Bulletin

Entomological Society of Canada

Société d'Entomologie du Canada

Volume 28

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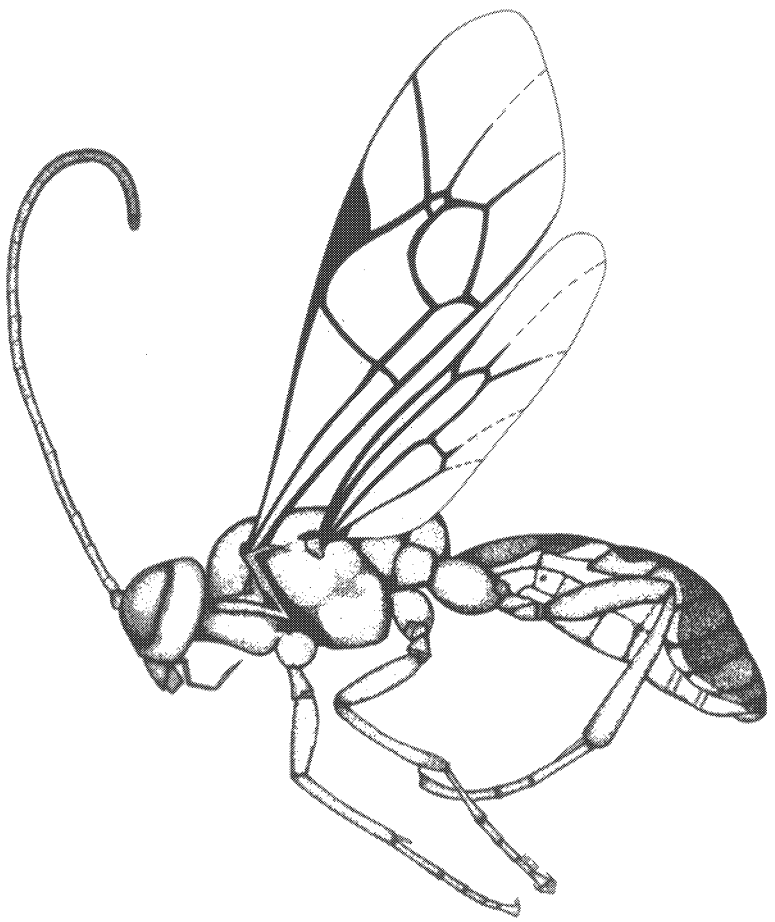
Sept/sept 1996



Entomological Society of Canada
Société d'Entomologie du Canada

393 Winston Avenue, Ottawa,
Ontario, Canada K2A 1Y8

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couverture-arrière

Date of issue/Date de publication:
Sept/sept 1996

The **Bulletin of the Entomological Society of Canada**, published since 1969, presents quarterly entomological news, opportunities and information, details of Society business, matters of wider scientific importance and book reviews.

Le **Bulletin de la Société d'Entomologie de Canada**, publié depuis 1969, présente trimestriellment des informations entomologiques, des occasions, des reseignements sur les opérations de la Société, des dossiers scientifiques d'importance, et des analyses d'ouvrages.

Illustrated on the front cover is a male Lathrolestes luteolator (Gravenhorst) (Hymenoptera: Ichneumonidae). This parasitic wasp is known to attack the red oak leafminer [Profenusa alumna (MacGillivray)] and other pest insect species such as Caliroa spp. in eastern North America. [Habitus illustration courtesy of J. Hammond, University of Alberta, Edmonton.]

L'illustration de la page couverture représente un mâle Lathrolestes luteator (Gravenhorst) (Hymenoptera: Ichneumonidae). Cette guêpe parasite attaque la mineuse du chêne rouge, [Profenusa alumna (MacGillivray)], ainsi que d'autres espèces de ravageurs du nord-est de l'Amérique du Nord, dont certaines tenthrèdes (Caliroa spp.). (L'illustration est une courtoisie de J. Hammond, Université d'Alberta, Edmonton.)

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The Entomological Society of Canada was founded in 1863 primarily to study, advance and promote entomology. It supports entomology through publications, meetings, advocacy and other activities.

La Société d'Entomologie du Canada a été établie en 1863 principalement pour promouvoir l'étude et l'avancement de l'entomologie. Elle soutient l'entomologie par l'entremise de publications, de réunions et d'autres activités.

SOCIETY BUSINESS/AFFAIRES DE LA SOCIÉTÉ

46th Annual General Meeting

The Annual General Meeting of the Entomological Society of Canada will be held at the Lord Beaverbrook Hotel in Fredericton, New Brunswick, on October 7-9, 1996.

La réunion annuelle générale de la Société d'entomologie du Canada aura lieu au Lord Beaverbrook Hotel à Frédéricton, Nouveau-Brunswick, du 7 au 9 octobre 1996.

Governing Board Meeting

The Annual Meeting of the Governing Board will be held at the Lord Beaverbrook Hotel in Fredericton, N.B. on October 5 & 6, 1996

La réunion annuelle du conseil d'administration se tiendra au *Lord Beaverbrook Hotel* à Fredericton, N.B., le 5 & 6 octobre 1996.

Matters for consideration at any of the above meetings should be sent to the secretary at the address below:

Veuillez faire part au secrétaire de tout sujet pouvant faire l'objet de discussion à l'une ou l'autre de ses réunions en communiquant à l'address suivante:

Dr. Peggy Dixon
Agriculture and Agri-Food Canada, Box 37
Mount Pearl, Newfoundland A1N 2C1
Tel: 709-772-4763
Fax: 709-772-6064
E-mail: dixonp@nfrssj.agr.ca

Back issues of the Canadian Entomologist and Memoirs are available from the Ottawa office and may be purchased by Mastercard or VISA as well as by cheque or money order. Current issues of the Memoirs are also for sale.

Please send all correspondence concerning the Bulletin to:	Please send all correspondence concerning Book Reviews for the Bulletin to:
Dr. Hugh J. Barclay Bulletin Editor Pacific Forestry Centre 506 West Burnside Road Victoria, B.C., V8Z 1M5 Tel: (604) 363-0736; Fax: (604) 363-0775 E-mail: hbarclay@a1.pfc.forestry.ca	Dr. Al. B. Ewen Publications Committee P.O. Box 509 Dalmeny, Sask. S0K 1E0 Tel: (306) 254-4380 Email: ewena@duke.usask.ca

The deadline for submissions to be included in the next issue (Vol. **28(4)**) is **November 1, 1996**
La date limite pour recevoir vos contributions pour le prochain numéro (Vol. **28(4)**) est le **1 novembre 1996**

Call for Nominations

Achievement Awards Committee

Gold Medal for Outstanding Achievement in Canadian Entomology and The C. Gordon Hewitt Award

Members of the Society are invited to nominate individuals whom they regard as eligible for these awards (for the year **1997**). Nominations should be sent in an envelope marked "Confidential" to the following address:

Achievement Awards Committee
Entomological Society of Canada
393 Winston Avenue
Ottawa, Ontario
K2A 1Y8

and should comprise: (1) the name and address of the nominee(s); (2) a statement of relevant achievements; and (3) the name of the nominator and at least one seconder. To be considered by the Achievement Awards Committee, nominations must bear a postmark no later than **December 31 1996**.

The following conditions govern these awards:

1. Outstanding contributions should be judged on the basis of

(a) superior research accomplishment either as a single contribution or as a series of associated endeavours and which may be either in entomology or a related field where the results obtained are of great consequence;

or

(b) dedicated and fruitful service in the fields of Society affairs, research, administration or education.

2. No more than one of each award shall be granted per year but, where circumstances warrant, more than one individual may be mentioned in a single award.

3. Recipients need not be members of the Society providing their contribution is judged to have a major impact on entomology in Canada.

4. The award may be granted on different occasions to the same recipient but for different contributions to entomology in Canada.

5. Nominees for the C. Gordon Hewitt Award must be less than 40 years of age throughout the calendar year in which the award is both announced and awarded.

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Comité des décorations

Médaille d'Or pour Contributions Exceptionnelles à l'Entomologie Canadienne
et
Prix C. Gordon Hewitt

La Société invite les membres à lui faire parvenir les noms des personnes qu'ils considèrent éligibles à ces deux prix. Veuillez envoyer vos nominations (pour l'année **1997**) au:

Comité des décorations
La Société d'entomologie du Canada
393 Winston Avenue
Ottawa, Ontario
K2A 1Y8

dans une enveloppe portant la mention "Confidentiel". La nomination doit contenir: (1) le nom ainsi que l'adresse du (ou des) candidat(s) désigné(s); (2) un compte rendu des réalisations pertinentes; et (3) le nom du parrain et celui d'au moins une deuxième personne appuyant la mise en nomination. Pour être acceptées par le Comité, les nominations devront porter un sceau postal d'au plus tard le **31 decembre 1996**.

Les conditions suivantes régissent le choix des récipiendaires de ces prix:

1. Les contributions exceptionelles devraient être jugées dans le contexte

(a) d'un accomplissement hors pair en recherche, soit comme résultat d'une seule contribution ou d'une série d'efforts reliés et ayant abouti à des résultats de grande valeur. Cette recherche aura été realisér en entomologie ou tout autre domaine connexe.

ou

(b) de service dévoué et fructueux au profit de la Société, de l'administration de recherche, ou de l'éducation.

2. Chaque prix ne sera décerné qu'une seule fois par année. Cependent, lorsque les circonstances le justifient, plusieurs personnes peuvent collectivement devenir récipiendaires d'un prix.

3. Les récipiendaires ne doivent pas nécessairement être membres de la Société pour autant que l'on juge que leur contribution à eu un impact majeur sur l'entomologie au Canada.

4. Chaque prix peut être décerné plus d'une fois au même récipiendaire mais pour différentes contributions à l'entomologie au Canada.

5. Le candidat désigné pour le prix C. Gordon Hewitt doit être agé de moins de 40 ans pour toute la durée de l'année au cours de laquelle le prix est annoncé et décerné.

The 1996 Joint Meeting
of the Entomological Society of Canada
and the Acadian Entomological Society
Fredericton, October 5 - 9, 1996
Lord Beaverbrook Hotel

SHARE-A-ROOM FORM

If you wish to share a room with a colleague at the E.S.C./A.E.S. Joint Annual Meeting, please supply the following information and we will do our best to find you a roommate to share the cost.

Are you: Male Female Student Non-student
Do you prefer: Smoking Non-smoking Share with one person or more
Additional preferences (indicate): . . . . . .
. . . . . .
Date of arrival: . . . . . .
Date of departure: . . . . . .

Name and address: . . . . . .
. . . . . .
. . . . . .
. . . . . .
Telephone: . . . . . Fax: . . . . . E-mail: . . . . . .

Please send this card to: Troy Danyk, Chair, Student Affairs Committee, Agriculture and Agri-Food Canada, Research Centre, P.O. Box 3000, Lethbridge, AB, Canada T1J 4B1; tel 403-327-4561; fax 403-382-3156; danyk@abrsle.agr.ca

La Réunion Conjointe de 1996
de la Société Entomologique du Canada
et de la Société Entomologique Acadienne
Fredericton, du 5 au 9 octobre 1996
Hôtel Lord Beaverbrook

FORMULAIRE: "PARTAGE-UNE-CHAMBRE"

Si vous desirez partage une chambre avec un collègue lors de la Réunion conjointe de la S.E.C./S.E.A., prière de nous faire parvenir l'information suivante. Nous nous efforcerons de vous trouver un collègue pour partager les frais d'hébergement.

Etes vous: Homme Femme Etudiant Non Etudiant
Préférez vous: Fumeur Non Fumeur Partager avec une personne ou plus
Préférences additionnel (écrivez s'il vous plaît): . . . . . .
. . . . . .
Date d'arrivée: . . . . . .
Date du départ: . . . . . .

Nom et adresse: . . . . . .
. . . . . .
. . . . . .
. . . . . .
Téléphone: . . . . . Télécopieur: . . . . . .
Poste électronique: . . . . . .

Retournez ce formulaire à: Troy Danyk, Président, Comité des affaires étudiantes, Agriculture et Agro-alimentaire Canada, Centre de Recherches, C.P. 3000, Lethbridge, AB, Canada T1J 4B1; téléphone 403-327-4561; télécopieur 403-382-3156; danyk@abrsle.agr.ca

Strategic Review Committee of the Entomological Society of Canada

The Strategic Review Committee, struck early in 1995, was directed to recommend changes in the structure and operations of the Society for attaining long-term financial viability, and effectiveness in maintaining basic scientific and educational functions. Five subcommittees were created:

1. Organizational Structure (Chair: Dr. George Gerber)
2. Publications (Chair: Dr. Guy Boivin)
3. Revenue Enhancement (Chair: Dr. Hugh Danks)
4. Headquarters Operations (Chair: Dr. Gary Gibson)
5. Relations with Affiliated Societies (Chair: Dr. George Ball)

The Committee will present its final report at the annual meeting of the Governing Board in Fredericton in October. Recommendations approved by the Board that involve changes to the Bylaws or Standing Rules of the Society will be presented to the general membership at the Annual Business Meeting. Major recommendations for review are listed below.

Organizational Structure

1. Reduce the number of Directors-at-Large to three.
2. Eliminate the offices of Assistant Bulletin Editor and Editor of the Memoirs.
3. Require the Achievement Awards Committee to select Fellows and Honorary Members in addition to worthy recipients for the Gold Medal Award and C. Gordon Hewitt Award.
4. Replace the Scholarship and Graduate Research - Travel Grants Committees with the Student Awards Committee.
5. Replace the Science Policy and Public Education Committees with the Science Policy and Education Committee.
6. Establish the Marketing and Headquarters Committees as a continuing committees.
7. Eliminate the Annual Meeting and Endangered Species Committees.
8. Normally appoint Members of the Governing Board as Chairs of the following committees: Nominating; Achievement Awards; Finance; Insect Common Names; Membership; Publications; Student Awards; Science Policy and Education; Marketing; and By-Laws, Rules, and Regulations.
9. Time committee appointments to ensure broad overlap of terms and continuity of committee membership.

Publications

1. Discontinue publication of the Memoirs
2. Apply extra page charges to authors who are not members of the ESC but who wish to pub lish in Can. Ent.
3. Apply extra page charges to authors who do not submit electronic versions of manuscripts.
4. Regularly review scope and objectives of Can. Ent.
5. Publish appropriate items from the Bulletin on the ESC's Internet home page.
6. Contract out the publication of Can. Ent. provided that quality is maintained and cost reduc tions are realized.
7. Charge translation costs to authors who do not submit adequate translations of their abstracts.

Revenue Enhancement

1. Attract foreign members.
2. Revise the parameters for sustaining membership, and actively seek sustaining members.

3. Market a broader range of selected services and other items.
4. Advertise the Society through the Internet.
5. Seek every alternative to avoid cost increases likely to reduce memberships, subscriptions, etc.
6. Monitor revenue potential from specific publications and services on an ongoing basis.
7. Seek advertising in ESC publications, under appropriate guidelines.
8. Consider ways to participate in and help generate revenues from annual meetings, in consul tation with regional societies.
9. Develop sponsorships for specific Society activities.
10. Investigate ways to widen the appeal of the Society (e.g. broader educational assocation).
11. Establish evaluation policies with respect to revenue generation.

Headquarters Operations

1. No significant savings through reduction of headquarters operating expenses were identified.
2. Recognize the Headquarters committee as a standing committee rather than an ad hoc com mittee.
3. Require the Headquarters Committee to submit an annual estimate of expenses and budgetary requirements to the Treasurer.

Relations with Affiliated Societies

1. Mandate regional representation on the Science Policy and Education Committee.
2. Conduct business with the SEQ in the French language as much as possible.
3. Encourage the use of French in posters, papers and other communications at annual meetings.
4. Establish a section in the Bulletin to deal specifically with news from the Affiliated Societies.
5. Continue to support public education activities carried out by the Affiliated Societies.
6. Establish a WWW home page to promote entomology.

Rick West, Chair
August, 1996

Corrections for the ESC Common Names Disk

Please make the following corrections to your disk. If you registered it you will already have received this list of changes. (Press G on the menu to get the User Registration Form. Ignore serial number).

Change Allegheny spruce beetle to *boreal spruce beetle, which has been ratified by the Society.

Correct its footnote (8a) to - formerly called Allegheny spruce beetle

jack pine budworm = *Choristoneura p. pinus* (common name applies to this subsp.)

western plant bug - Add to footnote 89 - "*L.hesperus* called western tarnished plant bug by ESA."

(Make the above changes where appropriate in NAMES.TXT, SCI2.TXT, FRENCH.TXT and FTNOTE.TEXT. * - move entry to alphabetical order in NAMES.TXT)

Insect Common Names Committee
E.M.Belton, Director-At-Large, ESC, 12 July 1996
Centre for Pest Management, Biol.Sciences, Simon Fraser U.
Burnaby, B.C. Canada V5A 1S6.

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Student Affairs Committee Update

The Student Affairs Committee (SAC) has reviewed the reports from the Subcommittees of the Strategic Review Committee, and commented on how the proposed recommendations could affect Student Members and the Society. The purpose of the strategic review is to examine the structure, functions and procedures of the ESC and to suggest alternatives to stream-line operations (reports are published elsewhere in the Bulletin). We agreed with most of the recommendations and concluded that, for the most part, they would benefit the Society. However, some of the recommendations that the SAC did not support are outlined below.

1. The proposed Student Awards Committee no longer be responsible for fund raising for the scholarship fund. The SAC opposed this recommendation, given the apparent lack of an alternate plan. We do not want the valuable activity of scholarship fund generation to stop, especially at a time when university, college, provincial and national fund providers are reducing the numbers (i.e., total dollar value) of awards presented to students. If responsibility for fundraising is not going to reside with the Student Awards Committee, we would like to see this activity transferred to another Committee. We suggested that the Committee responsible for fundraising take an active role in soliciting funds for scholarships from companies and organizations.

2. The size of the Student Affairs Committee be reduced [from five] to four members. We disagreed. The SAC has coordinated activities at Annual Meetings that include workshops, symposia and the First Canadian Linnaean Games. The proposed loss of one member would reduce the efficacy of the Committee and good regional representation would be sacrificed.

3. The cost of publishing The Canadian Entomologist should be lowered by having the journal produced externally. We agreed in principle, but objected to the suggestion of using a publisher in the US to produce the Journal. We are aware of the "global economy", but stated that it is impossible to support the Canadian economy, and preserve jobs, by sending Society printing orders out-of-country.

The SAC is coordinating the "share-a-room" program for Joint Meeting of the ESC and AES in Fredericton. The program is open to all Members of the Society, and anyone planning to attend the meeting is encouraged to apply if they want to share a room with a colleague. Matched individuals will be responsible for making their own hotel reservations. An application form is published elsewhere in the Bulletin. Contact the Chair of the SAC for additional application forms or more information.

We have started to work on the survey of entomology education in Canada. We feel the survey is needed because there does not appear to be a single source of information about entomology programs in Canada. The survey will provide students (and other interested parties) with a concise summary of the state of entomology training in Canada. We would like to publish the results of the survey in a future issue of the Bulletin, and in the proposed ESC WWW home page.

If you have an issue that may be of interest to the SAC, contact me at: Agriculture and Agri-Food Canada, Lethbridge Research Centre, PO Box 3000, Lethbridge, AB, T1J 4B1, Canada; e-mail danyk@abrsle.agr.ca; fax 403-382-3156; phone 403-327-4591, extension 462. All members of the SAC can be reached via e-mail at esc-student@sfu.ca.

Troy Danyk Chair,
Student Affairs Committee
Lethbridge, Alberta

IN MEMORY

Lawrence Andrew Jacobson
(1910 - 1996)

Lawrence (Larry) Andrew Jacobson passed away on May 19, 1996 after a rewarding career and a happy and involved retirement. Larry was born in Lethbridge, Alberta and attended school in Barons, Alberta. He graduated with a B.Sc. from the University of Alberta in 1934 and an M.Sc. from Montana State College in 1938. Although Larry considered medicine as a career in 1929, the Depression dictated a shorter program in biology. He began his entomological career in May 1934 when he was hired at the Canada Department of Agriculture, Dominion Entomological Laboratory, Lethbridge, Alberta. He was primarily involved in studies on the Pale Western Cutworm and the Say's Grain Bug. His publication list of 28 scientific papers covers all aspects of the Pale Western Cutworm through observations on the feeding habits at the first instar, diapause in eggs, larval starvation and cultural control by delayed seeding, adult fecundity and complete rearing methods. He was also involved in the chemical control of this species as well as the Red-backed Cutworm.

By the time of his retirement in April, 1971, he had also become involved in the identification of pheremones with many of the cutworm species. Larry was certainly a leading authority on cutworms. He recorded the first occurrence of the Say's Grain Bug in Canada and contributed to the understanding of its life-history. Larry was a charter of the Alberta Institute of Agrologists, Past-President of the Lethbridge Branch of the Agricultural Institute of Canada, Life Member of the Entomological Society of Alberta, and an Emeritus member of the Entomological Society of Canada and the Entomological Society of America.

In private life, Larry was a Past-President of the Kinsmen Club and Dowtown Rotary Club of Lethbridge, Officer-in-Charge of the local Royal Canadian Engineers Squadron and a long time member of the Lethbridge Golf and Country Club. He was also an ardent fisherman and enjoyed many trips to the mountain streams and particularly to the west coast for the elusive salmon.

Larry was a devoted and loving husband and family man. He is survived by his wife, Edna, and daughter, Janice. He is predeceased by his daughter, Brenda Lois, and his son, Brian Andrew. Larry will be sorely missed by his family, his many friends, and colleagues.

Ed Swailes
Joe Shemanchuk

Kenneth Marion King
(1896-1996)

"One minute we were deep in conversation after the supper hour, the next second he was gone." The heart that had sustained the ever-active man for the past 100 years, suddenly stopped. The spirited soul of Kenneth Marion King had departed from the earth-weary body; freed to join its Maker on 5 April 1996.

Dr. King was born at Meadow Creek (near Virginia City) Montana on 1 March 1896, the son of a pioneer Minister of the Methodist Episcopal Church and veteran of the American

Revolution. His mother was of Mayflower and Plymouth-Covenant stock. Kenneth attended schools in Montana and in Seattle, Washington, where he graduated from Queen Anne High School in 1913. He then enrolled as a student in the Department of Zoology and Entomology at Montana State College, Bozemen, Montana.

To sustain himself and pay for his University education, he spent his summer months travelling by horse and buggy across the hot, dusty Montana countryside, selling pots and pans to the wives of farmers and ranchers. The Victoria Daily Colonist states: "On one occasion he was about to close a sale with a farm wife who was listening from behind a screen door, when suddenly he saw crawling up the screen a rare beetle he had long wanted to add to his collection. He stopped in mid-sentence, forgetting his sale; his jaw dropped open, his eyes popped as he reached for the gorgeous specimen slowly inching its way up the screen." But that was Ken, who even at the age of 20, was direct, sincere and dynamic in everything he undertook.

Because the First World War was still in full swing at that time, Ken interrupted his studies to serve in Base Hospital 50 (University of Washington) as a member of the American Expeditionary Force in France (1917-1919). He returned to his studies and graduated with a Bachelor of Science degree in 1920.

He began his professional career in entomology in 1919 as a scientific assistant with the United States Department of Agriculture in Charlottesville, Virginia. Here he was involved in biological studies of the corn earworm until 1922. At the same time, in 1921, being a gifted singer with a rich baritone voice, he was recommended to undertake a professional career in singing and studied music at the University of Virginia. In 1922, when he applied for and was accepted to fill a postion as a Research Scientist with the Divion of Entomology, Canada Department of Agriculture, he made his choice to become a full-time entomologist in Canada.

He took up his new duties in August 1922 and developed the Laboratory from a one-man establishment to a dynamic research laboratory staffed with well-trained personnel. He led by example in the zeal, dedication and thoroughness with which he applied his talents in developing programs that met the needs of field crop and garden insect problems of Saskatchewan. In addition to his manifold responsibilities, he pursued post-graduate studies and graduated with a M.Sc. degree from the University of Saskatchewan in 1926.

Ecology was his conviction and interest; especially the quantitative method of analyzing biotic and abiotic factors and his faunal studies of insects included: population dynamics of insects in natural and cultivated habitats; life history and control of wireworms, cabbage maggots and cutworms; survey methods, cultural, chemical and economics of control of grasshoppers; relation of mosquitoes and biting flies to encephalomyelitis; and insects problems of stored grain. During his tenure in Saskatchewan, Ken developed a high order of co-operation between entomologists, off icials of the provincial Department of Agriculture, and with leaders of other federal organizations and the University. More than 220 publications - research, extension, and popular - attest to his enormous energy and dedication to the betterment of entomology and agriculture.

Amidst this regime of work, Ken was able to continue his graduate studies, assisted by a Caleb Dorr Fellowship at the University of Minnesota, and received his Ph.D. in 1940. In 1946 he was transferred to Victoria, B.C., to establish a garden and field crop insect laboratory. He was

a participatory member of several professional societies including the Entomological Societies of Canada and Ontario, the Ecological Society of America, Entomological Society of America (elected a Fellow in 1938), the Agricultural Institute of Canada, Chairman (in 1945) of the Grasshopper Research Committee of the American Association of Economic Entomologists, and a member of the Committee of Grassland Research of the United States National Research Council.

Ken was as enthusiastic about sports as he was in his chosen profession. At Montana State College he was a triple letterman in football and basketball. Then there were also the memorable evenings listeninbg to classical music in his home. No one who has worked with Ken, or played golf with him, will forget the spontaneous rendition of a classical aria that suddenly burst from his throat in rich baritonic splendor, after the completion of a successful golf shot, or a conclusive entomological exercise.

On the day of his retirement after 35 years of service as a federal entomologist, Ken was ordained as a priest in the Church of St. John the Divine of the Anglican Church of Canada. He was the first incumbent of St. Peter's Church, Lakehill, a parish he served until he retired at the age of 70. He continued his work in the sacred ministry as an Assistant at St. Matthias, St. Andrew's, Holy Trinity, St. Luke's, and St. George the Martyr; these located in Victoria and Sidney.

Dr. King married Francis Monk of Seattle, Washington in 1918. After her death he married Hilda Kirkby of Saskatoon in 1950. She gave music lessons to children and together they trained many in choral singing, both as Junior and Senior Church Choirs at St. John's, St. Peter's, St. Luke's and St. George's.

Many have been touched by the 100-year presence of the Rev. Dr. Kenneth M. King. There are those of his former staff, many now in important positions in science, entomology and medicine, who benefitted by the constant encouragement and thoughtful training that he gave so freely. Many others have been strengthened and comforted in their spiritual well-being and faith in God, by his generous counselling and leadership. He is one of only a few who have endured, yet prospered in a century of living. He may be gone from our midst but he leaves a profound legacy of scientific achievement, entomological excellence and spiritual enhancement. May he rest gently

Paul W. Riegert
Regina, Saskatchewan.

ARTICLES

L'aventure à succès des recherches sur le comportement du charançon de la prune

par Charles Vincent
Centre de recherche et de développement en horticulture
Agriculture et agro-alimentaire Canada
Saint-Jean-sur-Richelieu, Québec, Canada

Quand les Européens sont arrivés pour de bon en Amérique du Nord, ils amenèrent le pommier avec eux. Cette nouvelle plante hôte constituait une ressource de choix pour un insecte indigène, le charançon de la prune, Conotrachelus nenuphar Herbst. Comme son nom l'indique,

l'insecte préférait auparavant les pruniers sauvages et d'autres arbres ou arbustes de la famille des Rosaceae pour se nourrir et compléter son cycle vital. Le charançon se mit alors à envahir les vergers de pommiers de l'est de l'Amérique du Nord. Tant que les pomiculteurs n'eurent pas d'insecticides efficaces pour le combattre, le charançon était l'ennemi numéro un des vergers. En fait, en absence de traitements insecticides spécialement dirigés contre cet insecte, les femelles de charançon défigurent souvent toutes les pommes des vergers en pondant leurs oeufs dans les fruits.

Les insecticides de synthèse apparus après la seconde guerre mondiale sont tellement efficaces pour tuer les adultes de charançons que les dommages de charançons sont fréquemment inférieurs à 1% des fruits à la récolte en vergers commerciaux. Cependant, l'utilisation de ces insecticides causent des problèmes. Premièrement, d'autres insectes sont également touchés, y compris les insectes prédateurs qui se nourissent de plusieurs espèces d'insectes ravageurs. Deuxièmement, certains insecticides de synthèse sont stables et deumeurent longtemps dans l'environnement. Enfin, plusieurs espèces d'insectes ont développés des résistances à ces insecticides, de sorte que l'on doit augmenter les doses pour avoir une même efficacité. Mais cette logique a une limite et, dans la pratique, les insecticides de synthèse doivent être considérées comme des ressources non renouvelables. Une fois que les insectes sont devenus résistants, les insecticides sont pratiquement inutilisables et il est impossible de faire marche arrière.

Peut-on alors produire des pommes exemptes de dommages de charançon sans avoir recours aux insecticides chimiques? Presque. La clé de la solution était une meilleure connaissance du comportement en champ des adultes du charançon. Et voici comment cela est arrivé.

Depuis le début du siècle, les chercheurs ont publié environ 2000 articles sur le charançon de la prune. Presque tous ces articles traitent soit la biologie ou de la lutte à l'aide d'insecticides de synthèse. Mais on disposait de peu d'informations sur le comportement en nature des adultes. Au début des années '80, Gérald Lafleur, un étudiant du Collège Macdonald de l'Université McGill a entrepris de mettre au point une technique pour marquer les adultes du charançon. Il s'agissait simplement de mélanger une quantité de Zinc65 (un isotope radioactif) avec de la colle et d'appliquer ce mélange sur les ailes de l'insecte. Puis, on appliquait des colles de couleurs différentes de sorte qu'en combinant plusieurs couleurs disposées sur des endroits différents des ailes, on pouvait marquer et différencier plusieurs milliers d'individus. La demi-vie du Zn65 étant de 243 jours, on pouvait suivre les individus marqués au cours d'une saison complète, ou encore en marquer au mois d'août et les retrouver le printemps suivant !

La mise au point de la méthode consistait à déterminer la dose minimale permettant de détecter les adultes dans la nature mais qui ne causerait pas la mort de l'insecte. La suite a été une série de travaux consistant à relâcher des milliers d'individus marqués dans un verger expérimental de la Ferme d'Agriculture Canada à Frelighsburg et de suivre leur déplacements en nature avec un compteur à scintillation. En balayant tout le verger (les arbres, le sol, et la végétation située sur le pourtour du verger) avec un compteur à scintillation, on pouvait détecter les adultes marqués en tout temps, qu'il pleuve ou qu'il fasse nuit. Après avoir inscrit leur identité (grâce au code de couleurs) et leur localisation exacte où on les avait retrouvé, on relâchait les insectes à nouveau. Certains individus ont été capturés jusqu'à sept fois au cours d'une saison ! Toutes ces informations ont été cartographiées, de sorte que l'on a pu suivre les déplacements du charançon dans l'espace et le temps. Une des conclusions de cette étude est que la plupart des adultes immigrent dans les vergers à partir des fôrets avoisinantes au printemps et qu'à l'automne, ils émigrent des vergers vers les forêts pour passer l'hiver.

Mais pourquoi ce comportement? Pour répondre à cette question, on a effectué deux types d'expériences. On a d'abord déplacé environ 15 tonnes de matériel à la ferme d'Agriculture Canada à l'Acadie où il n'y avait pas de pommiers et, par conséquent de charançon. On a transporté de Frelighsburg du sol du verger, du sol de deux types de fôrets situés près de vergers de la

ferme de Frelighsburg et de la pierre. Après avoir disposé ces micro-habitats au hasard selon un arrangement rappelant un damier, on a relâché un nombre égal de charançon en septembre. Lorsqu'on a tenté de les retrouver à la fin d'octobre, la plupart des charançons avaient choisi le type de sol avec des feuilles d'érable pour hiberner. Quel est l'avantage de choisir un milieu plutôt qu'un autre pour hiberner ? Des expériences supplémentaires ont démontré que les charançons qui hibernent dans ce type de litière n'avaient que 5% de mortalité. Par contre, les individus qui hibernent dans le verger subissent environ 90% de mortalité.

On a également trouvé que les charançons qui envahissent les vergers au printemps explorent les arbres situés en bordure avant d'entrer plus profondément dans le verger. En fait, ils grimpent dans ces arbres et en redescendent, la plupart du temps en marchant ! On a alors imaginé qu'en traitant les arbres situés en bordures des vergers avec des insecticides synthétiques, on ferait une barrière chimique contre laquelle les populations de charançons se buteraient. Mais il fallait savoir quand traiter contre ces insectes.

Après quatre années d'essais empiriques dans un verger expérimental de Frelighsburg, on est arrivé à une approche gagnante. Cela consistait à effectuer un traitement complet du verger avec des insecticides synthétiques lors de la chute des pétales. Puis on a divisé le verger en cinq secteurs, soient quatre secteurs de bordures (nord, sud, est et ouest) et un secteur central. Les secteurs de bordures comprenaient les trois premières rangées de pommiers ou 20 m de distance de la périphérie. Pendant quatre semaines, on a échantillonné 200 fruits au hasard dans chaque secteur à tous les deux jours suivant la chute des pétales. On effectuait un traitement dans les seuls secteurs où l'on trouvait plus de 1% de fruits endommagés par le charançon. Ainsi, si l'on trouvait 3% de fruit endommagés que dans le secteur ouest, on ne traitait que ce secteur. En ne traitant que lorsque les besoins étaient pressants et nécessaires, cette approche a permis de faire des économies appréciables d'insecticides en verger expérimental.

On a ensuite passé à l'étape de la validation. Elle a été réalisée pendant deux ans dans quatre vergers commerciaux dans le cadre d'une collaboration entre la firme Agrilus Inc. et Agriculture Canada. Les pommiculteurs participants ont accepté d'assumer une partie des risques: ils n'étaient pas compensés entièrement si une grande proportion leurs pommes étaient endommagées en appliquant le programme. On a essentiellement repris l'approche utilisée dans le verger expérimental de Frelighsburg. Ce fut un succès ! Dans tous les vergers, les pommiculteurs ont produit des pommes (ayant moins de 1% de dommages de charançon à la récolte) en pulvérisant environ 50% des quantités d'insecticides normalement recommandées pour le contrôle de cet insecte.

Les résultats de ces recherches ont fait l'objet une quinzaine d'articles scientifiques et de nombreux articles de vugarisation. Ce qui couronne toutes ces années de recherches, c'est que l'approche de traitement de bordures est maintenant pratiquée par de nombreux pomiculteurs québécois, canadiens et nord-américains.

(Ont participé activement à ces projets de recherche: Stuart B. Hill, Gérald Lafleur, Gaëtan Racette et Gérald Chouinard, du Campus Macdonald de l'Université McGill; Charles Vincent, Station de recherches d'Agriculture Canada à Saint-Jean-sur-Richelieu; Yvon Morin de la firme Agrilus Inc.)

Cet article a remporté le prix Jean-Charles Magnan 1994 décerné par l'Ordre des Agronomes du Québec pour l'excellence d'un article de vulgarisation en agriculture.

NEWS OF ORGANIZATIONS

International Commission on Zoological Nomenclature

The following Applications were published on 28 June 1966 in Vol. 53, Part 21 of the Bulletin of Zoological Nomenclature. Comment or advice on any of these applications is invited for publication in the Bulletin and should be sent to the Executive Secretary (I.C.Z.N.), c/o The Natural History Museum, Cromwell Road, London SW7 5BD, U.K.

Case 2925 ***Crenitis*** **Bedel, 1881,** ***Georissus*** **Latreille, 1809 and** ***Oosternum*** **Sharp, 1882 (Insecta, Coleoptera): proposed conservation**

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Abstract. The purpose of this application is to conserve the names of three beetle genera which are junior objective synonyms of names which have not been used since the 19th century. The names are *Crenitis* Bedel, 1881 (threatened by Fontiscrutor PandellÈ, 1876), *Georissus* Latreille, 1809 (threatened by *Cathammistes* Illiger, 1807) and *Oosternum* Sharp, 1882 (threatened by *Crypteuna* Motschulsky, 1863).

Keywords. Nomenclature; taxonomy; Coleoptera; *Crenitis; Georissus; Oosternum.*

Case 2974 *Stilpon* Loew, 1859 (Insecta, Diptera): proposed conservation

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Abstract. The purpose of this application is the conservation of the generic name *Stilpon* Loew, 1859 for a widely distributed genus of flies placed in the EMPIDIDAE or HYBOTIDAE. The senior subjective synonym *Agatachys* Meigen, 1830 is available, but it has only once been listed as a valid name and its suppression is proposed.

Keywords. Nomenclature; taxonomy; Diptera; *Agatachys; Stilpon.*

The following Opinions were published on 28 June 1996 in Vol. 53, Part 2 of the Bulletin of Zoological Nomenclature. Copies of these Opinions can be obtained free of charge from the Executive Secretary, I.C.Z.N., c/o The Natural History Museum, Cromwell Road, London SW7 5BD, U.K.

OPINION 1838. *Temnorhynchus* Hope, 1837 (Insecta, Coleoptera): conserved.

OPINION 1839. *Coproica* Rondani, 1861 and *Ischiolepta* Lioy, 1864 (Insecta, Diptera): conserved by the designation of *Limosina acutangula* Zetterstedt, 1847 as the type species of *Coproica.*

Biological Survey of Canada (Terrestrial Arthropods) Survey Report

The Scientific Committee met in Ottawa on 18-19 April 1996.

Scientific Projects

1. Arthropods of Canadian Grasslands

The extensive report of the SAGE workshop on arthropod sampling protocols (October 1995) will soon be in final form. It is proposed to launch a pilot study to test the protocols. The Survey's brief on the Advantages of Using Arthropods in Ecosystem Management is also being distributed in support of the project. A workshop on the prairie ecozone chaired by Dr. A.T. Finnamore, with a very wide range of participants, was held after the Scientific Committee meeting.

2. Arthropods of the Yukon

Following various discussions about the available manuscripts and the production and funding of the Survey's book on the Insects of the Yukon, it was decided that Dr. H.V. Danks will finish editing the Yukon publication, as editor with Mr. J.A. Downes, who is now unable to drive the project forward. Manuscripts will be completed during 1996 for publication in 1997. Donations and grants will be sought as part of the funding package.

3. Arctic Invertebrate Biology

Some replies had been received to the Survey's letter sent to various organizations in late 1995, pointing out that there is a serious deficiency in Canada's policies with respect to the arctic. Some replies had been encouraging, but government agencies that might be able to address this state of affairs did not appear to have taken the problems identified by the Survey seriously.

Other Scientific Priorities

1. Faunal analysis

The fields for a database on the Canadian fauna and relevant systematic experts have been refined further, including a review of data for a number of test groups. Revised formats for the analysis and an explanation of the project and its rationale will be used to introduce the project on the Internet.

2. Endangered Species

Increasing awareness of endangered species among the general public is causing some potential problems. For example, an article was published in Audubon magazine that made it appear as though all collectors or scientists who are concerned about the problems created for collections by the enforcement of the U.S. Endangered Species Act think or behave like butterfly poachers. Evidently, the average person does not really understand the nature of scientific collections. On the positive side, Dr. Scudder emphasized that the publication of a paper on potentially rare and endangered species in B.C. has helped to generate funding to study rare and endangered species there.

3. Possible Internet Connections

Dr. Behan-Pelletier introduced a report outlining the requirements that would be essential to launch and maintain an Internet site for the Survey. It was agreed to establish a BSC home page in conjunction with the Entomological Society of Canada site. That home page will be designed over the next few months.

4. Potential Survey Document on Biodiversity Assessments

The Committee reviewed a draft document entitled "How to assess insect biodiversity without wasting your time", which provides a generalist approach to encourage proper planning. The document will be published by the Survey in due course.

5. Monitoring of Continuing Priorities for Work on Canadian Faunas

The Committee reviewed a large number of completed or inactive projects that have reached a staging point (and so are no longer fully active) but that remain of interest to the Survey. Among many other matters noted was a concern about the fate of environmental impact assessments, and the fact that many lists of expert systematists are currently being developed, which, though useful, do not make the experts listed available to solve all of the problems of biodiversity.

6. Other projects

Also discussed was information on the arthropod fauna of soils, old-growth forests, invasions and reductions in the Canadian fauna, the Canadian biodiversity strategy, and damaged ecosystems.

Secretariat activities

During the 1995 round of visits on behalf of the Survey to entomological centres in Canada, Dr. H.V. Danks learned about a variety of work in progress, and also discussed the Survey and its projects and interests informally with many entomologists and other biologists. Various lectures or seminars on the Survey and on aspects of the insect fauna were presented too.

Liaison and exchange of information with other organizations

1. Canadian Museum of Nature

Dr. P. Colgan, Executive Vice-President, Canadian Museum of Nature, reported that the Museum's appropriation budget is down 8% this year, and operating funds are running out especially for science programs. The CMN therefore is undertaking initiatives to acquire non-governmental revenue from business, sponsors and grants. Construction of the Museum's new science and administration building in Aylmer is progressing well, and moves are planned for 1996. Preparing for the move is the top priority for all staff. In the collections area the CMN is working on a number of databases and systems and is developing a national collection strategy. The Biological Survey Secretariat is now within the Canadian Centre for Biodiversity at the Museum. A summer school on Biodiversity and Systematics (June-July 1996), to provide necessary systematics training, is supported by the CMN and by national and international funds. Dr. Colgan emphasized the changes going on within the Museum, including cultural changes, which are demanding for staff and management.

2. Crop Protection Program, ECORC (formerly Biological Resources Division of CLBRR)

Dr. J. Surprenant, Program Chair, Crop Protection Program, noted that the change of title is a message to staff and clients that the ECORC works in agriculture, using a client technology market approach. Work at Crop Protection will be covered by 12 studies related to agriculture. Emphasis is placed on linkages with the private sector, and collaborative projects in which both costs and profits are shared. The time when Agriculture and Agri-Food Canada collaborated for free is over, not because of a lack of goodwill, but because of a lack of resources. Work outside the Agriculture mandate will now have to be done on a cost-recovery basis. This approach requires that work is done only because someone somewhere wants the information, and the work has to be put into a form that others can use directly. Members of the Committee noted that one of the most useful products produced in the past has been the handbook series, which takes the work of biodiversity experts and puts it into a form that is readily usable. Dr. Surprenant explained that ECORC is trying to keep the handbook series going by linking with the National

Research Council. Agriculture had lost its publishing arm; moreover, the production of the handbooks is very expensive, which is why NRC is being sought as a partner.

3. Entomological Society of Canada

Dr. G. Boivin, President, Entomological Society of Canada, reported that the Society's first priority over the last few months has been preparation of the strategic review, the results of which are expected to have a major impact next year; recommendations will be prepared for the Annual Meeting in October.

4. Canadian Society of Zoologists - Parasitology

Dr. D. Marcogliese reported that the Directory of Parasitologists is in the final editing stage, and a listing of expertise and gap analysis is 50% complete. The major current projects of the parasitology module are nearing completion, and some new projects will hopefully be initiated, for example a survey of the parasites of stickleback species in Canada. Dr. Marcogliese reviewed some developments of interest in biodiversity studies, including the ATBI and INBIO initiatives in Costa Rica, and the St. Lawrence biodiversity initiative, and circulated copies or contents of publications of possible interest to the Committee.

5. Canadian Forest Service

Dr. B. Moody, Coordinator, Biocontrol, Canadian Forest Service, reported that the CFS has formed 10 research networks. A CFS biosystematics working group has been formed. The biodiversity network and the forest health network are concerned with systematics, and the two relevant centres (Quebec and Edmonton) will be staffed with generalist taxonomists. CFS has maintained its 3 scientists in BRD, and therefore is being charged a reduced rate for identification of specimens.

6. Ecological Monitoring and Assessment Network, Environment Canada.

Dr. P. Roberts-Pichette, Senior Scientific Advisor, EMAN, reported that 400 people had attended the national EMAN meeting in January. A large amount of material was submitted by participants which will be put on the Internet and eventually will appear as hard copy. One of the recommendations of the National Committee was that EMAN should encourage its partners and others to provide support for the training of Canadians in systematics and taxonomy. Several relevant courses and training sessions are being given. A document on the Canadian Ecological Framework has been produced. Upcoming EMAN workshops include those on the Mixedwood Plains, on the Grasslands, and on biodiversity monitoring protocols (grasslands, marine, freshwater). After that meeting a summary of protocols will be distributed widely for comment. Members of the Committee noted that it is clear from the EMAN meetings that there is recognition outside the entomological community that arthropods are a major gap in environmental analysis, and detailed knowledge of them is required.

7. Canadian Wildlife Service

Projects on the development of a captive breeding technique for the extirpated Karner Blue butterfly and on an endemic species of dragonfly, Somatochlora brevicincta, from one site in Quebec are likely to be funded this year under the Endangered Species Recovery Fund, a joint fund of the Canadian Wildlife Service and the World Wildlife Fund.

8. National Atlas Information Service

Ms. Claire Gosson, National Atlas, explained that the role of the National Atlas is to assume leadership in making geo-spatial data widely available across Canada, and to support both the users and providers of such information (including cooperative arrangements). Ms. Gosson explained some of the approaches undertaken during the last two years, and potentially related to the work of the Biological Survey. She reviewed the Biomap project, made available relevant information, and demonstrated some of the information on a web site.

Other items

1. Regional developments

Information of interest from different regions of the country was summarized, including the following items. In British Columbia, a variety of research work on arthropods in forest canopies is continuing. The Royal B.C. Museum has been funded to georeference all of the collections and put them into a database. Several studies on rare species, keys, and other work on the fauna have been funded. In the prairies, the Provincial Museum of Alberta will be running an exhibit using giant mechanical robotic moving insects. In Ontario, the Royal Ontario Museum has been reorganized in the face of recent government cutbacks: a new Centre for Biodiversity and Conservation Biology will focus on northern biodiversity, biodiversity in tropical forests and reefs, molecular systematics and conservation genetics. An application for a major facilities access grant from NSERC, which would support the curation of the Guelph collection, has been denied. Some studies of insect biodiversity in Québec were reviewed, including the use of Luminoc light traps as a new study tool. The 1996 meeting of the Societé d'entomologie du Québec will be held in Québec City, 31 October–1 November. A CD-ROM and written guide on Orthoptera singing (by Mr. G. Pelletier) is available through booksellers. The annual meeting of the Dragonfly Society of America has been organized during June in New Brunswick. The fourth Annual Newfoundland Entomological weekend will be held in Terra Nova Park during June. Mr. Lloyd Hollett is still pursuing the idea of a Newfoundland insectarium; his continuing enthusiasm provides very good publicity for entomology. The entomological section of Forestry Canada is being moved from St. John's to Cornerbrook in conjunction with Sir Wilfred Grenville College.

2. Other matters

The Committee also discussed such topics as the Biological Survey Foundation (Annual General Meeting), the 1996 annual report to the Museum, general operations of the Survey Secretariat, and the availability of mapping software.

H.V. Danks
Ottawa, Ontario

PUBLICATIONS

BOOK REVIEWS

Waldbauer, G. 1996. ***Insects Through the Seasons.*** **Harvard University Press: Cambridge, Massachusetts, London, England. ISBN 0-674-45488-X, Price: $24.95**

Entomology has enjoyed a long series of talented people who have made it appealing and comprehensible to the public. "Insects Through the Seasons" should insure that Gilbert Waldbauer's name is added to that list. The development of a generation of cecropia moths from their emergence in the spring to the spinning of the next generation of cocoons in the fall forms the plot line for a discussion of the elements of insect biology. Waldbauer has made an excellent choice for the central character of his story. Cecropia is a large, showy insect that is popular with the public and his long history of research on various aspects of cecropia biology eminently qualify him to tell its story.

The first chapter sets the stage for the cecropia story by examining the changes in the pupa that have gone on during the winter and the acceleration of these changes as the spring approaches. The introduction of the main actor in the plot is supported in chapter 2 by a general discussion of the origins of insects and their place in biology. These first chapters introduce Waldbauer's principal concerns, ecology and evolution. In this book ecology provides the rationale for the examination of specific adaptations, both physiological and anatomical. Similarly

evolution, through the mechanism of natural selection, provides an explanation for the origin of these adaptations.

In keeping with this approach the first subject considered is reproduction, beginning with courtship, continuing with the production of offspring and concluding with the role of parental care. This is followed by a discussion of mortality as represented by predators and parasites. The importance of feeding in growth and survival is recognized by discussions on finding and consuming the appropriate food. The end of the summer season of activity is recognized by two chapters on the adaptations of insects to seasonal climates as our hero spins a cocoon in which to pass the winter. A final chapter sets the life of cecropia in perspective and anticipates the beginning of a new year.

Each aspect of insect biology is illuminated by an appropriate example, such as the description of a crucial experiment, an unique life history or a personal experience. Entomologists will readily identify with such stories as the one he relates about the ability of the adults of fleas to remain in their cocoons for extended periods of time. This book will appeal to a broad audience of adults with an interest in nature and natural history. It should also be useful as a reading supplement for courses in general and economic entomology where it may serve to illustrate the important role of specialized physiological and anatomical traits to the survival of insects in the field. Those who enjoy reading about insects will thank a certain grade three teacher for introducing Gilbert Waldbauer to cecropia.

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Robinson, R.A. 1996. *Return to Resistance: Breeding Crops to Reduce Pesticide Dependence.* Davis, California: agAccess, ISBN 0-932857-17-5 496 pp.. Price: $29.95US

"Return to Resistance" has the potential to become one of that select group of non-technical books, like Rachel Carson's "Silent Spring", which focus the debate over the way agriculture is practised. The thesis of this book is that, although plant breeders have been spectacularly successful in increasing the yield, enhancing the quality and improving the agronomic characteristics of crop plants, they have failed dismally in the realm of resistance to parasites: insects and pathogens. The evidence for success is the continued feeding of a massively increased (and increasing) human population. The failure lies in the ever growing dependence upon chemical pesticides with the result that environmental pollution and health problems have reached alarming proportions. In substantial detail and with well-documented examples, Robinson analyses the reason for the failure and suggests a solution that is nothing less than a radical revision of plant breeding methodology.

The current breeding methodology dates from the re-discovery of Mendel's papers on genetics in 1900. His success in providing an explanation of the behaviour of traits determined by alternative alleles at the same locus led to the subsequent emphasis in plant breeding on single genes that confer resistance to infection. This simple type of resistance, termed vertical resistance, is not present in all plants. Where it is present, it sooner or later breaks down because of variation in the parasite population. When vertical resistance fails in a genetically uniform crop the result is often a disastrous epidemic which can only be controlled by the use of chemical agents until another resistance gene can be introduced into the crop.

Robinson argues that plant breeders have systematically ignored, or perhaps been unaware of horizontal resistance, a second type based on many genes. This type of resistance has little to

do with preventing infection but limits the damage caused by parasites. When well developed it reduces the impact of parasitism without the used of chemicals. As a result of its multigenic nature this line of defence is durable and adaptive and supported by natural biological controls that, of course, tend to be disrupted by extensive chemical use.

Prior to the introduction of synthetic organic insecticides and fungicides in the period following World War II farmers depended heavily on the natural resistance of their crops to combat crop parasites. Under the conditions that existed then any crop variety that was unduly susceptible to even a single species of crop parasite could not be cultivated. The spectacular early results of synthetic organic insecticides and fungicides led to a loss of interest in breeding for resistance. However, crop parasites continued to destroy a significant fraction of agricultural produce before it could be harvested in spite of heavy and persistent application of chemical pesticides. The world-wide use of these chemicals now costs many billions of dollars each year and produces residues that are hazardous to both human health and the health of other organisms in the environment.

A major factor in the failure of chemical controls was the development resistance strains of insect pests. The same pattern appeared with the introduction of synthetic organic fungicides and antibiotics. The initial spectacular results of chemically induced parasite mortality could be countered by quite small changes in the genetic makeup of the parasite, usually changes in the predominant allele at a single genetic locus. Given the combination of short generation times, massive rates of reproduction and heavy mortality these small changes in the genetics of the parasite appeared rapidly in a process which Robinson describes as microevolution, actually simple natural selection.

The observation that some crop plant resistances, crop protection chemicals, and drugs, can be permanent, by virtue of being beyond the capacity for micro-evolutionary change of the parasite leads him to the conclusion that there is a way out of the chemical protection dilemma. Robinson argues that this is to abandon the fixation on resistance genes and select for the horizontal resistance that has actually been diminished by current plant breeding methods. He anticipates, quite correctly, that this suggestion will meet strong and influential opposition.

Plant breeding institutes, commercial producers of certified seed and the manufacturers of crop protection chemicals have a vested interest in the status quo. He notes that it is not without significance that chemical manufactures have increasingly entered into the plant breeding industry on a large scale. Horizontal resistance suffers from the same economic disadvantage as biological control—it provides no rewards for the supplier of crop protection.

The final third of the book presents in concrete form Robinson's proposals for the implementation of a solution to the resistance problem and the reader is left to decide just how practical it is. He proposes the establishment of plant breeding clubs and provides a manual for the operation of such organisations complete with details on breeding techniques. the objective would be to produce varieties that are adapted to local conditions including chemical free resistance the the parasites prevalent in the region. Local need not mean restricted to the individual farm or township but could extend over any area in which the same conditions prevail. This proposal bears some resemblance to the existing Heritage Seed Program which, however, is mainly concerned with the preservation of traditional varieties.

This book should be of particular interest to plant breeders and crop protection specialists although they may find it somewhat disturbing. There is, however, a much broader audience for whom it will provide an interesting alternate perspective on the present state of the agricultural industry. It is deliberately written to be understandable by anyone concerned with the questions of world food supply and environmental degradation and the disquieting connection between the

two. Some basic biological knowledge will be helpful but those sections that are moderately technical can be skipped without loss of the thread of the argument. As an aid to those general readers who persevere, an excellent glossary of technical terms is included.

There is one weakness in the argument that the author readily acknowledges. Since weeds are competitors of crops, not parasites, and this book is about resistance to parasitism, the extensive use of chemicals in weed control is not addressed. This aspect of the general problem must be approached through biological control, not plant breeding.

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Parker, B. L., M. Skinner and T. Lewis. (eds.). 1995. *Thrips Biology and Management.* Plenum Press, New York. 636 pp. Hardcover, $145 (U.S.). ISBN 0-306-45013-5.

Over the last decade, thrips have rapidly become very important economic pests of a wide variety of crops (greenhouse vegetables and ornamentals, orchard, forestry, and field crops). Thrips are also important vectors of plant pathogens. Some thrips species, such as *Frankliniella occidentalis* and *Thrips palmi* have become cosmopolitan in distribution in a very short time period. As a result, many people are studying the various aspects of thrips biology and management. In 1993, an international conference was held on "Towards Understanding Thrips Management." This book summarized the review papers and poster presentations that were given at Vermont. The editors have nicely integrated the review papers and posters into coherent chapters that highlight the major themes of the conference. This was not an easy task considering that there were 91 contributions from 26 countries.

The book was divided into nine chapters. The first chapter dealt with thrips/plant relationships. The emphasis in this chapter was on evolutionary relationships and on how diverse thrips species are in colonization of many different types of habitats and adapting to a variety of food sources, especially for the more economically-important species. This chapter amply pointed out how little that we really know about the taxonomy and biology of many thrips species.

The second chapter discussed pest problems in field, forest and glasshouse crops. Leigh presented a thorough discussion of the status of thrips on cotton. A collection of papers dealt with topics on economic thresholds, phenology, damage and control measures for thrips on onions, orchard crops, sugar maple, American basswood, field peppers and for crops produced in Taiwan. An informative review was also presented on the international movement, detection and quarantine of Thysanopteran pests.

The next chapter looked at thrips as vectors of plant pathogens. Several papers presented interesting findings on how thrips transmit the tomato spotted wilt virus (TSWV) and that a test has been developed that will detect which thrips are capable of transmitting the virus. A paper on western flower thrips (WFT)/TSWV host plant interactions showed that cultivars can have a significant effect on the susceptibility of plants to the virus and to feeding damage by thrips. The relationships between thrips and peanut bud necrosis virus and purple blotch disease were also presented. Evidence was presented that thrips can disseminate plant pathogenic fungi.

Chapter 4 dealt with the area of biological control agents and practices. This chapter covered a wide range of subject areas from factors that affect the choice of IPM versus chemical control programs, marketing issues for biological control agents, new biological control agents, biology and life table information of biological control agents, use of thrips as predatory control

agents for other pests to the use of entomopathogens for thrips control. Brownbridge wrote a good review on the status of entomopathogens for thrips control, particularly WFT and pear thrips.

Chapter 5 was concerned with chemical control of thrips. This section had only three articles. Two of them dealt with resistance of WFT to insecticides in California and United Kingdom, and the other with postharvest fumigation of WFT on carnations. It would have been nice if this chapter had contained some information on the development of new environmentally- and biological control-friendly chemical products. Some new developments have occurred in this area and this information would have presented a more-balanced picture for the future of chemical control of thrips.

Integrated pest management was the subject of chapter 6. The present state of pest management programs were outlined for the major pests (WFT, *T. palmi, T. tabaci* and bean thrips). Control programs were detailed for greenhouse ornamentals, citrus, field vegetables, peaches, cowpeas and avocados. It is unfortunate that nothing was included on greenhouse vegetables as WFT are a major pest and biological control is successfully being used as a main control strategy. Several papers also dealt with host plant resistance with respect to cultivar susceptibility to WFT.

General ecology and behavior of thrips were the themes for chapter 7. This section was really a catchall for papers that did not seem to fall under the headings of the other chapters. Articles were mostly concerned with the population dynamics and distribution of thrips in different habitats and geographic areas. A couple of very interesting papers were presented on the mating and alarm behavior of WFT.

Chapter 8 had just three papers that talked about the morphogenesis of immature and adult stages, embryogenesis, review of the origin and proliferation of germ cells and environmental influence of that host plants can have on the genetics of local populations of thrips. These papers gave a good overview of the present knowledge on development and genetics of thrips. Chapter 9 presented papers on field sampling and laboratory techniques. The information in this chapter and the previous one could have perhaps been integrated with other chapters as many topics were similar to papers that have been previously presented.

The book was very well indexed (by thrips species and subject). The editors have also included lists of the scientific and common names along with authorities for all thrips species that were mentioned in the book and a list of conference participants. As a reader, I find these indexes and lists invaluable if I want to quickly look up a particular species or would like to contact one of the authors for more information.

In summary, the book was well edited. There were few spelling mistakes and the information presented is the latest on what is happening with the order Thysanoptera. It would have been nice if the editors could have made the citation listings in the references more uniform, but I realize that it is difficult to edit more than 90 papers. I whole-heartily recommend this book to anyone that is interested in Thysanoptera from a pure academic to an applied viewpoint. You will not only find out the status of the more important economic pests, but also will have a contact list if you desire more specific information.

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Brown, James H. 1995. *Macroecology.* University of Chicago Press, 269 pp. $15.95 U.S., softcover.

"Macroecology" is a shiny, new term with a pleasing ring amid our fancy for global perspectives. In this book of the same name, James Brown defines the field as a search for the "big, general explanations for the structure and function of complex ecological systems" (p. 227). In reality, however, the book recounts mainly the attempts of it's author and his associates to explain patterns of distribution and abundance of the relatively small sub-set of the world's birds and mammals on the North American continent. Herps and fishes figure less prominently in the text and invertebrates hardly at all. About 70% of the figures and tables come from work of Brown's group — it is a highly personal account of an approach more broadly shared among biologists than is allowed in the book. Readers are told that the particular examples also provide a framework for interpreting more general biological patterns, that parallel reasoning applies to understanding of other taxonomic groups and that fundamental ecological processes identified in the book work with wide sweep. Entomologists are accustomed to such assertions in treatments that barely mention the most diverse creatures on the planet. For those who still believe them, *Macroecology* may be inspirational.

The recipe for Brown's style of macroecology is relatively simple. First, gather a large, wide-ranging data set, about a biological variable of interest, say, population density. Second, combine this with something else of intuitive interest that can be looked up in the library, or better yet in a computer archive — say, body mass or area of geographical range. Third, mix these variables in a data base, pour out scatter plots and inspect them for patterns. In addition to regression techniques the macroecologist uses "constraint envelopes", or outlines of the overall distribution of points from the scatter plots, to focus explicit attention on combinations of variables that are poorly represented or missing in nature. Although others have used the concept implicit in constraint envelopes, Brown's school has developed the tool especially well in relation to the fourth step in macroecological cooking. This is the double-measure of constructing and testing hypotheses that explain the broad patterns revealed by steps 1-3. The fifth step, the icing on the macroecological cake, so to speak, is to connect these big pictures to detailed snap-shots of nature at work, as provided by field experiments.

The book is rich with examples of steps 1-3 but, achieves less with respect to step 4, especially the second measure. Most disappointingly, I found that the cake had only a few dabs of the sweet icing more often promised than delivered by ecologists. Clearly, however, the future will be no sweeter if the ecologists who best understand the details of their own experimental work aren't tempted to think at larger, macroecological scales. Brown's book may encourage others to take up the torch.

I found the first two and last chapters most interesting. They clarify the macroecological approach of bringing both historical and large-scale geographical perspectives to the study of ecology. They convey Brown's enthusiasm for the approach, tracing the history of this line of thought back to origins in the work of giants in ecology like G. E. Hutchinson and R. H. MacArthur and sketching one vision of where concerted effort might lead. Brown does a nice job at showing what has been left out by our two-decade scramble to define "good" ecology as that wed to a rigorous experimental approach, or at least locally focused on issues subject to the isolation of efficient controls in tests of single-factor hypotheses. However, I found this appreciation of the shortcomings of high-profile, modern ecology contradictory to Brown's own predilection for simple, single-factor hypotheses in the macroecological context.

The remainder of the book is presented in two main layers, one dealing with spatio-temporal correlates of ecological data and a second with relationships of phylogenetic and biogeographical data. Chapters 3-8 focus on analyses of the emergent, statistical properties of data about

large numbers of vertebrate species, like those from the North American Breeding Bird Survey. Distributions of body, range and population sizes are the main foci, with most explanatory hypotheses framed in the domain of physiological ecology. I recognized two main themes, 1) that physiological and population ecologists should develop a common currency for analysis, preferably one that connects easily to energetics, and 2) that progress will come as the Gleasonian individual- or species-centered view of natural systems is reconciled with the more aggregative, community-centered views of Clemments, MacArthur and others. Most ecologists would like to see this latter paradox settled and Brown's optimism about prospects is uplifting, if not explicit about the resolution. Chapters 9-11 attempt to set the macroecological stage for the macroevolutionary play. This treatment was less detailed than I expected, given recent advances in ecological phylogenetics. At one point (pp. 190-191) Brown expresses reservations about the value of phylogenetic reconstructions, based principally on our scant success in connecting the cladistics rigorously to actual data about past environments and lineages. The last chapter before the summary is about human ecology and conservation biology. The main conclusions are 1) that the human population is the mother of all problems, and 2) that exotic species as a class are less generally ecological problems than suggested by the literature on the topic, and that we could learn much more through serious study of introduced species. All in all, I found little news in these chapters. Their principal value is as a synthetic overview of what has been produced by Brown and his students and an explanation of the scientific motivation that has driven it.

Who should read or purchase this book? I'd recommend it as supplemental summer reading for 2nd or 3rd year university students dedicated to organismic or environmental biology, or to vertebrate ecologists wondering why their rigorous experiments about specific systems seem increasingly short of the mark. Mainly to deliver its philosophical message about "forests 'n trees", the book ought to be on the shelves of any serious library that supports a community of ecologists. The modest price is commensurate with what I expect to be the book's lasting conceptual impact or usefulness as a source of reference for individual biologists. Those whose principal scientific joy is the study of insects will find little to turn their cranks in *Macroecology*.

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Hanson, Trish and E.B. Walker. *Field Guide to Common Insect Pests of Urban Trees in the Northeast.* 1996. Vermont Department of Forests, Parks and Recreation, Forest Biology Laboratory, Waterbury, Vermont 05671-0409. 87 pages, $15 US.

The stated purpose of this field guide is "...to provide tree health managers with a means for field identification of some common insect pests associated with trees in urban settings, with an emphasis on identification and the habitat needs diagnostic of each insect." To a limited degree it achieves those ends, but hardly better than other books already available, some of which are cited, because it includes pests of only 11 genera of trees. On the other hand, it consists of 11.5 x 17-cm leaflets in looseleaf format, and purchasers can obtain additions from the publisher, presumably as they are produced (price not stated).

The book has several shortcomings, most of them because of format and piecemeal publication. There are no keys to insects or their damage except the table of contents, which permits search by principal host only. Pagination is independent within ten sections which are arranged alphabetically by host, separately for conifers and hardwoods. Only insects are indexed, so that secondary host genera cannot be found unless the insect or principal host is already known. The illustrations are of necessity on the backs of relevant text rather than opposite.

Conspicuously missing are many pests, sometimes serious, at least in this northeastern

neck-of-the-woods (New Brunswick). Among the missing are spruce budworm, spruce budmoth, spruce bud midge, spruce web-spinning sawfly, birch casebearer (briefly mentioned under birch leafminer), European birch sawfly, clearwing borers in cherry. Perhaps these and significantly missing urban tree genera and species will be included in the promised additions.
Some of the leaflets could be improved. The illustrations of insects are generally well chosen to show the damage and the stages that do it. But there are omissions such as the egg masses of tent caterpillars ("early diagnosis...is a crucial step"), which we are instructed to prune off and destroy. Likewise some of the text could be improved: for example that on redheaded pine sawfly in which the management advice seems to address a plantation rather than an urban situation; that on balsam gall midge which says that eggs are laid in developing needles but on them in a figure caption; that on spider mites which fails to mention that dry hot weather favors outbreaks. Nonetheless the text is generally good although brief because that for each pest is constrained to one page.

A similar book in the same format, the 1996 *Field Guide to Managed Forests in British Columbia* by K.E. Finck et al., would have been a good model. It has the same format, but contains damage keys, a glossary, a unique (to me) host-pest index, and includes diseases, symptoms of which can sometimes be confused with insect damage. Issuing new and revised pages, as promised for the Vermont book, would obligate issuing revised keys and index.

I would hesitate to purchase this book because the information is more complete in books already on my shelf. However, it does suggest good control strategies and has a convenient portable format. If the pest problem at hand can be found in it, it promises to be a useful booklet for the "tree health managers" it addresses.

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Van Driesche , R.G. and T. S. Bellows, Jr. 1996. *Biological Control.* Chapman and Hall, N.Y.

The authors are to be commended for their ambitious effort to encompass the discipline of biological control in a single volume. Broadly-based textbooks on biological control are few in number, certainly few books on the subject are adequate as classroom texts for introductory courses. The book consists of 22 chapters organized into 6 sections. In several sections the authors introduce and explain the use of specialized terminology, an approach I find more useful than a single glossary nestled near the end of a book.

Section I contains a brief history of the subject and introduces the major players, that is, the animals, plants and pathogens of interest. Here one becomes immediately aware of the scope of this book. An introduction to antagonists of plant diseases and feral populations of pest vertebrates follows the familiar discussion of insects, their allies and weeds.

Section II consisting of four chapters reviews biological control agents in more detail following a taxonomic framework. By no means a complete taxonomic treatment, the framework does help to illustrate the large number of agents currently employed, potential agents and even provides brief descriptions of groups that should be avoided. Although I (insect pathologist) might reorganize the discriptions of insect pathogens, these were adequate.

Section III consisting of six chapters deals with biological control methodolgy. The authors claim this section is the "heart of the book" since they describe the nuts and bolts of biological control operations. Quite appropriately the first chapter addresses ways in which those natural enemies already present may be conserved. Neatly tucked into this chapter is a discus-

sion of the issues involved in the use of pesticides. A short description of "ecologically selective" means of managing pesticides is very useful. Two chapters deal with the introduction of new natural enemies, one on principles and the other, methods. Two chapters deal with augmentation; pathogens and nematodes are treated separately from parasitoids, predators and beneficial herbivores. The final chapter in this section addresses biological control of plant pathogens. It is discussed separately because of the differences in terminology and concepts. It even includes a short description of mycorrhizae fungal associates of plant roots which are thought beneficial to their plant hosts. This important component of the soil environment briefly described again brings home the point of how poorly known this area remains, a view that the authors share and mention in several places in the book.

Section IV entitled evaluation and integration cosists of two chapters. The first is a brief but reasonably thorough description of evaluation stategies. It includes both a discussion of the collection techniques employed and approaches to data analysis. Although perhaps not detailed enough for the expert this section certainly will be adequate for students. For the more motivated, references in the text provide a good entry into the literature on this subject. The second chapter briefly describes how biological control can be used in broader pest management systems. The authors discuss the challenges one can expect to encounter when trying to integrate biological control into preexisting chemically based control systems. A very useful diagram summarizes key differences between biologically and chemically based systems even within a specific component of the system. Many points made in this chapter certainly will serve as stimuli for discussion.

Section V consists of four chapters, three chapters dealing with the biology of natural enemies and the fourth discussing the concepts of population regulation theory. The biology chapters are not narrowly focused on the biology of a particular organisms which they leave to others rather they are discussions of broader aspects that are important in the interplay of natural enemy and host. For example, in the first of these chapters which deals with arthropod parasitoids and predators the authors address the complex activities involved in finding, moving between, recognizing hosts and overcoming their defenses. I was especially delighted to see a discussion of evasion of encapsulation that some parasitoids employ for successful development. The chapter on the biology of pathogens is very brief but does cover the fundamentals. The role of *Bacillus thuringiensis* is underplayed and a few comments from the authors about the benefits/risks of current use of this pathogen would of been appreciated. The chapter on weed control agents considers arthropods, fungi and fish, although fungi and fish receive minor treatment. Population regulation theory is examined to introduce the reader to the dynamics of interacting populations and the implications for biological control.

Section VI is the repository for additional information that certainly bears on biological control today and into the future. Education, government regulation and nature conservation are examined in three separate chapters. Education is the thread which ties together farmers, the public, media and policy makers and these authors emphasize its key role. The discussion is general enough that it can apply to the different jurisdictions in different countries.

The final chapter of the book looks to the future and while I agree with the sentiments expressed I think the authors should have taken this opportunity to comment on the rapidly dwindling resources in personel trained in systematics and taxonomy. In a previous chapters they do stress the critical role this expertise has played in some successful control programs.

One disappointment is the overall low quality of photographic plates. The reproduction process makes images difficult to interpret at worst and reduces their impact at best. Graphs, tables, etc. are quite acceptable. Perhaps an effort has been made to keep the costs lower and in line with student budgets ($75.00 U.S. and $110.00 Canadian).

These criticisms aside I believe this volume is a useful addition to the bookshelf of anyone even with a passing interest in biological control. For those with teaching responsibilities this volume could serve as a text for an upper level course in biological control or as a good reference for any course in which biological control is covered. In my own case I allocate 7-8 lectures within an agricultural entomology course - I have already begun to rewrite several of these lectures using this handy reference.

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Mound, L. A., and R. Marullo. 1996. *The Thrips of Central and South America: An Introduction (Insecta: Thysanoptera).* Memoirs on Entomology International. Vol. 6. Associated Publishers, Gainesville, Florida. cloth, iv + 487 pp. US $65.00.

In 1972, I spent a memorable August hiking the fog shrouded mountains of Chiapas and Oaxaca in southern Mexico with George Ball, collecting thrips while he dug, chopped, stomped and sifted for carabids. On my return to Edmonton, I prepared my specimens for study but had limited success in identifying many of them even to genus because I lacked access to an authoritatively identified collection, and had copies of few recent papers on or keys to, Mexican thrips. (At that time, Roberto Johansen of the Autonomous University of Mexico City had yet to begin describing the Mexican fauna. Also, although the late J. D. Hood of Cornell University had described some 1000 New World thrips, including many Mexican ones, most of his descriptions were unillustrated and he produced few keys to assist others in learning about them). This book would have solved many of my identification problems.

To one interested in the systematics of New World Thysanoptera, this is the single most important publication to appear since the late Lew Stannard's (1968) *The Thrips or Thysanoptera of Illinois* (Bull. Ill. Nat. Hist. Surv. 29 [4]: 215-552) since it provides, for the first time, and at an accessible price, effective access to a vast and scattered literature on Neotropical thrips (the 800 titles in its bibliography include all 176 of J. D. Hood's thrips papers).

Appearance of the book signifies fruition of a 24 month research contract to Laurence Mound from the Natural History Museum, London, (he recently retired as Keeper of Entomology there) to survey the thrips of Costa Rica. Extensive field work in that country, short visits to Panama, Jamaica, Trinidad, Colombia and Brazil and trips to or loans from the principal thrips collections of the world, showed many Costa Rican species to have broad distributions north into Mexico, east into the Caribbean and south into South America and convinced him to expand the geographical coverage of the book to the whole of the Neotropics although its emphasis remains on Costa Rica.

A concise, 29 page introduction summarizes the structure, life cycles, feeding, host associations, natural enemies, pest status, flight and dispersal, distribution, sex ratios, polymorphism, family phylogeny, and habitat associations of Neotropical thrips and provides advice on collecting them and preparing them for study. Illustrated keys for adult females (they also work reasonably well for males) are provided to 2 suborders, 7 families, 4 subfamilies and 227 genera (92 in Terebrantia and 135 in Tubulifera). One thousand four hundred and fifty two species (about 29% of the known world fauna) are treated including 3 new genera and 49 new species and 12 genus- and 48 species-group names are synonymyzed. Keys to species are provided for 71 of the best known genera: some for New World taxa as a whole, but most for the Neotropics, Central America and the West Indies, Central America or just Costa Rica. The most important and extensive of these, for most entomologists, is a key to the 74 known West Indian and Central American species of *Frankliniella*, a large, economically important genus of structurally conservative but

highly variable insects that are exceedingly difficult to identify.

Most of the book comprises a taxonomic treatment of Neotropical thrips including diagnoses of most genus- and family-group taxa, approximate number of known World and Neotropical species, the type species, author, date and source of original generic descriptions, and detailed consideration of intraspecific variation and the problems it poses for identification and classification (many earlier, nominal species were orginally described by R. S. Bagnall, J. D. Hood and D. Moulton from one or a few specimens too often collected by others and with little indication of habitat or host). A list of species is provided for each genus, including those not keyed, again for larger or smaller areas, depending on level of knowledge. Genera are listed alphabetically under family or subfamily and species under genus and, for species, include reference to the original genus in which described, the original description by author, year, source and page, the type locality and old and new synonymy (Mound examined type specimens for most keyed and for many non-keyed species and authoritatively identified specimens for most others). In better known genera, these lists are followed by a "Comments" section in which many species are further discussed and new localities indicated.

Descriptions of most new taxa are based on single or a few adults of one or both sexes and, if available, immatures, with measurements, designation of holotype, mention of other specimens examined, and comments on variation, relationships and life history. Genera in need of additional work are specified along with suggestions on how to proceed, making the book a wonderful source in which to identify research problems. Such revisional work is particularly necessary for large genera such as *Heterothrips* (Heterothripidae), *Frankliniella* (Thripidae), *Adraneothrips, Elaphrothrips, Hoplandrothrips,* and *Liothrips* (Phlaeothripidae) in which most species are known from few specimens and in which there is, undoubtably, much intraspecific variation. In preparing for this review, I used the keys to tentatively identify many of my Mexican thrips and met with substantial success. However, the keys to *Heterothirps, Adraneothrips, Hoplandrothrips* and some other large genera could not help me identify some of my specimens either because they represent undescribed or unrecorded species or unrecorded variants of known ones.

The book is clearly and concisely written, is practically free of typographical errors, is well printed on good quality paper and is strongly bound between dark green covers with gold lettering and a habitus drawing of the elegant, peanut winged thripid, *Arachisthrips millsi*. Three hundred and sixty five line drawings by Rita Marullo of the Instituto di Entomologia Agria e Forestale, Potenza, Italy, clearly illustrate characters mentioned in the keys and descriptions although some, of wings and antennae, were reduced excessively prior to printing with some of the latter lacking most sensilla. Also, the habitus drawings of dorsal and ventral aspects of a representative thripid and phlaeothripid illustrating the principal characters used in the keys (Figs. 362-365), are poorly reproduced and hard to read.

A brief discussion of the geography, physiography, climate, and vegetation zones of the Neotropical region and inclusion of maps of the areas covered showing their principal, political, physiographic and biogeographic regions, as in the late Charles Hogue's book (1993. *Latin American Insects and Entomology*. Univ. of California; Figs. 2.1 and 2.2), would greatly assist one in visualizing distributions and habitats of the species treated. However, their absence detracts little from a work that is a monument to the energy and efficiency of its authors and which is sure to stimulate increased work on the systematics and ecology of Neotropical thrips including, I hope, that by Latin American entomologists. It is a perfect example of the kind of taxonomic treatment required in the face of escalating, world-wide, habitat destruction. And the dedication is spot on!

Bruce Heming
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POSITIONS AVAILABLE

Professor and head of department: Position open for Head of the Dept. of Entomology, Kansas State University. Please request a detailed announcement from John C. Reese, Department of Entomology, Waters Hall, Kansas State University, Manhattan, KS 66506-4004; e-mail jreese@oz.oznet.ksu.edu; tel 913-532-4708; fax 913-532-6232. Review of applications will start Sept. 15. (Posted Jul. 10, 1996).

PhD study, chemical ecology/entomology: PhD research position is available at the Univ. of Neuchatel to study tritrophic level interactions between maize plants and insects. Project focuses on the plant's perspective and factors that determine its attractiveness to beneficial insects. A new aspect is to study the interactions between ancestral maize genotypes and insects and attempt to relate the findings to the interactions observed between insects and cultivated maize. Info: Ted Turlings, Institute of Zoology, University of Neuchatel, Rue Emile-Argand 11, CH-2007 Neuchatel, Switzerland; tel +41-38-232693; fax +41-38-233001; e-mail turlings@zool.unine.ch. (Posted Jul. 12, 1996).

Forest entomologist: The Kentucky Division of Forestry has a position available for a forest entomologist or forest pathologist. Applicants should have a background in either entomology or plant pathology with strong supporting course work in forestry. Salary based on experience. Information: Mark Matuszewski, State Forester; tel 502-564-4496.(Posted Jul. 16, 1996).

Household/Structural Urban Extension & Research Specialist: Available Jan. 2; 12-month tenure-track position; 75% extension, 25% research; Assistant or Associate Professor level. Person will: conduct extension and research into household/structural arthropod pest management; provide leadership in planning and implementing educational programs, including annual Pest Control Operator's School and the Master and Apprentice Termite Technician training programs; interact with faculty in other disciplines, county extension personnel, regulatory specialists, students, clientele groups, members of pest control industry, and public; Research: innovative program targeting urban pests and advising grad students. Candidates should have: PhD in entomology; graduate experience in household, industrial, institutional, or structural pest management; attracted competitive extramural funding; published in refereed and non-refereed journals. Experience with extension programs highly desirable. Salary based on qualifications and experience. Benefits include retirement plans, group hospitalization (major medical and dental), generous leave policy, and sabbatical privileges. Send CV, plan outlining proposed extension and research program, transcripts, and names, addresses and phone numbers of 3 references to Dr. Patricia A. Zungoli, Chair Search Committee, Clemson University, Entomology Department, Box 340365, Clemson, SC 29634-0365; tel 864-656-3111. Deadline Oct. 15, or until suitable candidate selected. (Posted Jul. 19, 1996).

Post-doctoral Fellowship, holly leafminer control: Two- (to 3) year project, starting Jan. 1, involves top-down and bottom-up control of holly leafminer populations using field experiments and path analysis. Required: independent worker; knowledge of experimental design and herbivore systems; be an effective writer. Send CV and 3 letters of recommendation to Buck Cornell, Department of Biology, University of Delaware, Newark, DE 19711; tel 302-831-2669; fax 302-831-2281; e-mail cornell@udel.edu. I won't return to Delaware until Sept. 7, so send application by e-mail and snail-mail. (Posted Jul. 25, 1996).

Post-doctoral Fellowship, Hymenoptera phylogeny: Post-doc research assistant position at the Natural History Museum (London) to work on the phylogeny of apocritan Hymenoptera using traditional and novel non-molecular characters and data from fossils. Begins Oct. 1 and lasts 3 years; starting salary 18,120 Pounds Sterling. Applications (by letter and CV) are invited from

post-docs preferably with experience in cladistic analysis, micro-dissection and/or electron microscopy. Info: Dr Donald Quicke, Department of Biology, Imperial College at Silwood Park, Ascot, Berks, SL5 7PY, UK; tel +44-0-1344-294238; e-mail d.quicke@ic.ac.uk. Or Dr Mike Fitton, Department of Entomology, The Natural History Museum, London, SW7 5BD, UK; tel +44-0-171-938-9446. (Posted Jul. 29, 1996).

Insect systematist: A 9-month tenured/11-month term faculty position; Associate Professor or Professor (15% teaching) level in the College of Agricultural and Environmental Sciences, and Associate Entomologist or Entomologist (85% research) in the Agricultural Experiment Station. PhD in a biological science, evidence of intellectual leadership in modern insect systematics, appropriate training and experience. Must have demonstrated world-class research program. Examples of fields considered suitable include systematics-biogeography, phylogenetics and comparative morphology. Teaching: organize and present formal undergrad and grad courses related to his/her area, contribute to courses in departmental teaching program, and supervise grad students. Research: maintain research program in systematics of any insect group (parasitic Hymenoptera preferred). Support and Facilities: funds available annually from proceeds earned by Endowed Chair corpus. Candidate expected to develop extramural sources of funding from state and federal agencies. Office and lab space provided in Bohart Museum of Entomology on UC Davis campus. Salary according to UC Faculty Pay Schedule for Associate Professor or Professor rank. Position available Jan. 1. Send letter of application, CV, brief statement of career goals for teaching and research, transcripts (if within 5 years of graduation), reprints of published scientific work, and names and addresses of 3 individuals familiar with professional accomplishments of applicant to Chair, Search Committee-Endowed Chair, Department of Entomology, University of California, Davis, CA 95616-8584. Open until filled, but applications should be submitted by Oct. 1. Employment subject to possession of US citizenship or right to work in the US. (Posted Jul. 31, 1996).

Assistant professor, vegetable IPM: Joint research position between Texas Agricultural Experiment Station (75%) and Texas Agricultural Extension Service (25%) at Weslaco, TX, part of Texas A&M University System. PhD in entomology, or related plant protection field, with strong background in IPM, pest ecology, and statistics plus a working knowledge of experimental design, computer systems, and systems research. Assignment: project to reduce the economic losses incurred in vegetable crop production due to arthropod pests. The person will: develop basic info on pest biology, damage assessment and prediction, spatial and temporal distribution of pest populations, and emerging pest control technologies; evaluate biological, chemical and cultural control methods; develop IPM tools to suppress pest populations and reduce damage; conduct sampling and dispersion studies of pest populations to develop economic thresholds, understand the ecology of pests, improve the effective use of insecticides, and reduce the risk associated with pest control decisions; evaluate insecticide resistance and efficacy; advise growers and personnel involved in crop production regarding problems relating to the IPM of arthropod pests of vegetable and cotton crops. Closing date Nov. 1, or until suitable candidate found. Info: J.M. Amador, Center Director, TAES, 2415 E. Hwy 83, Weslaco, TX 78596; e-mail j-amador@tamu.edu; fax 210-968-0641; tel 210-968-5585. (Posted Aug. 1, 1996).

Graduate opportunity: "Mechanisms of foraging behaviour by bumble bees". Research topics include: spatial cognition, foraging efficiency and nest entrance recognition; pattern recognition and floral use; motivation and individual variability; applications for crop pollination. Bilingualism an asset—Francophone students encouraged to apply. Student must arrange for funding—I can offer a graduate supplement contingent upon my continued research funding. Catherine Plowright, School of Psychology, University of Ottawa, Ottawa, Ont. K1N 6N5. Tel 613-562-5800 ext. 4849; e-mail cplowrit@aix1.uottawa.ca.

Troy Danyk, Chair
Student Affairs Committee
danyk@abrsle.agr.ca

SCHOLARSHIPS AND GRANTS

Entomological Society of Canada Graduate Research-Travel Grants Invitation for Applications

Preamble

To foster graduate education in entomology, the Entomological Society of Canada will offer two research-travel grants, awarded annually on a competitive basis. The intent of these grants is to help students increase the scope of the graduate training. These grants, up to a maximum of $2,000, will provide an opportunity for students to undertake a research project or to do course work pertinent to their thesis subject that could not be carried out at their own institution.

Eligibility

To be eligible, a student must:

1) be enrolled as a full-time graduate student
2) be an active member of the Entomological Society of Canada

Format of the Application Form

The application form will be in the format of a grant proposal, where the applicant will provide the following information: 1) the subject of the thesis; 2) a pertinent review of the literature in the field; 3) a concise presentation of the status of the ongoing thesis research; 4) a description of the research or course work to be undertaken, clearly indicating a) the relevance to the overall goal of the thesis, b) an explanation of why such work cannot be carried out at the student's own university and c) the justification of the site where the research/course work will be carried out; 5) a budget for the proposed project; 6) anticipated dates of travel and date on which grant money is needed.

The application form should also be accompanied by: 1) an up-to-date C.V.; 2) a supporting letter from the senior advisor; 3) When appropriate, a support letter from the scientist or Department Head at the institution where the applicant wishes to go.

Evaluation Procedure

The scientific merit of each application will be evaluated by a committee that has the option of sending specific projects out for external review by experts in the field. A constructive written report, underlining the positive and negative aspects of the proposal, will be returned to the applicant.

Timetable and Application Procedure

Application forms, which may be obtained from the Secretary of the Society, must be completed and returned to the Secretary of the Society by **15, January 1996**. The committee will evaluate all applications by 30 April, 1996 and determine if, and to whom, grants will be awarded. The successful applicants will be informed immediately, thereby providing sufficient time for students wishing to start in the fall to make necessary arrangements. Grants must be used in the 12 months following the award.

Recipients must provide a short final report, as well as a detailed list of expenses, in the three months that follow the trip. Any money not spent must be returned to the Society.

Volume 28 (3), Sept - sept, 1996

La Société d'entomologie du Canada Allocations de Voyage pour Étudiants Gradués
Appels pour Allocations

Préambule

Afin the promouvoir les tudes graduées en entomologie, la Société d'Entomologie du Canada offrira deux bourses de voyage associées à la recherche. Celles-ci seront décernées annuellement sur une base compétitive. Le but de ces bourses est de permettre aux étudiants gradués d'élargir les horizons de leur formation. Les bourses, d'une valeur maximale de $2,000 permettront à des étudiants de réaliser un projet de recherche, ou de suivre des cours pertinents à leur sujet de thèse qui ne peuvent être entrepris dans leur propre institution.

Éligibilité

Afin d'être éligible, l'étudiant doit:

1) être inscrit à temps plein comme étudiant gradué
2) être un membre actif de la Société d'Entomologie du Canada

Format du Formulaire de Demande

Le formulaire de demande sera dans le style d'une demande d'octroi et l'étudiant devra fournir les renseignements suivants: 1) le sujet de la thèse; 2) une présentation de la littérature pertinente au domaine d'étude; 3) une présentation concise du statut du projet de recherche en cours; 4) une description de la recherche ou des cours qui seront entrepris, indiquant clairement a) la pertinence des objectifs généraux de la thèse, b) les raisons pour lesquelles ce travail ne peut être entrepris à l'université où l'étudiant est inscrit, et c) une justification concernant le choix de l'endroit où la recherche/les cours seront entrepris; 5) un budget pour le projet proposé; 6) dates prévues pour le voyage et date pour laquelle la bourse sera requise.

Le demande devra aussi être accompagnée: 1) d'un C.V. complet mis-à-jour; 2) d'une lettre de recommendation du directeur de thèse; et 3) lorsque convenable, une lettre d'appui d'un administrateur d l'institution que le candidat désire fréquenter.

Évaluation

Le valeur scientifique de chaque demande sera évaluée par un comité qui aura l'option d'envoyer des demandes spécifiques pour évaluation par un lecteur externe, expert dans le domaine. Un rapport écrit, contenant une critique constructive, faisant ressortir les aspects positifs et négatifs de la demande, sera retourné à chaque candidat.

Échéances et Procédures

Les formulaires de demande, qui peuvent être obtenus du Secrétaire de la Société, doivent être remplis et retournes pour **le 15 janvier 1996** au Secrtaire de la Société. Le comité évaluera toutes les demandes pour le 30 avril 1996 et déterminera si, et à qui, les bourses seront décernées. Les candidats choisis seront contactés immédiatement, cela afin d'allouer suffisamment de temps pour les préparatifs nécessaires à un départ possible à l'automne. La bourse doit être utilisée dans les 12 mois suivant l'octroi.

Les récipiendaires devront préparer un court rapport final, en plus d'une liste détaillée de leurs dépenses, dans les trois mois suivant le voyage. Tout argent non dépensé devra être remis à la Société.

ENTOMOLOGICAL SOCIETY OF CANADA
LA SOCIÉTÉ D'ENTOMOLOGIE DU CANADA

393 Winston Ave., Ottawa, Ontario K2A 1Y8

Application for membership - (new members only)
Demande d'adhésion (nouveaux membres seulement)

Name and Address (please print):
Nom et Adresse (lettres moulées):

telephone (bus.) / téléphone (au travail):

Fax:

Electronic mail address / Adresse electronique:

Keywords describing interest (up to six):
Décrivez vos intérêts en utilisant jusqu'à six mots clés.

Membership is a personal affiliation; publications are the personal property of the indivudal member.
Cotisation est une affiliation personnelle; publications payees ici appartient a l'individu

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Endorsement/Signature du professeur .....

Note: Current members of the ESC who have retired from active employment may relinquish active membership and become emeritus members; eligible members please check the appropriate box. Emeritus members must return their renewal form each year in order to remain members. / A notez: Les membres de la SEC qui ont pris leur retraite peuvent abandonner leur adhésion et devenir membres émeritès; les membres qui sont éligibles dolvent 'indiquer dans la case appropriée. Veuillez noter que les membres émerités dolvent renouveler leur abonnement à chaque année afin de demeurer membres.

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