

Proceedings of the
Twentieth Annual Meeting
of the
ENTOMOLOGICAL SOCIETY
of
ALBERTA



University of Lethbridge

October 12 - 14, 1972

Proceedings of the 20th Annual Meeting of the
ENTOMOLOGICAL SOCIETY OF ALBERTA

October 12-14, 1972

University of Lethbridge

Volume 20

February 1973

Officers - 1972

President G. E. Swailes

Vice-President K. Ball

Secretary-Treasurer A. M. Harper

Editor W. A. Nelson

Directors W. B. Porter - Calgary
L. K. Peterson - Edmonton
D. L. Struble - Lethbridge

Regional Director W. O. Haufe

Introductory Remarks

Dr. J. E. Andrews, Director
C.D.A. Research Station
Lethbridge, Alberta

Dr. G. E. Swailes, President
Entomological Society of Alberta

Welcome to the University

Dr. W. E. Beckel, President
University of Lethbridge

Program Chairmen

Mr. J. A. Shemanchuk
Dr. D. L. Struble
Mr. S. McDonald

Banquet Address

Dr. B. F. Tyson
Department of English
University of Lethbridge

Program and Social Committee

Dr. W. A. Charnetski
Dr. G. E. Swailes
Dr. A. M. Harper

Insect Collection Committee

Dr. D. A. Craig
Dr. G. A. Hobbs
Mr. H. Goulet

Photography

Mr. E. Gushul

TABLE OF CONTENTS

Myths and moths: the insect in literature - B. F. Tyson	Page 1
Some thoughts on population studies - G. Pritchard	10
Distribution and economic importance of the black fly, <u>Simulium arcticum</u> , in Alberta - K. R. Depner	10
Protection of cattle from black flies in the County of Athabasca - M. A. Khan	10
Extermination of cattle grubs in Alberta and Saskatchewan - M. A. Khan	11
Cephalic fan evolution in larval Simuliidae (Diptera: Nematocera) - D. A. Craig	11
Skin reactions and pathogen transmission - W. A. Nelson	12
Keeping alfalfa leafcutter bees for the pollination of alfalfa - G. A. Hobbs	12
A pest of alfalfa--the pea aphid - A. M. Harper	12
Use of host plant relationships in the taxonomy of the Psyllidae (Insecta: Homoptera) - I. D. Hodgkinson	13
Biology and host plant selection of the red turnip beetle, <u>Entomoscelis americana</u> Brown (Coleoptera: Chrysomelidae) - B. Stewart	14
Economic importance and control of the red turnip beetle, <u>Entomoscelis americana</u> Brown, in Alberta - M. G. Dolinski	14
Influence of fungi on the downward movement of the rusty grain beetle, <u>Cryptolestes ferrugineus</u> (Stephens) (Coleoptera: Cucujidae) - M. G. Dolinski <u>et al.</u>	15
Investigations of the bertha armyworm in Alberta, 1971-1972 - H. G. Philip	15
Water quality of some coal mine effluents and their effects on stream insects - D. S. Radford	15
Crop insects of 1972 - N. D. Holmes	16
Tests of pheromone-baited traps for monitoring populations of spruce budworm, <u>Choristoneura fumiferana</u> (Clemens), in northern spruce forests - H. F. Cerezke	17

Energy flow through arctic Lepidoptera on Devon Island, 75°N 85°W - J. K. Ryan	17
Ultrastructure of sense organs on the ovipositor of the face fly, <u>Musca autumnalis</u> - Ruth L. Hooper	18
A new type of pitfall trap for catching ground beetles - H. Goulet	18
An improved method for microrespirometry using gas chromatography - M. J. Mitchell	18
Photographic highlights	19
Minutes of executive meeting	21
Minutes of the 20th annual business meeting:	
Part I, October 13, 1972	23
Part II, October 14, 1972	25
Financial statement for 1972 - A. M. Harper	28
Report of the regional director - W. O. Haufe	30
Report of annual insect collection committee - D. A. Craig	31
Membership list	32

MYTHS AND MOTHS: THE INSECT IN LITERATURE

B. F. Tyson
University of Lethbridge

Ladies and gentlemen of the Entomological Society of Alberta. Tonight I am making one of my rare speeches--rare in the culinary sense of probably not being very well done. After-dinner speaking has been described as the art of diluting a two-minute idea with a two-hour vocabulary, you can relax because I do not intend to speak for any longer than half an hour. My personal public speaking rule is if you do not strike oil in 30 minutes, stop boring. In any case, I would not risk anything longer on Friday the 13th--and particularly on the subject of insects. I cannot claim that the subject is close to my heart; sometimes it has been unpleasantly close to other parts of my anatomy. As a matter of fact, in spite of the fact that I come from the same country as the Beatles, let me confess at once that I am an insect hater --what you might call an 'insectophobe'. And this is dangerous because I am surrounded on all sides by insectophiles. But, like F. C. Burnand, I *'ates cockroaches, because they encroaches*. And had I had any sense when I was asked to address you tonight (I was asked by Dr. Smith whom I admire greatly, as a friend--not for his research, which I understand is in the field of grasshoppers--if you will forgive the pun), I should really have emulated the centipede who allegedly said while crossing her legs, *No, no, a hundred times no!*

Why did I accept? Well, to begin with, I misheard Dr. Smith on the telephone. I thought he said the Etymological Society and, since I know a little about the origins of words if not worms, the request seemed reasonable enough. But when I realized that I was to speak to entomologists, I began to see a kind of meaning in this. There is, believe it or not, a link between our two professions. That link being the word 'survival' (of which more later); in addition to which it is a great comfort for an insectophobe like myself to discuss his nightmares with experts--rather like a hypochondriac discussing his symptoms with a doctor. A third reason might have been this excellent dinner. But I did not know about that then; as a matter of fact, knowing that there are in certain parts of the world insects supposedly edible, I cannot describe to you the relief I felt at sitting down to beef. It might have been dried-diving beetle or fried caterpillars, or something

So here goes. My insectophobia began many years ago when as a youth on a farm I was regularly stuck for the drinks by swarms of armour-piercing mosquitoes (actually I have since discovered that the stinger of a mosquito is only 3/100 inch long--apparently, the other 15 inches is your imagination). [Forgive these "asides"--what you might call "Insect Asides"(!)] By the age of six I had empirical evidence that the experience of Little Miss Muffet was not an isolated one. In my farm house home spiders may not have got in my curds--but they certainly got in my whey; and with refreshing regularity I was stung by wasps, which in defiance of the phrase book made a bee-line for me (do forgive these puns). I was assured that it was the color of my hair that attracted them (not the puns), which is one of the reasons that I went prematurely bald--in self-defence. Naturally, I soon developed a healthy persecution mania, fostered further by my appalling taste in movies at that time: I used to go and see the sort of films which must have fallen into the developing fluid by mistake, films about such double-dyed villains as Dr. Fu Man Chu,

who had an unusual habit of dispatching his enemies by lowering giant red centipedes down their study chimneys; so that by the time I had survived 12 years of these terrors, I had had enough. A last-ditch attempt to revive my love for the insect creation by a well-meaning but misguided maiden aunt who gave me for my birthday a repulsive book entitled "Little Many Legs," a book that I instantly hurled into the nursery fire, was needless to say a failure.

So I bade farewell to the microscopic sciences--I thought forever. Speaking of microscopes, I could never understand why on earth it was that you entomologists are not content with insects the size they are. (The Goliath Beetle, which is six inches long, I understand--though I have not personally measured it; a 13-inch monster from the Malay Peninsula, known jocularly as the Walking Stick, supposedly because of its shape, but also, I suspect, though it did not say anything about it in the book I read, because of its habit of attracting its prey--I have a suspicion that it feeds on short-sighted English professors, who reach for it in mistake for their own . . .; or the Atlas Moth of Australia, which has a 14-inch wing span and, presumably, uses a landing strip). Why in the name of death and conscience, I ask myself, would entomologists want to look at these horrors under a microscope and make them appear even bigger? Surely to God they are big enough. And yet, you people are never happier than when you are photographing the eye of Musca domestica (the house fly) and blowing it up 50,000 times (transforming it into a blow fly?). Anyway, confronted in my Children's Encyclopaedia by these gigantic insects, small wonder that I fled these terrors into the comparative calm of literature.

Judge then of my horror when I tell you that I discovered in literature a race of insects 20 times as venomous and 50 times as large as those in the pages of my childish encyclopaedia. I should have been forewarned by my other nursery reading. Lewis Carroll had already introduced me to *bees as big as elephants*; Edward Lear had told me that:

*There was an old person of Skye
Who waltzed with a bluebottle fly.*

And Gulliver, on his celebrated travels, when visiting the giant land of Brobdingnag, had a skirmish with 20 wasps as large as partridges, which he attacked with his sword as they flew round him, killing four, I am delighted to report. Their stings, which were an inch and a half long, he removed and kept as curiosities.

Gulliver's primitive form of pest control has, I understand, been improved upon. But here's one link between literature and entomology, and here also is a paradox: Entomologists, I know, are invaluable in such matters as pest control--their work, in that case, redounding to the preservation of man and the extermination of the insect. Literature, on the other hand, ostensibly concerning itself with the human problem, seems to redound to the glorification of the insect and, recently, at any rate to the extermination of man.

Why does the insect receive such royal treatment in literature? Well, literature begins with the myth and it is not a fondness for puns, which makes me state that in many cases the myth begins with the moth. Sacredly and symbolically, the insect has always played a great part in man's mythology.

The use of an insect to symbolize the resurrection after death is fairly common in folklore; and particularly this is true of moths and butterflies, where, following the active life of the caterpillar, the chrysalis state is an apparent death and is, in turn, followed by the beautiful free-flying butterfly emerging from the chrysalis, as a soul from the tomb. In some areas, this beautiful belief has dwindled to a superstition. My Yorkshire grandfather was derisive about my Irish grandmother's belief that if a caterpillar measures your whole length (not in the sense of being as big as you are but inching over your body somewhat like an undertaker), you will die; and yet, one day the old boy himself confided to me his belief that night-flying white moths were the souls of the departed.

Writers seem to have assimilated this belief and to have adapted it, perhaps unconsciously, to their own uses. In Lewis Carroll's classic "Alice in Wonderland," Alice, travelling through this strange world, comes upon a large blue caterpillar, sitting on a mushroom. The caterpillar asks who she is, and Alice replies that she is not herself this morning--she has been changed so many times. *Being so many different sizes in a day is very confusing,* she concludes. *It isn't,* said the caterpillar. *Perhaps you haven't found it so yet,* said Alice, *but when you have to turn into a chrysalis--you will some day you know--and then after that into a butterfly, I should think you'll feel a little queer, won't you?* *Not a bit,* said the caterpillar. *Well perhaps your feelings may be very different,* said Alice. *All I know is, it would feel very queer to me.* You, said the caterpillar contemptuously, *Who are you?* . . . Now the answer to the caterpillar's question (*Who are you?*) is that Alice is a small girl in the caterpillar stage of life, who should listen to the caterpillar very carefully because she is approaching the ugly chrysalis of adolescence, from which, if she is as philosophical as the insect, she will blossom into the butterfly beauty of womanhood. The caterpillar is gently advising her not to be afraid of change.

Another example of the myth translated into literature begins with the ancient Egyptians. To them, because of its habits and its structure, the beetle was a symbol of eternal life; the insect itself personified the sun because of the sharp projections on its head, which resembled the rays of the sun; on each of its six legs there were five terminal segments totalling, therefore, 30 in number, which represented the days of the month (the Egyptian calendar was based on a 30-day month); the ball of dung which the beetle rolled, supposedly from sunrise to sunset, made this insect a symbol of resurrection and immortality. So sacred were the scarab beetles, that images of them were made; and after a man died his heart was often removed and a scarab charm was inserted in its place (which would presumably make the subject of insects close to his heart at least) to exempt the dead man from the sins of this earthly life when he stood before his judge, the god Osiris, in the next. I do not know whether it worked or not, whether they guaranteed satisfaction--or your mummy back--but it was certainly popular. Sometimes, the actual sarcophagus, resembling as it did a huge beetle with its wings closed, was painted in the insect's likeness.

Even when such beliefs themselves die, they are resurrected by literary men for their associative impact. Thus, when Aristophanes was writing his play called "The Peace," a play written during the long Peloponnesian War of 431-404 B. C., his principal character Trygaios, weary of the ever-lengthening war,

determines to go up to heaven and see Zeus about it. And the interesting thing is that he does not use, as one might expect, a bird to fly to the heavens--he uses a gigantic dung beetle, fattened for the purpose. Scholars, wondering why such an insect should have been used, have concluded that it was because of the jokes that could be made about its occupation; but I cannot help thinking that Aristophanes here is capitalizing on the ancient myth. Clearly to Aristophanes, a dung beetle is a perfectly reasonable companion to accompany one to heaven, where all are equal in the eye of a creator, who according to later Christian teaching, has his eye on the sparrow and, presumably, therefore, on the sparrow's breakfast.

Perhaps this is why writers throughout the ages have tended to hold up the insect to man either as an example, or sometimes as a warning. A splendid example of insects being held up as both warnings and examples is found in Jonathan Swift's "The Battle of the Books." This famous battle took place in St. James' Library, between the ancient books, who were somewhat conservative in nature, and who acknowledged the classical writers from whom they borrowed, and the modern books, who belonged to the now generation--and sneered at the past. The ancients claimed that merely because a thing is new, it does not follow that it is necessarily better; it does not follow that change is necessarily improvement. Now the main fight took place between books; but one incident is germane to my discussion. Up in a corner of the library there is a spider's web; and while the battle rages among the stacks, a wandering bee gets stuck in the web, which shakes it and brings the spider running down, and an argument ensues. The spider, of course, represents the moderns, and he disparages the bee as a vagabond, without house or home; as a freebooter, plundering nature; the spider claims that he is a domestic animal furnished with a native stock within himself, and he boasts of his web--claiming that it illustrates the more modern principles of mathematics. But the bee rejoins pleasantly that he is obliged to heaven for his flight and his voice; that though he visits the flowers he does not injure them; that even the spider is obliged for his own architecture to a little foreign assistance! In short, says the bee, representing the ancients,

the question comes all to this: Whether is the nobler being of the two that which by a lazy contemplation of four inches round, by an overweening pride; feeding and engendering upon itself, turns all into excrement and venom, producing nothing at all but flybane and cobweb; or that which, by an universal range, with long search, much study, true judgement and distinction of things, brings home honey and wax

The last two, of course, symbolizing sweetness and light. Shakespeare had already used the bee as an example to the human race in his play "Henry V":

*so work the honey bees;
Creatures that, by a rule in nature, teach
The act of order to a peopled kingdom.
They have a king, and officers of sorts:
Where some, like magistrates, correct at home;
Others, like merchants, venture trade abroad;
Others, like soldiers, armed in their stings,
Make boot upon the summers velvet buds:*

*Which pillage they with merry march bring home
 To the tent-royal of their emperor:
 Who busied in his majesty, surveys
 The singing masons building roofs of gold;
 The civil citizens kneading up the honey;
 The poor mechanic porters crowding in
 Their heavy burdens at his narrow gate;
 The sad-ey'd justice, with his surly hum,
 Delivering o'er to executors pale
 The lazy yawning drone*

Here Shakespeare seems to be both justifying the ways of God to men and, also, slipping in a pretty solid bit of Tudor propaganda: Elizabeth herself had, like the Queen Bee, carefully stung to death any pretenders to the throne, after the manner of the bee (known to the Elizabethans, however, as the King Bee, which was a pity, because it was not until 1609 when a King was on the throne that they realized that the leader of the swarm was in fact a Queen).

So the attempt to bring the worlds of man and the insects together in some sort of harmony, to bring man closer to his creator and all other creations, went on. Take John Donne's poem *The Flea*, written in the early part of the next century; in this poem the flea has bitten and sucked the blood of both the poet and his mistress:

*This flea is you and I, and this
 Our marriage bed, and marriage temple is*

In short, the flea is seen in this poem as one of the million created objects of this life, all equal because together they add up to the created world. If one posits the unifying concept of a creator, who made the universe as an order full of hidden relationships, then the poet, who is the creator of his own little world of the poem, can discover and reveal these relationships to man, thus, justifying the macrocosm not through the microscope but through the microcosm.

Go to the ant, thou sluggard: consider his ways and be wise, says the Psalmist. But alas, as the centuries have drawn closer to our own, it seems to have become increasingly difficult for man to go to the ant or the bee. By the nineteenth century, man's own sweetness and light had become obscured by the smoke from his rapidly multiplying factories; and with the scientific revolution of Tyndall and Huxley (and of Darwin, though Darwin certainly blessed the union of man and insect), man fattening his pride on narrow nationalisms, and with growing destructive power, like Swift's spider, was turning all into excrement and venom. If man proves himself unfit for survival, according to the Darwinian ethic, he will perish. By 1900, writers like H. G. Wells, despairing of man going to the ant to consider her ways, made the ant come to man, with a vengeance! In his short story "The Empire of the Ants" (1911), a tribe of ferocious ants, with preternatural powers of organization and a nice line in poison, threatens first of all a small village; and then, because the reports of the disaster are thought to be too incredible, it begins to threaten the whole human race. *There can be little doubt*, says the narrator in this story,

that these ants are far more reasonable, and with a far better social organisation than any previously known species. Instead of being in dispersed societies, they are organised into what is in effect a single nation. But their peculiar and immediate formidableness lies, not so much in this, as in the intelligent use they make of poison against their larger enemies.

The narrator adds that he is convinced that they will finally dispossess man through the whole of tropical South America. And then he concludes:

Why should they stop at tropical South America? Soon they ought to strike the Capuarana Extension Railway and force themselves upon the attention of the European capitalist. By 1920 they will be half way down the Amazon. I fix 1950 or 60 at the latest for the Discovery of Europe

I am happy to announce that Wells was wrong--but only as to the details. The insects in question were not ants; they were the screwworm and the bee. And the date of the invasion was not 1960 but 1972, this year. I am sure you know more about these events than I, but I quote a racy account from the gutter press dated August 26, 1972, with the headline *Sexy Worms Outwit The Scientists*. I knew I would get sex into this talk somehow. It is most appropriate. To me there are three 'sexts': the male sex, the female sex, and insects.

SPARE a thought this morning for the sex life of the lady screwworm, and the aggressive instincts of the Afro-American killer bee.

Thanks to some appalling blunders by scientists, these esoteric matters will shortly become subjects of pressing public concern.

The boffins thought they had invented the greatest thing since piped water when they hit on a way of messing up the screwworm's mating habits. The larvae were boring fist-sized holes in up to a million cattle a year, and the victims included 55 people one season.

But the female screwworm is--or was--a very frigid lady, breeding only once in a lifetime. [I am surprised that this reporter did not at this point make capital out of the creatures' somewhat vulgar name.] So the Government paid for millions of male screwworms to be bred, sterilised with atomic radiation, and released to compete for the ladies favours with the fertile wild ones.

By 1962, the screwworm was heading for extinction in the U.S.

ENTHUSIASM

Exiled to Mexico, the screwworm outmanoeuvred man by taking up sex with an enthusiasm that would startle Hugh Hefner. And now hundreds of millions of their offspring are streaming across the 2,000-mile border.

The new sexed-up strain will be far harder to control. And the danger of drastic losses of livestock has been recognised at high Government levels.

Any day now, Mexico and the U. S. will sign an agreement to release males in unprecedented numbers to beat the invasion.

Scientific blunder number two was made when scientists imported African bees into Brazil for research. The bees escaped, inter-bred with native Brazilian bees, and developed a ferocious new strain with a man-killing sting.

Now they're advancing towards the U. S. at 200 miles a year. And a U. S. Government-sponsored report said this week that unless a defensive zone is set up immediately in Central America, the bees will soon be chasing Americans.

'The most alarming characteristic is their aggressiveness--hundreds of bees pursue and sting animals and people' it said.

Wells was always prophetic and seems at this time to have been haunted by the fear that man might be superseded in the evolutionary struggle by other forms of life, and each time he, unconsciously perhaps, chooses the insect to survive man. You people know better than I the insect's powers of survival: they have been found at heights above 15,000 feet and in caves where no daylight penetrates. They have even survived atomic blasts. H. G. Wells' "The War of the Worlds" (1898) shows the beginning of the rout of civilization, of the massacre of mankind. The widespread panic in the U. S. A. on October 30, 1938, when that other redoubtable Welles, namely Orson, broadcast his famous radio version of "The War of The Worlds"--only to have his realistic treatment taken seriously--is proof of the way in which H. G. Wells' thinking had affected the man in the street in the first half of this century. The book, as most of you know, is about an invasion of this planet by Martians; but the Martians, though one would expect them to represent a higher form of animal life than their earthly adversaries, are straight out of my infantile nightmares. They glisten like wet leather; their oily skin seems somehow fungoid; their immense eyes are extraordinarily intense--something like the magnified ones of the house fly that winked at me from my childish encyclopaedias; their V-shaped mouths quiver incessantly; saliva drops from their lipless brims; (spiders anyone?); their bodies heave and pulsate convulsively and they possess spider-like tentacles: all this creating a nauseating dread and a hypnotic fascination for the reader. And Wells has given rise to a whole host of lesser science fiction writers, like C. S. Lewis, who in "Out of the Silent Planet" actually reflects upon H. G. Wells through the mind of his principal character Ransom, who hears that he is to be given up to a race of beings called Sorns--a race that he has never seen and can only imagine. He says:

He had read his H. G. Wells and others; his universe was peopled with horrors such as ancient and medieval mythology could hardly rival. No insect-like vermiculate crustacean abominable; no twitching feelers, rasping wings, seemed to him anything but likely in an alien world. He saw in imagination various incompatible monstrosities: bulbous eyes, grinning jaws, horns, stings, mandibles. Loathing of insects . . . loathing of things that squashed and squelched all played their horrible symphony over his nerves.

But there is an ambivalence in this: human beings may loathe the insect's appearance, yet they admire his organization and survival capacity. Nowhere is this ambivalence better illustrated than in Franz Kafka's spine-chilling masterpiece "The Metamorphosis." Let me read you the first paragraph:

As Gregor Samsa awoke one morning from uneasy dreams he found himself transformed in his bed into a gigantic insect. He was lying on his hard--as it were armor-plated--back and when he lifted his head a little he could see his dome-like brown belly divided into stiff arched segments on top of which the bed quilt could hardly keep in position and was about to slide off completely. His numerous legs, which were pitifully thin compared to the rest of his bulk, waved helplessly before his eyes

His ultimate fate is easy to predict. After their initial sickening shock, the family--his wife's parents, medical people--simply reject him: when Gregor attempts to crawl from the room his father drives him back with a walking stick (how is that for a switch?) damaging one of his fragile legs in the process and causing him to bleed brown blotches onto the painted woodwork. His end is easily foretold. He dies of neglect and starvation. Now, traditionally, critics of this strange story have--being human--accepted too readily the family view of Gregor as vermin. But I disagree. The fascinating thing about Gregor Samsa is that he is beetle and man both at once: as an insect, he sees with uncanny clarity the vanity, fear, small-mindedness, and uncharity of the human race, while as a human being trapped in the body of a beetle, he partly understands their loathing of him. In fact, Gregor Samsa is very like Franz Kafka, the author; he is a man with a sickness, which Kafka was; moreover, the sickness in question was one considered unclean--T. B.--the disease which isolates. But it goes deeper than that. Kafka wrote his story "The Metamorphosis" approximately at the time when mankind itself was suffering its most unclean sickness, known as World War I, which some people now see as the beginning of the breakup of Western civilization. On November 11, 1918, the armistice was signed and, as someone else facetiously remarked, there have been two minutes of peace every year since. Finally after another massive holocaust we have reached at last the atomic age when all men will be cremated equally.

Perhaps this is too morbid a subject for an after-dinner speaker--calculated to send you away with indigestion rather than to harmonize with the wine. You may think that in the groves of our academy, as Edmund Burke said, you see nothing but the gallows. Well, perhaps our motto may not be *let there be sweetness*; but it certainly is *let there be light*. In any case, tonight I do not represent the academy. I am merely being my paranoid self. But do not dismiss me as a pessimist. I am not a pessimist. I am an alarmist! I believe things are never as bad as they seem; they are worse. Just as much as when I fled from spiders as a child, I am still concerned with survival. And I still have my persecution mania about insects. To me every bedbug is an undercover agent.

But should my message tonight be simply "Let us Spray?"--or should it be "Go to the ant?" Well, I certainly believe we human beings have a great deal to learn from the insects. At the Paramount Cinema they are currently assuring us that "Butterflies Are Free" (though they are still charging \$1.75 to see

them), and I envy them their freedom. Ants are marvelously organized creatures, and I envy them their organization. But above all, insects seem assured of their ultimate survival, and I envy them that assurance. The human being--like Gregor Samsa--is trapped between two worlds. He lies helplessly on his back, but, as Wilde says somewhere, he contemplates the stars. While Kafka was working on his strange story, he wrote in a notebook the following:-

The solitude that for the most part has been forced on me--in part voluntarily sought by me--is now losing all its ambiguity and approaches its denouement Where is it leading? The strongest likelihood is that it may lead to madness. The pursuit goes right through me and rends me asunder Pursuit indeed is only a metaphor. I can also say "assault on the last earthly frontier," as assault, moreover, launched from below, from mankind, and since this too is a metaphor I can replace it by the metaphor of an assault from above, aimed at me from above

Kafka's metaphor--an attack from below and above--is striking: it reminds me forcibly of Homer's account of "The Golden Chain of Being," which reaches down from heaven to earth, by which every creature is annexed and depends on his creator. At the top stands God, followed by angels and archangels . . . in descending order of importance . . . through man and beasts . . . down to insects and inanimate things. Man, possessing attributes of both God and beast, stands exactly in the middle--partly fallen angel, partly risen brute: able, therefore, theoretically, to climb the golden chain or to fall down it, according to the dictates of his nature. From the survival standpoint, the chain seems to me to be strongest at either end; godlike wisdom or insect-like instinct, may solve the problem of survival. Man, in the middle, capable of neither, is its weakest link. For too long has he behaved like the chancellor in Tennyson's poem, who:

*dallied with his golden chain
And smiling, put the question by.*

I think he needs to make up his mind soon whether to climb up or down for his survival's sake. The evolutionary future is dark. And one can only hope with dear old Tennyson that out of the darkness will come the hands

That reach thro' nature, moulding man.

ABSTRACTS OF PAPERS

SOME THOUGHTS ON POPULATION STUDIES

G. Pritchard
University of Calgary

The crane fly, Tipula sacra, has a complex life history involving individuals that complete the life cycle in two years as well as some that emerge as adults in just over one year. The latter group emerges later in the season and forms 15-25% of each year's emergence. Different conditions in the larval environment, especially temperature, as well as time of egg-laying are thought to determine which individuals will emerge in one year. Various models are considered that will fruitfully describe such a life history and lead to meaningful hypotheses on the behaviour of the population. It is suggested that failure to account for variations in growth rate, as well as more obvious polymorphisms in populations, could be an obstacle to the development of useful principles of insect population dynamics.

*DISTRIBUTION AND ECONOMIC IMPORTANCE OF THE
BLACK FLY, SIMULIUM ARCTICUM, IN ALBERTA*

K. R. Depner
CDA Research Station, Lethbridge

The black fly, Simulium arcticum, breeds in all of the major rivers of Alberta including the Peace, Athabasca, North Saskatchewan, Red Deer, Bow, and the Oldman Rivers. The Peace River area is a potential source of trouble in the future and shows signs of having had troubles in the past. At present, the areas in Alberta most severely affected by attacks of S. arcticum on cattle lie downstream from the town of Athabasca and are the northeast portion of the County of Athabasca and the northwestern portion of Improvement District Number 18, in the area of the Community of Wandering River. At least 14 cattle were killed by S. arcticum in these areas in 1972 and, in nearly every instance, these were animals new to the area.

*PROTECTION OF CATTLE FROM BLACK FLIES IN THE
COUNTY OF ATHABASCA*

M. A. Khan
CDA Research Station, Lethbridge

As indicated by their average daily gain (ADG), the steers treated with a pour-on application of Prolate 4 OS were protected from black flies (Simulium spp.),

with gradually diminishing effectiveness, for a period of 14 days. The chemical was applied at the rate of 0.34 ml/Kg to 35 mature cows, 17 yearling heifers, and 15 yearling steers, but the conclusions were derived only from the steer data as the ADG's for the females might have been biased by undetected pregnancies. However, the trends in weight gains for the females were similar to those for steers.

The ADG in the treated steers and their controls, 17 yearling steers, were 0.3 and 0.6 Kg during the 30 days before treatment, when the fly activity was gradually building up to a high level; 1.4 and 0.2 Kg for 14 days after treatment, when the fly activity was high; 0.4 and 0.2 Kg for 57 days after treatment during the black fly season; and 0.4 and 0.3 Kg for 106 days after treatment, when during the last 23 days the fly activity was nonexistent.

EXTERMINATION OF CATTLE GRUBS IN ALBERTA AND SASKATCHEWAN

M. A. Khan
CDA Research Station, Lethbridge

A program to exterminate cattle grubs was initiated in the County of Wetaskiwin in 1968. Since then, the program organized by the Alberta Department of Agriculture, has been extended to all of Alberta, except for five municipal districts, namely, Taber, Brooks, Stettler, Red Deer, and Provost.

Since the inception of the program, the cattle grub population in Wetaskiwin County has decreased from 9.0 grubs/head in 1968-69 to 0.17 grub/head in 1971-72. As a result of the program in the county, the grub populations in areas immediately outside the county have also decreased from 16.5 grubs/head in 1968-69 to 3.7 grubs/head in 1971-72.

In 1972, the program was extended to Saskatchewan where more than 300,000 cattle were treated in the Agricultural Extension Districts of Maple Creek, Leader, East End, and Swift Current.

CEPHALIC FAN EVOLUTION IN LARVAL SIMULIIDAE (DIPTERA: NEMATOCERA)

D. A. Craig
University of Alberta, Edmonton

The musculature and sclerites of the labropalatum of larval Crephia, Crozetia, Gymnopais, Prosimulium, Simulium, and Twinnia were examined with light and scanning electron microscopy.

First-instar simuliids have a common head chaetotaxy. This chaetotaxy along with information from development of cephalic fans shows that certain labropalatal hairs on first-instar Gymnopais, Twinnia, and Prosimulium are homologous to the more typical cephalic fan rays.

Homologies have been established for the labropalatal sclerites of simuliid larvae with those of other nematoceros larvae.

A phylogeny for larval simuliids is proposed.

SKIN REACTIONS AND PATHOGEN TRANSMISSION

W. A. Nelson
CDA Research Station, Lethbridge

A summary was presented of unpublished work from various sources dealing with the effect of the type of skin sensitivity on the pathogenicity of disease organisms introduced into the skin during feeding of vector arthropods. The role of host inflammatory cells in bite lesions was discussed in relation to host as well as bacterial survival. Disease organisms dealt with were Franciscella tularensis and Yersinia pestis.

KEEPING ALFALFA LEAFCUTTER BEES FOR THE POLLINATION OF ALFALFA

G. A. Hobbs
CDA Research Station, Lethbridge

Ever since we first imported alfalfa leafcutter bees into Canada, we have striven to gain as complete control over them as possible in order to protect them from weather and other enemies. We have also tried to make their management such a precise art that our growers could handle millions of them efficiently and cheaply.

The film complements CDA Publication 1495 (Alfalfa leafcutter bees for pollinating alfalfa in western Canada). It depicts the annual routine, beginning in the spring when the cells containing overwintering prepupae are removed from cold storage and incubated and ending in the fall when the hives are brought indoors and the cells removed from the nests, tumbled, and then cold-stored in the incubation trays in which they will be incubated the following spring.

A PEST OF ALFALFA--THE PEA APHID

A. M. Harper
CDA Research Station, Lethbridge

The pea aphid is present in Alberta wherever peas, beans, or alfalfa are grown but seems to be mainly a problem in about 40,000 acres of irrigated alfalfa near Brooks.

The aphid does not build up large populations on alfalfa before the first cutting. Coccinellids and syrphids appear to be the main factor keeping the aphid under control early in the season. In 1972, alfalfa for seed, hay, dehydration, and cubing contained peak populations of the pea aphid in late August and early September as compared to late July and early August in most years. The aphid parasites and the fungus disease that were important factors in control of the aphids in August of 1971 were of little importance in 1972.

The pea aphid can probably be controlled in most years by predators, parasites, and disease, and modifications of cultural practices. Some varieties of alfalfa have shown resistance to a biotype of the pea aphid present in Alberta.

In fields where biological or cultural controls are not effective the pea aphid can be readily controlled by dimethoate or malathion. When one applies an insecticide for aphid control one must be aware of the aphid predators and parasites and the pest species of insects in the alfalfa fields. The insect pests are: the alfalfa caterpillar, the alfalfa curculio, the alfalfa looper, the alfalfa weevil, adelphorocorids, lygus, and thrips. In most Alberta alfalfa fields these insects are normally being kept under control without the use of insecticides.

*USE OF HOST PLANT RELATIONSHIPS IN THE TAXONOMY OF THE
PSYLLIDAE (INSECTA: HOMOPTERA)*

I. D. Hodkinson
University of Calgary

The Psyllidae are shown to be a very host specific group of insects in which speciation has closely followed the speciation of the higher plants. These findings are used to compare the schemes of psyllid classification proposed by American and European authors. On the basis of host plant relationships and life history studies the following conclusions are drawn:-

- 1) The Liviinae and Aphalarinae should be regarded as separate subfamilies;
- 2) The genus Livia Latreille as used in the American sense should be split into Livia sensu stricta and Diraphia Waga;
- 3) Strophingia Enderlein is distinct from Aphalaroida Crawford;
- 4) Aphalara Förster in the American sense should be split into Aphalara sensu stricta and Craspedolepa Enderlein;
- 5) Paurocephala Crawford is a polyphyletic genus worthy of further study.

In addition, the work of Heslop-Harrison on the North American Arytaina Förster is here reemphasized as it appears to have been completely ignored by North American psyllid taxonomists.

*BIOLOGY AND HOST PLANT SELECTION OF THE RED TURNIP BEETLE,
ENTOMOSCELIS AMERICANA BROWN (COLEOPTERA: CHRYSOMELIDAE)*

B. Stewart
University of Alberta, Edmonton

A brief account of the biology of the red turnip beetle is combined with a discussion of host plant selection by both larval and adult forms. Host plant selection is subdivided into two categories: location and recognition.

Field observations and laboratory experiments indicated that host plant location by the larvae is random. Similar studies indicated that location by the adults is directed. Both adult males and females responded to the odour of rapeseed blossoms, and the females also responded to the odour of rapeseed foliage.

Host plant recognition by both larvae and adults is due to the presence in cabbage and rapeseed plants of two compounds acting synergistically. A bioassay procedure for testing these chemicals on the larvae and adults is outlined. The method of extraction and characterization of the attractant chemicals in rapeseed foliage is described.

*ECONOMIC IMPORTANCE AND CONTROL OF THE RED TURNIP BEETLE,
ENTOMOSCELIS AMERICANA BROWN, IN ALBERTA*

M. G. Dolinski
Alberta Department of Agriculture
Edmonton

The red turnip beetle feeds on numerous cruciferous plants throughout northern and central Alberta, but is most damaging to seedling rapeseed. Chemical control consists of spraying a barrier between the previous year's infested field and the seedling crop. Cultural control methods are being tested.

This spring Azinphos-methyl was tested as a chemical control to replace DDT. Test plots 1 foot square were sprayed at rates of 1, 2, and 3 oz active/acre. The number of live beetles in each plot prior to spraying and 3 and 24 hours after spraying was recorded. Samples of rape were collected and fed to healthy beetles in the laboratory to determine residual killing action.

Control was adequate at all rates after 24 hours; however, only rape sprayed with 3 oz Azinphos-methyl/acre killed beetles when fed rape treated 24 hours previously.

Azinphos-methyl was given provisional registration for control of red turnip beetles 48 hours after completion of these tests. The speedy registration process is discussed.

*INFLUENCE OF FUNGI ON THE DOWNWARD MOVEMENT OF THE
RUSTY GRAIN BEETLE, CRYPTOLESTES FERRUGINEUS
(STEPHENS) (COLEOPTERA: CUCUJIDAE)*

M. G. Dolinski, S. R. Loshiavo, and W. Hanec
Alberta Department of Agriculture, Edmonton;
CDA Research Station, Winnipeg;
University of Manitoba, Winnipeg

Laboratory experiments were conducted to study the possible effect of fungi and moisture on the downward movement of Cryptolestes ferrugineus adults.

The apparatus and techniques used during experimentation are described.

C. ferrugineus adults were attracted through columns of grain to dishes of spoiled grain, but not to moisture in the form of water vapour. C. ferrugineus adults were also attracted to pure fungi grown on grain. Penicillium corymbiferum was most attractive, followed by Scopulariopsis brevicaulis, Fusarium sp., and spoiled grain, then Cephalosporium acremonium and Aspergillus repens. Streptomyces sp., wet grain, and dry grain were not attractive.

The response of C. ferrugineus to the odour of fungi rather than a water vapour gradient may be responsible for their accumulation in moist areas of a grain bulk.

INVESTIGATIONS OF THE BERTHA ARMYWORM IN ALBERTA, 1971-1972

H. G. Philip
Alberta Department of Agriculture, Edmonton

The economic losses in rapeseed production in Alberta caused by two successive outbreaks of the bertha armyworm (Mamestra configurata Walker) has prompted serious investigations of the biology of this rapeseed pest. The Plant Industry Laboratory of the Alberta Department of Agriculture has begun preliminary laboratory and field studies of bertha armyworm biology in an attempt to provide the necessary information to predict future outbreaks. This report outlines the procedures followed and results obtained after one season of laboratory and field investigations.

*WATER QUALITY OF SOME COAL MINE EFFLUENTS AND
THEIR EFFECTS ON STREAM INSECTS*

D. S. Radford
Alberta Department of Lands and Forests, Lethbridge

During 1971-72, an investigation of the water quality of some coal mine effluents and their effect on stream insects was undertaken. The effluents appear

at the entrance of both abandoned and operational coal mine tunnels in the Crowsnest Pass area of Alberta.

The pH of the effluents generally exceeded 7.0, although the pH of one of these was almost always slightly acidic. The most significant ion in the effluents was iron; however, other metals (copper, manganese, lead, zinc) also reached high concentrations. The average electrical conductivity of the effluents was much greater than that of the receiving streams. The major cations and anions were calcium, magnesium, sodium, and bicarbonates and sulfates, respectively. The water temperature of the effluents appeared to fluctuate little on a daily and/or seasonal basis.

The average numbers of benthos downstream of the effluents were reduced by varying amounts compared to upstream density, but the zone of influence was not great. The population of stream insects in a creek previously affected by a serious effluent showed only about 25% recovery during the first year.

Invertebrate drift probably accounted for the majority of the benthos immediately downstream of the effluents. [Abstract received, paper not presented--Editor.]

CROP INSECTS OF 1972

N. D. Holmes
CDA Research Station, Lethbridge

Late spring delayed the grasshopper hatch and reduced 'hopper damage. Flea beetles and false chinch bugs attacked rapeseed. The pale western cutworm damaged wheat near Lethbridge; the redbacked and clover cutworms attacked sugar beets near Taber. Farmers sprayed 5,500 acres of sugar beets for root maggot and 25,000 for webworm. Most grasshopper damage occurred in the Provost-Wainwright, Acadia Valley, Drumheller, Lethbridge-Pearce, and Grassy Lake areas.

Exceptionally large populations of plant bugs and alfalfa weevils occurred in alfalfa seed fields and Adelphocoris was generally present. The bertha armyworm spread south to Nobleford and Grassy Lake; 30/square yard occurred north of Strathmore. Aphids reached 250/wheat head; the pea aphid was heavy on alfalfa; and the corn leaf aphid, in numbers not reached since 1956, widely damaged barley cover crop.

Polyphemus, cecropia, and the cottonwood hawk moth were relatively abundant and the black witch, Erebus odora, was recorded in Lethbridge. Bumblebees and wasps in the foothill area were reduced. The alfalfa leafcutter bee continued to overwinter outdoors. The rye jointworm infested rye east of Lethbridge.

New records included the weevil Sitona scissifrons on rangeland, the thrips Frankliniella tenuicornis in alfalfa blossoms, a weevil Rhynchaenus uniformis (Brown) mining in cotoneaster leaves, and the spotted asparagus beetle. Earwigs are apparently established in Lethbridge.

*TESTS OF PHEROMONE-BAITED TRAPS FOR MONITORING POPULATIONS OF
SPRUCE BUDWORM, CHORISTONEURA FUMIFERANA (CLEMENS),
IN NORTHERN SPRUCE FORESTS*

H. F. Cerezke
Canadian Forestry Service, Edmonton

Sticky traps baited with trans-11-tetradecenal, the female sex pheromone of the eastern spruce budworm, Choristoneura fumiferana (Clemens), were tested for attraction of this moth in white spruce stands near Fort McMurray and west of High Level, Alberta. The tests were designed to explore the use of the baited trap as a tool to monitor populations of the budworm in general surveys and to evaluate experimental control treatments.

At concentrations of 100 µg and 1,000 µg pheromone/trap, no loss in attractiveness was detected over a two-week period. Traps baited with 1,000 µg caught about twice as many budworm moths as those baited with 100 µg. Within spruce forests, the position of the trap for optimum catch at the 2-m height level above ground seems to depend largely upon stand density, crown structure, age, and the presence or absence of live foliage. The preliminary results were encouraging for development of a monitoring technique and the traps may be sufficiently sensitive to detect low endemic populations, and possibly at levels which result in up to 20% current defoliation. Further studies are needed to relate moth catch in different spruce forest conditions to the larval populations preceding moth flight.

ENERGY FLOW THROUGH ARCTIC LEPIDOPTERA ON DEVON ISLAND, 75°N 85°W

J. K. Ryan
University of Alberta, Edmonton

Field-collected Byrdia groenlandica and B. rossi (Lepidoptera, Lymantriidae) larvae are 15.6% infected with Rogas sp. (Ichneumonidae) and pupae 17.6% with Spoggosia gelida (Tachinidae) parasites. Weights and caloric values are presented for these. Feeding trials show 58.5% of the food (Salix arctica) ingested is assimilated and 17.5% of the assimilated food converted to body tissue. Adults weigh 56% of the maximum pupal weight (wet). Larvae moult 1-2 times/year. An estimated 90 calories are assimilated/m²/year by all Lepidoptera species (total of 9). Comparisons are made to musk-oxen and lemmings.

ULTRASTRUCTURE OF SENSE ORGANS ON THE OVIPOSITOR OF THE
FACE FLY, MUSCA AUTUMNALIS

Ruth L. Hooper
University of Alberta, Edmonton

Sense organs on the ovipositor of the face fly, Musca autumnalis De Geer, were examined by scanning and transmission electron microscopy. Rings of long tactile hairs encircle distal margins of the proximal 2 ovipositor segments (abdominal segments 6, 7). The eighth abdominal segment, rarely fully extended, is covered with microtrichiae. Six morphologically different types of sense organs occur on six plates (dorsal plate, paired anal leaflets, medial plate, and paired ventral plates) of the terminal segment (abdominal 9). The anal leaflets have five different types of sense organs (long tactile hairs, campaniform receptors, a 3-dendrite thick-walled hair, a 5-dendrite thick-walled hair, and pegs with pores). Morphological evidence suggests that the thick-walled hairs on the anal leaflet are olfactory receptors. Two short ($3.8\ \mu$) pegs on each leaflet have large ($1600\text{--}1800\ \text{\AA}$) pores and are innervated by a single sensory dendrite. Although these pegs are morphologically similar to thin-walled chemoreceptors, no pore tubular system was detected. A sixth type of sense organ on the ovipositor may be the ventral plate pits.

A NEW TYPE OF PITFALL TRAP FOR CATCHING GROUND BEETLES

H. Goulet
University of Alberta, Edmonton

A new type of pitfall trap was described and compared with the classical type. Results showed that the new trap averaged six times more efficient; the efficiency varied with size, type of claws, and behaviour. The trap was found ideal for obtaining large collections in a short time as it is very easy to install.

AN IMPROVED METHOD FOR MICRORESPIROMETRY USING
GAS CHROMATOGRAPHY

M. J. Mitchell
University of Calgary

The advantages, over other methods, of using gas chromatography for microrespirometry were discussed. The technique for its employment was given using the respiration of Li acarus sp. (Acarina: Cryptostigmata) as an example.

Peter Meyer	P. R. Wilkinson	I. D. Hodkinson	G. Pritchard	Podology	Joe
A. M. Harper	M. Dolinski	H. G. Philip	N. D. Holmes	M. J. Mitchell	B. Stewart
K. R. Depner	A. M. Harper G. E. Swailes		J. L. Clearwater	J. E. Hudson	D. L. Struble H. Cerezke
B. Heming	L. A. Jacobson	A. Borkent	R. Lee	G. Pritchard	W. Charnetski L. Peterson J. Weintraub
Ruth Lynn Hooper and Doreen Watler	G. Ball	K. Ball	Hodkinson Mitchell	P. Meyer C. Hergert	F. A. Siddiqui G. Hobbs
F. and H. Goulet	Wendy Bělíček	M. and M. Chance	Enid McDonald	J. Gurba	H. R. Wong
Lois & Ed Swailes	Myths	Tyson	Moths	Jeanette Peterson	Banquet



ENTOMOLOGICAL SOCIETY OF ALBERTA

U. of L.	Moses ---	and Aperture	Registration	[✓] Belíček [✓] Meyer Ball	
Hazel Gushul Edna Jacobson Ann Weintraub	Enid McDonald Cathy Khan Lois Swailes	[✓] J. Belíček G. Hobbs	Peter Meyer	G. Pritchard	Ramona Gurba
G. Pritchard I. D. Hodkinson M. J. Mitchell	Bill and Emily Charnetski	Sonya Panchuk	S. McDonald J. Gurba		
J. E. Andrews	W. E. Beckel	A.M. 13 October 72			J. A. Shemanchuk
G. Pritchard	Grub droppings	M. A. Khan	D. A. Craig	black-fly fans	W. A. Nelson
H. & F. Goulet	Ramona & Joe Gurba	G. A. Hobbs with insect collections	S. McDonald	H. Cerezke	J. K. Ryan
Ruth Lynn Hooper	Ruth Lynn and her ovipositor	E. Gushul	H. Goulet	W. O. Haufe	



TWENTIETH ANNUAL MEETING LETHBRIDGE-1972

MINUTES OF EXECUTIVE MEETING

October 12, 1972, 7.00 p.m.

Held at the University of Lethbridge, Lethbridge, Alberta.

PRESENT: G. E. Swailes (Chairman), K. Ball, A. M. Harper, W. O. Haufe,
W. A. Nelson, L. K. Peterson, G. Pritchard.

G. E. Swailes discussed the decisions that were made by him and A. M. Harper (secretary-treasurer) at the June 16 executive meeting at which there was no quorum.

- 1) W. A. Charnetski was appointed as chairman of the 1972 annual meeting. G. E. Swailes and A. M. Harper were to assist him.
- 2) W. A. Charnetski and A. M. Harper were to draw up a budget, and G. E. Swailes and W. A. Charnetski were to set a date for the meeting.

G. E. Swailes discussed the problem of setting a date for the 1972 annual meeting. Difficulties were encountered because of other meetings, harvesting plots, and Thanksgiving and Remembrance Day holidays. He suggested that the Society should probably hold future annual meetings at another time of year. After much discussion it was decided to continue to hold the annual meetings in early fall, preferably, October.

A. M. Harper discussed the current fixed expenses of the Society and the current income and suggested that the fees be raised. Fixed expenses were: scholarships, proceedings, postage, insect competition prizes, and the Zoological Record donation. The fixed income is the \$2.00-per-year fee and a \$90.00-a-year grant from the Entomological Society of Canada for student encouragement. After considerable discussion it was suggested that A. M. Harper recommend a fee increase. The size of the increase was to be decided by the general membership.

A. M. Harper gave an interim report, showing we had a bank balance of \$812.78 as of October 10, 1972.

G. E. Swailes gave a report that Bernard Boisvert was awarded our student prize at the University of Alberta and Colin James was awarded the prize at the University of Calgary.

G. E. Swailes discussed Dr. Craig's letter concerning insect collection boxes, which are needed for the student insect collections. He pointed out that the ESC has agreed to give the ESA its Student Encouragement Grant for 10 years in advance to pay for the boxes. The executive agreed to present the proposal to the membership for approval.

G. E. Swailes discussed Dr. Craig's proposal that the Student Prize in Entomology be increased from \$50.00 to \$100.00 per year. G. Pritchard indicated

that he was satisfied with the \$50.00 prize for the University of Calgary. It was decided to bring Dr. Craig's proposal before the general meeting for discussion.

The executive appointed the committees that were necessary for the general meeting.

The executive agreed to waive the registration fee for E. Gushul as he was taking photographs of the annual meeting.

W. A. Nelson moved that the meeting adjourn. The meeting adjourned at 9.35 p.m.

MINUTES OF THE 20TH ANNUAL BUSINESS MEETING

Part I

October 13, 1972, 11.05 a.m.

The 20th annual meeting of the Entomological Society of Alberta was held at the University of Lethbridge, Lethbridge, Alberta, October 12-14, 1972. The meeting was opened by the president, Dr. G. E. Swailes, at 8.30 a.m.

- 1) The minutes of the 19th annual meeting were adopted as published in the 1971 Proceedings on a motion by G. E. Ball and seconded by N. D. Holmes.
- 2) The following committees submitted by the executive were appointed:-

Nominating Committee - K. Ball
 - L. A. Jacobson
 - J. Weintraub

Resolutions Committee - J. B. Gurba
 - B. Heming

Insect Collection Committee - D. A. Craig
 - H. Goulet
 - G. A. Hobbs

Auditing - C. E. Lilly
 - J. A. Shemanchuk

The executive suggested that because the 1973 meeting of the Society is to be held in Banff, the 1974 meeting be held in Edmonton instead of in Calgary. This suggestion was approved by the members.

- 3) As Dr. Craig will be on sabbatical leave next year, the executive suggested that he find a substitute to take his place on the Insect Collection Committee for the year. He agreed to find a substitute.
- 4) The report of the regional director to the National Society was submitted by W. O. Haufe. W. O. Haufe moved and C. E. Lilly seconded adoption of the report. The motion was carried. (A complete report is printed at the end of the financial statement for 1972.)
- 5) J. A. Shemanchuk moved and R. D. Dixon seconded that the "rules and regulations for election of fellows of the Entomological Society of Canada be sent to the membership for approval before being implemented." The motion was defeated.
- 6) G. E. Ball moved and C. E. Lilly seconded that "elections to the class of fellows be by the general membership and that this include all fellows,

even the six that the Entomological Society of Canada executive considered appointing first and who would select other fellows." The motion was passed.

- 7) D. A. Craig moved and W. A. Charnetski seconded that "the Entomological Society of Alberta accept the offer of the Entomological Society of Canada to loan our Society \$900.00 as an advance on our Student Encouragement Grant to buy collection boxes. The boxes will be sold and the money paid to the Entomological Society of Alberta at a rate equal to or above our annual grant." The motion was passed.
- 8) G. Pritchard, chairman of the ESA-ESC joint meeting committee, reported that the joint meeting of the Entomological Societies of Alberta and Canada will be held at the Banff School of Fine Arts from October 1 to 5, 1973.
- 9) G. Pritchard reported that the chairmen of the committees are as follows:-
 - Publicity - W. A. Charnetski
 - Social - G. E. Ball
 - Finance - J. B. Gurba
 - Reception and registration - G. E. Swailes
 - Program - N. D. Holmes
- 10) G. E. Ball, social chairman of the joint meeting, reported that the social program will be:
 - October 1 - Wine and cheese party
 - October 2 - Barbecue and cultural entertainment
by the Banff School of Fine Arts
 - October 3 - Banquet

There will also be a ladies' program.
- 11) The annual business meeting of the Entomological Society of Alberta will be held on the evening of Thursday, October 4, 1973.
- 12) G. E. Ball moved and J. A. Shemanchuk seconded that we send \$10.00 to Zoological Record as our annual contribution. The motion was passed.

MINUTES OF THE 20TH ANNUAL BUSINESS MEETING

Part II

October 14, 1972, 10.50 a.m.

- 1) K. Ball, chairman of the Nominating Committee, presented the following slate of officers for 1972:-

President - K. Ball
 Vice-President - B. Heming
 Secretary-Treasurer - A. M. Harper
 Editor - H. R. Wong
 Directors - L. K. Peterson (1st year)
 - W. B. Porter (2nd year)
 - W. A. Charnetski (3rd year)
 Regional Director - W. O. Haufe

K. Ball moved and J. Weintraub seconded that the report be accepted.
 G. E. Swailes called for nominations from the floor.

G. E. Ball moved and N. D. Holmes seconded that nominations cease.
 Carried.

G. E. Swailes declared the above slate elected.

- 2) J. B. Gurba presented the report of the Resolutions Committee:

"Whereas the success of the 20th Annual Meeting of the Entomological Society of Alberta can, to a large extent, be attributed to the following, be it resolved that letters of appreciation be sent to:

- a) Dr. B. Tyson for his witty, wise, and thought-provoking talk on "Myths and Moths: The Insect in Literature."
- b) The University of Lethbridge for accommodations and services during the meetings.

and

"Be it further resolved that a vote of thanks be tendered to the executive and to those involved in the preparation of the meeting and program."

- 3) D. A. Craig gave the report of the Insect Collection Committee (see page 31).

D. A. Craig moved and Ruth L. Hooper seconded that the report be adopted.
 The motion was passed.

- 4) The president extended congratulations to Dr. R. W. Salt of our Society, who won the Entomological Society of Canada Medal for 1972 for outstanding achievement in the field of research in Canadian entomology.
- 5) The treasurer, A. M. Harper, gave an interim report showing we had a bank balance of \$812.78 as of October 10, 1972.
- 6) A. M. Harper, the treasurer, reported that we had approximately 100 members and that our main revenue was the \$2.00 fee and the \$90.00 a year we received from the Entomological Society of Canada, giving us a total of \$290.00 per year. The usual annual expenses per year are:

Proceedings	\$135
Scholarship	100
Insect competition prizes	50
Zoological Record	10
Postage and stationery	50
Printing Insect Collection Competition notices	25

He reported that at present the Society is in a good financial position but our expenses each year are exceeding our income and he recommended a fee increase for 1974 as the fees had not been increased since the Society started in 1952.

- 7) G. E. Ball moved and G. A. Hobbs seconded that fees be increased to \$4.00 per year in 1974. The motion was carried.
- 8) D. A. Craig discussed the scholarship award at the University of Alberta and pointed out that, as it was the smallest scholarship award in the University of Alberta Calendar, he thought it should be increased in value. G. Pritchard indicated that he was quite happy with a \$50.00 award at the University of Calgary and saw little need to increase the size of the award.
- 9) J. Běliček moved and G. E. Ball seconded that the award be increased from \$50.00 to \$100.00 at the University of Alberta. The motion was defeated.
- 10) G. E. Ball moved and J. Běliček seconded that the Entomological Society of Alberta permit the Entomology Department of the University of Alberta to list the entomology prize in the Calendar as being \$100.00 instead of \$50.00. The members of the Society in the Department of Entomology will be responsible for raising \$50.00 of the \$100.00 scholarship and the Society as a whole will be responsible for the other \$50.00. The motion was carried.
- 11) J. Ryan suggested that a medal be given as part of the scholarship and indicated that he was prepared to make the medal. This proposal was passed on to the next executive.

- 12) N. D. Holmes, program chairman, reported that the major themes for the 1973 joint ESA-ESC meeting will be:

The latest developments and future prospects of the use of:

- a) Genetic control
- b) Biochemical products
- c) Biological control
- d) Insecticides

A general summary and overview of the above will also be presented.

At one of the afternoon sessions there will be a departure from the standard meeting. At this session four to six topics will be chosen and titles of papers will be solicited from the general membership. Abstracts will be obtained and distributed. A chairman will be chosen for each topic and the general meeting will be split up into concurrent meetings according to the topic. Contributors will not give an oral presentation but will answer questions and take part in the discussion.

Other suggestions for the program from the general membership were: "Systems analysis in relation to control" with Ken Watt as speaker; "Eradication; and Diversity and Stability in Insect Populations." It was also suggested that there be a short session on the natural history of the Banff area with data especially on the insect fauna and that there be a field trip after the meeting.

W. A. Charnetski moved the meeting adjourn. The meeting adjourned at 12.05 p.m.

A. M. Harper,
Secretary-Treasurer.

FINANCIAL STATEMENT FOR 1972

<u>Item</u>	<u>Subtotal</u>	<u>Total</u>
<u>Receipts</u>		
Bank balance transferred from Calgary	\$989.50	
Petty cash transferred from Calgary	<u>12.00</u>	
Total transferred from Calgary		\$1,001.50
Membership fees - 1970 - 2 at \$2.00	4.00	
- 1971 - 9 at \$2.00	18.00	
- 1972 - 43 at \$2.00	86.00	
- 1973 - 46 at \$2.00	<u>92.15</u>	200.15
Bank interest - April 30	4.48	
- October 31	<u>11.32</u>	15.80
Student Encouragement Grant - ESC		90.00
Annual meeting - Registrations - 47 at \$3.00	141.00	
- Coffee sales	16.06	
- Dinner tickets - 65 at \$4.00	<u>260.00</u>	417.06
Advance on Entomological Society of Canada Student Encouragement Grant for 10 years for insect collec- tion boxes for insect competition		<u>900.00</u>
Total receipts		<u>2,624.51</u>

Disbursements

Entomological Society of Alberta prizes:

University of Alberta	50.00	
University of Calgary	<u>50.00</u>	100.00

Insect collection competition:

Prizes for 1972	81.60	
Duplicating notices	<u>19.27</u>	100.87

Collection boxes for insect collection competition:

Entomological Society of Canada advance forwarded to Dr. Craig, University of Alberta		900.00
--	--	--------

Proceedings of ESA:

Printing 1971 Proceedings	133.43	
Binding nine volumes of Proceedings	<u>49.50</u>	182.93

<u>Item</u>	<u>Subtotal</u>	<u>Total</u>
<u>Disbursements (cont.)</u>		
Annual meeting:		
Wine and cheese party	\$103.78	
Banquet and coffee	333.77	
Room rental	<u>25.00</u>	\$462.55
Stamps to send out annual meeting notices		24.00
Contribution to Zoological Record		10.15
Receipt book, stamps, and miscellaneous expenses		12.66
Petty cash on hand		<u>10.62</u>
Total disbursements		<u>1,803.78</u>
 Total receipts	2,624.51	
Total disbursements	<u>1,803.78</u>	
Bank balance		<u>820.73</u>
 Petty cash on hand	10.62	
Bank balance	<u>820.73</u>	
Total cash in treasury December 31, 1972		<u>831.35</u>
 Loan to Insect Collection Competition Committee for insect boxes	 900.00	

A. M. Harper,
Secretary-Treasurer.

Approved by ESA Auditors

C. E. Lilly

J. A. Shemanchuk

REPORT OF THE REGIONAL DIRECTOR

The regional director attended the meeting of the Governing Board of the Entomological Society of Canada at Ottawa, February 23-24, 1972. Actions taken have been published in the Bulletin of the Society, Volume 4(1): 14 (March 1972). Since the bulletin is available to members of ESA, information on these actions will not be repeated in this report.

There are two subjects receiving considerable discussion, however, within ESC for possible action at the next meeting of the Governing Board on November 26, 1972, at Montreal. They are of direct concern to all professional entomologists in Canada and should be considered in terms of inviting both individual and regional inputs before final decisions are made.

Fellowship Class

A proposal to institute a new class of fellows in the Entomological Society of Canada was subjected to heavy discussion at the last meeting of the Board. As a result of divided opinions and the importance attached to any decision on this question, the full membership was circularized in March 1972 for reaction in principle to the proposal.

I believe that the most controversial aspect of the proposal is the method of implementing the suggested procedure whereby an initial small committee is nominated from among members of the Society to become the first fellows and then for them to proceed to nominate additional fellows to the class. The major objection in discussions so far is that nominations will not be adequately representative of regions and of different professional groups from scientific, technical, extension, and industrial activities. Regional direction and viewpoints from either the Entomological Society of Alberta or from individuals are invited on this question.

Professional Activity in ESC

Opinions have been expressed on several occasions that the Society ought to be engaging in more activities of direct benefit to the membership-at-large and to the science of entomology. The Society assumed a useful and prestigious role in this respect when it arranged to produce and publish a balanced brief on 'Pesticides and the Environment' for distribution among interested agencies and the public. Are there other areas where effective action might be taken in the interest of entomologists and in the strengthening of the credibility of our science?

If there are any views concerning the desirability and substance of this type of professional activity, especially of regional as compared to national interests, they would be appreciated by the regional director for information in future discussions of proposals for action in the Society.

W. O. Haufe,
Regional Director.

REPORT OF ANNUAL INSECT COLLECTION COMMITTEE

Entries in the competition were received only from Edmonton and Olds. There were four entries in the Senior Challenge. Prizes were awarded as follows:-

1st Prize

John Acorn
14416 - 78 Avenue
Edmonton, Alberta

2nd Prize

Katie Shaw
7816 - 148 Street
Edmonton, Alberta

3rd Prize

Bob Davidson
14407 - 78 Avenue
Edmonton, Alberta

These three collections were of extremely high standard, the insects being well identified, pinned, and presented.

In the Open Challenge there were nine entries. First, second, and third prize were again awarded to the three winners in the Senior Challenge as no other collections came close in standard to these three collections.

There was one entry in the Junior Challenge and a first prize was awarded to Leisa Murdoch, Crossfield, Alberta, for a good collection of reared Lepidoptera.

Hugh Godwin of Olds entered a series of herbarium specimens showing insect damage. For this well presented and informative entry he was awarded a special prize.

In view of the probable absence of the Committee chairman next year, it has been agreed that Henri Goulet, Department of Entomology, Edmonton, will act as chairman for 1973. Joseph Běliček has also agreed to assist.

D. A. Craig,
Chairman.

MEMBERSHIP LIST*

Dr. J. Awram Alberta Department of Agriculture Agriculture Building Edmonton, Alberta T5H 0V1 (1971)	Mr. J. L. Carr Rural Route Number Four Calgary, Alberta (1973)
Dr. G. E. Ball Department of Entomology University of Alberta Edmonton, Alberta T6G 2E3 (1973)	Mr. A. Carter Environmental Sciences Centre (Kananaskis) and Department of Biology University of Calgary Calgary, Alberta (1971)
Mrs. G. E. Ball 8108 - 138 Street Edmonton, Alberta T5R 0C9 (1973)	Mr. H. F. Cerezke Canadian Forestry Service Environment Canada 5320 - 122 Street Edmonton, Alberta T6H 3S5 (1972)
Mr. J. Běliček Department of Entomology University of Alberta Edmonton, Alberta T6G 2E3 (1973)	Mr. M. A. Chance Department of Entomology University of Alberta Edmonton, Alberta T6G 2E3 (1973)
Dr. M. Benn Department of Chemistry University of Calgary Calgary, Alberta T2N 1N4 (1971)	Mrs. Mary Chance Department of Entomology University of Alberta Edmonton, Alberta T6G 2E3 (1973)
Mr. P. E. Blakeley Research Station Research Branch, Agriculture Canada Lethbridge, Alberta T1J 4B1 (1972)	Dr. W. A. Charnetski Research Station Research Branch, Agriculture Canada Lethbridge, Alberta T1J 4B1 (1973)
Mr. A. Borkent Department of Entomology University of Alberta Edmonton, Alberta T6G 2E3 (1973)	Mr. A. Cheung Department of Nutrition Faculty of Household Economics University of Alberta Edmonton, Alberta T6G 2E3 (1971)
Mr. G. D. Burgess Mount Royal College Lincoln Park Campus Calgary, Alberta (1971)	Mr. D. Chomyn 4515 - 46 Avenue Leduc, Alberta TOC 1V0 (1971)

*Dues paid to year shown.

Mr. J. L. Clearwater
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3

(1972)

Dr. H. Clifford
Department of Zoology
University of Alberta
Edmonton, Alberta
T6G 2E3

(1971)

Dr. D. A. Craig
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3

(1973)

Mr. G. Daborn
Department of Zoology
University of Alberta
Edmonton, Alberta
T6G 2E3

(1971)

Dr. K. R. Depner
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1

(1973)

Mr. R. D. Dixon
Alberta Department of Agriculture
O. S. Longman Building
Edmonton, Alberta
T5H 0V1

(1973)

Mr. M. G. Dolinski
Supervisor of Entomology
Alberta Department of Agriculture
605 Agriculture Building
Edmonton, Alberta
T5K 2C8

(1973)

Mr. D. P. Elliot
1612 - 46 Street North West
Calgary, Alberta
T3B 1A9

(1971)

Dr. W. G. Evans
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3

(1972)

Miss K. Ghuman
P. O. Box 44
Grande Cache, Alberta
T0E 0Y0

(1972)

Mr. B. Godwin
Department of Advanced Education
Olds College
Olds, Alberta
T0M 1P0

(1973)

Dr. R. Gooding
Entomology Department
University of Alberta
Edmonton, Alberta
T6G 2E3

(1972)

Mrs. F. Goulet
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3

(1972)

Mr. H. Goulet
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3

(1973)

Mr. G. C. D. Griffith
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3

(1971)

Mr. J. B. Gurba
Alberta Department of Agriculture
Crop Protection and Pest
Control Branch
Agriculture Building
Edmonton, Alberta T5K 2C8

(1973)

Mr. E. T. Gushul
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1 (1973)

Dr. B. Hocking
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 (1973)

Dr. A. M. Harper
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1 (1973)

Mrs. B. Hocking
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 (1971)

Mr. B. Harrison
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 (1971)

Dr. I. D. Hodgkinson
Environmental Sciences Centre
University of Calgary
Calgary, Alberta
T2N 1N4 (1972)

Dr. R. C. B. Hartland-Rowe
Department of Zoology
University of Calgary
Calgary, Alberta
T2N 1N4 (1973)

Dr. N. D. Holmes
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1 (1973)

Dr. W. O. Haufe
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1 (1972)

Dr. Ruth L. Hooper
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 (1972)

Dr. B. Heming
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 (1973)

Dr. G. Hopping
1573 Begbie Street, No. 460
Victoria, British Columbia
Honorary Member

Mr. C. Hergert
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 (1973)

Mr. J. E. Hudson
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 (1973)

Dr. G. A. Hobbs
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1 (1973)

Mr. L. A. Jacobson
1011 - 14 Street South
Lethbridge, Alberta
T1K 1T5
Honorary Member

- Mr. C. James
411 - 13 Avenue North West
Calgary, Alberta
T2M 0G2 (1972)
- Mr. M. Jones
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 (1972)
- Dr. R. Kasting
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1 (1972)
- Mr. D. Kavinaugh
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 (1971)
- Mrs. D. Kavinaugh
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 (1971)
- Dr. M. A. Khan
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1 (1971)
- Dr. G. N. Lanier
1709 Euclid Avenue
Syracuse, New York 13224
U. S. A. (1972)
- Mr. D. J. Larson
Department of Biology
University of Calgary
Calgary, Alberta
T2N 1N4 (1972)
- Mrs. D. J. Larson
Department of Biology
University of Calgary
Calgary, Alberta
T2N 1N4 (1972)
- Dr. Ruby I. Larson
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1 (1973)
- Mr. R. Lee
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 (1973)
- Mr. T. Leischner
Environmental Sciences Centre
University of Calgary
Calgary, Alberta
T2N 1N4 (1972)
- Mr. C. E. Lilly
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1 (1972)
- Dr. W. R. M. Mason
Entomology Research Institute
Research Branch, Agriculture Canada
Ottawa, Ontario
K1A 0C6 (1973)
- Dr. W. Matthey
Environmental Sciences Centre
University of Calgary
Calgary, Alberta
T2N 1N4 (1971)
- Mr. V. J. McCauley
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 (1971)
- Mr. S. McDonald
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1 (1973)

- | | |
|--|--|
| Mr. J. Melvin
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3
(1972) | Dr. P. Pankiw
Research Station
Research Branch, Agriculture Canada
Beaverlodge, Alberta
T0H 0C0
(1973) |
| Mr. P. A. Meyer
Department of Entomology
University of Alberta
T6G 2E3
(1973) | Mr. L. K. Peterson, Head
Pesticide Chemicals Branch
Department of the Environment
Milner Building, 6th Floor
Edmonton, Alberta
T5J 0Z6
(1973) |
| Mr. M. J. Mitchell
Department of Biology
University of Calgary
Calgary, Alberta
T2N 1N4
(1972) | Mr. D. Pforr
Box 733
Kaslow, British Columbia
(1970) |
| Dr. J. Muldrew
Canadian Forestry Service
Environment Canada
5320 - 122 Street
Edmonton, Alberta
T6H 3S5
(1972) | Mr. H. G. Philip
Plant Industry Laboratory
Alberta Department of Agriculture
O. S. Longman Building
6909 - 116 Street
Edmonton, Alberta
(1973) |
| Mr. D. L. Nelson
Research Station
Research Branch, Agriculture Canada
Beaverlodge, Alberta
T0H 0C0
(1972) | Mrs. L. Pledger
Alberta Department of Agriculture
O. S. Longman Building
6909 - 116 Street
Edmonton, Alberta
(1971) |
| Dr. W. A. Nelson
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1
(1973) | Mr. W. B. Porter
Department of Biology
University of Calgary
Calgary, Alberta
T2N 1N4
(1971) |
| Mr. A. Nimmo
Tekarra
Market Place
Corbridge, Northumberland
England
(1973) | Mr. J. M. Powell
Canadian Forestry Service
Environment Canada
5320 - 122 Street
Edmonton, Alberta
T6H 3S5
(1971) |
| Mr. R. Owens
Department of Biology
University of Calgary
Calgary, Alberta
T2N 1N4
(1971) | Dr. G. Pritchard
Department of Biology
University of Calgary
Calgary, Alberta
T2N 1N4
(1973) |

- | | | | |
|---|--------------------|---|--------|
| Mr. D. Proctor
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 | (1971) | Mr. J. A. Shemanchuk
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1 | (1973) |
| Mr. D. Radford
Fish and Wildlife Division
Alberta Department of
Lands and Forests
104 Administration Building
Lethbridge, Alberta
T1H 0H5 | (1972) | Mr. J. Shorthouse
Department of Biology
University of Saskatchewan
Saskatoon, Saskatchewan | (1973) |
| Mr. K. W. Richards
2209 Tenth Avenue South
Lethbridge, Alberta
T1K 0C3 | (1972) | Dr. F. A. Siddiqui
Northern Alberta Institute
of Technology
Edmonton, Alberta
T5G 2R1 | (1973) |
| Mr. J. Rickert
Northern Alberta Institute
of Technology
11762 - 106 Street
Edmonton, Alberta
T5G 2R1 | (1973) | Dr. U. Soehngen
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1 | (1973) |
| Mr. D. Rosenberg
Fresh Water Institute
Department of Fisheries
Winnipeg, Manitoba | (1972) | Dr. D. S. Smith
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1 | (1972) |
| Mr. J. Ryan
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 | (1973) | Mr. R. E. Stevenson
Canadian Forestry Service
Environment Canada
5320 - 122 Street
Edmonton, Alberta
T6H 3S5 | (1969) |
| Dr. R. W. Salt
639 - 18 Street South
Lethbridge, Alberta
T1J 3E9 | (1973) | Mr. D. B. Stewart
Department of Entomology
University of Alberta
Edmonton, Alberta
T6G 2E3 | (1973) |
| Mr. H. L. Seamans
581 Fraser Avenue
McKellar Park
Ottawa, Ontario | Honorary
Member | Dr. D. L. Struble
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta
T1J 4B1 | (1973) |

Dr. G. E. Swailes
 Research Station
 Research Branch, Agriculture Canada
 Lethbridge, Alberta
 T1J 4B1 (1973)

Dr. P. R. Wilkinson
 Research Station
 Research Branch, Agriculture Canada
 Lethbridge, Alberta
 T1J 4B1 (1973)

Mr. A. E. Thomas
 Department of Entomology
 University of Alberta
 Edmonton, Alberta
 T6G 2E3 (1971)

Mr. H. R. Wong
 Canadian Forestry Service
 Environment Canada
 5320 - 122 Street
 Edmonton, Alberta
 T6H 3S5 (1973)

Mr. R. Walsh
 Zoology Department
 University of Alberta
 Edmonton, Alberta
 T6G 2E3 (1971)

Mr. J. W. Warren
 Chemagro Corporation
 No. 3 North Seventh Avenue
 Yakima, Washington 98902
 U. S. A. (1969)

Miss Doreen Watler
 Department of Entomology
 University of Alberta
 Edmonton, Alberta
 T6G 2E3 (1972)

Mr. G. R. Watson
 Rural Route Number Seven
 South Edmonton, Alberta (1972)

Mr. J. Weintraub
 Research Station
 Research Branch, Agriculture Canada
 Lethbridge, Alberta
 T1J 4B1 (1973)

Mr. R. M. White
 Rural Route Number One
 West Summerland, British Columbia
 Honorary
 Member

Mr. D. Whitehead
 Department of Entomology
 U. S. National Museum
 Washington, D. C. 20560
 U. S. A. (1971)