of the Entomological Society of Canada

Bulletin

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THIS ISSUE

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The **Bulletin** is your medium for publishing and receiving news and opinions. It is the principal medium by which the ESC keeps you informed.

CONTRIBUTIONS

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 E3B 5G4. Inquiries about subscriptions and back issues should be refered to the Treasurer, Entomological Society of Canada, 1320 Carling Ave., Ottawa, Ontario, K1Z 7K9.

BOOK REVIEWS

Books for review should be sent to Dr. Carl Yoshimoto, Chairman, Editorial Board, ESC, Biosystematics Research Institute, Agriculture Canada, Ottawa K1A 0C6.

DEADLINE

The deadline for the next issue, Vol 6, No. 2 for June 1974 is 15 May. The approximate date of mailing will be 15 June.

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Editorial

COMMITTEES

Members may wonder how the people who serve on Society committees are appointed. The incoming President, each year, in consultation with those who are closest to him – the Executive Committee, Governing Board, and colleagues who influence him – appoints them. Committee members are sometimes appointed by the chairman. This process favors people who are known, and strongly motivated newer and younger members are easily missed. To be most successful, the many activities of the Society need strong motivation and wide participation. If you see a way in which you would like to serve the Society, please inform the Secretary, Dr. Church. The list in **Bulletin** 6(3):98-99 gives a good idea of most Society activities; the reports on pages 100 to 116 give more detail. Your response may not gain you an instant assignment, but the Executive Committee would appreciate having a list to work from.

BULLETIN POLICY

Potential authors frequently ask the **Bulletin** policy on particular matters. Stated simply, it is to further the Society's objective "to study, advance, and promote entomology". The **Bulletin** is the members' medium for publishing news and opinions. Articles from non-members are welcome if they serve the objectives of the Society. The **Bulletin** receives minimal editing so members can escape the limitations of scientific and technical writing. Because there is no paid staff, no reporting staff, and no regular stenographic and photographic facilities, contributers should not expect to have their material prepared for them. They should submit typed, double-spaced, well edited copy whenever possible, with good, contrasty, glossy photographs and well executed drawings. Material can rarely be solicited, it is up to everybody to see that important items are not missed.

LETTER TO THE EDITOR

Sir:

Dr. C. P. Alexander of Amherst Mass. sent me a notice of a memorial service for the late Dr. Jay R. Traver who died September 5 of this year.

Although I never met Dr. Traver I knew her through her very significant contributions to the study of New World mayflies in numerous publications, including co-authorship of 'The Biology of Mayflies' with the late Dr. J. G. Needham of Cornell and Dr. Yin-chi Hsu (Cornell Univ. Press 1935). Among her published papers were many dealing with this group of insects, some in the **Canadian Entomologist.** She was a contemporary of the late Dr. J. H. McDunnough when he was working on mayflies in building up the Canadian National Collection at Ottawa.

Not knowing her personally, my information at hand is only the biographical sketch that appears in 'World Who's Who in Science' 1st. Ed. 1968. A number of graduate students were supported in this special field under her direction and extended the investigation of mayflies to many localities.

F. P. Ide.

ESC SCHOLARSHIP FUND

Members of the Society will now be aware from the report of the Scholarship Committee (**Bulletin** 6(3):107, September 1974) and from the Report of the Governing Board (see page 125), of the establishment of the Entomological Society of Canada Scholarship Fund. The initial objective is an annual post-graduate scholarship in Entomology of $2000 to $3000. This will require a capital fund of $25,000 to $35,000 to be raised by the membership. We are therefore soliciting contributions to the Fund from members of the Society and others. The Fund is registered with the Department of National Revenue as a charitable organization, and contributions are now eligible as charitable donations for income tax purposes. This is one way in which all members of the Society can contribute, within the limits of their ability, to the future of the science and practice of entomology in Canada. Cheques should be made payable to The Entomological Society of Canada Scholarship Fund and addressed to the Treasurer, Dr. E. C. Becker, 1320 Carling Ave., Ottawa, Ontario K1Z 7K9.

Until sufficient capital is accumulated to provide an annual scholarship, the Society will annually award an Entomological Society of Canada Award of $500 to a post-graduate student in Entomology. This award will come from the general revenue of the Society. A plan of how the Scholarship program should be administered is being prepared.

All contributions, large or small, are welcome.

GOVERNING BOARD

The Governing Board will meet 18-19 February 1975 at the University of Guelph. Members with matters for the consideration of the Board should send them to Dr. N. S. Church, Secretary, ESC, Agriculture Canada Research Station, University Campus, Saskatoon, Saskatchewan S7N 0X2.

PRESIDENT'S REPORT

On Behalf of the Governing Board to the Annual General Meeting, Halifax

28 August 1974

One of my predecessors in the Presidency, Dr. A. S. West, stated that ". . . it is incumbent upon the President to deliver an address which deals with some aspects of the present state and future course of entomology in Canada." **Bulletin** 1(2):2-7. Within the limits of my ability I have already performed that duty in my contribution to the Feature Symposium yesterday. Today, I want to report to you on behalf of the Governing Board.

First, I would like to thank my fellow members of the Executive Committee: the Past-President for seeing through some matters he had taken on as President, particularly concerning the Fellowship and Canadian Achievements in Entomological Science and Technology and the President-Elect for his support particularly in some matters of protocol and diplomacy. For an Executive so widely scattered geographically, it was gratifying to find the concurrence in viewpoint that could be reached with a minimum of discussion via correspondence and the telephone on many occasions. I offer my thanks also to the Managing Council, the Governing Board and those committee chairmen and representatives with whom I had direct dealings, for their help tendered willingly at all times and their patience in helping to deal with situations for which there were no guiding precedents.

The gist of my report regarding the Society is that in its 23rd or 111th year (depending on whether you look on it as the modern or ancient learned society) although your Society has its problems, it is alive and well and solving its problems with a fair amount of gusto.

Finance

Probably the major problems confronting the Society today concern its finances, for in these days of inflation the day-to-day operations of the Society and any project which the Society undertakes are affected by and dependent on the Society's ability to meet the costs. A great many requests for monetary contributions and assistance are made of the Society, to such an extent that the Board has had to ask the Finance Committee to determine to what extent the Society could meet these miscellaneous requests that individually are relatively small, but collectively amount to a considrable sum.

Present financial problems of the Society could have been much more serious than they are but for the foresight of our Finance Committee of almost five years ago in recommending the increase in dues and page charges to current levels which permitted the acquisition of a "cushion" against the blow that has now fallen. As many of you probably know our printers, Runge Press, as foreseen, have increased their page charges to the Society, but the increase, from $16 to $33.50 was considerably more than expected. In the ordinary course of events, a page-charge increase of over 100% would result in a considerable deficit in our budget. To avoid this deficit, the Finance Committee has made proposals, accepted by the Board and that you will be asked to ratify. I must warn the membership at this time, that expansion of the Society's activities will inevitably involve increased expenditures and will require setting priorities for those activities.

A partial easing of the situation could be achieved if the number of papers published in the **Canadian Entomologist** were increased. University members of the Society seldom publish in the **Canadian Entomologist** because those on NRC grants can publish in the **Canadian Journal of Zoology** without having to pay page charges. We have recently learned that NRC awards "Publication Grants" to Canadian scientific journals, consequently consideration is being given to applying to NRC (or NSRC) for a publication grant to pay for the page charges of papers submitted by university members on NRC grants. We are proud of the fact that the Society is now self-supporting and acceptance of such a grant would not compromise our independence.

Our Finance Committee has also been energetic in devising ways for counteracting the reduction in value due to inflation, of the Society's investments and cash on hand is being kept to a minimum and placed in short-term securities instead.

The Governing Board has empowered the Executive Committee, on recommendation of the Finance Committee, to purchase the Society's own building in the Ottawa area, **as an investment,** up to a maximum of $150,000.

As long ago as 1967, it was proposed that the Society employ a full-time Secretary-general to manage our affairs. With its expanding activities there is an increasing need for such a position in the Society and the advisability of establishing such a position has been considered by the Finance Committee. The proposal was rejected by the Committee as being beyond the present means of the Society, but instead recommended the hiring by the Secretary of a part-time Assistant Secretary; this has been approved by the Board.

Contemporary Role and Responsibilities

The accomplishments of the various other committees will be reported in the **Bulletin** so I do not propose to repeat them here. The Society is going through a very interesting period in its development resulting from a change that Dr. West foresaw in his 1969 Presidential Address (**Bulletin** 1(2):2-7), which was recognized by Dr. Corbet in his 1972 Presidential Address (**Bulletin** 4(4):74-77), by our Science Policy Committee in their Report to the Board of Governors entitled "Contemporary Role and Responsibilities of the Entomological Society of Canada" and has been discussed again in a Special Interest Group this morning. The Society is beginning to take a more active role in the identification and attainment of some national objectives and the promotion of entomology in this country. For example, at the Board Meeting of March 1973, Mr. J. A. Downes was assigned to draw up a proposal for a Biological Survey of Insects in Canada. Formulation of this proposal was completed in the second week of February 1974, and the brief was published as a supplement to **Bulletin** 6(2), which I urge you all to read. In the Throne Speech, read 27 February 1974 Science Policy was defined as ". . . the rational generation and acquisition of scientific knowledge and the planned use of science and technology in support of national goals." Within that definition our proposal for "A Biological Survey of Insects in Canada" and our suggestion that it could form part of a broader Faunal Survey of Canada was recognized by the B.C.C. as a logical national goal that could encompass determination of the biological resources of this country. Consequently the Survey Proposal is now being sponsored by the B.C.C. and will be recommended for support by the Ministry of State for Science and Technology.

Manpower

Although the Society is at present committed to support the B.C.C. and SCITEC and much of the time and energy of the Board and Executive are expended on our involvement with these two umbrella organizations, we are still mindful that our primary responsibility is to entomology and entomologists.

During the past year, Dr. Harris our President-Elect has been chairing an *ad hoc* committee that has been exploring ways and means for financing an Inventory of Canadian Entomological Manpower. This could also encompass an Inventory of the Entomological Research currently being pursued in Canada. Here again, a logical extension would be to another possible national objective i.e. an Inventory of Scientific Manpower in Canada. Under its revised terms of reference laid down in the Throne Speech, this project could well come within the purview of the Science Council of Canada.

Scholarship Fund

Those of you who did not hear it, will have read in the **Bulletin**, the eloquent appeal for a Society Scholarship that Professor Hocking made in his Gold Medal Address to the Society at Banff last year. Following the Banff meeting, a committee was appointed, with Professor J. E. McFarlane as Chairman, to enquire into and make recommendations regarding the feasibility of the Society establishing a scholarship fund for students interested in entomology. Following the report of that Committee, made at its February meeting, the Board approved the establishment of "The Entomological Society of Canada Scholarship Fund" to be registered as a charitable organization with the Federal Government. Since it will take some time to acquire the capital, interest from which will provide an annual post-graduate scholarship of $2000-$3000, an annual award of $500, to be known as the "Entomological Society of Canada Award" will be made initially. On learning of the establishment of the Fund, Professor and Mrs. Hocking immediately made a generous contribution to the Fund. I am pleased to be able to inform you that the Society's Scholarship Fund is now established as a charitable organization, contributions to which are now eligible as charitable donations for income tax purposes. In the spirit of Brian Hocking's appeal, we solicit from members and others, support for this Fund which will contribute to the continuity and stability of the science and practice of entomology in Canada.

Managing Council

Finally, I have to report two important changes in our Managing Council. Our Editor, Dr. Vickery, in spite of poor health agreed to assume the duties of Editor a year ago, on an interim basis, in order to get the editorial mechanism operating again. This he achieved in large measure but unfortunately his health has not improved so that with an increased teaching load he has found it necessary to resign. We accepted Dr. Vickery's resignation with considerable reluctance. The Society is greatly indebted to Dr. Vickery for stepping into the editorial office at a critical time and I am sure you will all join me in thanking Dr. Vickery for the splendid job he has done under difficult circumstances and in wishing him a rapid recovery of his health.

Dr. Vickery's successor will be Dr. Paul Morrison of Waterloo University. Dr. Morrison came to this meeting to meet the Governing Board and to be briefed by Dr. Vickery on the editorial duties. He will take up those duties on his return from a conference in Prague at the middle of next month.

I am sure you will all be sorry to learn that Dr. Davies, our Secretary, has also submitted his resignation effective 31 December next. Dr. Davies will be leaving on a sabbatical next year and he requires the intervening time to complete some papers before his departure. Dr. Davies will have served the Society as Secretary for almost three years having assumed the duties just before our "eviction" from the Neatby Building and consequently had to go through the managerial gear shifting with the other members of the Managing Council consequent on the establishment of new headquarters. Dr. Davies has performed his secretarial duties conscientiously and with quiet efficiency and I know you

will all join me in wishing him, and Mrs. Davies, an enjoyable sabbatical, wherever it might be, and in hoping that he will return refreshed and to further service in the Society.

Dr. Davies' successor as Secretary will be Dr. Norman Church of the Agriculture Canada Research Station, Saskatoon. Dr. Church is also present to meet the Governing Board and to be briefed by Dr. Davies so that the transition from one Secretary to the other should take place smoothly next December. Dr. Church is active in the affairs of the Profssional Institute of the Public Service and brings to the Secretaryship considerable experience in committee work.

J. McLintock

FELLOWSHIPS IN THE ENTOMOLOGICAL SOCIETY OF CANADA

Following an affirmative mail ballot on the desirability of establishing Fellowships in the Entomological Society of Canada, the Governing Board of the Society organized an Interim Fellowship Selection Committee. The Chairman of that Committee now invites the membership at large to submit nominations for consideration at the next annual meeting of the Society, at Saskatoon.

Remember, please, that any active member shall be eligible for nomination as a Fellow of the Society.

Any four active members of the Society may present a nomination as a Fellow of the Society over their signatures. This nomination shall include a critical review of the nominee's contribution to entomology as support for the nomination and shall be sent to Chairman of the (Interim) Fellowship Selection Committee.

The essential qualification shall be that the nominee shall have made a major contribution to entomology. The contribution may be in any area – research, teaching, application or administration – and may be judged on the basis of contribution to and stimulation of the work of others, as well as by direct personal effort. It will usually, though not necessarily, be cumulative over ten years or more. Once elected to Fellowship, a Fellow shall retain his status as such as long as he remains a member, active or Emeritus, of the Society.

G. P. Holland, Chairman,
ESC Interim Fellowship Selection Committee,
Biosystematics Research Institute,
Research Branch, Agriculture Canada,
Ottawa, Ontario. K1A 0C6

VIC VICKERY

The Canadian Entomologist is the principal means by which our Society and Canadian entomologists are known throughout the world. The Editor of **The Canadian Entomologist** carries the heavy responsibility for seeing that 12 issues a year reach the subscribers and members promptly and with a content that is interesting, informative and written in clear, economical language. This is no mean task that calls for patience, forbearance, tact and at least a reading acquaintance with the whole field of entomology. When the editorial office becomes vacant, the issues of the journal fall behind, the quality of the contents tends to decline and the Society's image may become tarnished in spite of the valiant efforts of those with other duties who must try to fill in. Thus it was when Vernon (Vic) Vickery, in spite of poor health, agreed to take on the duties of Editor of **The Canadian Entomologist** on an interim basis over a year ago. The office of Editor had been vacant for more than 2 months and the issues had been thrown further off schedule because the printer was moving into new quarters. In the short time that he was Editor, Vic got editorial schedules and procedures running smoothly, he inaugurated a practical system for receiving and reviewing manuscripts submitted for publication and established an efficient filing system. In view of the fine job he had been doing in the editorial office, it was with considerable reluctance that the Executive Committee accepted Vic's resignation. It was the fact that his health had deteriorated under the pressure of the editorial duties and an increased teaching load that persuaded us to accept his resignation. However, Vic's expertise is not completely lost to us in that he has agreed to remain as a member of the Editorial Board.

The Society is deeply indebted to Vic Vickery for seeing our journal through what was probably the most severe crisis in its long history. The members we are sure will all join in wishing Vic a speedy return to better health following his release from the burden of the editorial duties.

Vic is a native of Yarmouth County, Nova Scotia. He obtained his teacher's licence from the Nova Scotia Normal School in 1940 and spent a year teaching school. In 1941 he joined the R.C.A.F. and served in Canada, North Africa and Europe. He received his Diploma in Agriculture from the Nova Scotia Agricultural College, Truro, in 1947, his B.Sc. (Agr.) from McGill (Macdonald College) in 1949 and served as an extension entomologist with the Nova Scotia Department of Agriculture, Truro, where he also had considerable teaching experience. Except for a break to obtain his M.Sc. in Entomology at Macdonald College (1957) he remained at Truro until 1960, when he moved to Macdonald to become Assistant Professor of Entomology and Curator of the Lyman Entomological Museum, which was transferred from Montreal to the Ste. Anne Campus under his direction. While holding this position he obtained his Ph.D. (McGill) in 1964 and became full Professor 10 years later. He has been author or co-author of numerous papers, mostly dealing with North American orthopteroids, ranging from alpha taxonomy to cytogenetics. He and his wife, Muriel, have two sons and a daughter.

Officers and Governing Board – 1974-1975

D. M. DAVIES RESIGNS AS SECRETARY

Few of our members realize the importance of the Managing Council to the overall operation of the Society. The Secretary is a key member of the Managing Council and we have been fortunate in having a series of capable, dedicated Secretaries. Doug Davies has served as Secretary since 1972 under Presidents Corbet, Kevan, McLintock, and Harris and has devoted much time and effort to insuring smooth operation of Society affairs. In the near future Doug will be going on sabbatical leave and consequently has resigned as Secretary effective 31 December, 1974. The membership of the Society say "Thanks" to Doug for his outstanding efforts on behalf of the Society and wish him a successful and enjoyable year abroad.

N.S. CHURCH, NEW SECRETARY

The appointment of Dr. Norman S. Church as Secretary of the Society effective 1 January 1975, was announced to the Annual General Meeting at Halifax. Norman is a Research Scientist at the Agriculture Canada Research Station, Saskatoon. He is strongly interested in Society affairs, and brings to his new post considerable experience in committee work with other organizations.

OFFICERS AND GOVERNING BOARD 1974-1975

Front row: R. W. Fisher, Ontario; E. C. Becker, Treasurer; C. R. Harris, President; J. R. McLintock, Past-President; D. M. Davies, Secretary to 31 December 1974; W. J. Turnock, Director-at-Large.

Back row: I. W. Varty, Director-at-Large; J. S. Kelleher, Director-at-Large; J. B. Dimond, Acadian; B. N. A. Hudson, Director-at-Large; G. S. Cooper, President-Elect; P. Harris, Saskatchewan; N. V. Tonks, proxy for J. H. Borden, British Columbia; F. L. McEwen, Director-at-Large.

Absent: W. A. Charnetski, Alberta; R. N. Sinha, Manitoba; G. Rioux, Quebec; J.-J. Cartier, Director-at-Large.

STRATEGY OF INSECT CONTROL[1]

John McLintock

from the
President's Address
in the Feature Symposium
"Entomology and the Environment"
Halifax, Nova Scotia
27 August 1974

In the first part of my address I have dealt with the tactics of insect pest control. Now what of the strategy? How is it determined what, where, and when available means for controlling or managing insect pest populations should be used?

In Western Canada insect outbreaks occur at irregular intervals of years; they tend to be explosive, massive and costly. The most notorious of these have involved grasshoppers, cutworms, armyworm, beet webworm, aphids and wireworms. In 120 years there were six grasshopper outbreaks and, according to Edwards (1964), crop losses to grasshoppers exceeded $160 million in the 20-year period from 1938 to 1958, *i.e.* an average of over $8 million per year. The most recent outbreak of the bertha armyworm was in 1971; we have to go back 15 years to find its predecessor, in 1956. In cost of insecticide, aerial application and rapeseed destroyed, the 1971 outbreak of the bertha armyworm cost $17,554,500 according to McDonald (1972), i.e. an average of over $1 million per year. The 1973 mosquito outbreak in Central Alberta cost the ranchers of that area over $30 million in weight losses to their cattle; we have no estimate of the loss in milk production. It has been said that it costs a farmer more to feed the insects on his land than it does to educate his children (CBC, Channel 11, June 9, 1974, "The World WE Live In"). Here we are speaking only of economic losses to the Canadian farmer but what about the loss of food and fibre to the people of the world? The forest entomologists and fruit orchard entomologists could add their lamentations to this woeful tale. The annual losses to insects in this country are astronomical.

A Glorious Week

As a medical entomologist, I look on these insect outbreaks as analogous to epizootics or (even as) epidemics for their epidemiology includes a human factor. In the 35 or so years that I have been a practising entomologist on the Prairies, the reaction of the authorities to these outbreaks has been the same.

[1]The original address was entitled "Economic Insect Control and the Environment". The first part, which is omitted, reviewed recently published Canadian work which relates to attempts being made to maintain agricultural and forest production with reduced damage to the environment.

When the outbreak is first noticed it is usually well advanced and there is a general alarm. Resources and available federal and provincial manpower are mobilized and thrown into the attack; if there happens to be sufficient political pressure, caution regarding expenditures, and even safety will be thrown to the winds and for a glorious week or so sufficient funds are available for whatever has to be done. Usually, however, by that time there isn't much of value that can be done. By the time the available resources are being applied to combat the outbreak, the outbreak or epidemic has already entered its natural decline and it is always a very debatable point as to whether or not the outbreak would have subsided without the human assistance. However, it is very politic that the insecticide, those who applied it and those who marshalled the resources be given the credit for finally saving the day. During the first post-outbreak year the outbreak species is watched closely and insecticide is stock-piled ready for use should there be a threat of population concentration of the offending species. Usually there will be scattered outbreak spots that justify localized applications of the insecticide, but nothing to match the widespread high population densities of the outbreak year. However, the outbreak is still fresh in the memories of the farmers, of the insect control specialists and of the bureaucrats who had to deal with it and expenditures on learning more about the life history, habits and ecology of the pest species are still considered worthwhile. They will continue to be considered worthwhile for 6, 7, 8 and even 9 years after the outbreak, but around about the 10th post-outbreak, year, and often earlier, there having been no outbreaks of the same species in the intervening years, interest begins to lag and soon it is being asked why money should be spent on a pest that hasn't been seen for 10 years or more. By this time also the entomologists involved in the last outbreak might be dead, retired or transferred. If this procedure continues then in 1984 when an entomologist asks Big Brother for funds and assistance to study the bertha armyworm, he will be told that there isn't enough money and even if there was there would be more important things to spend it on. We have it from the Director General of the Research Branch that priorities for research in the Branch are decided by politics, money and need and in that order. So it is fair to ask at this point, since when did spending $10 to save $100 become unpolitic?

We have here a recurring situation that is costing this country countless millions of dollars and loss to the world of much-needed food and fibre. So what can be done about it.

Surveillance Teams

Forest entomologists, students of grasshoppers (Glen 1956) and medical entomologists long ago learned the importance of the continuous study of outbreak and vector populations during inter-outbreak or inter-epidemic years. The fallacy of attempting to deal with pests only during outbreaks reduces insect control to a band-aid, flit gun operation and as Meyer (1955) pointed out, we are usually out with the flit gun before we really know what it is we are trying to control. The most economical way to deal with insect outbreaks is to stop them before they begin. In my opinion the solution to this problem lies in the extension and elaboration of a procedure that has been applied for many years to grasshoppers and forest insects in Canada and in a less thorough way to bertha armyworm, cutworms, wheat stem sawfly and diamondback moth (monitoring and survey of insect pests in fruit orchards is relatively new). I refer to the use of Regional Insect Pest Surveillance Teams to which responsibility for the surveillance and study of insect pest species can be delegated on a continuing basis. Paraphrasing from A. H. Rose and O. H. Lindquist (1973); these teams should collect, identify, assess and record insect pest occurrence and damage caused.

This array of data and knowledge would provide a means for identifying the important insects that attack our crops, livestock, pastures, gardens and orchards as well as providing information on the biology and control of these pests.

The teams would be responsible for the development of acceptable population measurement techniques, a subject that has for some time attracted the attention of Canadian entomologists, and is the subject of discussion for a Special Interest Group that will meet here during the next few days. The recommendations in the Report of Harris and Miles (1973) reiterate the necessity of monitoring orchard, tobacco and vegetable insect pests in Ontario as a prerequisite for effective, economical application of insecticides; a recommendation that could also apply to crops, orchards, etc. in the rest of Canada. The teams would also be responsible for developing life tables and other techniques for forecasting abundance or outbreaks of specified species or groups of species (usually taxonomically related), for the development of acceptable control procedures, i.e. procedures that would give effective population reductions when required, at minimum cost and with least injury to man's environment. These teams should be composed of not one or two, but of at least five research scientists in each ecological region – population ecologist (synecologist), ecologist-ethologist, insect physiologist, insecticide specialist, specialist in insect culture; the actual disciplines represented on the teams might vary from region to region – with supporting fieldmen, technicians, transportation and equipment. The services of a statistician, biochemist, insect pathologist and toxicologist, probably located at Research Station or Institutes at some distance from the teams, should be available on an *ad hoc* basis to several teams. Obviously, in a country the size of Canada, an adequate travel budget should be available. These teams should also be able to recruit assistance for specific problems through the agency of something akin to EMR contracts. This is where the principle of contracting out research can have its practical application.

To stop significant loss or damage in a crop, the population level or density of the pest species that causes the loss or damage must first be determined and population levels monitored to indicate when the critical population level is reached. I have referred here to "significant" rather than "economic" loss. Significant damage can refer to the percentage of a crop damaged whereas "economic" loss is a much more complicated measurement and cannot be determined until after the crop is harvested and sold. The "economic" loss depends therefore not only on the amount of damage to the crop by the insects but also on its market value. A food crop that cannot be stored and cannot be sold because it is a glut on the market (e.g. new potatoes in some years in California) is economically not worth protecting from insect damage. On the other hand, in a world where millions are starving, a crop that can be stored is worth protecting from even a very low percentage of damage. In each area or region, experience will be the best indicator of insect population levels that become significantly damaging. In medical entomology the problem is much simpler and consists of determining the vector population level below which transmission of a disease organism ceases.

In addition to monitoring the presence and behaviour of indigenous species that are normally harmless and only become pests when their population densities exceed certain levels, the teams will also be able to detect invasion by a species from outside the area and be alert for the normally sudden population increase that often follows such invasions, when their normal parasites are not introduced with them.

Acceptable controls

When the critical population density is reached that requires the application of control measures, the control agency should be informed and the team should be ready to give the most up-to-date advice on the measures to be used. Just what these control measures will consist of will depend on the state of the art at the time. In the majority of cases at the present time the control agent applied would be an organic chemical and probably a successor to an organochlorine compound, but the application of a chemical insecticide alone is looked upon only as an interim measure until a more acceptable method of control is found. That more acceptable method might involve some form of biological or integrated control. Thus the empirical solution of the specific pest control problems will be one of the objectives of the Insect Pest Surveillance Teams, but at the same time fundamental studies of the biology, ecology and physiology of the pest species will be in progress. The fundamental studies will probably not lead directly to effective control measures, but they will be incorporated into the body of formal knowledge that will serve as a basis for further empirical solutions in the future. A grasshopper surveillance team has been active in the Prairie Provinces, and forest insect surveillance teams have been active across Canada, for about 40 years (Glen 1956).

A Sense of Direction

There is one other facet of the strategy of insect control that I should mention, namely "sense of direction". Beirne (1967) divides the people involved in pest control into three main categories "the researchers, the advisers, and the users". The research workers, with whom this talk has been mainly concerned this far, find and develop controls; the advisers diagnose causes and recommend appropriate treatments; the users apply the controls. Here I want to say something about the advisers. Present-day advisers are either agricultural representatives (agronomes) or pest control specialists usually employed by provincial governments; or information or extension officers who are usually federal government employees; and finally the commercial pest control operators. Beirne (1967) points out that as world population grows, the need for more food and fibre will increase to the point where we can no longer afford to continue to feed both pests and people and pest control will have to be applied more extensively and more effectively. The most effective pest control measures will have to be applied for the common good and "pest management will then develop into science and a profession . . . " As an indication of things to come, advances over the usual entomological extension services are seen in the CDA's Fredericton radio advisory service on potato pests. It is likely that when sufficient appropriate data can be collected, computers will be used to provide pest control information as apparently is at present being done for the cotton growers in New Mexico (A. Arthur, personal communication). This type of service would be invaluable for example to the vegetable growers in the Bradford Marsh in Ontario where insecticides apparently are used as insurance rather than when required, and as many as 19 applications of parathion are applied in a season over onions for control of onion maggot adults (Harris and Miles 1973).

Conclusion

Only two of the references I consulted in the preparation of this paper suggested eradicating insects, one a local, introduced infestation of the grape phylloxera and the other a mosquito. I can think of a few other species for which a good argument could be made for their extermination. There seems to be tacit agreement, however, that most insect species are necessary constituents of the environments in which they are found. If an abnormal increase in numbers produces an imbalance in the environment then all that is required to restore the balance is a decrease in numbers, not extermination.

I was asked to give this paper because I am the current president of the Entomological Society of Canada and the organizers of the programme thought it worthwhile to attempt to impress on the Government the general cynicism of their agricultural scientists as to whether the Federal Government is genuinely concerned about long-term solutions to pest control. As Harris and Miles (1973) pointed out, "Several years of restrictive budgets, lack of technical support, and failure to replace mission-oriented entomologists, and other specialists in recent years have had an effect on morale" and Beirne (1967) has warned that unless the essential long-term studies are started, pest problems will be merely contained, not solved.

John McLintock

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THE VAMPIRE WASPS OF BRITISH COLUMBIA.

An example of haematophagy by *Vespula* sp.

During the meeting of the Entomological Society of Canada in Victoria, B.C. in August 1971 I was walking down a footpath on the edge of the University campus, observing the local insects, but offering violence to none, when one of the very numerous wasps (*Vespula* sp.) began flying round my head. As it was very close to my face, I made no attempt to brush it off, but stood still. Eventually it alighted on my left ear and began to chew vigorously. My wife, who was with me, was able to watch the whole process and describe it to me. The chewing, as far as I was concerned, was fairly painful, but eventually the wasp produced a flow of blood and flew off carrying a drop in its mouthparts. For some time after the incident I possessed evidence in the form of a healing wound in my ear and a piece of bloodstained kleenex, but both have since disappeared.

I have not heard of wasps attacking and taking blood from vertebrates, though perhaps the attack would be more risky if made on any vertebrate other than an entomologist. I still remember many years ago in England seeing a wasp enter our dining room one Sunday lunch time and cut a small piece of meat from the cooked and still-warm joint on the table. This would, I suppose, be called kleptoparasitism.

John Phipps
Memorial University of Newfoundland

HABITAT 76

In response to an enquiry from the President, the executive of the Science Policy Committee decided that an ESC member should be sent to the preliminary Non-Government Organizations meeting for Habitat: the Human Conference on Human Settlement, held 1-2 November 1974. Dr. D. R. Oliver did this and his abridged report follows. Comments by members are welcome should be addressed to the President or to Dr. E. G. Munroe, B.R.I., Ottawa.

Habitat: The United Nations Conference on Human Settlements (Habitat 76) will be held in Vancouver, 31 May – 11 June, 1976. A special secretariat under the direction of Secretary-General Enrique Penalosa, based at the U.N. in New York, will direct the planning for the Conference. The Department of External Affairs will oversee Canada's role as host country. A Participation Secretariat, headed by Executive Director Hugh Hansen, has been established within the Ministry of State for Urban Affairs to plan Canadian participation in the Conference. It is expected that delegates from 140 nations will attend. The Participation Secretariat expects the following to be discussed: 1. Settlement and Development; 2. Social and Economic Aspects of Settlements; 3. Shelter, Services, and Facilities in Settlements; 4. Settlements and the Natural Environment; 5. Planning and Administration of Settlements; 6. International Aspects of Settlements;

Supporting the Conference discussions will be an exposition consisting of two parts. The U.N. Conference Secretariat will present exhibits on the condition of human settlements as they relate to the major themes. Each participating country has been asked to present exhibits on how specific or major settlement problems have been attacked. Parallel conferences of Non-Governmental Groups (NGO's) and individuals may run concurrently to present information, opinions, etc., to the main conference.

To coordinate public participation in preparing for Habitat 76, a Canadian National Committee, was established by the Ministry of State for Urban Affairs. Briefly, the mandate for the National Committee is to foster public awareness and interest in Habitat 76, to give advice to the Minister for the Canadian contribution to Habitat 76 based upon opinions of the Canadian public, and to alert the Minister to recommendations that could improve the quality of life in Canadian settlements.

The National Committee is to be a two-way channel for information exchange between the government and to the people. The NGO meeting was the first step in setting up this two-way channel. At the meeting the invited speakers described Habitat 76 and the various committees and secretariats that have been established. The delegates discussed the six themes outlined above and how NGO's could help the Canadian Government prepare for Habitat 76.

There has been a series of meetings organized by the U.N., which focused on "isolated crises" – the Stockholm environment conference, the third Law of the Sea Conference at Caracas, the World Population Conference at Bucharest, and the World Food Conference at Rome. The Vancouver conference will focus on yet another. While it may be valuable to focus attention on these crises one at a time, none can be solved unless the others are considered. Treating the various crises as isolated phenomena contributed to the lack of success of the previous meetings. Also there was little or no attempt to involve NGO's or people. The Canadian government in attempting to involve the Canadian public in its preparation for Habitat 76 is to be commended and should be supported.

ALBERT WESLEY BAKER 1891-1974

Albert Wesley (Jack) Baker, Professor of Entomology and Zoology at the University of Guelph for forty-four years, died at Sunnybrook Hospital, Toronto, 26 August 1974.

Professor Baker was born at Walkerton, Ontario. He graduated from the Ontario Agricultural College in 1911. On graduation he joined the Department of Entomology and Zoology at Guelph, becoming head of the department in 1922, a position he held until his retirement in 1955.

Professor Baker was blessed with a brilliant mind and an inexhaustible amount of energy. He spared neither. In the University community he was an articulate spokesman and presented entomology as an essential subject for all students in agriculture. He insisted that only dedicated and sincere students should enter entomology and many of his students will remember that he could not be convinced easily. His students, however, were a special lot and not one left his place until he had mastered histology, taxonomy and morphology.

Always the academic, Professor Baker was active in curriculum development, not only in entomology and other areas of zoology but for the entire college. He played a key role in the development of the graduate study program of the Ontario Agricultural College campus, serving as the first secretary of the conjoint committee of the Guelph and Toronto faculty which administered the program when it was established in 1926.

Professor Baker's interest in students embraced not only academic concerns but social and athletic activities as well. The Baker home was always open to students and served as a center where students gathered and where they were invited to meet scientists who visited the Guelph campus. An avid athlete he was active in student athletics, both in an executive capacity and as basketball coach for 26 years.

In addition to campus activities, Professor Baker's interest in his profession made him an active and forceful member of the Entomological Society of Ontario. He was Secretary of the Society from 1911 to 1925 and President 1927 to 1929. Always an historian he promoted the Society Library and extended its acquisitions through arrangements with sister societies throughout the world for an exchange of publications. Although a strong supporter of the

Ontario Society he recognized the need for a national body to represent entomology in Canada. To support this he became one of the founding fathers of the Entomological Society of Canada encouraging, through persuasion and logic, participation of all regional societies. He served as President of the Entomological Society of Canada 1952-1954. Both before and after retirement Professor Baker was a regular attendant at all society meetings.

Professor Baker joined the Royal Canadian Navy in 1943 and established the University Naval Training Division, first at Guelph, followed by divisions at campuses across the country. His interest in the navy continued. How well we all learned naval "lingo" during hospitality sessions at the Baker home. He was a member of the Naval Defence Conference and a director of the Naval Benevolent Fund.

Professor Baker had many activities in fields related to entomology. He was an enthusiastic naturalist and was past President and Honourary Life Member of the Conservation Council of Ontario and Past President and Life Member of the Federation of Ontario Naturalists. He was a fellow of the American Association for the Advancement of Science. He was active in the O.A.C. Alumni Association and was on the Planning Committee for the O.A.C. 50th Anniversary, Chairman of the 75th celebrations and Honourary Chairman for the Centennial in 1974.

Professor Baker's contributions to his profession and to Agriculture were also recognized in other ways. He was an Honourary Member of both the Entomological Society of Canada and the Entomological Society of Ontario. He was named alumnus of the year by the O.A.C. Alumni Association in 1973 and was given a centennial medal by the O.A.C. in 1974. He was named Professor Emeritus at the University of Guelph in 1974.

Professor Baker's keen wit, sharp mind and dedication to his profession did not dim with advancing years. He retained an incomparable grasp of the history of entomology in Canada, a history he knew from a lifetime of service to the discipline. Entomology has lost a great friend.

Former Colleagues
Environmental Biology
University of Guelph

LABORATORY COLONIES OF INSECTS AND OTHER ARTHROPODS IN CANADA

A list of colonies of insects, mites and ticks, maintained in Canadian laboratories, was last published as an insert in the **Bulletin** in June 1973. This is scheduled for revision in 1975, but will be printed as a separate, available to any member who requests it. In addition to insects, mites and ticks, the proposed list will also include spiders, myriapods and Collembola.

Custodians of colonies in the 1973 list will be contacted directly, but if there are laboratory colonies which might otherwise not be included please contact: **J. S. Kelleher, Research Program Services, Research Branch, Agriculture Canada, Ottawa, Ontario K1A 0C6.**

A further notice will appear in the **Bulletin** when the revised list is available for distribution.

JOHN ARTHUR CHAPMAN 1919-1974

Science lost a dedicated man in the death, due to leukemia, of John Chapman on 28 October 1974, at Victoria, British Columbia.

Born 18 October 1919, at Dumaguete, in the Philippines, John was the son of Dr. James Chapman (entomologist) and Ethel Chapman, both of whom were missionary teachers.

In his youth he was introduced to hiking and studying nature, activities which he continued to enjoy throughout his life. In 1935, at age 16, he went with his family to the United States and attended several universities from 1940 to 1949, with a break of 2 years during the war, in the U.S. Navy. In 1949, he obtained a Ph.D. in insect physiology from the University of California, Berkeley. After teaching for several years at Montana State University, Missoula, he moved to Victoria, B.C., in 1953, becoming a Canadian citizen five years later. He spent the remander of his working years with the Canadian Forestry Service.

John Chapman was complex and yet so simple that probably no one fully understood him. His actions and deeds were ample evidence of the principles to which he dedicated his life. He was a scientist and naturalist, a student and teacher, and, above all, a supreme humanitarian. He taught by example. Similarly, we can only set forth for those to follow some insights into a life that was exemplary toward everyone regardless of their origin, station, or ability.

As a scientist, Dr. Chapman's interest and investigations covered a broad field of entomology: insect behavior, physiology, ecology, morphology, techniques, and applied entomology. His early work on snow and high altitude insects led him to a lifelong interest in the summit swarming behavior of ants, insects which had held the attention of his father. At the time of his death he was organizing his collections and files to write a guide to the ants of British Columbia. Although he had worked with diverse insects and insect problems, his specialty and first love remained insect behavior; especially the host-finding behavior of bark and ambrosia beetles. It was in this field that he made his most significant scientific contributions. His concept of odor meteorology exemplified Dr. Chapman's pioneering work on insect response to attractants, which has laid foundations for development of management systems for bark and ambrosia beetles.

In addition to publishing 69 scientific papers, he was actively involved in a number of professional societies: Entomological Society of Canada, Entomological Society of British Columbia, Entomological Society of America, Canadian Institute of Forestry, American Association for the Advancement of Science, Ecological Society of America, Association of the Scientific, Engineering, and Technical Community of Canada. He held positions on the executives of many of these; he presented numerous scientific papers at meetings of entomological societies in North America.

John seemed indefatigable to those who worked beside him, yet he never demanded or expected as much from others. His literature reviews were

exhaustive, and from the apparent disorder of his personal papers, he could always produce references on a tremendous variety of subjects. He was too much of an individualist to be a natural team worker, but he still led by the example of his own energetic investigations. He did not order the work of others; he so inspired them with confidence that they could outperform their own expectations. He constantly attempted to lift others above himself, although he must have often been dissappointed, because this was so rarely possible.

In addition to his scientific affiliations, his involvement at various levels in Civil Defense of Canada, Canadian Club of Victoria, B.C. Society for Prevention of Cruelty to Animals, Victoria Cultural Association of India and Canada, United Nations Association, Victoria Natural History Society, Thetis Park Nature Sanctuary Association, and World Federalists of Canada, indicates his broad concern for world humanity.

As in his scientific endeavors, the individualist in him prevailed in his compulsion to be his brother's keeper; every day he did what was within his reach to improve the state of human welfare. He particularly concerned himself with helping and encouraging the young, the handicapped, and the distressed. In his kind, gentle, and courteous way he was able to give the support needed to help others regain perspectives and to build their strength and enthusiasm. His relations with others were always richly endowed with his personal warmth. The number of people he helped will never be known, for he never talked about them. Even in his own distress his deepest concern was for others, including those yet unborn. He applied himself to collecting facts about radioactive pollution and actively urged the limitation of atmospheric nuclear testing. When organizations failed to take positive action, John found time to communicate his own concern directly. Even in his last days he found the strength to write to the consul of a country responsible for recent atomic tests urging that more consideration be given to worldwide human welfare.

John was endowed with great strength of mind and body, but it was his selflessness, spartan-like self-discipline and dedication to principles that made him a man of great character. Time was his only enemy, and although he rigidly allocated his own life, he still gave freely of his time to the scientist needing information, to the technician requiring inspiration and guidance, to the student thirsting for knowledge, and to a host of people crying for help and compassion in their trouble or grief.

John was devoted to his family, and as with others, his was the guiding hand providing patience, example and understanding. His wife, Jane, who has been his constant partner in humanitarian deeds, survives him. He also leaves four children: John (Ph.D., Chemistry), Janet (R.N.), Nancy (Ph.D., Botany) and Barbara at the University of British Columbia.

John Chapman did more than this share in making the world a better place in which to live. The selfless John could never grieve for himself, but we do grieve that his untimely death has deprived so many people of the warmth of his personality and the wisdom of his counsel.

Friends and Associates

FELLOWSHIP SELECTION COMMITTEE

The interim Committee is composed of R. E. Balch, Fredericton, D. K. McE. Kevan, Macdonald College, E. J. LeRoux, Ottawa, G. F. Manson, Seeley's Bay, Ontario, A. S. West, Queens University, and G. P. Holland (Chairman), Ottawa.

PRELIMINARY NOTICE, 1975 JOINT MEETING

CANADIAN BOTANICAL ASSOCIATION
ENTOMOLOGICAL SOCIETY OF CANADA
CANADIAN PHYTOPATHOLOGICAL SOCIETY
ENTOMOLOGICAL SOCIETY OF SASKATCHEWAN

The 1975 annual meeting of the Entomological Society of Canada will be held in Saskatoon on the campus of the University of Saskatchewan, August 18-22. This will be a joint meeting with the Canadian Botanical Association, the Canadian Phytopathological Society and the Entomological Society of Saskatchewan. The program is being planned to cover, in a series of joint sessions, with specially invited speakers, some of the extremely interesting relationships that exist among plants, insects, and plant pathogens. The following is a list of the topics selected for these sessions together with the specialists who have tentatively accepted invitations to participate.

EFFECTS OF INSECTS AND PLANT DISEASES ON THE DISTRIBUTION AND ABUNDANCE OF PLANTS

D. H. Janzen, University of Michigan (insects, plant diseases, distribution and abundance of plants)

CO-EVOLUTION OF INSECTS, PLANTS, AND PATHOGENS

E. E. Leppik, U.S.D.A. Research Service, Beltsville, Md.
(rusts, host plants, and insects)

H. Zwölfer, Staatliches Museum für Naturkunde, Ludwisburg, Germany
(phytophagous insects and plants)

P. G. Kevan, Memorial University, Nfld.
(pollination)

PLANT GALLS, THEIR STRUCTURE AND DEVELOPMENT AND THE BIOLOGY OF INHABITANTS

J. Meyer, Université de Strasbourg, France
(insect galls, structure and development)

INSECT VECTORS AND PLANT DISEASES

K. Maramorosch, Rutgers University, New Jersey
(insect vectors, plant diseases)

R. J. Campana, University of Maine
(Dutch elm disease)

These special invited participants will serve as keynote speakers on the special topics indicated, and related contributed papers will be grouped around their presentations. Therefore, contributed papers related to these special topics are especially solicited, and ESC members are urged to begin thinking about possible contributions now! There is, however, no intention of restricting the submission of submitted papers to those topics receiving special attention; there will be as many sessions of submitted papers as are needed.

The program will include a banquet, a barbecue and a ladies program. Although it is too early to give details, plans for field trips are being formulated.

One half-day during the meeting will be set aside for local field trips in the vicinity of Saskatoon, and one or more full-day excursions are being planned for the Friday 22 August following the completion of the technical sessions.

Accommodation will be available in the University residences, and we strongly urge everyone to take advantage of this on-campus accommodation at the site of the meeting.

This joint meeting will be a unique opportunity for a sharing of knowledge among the three disciplines. Active participation by members of each participating society is an essential component for the success of this joint venture, so make plans now to attend.

ENVIRONMENTAL MONITORING, AQUATICS

(Report of a Special Interest Group held at the Annual Meeting, Halifax, 28 August 1974, D.C. Eidt, moderator, P. D. Kingsbury, rapporteur.)

The subject was discussed in the context of the theme of the meeting "Entomology and the Environment."

At a meeting of aquatic entomologists at the Banff meeting in 1973 the rationale of such monitoring was discussed. In general this was accepted by this group which went on to attempt to identify the limitations imposed on environmental monitoring using insects and associated invertebrates as a tool. First the relevant disciplines which form the basis for effective monitoring were listed. These were:

Impact studies 1. physical changes, 2. chemical changes, 3. biological changes.

Faunal inventory

Taxonomy and ethology

Methods 1. sampling, 2. evaluation, 3. analysis

Regulation and control

Limitations on effective monitoring are imposed by lack of information or expertise in certain subjects:

Primary background information

Baseline data are often not available but are necessary in every impact study. We recommend that longer lead time be made available in impact studies and that faunal surveys incorporating studies of community structure be fostered. We strongly support the proposed "Biological Survey of Insects of Canada" because of its basic relevance to environmental monitoring and its purpose to facilitate maintenance of environmental integrity, regulation of environmental quality, and control of insect populations.

Sampling sensitivity

We need to know the intensity of sampling needed to achieve the sensitivity necessary for valid monitoring, as distinct from the intensity needed in surveys. Can monitoring be less comprehensive than surveying? The seasonal aspect of sampling must be appreciated.

Control habitats

Because of habitat diversity and the universality of human impacts, controls, in the experimental sense, are difficult or impossible to obtain in most

monitoring situations. Three sorts of controls were recognized; controls in **space** which are often suitable for short term changes and certain other situations, controls in **time** which are necessary for long term changes, and controls in **degree** of impact which are useful where the unaffected situation does not exist.

Level of biological sensitivity

Identification of insects to the family and even genus level is of limited value. Variation of sensitivity is often such that species must be identified to measure impacts. A means of exploiting this fact is to use indicator species. The problem is one of choosing those species which are suitable as indicators. This is limited by the extent of taxonomic and ethological knowledge.

Limitations of taxonomic and ethological knowledge

We recommend that efforts be given to the taxonomy and ethology of at least certain groups of aquatic insects. We recommend that people involved in environmental monitoring and surveys ally themselves with taxonomists rather than look for an identification service only, to achieve feedback to facilitate this expansion of knowledge of aquatics.

Mutual appreciation among hydrologists, civil engineers, and aquatic biologists

Much of our problem can be alleviated by closer association with hydrologists, engineers and others, to ensure that we appreciate what values each is dealing with.

FORTHCOMING MEETINGS

Canadian Society of Environmental Biologists, 6-10 January 1975, Vancouver.

Southeastern Branch ESA, 28-30 January 1975, Sir Walter Raleigh Hotel, Raleigh N. C.

Southwestern Branch ESA, 12-13 February 1975, El Paso, Texas.

FAO/IUFRO Second Symposium on Forest Diseases and Insects, 7-12 April 1975, with field tours 2-6 and 14-19 April, Delhi, India.

North Central Branch ESA, 25-27 March 1975, Kellog Center, East Lansing, Michigan.

Genetics Society of Canada, 4-6 June 1975, University of Saskatchewan, Saskatoon.

Pacific Branch ESA, 24-26 June 1975, Thunderbird Motel, Jantzen Beach, Portland, Oregon.

Canadian Federation of Biological Societies, 24-27 June 1975, University of Manitoba, Winnipeg.

Canadian Society of Zoologists, June 1975, University of Guelph.

The Canadian Botanical Association, 18-21 August 1975, Saskatoon.

Canadian Phytopathological Society, 18-21 August 1975, Saskatoon.

Entomological Society of Canada, 18-21 August 1975, Saskatoon.

VIII International Plant Protection Congress, 21-27 August 1975, Moscow, USSR.

XV International Congress of Entomology, 19-27 August 1976, Washington, D.C., U.S.A.

WARREN TO DO AND SEE THINGS

G. Lyman Warren is retiring from the Federal Public Service in December 1974. After working in forest protection research with the Canadian Forestry Service for over 24 years, Lyman has elected for early retirement as he says, 'to do and see things while he is able to enjoy them" and most of all to enjoy life at the vacation retreat that he and his wife Marie have built at Culls Harbour, Bonavista Bay, Newfoundland. His many friends and colleagues from Nova Scotia where he was born, from Manitoba where he worked 14 years, from Newfoundland where he has worked since 1964, and from elsewhere, wish Marie and Lyman happiness in their new phase of life.

Lyman began his professional career in 1946, after five years in the RCAF, when he enrolled at the University of Manitoba for a B.Sc. in agriculture (1950). He continued on for his M.Sc. (1953) at McGill University and joined the Forest Biology Laboratory, at Winnipeg as a Research Officer in 1950. While in Manitoba, he conducted research on the ecology and control of the root collar weevils, *Hylobius* and *Hypomolyx*, and later on the white grubs, *Phyllophaga*. In the course of his research, he discovered a new species of weevil which was named *Hylobius warreni* Wood (**Can. Ent.** 89:37-43, 1957) in his honour. Lyman transferred to the Forest Biology Laboratory at Corner Brook, Newfoundland in 1964 as head of the Forest Insect and Disease Survey. Since 1967 he has been at the Newfoundland Forest Research Centre at St. John's as Program Manager, Forest Protection Research, and more recently Deputy Director. Lyman published over 50 journal papers and reports during his research career. For the past two years he has been a key member of the steering committee established for planning the proposed Newfoundland Environment Centre.

Culls Harbour, the haven Lyman and Marie have selected, is well-known for codfish, and with little travel in his 18-foot cabin cruiser, Lyman can get his supply of lobster and clams straight from the sea.

D. G. Bryant

NOTICE

The Entomological Society of Canada would appreciate the donation of duplicate or unwanted copies of the following issues missing from our back issue supply:

Volume	Issues	Memoir	Volume	Issues	Memoir
83	1,3,6		94	1,3,4,7,10	
85	4		95	7	30,31
88	1,7		96		32-35
89	1,4,6,7,10,12	5	97	1,2,3	40-42
90	1,5,11		98	4	48,49
91		11	99		50,51
92	2,6		101	1,2,3,7,8	60,61
93	2,3,4		105		88,90

THE STATE OF ENTOMOLOGY IN CANADA

The importance of insects in our ecosystem is often underestimated. Many species are beneficial. Some, of course, are pests and Canada certainly has its share. Although the fact is not often recognized, insect pests can exert major limiting influences on the development of many sectors of our economy. One needs only to mention such major pests as grasshoppers, biting flies, and the spruce budworm to illustrate the point. The tremendous importance of insect problems in relation to our economy has, in the past, been recognized by those in authority and for many years entomological research, extension, and education were strongly supported, and Canadian entomologists provided results without which our high productivity in agriculture and forestry today would never have been accomplished. And as the development of northern Canada continues, Canadian entomologists will be again called on to play significant roles in environmental impact studies, and on biting-fly control.

Considering its record of productivity, one would think that strong support of entomological programs in Canada would be continuing. However, such is not the case, and entomology is receiving less and less support as time goes on. Entomologists are not alone. Science in general is in disrepute with both the public and those who control the purse strings. For several years scientific research in this country has been subjected to investigations, reorganizations, usually by people who have little concept as to what science is really all about. New advisory bodies have been established, new government departments have been created to administer scientific research, new fund granting councils are being created and so on and, as the cost of administering scientific research soars, research budgets have been restricted to the point of little or no actual growth if inflation is taken into consideration. This is one instance where the old saying that there are "too many chiefs and not enough Indians" has real application.

A very high percentage of scientific research in this country is done within government departments. I am not going to engage in an argument as to whether or not this approach is justified. My point here is that when policy decisions to restrict scientific research budgets are made, it then falls on those departments carrying research programs to curtail or reduce them. The entomological research component is very strong in some government departments and perhaps for this reason it has been fair game for administrators forced to cut expenditures while straining to maintain a balanced overall research program. Being quite honest about it, I think that many entomologists will agree that some selective cuts in entomological research programs were justified relative to other research programs. However, I submit to you that in recent years the situation has gotten entirely out of hand. In the Canada Department of Agriculture, for example, where the strongest entomological research component exists, the average age of entomologists is in the mid 50's and as entomologists retire they are virtually all being replaced with scientists in other disciplines assigned a higher priority. The argument, of course, can be made that not all research should be done by government agencies and this indeed may be the case. However, the agricultural chemical industry in this country is hardly in a position to carry out extensive research programs of the kind required in entomology. With few exceptions, provincial agencies show little sign of assuming any further responsibilities and universities, with only a limited number of jobs available to students on graduation, are certainly not being encouraged to expand their emphasis on entomological training and research. One only needs to look at the insect pest problems in this country, at the average age of our entomologists. and at the total number of entomologists left, to realize that unless some drastic

steps are taken to relieve the manpower situation in the near future, our capability for research on insect control is going to be drastically impaired.

What can we as entomologists do about the situation? One approach would be to sit by complacently anticipating our early retirement. A second approach would involve a little wishful thinking: thinking, for example, of how appropriate it would be for our science policy makers to get their tail-ends so thoroughly bitten by biting flies when they visit northern Canada that they would at least understand the significance of this one entomological problem. But even if such a notable event did occur it would only result in an unbalanced entomological program with greatly expanded emphasis on the one problem at the expense of others.

A third approach would be to campaign for reassessment of present policies toward entomological research in Canada and for development of some moderate, realistic long-term goals. Certainly this would seem to be the most logical approach. However, as I mentioned earlier any hopes of accomplishing this goal on an individual basis are long gone in this era of bureaucratic decision making. Only by organization will we be able to make ourselves heard.

Entomologists are not the only scientists in Canada who face a dim future. Others are in a similar position and some tentative steps have been taken toward organizing scientific advisory bodies which can influence policy decisions concerning science. Such bodies as the Biological Council of Canada and SCITEC are examples and the Entomological Society of Canada has supported them since their inception. No doubt these advisory bodies will, in time, serve a useful function in helping to establish guidelines for overall science policy in Canada. However, I suggest we are deluding ourselves if we think that they will be able to protect our specific interests. That responsibility rests with us.

Our entomological societies have always been inward looking. We have had good annual meetings. We have published papers in good scientific journals and we have felt that the results of our work were obvious for all to see and justified strong support. Now the situation is different and support for entomology is rapidly going downhill. Perhaps it is time that our societies, both regional and national became much more active in identifying priorities and in actively lobbying for their acceptance.

It is rather astonishing when one looks at our various scientific societies in Canada and realizes how little actual influence they have. In the case of the Entomological Society of Canada, for instance, we do not have official representation on such influential committees as the Canada Committee on Pesticide Use in Agriculture, the Canada Committee on Biting Flies, or the NRC Associate Committee on Environmental Criteria which includes a subcommittee on pesticides. Nor do we have official representation on NRC granting committees. At the provincial level where there is an Environmental Council or a Pesticide Advisory Committee, do any of the regional entomological societies have official representation?

We are equally poorly prepared when we talk about the future shortage of trained entomologists in this country as I have done today, because, for lack of statistics on manpower, we are forced to generalize. Nor do we have an adequate inventory of entomological research programs so that we can establish research priorities. Until we obtain such data, we are in a very difficult position when it comes to speaking out.

Assuming that we did have such information, we must also accept the fact that we do not have an eager audience of policy makers impatiently waiting to carry out our recommendations. In the present competitive atmosphere for research dollars, we would have to actively lobby for our priorities and programs – a step which many scientists find repugnant.

We are really faced with a choice. We can sit idly by watching support for entomological programs slowly disappearing or we can actively fight for a reassessment of the present policies toward entomological research and development of some realistic long-term goals. Entomology in Canada today is at a very important crossroad. Actions which we do or do not take could have much to do with the path it follows.

C. R. Harris

STATISTICS IN RESEARCH — A USER'S VIEWPOINT

From a paper read at "Conference on Statistics in Manitoba" University of Manitoba, Winnipeg, 4 November 1974.

Research is a diligent search or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws. Statistics is the science of collecting, classifying and using of numerical data. The researcher is an experimentalist and the statistician is a methodologist. Because correct methodology is crucial to meaningful research, harmonous interaction between the researcher and the statistician can make the difference between success and failure of certain types of research. Not all types of scientific research require statistical involvement. Nevertheless, as biological, social, or other sciences are becoming more sophisticated, the need for quantification of large volumes of descriptive knowledge is becoming urgent. Availability of high-speed computers for solving the time-consuming computational headaches, has given the researcher further incentive to tackle research problems that require a quantitative approach.

Statistical science has made giant strides since the days of Thomas Bayes who in 1763 made the first attempt to use the theory of probability as an instrument of inductive reasoning. Satistics has revolutionized the methodology of research. Ironically, however, statistics still faces formidable difficulties in making its impressive techniques understood and usable to many non-mathematically attuned but competent researchers. A main reason for this very genuine communication problem is that mathematical thoughts are exact. To make them useful to a practical researcher the concepts must be applied and dressed in realism before they are useful. The concepts of biologists or social scientists are often more subtle and complex – sometimes too ambiguous for scientific testing. A combination of the two disciplines, therefore, yields results that could not be obtained from either one pursued separately. To make an amalgam of the two, the individual roles of each should be defined clearly.

The researcher must have a clear idea about exactly what he wants to know; he must ask the question as precisely as he can, because the purpose of the experiment–not the form of the data–determines the proper way of analyzing a mass of data. Formulating this all important "purpose" is the sole responsibility of the experimenter – no statistician can tell him what questions should be asked. The researcher frames his questions from his own mind through his creativity, training, experience and assessment of the realities surrounding his subject.

The statistician provides methods of analysis and techniques that are needed to find the best possible answers to the researcher's questions. The statistician tries to provide quantitative forms to what he has been told. Once he grasps the aims, he uses his mathematical knowledge of the study of populations, variations and the method of reduction of data either to test or to estimate what is required.

Sequence of events dictates that the researcher leads the partnership. This dilemma has recently been expressed by an English statistician, S. C. Pearse. "For the last 26 years, I have been a mathematician working among biologists, and I have continually been made aware each has to learn from the other in the conduct of experiments. Time and again I have explained to a colleague what I was doing, but he has not understood. When I explained further, until at last comprehension dawned, the biologist often restated what I meant, in words that were very different but often much clearer".

Meaningful dialogue among the users of statistics (scientists, economists, business managers and others) and the statisticians can be deveolped only when both parties recognize that (a) each can teach the other something that he does not know; mutual respect for each other's knowledge and experience is necessary – the other person often knows more than you think, (b) both are in a joint endeavour in which the solution of the specific problem within the limits of available resources is more important than competing with each other to impress with superior knowledge or depress each other with complete ignorance, (c) benefits from the solution of the problem are considerable and credits are due to both parties.

Over the last 20 years I have worked with 20 or more statisticians from universities, governments and business establishments. Initially I have found communication with them extremely difficult, but by sheer perseverance prompted by my conviction that statistical tools are essential for the solution of my problems, I have managed to develop meaningful dialogue with several. Such collaboration led to the solution of a number of complex, biostatistical, research problems associated with the Canadian grain industry. The five most important steps I use to achieve collaboration in a major research problem are:

1) Telling the statistician frankly what he will gain in advising or collaborating with me, e.g. consultant's fee, coauthorship, a good word to the dean, whatever it may be. We all love incentives; there is no reason why statisticians should be excepted.

2) Seeking statistical collaboration, whenever possible, at the planning stages of the project.

3) Defining my research problem clearly, particularly its purpose.

4) Finding out all the basic assumptions of the statistical techniques to be used, knowing which assumptions can be bent and which can not be bent.

5) Finally, learning to interpret the biological meaning myself from the computer output for every statistical technique I use.

R. N. Sinha

CANADIAN ENTOMOLOGIST 100 YEARS AGO

It would be well if the authors of new created generic names would give their Greek or Latin derivations. 6:19.

INFORMATION EXCHANGE WITHIN GROUPS — A VIEW

At the past two annual meetings of the ESC the program has included, in addition to featured speakers and presented papers, the allocation of time for group discussions. In Banff, these were called "Discussion Groups" or "Special Interest Groups" while at Halifax only the latter term was used. As a moderator of two such groups and as a participant or observer at several others, I have developed some ideas as to their objectives and the means to achieve them. The following views are presented in response to popular demand – at least, one person asked me for them.

Basically the objective of these sessions is to stimulate wider participation in the exchange of knowledge and experience, including the examination of current problems, controversies, new ideas and promising solutions to unsolved problems. The method of achieving this objective has varied depending on the approach adopted by the program committee and the individual moderators. The discussions have ranged from outstanding successes to near failures. Since future annual meetings will probably include this popular format, I think it is desirable to identify and classify the following two approaches to broader participation:

I. The Panel Approach

In this approach, a limited number of "experts" are selected by the moderator and asked to deliver within a specified time a summary of their knowledge and experience pertinent to the discussion topic. The "audience" then participates through questions and comments following each or only after all the panelists have spoken.

Advantages

1. Participation, at least by the panelists, is guaranteed.

2. Panelists, if properly selected, briefed on their duties and prepared, will give a balanced coverage of the topics and expose controversy, unsolved problems and new approaches.

3. Knowledgeable individuals who do not eagerly enter public discussion can be selected as panelists, thus ensuring their participation.

Disadvantages

1. Panelists may expose their full knowledge of the topic, dwelling heavily on well-known background instead of current aspects.

2. Panelists, in an effort to be comprehensive, may speak well beyond their allotted time, thus curtailing general discussion and thwarting the objective of wider participation. If the moderator insists on the time limit, the terminal and perhaps the most imporant part of the prepared talk is not presented.

II. The Discussion Group Approach

In this approach, interested members are invited to contact the moderator well before the meeting. The moderator then contacts these self-identified participants asking them to identify their specific areas of interest and knowledge in the topic and to suggest an "agenda" to cover the various aspects of the topic. After consultation, an agenda is agreed upon and some or all of the participants are asked by the moderator to be prepared to lead discussion on a particular aspect of the agenda. However, these "lead" participants will be asked to perform only if participation flags. At the beginning of the discussion period, the moderator exposes the agenda to potential participants who had not previously contacted him and asks all present to speak whenever they feel it appropriate. As

the discussion develops, the moderator may intervene to maintain the flow of the agenda by redirecting discussion or terminating irrelevent details or bipolar bickering.

Advantages

1. Preliminary correspondence leads to an agenda that emphasizes areas of current interest, importance, and excitement.

2. This agenda focuses attention on problems and approaches, tending to avoid details of results and experience.

3. The opportunity to participate is given equally to all who attend, limited only by their willingness.

4. The moderator can, depending on the vigor of the discussion, modify the agenda, passing quickly over items that get limited participation or discussion and extending the time for more interesting items.

5. The moderator, or any other participant, may ask a specific question of a knowledgeable individual to redirect or stimulate the exchange of information.

Disadvantages

1. The discussion may not adequately cover some aspects of the topic due to the unwillingness of some individuals to volunteer information or opinions.

2. If the group is minimally interested, or lethargic for any reason, the lack of individuals with prepared scripts may lead to the collapse of the whole discussion.

3. Interesting information may not be elicited because its possessors are not specifically asked to describe their work or experience.

The foregoing descriptions inevitably reveal my personal bias for the discussion group approach. It seems to most closely approach the objective of wide participation and offers the greatest opportunity for an exciting exchange among participants. It may also offer an opportunity for a humilating failure. This approach seems best suited to subjects where many people can contribute to the subject, or if contributors are limited, they prefer the informal format to the presentation of a prepared text.

The panel approach is perhaps most useful where there are a limited number of experts who present their information and respond to questions. Alternatively, where a group working in various aspects of a problem wish to compare results, the panel approach encourages the presentation of detailed information. This is also the safer of the two approaches; it may fail, but it is less likely to fail miserably. I hope that this distinction in approaches will help future Program Committees, moderators, and participants to improve our exchange of information.

W. J. Turnock

CANADIAN ENTOMOLOGIST 100 YEARS AGO

I am sorry to say that . . . this caterpillar, which was always exceedingly restless under confinement, effected its escape. 6:43.

ENTOMOLOGY MANPOWER STUDY

Members of the Society will be aware of the concern among entomologists for the future of entomology in Canada. A few points will emphasize the situation:

1. Recruitment of entomologists in the Federal Public Service has decreased dramatically in the past six years and is much lower than that of other research disciplines.
2. A recent survey indicates that almost half of the entomologists in the Federal Public Service are more than 50 years old.
3. Universities in Canada are not producing candidates with the background required for the positions that have been available during the past few years.

The demands of society for increased food and fibre, for protection against nuisance insects, for environmental protection, and for efficient utilization of energy, will require an increased corps of entomologists, and plans must be made to ensure this is available. The Entomological Society of Canada has a responsibility to monitor the supply-need situation and to give guidelines to government and the universities on this important matter. To accomplish this, the Society established a Manpower Committee (see report, **Bulletin** 6(3): 111) to investigate approaches to such a study. The object is to appraise the present situation and project what may be expected in the future. Although some funds will be available for the study, much of the effort will be voluntary through the National and Regional Societies. Each of you will receive a questionnaire asking you to classify yourself, a questionnaire which only you can answer. Your prompt response is important; with a complete inventory of entomologists in Canada we can:

1. Document the critical shortage of entomologists in Canada and the sub-disciplines of greatest need.
2. Project needs for entomologists on the basis of replacements for those retiring.
3. Project needs for entomologists on the basis of realistic assessments of increased opportunities.
4. Make known to universities and students the job market for entomologists in Canada.

This kind of information is vital to our future.

F. L. McEwen
Chairman, Manpower Committee

A cocoon
Is a balloon
With a caterpillar
As a filler

D. M. Davies

BOOK REVIEWS

Functional Response to Prey Density in an Acarine System. H. G. Fransz. Center for Agricultural Publishing and Documentation, Wageningen, 1974, 143 pages, ISBN 90 220 0509 7.

This paperback is one of a series of Simulation Monogrpahs and presents an analysis of the functional response of the mite *Typhlodromus occidentalis* Nesbitt (= *Metaseiulus occidentalis* (Nesbitt)) (Acarina: Phytoseiidae) to the density of the mite *Tetranychus urticae* Koch (Acarina: Tetranychidae).

The general theme of the book is to explain why data collected by Kudhlein (in prep.) on the functional response to *T. occidentalis* do not conform to the three types of functional response curves proposed by Holling (1959). The author has criticized Holling's work on predation but he has used many of Holling's basic concepts.

The book is divided into five chapters: (1) Introduction, (2) The predator-prey system, (3) The analysis of the structural relationships, (4) Simulation, and (5) Discussion. The author presents an account of a simulation model he developed based on data collected in the laboratory supplemented by data collected by Kuchlein (in prep.). The results of the simulation help explain the variable shapes of the functional response curves of the predator.

Parameterization of the various model components is well documented: the example which measures and quantifies the predator's ingestion rate (p. 17) illustrates this.

There are some shortcomings. Some of the terminology was distracting. In particular, the author introduces the reader to a "preconceptual model of the predator-prey system" (p. 7-8) which "leads to a provisional idea of the system". A model implies structures whereas preconceptual implies non-structure. Perhaps preconceptual was a poor word choice.

CSMP (Continuous Systems Modeling Program) developed by IBM (1968) was the simulation method used to model the mite system. In the middle of some useful discussion about the predation process, the author attempted to instruct the reader how to program in CSMP. Also many CSMP programs or program segments are scattered throughout the text which distracted significantly from the flow of thought. The author could have been more effective by including a general CSMP flow-chart to help guide the reader through the model. A flow-chart of the simulation model is essential, especially if sub-components of the model are given and if the reader is not familiar with the computer simulation language used.

Apart from some of the drawbacks, there are many interesting aspects of mite predation which have been examined. This book would be a useful addition to the library of those interested in the functional response of predators to prey density and in the application of CSMP in modeling behavioral systems.

Stuart H. Gage
Saskatoon, Saskatchewan

CANADIAN ENTOMOLOGIST 100 YEARS AGO

'Tis true that the variable colors of animals in many cases are brought about through the influence of the *will*. 6:89.

Economic Entomology in the Tropics. K. P. Lamb. 1974. Academic Press Inc., London and New York. viii – 195 pp., 31 Figs., 26 tables, index. Cloth £4.00, $10.25 (U.S.).

This is a short book in relation to the subject matter treated. Although highly condensed, it provides a fairly broad review of economic entomology, as well as of some insects of medical and veterinary importance, in both the old and new world tropics. However, it is primarily oriented to agricultural pests of the Oriental and Australian regions.

The titles of the 16 chapters in the book, and the number of pages of each chapter indicate the scope of the book and the extent of coverage of each subject. At the end of each chapter is a list of references for "further reading".

Chapter 1. Insects, Good and Bad. (5 pp.)
Chapter 2. Classification of Insects and their Arthropod Relatives. (6 pp.)
Chapter 3. Springtails, Silverfish and some Aquatic Insects. (4 pp.)
Chapter 4. Cockroaches, Mantids and Stick Insects. (2 pp.)
Chapter 5. Termites. (6 pp.)
Chapter 6. Orthoptera, Dermaptera and Some Paraneoptera. (7 pp.)
Chapter 7. Hemiptera. (24 pp.)
Chapter 8. Lepidoptera: Moths and Butterflies. (21 pp.)
Chapter 9. The Flies and Fleas. (12 pp.)
Chapter 10. Beetles. (30 pp.)
Chapter 11. Hymenoptera. (6 pp.)
Chapter 12. Ecology of Pest Control. (6 pp.)
Chapter 13. Host Resistance and Susceptibility: Genetic Control. (4 pp.)
Chapter 14. Insecticides and their Application. (9 pp.)
Chapter 15. Malaria Control and Eradication. (4 pp.)
Chapter 16. Summary of Major Pests of Tropical Crops. (35 pp.)
Coffee, tea, cotton, cocoa, sugar cane, rice, coconuts.

The illustrations, mostly of pinned insects, are fair to good, but generally are a bit too dark to be pleasing. On page 1, the insects are relegated to the status of "order", while on page 6, they are treated as a "class". On page 80, *Anopheles gambiae* is "high" anthropophilic instead of "highly" so. Aside from minor items such as these, the book seems to be quite free of any glaring errors.

To this reviewer, the most useful aspect of the book is the various tables in which insects of economic importance are listed by species, common name, hosts, and distribution; and the tables of chapter 16, in which major pests of selected tropical crops are listed by species, method of attack, and distribution. The main criticism or shortcoming of this book, in my opinion, is that it is too short and superficial for the nature of its subject matter. It should serve as a good introduction to the subject of economic entomology in the tropics for students and others who have a casual interest in this topic, but for the more serious and advanced workers it leaves much to be desired.

B. V. Peterson

CANADIAN ENTOMOLOGIST 100 YEARS AGO

My object is to ventilate the subject, in order that it may be more thoroughly investigated by these who have leisure. 6:96.

Insecta: Plecoptera Phylogenetisches System und Katalog by Peter Zwick. Das Tierreich. Lieferung 94. Pp 465 and 75 text figures. Walter de Gruyter, Berlin, New York. 1973. 490 DM.

This volume is partly a supplement to the systematic catalogue of the stoneflies published by Illies in 1966 in the same series (Lief. 82), and together they assemble all the taxonomic literature on the order up to 1971. Of much more significance to entomologists generally, however, is the fact that it devotes 190 pages to a detailed morphological study of the order as a whole.

Zwick had available to him the large and varied collection of Plecoptera housed at the river research station at Schlitz, so he was able to make detailed dissections of larvae and adults of all families and almost all the important genera from all over the world. So, system by system, both internally and externally, he studied the whole order.

With this wealth of comparative anatomy, and also taking account of some other features such as the drumming of adult males, Zwick has applied Hennig's phylogenetic analytical method to draw up a fresh, and logical, classification of the order. This involves few changes at the family level, and none at all in North America, but it does make some changes in major groupings. All northern hemisphere families now belong to the sub-order Arctoperlaria, with two major groups in it. The Systellognatha, with reduced adult mouth parts and eggs that bear anchor plates among other characters, include the Pteronarcydae, Peltoperlidae and the three families Perlidae, Perlodidae and Chloroperlidae, which are grouped, as previously, as the Subulipalpia. The other North American families, together with the wingless Scopuridae of Japan are Euholognatha, a name that stresses the unmodified mouth parts of the adults.

There remain, of course, a few unsolved problems, such as the validity of the sub-families in the Perlidae and of some generic limits within the Perlodidae, both of which need solution here in North America. This work therefore points up problems that need solution. It also gives us an excellent background for all future taxonomic work. One needs to look no further than to this volume for terminology and comparative information, and this should go a long way to improving mutual understanding among plecopterists. The general entomologist will also find it of value to have a primitive orthopteroid order so thoroughly worked.

Two snags are the enormous price of the book which will eliminate most private owners, and the fact that it is written in German. Dr. Zwick has, however, translated all the figure legends into English, and he gives, in English, a list of all the 103 characters with which his Hennigian analysis was made. So even with no knowledge of German the diligent entomologist can follow the main thesis. This is a book that should be in all entomological libraries.

H. B. N. Hynes
University of Waterloo

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Master of Pest Management is an attractive brochure describing the program leading to the awarding of this degree at Simon Fraser University. Significant details are given including course descriptions. M.Sc and Ph.D. programs are also available in specialized aspects of pest management Ask for Circular No. 5, Pestology Centre, Department of Biological Sciences, S.F.U., Burnaby 5, B.C.

The forest must remain green — Pour que la forêt reste verte. by W. A. Smirnoff. Special issue of **Milieu.** Laurentian Forest Research Centre, Environment Canada, 47 pages. 1974.

Invitations to love and protect the environment have come from many quarters over the past decades. Entomologists have let their views be known mostly through the various society's journals. The press has sometimes picked up the story of entomologist X trying to introduce a new form of control. However, the general public still does not have access to the work of the average scientist mostly because of the form in which it is published.

Smirnoff's publication on how to fight the spruce budworm with a microbial insecticide is therefore welcome because it has been written specifically for . . . the taxpayer. At a time when it is difficult not only to obtain funds for research but to justify one's innovative ideas it is important that the public have access to this kind of scientific information. We cannot expect to change the public's attitude towards the different ways in which crop protection or forest protection is to be achieved if we do not take the time to inform, and to do it in simple, straightforward, **human** terms.

The publication stresses microbial control and how difficult it is to apply this kind of entomological knowhow. Frustration, perserverance, patience are familiar elements of the life of a research scientist not only with the experiments carried out but also with the ever-present red tape. Smirnoff relates his experiences in a very colourful way. But if you really want to have the full-measure of the work you should read the French version **which is** Smirnoff. The English version does not carry the same message. *Traduttore, traditore.* It is not only the spirit that is lost in the English text; there are also many inaccuracies. This is not the first time that I have witnessed such poor translation in our official publications. Since when is the English equivalent of the word "maître", "king;" "Un des grands spécialistes" becomes "the best-known specialist"; technicians are "excellent" en français, but "great" in English, and so on. . .

It is a pity that the English version has to suffer from such imperfections, because Smirnoff's message is important and should be read by the largest possible number of Canadian taxpayers.

Maybe it would have been better to leave the reader under the impression that the fight against the spruce budworm with *Bacillus thuringiensis* was far from being won. "The forest remained green." Yes but for how long? Smirnoff points out in the postscript that the "march forward must never stop". He should have emphasized even more, the necessity for research which has wrongly and for a long time been considered peripheral because the immediate results could not be foreseen. He certainly proved that there can be another weapon. Chemical insecticides are not the only answer.

Bernard Philogène
Department of Biology
University of Ottawa

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Entomological Society of America. Actually an untitled brochure describing the Society, its purpose, organization, activities, publications, etc., and soliciting membership applications. A form is included. Write the E.S.A. at 4603 Calvert Road, P.O. Box AJ, College Park, Maryland 20740.

Natural Chelating Polymers. R. A. A. Muzzarelli 1973. Pergamon Press, Inc., New York and Toronto. 252 pp., 430 refs. $15.00.

The author covers the general chemistry of these natural polymers, but discusses them especially from the standpoint of an analytical chemist. He points out in the preface that polymers with functional groups capable of reacting with metal ions occur widely in nature, sometimes in large amounts. Their application to chromatographic separations have, however, been neglected. This point seems to be well taken, considering the unique properties of some of them.

The first two chapters discuss modified celluloses and alginic acid. The next three chapters are devoted to chitin, chitosan, and their analytical chemical applications. A final chapter summarizes what information the author had on the reactions with metal ions with such polymers as chondroitin sulphate, collagen, and humic materials. In general, the author reviews for each type of polymer the chemical structure and properties, the methods of preparation, and the chromatographic separations of metal ions and organic bases. In some cases additional information has been added on such topics as biosynthesis of the polymer, and the effect of a chelating polymer on the uptake or radioisotopes by the human digestive system.

Chapter 5, on the analytical chemical applications of chitin and chitosan, and Chapter 2 which covers the alginates are the two most important parts of the book. Chapter 5 is well done and is based mainly on the author's own research work.

The rest of the book is not as well written as it should be. For example, the rambling discussion in Chapter 1 should be reorganized into coherent subsections on preparation methods, sorption and ion exchange, and chomatographic separations of metal ions and of organic bases. In Chapter 2 the text does not distinguish clearly between the cases in which the alginate sample is a separate ion exchange phase in contact with an external electrolyte, and the cases in which it is an external polyelectrolyte solution in contact with an ion exchange phase. The author should consult Helfferich's "Ion Exchange" [1]. In Chapter 6, the discussion of humic materials is also deficient, being both incomplete and out of date. The author has two alternatives here. He could consult the very recent literature on the metal ion-humic materials reaction equilibria [2], or he could simply declare the humic polyelectrolytes to be outside the scope of his review. There are also two minor but irritating flaws. First, the mannuronic and guluronic acid structures on page 24 should be labeled, for the convenience of the reader. Secondly, the subheading "Introduction" at the beginning of each chapter has been wrongly translated into English as "Presentation".

This book is interesting and useful because it brings attention to some important but neglected natural materials. It requires some revision, however. The writing needs to be brought up to normal textbook standards, and correct ion exchange concepts should be used. Discussion of the humic materials should be either updated or dropped.

[1] Friedrich Helfferich. Ion Exchange. McGraw-Hill Book Company, Inc., 1962. New York.

[2] Donald S. Gamble and Morris Schnitzer. The Chemistry Of Fulvic Acid And Its Reactions With Metal Ions. Chapter 9 in Trace Metals and Metal-Organic Interactions in Natural Waters. Philip C. Singer, Editor. Ann Arbor Science Publishers Inc.

Donald S. Gamble
Soil Research Institute
Agriculture Canada, Ottawa

PERSONALIA

Dr. B. J. R. Philogène was recently appointed Assistant Professor in the Department of Biology, University of Ottawa. Bernard has been at the Institute of Animal Resource Ecology, University of British Columbia, Vancouver, the past few years.

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Dr. Tom Royama, Maritimes Forest Research Centre, Fredericton, is in Australia on a year's transfer of work. He is working with Dr. P.A.P. Moran at the Australian National University. Tom's objective is to gain expertise in the use of time series analysis and stochastic processes in the analyis of population processes.

EMPLOYMENT

The Entomological Society of Canada maintains a list of employment opportunities in Canada for members, and has an employment office at annual meetings of the Society. Positions wanted and available are published in the **Bulletin.** Forms for the use of prospective employers and employees are available on request. Those seeking employment through and filing curricula vitae with the Employment Committee will please indicate their membership in the ESC.

POSITIONS WANTED

Graduating Ph.D., August 1975, desires position in research or teaching. Special interests: behaviour, behaviour-genetics. Degrees from U. of Toronto, York U., and U. of Edinburgh. Ref. No. 47-5-74.

Ph.D. (1973), recent landed immigrant, with experience in rearing and evaluating parasites and predators of agricultural pests, desires position in research. Available immediately. Ref. No. 43-6-74.

Please direct all inquiries and correspondence to: A. G. Robinson, Chairman, Employment Committee, Entomological Society of Canada, Department of Entomology, University of Manitoba, Winnipeg R3T 2N2.

Do not direct inquiries to the Bulletin.

POSITIONS AVAILABLE

Assistant professor, with duties in teaching, research and extension in veterinary entomology. Persons wishing to make further inquiry or to make application are invited to contact: Edward H. Smith, Chairman, Department of Entomology, Comstock Hall, Cornell University, Ithaca New York 14853, or telephone 607-256-3253.

Assistant professor of economic entomology; Ph.D. (equal opportunity); duties in teaching, research and extension in agricultural entomology, with research emphasis on insect physiology. Send curriculum vitae and three letters of reference to: Dr. V. C. Runeckles, Chairman, Department of Plant Science, University of British Columbia, Vancouver, B.C. V6T 1W5. Effective date of appointment 1 January 1975.

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