Proceedings of the Entomological Society of Manitoba

Volume 56
2000

Titles Currently Received by the Entomological Society of Manitoba

Held in the University of Manitoba Library for Science and Technology

Acta Entomologica Musei Nationalis Pragae
Acta Entomologica Serbica
Acta Zoologica Cracoviensia
American Museum Novitates
American Museum of Natural History, Bulletin
Beitrage zur Entomologie
Boletin do Museu Nacional, N.S. Zoologica. Museu Nacional. Rio
Bollettino del Laboratoria Di Entomologica Agraria
Bollettino di Zoologiz Agraria e di Bachicoltura
Bologna, Universita Instituto di Entomologia Bollettino
Cab International Institute of Biological Control, Annual Report
CISTI News
Entomologica Fennica Notulae Entomologicae
Entomological Society of British Columbia, Journal
Entomological Society of Manitoba, Newsletter
Entomological Society of Manitoba, Proceedings
Entomological Society of Ontario, Proceedings
Entomologische Berichten
Ethology, Ecology and Evolution
Foli Biologica
International Milling Flour & Feed
Iowa Academy of Sciences, Journal
Japanese Journal of Genetics
Monografie Fauny Polski, Warsaw
Nutur und Museum
Polska Akademia Nauk. Instytut Zoologiczny, Annales Zoologici
Polska Akademia Nauk. Instytut Zoologiczny, Fragmenta Faunistica
Polskie Pismo Entomologiczne
Redia: Giornale di Zoologia
Smithsonian Contributions to Zoology
Studi Sassaresi, Sezione III Agraria
Swedish Journal of Agricultural Research
Tropical Zoology, Firenze
University of California Publications in Entomology
Wings
Zastita Bilja (Plant Protection)

Proceedings of the

Entomological Society of Manitoba

VOLUME 56

2000

D. Vanderwel
Editor

Winnipeg, Manitoba

Contents

Echidnophaga gallinacea (Siphonaptera: Pulicidae) recorded in Canada for the first time

Terry D. Galloway[1,*], Andrea Andruschak[2] and Robyn M. Underwood[1]
[1]Department of Entomology, University of Manitoba,
Winnipeg, Manitoba, Canada R3T 2N2

[2]47 Silverfox Place, East St. Paul, Manitoba, Canada R2E 0G4

Echidnophaga gallinacea (Westwood, 1875) is a cosmopolitan sticktight flea which parasitizes a wide variety of birds and mammals. In North America, this ectoparasite is found primarily in the southern United States. This species is reported here from a Brown-headed Cowbird, *Molothrus ater* (Boddaert), from the University Field Station at Delta Marsh, Manitoba, and this is its first record in Canada.

INTRODUCTION

The genus *Echidnophaga* Olliff, 1886 includes 21 species all of which are distributed in the Palaearctic, Ethiopian and Autralasian Regions (Lewis 1998), except for the hen flea, *Echidnophaga gallinacea* (Westwood, 1875). This species is now cosmopolitan, and the only species in the genus found in North America, a result of accidental introduction by humans along with their domestic animals (Lewis 1998). Females of these sticktight fleas attach and feed at one site on their hosts for prolonged periods (4-19 days), during which time the surrounding tissue becomes swollen and ulcerated. Males feed for shorter periods, interspersed with mate-seeking behaviour (Harwood and James 1979; Parman 1923). Mating and oviposition occur on the host (Parman 1923). *Echidnophaga gallinacea* has an extremely wide host range, including many species of mammals and birds. It may be a serious pest of poultry and cause irritation to cats, dogs, rabbits, horses and humans (Harwood and James 1979). It frequently parasitizes insectivores and rodents (Lewis 1972).

Holland (1985) listed 10 species and subspecies of Pulicidae for Canada, Alaska and Greenland, and it appears that he did not expect that additional species in this family would be found in Canada (Holland 1979). This is not surprising, since there are only scattered records for other pulicids anywhere close to the Canadian border. *Echidnophaga gallinacea* has not been found in Washington (Lewis *et al.* 1988), though there is a record for Wasco County in northern Oregon (Hubbard 1947). It has not been recorded from Montana (Jellison 1943), North Dakota (Larson 1997) or

*Author to whom reprint requests should be sent.

South Dakota (Easton 1982). Benton (1980) provided detailed records of *E. gallinacea* in the United States east of the Mississippi River, the vast majority of which fall south of the northern borders of Tennessee and North Carolina. However, he did report a few isolated records for New York, New Jersey, Pennsylvania, Delaware, and southeastern Michigan. Of relevance to Manitoba, the nearest published record for *E. gallinacea* is a specimen from a Norway rat, *Rattus norvegicus* (Berkenhout), from Ramsey County in southern Minnesota (Fox 1940, Benton and Timm 1980).

NEW CANADIAN RECORD

When a female Brown-headed Cowbird, *Molothrus ater* (Boddaert), was examined by Andrea Andruschak as part of a research project on brood parasitism, a tiny flea was seen attached near the eye of the bird. This specimen was later determined to be a female of *E. gallinacea*, the first of this species recorded in Canada. This record should not be totally unexpected, given the prolonged period of attachment and feeding characteristic of the females of these fleas, and given the dispersal capacity of migrating birds. However, this specimen was collected well beyond the known range of *E. gallinacea*.

Details of the collection data for this specimen are as follows: CANADA: Manitoba, University Field Station, Delta Marsh (50° 11' N, 98° 23' W), 1_,16 May, 2000, *ex* Brown-headed Cowbird, *Molothrus ater*, coll. A. Andruschak.

Since *E. gallinacea* was not included by Holland (1985) in his monograph, it does not appear in the key to species he provided. The following is a supplement to the key to the genera and subgenera of fleas known or suspected to occur in Canada, Alaska and Greenland, provided by Holland (1985: 29; references to figure numbers are those in Holland 1985), beginning with couplet 5:

5(4) Mesothorax lacking pleural ridge (Fig. 8) 5a

Mesothorax with pleural ridge (Fig.11) 6

5a(5) Frons strongly angulate; labial palps soft, membranous ..... *Echidnophaga*

Frons rounded; labial palps stiff, sclerotized ..... *Pulex*

Since *E. gallinacea* is the only species in the genus known to occur in North America, this couplet in the key can be used to identify it. For a description and additional figures of *E. gallinacea*, refer to Hopkins and Rothschild (1953). There may be additional records for *E. gallinacea* in the future in Canada, most likely from migratory birds. It will be interesting to see if the range of *E. gallinacea* expands northwards in North America. These fleas are extremely small, and may remain firmly attached to hosts being examined. Careful examination and a sharp eye are required to collect this interesting flea.

ACKNOWLEDGEMENTS

We would like to thank Dr. R.E. Roughley, Department of Entomology, University of Manitoba, for his helpful suggestions on the manuscript.

REFERENCES

Benton, A.H. 1980. An atlas of the fleas of the eastern United States. Marginal Media. Fredonia, NewYork. xvi + 178 pp.

Benton, A.H. and R.M. Timm. 1980. The Siphonaptera of Minnesota. pp.158-178. In: Benton, A.H. *An atlas of the fleas of the eastern United States*. Marginal Media. Fredonia, New York.

Easton, E.R. 1982. An annotated checklist of the fleas of South Dakota (Siphonaptera) Entomological News 93: 155-158.

Fox, I. 1940. The fleas of eastern United States. Iowa State College Press, Ames, Iowa. 191 pp.

Harwood, R.F. and M.T. James. 1979. Entomology in human and animal health. 7th Edition. Macmillan Publishing Co., Inc., New York. vi + 548 pp.

Holland, G.P. 1979. Siphonaptera. pp. 424-426. In: Danks, H.V. (Ed.), *Canada and its insect fauna*. Memoirs of the Entomological Society of Canada 108.

Holland, G.P. 1985. The fleas of Canada, Alaska and Greenland (Siphonaptera). Memoirs of the Entomological Society of Canada. No. 130. 631 pp.

Hopkins, G.H.E. and M. Rothschild. 1953. An illustrated catalogue of the Rothschild collection of fleas (Siphonaptera) in the British Museum (Natural History). With keys and short descriptions for the identification of families, genera, species and subspecies. Volume I. Tungidae and Pulicidae. The Trustees of the British Museum. University Press, Cambridge. xv + 361 pp. + 45 plates.

Hubbard, C.A. 1947. Fleas of western North America. Iowa State College Press, Ames, Iowa. 533 pp.

Jellison, W.L. 1943. Siphonaptera. Species and host list of Montana fleas. Miscellaneous Publication No. 2, Montana State Board of Entomology. 22 pp.

Larson, O.R. 1997. North Dakota fleas. X. An atlas of the state's siphonapterans. University of North Dakota Research Report No. 47. vii + 77 pp.

Lewis, R.E. 1972. Notes on the geographical distribution and host preferences in the order Siphonaptera. Part 1. Pulicidae. Journal of Medical Entomology 9: 511-520.

Lewis, R.E. 1998. Résumé of the Siphonaptera (Insecta) of the world. Journal of Medical Entomology 35: 377-389.

Lewis, R.E., J.H. Lewis and C. Maser. 1988. The fleas of the Pacific northwest. Oregon State University Press, Corvallis, Oregon. 296 pp.

Parman, D.C. 1923. Biological notes on the hen flea, *Echidnophaga gallinacea*. Journal of Agricultural Research 24: 1007-1009.

Scientific Program Abstracts for the 2000 Annual Meeting of the Entomological Society of Manitoba

October 20–21, 2000
Winnipeg, Manitoba

Keynote Addresses

BIOLOGICAL INFORMATICS AND THE CHANGING NEXUS OF MUSEUM COLLECTION DATA, BIODIVERSITY RESEARCH AND SYSTEMATIC BIOLOGY. James S. Ashe. Department of Ecology and Evolutionary Biology, KU Natural History Museum/Biodiversity Research Center, University of Kansas, Lawrence, KS, 66045.

We often lament our superficial knowledge of the earth's biological diversity, and it is certainly true that the full extent, and the patterns of, biological diversity are very incompletely known. However, in fact, museum research collections and the vast literature in systematics and taxonomy contain a wealth of data about biological diversity. Sadly, access to these data is very limited even for that small cadre of specially trained professionals that traditionally use such resources. Recent advances in computer technology and the emerging field of biological informatics have exciting implications for future directions in systematics and biodiversity research. Using existing web-based demonstration projects, this paper will demonstrate the enormous potential of biological informatics for scientific research in biodiversity including visualization of temporal and geographic patterns and effect of changing climatic on modeled distributions, and for informing conservation and resource use management decisions. In order to take full advantage of the potential of biological informatics for biodiversity research numerous protocols in museum collection management, systematics and biodiversity research need to be modified. We should strive to produce databases from which data can be organized by user-defined queries into data packages that directly meet the needs of the user. With such databases, the number and diversity of potential users that can access and use biodiversity data can be greatly increased, thus making the rich source of data resident in museum research collections and biodiversity/systematic research accessible for the first time to broad segments of society.

POTENTIAL OF INSECT-SPECIFIC VIRUSES AS BIOLOGICAL CONTROL AGENTS OF INSECT PESTS. Martin A. Erlandson. Insect BioControl Lab, Saskatoon Research Centre, Agriculture & Agri-Food Canada, 107 Science Place, Saskatoon, SK, S7N 0X2.

Insects are hosts to a spectrum of viruses and many of these play an important role, as pathogens, in the population dynamics of insects including many pest species. Of the fifteen families of viruses infecting insects only three, baculoviruses, entomopoxviruses and cypoviruses are generally considered to have some potential as biological control agents for insects. The common characteristics and biological themes of these virus groups will be discussed. The baculoviruses have the most potential for development as viral insecticides, and the pathogenesis and epizootiology of these viruses will be discussed in relation to their development as biocontrol agents. Several examples of biocontrol attempts using baculoviruses will be discussed to illustrate some the successes and shortcomings of these viruses. Baculoviruses have a long evolutionary history with insects and appear to have incorporated a number of host genes in order to maximize their virulence and infectivity for their insect host. The molecular characterization of baculoviurses will be summarized in relation to their pathogenic relationship to insects and from the perspective of utilizing genetic engineering to develop agents with improved insecticidal properties.

ARBOVIRUS ACTIVITY IN CANADA: PAST, PRESENT AND FUTURE. Harvey Artsob. Zoonotic Diseases and Special Pathogens, National Microbiology Laboratory, Canadian Science Centre for Human and Animal Health, Winnipeg, MB, R3E 3R2.

Nineteen arboviruses have been isolated in Canada including eleven mosquito-transmitted, six tick-transmitted and two culicoides-transmitted viruses. Nine of these viruses have been implicated as etiological agents of human disease including western equine encephalitis, eastern equine encephalitis, St Louis encephalitis, Powassan, snowshoe hare, Jamestown Canyon, California encephalitis, Cache Valley and Colorado tick fever viruses. In addition, numerous different arbovirus infections, particularly dengue, have been diagnosed in Canadians returning home from travel outside the country. In 1999,West Nile (WN) virus, previously considered exotic to North America, was documented for the first time on this continent following an epidemic in New York city. Anticipating the possibility that this virus might become established in North America and move into Canada, surveillance systems were set up for this virus in 2000 from Atlantic Canada to Saskatchewan. It is anticipated that WN virus may become a serious health concern for Canadians in the coming years.

Submitted Papers

THE EFFECTS OF TILLAGE AND SEEDING RATES ON POPULATIONS OF *DELIA RADICUM* (DIPTERA: ANTHOMYIIDAE) ON OIL SEED RAPE IN MANITOBA. A. K. Hawkins-Bowman and N. J. Holliday. Department of Entomology, University of Manitoba, Winnipeg, MB, R3T 2N2.

The presence of *Delia radicum* (L.) in oil seed rape (*Brassica* spp.) is becoming an increasing concern across the Prairies. In Alberta, oil seed rape (canola) growers are already suffering economic losses from this pest and no effective chemical insecticides are registered to protect canola against *D. radicum*. A research project has been established at the University of Manitoba, Carman Research Station to test the effects of different tillage regimes and seeding rates on the population of the *D. radicum*, cabbage root maggots, in canola (*B. napus*). Tillage regime treatments were zero tillage and conventional tillage, and seeding rates were 4 and 8 kg/ha. Results from 1999 showed that there were at least two generations of *D. radicum* on canola in Manitoba. Analysis of variance indicated that there was no significant effect either of tillage regime or of seeding rate in 1999. This study is continuing in 2000 and results from both years will be presented. Information will be presented on the temporal patterns of egg, larval, and pupal abundance, and the effects of tillage and seeding rate treatments on the abundance and degree of damage associated with the population of *D. radicum*.

WITHIN FIELD DISTRIBUTION OF THE SUNFLOWER MIDGE USING GEOGRAPHIC INFORMATION SYSTEMS. Erin Hodgson[1], Ian MacRae[2] and Gary Brewer[1]. [1]Entomology Department, North Dakota State University, Fargo ND 58103; [2]Entomology Department, University of Minnesota, Crookston, MN, 56716.

Sunflower midge (SFM) larvae infest sunflower when plants enter the early reproductive stages and heavy infestations can result in yield loss. The distribution of sunflower midge within sunflower fields is unknown. The objectives were to determine infestation levels in the field and to describe the spatial distribution of the sunflower midge using Geographic Information Systems (GIS). Systematic sampling was done using a non-equal sized grid pattern superimposed in a 200 acre sunflower field. The grid was made up of 64 cells, marked with a pole at the center of each cell and poles were tracked using a Global Positioning System (GPS). Four randomly selected sunflower heads were collected from cell, three times per week for five weeks. Population densities were recorded, cumulative insect days were calculated and data were analyzed using a spatial analyst program, ArcView (ESRI, Redlands CA).

PARASITIC WASPS (SCELIONIDAE, TRICHOGRAMMATIDAE) ATTACKING TABANID EGGS IN MANITOBA, CANADA. [1]M. Iranpour, [1]T. D. Galloway and [2]L. Masner. [1]Department of Entomology, University of Manitoba, Winnipeg, MB, R3T 2N2; [2]Agriculture and Agri-food Canada, ECORC, Ottawa, ON, K1A 0C6.

Horse fly and deer fly egg masses were collected from six locations east and southeast of Winnipeg during 1996-99. More than 94% of collected egg masses were parasitized by 3 new species of Scelionidae, *Telenomus* species A, *Telenomus* species B, *Telenomus* species C (Hymenoptera: Scelionidae) and *Trichogramma semblidis* (Hymenoptera: Trichogrammatidae). In the summer of 1998, 98.9% of multi-layered

egg masses of *Hybomitra nitidifrons nuda* which were collected southeast of Winnipeg were parasitized by *Telenomus* species A and *Telenomus* species B with very fine host partitioning. Parasitism by both species within egg masses was 34.5% on average. In addition, 36.3% of all unparasitized eggs failed to hatch. East of Winnipeg, 153 single- layered egg masses of deer fly, *Chrysops aestuans*, were collected. There were 121 egg masses (79.1%) parasitized by *Telenomus* species C and *Trichogramma semblidis*. Among other egg masses collected, 11.1% were attacked only by *Telenomus* species C, 3.9% only by *Trichogramma semblidis*, and 5.9% were unparasitized. Within egg masses attacked by both species, *Telenomus* species C emerged from 44.1% and *Trichogramma semblidis* emerged from 9.9%. In egg masses where a single species of parasitoid attacked the eggs, 40.8% were killed by *Telenomus* species C and 11.1% by *Trichogramma semblidis*. Of the total eggs, 18.6% produced neither deer fly larvae nor parasitoids. There was a significant interaction between these two parasitoids in *Chrysops aestuans* eggs.

SENSITIVITY OF *BEAUVERIA BASSIANA* TO ALKALOIDS FOUND IN INSECT RESISTANT POTATOES. Carl Jorgensen and Denise Olson. Department of Entomology, North Dakota State University, Fargo, ND, 58105.

The Colorado potato beetle (CPB), *Leptinotarsa decemlineata* (Say), has developed resistance to most classes of insecticides after a history of frequent insecticide applications. Resistant potatoes and the entomopathogen, *Beauveria bassiana* (Balsamo) Vuillemin, are effective against the CPB. The integration of compatible tactics in an IPM program will be necessary for sustainable management of this economical pest. The compatibility of *B. bassiana* with alkaloids (insect feeding deterrents) was determined in laboratory studies. Chaconine, solanine, tomatine, leptine I, leptine II, a crude extract from a resistant potato variety (ND 4382-17), water, and ethanol were tested at 0.0033, 0.0065, and 0.013 mg/cm^2; and chaconine, solanidine, demissidine, solasodine, solanine, tomatine, tomatidine, water, and ethanol were tested at 0.0065, 0.013, and 0.026 mg/cm^2 against *B. bassiana*. The first series of alkaloids were measured for colony diameter and number at 67, 91, 115, and 139 hours after inoculation. In the second series of alkaloids, the number and colony diameter were measured at 48, 72, and 96 hr after inoculation. Colony growth was inhibited by only tomatine at the highest level in the first series of alkaloids tested. None of the alkaloids, at any concentration, had an affect on the number of colonies formed. In the second series of alkaloids, tomatidine inhibited colony growth the most at all concentrations and times. The other alkaloids only slightly inhibited the growth of *B. bassiana* compared to the checks. Data from these studies indicates that *B. bassiana* would be compatible with resistant potatoes in an IPM program for CPB.

METHYLMERCURY IN ZOOPLANKTON IN RESERVOIRS THAT FLOODED BOREAL FOREST CATCHMENTS; THE FLOODED UPLANDS DYNAMICS EXPERIMENT. K. P. Peech and M. J. Paterson. University of Manitoba, Department of Entomology, Winnipeg, MB, R3T 2N2.

As part of the FLooded Uplands Dynamics EXperiment (FLUDEX), we measured the concentrations of methyl mercury (MeHg) in zooplankton from three experimental reservoirs that flooded boreal forest uplands. The three reservoirs differed in soil and vegetative carbon storage as well as in moisture conditions, and were classified as a high carbon-moist forest (R1), a medium carbon-dry forest (R2), and a low carbon-very dry forest (R3). We found that concentrations of MeHg in zooplankton increased dramatically in all three reservoirs within 1-4 weeks after flooding and remained higher than pre-flooding concentrations throughout the season. By the end of the first summer of flooding, concentrations of MeHg in zooplankton were similar in all three reservoirs; (R1 - 571 ng g-1 dw, R2 - 569 ng g-1 dw, R3 - 642 ng g-1 dw). These similarities occurred despite the fact that the zooplankton community composition and biomass was very different among the reservoirs. The concentrations of MeHg in zooplankton from the lake that was the source of water and zooplankton for the reservoirs were always low, indicating that flooding has a direct affect on MeHg concentrations in zooplankton. Comparable MeHg concentrations in zooplankton (543 ng g-1 dw) have been found in an experimentally flooded wetland reservoir (Lake 979), although in general, MeHg concentrations in zooplankton from reference lakes tend to be lower (26-72 ng g-1 dw) than the high concentrations found in the upland reservoirs. MeHg in zooplankton may have important implications for the bioaccumulation of MeHg up the food chain and mercury cycling within the reservoir environment. Therefore, factors affecting the bioavailability of MeHg and uptake by zooplankton are extremely important.

RESPONSE OF NATURAL ENEMIES OCCURRING IN ALFALFA FIELDS TO THE PEA APHID SEX PHEROMONE. M.J. Uddin[1], N.J. Holliday[1], P.A. MacKay[1] and W. Powell[2]. [1]Department of Entomology, Faculty of Agricultural and Food Sciences, University of Manitoba, Winnipeg, MB, R3T 2N2; [2]AFRC Institute of Arable Crops Research, Rothamsted Experimental Station, Harpenden, Herts, AL5 2JQ, UK.

Sex pheromones are important in reproduction and survival of insects. For sexual reproduction during the fall, pea aphid females release sex pheromone to attract their mates. It is possible that the natural enemies of pea aphids might use this pheromone as a cue for locating their hosts. The involvement of sex pheromone in attracting the natural enemies of pea aphids was investigated in field and laboratory conditions during the summer of 2000. The field study was conducted in two alfalfa seed fields, each adjacent to a hay field, in the interlake region of Manitoba, while the laboratory part was carried out in the Entomology Department at the University of Manitoba. PVC strips impregnated with synthetic sex pheromone of the pea aphid were used as pheromone dispensers. After placement of the lures in the experimental blocks in the seed field, the hay field was mown in an attempt to displace natural enemies form the hay field and attract them into the seed field. Natural enemies were then sampled in the experimental blocks and compared with those sampled in the control blocks. In the field trial, no parasitoid species was found to be attracted to the lure, however, the adults of a predaceous species, *Chrysopa oculata*, were found to be significantly

attracted to the pheromone traps. *Pterostichus melanarius*, *Chrysoperla carnea* adults and lacewings larvae were tested in a wind tunnel study in the laboratory and found not to be attracted to the pheromone. Even though no influence of the pheromone lures on lady beetles was evident in the field, significant attraction of *Coccinella septempunctata* to the pheromone lure was evident in the laboratory wind tunnel study. Influence of pheromone on the parasitoid species and some other predaceous species of pea aphids is yet to be investigated. Further studies will be conducted before concluding on the feasibility of using the pheromone as a component of IPM scheme for seed alfalfa.

MIGHTY BEE MITE MIGHT BE DOOMED: WINTER FUMIGATION OF *VARROA*-INFESTED HONEY BEE COLONIES IS A PRACTICAL CONTROL ALTERNATIVE. Robyn Underwood and Robert Currie. Department of Entomology, University of Manitoba, Winnipeg, MB, R3T 2N2.

Varroa jacobsoni is an introduced pest of honey bees (*Apis mellifera*). This ectoparasitic mite feeds on adult and immature bees, causing untreated infested colonies to die within 2-4 years of the initial infestation. Current control methods are failing due to resistance. Formic acid treatment is a control alternative that is inexpensive and easy to use, but can be labor-intensive and dangerous. Efficacy of treatment varies under outdoor conditions. This study examined the use of formic acid in a practical experiment on indoor-wintered colonies. This study was conducted in a building kept dark and at 5C from 24 November 1999 to 24 March 2000. Colonies were placed in small rooms that were fumigated for 48 hours on 22-24 January 2000. Bee and mite mortality were monitored throughout the winter. This study revealed that formic acid fumigation of indoor-wintered honey bees is feasible and effective. The highest dose caused the highest mite mortality without increasing bee mortality. Queen loss was seen. Repeated fumigation periods may increase the efficacy of this treatment method and should be tested in future studies.

IMPLICATIONS OF SPRUCE BUDWORM MANAGEMENT FOR THE ECOLOGICAL DIVERSITY OF MOTHS AND CARABID BEETLES IN THE BOREAL FOREST. Carla Wytrykush and Neil J. Holliday. Department of Entomology, University of Manitoba, Winnipeg, MB, R3T 2N2.

Spruce budworm outbreaks can kill entire stands of host trees in the boreal forest. There are two alternative spruce budworm management techniques: 1) apply insecticide to protect the foliage, or 2) no application of insecticide, which results in continuing defoliation. Foliage protection through insecticide applications affects successional processes of the forest. The implication of these budworm management practices for subsequent ecological diversity of moths and carabid beetles was studied in eastern Manitoba. Five pairs of sites were chosen in stands of balsam fir and white spruce that had been previously attacked by budworm. Budworm attacks had terminated in these sites at least 5 years before this study. Within each site pair one site had received insecticide sprays, while the second had not. Moths were sampled

in each site with an ultraviolet light trap, and carabid beetles were sampled with an array of pitfall traps. Compared to sprayed sites, unsprayed sites had more moth species and individuals. Unsprayed sites also had more carabid individuals, but there was no increase in the number of carabid species. This was because species such as *Agonum retractum* and *Sphaeroderus nitidicollis* were much more abundant in unsprayed sites. Vegetation differences may be the most significant factor influencing the response of the moths and carabid beetles. Ordination and canonical correlation analysis were used to explore the relationships between arthropod assemblages and vegetation.

NATURAL PRODUCTS TO REPEL STORED-GRAIN INSECTS. P. G. Fields[1], S. Mohan[2], and S. Suresh[2]. [1]Cereal Research Centre, Agriculture and Agri-Food Canada, 195 Dafoe Rd. Winnipeg, MB, R3T 2M9; [2] Department of Agricultural Entomology, Centre for Plant Protection Studies, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu 641 003, India.

Natural products have been used to control stored product insect pests since the dawn of agriculture, but they usual require high doses or do not provide sufficient control. In addition to being toxic to stored-grain insects, many natural products are also repellant. We have developed a simple and rapid technique to determine if natural products are repellant or attractive to stored-product insects. Five legume seeds *Stizolobium deeringianum* (Florida velvet bean)*, Canavalia ensiformis* (Jack bean), *Crotalaria* sp(Devil bean), *Pisum sativum* (garden pea) and *Lathyrus odoratus* (sweet pea) as well pea protein and diatomaceous earth (DE) were tested for repellant, antifeedant or toxic effects against the stored-product insect pests, *Sitophilus oryzae* (rice weevil), *Rhyzopertha dominica* (lesser grain borer) and *Cryptolestes ferrugineus* (rusty grain beetle). All five legume seeds, pea protein and the DE showed some repellant or antifeedant activity against all tested insects. Experiments were also conducted using *R. dominica*, pheromone outside the grain. After one day, 47% of *R. dominica* adults had left the grain in the pheromone treatment, compared to 5% in the untreated controls. This bioassay mimics field conditions (bin storage) better than current bioassays that use filter paper treated with repellants/attractants. These concept was tested with insect removal bins with 2 kg of sorghum. The repellants, neem and DE, caused increased migration from bins and lower damage to grain compared to untreated grain.

INSECTS ON FIELD AND FORAGE CROPS IN MANITOBA IN 2000 – AN EXTENSION UPDATE FROM MANITOBA AGRICULTURE AND FOOD. J. E. Gavloski. Soils and Crops Branch, Manitoba Agriculture and Food, Box 1149, Carman, MB, R0G 0J0.

Insects on field and forage crops in Manitoba will be discussed by commodity. **Cereals**: True Armyworm (*Pseudaletia unipuncta*) was above economic thresholds in many wheat, barley, oats, and timothy fields in the eastern and interlake parts of Manitoba, exceeding 50 armyworms per square meter in some fields. Wheat Midge

(*Sitodiplosis mosellana*) numbers were low this year, with very few fields having adult counts at economic threshold levels. **Canola:** Populations of flea beetles (*Phyllotreta spp*.) were high in canola fields in various locations throughout Manitoba. Populations of Bertha armyworm (*Mamestra configurata*) and diamondback moth (*Plutella xylostella*) were low throughout the province this year. **Sunflowers:** Sunflower beetle (*Zygogramma exclamationis*) numbers were high and many sunflower growers applied insecticides to control them. Larvae of the banded sunflower moth (*Cochylis hospes*) became very noticeable in many sunflower fields in August, and some reduced grading of samples may occur. Lygus bug (*Lygus* spp.) numbers were very high in many flowering sunflower fields. **Pulse Crops:** Insecticides were used to control lygus bugs (*Lygus* spp.) in many fababean fields this year. Growers were encouraged by processors to spray when even low numbers of lygus bugs were present on fababeans, since more than 1% perforated damage on fababeans reduces the quality to Canada #2 beans. **Issues of Concern:** Cereal Leaf Beetle (*Oulema melanopus*) moved into North Dakota this past season in two west-central counties. This insect has never been found in Manitoba. A monitoring program, by Manitoba Agriculture and Food and the Canadian Food Inspection Agency, found no cereal leaf beetles in Manitoba.

DRYINID (HYMENOPTERA: DRYINIDAE) PARSITES OF PLANT HOPPERS (HOMOPTERA) IN A RICE ECOSYSTEM IN TAMIL NADU, INDIA. M. A. K. Pillai. Tamil Nadu Agricultural University, Coimbatore - 641 003, Tamil Nadu, India.

The Dryinidae are important predators cum parasites found in the rice ecosystem with a great influence in the biological control of planthoppers viz. brown planthopper *Niloparvata lugens* and whitebacked planthopper *Sogatella furcifera*. Dryinids like other beneficial insects stand out by being voracious, having high search ability, being both predatory and parasitic, and attacking a broad number of prey species. Female adults of Dryinids were observed preying on the early instars of brown planthopper and white backed planthopper and parasitizing the adult hoppers of both sexes. Surveys made on the distribution of dryinid parasitoids on different rice varieties in various locations indicated the prevalence of three species of dryinids viz. *Haplogonatopus* sp., *Pseudogonatopus* sp., *Pseudogonatopus flavifemur*, and among them *Pseudogonatopus* sp. was the dominant one.

THE EFFECT OF DOMESTICATION ON THE SUSCEPTIBILITY OF WHEAT (TRITICUM SPP.) TO THE WHEAT MIDGE. I. L. Wise, R. J. Lamb, and M. A. H. Smith. Cereal Research Centre, Agriculture and Agri-Food Canada, Winnipeg, MB, R3T 2M9.

The genus *Triticum* is known to comprise 17 species of diploid, tetraploid, and hexaploid wheats. At least three wild diploid species contributed to the evolution of tetraploid and hexaploid domesticated wheats. Domesticated wheat evolved from wild ancestors through natural hybridization and the selection by farmers of species with

glumes that are more brittle and less tightly adhered to the seed. This trait enables seed to readily separate from the glume during threshing, producing a hulless seed. Domestication has also produced species with larger, more compact spikes than their ancestors. The wheat midge is a serious pest of two wheat species, common wheat, *T. aestivum*, and durum wheat, *T. durum*, in western Canada. The association of the wheat midge and wheat species is thought to be very recent based on the different geographical origins of the pest and host species. The effect domestication has had on the susceptibility of wheat species to the wheat midge was tested by exposing plants of all 17 *Triticum* species to the wheat midge in field and laboratory trials. Wheat species with brittle glumes and compact spikes were more infested than ancestral species. Domestication increased the susceptibility of wheat species to wheat midge, probably because the free-threshing trait improved the suitability of the glume-seed interface for oviposition and establishment of the larvae on the seeds.

OVIPOSITION BY *SITODIPLOSIS MOSELLANA* (DIPTERA: CECIDOMYIIDAE): CONSEQUENCES FOR EGG DENSITIES ON WHEAT SPIKES (GRAMINEAE). M. A. H. Smith and R. J. Lamb. Cereal Research Centre, Agriculture & Agri-Food Canada, 195 Dafoe Road, Winnipeg, MB, R3T 2M9

The wheat midge, *Sitodiplosis mosellana* (Géhin), infests spikes of common and durum wheats, *Triticum aestivum* L. and *T. durum* L., reducing yield and quality of wheat. Oviposition by wheat midge and factors contributing to variability in egg density among wheat spikes were investigated in the field and laboratory. Females laid most eggs singly or in pairs on spikelets usually between glumes and lemmas. They showed no preference for ovipositing on different parts of a spike, although as a spike emerged from the flag leaves spikelets on one side and at the base remained covered longer than others and often received fewer eggs because females initially could not reach those spikelets. Females showed no preference for spikes at different growth stages, from the time spikes began to emerge until at least flowering. Egg density had a similar aggregated distribution in the field and in the laboratory, although variance in egg density was higher in the laboratory. In the field, comparisons among spikes which emerged on the same day, reduced but did not eliminate high variation in egg density among spikes.

OVIPOSITION DETERRENCE AS A RESISTANCE MECHANISM AGAINST WHEAT MIDGE, SITODIPLOSIS MOSELLANA (DIPTERA: CECIDOMYIIDAE), IN SPRING WHEAT. R. J. Lamb, I. L. Wise and M. A. H. Smith. Cereal Research Centre, Agriculture & Agri-Food Canada, 195 Dafoe Road, Winnipeg, MB, R3T 2M9.

Spring wheat, *Triticum aestivum* L., previously identified as being lightly infested by wheat midge, *Sitodiplosis mosellana* (Géhin) (Diptera: Cecidomyiidae), were tested to determine if reduced infestation was the result of oviposition deterrence. Egg densities on some of these wheat lines were 10% or less of those on the cultivar Roblin in choice tests, and 20% or less in no-choice tests in the laboratory. These wheat

lines also deterred oviposition in the field reducing egg densities by at least 50% in single-row and multi-row field plots. Other wheat lines showed levels of oviposition deterrence intermediate between the most deterrent lines and Roblin. This level of oviposition deterrence would be agriculturally useful, and desirable in combination with a previously described antibiotic resistance.

IDENTIFICATION OF RESISTANT SOURCES AND STUDIES ON THE MECHANISMS OF RESISTANCE TO THE SESAME LEAF WEBBER, *ANTIGASTRA CATALAUNALIS* (DUPONCHEL) (LEPIDOPTERA: PYRALIDAE). Philip Sridhar Raj. Tamil Nadu Agricultural University, Coimbatore - 641 003, Tamil Nadu, India.

Sesame, *Sesamum indicum* L., is one of the major oilseed crops of India. The Sesamum Shoot and Leaf Webber, *Antidastra catalaunalis*, is one of the major insects attacking this crop and results in yield reductions of up to 40 percent. Attempts were made to standardize a screening technique both in laboratory and field. The mechanisms of resistance were studied for ovipositional preference and antibiosis. The identified mechanisms will be helpful for further resistant breeding programmes for this insect.

The Entomological Society of Manitoba gratefully acknowledges the following organizations, which provided financial support to the 56th Annual Meeting

Agrevo

Bayer, Inc.

Canadian Grain Commission

City of Winnipeg Pest Control

Dow Agro Sciences

Gustafson

Louisiana Pacific Canada, Ltd.

Metro Pest Control

North South Consultants

PCO/Orkin

Poulins The Exterminators

Rohm and Haas Canada, Inc.

Swat Team Pest Services, Inc.

Minutes of the 56th Annual General Meeting of the Entomological Society of Manitoba

2:00 p.m., 21 October 2000, Saturday,
Freshwater Institute, Winnipeg, MB

The President, Pat MacKay presided with a quorum being present, the President called the meeting to order.

Attendance of Members

President	Pat MacKay
President Elect	Ian Wise
Past-President	Marjorie Smith
Editor, Proceedings	Désirée Vanderwel
Rep. to ESC	Robert J. Lamb
Secretary	Noel White
Treasurer	Bill Preston

Members

Christie Borkowsky	Randy Gadawski	Robyn Underwood
JoAnne Buth	Terry Galloway	Richard Westwood
Jason Diehl	John Guthrie	Carla Wytrykush
Brent Elliott	Robbin Lindsay	Debra Wytrykush
R. Ellis	Rob Roughley	
Paul Fields	James Tucker	

1. Agenda (Appendix A)

Motion: Lamb/Galloway

That the proposed agenda for the 56th AGM of the Entomological Society of Manitoba be accepted. CARRIED

2. Acceptance of the Minutes of the Last Annual General Meeting of November 6, 1999

Motion: Vanderwel/Holliday

That the Minutes of the 55th Annual General Meeting of the Entomological Society of Manitoba be accepted. CARRIED

3. Business Arising From The Minutes

None

4. Executive Reports

Motion: Holliday/Roughley
That all Executive and Committee Reports be received. CARRIED

Appendix B – President (Pat MacKay) thanked all the Committee Chairs and members for their work and support.

Appendix C – Treasurer (Bill Preston) - Auditors Report.

Appendix D – Regional Director to the ESC (Bob Lamb) - Joint Annual Meeting ESC/ESM will probably be held in 2002 in Winnipeg.

Appendix E – Editor of the Proceedings (D. Vanderwel) - 225 copies of the Proceedings have been printed, 113 for Society members.

Appendix F – Endowments Fund Board.

5. Committee Reports

Appendix G – Finance (Blaine Timlick) - Small deficits are predicted for the next few years but are not a concern.

Appendix H – Publicity/Newsletter (Jason Diehl) - Total costs of producing and mailing 3 newsletters was $211.27.

Appendix I – Social Committee (Debra Wytrykush/Carla Wytrykush) - New member's social was a great success.

Appendix J – Youth Encouragement and Education Committee (Robyn Underwood) - Note activities conducted in report.

Common Names/Archives (Rob Roughley) - An original manuscript by N. Criddle was found in our archives, as were pictures of Ralph Bird who worked in Brandon. The University of Manitoba Library conservers will be approached.
Action: Galloway/Lamb
R. Roughley put a note about the find in the ESC bulletin. A filing cabinet will be obtained for the Archives. CARRIED

Appendix K – Scholarship and Awards (Richard Westwood) - *Jashim Uddin* was awarded the ESM Scholarship. *Rachel Haverluck* was awarded the Student Achievement Award. *Jeffery Shaddock* received the SWAT Student Award.

Appendix L – Scientific Program (Robbin Lindsay) - 63 people registered. Income was $2800 in dues, registration, and banquet tickets. 53 people attended the banquet at the Round Table. *Joel Gosselin* raised $950 from industry for the meeting.

Appendix M – Fundraising Committee (Joel Gosselin) - Robyn Underwood and Carla Wytrykush organized production of bucket hats with the ESM logo. They will sell hats, t-shirts, pins at the joint ESC/ESA meeting in Montreal.

Appendix N – Membership Committee (James Tucker).

Appendix O – ESM Internet Site Committee (Paul Fields) - The website is now running and will feature newsletters and the Proceedings.

6. **Scrutineer Committee** (Colin Demianyk) - There was a tie for President between Paul Fields and Neil Holliday. Member-at-Large is Brent Elliott.

Preamble: In 1998 in the election for Member-at-Large, the two candidates J. Gavloski and R. Lafreniere received the same number of votes. There was nothing in the ESM by-laws at that time to deal with such an event. At the 1998 Annual General Meeting (AGM) the then Secretary, Ian Wise, reported that the Society could resolve the problem in one of two ways: either by amending the bylaw that covers ESM elections, through a mail ballot, or by approving a standing rule, passed by the members at the AGM. Such a rule would be in effect only until the next AGM at which time it would either expire or could be passed with or without amendments to become a Permanent Standing Rule. The Standing Rule was passed in 1998, but since this had never happened before it was assumed that it would never happen again and in 1999 the AGM failed to confirm the Standing Rule and it expired.

In 2000, it has happened again, and the two candidates for President-Elect, Paul Fields and Neil Holliday received exactly the same number of votes. As a consequence the Executive moves below that the Standing Rule be passed again by the membership at the AGM and that in 2001 the Rule be brought forward again to become a Permanent Standing Rule. **Future Business Arising.**

That the following Standing Rule be instituted: in Executive Committee elections where both candidates receive the same number of votes, each candidate will serve for one term, with the order of appointment being determined alphabetically by surname.

Amendment: Lamb/Underwood
by mutual agreement between the two candidates or alphabetically by surname.

CARRIED

CARRIED

Paul Fields will be President-Elect in 2000-2001

Neil Holliday will be President-Elect in 2001-2002

7. ***Motion***: Holliday/Roughley
That the auditor D. Nicholson be re-appointed. CARRIED

8. ***Motion***: Lamb/Galloway
That the election ballots be destroyed. CARRIED

9. ***Motion to Adjourn***: MacKay/Lamb CARRIED

Appendices

APPENDIX A:
AGENDA OF THE ENTOMOLOGICAL SOCIETY OF MANITOBA
56TH ANNUAL BUSINESS MEETING
21 October 2000

1. Acceptance of Agenda.
2. Acceptance of the Minutes of the last Annual Meeting (November 6, 1999).
3. Business arising from the Minutes.
4. Reports - Executive

President	P. MacKay
Treasurer	W. Preston
Regional Director to the ESC	R. Lamb
Editor of the Proceedings	D. Vanderwel
Endowment Fund Board	B. Timlick

5. Reports - Committees

Finance	B. Timlick
Publicity/Newsletter	J. Diehl
Social	C and D. Wytrykush
Education/Youth Encouragement	L. Baspaly
Common Names/Archivist	R. Roughley
Scholarship & Awards	R. Westwood
Scientific Programme	R. Lindsay
Fund Raising	J. Gosselin
Membership	J. Tucker
Web Page	P. Fields

6. Elections Results - Scrutineer Committee – C. Demianyk
7. Standing Rule re: Elections
8. Transfer of Office
9. Other Business
10. Adjournment

Appendix B: Report of the President

Things seem to be going well for the Entomological Society of Manitoba. In 1998, in her report, President JoAnne Buth commented on the Society's declining membership and revenues and the difficulties associated with filling positions in a voluntary organization. In 1999, President Marj Smith commented in her report that membership had stabilized and was even up sightly, and at the Annual Business Meeting that year there was discussion of the fact that almost every year for some years now the Society has predicted a deficit and then, in spite of declining revenues, ended up showing a surplus. So then I began my presidency, the Society was in good shape for another potentially productive year. However, as in 1986, when I began my first term as President of the ESM, there were some anxious moments last fall as I began work to fill the various Chairs for the year. I knew we had lost some key people and with our lower membership numbers I worried about getting replacements, I also worried about whether I could be persuasive enough to get as many Chairs as possible to serve one more year. In the end, as I should have known would be the case, Society members came through, agreed to serve, and their hard work has meant a great year for the ESM. I'd like to thank some of these people now, and highlight some of the activities of the Society in doing so.

There were some major changes to the Executive this year in addition to the usual roll over of elected members. It was both a good thing and a bad thing that we lost our Secretary, Ian Wise last year. That loss was the bad part. The good part was that he remained on the Executive as President-Elect and will shortly take over as President. Noel White agreed to take over from Ian as Secretary, and returned to a position he held for many years. With all of his experience and efficiency, he kept things running smoothly. Randy Gadawski stepped down from the Treasurer's position after several years of outstanding service. Bill Preston replaced him, and has just finished his first year, which as far from my perspective has gone without a single problem. I cannot express my gratitude, and the Society's gratitude, loudly enough to Bill for taking on this substantial responsibility and workload. On the financial side, Blaine Timlick deserves notice. He has been doing Finance and Endowment Fund for several years now and is greatly appreciated. Désirée Vanderwel has continued in another demanding position, that of Proceedings Editor. During her tenure the Proceedings has developed its role as a repository for peer-reviewed original scientific research, and this has greatly enhanced its usefulness and stature.

There are some important acknowledgments necessary among the Committee Chairs. Robbin Lindsay agreed to chair the Scientific Program Committee, and I think we would all agree has done a fabulous job, in spite of distractions from such issues as Hantavirus and West Nile virus. I know he had lots of help, but I'd especially like to mention Joel Gosselin who, as he has done for several years now, took on fund raising for the meeting, and also Dave Rosenberg, who has also now served on the Program Committee for several years and has ensured that things worked smoothly for us at the Freshwater Institute, a venue we are very pleased to have access to. It is not possible to talk about the Annual Meeting without talking about the Social Chair, held for several years now jointly by Carla and Debra Wytrykush. They deserve

tremendous thanks not only with respect to the Annual Meeting, but also in relation to all the Society's other social activities. I'd like to say a special thank you to a large number of our student members in addition to Carla and Debra. They've all shown incredible enthusiasm, organization, and commitment. Of special note are the former Chair of Youth Encouragement and Public Education, Robyn Underwood and her successor Lisa Baspaly, plus all sorts of other undergraduate and graduate students. I suspect they don't realize just how important the are to the Society.

I'd like to thank Richard Westwood for taking on the task of re-organizing into a single committee, the responsibility for the Graduate Scholarship and the Undergraduate Awards. This will be a significant amount of work realizing these activities. I'd also like to thank Bill Gallaway for his many years handling the Undergraduate Awards.

Patricia MacKay,
President

Appendix C: Report of the Treasurer

ENTOMOLOGICAL SOCIETY OF MANITOBA, INC.
FINANCIAL STATEMENTS
AUGUST 31, 2000

DOUG NICHOLSON* & CO.,

Certified General Accountant

AUDITOR'S REPORT

To the Members of the
Entomological Society of Manitoba Inc.

I have examined the balance sheet of the **Entomological Society of Manitoba Inc.** as at **August 31, 2000** and the statement of income, expenses and surplus for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I consider necessary in the circumstances.

In common with many non profit organizations, the organization derives some cash revenue, the completeness of which is not susceptible to conclusive audit verification. Accordingly, my verification of these revenues was limited to the amounts recorded in the records of the organization and I was not able to determine whether any adjustments for unrecorded receipts from these sources might be necessary to income or surplus balances.

In my opinion, except for the effect of any adjustments, if any, which I might have determined to be necessary had I been able to satisfy myself concerning the completeness of the cash revenues referred to that above, these financial statements present fairly the financial position of the society as at August 31, 2000 and the results of it's operations and the changes in it's financial position for the year then ended in accordance with generally accepted accounting principles.

original signed by Doug Nicholson & Co.

Winnipeg, Canada
October 13, 2000

Doug Nicholson & Co.,
Certified General Accountant

ENTOMOLOGICAL SOCIETY OF MANITOBA, INC.
BALANCE SHEET
AS AT AUGUST 31, 2000

ASSETS

CURRENT	**2000**	**1999**
Cash in bank	$ 4,215	$ 4,655
Cash advances (note 2)	200	225
Canadian T-Bill fund (note 4)	3,444	3,302
Investments (note 3)	35,000	35,000
	$42,859	$43,182

LIABILITIES

LIABILITIES		
	nil	nil

SURPLUS

SURPLUS		
	$42,859	$43,182
	$42,859	$43,182

APPROVED BY THE BOARD:

original signed by
Patricia MacKay President W Preston Treasurer

The accompanying notes form an integral
part of these financial statements

ENTOMOLOGICAL SOCIETY OF MANITOBA, INC.
STATEMENT OF INCOME, EXPENSES AND SURPLUS
YEAR ENDED AUGUST 31, 2000

	2000	1999
REVENUE		
Annual meeting	$1,469	$1,765
Donations	1,205	1,360
Fundraising committee	372	0
Interest income	2,187	2,166
Members fees	1,688	1,698
Miscellaneous	106	110
Proceedings	433	203
Youth encouragement & public education	200	400
	$7,660	$7,702
EXPENSES		
Awards and scholarships	$1,500	$1,200
Fundraising	1,012	0
General	973	1,026
Meetings	3,011	2,331
Newsletter	161	97
Proceedings	891	770
Social committee	68	122
Youth encouragement & public education	367	434
	$7,983	$5,980
EXCESS (DEFICIT) OF INCOME OVER EXPENSES	**$(323)**	**$ 1,722**
Add: Surplus, beginning of year	43,182	41,460
SURPLUS, END OF YEAR	**$42,859**	**$43,182**

The accompanying notes form an integral part of these financial statements

ENTOMOLOGICAL SOCIETY OF MANITOBA, INC.
STATEMENT OF INCOME, EXPENSES AND SURPLUS
YEAR ENDED AUGUST 31, 2000

1. SIGNIFICANT ACCOUNTING POLICIES

Income and expenses are recorded on the cash basis of accounting. There are no accruals of receivables or payables at the year-end. Inventory is expensed when it is purchased. Interest from investment certificates is paid out annually and no interest is accrued. Capital assets are written off when acquired and, therefore, there are no annual depreciation allowances.

2. CASH ADVANCES

Editor – Newsletter R. Lafreniere $200

3. INVESTMENT CERTIFICATES

CertificateNumber	InterestRate	MaturityDate	ParValue
25703249	5.250	Feb 26, 2002	$3,000
960006276-1	4.500	Oct 31, 2002	$3,000
960006276-2	5.300	Feb 10, 2003	$10,800
960006276-3	5.150	Sep 16, 2003	$4,000
960006276-4	4.800	Dec 11, 2003	$3,000
25723170	4.800	Apr 5, 2004	$2,000
55611-0004	6.00	Nov 12, 2004	$9,200
			$35,000

4. INVESTMENT - T-BILL FUND

The Canadian T-Bill fund was opened February 28, 1997 with a principal balance of $3,000. The T-Bill is shown at market value at year-end.

Appendix D: Report of the ESC Regional Director

The Entomological Society of Canada and its President, Dan Johnson, have been busy over the past year organizing for the next Annual General Meeting to be held in conjunction with the Entomological Society of America and Société d'Entomologie du Québec, Dec 3-7, 2000 in Montréal. Given the size, complexity and joint nature of this meeting, considerable consultation was required. As a Regional Director I was kept well informed of progress, but little effort on my part was required. I will attend the Board Meeting of the Entomological Society of Canada as your representative. In 2001 the Entomological Society of Ontario is hosting the joint meeting in Niagara Falls. The following year, 2002, is the turn of ESM. An invitation to ESC to hold a joint meeting in Manitoba in 2002 has been extended and will be confirmed at the Board Meeting in December. Your executive has begun the planning process and to form a committee to organize the meeting. Some discussion between ESC executive took place regarding joint meetings with other professional societies, such as the Canadian Society of Zoology, that might have affected when we would host ESC. That proposal appears to have been dropped and so should not interfere with our plans. This is the third and final year of my term as Regional Director and so an election for this position will have to be undertaken next year.

Bob Lamb,
Regional Director

Appendix E: Report of the Proceedings Editor

Two-hundred twenty-five copies of Volume 55 (1999) of the *Proceedings* will be printed and mailed in October 2000. Volume 55 is 56 pages long and contains three refereed scientific papers. Copies will be mailed to 113 Society members and 90 outside institutions (those that subscribe, exchange their journal with ours, or receive the *Proceedings* as a gift).

I would like to thank everyone involved with Volume 55 for their efforts — particularly the authors, the anonymous reviewers, Bill Preston (Treasurer of the ESM), Warren Schuetz (graphic designer, U of W print shop), and Murielle Corriveau (Administrative Assistant, U of W).

Désirée Vanderwel,
Proceedings Editor

Appendix F: Report of the Endowment Fund Board

The Endowment Fund continues to provide the resources necessary to enable the Entomological Society to function. Costs associated with the Student Scholarship, the Proceedings and costs associated with the Annual General Meeting are all supported by the Earnings of the Endowment Fund. In the past this support was in the range of $2000 annually.

Currently the Endowment Fund is $35,000 and the cap is currently $40,000. The fund generated over $2000 in 1998-99. This rate of return has been reduced with the last of the larger returning certificates maturing last year. The Fund currently has certificates generating between 4.8% and 6.0%. While the returns are considerably less than the Society has experienced in the past, they will remain stable for the next two years as the next maturing dates of 2002. The current return rate for the certificates is approximately $1870.00.

Endowment Fund Guaranteed Investment Certificates

Certificate Number	Principle	Interest Rate (%)	Maturity Date	Annual Interest
25703249	$3,000	5.250	Feb 26, 2002	$157.50
960006276-1	$3,000	4.500	Oct 31, 2002	$135.00
960006276-2	$10,800	5.300	Feb 10, 2003	$572.40
960006276-3	$4,000	5.150	Sep 16, 2003	$206.00
960006276-4	$3,000	4.800	Dec 11, 2003	$144.00
25723170	$2,000	4.800	Apr 5, 2004	$96.00
55611-0004	$9,200	6.00	Nov 12, 2004	$552.00
Total	$35,000			$1,862.90

Appendix G: Report of the Finance Committee

Members of the Finance Committee met in October 2000 to exchange information, review the annual budget and assess the potential revenues and expenditures.

In the 1999-00 fiscal year expenses exceeded revenue by $323.00. It is anticipated that expenditures will also be greater than revenue in the following year.

In the past, budgets have been conservative and our expenditures have usually been less than expected. However, some increases in expenditures in addition to the 30% decline in donations are the primary reasons for the deficit position.

The Committee urges the Committee Chairs to attempt to stay within the allocated budget if possible. The funds associated with the society can support small deficit positions for a few years, but the society should attempt to balance expenditures with revenues.

Entomological Society of Manitoba Inc. - Budget

Budget Item	1999-00 Actual	2000-01 Actual and Proposed	2001-02 Proposed
Endowment Fund	$35,000.00	$35,000.00	$35,000.00
Revenue			
Membership Dues	$1,688.00	$1,650.00	$1,650.00
Proceedings	$433.00	$400.00	$400.00
Social Committee	$0.00	$0.00	$0.00
Youth/Education Committee	$200.00	$200.00	$200.00
Donations	$1,205.00	$850.00	$850.00
Fund Raising Committee	$372.00	$300.00	$300.00
Student Awards/Scholarship	$100.00	$100.00	$100.00
Meeting ESM/AGM	$1,469.00	$1,400.00	$1,400.00
Miscellaneous	$106.00	$100.00	$100.00
Investment Income	$2,187.00	$1,900.00	$1,900.00
Totals	$7,760.00	$6,900.00	$6,900.00
Expenses			
General Society Expenses	$973.00	$1,000.00	$1,000.00
Proceedings	$891.00	$700.00	$700.00
Newsletter	$161.00	$150.00	$150.00
Social Committee	$68.00	$100.00	$100.00
Youth/Education Committee	$367.00	$300.00	$300.00
Fund Raising	$1,012.00	$500.00	$500.00
Student Awards/Scholarship	$1,500.00	$1,500.00	$1,500.00
Meeting ESM/AGM	$3,011.00	$3,000.00	$3,000.00
Other Committees	$0.00	$50.00	$50.00
Representation at ESC	$0.00	$350.00	$350.00
Totals	$7,983.00	$7,650.00	$7,650.00
Year End Aug 2000	($223.00)	($750.00)	($750.00)

Appendix H: Report of the Newsletter and Publicity Committee

Jason Diehl took over as Editor of the Newsletter in the fall of 1999 and has published three issues since that time (Volumes 27, 1-3). An old column has been revived in which members of the ESM are profiled. It has been slightly modified to include the profile of both a new and accomplished member of the Society (with no selection criteria). Due to easily used imaging software, more and more digital images are being included in the newsletter (making it less e-mail friendly in some instances). Interest in posting the Newsletter on an ESM website has been expressed and will likely happen in the near future. When this occurs, e-mail messages could be sent to those who wish, notifying them to visit the website and view it. This would save some postage and copy charges. The cost of each of the three Newsletters is as follows:

Issue	Postage & Envelopes	Copying
Spring 2000	$30.74	$58.14
Summer 2000	$32.80	$30.47
Fall 2000	$28.61	$30.49

The total costs associated with the three Newsletters were $211.27. My thanks to Rheal Lafreniere, Brent Elliott (Co-Editors) and Nicole Lauro (new Co-Editor) for their help with the Newsletter.

Jason Diehl, Chair

Appendix I: Report of the Social Committee

The New Members Social started the year with great success. Once again, an ethnic potluck dinner was held at the Wytrykush residence, where culinary dishes were sampled from around the world. Many new members were present as well as many familiar faces. More than 50 people were present for the evening, which is excellent attendance.

Due to some bad luck, we were unable to hold any luncheons this year. However, we have a strong list of people who are willing to present at luncheon meetings. We will provide the new Social Committee with this list.

Ethnic Potluck	$0.00
Photocopying*	
Envelopes*	
Mailing Costs*	

*We were unable to obtain the figures for these expenses in time for the AGM. We will get these figures as soon as possible and forward them to the ESM Executive.

Debra Wytrykush
Carla Wytrykush
Social Committee Co-chairs

Appendix J: Report of the Education/Youth Encouragement Committee

The ESM Youth Encouragement Committee with its 20 volunteers taught over 2000 students about insects since the last ESM AGM. These were mostly in the form of presentations given to individual groups of about 20-50 students at their school/ daycare centre or in the Department. About 800 of the students were seen within 2 days at "Amazing Grains". Volunteers taught groups of 50 children for 40 minutes for eight sessions each day for 2 days.

We made a new addition to the live arthropod supply, a tarantula named "Betsy". We often get calls from teachers who want to hear about spiders and, now that we have a student studying spiders, we are all set to give those presentations.

Thank you to all the volunteers who helped throughout the year and to the Society for supplying the money we need to keep this going.

Robyn Underwood

Appendix K: Report of the ESM Student Awards and ESM Scholarship Committee

The Committee reviewed five applications for the ESM post-graduate award. The ESM Scholarship Committee unanimously recommends that the ESM post-graduate award be made to Mr. Jashim Uddin, Dept. of Entomology, University of Manitoba. Mr. Uddin is currently working on his Ph.D. degree. His thesis is on the development of an IPM scheme for seed alfalfa.

The Committee reviewed the nominations for the Student Achievement Award and SWAT Student Award. Ms. Rachel Haverluck, currently registered at the University of Manitoba, was selected as the recipient of the Student Achievement Award. The Committee selected Mr. Jeffery Shaddock, currently registered and the University of Winnipeg, as the recipient of the SWAT Student Award.

Richard Westwood (Chair)
Deirdre Zebrowski
Désirée Vanderwel

Appendix L: Report of the Scientific Program Committee for 2000

Date	Name	Expenses			Income		Annual Mtg
		Chq # ret.	Amount	Deposit Balance	Donations	Registration	
13/10/00	Dr. R. Lindsay	180<	$698.06	$3,330.90			Guest speaker
20/10/00	Grant Jones	185<	$300.00	$2,390.50			Entertainment
21/10/00	Debra Wytrykush	187<	$1,585.05	$56.45		$1,837.07	Banquet
15/11/00	Robbin Lindsay	190<	$63.84	$3,583.07			Supplies; 2 lunches
15/11/00	Martin Erlandson	191<	$265.90	$3,317.17	$920.00		Flight to Winnipeg
21/11/00	Canadian Select Food Service	192<	$89.98	$3,227.17			Coffee, etc.
24/01/01	Terry Galloway	197	$38.10	$2,970.90			Coffee & donuts
08/02/10	Patricia Mackay	200	$283.61	$2,582.44			Annual mixer

Expenses	*Income*	*Balance*
$3,324.54	$2,757.07	$(567.47)

Appendix M: Report on the ESM Fundraising Committee

The Fundraising Committee received donations in the amount of $950.00 for the Annual General Meeting. Additional revenues from the sale of T-shirts, sweatshirts, and ESM pins provided gross revenues of $630.00 which will assist in covering the cost of the 85 new Bumble Bee t-shirts.

Joel Gosselin, Chair

Appendix N: Report of the ESM Membership Committee

The membership total for the Entomological Society of Manitoba was 121, as of October 2000. This value was relatively unchanged from the preceding year, which included 119 members as of September 1999.

James Tucker, Chair

Appendix O: ESM Internet Site Committee:

Pat MacKay has asked me to head up a committee to set up and maintain a web page for the ESM. I see this site as an archive for the Society (past newsletters, committee guidelines, etc.), and as a resource for anyone interested in entomology in Manitoba. I have placed it on the University of Manitoba server at the following address: .

So far I have placed on the site:

< Introduction to the ESM.

< Executive: contact particulars and e-mail addresses.

< Newsletter and Proceedings: full text, some past issues (more to come).

< Committee guidelines, and By-Laws (soon).

< Scientific meeting details, titles, and abstracts.

< Youth Encouragement

< Links

I would be interested in your comments, and in other items you would like to have on the ESM web page. Some examples could be: photos from meetings or excursions, ordering t-shirts or other fund raisers.

Suggested Guidelines for the Internet Site Committee

Composition: A chairperson with power to add to the committee.
Term of Office: One year. Successive appointments may occur.
Appointment: By the President of the ESM.
Objective: To develop and maintain web pages for the ESM.
Duties:

1. Ask the membership for input for the content of the web site.
2. Update the web site with the names of the new executive each year.
3. Place copies of the newsletter and the Proceedings on the web site.
4. Present a report on activities to the Annual General Meeting.
5. Inform sister societies to link with the site.

Paul Fields

Notice to Contributors

Research papers in the *Proceedings of the Entomological Society of Manitoba* are fully refereed. The *Proceedings* are published once a year and manuscripts are welcome any time. The research papers section of the *Proceedings* is primarily intended to highlight entomological research of local (Manitoba) or regional (prairie provinces) interest. The following guidelines should be followed in writing and preparation of manuscripts. Guidelines are adapted from *The Proceedings of the Entomological Society of Ontario*, Volume 117, 1986.

General. Articles are normally in English and should not be offered for prior or simultaneous publication elsewhere. The Editor should be informed if manuscripts have been refused elsewhere. Authors need not be members of the Entomology Society of Manitoba to submit articles.

Text. Articles should be typed, double spaced and on one side of the paper. Margins be 25 mm on all sides. One original and two copies of text should be submitted to the Editor. Spelling should conform to usage recommended in either the Oxford or Webster's New International dictionary. Except in tables, figures, or quotations, dates should be written in the form of 15 July, 1992, etc. Reference to illustrations should be in the form 'Figure 2' or 'Fig. 2', and references to tables should be in the form 'Table 2', etc. Citation references in the text should be in the form 'Wilson (1992) stated', '(Smith 1990)', '(Brown 1985, 1990a,b)' or '(Wilson and Brown 1984; Smith 1990)' in chronological order for multiple citations within one set of parentheses. Footnotes should be kept to a minimum and typed at the bottom of the page to which they apply. Abbreviations should be kept to a minimum and only those that are generally recognized, or defined within the text for the sake of brevity, should be used. Units of measurement should be metric and abbreviated according to the Canadian national standards.

Manuscript Submission and Review. Typed manuscripts must be submitted for review purposes. After final acceptance all manuscripts should be submitted in both typed form and on floppy disk. The name(s) of the file(s) on the disk, name of the word processing language, and the type of computer used must also be included. All manuscripts are reviewed by at least two reviewers. The Editor selects those reviewers and does not disclose their names. The Editor decides to accept, reject or return for revision, manuscripts after reviewer evaluation

Abstract. Articles greater than two typewritten pages, except scientific notes, must preceded by a brief but informative abstract.

Acknowledgements. Acknowledgements should be short and placed in a paragraph at the end of the text.

References. All references should be listed alphabetical order of authors at the end of the article. References not directly consulted by the author should be preceded by an asterisk. The full title for each reference must be given, plus pagination for all items, including books. The names of serials and periodicals should be written out in full.

Layout. The general layout of articles should follow the format for those appearing in recent Volumes (e.g. use of italics, use of bolding and capitals for wording etc.). Tables and figures should also follow the format for those articles appearing in recent Volumes. Two copies of each illustration for each reviewer should be submitted. Captions should be numbered consecutively and must be attached to each illustration.

Publication. There are no page charges for publication of articles in the *Proceedings of the Entomological Society of Manitoba.* Charges are applicable to article reprints on a cost recovery basis

Acknowledgements

The editor wishes to acknowledge the efforts of the anonymous reviewers asked to review the research paper appearing in this Volume. Special thanks to Warren Schuetz of The University of Winnipeg Printing Services for the graphic design of this journal.

Acknowledgements

The editor wishes to acknowledge the efforts of the anonymous reviewers asked to review the research paper appearing in this Volume. Special thanks to Warren Schuetz of The University of Winnipeg Printing Services for the graphic design of this journal.

Entomological Society of Manitoba

The *Entomological Society of Manitoba* was formed in 1945 “to foster the advancement exchange and dissemination of Entomological knowledge”. This is a professional society that invites any person interested in entomology to become a member by application in writing to the secretary. The society produces a quarterly newsletter, the *Proceedings*, and has a variety of meetings, seminars and social activities. Persons interested in joining the society should contact:

The Secretary
Entomological Society of Manitoba
c/o Agriculture and Agri-Food Canada
Cereal Research Station
195 Dafoe Road
Winnipeg, Manitoba,
CANADA. R3T 2M9.

ISBN 0315-2146