

Proceedings of the Eleventh Annual Meeting

of the

Entomological Society

of

Alberta



Lethbridge - Alberta

October 25th - 26th, 1963

Proceedings of the  
ENTOMOLOGICAL SOCIETY OF ALBERTA

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THE ELEVENTH ANNUAL MEETING

The Eleventh Annual Meeting of the Entomological Society of Alberta was held October 25 and 26 at the Park Plaza Motel, in Lethbridge. The occasion marked the fiftieth anniversary of professional entomology in Alberta.

The chairman of the business sessions was Dr. N. D. Holmes, President of the society. Fifty-four members were in attendance and a full program of 18 interesting and diversified papers was presented. The invitational paper, by Mr. Alex Weir, Departmental Solicitor, Alberta Department of Agriculture, concerning the legal responsibilities involved when submitting chemical-control recommendations to the public, provoked much thought and discussion. At the evening banquet Judge L. S. Turcotte spoke on the administration of justice in the early west, punctuating his remarks with many amusing and interesting incidents.

The judging of the insect collections took place on Saturday morning. The number of contestants has decreased over the years causing concern among some of the members. It was decided that more effort should be made to stimulate interest in the competition.

Dr. W. G. Evans was elected President for 1964. The Twelfth Annual Meeting will be held in Edmonton.

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## PRESIDENTIAL ADDRESS

by N. D. Holmes

### Professional Entomology in Alberta 1913-63

Although it is customary at this time to give a presidential report I am going to break this precedent and discuss the Lethbridge Entomological Laboratory. The reason for this departure is that this is the 50th anniversary of professional entomology in Alberta.

When Strickland arrived at Lethbridge in March, 1913, he had no associates to consult and very little equipment. Yet in the first year he developed a cultural control for an "eelworm attack on winter wheat" that had first caused damage in 1908. By the next year he had concluded that the causal organism was not a nematode but he did find mites on the affected plants. Within two years the disease had practically disappeared. Forty years later the disease was re-discovered, identified as wheat streak mosaic, and the vector shown to be a mite. The controls advocated were identical to those that Strickland had recommended in 1913.

In 1915 Strickland was faced with the first outbreak of army cutworm in Canada. Within a year he had developed a control and had published Bulletin 13, "The Army Cutworm", the first really intensive report on this insect.

He met the problem of the pale western cutworm, a pest that repeatedly destroyed large acreages of wheat. He invented a trap for the adults, studied their parasites, and developed a chart to show when it was safe to reseed.

He opened a plant inspection and fumigation station at North Portal in 1913 and continued as inspector of imported nursery stock and foodstuffs until 1920.

On his return from the Army in the spring of 1919 he was assigned to investigate stored grain insects. He managed, however, to return to Lethbridge and successfully fought against the closing of the laboratory. He returned to Lethbridge for another two years to help in the fight against grasshoppers, which had now reached outbreak proportions. Finally, in the fall of 1921, he accepted an offer by the University of Alberta where he continued, until his retirement, to play a major role in entomology in Alberta.

In the spring of 1921, Seamans arrived from Montana and remained as officer-in-charge until 1944. He, more than Strickland, was the one who left his imprint on the nature of the laboratory and who set the style of informality that it has never lost.

Seamans developed cultural controls of the pale western cutworm and the method of forecasting its outbreaks. His work was recognized by an award for meritorious service by the Professional Institute in 1938.

He initiated the cooperative project with plant breeders at Swift Current and Saskatoon that was later taken over by Farstad and Platt and which eventually led to the production of a sawfly-resistant wheat.

When the grasshopper control program, which was organized under the principals of the Schools of Agriculture, faltered, he and Strickland took over the program. Along with Strickland he was largely instrumental in obtaining the passage of the Pest Control Act, which has been valuable in the fight against grasshoppers.

Among the entomologists that played a part in the work of the laboratory, Wooly-Dod, an amateur entomologist contributed through his knowledge and his collection of noctuids. In 1914 there was Walsh, later killed in action, and in 1920, E. G. Arnason. From 1921 to 1923 Carter worked on the pale western cutworm and alfalfa insects. Carter left for the United States and from there for Honolulu. Gray started in 1923 and Tinkham in 1926. Tinkham left in 1927 and Gray in 1931. Manson arrived in 1928, Farstad in 1929, and Salt in 1930. Rock started in 1931, and White in 1932 along with MacMillan, who died in 1935. Jacobson started in 1934, and Neilson in 1935. In 1938, Painter arrived, and, in 1939, Hurtig.

During the war the staff did not expand, Neilson and Hurtig joined the army, Rock returned to farming, and Seamans left for Ottawa. In 1947 the Livestock Insects Laboratory was formed and in 1949 the Field Crops Insect Laboratory moved into the new Science Service building with a staff of 20 research officers, three technicians, and three stenographers, one of whom, Cathy Webster, had started in 1934.

The Entomology Section remained numerically about the same, but as research officers left, their positions were converted into technician posts. In 1959, the Research Station was formed by amalgamation with the Experimental Farm.

Sometimes we feel that our lives are becoming more regulated and that we would like to return to the freedom of the old days. But were the "old days" really as we like to think?

Strickland was not free of administrative regulation. Almost every second or third day he received letters from the Dominion Entomologist, asking questions, setting out some new regulation, or giving orders. In 1916, for example, he received this letter: "Enclosed is a sign prohibiting smoking to be hung in your laboratory according to instructions by the Deputy Minister".

By 1921, three different regular reports had to be submitted. All field trips, their nature and success had to be reported in the

fortnightly report. In 1938, for example, the laboratory reported receiving 200 letters, 200 visitors, and 90 telephone calls, with the name and purpose of each. In 1963 the only reports are those to the Minister and the annual project report.

In the past less time was spent on research. In 1932, the staff visited over 1,700 farmers and made detailed reports on each visit. In 1939, the nine entomologists then on staff gave 40 public talks and visited more than 300 farmers. How many extension talks or visits to farmers were paid in 1963?

The facilities of the laboratory improved slowly. In 1913 Strickland was provided with a motorcycle, in 1915 with a two-roomed laboratory, and in 1919 with a sanitary privy, which remained in use until 1935. Offices were provided in the Post Office, but adequate laboratory space was obtained only in 1949. In 1938 the library received Can. Ent., Ecology, Ent. News, Rev. of Applied Ent., and Scientific Agriculture, but not Biological Abstracts, although Seamans had been requesting it since 1927. Today the Station library receives over 500 journals plus 700 distributed through Ottawa.

Over the last 50 years, new insects of economic importance have appeared every few years, some only briefly, others became established.

The pale western and army cutworms appeared at the start and are still with us although the massive migrations of army cutworms of 100 per square foot have not occurred in the past 30 years. In 1913 Strickland found the beet webworm on weeds; in 1920 the webworm stopped two trains and forced motorists at High River to put on chains. The Hessian fly attacked wheat in 1916 and grasshoppers became a major problem in 1919. The wheat stem sawfly appeared in 1920 and at first some hail adjustors were able to convince farmers that their hail damage was caused by sawfly. In 1921 flea beetles, wire worms, and the woolly bear, Apanteses, caused economic losses. Blister beetles appeared in years of grasshopper outbreaks to damage legumes and occasionally sugar beets. The alfalfa seed chalcid and tipulid larvae in alfalfa fields appeared in 1923 and disappeared in 1925. Diamond back moth and false chinch bug damaged crops in 1924, and the bertha army worm was found on alfalfa in 1927. The potato psyllid appeared in 1933, rose to a peak over the prairies in 1936, and disappeared in 1939. The sugar-beet root maggot was found in 1933 and Say grain bug in 1934. The corn earworm appeared in 1941 and the pea aphid was a problem on peas from 1940 to 1942. In 1941 the pear slug was found at Brooks and the black witch, Erebus adora, at Blairmore. (In 1963 another black witch was found at Manyberries and cecropis and polyphemus larvae, usually rare, were common in both 1941 and 1963.) Clover mites first began troubling householders in 1942, and the grape leaf hopper, which had caused much damage to virginia creeper in Medicine Hat for years, finally appeared at Lethbridge. The sugar-beet root aphid and the sweet clover weevil caused their first serious damage in 1943. The western wheat aphid stunted wheat plants at Cowley in 1944. The cottonwood gall mite caused

severe damage to poplars from 1945 to 1947, and the English grain aphid destroyed cover crops in 1948. The black army cutworm attacked alfalfa in 1953. In 1954, the corn leaf aphid attacked barley and the alfalfa weevil, which had been expected ever since 1913, finally arrived. The corn borer appeared briefly in 1956 and 1957 and the wheat curl mite caused silver top of grasses in 1957 and 1958. Damage from the subterranean termite was found in two houses in Medicine Hat in 1959, and in 1962 the western beet leaf beetle attacked sugar beets.

Some problems remain unsolved. The high prevalence of white heads in wheat in 1915 was attributed to frost, 22 years later, to hail and high winds, and 48 years later to wind, hail, high and low temperatures, and other unknown factors.

On occasion the laboratory has had other problems. Wrote a Calgary wholesale house in 1915, "Why are we not to receive compensation for the load of plums ordered destroyed by your agent because of San Jose scale. Moreover your inspector removed several braces during his inspection so that many cases of pears and peaches were damaged". A farmer from Retlaw wrote to the Prime Minister in 1921: "My crop is eaten up again ... I have a family of 11 who need clothes and food. In Scotland we used lime to fight the cutworms. I made this suggestion two years ago to Mr. Strickland ... Please let me know what you propose to do ..."

In a report dated 1927, "A visit was paid to (a farmer) at Wild Horse, who produces a very large alfalfa seed yield. Many wild bees, mainly Megachile were present. The observer counted 50 passing within six feet in one minute" and "Agronomists argue that tripping is caused mainly by temperature and humidity. Our caged experiments showed that insects are mainly responsible." Twenty-five years later in a letter from the same farmer at Wild Horse ... "I was then convinced that weather conditions had more to do with seed setting than insects ... In my opinion seed yield becomes lighter not because of the lack of bees but because alfalfa takes something out of the soil ..." Were the agronomists easier to convince? In 1957, in a paper written by a member of the Plant Science Department, University of Alberta, "... In general open-pollination in alfalfa has been assumed to be largely due to cross-pollination, but there is some indication that this concept may need revision ... Observations ... indicated that almost no pollinating insects were active in the nursery."

In 1933 Seamans reported "I have conducted studies at Indian Head because of the agitation in 1932 against the cultural control of the pale western cutworm ..." Thirty years later the Department of Agriculture received a letter from a farmer at Indian Head. "This write-up ... is same as Bug Branch at Ottawa has published since 1926. It's proved useless here to control cutworm damage ..."

Fortunately these are the exceptions. As Seamans reported in 1932, only 9 per cent of the farmers believed that the summer fallow practice for preventing infestation was ineffective.



Even in the early years of the Laboratory, the research involved many phases of entomology. Various formulations of baits were tested for grasshoppers and cutworms. A fungus disease was tested for control of cutworms in 1923. Control of cutworms by trapping the adults with baits and lights was attempted as early as 1921. In 1921, the attractiveness of various coloured lights to the moths was tested. In 1923 preferences of bees for various flowers were related to length of tongue and corolla tube, and in 1925 a colony of bumble bees was studied in an artificial domicile. In 1927 the effect of weather on activity of wheat stem sawfly was studied and in 1929 a solid-stemmed wheat variety was tested for resistance to sawfly. From 1930 to 1932 all of the staff were employed in extensive field observations on the pale western cutworm. With the pressure slackened in 1932, other projects were again taken up. The nutritional values of various plants for cutworms, the relation of soil acidity to selection of egg beds by grasshoppers, the value of petunias for control of potato beetles, and the lack of predation on grasshopper eggs by crickets were all reported in 1933. The effects of temperature on diapause in sawfly were studied in 1930 and in 1934. The grasshopper program was re-organized in 1935 to determine the principles underlying grasshopper outbreaks. A mechanical soil sifter was developed and the starvation control of the pale western cutworm was tested in 1936. The cold-hardiness of a few insects were tested and the effects of defoliation of wheat by grasshoppers were studied by 1938.

The greatest changes in entomology at Lethbridge occurred in the decade starting in 1940. By the end of this period seven of the pre-war staff had either resigned or were transferred and 17 new entomologists were appointed. Statistical analysis came into use and the research became less subjective. Specialized fields such as cytogenetics and insect physiology received more emphasis. In 1944 paris green was still being recommended for beet webworm, the grasshopper program was re-organized, and DDT was tested on aphids, cabbage worms, flea beetles, and Lygus bugs. In 1946, DDT came on the market at Lethbridge and Rescue, the sawfly-resistant wheat, was licensed. Although heptachlor was tested in 1948, sprays had not yet replaced baits for the control of grasshoppers.

The next decade was marked by the proliferation of new insecticides. It appeared that the entomologists had been so successful that they were no longer needed. The work on alternate methods of control was continued, however, and was later to receive more public acceptance when Rachel Carson aroused the public to the dangers of residues. The role of stem solidness in sawfly resistance was disputed and settled. The possibilities of increased legume seed production came closer to realization.

What has the laboratory contributed to Agriculture over the past 50 years? Seamans estimated that farmers saved over five million dollars between 1923 and 1928 and over 20 million dollars in 1939 because of the work of the Lethbridge laboratory. In a year of serious outbreak the pale western cutworm has destroyed 20 per cent of the crop

grown on 150,000 square miles and the wheat stem sawfly over 50 million bushels of wheat. That these losses are unlikely to occur again are due in a large part to the work of the Laboratory. To these savings can be added those from controls for the sugar-beet root maggot, the beet web-worm, the army cutworm, grasshoppers, corn leaf aphid, and silver top of blue grasses. In addition, the laboratory provides advisory services and forecasts of grasshopper and cutworm outbreaks. It also saves the farmers money by advising them when not to apply controls as in the case of the sugar-beet root aphid, the pea aphid on alfalfa, the sweet clover weevil, aphids on wheat, and the corn leaf aphid on barley.

The research of the laboratory has not been limited only to the empirical or the applied. It has provided important new knowledge on the life history, ecology, and habits of many insects, on insect nutrition, on diapause, on pollination, on the nature of cold-hardiness, on the cytogenetics of wheat, on resistance of plants to insects, on bioassay of insecticides, and on sex attractants. Although the Entomology Section comprises less than nine per cent of the staff of the Lethbridge Research Station, it produced over 30 per cent of the papers published by the Station from 1959 to 1961.

The first 50 years have been productive and useful. The savings effected by its research are already sufficient to pay for the next 50 years but we are not resting on the past. We are attempting to solve the problem on insecticide residues, to improve the efficiency of control with insecticides. We are specializing more in the study of aphids, a generally neglected but frequently harmful group, we are on the point of managing bees for the production of legume seed. We are learning more about sex attractants, sterilants, bumble bees, and insect nutrition. We are continuing to study the ecology of many species, the nature of cold-hardiness, host-plant resistance, and we may yet determine the causes underlying grasshopper outbreaks. While we continue to enrich the store of scientific knowledge we are not overlooking our major objective: to increase crop production.

We can only hope that the record of entomology at Lethbridge for the next 50 years will equal that of the first 50.

## ABSTRACTS OF PAPERS

### Kodiak-Beetles and Bears

George E. Ball

A portion of southwestern Kodiak Island has been ice-free for about 90,000 years, since the end of the Illinoian glacial stage. The rest of the island and the adjacent mainland of Alaska was twice covered with ice (the Iowan and Wisconsin glaciations) since then. Thus southwestern Kodiak Island could have functioned as a refugium for the pre-Iowan fauna and flora of the area. The distribution patterns of the six Kodiak species of the beetle subgenus Cryobius (Pterostichus: Carabidae) and of the native mammals of the island were analyzed to attempt to determine if any of these species had survived in the refugium. The data suggest that probably one and possibly four species of Cryobius are refugium survivors, but that two have arrived in post-glacial time. All of the mammals probably arrived in post-glacial time.

### Facets of Insect Vision

Brian Hocking

The functional morphology of the insect compound eye is reviewed with special reference to its surface and volume relationships with the rest of the head and its evolutionary development. Measurements of the more important parameters of the eyes of 28 species representing 14 major orders are given and interpreted in relation to this review. Recent histological and biophysical work on insect vision is also reviewed and some conclusions, especially the limit of sensitivity in the ultra-violet, are shown to be consistent with current theories of the early history of the oceans, the atmosphere, and of life.

### Use of Radioactive Compounds to Measure the Food Consumption of Insects

R. Kasting and A. J. McGinnis

In studies of the nutritional needs of insects and effects of plant tissues on growth and development of insects it is desirable to know the relative quantities consumed. The classical gravimetric method for measuring consumption is generally inadequate and not practical for small insects. A rapid procedure was developed ~~with~~ diets prepared from plant tissues that had been lyophilized and ground and radioactive carbon

compounds such as sucrose-U-C<sup>14</sup>. A comparison of results from the radioactivity and gravimetric methods for fifth-instar larvae of the pale western cutworm, Agrotis orthogonia, showed good agreement. Results that were obtained with the radioactivity method for three diets fed to newly hatched larvae of the cutworm were also presented.

### Obtaining Colonies of Bumble Bees

W. O. Nummi

Careful consideration of the habits of the queens of each of the various species of bumble bees found in a region will enable one to obtain many colonies.

Bumble bee queens emerge from hibernation over a two-month period, depending on the species. The earliest emerging species emerge when Salix and Anemone begin to bloom, and the latest emergers do not appear until legumes like Caragana and Vicia bloom. When they emerge, they seek flowers on which to feed and when they have had their fill, they immediately begin to look for nesting sites. Hence, the ideal site for obtaining occupancies by bumble bee queens is one on which there will be a succession of bloom from early spring until early summer. The presence of Salix often indicates that soil and moisture conditions are conducive to the abundant and diverse flowering growth needed to support bumble bees.

Because some species nest more often in aboveground locations whereas others nest more often in underground locations, and because species of both groups usually inhabit a region, one should set out both above- and underground hives. Because the natural nesting sites are often the abandoned nests of rodents, the percentage of acceptances of hives as nesting sites will be much higher in areas where there are no rodent burrows.

In regions like southern Alberta in which there are wide climatic differences as a result of altitude in the Rocky Mountains, it is necessary to trap-nest at many different locations in order to adequately sample the bumble bee fauna. Some species are confined to narrow ranges, whereas others may be found throughout the region. For example, we have not obtained colonies of Bombus balteatus below 7,400 feet elevation or B. borealis anywhere but on the prairie, whereas we have obtained B. frigidus from all but pure prairie habitats.

## Ecologies of Species of Psithyrus Lep. in Southern Alberta

J. F. Virostek

Nineteen species of bumble bees and three of Psithyrus have nested in our hives in southern Alberta. The species of Psithyrus in the order in which they emerge from hibernation in the ground are: P. fernaldae Franklin, P. suckleyi (Greene), and P. insularis (F. Sm.). Because they emerge at different times, they tend to be associated with the species of bumble bees that emerge before them. Otherwise, they are not host specific.

When Psithyrus females invade the nests of bumble bees, they seldom if ever kill the queens but usually live in apparent harmony. However, this lack of animosity between the Psithyrus and the queen is misleading. Soon after Psithyrus invades a nest, she destroys the broods containing eggs and larvae, especially younger larvae. Psithyrus lays her eggs in cups she constructs near the centre of the comb, whereas the bumble bee queen lays them in cups near the perimeter. Egg cups of Psithyrus contain three or four times as many eggs as those of bumble bees, and the eggs of Psithyrus are longer and thinner.

When bumble bee queens are found dead in nests also occupied by Psithyrus, another bumble bee queen of the same species is almost always found in the nest. These intraspecific supersedures were very common in the hives, as many as 11 were recorded from one nest. When more than one Psithyrus enters a nest, there is always a mortal combat between them, just as there is between queens of the same species of bumble bee. When the combats are interspecific, insularis usually triumphs over fernaldae, and suckleyi over both insularis and fernaldae. Suckleyi is the largest and apparently the most heavily armoured of the three species.

Sometimes Psithyrus enters a nest in which bumble bee workers have not yet been produced. Almost always this results in the abandonment of the nest by the bumble bee queen. Because the Psithyrus cannot supply the bumble bee larvae with pollen, they die. Then the Psithyrus leaves.

### A Proven Method of Close-Up Photography

E. T. Gushul

Many pictures of insects must be taken in the field in their natural habitat and, when possible, in their natural attitudes. We have developed a very quick and efficient method for photographing active insects in the field, using a 35 mm. single lens reflex camera, extension bellows, and electronic flash unit.

The proper diaphragm setting was determined by previous tests based on lamp to subject distance. When the lamp is at the lens position, the effective aperture is automatically compensated for regardless of the lens to film distance, i.e., the f-stop remains the same. The electronic flash lamp can be fastened to the lens board or can be held by an assistant, if it is necessary to direct the light from a more suitable angle.

For a general shot at 30 inches (field of view  $4\frac{3}{4}" \times 7"$ ) taken with a 105 mm. lens, the bellows on a reflex camera is set at the 1.6 exposure factor mark. The focussing is done, with the diaphragm wide open, by moving the body to and from the subject. Without moving the eye from the finder, the diaphragm is then set by rotating the diaphragm ring to minimum and then backing off to the required f-stop. If Kodachrome II film is used with a 105 mm. click stop, short-mount lens attached to a bellows and with a Braun Hobby Automatic flash at full power, the diaphragm setting will be f22. For a medium close-up at 11 inches (f.o.v.  $1\frac{3}{8}" \times 2"$ ), the only change required is to set the bellows at full extension. For the extreme close-up at less than three inches (f.o.v.  $9/16" \times 5/8"$ ), the camera is attached to a universal clamp, which in turn is attached to the vertical column of a stand by means of a sliding, locking clamp. A 50 mm. lens replaces the 105 and the bellows is set at maximum extension.

In close-up work it is imperative that the subject be focussed carefully and centered properly. The above method allows us to do this quickly and easily.

#### Some Aspects on the Overwintering Habits of Mosquitoes

J. A. Shemanchuk

Culex tarsalis and Culiseta inornata are abundant species of mosquitoes in the irrigated areas of Alberta. Both species overwinter in the adult stage.

Population studies have shown that the adults of these species appear in visual attraction traps in late May and early June and the population gradually builds up to a peak about the last half of August with a sharp decline during September. During the decline period they invade rodent burrows. The number appearing in the burrows range up to 100 adults.

Live adults of C. tarsalis and C. inornata were taken from rodent burrows during the winter and early spring. This indicates that rodent burrows are one overwintering habitat in the irrigated areas of Alberta.

## Recent Population Trends of the Lodgepole Needle Miner

R. F. Shepherd

An outbreak of needle miner on lodgepole pine occurred in the late 1940's, which decreased to low levels in the 1950's but increased again recently. In both outbreaks, populations were highest in a band along the middle of the slopes of the valleys.

The moths are crepuscular with most of the flight, feeding, and laying activities taking place at sundown. Temperatures and wind at this time are critical for these activities. Low temperatures and wind, which are more common at higher elevations, probably reduce oviposition. Some downward drift of the moths also probably takes place making the rate of increase through the adult and egg stages much higher at valley bottom than further up the slope.

During winter, however, temperature inversions are very common with the coldest being at valley bottom. This results in winter mortality being extremely high in the valley bottom but decreasing quickly with increasing height. Thus, there is at elevations of 250 to 700 feet above valley bottom, only a modest rate of population increase, but, because winter mortality is usually low at these elevations, there is a persistent high population. Above 700 feet the rate of increase is low, and moth emigration probably high, so that large populations are unlikely to build up in this zone. Below 250 feet the population can build up quickly provided winter mortality remains low. However, a series of consecutive warm winters is rare enough that populations rarely reach outbreak proportions in the valley bottoms.

## A Technique for Obtaining Identical Pairs of Seedling Beets

A. M. Harper and J. B. Tennant

A technique is described in which beets in the two-leaved stage were equally bisected between the leaves. From the paired halves plants developed that had almost identical leaf shape, leaf position, and longevity of leaves, and one plant was the mirror image of the other.

## Marking Grasshoppers with Fluorescent Materials

D. S. Smith

Sodium fluorescein, rhodamine, or "fluorosol" (National Aniline) mixed with aqueous insecticide spray solutions at the rate of approximately one part per thousand were applied by ordinary field

sprayers (4 gals./acre) to field plots. Grasshoppers swept from these plots subsequently and examined under ultra-violet light were distinctly marked if they were first moistened with a fine mist-spray of water. The dry spray deposit on the grasshopper did not fluoresce. Markings could still be distinguished on grasshoppers collected three days after spraying.

Varietal Resistance of Sugar Beets to the Sugar-beet Root  
Aphid, Pemphigus betae Doane (Homoptera: Aphididae)

A. M. Harper

Two leaf-spot- and spider-mite-resistant varieties of sugar beets, GW 674 and GW 359, exhibited resistance to the development of populations of the sugar-beet root aphid, P. betae. GW 674 is a selection of GW 359 but has higher sugar content and greater leaf-spot resistance. Nine other varieties were susceptible to root aphid infestations.

Nerve Responses to Repellents

M. J. Reddy

A description was given of some of the methods used in an electrophysiological investigation into the nervous responses of P. americana to repellent materials, mostly in vapour form. Also the effects of repellent treatment on other stimuli. Action potentials resulting from stimulus with repellent vapours (D.M.P., 874) can be obtained not only from the antennae, but also to a lesser extent from the legs and other nerve preparations. They are characteristically very slow and unlike any other nerve spikes. Similar responses can be obtained with benzene, toluene, etc., these substances being too volatile for use as repellents, but do act in the same way. It was possible to show that treatment with repellent vapour has a fairly long lasting depressing effect on the response to subsequent treatment with the same and other vapours (several minutes), but no demonstrable effects have been shown on the responses to other stimuli, e.g., mechanical stimuli.

The Monarch Butterfly (Danaus plexippus L.)

Joseph D. Shorthouse

Although a great deal of work has been done on the Monarch, very few specimens have been captured in Alberta. There are no records of adults being captured near Lethbridge. This paper deals with the biological and migratory habits of the south Alberta Monarch.



On August 20, 1961, six larvae were collected in a milkweed patch about four miles north of Lethbridge. These were reared and adults were obtained from all six. The area was checked again in 1962, but there was no milkweed because of herbicide spraying. This year I was able to collect about 35 larvae from milkweed patches within a 40-mile radius of Lethbridge.

When the larva reaches full development, it leaves the plant in search of a suitable location for changing into the chrysalis. After this location has been found, the larva lays a thin layer of silk over the surface of the support area. The larva then assumes an upside down position, thus hanging in a J-shape. The larval skin splits and the cremaster is embedded firmly into the silk button. The chrysalis stage lasts from 9 to 16 days. All adults emerged between 9.00 a.m. and 3.00 p.m. After emergence it takes the adult from 10 to 20 minutes to pump its wings to maximum size.

Out of the 35 larvae collected this year, seven were parasitized by a tachinid fly (order Diptera). Three days after the parasitized larva pupated, the chrysalis turned a light brown. After maturation, the tachinid larva emerged from the chrysalis and lowered itself to the ground by a strand of slimy material. The maggots pupated on the ground and the flies emerged in 7 to 10 days.

Little is known of the migratory habits of the south Alberta Monarch. It is believed that the majority of them spend the winter in the Pacific Groves area in California. To learn more about this strange phenomenon I had Dr. F. A. Urquhart, Department of Zoology, University of Toronto, send me about 100 tags and instructions on how to apply them. I tagged and released four Monarchs at my home, here in Lethbridge. On the day of releasing them, one was captured after flying two blocks south. The other three are presumedly on their way to Pacific Groves, where they spend the cooler parts of the day, hanging inverted by the thousands on the branches of pine.

The tagging is a very simple process. All the scales are removed from the front margin of the right-front wing by rubbing the thumb and forefinger against the wing. The tag is bent in half, placed over the wing, and pressed firmly into position.

This fall I scattered milkweed seeds along many irrigation banks in the hope of attracting a female next spring. With about 400 Monarchs to study next summer, I feel that I will be able to learn more about their biology and migratory habits.

Slides produced by the Photographic section of the Lethbridge Research Station showed the tagging process, biology, and the life history.

## The Hazen Camp Spiders

Robin Leech

This past summer work was started on a study of the Hazen Camp spiders. Hazen Camp is on Lake Hazen, Ellesmere Island, N.W.T. (approximately 82° N by 70° W). Almost 12,000 spiders were collected in about seven weeks. They were collected mostly in cake pans, (9 x 9 x 2½ inches deep) placed in the ground at carefully selected sites. Each pan contained a solution of ethylene glycol, detergent, water, and formalin.

The work will continue next summer on taxonomy, biology, and zoogeography, with emphasis on glacial refugia and post glacial invasion routes.

## Keds Cause Reduced Weight Gains in Sheep

W. A. Nelson

A two-year experiment was conducted on two groups of 16 sheep, one group of which was ked-infested and the other group ked-free. During the first four months of the experiment no differences in weight gain were noted. This confirmed earlier work in which no differences in weight gains could be demonstrated in infested lambs during the normal feeding period. Therefore, the only benefit of controlling keds on feeder lambs is in a clean fleece. However, in May, eight months after infestation of the lambs, the infested group had gained seven pounds less than the ked-free group. This was significant at the one per cent level. One year later the difference in gain had increased to 16 pounds, but was significant only at the five per cent level. We may suggest then that it is worthwhile to control keds on breeding stock and that more vigour, more resistance to the environment, and fewer lambing troubles will result.

## Weather and Say Stink Bug, Chlorochroa sayi Stål

L. A. Jacobson

In 1963 populations of Say stink bug, Chlorochroa sayi Stål increased very rapidly during the spring and early summer and, in some areas, caused damage to wheat in southern Alberta. A gradual increase was concurrent with drought conditions that commenced in 1960. The sudden upsurge of numbers in 1963 was the result of a mild, open winter when survival of overwintering adults was high followed by a warm, dry spring that provided optimum conditions for oviposition by the overwintering population and development of the first generation.

Key to Pictures on Following Page

Thirsty                      Thirstier                      Inspection                      Inspection?

Registration

Panorama of Delegates

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				W. Haufe	
N. Holmes	A. J. McGinnis		J.		
	Centennial Exhibit	A. Weir	Weintraub	Centennial Exhibit	C. Lilly

---

				L.	J.
R. Shepherd	C. Brown	R. Kasting	R. Leech	Jacobson	Shorthouse

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		W.			
N. Kloppenborg	Lee, Haufe, and Salt	Broadfoot	G.	Rita	M.
			Evans	Murdock	Reddy
Ruby Larson	"Relaxed"	"Sour grapes"			

---

		B.		E.	
		Robertson		Larson	
G. Ball	Gertrude and Larry	Abdul Nur	S. McDonald		C. Lilly
			J. Proctor		S. Smith

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	J.	W.	E.	J.		W.	J.
G. Hobbs	Virostek	Nummi	Gushul	Gurba	F. Lee	Charnetski	Awram

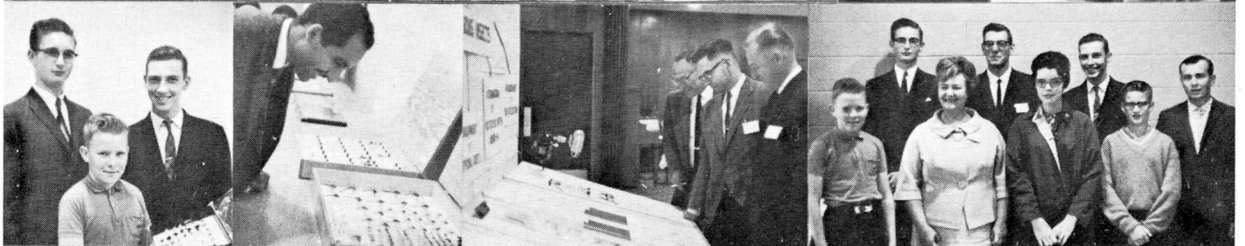
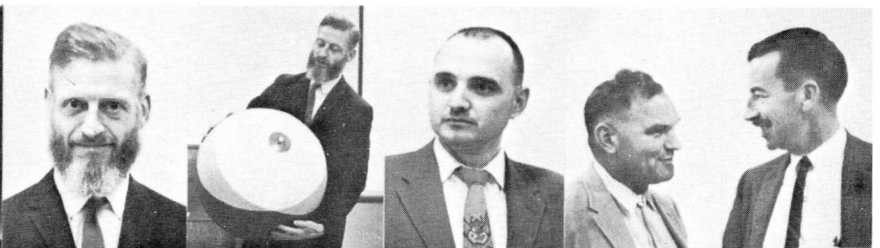
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ELEVENTH ANNUAL MEETING-LETHBRIDGE-1963

Comparison of Gravimetric and Radioactivity Methods  
for Measuring Food Consumption

Item	Gravimetric mg.	Ratio	Radio- activity	Ratio
Leaf	15.6	1.0	18.0	1.0
Grout	10.5	0.7	11.0	0.6
Cellulose	1.9	1.1	1.0	0.1



ENTOMOLOGICAL SOCIETY OF ALBERTA

Key to Pictures on Preceding Page

R. Kasting	B. Hocking	Hocking and ball	G. Ball	J. Edmonds	G. Burgess
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Panorama of Delegates

Registration

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J. Shorthouse	M. Tawfic	R. Shepherd	A. McGinnis	Larson's Junior Scientists
J. Kloppenborg		J. Weintraub		
K. Richards				

---

M. Khan	L. Peterson	Ruby Larson	J. Shemanchuk	R. Hartland- Rowe
	C e n t e n n i a l	E x h i b i t s		R. Leech

---

Cocktails

More Cocktails

A. Nimmo

---

Kathy Khan	Kay Ball	Ruby Larson	Clara Shemanchuk	Gertrude Von Gernet	Bev Holmes	The Storys
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Banquet

Neil and Bev Holmes

Judge Turcotte

The After-Dinner Speaker

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# MINUTES OF THE ELEVENTH ANNUAL MEETING

Park Plaza Motel,  
Mayor Magrath Drive and 10 Avenue South, Lethbridge  
October 25, 1963

The meeting was opened by the President, Dr. N. D. Holmes, who welcomed the assembled members and guests.

1. There was one omission in the 1962 minutes: Director to the National Society for 1963-65 was Dr. G. A. Hobbs. A. M. Harper moved and A. J. McGinnis seconded that the minutes as published in the 1962 proceedings together with the omission as stated be adopted. CARRIED.
2. The correspondence for the year was reviewed by the Secretary. Included was an exchange of letters by the local president and the Post-Master General concerning the possibility of issuing a postage stamp commemorating the Centennial of Entomology in Canada.
  - . The Secretary read a letter from Mr. H. L. (Hod) Seamans expressing his deep appreciation to the Society for their efforts in securing for him the honorary degree from the University of Alberta.
3. The following committees submitted by the Executive were appointed:-

Resolutions Committee	R. W. Salt (Chairman) G. E. Ball
Nominating Committee	C. E. Brown (Chairman) D. S. Smith W. O. Haufe
Auditors	P. E. Blakeley L. A. Jacobson
Judges of Insect Collections	G. E. Ball (Chairman) R.C.B. Hartland-Rowe R. W. Salt
Standing Committee to Supervise Insect Collec- tion Competition	C. E. Lilly (Chairman) G. A. Hobbs W.G. Evans (Edmonton rep.) C. E. Brown (Calgary rep.)
4. Treasurer's interim financial report was presented and a discussion followed concerning the adequacy of the present membership fee of \$2.00. J. Weintraub moved and R. W. Salt seconded that no increase in fees was needed as yet, and that each succeeding executive strive to make each conference financially self-sufficient. CARRIED.



5. The value of the annual award of \$50.00 cash was discussed at some length. The original motion of 1953 was read and G. E. Ball remarked that almost one-half of our annual dues were used for the award. Finally J. Shemanchuk moved and R. Hartland-Rowe seconded that the award remain as is. CARRIED.

6. A. M. Harper reported concerning the Insect Guide Book. The only revision suggested by local amateurs was to delete the recommendation of using KCN in killing bottles because of the danger to children. The second edition of the Guide can be printed locally at rates of \$61.00/200 copies or \$84.00/400 copies.

A. M. Harper moved and S. McDonald seconded that the Standing Committee regarding Insect Competitions be authorized to order 400 copies.

More discussion followed and the motion was tabled for the second section of the business meeting.

S. McDonald moved adjournment of the meeting until 11.00 a.m., October 26. CARRIED.

October 26, 1963

The meeting was reopened by the President at 11.00 a.m.

1. A. M. Harper reported that the local printer was again contacted and quoted prices of \$308.00/2000 copies of the Insect Guide and \$546.00/4000 copies. The original motion was then defeated. A. M. Harper moved and J. Gurba seconded that we refer this problem to the Committee in charge of Insect Collection Competition with power to act to obtain a new edition of the Insect Guide. CARRIED.
2. The executive suggested 3-year terms for Directors of the Society beginning next year as this would establish continuity between Executive bodies. This would require that notices be sent to all members for ratification of the proposed amendment to the constitution.
3. The executive suggested that future editors be instructed that where possible copies of the Proceedings be sent to a central point, or sent individually in unsealed envelopes.
4. The President reported that requests for the Proceedings have been obtained from the British Museum (London) and the USSR Institute of Scientific Information (an abstracting service). These requests had been tabled until the annual meeting.

A discussion followed concerning the advisability of filling such requests, and the value of having a published "Proceedings".



D. S. Smith moved and R. W. Salt seconded that because there is ample opportunity to publish elsewhere we should retain the present status of our Proceedings, i.e., of not constituting a publication and that we retain the present limited distribution. CARRIED.

5. The executive suggested to the Society that because of the increasing age of the members, with the probability of increased mortality, a memorial fund could become expensive. They also suggested that a plaque or a suitably-inscribed book for the Strickland Memorial Library would be more practical.

P. E. Blakeley moved and R. W. Salt seconded that the Society place a suitably-inscribed book selected by the Executive in the Strickland Memorial Library in memory of Colonel E. H. Strickland. CARRIED.

G. Burgess moved and J. Shemanchuk seconded that the Society place a second suitably-inscribed book selected by the Executive in the Strickland Library in memory of A. R. Brooks. CARRIED.

6. G. E. Ball, Chairman of the Committee in charge of the Amateur Directory, reported that lists are being compiled for B.C., Alberta, and Saskatchewan and that when completed they will be mimeographed and circulated to the amateurs listed, and to the Society members.
7. C. E. Brown presented a comprehensive report concerning the present status of the Society's library. He moved and A. M. Harper seconded that since there has been no use made of the library to date it should be discontinued. CARRIED.

R. Leech moved and Gertrud von Gernet seconded that the contents of the library be sent to the Department of Entomology library at Edmonton (U. of A.) to dispose of as they see fit.

R. Hartland-Rowe moved an amendment seconded by W. G. Evans that the contents of the library be sent to the Department of Entomology, Edmonton, then to the Calgary branch of the University, and finally to the Lethbridge Research Station, and that each establishment retain any desired material. AMENDED MOTION CARRIED.

8. C. E. Lilly presented the terms of reference of the Committee supervising the Insect Collection Competition and moved their adoption. Seconded by G. A. Hobbs. CARRIED.
9. C. E. Brown, Chairman of the Nominating Committee, presented the following slate of officers for the coming year. B. Hocking moved and A. M. Harper seconded that the slate as presented be adopted. CARRIED.

President	W. G. Evans (Edmonton)
Vice President	R.C.B. Hartland-Rowe (Calgary)
Secretary	E.B.S. Swindlehurst (Edmonton)
Treasurer	Janet Sharplin (Edmonton)
Editor	J. Proctor (Edmonton)
Directors	R. E. Stevenson (Calgary)
	Joan Shore (Edmonton)
	J. Weintraub (Lethbridge)

10. The following report of the Resolutions Committee was read by R. W. Salt who moved its adoption. Seconded by L. K. Peterson, **CARRIED.**

WHEREAS the Eleventh Annual Meeting of the Entomological Society of Alberta has been enjoyable and stimulating  
BE IT RESOLVED that our thanks be extended to:

- a) Mr. Alex Weir and Judge L. S. Turcotte for their excellent addresses
  - b) The committees in charge of the program, local arrangements, exhibits, and competitions
  - c) The Alberta Wheat Pool, Canadian Sugar Factories Ltd., Oliver Chemical Company Ltd., and Chipman Chemicals Ltd. for financial aid, and to Sicks' Lethbridge Brewery for a social evening highlighted by a tour of their plant.
11. G. E. Ball presented the following list of winners for the Insect Collection Competition:-

Junior event      - 1) Robert Iverson (First)  
                              2) Gordon Bridgewater (Second)  
                              3) John Kloppenborg (Third)

Senior event      - No entries

Challenge event - Joe Shorthouse (First)  
                              Ken Richards (Second)

12. At the meeting of the Executive, October 24, it was moved by J. B. Gurba and seconded by W. G. Evans that we send our annual donation of \$10.00 to the Zoological Records Fund. **CARRIED.**
13. J. B. Gurba discussed a suggestion from the Executive that each succeeding Secretary compile a mailing list of prospective members in their own area who might join the Society and attend the Conference when it was held locally.
14. B. Hocking moved and A. M. Harper seconded that on the occasion of the Centennial birthday of the National Society the local society present a suitably-inscribed gavel to the President of the parent society, B. Hocking to provide the gavel and the Society to pay for an inscribed plaque. **CARRIED.**
15. Finances of the Society were again discussed.

R. Shepherd moved and R. Leach seconded that we continue the special assessment of \$1.00 per member for 1964 to assist in defraying anticipated extra expenses. **MOTION DEFEATED.**

16. R. W. Salt submitted the following report of the Directors' meeting held at the National Centennial Congress, Ottawa, September 3-6, 1963:-

Report of the Centennial Meetings of the  
Entomological Society of Canada, Ottawa, September 3-6, 1963

The Centennial meeting of the Society differed from the usual annual meetings in several respects. It lasted for four days instead of the usual three, all papers were given by invitation, and exhibits were emphasized. On the first day a special convocation of Carleton University granted honorary Doctor of Science degrees to E. M. DuPorte, C. P. Holland, W. R. Thompson, and E. M. Walker. At the banquet, honorary memberships in the Society were presented to A. W. Baker, W. H. Brittain, J. D. Detmeter, and W. N. Keenan, and the gold medal for Achievement was presented to A. W. A. Brown. Twenty-six papers were presented, six of these forming a symposium on Strategy and Tactics of Insect Control.

The Proceedings will be published in a single issue of the Canadian Entomologist, but as two numbers, January-February, 1964. The 1964 meetings will be held in Vancouver, B.C., and in 1965 at Fredericton, N.B.

17. L. A. Jacobson moved a vote of thanks to the outgoing Executive.  
Seconded by C. E. Brown. CARRIED.

L. K. Peterson moved adjournment. Carried.

Signed: C. E. Lilly,  
Secretary.

TREASURER'S REPORT

Paid up membership for the year 1963 for the Alberta Entomological Society was 67, of whom 11 were students. Canadian Entomological Society membership was 32.

The donation of \$150.00 to the Canadian Entomological Society for its Centennial Celebration in Ottawa in September made a large hole in our reserves. However, we were able to retrieve \$51.00 of this through special assessment. New members in 1963 were not charged the special assessment, nor were students. Our bank balance therefore stands only \$20.00 higher at the end of 1963 than it was in 1962, or about \$100.00 less than previous years in which the annual meeting was held at Lethbridge.

A plea was made at the annual meeting for economy of operations. Fixed costs have been rising steadily over the past six years and it will be necessary for the Calgary and Edmonton executives in the future to canvass for donations from industry to aid in covering the expenses of the annual meeting. In addition, the most economical method of preparing the Proceedings must be sought out.

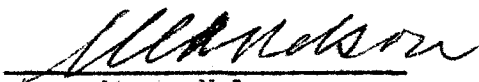
FINAL STATEMENT OF FINANCES  
YEAR ENDING JANUARY 10, 1964

Receipts


Bank Balance January 1, 1963 (Transferred from Calgary)			328.34	
Membership Fees				
Ent. Soc. Canada	1963	320.00		
	1964	<u>72.00</u>		
			392.00	
Ent. Soc. Alberta	1963	187.00		
	1964	<u>18.00</u>		
			205.00	
Rebate on postal error		10.50		
U. S. premium		1.78		
Annual Meeting		398.00		
Bank exchange		<u>0.30</u>	<u>410.58</u>	
				1335.92

Disbursements

Can. Ent. fees	392.00	
1962 Proceedings expenses	55.72	
Donation Ottawa Centennial	150.00	
Ent. Soc. prizes 1961 and 1962	49.64	
Receiver General of Canada postage due	12.60	
University of Alberta Entomology Society prize	50.00	
Contribution, Zoological Record	10.00	
Bank Exchange	3.30	
Bank Service Charge	2.00	
Postage	2.60	
Annual Meeting	<u>261.48</u>	
		<u>989.34</u>
Balance		<u>346.58</u>
Audited Jan. 16, 1964		

  
W. A. Nelson  
Treasurer

  
P. E. Blakeley

  
L. A. Jacobson

MAILING LIST, 1963-64

Members

Abdulnur, Mr. O.	Department of Entomology, University of Alberta, Edmonton.
Adiosomarto, Mr. Tony	Department of Entomology, University of Alberta, Edmonton.
Awram, Mr. J.	Department of Entomology, University of Alberta, Edmonton.
Ball, Dr. G. E.	Department of Entomology, University of Alberta, Edmonton.
Ball, Mrs. K.	Department of Entomology, University of Alberta, Edmonton.
Belur, Mr. N. V.	Department of Entomology, University of Alberta, Edmonton.
Berg, Dr. C. O.	Department of Entomology, Cornell University, Ithaca.
Berg, Mr. C. V.	553 Breckenridge Street, Helena, Montana.
Blakeley, Mr. P. E.	Research Station, Canada Agriculture, Lethbridge.
Broadfoot, Dr. W. C.	Research Station, Canada Agriculture, Lethbridge.
Brown, Mr. C. E.	Forest Ent. & Path. Lab, 102 - 11th Ave. S. E., Calgary.
Carr, Mr. J. L.	R. R. 4, Calgary.
Cerezke, H. F.	Forest Ent. & Path. Lab., 102 - 11th Ave. S. E., Calgary.
Chan, Mr. K.	2523 - 17th Ave. S. W. Calgary.
Depner, Mr. K. R.	Research Station, Canada Agriculture, Lethbridge.
Evans, Dr. W. G.	Department of Entomology, University of Alberta, Edmonton.
Gurba, Mr. J. B.	Department of Crop Protection and Pest Control, Field Crops Branch, Alberta Department of Agriculture, Edmonton.

Gushul, Mr. E. T.	Research Station, Canada Agriculture, Lethbridge.
Harper, Dr. A. M.	Research Station, Canada Agriculture, Lethbridge.
Hartland-Rowe, Dr. R.C.B.	Department of Zoology, University of Alberta at Calgary, Calgary.
Haufe, Dr. W. O.	Research Station, Canada Agriculture, Lethbridge.
Hewitt, Mr. A. G.	Research Station, Canada Agriculture, Lethbridge.
Hilton, Mr. D. F. J.	3048 First St. S. W., Calgary.
Hobbs, Dr. G. A.	Research Station, Canada Agriculture, Lethbridge.
Hocking, Dr. B.	Department of Entomology, University of Alberta, Edmonton.
Holmes, Dr. N. D.	Research Station, Canada Agriculture, Lethbridge.
Hopkins, Mrs. M. E. P.	3 Canyon Drive, Calgary.
Hopping, Mr. G. R.	Forest Ent. & Path. Lab., 102 - 11th Ave. S. E., Calgary.
Jacobson, Mr. L. A.	Research Station, Canada Agriculture, Lethbridge.
Johnson, Mr. P. C.	Division of Forest Insect Research, Federal Building, Missoula, Montana.
Kloppenborg, Mr. N. E.	Research Station, Canada Agriculture, Lethbridge.
Larson, Dr. Ruby I.	Research Station, Canada Agriculture, Lethbridge.
Lilly, Mr. C. E.	Research Station, Canada Agriculture, Lethbridge.
Lee, Mr. F. C.	633 Gore Ave, Vancouver 4.
Leech, Mr. R. E.	Department of Entomology, University of Alberta, Edmonton.
Lindsay, Mr. I. S.	Environmental Protection, Defence Research Board Headquarters, Ottawa.

McDonald, Mr. S.	Research Station, Canada Agriculture, Lethbridge.
McGinnis, Dr. A. J.	Research Station, Canada Agriculture, Lethbridge.
Murdoch, Miss Rita	Department of Entomology, University of Alberta, Edmonton.
Nelson, Dr. W. A.	Research Station, Canada Agriculture, Lethbridge.
Newgard, Mr. B.	2501 Olive St., Apt. 1, Long Beach 6, California.
Nummi, Mr. W. O.	Research Station, Canada Agriculture, Lethbridge.
Painter, Mr. R. H.	Livestock Insect Liason Officer, c/o Research Station, Canada Agriculture, Lethbridge.
Pankiw, Mr. P.	Experimental Farm, Beaverlodge, Alta.
Peterson, Mr. L. K.	Research Station, Canada Agriculture, Lethbridge.
Proctor, Mr. J.	Department of Crop Protection and Pest Control, Field Crops Branch, Alberta Department of Agriculture, Edmonton.
Pucat, Miss A. M.	Department of Biology, University of Saskatchewan, Regina.
Reddy, Mr. M. J.	Department of Entomology, University of Alberta, Edmonton.
Reid, Dr. R. W.	Forest Ent. & Path. Lab., 102 - 11th Ave. S. E., Calgary.
Robertson, Mr. R. H.	Research Station, Canada Agriculture, Lethbridge.
Salt, Dr. R. W.	Research Station, Canada Agriculture, Lethbridge.
Sharplin, Dr. Janet	Department of Entomology, University of Alberta, Edmonton.
Shemanchuk, Mr. J. A.	Research Station, Canada Agriculture, Lethbridge.
Shepherd, Dr. R. F.	Forest Ent. & Path. Lab., 102 - 11th Ave. S. E., Calgary.

Shore, Miss Joan C.	Department of Entomology, University of Alberta, Edmonton.
Smith, Dr. D. S.	Research Station, Canada Agriculture, Lethbridge.
Stevenson, Mr. R. E.	Forest Ent. & Path. Lab., 102 - 11th Ave. S. E., Calgary.
Story, Mr. T. P.	Research Station, Canada Agriculture, Lethbridge.
Swailles, Dr. G. E.	Research Station, Canada Agriculture, Lethbridge.
Swindlehurst, Mr. E. B. S.	Research Information Editor, Alberta Department of Agriculture, Edmonton.
Tawfic, Mr. M. S.	Department of Entomology, University of Alberta, Edmonton.
Van Veen, Mr. N. W.	932 - 5th Avenue N. E., Calgary.
von Gernet, Gertrude	Department of Entomology, University of Alberta, Edmonton.
Virostek, Mr. J. F.	Research Station, Canada Agriculture, Lethbridge.
Weintraub, Mr. J.	Research Station, Canada Agriculture, Lethbridge.
Whitehead, Mr. D.	Department of Entomology, University of Alberta, Edmonton.

Honorary Life Members

Seamans, H. L.	581 Fraser Avenue, McKellar Park, Ottawa.
White, R. M.	R. R. 1, West Summerland, B. C.