Mount Maxwell

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The Insects of Mount Maxwell Ecological Reserve, Saltspring Island, B.C.

by

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Introduction

Ecological studies of insect populations have, in the past, tended to concentrate on a single species, or small groups of species. Little work has been completed which reflects the interractions of the whole spectrum of insects to be found in a wilderness area. Martin (1965, 1966) has described in detail the ecology of an arthropod community in a cultured red pine plantation, but while this provides valuable information the uniformity of such a forest area does not adequately describe the interractions of flora and fauna in a wild "natural" woodland. The establishment of ecological reserves in British Columbia has provided an oppotunity to study arthropod communities which have been subject to relatively little human interferance. To date little work has been done on these reserves and none at all in the field of entomology.

The intention of this report is to lay the ground work for future, more detailed research. The primary purpose was to survey the insect population of the Mount Maxwell ecological reserve, Saltspring Island, and to provide a list of the species living there. It was not sought in this study to provide quantitative data. A great deal of controversy still exists over the accuracy of available sampling techniques for use in population determinations. For instance Williams (1958) and Briggs (1961) have found that pit fall traps could be selective of certain ground dwelling species due to construction and bait. It is generally agreed that the reaction of one species to a trap or other sampling device can be quite different from that of another. Thus, as it was desirable to sample as wide a range of species as possible during a single season it was not deemed practicle to attempt a quantitative census at this time.

Description of the Study Area

The Mount Maxwell ecological reserve is a quarter section of land located on the Southwest slope of Mount Maxwell, Saltspring Island. It is a steeply sloping area, having a grade between 5° and55°, the mean being about 22°. The Southwest corner of the reserve is intersected by the coast for approximately 150m., while the Northeast corner rises to an elevation of 350m. During the summer long hours of sunlight and low relative humidity compound to make the area extremely dry for periods up to several weeks in duration. A few small streams traverse the reserve during the wet months, but these are intermittent and dry up rapidly in hot weather.

The plant life of the reserve has been described in great detail by Clarke, Handley, and Mainguy (unpublished) and will thus be described herein only briefly. Basically there are three community types described simply as Douglas fir, Gary oak, and outcrop. Ground vegetation in the Douglas fir community is greatly reduced due to the dense overhead canopy. The Gary oak community is much more open and consequently has a greater abundance of ground flora, principally grasses. The outcrop areas are densely populated by grasses and mosses and are unshaded except on fringe transition areas. The latter two communities tend to become extremely dry during long hot spells. Surface water evaporates and the underlying soil becomes powdery to a depth of several inches. The Douglas fir community in contrast remains relatively moist throughout the summer, the topsoil never completely drying out due to shading by the overhead foliage.

Human interference in the reserve is limited largely to the north east corner where a road leading to nearlby Mt. Maxwell Provincial Park cuts across protected land. The distribution of litter, such as

beer bottles, candy wrappers,etc... indicate that less than an acre is subject to human use. Local farmers allow several small flocks of domesticated and semi-wild sheep to roam over the reserve, grazing freely on shrubs and grasses, the damage to which is readily apparent. However, this has been practised for so long (80 to 100 years) that it could be argued that this now forms a part of the reserve's ecology. While this may be debatable it does not seem likely that the practice will be stopped in the near future.

Access to the reserve can be made by two routes. The most convenient is via the Mount Maxwell Provincial Park road. A small look-out-parking area is situated approximately fifty meters from the N.E. corner post. The alternate route involves hiking approximately one kilometer along the shoreline from Burgoyne Bay. This latter route involves crossing two pieces of private land.

Materials and Methods

Collection was done from mid-May to the end of August, 1974. Ground surface inhabiting insects were caught in thirty permanent pitfall traps installed throughout the reserve. Each of the three plant communities was allotted ten traps, distributed in appropriate locations along a diagonal from the N.E. corner to the S.W. corner. Obtrel, (1971) has shown that pitfall trapping using a minimum of ten or twelve traps provides sufficient coverage to capture most species of soil surface Coleoptera in a comparable area. Thus it is felt that most of the soil surface insects inhabiting the reserve have been included in this survey.

Abundant sheep droppings and the occasional sheep carcas proved to be excellent collecting sites, both for soil surface insects and many species of flying insects. Droppings were particularly useful when fresh, i.e. when the moisture content was high. Dried stools were not good collecting sites.

Insects inhabiting foliage were collected in a sweep net, killed in an atmosphere of ethyl acetate and preserved in 75% ethanol. Large plants, such as oak and fir were sampled to a height conveniently reached from the ground (approx. 2.75m.) Crown sampling was not considered practical at this time.

Flying insects were caught in a hand-held aerial net. An attempt was made to trap flying insects on Aeroxon fly catching strips. Eight strips were hung from trees in a test area during a period of warm weather. After a week the strips were cut down and examined. This method was abandoned as it was discovered that the sticky substance used to catch insects broke down on exposure to sunlight, subsequently losing its trapping ability.

Nocturnal insects were captured on two occaisions by means of attraction to an ultraviolet light. The light was placed on a 1m. square white sheet. Insects landing on the sheet were caught in a net. Five soil samples were collected from each community and the insects contained in them seperated out in a Berlese funnel.

All specimens were identified in the laboratory using chiefly Boror and Delong (1971) and Jaques (1970) to the family level. Further classification was carried out using the collections of the University of Victoria, the British Columbia Provincial Museum, and the Pacific Forest Research Center. Specimens were labelled, pinned, and organized into a permanent collection maintained at the University of Victoria. For access contact Dr. Richard Ring, Department of Biology.

Results

One hundred and seventy-two species were collected representing 98 families in 14 orders. The following chart lists all species captured and identified and the plant community in which they were caught. Occaisionally identification was possible only to the family level due to lack of adequate reference material.

KEY:

Frequency* ... estimate of species density made under three sub-headings:

1) Abundant..... Species appeared in almost all samples, usually in great numbers

2) Common..... Species appeared in over 50% of samples

3) Rare..... Species rarely collected, never in great numbers

NOTE: Curculionidae**... identification only to Family

PTERYGOTA	Douglas Fir	Gary Oak	Outcrop	Frequency*
ODONATA				
Aeshnidae				
Aeshna interrupta		X	X	abundant
Libellulidae				
Libella sp.		X	X	abundant
ORTHOPTERA				
Gryllacrididae				
One unidentified species	X	X	X	abundant
Acrididae				
Trimerotropis sp.		X	X	abundant
Gryllidae				
One unidentified species			X	rare
Anthocoridae				
One unidentified species			X	rare
Issidae				
One unidentified species			X	rare
DERMAPTERA				
Forficula auriculara	X	X	X	abundant
PSOCOPTERA				
One unidentified species (F. Pseudocaeciliidae)	X			rare
NEUROPTERA				
Agulla sp.			X	rare
One unidentified species (F. Hemerobiidae)	X		X	rare
TRICHOPTERA				
One unidentified species (F. Philopotamidae)	X			rare

	Plant Community			
	Douglas Fir	Gary Oak	Outcrop	Frequency *
COLEOPTERA				
Carabidae				
Zacotus mathevii	X	X		common
Carabus sp.	X	X	X	abundant
Harpalus sp.	X	X	X	common
Loxandrus sp.	X	X	X	rare
Pterostichus orindnum	X	X	X	abundant
Scaphinotus sp.	X			common
Cleridae				
Enoclerus eximus			X	rare
Histeridae				
Saprinus sp.			X	rare
one unidentified species			X	rare
Staphylinidae				
Oxcypus globuliferra		X		rare
Hyponigrus sp.			X	abundant
Two unidentified genus'			X	common
Elateridae				
Althous vitiger			X	rare
Ctenicera sucktevi	X			rare
Dalopius sp.	X	X	X	common
Elater nigrinus	X	X		common
Siliphidae				
Nicrophorus sp.	X			rare
Throscidae				
One Unidentified genus			X	rare

	Douglas Fir	Gary Oak	Outcrop	Frequency
Cantharidae				
Podabrus tomentos			X	Rare
P. piniphilus	X			abundant
P. lutosus			X	rare
One unidentified genus				common
Scolytidae				
Hylastes sp.	X			rare
**Curculionidae				
H ylobiinae	X			rare
Tanymelinae	X			common
Erithininae			X	rare
Thylacitinae	X			common
Brachyrhininae	X	X	X	abundant
Anthonominae			X	rare
Anobiidae				
One unidentified genus			X	rare
Anthribidae				
One unidentified genus			X	rare
Tenebrionidae				
Blastinus sp.	X			rare
Eleodes cordata	X			common
Scarabaeidae				
Aphodius aleutus			X	rare
Diplotaxis brevicollis			X	rare
Lucanidae				
Trox sordidus			X	rare

	Douglas Fir	Gary Oak	Outcrop	Frequency
Geotrupidae				
B ulbocerus obesus			X	common
Alleculidae				
Cistella sp.			X	common
One unidentified genus			X	rare
Melandryidae				
One unidentified genus			X	rare
Chrysomelidae				
One unidentified genus			X	rare
Byrrhidae				
Pedilophorus sp.			X	common
Lathridiidae				
Melanophthalma sp.	X			rare
Coccinellidae				
Cycloneda munda			X	common
Dermestidae				
Anthrenus sp.			X	abundant

DIPTERA	Douglas Fir	Gary Oak	Outcrop	Frequency
Tipulidae				
Tipula trichotipula	X			abundant
One unidentified species		X		common
Trichoceridae				
One unidentified genus				
Culicidae				
Culex sp.	X	X	X	abundant
Two unidentified species	X	X	X	abundant
Chironomidae				
Three unidentified genus'	X	X		abundant
Simulidae				
Prosimulum sp.	X		X	common
Sciaridae				
Three unidentified genus'	X	X		abundant
Cecidomyidae				
One unidentified genus			X	rare
Mycetophilidae				
Two unidentified genus'			X	common
Tabanidae				
Tabanus sp.	X			rare
Asilidae				
Pilica sp.			X	rare
Two unidentified genus'			X	common
Xylomyidae				
One unidentified genus	X			rare

	Douglas Fir	Gary Oak	Outcrop	Frequency
Rhagionidae				
One unidentified genus	X			rare
Empidae				
Four unidentified genus'			X	abundant
Phoridae				
Phora sp.			X	common
Two unidentified genus'			X	common
Lauxaniidae				
Two unidentified genus'			X	common
Syrphidae				
Syrphus sp.		X	X	common
Sphaeroceridae				
One unidentified genus			X	abundant
Chloropodae				
Two unidentified genus'		X		common
Heleomyzidae				
Three unidentified genus'	X	X	X	abundant
Agromyzidae				
One unidentified genus	X			rare
Muscidae				
Three unidentified genus'	X	X	X	common
Anthomyidae				
Five unidentified species	X		X	common
Calliphoridae				
Protophormia sp.			X	abundant
Piophilidae				
One unidentified genus			X	rare

HYMENOPTERA	Douglas Fir	Gary Oak	Outcrop	Frequency
Ichneumonidae				
Three unidentified species	X	X		common
Braconidae				
Two unidentified species	X		X	common
Formicidae				
Camponotus machlatus	X	X		common
Camponotus sp.	X	X	X	abundant
S.F. Dolichocterinae				
One unidentified species		X		rare
S.F. Myrmicinae				
One unidentified species		X	X	common
Sphecidae				
Four unidentified species	X		X	common
Apidae				
Bombus sp.		X	X	abundant
Apis sp.		X	X	abundant
Halictidae				
Two unidentified genus'		X	X	common
Megachilidae				
One Unidentified genus			X	rare
Colletidae				
One unidentified species		X		rare
Vespidae				
Vespula sp.	X	X		common
One unidentified species			X	common
Pompilidae				
One unidentified species	X			rare

LEPIDOPTERA	Douglas Fir	Gary Oak	Outcrop	Frequency
Geometridae				
Campaea perlata			X	common
Chlorosea nevadaria			X	common
Stenoporpia albescens			X	common
Sicya macularia	X			common
Dysstroma sp.	X			common
Enypia sp.		X		common
Three unidentified species	X	X	X	common
Pieridae				
Pieris sp.			X	common
Tineidae				
Three unidentified species	X	X	X	common
Nymphalidae				
Argynnis hesperis		X	X	common
Grapta silens		X	X	common
Lycaenidae				
Lycaena sp.		X	X	common
Hesperidae				
Thanos sp.	X	X	X	abundant
Noctuidae				
One unidentified species	X			common
Papilionidae				
Papilio eurymedon			X	rare
Papilio rutulus			X	rare

HOMOPTERA	Douglas Fir	Garry Oak	Outcrop	Frequency
Cicadellidae				
Gyponana sp.		X	X	common
One unidentified species		X	X	common
Cercopidae				
Philaenus leucopthalmus		X	X	common
One unidentified species			X	common
Delphacidae				
Two unidentified genus'			X	common
Achilidae				
Two unidentified genus'		X	X	abundant
Aphididae				
Three unidentified species	X	X	X	abundant

HEMIPTERA	Douglas Fir	Gary Oak	Outcrop	Frequency
Berytidae				
Neides muticus			X	common
Coreidae				
Coriomeris sp.			X	rare
Miridae				
Adelphocoris sp.		X	X	common
Lygus sp.		X	X	common
Stenodema sp.			X	common
Two unidentified species			X	common
Nabidae				
Nabis ferus			X	common
Tingidae				
One unidentified species			X	rare

APTERYGOTA	Douglas Fir	Gary Oak	Outcrop	Frequency
THYSANURA				
Machilidae				
Two unidentified species	X	X	X	common
COLLEMBOLA				
Entomobryidae	X	X	X	abundant
Isotomidae	X	X	X	abundant
Sminthuridae	X	X	X	abundant
Poduridae	X	X	X	abundant

Dispersal:

Species occurring in only one community type... 54.1%

Species occurring in two community types 28.5%

Species occurring in all three communities.....17.4%

Distribution of species with respect to community:

Plant Community	Percent of total species
Douglas fir	34.2
Gary Oak	23.7
Outcrop	42.1

Discussion and Recommendations

The outcrop community demonstrated the greatest diversity , 42.1% of all species being captured in this area, followed by the Douglas fir community with 34.2%, and Gary oak with only 23.7%. It is interesting to note that the Gary oak community combines features inherent to the two other communities, i.e. grass and moss ground layer and thin overhead canopy. It would appear that this condition is not preferable to those of the other communities (dense canopy in douglas fir, zero canopy in outcrop). There is also a strong indication that individual species are restricted to a sinle type of plant community type. Fully 54.1% of all species occurred in only one community type, only 28.5% in two community types, and just 17.4% in all three types. This could indicate that the degree of complexity of individual species, except for a few species, is not sufficient to overcome the diversity of the habitats. This must remain speculation, however, until further study can be carried out.

The primary purpose of this study was to provide a species list. Several recommendations can be made from the experience of this project which will aid future studies of this type. Sampling techniques used in this report were largely inefficient. Manual sampling (use of nets, aspirator, etc.) is somewhat arbitrary and relies on the mood, whims and energy of the collector to seek out every habitat at various times of day. It must be noted that the use of ecological reserves for scientific research is conditional on the utilization of non-destructive sampling methods. Previously sampling in some studies has been acclomplished by spraying foliage with

such chemicals as Prentox pyronyl, various pyrethrins, piperonyl butoxide, etc.(Martin, 1966). While this provides excellent numerical data, the possible ecological side effects make this sort of tehnique unacceptable for use on a reserve. Budgetary limitations restricted the present studt to manual collection, save for the use of inexpensive pit-fall traps. It is felt that a superior studt could be possible if permanent traps were utilized. For instance, several window flight traps(Chapman, 1965) located throughout the reserve could be left unattended and provide round the clock sampling of Diptera and Lepidoptera, rather than relying on haphazard, time limited net sampling. The use of permanent traps, available both commercially or home-made, would not only provide a more compltee sample, but by freeing the researcher from constant field work would enable the study of more than one reserve in an equal amount of time.

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