ENTOMOLOGICAL SOCIETY OF BRITISH COLUMBIA

The Entomological Society of British Columbia is a scientific Society founded in 1902 for the advancement of entomological knowledge in the province.

BOREUS

NEWSLETTER OF THE ENTOMOLOGICAL SOCIETY OF BRITISH COLUMBIA

Volume 24, Number 1 June 2004

Page

SOCIETY BUSINESS

NOTES

Publications of the ESBC

Journal of the Entomological Society of British Columbia

The *Journal of the Entomological Society of BC* is published annually. Papers for the *Journal* need not have been presented at meetings of the Society, nor is it mandatory, although preferable, that authors be members of the Society. The chief condition for publication is that the paper has some regional origin, interest or application. Line drawings or photographs as candidates for the cover are also accepted. Contributions should conform to the standards outlined in the Journal and the Website (http://esbc.harbour.com/), and should be sent to the Editor, Dr. Ward Strong, BC Ministry of Forests, 3401 Reservoir Road, Vernon BC, Canada V1B 2C7; tel 250-549-5696; fax 250-542-2230; e-mail Ward.Strong@gems7.gov.bc.ca.

The deadline for submissions to be included in the 2004 issue is **September 1, 2004**.

Boreus

Boreus, the Newsletter of the Society is published in June and December. It contains entomological news, comments, reports, reviews and notices of meetings and other events. While emphasizing the Society's affairs, *Boreus* provides members with a forum for their views and news of British Columbia entomology, as well as informal articles, notes regarding research projects, and anything else that may be of interest to entomogists. Please send correspondence concerning *Boreus* to the Editor, Cris Guppy, 4627 Quesnel-Hydraulic Rd., Quesnel BC, Canada V2J 6P8; tel 250-747-1512; e-mail cguppy@quesnelbc.com.

The deadline for submissions to be included in the December 2004 issue is **November 1, 2004**.

Membership of the Entomological Society of BC is available to anyone interested in entomology. Annual dues are Can$20.00 (regular member) or Can$10.00 (student member). Members receive the *Journal*, *Boreus* and *Occasional Papers* (the latter published intermittently).

Inquiries concerning membership and back issues should be sent to the Secretary/Treasurer, Dr. Robb Bennett, BC Ministry of Forests, 7380 Puckle Road, Saanichton, BC, V8M 1W4, Canada; tel 250-652-6593; fax 250-652-4204; e-mail Robb.Bennett@gems6.gov.BC.ca

Cover: *Boreus elegans* (Mecoptera: Boreidae); one of the more conspicuous snow scorpionflies in BC. Larvae and flightless adults live in, and feed on, moss and clubmoss. Adults appear in the fall and are active on snow on warm winter days.

SOCIETY BUSINESS

PRESIDENT'S REPORT: BOB VERNON

For those of you who may not have heard, Dr. H. R. 'Mac' MacCarthy passed away at age 92 on April 7, 2004. A memorial ceremony was held on Friday, April 30th at the Unitarian Church of Vancouver on 49th and Oak Streets, where several of his relatives, friends and colleagues paid tribute to this phenomenal man. I first met Mac in the summer of 1976, when he became the coordinator of the SFU Master of Pest Management summer courses after retiring at age 65 from Agriculture and Agri-Food Canada. At that time, I was taking the Agricultural Pest Management summer course (BISC 603 for those who care), and I was immediately impressed by Mac's keen knowledge of agricultural pests, and his gripping tales of various research endeavours and battles against pestilence in BC. It was not just the stories that impressed me but the way that he told

This picture of Mac was taken in 1976 at his retirement party at the Vancouver Research Station of Agriculture and Agri-Food Canada.

them, with his perfect, clear and enthusiastic 'Henry Higgins-like' command of the English language. Over the years, I would hear the same stories from Mac, and almost always they were told in the same clear way and with the same relish. What impressed me about Mac was that he was always consistent and dependable, always fair, always giving, always interesting, and for some reason never seemed to age.

Mac was actively involved in the executive of the Entomological Society of BC for the majority of his professional career. He was a past president and the editor of the Journal of the Entomological Society of BC for an incredible 34 years (1955-1988). I cannot think of another individual who has given so much to our Society since its inception. As editor, Mac would go over each and every manuscript with a fine toothed comb, and I'm sure that all of us who published during that time benefited greatly from his comments and critiques. From time to time, even into the1990s, I would pass various manuscripts by Mac for review. Although most of us despise being asked to review a paper, Mac actually seemed to enjoy the task and within a day or two I would get a call from him saying "Are you ready to do battle?" I would then take the short drive to his house, which was close to the Vancouver Research Station, feeling rather like a student going to see the results of his English final exam. We would then sit down at his incredibly uncluttered desk or kitchen table and literally word-by-word plod through the manuscript. When we came to the disputed text, which was quite plentiful (usually beginning with the Title), sometimes he would give me the opportunity to defend myself, or sometimes simply and matter-of-factly insult my "Germanic" style of writing. He would write his 'suggested' revisions on the paper in perfectly crafted handwriting that you just don't see anymore. I never once saw him stroke out what he had written, and I often marvelled at what an organized and concise mind he had. At the end of the "Battle", in which I was always thoroughly defeated, he would lead me to his basement and give me a bottle of his homemade Sherry. A peace offering I'm sure. I would then go back to my office and place my paper in a filing cabinet under 'Miscellaneous MacCarthy Massacres', which I still refer to today. I would drink the Sherry later of course. He was a maker of fine wines. He learned and mastered the art of Bonsai, and established a formidable collection (somewhere between 50 and 100 as I recall) which he simply gave away to his friends and family when he downsized from house to apartment. I remember him handing me a Giant Sequoia that was over 20 years old and a whopping 1 foot high. Mac was a mentor to me and many others, and he will be sincerely missed.

In 1990, the H.R. MacCarthy Pest Management Lecture was launched at Simon Fraser University, and featured Dr. Marcos Kogan as the inaugural speaker. The lecture was founded by a number of Mac's colleagues and friends to honour his broad contributions to Entomology and Pest Management and included: the Entomological Society of B.C.; the Professional Pest Management Association of B.C.; Agriculture and Agri-Food Canada; the Centre for Pest Management, SFU; Faculty of Agricultural Sciences, UBC; the Association of Professional Biologists of B.C.; and numerous donations from private individuals. Needless to say, Mac was very proud to have been given this honour, and attended the lectures until poor health eventually overtook him. The lecture rotates from SFU to UBC, and this year's lecture will be held in conjunction with the ESBC AGM at the Halpern Centre at SFU (See the announcement in this newsletter). The H.R. MacCarthy Lecture Committee is pleased to announce that Dr. Dan Johnson will be the guest speaker.

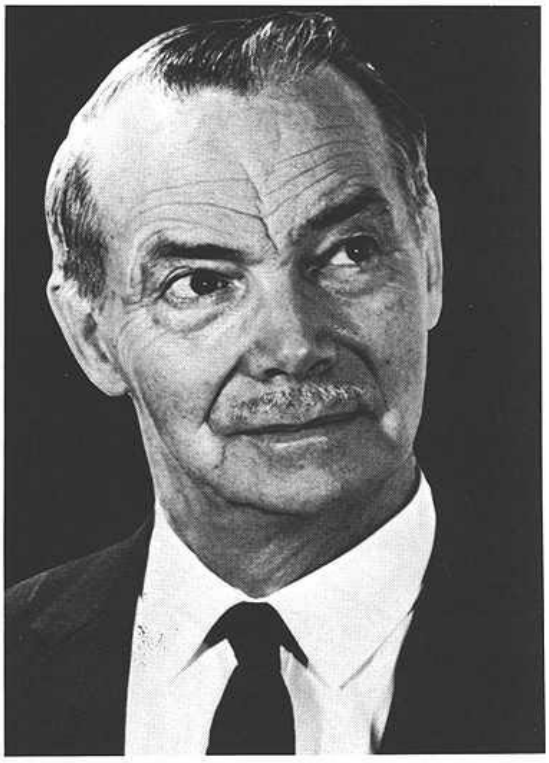
DR. MAC MACCARTHY
From the Vancouver Sun newspaper

MacCARTHY – Hubert Reagh "Mac", born June 22, 1911, passed away on April 7, 2004. He will be greatly missed and lovingly remembered by his son Dermot, grandchildren Katherine and Ian, his nieces and nephews, and all the friends, colleagues and students whose lives he touched over his long life. Mac was sadly predeceased by his wife Ruth in 1976 and by his five brothers. Mac was a rancher during the depression and served in the army for six years before going to the University of B.C. and the University of California at Berkeley. He joined Agriculture Canada and worked for twenty years at the Vancouver Research Station on the UBC campus and as an adjunct professor at UBC. After retirement he served as the Acting Director of the Master of Pest Management Program at Simon Fraser University and as the thesis editor and mentor to numerous graduate students there. The H. R. MacCarthy Lecture in Pest Management, held alternate years at UBC and SFU, celebrates his dedication to students. Mac will be remembered for his generosity, integrity, intelligence and wit.

DR. KEN GRAHAM

Dr. Ken Graham, a long-time UBC forest entomologist and ex-member of the Entomological Society of British Columbia, recently passed away. His biography was published last year in Boreus 23(1). The following notice was published in the Vancouver Sun, June 19, 2004. For further information please contact his son Ian at 604-221-5952 or irgraham@shaw.ca.

GRAHAM – Kenneth. Born 1911 near Keatley Saskatchewan, died peacefully at Crofton Manor, Vancouver, June 6, 2004. Predeceased by his first wife, Lucile, and second wife, Ruth. Greatly missed and fondly remembered by Ian (Nancy), Loyd (Ginny), Arlene (Peter); grandchildren Allison, Carson, Laurel, Eric (Sarah) and great-grandchild Anders. BA UBC (1933); MSc McGill (1937); PhD Toronto (1945), Professor of Forest Entomology at UBC 1948-1977. Avid gardener with a green thumb. A keen mind till the end, he absorbed with interest developments on all fronts of science, as well as the progress of his family. A memorial service and reception will be held at Carey Hall, 5920 Iona Drive (off Wesbrook Cresc. near Chancellor Blvd.), Vancouver on Wednesday, June 30th at 2:00 p.m. In lieu of flowers, a donation may be made to the Kenneth Graham Memorial Fund, for forestry studies at UBC (Attn: Lindsay Follett, 6253 NW Marine Drive, Vancouver, BC, V6T 1Z1 604-822-4293).



Dr. Ken Graham, from a 1970s UBC Forestry yearbook.

2004 Annual General Meeting

CALL FOR PAPERS & PARTICIPATION

The 2004 ESBC AGM will be held at the Halpern Centre, Simon Fraser University

Friday, October 29, 2004

IMPORTANT: Submit titles and abstracts for presentations to Bob Vernon by **Sept. 30th**.

ABSTRACT: Fifty words, Journal of ESBC format, electronic copy to Bob Vernon.

REGISTRATION COST: $20 regular member, $10 student - payable at the door.

STUDENTS: Remember: there are prizes for best MSc and PhD presentations.
Also, the winners of the 7th annual MSc and PhD Graduate Student Travel Scholarships (**$500 each to attend conferences other than the ESBC AGM**) will be announced at the AGM. Ask your supervisors about this award and check out requirements in this newsletter.

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Egg of the Green Anglewing butterfly, digitally scanned at 2400 dpi. Quesnel, BC. (Cris Guppy).

ENTOMOLOGICAL SOCIETY OF BRITISH COLUMBIA
7th ANNUAL GRADUATE STUDENT SCHOLARSHIPS

The Entomological Society of British Columbia announces the seventh annual Graduate Student Scholarship competition. Two $500.00 Scholarships (one M.Sc., one Ph.D.) are awarded each year at the Annual General Meeting. Scholarships are to be used to defray research paper or poster presentation related costs (including travel) incurred by graduate students for participation in conferences other than the ESBC AGM.

For consideration, applicants must be:

- Graduate students and ESBC members in good standing, and **must submit a Word file containing:**
  - name and locality of conference to be attended,
  - title and abstract of research to be presented, and
  - current CV.

Abstract should be double spaced, 12 font, and a **maximum** of 200-250 words (based on processor electronic word count). Applications will be judged on the basis of scientific importance, quality of the application, and qualifications of the applicant. Applications from M.Sc. and Ph.D. students will be judged in separate categories; a singleton application in either category will be judged with applications in the other.

Deadline for receipt of applications for 2004 Scholarships is 30 September 2004. This year's scholarships will be awarded during the ESBC Annual General Meeting, 29 October 2004. Send applications to:

Robb Bennett
Secretary/Treasure, ESBC
BC Ministry of Forests
7380 Puckle Road
Saanichton, BC V8M 1W4
or by e-mail to: robb.bennett@gems6.gov.bc.ca

Hoverfly (Diptera: Syrphidae) on Canada Thistle, Mt. Tuam Saltspring Island (Cris Guppy)

NOTES

BRITISH COLUMBIA MOSQUITOES AS VECTORS OF WEST NILE VIRUS

P. Belton, PhD ARCS, Biological Sciences, Simon Fraser University (Retired)

West Nile Virus (WNv) is transmitted between birds and mammals and maintained in endemic areas by mosquitoes (Diptera: Culicidae). Bird-biting species in the culicine group (*Culex, Culiseta, Aedes/Ochlerotatus*) evidently amplify the virus in endemic areas of Africa, S. Europe and W. Asia, and since 2000 in N. America. Mosquitoes develop in water, many of them, including most *Anopheles*, *Culex* and *Culiseta* species, have several generations a year, and almost all of these overwinter as mated but unfed adult females. WNv has been identified in a few males and overwintering females and it may therefore pass from adult ovary to egg.

The virus has been isolated from over 80 species of mosquito world wide since its discovery in the West Nile district of Uganda in 1937. The virus may multiply to a greater or lesser extent in the blood space of infected mosquitoes and it must then migrate to the salivary glands ready to be injected into a host if and when the mosquito takes a second blood meal. This, together with the biology of the species, leads to a scale of 'vector competence'.

The CDC (2002) ranked 16 eastern WNv vectors with ratings from +++ to + competence. The infectivity and vector competence of 10 species found in California were tested that year (Goddard *et al*. 2002) and currently 51 species in N. America have been found infected (P in the table below) with WNv (CDC 2004). We have about 50 species in BC (Belton 1983) and I have arbitrarily rated the 20 BC species listed by the CDC (taking into account their ability to transmit other viruses), adding a question mark for the species not yet infected in nature. I have also added the competent virus vector *Aedes togoi*, which is found in rockpools around Georgia Strait and on Gulf Islands here and in WA. At the time of writing (May 2004), WNv has not been identified in any resident host in our Province. The potential vectors in BC are listed in Table 1 on the next page.

Mortality of birds and infection of horses will probably be our first notification of WNv in the Province. Nevertheless humans sharing the habitat of any of the species listed above might expect bites from them in a normal season and we should be prepared to confirm the mosquitoes' distribution and verify their blood feeding habits before then. Traps are being set out and picture keys to the genera of immature and adult mosquitoes of BC are available from BCCDC where tests for viral RNA are being done.

Names of the genera of mosquitoes follow Wood *et al*. (1979).

Biology and Distribution

+++ *Culex tarsalis* is a native species, widely distributed in ditches and permanent and semipermanent pools in grassland and open woodland in the southern third of the Province. Specimens have recently been found in southern Vancouver Island. It is a proven virus vector, implicated in our human cases of Western Equine Encephalomyelitis (WEE) in the 1970's. They are present and bite mostly in the early morning and evening all summer. All our *Culex* and *Anopheles* species and most *Culiseta* overwinter as mated females and emerge in early spring for blood meals.

Table 1. Potential Vectors of West Nile Virus in BC

Potential Vectors in BC	Positive (P)	Competence (+)	Feeding preference, biology
Culex tarsalis	**P**	**+++**	Birds, mammals[3]
Cx. pipiens	**P**	**++**	Mostly birds[3]
Cx. territans	**P**		Mostly amphibia[3]
Culiseta impatiens	**P**		Mostly mammals[5]
Cs. incidens		**+?**	Mostly mammals[3]
Cs. inornata	**P**	**++**	Birds, mammals[3]
Cs. morsitans	**P**	**++**	Mostly birds[5]
Aedes cinereus	**P**	**+**	Birds? Mammals[1]
Ae. vexans	**P**	**+**	Mostly mammals[1]
Aedes (Ochlerotatus) canadensis	**P**	**+**	General feeder[1]
Ae. (Oc.) dorsalis	**P**	**++**	Mammals, occasionally birds[1]
Ae. (Oc.) fitchii	**P**		Mostly mammals[1]
Ae. (Oc) hendersoni		**+?**	Birds? mammals[1]
Ae. (Oc.) melanimon	**P**	**++**	Mammals, occasionally birds?[1]
Ae (Oc.) provocans	**P**		Mostly mammals?[1]
Ae. (Oc.) sierrensis		**+**	Mammals[4]
Ae (Oc.) sticticus	**P**	**+**	Mammals[1]
Ae. (Oc.) togoi		**+++?**	Birds, mammals[4]
Mansonia (Coquilletidia) perturbans	**P**	**++**	Birds, mammals[2]
Anopheles punctipennis	**P**	**+**	Mammals, birds?[3]
An. earlei	**P**	**+**	Mammals, birds?[3]

[1] Eggs overwinter, one or two generations / year; [2] Larvae overwinter, one generation / year; [3] Females overwinter, several generations / year; [4] Eggs and larvae overwinter, several generations / year; [5] Females overwinter, one generation / year.

++ *Cx. pipiens* was probably introduced to the west coast of North America in the late 1800's. Since the 1920's it has spread across the southern margin of the Province and into Vancouver Island and is now one of the commonest mosquitoes in artificial containers (e.g. rain barrels and paddling pools) drainage ditches and storm sewers, particularly those contaminated with organic matter. It feeds primarily on birds but comes indoors to bite on warm summer nights, often making itself heard in the bedroom. It is a proven vector of WNv, WEE and St Louis Encephalitis (SLE).

(++ *Cx. restuans* is an important amplifying vector of WNv. There are unconfirmed records of a female from Esquimalt and others from northern ID, but these could be misidentified *Cx pipiens*. It is less 'domestic' than *Cx. pipiens*, but larvae can be found in artificial containers around homes, as well as other sites with some organic content. Primarily a bird feeder, females will also feed on reptiles and mammals.)

Cx. territans is widely distributed in BC but has nowhere been seen or persuaded to bite a mammal. It was perhaps infected from a bird or reptile, its preferred hosts are amphibians.

Culiseta impatiens, also widely distributed, is a human biter early in the season. Primarily a woodland species, it is long-lived, with just one generation a year. Its vector capacity and its host preferences later in the year are not known.

+? *Cs. incidens* is our commonest mosquito with many generations a year and very well adapted to domestic sites. It has not been found with WNv but in laboratory tests it has transmitted several other viruses (Reeves and Hammon 1946).

++ *Cs. inornata* is widely distributed across the western Provinces and into the arctic with several generations a year in the south of the Province. Egg rafts are laid in almost any slow moving or stagnant water but seldom in artificial containers and females are known to be competent vectors of WEE, feeding readily on birds and mammals. Its transmission rates were moderate in tests with WNv in CA but it is active earlier and later in the year than *Culex pipiens* and *tarsalis* both there and in BC.

++ *Cs. morsitans* is a widely distributed northern species. Most of its blood meals are from birds and it is known to bite mammals but its vector ability has not been investigated. It is our only member of the genus that overwinters in the egg stage.

+ *Aedes cinereus* is found throughout the Province and is known to bite humans even during the day. It is a late hatching species with several generations a year in southern BC. Its vector capacity is unknown.

+*Ae. vexans* is a notorious early summer floodwater pest over the entire Province. With favourable early warm flooding, it may produce 2 generations a year. Females bite man and domestic mammals indiscriminately but seem to feed on birds less often. Most bite between dusk and dawn and are proven virus vectors.

+ *Ae. (Ochlerotatus) canadensis* is a fairly common species found in the late summer throughout the Province. In the south it may produce two generations a year and is a very general feeder on animals ranging from amphibia to mammals. They have not yet been found with virus in Canada.

++ *Ae. (Oc) dorsalis* and *melanimon* are very similar species producing up to two generations a year in saline pools and flooded pastures in the interior of the Province. *Ae. dorsalis* is also found in coastal salt marshes around the Georgia Strait and south to CA. It is known to feed on birds occasionally. Both are confirmed vectors of other viruses

+ *Ae. (Oc) fitchii* is a widely distributed human pest of woodland and open pools often up to high altitudes in mid and late summer. Its vector ability is not known.

+? *Ae. (Oc) hendersoni* is an uncommon tree cavity and shaded artificial container breeder known from Vernon to Kootenay Lake. It can be a significant local pest but its biology and vector capacity are not well known. It has been confused in the past with *Ae. (Oc) triseriatus*, a proven vector, found with WNv in the east.

Ae. (Oc) provocans is an early man-biting snowmelt species collected mostly in the east of the Province. Its vector capacity has not been investigated.

+ *Ae. (Oc) sierrensis* can be a significant pest on the west coast and the south of the Province, biting during the day and entering houses. It develops in tree cavities and shaded artificial containers, overwintering in the larval stage or as eggs if the late summer is dry. Its WNv infection and transmission rates were low in Goddard's tests. It has not been found with WNv in the wild and, because it seems not to bite birds, may not be an important virus vector.

+ *Ae. (Oc) sticticus* is, after *Ae. vexans*, our second most important flood-plain pest, hatching after extensive flooding or prolonged rainfall. It has been shown to transmit SLE in the laboratory (Hammon and Reeves 1943).

+++? *Ae. (Oc) togoi* could be as important a vector as the two other species introduced from Asia, *Ae. albopictus* and *Ae. (Oc) japonicus* established in the east. The last is now also established in WA. All 3 feed during the day on a variety of hosts. Fortunately our species has not spread inland from its favoured coastal rock pools but it is distributed widely around the Georgia Strait, the Gulf Islands and the Washington coast. In Asia it is an important vector of Japanese Encephalitis, a virus of the same serotype, (B), as WNv. It breeds year round, feeds on birds and mammals and is often common enough to be a pest to seaside homeowners.

+ *Mansonia (Cq) perturbans* typically develops in permanent 'cat tail' marshes where the larvae and pupae attach to the air-filled roots of the rushes and resist conventional control methods. It overwinters in the larval stage and has a southern distribution; there are records of it on Vancouver Island and in the Georgia Strait. They bite birds and mammals readily day and night, enter houses and inflict a bite that is painful and long lasting on most victims. It is a proven virus vector in the east. Present but not tested for competence as a vector in CA.

+ *Anopheles punctipennis* can develop in almost any open water and is occasionally found in tree cavities and artificial containers. All three of our *Anopheles* species are potential virus vectors; this one is generally distributed in the southern half of the Province, *An. freeborni*, an efficient vector of human malaria, is restricted to dryer southern regions. *Anopheles punctipennis* is the only anophelene confirmed from Vancouver Island (Centre for Coastal Health 2003).

+ *Anopheles earlei* extends much farther north than *An. punctipennis* but its biology is similar with several generations a year in the south. It probably feeds mainly on mammals and, often found in beaver lodges, has been called our national mosquito.

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For the latest information on West Nile virus

visit the BCCDC web site

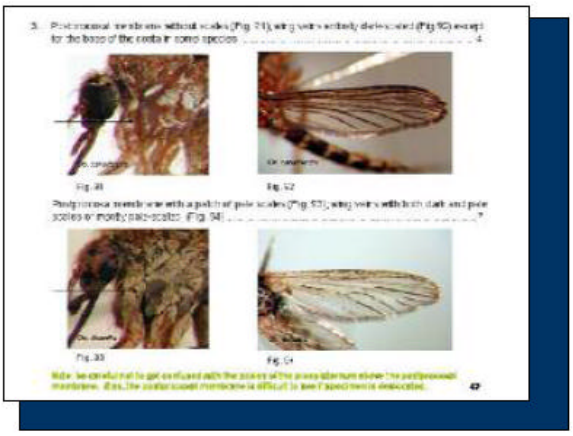
http://www.bccdc.org

Photographic Key to the Adult Female Mosquitoes of Canada –
First Print Edition
by Aynsley C. Thielman and Fiona F. Hunter

About the Key:

Developed at Brock University during the West Nile Virus Surveillance Program, this key is designed to help both amateur and more experienced entomologists in making correct mosquito identifications. The digital images included in this key help make identification easier. It contains keys to all of the mosquito species of Canada (including species newly introduced to Canada such as *Oc. japonicus* and *Ae. albopictus*), anatomical illustrations, a glossary of terms used in the key, an appendix of possible species variations, and a section with detailed descriptions of newly introduced species. Throughout the key there are notes that, from experience, make this an invaluable resource for mosquito identification.

Example:



For more information, please contact: Aynsley Thielman
phone: 905-688-5550 x3879
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Order Form

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EUCHLOE NAINA (GREEN MARBLE) HABITAT IN YUKON, CANADA

Norbert G. Kondla, Genelle, BC

The Green Marble, *Euchloe naina*, is a distinctive but little known butterfly that was first collected in Canada in the Ogilvie Mountains of Yukon in 1972 by E.M. Pike. It was first reported in the literature more than twenty years later (Kondla and Pelham 1995). Since then museum specimens have been found from the Kenai Peninsula of Alaska and a few individuals have been found in extreme northwestern British Columbia (Layberry et al. 1998, Guppy and Shepard 2001).

This butterfly was likely overlooked for many years due to its early flight period (known as early as 7 June) and specialised habitat. In the north Ogilvie Mountains it inhabits calcareous scree slopes although occasional individuals can be seen at lower elevations along watercourses and along the Dempster Highway. Treeline in the North Ogilvie Mountains Ecoregion is at about 900 metres and the mountains are largely sedimentary dolomite, limestone and shale (Oswald and Senyk 1977). Following are a few photographs of the habitat of this interesting butterfly.

This butterfly often has very extensive green coloring on the ventral hindwing. One such example is illustrated in Figure 6. Females are characterised by a quite melanic dorsal surface and can be white or yellow as shown in Figure 7.

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Figure 1. View looking north to the area of kilometre 130-131 of the Dempster Highway. *Euchloe* habitat is the scree slopes above the treeline

Figure 2. The north facing slope of the nearer ridge visible on the left of Figure 1. The view is westerly and the butterflies were found to be common on the lower scree slope in 1993.

Figure 3. View while standing in *Euchloe* habitat on the distant mountain seen in Figure 1 and looking to the southwest at the same ridge illustrated in Figure 2.

Figure 4. View from higher elevations of the ridge shown in Figure 2 and looks southerly over the Blackstone River valley with dust clouds from the Dempster Highway visible below.

Figure 5. *Parrya nudicaulis*, a favourite nectar source for *Euchloe naina*

Figure 6. Ventral wing pattern of *Euchloe naina*.

Figure 7. Dorsal wing colours of *Euchloe naina* females.