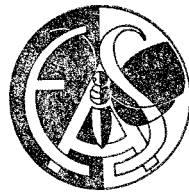


PROCEEDINGS OF THE FIFTH ANNUAL MEETING
OF THE
ENTOMOLOGICAL SOCIETY
OF
ALBERTA

HELD JOINTLY WITH THE
ENTOMOLOGICAL SOCIETY OF CANADA



LETHBRIDGE - ALBERTA

OCTOBER 29TH - 31ST, 1957



ENTOMOLOGICAL SOCIETY
OF ALBERTA

ORGANIZED
NOVEMBER 27
1952

CHARTER MEMBERS

<i>E.H. Sutherland</i>	<i>W. Varstedt</i>
<i>Robert Austin</i>	<i>Ed Hutto</i>
<i>H. Austin</i>	<i>Russalt</i>
<i>W.C. Mittleffer</i>	<i>H. Hunting</i>
<i>John Filduff</i>	<i>Leslie Hopping</i>
<i>R.L. Blakelock</i>	<i>Law S. Lindsay</i>
<i>R.F. Sheld</i>	<i>R.W. Stark</i>
<i>R. R. Stogray</i>	<i>P. de Regent</i>
<i>Maymie Roslett Mackay</i>	<i>L. K. Peterson</i>
<i>Andy S. Larson</i>	<i>Chapman</i>
<i>B. C. Lilly</i>	<i>N. D. Holmes</i>
<i>A. C. Rayner</i>	<i>F. Brown</i>
<i>Wm. H. Hays</i>	<i>Blundell</i>
<i>X. R. Dwyer</i>	<i>L. A. Wilson</i>
<i>R. V. Bleasid</i>	<i>W. W. Hopewell</i>
<i>Omar Broughton</i>	<i>N. S. Church</i>
<i>M. D. McDonald</i>	<i>Arthur B. Hewitt</i>
<i>D. S. Smith</i>	<i>H. C. Swais</i>
<i>Alan M. Harper</i>	<i>McBroadfoot</i>
<i>Joyce M. Hepburn</i>	<i>R. D. Shultz</i>
<i>Stanley L. W. Mann</i>	<i>C. F. Green</i>

Proceedings of the

ENTOMOLOGICAL SOCIETY OF ALBERTA

Vol. 5

December, 1957

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Proceedings of the
ENTOMOLOGICAL SOCIETY OF ALBERTA

held jointly with the
Entomological Society of Canada

Vol. 5

December, 1957

MESSAGE FROM THE PRESIDENT
(Entomological Society of Alberta)

The Entomological Society of Alberta was given an opportunity in the year just ended to render a service of national importance. We were privileged to act as hosts and organizers of the joint meeting of our own and the national society. The local arrangements, the facilities, the entertainment, and the scientific program all together provided an occasion that will be long remembered by the visitors and our own members as well.

Success such as this is the result of careful planning followed by a lot of hard work. Two people, I think, deserve special mention, the over-all chairman, L. A. Jacobson, for having had everything in readiness in advance of the sessions, and R. W. Salt, chairman of the Program Committee. The rooms, the projectors, and the operators were on hand when required--all these things do not just happen. They are the result of a carefully planned program with responsible men in charge. The scientific program was of high calibre, well balanced between the theoretical and the practical, and the papers were well prepared. The Tenth International Congress had been a maturing and stimulating experience to all those who participated and even to those who were spectators only. Many of us feared that the first post-Congress meeting might be an anti-climax, but the enthusiastic response and the interest shown made the responsibility of being host for the national meetings a real pleasure.

Our Society's activities were rather restricted; the joint collecting trips that some of our members had found time to participate in in previous years were passed up this year. Without the preoccupation of a national meeting our new executive may find time to plan these really enjoyable aspects of our avocation. I hope that this year will be a most successful one for them and for the Society as a whole.

I cannot end this note without expressing my thanks to the Entomological Society of Alberta for the privilege of serving them in the capacity of President during this past year.

C. W. Farstad,
Past-President.

Minutes of
FIFTH ANNUAL MEETING OF THE
ENTOMOLOGICAL SOCIETY OF ALBERTA

Science Service Laboratory
Lethbridge, Alberta
October 28, 1957

The meeting convened at 2.00 p.m. with 16 members present. (This increased to 28 before the meeting was over.) The President, C. W. Farstad, welcomed the members.

The minutes of the last general meeting were read and adopted on a motion by J. A. Shemanchuk, seconded by A. M. Harper.

The motion made by W. C. Broadfoot and seconded by L. K. Peterson at the last general meeting was presented to the members. The motion reads:

That Article 3, paragraph (a), of the Constitution of the Entomological Society of Alberta be amended to read:-

(a) Any person interested in entomology may become a Full Member on application in writing

to the Secretary of the Society and on approval by the Executive. Such prospective members are to be notified of their election and are to pay their fees within six months of the date of their election, otherwise such election will become null and void.

Any person who is studying entomology at the college undergraduate level or high school level and who is enrolled in a recognized educational institution may become a Student Member.

Honorary Life Membership may be conferred on anyone who has performed long and distinguished service in the field of entomology. The total of Honorary Life Members shall not exceed five per cent of the total membership at the time of election. An Honorary Life Member will enjoy all the privileges of Full Members but will be exempt from payment of dues. All Full Members are entitled to propose the names of prospective Honorary Life Members provided each such proposal is supported by two other Full Members and is submitted in writing to the Secretary at least one month prior to the Annual Meeting. Such Honorary Life Members will be elected at an Annual Meeting. Carried.

The bookplate to be placed in books awarded as prizes was displayed to the members, and the President reported that no progress was yet to be divulged on the questions of government policy regarding private collections, on grants to our Society from the provincial government, or on the question of honorary patrons.

C. E. Lilly presented an interim financial statement and moved its adoption. This was seconded by P. E. Blakeley. Carried.

The President appointed the following committees:-

Nominations: R. W. Salt (Chairman)
N. D. Holmes
J. Weintraub
W. C. McGuffin

Resolutions: G. R. Hopping (Chairman)
W. C. Broadfoot
L. K. Peterson

Nominations were called for two auditors. S. McDonald nominated Catherine M. Webster, and N. D. Holmes nominated P. E. Blakeley.

A. M. Harper moved that nominations close, seconded by L. K. Peterson. Carried.

G. R. Hopping moved that the name of E. S. Strickland be repropoed for Honorary Membership in the Entomological Society of Canada when nominations are again called for, seconded by C. E. Lilly. Carried.

The Secretary read a proposal that H. L. Seamans be elected to Honorary Life Membership in the Entomological Society of Alberta, signed by C. E. Lilly, J. A. Shemanchuk, and C. W. Farstad. The members voted unanimously for this proposal.

R. W. Salt moved that the Entomological Society of Alberta request the Entomological Society of Canada to raise its annual fee by an amount sufficient to enlarge the Canadian Entomologist and to perform other services as required, seconded by G. E. Swailes. Carried.

L. A. Jacobson, chairman of the local committee for the meetings, gave a report to the members.

After a break for coffee R. W. Salt presented the following slate of officers drawn up by the Nominating Committee:-

President	-	G. E. Ball
Vice-President	-	C. E. Brown
Secretary	-	J. B. Gurba
Treasurer	-	J. H. Brown
Editor	-	R. F. Shepherd
Directors	-	R. W. Stark
	-	W. A. Nelson
	-	G. E. Swailes

As no further nominations came from the floor, B. Hocking moved that nominations close, seconded by W. C. Broadfoot. Carried.

G. R. Hopping presented the report of the Resolutions Committee as follows:-

Be it resolved that

- (a) The regional representatives in Edmonton, Calgary, and Lethbridge be thanked for

their efforts in continuing to maintain and foster the interest of young people in the insect collection competition.

(b) The committee responsible for the arrangements of the seventh annual meeting of the Entomological Society of Canada and the fifth annual meeting of the Entomological Society of Alberta be extended a cordial vote of thanks. This occasion should be especially noted in the minutes as a memorable one in the annals of the Society.

(c) The Secretary be instructed to write to the representatives of the press, radio, and TV as well as the companies and establishments listed in the program, and especially the Province of Alberta, thanking them for the banquet and other entertainments provided.

(d) The outgoing Executive be thanked for their efforts on behalf of our Society.

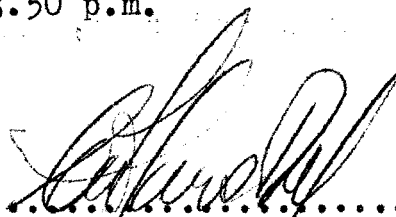
The adoption of this report was moved by G. R. Hopping, seconded by I. S. Lindsay. Carried.


G. E. Swailes suggested that a meeting of our Society be held later this year. There was no vocal support for this idea, so it died right there.

W. C. Broadfoot suggested that there be incorporated in our minutes or annual report a list of papers published by members of the Society.

C. E. Brown moved that the Executive be authorized to receive reports and financial statements from the committees organizing the national meeting on behalf of the Society as a whole, seconded by R. W. Salt. Carried.

The meeting adjourned at 3.50 p.m.


.....
President


.....
Secretary

FINANCIAL STATEMENT FOR YEAR ENDING DECEMBER 31, 1957

Receipts

Balance as at January 1, 1957		60.82
Membership fees:		
Ent. Soc. of Alberta - 1955 ..	2.00	
- 1956 ..	10.00	
- 1957 ..	86.00	
- 1958 ..	<u>42.00</u>	140.00
Ent. Soc. of Canada - 1956 ..	4.00	
- 1957 ..	84.00	
- 1958 ..	<u>56.00</u>	144.00
Surplus funds - annual meeting of Entomological Society of Canada		404.34
Sale of insect boxes	<u>3.30</u>	<u>691.64</u>
		752.46

Disbursements

Fees - Entomological Society of Canada ...	148.00	
University of Alberta Bursary	50.00	
Proceedings - 1956	30.25	
Banquet speaker - 1956	9.15	
Postage and stationery	15.55	
Bank charges	1.20	
Miscellaneous	<u>5.51</u>	<u>259.66</u>
Balance as at December 31, 1957		<u><u>492.80</u></u>

Audited and found correct.....

W. Webster
.....
P. Blakeley
.....

C. E. Lilly
.....
C. E. Lilly, Treasurer

ENTOMOLOGICAL SOCIETY OF ALBERTA
INSECT COLLECTION COMPETITION, 1957

Prize winners in the 1957 Insect Collection Competition were as follows:-

- Senior Group: 1st prize - Kenneth Beswick of Spring Coulee
2nd prize - Douglas Salt of Lethbridge
3rd prize - Jane Moonen of Millet
- Junior Group: 1st prize - Christine Marshall of Claresholm
2nd prize - Bruce Martin of Edmonton
3rd prize - Gary Brown of Calgary

Acknowledgement is made of the services of Dr. J. R. Vockeroth and A. R. Brooks of the Systematic Unit, Division of Entomology, who very kindly acted as judges for the entries.

Bookplates were printed and will be used for the first time in the book prizes awarded.

No material of outstanding interest was in the collections. Prizes, and comments on the collections will be sent out shortly.

Minutes of
ENTOMOLOGICAL SOCIETY OF ALBERTA
LIBRARY COMMITTEE MEETING

Calgary, Alberta
January 10, 1958

Those present at the meeting were J. Weintraub (Chairman), Margaret E. P. Cumming, and R. F. Shepherd. R. L. Anderson was unable to attend.

The first matter discussed was the contents of the library. It was felt that the papers should be limited to those that would be useful to the amateurs, which would be chiefly of a taxonomic nature, and would include distributions and check lists. It was suggested that the professional members could assist the librarian by bringing papers of this nature to his attention. The following members were to be contacted by Mr. Weintraub and asked to make a particular effort along this line, since they were interested in taxonomy: G. E. Ball, W. C. McGuffin, G. R. Hopping, and G. A. Hobbs.

A permanent exchange list was discussed. It was considered desirable to exchange copies of proceedings regularly with the following societies: Entomological Societies of British Columbia, Manitoba, Quebec, and Ontario and Acadian Entomological Society, and to give copies to the laboratory libraries at Lethbridge, Calgary, and the University of Alberta. Mr. Weintraub agreed to send a note with each submission to the above societies, requesting that a regular exchange be instituted and stating that back copies of the Entomological Society of Alberta Proceedings are available. It was agreed that it was the responsibility of the permanent librarian to make sure that copies were actually received. The name and address of the permanent librarian would be given on the notice. A permanent exchange list should be set up. It was suggested that the Canadian Entomologist should be in the library. Mr. Shepherd agreed to determine if copies could be obtained since we were an affiliate society or if a subscription would have to be obtained.

It was also suggested that the lacunae in the present library be filled in, particularly those in the proceedings of other societies.

The permanent librarian's duties were outlined as follows:-

- To set up an index with the help of the Committee
- To compile an accessions list after some culling of present books
- To furnish the editor with a list of accessions each year to be published in the Proceedings

It was suggested that an appeal be made to members of the Society to give any extra papers on taxonomic subjects, which they might have, to the library. Mr. Weintraub agreed to put a notice about this in the 1957 Proceedings.

It was suggested that a notice be given to change the constitution at the next annual meeting regarding the naming of the Librarian as the Permanent Librarian and to call the elected Editor-Librarian simply the 'Editor'. Mr. Shepherd agreed to do this.

Some culling of the list of library books was done. Papers removed were on such subjects as control, which are unrelated to the type of publication to be kept in the library. Mr. Weintraub handed over the Chairmanship of the Committee to Mr. Shepherd. It was decided that the Calgary members would contact the three amateur entomologists in

Calgary as soon as possible in order to finalize as many as possible of the suggestions made in the meeting.

Margaret E. P. Cumming,
Acting Secretary.

NOTICE TO ALL MEMBERS

The library of the Entomological Society of Alberta will accept gratefully any reprints or publications you may wish to donate on the taxonomy of insects pertaining to Alberta or this region. You are urged to acquire extra reprints for this purpose.

Joint Meeting

7TH ANNUAL MEETING of ENTOMOLOGICAL SOCIETY OF CANADA

5TH ANNUAL MEETING of ENTOMOLOGICAL SOCIETY OF ALBERTA

REPORT OF GENERAL CHAIRMAN
Meetings Committee, 1957

The Entomological Society of Alberta acted as host for the joint meeting of the Alberta Society and the Entomological Society of Canada at Lethbridge on October 29, 1957. As hosts we were responsible for securing meeting places for all sessions, for arranging luncheons, banquets, and evening social affairs, and, most important of all, for organizing a scientific programme of symposia, invitation papers, and submission of papers by members.

Unfortunately the Marquis Hotel did not have rooms for all meetings, but additional accommodation at the Civic Centre was very satisfactory for the joint paper-reading sessions. General sessions had to be held in the main diningroom at the hotel, but there was little difficulty in adhering to time schedules. The smoker at the Country Club provided the social highlight with its feature of barbecued cattalo for the evening snack. The luncheon and the film on the sugar-beet industry, provided by Canadian Sugar Factories, were well received. The annual banquet was tendered by the Province of Alberta, and the address by A. J. Cullen, coupled with the entertainment by George Brown Jr., made the entire evening an unqualified success. Although very few wives attended, those who were present were well entertained with a tea, a theatre party, and a visit to the sugar factory at Taber.

Press coverage was disappointing. We had assumed incorrectly that reporters would have no difficulty in obtaining stories, but it is now apparent that they should have been provided with more guidance and advance background material.

The surplus shown in the Financial Statement (page 6) is accounted for mainly by the larger-than-expected registration and, secondly, by the necessity of cancelling the cocktail party because of a provincial plebiscite. Furthermore, we were fortunate in obtaining sponsors for the noon luncheon and the annual banquet.

The success of the joint meetings was due to excellent work by the chairmen and members of all committees. The measure of success is shown by the many compliments expressed by letter from or in conversation with those who attended.

L. A. Jacobson

PRESIDENTIAL ADDRESS
(Entomological Society of Canada)

"The Entomological Society in Perspective"

Robert Glen

Because we live in an age of science we also live in an age of scientific societies and conferences. Over the years, an immense pyramid of scientific and technical organizations has arisen. This pyramid is surmounted by ICSU, the International Council of Scientific Unions. Clustered around and forming the base of the pyramid is a host of local, semi-permanent discussion groups and clubs. Somewhere between these extremes we find the Entomological Society of Canada and its seven regional affiliates. My purpose today is to bring before you some of the relationships between our Society and this vast array of organizations that runs perhaps to the thousands, in other words, to see the Entomological Society of Canada in a little broader perspective.

Now I must frankly admit that I have only been able to scratch the surface of this problem and to probe it in depth at very few places. I shall not attempt, therefore, to orient you thoroughly but simply to provide some background that may be useful in assisting you to decide where we should go from here as a society. I shall dwell at somewhat greater length on a few organizations: the International Council of Scientific Unions (ICSU), the American Institute of Biological Sciences (AIBS), the Agricultural Institute of Canada (AIC), the Entomological Society of America (ESA), and the newly formed Canadian Federation of Biological Societies (CFBS).

Let me begin at the top of the pyramid with a few international considerations. ICSU is a corporate body of 13 international scientific unions such as the International Union of Biological Sciences, the International Union of

Pure and Applied Physics, the International Union of Pure and Applied Chemistry, and the International Mathematical Union. Although there are nine other international unions involved, I wish only to emphasize that the major fields of science (biology, physics, chemistry, and mathematics) are all represented at this level.

ICSU is an older body than the United Nations, but it has become an important agent of UNESCO, the United Nations Educational, Scientific, and Cultural Organization, which assigns to ICSU a number of authorities and responsibilities in the scientific field. These assignments are accompanied, of course, by appropriate grants of money from UNESCO to be spent in the interests of science and of mankind generally. The origin of ICSU goes back to the latter part of the nineteenth century and the first international arrangements for uniform standards of measurement. It took on its present form and status in 1931 and in recent years it has extended its influence by sponsoring, for example, the International Geophysical Year. There is, therefore, a comprehensive international scientific organization operating at the level of, and in conjunction with, the United Nations. That important goal in international collaboration has been attained and, in my opinion, is a thoroughly meritorious achievement.

Canada is an adhering member of ICSU and of 12 of its 13 constituent unions. The National Research Council of Canada is the adhering body through which this membership is arranged and paid for. The NRC usually carries out the technical aspects of this function through a series of national committees, one for each scientific union concerned.

The Entomological Society of Canada has a firm connection at present with this hierarchy of organizations. This is achieved through Dr. W. R. Thompson, who, as President of the Tenth International Congress of Entomology, became a member of the Permanent Committee of the Congress. Since 1950 the Permanent Committee has functioned as the Entomology Section of the International Union of Biological Sciences, which, of course, is a member union of ICSU.

At this juncture let us consider our own Society in relation to others of its kind. The Entomological Society of Canada is but one of some 113 active entomological societies in the world today. This is a conservative figure and excludes societies in the specialized fields of apiculture and sericulture, commercial associations, and natural history organizations. It is based on the valuable recent compilation of Dr. Curtis Sabrosky (1) of the Entomology Research Division, United States Department of Agriculture. These 113 are the survivors of about 200

organizations, of which the first was the Aurelian Society of London, England, begun in 1745. The mortality among entomological societies stands, therefore, at well over 40 per cent for the world as a whole, but it is greatest in Europe, where it is of the order of 60 per cent. However, since 1945 only two societies are known to have failed and at least 35 new ones have been formed. It is astonishing that, although entomological societies have been formed over a period of 200 years, nearly one-third of those now functioning have been founded in little more than the past decade. Of the 35 newest societies five are in Canada, 16 in the United States, 10 in Japan, and only four in all other parts of the world. On the basis of numbers of entomologists, Japan must be rated as the country most active in society formation and Europe as the least active centre during the past decade.

We all know, of course, that the Entomological Society of Ontario is the oldest entomological society in Canada and the second oldest active entomological society in North America, dating back to 1863. Most of our seven regional societies and the national body itself were formed or revived after World War II (2, p. 297).

In the United States, entomological activity, until the mid-nineteenth century, was largely centred in agricultural societies, philosophical societies, natural history organizations, and academies of science. The most prominent of these was the Academy of Natural Sciences of Philadelphia (1812), of which Thomas Say, the "father of American entomology", was a founding member. The first truly entomological society in America was the Entomological Society of Pennsylvania formed in 1842; the next, and the oldest active society today, was founded in 1859 as the Entomological Society of Philadelphia and renamed in 1867 as the American Entomological Society, which is best known through its publication, Entomological News. Thereafter in the United States the formation of entomological societies proceeded steadily and today, with some 40 active groups, the United States apparently has more such organizations than the whole continent of Europe. Among the strong regional societies in the United States are: the Brooklyn Entomological Society (publishes its Bulletin and Entomologica Americana), the Cambridge Entomological Club (Psyche), the Entomological Society of Washington (Proceedings), the New York Entomological Society (Journal), and the Pacific Coast Entomological Society (Pan-Pacific Entomologist), and the Hawaiian Entomological Society (Proceedings). There are also a number of specialized entomological societies in the United States with international membership. Examples are the American Mosquito Control Association (publishes Mosquito News), the

Insecticide Society of Washington (no publication), the Coleopterists' Society (Coleopterists' Bulletin), and the Lepidopterists' Society (Lepidopterists' News). However, the society in the United States that is best known to us is the Entomological Society of America (Bulletin; Annals; Journal of Economic Entomology), a strong national society, which has five large regional branches, a membership exceeding 4,000, and a paid secretariat. This Society, as its name implies, is really international in its operations, serving entomological interests in the United States proper, Canada, Mexico, Central America, the Canal Zone, the Hawaiian Islands, and Alaska, and it has been suggested by its president (H. M. Armitage) that the Entomological Society of Canada might wish to affiliate with ESA to make it an international organization in fact as well as in name.

However, there is another interest now at fever pitch in the ESA that is probably of equal concern to us: the possibility of the ESA seeking membership in the American Institute of Biological Sciences. Some details about this higher body seem warranted since the formation of a Canadian equivalent to the AIBS is in the minds of many Canadian biologists these days.

The AIBS is a federation of biological societies. It was founded in 1948 and is attempting to do for biology and biologists in the United States what the American Institute of Physics, the American Chemical Society, and the American Mathematical Society have already done for the other major sciences and their adherents: to create one national body to speak authoritatively for the group as a whole that it might receive suitable recognition and support and thus be enabled to discharge better its important public and professional responsibilities to the nation and to mankind generally.

Although the Institute still lacks the active participation of some biological organizations in the United States, it represents full approximately 17,000 American biologists, who are the members of its 21 member societies, and it represents to a lesser degree an additional 38,000 biologists, who are members of its 17 affiliate societies. Accordingly, it speaks in part at least for 38 of the 60 national biological societies and for roughly 55,000 of the estimated 70,000 biologists in the United States. The significance of this growing representation and of the impressive quality of AIBS leadership is clearly reflected in the strong financial support contributed to the Institute by outside agencies, an amount now approaching 20 times the total provided in annual dues by the constituent societies. Thus every dollar contributed by biologists themselves is bringing an additional 20 dollars in support of biological

work in general. These funds are used for activities such as planning, conducting, and publishing results of special biological conferences and symposia; provision of travel grants for attendance of biologists at international meetings; provision of advisory committee services to federal fund-granting agencies: National Science Foundation, Office of Naval Research, and Atomic Energy Commission; preparation of a national directory of biologists; publication of English translations of four Russian-language biology journals for distribution at a reasonable subscription rate; provision of office and business services at reduced rates to member societies; and several other activities of direct benefit to individuals as well as to organizations. The annual meeting of AIBS is usually held in the summer on the campus of a large university. This provides accommodation for joint sessions, and the use of university dormitories and cafeterias permits attendance at minimum cost to individuals.

Important as all such matters are, I feel that the basic issue before the members of ESA is: Do entomologists wish to be identified with a national movement in the interests of the whole science of biology and on behalf of all biologists? Regardless of the decision taken in the United States, I suggest that the same question should be asked and answered by biologists in Canada, including the members of the national Entomological Society. You will probably be faced with this problem in the near future and from more than one direction for alternatives appear to be in the making. In all probability, you will be presented with a well-considered plan. Your only hope for a well-considered answer lies in adequate advance preparation. I would urge the members of this Society to study this whole question carefully and to take an active rather than a passive role in the developments that you favour.

Where do biologists in Canada stand at the present moment in this matter? As in the United States the physical sciences are already organized nationally. For example, we have the Canadian Association of Physicists, the Chemical Institute of Canada, the Canadian Mathematical Congress, and the Engineering Institute of Canada. On the biological side we have a plethora of national organizations (3) but no counterpart of the American Institute of Biological Sciences. In our attempts to find a suitable national coordinating group, we might begin with an appraisal of existing organizations. In so doing, we may reject from further consideration all those that are primarily professional in purpose, such as the Canadian Medical Association; those that are largely commercial in their interests as the Canadian Pulp and Paper Association; those that operate mainly on behalf of governments as research boards, foundations, councils,

etc., and those special-interest groups that are often non-technical in membership as the Canadian Arthritis and Rheumatism Society. Several natural history and conservation societies, such as the Audubon Society of Canada, might hold interest for some of our members, but they have little in common with an appropriate national biological body. So we are left to consider the societies that have relatively important scientific interests.

The Royal Society of Canada formed in 1882 has a broad academic purpose. However, it has a severely restricted membership, and only one of its five sections is devoted to the biological sciences (approximately 120 members). Preliminary enquiries have led me to feel that the Royal Society would probably not be interested or well suited to serve as a national coordinating body on behalf of biologists.

The Agricultural Institute of Canada founded in 1920 warrants greater consideration. It might even be receptive to a suggestion to expand its field of coverage. It has 30 geographic branches, five adhering provincial associations, and eight national affiliates, as follows: The Canadian Agricultural Economics Society, the Canadian Agricultural Pesticides Technical Society, the Canadian Phytopathological Society, the Canadian Society of Agricultural Engineers, the Canadian Society of Agronomy, the Canadian Society of Animal Production, the Canadian Society for Horticultural Science, and the Canadian Soil Science Society.

The constituent societies pay no adhering dues and receive assistance from the parent body in their annual convention arrangements and in the publication of their annual proceedings. In addition, the AIC provides regular publication outlets for its members through a series of journals. This institute and its associated groups are an important force in Canadian agriculture and merit the support of every professional agriculturist. Nevertheless, its interest is agriculture and it does not embrace other broad applied biological fields such as forestry, fisheries, and medicine. Accordingly, I have serious misgivings concerning its suitability as the coordinating agency for the biological sciences as a whole. In my opinion, the AIC is correctly cast as the champion of agriculture and of agriculturists and with the Canadian Institute of Forestry and the Canadian Institute of Mining and Metallurgy completes a trinity of important natural resources societies. But what is needed is the biological counterpart of the strong organizations that already exist in Canada for the whole sciences of physics and chemistry.

A small move has already been made in this direction. On October 11, 1957, the Canadian Federation of Biological Societies was formed in Ottawa. As stated in its provisional constitution:-

"The purpose of the Federation shall be to bring together persons who are interested in teaching and research in the biological sciences; to disseminate information on the results of biological research through scientific meetings and through publication; to encourage exchange of information between constituent societies; and to act for member societies when it is agreed that concerted action is desirable."

Also,

"The Federation shall be managed by a Board on which each constituent society shall have two representatives."

Leadership in this development was provided by the Canadian Physiological Society (formed in 1935), and the other three founding societies, none more than a year old, were the Pharmacological Society of Canada, the Canadian Association of Anatomists, and the Canadian Biochemical Society. As now constituted the Federation has a strong medical slant, and the decision to federate arose in part, no doubt, to facilitate arrangements for joint annual meetings of common interest groups. The broader objectives and means of reaching them will probably be threshed out at the Federation's first annual meeting scheduled for June, 1958, at Kingston, Ontario. Perhaps representatives of other biological societies will be invited to participate in these deliberations. It is too soon to know, but not too soon to begin to consider what our response should be to such an invitation and what views, if any, a delegate from our Society would be expected to express.

In my opinion, a national biological society should include the medical biologists, but it must also include the agricultural biologists, the forestry biologists, and so on, and it must not be narrow or partisan in its interests. For these reasons I regret that the Canadian Physiological Society did not circularize all important Canadian biological institutions and all pertinent national biological organizations in an effort to form a truly representative body. But perhaps getting started was the preferred immediate objective, and I suggest that for the present we centre our thoughts on the success attained and not on the means employed. However, even in the early stages of development

a suitable Canadian biological federation should aim to include, in addition to the four organizations already federated, such societies as:-

The Canadian Phytopathological Society (currently affiliated with AIC)	(1929, membership 240)
The Canadian Psychological Association	(1939, " 759)
The Canadian Association of Pathologists	(1949, " 197)
The Entomological Society of Canada	(1950, " 578)
The Canadian Society of Microbiologists	(1951, " 379)
The Genetics Society of Canada	(1955, " 150)
The Nutrition Society of Canada	(1957, " ?)
The Canadian Society of Plant Physiologists	(Formation pending)

and the national societies of botany and zoology whenever these are formed.

With the groups already federated this would give a total of 13 or more member societies and a membership approaching 3,000. Such a body would be considerably smaller than the Canadian Institute of Chemistry but much larger than the Canadian Association of Physicists. However, it should be able to speak authoritatively for Canadian biologists as a whole, to work effectively towards strengthening the science of biology in this country in both its educational and research aspects, and to enable biologists to perform better those broader public services for which by training and experience they are peculiarly fitted.

As a society, however, we also have practical reasons for considering membership in an organization bigger than our own. For example, we are not large enough as yet to support a central office with paid staff, but we are gradually becoming too large to obtain the essential management and business services gratis or for the modest honoraria that we can afford on the basis of present revenues. Accordingly, the 'hidden subsidies' by which we maintain such services are gradually assuming larger and more daring proportions. We are not yet out of our depth, but we are aware of the rising water!

These then are some of the observations that have interested me during this year as your president. I leave them with you for reflection, for reflection and perchance

for study leading to decision. Scientific events of great significance are occurring with unprecedented frequency today. The physical sciences are in the forefront with the developments in new sources of power and in new means of probing the secrets of outer space. But biological implications invariably follow in the wake of such advances. Perhaps the next great event to be sponsored by ICSU will be an IBY, an International Biological Year. When that occurs let us hope that Canada will have a strong central biological organization to coordinate the efforts of its many vigorous subject groups. Meanwhile the basic question awaits us: Where do we go from here as a society?

Literature Cited

1. Sabrosky, Curtis W. Entomological societies. Bull. Ent. Soc. America 2(4) : 1-22. 1956.
2. Glen, R., compiler. Entomology in Canada up to 1956. Canadian Ent. 88 : 290-371. 1956.
3. Kohr, John R., compiler. Handbook of scientific and technical societies of Canada. Natl. Res. Counc. Canada Publ. 3510. 1955.

SUMMARIES OF PAPERS SUBMITTED BY MEMBERS

Brown, J. H. MEDICAL AND PUBLIC HEALTH ENTOMOLOGY IN ALBERTA, 1938-57.--A summary is presented of investigations on the occurrence of Bubonic Plague, Rocky Mountain Spotted Fever, Tularaemia, and other arthropod-borne diseases and on the development of preventive and control measures undertaken in Alberta from 1938 to 1957.

Gooding, R. H., and J. Weintraub. MORPHOLOGY OF THE GENITALIA OF HYPODERMA LINEATUM AND HYPODERMA BOVIS.--A description of genitalia of both species in copula is presented. Precise descriptions and measurements of the genital armatures provides data for differentiation of the two species. Male genitalia of H. bovis, observed in the pupal stage, show the development of the hypopygium inversum,

succeeded by the hypopygium circumversum, which persists in the imago. Attempts at interspecific coupling are described.

Harper, A. M. PREDATORS OF POPLAR GALL APHIDS IN SOUTHERN ALBERTA.--There are eight species of poplar gall aphids in southern Alberta belonging to the subfamily Eriosomatinae and the genera Pemphigus, Thecabius, and Mordvilkoja. Predators of these aphids in the galls include anthocorids, syrphids, coccinelids, and ochthiphilids. Notes are given on the predators of the aphid Pemphigus betae Doane on its secondary host.

Jacobson, L. A., and P. E. Blakeley. SOME EFFECTS OF STARVING LARVAE OF THE PALE WESTERN CUTWORM, AGROTIS ORTHOGONIA MORR.--Larvae of the pale western cutworm, Agrotis orthogonia Morr., were starved for various periods during the fourth, fifth, and sixth instar. Differences were found in the duration of the larval and pupal periods and weight of pupae between larvae that were starved and those that were fed continuously.

Kasting, R., and A. J. McGinnis. DETERMINATIONS OF ESSENTIAL AMINO ACIDS FOR INSECTS BY AN INDIRECT METHOD.--Unless an organism can be reared on a chemically defined diet it is not possible to determine the essential components by the classical method. An indirect method for determining essential amino acids is described and discussed. This method, which uses radioactive carbon labelled substrates, has been applied to the blowfly (Phormia regina) and results were compared with those of the synthetic diet procedure. For the amino acids investigated to date the results agree with the classical method. The application of the method to the study of essential components in the diet of insects that cannot be reared on synthetic diets is discussed. The procedure is being applied at the Lethbridge laboratory to the feeding stages of the wheat stem sawfly, pale western cutworm, and warble fly.

Lilly, C. E. OBSERVATIONS OF PREDATION BY THE PLANT BUG, LIOCORIS BOREALIS KELTON.--During an experiment designed to determine the effectiveness of Sinea diadema (Fabr.) in the control of mirids in alfalfa, it was observed that some of the predators were killed by their intended prey. At least one-fifth of them were attacked and destroyed during moulting by nymphs and adults of the plant bug, Liocoris borealis Kelton. Nymphs of L. borealis also preyed on the pea aphid, Macrosiphum pisi (Harris); fourth-instar nymphs were reared to maturity on a diet consisting solely of aphids.

McDonald, S., and L. A. Jacobson. A LABORATORY EVALUATION OF THE RELATIVE TOXICITIES OF SOME CHLORINATED HYDROCARBONS TO THE ARMY CUTWORM AND OF THE DIFFERENCES IN SUSCEPTIBILITY OF VARIOUS LARVAL INSTARS.--Endrin was the most effective chlorinated hydrocarbon tested as a contact and stomach poison for the control of the army cutworm, Chorizagrotis auxiliaris (Grote). The susceptibility of larvae to endrin as a stomach poison decreased with successive molts. Endrin was 35 times more toxic to fourth-instar, 11 times more toxic to fifth-instar, and 3 times more toxic to freshly molted sixth-instar larvae than to mature sixth-instar cutworms.

McGinnis, A. J., and R. Kasting. QUANTITATIVE OBSERVATIONS ON THE DEVELOPMENT OF PALE WESTERN CUTWORM LARVAE UNDER CONTROLLED LABORATORY CONDITIONS.--Preliminary to a detailed nutritional study of the pale western cutworm, Agrotis orthogonia Morr., it was desirable to know the pattern of weight change over the larval period and the quantity of food required for satisfactory development. The larvae were reared under controlled laboratory conditions on wheat sprouts and were weighed daily. Weights of food consumed and excrement passed were also determined. Consideration is given to the efficiency of dry matter and nitrogen utilization by the organism. The effect of wheat variety and quantity of food supplies upon growth and development is discussed.

Nelson, W. A. RESPONSE OF SHEEP KED POPULATIONS TO PITUITARY-ADRENAL HORMONES IN SHEEP.--Ked populations on all sheep showed a fall and early winter rise, and a late winter, spring, and summer decline. Rams maintained high populations longer than ewes or castrates. Malnourished sheep and pregnant ewes maintained populations longer than healthy barren ewes or castrates. A triple cycle occurred on lambs during their first year. Ked declines were due to mortality caused by the plugging of the midgut by the crithidial stage of Trypanosoma melophagium (Flu). Flagellate development and ked mortality were inhibited by injecting sheep with adrenocorticotrophic hormone (ACTH), 9a-fluorohydrocortisone acetate, or desoxycorticosterone acetate. It is suggested that pituitary-adrenal activity in sheep is stimulated by pregnancy and malnutrition and ked declines thereby prevented.

Salt, R. W. RELATIONSHIP OF RESPIRATORY RATE TO TEMPERATURE IN A SUPERCOOLED INSECT.--The rate of oxygen consumption of mature larvae of Ephestia kühniella exhibits a logarithmic

relationship to temperature over a range extending from the limit of supercooling to the beginning of heat injury. This information supplements that of Scholander et al., who demonstrated the same relationship in frozen Chironomus larvae, but with a much lower rate than in supercooled forms. Together these two simple relationships invalidate Kozhantschikov's theory of cold-hardiness, which was based on a supposed thermostable respiration below 0° C. in cold-hardy insects and no respiration in frozen non-cold-hardy insects.

Shemanchuk, J. A., and C. O. M. Thompson. ANEMIA IN RANGE CATTLE CAUSED BY HEAVY INFESTATIONS OF SUCKING LICE.-- Heavy infestations of sucking lice caused anemia in range cattle, the condition being improved when the lice were destroyed.

Swales, G. E. PERIODS OF FLIGHT AND OVIPOSITION OF THE CABBAGE MAGGOT, HYLEMYA BRASSICAE (BOUCHE), IN SOUTHERN ALBERTA.--There are two generations of cabbage maggot annually in southern Alberta. First emergence was recorded on May 11, 18, 21, and 8, in 1954 to 1957, respectively. Most adults emerged in the last week of May and the first two weeks of June. First generation adults emerged in late August and produced a maximum number of eggs in early September.

Weintraub, J. USE OF THE BIOLOGY OF CATTLE GRUBS AS A GUIDE IN PLANNING AND EVALUATING CHEMICAL CONTROL EXPERIMENTS.-- Considerations such as age-class of cattle, range husbandry procedure, constitution of cattle grub populations and behavior of attacking warble fly adults, are discussed in relation to choice of sample groups for adequate tests. Considerations of development of grub populations in the back, development and natural mortality of the grubs, species and instar composition, and methods of collecting and rearing survivors are discussed in relation to evaluating the effects of compounds used. Examples from southern Alberta grub and cattle populations are cited to illustrate the pertinent criteria for testing of both systemic and contact insecticides.

TITLES OF PAPERS SUBMITTED
BY NON-MEMBERS

ALLEN, W. R. Observation on the insect predators of grasshopper egg pods in Manitoba.

ARMSTRONG, T. Summary of studies of new acaricides in Canada, 1954-56.

AUCLAIR, J. L. Honeydew excretion in the pea aphid, Acyrtosiphon pisum (Harris) (Homoptera: Aphididae).

BANHAM, F. L. Control of the tuber flea beetle, Epitrix tuberis Gent., in the interior of British Columbia.

BURRAGE, R. H. A comparison of some chemical seed treatments for the control of wireworms in Saskatchewan.

CANNON, F. M. The barley jointworm, Harmolita hordei Harr., a serious pest in Prince Edward Island.

CARTIER, J. J. Differentiation of three biotypes of the pea aphid, Acyrtosiphon pisum (Harr.), on three varieties of peas.

CHAPMAN, J. A. Reflections on wing structure in relation to ecological and physiological patterns of beetle life.

CHEFURKA, W. Glycolytic and pentose cycle enzymes in tissues of the American roach, P. americana.

CRAM, W. T. The gross anatomy and growth of the reproductive system of the black vine weevil, Brachyrhinus sulcatus (F.).

CURTIS, L. C. Control of the Rocky Mountain wood tick, Dermacentor andersoni Stiles, by ground spray.

DAVIES, L. Stream temperatures and the distribution of certain black fly larvae (Diptera: Simuliidae).

DAVIS, G. R. F. A new method for laboratory rearing of wireworm larvae.

DIXON, S. E., and R. W. SHUEL. Changes occurring in fresh royal jelly indicated by Cartesian diver respirometry.

FREDEEN, F. J. H. Laboratory rearing of black flies (Diptera: Simuliidae).

GREGSON, J. D. Host susceptibility to tick paralysis by Dermacentor andersoni Stiles.

HARVEY, G. T. Studies of the diapause requirements of the spruce budworm.

IVES, W. G. H., and R. M. PRENTICE. A sequential sampling technique for surveys of the larch sawfly.

KINGHORN, J. M. A portable rotating net device.

LeROUX, E. J. Effects of modified and commercial spray programs on fauna of apple orchards in Quebec.

LeROUX, E. J. Some arthropod eggs and egg masses observed in apple orchards of Quebec.

LeROUX, E. J., and J. P. PERRON. Description of immature stages of Coenosia tigrina (F.) (Diptera: Anthomyiidae).

McMULLEN, L. H., and M. D. Atkins. Life history and habits of Scolytus unispinosus Leconte (Coleoptera: Scolytidae) in the interior of British Columbia.

MONRO, H. A. U. Soil and building fumigation treatments with methyl bromide to suppress the oriental fruit moth in the Okanagan Valley, British Columbia.

PICKFORD, R. Observations on the reproductive potential of Melanoplus mexicanus (Sauss.) (Orthoptera: Acrididae) reared under laboratory conditions.

PUTMAN, W. L., and D. C. HERNE. Gross effects of some pesticides on the populations of phytophagous mites in Ontario peach orchards and their economic implications.

STEHHR, G. On the genetics of haemolymph color in the genus Choristoneura Led. (Lepidoptera: Tortricidae).

WOOD, G. W. Studies on the blueberry thrips, Frankliniella vaccinii Morgan, in New Brunswick.

ZACHARUK, R. Y. Structures and functions of the reproductive systems of the prairie grain wireworm, Ctenicera aeripennis destructor (Brown).

INVITATION PAPERS

Hoffman, C. H. ENTOMOLOGY RESEARCH FOR CONTROL AND REGULATORY PROGRAMS

Pepper, J. H. PROBLEMS IN POPULATION BIOLOGY.--The author advocates re-evaluating the concepts underlying the study of the causes of population fluctuations and attempting independent approaches to that problem.

The current thinking is that an understanding of population control is best provided by the concept that most animals tend to overreproduce to the limits of a correct balance between reproduction and mortality imposed by external mortality factors. The nature of the research that followed general acceptance of this idea was necessarily dictated by the thoughts expressed in the original premise, and the hypothesis has settled somewhat to the status of a fact as witnessed by the reliance on it of the two main schools of population dynamics (density dependence vs. density independence). Though bolstered by mathematical treatment of data (even if this does not impart greater understanding of the biological events) and by emphasis on

outbreaks (though these have economic, not biological, implications), the current hypothesis has left many questions about the nature of population changes unanswered.

At least partial answers might develop from the concept "that the animal itself through its particular biological activities plays a part in determining its future population levels". For example, studies by Errington of muskrat behaviour in relation to their habitat have shown how predation affects only a surplus portion of the muskrat population, of which the central structure is determined largely by the breeding behaviour and availability of breeding sites. Thus, one result was Errington's definition of the maximum number of muskrats that a habitat can support in some particular stage of the life history as "the security level for the habitat". Similarly, the concept of an "internal self-limiting factor" of population control has come from Chitty's studies on voles. The physiological states of voles in "spent" populations was different from that of voles in vigorous populations as a direct result of overcrowding. Examples from unpublished work on sugar-beet webworms and grasshoppers in Montana and from scattered published reports also indicated that animal behaviour and physiology might be responsible for checking populations before the factors of overreproduction and external mortality agents come into force.

That much research is still necessary to evaluate the above hypotheses, and that these hypotheses will still not provide the whole truth regarding population control is not of much importance so long as the process of re-examining and re-evaluating basic principles in the light of newer knowledge continues.

Brooks, A. R. VARIATIONS AND DISTRIBUTIONS OF PRAIRIE GRASSHOPPERS.--Grasshoppers belong to a very plastic group, particularly sensitive to ecological and environmental influences and changes. Some of the ecological differences, such as those found between forest and grassland, have produced comparatively stable subspecies. Some environmental influences, such as found during prolonged wet and dry periods, produce non-stable periodic forms within populations. There are, therefore, larger aggregations of populations (species), more or less divided into smaller aggregations by comparatively stable ecological influences (subspecies), these in turn being periodically changed by less stable climatic factors (forms). Superimposed upon each of these is the variable genetic make-up of individuals (variants) or of groups of individuals (local populations).

Topography of the study area.--The study area included the grasslands and adjoining forest margins of the southern half of the three Prairie Provinces. A gradual uplift occurs from the east (800 ft.) to the foothills in the west (3500 ft.) and, in addition, there are a series of escarpments, plateaus, and isolated hills, some of considerable elevation. Three main drainage systems are apparent, the Mississippi-Missouri system in the south (Milk, Frenchman, and Poplar Rivers), the Saskatchewan-Red Deer system in the central region, and the Qu'Appelle-Assiniboine system in the east. In general, the valleys are very deep and narrow and run from west to east. Along the course of each of the rivers there are a number of large sandy or silty areas usually supporting a parkland (poplar-birch-willow) vegetation.

The deep west-east river valleys in which the south-facing slope supports only a xerophytic vegetation chiefly of short grasses and the north-facing slopes are often heavily treed together with large sand masses, and elevated areas are very significant in insect distribution. The valleys provide means for insects from one ecological area to extend into other areas, the 'dry land' species along south-facing slopes, the 'wet land' species along north-facing slopes. The sandy areas and the elevated areas (usually more humid and with heavier vegetation) allow species to become established as small populations often far from the main body of the population.

Variations in prairie grasshoppers.--Two main types of variation are evident: (1) continuous or discontinuous variation due to genetic polymorphism as, for example, Mendelian variations, and (2) variations apparently due to climatic factors, especially those of temperature and humidity.

Variations of the first type have been demonstrated by various authors in wing polymorphism (as in Melanoplus dawsoni, Neopodismopsis abdominalis, or Chorthippus longicornis), in the inheritance of red or blue hind tibiae (as in Melanoplus bilituratus, M. confusus, M. foedus, or M. angustipennis), and in wing color (as in Metator pardalinus or Derotmema haydenii). The inheritance, however, is apparently not of a simple type governed by single genes. In nearly all cases many modifying genes are present and, in addition, it appears that the expression of the characters depends to a great extent on climatic or ecological conditions or on geographical locality.

Variations of the second type are apparent in most species. Climatically-induced forms may be relatively stable from year to year or periodic depending upon the stability

of the inducing factors; they occur more often in some geographical areas than in others. The differences between the form and the parent may be expressed by qualitative morphological change (Aerochoreutes carlinianus, Xanthippus latefasciatus), qualitative color change (wing colors of Arphia conspersa), or by quantitative changes in color, size, and length of wing (Melanoplus bilituratus, M. borealis).

Distributions of prairie grasshoppers.--When the individual static distributions (locality records) of the species are combined with the dynamic distributions (abundance) of the same species throughout its entire range, an approximation of the extent and direction of the various distributional tendencies is obtained. The species complex in this region may readily be divided into six associations, the members of each association tending to follow the same distributional pattern as other members of the association. It appears that each association has, or has had in the past, a centre of distribution from which it has spread as far as climatic factors or competition with other associations has permitted.

Six associations of species or subspecies are found in the Prairie Provinces. These are as follows:-

1) Mountain species.--The centre of distribution for five species appears to be in the mountainous region to the west and southwest. Examples: Asemoplus montanus (Bruner), Melanoplus montanus (Thomas), Trimerotropis suffusa Scudder.

2) Foothills or southwestern species.--The centre of distribution of 19 species appears to be on the eastern slopes of the Rocky Mountains in United States. In the Prairie Provinces the species often penetrate far into the interior along river valleys. Examples: Melanoplus alpinus Scudder, Trimerotropis pistrinaria Saussure, Acrolophitus hirtipes Say.

3) Central prairie and parkland species.--The centre of distribution of 30 species appears to be in the north-central prairie region of North America, many of the species having a very limited distribution southward. Examples: Melanoplus bilituratus (Walker), Aeropedellus clavatus (Thomas), Arphia conspersa Scudder.

4) Eastern prairie species.--The centre of distribution for 12 species appears to be in east-central North America. Several of the species have wide distributions in the Prairie

Provinces but become increasingly scarce and more confined to special habitats in the western part. Examples: Melanoplus bivittatus (Say), Chortophaga viridifasciata (DeGeer), Orphulella pelidna (Burmeister).

5) Northern forest species.--The centre of distribution of 14 species appears to be in the northern forest region. The species often extend far into the parklands and into eastern and western forests. Examples: Melanoplus borealis (Fieber), Neopodismopsis abdominalis (Thomas), Pardalophora apiculata (Harris).

6) Eastern forest species.--The centre of distribution of three species appears to be in the forest region of eastern Canada and northeastern United States. Examples: Melanoplus foedus stonei Rehn, M. islandicus Blatchley, Tettigidea lateralis (Say).

References

1. Brooks, A. R. Acridoidea of southern Alberta, Saskatchewan, and Manitoba (Orthoptera). To be published as a Canadian Ent. supplement.
2. Gurney, A. B., and Brooks, A. R. A revision of the grasshoppers of the Mexicanus group of the genus Melanoplus (Orthoptera: Acrididae). To be published as a Proc. U. S. Natl. Mus. Report.

SYMPOSIA

HOST PLANT RESISTANCE TO INSECT ATTACK by C. W. Farstad (Chairman), R. H. Painter, J. B. Adams, J. L. Auclair, H. F. Holdaway, N. D. holmes, L. K. Peterson, R. I. Larson.

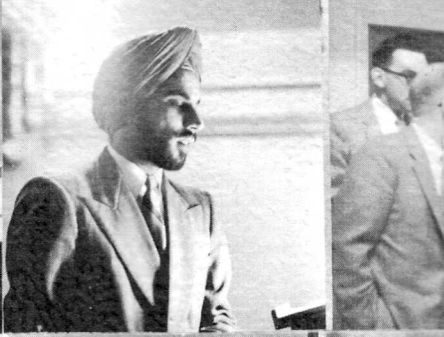
SYSTEMIC INSECTICIDES FOR LIVESTOCK by J. Weintraub (Chairman), O. H. Graham, R. D. Radeleff.

Graham, O. H. Laboratory and Field Tests to Develop Systemic Insecticides for Livestock.--

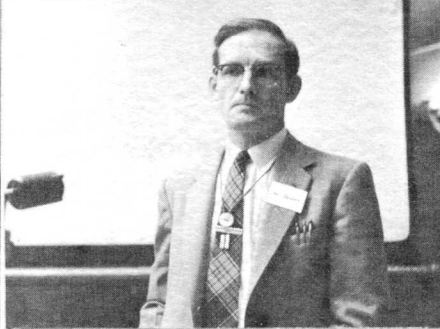
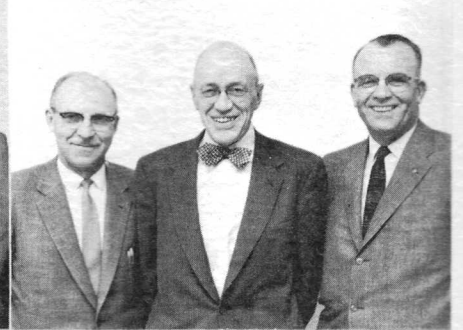
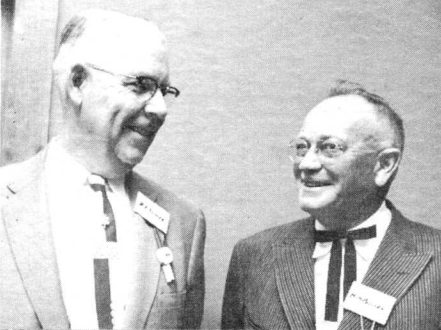
During the past 11 years the Kerrville, Texas, laboratory of the United States Department of Agriculture has been actively seeking systemic insecticides for use on livestock with special emphasis on control of cattle grubs. Early work with the chlorinated hydrocarbons was encouraging but there were practical objections, which prevented development of those compounds. Recently some phosphorus insecticides have shown outstanding promise in both laboratory and field tests. The results with some of these promising compounds are illustrated by data from laboratory tests against cattle grubs, screw-worms, stable flies, and lone star ticks. Mode-of-action studies with radioactive insecticides are described. Field studies with grub-infested cattle are summarized.

Radeleff, R. D. : Toxicological Problems in the Development of Systemic Insecticides for Livestock.--Systemic action of insecticides creates certain special problems in addition to those associated with direct contact action. Safety of the treated animal and residues in animal tissues and animal products are prime considerations. Deleterious effects upon enzyme systems and intestinal organisms should be investigated. Methods of administration, formulation, and sites of administration are important. Other problems associated with the use of systemics are discussed.

<p>N. D. Holmes P. E. Blakeley B. N. Smallman</p>		<p>N. D. Holmes P. E. Blakeley R. Glen</p>	
<p>Salt Pepper</p>	<p>H. L. Seamans</p>	<p>R. Glen B. N. Smallman L. A. O. Roadhouse G. A. Hobbs</p>	
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<p>L. G. Putnam R. Pickford</p>	<p>C. W. Farstad R. H. Burrage</p>	<p>A. S. Atwal</p>	<p>O. H. Graham R. D. Radeleff J. Weintraub</p>
<p>George Brown, Jr. H. L. Seamans Mrs. H. L. Seamans</p>	<p>A. J. Cullen (Hon.) L. C. Halmrast R. Glen</p>	<p>Mrs. G. R. Hopping G. R. Hopping Mrs. W. C. McGuffin W. C. McGuffin</p>	



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<p>The O/C's Crop Insect Lab. Lethbridge 1921-57 C. W. Farstad H. L. Seamans G. F. Manson</p>	<p>G. E. Ball W. T. Cram R. Y. Zacharuk J. Marshall E. J. LeRoux</p>	<p>The R. H. Painters (Reginald H. and Richard H.)</p>
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<p>R. H. Painter W. C. Broadfoot</p>		

MEMBERSHIP

- Anderson, R. L., Field Titles Service, 2nd Floor, Royalite Building, 11 Hunter Street, Calgary.
- Archibald, J. G., Department of Agriculture, Court House, Lethbridge.
- Baird, R. B., Science Service Laboratory, Box 970, Lethbridge.
- Blakeley, P. E., Science Service Laboratory, Box 970, Lethbridge.
- Birch, F., 10540 - 101 Street, Edmonton.
- Broadfoot, W. C., Science Service Laboratory, Box 970, Lethbridge.
- Brooks, A. R., Canada Agriculture Research Laboratory, University Sub Post Office, Saskatoon, Sask.
- Broughton, O., c/o Alberta Wheat Pool, Lougheed Building, Calgary.
- Brown, C. E., Forest Biology Laboratory, 102 - 11 Avenue East, Calgary.
- Brown, J. H., Provincial Entomologist, Department of Public Health, Edmonton.
- Carr, J. L., R. R. 4, Calgary.
- Chisholm, Mrs. R., 9816 - 112 Street, Edmonton.
- Clancy, D. N., 92 Westview Drive, Calgary.
- Collett, Miss B., Lacombe, Alberta.
- Cook, J. A., Forest Biology Laboratory, 102 - 11 Avenue East, Calgary.
- Cooper, G. S., North America Cyanamid, 160 Bloor Street East, Toronto 5, Ontario.
- Cumming, Miss M. E. P., Forest Biology Laboratory, 102 - 11 Avenue East, Calgary.
- Depner, K. R., Livestock Insect Section, Science Service Laboratory, Box 970, Lethbridge

Edmunds, J. W., Department of Agriculture, Terrace Building,
Edmonton.

Farstad, C. W., Crop Insect Section, Science Service
Laboratory, Box 970, Lethbridge.

Fredeen, H., Canada Agriculture Research Laboratory,
University Sub Post Office, Saskatoon, Sask.

Gooding, R., 12850 - 107 Street, Edmonton

Green, C. F., Suffield Experimental Station, Ralston,

Gurba, J. B., Field Crops Branch, Provincial Department of
Agriculture, Edmonton.

Gushul, E. T., Science Service Laboratory, Box 970,
Lethbridge.

Harper, A. M., Crop Insect Section, Science Service
Laboratory, Box 970, Lethbridge.

Haufe, W. O., Livestock Insect Section, Science Service
Laboratory, Box 970, Lethbridge.

Hewitt, A. G. Chemistry Section, Science Service Laboratory,
Box 970, Lethbridge

Hillerud, S. O., Department of Extension, University of
Alberta, Edmonton.

Hobbs, G. A., Crop Insect Section, Science Service
Laboratory, Box 970, Lethbridge.

Hocking, B., Department of Entomology, University of
Alberta, Edmonton.

Holmes, N. D., Crop Insect Section, Science Service
Laboratory, Lethbridge.

Hopping, G. R., Forest Biology Laboratory, 102 - 11 Avenue
East, Calgary.

Hurtig, H., Entomology Division, Science Service Building,
Carling Avenue, Ottawa, Ontario.

Jacobson, L. A., Crop Insect Section, Science Service
Laboratory, Box 970, Lethbridge.

Johansen, H., 809 - 2 Street East, Calgary.

- Khan, M. A., Livestock Insect Section, Science Service
Laboratory, Box 970, Lethbridge.
- Klassen, W., Box 104, Vauxhall, Alta.
- Kloppenborg, N. E., Science Service Laboratory, Box 970,
Lethbridge.
- Larson, Miss R. I., Crop Insect Section, Science Service
Laboratory, Box 970, Lethbridge.
- Law, E. G. (Helen McGugan, S. W. Armstrong), Allied
Chemical Services Limited, 5507 - 1 Street South
East, Calgary.
- Lilly, C. E., Crop Insect Section, Science Service
Laboratory, Box 970, Lethbridge.
- Lindsay, I. S., Environmental Protection, D. R. B. Head-
quarters, Ottawa, Ontario.
- Lobay, W., Field Crops Branch, Provincial Department of
Agriculture, Edmonton.
- Longden, J. A., 610 - 15 Avenue West, Calgary.
- MacGregor, H. A., 11406 - 66 Street, Edmonton.
- McDonald, S., Crop Insect Section, Science Service Laboratory,
Box 970, Lethbridge.
- McGinnis, A. J. Crop Insect Section, Science Service Labo-
ratory, Box 970, Lethbridge.
- McGuffin, W. C., Forest Biology Laboratory, 102 - 11 Avenue
East, Calgary.
- Nelson, W. A., Livestock Insect Section, Science Service
Laboratory, Box 970, Lethbridge.
- Nummi, W. O., Crop Insect Section, Science Service Laboratory,
Box 970, Lethbridge.
- Painter, R. H., Box 548, Lethbridge.
- Peterson, L. K., Crop Insect Section, Science Service
Laboratory, Box 970, Lethbridge
- Qually, M. C., Livestock Insect Section, Science Service
Laboratory, Box 970, Lethbridge.

- Reid, R. W., Forest Biology Laboratory, 102 - 11 Avenue East, Calgary.
- Riddell, W. M., 2210 - 12 Avenue South, Lethbridge.
- Robertson, R. H., Livestock Insect Section, Science Service Laboratory, Box 970, Lethbridge.
- Salt, R. W., Crop Insect Section, Science Service Laboratory, Box 970, Lethbridge.
- Shemanchuk, J. A., Livestock Insect Section, Science Service Laboratory, Box 970, Lethbridge.
- Shepherd, R. F., Forest Biology Laboratory, 102 - 11 Avenue East, Calgary.
- Smith, D. S., Crop Insect Section, Science Service Laboratory, Box 970, Lethbridge.
- Sollitt, Miss Judy, 8833 - 95 Street, Edmonton.
- Stark, R. W., Forest Biology Laboratory, 102 - 11 Avenue East, Calgary.
- Stogryn, R. P., 310 Post Office Building, Lethbridge.
- Story, T. P., Crop Insect Section, Science Service Laboratory, Box 970, Lethbridge.
- Strickland, E. H. (Honorary Life Member), 3012 Sea View, Victoria, B. C.
- Swalles, G. E., Crop Insect Section, Science Service Laboratory, Box 970, Lethbridge.
- Swindlehurst, E. B. S., Provincial Department of Agriculture, Edmonton.
- Thompson, C. O. M., Livestock Insect Section, Science Service Laboratory, Box 970, Lethbridge.
- van Veen, N. W., Field Titles Service, 2nd Floor, Royalite Building, Calgary.
- Virostek, J. F., Crop Insect Section, Science Service Laboratory, Box 970, Lethbridge.
- Weintraub, J., Livestock Insect Section, Science Service Laboratory, Box 970, Lethbridge.