

of the Entomological Society of Canada  
*Bulletin*

Vol. 4, No. 3, September, 1972

---

THIS ISSUE

Society Officers	inside front cover
Editorial	33
Letter to the Editor — 1973 Annual Meeting	33
Achievement Award, R. W. Salt	34
Ralph Durham Bird 1901-1972	36
ESC Notice, Deadline for Titles	37
William Robin Thompson 1887-1972	38
Bibliography of the Works of W. R. Thompson	40
Financial Statements, 1971	48
ESC Notice, SCITEC at the Annual Meeting	49
La Pluie au Service des Entomologistes	50
Report of the Election Committee	50
Ladies Program Tours, ESA-ESC-ESQ Joint Meeting	51
SCITEC: what's in it for the ESC?	52
Review: Science Council Annual Report	54
Book Reviews:	
Biological Control in Canada	55
Biological Control in Ethiopian Region	56
Biological Control in S.E. Asia and Pacific	56
Symposium on Entomology and Education	57
Review: It's Not Too Late — Yet	58
A Survey of Employment Opportunities	60
Symposium on Biting-Ily Control and Environmental Quality	62
Employment	65
Personalia	66,67,68
Edna Mosher 1879-1972	68

---

D. P. Pielou      Editor (Society Publications)  
D. C. Eldt        Assistant Editor (Bulletin)

---

Cover Design: M. A. Syder, Bio-Graphic Unit

---

Published by the  
Entomological Society of Canada  
K. W. Neatby Building, Ottawa

---

## ENTOMOLOGICAL SOCIETY OF CANADA

President:	P. S. Corbet, Dept. of Biology, University of Waterloo, Ontario
President-Elect:	D. K. McE. Kevan, Dept. of Entomology, Macdonald College, P.Q.
Past-President:	W. F. Baldwin, Atomic Energy of Canada Ltd., Chalk River, Ontario
Secretary:	D. M. Davies, Dept. of Biology, McMaster University, Hamilton, Ont.
Treasurer:	E. C. Becker, K. W. Neatby Bldg., Carling Ave., Ottawa K1A 0C6
Editor:	D. P. Pielou, Dept. of Biology, Dalhousie University, Halifax

### NEW APPOINTMENTS

Chairman of the Science Policy Committee: W. F. Baldwin has replaced  
A. S. West

### APPOINTMENT OF SECRETARY

Professor Douglas M. Davies, Department of Biology, McMaster University, Hamilton, Ontario has accepted the appointment as Secretary of the Entomology Society of Canada, in succession to Mr. D. G. Peterson who resigned at the end of 1971.

Philip S. Corbet  
President

Contributions and correspondence should be sent to: D. C. Eidt, Editor, Bulletin of the Entomological Society of Canada, P.O. Box 4000, Fredericton, New Brunswick. Inquiries about subscriptions and back issues should be referred to the Treasurer, Entomological Society of Canada.

The deadline for the next issue Vol 4, No. 2 for June 1972 is 15 May.

## *Editorial*

### POPULAR ENTOMOLOGY

Some authors of papers in the *Canadian Entomologist* have received letters asking them to prepare an article or abstract in popular style, based on their paper. This is part of an attempt by the Society to make the fruits of entomological research more readily available to the public. As a result of discussions between the Secretary and the Canadian Science Writer's Association, members of the Association will receive the *Bulletin* regularly. Needless to say, routine Society news has little interest to them — the real news being the results of our work. The first of such articles, and a good example to emulate, is in this issue — *La Pluie au Service des Entomologistes*. Don't wait to be asked to prepare an article, your judgement may be better than ours. The journal of origin is not important, it need only be of Canadian or cosmopolitan interest.

### CONGRES ANNUAIRE

Hospitality is spoken here! Ajouté à une vraie atmosphère intellectuelle pour échanger les idées, la Belle Province sera un lieu parfait pour un congrès de savants. Il y a une atmosphère propre pour donner la bonne humeur et élever l'esprit. Chaque fois que les Québécois nous reçoivent, nous sommes enchantés de leur hospitalité. Au congrès!

---

## LETTER TO THE EDITOR

### 1973 ANNUAL MEETING

Sir,

Although the 1972 Annual Meeting has not yet taken place, members of the Society may be interested in the location and timing of the 1973 meeting, which is being organized by the Entomological Society of Alberta.

The 23rd Annual Meeting of the ESC — 21st Annual Meeting of the ESAlberta will be held at the Banff School of Fine Arts on 1-5 October 1973. This is the same location as the highly successful 1966 meeting. The various committees have been busy for several months and plans are well advanced and should be finalized at the time of this year's Entomological Society of Alberta meeting, 12-14 October.

Should members require further information at this time, they should contact me.

Gordon Pritchard  
Department of Biology  
The University of Calgary

## ENTOMOLOGICAL SOCIETY OF CANADA MEDAL



*Reginald Wilson Salt*

Montréal, Québec, November, 1972

The Entomological Society of Canada Medal for 1972 is awarded to Reginald Wilson Salt for outstanding achievement in the field of research in Canadian entomology.

Dr. Salt (who prefers to be known as Reg) has contributed in various ways to Canadian entomology, but it is primarily his distinguished performance in research, particularly in the cold-hardiness in insects, that the Society wishes to recognize.

By birth a Leicestershire "woollyback", born at Loughborough, England, September 10, 1910, he was, without being consulted, moved with his family at the age of six months to Calgary, Alberta, March, 1911, where he in due course attended school. He developed an enthusiasm for insects at a tender age, emulating his eldest brother, George. He went on to study entomology at the University of Alberta, Edmonton, obtaining his bachelor's degree in May, 1930. (By a strange quirk of fate, Reg Salt was a fellow student of James Pepper!) In the same year, he joined the staff of the Dominion Entomological Laboratory at Lethbridge, Alberta, with which he has been associated ever since, cutting his professional teeth at a time of severe cutworm, sawfly and grasshopper outbreaks, coupled with the droughts and economic depression of the early thirties.

During this period he began graduate studies at Montana State College and there developed his initial interest in insect freezing and winter survival. He obtained his Master of Science degree in 1933 with a thesis on freezing of

the Colorado potato beetle, *Leptinotarsa decemlineata* (Say). He then attended the University of Minnesota for three years, holding Caleb Dorr Research Fellowships during his first two years and a Royal Society of Canada Fellowship during the third. He graduated Doctor of Philosophy in 1936 with a thesis on insect freezing. During his graduate studies, he continued to work during the summers at Lethbridge.

In the late 1930's he took over the wild bee-alfalfa seed pollination investigations begun by his Lethbridge colleagues a decade previously. During the Second World War he spent two academic sessions, from 1940-42, as substitute Professor of Entomology at the University of Alberta, and then began studies on the effects of controlled temperature and moisture on diapause on the wheat-stem sawfly, *Cephus cinctus* Nort., demonstrating the conditions under which the species re-enters diapause.

In 1950 he was invited to read a paper on cold and poekilothermic animals at a symposium arranged by the Royal Society of Canada, and in the early 1950's, he turned over his diapause work to a colleague and concentrated on problems of cold-hardiness which attracted a succession of collaborators from several different countries. Their joint studies included research on cold-acclimation, glycerol in relation to freezing, plant tissue nucleation and freezing, and cold-hardiness of megachilid bees.

The long-term objectives of Reg Salt's work was to reduce the apparent complexity of insect cold-hardiness to basic principles. By a series of elegant experiments, he and his associates demonstrated the effects of food on freezing, the action of alimentary wastes as freezing nuclei, the fallacy of the theory that intracellular matter acts on nucleation sites, the effects of dehydration, mechanisms of freezing whilst insects are in contact with ice or freezing water, and the interaction of quality and quantity in ice nucleation. He was also able to interpret freezing temperature distributions, the protective role of glycerol and other polyhydric alcohols in winter survival and their relation to "supercooling" and freezing.

His published research papers number forty-eight, and, in addition, he has given us three valuable reviews of the field, including those in *The Annual Review of Entomology*, 6:55-74 (1961) and in "Dormancy and Survival" *Symposia of the Society for Experimental Biology*, 23: 331-350 (1969). With his retirement at the end of December, 1970, The Canada Department of Agriculture Research Branch discontinued the cold-hardiness programme, which has now been wound up.

During his research career Reg Salt had the support of his wife, Beulah (née McKenzie) whom he married in October, 1935. They have one daughter and one son. He continues to live in Lethbridge and is enjoying retirement pursuing his hobbies of lapidary, carving and polishing juniper roots, gardening and organ playing.

The Society honours this outstanding research worker for his distinguished and pioneering contributions to insect physiology in Canada, and to the understanding of cold-hardiness in living organisms generally and its implications for non-biological disciplines. The Society deems him a worthy recipient of the Gold Medal.

#### MEDALISTS

1962, R. F. MORRIS  
1963, A. W. A. BROWN  
1964, R. CLEN  
1965, M. I. PREBBLE  
1966, G. W. FARSTAD

1967, B. N. SMALLMAN  
1968, W. C. WELLINGTON  
1969, K. E. F. WATT  
1970, C. S. HOLLING  
1971, J. G. REMPEL

## RALPH DURHAM BIRD 1901—1972

On March 1, 1972, Ralph Durham Bird died suddenly at Ganges, British Columbia. He had been a member of the Entomological Society of Ontario since 1932 and of the Entomological Society of Canada since its inception in 1951. In August 1970, he was made an Honorary Life Member of the Entomological Society of Canada. In addition, Ralph was a Charter Member of the Entomological Society of Manitoba and was made an Honorary Life Member in 1966.



Ralph Bird was born at Arrow River, Manitoba, receiving his early education and spending most of his working career in that province. He obtained his B.Sc. degree in Botany and Zoology in 1924 and his M.Sc. degree in Zoology and Entomology in 1926 at the University of Manitoba. In 1929, he obtained his Ph.D. degree at the University of Illinois, studying under an outstanding ecologist, Dr. V.E. Shelford. His thesis study entitled "Biotic communities of the aspen parkland of central Canada" was a detailed analysis of the ecology of the aspen parkland. It became the basis of subsequent studies of this ecosystem and formed the core for his later work which culminated in his book "The Ecology of the Aspen Parkland", published in 1961. This book is used as a reference text for courses in ecology at universities in western Canada.

From 1929-1933 he taught during the winter months at the University of Oklahoma and worked during the summers for the Oklahoma Biological Survey and at the Canada Department of Agriculture stations at Vernon, B. C. and Hat Creek, B. C. In October 1933, after the death of Norman Criddle he was appointed Officer-in-Charge of the Dominion Entomological Laboratory at Trecebank, Manitoba. Shortly afterwards, the laboratory was moved to Brandon and Ralph directed the work there until 1957 when the laboratory was closed and the staff were transferred to Winnipeg to become part of the newly-formed Canada Department of Agriculture Research Station. At Winnipeg, he was Head of the Entomology Section which included entomologists from Brandon, Morden and the Stored Products Insect Laboratory, Winnipeg. In 1963, plant pathologists were added to the section and it was renamed the Crop Protection Section. He continued as Head of this section until his retirement in 1966.

The work at the Brandon laboratory was concerned entirely with grasshopper ecology and surveys from the time Ralph took charge until 1942. Then the programme was expanded to include work on insects attacking oil seeds, small fruit, vegetables and forage crops. Ralph's personal interests were mainly the effect of land use on insect populations, particularly grasshoppers; the biology and control of the sweetclover weevil; and blackbird depredations of agricultural crops. During this period, he established a reputation as an outstanding photographer of insects, wildflowers and wildlife.

As a leader, Ralph was unstinting in the time and energy he devoted to the encouragement and support of his staff. He considered carefully any reasonable proposal or criticism and strove to be fair and considerate in his decisions.

Ralph Bird was a meticulous observer of the ecological situation in which he lived and sought to interpret the changes in the ecosystem by carefully weighing the contribution of each component of the ecosystem. This was probably a legacy of the strong influence of Norman Criddle during the early years of his career. His analysis of the changes in the aspen parkland ecosystem as related to changes in land use, based as it was on a lifetime of study and observation, has been a major contribution to an understanding of the ecology of the aspen parkland.

Ralph's great love was the outdoors, and he often said his activities were selected to give him the most time outdoors. As a result, he was a first-rate hunter and fisherman as well as an outstanding wildlife photographer of the fauna and flora of western Canada. He was very active in naturalist organizations, being a Past-President and an Honorary Life Member of the Natural History Society of Manitoba. He did much to foster a love of the outdoors through his generous advice to colleagues and students, his excellent photographs and his numerous publications.

Ralph married Lois Hazel Gould of Norman, Oklahoma, in 1929 and they raised three children; Charles Durham, of Calgary, Alberta; Maida Dorothy (Neilson), of Winnipeg, Manitoba; and Linda Lois (Young), of Ottawa, Ontario. His wife Lois died in January, 1939, and Ralph subsequently married Lilian Mary Watson of Winnipeg. Ralph is also survived by 9 grandchildren.

L. B. Smith

### ESA-ESC-ESQ JOINT MEETING DEADLINE FOR TITLES

Some members of the Entomological Society of Canada have expressed concern that they had no firm indication of the July 1 deadline for submission of titles for papers to be presented at the joint meeting of our Society with the Entomological Society of America and the Entomological Society of Quebec.

Those planning this meeting hope that all members were informed by one of the following two methods:

- 1) All members of the Entomological Society of America (whether they were members of the ESC or ESQ or not) were alerted to the deadline by an announcement with application form (page 91) in the March 1972 ESA Bulletin and again (page 123) in the June 1972 ESA Bulletin.
- 2) Members of the ESC and ESQ who were not members of the Entomological Society of America were sent (by first class mail) photostats of the appropriate pages of the March 1972 ESA Bulletin dealing with papers, informal symposia and the Insect Photo Salon.

D. M. Davies, Secretary

## WILLIAM ROBIN THOMPSON 1887-1972



William Robin Thompson, one of the most distinguished of Canadian entomologists, died in Ottawa on 30 January 1972.

Born in London, Ontario, in 1887, he early became interested in natural history and was encouraged by family, friends and acquaintances who included Edward Saunders, the first Director of the Central Experimental Farm, John Dearnness the botanist, and C. J. Bethune of the Entomological Society of Ontario. He studied biology at the Ontario Agricultural College, Guelph, graduated in 1909, and in 1912 obtained his M. Sc. at Cornell University under Prof. Comstock. During the years at Guelph, he worked for several summers as an assistant to C. H. T. Townesend at the Gypsy Moth Parasite Laboratory, and thus

served his apprenticeship with the parasitic insects, and in particular the Tachinidae, that were to be the subjects of his life's work.

In 1912 he was appointed by the U.S.D.A. to assist Fiske in the search for insect parasites in Europe. In this position he travelled extensively and became fluent in both French and Italian, and made the acquaintance of Silvestri, Caullery and other leading biologists, and younger future leaders such as David Keilin. The following year he registered at the University of Paris, from which, after the War, he received his doctorate. This early period was very fruitful scientifically and resulted in a long series of papers on many interesting tachinids and other parasites. These papers included numerous highly original observations on the development and behaviour of the parasite larva and on the responses of the host. He published also, with Keilin, on the pipunculids and dryinids and, at a later date, he collaborated with H. L. Parker in similar important work on the chalcids.

From 1919 to 1928 he directed the work of the European Laboratory, U.S. Bureau of Entomology, at Hyères in the south of France. Here he developed his studies on Tachinidae with extensive comparative work on their structure and bionomics, especially in the egg and larval stages. He attempted step by step to found on these observations a rational classification of this very intricate family. He directed his attention also to general questions concerning parasitic insects, and from 1922 onwards published a series of studies in which he formulated a mathematical statement of the relations between populations of entomophagous parasites and their hosts. These papers represent the first attempt to state a general theory of parasite and host populations in mathematical terms; they antedate similar work by Lotke and Volterra who are generally regarded as the founders of this branch of biology, and they form the starting point of a now very important part of entomological science.

Dr. Thompson was appointed in 1928 as Superintendent of Farnham House Laboratory (Imperial Bureau of Entomology), recently established in England by the British Government to serve as headquarters for research and development in the biological control of insect and plant pests. A general report on the work of the laboratory and the status of the discipline was soon published (1930). It gives a vivid account of the many investigations in progress and of the active exchanges with Dominion and colonial entomologists in many parts of the world. As the work expanded, laboratories for the collection and study of potentially useful parasites and predators were established in



many places — California, Uruguay, Trinidad, Switzerland, India and finally Pakistan. A comparable laboratory had also been established by the Canadian Government at Belleville, Ont. With the outbreak of the Second World War, Thompson transferred the work of Farnham House that could still be maintained to Belleville, and later moved headquarters to Ottawa. He retired as Director of the Commonwealth Institute of Biological Control, as the organization was by that time called, in 1958.

Throughout the thirty years as scientific director of this almost world-wide undertaking, Dr. Thompson remained a prolific contributor in his special fields of scientific interest, and also wrote increasingly frequently on more general or philosophical aspects of biology — the nature of systematics; instinct; the role of mathematics in the study of populations; the theory of evolution. In 1943 he published the first part of his *Catalogue of the Parasites and Predators of Insect Pests*, a monumental compilation that was completed in 1965, in collaboration with F. J. Simmonds, his successor as Director of C.I.B.C.. Shortly after he retired he was appointed as Honorary Fellow of the Entomology Research Institute, C.D.A., Ottawa, and commenced a long series of taxonomic studies on the Tachinidae of Trinidad. He was assisted throughout this project by his wife, Mary Carmody, an entomological artist of distinction who, much earlier in her career, had contributed also to the illustrations of Dyar and Knab's great monograph of the North American mosquitoes (1913-17). Eight parts were published, the last in 1968, in all comprising over 800 pages and 600 figures. Thompson drew to the full on his unequalled knowledge of the structure and biology of these insects, and the work constitutes a landmark in the study of the family as a whole.

His achievement was thus very great. He made many notable discoveries concerning the bionomics of tachinids and other entomophagous insects; he applied these characters, equivalently with the more familiar structural ones, to the development of a satisfactory classification; he compiled a world catalogue of the parasites and predators of insect pests; and he directed, and in large part established, a world wide organization for work on biological control. To him also we owe the first mathematical statement of the theory of parasite-host interactions, and subsequent innovations and critiques in the same field. In most respects these massive contributions will remain unchallenged; yet to many entomologists W. R. Thompson was, and remains, an often obscure writer and an enigmatic scientific personality.

The problems appear most markedly in his numerous writings on the nature of species, biological classification, and the theory of evolution. He came to consider that species — and by species he understood the natural entities recognized as species by the taxonomist, *Comptosia concinnata* and the rest — differ not only materially but also in their form, using this word in the technical sense of Aristotelian metaphysics. Between one species and another, therefore, differences existed that were not to be bridged by material processes. This conviction created, quite clearly in some of his later work, an impassable barrier to the acceptance of any natural theory of biological evolution. It was compatible, however, with the development of a classification as in ordinary taxonomic practice, the classification becoming a construct that described a graded array of related forms; the conception is close to that of Linnaeus. Some of these ideas are evidently not shared by most scientists at the present day. It must also be said, it seems to the writer, that his radical critique of biological evolution led him only too often to an oversimplification and disparagement of carefully conducted studies.

There are obscurities also in Thompson's treatment of the population question. The first decades of the development of this field were marked by

vigorous discussion among the leading contributors, accompanied, again in the writer's opinion, by considerable and mutual misunderstanding of positions. A more orderly development is now perhaps being achieved, and it was a particular happiness to him when in 1967 the University of California conferred on him the first Hany S. Smith Award, established in memory of one of his earliest colleagues, later the distinguished Professor of Biological Control at Riverside.

Many other honours came to him in the course of his career. He was a Fellow of the Royal Society (elected 1933) and of the Royal Society of Canada (1949), and President of the Tenth International Congress of Entomology, held in Montreal in 1956. He was an honorary Doctor of the University of Bordeaux (1956) and of Carleton University, Ottawa (1963); Hon. Fellow, Royal Irish Academy (1958), Hon. Fellow, Royal Entomology Society of London (1957), Hon. Member, Professional Institute of the Public Service of Canada (1949), and an Honorary Member of the Entomological Societies of Ontario and Canada. He served as Editor of the Canadian Entomologist from 1949 to 1958.

Robin Thompson lived a remarkably full life, as scientist, man of action, philosopher, controversialist, but first of all a religious man. A conservatively traditional Catholic, he would wish to be remembered also as a former President of the Aquinas Society of London, England and as President of Una Voce — Canada.

On behalf of the Society, I offer condolences to Mrs. Thompson, and to his son and daughter, on the passing of one of our most distinguished members.

J. A. Downes

Following is a bibliography of Dr. Thompson's publications prepared by Miss Danc McClymont.

#### 1909

Notes on the parasites of the Salurniidae. (Fiske, W. F., and W. R. Thompson.) J. econ. Ent. 2: 450-460.

#### 1910

A new species of the genus *Leucopis*. Can. Ent. 42: 238-242.

Notes on the pupation and hibernation of tachinid parasites. J. econ. Ent. 3: 283-295.

Synonymical and other notes on Diptera. Psyche, Camb. 17: 210-213.

#### 1911

Tachinidae, new and old. Can. Ent. 43: 265-272 313-317.

#### 1913

Osservazioni e note critiche su alcuni Ditteri Muscoidel. 1. Caratteri trascurati nella classificazione di questi Ditteri. Boll. Lab. zool. gen. agr. Portici, 7: 39-45.

Osservazioni e note critiche su alcuni Ditteri Muscoidel. 2. Gli ovariooli dei Muscoidel. Boll. Lab. zool. gen. agr. Portici, 7: 46-48.

Osservazioni e note critiche su alcuni Ditteri Muscoidel. 3. Nota sopra un parassita indeterminato della *Cistela amoena* Say. Boll. Lab. zool. gen. agr. Portici, 7: 49-58.

Sur la spécificité des parasites entomophages. C.r. Séanc. Soc. Biol. 75: 510-521. 559-560.

#### 1914

Les conditions de la résistance des insectes parasites internes dans l'organisme de leurs hôtes. C.r. Séanc. Soc. Biol. 77: 562-564.

Notes biologiques sur *Minella chalybeata* Meig., parasite de *Cassida deformata* Suff. (Rabaud, E. and W. R. Thompson.) Bull. Soc. ent. Fr. (1914): 329-332.

## 1915

- Sur une tachinaire parasite à stade intracuticulaire. C.r. Acad. Sci., Paris 160: 83-86.
- Sur le cycle évolutif des Pipunculides, parasites intracoelomiques des Typhloxybes. (Keilin, D. et W. R. Thompson.) C.r. Séanc. Soc. Biol. 78: 9-12.
- Sur le cycle évolutif des Dryinidae Hyménoptères parasites des Hémiptères homoptères. (Keilin, D. and W. R. Thompson.) C.r. Séanc. Soc. Biol. 78: 83-87.
- Sur un Diptère parasite de la larve d'un Mycétophilidae. C.r. Séanc. Soc. Biol. 78: 87-89.
- The cuticula of insects as a means of defense against parasites. Proc. Camb. phil. Soc. 18: 51-55.
- Sur le cycle évolutif de *Fortisia foeda*, Diptère parasite d'un *Lithobius*. C.r. Séanc. Soc. Biol. 78: 413-416.
- Contribution à la connaissance de la larve *Platidium*. Bull. sci. Fr. Belg. Paris. 48: 319-349.
- Sur les formes larvaires de *Digonichaeta setipennis* Fall. Diptère parasite de *Forficula auricularia* L. C.r. Séanc. Soc. Biol. 78: 602-605.
- Sur les caractères anatomiques et éthologiques des Tachinaires du genre *Plagia* Meig. C.r. Séanc. Soc. Biol. 78: 671-674.
- Sur la biologie de deux Tachinaires à stade intramusculaire (*Plagia trepida* Meig. et *Sturmia scutellata* Rond.) C.r. Séanc. Soc. Biol. 78: 717-721.
- Contributions à l'étude des Tachinaires. C.r. Séanc. Soc. Biol. 78: sep. pp. 1-12 reprint of: C.r. Séanc. Soc. Biol. 78: 602-605, 671-674, 717-721.
- Les rapports entre les phagocytes et les parasites chez *Arthronodes*. Bull. Soc. Zoo. Fr. 40: 63-68.

## 1917

- Sur un Diptère parasite des isopodes terrestres (*Phyto melanocephala* Meig.). C.r. Séanc. Soc. Biol. 80: 785-788.

## 1918

- On the pathology of the present epidemic. (Thompson W. R., P. Fildes, and S. L. Baker.) Lancet (1918): 1-11.

## 1920

- Sur les Diptères parasites des isopodes terrestres. C.r. Séanc. Soc. Biol. 83: 450-451.
- Sur un nouveau parasite de la Galéruque de l'orme, *Degeeria collaris* Fall. (Dipt., Tachinidae). Bull. Soc. ent. Fr. (1920): 180-184.
- Note sur *Rhaconidinea antiqua* Fall., Tachinaire parasite des Forficules (Dipt.). Bull. Soc. ent. Fr. (1920): 199-201.
- Sur *Cyrtillia angustifrons* Rond., Tachinaire parasite d'un Isopode terrestre (*Metapoponotus pruinosis* Brandt). C.r. Acad. Sci. Paris. 170: 1621-1722.
- Sur une Tachinaire parasite de la larve de *Phytonomus posticus* Gyll. Bull. Soc. Etud. Vulg. Zool. agric., Bordeaux. 19: 116-121.

## 1921

- Contributions à la connaissance des formes larvaires des Sarcophagides. I. *Engyrops pecchiolii* Rond. Bull. Soc. Ent. Fr. (1921): 27-31.
- Contributions à la connaissance des formes larvaires des Sarcophagides. II. *Ptychoneura rufitarsis* Meig. Bull. Soc. ent. Fr. (1921): 219-222.
- Studies of *Zenillia roseanae* B. & B. a parasite of the European corn borer. (*Pyrausta nubilalis* Hb.). (Thompson, W. R. and M. C. Thompson.) Proc. ent. Soc. Wash. 23: 127-139.
- Recherches sur les Diptères parasites. I. Les larves des Sarcophagidae. Bull. Biol. Fr. Belg. 54: 313-463.

## 1922

- On the taxonomic value of larval characters in Tachinid parasites (Dipt.). Proc. Ent. Soc. Wash. 24: 85-93.
- Biologie-Théorie de l'action des parasites entomophages. Les formules mathématiques du parasitisme cyclique. C.r. Acad. Sci., Paris. 174: 1201-1204.
- Entomologie — Etude mathématique de l'action des parasites entomophages. Durée du cycle parasitaire et accroissement de la proportion d'hôtes parasites. C.r. Acad. Sci., Paris. 174: 1433-1435.
- Parasitologie — Etude de quelques cas simples de parasitisme cyclique chez les insectes entomophages. C.r. Acad. Sci., Paris. 174: 1647-1649.

Parasitisme — Théorie de l'action des parasites entomophages. Accroissement de la proportion d'hôtes parasités dans le parasitisme cyclique. C.R. Acad. Sci., Paris, 175: 65-68.

### 1923

- Sur le déterminisme de l'apterisme chez un Ichneumonide parasite [*Pezomachus sericeus* Forst.] Bull. Soc. ent. Fr. (1923): 40-42.
- Recherches sur la biologie des Diptères parasites. Bull. biol. Fr. Belg. 57: 174-237.
- Muscarda sexilis*, a parasite of the European corn borer (*Pyrausta nubilalis*). (Thompson, W. R., and M. C. Thompson.) Proc. ent. Soc. Wash. 25: 33-44.
- La théorie mathématique de l'action des parasites entomophages. Rev. gén. Sc. 15: 1-11.
- Observations sur quelques "espèces biologiques" dans le groupe des Tachinaires. Bull. Soc. zool. Fr. 48: 165-170.
- A criticism of the "sequence" theory of parasitic control. Ann. ent. Soc. Am. 16: 115-120.
- Recherches sur les Diptères parasites. Les larves primaires des Tachinidae du groupe des Echinomyiinae. Annls. Epiphyt. 9: 137-201.
1. Unité de l'Etre vivant et la Subsumption des Formes. Felix. Veritas, Belgique. 42 pp. also published in Revue Thomiste, (1923) 41 pp.

### 1924

- La théorie mathématique de l'action des parasites entomophages et le facteur du hasard. Annls. Fac. Sci. Marseille, 2: 69-89.
- Les larves primaires des Tachinaires à oeufs microtypes. Annls. Parasit. hum. comp. 2: 185-201, 279-306.
- Le parasitisme et la doctrine transformiste. Revue Thomiste, Sept., Oct., 1-21 also published in "Le Transformisme", (1927): 123-151.

### 1925

- Le crépuscule de la théorie évolutionniste. La Revue Hebdomadaire, Paris 34, 57-71.
- Notes on the larvae of the Chalcidoidea. (Parker, H. L. and W. R. Thompson.) Ann. ent. Soc. Am. 18: 384-395.

### 1926

- Recherches sur les larves des Tachinaires *Sturmia*, *Winthemia*, *Cercelia* et *Exorista*. Annls. Parasit. hum. et comp. 4: 111-125, 207-227.

### 1927

- A method for the approximate calculation of the progress of introduced parasites of insect pests. Bull. ent. Res. 17: 273-277.
- A contribution to the study of hibernation in the larva of the European corn borer (*Pyrausta nubilalis* Hübn.). Parker, H. L. and W. R. Thompson.) Ann. ent. Soc. Am. 20: 10-22.
- The problem of host relations, with special reference to entomophagous parasites. (Thompson, W. R. and H. L. Parker.) Parasitology, 19: 1-34.
- Etudes sur la biologie des insectes parasites: la vie parasitaire et la notion morphologique de l'adaptation. (Thompson, W. R. and H. L. Parker.) Annls. Soc. Ent. Fr. 98: 113-146.
- On the effect of methods of mechanical control on the progress of introduced parasites of insect pests. Bull. ent. Res. 18: 13-16.

### 1928

- The golden glow borer (*Ephyra caroliniana*, Walsingham). 56th Rep. Ent. Soc. Ontario, 1927 Toronto, 73-75.
- The European corn borer and its controlling factors in Europe. (Thompson, W. R. and H. L. Parker.) Tech. Bull. U.S. Dept. Agr. Washington, 59: 1-62.
- A contribution to the study of biological control and parasite introduction in continental areas. Parasitology, 20: 90-112.
- Host selection in *Pyrausta nubilalis*, Hübn. (Thompson, W. R. and H. L. Parker.) Bull. ent. Res. 18: 359-364.
- A contribution to the study of the dipterous parasites of the European earwig (*Forficula auricularia* L.) Parasitology, 20: 123-158.
- Contribution à la biologie des Chalcidiens entomophages. (Parker, H. L. and W. R. Thompson.) Annls. Soc. ent. Fr. 97: 425-485.

## 1929

- A study of the abundance of *Pyrausta nubilalis* Hübn. in corn (*Zea mays* L.) in southwestern France. (Parker, H. L.; W. R. Thompson; P. de Rippas, and S. Kozlovsky) J. econ. Ent. 22: 183-195.
- The natural control of *Pyrausta nubilalis* Hb. in Europe. Cong. Intern. Zoo. Budapest (1927), 10: 1183-1195.
- On the relative value of parasites and predators in the biological control of insect pests. Bull. ent. Res. 19: 343-350.
- On the effect of random oviposition on the action of entomophagous parasites as agents of natural control. Parasitology, 21: 180-188.
- On natural control. Parasitology, 21: 269-281.
- On the part played by parasites in the control of insects living in protected situations. Bull. ent. Res. 20: 457-462. and l'Italia Agricola, 8: 176-178.
- A contribution to the study of morphogenesis in the Muscoid Diptera. Trans. R. ent. Soc. Lond. 77: 195-244.

## 1930

- Entomophagous parasites and phagocytes. Nature, Lond. 125: 167.
- The morphology and biology of *Eulimaeria crossifemur*, an important parasite of the European corn borer. (Thompson, W. R. and H. L. Parker.) J. agric. Res. 40: 321-345.
- Reaction of the phagocytes of Arthropods and their internal insect parasites. Nature, Lond. 125: 565-566.
- The principles of biological control. Ann. appl. Biol. 17: 306-338.
- The biological control of insect and plant pests. A report on the organization and progress of the work of Farnham House Laboratory. E.M.B. 29: 1-124.
- Proceedings of the Association of Economic Biologists. I. The utility of mathematical methods in relation to work on biological control. Ann. app. Biol. 17: 641-648.
- The third imperial entomological conference. Nature 120: 150-151.

## 1931

- On the reproduction of organisms with overlapping generations. (With an appendix by H. E. Soper). Bull. Ent. Res. 22: 147-172.
- The biological method of pest control. Trans. Oxford Univ. Junior Scientific Club, 5: 124-128.

## 1933

- Economic entomology and agricultural practice. Cong. int. Ent. Paris (1932), 5: 659-665.
- Book Review of the Interpretation of Development and Heredity by E. S. Russell. The Dublin Review, 97: (387): 321-325.
- Book Review of the History of Biological Theories by Emanuel Radl. Translated and adapted from the German by E. J. Hatfield. The Dublin Review, 97 (387): 317-321.

## 1934

- The biological control of injurious insects and plants, and the work of the Farnham House Laboratory. Emp. Cott. Grow. Rev. 11: 188-187.
- The development of a colony of *Aphelinus mali* Hald. Parasitology, 26: 449-453.
- The Tachinid parasites of wood lice. Parasitology, 26: 378-448.
- Evolution and the concept of the species. The Dublin Review, 98 (389): 199-211.
- Report on the work of Farnham House Laboratory, 1933-34. Fifth Annual Report. Exec. Council I.A.B., London. 31-37.

## 1935

- Report on the work of Farnham House Laboratory, 1934-35. Sixth Annual Report. Exec. Council I.A.B. London: 29-33.

## 1936

- Report on the work of Farnham House Laboratory, 1935-36. Seventh Annual Report. Exec. Council I.A.B. London: 83-93.
- Report on a Conference on Biological Methods of Controlling Insect Pests. Belleville, Ontario, June 25 and 26, 1936. The work of the Farnham House Laboratory, 88 pp. multigraph. Dept. Agr. Ent. Br., Ottawa.

## 1937

- Research on biological control. *Nature*, Lond. 139: 552.  
 The problems of biological control. *Biology*, Lond. 3: 1-8.  
 Science and Common Sense. London. Longmans, 234 pp. (Reprinted by Longmans, U.S.A. 1965).  
 Report on the work of Farnham House Laboratory, 1936-37. Eighth Annual Report. Exec. Council, I.A.B. London: 43-48.

## 1938

- A dipterous parasite of Mycetophilids. *Parasitology*, 30: 176-180.  
 Mechanical Thought, a review of The Axiomatic Method in Biology by J. H. Woodger, 1937. *Sci. Prog.* 33: 343-348.  
 Report on the work of Farnham House Laboratory, 1937-38. Ninth Annual Report. Exec. Council I.A.B. London: 48-53.  
 Johann Gregor Mendel in Great Catholics. pp. 426-436, ed. by C. Williamson. Collier, McMillan.

## 1939

- Some beneficial insects. *Bull. Minist. Agr. Fish.* 20: 1-26.  
 Biological control and the theories of the interactions of populations. *Parasitology*, 31: 299-388.  
 Report on the work of Farnham House Laboratory, 1938-39. Tenth Annual Report. Exec. Council I.A.B. London: 43-48.  
 Biological control of insect and plant pests. *School Science Review* 82 (Dec.): 847-858.

## 1943

- A catalogue of the parasites and predators of insect pests. Section 1. Parasite host catalogue. Part 1. Parasites of the Arachnida and Coleoptera ix + 151 pp. Part 2. Parasites of the Dermaptera and Diptera vi + 99 pp. Belleville, Ont., Imp. Paras. Serv. multigraph.  
 Providence, The Thomist, Maritain Volume: 229-245.  
 Report on the work of Farnham House Laboratory 1940-43. Thirteenth Annual Report, Exec. Council I.A.B. London: 1-18.

## 1944

- A catalogue of the parasites and predators of insect pests. Section 1. Parasite host catalogue. Part 3. Parasites of the Hemiptera, v + 149 pp. Part 4. Parasites of the Hymenoptera, Isopoda and Isoptera v + 130 pp. Part 5. Parasites of the Lepidoptera (A —CH) v + 130 pp. Belleville, Ont., Imp. Paras. Serv. multigraph.

## 1945

- A catalogue of the parasites and predators of insect pests. Section 1. Parasite host catalogue. Part 6. Parasites of the Lepidoptera (CI —F). pp. 131-258. Belleville, Ont. Imp. Paras. Serv. multigraph.

## 1946

- A catalogue of the parasites and predators of insect pests. Section 1. Parasite host catalogue. Part 7. Parasites of Lepidoptera (G —M). pp. 259-385. Part 8. Parasites of Lepidoptera (N —P). pp. 386-523. Belleville, Ont. Imp. Paras. Serv. multigraph.

## 1947

- A catalogue of the parasites and predators of insect pests. Section 1. Parasite host catalogue. Part 9. Parasites of Lepidoptera (Q —Z) pp. 524-627. Belleville, Ont. Imp. Bur. Biol. Contr. multigraph.  
 Mathématiques et biologie. Laval Théologique et Philosophique, Québec, 3: 79-88.  
 La croissance et la reproduction des êtres vivants, Laval Théologique et Philosophique, Québec, 3: 195-221.  
 The unity of the organism. *The Modern Schoolman*, 24: 125-157.  
 Interim Report on two Scales attacking the Bermuda Cedar. Dept. Agric., Hamilton, Bermuda, 3 pp.

## 1948

Editorial. Can. Ent. 80: 7-8.

Can economic entomology be an exact science? Can. Ent. 80: 49-55.

## 1949

Remarks from symposium on entomological education. Rep. ent. Soc. Ont. (1948), 79: 63.

Obituary: J. F. C. Fryer; A.D. Imms; F. Silvestri. Can. Ent. 81: 215-216.

Book Notice: Introducing the Insect by F. A. Urquhart, Clarke, Irwin & Co. Toronto. 187 pp. Can. Ent. 81: 283-284.

## 1950

New leadership in the Canadian Division of Entomology. Can. Ent. 82: 70-72.

Radioisotopes in entomology. Can. Ent. 82: 114-115.

A catalogue of the parasites and predators of insect pests. Section 1. Parasite host catalogue. Part 10. Index of parasites of the Lepidoptera. 107 pp. Ottawa. Commonw. Bur. Biol. Contr. multigraph.

A catalogue of the parasites and predators of insect pests. Section 1. Parasite host catalogue. Part 2. Parasites of the Neuroptera, Odonata, Orthoptera, Psocoptera, Siphonaptera and Thysanoptera. iv + 35 pp. Ottawa, Ont. Commonw. Bur. Biol. Contr. multigraph.

## 1951

The Entomological Society of Canada. Can. Ent. 83: 27-28.

The illustration of entomological papers. Can. Ent. 83: 107-108.

Book Review of A Field Guide to the Butterflies of North America, East of the Great Plains; by A. B. Klotz, Houghton Mifflin Co. Boston 349 pp. Can. Ent. 83: 211-212.

The time factor in biological control. Can. Ent. 83: 230-240.

The specificity of host relations in predacious insects. Can. Ent. 83: 282-289.

A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue. Part 1. Hosts of the Coleoptera and Diptera ii + 147 pp. Ottawa. Commonw. Bur. Biol. Contr. multigraph.

The Commonwealth Bureau of Biological Control. Research 4: 374-377.

## 1952

The work of the Commonwealth Institute of Biological Control. Brit. Agric. Bull. 19: 52-57.

The status of evolutionary theory. (In Symposium on Evolution, Laval University, 1950), Laval Théologique et Philosophique, Quebec 9: 196-202.

The philosophical foundations of systematics. Can. Ent. 84: 1-16.

Joint Meeting of the Entomological Society of Canada and the Entomological Society of Ontario. Ottawa, Ontario, November 1, 2, 3, 1951. Can. Ent. 84: 29.

## 1953

Souvenirs de la vie entomologique en Europe. Québec Soc. Protect. Plants Rpt. (1952) 34: 26-32.

A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue. Part 2. Hosts of the Hymenoptera (Agaonidae to Braconidae). ii + 190 pp. Ottawa, Commonw. Bur. Biol. Contr. multigraph.

The tachinid parasites of *Archips cerasivorana* Fitch. (1) *Dichaetoneura leucoptera* Johns. (Diptera). Can. Ent. 85: 19-30.

Book Notice of How to know the Spiders by B. J. Kaston, William C. Brown Co. Iowa, 220 pp. Can. Ent. 85: 346.

Note on *Dichaetoneura leucoptera* Johns. (Diptera, Tachinidae). Can. Ent. 85: 391-392.

Book Notices of: Entomological Photography in Practice by E. F. Linssen. The Fountain Press, London, England 112 pp. Cytochemistry, A critical approach by J. F. Danielli, John Wiley & Sons, Inc., New York. 139 pp. A Manual of Entomological Techniques by A. Peterson, Edwards Bros. Michigan. 367 pp. Can. Ent. 85: 392.

The tachinid parasites of *Archips cerasivorana* Fitch (2) *Eusisyropa blanda* O.S. (Diptera). Can. Ent. 85: 393-404.

Biological control. Agric. Inst. Rev. 8: 47-48.

## 1954

- Book Review of Evolution in the Genus *Drosophila* by J. T. Patterson and W. S. Stone. Macmillan Co. New York, 610 pp. Can. Ent. 86: 98-100.
- Hyalomyodes triangulifera* Loew. (Diptera, Tachinidae). Can. Ent. 86: 137-144.
- Biological Control Work on Cedar Scales in Bermuda. Report of the 6th Commonwealth. Ent. Conf. July 1954: 89-95.
- A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue. Part 3. Hosts of the Hymenoptera (Calliceratidae to Evaniidae), pp. 191-332. Ottawa, Commonwealth. Inst. biol. Contr. multigraph.

## 1955

- The systematic relationships of *Dichaetoneura* Johns. and *Phytomyza* Rond. Can. Ent. 87: 100.
- Mortality factors acting in a sequence. Can. Ent. 87: 264-275.

## 1956

- Book Notice of The Eucalyptus Snoutbeetle, *Gonipterus scutellatus* Gyll. A Study of its Ecology and Control by Biological Means. by F.G.C. Tooke, South Africa, Dept. Agr. Ent. Memoirs Vol. 3, 184 pp. 1955. Can. Ent. 88: 42-44.
- The International Congresses of Entomology. Can. Ent. 88: 285-289.
- Book Review of Fishing with Natural Insects by A. Peterson, distributed by author, 176 pp. Can. Ent. 88: 563-564.
- The fundamental theory of natural and biological control. A. Rev. Ent. 1: 379-402.
- Systematics: the ideal and the reality. Naples. U. Facol. Agr. in Portici Lab di Zool. Gen. e Agr. B. 33: 320-329.

## 1957

- L'Oeuvre de Jean-Henri Fabre. Revue Zool. agric. appl. 64: 2-13.
- A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue. Part 4. Hosts of the Hymenoptera (Ichneumonidae). 560 pp. Ottawa, Commonwealth. Inst. biol. Contr.
- Evolutionary theory and the morphological concept of adaptation. Bull. nat. Inst. Sci. India, New Delhi. 7: 35-45.

## 1958

- The meaning of species in systematics. Studia ent. 1: 202-203.
- Tenth International Congress of Entomology: Introductory remarks and address. Proc. 10th int. Cong. Ent. (1956) Montreal, 1: 14-15, 44-45, 48-50.
- Interpretation of taxonomy. Proc. 10th int. Cong. Ent. (1956) Montreal, 1: 61-74.
- Introduction to Origin of Species by Charles Darwin. Everyman's Library No. 811, J. M. Dent, London.
- Dr. C.J.S. Bethune, 1838-1932. Ent. Division News Letter. Ottawa, 36: (No. 10): 2-3.
- A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue Part 5. Hosts of the Hymenoptera (Miscogasteridae to Trigonidae). Lepidoptera and Strepsiptera. 698 pp. Ottawa, Commonwealth. Inst. biol. Contr. multigraph.

## 1959

- Some notes on ecological theory. Boll. Ist. Ent. Univ. Bologna 23: 205-225.

## 1960

- Notes on the Volterra equations. Can. Ent. 92: 582-594.
- The larval morphology of some Tachinid parasites of *Distraea* (Diptera). Trans. Am. ent. Soc. 86: 207-224.
- Guy Anstruther Knox Marshall 1871-1959. Biogr. Mem. Fellows R. Soc. 6: 169-181.

## 1961

- The Tachinids (Diptera) of Trinidad. I. The Voriines. Trans. Am. ent. Soc. 87: 21-44.

## 1962

- Teilhard: neither scientific nor orthodox? Search. London, 1: 189-193.
- Evolution and Taxonomy. Studia ent. 5: 549-570.



## 1963

- The Tachinids of Trinidad II. Echinomyiines, Dexiines, and allies. Can. J. Zool. 41: 335-376.  
 The Tachinids of Trinidad. III. The Goniines with microtype eggs (Diptera Tachinidae). Studia ent. 6: 267-404.  
 The Tachinids of Trinidad. IV. Winthemiines. Can. Ent. 95: 963-995.  
 The Tachinids of Trinidad. V. Siphosturmiines and Masiphiyines. Can. Ent. 95: 1292-1320.  
 Diversas Comunicações: A critique of the Darwinian theory of evolution. Studia ent. 6: 563-574. (Reprinted from Thompson, 1958, Introduction to the Origin of Species by Charles Darwin.)

## 1964

- Convocation Address, The work of Jean Henri Fabre. Can. Ent. 96: 62-70, also Studia ent. 7: 471-479.  
 A catalogue of the parasites and predators of insect pests. Section 3. Predator host catalogue. (Thompson, W. R. and F. J. Simmonds). 204 pp. Farnham, Commonw. Inst. biol. Contr. multigraph.  
 The Tachinids of Trinidad. VI. The larviparous Goniines of the Carceline type (Diptera, Tachinidae). Studia ent. 7: 97-152.

## 1965

- A catalogue of the parasites and predators of insect pests. Section 4. Host predator catalogue. (Thompson, W. R. and F. J. Simmonds.) 198 pp. Farnham, Commonw. Inst. biol. Contr. multigraph.  
 Book Review of George Cuvier: Zoologist, A study in the history of evolution theory, by William Coleman. Harvard Univ. Press. 1964. 206 pp. The New Scholasticism, 39: 390-392.  
 The Tachinids of Trinidad. VII. The larviparous goniines with broad cheeks (Diptera, Tachinidae). Studia ent. 8: 353-434.  
 The status of species in Philosophical Problems in Biology by Vincent Edward Smith. St. John's Univ. Phil. Ser. 5: 67-128.

## 1966

- Diversas comunicações, Taxonomic typology and population systematics. Stud. ent. 9: 522-523.

## 1967

- Is the species subjective? Studia ent. 10: 490.  
 An introduction to Teilhard de Chardin. Christendom, the Catholic Monthly, Lexington, Kentucky, Oct., 22 pp. (Reprinted in 1967 by the Oratory, Lexington, Kentucky, 22 pp.)

## 1968

- The Tachinids of Trinidad. VIII. Phorocerines. Ent. Soc. Canada, Memoirs, Ottawa, 56: 1-207.  
 Blackout in Canada. Christendom, the Catholic Monthly, Lexington, Kentucky, Feb. pp. 3-11.  
 Evolution and some philosophers. Mélanges à la Mémoire de Charles de Koninck. pp. 363-378. Les Presses de l'Université Laval, Québec. 423 pp.

## 1971

- The status of species. Stud. Ent. 14: 399-456. (Reprinted from Thompson, 1965, The Status of Species in Philosophical Problems in Biology).

## SYMPOSIUM ON "PEST MANAGEMENT FOR THE 21ST CENTURY"

13-14 October 1972

UNIVERSITY OF IDAHO, MOSCOW

Five 60 minute papers have been scheduled in the areas of Legal, Social and Economic Restraints (W. E. Waters), Conceptual Organization of Research and Development (R. W. Campbell), Measurement of Social and Economic Impact (N. E. Johnson), Future Techniques (C. B. Huffaker and R. F. Smith), and Decision Making Techniques (G. C. Mott). For further information write A. R. Githens, Head, Department of Entomology, University of Idaho, Moscow, Idaho 83843.

# FINANCIAL STATEMENTS

Year ended 31 December 1971

To the members of  
ENTOMOLOGICAL SOCIETY OF CANADA

We have examined the balance sheet of the Entomological Society of Canada as at December 31, 1971 and the statement of financial activities for the year then ended. Our examination included a general review of the accounting procedures and such tests of accounting records and other supporting evidence as we considered necessary in the circumstances.

As is usual in organizations of this kind, it is not possible to completely verify the revenue from all sources and therefore the statements show the recorded revenue.

Subject to the foregoing, we report that in our opinion these financial statements present fairly the financial position of the Society as at December 31, 1971 and the results of its operations for the year then ended, in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Geo. A. Welch & Company  
Chartered Accountants

## BALANCE SHEET 31 DECEMBER 1971

(with comparative figures for December 31, 1970)

### ASSETS

	1971	1970
Cash	\$ 59,385.73	\$ 50,270.15
Receivable re Memoirs	—	34,053.00
Receivable re reprints and back issues	14,544.50	12,501.00
Term deposit — 8-3/4% — due September 18, 1973	10,000.00	10,000.00
Term deposit — 8% — due December 29, 1973	10,000.00	10,000.00
Government and government guaranteed bonds — at cost (Quoted value — \$50,417.50)	54,673.03	34,923.03
	<u>\$148,603.26</u>	<u>\$151,747.18</u>

### LIABILITIES AND SURPLUS

#### LIABILITIES

Accounts payable and accrued liabilities	\$ 12,900.90	\$ 43,607.82
Deposit for publishing Memoirs	—	2,500.00
Prepaid memberships, subscriptions and reprints	23,866.11	25,400.29
	<u>36,767.01</u>	<u>71,508.11</u>

#### SURPLUS

Balance, December 31, 1970	80,239.07	60,654.89
Net revenue for year	<u>31,597.18</u>	<u>19,584.18</u>
Balance, December 31, 1971	111,836.25	80,239.07
	<u>\$148,603.26</u>	<u>\$151,747.18</u>

## FINANCIAL ACTIVITY YEAR ENDED 31 DECEMBER 1971

(with comparative figures for year ended December 31, 1970)

### REVENUE

	1971	1970
Regular memberships	\$ 13,108.55	\$ 13,463.66
Student memberships	952.32	1,080.50
Sustaining memberships	400.00	400.00
Subscriptions	27,409.68	26,765.75
Sale of reprints including page charges	67,837.82	46,255.49
Sale of back issues	2,440.77	1,570.60
Publishing Memoirs	65,117.50	97,132.00
Interest earned — net	5,206.85	3,940.82
	<u>182,473.49</u>	<u>190,608.82</u>

### EXPENDITURE

Publishing costs — Canadian Entomologist	53,610.46	47,126.66
— reprints	8,821.74	7,993.83
— Memoirs	55,744.45	79,991.56
Annual meeting — grants	750.00	1,250.00
— travel expense	3,848.99	961.52
— miscellaneous	192.31	281.60
Biological Council of Canada — dues	814.00	914.00
— delegate	870.16	324.06
SCITEC — founding grant	—	500.00
— delegate	—	95.00
Salaries	17,036.04	18,506.60
Directors' expenses	3,017.65	4,837.19
Canada Pension Plan	148.99	143.07
Professional fees	350.00	450.00
Postage and office supplies	1,535.91	1,443.36
Telephone	118.80	107.63
Repairs and maintenance	—	460.53
Insurance	—	1,002.50
Bulletin	3,908.71	4,513.32
General expense	110.10	122.21
	<u>150,876.31</u>	<u>171,024.64</u>
NET REVENUE FOR YEAR	<u>\$ 31,597.18</u>	<u>\$ 19,584.18</u>

### SCITEC AT THE ANNUAL MEETING

Dr. Louis Berlinguet, Past-President of SCITEC, has accepted an invitation from President P. S. Corbet to address our Society during The Joint Meetings in Montreal, 28 to 30 November 1972. His subject will concern the advantages of our continued membership in SCITEC. Dr. Berlinguet is an accomplished speaker and he will undoubtedly be willing to discuss with members any questions on the relationship between SCITEC and its member societies.

## LA PLUIE AU SERVICE DES ENTOMOLOGISTES

Il est presque indécrot pour un citoyen de Vancouver de souligner les bienfaits de la pluie quand on sait tout ce qu'il tombe d'eau dans cette partie du Canada. Cependant, il faut bien admettre que sans cette bénédiction du ciel, rien ne pousserait sur cette terre et l'industrie du bois de notre beau pays ferait vite faillite. Les précipitations atmosphériques ont également d'autres côtés bénéfiques que l'on a généralement tendance à négliger. Ainsi il a été mentionné à quelques reprises dans la littérature scientifique que la pluie peut avoir un effet néfaste marqué sur la prolifération des insectes. Ces assertions ont été vérifiées en laboratoire dans une pièce munie d'un système d'arrosage automatique (Can. Ent. 104: 895-896). Sous des conditions simulées de pluie fine mais fréquente, on a constaté que l'insecte utilisé (la mouche à scie du pin gris, *Neodiprion swainei*) subissait une mortalité élevée (plus de 70%) au stade larvaire, autrement dit à la période de son développement où il est le plus dangereux pour les forêts. Une saison très pluvieuse peut donc être considérée comme particulièrement néfaste à ce défoliateur de nos forêts. Ce genre d'observation nous amènera peut-être à arroser les forêts avec tout simplement de l'eau plutôt qu'avec toutes sortes d'insecticides plus ou moins efficaces. La croissance des arbres s'en trouverait affectée de plusieurs façons: les arbres auraient davantage d'eau pour leur croissance, il y aurait moins de défoliateurs, et les risques d'incendie seraient moindres. De plus la pollution par les produits chimiques ne serait plus un problème.

---

## REPORT OF THE ELECTION COMMITTEE

Your Election Committee (L. Burgess, N. S. Church and F. J. H. Fredeen, Chairman) counted on July 17 all ballots received up to midnight of July 15, for the 1972 election of officers and bylaw changes.

Ballots were mailed to about 742 members; 397 were returned and counted with the following results:

Ballot for President-Elect: (G. S. Cooper, Rexdale, Ontario; J. J. R. McIntock, Saskatoon, Sask.) Dr. McIntock was elected.

Ballot for Director-at-Large: (K. P. Butler, Kentville, N. S.; B. N. A. Hudson, Ottawa, Ontario; R. A. Ring, Victoria, B.C.; C. Ritchot, St. Hyacinthe, Quebec; W. J. Turnock, Winnipeg, Manitoba) Drs. Hudson and Turnock were elected.

Ballot for Honorary Member: (H. H. Ross) The great majority voted yes for Dr. Ross.

Ballot for Proposed Changes in ByLaws: New Articles IV, 1(a) (4) and IV, 2(c) — the great majority voted yes for both. Amendment to Article VI, 4 — the great majority voted yes.

Ballot for the Principle of a Fellowship Class: the great majority voted yes in agreement of the principle.

I hereby certify that the Election Committee has correctly counted all ballots received prior to July 16, 1972 and rejected those received later.

F. J. H. Fredeen

## JOINT MEETING

### Entomological Society of America Entomological Society of Canada Entomological Society of Quebec

Montreal, 27-30, 1972

#### LADIES PROGRAM

Monday November 27

Leaving the Queen Elizabeth Hotel at 10 a.m., a bilingual guided tour of the city of Montreal, including a stop at Westmount lookout and Notre Dame Church, followed by luncheon at Le Nautique Restaurant in Place Jacques Cartier, Old Montreal. From 2 p.m.-3:30 p.m. a guided walking tour of Old Montreal, including a visit to Chateau Ramezay. Return to Q.E. approximately 4 p.m. Total cost of tour including luncheon, \$10.65 per person. Minimum number - 60 persons. Tour has been arranged by Murray-Hill Limousine Service Ltd. Tickets for presale at registration desk will be provided by Murray Hill, at no cost, provided there is a minimum of 100 persons.

Tuesday November 28

Tour of Seagrams distillery at LaSalle, leaving Q.E. 9:30 a.m. Tour includes a film "The Secret of Seagram" and coffee will be served at the end. Return to Q.E. approximately 12:00 noon. Maximum number - 60 persons. Ladies will then be asked to make their own way to Morgan's downtown department store for luncheon in the (9th floor) Regency Room, 1:30-3:00 p.m. approximately, with a fashion show from 2-2:30 p.m. (The fashion show is not yet certain. If arranged, will cost \$100.00). Ladies pay for their own luncheon.

Wednesday November 29

Tour of Botanical Gardens greenhouse to view the autumn display, leaving Q.E. approximately 10:15 a.m. - returning 12:00 noon. Lunchtime free. Tour leaving Q.E. at 2 p.m. for new CBC building, Dorchester E. Tour includes a live broadcast, returns to Q.E. approximately 3:30 p.m.

If a suitable program is on at Place des Arts in November we may also provide thirty (30) tickets to be sold at the registration desk. Program will not be available until July.

#### TOUR PROGRAM TO QUEBEC CITY

Thursday, November 30th

1. Time and Place of Arrival: 3:00 p.m. at the Laval University campus (Faculty of Sciences).

2. Afternoon Activity: A tour of Laval University campus with a brief visit to the Department of Biology, Entomology section. Dinner at the "Salon des Professeurs".

3. Evening Activity: An evening at the "Cave de l'Abbaye" (Holiday Inn) and lodging facilities at the same place.

Friday, December 1st

1. Morning Activity: A guided tour of Old Québec. Lunch at the "Bavard Roy" or at "Le Fiacre."

2. Afternoon Activity: A visit to the Laurentian Forest Research Centre. A visit to the Agriculture Research Center.

3. Departure for Montreal: At 5:00 p.m.

## SCITEC: WHAT'S IN IT FOR THE ESC?

You may have asked yourself this question many times recently. If not, our Managing Council has, for SCITEC costs us money and any expenditure must be carefully analyzed for costs and benefits. The purpose of this statement is to provide you with information that will assist you in finding your answer to the question. When I was President, I assisted in the formation of SCITEC and remained active on its Council until recently. Another former President, Dr. A. S. West, also has been involved in SCITEC affairs since the beginning.

### What is SCITEC?

SCITEC, a body unique to Canada and in some respects to the scientific world, is the Association of the Scientific, Engineering and Technological Community of Canada. It was organized in direct response to the question, "Who speaks for science and technology?", asked by Senator Lamontagne, Chairman of the Special Senate Committee on Science Policy. The Committee had just heard more than a hundred voices in the form of briefs submitted by scientific, engineering and technological societies and associations.

It is not surprising that most briefs recommended that any national science policy should include more support for the particular discipline represented by the society submitting the brief. The briefs often, and understandably, were contradictory, and seldom presented a holistic view of the contribution that the scientific community could and should make to the rational development of our modern society and the solution of the innumerable problems facing it.

Reacting to the realization that no one was the answer to the Senator's question, representatives of most of the scientific, engineering and technological societies met informally in 1969 to discuss whether there should be a voice of science and technology in Canada. There were many aspects to the question. Could scientists and technologists isolate themselves from any meaningful participation in the dialogue leading to a national science policy? Could they isolate themselves from the planning of programs for the solution of the innumerable and complex problems that confront our society? Could they continue to isolate themselves in discipline-oriented societies for the sole purpose of promoting their disciplines? It was the consensus that they could not.

In January 1970 the representatives met again and SCITEC was born. L'Association Canadienne-Française pour l'Avancement des Sciences (ACFAS), the Biological Council of Canada (BCC), the Agricultural Institute of Canada, the Chemical Institute of Canada and many other associations and societies became members. The ESC supported SCITEC as a member of the BCC and has continued to do so. We also provided SCITEC with a founding grant.

SCITEC is governed by a Council that includes representatives of all member associations and societies. SCITEC is a forum which provides scientists, engineers and technologists with an opportunity to express their opinions on national policies, especially those relating to science and its contribution to society. It does not attempt to represent itself as a single voice except on such matters on which there is unanimity or a clear consensus in the SCITEC community. It is not a political tool or force, either for science or the politician.

SCITEC has organized regional and national forums. A forum on Science Policy is to be held in October of this year. A symposium on Highly Qualified Manpower will be held early in 1973. SCITEC, through an interdisciplinary committee, had a major impact on the development of the Canadian position at the recent Stockholm conference on Man and the Environment. A Committee on Science Policy Response has obtained an evaluation of opinion from the SCITEC community and is organizing a meeting for the near future. With the support of the Science Council of Canada, SCITEC recently completed a study of the national science-based societies. Our Dr. A. S. West was the Study Director.

The SCITEC Bulletin is a quarterly publication and there are plans to increase the number of issues as finances permit.

### What is the Membership?

Society Members are societies, institutes, associations and councils of the scientific, engineering and technological community. There are 30 such members at present, 80% representing the life sciences, 28% the social sciences and 14% the physical sciences. Each member has representation on the Council with full voting rights. The dues are ten cents for each member of member societies, excluding associate and student members. The ESC pays about ninety dollars per annum through the BCC.

Individual Members are those who, regardless of any membership in member societies, wish to support directly the objectives of SCITEC and to participate fully in its activities. The dues are ten dollars per annum.

Industrial Members are companies that have elected to support SCITEC because of their interest in interdisciplinary solutions to our current complex problems. These members make an annual grant to SCITEC or pledge such support for a three-to five-year period. There are now seven such members.

### How Does it Operate?

SCITEC has an Executive Director, John Harcourt, M.C.I.C., who with a secretary conducts the general business of the Association. Both are employed on a part-time basis and operate out of an office in Ottawa. Accounting services are obtained from the Chemical Institute of Canada while the Association of Universities and College of Canada provides mailing and translation services.

### What is the Problem?

On 1 January 1973, in order to permit the effective operation of SCITEC and the attainment of its objectives, the dues of Society Members will be increased from ten cents for each of their members, to the following scale:

Up to and including 1000 members:	\$1.00 per member
1001 to 2000 members:	0.75 " "
2001 to 5000 members:	0.50 " "
More than 5000 members:	0.25 " "

BCC will be required to increase its dues since, on our behalf alone, it will pay \$950 rather than \$95 per annum to SCITEC. We shall be asked by BCC to ratify this increase from ten cents to one dollar each.

I believe that we should ask BCC to continue to support SCITEC, and that a payment of one dollar each year for a voice for science and technology in Canada is a minimal contribution from each of us.

E. J. LeRoux

## SCIENCE COUNCIL'S SIXTH ANNUAL REPORT

The Council's Annual Report for 1971-72 contains three major sections — a factual account of the activities of the past year, the text of the Council's Commentary on Volume 2 of the Senate Committee's Report on Science Policy (which was released in mimeograph form 10 May) and the Chairman's Annual Report by the now-retired first Chairman of the Council, Dr. O. M. Solandt.

The Council's Commentary on the "Lamontagne Report" set out to expose three broad areas in which the Council had a substantially different opinion from the one advanced by the Senators. The differences, in brief, concerned:

**The purpose of science and technology:** the Council views them as tools, not as goals. This point of view leads to opinions on the validity of concepts such as "a coherent national science policy" and "target expenditures for R & D" which differ markedly from those advanced by the Senators.

**The relationship between basic and applied research:** the Council's concern about the difficulty of promoting adequate intercommunication between "basic" and "applied" scientists leads to a view opposing the Senators' major reorganization of government science (which would have created a "pure" National Academy, and an "applied" Industrial Laboratories Corporation).

**The nature of the innovative process:** the Council takes a very broad view of what is involved in "technological innovation", that process which takes ideas or inventions and brings them finally into use; the Senators' view is of a process dominated by R & D but, in the Council's words "pushing on the innovative end of the R & D chain is not nearly as practical or rewarding as pulling on it from the market end".

The major new text is Dr. O. M. Solandt's final Annual Report as Chairman of the Council — his term of office expired 23 May. In two sections — on "The Structure of Science and Government" and on "Policy Problems: Past, Present and Future" — he provides a personal view of how he sees science today in Canada and of some of the problems to be faced in future.

The most specific comments are reserved for his commentary on how he would reorganize the NRC — a much debated topic in Canadian science policy circles. While no claims are made that his suggestions are the only ones, they seem more valid and workable than the dismemberment proposed by the Senate Committee. In essence Solandt's proposal calls for the removal of the task of providing support for research in the natural sciences and engineering in Canada's universities from the NRC and a reorganization of NRC's remaining functions to focus them more closely on industrial objectives.

Solandt proposes that a new single granting Council be established to support research in the universities, being composed of activities now performed by the NRC, the MRC and the Canada Council.

In terms of internal reorganization, he suggests: (a) that NRC report to the Minister of Industry, Trade and Commerce; (b) that it up-grade its planning group and provide through that group for improved relations both with the industrial sector and the Department of Industry, Trade and Commerce; (c) that a small Institute of Pure Research be established in NRC to



house its most gifted basic research workers who should be allowed to pursue programs whose objectives they themselves have chosen.

Finally, he recommends that the reorganization of NRC's activities in the dissemination of scientific and technical information, as proposed in Science Council Report No. 6 in late 1969, should be fully implemented.

Solandt faces up to one of mankind's severest dilemmas — the conflict between the short term need to stimulate economic growth to cope with present problems and the long term need to develop a stable society which can live in harmony with man's environment and which can ensure the future of mankind. He ends on a mildly optimistic note:

It is important to emphasize that what I have called a stable society would only be relatively stable in population and not resource consumption. There is ample room within these limits for a continued growth and evolution of civilization. The no-growth society should not be a "no-hope" society. It could embrace the most potentially liberating forces in the history of mankind. This new society could be much more creative in the fields of human relations, of the arts and crafts and of scientific discovery than our present one, and should be regarded as a more, not a less, desirable alternative in the increased material affluence toward which our society has in the past been directed.

---

## BOOK REVIEWS

BIOLOGICAL CONTROL PROGRAMMES AGAINST INSECTS AND WEEDS IN CANADA 1959-1968. Commonwealth Institute of Biological Control Technical Communication No. 4, by Staff of the Canada Department of Agriculture, Belleville, Ontario. Hard cover, Quarto, 260 pages. Price: £2.50

Canada, through the Department of Agriculture and the Canadian Forestry Service, has a distinguished reputation in the field of biological control, and has contributed much of value to both of the theory and practice of this important field during the last 60 years or so.

In 1962 CIBC published a comprehensive review of Canadian biological control programmes undertaken against insect pests of agricultural crops and forests, and against weeds, up to 1958. Now a successor to this volume has been prepared covering the next decade 1959-1968.

This comprises four parts. The first three are devoted to agricultural pests, weeds and forest pests, respectively. The fourth, which constitutes a departure from the form of the first volume, is an appraisal, by an independent scientist, of the status and potential of biological control in Canada. The emphasis throughout the volume is on the status of target pests, release and recovery records and evaluation of control attempts, with the intention that the experience of the 48 contributors can be put to the best use when future biological control programmes are being planned. Thus this volume is both a synopsis and an up-to-date critical review of the Canadian effort in biological control.

**BIOLOGICAL CONTROL IN THE ETHIOPIAN REGION.** Commonwealth Institute of Biological Control Technical Communication No. 5, by Dr. D. J. Greathead and others. Hard Cover, Quarto, 176 pages. Price: £4.00

This volume reviews biological control work in the Ethiopian region in its broadest sense — Africa, Madagascar, the Seychelles, the Mascarenes, St. Helena and other small islands. While emphasis has been placed on Commonwealth countries, work in other countries is also noticed as it affects neighbouring Commonwealth countries, and on occasion work has been carried out co-operatively.

All attempts at biological control where organisms were actually introduced or redistributed are included, and, where appropriate, investigations which led to the conclusion that biological control was not feasible. The intention is to show what has been achieved and to provide a guide to future work. The results are discussed in relation to theories of biological control, in particular the proposition that islands are more suited to biological control than continents, the problem of what constitutes an adequate colony for the establishment of a species, and factors which should be considered in selecting candidates for introduction.

Africa as a source of organisms for use in biological control is also considered. As far as possible attempts to use organisms from Africa are reviewed and future prospects are discussed. Brief accounts of climatic, vegetation and faunal patterns are given as a guide to planning exploration, and suggestions as to the type of pest problems which would be studied to advantage in Africa.

The work is completed with a table of movements of beneficial organisms within the Ethiopian Region, a bibliography and species index. The layout is geographical so that work in particular areas is reviewed together. Much unpublished material has been included and accounts of some important successes are given for the first time.

**A REVIEW OF THE BIOLOGICAL CONTROL OF INSECTS AND OTHER PESTS IN SOUTH-EAST ASIA AND THE PACIFIC REGION.** Commonwealth Institute of Biological Control Technical Communication No. 6, by Dr. V. P. Rao and others. Hard Cover, Quarto, Approx. 100 pages. Price: £3.00

This deals with biological control of pests, including weeds, in South East Asian countries, chiefly Burma, Ceylon, India, Indonesia, Malaysia, Pakistan, the Philippines, Taiwan and Thailand as well as a number of Pacific islands. It comprises two parts: the first deals with biological control work in these areas, using natural enemies obtained from within or outside this general geographical region, and the second gives an account of the beneficial species sent from these areas to other parts of the world in attempts at biological control. Each pest species or group of related species and their natural enemies in each country or area are discussed in separate sections, together with a summary of available information on the results obtained.

This publication provides, for the first time, a general review of biological control work in this region, based not only on published literature but on many unpublished reports and records and information from individuals engaged in this field in the general area. A list of some 500 references and a species index are given.

## SYMPOSIUM ON ENTOMOLOGY AND EDUCATION

To celebrate the 50th anniversary of its founding by E. H. Strickland, the Department of Entomology at the University of Alberta hosted two symposia the week of 14 May. The proceedings of the first, on "Biting Fly Control and Environmental Quality" will be published by the Defence Research Board. Those of the second on "Entomology and Education" will appear as a supplement to the department's journal *Quaestiones entomologicae*.

This theme of the second symposium was chosen because entomological education, like education in general, has entered a period of crisis with too many students being graduated to fill too few jobs. In the eyes of the public our graduates are over-qualified and therefore useless. To today's taxpayer it seems that science creates rather than solves problems and taxpayer support is therefore lacking.

The principal objective of the symposium was to re-evaluate the rôle of the entomology department in the light of present and future conditions. Invited speakers were asked for their comments on three questions: 1. What is the proper education for entomologists of all kinds? 2. What can entomology contribute to education in general? 3. What changes should be made in the curriculum of the Department of Entomology at the University of Alberta?

The six speakers, all graduates of the department in Edmonton, were: Don Jantzie, County Central Highschool, Vulcan, Alberta (highschool biology teaching); Dr. Richard Freitag, Lakehead University, Thunder Bay, Ontario (undergraduate university biology teaching in Canada); Dr. Art Gittins, University of Idaho, Moscow (undergraduate and graduate entomology teaching in U. S. land grant universities); Dr. Bill Mason, Canada Department of Agriculture, Ottawa (basic government research); Dr. Neil Holmes, Canada Department of Agriculture Research Station, Lethbridge, Alberta (applied government research); and Dr. George Cooper, Cyanamid of Canada Ltd., Rexdale, Ontario (industry).

The following conclusions emerged from the meeting:

- (1) There is a lack of appreciation of the social and biological significance of insects and entomology among parents, educators, employers, the communications media, and governments at all levels. Continuing and increasing efforts should therefore be devoted to remedying this lack.
- (2) Too few graduating entomologists have adequate background in applied fields for immediate employment in them. Greater efforts should thus be made by all concerned to facilitate summer employment for undergraduates in applied research fields. In addition more material in applied fields should be made available in the curriculum as formal courses and through appropriate invited speakers.
- (3) As knowledge of insects is essential in the work of all agriculturists, foresters and educators in the life sciences and desirable in educators in all sciences, faculties of agriculture and forestry should be requested to give favorable reconsideration to a requirement for entomology for all of their students. Faculties of education should be similarly requested in respect of students in science and especially in biology majors.

Recommendations were formulated as resolutions and these received unanimous support.

Bruce Heming

## REVIEW

**It's Not Too Late — Yet, A Look at Some Pollution Problems in Canada's Natural Environment and Identification of Some Major Concerns.** Report No. 16 of the Science Council of Canada. Available from Information Canada, Ottawa, or Information Canada bookshops elsewhere.

The Science Council of Canada's Report No. 16, "It's Not Too Late — Yet", presents the Council's opinion on the state of Canada's natural environment, the capability of the scientific community to tackle environmental problems, the state of the Canadian public's environmental conscience, and a recipe for action.

The title of the report reflects the Council's cautious optimism together with its restlessness to have the more important jobs tackled without delay. The report makes no claim for completeness but appears as a deliberate attempt to highgrade the problems and establish an order of priority. It is clear that the Council is not advocating that action already under way in many areas not mentioned in the report should be discontinued or slowed down. An attack on a particular pollution problem, once mounted, should be pressed to its logical conclusion. The report, however, does recommend some very precise priorities, recognizing that Canada cannot tackle all its pollution problems simultaneously.

The report is also specific in that it deals with the natural environment only. The Committee, chaired by Dr. Gabriel Filteau of Laval University, decided that they would deal first with the natural environment and leave the urban environment to a subsequent report.

The Council recommends that top priority should be given to fresh water pollution in Canada, and within this area the Great Lakes — St. Lawrence River, Estuary and Gulf system is the most important to tackle immediately. The Council finds that the IJC program in the Great Lakes, if funded at the level proposed, should do the job, but stresses the urgency of mounting a similar program for the study of the St. Lawrence River and the Estuary and Gulf simultaneously because they are three parts of one system.

The Council also makes important recommendations regarding the need to contract out much of the work if Canadian industry and firms of consulting engineers are going to profit from this work and gain the ability and understanding to apply the lessons learned in the Great Lakes — St. Lawrence system to other areas in Canada and abroad.

The Council identifies the major concerns with regard to the pollution of the air and the oceans as requiring international collaboration and enjoins the government to take a leadership role. In this regard it is noted that the report was completed on the 16th of February, well before the Stockholm Conference, but was not issued until June. Printing delays of this sort should not occur and should not be tolerated when they do. It is encouraging to note that the Canadian delegation did take a leadership role in the Stockholm Conference.

The Council adds its voice to others who have pointed out the need for a sustained study of the middle north and Arctic eco-systems if we are to ensure intelligent development of land use with a minimum of environmental disturbance in these areas. It is quite clear that the continuity of such

studies is in fact more important than the actual number of dollars involved. The on again, off again, everything in summer — nothing in winter, kind of work that has characterized much of Canada's activity in the Arctic, the report urges, should be replaced by a sustained effort.

The report touches on land environment, referring to monoculture in agriculture and the need to give additional attention to sustained yield in forestry operations and to be continually aware that there are other uses for forest land. It makes a plea for more effective planning strategies for the multiple use of land resources in prime recreation areas.

The report also makes a much needed plea for environmental impact studies to be carried out on all proposed major engineering works before decisions are made so that the environmental considerations can be one of the important inputs to the political decision as to whether to proceed with a project or not. Let us hope that all three levels of government are listening.

The Council sees the scientific community in Canada as reasonably adequate for the environmental job which they must tackle but points out important gaps in the areas of non-human toxicology, bio-systematics, the chemistry of salt and fresh water and, more generally, in the overall ability to tackle large, complex, multi component problems, including the techniques of systems simulation.

In examining what the Council calls the present state of the environmental conscience of Canadians the report has a kind word to say about ginger groups such as Pollution Probe and the Society for Pollution and Environmental Control and urges that they join forces in national organizations such as the Canadian Association for the Human Environment.

The Council sees a growing credibility gap between the public and government environmental agencies, fed by the failure of these agencies to publish all pertinent data. In order to start closing this credibility gap the report recommends the creation of a politically independent organization, sponsored by the federal government, which would have as its basic role the provision to the public of the facts about the environment.

In an epilogue the Council takes a broader, almost philosophic, view of the problem and returns to its theme that society will have to learn to control its urge to apply technology just because it is available. It finds our base of understanding of the social and economic components of our problems is much in need of reinforcement but ends on the optimistic note that "Given strengths in these areas, we will then need the sincerity, wisdom and determination to undertake reforms of our social and economic systems, so that they will reflect our more enlightened understandings." Hence the title, *It's Not Too Late — Yet*.

The report, only forty pages long, is probably the briefest book on environmental problems. It should be read by all those concerned with the state of the natural environment. You may not agree with the priorities the Science Council has set but if you do not the report will challenge you to set your own, which undoubtedly is the first step to action.

The report is published on recycled papers, which is a nice touch.

Contributed by S. C. C.

## A SURVEY OF EMPLOYMENT OPPORTUNITIES

The current trend toward reduced pesticide use and the development of integrated approaches to insect pest control is requiring a reorientation of entomology training programs. Such a reorientation underway at California State University, San Diego has been accompanied by a doubling of enrollment in entomology courses and a marked increase in the number of graduate students selecting entomology as their area of specialization. Before changing and expanding the entomology program further we thought it might be useful to conduct a survey of job opportunities and the kind of training prospective employers would prefer applicants to have.

A questionnaire was developed to obtain what we thought to be the most useful information both for curriculum planning by faculty, and career selection by students. Seventy questionnaires were mailed to 24 universities in the United States and Canada, 26 State Departments of Agriculture, 19 chemical companies, and the United States Department of Agriculture.

1. How many entomology positions did you fill in 1971, and how many applicants applied for them?

The replies indicated that the 44 respondents received 1394 applications for 61 positions filled during 1971.

2. How many entomology positions do you estimate will be available in your organization on a yearly basis from 1972-1982?

They estimated that they would employ a total of 200 more entomologists during the next ten years.

3. What was your organization's starting salary and salary range for entomologists for the year 1972?

The average monthly salaries for new recruits were \$680 (\$500-\$990) for holders of a Bachelor's degree, \$810 (\$725-\$1000) for a Master's degree, and \$1040 (\$720-\$1300) for entomologists with a Ph.D.

4. Do you anticipate changes in your employment needs in entomology?

	Universities	Government	Industry	Total
No Change (%)	71	79	63	73
Increase %	18	16	13	16
Decrease (%)	6	5	13	7
No Response (%)	5	—	11	4

5. What educational level will you look for among job applicants?

Bachelors (%)	35	84	75	64
Masters (%)	41	58	75	55
Doctorate (%)	100	21	75	61

\*Totals over 100% reflect multiple answers.

6. What, if any, particular areas of emphasis would you be interested in, if or when positions are made available?

Agriculture (%)	41	68	75	59
Integrated Control (%)	82	42	75	57
Biological Control (%)	41	42	38	41
Medical Entomology (%)	35	5	13	18
Forest Entomology (%)	6	16	13	9
Aquatic Entomology (%)	12	—	—	5
Other (%)	29	—	—	12

7. What is your opinion of entomology as a career for students now entering college?

Good (%)	99	63	100	86
Less Than Good (%)	35	26	—	25
No Response (%)	6	11	—	9

8. Do you anticipate an increase in job opportunities in entomology?  
Can you estimate how much expansion can be expected in the next 10 years?

	Universities	Government	Industry	Total
Yes (%)	39	68	75	64
No (%)	24	21	13	20
No Response (%)	17	11	12	18

9. Who do you feel will be the main employer of entomologists in the next decade?

Federal Government (%)	88	58	75	70
Private Industry (%)	41	53	38	43
State Government (%)	35	11	25	20
Universities (%)	29	11	25	20
Other (%)	6	—	—	2

10. What kind of training should today's students emphasize?

Broad Biological Background (%)	65	47	38	50
Ecology (%)	35	21	13	25
Computer Technology (%)	12	5	—	7
Taxonomy (%)	12	—	—	5
Toxicology (%)	—	5	13	5
Economics (%)	6	—	—	2
Other (%)	24	—	50	32

Clearly agricultural entomology and integrated control are the areas offering the best employment potential and the Federal government will continue to be the major employer. There also appears to be a reasonable number of opportunities for holders of Bachelor's and Master's degrees with only the universities showing a preference for the Ph.D.

We were unable to determine if all applicants recorded in question 1 were qualified, or how many applied for more than one of the positions.

The answers to questions concerning future employment trends seem to be somewhat contradictory. The number of positions estimated for the coming ten-year period . . . approximately 0.5 per year for each employer . . . seems to be rather low and is based mainly on normal attrition. Most respondents did not anticipate receiving any increase in funding for establishment of new programs. Thus 73% of the respondents anticipate no change in their own employment opportunities, but 64% anticipate an overall increase in job availability. Apparently most of the employers recognize that there will be a demand for more trained entomologists, but they have received no internal encouragement that they will be able to expand their own services.

There is little doubt that integrated control is the best alternative to the use of pesticides alone. Such an approach is considerably more complex and will require an increased demand for technical advice from a rather new breed of practical entomologists with a broad training in all aspects of biology. How soon this need will be reflected in the budgets of agencies that will be expected to supply the advice remains to be seen. Perhaps there will be an increase in the number of self-employed consultants as a few respondents suggested.

William McGinnis  
Michael Atkins

## INTERNATIONAL SYMPOSIUM ON BITING-FLY CONTROL AND ENVIRONMENTAL QUALITY

An international symposium on Biting-fly Control and Environmental Quality was held at the University of Alberta in Edmonton on 16, 17 and 18 May 1972. This symposium was organized by members of the Entomology Department of the University of Alberta, by members of the Advisory Committee on Entomological Research to the Defence Research Board (ACER) and by entomologists from the Universities of Toronto and Waterloo. The symposium had two objectives, the first to provide ACER with up-to-date information in all areas of biting-fly research and control, so that this Committee can recommend the most useful allocation of funds to alleviate the problem as it affects the Canadian Armed Forces. The second objective was born on receipt of the information that the Canada Department of Agriculture would assume responsibility for biting-fly research and control and take part in it. It is hoped that the information made available at this meeting will provide a sound basis for the programme planning which follows acceptance of this responsibility.

The overall theme of the symposium was the reconciliation of control with the preservation of environmental quality. Speakers were invited from Canada, the United States, the United Kingdom and the Soviet Union and were asked to emphasize new ideas and new methods and to stress those which are feasible now, and to show where intensified effort could bring others within reach. The programme was arranged under two main headings: Area Control and Personal Protection.

The main division of topics under the heading Area Control was between control by chemicals and control by alternative methods. Conventional chemical methods were discussed by Dr. A. S. West and Dr. Jadu Saha. Dr. West claimed that particulate formulations of Methoxychlor and Abate have a highly selective action on the larvae of blackflies, probably only affecting philopotamid caddisflies in addition. However, he stated that much research remains to be done. The carbamate compound Baygon was acclaimed as a promising air-spray adulticide. Dr. Saha warned that information about the pollution potential of even the most widely used organophosphate and carbamate insecticides is still very patchy and incomplete. Dr. Frank Stron of the University of California at Davis discussed the possibilities of insect control through hormonal manipulation. In working with juvenile hormone analogues he said that one of the problems is that so far these have exhibited rather short half-lives, 1-3 days under normal sterile rearing conditions. Little is known as yet of the effect on non-target organisms but they have a low toxicity to higher animals. Commercial companies are gathering toxicological data and working on large-scale production methods; Dr. Strong believes that juvenile hormone analogues may be available on a limited basis in 2 to 3 years.

On the second day of the symposium, alternative methods to conventional and unconventional chemical control were discussed. Dr. Bay stated rather clearly the position in which we find ourselves at present, that is, that pesticides are still the most effective and convenient method of control, but he placed insect pathogens highly in comparison. Dr. Harold Chapman discussed the potential of pathological organisms, including nematodes, in reducing blackfly and mosquito populations. He mentioned particularly *Reesimermis nielsenii* which now can be mass cultured and released in the field. He stressed the fact that biological control methods for biting insects lag very seriously behind those for forest and crop insects because of the lack of



money and manpower allotted to research. Dr. K. S. Rai spoke about the progress of methods of genetic control and the prospects for these in the future. He spoke at some length on the use of chromosomal translocations, and he believed that this of all genetic methods of control would be most applicable to Canadian biting flies. Dr. Rai stressed also that genetic control must be used with insecticides in an integrated control programme.

On the third day the programme dealt with the main heading of Personal Protection, which included a paper on repellents by Dr. D. A. Weidhaas and 3 papers which indicated the need for a great deal more study of the behaviour of biting flies to provide the information necessary for effective planning of control. Mr. J. A. Downes, in a paper entitled "Biting flies: the necessity for a new systematics", pointed out that a classification based upon behavioural, physiological, biochemical and genetic factors is required in addition to one for traditional morphological characteristics. Dr. Michael Service, of the Nature Conservancy, Huntingdon, England, spoke of some little-known facets of the behaviour of mosquitoes. Finally, Dr. Reinhardt Brust described a programme of control of mosquitoes in the Winnipeg area which was based on a sound knowledge of the behaviour and exact habitats of the mosquitoes. He was able to show that only 3 per cent of the land area around Winnipeg was involved in mosquito production and that without the survey, 97 per cent of the land would have received insecticides where none were required. This was a very striking example of a successful programme executed according to a well-conceived plan, and we were reminded many times during the meetings that success is the key to the promotion of funds. We should continue to bear this in mind in the planning of programmes for Canadian biting-fly control and emphasize those projects which are most likely to be successful and for which we already have, or can be sure of obtaining, the necessary expertise.

The papers were followed by very active discussion periods on each day and at the end of the meetings a resolutions committee constituted by the rapporteurs, J. J. Fettes, I. S. Lindsay, P. S. Corbet and Susan Melver; and Brian Hocking and Anne Hudson, presented 6 resolutions for consideration and discussion by all of those present.

Dr. P. S. Corbet presented the resolutions to the meeting at large and explained their intent as follows: "... we have just heard three days of deliberation on the subject [of biting flies]. While these are still fresh in our minds, it seems useful to try to crystallize some of our ideas in statements that we can support, and particularly for the Committee on Entomological Research to the Defence Research Board and the Canada Department of Agriculture. We hope that the resolutions that come out of these meetings can help decision-makers and therefore, indirectly, help ourselves as practitioners of Biting-fly Research."

The resolutions are:

1. WHEREAS mosquitoes, blackflies, and deerflies and other biting-flies have a substantial socio-economic impact on: the health and welfare of man and domestic animals, military efficiency, industrial and agricultural production, the management of resources, and the future of northern and wilderness regions

AND WHEREAS insufficient socio-economic information is available, and a sound strategy for biting-fly control with distinct criteria for the assessment of success does not exist

BE IT RESOLVED THAT planning in science and technology be directed to: 1. A definition of the problem and criteria for control; 2. The development of biting-fly control methodology emphasizing criteria for

strategies in research and development, systems analyses and socio-economic assessments, and criteria for control programmes.

2. WHEREAS at present synthetic chemical pesticides will continue to play a major role in the repression of biting-fly populations

AND WHEREAS there is a vital need to reduce the amount of such pesticides applied to the environment

AND WHEREAS research and development of alternative methods to synthetic chemical pesticides have progressed and much has been done to advance the technologies of biological, autocidal, genetic and mechanical methods of control

AND WHEREAS the demonstration of a success in the use of alternative methods will do much to generate additional support

BE IT RESOLVED THAT priorities be identified and increased resource be devoted to: 1. The development, formulation and application of ecologically acceptable chemical control agents; 2. The monitoring of side effects and the assessment of efficiency; 3. The development of control methods that offer alternatives to pesticides, particularly those which hold the greatest promise of early application and adoption, e.g., pathogenic organisms (especially nematodes); application of juvenile hormone analogues, genetic manipulation, and to monitoring and assessment of these methods; 4. The development of integrated pest management programmes; 5. involve the improvement of techniques for *in-vivo* or *in-vitro* propagation.

3. WHEREAS the effectiveness of all control operations depends on their suitability for the species and stage of that species against which they are directed

AND WHEREAS biting-fly populations are influenced by populations of the host and other species with which biting-flies interact

BE IT RESOLVED THAT resources be directed towards a mission-oriented basic ecological study of biting-flies consisting of the contributory studies of: basic biology, speciation and variability, distribution in time and space, detailed life cycles, relationships with other organisms, behaviour, physiology.

4. WHEREAS in many regions and situations, area control of biting-flies may remain inadequate or unfeasible

BE IT RESOLVED THAT immediate attention be given to improvements of methods of personal protection such as repellents, protective clothing, tents and other shelter, and a psychological approach to the problems of over-reaction to biting-flies and to the promotion of a more tolerant attitude towards them.

5. WHEREAS the layman's understanding of the biting-fly problem is inadequate

BE IT RESOLVED THAT increased effort be given to the improvement of the quality and quantity of communication and publicity between the scientist and the media, the public and governments, in order to: 1. ensure that the complexity of the problems of controlling biting-flies is understood; 2. prevent the results of research and development on biting-fly control from being presented in a misleading or croneous way; 3. ensure that all educational levels are kept informed of biting-fly problems and progress; 4. increase the understanding of the representatives of other scientific disciplines, particularly relevant physical scientists, of the problems in biting-fly control.

It is hoped that copies of the Proceedings will be available in the fall. Notification will be given of the date.

B. N. A. Hudson

## EMPLOYMENT

The Entomological Society of Canada will maintain a list of employment opportunities in Canada for entomologists, and establish an employment office at annual meetings of the Society where prospective employers and employees may contact one another and conduct interviews. Up-to-date listings of positions available and positions wanted will be published in this and future issues of the *Bulletin*. Listings will appear in one issue only unless otherwise requested. Blank forms designed for use by prospective employers and candidates for employment are available on request. The employment committee will not publish names unless expressly requested by individuals concerned. All resumes received will be accessible to interested persons at the placement office at annual meetings unless otherwise instructed by applicants.

It is physically impossible for the employment committee to provide a personalized service to individuals requesting information about job openings. All information is prepared in classified ad form and printed in the *Bulletin* or is available at annual meetings of the Society. Requests by prospective employers for curriculum vitae are handled by the committee. **THE SERVICE PROVIDED BY THE COMMITTEE IS OPEN ONLY TO MEMBERS OF THE ENTOMOLOGICAL SOCIETY OF CANADA.** Those sending curriculum vitae to the committee are requested to indicate if they hold membership in the Society.

---

### POSITIONS WANTED

Ph.D. with experience in university teaching and research in arthropod morphology, evolution and biosystematics seeking position in teaching, research, or research administration. (36-33-72).

Candidate for PhD in 1973 desires research and/or teaching position. Interested in the ecology and taxonomy of aquatic insects and its application in fishery biology. (38-32-72).

Insect physiologist, Ph.D. interested in biochemistry of lipids, pheromones, etc. desires research position as research associate or post-doctoral fellow. (38-31-72.)

---

Please direct all inquiries and correspondence to:

S. R. Loschiavo, Chairman,  
Employment Committee,  
Entomological Society of Canada,  
c/o Research Station,  
25 Dafoe Rd.,  
Winnipeg 19, Manitoba,

DO NOT direct inquiries to the *Bulletin*.

## PERSONALIA

L. L. Roadhouse has been appointed Pesticide Coordinator, Environmental Protection Service, Department of the Environment. He was formerly Head of the Pesticide Technical Information Office, Scientific Information Section, C.D.A.

• • • • •

Andre Beaulieu has relinquished his post as Director of the C.D.A. Research Station, St. Jean, P.Q., to join "Project 75" a group whose task is to study means by which a market-oriented, food-systems approach can be adopted in the development of C.D.A.'s research Program.

• • • • •

Six Canadian delegates to the 14th International Congress of Entomology, at Canberra, Australia, are known to the Bulletin. They are Antony Downes, Phillip Corbet, Roger McLellan, Dick Prentice, Bill Seabrook and Bill Varty.

## BIOLOGICAL COUNCIL OF CANADA

### CONSEIL CANADIEN DE BIOLOGIE

At the recent annual meeting of the Biological Council of Canada the following officers were elected:

President, Dr. M. Shaw, The University of British Columbia  
Vice-President, Dr. Roy L. Taylor, The University of British Columbia  
Secretary, Dr. R. G. S. Bidwell, Queen's University  
Treasurer, Dr. A. C. Blackwood, MacDonald College, P.Q.

## FORTHCOMING CONFERENCES

Conference on Regulation of Insect Populations by Microorganisms,  
4-6 October 1972, Barbizon - Plaza Hotel, New York. Registration,  
non-members only, \$20, students \$2. Contact: The Associate Executive  
Director, The New York Academy of Sciences, 2 East 63rd Street, New  
York, N.Y. 10021.

Eastern Branch, Entomological Society of America,  
18-20 October 1972, Hotel/Motel Dennis, Atlantic City, N. J.

American Association for the Advancement of Science,  
28-31 December 1972, Washington D.C.

Entomological Society of America

Entomological Society of Canada

Entomological Society of Quebec

joint meeting, 26-30 November 1972, Queen Elizabeth Hotel, Montreal.

## FIFTH INTERNATIONAL COLLOQUIUM OF SOIL ZOOLOGY

The above Colloquium under the sponsorship of the International Congress of Soil Biology and INTECOL will be held in Prague, Czechoslovakia 17 to 22 September 1973 (the previously announced dates have had to be changed). Further announcements will appear in the Bulletin of Soil Biology and certain other relevant journals.

Further information may be obtained from:

Ing. J. Vanek C.Sc., UKE-CSAV, Bezrucova 927, Rucany u Prahy 2,  
Czechoslovakia.

## PERSONALIA

Douglas Findlayson, C.D.A. Vancouver, has undertaken a year's transfer of work to the National Vegetable Research Station, Wellesbourne, England. He is working with G. F. Wheatley, Head of the Entomology Section, on the effects of plant spacing and the placement and interaction of pesticides used for controlling weeds, insect and diseases.

\* \* \*

Before returning this month to his post at the C.D.A. Research Station, Saskatoon, after his one-year transfer of work to the Anti-Locust Research Centre, London, Roy Pickford spent a month in Nigeria.

\* \* \*

Henry Hurrig presented a keynote address and two additional lectures at a Pesticides Seminar for Central America and the Caribbean, held in Turrialba, Costa Rica, from 20 to 28 April.

\* \* \*

Jinx Proverbs, entomologist at Summerland, recently participated in a sectional meeting of the International Organization for Biological Control of Noxious Animals and Plants at Montfavet, France, where entomologists from eight apple-growing countries discussed recent developments in the genetic control of two apple pests, the codling moth and adoxophyes. He also visited Vienna to advise the International Atomic Energy Agency and F.A.O. on the sterility principle for control of Lepidoptera and to participate in a panel on computer models and application of the sterile male technique. Before returning to Summerland, Dr. Proverbs visited fruit insect laboratories in France, Switzerland, Austria and Hungary.

\* \* \*

The C.D.A. staff at Winnipeg held a tea to honor Bud McGinnis upon his leaving to become Director at Vineland, and presented a gift to him. He was also honored by the Entomological Society of Manitoba, in recognition of his contributions to the Society.

\* \* \*

A. F. Hedlin, Pacific Forest Research Centre, Victoria, B.C. begins a 1-year transfer of work in Norway starting in September. He will be working on aspects of the cone and seed insect problem in Scandinavia with Dr. A. Balke of the Norwegian Forest Research Institute, As, Norway. He will attend the sixth International Biometeorological Congress to be held in Noordwijk, The Netherlands, Sept. 3 to 9 en route to Norway.

\* \* \*

Among several recent senior appointments in the Canadian Forestry Service, four involved entomologists. C. P. Thomas was appointed Director-General, R. M. Belyea became Director, Program Operations Branch, F. E. Webb was appointed Director of The Maritimes Forest Research Centre and C. T. Silver Director of the Pacific Forest Research Centre.

\* \* \*

Philip S. Corbet visited Kenya and Tanzania during May and June, in connection with his membership in the International Centre for Insect Physiology and Ecology, Nairobi.

\* \* \*

In The Canada Department of Agriculture, Research Branch, D. G. Peterson has been appointed Coordinator (Executive Program) and J. J. Cartier has acquired the dual portfolio of Coordinator (Entomology and Crop Protection).

## PERSONALIA

Marcel Hudon participated in the third annual work planning conference of the International Working Group on the European corn borer at the Station de Zoologie Agricole, Institut National de la Recherche Agronomique, Bordeaux, France. In *Tableau*, the C.D.A. Research Branch newsletter, he writes that this is a unique group in entomology, involving eight European and two North American countries in a cooperative attack on this world-wide pest. He is enthused with the scientific results and goodwill generated in the past three years of the existence of the group, and enthusiastic about the future. The project involves different phases. The emphasis has been shifted from ecological study of the insect by screening inbred lines of different origins to a more practical approach by hybridization of some highly resistant inbred lines of corn.

. . . .

J. D. Gregson, who retired last year (*Bulletin* 3(3):70), has been made an Honorary Life Member of the International Northwest Conference on Diseases in Nature Communicable to Man, in recognition of his outstanding contribution in this field of science.

. . . .

Fred Wilkinson of C.D.A. Vancouver visited the C.I.B.C. laboratory at Délemont, Switzerland, in connection with his investigations of parasites and diseases of the European marsh crane fly. He plans to collect parasites elsewhere in Europe.

. . . .

Ralph Chapman, Ph.D., has joined the staff of the C.D.A. station at London Ontario where he will study the persistence and degradation of organophosphorus and carbamate insecticides in soils.

. . . .

G. C. Shaw has taken up an appointment as Assistant Professor at the University of North Carolina. He had been studying nutritional aspects of the population dynamics of the spruce budworm at the Maritimes Forest Research Centre, Fredericton, N.B. for the past three years.

. . . .

### POST — GRADUATE DEGREES

Mohamed Abdul Latheef, Ph.D., Carleton University.

Dissertation on the life system and population dynamics of the Colorado potato beetle. Supervisor: D. G. Harcourt, Ottawa Research Station, C.D.A. Dr. Latheef is the first doctoral candidate to graduate under a cooperative educational program between Carleton University and the Canada Department of Agriculture.

---

### EDNA MOSHER 1879-1972

A retired teacher who was associated with the Smithsonian Institution, Edna Mosher died in a nursing home at Windsor, Nova Scotia, 2 May 1972. Her pioneering study "A classification of the Lepidoptera based on characters of the pupa." (*Bull. Illinois State Lab. Nat. Hist.* 12(2), 159 pp.) is now a classic.