223. *Nysson* sp. C 1♂.

BIOLOGY: cleptoparasite. Host - Hymenoptera: Sphecidae: Gorytini.

DISTRIBUTION: unknown.

ALBERTA: Scandia.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens						1♂				

224. *Gorytes* sp. 3♂ 6♀.

BIOLOGY: predator. Host - Homoptera: Cicadellidae, Fulgoridae, Cercopidae, Membracidae.

DISTRIBUTION: unknown.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens except one were captured by Malaise trap on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens						1♂				2♂ 6♀

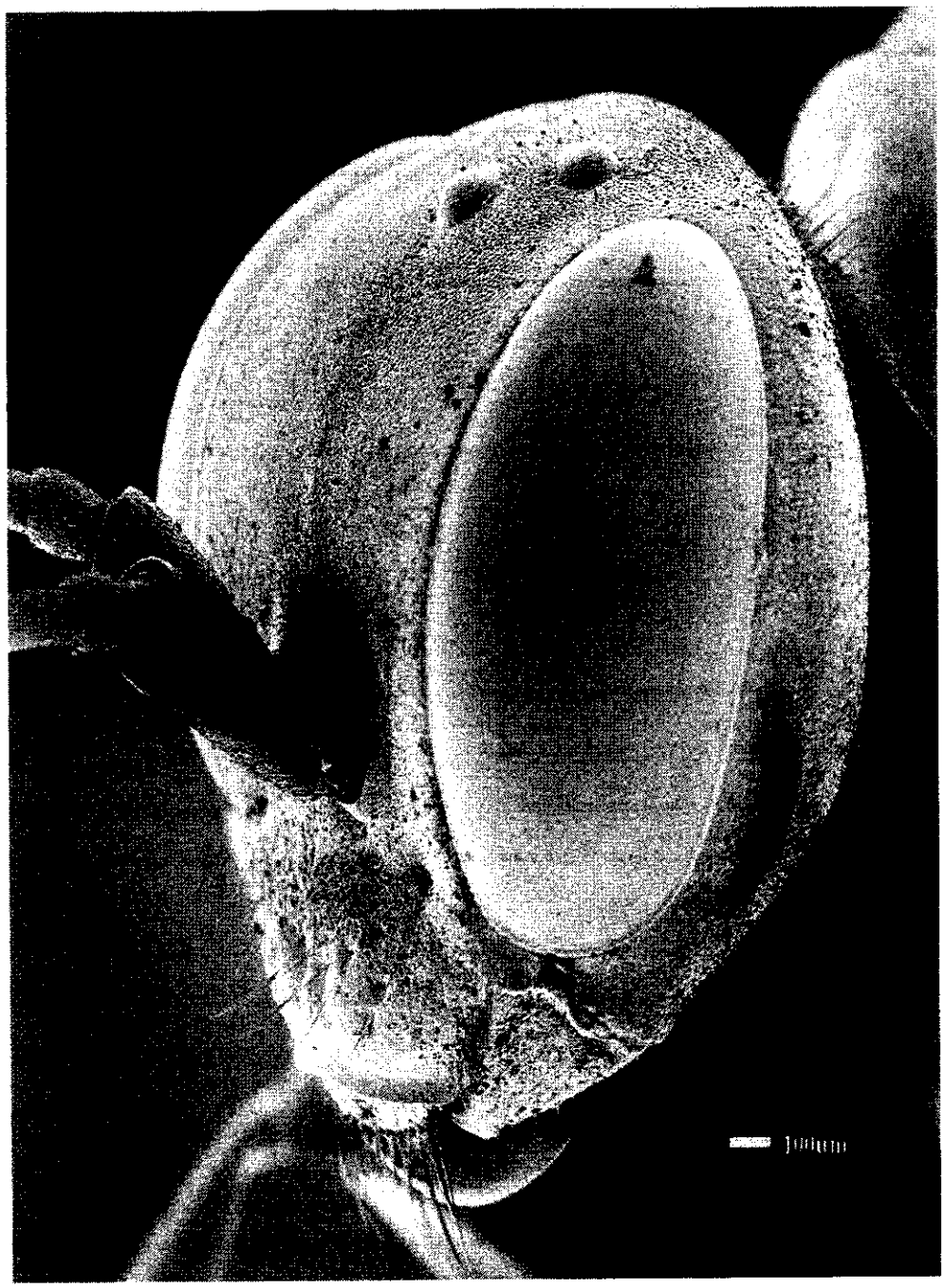


Figure 39. Head of *Lestiphorus piceus* (Handlirsch) ♀ (Sphecidae: Nyssoninae), no. 225.

225. *Lestiphorus piceus* (Handlirsch) 16♂ 6♀.

BIOLOGY: predator. Host - Homoptera: Cercopidae.

DISTRIBUTION: Bohart and Menke (1976) reported this specimen from the western United States and Canada.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured by a Malaise trap on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										16♂ 6♀

226. *Hoplisoides* sp. 3♀.

BIOLOGY: predator. Host - Homoptera.

DISTRIBUTION: unknown.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured at eolian sites.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens								1♀		2♀

227. *Bembix americana spinolae* Lepeletier 3♂ 8♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Bohart and Menke (1976) report this subspecies throughout North America, except the Pacific coast.

ALBERTA: Athabasca, Edgerton, Edmonton, Lethbridge, Manyberries, Medicine Hat, Opal, Oyen, Peace River, Slave Lake, Tilley, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured at eolian sites. In addition, a single male was taken in a sweep sample of an active dune blowout on Mounted Rifles Road.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♀									2♂ 7♀

228. *Bembix sayi* Cresson 1♀.

BIOLOGY: predator. Host - Diptera (flies).

DISTRIBUTION: Bohart and Horning (1971) reported this species from the United States as far north as South Dakota, Iowa and Georgia.

ALBERTA: Medicine Hat, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected by Malaise trap at a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♀

Sphecidae: Philanthinae

229. *Philanthus albopilosus* Cresson 1♀.

BIOLOGY: predator. Host - Hymenoptera: Apoidea (bees and wasps).

DISTRIBUTION: Bohart and Grissell (1975) reported this species from southern Canada and the United States west to Alberta, Utah and Arizona.

ALBERTA: Empress, Medicine Hat.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected in a sweep sample on an active dune blowout on Mounted Rifles Road.

230. *Philanthus politus* Say 1♀.

BIOLOGY: predator. Host - Hymenoptera: Apoidea (bees and wasps).

DISTRIBUTION: Bohart and Grissell (1975) reported this species from southern Canada and the United States, west to Saskatchewan and North Dakota.

ALBERTA: Edmonton, Empress, Orion, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was captured by Malaise trap on a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♀

231. *Aphilanthops frigidus* (F. Smith) 17♀.

BIOLOGY: predator. Host - Hymenoptera: Formicidae, winged queen ants of the genus *Formica*.

DISTRIBUTION: Bohart and Grissell (1975) reported this species as transcontinental in southern Canada and the United States south to Virginia, Michigan, New Mexico, Utah, and California.

ALBERTA: Orion, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured by Malaise trap at a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										17♀

232. *Cerceris calochorti* Rohwer 1♂ 1♀.

BIOLOGY: predator. Host - Coleoptera (adult beetles).

DISTRIBUTION: Ferguson (1984) reported this species from southwestern Canada and the western United States.

ALBERTA: Empress, McIntyre Ranch near Magrath (Finnamore 1996), Medicine Hat, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were collected on the chernozem sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♀										1♂	

233. *Cerceris deserta* Say 1♂ 5♀.

BIOLOGY: predator. Host - Coleoptera (adult beetles).

DISTRIBUTION: Ferguson (1984) reported this species from southeastern Canada and northeastern United States.

ALBERTA: Lethbridge, Manyberries, McIntyre Ranch near Magrath, Medicine Hat, Orion, Writing-On-Stone Provincial Park.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Most specimens were captured at chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			1♀	1♂	1♀					1♀		1♀

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♀

234. *Cerceris nigrescens* F. Smith 4♂ 1♀.

BIOLOGY: predator. Host - Coleoptera (adult beetles).

DISTRIBUTION: Ferguson (1984) reported this species from Alaska, Canada, and the western United States.

ALBERTA: Beaverlodge, Cypress Hills, Edmonton, Empress, Lethbridge, Manyberries, Orion, Taber, Wabamun, Writing-On-Stone Provincial Park.
CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens were captured at sites on both soil types.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂	1♂		1♂								

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1♂ 1♀					

235. *Cerceris sexta* Say 3♀.

BIOLOGY: predator. Host - Coleoptera (adult beetles).
DISTRIBUTION: Ferguson (1984) reported this species from southern Canada to central Mexico.
ALBERTA: Lethbridge, Manyberries, Tilley.
CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured from the dry chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens											1♀	2♀

236. *Cerceris wyomingensis* Scullen 1♀.

BIOLOGY: predator. Host - Coleoptera (adult beetles).
DISTRIBUTION: Ferguson (1984) reported this species from the central United States. Its occurrence at SNWA represents a substantial extension of its known range and a new record for Canada.
CFB SUFFIELD NATIONAL WILDLIFE AREA: The single specimen was collected by Malaise trap from a stabilized dune site.

Eolian Soil Sites

Moisture Stability	High Soil Surface Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1♀

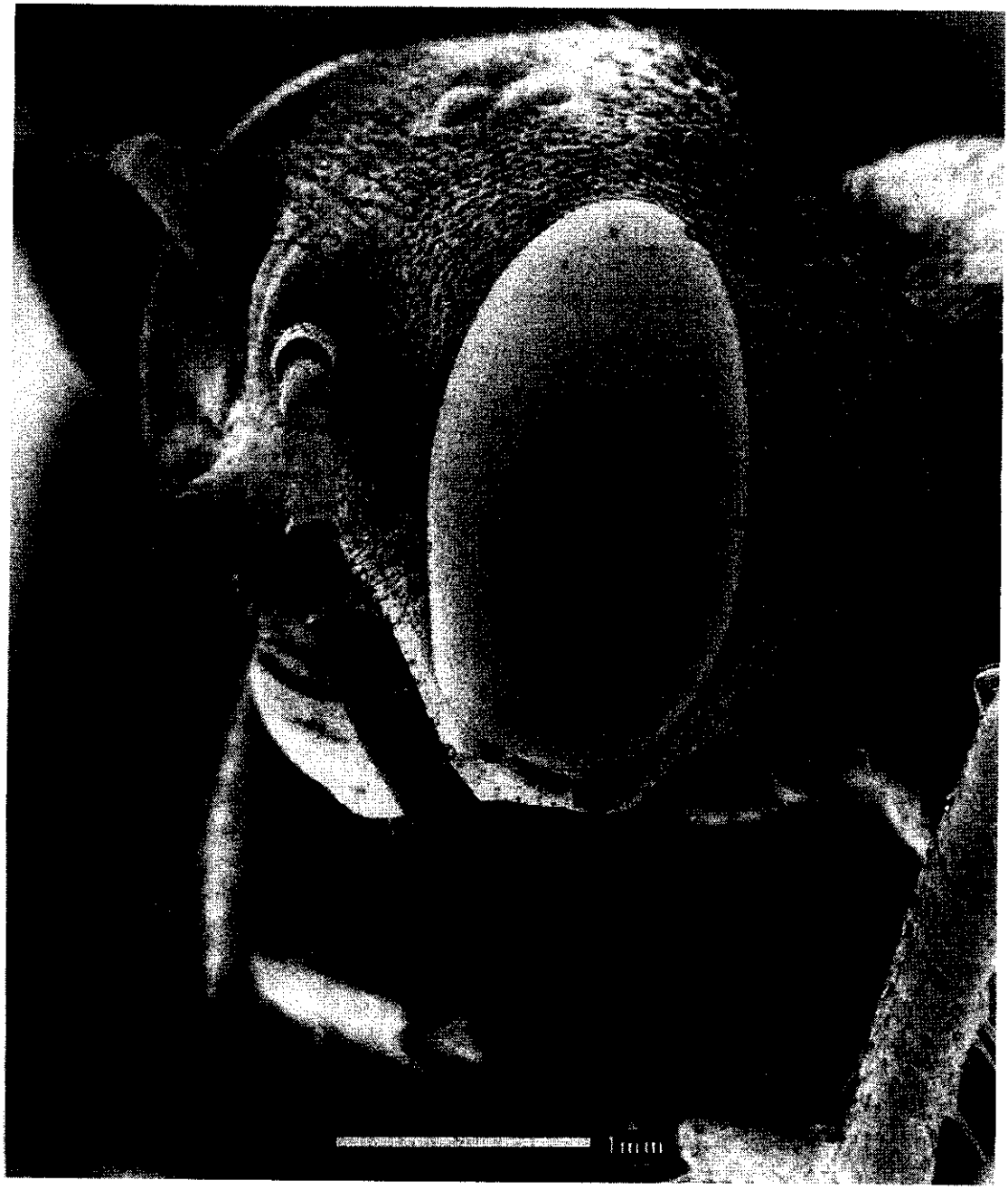


Figure 40. Head of *Eucerceris superba* Cresson ♀ (Sphecidae: Philanthinae), no. 237.

237. *Eucerceris superba* Cresson 7♂ 5♀.

BIOLOGY: predator. Host - Coleoptera: Curculionidae (adult weevils).

DISTRIBUTION: Bohart and Menke (1976) reported this species from north central and central United States.

ALBERTA: Jenner, Lethbridge, Manyberries, Medicine Hat.

CFB SUFFIELD NATIONAL WILDLIFE AREA: All specimens were captured from chernozem soil sites.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♀	1♂ 1♀	1♂	1♀	2♂	1♂				1♂	1♂ 2♀	

5.0 RESULTS AND DISCUSSION - SPIDERS AND RELATIVES (ARANEAE, OPILIONES, AND SOLPUGIDA) FROM SNWA

About 3 million arthropod specimens were collected from SNWA. These included 97 species of spiders, 1 species of solpugid, and 2 species of harvest spiders (Opiliones), collectively represented by 1,760 specimens. Spider (Araneae) data from one year of pan traps (87 species represented by 1,635 specimens) were used in a quantitative analysis of species assemblages from SNWA. Samples were pooled for the season and are presented in the data set in Appendix 2, with total species collected at each site summed at the end row.

Data were analyzed using BIODIV 5.1 (Baev and Penev 1995). Analysis of spider species assemblages was performed using the Czekanovski-Dice-Sørensen index of association. The results were clustered using the single linkage or nearest neighbour algorithm available on the BIODIV 5.1 software. The resulting dendrogram is presented in Figure 41.

In this spatial analysis, the results obtained from the Czekanovski-Dice-Sørensen index of association demonstrated a relationship between soil type and spider species assemblages. In other words, a change in soil from chernozem to aeolian types is accompanied by a shift in spider species assemblages. Moreover, within the chernozem sites, spider species assemblages also shifted with respect to vegetation structure (vegetation height is used as a proxy for structure). Furthermore, the spider assemblages in the chernozem sites clustered sequentially along the transition from wet sites through increasingly arid sites, probably mirroring a response by vegetation to the underlying hydrological gradient in this grassland system. The hydrological gradient reflected by vegetation structure in this grassland is the gradient most likely to demonstrate the greatest biotic shifts resulting from management practices or in long-term change scenarios that hypothesize increasing aridity. Spider assemblages in this system could prove valuable in assessing biotic shifts resulting from management practices or in assessing shifts driven by long-term changes to climate patterns.

5.1 Conclusion and Management Considerations

Spider species assemblages in ungrazed or minimally-grazed grassland ecosystems are associated with soil type and vegetation structure. Most species inhabit a range of vegetation structures but some species were collected only from a narrow range or even a single vegetation structure. Figure 41 provides the number of species collected from single sites as well as the number of species collected from single vegetation heights. In total, 16 species (18%) of spiders were collected from single vegetation heights on chernozem soil. The management implications for grasslands are such that the reduction of canopies to a single level (or to fewer levels than the ungrazed condition) through grazing may adversely affect spider diversity, particularly for those species associated with specific vegetation structures. One of the questions arising from this study concerns the fate of species associated with specific vegetation structures when vegetation is altered through management practices.

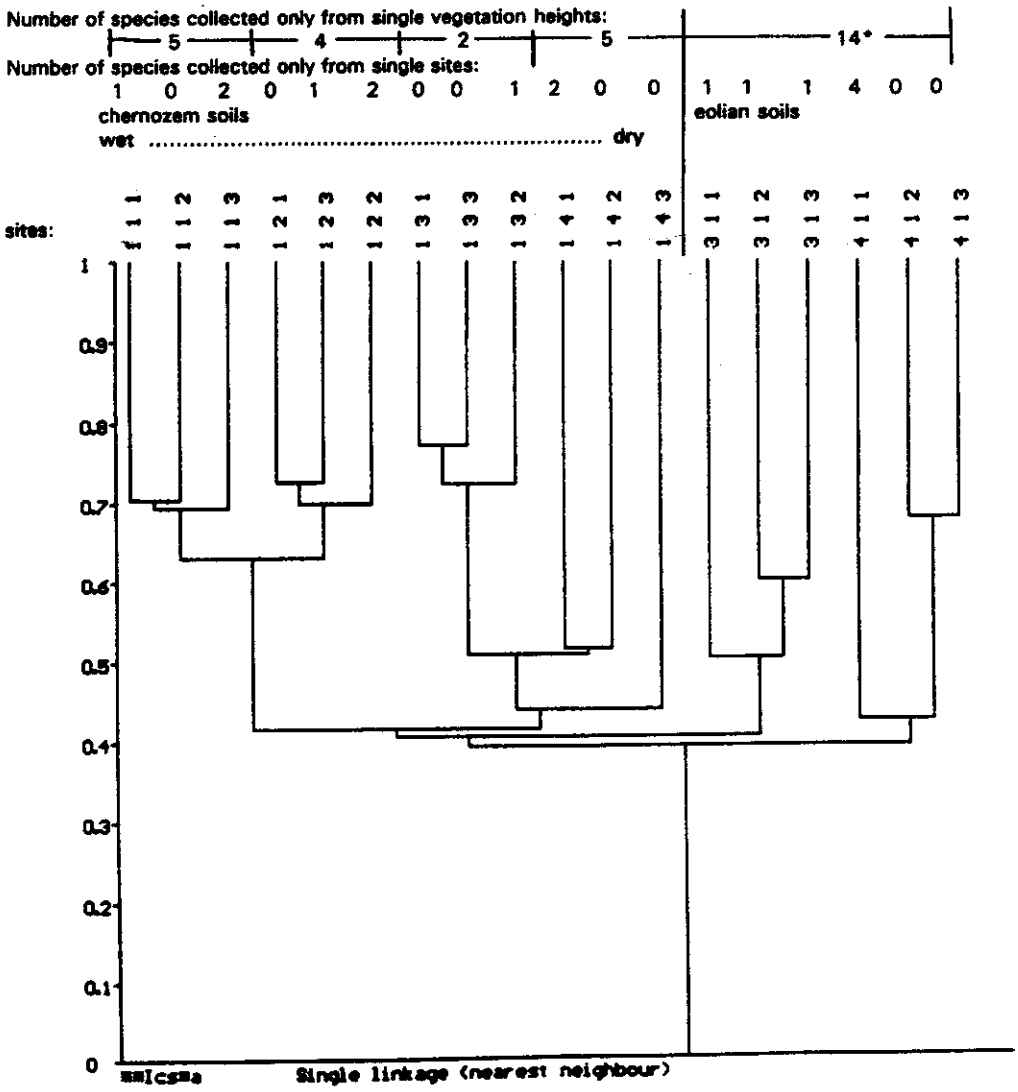


Figure 41. Cluster analysis of spider species assemblages from CFB Suffield National Wildlife Area. Cluster analysis of result obtained using the Chekanovski-Dice-Sorensen index of association with 87 species (Malaise samples excluded) and 1,635 specimens of adult spiders collected from CFB Suffield during 1995. Sites correspond to those characterized in the Methodology section. First number in the site designation (*e.g.*, 1.3.2) corresponds to major soil type; 1 = chernozem, 3 = eolian with vegetation cover, and 4 = eolian sparse vegetation, if any (dune blowout). Middle number in the site designation corresponds to vegetation height; 1 = ~60cm, 2 = ~30cm, 3 = ~15cm, 4 = ~8cm. The last number in the site designation is the replicate within the vegetation height class.

6.0 ANNOTATED LIST OF THE ARANEAE, OPILIONES AND SOLPUGIDA FROM THE CFB SUFFIELD NATIONAL WILDLIFE AREA

6.1 Solpugida

6.1.1 Eremobatidae

1. *Eremobates docolora* Brookhart & Muma 14 specimens.

DISTRIBUTION: Northern Great Plains south to northern Colorado.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							1♂			1♂	3♂	2♂

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂	1♂			1♂	♂	

6.2 Opiliones

6.2.1 Phalangiidae

2. *Phalangium opilio* Linnaeus 23 specimens.

DISTRIBUTION: Cosmopolitan.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	8	11			2		

3. *Togwoteeus biceps* (Thorell) 23 specimens.

DISTRIBUTION: Western North America in dry prairie and mountains.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Fifteen specimens of this species were collected on the Base from the riparian zone of the South Saskatchewan River at the River Sentry; 6 specimens by sweeping, and 9 by a Malaise trap before it was destroyed by flooding.

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1					7

6.3 Araneae

6.3.1 Amaurobiidae

4. *Titanoeca nigrella* (Chamberlin) 16♂ 1♀.

DISTRIBUTION: Western and central North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens								5♂	5♂	3♂ 1♀	3♂	

6.3.2 Araneidae

5. *Argiope trifasciata* (Forskal) 1♂, 1 immature.

DISTRIBUTION: Ranges from southern South America north to southern Canada. A grassland species in western Canada.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1 im.						1♂				

6. *Hypsosinga funebris* (Keyserling) 10♂ 3♀.

DISTRIBUTION: Widespread in North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		2♂		2♂		1♂	3♀	1♂		2♂	2♂	

7. *Larinia borealis* Banks 3♂, 1 immature.

DISTRIBUTION: Widespread in North America. In western Canada it has been found on mesic grassland.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens				2♂		1♂	1 im.					

8. *Metepeira palustris* Chamberlin & Ivie 2♀.

DISTRIBUTION: Northeastern United States and across eastern and central Canada. This species extends onto the northern edge of the Great Plains where it is sympatric with *M. dakota* Chamberlin & Ivie.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens				2♂		1♂	1 im.					

6.3.3 Clubionidae

9. *Castianeira descripta* (Hentz) 5♂ 3♀.

DISTRIBUTION: Southern Canada east of the Rockies, and south to Florida and Texas. It is a grassland species in western Canada.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂		1♂		1♀	1♀		1♂	1♂ 1♀			

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂						

10. *Clubiona mutata* Gertsch 3♂ 6♀.

DISTRIBUTION: Great Plains and the dry intermontaine valleys of the west. A dry prairie species.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♀	2♀	2♀	2♂	1♀							

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂						

6.3.4 Dictynidae

11. *Dictyna bostoniensis* Emerton 11♂ 10♀.

DISTRIBUTION: Widely distributed in North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♀			4♂	2♂	2♂ 1♀	3♂ 8♀

12. *Dictyna coloradensis* Chamberlin 15♂ 1♀.

DISTRIBUTION: Widely distributed in North America. A grassland species.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂		1♂			2♂		3♂	3♂			

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂ 1♀	1♂	2♂			1♂	

13. *Dictyna completoides* Ivie 15♂ 3♀.
DISTRIBUTION: Great Plains.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens						1♀	2♂	2♂ 2♀	2♂	2♂		

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	2♂	1♂	1♂	1♂	1♂	1♂	

14. *Dictyna consulta* Gertsch & Ivie 9♂ 1♀.
DISTRIBUTION: Great Plains.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂	1♂ 1♀	1♂	5♂	1♂		

15. *Dictyna cornupeta* Bishop & Ruderman 16♂ 1♀.
DISTRIBUTION: Recorded from Arizona, Utah and northern Mexico.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♂	6♂	5♂	2♂	2♂ 1♀	

16. *Dictyna personata* Gertsch & Mulaik 21♂ 2♀.
DISTRIBUTION: Recorded from southern Great Plains and northern Mexico. It has also been collected on mesic mixed grass prairie near Saskatoon, Saskatchewan.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							2♂		2♂	3♂ 2♀	1♂	2♂

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	2♂	1♂	4♂	3♂	1♂		

17. *Dictyna terrestris* Emerton 38♂ 5♀.

DISTRIBUTION: Eastern North America and the Great Plains.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm± canopy height			Medium-high Soil Moisture 30 cm± canopy height			Medium-low Soil Moisture 15 cm± canopy height			Low Soil Moisture 8 cm± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂			1♂		1♂	10♂ 2♀	9♂ 2♀	8♂ 1♀	2♂	3♂	2♂

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♂					

18. *Dictyna* sp. 1 5♂ 1♀.

DISTRIBUTION: Unknown.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂ 1♀			2♂	1♂	1♂						

19. *Tricholathys dakota* Chamberlin & Gertsch 6♂ 1♀.

DISTRIBUTION: Northern Great Plains south to Colorado.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height .			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			6♂ 1♀									

6.3.5 Gnaphosidae

20. *Drassodes neglectus* (Keyserling) 40♂ 7♀.

DISTRIBUTION: Holarctic, widespread in North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	2♂ 1♀	9♂ 1♀	5♂ 1♂	7♂	10♂ 1♀	4♂ 2♀	1♂ 1♀		2♂			

21. *Drassodes saccatus* (Emerton) 8♂ 2♀.

DISTRIBUTION: Widespread in North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										5♂ 1♀	1♂	2♂ 1♀

22. *Drassyllus lamprus* (Chamberlin) 4♂ 1♀.

DISTRIBUTION: Great Plains and dry intermontaine valleys of the west, from southern Canada to central Mexico.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										3♂		1♂

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			1♀				

23. *Gnaphosa clara* (Keyserling) 31♂ 19♀.

DISTRIBUTION: Washington and southern Alberta, south to Texas and northern Mexico.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♀					1♂	2♂ 2♀	10♂ 3♀	5♀	13♂ 5♀	3♂ 2♀	2♂ 1♀

24. *Gnaphosa muscorum* (L. Koch) 19♂ 8♀.

DISTRIBUTION: Holarctic, widespread in North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	2♂ 1♀	2♀	2♂ 1♀	2♂	3♂ 2♀	6♂ 2♀				1♂		

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	2♂	1♂					

25. *Gnaphosa parvula* Banks 5♂.

DISTRIBUTION: Widespread in North America south to West Virginia and Colorado.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	2♂		3♂									

26. *Haplodrassus bicornis* (Emerton) 1♀.

DISTRIBUTION: Widespread in North America. It is a grassland species in western Canada.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens								1♀				

27. *Haplodrassus chamberlini* Platnick & Shadab 24♂ 2♀.

DISTRIBUTION: Great Plains from Alberta to Texas.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂	1♂	2♂	3♂	3♂	4♂		1♂ 1♀		1♂		1♂

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	2♂	3♂ 1♀	2♂				

28. *Haplodrassus signifer* (C.L. Koch) 23♂ 6♀.

DISTRIBUTION: Holarctic, widespread in North America.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm± canopy height			Medium-high Soil Moisture 30 cm± canopy height			Medium-low Soil Moisture 15 cm± canopy height			Low Soil Moisture 8 cm± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	7♂ 1♀	7♂ 1♀	2♂ 2♀	2♂ 1♀	1♂ 1♀	4♂						

29. *Micaria coloradensis* Banks 4♂ 8♀.

DISTRIBUTION: Dry habitats in western mountains and northern Great Plains.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	2		2	7	1		

30. *Micaria emertoni* Gertsch 13♂ 30♀.
DISTRIBUTION: Widespread in North America. A dry prairie species in western Canada.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			4♂ 2♀	4♂ 15♀	2♂ 7♀	3♂ 6♀	

31. *Micaria gertschi* Barrows & Ivie 2♂.
DISTRIBUTION: Widespread, a dry prairie species in western Canada.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			1♂	1♂								

32. *Micaria longipes* Emerton 1♂.
DISTRIBUTION: Widespread in North America.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										1♂		

33. *Micaria longispina* Emerton 1♂.
DISTRIBUTION: Widespread east of the Rockies. A dry prairie species in western Canada.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens						1♂						

34. *Micaria medica* Platnick & Shadab 2♂.

DISTRIBUTION: Northern Great Plains. Alberta, North Dakota, and Colorado.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										1♂	1♂	

35. *Micaria mormon* Gertsch 6♂ 7♀.

DISTRIBUTION: Great Plains from southern Alberta to northern Mexico.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens								2♀		3♂ 3♀	1♀	

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♀		2♂	1♂		

36. *Micaria porta* Platnick & Shadab 21♂ 1♀.

DISTRIBUTION: Great Plains and intermontaine valleys, from Alberta to northern Mexico.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	8♂ 1♀	5♂	4♂	3♂	1♂		

37. *Micaria riggsi* Gertsch 1♀.

DISTRIBUTION: Widespread in North America. A dry prairie species in western Canada.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♀					

38. *Nodocion rufithoracicus* Worley 6♂ 1♀.

DISTRIBUTION: Great Plains and western intermontaine valleys. British Columbia and Alberta south to California and New Mexico.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							1♂	1♂	1♂ 1♀	2♂	1♂	

39. *Zelotes lasalanus* Chamberlin 11♂ 24♀.

DISTRIBUTION: Great Plains from Saskatchewan and Alberta south to Mexico.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			1♂			1♂ 1♀	6♀	1♂ 6♀	1♂ 6♀	2♂ 1♀	2♂ 1♀	

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	2♂ 2♂	1♀	1♂	1♂			

40. *Zelotes puritanus* Chamberlin 13♂ 5♀.

DISTRIBUTION: Widespread in North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens				1♂				1♂		6♂ 2♀	2♂	

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂ 1♀	1♂ 2♀	1♂				

6.3.6 Linyphiidae: Linyphiinae

41. *Meioneta* sp. 1 1♂.

DISTRIBUTION: Saskatchewan and Alberta, found in several prairie and woodland localities.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂											

42. *Microlinyphia mandabulata* (Emerton) 1♀.

DISTRIBUTION: Widely distributed in North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♀						

43. *Tennesseellum formicum* (Emerton) 20♂ 8♀.

DISTRIBUTION: Widespread in North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							7♂ 3♀	1♂ 4♀	9♂ 2♀		1♂	

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♀			

Linyphiidae: Erigoninae

44. *Ceraticelus, fissiceps* group sp. 1 1♂.

DISTRIBUTION: Also collected from mesic mized grass prairie near Saskatoon, Saskatchewan.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens					1♂							

45. *Erigone aletris* Crosby & Bishop 6♂.

DISTRIBUTION: Holarctic, north temperate North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♂	2♂		2♂	1♂						

46. *Grammonota gentilis* Banks 4♂ 9♀.

DISTRIBUTION: Widespread in North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	2♂ 1♀	4♀	2♂ 4♀									

47. *Islandiana flaveola* (Banks) 9♂ 1♀.

DISTRIBUTION: Widespread in North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA: A specimen of this species was collected on the Base from the riparian zone of the South Saskatchewan River at the River Sentry; 1♂ 30-V-1995, by a Malaise trap.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		2♂	1♂		4♂	2♂						

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens							1♀

48. *Islandiana princeps* Braendegaard 18♂ 3♀.

DISTRIBUTION: Canada and northern United States.

CFB SUFFIELD NATIONAL WILDLIFE AREA: A specimen of this species was collected on the Base from the riparian zone of the South Saskatchewan River at the River Sentry; 1♂ 30-V-1995, by a Malaise trap.

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	4♂ 1♀	3♂ 1♀	1♂ 1♀	3♂	4♂	3♂						

49. New genus near *Disembolus*, sp. #1 36♂ 8♀.

DISTRIBUTION: North Dakota, southern Saskatchewan and Alberta.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			1♂	1♂	5♂ 1♀	2♂	4♂ 2♀	3♂ 1♀	5♂	3♂		

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	2♂ 1♀	4♂ 2♀	6♂ 1♀				

6.3.7 Lycosidae

50. ***Alopecosa aculeata*** **(Clerck)** 2♂.

DISTRIBUTION: Canada and the northern United States, south in the Rockies to northern New Mexico.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens						1♂						

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			1♂				

51. ***Arctosa emertoni*** **Gertsch** 1♂ 3♀.

DISTRIBUTION: Widely distributed in North America. Primarily a grassland species in western Canada.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♀				1♀				1♂		

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			1♀				

52. *Hogna frondicola* (Emerton) 2♂ 5♀.
DISTRIBUTION: Widely distributed in North America.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♂ 1♀	1♀		1♂ 3♀							

53. *Pardosa distincta* (Blackwall) 72♂ 35♀, 2 immatures.
DISTRIBUTION: Widely distributed in North America. Mesic grassland.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	11♂ 5♀	13♂ 6♀	19♂ 10♀ 2im.	6♂ 4♀	12♂ 9♀	6♂		1♂				

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂	2♂		1♂			

54. *Pardosa dromaea* (Thorell) 1♀.
DISTRIBUTION: Northern Great Plains from Alberta and Manitoba south to Colorado and Nebraska.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens					1♀							

55. *Pardosa modica* (Blackwall) 56♂ 20♀.

DISTRIBUTION: Northern North America. Marshes and moist meadows.

CFB SUFFIELD NATIONAL WILDLIFE AREEA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	17♂ 2♀	13♂ 5♀	11♂ 8♀	4♂ 2♀	2♂ 1♀	5♂ 2♀						

56. *Pardosa moesta* Banks 1♀.

DISTRIBUTION: Northern and central North America. In western Canada it is usually found in moist, grassy habitats.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			1♀									

57. *Pardosa mulaiki* Gertsch 2♂ 1♀.

DISTRIBUTION: Alberta to Manitoba, and south to Colorado. Slough margins and moist grasslands.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂				1♀	1♂						

58. *Pardosa ontariensis* Gertsch 10♂ 4♀.

DISTRIBUTION: Alberta to Manitoba, south to Oregon and Colorado. Mesic grasslands.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	5♂ 2♀	2♂ 1♀	1♂	1♂	1♂ 1♀							

59. *Schizocosa mccooki* (Montgomery) 257♂ 43♀, 1 penultimate, 7 immatures.

DISTRIBUTION: Central and western North America; British Columbia to Ontario, south to Mexico.

A dry prairie species in Saskatchewan and Alberta.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	13♂	11♂ 1♀	26♂ 2♀	35♂ 6♀	39♂ 4♀	38♂ 3♀	22♂ 4♀ 5 im.	19♂ 7♀	26♂ 7♀	9♂ 3♀	4♂ 3♀ 1pu♀	3♂ 2 im.

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	5♂	1♂	1♂ 2♀	4♂ 2♀		1♂ 1♀	

60. *Schizocosa minnesotensis* (Gertsch) 9♀.
DISTRIBUTION: A prairie species occurring from British Columbia to Manitoba, south to New Mexico.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							1♀			3♀		1♀

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	2♀	1♀	1♀				

6.3.8 Mimetidae

61. *Mimetus eperiodes* Emerton 1♂ 6♀, 1 immature.
DISTRIBUTION: An eastern North American species occurring, as well, on the northern Great Plains. North Dakota, Saskatchewan, and Alberta.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens					1♀					1♂ 1♀		1♀

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♀	2♀			1 im.		

6.3.9 Philodromidae

62. *Ebo bucklei* Platnick 2♂ 5♀.

DISTRIBUTION: Northern Great Plains. Saskatchewan and Alberta.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		2♂		1♀	2♀	2♀						

63. *Ebo dondalei* Sauer 1♂.

DISTRIBUTION: Western North America from southern Saskatchewan and Alberta to New Mexico and California.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♂ 1♀			

64. *Ebo pepinensis* Gertsch 1♂.

DISTRIBUTION: Widely distributed in North America. A grassland species.

CFB SUFFIELD: A specimen of this species was collected on the Base from the riparian zone of the South Saskatchewan River at the River Sentry; 1♂ 30-V-1995, by a Malaise trap.

65. *Philodromus cespitum* (Walckenaer) 19♂ 5♀, 1 immature.

DISTRIBUTION: Holarctic, widely distributed in North America. Usually found on shrubs or trees.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens							19♂ 7♀ 1 im.

66. *Philodromus histrio* (Latreille) 1♂.

DISTRIBUTION: Holarctic. Northern North America, south in the west to California and northern Mexico. A grassland species in western Canada.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			1♂				

67. *Thanatus coloradensis* Keyserling 58♂ 1♀.

DISTRIBUTION: Widespread in North America. Common on dry prairie in western Canada.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	4♂	4♂	6♂ 1♀	5♂	5♂	12♂	5♂	2♂	2♂	3♂	1♂	1♂

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	4♂	2♂	2♂				

68. *Thanatus striatus* C.L. Koch 6♂ 8♀.

DISTRIBUTION: Holarctic, widely distributed in North America. A grassland species.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂ 1♀	1♀	2♂ 4♀	1♂	2♂ 2♀							

69. *Tibellus oblongus* (Walckenaer) 15♂ 1♀.

DISTRIBUTION: Holarctic, throughout North America. Found on tall grass in moist or mesic habitats.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂ 1♀	1♂		6♂		2♂						

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♂		2♂	1♂		1♂

6.3.10 Pisauridae

70. *Dolomedes triton* (Walckenaer) 1 immature.

DISTRIBUTION: Widely distributed in North America. Found along the margins of ponds, lakes and streams. This species is known to disperse by ballooning and it is likely that the single immature collected arrived on site 4.1.2, a dune blowout, in that manner.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens					1 im.		

6.3.11 Salticidae

71. *Habronattus altanus* Gertsch 22♂ 15♀.

DISTRIBUTION: Great Plains.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	3♂ 2♀	3♀		2♂ 1♀		3♂	3♂ 3♀	3♂ 3♀	1♀	1♂	1♂ 1♀	

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂	1♂	1♂ 1♀	1♂			

72. *Habronattus americanus* (Keyserling) 23♂ 9♀.

DISTRIBUTION: Central and western North America.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂	2♂ 2♀	2♀	3♂	3♂	5♂	1♀	2♂ 1♀	1♀	1♂		

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	5♂ 1♀		1♀		1♂		

73. *Habronattus cognatus* (Peckham) 2♂.

DISTRIBUTION: Great Plains, and east to Great Lakes region.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♂		1♂			

74. *Habronattus cuspidatus* Griswold 8♂ 9♀.

DISTRIBUTION: Northern Great Plains; Alberta and Saskatchewan, south to Colorado.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂ 1♀	4♂ 3♀	1♂ 3♀	2♂ 1♀	1♀							

75. *Pelegrina insignis* (Banks) 2♂.

DISTRIBUTION: Northeastern North America and northern Great Plains. A prairie species in western Canada.

CFB SUFFIELD NATIONAL WILDLIFE AREA: A specimen of this species was also collected on the Base from the riparian zone of the South Saskatchewan River at the River Sentry; 1♂ 30-V-1995, by a Malaise trap.

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens							1♂

76. *Pellenes* sp. 1 1♂ 3♀.

DISTRIBUTION: Southern Saskatchewan and Alberta.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										1♂ 1♀		2♀

77. *Phidippus purpuratus* Keyserling 2♂.

DISTRIBUTION: Widely distributed in North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens					1♂		1♂					

78. *Tutelina similis* Banks 1♂ 1♀.

DISTRIBUTION: Widely distributed in North America. A grassland species.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens							1♂ 1♀

6.3.12 Tetragnathidae

79. *Tetragnatha laboriosa* Hentz 2♂ 1♀, 2 immatures.

DISTRIBUTION: Widely distributed. A grassland species.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens				1♀								

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♂ 2 im.			1♂

80. *Tetragnatha versicolor* Walckenaer 2♂ 2♀.

DISTRIBUTION: Widely distributed in North and Central America. In western Canada it is found in woodlands, and on waterside shrubs.

CFB SUFFIELD NATIONAL WILDLIFE AREA: Specimens of this species were collected on the Base from the riparian zone of the South Saskatchewan River at the River Sentry; 2♂ 2♀ 30-V-1995, by a Malaise trap.

6.3.13 Theridiidae

81. *Enoplognatha joshua* 1♂.

DISTRIBUTION: Southeastern and western United States; southern Alberta and British Columbia.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens				1♂			

82. *Enoplognatha marmorata* (Hentz) 2♂.

DISTRIBUTION: Widely distributed in North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♂				1♂						

83. *Euryopis saukea* Levi 3♂.

DISTRIBUTION: Recorded from northeastern and midwestern United States, North Dakota.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										1♂		

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			1♂	1♂			

84. *Euryopis, funebris* group sp 1 19♂ 4♀.

DISTRIBUTION: Saskatchewan and Alberta. Taxonomy of the *funebris* group is confused and it is currently impossible to place specimens to species.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens					2♂			1♂		1♂		

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	2♀	8♂	6♂	1♂			2♀

85. *Steatoda albomaculata* (De Geer) 12♂ 1♀.
DISTRIBUTION: Holarctic. Northern and western North America.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		5♂ 1♀	6♂		1♂		

86. *Theridion bimaculatum* (Linnaeus) 1♂.
DISTRIBUTION: Introduced from Europe. Recorded from eastern North America and the Pacific northwest. Usually synanthropic here.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										1♂		

87. *Theridion petraeum* L. Koch 4♂.
DISTRIBUTION: Holarctic, northern and western North America.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens					1♂	1♂						

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1♂		1♂			

6.3.14 Thomisidae
88. *Xysticus acquiescens* Emerton 71♂ 10♀.
DISTRIBUTION: Great Plains.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	3♂	6♂	7♂	7♂ 2♀	5♂ 2♀	18♂ 3♀	2♂	2♂	1♀	4♂ 1♀	6♂ 1♀	2♂

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	4♂	2♂	3♂				

89. *Xysticus auctificus* Keyserling 5♂.

DISTRIBUTION: Great Plains and eastern United States. A grassland species.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			1♂		1♂		1♂	2♂				

90. *Xysticus benefactor* Keyserling 3♂.

DISTRIBUTION: A western species extending from New Mexico and California north to British Columbia. Spills onto the northern plains in Alberta.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens				1♂	1♂							

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens			1♂				

91. *Xysticus cunctator* Thorell 10♂ 5♀.

DISTRIBUTION: Western North America from southern British Columbia and Saskatchewan south to Arizona. A grassland species.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂				1♂					1♂	1♀	2♀

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂	1♂ 1♀	5♂				

92. *Xysticus ferox* (Hentz) 52♂ 10♀.

DISTRIBUTION: Widely distributed in North America.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	4♂ 3♀	21♂ 3♀	17♂ 1♀	2♂	4♂ 2♀	4♂ 1♀						

93. *Xysticus luctans* (C.L. Koch) 2♂ 1♀.

DISTRIBUTION: Widely distributed in North America. A grassland species.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1♀		1♂	1♂							

94. *Xysticus montanensis* Keyserling 2♂ 1♀.

DISTRIBUTION: Alberta to central Ontario, and south to California and New Mexico.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1♂			1♀				1♂				

95. *Xysticus nigromaculatus* Keyserling 14♂ 1♀.

DISTRIBUTION: Western United States and northern Great Plains.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens							1♂	1♂		2♂	1♂	1♀

Eolian Soil Sites

Moisture Stability	Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens	1♂	1♂	5♂		1♂	1♂	

7.0 REFERENCES CITED

Adams, G.D., G.C. Trottier, W.L. Strong, I.D. MacDonald, S.J. Barry, P.G. Gregoire, G.W. Babish, and G. Weiss. 1997. Vegetation component report, Canadian Forces Base Suffield National Wildlife Area, wildlife inventory. Unpublished Canadian Wildlife Service Report, Edmonton, Alberta. 96 pp.

Allen, H.W. 1971. A monographic study of the genus *Tiphia* (Hymenoptera: Tiphiidae) of western North America. *Transactions of the American Entomological Society* 97:201-359.

Anonymous. 1993. Base Brief. 10pp.

Baars, M.A. 1979. Catches in pitfall traps in relation to mean densities of carabid beetles. *Oecologia (Berl.)* 41:25-46.

Baev, P.V. and L.D. Penev. 1995. BIODIV 5.1 - program for calculating biological diversity parameters, similarity, niche overlap, and cluster analysis. Pensoft, Sofia.

Bohart, R.M. 1962. The *Tachytes pepticus* group in North America. *The Pan-Pacific Entomologist* 38:117-129.

Bohart, R.M. 1976. A review of the Nearctic species of *Crabro* (Hymenoptera: Sphecidae). *Transactions of the American Entomological Society* 102:229-287.

Bohart, R.M. and G.E. Bohart. 1962. A revision of the *Larropsis* subgenus *Ancistromma* Fox (Hymenoptera: Sphecidae). *Proceedings of the Entomological Society of Washington* 64:21-27.

Bohart, R.M. and E.E. Grissell. 1975. California wasps of the subfamily Philanthinae (Hymenoptera: Sphecidae). *Bulletin of the California Insect Survey* 19:1-92.

Bohart, R.M. and D.S. Horning. 1971. California bembicine sand wasps. *Bulletin of the California Insect Survey* 13:1-49.

Bohart, R.M. and L.S. Kimsey 1982. A synopsis of the Chrysididae in America north of Mexico. *Memoirs of the American Entomological Institute* 33:1-266.

Bohart, R.M. and A.S. Menke. 1963. A reclassification of the Sphecinae with a revision of the Nearctic species of the tribes Sceliphronini and Sphecini (Hymenoptera, Sphecidae). *University of California Publications in Entomology* 30:91-182.

Bohart, R.M. and A.S. Menke. 1976. Sphecid wasps of the world, a generic revision. University of California Press, Berkeley. 695 p.

Bohart, R.M. and E.I. Schlinger. (1957). California wasps of the genus *Oxybelus* (Hymenoptera: Sphecidae, Crabroninae). *Bulletin of the California Insect Survey* 4:103-142.

Bohart, R.M. and N.J. Smith. 1978. A revision of Nearctic *Ammoplanops* (Hymenoptera, Sphecidae). *Journal of the Kansas Entomological Society* 51:75-90.

Briggs, J.B. 1961. A comparison of pitfall trapping and soil sampling in assessing populations of two species of ground beetles (Col.: Carabidae). *Report of the East Malling Research Station* 1960:108-112.

Brothers, D.J. and A.T. Finnamore. 1993. Superfamily Vespoidea. Pp. 161-278 *in:* H. Goulet and J. Huber (editors) *Hymenoptera of the World: an Identification Guide to Families.* Research Branch Agriculture Canada Publication 1894/E, 668 pp.

Brumley, J.H., and B.J. Dau. 1985. Proposed historical resource development zones on the Suffield Military Reserve, Alberta. Final report. Prepared for the Alberta Energy

Company. Volume 1 (text) 171 pp., volume 2 (data summaries) 186 pp.
Colwell, R.K. 1997. EsitmateS: Statistical estimation of species richness and shared species from samples. Version 5. User's Guide and application published at: http://viceroy.eeb.uconn.edu/estimates
Culotta, E. 1996. Exploring biodiversity's benefits. *Science* 273:1045-1046.
Cumming, J.M. 1989. Classification and evolution of the eumenine wasp genus *Symmorphus* Wesmael (Hymenoptera: Vespidae). *Memoirs of the Entomological Society of Canada* 148:1-168.
Dale, B., Goossen, P., and P. Taylor. 1999. Avifauna component report, Canadian Forces Base Suffield Suffield National Wildlife Area, wildlife inventory. Unpublished Canadian Wildlife Service Report, Edmonton, Alberta. In prep.
Dau, B.J. 1983. The Suffield Military Reserve: an examination of land utilization patterns through time. University of Calgary unpublished MA thesis.
Didiuk, A.B. 1999. Reptile and amphibian component report, Canadian Forces Base Suffield National Wildlife Area, wildlife inventory. Unpublished Canadian Wildlife Service Report, Edmonton, Alberta. In prep.
Dollfuss, H. 1995. A worldwide revision of *Pemphredon* Latreille 1796 (Hymenoptera, Sphecidae). *Linzer biol. Beitr.* 27:905-1019.
Eighme, L.E. 1989. Revision of *Diodontus* (Hymenoptera: Sphecidae) in America north of Mexico. *Annals of the Entomological Society of America* 82:14-28.
Evans, H.E. 1950. A taxonomic study of the Nearctic spider wasps belonging to the tribe Pompilini (Hymenoptera: Pompilidae). Part I. *Transactions of the American Entomological Society* 75:133-270.
Evans, H.E. 1951a. A taxonomic study of the Nearctic spider wasps belonging to the tribe Pompilini (Hymenoptera: Pompilidae). Part II: Genus *Anoplius* Dufour. *Transactions of the American Entomological Society* 76:207-361.
Evans, H.E. 1951b. A taxonomic study of the Nearctic spider wasps belonging to the tribe Pompilini (Hymenoptera: Pompilidae). Part III. *Transactions of the American Entomological Society* 77:203-330.
Evans, H.E. 1978. The Bethylidae of America north of Mexico. *Memoirs of the American Entomological Institute* 27:1-332.
Ferguson, G.R. 1984. An annotated synonymic list of North American and Caribbean wasps of the genus *Cerceris* (Hymenoptera: Philanthidae). New York Entomological Society 91:466-502.
Finnamore, A.T. 1982. The Sphecoidea of southern Quebec (Hymenoptera. *Lyman Entomological* Museum and Research Laboratory Memoir 11, 348 pp.
Finnamore, A.T. 1983. Revision of the American species of *Mimesa* (Hymenoptera: Pemphredonidae: Pseninae). *Lyman Entomological Museum and Research Laboratory Memoir* 12, 171 pp.
Finnamore, A.T. 1988. Peatland Hymenoptera of Bistcho Lake, Alberta: a faunal comparison of a subarctic peatland to a mid-boreal continental peatland in Alberta. Pp. 39-68 *in*: McGillivray, W.B. and R.I. Hastings (editors). Natural History of the Bistcho Lake Region, Northwest Alberta. *Natural History Occasional Paper* 10, 106 pp.
Finnamore, A.T. 1990. Aculeate wasps (Hymenoptera), with the exception of the Formicidae, of

Andrew Lake. Pp. 33-46 *in*: McGillivray, W.B. and R.I. Hastings (editors). Natural History of the Andrew Lake Region, Northeastern Alberta. *Natural History Occasional Paper* 12, 97 pp.

Finnamore, A.T. 1992. Arid grasslands - biodiversity, human society, and climate change. Quantifying biotic responses associated with anthropogenic change, a prerequisite for interpreting biotic shifts in long-term climate change research. *Canadian Biodiversity* 2:15-23.

Finnamore, A.T. 1993. Series Spheciformes. Pp. 280-306 *in:* H. Goulet and J. Huber (editors) *Hymenoptera of the World: an Identification Guide to Families*. Research Branch Agriculture Canada Publication 1894/E, 668 pp.

Finnamore, A.T. 1994. Hymenoptera of the Wagner Natural Area, a boreal spring fen in central Alberta. Pp. 181-220 *in:* Finnamore, A.T. and S.A. Marshall (eds.) Terrestrial arthropods of peatlands, with particular reference to Canada. *Memoirs of the Entomological Society of Canada* 169, 289pp.

Finnamore, A.T. 1996. The aculeate wasps with the exception of the Formicidae (Hymenoptera: Chrysidoidea, Vespoidea, Apoidea: Spheciformes) of the McIntyre Ranch in the grasslands of southern Alberta. Pp. 65-80 *in* W.B. McGillivray and M. Steinhilber (editors) A Bioinventory on McIntyre Ranch: An Extensive Fescue-dominated Grassland in Southern Alberta. *Provincial Museum of Alberta Natural History Occasional Paper* No. 22.

Finnamore, A.T. 1997. Aculeate wasps (Hymenoptera: Aculeata) of the Yukon, other than Formicidae. Pp. 867-900 in H.V. Danks and J.A. Downes (eds.) Insects of the Yukon. Biological Survey of Canada.

Finnamore, A.T. and D.J. Brothers. 1993. Superfamily Chrysidoidea. Pp. 130-160 *in:* H. Goulet and J. Huber (editors) *Hymenoptera of the World: an Identification Guide to Families*. Research Branch Agriculture Canada Publication 1894/E, 668 pp.

Finnamore, A.T. and C.D. Michener. 1993. Superfamily Apoidea. P. 279 *in:* H. Goulet and J. Huber (editors) *Hymenoptera of the World: an Identification Guide to Families*. Research Branch Agriculture Canada Publication 1894/E, 668 pp.

Francoeur, A. 1973. Revision taxonomique des especes Nearctiques du groupe *fusca*, genre *Formica* (Formicidae, Hymenoptera). *Memoires de la Societe Entomologique du Quebec* 3:1-316.

Gauld, I.D. and B. Bolton (editors). 1988. *The Hymenoptera*. British Museum (Natural History), Oxford University Press, Oxford. 332 pp.

Greenslade, P. 1973. Sampling ants with pitfall traps: digging-in effects. *Insectes Sociaux* 20:343-353.

Greenslade, P. and P.J.M. Greenslade. 1971. The use of baits and preservatives in pitfall traps. *Journal of the Australian Entomological Society* 10:253-260.

Greenslade, P.J.M. 1964. Pitfall trapping as a method for studying populations of Carabidae (Coleoptera). *Journal of Animal Ecology* 33:301-310.

Hågvar, S. 1994. Log-normal distribution of dominance as an indicator of stressed soil microarthropod communities? *Acta Zool. Fennica* 195:71-80.

Hölldobler, B. and E.O. Wilson. 1990. The Ants. The Belknap Press of Harvard University Press, Cambridge, Massachusetts. 732 pp.

Kareiva, P. 1996. Diversity and sustainability on the prairie. *Nature* 379:673-674.

Krombein, K.V., P.D. Hurd Jr., D.R. Smith and B.D. Burks. 1979. Catalog of Hymenoptera in

America north of Mexico. Vol. 2:1199-2209. Smithsonian Institution Press, Washington D.C.

Macdonald, I. D. 1997. Vascular plant flora component report, Canadian Forces Base Suffield National Wildlife Area, wildlife inventory. Unpublished Canadian Wildlife Service Report, Edmonton, Alberta. 209 pp.

Martin, J.E.H. 1977. Collecting, preparing, and preserving insects, mites, and spiders. The insects and arachnids of Canada Part 1. Research Branch Canada Department of Agriculture, Publication 1643. 182 pp.

Masner, L. 1996. Pan traps. Pp. 57-59 in: A.T. Finnamore (editor), The SAGE Project - A workshop report on arthropod sampling protocols for graminoid ecosystems. EMAN Occasional Paper Series Report No. 7.

Masner, L. and G.A.P. Gibson. 1979. The separation bag - a new device to aid in collecting insects. *The Canadian Entomologist* 111:1197-1198.

Menke, A.S. 1965 unpublished. A revision of the North American *Ammophila* (Hymenoptera, Sphecidae). University of California, Davis, doctoral thesis. 247 pp.

Mickel, C.E. 1928. Biological and taxonomic investigations on the mutillid wasps. *United States National Museum Bulletin* 143:1-351.

Mitchell, B. 1963. Ecology of two carabid beetles, *Bembidion lampros* (Herbst) and *Trechus quadristriatus* (Schrank). II. Studies on populations of adults in the field, with special reference to the technique of pitfall trapping. *Journal of Animal Ecology* 32:377-392.

Moffat, A.S. 1996. Biodiversity is a boon to ecosystems, not species. *Science* 271:1497.

Murray, W.D. 1940. *Podalonia* (Hymenoptera: Sphecidae) of North and Central America. *Entomologica Americana* 20:1-77.

Naeem, S. and S. Li. 1997. Biodiversity enhances ecosystem reliability. *Nature* 390:507-508.

Niemelä, J., E. Halme and Y. Haila. 1990. Balancing sampling effort in pitfall trapping of carabid beetles. *Entomologica Fennica* 1:233-238.

Olmi, M. 1984. A revision of the Dryinidae (Hymenoptera). Memoirs of the American Entomological Institute 37(part 1): i-xii, 1-946, (part 2): 947-1913.

Parker, F.D. 1962. On the subfamily Astatinae, with a systematic study of the Genus *Astata* of America north of Mexico (Hymenoptera: Sphecidae). *Annals of the Entomological Society of America* 55:643-659.

Parker, F.D. 1966. A revision of the North American species of *Leptochilus* (Hymenoptera: Eumenidae). *Miscellaneous Publications of the Entomological Society of America* 5:153-229.

Parker, F.D. 1969. On the subfamily Astatinae. Part VI. The American species in the genus *Dryudella* Spinola (Hymenoptera: Sphecidae). *Annals of the Entomological Society of America* 62:963-976.

Parker, F.D. 1972. On the subfamily Astatinae. Part VII. The genus *Diploplectron* Fox (Hymenoptera: Sphecidae). *Annals of the Entomological Society of America* 65: 1192-1203.

Pate, V.S.L. 1937. Studies in pemphredonine wasps (Hymenoptera: Sphecidae) I. New genera and species of the ammoplanoid complex. *Transactions of the Entomological Society of Washington* 63:89-125.

Pate, V.S.L. 1940. The taxonomy of the oxybeline wasps (Hymenoptera: Sphecidae) II. The classification of the genera *Belomicrus* and *Enchemicrum*. *Transactions of the American*

Entomological Society 66:209-264.
Patriquin, D.L. and D.L. Skinner. 1992. Review and assessment of the vegetation, wildlife and habitat of CFB Suffield, Alberta. D.A. Westworth and Associates Ltd., Edmonton. 72 pp.
Pulawski, W.J. 1988. Revision of North American *Tachysphex* wasps including Central American and Caribbean species (Hymenoptera: Sphecidae). *Memoirs of the California Academy of Sciences* no. 10, 211pp.
Reynolds, H. W., Barry, S. J., and H. P. L. Kiliaan. 1999. Small mammal component report, Canadian Forces Base Suffield National Wildlife Area, wildlife inventory. Unpublished Canadian Wildlife Service Report, Edmonton, Alberta. In prep.
Schuster, R.M. 1956. A revision of the genus *Ephuta* (Mutillidae) in America north of Mexico. Part II. Species group *grisea*. *Journal of the New York Entomological Society* 64:7-84.
Scudder, G.G.E. 1996. Pitfall trapping. Pp. 53-56 in: A.T. Finnamore (editor), The SAGE Project - A workshop report on arthropod sampling protocols for graminoid ecosystems. EMAN Occasional Paper Series Report No. 7.
Sharkey, M.J. 1996. Malaise/flight intercept sampling protocols. Pp. 65-67 in: A.T. Finnamore (editor), The SAGE Project - A workshop report on arthropod sampling protocols for graminoid ecosystems. EMAN Occasional Paper Series Report No. 7.
Sharplin, J. 1966. An annotated list of the Formicidae (Hymenoptera) of central and southern Alberta. *Quaestiones entomologicae* 2:243-253.
Siri, M.L. and R.M. Bohart. 1974. A review of the genus *Mellinus* (Hymenoptera: Sphecidae). *The Pan-Pacific Entomologist* 50:169-176.
Southwood, T.R.E. 1978. Ecological methods with particular reference to the study of insect populations. 2nd edition. Chapman & Hall, London.
Spence, J.R. and J.K. Niemelä. 1994. Sampling carabid assemblages with pitfall traps: the madness and the method. *Canadian Entomologist* 126:881-894.
Tilman, D., D. Wedin, and J. Knops. 1996. Productivity and sustainability influenced by biodiversity in grassland ecosystems. *Nature* 379: 718-720.
Townes, H.K. 1957. Nearctic wasps of the subfamilies Pepsinae and Ceropalinae. *United States National Museum Bulletin* 209:1-286.
Townes, H. 1972. A light-weight Malaise trap. *Entomological News* 83:239-247.
Wheeler, G.C. and J. Wheeler. 1963. The ants of North Dakota. University of North Dakota Press, Grand Forks. 326 pp.
Williams, F.X. 1960. The wasps of the genus *Plenoculus* (Hymenoptera: Sphecidae, Larrinae). *Proceedings of the California Academy of Sciences* 31:1-49.

8.0 ACKNOWLEDGEMENTS

Thanks go to Canadian Forces Base Suffield, Department of National Defence; the Canadian Wildlife Service, Environment Canada, Prairie and Northern Region, for supporting arthropod inventories as part of the wildlife inventory of the National Wildlife Area on SNWA. In addition, thanks are extended to the following people for identification of material: James Carpenter, American Museum of Natural History (several Vespidae); Ed Fuller, University of Alberta (Elateridae); Gerry Hilchie, University of Alberta (Lepidoptera); Robert Holmberg, Athabasca University (Opiliones); Lynn Kimsey, University of California (several Chrysididae); Rob Longair, University of Calgary (several eumenine Vespidae); Marius Wasbauer, Brookings, Oregon (several Pompilidae); Donna Cherniawsky, Provincial Museum of Alberta (plants); and Bill Richards, Alberta Environmental Protection (plants). Thanks are also due to Darren Pollock for sorting specimens and servicing the traps at SNWA sites; to Jim Tansey for assistance in sorting specimens; and to Robert Gerlock for field assistance.

APPENDIX 1. Aculeate wasp dataset from SNWA sampling sites.
Trap sites are indicated in the top row. Species are indicated in the first column with numbers corresponding to those of the species listed in the Annotated List. Specimens of each species collected at each sampling site are indicated by numbers in the rows and columns. The Formicidae were excluded from the dataset because of a sampling bias associated with the proximity of a trap to a colony of eusocial insects.

	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	Mt
001	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
002	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
003	0	1	2	1	6	2	0	0	1	2	2	3	0	0	0	0	0	0	0	0	0	1
004	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
005	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2
006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
007	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
008	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
009	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
011	0	1	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
012	0	1	0	0	0	0	0	1	1	0	0	3	0	0	0	0	0	0	0	0	0	0
013	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
015	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
016	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
017	0	0	1	0	1	1	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0
018	0	0	0	1	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0
019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
021	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
022	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
023	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	16
024	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	7	7	24	0	0	0	4

025	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0
026	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	9	6	0	0	0	1
027	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0
028	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	4
029	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	7
030	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
031	0	0	0	1	2	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
032	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
033	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
034	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
035	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
036	1	0	0	1	2	5	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
037	0	1	0	0	0	0	3	0	0	0	0	0	1	1	0	7	2	2	2	1	2	2	
038	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
039	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
040	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
041	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	1	0	0	0	0	
042	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
043	0	0	0	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
045	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
046	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	7	
047	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	
050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	
051	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
052	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	4	
053	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	
054	0	1	1	1	3	1	3	1	1	1	2	3	0	0	0	3	0	0	0	0	2	2	
055	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	
056	1	0	1	1	4	7	2	1	2	0	0	1	0	0	0	0	0	0	0	0	0	3	

057	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
095	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
096	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
097	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
098	0	0	0	2	1	0	5	1	2	4	1	2	0	0	0	0	0	0	0	0	0	0	0
099	18	11	7	4	11	11	7	5	3	2	2	2	3	3	3	0	3	5	3	1	3	5	
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
102	0	1	1	0	0	1	0	0	0	0	0	0	0	2	1	0	0	3	0	0	0	5	
103	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
104	0	0	0	0	0	0	0	0	0	0	0	0	2	4	0	1	0	5	5	5	3	8	
105	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
107	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
108	1	1	2	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	10	
109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
110	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	1	0	0	0	0	0	0	
111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1	0	0	0	2	
113	1	0	0	4	3	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	7	
114	0	1	1	0	0	2	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	
116	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	1	2	
117	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	4	
118	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
119	0	1	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	18	
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3	
121	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
122	1	1	1	0	3	1	0	0	1	2	0	0	0	0	0	9	4	2	0	0	1	1	
123	0	1	0	1	1	1	0	0	0	0	0	2	0	1	0	0	2	1	0	0	1	0	

124	3	2	0	3	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2
125	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	3
126	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
127	0	1	0	1	1	0	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0
128	0	2	0	0	2	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
129	6	1	5	1	6	2	0	1	0	5	5	2	0	0	0	3	2	0	0	0	0	13
130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	5
131	1	2	3	1	1	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	4
132	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	5
133	1	0	1	0	0	2	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	15
134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
136	2	0	0	0	0	2	0	0	0	0	0	4	1	0	1	0	0	1	0	1	0	12
137	0	0	0	0	1	8	2	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0
138	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	7	0	3	2	7
139	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	2	1	0	0
140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
141	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
142	0	0	2	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3
145	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
147	0	0	0	1	0	1	1	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0
148	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
149	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
150	1	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	4
151	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1

153	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
154	1	3	1	0	0	2	1	1	1	4	0	2	0	0	0	0	1	1	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1	2	1	0	0	0	0
156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	5	11	2	7	13	1	0
157	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	12	13	0	0
158	14	25	27	20	12	21	13	13	12	17	14	8	0	0	1	3	6	0	3	4	1	2	0
159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
160	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
161	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
162	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0
163	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
165	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
166	3	0	1	2	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	9	0
167	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0
168	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0
170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0
171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	4	9	0	5	1	1	0
173	2	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1	1	3	0	5	13	1	0
174	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	8	5	1	0	0	6	0
175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0
176	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
177	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
178	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
179	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	0	0	0	3	0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
181	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	14	0
182	1	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0

183	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
184	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	7
186	12	11	8	22	8	8	1	0	0	0	0	0	0	0	1	2	4	6	0	1	11	40
187	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1
189	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	5	6	0	2	0	14
190	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59
191	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3
192	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
193	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
194	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	2	0	1	2	0
195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	2	0	0	0	0
196	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
197	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	2
198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
199	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	0	0	0
201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	4	0	2
202	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
203	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
204	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
205	0	0	0	0	0	0	0	0	0	1	0	0	0	0	6	2	2	3	0	0	1	12
206	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	2	4	0	1	0	12
207	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	13	11
209	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2	2	12	13
210	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
211	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
212	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1

215	0	5	0	0	0	4	0	0	1	0	0	0	0	0	1	1	2	2	0	0	0	1
216	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	1
217	0	0	0	0	0	0	0	0	0	0	0	0	52	217	23	4	9	47	1	0	0	12
218	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	0	0	0	0	0	0	0	0	0	0	0	01	2	0	0	0	0	0	0	1	1	1
220	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
221	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
222	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
223	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
224	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	8
225	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22
226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
227	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	9
228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
231	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17
232	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
233	0	0	1	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1
234	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
235	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0
236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
237	1	2	1	1	2	1	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0

APPENDIX 2. Spider dataset from SNWA sampling sites.
Trap sites are indicated in the top row. Species are indicated in the first column with numbers corresponding to those of the species listed in the Annotated List. Specimens of each species collected at each sampling site are indicated by numbers in the rows and columns.

	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3
04	0	0	0	0	0	0	0	5	5	4	3	0	0	0	0	0	0	0
05	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
06	0	2	0	2	0	1	3	1	0	2	2	0	0	0	0	0	0	0
07	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0
09	1	0	1	0	1	1	0	1	2	0	0	0	1	0	0	0	0	0
10	1	2	2	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4	2	3
12	1	0	1	0	0	2	0	3	3	0	0	0	2	1	2	0	0	1
13	0	0	0	0	0	1	2	4	2	2	0	0	2	1	1	1	1	1
14	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	5	1	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	5	2	3
16	0	0	0	0	0	0	2	0	2	5	1	2	2	1	4	3	1	0
17	1	0	0	1	0	1	12	11	9	2	3	2	0	1	0	0	0	0
18	2	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	3	10	6	7	11	6	2	0	2	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	6	1	3	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	3	0	1	0	0	1	0	0	0
23	1	0	0	0	0	1	4	13	5	18	5	3	0	0	0	0	0	0
24	3	2	3	2	5	8	0	0	0	1	0	0	2	1	0	0	0	0
25	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
27	1	1	2	3	3	4	0	2	0	1	0	1	2	4	2	0	0	0
28	8	8	4	3	2	4	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	7	1	0

30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	19	9	9
31	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
33	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	2	0	6	1	0	0	1	0	2	1	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	9	5	4	3	1	0
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
38	0	0	0	0	0	0	1	1	2	2	1	0	0	0	0	0	0	0	0
39	0	0	1	0	0	2	6	6	7	3	3	0	4	1	1	1	0	0
40	0	0	0	1	0	0	0	1	0	8	2	0	2	3	1	0	0	0
41	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
43	0	0	0	0	0	0	10	5	11	0	1	0	0	0	0	1	0	0
44	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	1	2	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0
46	3	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	0	2	1	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0
48	5	4	2	3	4	2	0	0	0	0	0	0	0	0	0	0	0	0
49	0	0	1	1	6	2	6	4	5	3	0	0	3	6	7	0	0	0
50	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
51	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0
52	0	2	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
53	17	19	29	10	21	6	0	1	0	0	0	0	1	2	0	1	0	0
54	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
55	19	18	19	6	3	7	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
58	7	3	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0

59	13	12	28	41	43	41	26	24	33	12	7	3	5	1	3	6	0	2
60	0	0	0	0	0	0	1	0	0	3	0	1	2	1	1	0	0	0
61	0	0	0	0	1	0	0	0	0	2	0	1	1	2	0	0	0	0
62	0	2	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
67	4	4	7	5	5	12	5	2	2	3	1	1	4	2	2	0	0	0
68	2	1	6	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0
69	2	1	0	6	0	2	0	0	0	0	0	0	0	1	0	2	1	0
71	5	3	0	3	0	3	6	6	1	1	2	0	1	1	2	3	0	0
72	1	4	2	3	3	5	1	3	1	1	0	0	6	0	1	0	1	0
73	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
74	2	7	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0
77	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
79	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
82	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0
84	0	0	0	0	2	0	0	1	0	1	0	0	2	8	6	1	0	0
85	0	0	0	0	0	0	0	0	0	0	0	0	0	6	6	0	1	0
86	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
87	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	1	0	0
88	3	6	7	9	7	21	2	2	1	5	7	2	4	2	3	0	0	0
89	0	0	1	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0
90	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0
91	1	0	0	0	1	0	0	0	0	1	1	2	1	2	5	0	0	1
92	7	24	18	2	6	5	0	0	0	0	0	0	0	0	0	0	0	0
93	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0

94	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	1	1	0	2	1	1	1	1	5	0	1	1
Total species	29	27	29	30	34	33	19	26	18	31	17	14	26	28	27	23	13	8

APPENDIX 3. List of Click Beetles (Coleoptera: Elateridae) From SNWA

1. *Ctenicera aeripennis destructor* (Brown) 168 specimens.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	18	23	29	30	20	25	9	4	7	1	2	

2. *Cardiophorus cardisce* (Say) 1 specimen.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens											1	

3. *Cardiophorus montanus* Blanchard 1 specimen.
CFB SUFFIELD NATIONAL WILDLIFE AREA: a single specimen was captured at 50°15'N 110°37'W in a sweep sample on 26-V-1994.

4. *Conoderus auritus* (Herbst) 2 specimens.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										2		

5. *Aeolus mellillus* (Say) 4 specimens.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens				1		1						2

6. *Hemicrepidius carbonatus* (LeConte) 2 specimens.

CFB SUFFIELD NATIONAL WILDLIFE AREA: two specimens were captured in a sweep sample at 50°23.568'N 110°35.153'W on 28-VI-1994.

7. *Hypnoidus bicolor* (Eschscholtz) 5 specimens.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1	3				1						

8. *Dalopius mirabilis* Brown 1 specimen.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	High Soil Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens		1								

9. *Ampedus uteanus* (Van Dyke) 1 specimen.
CFB SUFFIELD NATIONAL WILDLIFE AREA: a single specimen was captured at 50°23.568'N 110°35.153'W in a sweep sample on 28-VI-1994.

10. *Negastrius dubius* (Horn) 5 specimens.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens										3	2	

APPENDIX 4. List of Butterflies (Lepidoptera) From SNWA

HESPERIIDAE

1. *Atrytone logan* (W.H. Edwards) 2 specimens.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens								1				1

2. *Erynnis afranius* (Lintner) 1 specimen.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens						1						

3. *Hesperia uncas* W.H. Edwards 1 specimen.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens								1				

4. *Polites peckius* (W. Kirby) 2 specimens.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens			1				1					

PERIDAE

5. *Colias philodice* Godart 11 specimens.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1			1	1	3	5				

6. *Pontia occidentalis* (Reakirt) 34 specimens.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	2	1	2	5	2	11	6	4	1			

LYCAENIDAE

7. *Lycaena rubida* (Behr) 1 specimen.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	High Soil Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										1

8. *Harkenclenus titus* (Fabricius) 1 specimen.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	High Soil Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens								1		

9. *Plebejus melissa* (W.H. Edwards) 14 specimens.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	4					2	2	4	1	1		

NYMPHALIDAE

10. *Speyeria callippe* (Boisduval) 9 specimens.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1	2		1			2	1		1		1

SATYRIDAE

11. *Ceononympha inornata* W.H. Edwards 8 specimens.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1	1	1						1		1	

Eolian Soil Sites

Moisture Stability	High Soil Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										3

12. *Cercyonis oetus* (Boisduval) 39 specimens.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Eolian Soil Sites

Moisture Stability	High Soil Moisture No Vegetation (shoreline)			Medium Soil Surface Moisture Stabilized Dune			Low Soil Surface Moisture Active Dune Blowout			Malaise Trap
Sites	2.1.1	2.1.2	2.1.3	3.1.1	3.1.2	3.1.3	4.1.1	4.1.2	4.1.3	5.1.1
# specimens										39

13. *Cercyonis pegala* (Fabricius) 1 specimen.

CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens	1											

LIBRARY
Canadian Wildlife Service
Saskatoon

14. ***Oeneis uhleri*** **(Reakirt)** 3 specimens.
CFB SUFFIELD NATIONAL WILDLIFE AREA:

Chernozem Soil Sites

Soil Moisture Plant Height	High Soil Moisture 60 cm ± canopy height			Medium-high Soil Moisture 30 cm ± canopy height			Medium-low Soil Moisture 15 cm ± canopy height			Low Soil Moisture 8 cm ± canopy height		
Sites	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.3.3	1.4.1	1.4.2	1.4.3
# specimens		1									1	1