

PROCEEDINGS OF THE 43RD ANNUAL MEETING OF THE



Entomological Society of Alberta

Edmonton, Alberta 2 - 4 November 1995

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THE ENTOMOLOGICAL SOCIETY OF ALBERTA

The Entomological Society of Alberta was organized November 27, 1952, at a meeting held in Lethbridge, Alberta, as an affiliate of the Entomological Society of Canada. A certificate of incorporation was obtained under the Societies Act of Alberta on February 19, 1953.

The membership of about 70 paid-up members at that time consisted mainly of Dominion (Federal) entomologists at the Science Service Laboratories in Lethbridge (now an Agriculture Canada Research Station), Suffield Research Station, the Forest Zoology Laboratory in Calgary, and students and staff from the University of Alberta.

One of the prime motives for establishing the Society was to encourage interest in amateur entomology, which had declined from its earlier vigour. The objectives of the Society are succinctly stated in the original Constitution, which differs only slightly from the present day Bylaws:

"The object of the Society shall be to foster the advancement, exchange, and dissemination of the knowledge of insects in relation to their importance in agriculture, forestry, public health, and industry and, for its own sake, among the people of the province of Alberta."

OFFICERS - 1995 & 1994

	1995	1994
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Membership is open to anyone interested in Entomology. Annual dues are \$10.00 (\$5.00 for students). Contact the Treasurer whose address is in the membership list at the back of this Proceedings.

PROGRAM OF THE 43RD ANNUAL MEETING

Thursday, Nov. 2

19:00 Registration and Mixer

Friday, Nov. 3

08:00 Registration

08:30 Introduction and Welcome: B.A. Keddie, President ESA

08:45 Keynote Lecture: Larry Speers, Biological Resources Division, Agriculture and Agri-Food Canada, Ottawa. "Global Master Species Databases"

09:45 Coffee Break

10:15 Scientific Papers: Aquatic, Agricultural Entomology

12:00 Lunch

13:00 Scientific Papers: Agricultural Entomology, Forest Entomology

15:00 Coffee

15:30 Scientific Papers: Forest, Urban Entomology

19:00 Cash Bar

19:30 Banquet

After Dinner Speaker: Robert Holmberg
"Travels in Indonesia"

Saturday, Nov. 4

08:30 Scientific Papers: A Smorgasbord of Bugs

09:45 Coffee

10:00 Annual General Meeting

PRESIDENT'S REPORT 1995: ANDY KEDDIE

First of all I would like you to join me in thanking Dave Langor for making the local arrangements and Lloyd Dosdall and Alec McClay for their efforts in preparing this excellent program and sending out all the notices and requests.

Secondly I would like to thank Tim Lysyk for revising the Insect Collector's Guide, a much needed revision of a 1965 document. I would also like to thank those of you who aided Tim by reviewing this document. I think that the completion of this effort may have come at a very opportune time but I will defer further comment to Tim's report.

Finally I would like to thank all of you who succumbed to my suggestion that a "media event" may be in order for this time. In a period of shrinking resources and what I believe to be a lower profile within society at large for entomologically based research I thought it prudent to develop an effort to raise public awareness of what we collectively do for society at large. I also thought we had a wonderful opportunity to utilize the public awareness that has been generated by the huge successes of the Bug Room at the Provincial Museum and the Butterfly House at the Devonian Gardens. For example as a result of those efforts I have been receiving inquiries about displaying insect collections at our meetings, a previous practice dropped due to the lack of interest.

Realizing I was a novice at this kind of event I managed to elicit the support of two experts, Terry Thormin and Brent Karner who are completely responsible for recruiting the media. I thank them personally and request that you all join me in thanking them for their incredible efforts.

I hope we can make this an annual event and perhaps expand it in to additional venues.

Financial Support for the Alberta Butterflies

Last year we received two requests for financial support in aid of two projects. The membership received by mail a short description of each project and a ballot which was returned by mail. A large majority were in favour of supporting one of these projects, the publication of Alberta Butterflies. In the original description a yes vote authorized the expenditure of \$3000.00 for which we were to receive 60 -100 copies of the book which could be resold to recoup our investment. Subsequent to that vote I received a proposal that instead of receiving and then reselling these books that these funds be used to help purchase books that would subsequently be distributed to high schools throughout the province. These books would include a frontispiece acknowledging the contribution of our Society. This proposal required a rapid response and I was unable to contact many of the membership however I did receive a unanimous approval from approximately 23 members. I accepted the modified proposal on the Society's behalf. My personal justification for this decision is that this book distribution is in keeping with my belief that maintaining a profile in as many places as possible will serve the Society well.

Joint Meeting of the ESC and ESA, 1997.

We have successfully recruited the Joint Meeting Chair. Bruce Heming has kindly agreed to this task and I am sure he will accept your support for this large task. I know we are all busy and in some cases working towards producing a good meeting will require some personal sacrifices, but if you don't do it who will and if we are to survive with entomological careers we must all do our bit.

Finally I would like to thank you all for giving me the opportunity to be President of this Society. Nobody in this society refused any of my requests for information or labour and I think that speaks well for all of us. Thank you.

KEYNOTE SPEAKER: LARRY SPEERS

Global Master Species Databases

Scientific names are the "information carriers" and "primary keys" that we use to communicate biological knowledge. Scientific names are essential for the accurate communication of biological information, not only within the scientific community but increasingly for international trade and commerce. As a result, it may come as a surprise to many to learn that the last comprehensive compilation of published scientific names is Linnaeus's *Systema Naturae*, 13th edition (Gmelin 1790-1792). In the 250 years since the release of Gmelin's list, it is estimated (Hammond, 1992) that there has been approximately 1.75 million new species descriptions published. No comprehensive list of these described species is available. Although many paper-based catalogues and checklists for specific groups do exist, the scattered and uneven coverage of this material makes the task of attempting to document our existing knowledge of the world's flora and fauna a very intimidating proposal. The size of this task becomes even more daunting when one considers that recent estimates (Hammond, 1992) suggest that more than 80% of the total world fauna has yet to be described. In Canada, for example, Danks (1979) estimates the total number of arthropod species at approximately 54,000 with about 50% of this total being either undescribed or unrecorded.

Since the names of living organisms are the key to communicating our wealth of knowledge about the world's biodiversity, the ratification on Dec. 29, 1993 of the "Convention on Biological Diversity" which was signed by over 150 governments has highlighted the need for the development of a comprehensive indexing system to existing scientific names. Partly in response to this need, the general assemblies of both the International Union of Biological Sciences (IUBS) and Committee on Data for Science and Technology (CODATA) adopted proposals for an initiative "Species 2000" to develop a global master species database. The intent of this initiative is the eventual production of an electronic information system that would contain worldwide coverage of species level information that has been validated by an acknowledged taxonomic expert. This system would provide an enumeration of all known species of plants, animals, fungi and microbes as a baseline data set for studies of global biodiversity.

The development plan for "Species 2000" aims to provide a uniform, validated quality index to scientific names by stimulating the completion of existing species databases and promoting new projects where gaps in existing coverage are identified. These distributed databases would be electronically interconnected over the "Internet" through a standardized "common access framework". This inter-operability of distributed databases allows end-user queries to appear to be accessing a single database and will allow easy access to the basic nomenclatural information about species.

For more information access "Species 2000" project home page at:
(<http://www.uel.ac.uk/species2000/>)

Danks, H. V. 1979. Canada and its insect fauna. *Mem Entomol. Soc. Canada* 108:1-573.

Gmelin, J.F. 1790- 1792. *Systema Naturae, Editio decima tertia, aucta, reformata*. 1(4-6) : 1517-3020. Lipsiae.

Hammond, P. 1992. Species inventory. Pp. 17-39. In. Groombridge, B. (ed.), *Global Biodiversity. Status of the Earth's Living Resources*. xix - 585 pp. Chapman & Hall.

ABSTRACTS OF SUBMITTED ORAL PAPERS

Size and life histories of water striders: Patently absurd results from a wrongheaded experiment. Christian P. Klingenberg & John R. Spence, Biological Sciences, U. AB.

Body size is a central element in current theories of life history evolution. Models for optimal age at maturity are based on the assumptions that there is a trade-off between development time and adult size and that larger size provides a reproductive advantage. The results of large, replicated experiments with the water strider *Gerris buenoi* (Heteroptera:Gerridae) contradict both these assumptions. Individual rearings under field conditions showed there is a negative, not positive, correlation between development time and adult size. The physiological basis of growth, with stretch-induced molting, may provide a partial explanation for this correlation. We examined a number of fitness components for their correlations with female size: lifetime fecundity, reproductive life span, average volume per egg, total volume of eggs laid, and the proportion of eggs hatched. None of these traits was correlated with female size. Our data on water striders suggest an alternative scenario for life history evolution, in which size is not an adaptive trait, but evolves as a correlated response to selection on other traits. This expands the range of possible models, and opens life history theory to the debate about adaptation and optimality.

Larvae of a chironomid in a symphoretic association with damselfly nymphs. L.M. Dosdall, AB Environmental Centre, Vegreville.

In Cartier Creek, a small stream in eastern Ontario, larvae of the chironomid *Nanocladius branchicolus* Saether were found attached symphoretically to nymphs of the damselfly *Argia moesta* (Hagen). This represents the first host/ectosymbiont record for *N. branchicolus* and *A. moesta*. The chironomid larvae were sheathed in gelatinous cases which were firmly attached to the host's body surface. From a sample of 176 damselfly nymphs, almost 22% had symphoretic chironomid larvae associated with them. The most frequent attachment site, for approximately 70% of symphoretic chironomid larvae collected, was along the host abdomen, but larvae were also found attached to the wing pads (19%), the gills (8%), and the mesothorax (3%). *Nanocladius* apparently derives several benefits from this relationship, including increased stability in fast currents and unstable substrates, reduced energy expenditure for relocation, reduced interspecific competition for food, and a superior pupation site. However, the possible cost to *N. branchicolus* that may result from this association is mortality during host search and attachment because *Argia* is a predator on smaller invertebrates like *Nanocladius*.

Seasonal reproductive phenology and crop synchrony of *Lygus elisus* and *Lygus borealis* in southern Alberta. S. Wilkins, J. Otani, and R. Butts, Agriculture and Agri-Food Canada, Lethbridge.

Lygus elisus and *Lygus borealis* are significant pests of *Brassica* spp. in southern Alberta. The underlying biological and behavioural differences between these two pests must be elucidated before an effective control strategy can be formulated.

Seasonal reproductive development and crop stage synchrony of *L. elisus* and *L. borealis* were studied on Canola (*Brassica napus*) and Alfalfa (*Medicago sativa*) during 1994. Weekly collections were made from field sites in the Lethbridge area. *Lygus* females were dissected and categorized on the basis of their reproductive and egg development.

L. borealis is generally the most abundant species on Alfalfa in southern Alberta. *L. borealis* females were reproductively advanced with respect to *L. elisus* females on Alfalfa throughout the field season.

L. elisus is generally the dominant pest species of Canola in southern Alberta. The reproductive development of *Lygus* bugs on Canola initially corresponded with the populations on nearby Alfalfa fields. However, *L. elisus* females demonstrated a faster reproductive development rate with respect to *L. borealis* females over the rest of the field season.

L. elisus is known to have a faster nymphal development rate than *L. lineolaris* in southern Alberta. The nymphal development rate of *L. borealis* will be determined in the future.

The second generation females were characterized as reproductively diapaused on the basis of teneral reproductive structures and the presence of fat bodies.

Lygus reproduction in relation to Canola crop phenology. J.K. Otani and R.A. Butts, Agriculture and Agri-Food Canada, Lethbridge. *Lygus elisus* is found commonly among Canola in southern Alberta where it has been shown to decrease yield. Of critical importance is a better understanding of *L. elisus* reproductive biology and its relation to the host Canola crop. Understanding what reproductive state dispersing *L. elisus* adults enter Canola (*i.e.*, mating status and egg development) and how these individuals utilize the host Canola crop (*i.e.*, for mate location and/or oviposition) will elucidate methods of sampling and control. Studies were conducted to determine if *L. elisus* disperses to Canola in response to crop phenology or if dispersal is a result of the reproductive requirements of the insect.

A field study was performed using *Brassica napus* var. Legend as the host crop. An early (May 10 1994) and late (June 3, 1994) Canola stand were seeded. *Lygus* were collected from these two stands using a sweep-net (24" dia.) during the rosette, bud and early flower growth stages. *Lygus* were classified to species, the ratios of males to females were recorded, and females were dissected to determine mating status and egg development. Females were characterized as mated or unmated by the relative size of the female seminal depository which was empty, full or partially full. Eggs were examined within the ovarioles of the dissected female and classified as pre-vitellogenic, vitellogenic, or chorionated.

Lygus were collected in the early Canola seeding date from June 22 - July 8, 1994 and July 8 - 27, 1994, respectively. A higher proportion of male *L. elisus* were collected at the rosette stage in both seeding dates with a sex ratio of 0.64 and 0.86 males:females, respectively. During the bud stage, for both seeding dates, the sex ratio dropped to an almost even number of males to females producing a sex ratio of 0.49 and 0.48 males:females in the early and late seeding dates, respectively. During the early flower stage, a sex ratio of 0.52 and 0.49 were collected from the early and late seeding dates, respectively. Despite the higher proportion of male *L. elisus* immigrating into the Canola at the rosette stage, the sex ratio returned to roughly 1:1 during the bud and early flower stages in both seeding dates.

A limited number of females suitable for dissection were collected during the rosette stage of both the early and late seeded Canola stands. In the early seeded Canola, during the rosette stage, 80% of the females collected were mated which increased to 86% during the bud stage, and 98% during the flower stage. A small sample size was collected in the late seeded Canola during the rosette stage therefore results on the mating status of these females could not be verified. However, 96% and 98% of the females collected during the bud and early flower stage, respectively, were mated.

The same females dissected to determine mating status were also examined for egg development. In the early seeded Canola, during the rosette stage, 80% of the females collected contained vitellogenic and chorionated eggs indicating a high proportion of females were ready to oviposit in the host crop when immigrating. The corresponding 20% of the females collected were pre-vitellogenic and would not be ready to oviposit in the Canola until a minimum of 7 days had passed. During the bud stage in the early seeded Canola, 72% of the females collected contained vitellogenic and chorionated eggs while 17% of the females were pre-vitellogenic. The corresponding 11% of the females were post-ovipositional and had completed oviposition. During the early flower stage in the early seeded Canola, 85% of the females contained vitellogenic and chorionated eggs while 10% of the females were pre-vitellogenic and 5% were post-ovipositional. During the bud stage in the late seeded Canola, 94% of the females collected contained vitellogenic and chorionated eggs indicating that females were ready to oviposit upon entering the Canola stand. The corresponding 2% of the females collected were pre-vitellogenic while 4% were post-ovipositional indicating

that a very small proportion of the females collected in the bud stage were not ready to oviposit being too immature to lay eggs immediately after entering the Canola or having completed oviposition previously. During the early flower stage of the late seeded Canola, 93% of the females collected contained vitellogenic and chorionated eggs while the corresponding 7% were post-ovipositional. Therefore, as in the bud stage, a high proportion of the females collected were ready to oviposit immediately after entering the Canola stand while 7% had completed egg laying. None of the females collected in the early flower stage of the late seeded Canola were pre-vitellogenic.

It would seem that *L. elisus* respond to crop phenology as shown by the greater proportion of males entering the Canola at the rosette stage. However, egg development and mating status in *L. elisus* seem to occur independent of the Canola crop phenology. More work needs to be done to characterize egg development in *L. elisus* and to determine if multiple mating occurs in the species.

The feeding preferences of *Lygus elisus* and *Lygus borealis* in southern Alberta. **S. Wilkins and R. Butts, Agriculture and Agri-Food Canada, Lethbridge.** *Lygus* bugs are polyphagous feeders in southern Alberta. These plants often act as population reserves for a variety of *Lygus* species. The differences in feeding preference between *Lygus elisus* and *Lygus borealis* must be elucidated before an effective control program can be developed. *L. elisus* predominates on early season crucifers and utilizes chenopods as their seasonal hosts. *L. borealis* is generally the most abundant species on the legume *Medicago sativa*. Both species may reach pest levels on *Brassica* spp.

Feeding preference experiments were conducted for both species on *Brassica napus* (a crucifer), *Chenopodium album* (a chenopod) and *Medicago sativa* (a legume). *Lygus* test groups were composed of five unmated adults of the same species and sex. The plant species were in the same stage of development. "Active feeding" on a given plant species was defined by as the physical contact between the plant surface and a *Lygus* individual. A time-lapse VCR was used to observe the feeding activities of *Lygus* bugs on the three plant species over a 23 hour period. The relative feeding preference for each plant species was based on the combined "active feeding" of the five individual *Lygus*.

L. elisus females demonstrated a significant relative preference for *C. album* (Lambsquarters). When *L. elisus* and *L. borealis* were tested on plants in bud, both species preferred *C. album* (Lambsquarters) and *B. napus* (Canola). This preference was relatively stronger for *L. elisus*. First generation *L. elisus* females appear more likely to migrate to *B. napus* and *C. album* buds for feeding and mating than *L. borealis* females. Feeding preference can be a significant factor leading to the dominance of *L. elisus* over *L. borealis* in *B. napus* fields.

A new look at an old pest – Hessian fly. **M.G. Dolinski, Alberta Agriculture, Food and Rural Development, & L.M. Dosdall, Alberta Environmental Centre, Vegreville.** The history of the Hessian fly in Western Canada was reviewed along with its biology. Hessian fly has recently become important because it is restricted in densified hay products destined for the Japanese feed market. This market has the potential to reach \$30 million annually. The fumigation and heat treatment processes being developed to eliminate this insect from densified hay were briefly outlined. In 1995, Hessian fly populations were high in the Three Hills area. The first generation caused 8–10% stem breakage in some fields. Breakage occurred at the site of pupation near the soil surface with the 1st generation and generally occurs above the second node from the soil with the 2nd generation. Pupation of the 1st generation caused a depression in the stem where breakage typically occurred. Populations may be increasing due to shortening rotations and continuous cropping under minimum tillage systems. Further work to evaluate the economic impact of Hessian fly on wheat production under Alberta conditions is necessary to assess whether its status as a non-economic pest has changed in the last 50 years.

First field releases and recovery in Canada of *Lema cyanella*, (Coleoptera: Chrysomelidae), a biocontrol agent for Canada thistle. McClay, A.S. (1), C. Saunders (2), & M.D. Wartenbe (2), (1)Alberta Environmental Centre, (2)Pest Management Services, Edmonton Parks & Recreation. *Lema cyanella* (L.) is a chrysomelid beetle native to Europe and Asia which feeds almost exclusively on foliage of Canada thistle [*Cirsium arvense* (L.) Scop.]. It was approved for release as a biocontrol agent for this weed in Canada in 1984, but no significant releases were made at that time because of disease problems in the stock culture and the scarcity of the insect in Europe. In 1992 we obtained a healthy colony of *L. cyanella* from New Zealand, where a successful rearing system had been developed. This colony has been maintained in culture at the Alberta Environmental Centre, and three field releases were made in 1993 and 1994. The 1993 release was made with prediapause adults in October; a few surviving adults and eggs were found in spring 1994, but there was no indication that any progeny completed development that summer. Two field releases were made with postdiapause adults in June 1994, one in a field cage in the City of Edmonton and one at an open site at Vegreville. At the Edmonton site, overwintered beetles were seen in late May 1995 and larval damage was visible on the leaves by early June. Adults, probably the progeny of the overwintered beetles, were seen from mid July onwards. At the Vegreville site, eggs were seen on June 1 and larval feeding damage was scattered over a wide area by late June. A GPS receiver was used to map the distribution of plants showing larval feeding damage; 125 such plants were found up to approximately 360 m from the release point. This is the first record of successful overwintering and breeding of *L. cyanella* in the field in Canada.

Host detection and selection by ovipositing Diamondback moth, *Plutella xylostella* (L.) (Lepidoptera:Plutellidae). K.A. Justus, Biological Sciences, U. AB. Although *Plutella xylostella* (L.) is a worldwide pest of cruciferous crops, relatively little is known about its oviposition behaviour. This study was undertaken to provide necessary information about mechanisms involved in *P. xylostella* host selection. Four oviposition behaviours were described. Moths were given artificial substrates treated with water, sinigrin, or *Brassica napus* (cv Westar) squashes, combined with *B. napus* volatiles and/or grooves in the substrate. No eggs were deposited in the absence of olfactory and gustatory stimuli. Moths given gustatory, but not olfactory stimuli, deposited similar numbers of eggs, but spend significantly more time performing olfactory-related behaviours. Conversely, moths given olfactory, but not gustatory stimuli, did not oviposit. Substrate grooves did not influence egg numbers, but appeared to influence egg location. The order in which behaviours occur and the relative importance of stimuli is discussed.

Impact of host plant association on aphid survival at low temperatures. Richard A. Butts, Agriculture and Agri-Food Canada, Lethbridge. The hypothesis, suggested by previous studies, that host plant contact reduces the cold tolerance of anholocyclic aphids was tested under laboratory conditions. Adult and first instar *Rhopalosiphum padi* (L.) were exposed to temperatures of 0°C, -5°C and -10°C on intact plants, excised leaves and in the absence of contact with plant material. Aphids survive longer when exposed in association with plant material than aphids that have no contact with their host plant. The difference in survival was most pronounced at -10°C. Therefore, the above hypothesis is rejected for aphids on cereals since host plant contact apparently enhances cold tolerance. Exposure on excised leaves also enhanced aphid survival at low temperature but was less effective than the intact plant. This suggests that plant quality as well as the presence or absence of plants is important in the cold tolerance of aphids on cereals. The implications of this for field and laboratory studies of overwintering are discussed.

Life after *Bacillus thuringiensis* (Btk): Recovery of Lepidoptera in wetland gaps. Michele L. Williamson, Biological Sciences, U. AB. *Bacillus thuringiensis* Berliner var. *kurstaki* (Btk) was aerially applied to control spruce budworm (*Choristoneura fumiferana* Clemens) in the northern boreal forest of Saskatchewan. A general fauna survey was used

to quantify the extent and speed of recovery. In 1993 to 1995, numbers of individuals and species of moths varied considerably but did not differ between sprayed and unsprayed gaps. This lack of difference among spray treatments may have been the result of extensive colonization rather than the lack of *Btk* impacts. Field experiments assessed whether non-target Lepidoptera on flat-leaved willow (*Salix planifolia* Pursch) can recover after *Btk* reduced their numbers in wetland gaps. These experiments examined how recovery was mediated by local establishment and immigration. Recovery ability of non-targets can be summarized: 1) many Lepidoptera are exposed to *Btk* as their larvae are present during spraying, 2) Lepidoptera are likely able to colonize sprayed areas, and 3) *Btk* impacts may not be observed immediately after aerial applications.

Integrated management of spruce budworm using *Bt*: A model. Barry Cooke, Biological Sciences, U. AB. In eastern North America, *Bt* (*Bacillus thuringiensis* Berliner var. *kurstaki*) has proven to be highly variable in its efficacy against eastern spruce budworm, *Choristoneura fumiferana* (Clem.). To improve the predictability of *Bt* efficacy, recent research has focused on fundamental processes governing *Bt* dose acquisition and expression. The fruits of this research have not yet been synthesized in a quantitative format. To this end, a process-based *Bt* spray efficacy simulation model was built, and is described here. As natural enemies are a significant source of budworm mortality that can be indirectly affected by *Bt* sprays, the model was designed to simultaneously investigate the costs and benefits of parasitoid conservation. *Apanteles fumiferanae* (Hymenoptera: Braconidae) and *Trichogramma minutum* (Hymenoptera: Trichogrammatidae) are ubiquitous parasitoids of spruce budworm larvae and eggs that are vulnerable to the effects of *Bt*. These parasitoids were included in a case study of spruce budworm integrated pest management. Simulations with the model provided plausible explanations for variability in *Bt* efficacy, suggested possible methods of improving efficacy measurement and prediction, and suggested some interesting tactical solutions for optimal management of spruce budworm populations.

Between a rock and a hard place: A phenological window for the larval development of forest tent caterpillar, *Malacosoma disstria* Hübner. Dylan Parry, Biological Sciences, U. AB. Eggs of the forest tent caterpillar (Lepidoptera: Lasiocampidae) hatch in late April and early May in central Alberta. Hatching occurs shortly before budbreak of their primary host, trembling aspen (*Populus tremuloides* Michx). In 1993, I designed an experiment to test the consequences of variation in the phenology of egg hatch. Using an aspen stand of clonal origin, hatching egg bands were placed on trees at four day intervals beginning at budbreak. On each tree, one egg band was protected with a mesh pollination bag and the other received no protection. Significant increases in development time were recorded for larvae from later hatching groups. Larvae from egg bands with delayed hatch suffered significant increases in mortality but only in the non-protected treatment. This suggests that although phenological changes in aspen phytochemicals increase development time in forest tent caterpillar, it is the interaction between natural enemies and extended development times that reduced survival. The narrow phenological window in host quality following budbreak may have exerted strong selective pressure on tent caterpillar larvae to emerge from eggs as early as possible in the spring.

Phenology and mortality of the white pine weevil in Alberta. David W. Langor, Northern Forestry Centre, Canadian Forest Services. The white pine weevil, *Pissodes strobi* (Peck), is an important pest of young spruce and pine throughout Canada and the northern United States. Weevil larvae girdle and kill the terminal leaders of trees which results in vertical height growth as well as deformation of the stem. This damage has substantial economic impact. The bionomics of this species has been well studied in pines in eastern North America and in Sitka spruce on the west coast; however, there has been relatively little work on this weevil in the prairie provinces, where white spruce is the principal host. In 1995, a study was commenced in north-central Alberta to investigate the phenology and mortality of *P. strobi*. Weevil populations were sampled weekly to ascertain development and mortality

from late April until early October at two sites near Calling Lake. Both sites were planted with white spruce in 1981-82 and were manually released from hardwood competition in 1989-90. Both sites were very similar except that one (Block 3) had a more rolling relief and was more moist than the other (Block 15). Phenology was similar to that reported for *P. strobi* throughout most of its range. Adults emerged from overwintering sites in the duff in mid-April and commenced laying eggs in the previous year's terminal leader in late April. Oviposition continued until late May. Development proceeded rapidly through the first three larval instars; fourth larval instars were present by mid-June. Pupae were present by early July and teneral adults by late July. Adult emergence occurred from mid-August to late September. Instar-specific mortality was 18-26% for eggs, 10-16% for first larval instars (L I), 5-12% for L II, 9-14% for L III, 62-66% for L IV, 35-47% for pupae, and 5-14% for adults before emergence. Resinous (drowning or entrapment in resin) caused 24-35% mortality, mainly among eggs and small larvae. Predation by larvae of a lonchaeid fly, *Lonchaea corticis* Taylor, caused 32-37% mortality, and parasitoids caused 10-11% mortality, mainly among L III, L IV, and pupae. Pathogens caused only 0.4-0.8% mortality. The cause of death for 13-15% of cadavers could not be identified. Twice as many progeny survived to emerge as adults in Block 15 (14.4% of population) as in Block 3 (7.3%). This difference is largely explained by the difference in mortality due to resinosis which was significantly higher in Block 3. It is possible that trees in Block 3 may be more vigorous because of the higher soil moisture and may therefore produce larger quantities of resin. The difference in survival of progeny between Block 3 and Block 15 has implications for population dynamics of *P. strobi*. If the population in Block 15 continues to experience high survival, it is expected that population size and damage to trees will increase more rapidly there than in Block 3, assuming that overwintering survival of adults is similar among blocks. A survey of *P. strobi* to trees in both blocks in 1995 showed that damage levels are at least as high in Block 15 as in Block 3.

Forest sustainability: Bugs, cruds and logs. J.R. Spence¹, W.J.A. Volney², I.G.W. Corns², B.A. Keddie¹, D.W. Langor², K.I. Mallett² & D.G. Maynard², 1 Biological Sciences, U. AB & 2 Northern Forestry Centre, Canadian Forest Services. We argue that insects and diseases are central organizing forces in natural stand development and that their impacts, in interaction with fire and physical features of the landscape, control the development of boreal spatial mosaics. Thus, any realistic "natural disturbance model" for forestry must include study of these organisms. Furthermore, given their overwhelming numbers and probable importance to ecosystem function, arthropods must be centrally included in reasonable assessments of wildland value based on biodiversity. Our research, proposed in the context of the new National Centre of Excellence in Sustainable Forest Management has the following two general objectives:

- 1) We will measure and study the mechanisms for insect and disease impact under various silvicultural regimes and seek strategies for reducing them that are both environmentally-sensitive and cost-effective. We will collaborate with silviculturalists in a comprehensive study of aspen dieback and processes involved in regeneration of white spruce. Using chronosequences based on stem analysis and records of defoliation, we will exploit temporal and spatial gradients afforded by forests in the western boreal region to investigate the interactions among forest pests, soil types, climate and forest productivity. We will also use experiments at a few sites to study the details of aspen responses to defoliation and how these interact with drought, soil type and effects of root pathogens. We will develop models to link defoliator activity with nutrient cycling to better understand long-term implications for stand development, especially with respect to natural increases in the spruce component.

- 2) We will assess the "biodiversity" (*i.e.*, species composition and community structure) of selected arthropod groups in two main lines of study. a) We will contribute an invertebrate component in studies of wildlife in fire-origin and harvested stands. Using soil and litter dwelling beetles and beetles living in coarse woody debris, we will focus on whether

conventionally harvested stands and fire-origin stands do, in fact, converge on the same successional trajectories with respect to invertebrate assemblages and the role of various insects and diseases in successional processes. b) We will investigate how a range of partial-cut silvicultural systems affect biodiversity of selected invertebrate groups, and how insects affect development of spruce components in the mixedwood. In addition to the taxa studied above, we will also look at a range of representative herbivores to achieve rough assessments of impact on forest depletion under different silvicultural programs.

Arthropod diversity in *Populus* coarse woody material. **H. E. James Hammond, Biological Sciences, U. AB.** Over the last three years I have investigated the arthropod diversity in aspen and poplar rotting wood from central and northern Alberta. Several spatial scales have been examined. These data suggest faunal differences between region, age of forest stands and clearcuts, and decay stage of the wood. Also, several new Coleoptera records have been noted. Thesis is impending.

Relating regional weather patterns to defoliator outbreaks in the prairie provinces. **Cameron R. Currie & W. Jan. A. Volney, Northern Forestry Centre, Canadian Forest Services.** Forest tent caterpillar, *Malacosoma disstria* Hbn., and spruce budworm, *Choristoneura fumiferana* (Clemens), outbreaks in the prairie provinces were mapped from information compiled by the Canadian Forest Service's Forest Insect and Disease Survey Reports. Outbreak frequency and severity were used to determine areas most susceptible to defoliation using a Geographic Information System. Daily minima and maxima temperature data from 70 locations in the region were used to assess how weather affected the regional distribution of forest tent caterpillar and spruce budworm outbreaks. Forest tent caterpillar and spruce budworm outbreaks are influenced by the frequency of frosts in spring. Also, forest tent caterpillar defoliation has increased significantly over the last 50 years, perhaps a result of climate warming.

The effect of epigeic earthworm invasion on oribatid mites in pine forest soil. **Mary Ann McLean & Dennis Parkinson, U. Calgary.** An invasion of the epigeic earthworm *Dendrobaena octaedra* was observed in lodgepole pine forest soil in Kananaskis in SW Alberta. Field plots were set up in a part of the forest which had not yet been extensively invaded by earthworms and *D. octaedra* was added to half the plots. Worm densities varied from 0 to 1500 worms per m². Oribatid mites, other suborders of mites and Collembola were extracted from field plots 1 year after the addition of *D. octaedra*. Oribatid species richness, total numbers of oribatids and numbers of several abundant oribatid families such as the Brachychthoniidae and Oppiidae decreased significantly in the presence of increasing numbers of earthworms. Abundances of Collembola and other mite suborders such as Mesostigmata were not affected by earthworm density. It is possible that mesostigmatids were less limited than oribatids at high worm densities due to differences in size and feeding habits; oribatids are smaller and fungivorous while mesostigmatids are larger and although considered predatory have been observed eating a surprising variety of substrates including algae and fungi.

Spatial pattern of tent caterpillar parasitism across continuous and fragmented forests. **Jens Roland, Biological Sciences, U. AB.** Rates of parasitism of forest tent caterpillar were monitored for three years at a total of 236 sites at two spatial scales during the outbreak phase of a forest tent caterpillar population near Ministik Hills, Alberta. At a fine spatial scale, forest fragmentation reduced the efficacy of the tachinid fly *Patelloa pachypyga*, but was associated with enhanced parasitism by *Carcelia malacosomae*. Forest fragmentation did not reduce the impact of the sarcophagid parasitoid *Arachnidomyia aldrichi*. Large-scale patterns of parasitism (420 km² grid) reflected these fine-scale patterns. Large-scale reduction in efficacy of some elements of the natural enemy complex may, in part, explain variation in historical patterns of tent caterpillar outbreaks.

An overview of Calgary Parks & Recreation's Dutch Elm disease program. T.R. Reichardt, K.J. Delago and S.J. Wilkins. Central Parks Services, Calgary Parks & Recreation. In July 1994, the smaller European elm bark beetle, *Scolytus multistriatus* (Marsh.) was discovered in Calgary. This was the first recorded capture in Alberta. *S. multistriatus* adults were detected during the months of July, Aug. and Sep. at 20 to 32 trap sites. The following year, the number of trap sites was increased three-fold to include a wider geographical area. In 1995 from May to Sep., *S. multistriatus* was detected in 40 of 103 trap sites. The focus of infestation appears to coincide with areas of established elm trees.

S. multistriatus was most likely introduced upon elm firewood transported from out of province. The smaller European elm bark beetle is one of two known vectors of Dutch Elm disease. Calgary Parks & Recreation has implemented a Dutch Elm disease program to address this potential threat to the urban elm population. Further aspects of the program will be discussed.

Satin moth, *Leucoma salicis* (L.) (Lepidoptera:Lymantriidae), a recent introduction to Edmonton. C. Saunders, Forestry & Environmental Services, Edmonton Parks and Recreation. The recognition of satin moth in North Edmonton in June of 1994 marks the first provincial record of this poplar and willow tree defoliator. In 1995, 130 satin moth defoliation sites were confirmed, mostly on hybrid poplars in north Edmonton and neighbouring St. Albert. Two of the infestations were found on native poplar trees. Male moth trapping shows the species distribution to have expanded to south Edmonton and the community of Sherwood Park. To date, parasitoid rearings from Edmonton satin moth show the probable presence of the braconid wasp *Cotesia melanoscelus* (Ratzeburg), one of four enemies introduced to British Columbia to help combat satin moth. Small scale rearings of satin moth from outbreaks near Golden and McBride B.C., like Edmonton, failed to show the presence of a second introduced braconid wasp *Meteorus versicolor* (Wesmael) which killed over 60% of a small sample of satin moth caterpillars from Victoria B.C.

Birch Leaf Miners in the City of Edmonton. Robin McQueen, Biological Sciences, U. AB.

Two introduced species of leaf mining sawflies, *Fenusa pusilla* (Lepeletier) and *Profenusa thomsoni* (Konow) have caused extensive damage on ornamental birch in the City of Edmonton since the 1970's. In 1994, a parasitoid, *Lathrolestes luteolator* (Gravenhorst), was found attacking the most damaging species of birch leaf miner, *Profenusa thomsoni*. This discovery was in conjunction with a drastic reduction on the *P. thomsoni* population in Edmonton. In response to this discovery, a small survey was conducted to determine the distribution of *L. luteolator*. Parasitoid adults were trapped in Sir Winston Churchill Provincial Park, Edmonton, Calgary and Fort McMurray but not in Lethbridge, Slave Lake, Touchwood Lake Provincial Campground, or Saskatoon. *Lathrolestes luteolator* appears to be in different stages of colonization throughout Alberta. However, further research is necessary to understand interactions between *P. thomsoni* and *L. luteolator*.

Variability and chemosensory cues of larviposition behaviour of the flesh fly, *Neobellieria* (= *Sacrophaga*) *bullata* (Diptera:Sarcophagidae). Greg Pommen, Biological Sciences, U. AB. Chemosensory stimuli of a flesh fly, *Neobellieria bullata* (Parker) were investigated. Larviposition behaviour is primarily chemically mediated and it has been assumed chemical stimuli are primarily low molecular weight, water soluble components of animal flesh. Methanol: chloroform: water extractions were used to derive water soluble constituents from a standard larviposition substrate, Sigma liver concentrate. A significant difference in larviposition behaviour was found in no choice bioassays using the standard and water soluble derivative. Analysis of the derivative compared to the standard using HPLC and capillary electrophoresis showed virtually no changes in amino acid, nucleotide, or protein content between the fractions. It is suggested the range of chemical stimuli are broader than previously discussed and lipid components are potent modifiers of the chemical stimulus in larviposition.

The eight-legged acid test: Does sulphur contamination affect ground spiders? Hector A. Cárcamo & Don Buckle, Biological Sciences, U. Calgary. Litter-dwelling spiders were sampled along a sulphur deposition gradient in a pine forest in central south-west Alberta using pitfall traps in 1994. The family Linyphiidae (including Linyphiinae and Erigoninae) were significantly more abundant in sites under the lowest sulphur deposition regime. *Pardosa mackenziana* (Lycosidae) and *Xysticus canadensis* (Thomisidae) were more abundant in sites under highest sulphur contamination. Ordination of the sites using Principal Component Analysis (PCA) ranked the sites according to the sulphur deposition gradient. However, correlation of PCA axes with several environmental variables suggests that forest heterogeneity (shrubs, ground plant cover and coarse woody debris) are more important in structuring ground spider communities than sulphur contamination.

The effects of host diet on parasitoid success in host and non-host Insects. M. McFarlane, J. Tansy, & B. A. Keddle. Biological Sciences, U. AB. The parasitoid *Cotesia congregata* previously described as a specialist that can utilize *Manduca sexta* and closely related sphingids as hosts is capable of developing on alternate hosts (non-hosts) such as the noctuid, *Trichoplusia ni*. Successful development of these parasitoids is influenced by host diet; more parasitoids completed development on *T. ni* reared on artificial diet than on plants; similar results were obtained with *M. sexta* reared on artificial diet. Although fewer parasitoids emerged from any host reared on any plant, impacts on host populations may be the same as the overall mortality due to parasitism was unchanged.

Agroforestry potentials for pest management: The case of a maize-tree legume intercrop in Kenya. Callistus K.P.O. Ogot, Biological Sciences, U. AB. Increasing vegetation diversity of Agroecosystems is a cultural practice that has been acclaimed to increase system stability and decrease the incidence of major insect pest outbreaks often prevalent in monocultures. Studies were conducted in Kenya to establish the pest management potential of agroforestry as a production technology for resource-limited farmers of the tropics. The popular system of alley cropping maize with the leguminous multi-purpose tree species *Leucaena leucocephala* was examined. Maize stem borers host location and colonizing ability, crop damage levels and yield loss were significantly reduced in the intercrops as compared to the maize monocrop. Alley cropping with *Leucaena* could form a useful IPM component for stem boring lepidopterous pests of maize in the tropics.

Bugged Bugs. Susan Bjornson, Biological Sciences, U. AB. Growers depend on the predatory mite, *Phytoseiulus persimilis* Athias-Henriot, for biological control of pest mites in commercial greenhouses. This predator is mass-reared in commercial insectaries and shipped to growers world wide. *P. persimilis* is normally a very efficient predator, and its successes have been well documented. Recent reports of poor performance, however, have been associated with a microsporidian pathogen.

In *P. persimilis*, the microsporidium begins its development within digestive cells of the ventriculus; the initial stages of infection occur within the nucleus. Infected cells become packed with microsporidia and are sloughed off into the caecal lumen where re-infection may occur. Most internal tissues become infected, including the caecal wall, super- and subesophageal ganglia, and muscle tissue. This microsporidium is, in part, vertically transmitted. Preliminary data verifies that this pathogen causes reduced fecundity in infected *P. persimilis*, and is capable of becoming prevalent in mite colonies within a short time. Microsporidia may, therefore, hinder successful mass-rearing of *P. persimilis* in commercial insectaries.

ABSTRACTS OF SUBMITTED POSTERS

Pollination ecology and biocontrol: Developing release strategies for seed-feeding insects on *Dalmatian toadflax*. Rosemarie DeClerck-Floate & Ken Richards, Agriculture and Agri-Food Canada, Lethbridge. *Dalmatian toadflax* is a noxious rangeland weed of European origin that has been targeted for biocontrol in Canada since the 1970's. Among the insects recently approved for release against *Dalmatian toadflax* is a host specific strain of the seed weevil, *Gymnetron antirrhini*. Effective releases of biocontrol insects require an understanding of the relationships between weed and insect development so that insects are released when adequate plant resources are available. Hence, a study was initiated in 1994 which investigates the pollination requirements, pollinators, and seed setting efficiency of *Dalmatian toadflax* at different elevations in southwestern Alberta, in order to determine the best time and locations for releases of the seed weevil. Preliminary results based on the first year of data are: 1) *Dalmatian toadflax* must be cross-pollinated to produce seed. 2) Bumble bees are the major pollinators of *Dalmatian toadflax*, and their presence or absence will affect the availability of resources for *G. antirrhini* or any seed-feeding insect used for biocontrol (*i.e.*, a late spring snow storm in the foothills in 1994 reduced bumble bee populations and consequently, seed set on *Dalmatian toadflax*). 3) Toadflax flowering and seed production terminated early in the fall at dry sites. Recommendations arising from the preliminary results are to release *G. antirrhini* early in the summer and at lower elevations to increase its chances of successful establishment and population increase.

Measurement of fluctuating asymmetry in insect wings using image analysis. K.D. Floate, E.G. Kokko, D.D. Colwell & B. Lee, Agriculture and Agri-Food Canada, Lethbridge. Minor, non-directional deviations from bilateral symmetry [*i.e.*, fluctuating asymmetry (FA)] are widely used as a quantifiable indicator of genetic or environmental stress. Because differences in FA among samples are often small, accurate measurement of the morphological character of interest is important. We developed an image analysis (IA) method to improve the accuracy of FA measurements for insect wing characters, which typically are obtained using an ocular micrometer (OM). We then compared the accuracy of the two methods by testing the repeatability of measurements obtained independently by two researchers from 60 horn flies, *Haematobia irritans*; *e.g.*, if measurements were 100% accurate, we expected them to be 100% repeatable.

The repeatabilities of FAs calculated from linear measurements using either method was about 10%, averaged over three wing veins and wing length. This result suggested that neither method was particularly suited for detecting the low levels of FA observed in the current study. However, the repeatabilities of FAs calculated from area measurements was about 65%, averaged over three wing cells and total wing area. For practical reasons, area measurements only could be obtained using IA. In addition to the obvious advantage of providing area measurements, the IA method was rapid and less prone to transcription errors. We obtained four length measurements and four area measurements in less than 4 min per wing. Additional characters could have been measured with very little increase in processing time. Data was transcribed directly into computer files where it was immediately available for statistical analyses.

ENTOMOLOGICAL SOCIETY OF ALBERTA

MINUTES OF THE EXECUTIVE MEETING

Strickland Library, Dept. Biological Sciences,
University of Alberta, Edmonton
April 6, 1995

Attendees: H. Cárcamo, R. DeClerck-Floate, L. Dosdall, K. Floate, J. Jones, A. Keddie, A. McClay, B. Mitchell, G. Pohl, M. Williamson

1. **Call to order**

The meeting was called to order at 13:30 h by President Andrew Keddie

2. **Adoption of agenda**

MOTION: Williamson/DeClerck-Floate; That the agenda be adopted. CARRIED.

3. **Approval of minutes of previous meeting (Oct. 27, 1994)**

MOTION: McClay/Cárcamo; That the minutes of the previous executive meeting be adopted. CARRIED.

4. **Reports**

i) **Treasurer's report - Jim Jones**

Jim Jones reported that income from memberships (\$516.71), interest (\$615.56), and registrations/banquet tickets for the annual meeting (\$1,930.00) totaled \$3,062.27. Expenditures resulting from the annual meeting (\$2,676.13), the Proceedings (\$153.45), postage (\$173.78), photographic services (\$246.14), bank charges (\$17.05), and corporate services (\$16.00) totaled \$3,538.05. When including the investments of the Society, net assets are approximately \$16,505.10. There is some discrepancy between this balance (\$16,505.10) and the figure reported on a summary balance sheet (\$16,792.90); Jim will investigate this item. Jim also reported that the ESA had received cheques from an American company called Faxon (total = \$16.71), and it is not known why these funds have been forwarded to the Society. It was agreed not to investigate this matter further.

MOTION: Williamson/Mitchell; That the Treasurer's Report be accepted. CARRIED.

ii) **Editor's report - Michele Williamson**

Michele Williamson reported that with two exception, all abstracts were received from 1994 Annual Meeting participants in Canmore and that most were provided in electronic format. The Proceedings have been completed except for inclusion of the audited financial report. Jack Scott has prepared the photographic plates and a copy of the ESA By-Laws has been added to the Proceedings. Abstracts of scientific paper presentations have also been forwarded to the Entomological Society of Saskatchewan for incorporation into their Proceedings. It is hoped that the Proceedings can be completed by the end of May when Michele leaves for her summer field work; the Proceedings will then be mailed out or distributed through the Government of Alberta courier system.

It was agreed that the ESA By-laws should be updated and forwarded to executive members, and that the minutes of meetings since the By-laws were last published should be checked to ensure that any changes to the By-laws are properly incorporated. Michele agreed to check previous minutes for changes to the By-laws and to provide executive members with an electronic copy of the updated version.

MOTION: Cárcamo/McClay; That the Editor's report be accepted. CARRIED.

iii) **Report of the Regional Director to the ESC - Bev Mitchell**

Bev Mitchell reported that a major reorganization of the ESC is necessary due to the large reduction in membership that has occurred in recent years, due primarily to the loss of

positions in entomology in government research institutions. There will be further discussion on this at the national meeting in Victoria next fall. The ESA should ensure that official invitations to attend the Annual Meetings of the ESA are extended each year to the ESC President. It was agreed that the ESA Secretary Lloyd Dosdall should extend this invitation to the ESC President prior to the next annual meeting.

MOTION: DeClerck-Floate/Cárcamo; That the Regional Director's report be accepted. **CARRIED.**

5. Business arising from the executive meeting of Oct. 27, 1994.

i) Report of the maintenance of our society as required by consumer and corporate affairs - J. Jones

Jim Jones reported that the ESA was incorporated in 1953. A "Revival Certificate" was issued in 1993, and every year it is necessary to complete a revival application, submit a list of officers, and to pay \$8.00 to maintain the status of our Society. Jim has fulfilled these requirements, and the ESA is now up-to-date with Consumer and Corporate Affairs.

ii) Report on re-evaluation of policy for student scholarships and prizes - A. McClay.

Alec McClay reported that he was not prepared to report on this item.

It was pointed out that in the past the ESA offered a prize of \$300.00 to the student with the highest marks in a third-year course in entomology at the University of Alberta. The issue of concern was whether the prize should be canceled, maintained but extended to all other universities in the province or changed (perhaps to an essay format).

MOTION: Jones/DeClerck-Floate; That the ESA terminate its current prize as stated in the University of Alberta calendar. **CARRIED.**

Lloyd Dosdall will forward a letter on behalf of the ESA to Dr. Mark Dale (Associate Chair, Biological Sciences Undergraduate Programs, University of Alberta) requesting that the prize be removed from the current calendar.

Kevin Floate agreed to develop a proposal for presentation as a motion at the next Annual Meeting. The proposal would be formed in consultation with other members of the ESA Executive and would address the type of award to be offered to students and amateur entomologists.

iii) Report on binding and distribution of copies of the ESA Proceedings - A. Keddie

Andy Keddie reported that eight sets of Proceedings covering the past 10 years have been bound and are ready for distribution. It was agreed that one copy should be distributed to each of the following libraries: Strickland, Cameron, Alberta Environmental Centre, Agriculture and Agri-Food Canada (Lethbridge), Alberta Agriculture's Crop Diversification Centre South (Brooks), and Forestry Canada. One copy would also be held in the ESA archives in Lethbridge.

iv) Applications for student travel grants

At the last annual meeting, a motion was passed enabling \$500 per year to be paid to students to support travel and accommodations to attend annual meetings of the ESA. A sub-committee comprised of Greg Pohl, Hector Cárcamo, Rosemarie DeClerck-Floate, and Kevin Floate was formed to draft an application form for students, to forward it to different academic institutions in Alberta prior to the next annual meeting, to review applications, and to assign travel grant awards.

It was suggested that the sub-committee consider including the following information in their application form: name/address of applicant, the entomology courses in which he/she has registered, whether or not a paper presentation will be given at the ESA meeting, and other sources of funding held by the applicant. The application form should be distributed to

the University of Alberta, University of Lethbridge, University of Calgary, Mount Royal College, Lakeland College, Medicine Hat college, and NAIT.

6. New business

i) Results of the two mail ballots relating to funding requests

Andrew Keddle reported that a total of 61 ballots were received prior to the deadline date. The funding request to support publication of *Alberta Butterflies* was approved (58 votes in favour, 3 opposed); the funding request to support the organic farming video was defeated (21 votes in favour, 39 opposed).

Andy also reported that subsequent to the ballot, he received a modified proposal from publishers of *Alberta Butterflies*. In this modified proposal, the ESA would contribute \$3,000.00 toward publication costs, but instead of receiving book copies to be sold by the ESA, these copies would be donated to high schools in the province. The frontispiece of the donated books would acknowledge the support of the ESA. All other book copies sold (and not donated) would also have an acknowledgment of the contribution of the ESA. Andy reported that he polled 23 ESA members subsequent to receiving the ballots, and that all were in favour of approving the modified proposal. Andy therefore accepted the modified proposal on behalf of the ESA and has communicated this to the publishers.

Andy agreed to inform M. Okuda that her funding proposal was not approved by the ESA membership.

ii) ESA annual meeting, Edmonton 1995

The meeting of the ESA will be held on Nov. 3-4, 1995. As decided in our previous meeting, the meeting will be held in Edmonton; D. Langor and A. Keddle will supervise local arrangements and L. Dosdall and A. McClay will develop the scientific program.

iii) Joint meeting of the ESC and ESA, 1997

It was agreed that it is necessary to identify an ESA member to serve as Joint Meeting Chair, and that this should be done as soon as possible so that various committees could be established. Lloyd Dosdall was assigned to write letters to Ron Gooding, Bert Finnermore, David Langor, Jan Volney, Bruce Heming, and Doug Craig requesting that they consider assuming the duties of this position.

7. Adjournment

MOTION: McClay/Pohl; That the meeting be adjourned. CARRIED.

ENTOMOLOGICAL SOCIETY OF ALBERTA MINUTES OF THE ANNUAL MEETING

Holiday Inn, Edmonton, Alberta
November 4, 1995

1. Call to order

The meeting was called to order at 10:05 am by President Andrew Keddle.

2. Adoption of agenda

MOTION: Spence/Mitchell; That the amended agenda be adopted. CARRIED.

3. Approval of minutes of previous ESA Annual Meeting (Oct. 29, 1994)

MOTION: Shemanchuk/Floate; That the minutes from the 1994 ESA Annual Meeting be adopted. CARRIED.

4. **Report from the Entomological Society of Canada - Les Safranyik**

Les Safranyik reported that the Joint Meeting of the Entomological Societies of Canada and British Columbia was recently held in Victoria, BC. The meeting was very well organized and set an all-time attendance record of 315 people. The meeting was particularly noteworthy because of the strong participation by students, both in terms of paper/poster presentations, and in helping out with organizational details.

The Entomological Society of Canada (ESC) has recently launched a strategic review of its organizational structure. In the early 1980's, the ESC comprised ca. 1,000 members, but membership has now declined to 540 mainly because of the loss of professional positions in entomology throughout the country. Because expenses incurred by the Society have not declined with the reduction in membership, it is necessary to bring expenses into line with income. The Strategic Review Committee comprises five subcommittees with Rick West serving as General Chair: 1) Organizational Structure Subcommittee chaired by G. Gerber; 2) Revenue Enhancement Subcommittee chaired by H. Danks; 3) Headquarters Operations Subcommittee chaired by G. Gibson; 4) Publications Subcommittee chaired by G. Boivin; and 5) Relations with Regional Societies Subcommittee chaired by G. Ball. In the September 1996 issue of the *Bulletin*, a report will be published on the recommendations of the Strategic Review Committee.

The recent publication of the book entitled, "Diseases and Pests of Vegetable Crops in Canada" has helped stabilize the ESC deficit over the past two years at ca. \$20,000 per year. The ESC and the Canadian Phytopathological Society have each committed \$120,000 for publication of the book and it is necessary to sell 4,500 copies to break even; to date, 1,800 copies have been sold.

Beginning in January 1996, the ESC journals will have a new look with uniform front covers, bilingual text, and copyright designation. The future of the *Memoirs* series is uncertain as there will probably be no issues published in 1996. Canceling the *Memoirs* may adversely affect subscriptions because at present libraries pay to receive copies.

In 2000, a joint meeting will be held with the ESC and the Entomological Society of America. Site selection is now underway with G. Gerber as Chair of the Site Selection Committee. The meeting will be held in either Montreal, Toronto, or Vancouver.

The ESC and the Entomological Society of America are developing a list of insect common names for North America. It is anticipated that the list will be prepared in English, French, and Spanish.

5. **Reports**

i) **Treasurer's report - Jim Jones**

Jim Jones reported that as of September 30, 1995 the ESA had no liabilities and its total assets were \$14,132.96. This figure comprises amounts of \$686.55 (chequing account), \$5,318.60 (60-day term deposit), \$8091.52 (Alberta Plus Term Deposit), and \$36.29 (common shares). In 1995, 63 memberships have been paid (50 regular, 12 students, 1 library).

MOTION: Jones/Volney; That the Treasurer's report be accepted. CARRIED.

ii) **Editor's report - Michele Williamson**

Michele Williamson reported that the Proceedings of the 1994 ESA meeting have been published and many copies were distributed during the 1995 ESA meeting. Publication cost was ca. \$500.00. Publication of the Proceedings was greatly facilitated by those authors who sent in abstracts in electronic format. It was requested that all abstracts for the 1995 Proceedings be forwarded to Michele by the end of the month.

MOTION: Williamson/Langor; That the Editor's report be accepted. CARRIED.

iii) Report of the Regional Director to the ESC - Bev Mitchell

Bev Mitchell agreed with Les Safranyik's report that the recent Joint Meeting of the Entomological Societies of Canada and British Columbia was a great success, and that strong student participation was evident. For the first time, Linnaean Games were held during the meeting, and these will be continued at the 1996 meeting in Fredericton. A team from Alberta should be encouraged to participate. The 1996 meeting will be held in conjunction with the Acadian Entomological Society on October 5-9, 1996. Jon Sweeney will be General Chair. The Strategic Review Committee will be a major focus of the ESC for the next few months, and specific proposals will be discussed at the 1996 meeting in Fredericton. Current ESC membership is 428 regular, 91 student, 8 honorary, and 76 emeritus.

MOTION: Mitchell/Heming; That the Regional Director's report be accepted.

CARRIED.

John Spence pointed out that it will be very helpful for the new Regional Director (Bev Mitchell's term has expired) to have feedback from ESA members prior to the fall meeting of the ESC when proposals of the Strategic Review Committee will be discussed and implemented. It was agreed that Andrew Keddle will draft a letter to Rick West on behalf of the ESA requesting information on recommendations of the Strategic Review Committee so that as much feedback as possible can be acquired from ESA members prior to the ESC fall meeting.

iv) President's report - Andrew Keddle

Andrew Keddle thanked Dave Langor, Lloyd Dosdall, and Alec McClay for their efforts in organizing the ESA meeting, and Tim Lysyk for revising the Insect Collector's Guide. Andrew also expressed gratitude to ESA members, particularly Terry Thormin and Brent Karner, who assisted in making the media event (held on Thursday Nov. 2) so successful. The media event provided an excellent opportunity to raise public awareness of entomology, and its success was facilitated by the educational initiatives of the Provincial Museum's Bug Room and the Butterfly House at the Devonian Gardens.

In a ballot vote conducted during the past year, ESA members authorized expenditure of \$3000.00 towards publication of *Alberta Butterflies*, with the understanding that these funds would be recouped by selling 60 to 100 copies of the book. Since then, an opportunity arose whereby one book copy could be donated to each school in the province; a frontispiece in each of these copies would acknowledge the contribution of our Society. Although the \$3000.00 would therefore not be recovered, Andrew authorized this donation with the unanimous support of some 23 ESA members. The benefit of this donation to the Society will be an increased public profile and greater appreciation for entomology in Alberta.

Bruce Heming has agreed to serve as General Chair of the 1997 Joint Meeting of the Entomological Societies of Alberta and Canada, and all members should consider volunteering their services to support this important event.

Finally, Andrew expressed appreciation to all ESA members for providing him with this opportunity to serve the society, and for supporting his requests for information and assistance.

6. Reports of standing committees

i) 1995 Annual meeting organizing committee - D. Langor

Dave Langor reported that approximately 60 people registered for the 1995 Annual Meeting, and that there were 26 scientific papers and two posters presented. Meeting receipts totaled \$2,710.00, including memberships and registrations. Excluding expenses for our guest speaker, the meeting will probably not run a deficit.

MOTION: Langor/Heming; That the report of the 1995 Annual Meeting Organizing Committee be accepted. CARRIED.

ii) Awards committee - K. Floate

Kevin Floate reported that two awards were proposed:

1. Undergraduate Award (\$500). Awarded by the Society to an undergraduate student attending an Alberta university or other post-secondary institution in recognition of academic achievements related to entomology. Student applications are to be accompanied by a letter of support written by their major professor. The prize may or may not be awarded annually depending upon the quality of the applicants or the availability of Society funds.
2. Amateur Award. Awarded by the Society to an individual in recognition of efforts, excluding professional obligations, that promote entomology to the public. Examples of such efforts include the presentation of insect-related talks, public showings of insect photographs or collections, and the writing of articles on an entomological theme. Applicants would be nominated by members of the Society. The award would consist of an engraved plaque to take home and the recipient's name would be placed on a plaque permanently mounted at the provincial museum in the "Bug Room". The prize may or may not be awarded annually depending upon the quality of the applicants or the availability of Society funds.

MOTION: Floate/Jones; That the Undergraduate Award be instituted by the ESA in accordance with the guidelines stated above. CARRIED.

Members suggested that the Awards Committee advertise the availability of the Undergraduate Award, but that the award should not be listed in university calendars.

MOTION: Keddle/Jones; That the ESA Awards Committee bring a proposal to the 1996 ESA Annual Meeting describing an award that could be made to amateur entomologists that is not related to Science Fairs, and that the Awards Committee consider some form of recognition of the contributions of amateur entomologists that does not include a monetary gift. CARRIED.

iii) Student travel grants - A. Keddle

Andrew Keddle reported that a motion was passed at the 1994 ESA Annual Meeting which provided travel grants to a maximum of \$500 per year to help defray costs for students traveling to the annual meetings. An application form was developed which required information on the applicant's name, institution, address, signature of major professor, whether alternative funding is available, whether the student is presenting a paper, etc.

MOTION: Shemanchuk/Volney; That Student Travel Grants be canceled. DEFEATED.

7. Report on the insect collector's guide - A. Keddle

Andrew Keddle reported that the Insect Collector's Guide has been completed by Tim Lysyk, and it has been reviewed by some ESA members.

MOTION: Volney/Spence; That copies of The Insect Collector's Guide be available, for a nominal fee, from the Book Store at the Provincial Museum of Alberta. CARRIED.

Robert Holmberg noted that the Museum's Book Store would be reluctant to sell copies of the Guide for a small fee unless the Guide is bound more attractively. Robert offered to investigate improving the binding of the Guide and to report back to the ESA.

8. New Business

i) 1996 meeting of the Entomological Society of Alberta

Given the normal rotation in meeting locations between northern, southern, and central Alberta, it is the turn of southern Alberta to host the meeting in 1996. Kevin Floate reported that although Lethbridge, Medicine Hat, and Waterton would be considered, it would be less costly and less hassle for the organizers to hold the meeting in Lethbridge.

ii) Joint meeting of the ESA and ESC in 1997

Bruce Heming, General Chair of the 1997 meeting, requested that ESA members seriously consider volunteering to participate in the planning and operations of the 1997 meeting. At least 20 volunteers will be required for the Scientific Program, Finances, Catering, Local Arrangements, Fund Raising, Spouse's Program, and Photography.

iii) Future media events organized by ESA

Andrew Keddle proposed that a media event should occur annually in conjunction with the ESA Annual Meeting. Although there were small numbers of the general public who attended the 1995 media event, those who did attend expressed much interest in the displays. An important opportunity exists to generate public interest in entomology and it is hoped that this venture will become an annual event.

MOTION: Spence/Volney; That a committee of interested parties be struck to advertise entomological activities for the Joint Meeting of the Entomological Societies of Canada and Alberta in 1997. CARRIED.

iv) Election of Officers

The following positions were filled:

Director for Central Alberta: Hector Cárcamo

Regional Director to the ESC: Dave Langor

Vice-President: Jan Volney

Secretary: Alec McClay

Auditor: Hideji Ono

Other members of the ESA Executive for 1996 are:

President: Kevin Floate

Treasurer: Jim Jones

Director for Southern Alberta: Rosemarie DeClerck-Floate

Director for Northern Alberta: Greg Pohl

Editor: Michele Williamson

9. Adjournment

MOTION: Volney/Williamson; That the meeting adjourn. CARRIED.

ENTOMOLOGICAL SOCIETY OF ALBERTA

FINANCIAL STATEMENT for 1995

For Year Ending 31-Dec-95

Submitted on July 16, 1996

	1993	1994	1995
ASSETS			
Bank Assets on December 31	\$17,008.88	\$16,980.88	\$16,621.54
Bank Drafts minus Assets from Edmonton		\$76.97	
TOTAL ASSETS	\$17,008.88	\$17,057.85	\$16,621.54
REVENUE			
MEMBERSHIPS			
Regular 1996 @ \$10.00			\$380.00
1995 @ \$10.00	\$0.00	\$250.00	\$310.00
1994 @ \$10.00	\$360.00	\$170.00	\$130.00
1993 @ \$10.00	\$430.00	\$30.00	\$0.00
1992 @ \$10.00	\$170.00	\$0.00	\$0.00
1991 @ \$10.00	\$10.00	\$0.00	\$0.00
Student 1996 @ \$ 5.00			\$95.00
1995 @ \$ 5.00	\$0.00	\$45.00	\$20.00
1994 @ \$ 5.00	\$45.00	\$5.00	\$10.00
1993 @ \$ 5.00	\$10.00	\$0.00	\$0.00
1992 @ \$ 5.00	\$5.00	\$0.00	\$0.00
Corporate	\$17.00	\$16.00	\$10.00
Exchange	\$9.21	\$6.18	\$3.42
Total	\$1,056.21	\$522.18	\$958.42
INTEREST			
Term Deposit (60-day) interest paid	\$239.18	\$183.34	\$306.00
Term Deposit (6-month) interest paid	\$575.39	\$329.81	\$561.54
Community account interest paid, Brooks		\$19.12	\$38.41
Common Share Interest Paid, Brooks		\$11.29	\$30.57
Term Deposits interest paid, Edmonton		\$12.13	
Total	\$814.57	\$555.69	\$936.52
ANNUAL MEETING			
Registrations @ \$15	\$315.00	\$555.00	NA
@ \$25	NA	\$225.00	NA
@ \$30	NA	NA	\$810.00
@ \$35	\$2,030.00	NA	NA
@ \$40	NA	NA	\$1,320.00
@ \$65	NA	NA	\$65.00
Banquet Tickets @ \$25	NA	\$1,150.00	NA
Total	\$2,345.00	\$1,930.00	\$2,195.00
TOTAL REVENUE	\$4,215.78	\$3,084.84	\$4,089.94

EXPENDITURES**MEETING EXPENSES****Annual Meeting**

Banquet Charges & Keynote Speaker	\$2,728.12	\$2,522.68	\$2,960.24
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Executive Meetings

Travel, Parking etc.		\$153.45	\$92.52
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AWARDS

Amateur, Book Prize & Pub. Grant	\$0.00	\$0.00	\$3,151.13
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PROCEEDINGS

Proceedings duplication charges	\$1,076.64	\$408.95	\$150.41
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POSTAGE & MAILING CHARGES

Meeting notices & member mail	\$208.71	\$173.78	\$236.51
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PHOTOGRAPHIC SERVICES

Film & processing for the 1993 Proceedings		\$109.33	
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Film & processing for the 1994 Proceedings		\$136.81	
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Fiscal 1993 services	\$21.36		
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BANK CHARGES

Community Account, Brooks		\$10.00	\$14.50
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Community Account, Edmonton	\$21.98	\$7.05	
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CORPORATE SERVICES

Society Annual Returns	\$74.00	\$0.00	\$53.31
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Cash on hand	\$36.00	\$0.00	\$0.00
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TOTAL EXPENDITURES	\$4,166.81	\$3,522.05	\$6,658.62
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Assets + Revenues	\$21,224.66	\$20,142.69	\$20,711.48
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Expenditures	\$4,166.81	\$3,522.05	\$6,658.62
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BALANCE	\$17,057.85	\$16,620.64	\$14,052.86
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ENTOMOLOGICAL SOCIETY OF ALBERTA MEMBERSHIP LIST

(Revised: July 1996)

Honourary Members:

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Glenbow Alberta Institute, 130 - 9 Avenue S.E., Calgary, AB, T2G 0P3

National Library of Canada, Canadian Acquisition Division and Legal Deposit Office, 392
Wellington Street, Ottawa, ON, K1A 0N4

Northern Forestry Centre, Library, 5320-122 Street, Edmonton, AB, T6H 3S5

University of Alberta, Library - Periodicals Section, Edmonton, AB, T5G 2E3

University of Calgary, Library, Calgary, AB, T2N 1N4

University of Lethbridge, Library, 4401 University Drive, Lethbridge, AB, T1K 3M4

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Canadian Forest Services
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Edmonton, Alberta, T6H 3S5

Address #5

Alberta Environmental Centre
Bag 4000
Vegreville, Alberta, T9C 1T4

Note: area code for Alberta is 403.

ENTOMOLOGICAL SOCIETY OF ALBERTA BY-LAWS

ARTICLE 1

Title

This society shall be known as the Entomological Society of Alberta in affiliation with the Entomological Society of Canada.

ARTICLE II

OBJECT

The object of the Society shall be to foster the advancement, exchange, and dissemination of the knowledge of insects in relation to their importance in agriculture, horticulture, forestry, public health, industry, and for its own sake, among the people of the Province of Alberta.

ARTICLE III

Memberships, Dues, and Expenditures

- a. Any persons interested in entomology may become a Full Member by submitting a completed membership application form and membership fee payment to the Secretary of the Society.

Honourary Life Membership may be conferred on anyone who has performed long and distinguished service in the field of entomology. The total of Honourary Life Members shall not exceed five percent of the total membership at the time of election.

An Honourary Life Member will enjoy all the rights and privileges of Full Members but will be exempt from payment of dues. All Full Members are entitled to propose the name of prospective Honourary Life Members provided each such proposal is supported by two other Full Members and documentation is submitted in writing to the Secretary at least one month prior to the Annual Meeting. Such Honourary Life Members will be elected at an Annual Meeting.

- b. A member may withdraw from the Society upon giving notice to the Secretary.
- c. An annual fee necessary for the operation of the Society shall be levied for each member as provided for in Section 1 of the Rules and Regulations.
- d. The Executive shall have power to meet expenses required in the normal operation of Society business. Such expenditures shall be subject to subsequent ratification at the Annual Meeting by the majority of the members present.
- e. A member who neglects to pay the annual fee for two consecutive years shall automatically cease to be a member.

ARTICLE IV

Meetings

Meetings may be called each year by the President at times and places suitable to the majority of the members. The fall meeting shall be considered the Annual Meeting and shall be held in the locality decided upon the preceding Annual Meeting. One-quarter of the total paid-up membership shall constitute a quorum.

ARTICLE V

Officers

These officers shall constitute the Executive of the Society with full power to act on behalf of the Society within the bounds of the Rules and Regulations, and to appoint committees as necessary.

ARTICLE VI

Council

The Council shall consist of the five Officers, the immediate Past-President, a Regional Director to the Entomological Society of Canada, and three Ordinary Directors. The Ordinary Directors shall represent the various fields of entomology and the geographical areas of Alberta as widely as possible.

ARTICLE VII

Elections

Elections shall be held once a year at the Annual Meeting, and Officers so elected shall take office at the beginning of the following calendar year and remain in office for a term of one year.

The office of President shall not normally be held by the same person for two consecutive years. The Vice-President shall normally follow his/her term for office with a term as President. The Secretary, Treasurer, and Editor shall be eligible for immediate re-election.

The Directors shall also take office at the beginning of the calendar year following their election. The Regional Director shall be elected for a period of three years, with his/her term of office beginning at the end of an Annual Meeting of the Entomological Society of Canada. A Regional Director is not immediately eligible for re-election.

The term of office of each Ordinary Director shall be three years, with one Director replaced in each year. Ordinary Directors are not immediately eligible for re-election.

ARTICLE VIII

Vacancies

Vacancies in any office (except that of President) on the Council between elections shall be filled by appointment by the President, with the concurrence of Council, the tenure of such co-opted members to terminate at the end of the calendar year during which the appointment is made. A vacancy in the office of President shall be filled by the Vice-President who will then serve his/her normal term as President.

Members elected at the Annual Meeting to fill vacancies on Council shall complete the period of service of the Council members whose places they have taken. On completion of this term they shall be eligible for re-election only if their period of service (co-opted and/or elected) has not exceeded 18 months.

ARTICLE IX

Duties of Officers

The President shall preside at all meetings and act ex-officio on all committees. The Vice-President shall, in the temporary absence or disability of the President, perform the duties and exercise the powers of the President, shall chair the Science Fair Liaison Committee and the Membership Committee, and shall perform such other duties as shall from time to time be imposed upon the Vice-President by the Council.

The Secretary shall maintain a record of all meetings and act as custodian of minute books and current correspondence, and shall forward appropriate material to the Agriculture Canada Station in Lethbridge for storage in the Society's archives.

The Treasurer shall receive and disburse all funds, handle all correspondence relating to membership in the Society, and prepare the annual financial statement.

The Editor shall receive and record reports and publications on behalf of the Society and act as editor of the Proceedings.

ARTICLE X

Signing Officers

The signing officers of the Society shall be the Treasurer and either the President or Secretary.

ARTICLE XI

Alteration of the By-Laws

The By-Laws may be altered or amended at any Annual Meeting of the Society with the approving vote of three-fourths of the members present and in good standing. Such alterations must be made by Notice in Motion, which shall have been sent to the Secretary and a copy of such forwarded to all members at least two weeks before the Annual Meeting.

June, 1996

ENTOMOLOGICAL SOCIETY OF ALBERTA RULES AND REGULATIONS

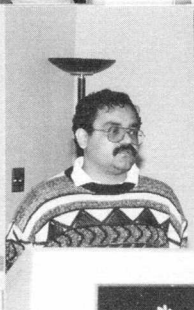
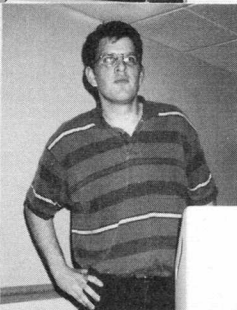
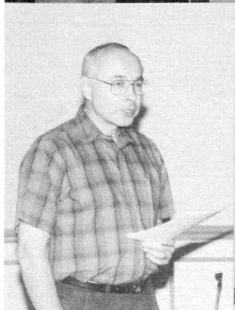
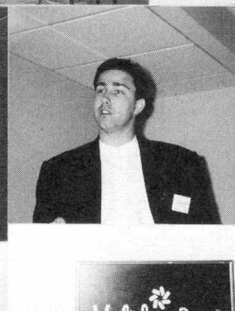
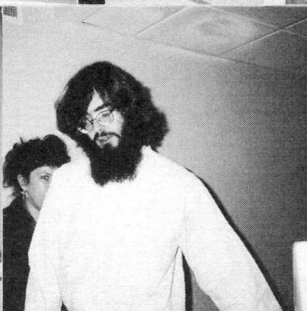
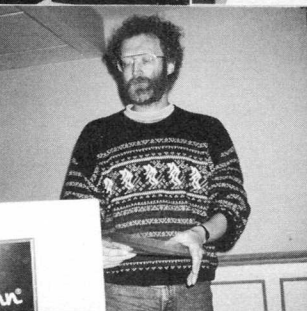
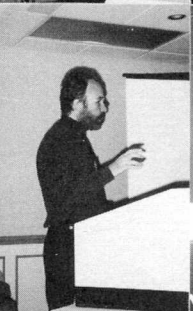
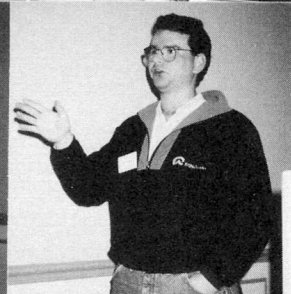
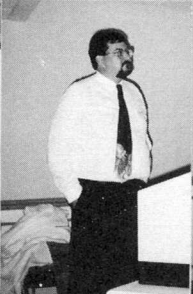
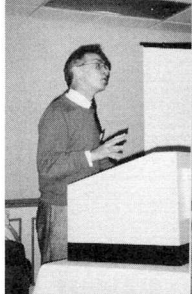
1.
 - a. The annual fee for full membership shall be \$10.00.
 - b. The fiscal year of the Society shall coincide with the calendar year; fees are payable in advance, at the time of the Annual Meeting.
2.
 - a. The interim financial statement shall be presented by the Treasurer at the Annual Meeting and the final, year-end statement at the first general meeting following the end of the fiscal year.
 - b. Two Auditors shall be elected at each Annual Meeting to examine the accounts of the current year and the annual financial statement.
3.
 - a. Registration fees for student members of the Entomological Society of Canada attending the Entomological Society of Canada meetings shall be reduced when these meetings are held in Alberta with the Entomological Society of Alberta as host.
4. The following standing committees shall exist to assist the ESA Council achieve the objectives of the Society:
 - a. Awards Committee - members: Past President, Regional Director to ESC, and the Regional Directors of the ESA. Duties: to solicit and generate nominations of the Entomological Society of Alberta members for Entomological Society of Canada awards (e.g., Gold Medal, Gordon Hewitt, Norman Criddle) and Entomological Society of Alberta awards (e.g., Honourary Membership, Undergraduate Award, Student Travel Grant, Amateur Award).
 - b. Environment Council of Alberta - one ESA member shall be elected to represent the society.
 - c. ESA-ESC Joint Meeting Committee - to be established a year preceding any joint meeting of the Entomological Society of Canada and the Society; members to be selected from Society membership.
 - d. Nomination Committee - members: the Past President, Vice-President, and one member in good standing shall prepare a nomination slate prior to each Annual Meeting and the Vice-President shall present the slate of nominated Executive Council members at the Annual Meeting.
 - e. Resolutions Committee - members: two Society members shall be appointed by the Nomination Committee immediately preceding each Annual Meeting.
 - f. Science Fair Liaison Committee - members: Vice-President (as chair) and three Ordinary Directors. Other members to be appointed as necessary by the Committee. Duties: to maintain contact with the principal Science Fairs in AB.
 - g. Membership Committee - members: Vice-President (as chair), and three Ordinary Directors. Duties: to publicize the objectives and activities of the Society in such a way as to recruit new members to the Society.

- h. All elections and appointments are not to exceed one year unless otherwise approved by the Society.
- 5.
 - a. The Rules and Regulations may be changed by a motion approved by the majority of members present at any general meeting.

June 1996



David Larson	Susan Bjorson	Betty Price	Anne Bird	Sheila Gooding	Joe Shemanchuk
Michele Williamson	Daryl Williams	Greg Pommen	Jim Ryan	Chris "J." Saunders	Graham Griffiths
Andrea Durand	Jim Hammond	Mike McFarlane	Jerry Hilchie	Christian Kingenberg	
Kay Ball	Lois Swales	Andy Keddie	the Dosdalls	Joe Gurba	Clara Shemanchuk
Ed & Lois Swales	Grant McIntyre	Rick Butts			
		Kevin Floate			
		Rosemarie DeClercke-Floate	Alec McClay	Hideji Ono	Clara Shemanchuk
Paul Schouten	Chug-a-lug	The Heming way		Smile, you can photograph yourself	
Kay Ball	Larry Speers	This beer might reproduce if I stare at it long enough	Jennifer Otani	Rick Butts	Southern comfort
Go on, tell me another one		Gary Byrtus			



Entomologist's Palace		Two for the price of one		The swarm that stayed to the end.		Doug Macaulay <i>Amateur awarded by the Prez</i>
Lloyd Dosdall <i>Schezam, Data!</i>	Simon Wilkins <i>Beetle-style</i>	Jennifer Otani	Mike Dolinski <i>I caught a Hessian this big but it got away!</i>	Kris Justus	Dylan Parry <i>Vertically-challenged between a rock & a hard place</i>	<i>Howdy, partner!</i> Jim Hammond
<i>The moderator</i> Robin McQueen	Alec McClay <i>Live long and prosper</i>	Jens Roland		Barry Cooke		Todd Reichardt <i>What's the Q?</i> Mary McLean
Bev Mitchell	<i>The posing</i> Cam Currie	Callistus Ogol <i>Ogollicious!</i>		Susan Bjorson <i>Son-of-Bear</i>	Hector Cárcamo	Dave Langor <i>Don't mess with my weevils!</i>
	The swarm that stayed until the middle		ESC "We must ..." and ESA's reaction		Robert Holmberg <i>with Indonesian duds</i> Charlie Bird	
John Spence Les Safranyik Jan Volney <i>On the Power of Dwarves</i>		<i>Bad Boy</i> Brent Karner		Ted Pike Jim Ryan Andy Nimmo		Bert Finnamore

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