

ICN-6

INSECT COLLECTION NEWS • NO. 6 • JULY 1991

INTRODUCTION

We are pleased to announce that the number of ICN regional co-editors continues to grow. Robert Anderson of the Canadian Museum of Nature, Ottawa, has volunteered to help coordinate entomological news from Canada. In this issue Bob and Francois Genier contribute a review of the Canadian Museum of Nature Insect Collection. Jack Schuster (Universidad del Valle de Guatemala) has agreed to take on similar responsibilities for news from Guatemala and will help promote communication from adjacent countries (we need other volunteers from Central America). For ICN-6, Jack has contributed a valuable article on collecting permits and regulations in Guatemala. We are pleased to note that Vincent Razafimahatratra (Universite de Madagascar) has most recently come on board and will contribute news from Madagascar for ICN-7. They all join Laurence Mound (for United Kingdom) and Ebbe Nielsen (for Australasia) in our attempt to promote informal global communication relating to entomological collections and associated research activities. While ICN is already international in distribution and involvement, it has a long way to go before it can be considered truly international. If you value what ICN attempts to be ... please offer suggestions for improvement, articles for distribution, and better yet, volunteer to be a regional co-editor and help promote local communication that can be passed on to ICN for general distribution.

In ICN-6, Neal Evenhuis, who in real life is a Diptera systematist at the Bishop Museum, Honolulu, continues his tenacious and noble

search for the elusive FAX. He started with "Just the FAX Ma'am" (ICN-2), continued the hunt with "More True FAX" (ICN-3), and herein contributes the "International Biological FAX Directory." Neal kindly sent us a copy of this a few months ago for our own use. Because of its comprehensiveness, i.e., size, we did not intend to distribute it via ICN. However, it has proved to be so useful that we felt compelled to share it with the rest of the entomological community. Please send additions, corrections and updates to Neal; they will be added to ICN-7.

We hope to distribute ICN-7 in November, 1991. Please contribute news items as soon as possible. You can direct communications to the editors or regional co-editors.

ENTOMOLOGY COLLECTIONS NETWORK (ECN) MEETS

Introduction

Scott E. Miller
Department of Entomology
P.O. Box 19000-A
Bishop Museum
Honolulu, Hawaii 96817-0916

The Entomology Collections Network (ECN), an informal organization of entomological collections, held its second regular meeting November 30 and December 1, 1990, at Louisiana State University. The meeting was attended by about 50 people representing some 40 institutions. ECN was founded in 1989 in response to growing needs for coordination and cooperation among entomological collections.

The meeting focused on two areas: national agendas for entomology collections and data standards. The national agendas discussion centered on four topics: strength from diversity, roles of science and service, opportunities for networks and cooperation, and the roles of small institutional collections. A series of position papers was issued in Insect Collection News 5 (November 1990) and summaries of the discussions follow.

A data standards committee presented their draft report for discussion. The draft had been mailed along with Insect Collection News 5. The final version, with only minor changes from that previously distributed, is available on request.

The new Steering Committee for 1991 is Richard L. Brown (Mississippi State University), Ronald Hellenthal (Notre Dame University), Margaret Thayer (Field Museum) and Scott Miller (Bishop Museum), who Chairs the 1991-1992 Committee. The minutes of the business meeting follow the workshop discussion summaries below.

Among items on the ECN agenda for 1991 are continued development and testing of data standards, development and testing of cooperative networks for specimen processing, and organization of the next ECN meeting. The next meeting will be held immediately before the Entomological Society of America meeting in Reno, 7-8 December. The program is still being developed. Contact Scott Miller for updates and additional information.

INSECT COLLECTION NEWS

Editors:

Ronald J. McGinley, Department of Entomology
National Museum of Natural History
Smithsonian Institution, Washington, D.C. 20560
FAX: 202-786-2894
BITNET: MNHEN011@SIIVM

Douglass R. Miller
Systematic Entomology Laboratory, USDA
Beltsville, Maryland 20705
FAX: 301-344-5482

Regional co-editors:

Robert Anderson, Entomology Section
Canadian Museum of Nature
P.O. Box 3443, Station D, Ottawa, Ontario K1P 6P4
CANADA
FAX: 613-954-6439

Laurence Mound, Department of Entomology
The Natural History Museum
Cromwell Road, London SW7 5BD
UNITED KINGDOM
FAX: 071-938-8937

Ebbe S. Nielsen, Division of Entomology, CSIRO
GPO Box 1700, Canberra, ACT 2601
AUSTRALIA
FAX: 06-246-4264

Vincent Razafimahatratra
Laboratoire de Zoologie et Biologie General
Universite de Madagascar
Tanananarive B. P. 906, MADAGASCAR

Jack Schuster, Head, Systematic Entomology Lab
Universidad del Valle de Guatemala, Apartado 82
Guatemala, GUATEMALA

SUBMISSION OF CONTRIBUTIONS:

News items of interest to the collection-based entomological community can be submitted for ICN distribution at any time; send communications to the editor or appropriate co-editors. ICN is intended to complement the articles of more general interest distributed by the Association of Systematics Collections. The ICN emphasis is on informal communication and dialogue; it is not an outlet for communications more appropriately recorded in professional journals.

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ECN Discussion Group Summary: HOW TO GAIN STRENGTH FROM DIVERSITY

Margaret K. Thayer
Department of Entomology
The Field Museum of Natural History
Roosevelt Road at Lakeshore Dr.
Chicago, Illinois 60605

Systematic institutions have a wide range of missions, varying in importance from institution to institution. These include:

- Research of various kinds, such as: documenting biodiversity through monographs, faunal surveys and identification manuals; biogeographic studies; advances in systematic theory; comparative morphology
- Establishing and maintaining collections and associated data, including voucher specimens
- Training — both of systematists and systematic training for non-systematists
- Providing identifications and information to extension agencies, departments of agriculture or health, and the public
- Promoting conservation
- Public education via exhibits and talks concerning entomology, concepts of systematics, and the importance of collections

In many cases, the clientele for these activities (e.g., government agencies, conservation organizations) is also a potential source of external support, either on a program basis (contracts or grants for manuals or surveys) or on a fee-for-service basis (identifications, sales of "product" — manuals, etc.). Additional sources for some activities include NSF and other agencies whose mission is to support such functions; professional societies; private foundations; and volunteers/private individuals.

Recommended action points for individuals and/or their institutions are:

- Urge own institutions to support The Association of Systematic Collections (ASC) more generously — ASC is the major federal lobbyist for systematics collections
- Coordinate state-level action for lobbying (possibly through ASC

to some extent)

- Increase communication to avoid duplication of effort
- Consider joint projects/proposals to improve efficiency
- Improve institutions' core support as means to increase leverage for external funding
- Educate community re: NSF review process via ICN article [from NSF merit review document]
- Urge change in editorial policy of journals to require evidence of deposition of voucher specimens as condition of publication

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ECN Discussion Group Summary: COLLECTION NETWORKS

Douglass R. Miller
Systematic Entomology Laboratory, USDA
Beltsville, Maryland 20705

- Recommend that entomological collections define their role(s) within the framework of systematics as the basis for cooperation
- Specifically recommend evaluation of "A Network and Tracking System for Entomology" (ANTSE) as a specimen sorting and preparation system
- Specifically recommend long-term loans, block transfers as exchanges, and off-site collection improvement programs
- Recommend adoption of a common language and protocol for electronic exchange of information
- Recommend adoption of BITNET as the primary mechanism for mass electronic communication
- Recommend adoption of ICN as a primary mechanism for mass written communication
- Recognize the critical need for a directory of entomological systematists to the extent that a working list be developed immediately
- Recommend a series of training workshops for collections management that will facilitate information and specimen exchange within the network
- Recognize the need for dynamic spokesperson(s) for entomological systematics

**ECN Discussion Group Summary:
THE ROLE OF SMALL SYSTEMATIC
INSTITUTIONS**

Richard L. Brown
Department of Entomology
Drawer EM
Mississippi State University
Mississippi State MS 39762

Steven A. Marshall
Environmental Biology Department
University of Guelph
Guelph, Ontario N1G 2W1
CANADA

**MISSION OF SYSTEMATIC
ENTOMOLOGY:**

The mission of Systematic Entomology is to provide a foundation for understanding biodiversity. Intrinsic to this mission is the collection and preservation of arthropods and the documentation and analysis of data. It is recognized that the mission involves communication and cooperation, public relations, and integration of science and society.

**MISSIONS OF THE SMALL
COLLECTION:**

Small collections should integrate their missions with those of the institution and department in which they are located. Thus, the mission for a small collection at a Land Grant University may be expected to differ from that of a small collection at a private institution. Small collections should work with other collections in their state to minimize duplication of effort. Small collections should emphasize the state and regional fauna, especially in threatened habitats, and should serve as repositories for voucher specimens. Small collections should have a significant role in public education and graduate training in collections management, and they should serve as local centers for systematics and systematic issues. Small collections should network with regional, national, and international collections.

**IDENTITY OF COLLECTION AND
COLLECTION STAFF:**

The ownership of the small collection should be defined relative to the curator, department, and institution. As the collection is a permanent resource and the collection staff are temporary resources, the collection program and staff research programs should have separate identities. It is recognized that a collection may become well recognized because of the holdings obtained through the curator's research. However, funding for the collection program and research program should be separated. The collection should maintain an identity that reflects taxonomic and regional specialization.

**SMALL COLLECTIONS AND HIGHER
ADMINISTRATION:**

Curators and systematic entomologists associated with small collections should understand their administrator's priorities. The collection program should enhance the image of the administrator and institution and should increase administrative budgets through overhead dollars that are obtained by grants. Higher administrations should be best convinced of the importance of entomological collections from external influence, such as the public and researchers/curators at other institutions, rather than directly from the curator. The curator and systematists associated with small collections should learn how to make "sound bites" for television and news media, and such public statements should acknowledge higher administrators whenever appropriate. Small collections should have formal, legally binding agreements with larger collections to make administrators aware of the importance and interrelationships of systematic collections. The use of the collection in support of service, research, and teaching and the estimated replacement value in dollars of the collection should be documented for the administrator. The small collec-

tion should show productivity in publications, grants, and graduate students.

**INCREASING FUNDS AND
BUILDING LONG-TERM STABILITY:**

The small collection should develop cooperative ties between departments and disciplines to circumvent negative action from a single administration. For example, collections associated with the departments of entomology in divisions of agriculture should establish relationships with departments of biology or university libraries. Curators should exercise political and business acumen. Endowments should be established with university development foundations. Separate funds should be established for the various activities of the collection, e.g., collecting, equipment, and curatorial support.

Federal and state regulations concerning collections should be followed. Permits for collecting in national parks may require that specimens be maintained in proper condition or may state that the specimens are on long-term loan from the National Park Service. The Sundry Civil Act of 1880 states that all collections of natural history objects made by any party for any federal agency shall be offered for deposit in the National Museum of Natural History, Smithsonian Institution when such collections are no longer needed for research. Federal and state agencies that grant research funds should require deposition of voucher material whenever appropriate. Evaluation of donated collections for income tax deductions carries a commitment to the donor and the Internal Revenue Service to maintain the donation for the period during which the donor might be audited.

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**ECN Discussion Group Summary:
SUMMARY REPORT OF ECN
WORKSHOP:
INTERACTIONS OF SCIENCE AND
SERVICE:**

James S. Ashe
Snow Entomological Museum
Snow Hall, University of Kansas
Lawrence, KS 66045-2119

S. J. Weller
Dept. of Entomology
Louisiana State University
Baton Rouge, LA 70803-1710.

The goal of this discussion group was to determine how, given the different missions of our institutions, we can all work together toward common needs of entomological systematics. The group focused on the often negative interactions among systematic entomologists over the science and service issue. Having defined the root of the problem, our group composed a list of recommended actions to alleviate the tension between parties representing the extremes. The most important action is to educate those in entomology and biology in general, concerning our perceived role. The present climate is one of polarization between science and service. This polarization occurs at both a personal and professional level. Individuals have to budget time between their research and service roles. For example, the overwhelming identification load (D. Blocker, ICN 5:6) was identified as a major time drain of researchers. Professionally, our field of systematic entomology is often viewed in a handmaiden role by other entomologists. Non-entomological systematists view us as being old-fashioned intellectually, in that we are still struggling with the species diversity and have not progressed beyond the descriptive stage.

Our group began by listing service and science items separately, and quickly concluded that the two cannot be separated. Systematics is a science concerned with natural diversity—its description, origin, maintenance and historical components. There is a synergistic inter-

action in that research provides service opportunities, and service provides new questions and information for the systematist (Fig. 1). We concluded that it is the relative roles of science and service that cause the erosion of systematic entomology within the biological community. When service responsibilities preclude the ability to conduct research, an antagonistic relationship develops.

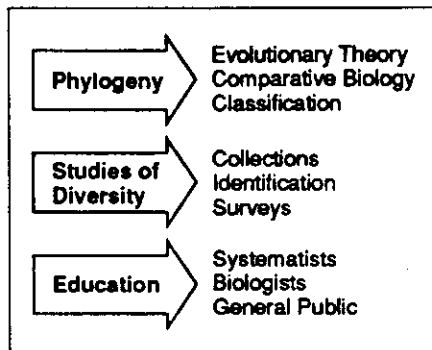


Figure 1. Scientific research providing services

Certain aspects of systematic entomology promote a positive image. These include the study of phylogeny, particularly cladistic studies. Also, the provision of identifications and maintenance of collections promote a positive image among other entomologists. Research projects make available distributional information, life history and other biological information. Finally, resultant classifications from systematic studies were generally viewed as important.

Surprisingly, the positive aspects of systematic entomology could become negative. Many perceive systematic entomology as little more than stamp collecting (collections) and cataloging (identifications, classifications). Systematists were caricatures isolated, ivory tower individuals who failed to communicate and cooperate both within and between disciplines. Our discussion group concluded that we should accent our positive image and address our negative image mainly through education.

Education is necessary at several levels from colleagues and ad-

ministrators to the general public. Our group recommends that individually and through organizations such as museums and ASC we focus on two areas (Fig. 2): 1. education and cooperation; 2. enhanced service. Under education and cooperation, we identified three levels that must be addressed. First, systematic entomologists must change the way that they interact with colleagues. In particular, they must demonstrate that their science is critical to the resolution of questions in other fields. Collaborative projects is a means of enhancing communication between us and colleagues. Systematic entomologists also need to be much more effective in expressing the scientific value and importance of collections as "libraries of diversity." We should also support the requirement of voucher specimens for non-systematic studies (e.g., ecological), and support the accompanying requirement of funding from colleagues to identify and maintain their vouchers. This is critical given the expense of maintaining collections and administrators' need to balance budgets by eliminating costly items.

Education and Cooperation
Colleagues and Administrators
Next Generation
General Public

Education and Cooperation
Dissemination of Information
— keys, handbooks

Figure 2. Recommendations to enhance the image of systematic entomology

A second level of education is the next generation. From public school to graduate education, systematists must effectively articulate the value and role of systematics in the biological sciences. This will require that we change isolationist attitudes and provide this information to various communities in an appropriate and digestible manner. Those at universities must train

graduate students to be more articulate at conveying the role of systematics in biology. Those at museums must interface with public schools and the general public more effectively.

Public education through the general media was identified as a third area of need. Systematists must more effectively articulate the scientific importance of systematics and the unique nature and importance of natural history collections to the public. Media services (newspaper, radio, television) provide a means of communicating with the general public. The role of the Systematic Entomology Laboratory (USDA) in educating the public concerning the 17-year cicada was mentioned as a positive interaction and model for others. Popular articles in local newspapers and magazines also provide excellent and virtually untapped opportunities to change the public attitude towards insects and systematics.

Service at all levels, from published studies in scientific journals to responding to public questions enhances the image of systematists. Systematists should be encouraged to provide keys, handbooks and other services that enhances our visibility and importance as a science. It was mentioned that any interested amateur can identify a local bird, but few will be able to identify their insects easily. By increasing the number of (quality) keys and handbooks, we will decrease our individual identification loads. Given that identification loads were constantly mentioned as detracting from research time, identification materials should be a priority issue.

To summarize, systematic entomology is a field wherein science and service cannot be separated. Opportunities for quality service result directly from our research. Service at all levels provides a unique opportunity to enhance the profile of systematic entomology as a science. Finally, education is needed to dispel negative images of systematic entomology. Each systematist must evaluate the level at

which he or she can most effectively contribute to promoting our science.

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MINUTES OF THE BUSINESS MEETING OF THE ENTOMOLOGICAL COLLECTIONS NETWORK

Ronald A. Hellenthal
Department of Biology
University of Notre Dame
Notre Dame, Indiana 46556

The Business Meeting of the Entomological Collections Network was chaired by K. C. Kim. Joan Chapin, local arrangements chairman, indicated that 48 individuals had registered for and participated in first annual ECN meeting and workshop.

Scott Miller proposed a resolution endorsing the Association of Systematics Collections (ASC) and encouraging its support by the entomological community. He indicated that the ASC had been instrumental in representing the interests of entomological collections to Congress. The resolution was seconded and approved unanimously. The text of the resolution is as follows:

WHEREAS, the activities of the Association of Systematics Collections (ASC) are vital to the health and development of systematic entomology collections resources, and

WHEREAS, entomological collections are vital to diverse aspects of the science of entomology in general,

BE IT RESOLVED that the Entomology Collections Network supports the ASC and encourages all appropriate institutions and professional groups to be members of and support ASC.

Scott Miller indicated that a summary of the meeting sessions on national agendas would appear in the next issue of Insect Collection News [Included herein].

F. Christian Thompson asked for endorsement of the Conclusions and Recommendations section of the draft report on "Automatic Data Processing for Systematic Entomology: Promises and Problems" distributed at the meeting. He read this section of the report in the form of a resolution. This resolution was seconded and approved unanimously. The text of the resolution is as follows:

WHEREAS, data standards are essential for efficient handling and sharing of systematic data, and

WHEREAS, a single comprehensive view of systematic data can support the needs of all users, and

WHEREAS, a relational model is the proper context in which to express this view of systematic data, and

WHEREAS, biosystematic information and its underlying sources (collections and literature) are important,

BE IT RESOLVED that the Entomological Collections Network:

- (1) endorses the report on Automatic Data Processing (ADP) for Systematic Entomology as a working draft from which a final draft can be derived; and
- (2) recommends that the working committee on ADP standards be made permanent and that additional members be solicited so that the standards may evolve to meet the changing needs of the community;
- (3) recommends that endorsement of these data standards be sought from the Systematic Resources Committee of the Entomological Society of America;
- (4) endorses the initiative of the Association of Systematics Collections to develop broader standards for systematics as a whole and appoints Dr. G. R. Noonan as our representative to the ASC task

force on computerization and networking of natural history collections; and

- (5) supports this data standardization process and its implementation in useful programs for systematics from funding agencies.

F. Christian Thompson said that the Automatic Data Processing Group would accept additional comments and suggestions on the draft report until 31 December 1990, and then would publish the report as a "Working Draft." Copies of the final version, only minor typographic corrections being made, are available directly from F. Christian Thompson, the coordinator of the report.

K. C. Kim indicated that the steering committee had discussed whether a constitution and bylaws should be developed for the ECN, but that this was not seen as advantageous for the present. The next meeting of the ECN will be held at Reno, Nevada, during the Friday evening through Sunday noon prior to the next annual meeting of the Entomological Society of America. The specific agenda for the next meeting will be developed by the next ECN steering committee. K. C. Kim said that the current ECN steering committee had recommended that two of its members be replaced by election effective at the end of this meeting and that the other two members remain on the steering committee for an additional year of continuity. He indicated that he and F. Christian Thompson would step down and that Scott Miller and Ronald Hellenthal had agreed to remain on the ECN steering committee for an additional year. Richard L. Brown (Mississippi State University), and Margaret Thayer (Field Museum of Natural History) were nominated by the steering committee. Additional nominations were solicited from the floor but none were received. Richard L. Brown and Margaret Thayer were elected to the ECN steering committee for terms of two years each. The other candidates were thanked

for their willingness to serve the group. Scott Miller will serve as Chairman of the Steering Committee.

Scott Miller expressed the thanks of the group to K. C. Kim for his efforts in founding the ECN, to Joan Chapin for serving and local arrangements chairman for the LSU meeting, to J. Steven Ashe for his help in developing the ECN program for this meeting, and to all those individuals and institutions whose dedicated efforts had made this ECN meeting a success.

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THE ARTHROPOD SYSTEMATICS AGENDA

Quentin D. Wheeler
Department of Entomology
Comstock Hall
Cornell University
Ithaca, New York 14853-0999

Norman I. Platnick and
Randall T. Schuh
Department of Entomology
American Museum of Natural History
Central Park West at 79th Street
New York, New York 10024

We are concerned that in the absence of a clearly articulated statement of the objectives of the arthropod systematics community, that limited resources may be committed in a manner inconsistent with such priorities. One example is computerization of existing entomological and arthropod collections. Given unlimited resources, this would be a worthy objective. However, in light of the urgent need for other kinds of support we believe that such expenditures of time and money are today inappropriate.

What are the ranked priorities for the arthropod systematics community? And which of them do we regard as "urgent", and why?

Several of the following priorities we regard as equal in importance, and as inter-related such that success in achieving one may depend in part on success in others. That being said, we would rank - beginning with the highest priority items - the following needs for the arthropod systematics community.

1. Support for research on phylogenetic relationships and phylogenetic classifications. Under such research support should be included phylogenetic analyses at all taxonomic levels above species, monography, and revisional taxonomy. Funds are needed in this regard for field and museum research, publication costs, etc.

2. Inventory of the insect fauna. We regard this priority to consist of targeted inventory work on the diversity of insects at all taxonomic levels at and above the species. Such work should be coordinated with the goals of sampling by population biologists and conservation biologists who need information at a lower biological level. Inventories should be research problem oriented, and involve, where appropriate, the cooperation of entomologists and arthropodologists with differing expertise, methods, and taxonomic interests. Priorities for inventory work should be based on considerations that include the phylogenetic interest of the taxa, the taxonomic status of taxa, the geographic regions involved, and patterns and rates of habitat degradation.

3. Support for Training. Funds are badly needed to support graduate students and postdocs working on arthropod systematics. We are currently turning excellent students away from a joint graduate program of the American Museum of Natural History and Cornell University because of restrictions on funds to support students. Given the current need for expertise on arthropod taxa and rates of species extinction, lack of stipends for students and postdocs should not be the limiting factor.

4. Support is needed to prepare and sort priority specimens as they are collected, and to remove existing museum backlogs in a directed way.

5. Facilities. Funds are needed now and will be increasingly needed to expand and modernize both museum and university systematics resources. This includes climate controlled, efficient collection storage spaces and it includes the equipment and facilities necessary for contemporary graduate training and research in systematics. Because the insect fauna for many microhabitats and geographic regions can only be inventoried during a relatively constrained window of time, great emphasis must be placed on the physical housing and conservation of insect and arthropod collections immediately and well into the next century.

6. Computerization. Modern computing equipment is necessary for systematic research and for curatorial activities. For collections management, it is most important to utilize computers to produce labels, track correspondence, and increase the efficiency of records-keeping, procurement of supplies, and so forth. As data is entered for the purpose of labeling new accessions, this data could be captured in a database. However, given the enormous needs in the area of research, training, and inventory, it is inadvisable to place a high priority or commit significant levels of support to efforts to simply catalog existing collections at the specimen level. It is not our position that this work should not be done. Our argument is, stated simply, that this work is a much lower priority than many others for which we have grossly inadequate support.

We believe the adoption of these priorities is of immediate and long range importance. It is of immediate importance because of the projected rate of species extinctions and because of the need for credible phylogenetic hypotheses in order to interpret all biological research in a truly evolutionary framework. And

it is of long range importance because the worth of systematic biology rests on what it generates. We suggest that its primary product consists of a conceptual framework within which all comparative information can be interpreted in a meaningful and predictive fashion. We suggest that inventory efforts are urgent due to patterns of habitat degradation, and because such work provides the raw materials for systematic research.

Ironically, just as our theories and methods have armed us to provide the conceptual framework essential to biology, we are faced with aging equipment, inadequate space and personnel, declining numbers of systematists, and pressures to accelerate the process of collecting, describing and analyzing arthropods. We suggest that all available resources be directed to these problems in a ranked, prioritized order. Until resources available to us exceed those necessary to meet our first objectives, we believe it is unwise to commit them to items of lower priority.

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**ENTOMOLOGICAL SYSTEMATICS
IN AUSTRALIA:
FUTURE DIRECTIONS
INTRODUCTORY TALK AT THE
ENTOMOLOGICAL SOCIETY OF
AUSTRALIA, JULY, 1990**

M. J. Whitten
Chief, Division of Entomology
CSIRO, GPO Box 1700
Canberra, ACT 2601, AUSTRALIA
FAX: (062)470217

I suppose I could be honest and say I didn't choose the title for this homily. It must have been done by a taxonomist - because it presupposes for taxonomy, and for taxonomists, that there is a future.

We can speculate on where taxonomy will be in five-ten years time and beyond:

- Whether taxonomists will increase or decrease in numbers?
- What groups they will be studying?
- Will the focus of the work be alpha taxonomy or phylogenetic studies, inventory preparations, economic or conservation-oriented?
- Whether they will lead the debate and take the initiative, or whether they will be service units for economic entomology or environmental studies?
- And so on.

Now we can ask two questions:

- Where will taxonomists be with regard to these issues in five-ten years?
- Where should they be with regard to these issues in five-ten years?

My answer is simply this - it will depend, not on politicians, not on senior bureaucrats or science administrators. It will depend on taxonomists themselves. They cannot afford to be the gauche Malcolm's of the research world, or the reticent scholars in the back rooms of the Museums, or the lucky Jim's of the University system. They have got to take the ball and run with it - if they don't, they will be the forgotten tribe - and the rest of us and the community at large will be the poorer for it. I remember early in the 80's when the funding cuts to CSIRO were beginning to bite deeply, a senior ecologist said to me, "If we are forced to reduce from seven Sections to one Section in the Division of Entomology, that one Section should be the taxonomy Section." While that view is not shared with equal enthusiasm by all entomologists, nevertheless Taxonomy holds a special place in the minds of most entomologists who have a well developed interest in economic and environmental aspects of entomology. In a sense, then, I am speaking to a committed and sympathetic audience when I talk about the future of taxonomy. Nevertheless, we do have to look critically

at where insect taxonomy stands today, where we think it will be in five years, and what steps we might contemplate will be necessary for taxonomy to play its legitimate role in at least four areas, over the coming decades:

- Contribution to science and fundamental knowledge
- Economic well-being
Australians (and others)
- Management and conservation of our environment, especially in the fields of restoration ecology, conservation biology, and environmental planning and management
- Understanding, appreciation and enjoyment of our native flora and fauna

Many of these elements were featured in Tim New's excellent Presidential Address to the Society yesterday on what to conserve and why. Tim's perspective presupposes the existence of a strong taxonomic capability in Australia.

The Science of Systematics and Taxonomy

Firstly, I would like to make a few observations about the changing importance of various tools or disciplines of science which are likely to be used by taxonomists, or in taxonomy in the coming years. In particular, I would like to say some things about molecular biology and information technology, as a significant shift is likely to be associated with these two disciplines. I know it is presumptuous for an out-of-condition geneticist to do so, nevertheless I will!

Molecular Biology

Biochemical (via electrophoresis and allozyme analyses) and immunological techniques became popular in the late 60's - but didn't have the pervasive impact that some anticipated. They were particularly helpful with refractory cryptic species, where traditional morphological approaches had faltered, and with phylogenetic studies, and

helped with quantification of concepts like genetic distance. However, with recent advances in our ability to analyse DNA, important opportunities emerge. Even the crudest method of DNA ANALYSIS - DNA/DNA hybridisation has produced some surprising results. With some recent advances in the technology of direct DNA sequencing, especially with one new technique, the polymerase chain reaction (PCR), we can expect to see, over the next five years, a practical ability to sequence lengths of DNA, say up to 200 base pairs, from individuals whose relationship we might wish to determine. At least three research groups in Australia and probably more, have developed a capability to use modern molecular techniques including PCR, to conduct such analyses amongst insects.

To fully exploit these advances, taxonomists and molecular biologists need to collaborate: taxonomists need a basic level of literacy in molecular biology, and molecular biologists need to acquire an interest in the questions asked by taxonomists. The availability of so many new characters places new demands on software and methods available for phylogenetic analysis for the taxonomists to be able to optimally handle the type of data capable of being generated by the molecular biologist. The theory and practice of molecular taxonomy poses some challenges and great opportunities. Nevertheless, it will always remain one tool of taxonomy - and while vision remains a dominant sensory perception of humans - morphology and its analysis will reign supreme for identification whether by the professional taxonomist, applied entomologist, naturalist or occupier of Burke's backyard.

Information Technology

Taxonomists are in the information business and, whether they like it or not, the future of taxonomy is very much coupled with the future of Information Technology. I would concede that

we can survive without molecular biology - but we cannot survive without becoming an integral part of Information Technology (IT). This we can consider at three levels:

- IT as a tool in systematic and taxonomic research
- As a modern tool in collection management
- As a means of conveying information to the clients of the taxonomist - applied entomologists, ecologists, land managers and other professionals, to the amateur naturalist, and indeed to the wider community.

Australia is a world leader in the development and publication of software, used for the storage and analysis of taxonomic data and the generation of keys, thanks to the pioneering efforts of Mike Dallwitz in the Division of Entomology, CSIRO. Dependence on such software will undoubtedly increase over the next five-ten years and all students of taxonomy should become computer literate, and be comfortable with the use of such methods of analysis.

Australia's major collections, like many of the world's large collections, are stored using Nineteenth Century technology - and are accordingly about as accessible as medieval libraries! The vast body of highly valuable information, such as contained in the ANIC, must, as a matter of urgency, be transferred to electronic files where it can be accessed not just by professional taxonomists but by applied entomologists, ecologists and persons charged with managing and conserving our natural resources. The data bases must transcend individual collections like the ANIC - there should be a national data base containing information on all accessions, and this in turn should be linked to a global data base for the world's flora and fauna. This might represent a major and a costly project - but probably more valuable and maybe not as costly as the sequencing of the human genome. The Division's recent experience in

providing information to the Commonwealth during its "World Heritage Listing" controversy with the Queensland Government, highlighted the need for such a comprehensive access to the information contained in such collections.

Finally, we will see a variety of computer-aided methods of bringing natural history information to a wider and more interested community. For example, a combined hard copy and CD-ROM (or Compact Disk-Read Only Memory) package being developed by John Lawrence and Mike Dallwitz permitting identification of beetle larvae from around the world is an indication of things to come. This task, which is aimed for completion during 1991, will make available to a wide and appreciative audience the rather inaccessible but encyclopedic knowledge about beetle larvae, which resides in the head of John Lawrence. Computer graphics, of the type being explored in CSIRO should assist professional taxonomists, but also help, along with interactive keys, bring this knowledge into ordinary households. Of course, I'm not just talking about insects here, but other prominent components of the fauna and flora. Just as wheat growers in various European countries use the interactive public television system, to access IPIPRE, a computer-based decision support system for integrated pest management advice on wheat pests, similarly I can expect one day the interested lay-person gaining access to such knowledge by interactive television, CD-ROM systems and coffee table publications, etc.

Funding Cuts, the Reaction, and the Future of Entomology, and especially Taxonomy

Some here might feel that the discipline of entomology, especially in CSIRO, and the discipline of taxonomy within entomology, were singled out for special funding cuts in recent years. Neither is true. The cuts to science, and CSIRO, in particular were cuts orchestrated by bureaucrats. They were broad-brush

and indiscriminate. Initially, they went largely unnoticed by the politicians. It was just that entomologists were more prepared to stand up and say these cuts were not in the country's interests. In my Division, the cuts were largely borne by groups other than taxonomy. We elected to become especially vocal at the time taxonomy came in for some shrinkage. This coincided with an increasing interest by the community in environmental matters. Again, insect taxonomy became a banner for embarrassing governments and senior bureaucrats about the stupidity of cutting our efforts in taxonomy.

I believe CSIRO understands better now the implication for Australia if we do not increase the support base for taxonomy. A recent letter from CSIRO to the Government illustrates this shift. "CSIRO wishes to draw particular attention to the situation for the Australian National Insect Collection. This important collection suffers from a shortage of funding that is both chronic and acute. It is in competition, within CSIRO, against a number of more urgent needs for research funds, yet it is worthy of a better level of sustained support." This quotation also serves to remind us that taxonomy will be competing for finite resources with other credible bids that also have their champions, and are equally claiming to advance Australia.

Cuts in entomology, and especially taxonomy, have not been without considerable personal cost to some individuals. However, they have caused us all to take stock of our positions. Taxonomists had tended to give little thought to the future - they assumed that it would be "business as usual." Like in some other disciplines, some felt they were owed a living! Most, however, are extremely hard working - and relied on others to protect their interests. I believe taxonomists now realise they will need to be more political, and be prepared to articulate their case to maintain their legitimate share of the research dollar.

Let me give some examples of how taxonomists have responded to the challenge, and why they are entitled to be confident about the future of taxonomy.

Nationally

Taxonomists, both State and Commonwealth, have risen recently above institutional interests and joined together nationally to argue their case (certainly, more effectively than plant taxonomists and others). They project a unified front.

Formed a Council of Heads of Australian Entomological Collections, meeting this week for the first time - a major initiative!

Set up a National Workshop working toward developing a national strategy on insect taxonomy, organised by Barry Richardson (ABFF) and Ebbe Nielsen (Head, ANIC).

The unified approach I just referred to enabled the strong letter of concern about insect taxonomists to be sent by Lester Russell, Chairman of the Council of Australian Museum Directors, to the Prime Minister and Neville Wran ... "Unless there is a national commitment to research designed to describe, document and classify the Australian fauna and flora, this knowledge will never be obtained. All groups of plants and animals deserve attention, but the need, and the potential value of the information to be obtained, is greatest for the invertebrate animals. Scientific research of this kind should be specified as an area of priority for research by CSIRO, the state museums, and educational institutions. Such research needs increased funding to allow the recruitment and training of additional research personnel. More importantly, we must ensure that we do not make short-sighted budget cuts which will cause the loss of expert scientists who already have specialised skills in this area."

Again, the unity amongst insect taxonomists enabled Peter Raven, as a lead-up to the 1990 Federal election, to give a high profile to invertebrate taxonomy.

Preparation of several proposals for Cooperative Research Centres featuring insect taxonomy:

- A National Centre for Insect Systematics centred on the ANIC, embracing many insect taxonomists in the country
- A National Centre for Biodiversity Studies, which would have a significant insect taxonomy component - based in Canberra
- Other Centres, requiring taxonomic effort - e.g., Asian-Pacific Centre on Integrated Pest Management, based in Brisbane.

Development of a proposal for a Key Centre for Entomological Teaching in NSW, based in Sydney, again a workshop is scheduled on this topic during this meeting to explore extending the concept to other regions.

CSIRO publications have been taking a keen business interest in taxonomic publications. Examples include,

- Insects of Australia (second edition)
- Weevils of Australia (Elwood Zimmerman)
- Australian Dragonflies (Tony Watson)
- and others on Lepidoptera (Ebbe Nielsen)

Internationally

An upgraded Insect Collection Newsletter, edited by Ron McGinley at the Smithsonian and with regional editors around the world - supplying information on developments in insect taxonomy. Let me read an extract from the November 1989 edition. The item, contributed by K.C. Kim of Pennsylvania State University, concerns the "Formation of Entomology Collection Networks." It reinforces what I said earlier about IT in taxonomy for managing collections and making their contents accessible to a wider audience: "... Systematics resources in entomology lack a computer-

based information system that permits direct access to information about entomological collections and collection related research. They are poorly supported and badly lag behind other biological disciplines in data-processing and standard collection management practices ..."

Periodic meetings of the heads of the four major collections in UK, Canada, USA and Australia with computer-based management of collections high on the agenda. The first is to take place at the Smithsonian in April.

A 1989 Report to the US National Science Foundation (NSF) on Inventory of World's Biodiversity. The Report states "The NSF should provide leadership to undertake the inventory of the world's biodiversity." It also recommends "that support of biotic inventories be significantly expanded within the Division of Biological Systems & Resources, with initial funding of \$5 million annually, climbing to about \$20 million." The report also observes "the total cost of a global survey of biodiversity conducted over a ten year period (presuming the availability of a sufficient number of trained people) can be estimated, very approximately as follows ... 1) detailed investigation, over several years, of perhaps 100 major sites in Latin America (which is more poorly known biologically and richer in species) and at least another 100 in Africa and Asia together, would be necessary to gain a sufficiently detailed picture of the distribution of plants, vertebrates, and major invertebrate groups throughout the tropics; 2) the cost of investigating each of these sites, including only the field work and processing the resulting data has been estimated as between \$300,000 and \$750,000. The total cost for the project is estimated at between \$60 million and \$200 million over a ten year period."

Again, the central role assigned to taxonomists if these objectives are to be realised is manifestly apparent. These recent events I cite are just some of the examples of actions by the taxonomic community here and

overseas to reverse the erosion largely caused by complacency about their value to science and the community. As I said at the beginning, the future of taxonomy depends on the taxonomists, and they are rising to the occasion.

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PUBLICATION AND INFORMATION TRANSFER: are they congruent?

Laurence Mound
The Natural History Museum
London, SW7 5BD, U.K.

The review by Jay Savage in ICN-4 of the meetings of the International Commission on Zoological Nomenclature indicated that the concept of licensing certain publishers for the issue of new names is raising its Orwellian head - again. The aim is "to ensure publication in the primary scientific literature, as opposed to privately printed and/or unedited sources". Poor quality taxonomic publications are a continuing problem, whether a description which purports (but fails) to distinguish a new taxon from its relatives, or a series of new species in a large genus with no identification key, or a phylogeny based on a few taxa from a large and unstudied group. But does such work really appear more frequently in privately published or unedited texts than in mainstream journals?

The concept of licensing a journal (or possibly its current editors?) to issue new taxonomically acceptable names is closely associated with the concept of priority. If "priority" were to lose its preeminence under the Code in favour of "current usage", then we would have a changed situation. Poor taxonomic work could be ignored, as happens in other sciences; it would not come into use, and thus might not become current. But how would "current" be defined when many taxonomic publications are not reworked within 20 or even 50 years. Many insect groups have only two or three specialists worldwide, and these do not always agree with each

other. Would frequency of use in the user community, the non-taxonomic literature, determine nomenclatural validity? Before adopting yet more restrictive legislation to control this very basic human activity of naming the things around us, perhaps we need rather wider discussion.

More interesting is the question as to whether printing taxonomic information in journals and books will continue to be the most effective method of disseminating information as we reach the end of the twentieth century. Currently there are 6000 members of the Entomological Society of China, and the number of entomologists in India possibly exceeds the number in Europe. But less than ten copies of the *Bulletin of this Museum* are sent to the Indian subcontinent, and even fewer to China. Publications in this traditional sense are more effective for communicating with posterity than with the present generation. Communicating with present-day scientists is increasingly more effective electronically. More entomologists in India have access to word-processors now than have access to libraries with major taxonomic publications.

The insistence by ICZN on traditional publishing criteria will have its greatest effects on entomologists, because of the large number of undescribed insect species. Few primary journals accept large taxonomic papers, although our science is in great need of revisionary studies. The high cost of printing and distributing copies of a revisionary work when this includes the description of many new species must increasingly be borne by each research worker's own budget. The sales of such works cannot be relied on to generate sufficient income to cover production and distribution costs, and warehousing unsold copies, as well as the library housing of large volumes which are rarely consulted are further costs on someone's budget which taxonomists take for granted.

The biodiversity crisis is all too real. But our stereotyped reaction that the solution lies in getting more of those things we have always had

— larger collections, more research facilities, larger but cheaper journals — fails to make economic sense. We need to consider the possibility of other solutions to our problems. One such problem is the large quantity of data we produce; catalogues of such data are essential tools, although no editor wants to publish such archival material in a primary journal. Six years ago I started a new series as an outlet for such taxonomic catalogues, *Occasional Papers in Systematic Entomology*, and the table below gives the total distribution figures (sales, exchanges and freebies) for the first seven issues. These figures indicate that this series is not effective at information dissemination; possibly our advertising is too poor, or our prices too high, or our data of too little interest. Should such information be made available as xeroxed pages, on request? Or should we distribute it cheaply on disc? And if so, could such discs include nomenclatural changes and new taxa?

ICZN has indicated its recognition that our current code of nomenclature needs revision. But the Code is only the formalization of our method of communication. The problem seems to lie in identifying the audience to whom we wish to communicate our taxonomic data. Is it today's fellow specialists, or those in the future? Perhaps one reason why taxonomy is so unpopular amongst the biological sciences is its preoccupation with past and future biologists, rather than today's students. Whatever other decisions ICZN takes it must help us to avoid conflict between effective communication of data and the concept of publication in nomenclature.

Occasional Papers in Systematic Entomology (price and total copies distributed in brackets)

- 1986. Catalogue of Neotropical Tiger Moths. Watson, A. & Goodger, D. 71pp. 4 col.pls. (£14.50; 92).
- 1986. Checklist of Carabidae from Borneo. Stork, N. 24pp. 1 map (£7.00; 99).

- 1987. Catalogue of the Crotch Coccinellidae. Gordon, R. 46pp. (£9.50; 166).
- 1987. Checklist of Australian Thysanoptera. Mound, L. & Houston, K. 28pp (£4.00; 178).
- 1989. Keys to alate Aphis of northern Europe. Brown, P. 29pp. 42 figs (£3.50; 148).
- 1989. Sphaeroceridae described by O.W.Richards. Pitkin, B. 44pp. (£6.00; 71).
- 1990. Catalogue of the types of bloodsucking flies in the BMNH. Townsend, B. et al. 371pp. (£25.00; 61)

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PUBLICATIONS AVAILABLE

Gary F. Hevel
Department of Entomology
National Museum of Natural History
Smithsonian Institution
Washington, DC 20560

One consistent problem that occurs within the managerial framework of any given large museum is the distribution of duplicates of research publications. After a research entomologist sends reprints of a recent publication to taxonomic workers and colleagues, there is frequently a large surplus of the reprint that creates problems in storage. In an effort to avoid the unsavory option of discarding such accumulations, I would encourage the announcement of available reprints in the ICN. As an experiment, the following papers are offered free of charge from the Smithsonian.

Anyone interested in receiving one or more copies of any listed publication should contact me at the following address: Department of Entomology, Mail Stop NHB 165, Smithsonian Institution, Washington, DC 20560, USA.

Blackwelder, R. E. 1943. Monograph of the West Indian Beetles of the Family Staphylinidae. 658 pages.

- Blackwelder, R. E. 1957. Checklist of the Coleopterous Insects of Mexico, Central America, the West Indies, and South America, Part 6, 566 pages.
- Johnson, C.D. and Kingsolver, J.M. 1976. Systematics of Stator of North and Central America (Coleoptera: Bruchidae). 101 pages.
- Kramer, J.P. 1977. Taxonomic study of the Planthopper genus *Oedeus* in the United States (Homoptera: Fulgoroidea: Cixiidae). 71 pages.
- Kramer, J.P. 1979. Taxonomic study of the Planthopper genus *Myndus* in the Americas (Homoptera: Fulgoroidea: Cixiidae). 89 pages.
- Kramer, J.P. 1983. Taxonomic study of the Planthopper family Cixiidae in the United States (Homoptera: Fulgoroidea). 58 pages.
- Mead, F.W. and Kramer, J.P. 1982. Taxonomic study of the Planthopper genus *Oliarus* in the United States (Homoptera: Fulgoroidea: Cixiidae). 189 pages.
- Saylor, L.W. 1948. Contributions toward a knowledge of the insect fauna of Lower California. 38 pages.
- Smith, D.R. 1979. Nearctic Sawflies IV. Allantinae: Adults and Larvae (Hymenoptera: Tenthredinidae). 172 pages.
- Spilman, T.J. 1959. A study of the Thaumastodinae, with one new genus and two new species (Limnichidae). 12 pages.
- Traub, Robert, Morrow, M.L. and Lipovsky, Louis. 1958. New species of Chiggers from Korea. 22 pages.
- Ward, C.R. et al. 1977. Annotated Checklist of New World Insects Associated with *Prosopis* (Mesquite). 115 pages.

SPNHC PUBLICITY & LIAISON COMMITTEE

Elana Benamy
Invertebrate Paleontology
Academy of Natural Sciences of Philadelphia, 19th and the Parkway
Philadelphia, PA 19103.

It has been brought to my attention that the special issue of *Insect Collection News* (ICN-5) contained an article by Suzanne McClaren of the Carnegie Museum which introduced ICN readers to SPNHC. As a follow-up, in case there might be some who would be interested in more information on SPNHC (perhaps even membership?), I was wondering if it would be possible to include a brief mention in ICN that further information about The Society for the Preservation of Natural History Collections (SPNHC) may be obtained by writing to Elana Benamy.

SPNHC members are involved in research and publishing about collection-related problems that would be of direct interest to the readers of *Insect Collection News*. Recently our journal, *Collection Forum*, has contained articles on preserving insects in amber, integrated pest management, archival materials, environmental controls, etc. SPNHC also runs symposia and workshops.

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NATURAL HISTORY COLLECTION WORKING GROUP OF ICOM-CONSERVATION COMMITTEE

C.V. Horie
Coordinator — Natural History Collections Working Group
The Manchester Museum
Manchester, M13 9PL, U.K.

The aim of the ICOM—Conservation Committee is to improve techniques for the physical care and conservation of natural history collections, encompassing botany, earth sciences and zoology.

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The maintenance, survival and use of these collections is increasingly recognised as an important contribution of museums. However, many have suffered years of neglect and there are very few conservators in the field. The contrast with fine art and archaeological collection maintenance is startling, both of which have a long history of conservation activity and expertise.

At a time when the natural environment is being lost at an unprecedented rate, resources have started to be directed to preserving the museum records of present and past environments. The resources are still small when measured against the number of specimens. What resources there are must therefore be used efficiently. This international group acts as a focus of information exchange around the world. The newsletter, *Natural History Conservation*, is circulated to all interested parties (currently ca. 200). It provides notices of relevant meetings, reviews of meetings and publications, statements on techniques and policy and an expanding bibliography on papers relevant to this field.

More substantial papers are published in the preprints of the triennial meetings of ICOM-CC, from which the working group has received substantial support and encouragement.

The Group welcomes all those who are involved with the physical care of specimens, and includes natural historians, conservators, preparators, medical technicians, administrators etc. We particularly wish to be kept up to date with developments in all the various fields and countries tackling the large problems on natural history collections.

For further information contact:
C.V. Horie.

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CANADIAN MUSEUM OF NATURE INSECT COLLECTION:

Robert S. Anderson & Francois Genier
Entomology Section
Canadian Museum of Nature
P.O. Box 3443, Station D
Ottawa, ON. K1P 6P4
CANADA

HISTORY

The recent history of entomological collections and research at the Canadian Museum of Nature (CMNC; previously the National Museum of Natural Sciences) is a short one. For many years, an extensive insect collection and associated systematics research in Ottawa has been supported through Agriculture Canada, which deals with the administration of the Canadian National Collection of Insects (CNCI) and the curatorial staff of the Biosystematics Research Center, the facility where that collection is housed. The early nucleus of that insect collection was transferred to Agriculture Canada from the National Museum in 1916, when space was made available in the museum building in Ottawa to house the Parliament of Canada, displaced by a fire which had burned the Parliament Buildings. Subsequently, the National Museum of Natural Sciences did not support an active program in entomological systematics until the mid-1980's. At that time, it was strongly felt that a museum of natural history could not continue to ignore 90% of animal diversity and that the public deserved ready access to information concerning insects generated or made available by the research staff at CMNC.

In 1985, Dr. John Cooper was hired as a contract (term) curator by the National Museum of Natural Sciences to coordinate activities focussed at initiating an entomology program at the National Museum. Portions of the Henry and Anne Howden private collection of Coleoptera were donated to the museum at this time and served as the basis for this program. Following the termination of Dr. Cooper's term in 1986, donations of insects continued

but there was little, if any, other activity in entomology until April of 1988, when Dr. Bruce Gill was hired to continue to encourage and oversee the growth of the collection and to develop and promote public programs in entomology. He remained with the museum through March of 1990. As with Dr. Cooper, Dr. Gill's appointment was on a contract or term basis. This situation changed in January of 1990 when the museum appointed a permanent entomological curator (Dr. R.S. Anderson) and thus made a firm commitment to developing a permanent, research collection of insects and associated systematics research program. This commitment was further enhanced by the hiring of a permanent curatorial assistant (F. Genier) in September of 1990.

In July 1990, the National Museum of Natural Sciences became the Canadian Museum of Nature and changed its status from a branch of the National Museums of Canada to an independent Crown Corporation with its own Board of Trustees. This change, presumably, will allow the museum increased flexibility in the management of its various programs.

The CMNC is also home to the Biological Survey of Canada (Terrestrial Arthropods), a joint venture with the Entomological Society of Canada. Dr. Hugh V. Danks is head of the BSC.

COLLECTION HOLDINGS

Since 1985, the Canadian Museum of Nature Insect Collection (CMNC) has grown rapidly, mainly due to the donations of large numbers of specimens by local professional coleopterists, Henry F. and Anne T. Howden, and Stewart B. Peck. At present all of the holdings of the Howden private collection, including 43 primary types, but excluding all Scarabaeidae and Curculionoidea (which also are to follow in the future), are housed in the CMNC. Both Howden and Peck still conduct extensive world-wide field work and material collected on these expeditions continues to be added to the CMNC at an annual

rate of about 15,000+ specimens. In addition to this material, the private collection of Curculionoidea of R.S. Anderson (ca 40,000 specimens) is in the process of being transferred to the CMNC, field activities of the curatorial staff continue to add specimens to the collection, a limited number of purchases of collections have been made (largely to enhance existing holdings), and a number of entomologists other than Howden and Peck now are making donations of valuable specimens. As a result of the interests of the donors, and the research interests of the curatorial staff, Coleoptera largely predominate the CMNC holdings.

Although Coleoptera are the strength of the collection, the CMNC is interested in expanding its taxonomic coverage to other insect orders, although in a controlled and limited manner. The existence of both the CNCI and CMNC in Ottawa has caused some concern over the roles of the various institutions. This is recognized at the CMNC, but CNCI, as it is administered by Agriculture Canada, has come under increasing recent pressure to develop and maintain an economic mandate; CMNC is not so constrained. The expansion of taxonomic coverage will also allow for the development of exhibits which use insects to illustrate a variety of biological principles and theories.

Currently approximately 215,000 specimens of Coleoptera are housed in 1040 Cornell style drawers. Strengths of the CMNC are Curculionoidea (ca. 40,000+) and Chrysomeloidea (ca 45,000+) although there are also significant holdings of Cicindelidae, Histeridae, Scarabaeidae, Buprestidae and Tenebrionidae. Particularly well-represented geographic areas are South, Central and North America, Australia, and the Republic of South Africa. The current foci of field work by the curatorial staff are south Florida and Latin America, particularly Mexico and Guatemala, and specimens will continue to be added from these areas. A variety of specialized collecting techniques,

most notably various baited traps, berlese funnel extraction of various kinds of organic debris, and flight intercept traps, will be used in these and all future field sampling programs. CMNC currently houses ca. 50 primary types, all Coleoptera.

STAFF & ACTIVITIES

At present, Robert S. Anderson is the curator and Francois Genier is the curatorial assistant. Research interests of these individuals are Curculionidae (RSA) and Scarabaeidae (FG). In addition, J. Anthony Downes (Diptera: Nematocera) and Fenja Brodo (Diptera: Tipulidae) are research associates of the museum. CMNC is always interested in enhancing existing holdings and any donations or exchanges are encouraged. Limited funds are available for work of a curatorial nature in the CMNC and for purchases of special insect collections. Individuals interested in pursuing these opportunities should contact the curator. Loans of CMNC specimens are encouraged; standard loans rules apply. Individuals interested in determining CMNC specimens should contact either the curator or curatorial assistant.

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SYSTEMATIC ENTOMOLOGY LABORATORY NEWS

Dave Smith, Systematic Entomology Lab., USDA,
NHB-168 Smithsonian Institution
Washington, D. C. 20560

The Systematic Entomology Laboratory recently had its biennial review. Since the last review in October 1988, the review team noted significant increase in research, both quality and quantity, and marked improvement in morale. These results stem from additional base operating funds and others special funds, which have allowed the laboratory to increase its support staff and modernize its equipment. More details will appear in the next issue of ExSEL, the

laboratory newsletter. A few copies of the review documentation are also still available.

SEL has filled two scientific position in the depleted Coleoptera Research Unit. Only two coleopterists remained after the death of Dr. Whitehead and the retirements of Drs. Anderson and Kingsolver. Dr. James Pakaluk from the University of Kansas has joined SEL and is responsible for weevils. Dr. Natalia Vanderberg from University of California (Berkeley) is a Service Scientist with responsibilities for identification and curation of the Coleoptera, and research on beetle identification.

We welcome several new members to our support staff. Dr. David Adamski from Mississippi State University is a Support Scientist working with Dr. Alma Solis on pyraloid moths. Dr. Gary Miller from Auburn will be the Support Scientist for the Research Leader, Dr. Douglass R. Miller, aiding Dug with his research on scale insects. Ms. Joan Barch is a Technical Information Specialist who provides general information support for SEL, including work on the Diptera Databases and the Coleoptera Catalog. Four new technicians began work this year, Mr. Charles Allen in the STAR unit, Mr. Michael Wise in the Lepidoptera/Heteroptera unit, Ms. Suzanne Shute in the Diptera unit and Mr. Edward Brodie in Coleoptera unit. Ms. Terri Taylor will begin work in the Hymenoptera unit in July, 1991. Two other new technician positions for SEL have been advertized and are to be filled in the near future.

An \$100,000 appropriation approved by Congress for the Laboratory in fiscal 1991 was a positive sign. The personnel and money are welcome additions, and they help SEL approach the level needed to achieve its mission. We thank all those who have supported SEL, so we can continue to provide the systematic research and services vital to American agriculture.

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ARTHROPOD COLLECTING IN GUATEMALA

Jack Schuster
Head, Systematic Entomology Lab
Universidad del Valle de Guatemala
Apartado 82
Guatemala, GUATEMALA

Guatemala has recently implemented new regulations for the collection of organisms. Basically, three permits are required: a collection permit, a research permit, and an export permit. To obtain these you need a brief description, in Spanish, of the project and a curriculum vitae of the primary investigator. If you desire to collect in national parks or reserves, administrators of these areas must approve the permits. At present, there are no fees for these permits and issuing of the permits has been quite rapid. They request that duplicate specimens be left at the appropriate Guatemalan national institution and that three reprints of any articles resulting from the research be sent to the Guatemalan central research data bank. It is understood that, in some cases, material must be exported for identification before duplicates can be returned.

According to the Comision Nacional de Areas Protegidas, in charge of issuing the permits, the idea is to enable people to know what kind of research is occurring in Guatemala, who is doing it, where collected material is located, and to forge links between Guatemalan and foreign institutions. They wish to encourage foreign scientists to come to Guatemala. Nevertheless, "red tape" of any kind can be a discouraging factor, even when people come to Guatemala predisposed to cooperate and help strengthen existing institutions. It is possible to obtain the permits ahead of time by writing the Commission at the address given below. I don't know how efficient that will be. I have obtained the permit forms and have filled them out for some visitors before they arrive in country and that has worked well so far. I'm willing to continue doing this as long as I am not inundated with requests. National elections occurred in

January; I'm not sure how this will affect things.

Institutions at which specimens may be left include: the Natural History Museum, Sanidad Vegetal, the Universidad de San Carlos, and the Universidad del Valle de Guatemala. The latter collection has been designated the Guatemalan National Collection. Most of these institutions would be glad to cooperate with visiting scientist in various ways.

Address for the Commission Nacional de Areas Protegidas (CONAP):
 Segunda Avenida 0-69, Zona 3.
 Colonia Lo de Bran
 Guatemala, GUATEMALA
 Fax + Phone No.: 502-2-51 89 51

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A RESOURCE MANAGEMENT REPORT

Snow Entomological Museum Participation In — BOLIVIAN EXPEDITION BIOLAT SI/MAB - 1988: REPORT ON COSTS IN TIME AND MATERIALS

James S. Ashe
 Snow Entomological Museum
 Snow Hall
 University of Kansas
 Lawrence, Kansas 66045

Introduction

In 1988, the Collection Manager of the Snow Entomological Museum, Robert Brooks, participated in the BIOLAT project in Bolivia. His primary responsibility on this expedition was to collect bees. However, in order to make the trip maximally productive, he also collected other taxa. It became the responsibility of the Snow Entomological Museum to prepare and label the material, sort all specimens to morphospecies and identify to lowest possible taxon, then divide the material as indicated in prior agreements. A total of

13,200 specimens was prepared from 120 individual collections. This report documents the costs to the Snow Entomological Museum of completing the above mentioned task.

A note on the preparation times indicated in this report is approximate. Our preparation times are long-term averages (a month or more) across all the individuals involved in the preparation phase of the program. In addition, all the aspects of preparation are included in the time estimate: sorting specimens from often dirty alcohol samples, washing and cleaning if necessary, typical pointing of dried specimens, etc. In addition, these estimates include the numerous other interruptions that decrease long-term preparation figures: breaks to re-supply unit trays, drawers, pins, point-paper and other expendibles; to co-worker interruptions, and start-up and clean-up time for each work session. Additionally, the majority of our preparation program is based on work-study student help. This is very cost-effective; however, since such individuals do not usually work long hours at a time, their relative long-term productivity is decreased. Of course, some individuals are highly skilled and rapid, while others are less so. We believe that these preparation rates are a very accurate estimate of long-term production under these criteria. Clearly we would have achieved higher numbers had we only estimated hourly rates for our best pinner under ideal circumstances.

Cost of Materials:

| | |
|---|----------|
| Pins @ \$.047/pin for 13200 pins | \$620.40 |
| 100% rag paper @ .07/page for 80 pages | \$ 5.60 |
| Laser printer @ .10/page for 80 pages | \$ 8.00 |

In addition there is cost associated with use of the computer to word process the labels which is not figured here.

Cost of time:

Making Points:

Five-sixths of the collection is pointed approximately equaling 11000 specimens. It takes about 9 hours to make 2000 points. 11000 points takes 49.5 hours @ \$5.00/hour

\$247.50

Pointing Specimens:

On the average 28 specimens are pointed per hour (this includes pouring them out of vials or whirlpacs into a petri dish, taking them individually out of alcohol to a paper towel to dry, sonication for cleaning of soiled specimens, bending point tip, and affixing adhesive to the point). 11000 specimens @ 28 specimens/hour takes 393 hours @ \$5.00/hour

\$1965.00

Pinning Specimens:

On the average 55 specimens are pinned per hour (this includes relaxing layered specimens and taking alcohol specimens from vials or whirlpacs as above). 2200 specimens @ 55 specimens/hour takes 40 hours @ \$5.00/hour

\$200.00

Labeling Specimens:

Preparation:

To make labels it takes about an hour to cast and print 500 individual labels consisting of 10-15 different labels. The specimens require two labels each. For the 120 different collections it took about 10 hours to prepare the labels @ \$5.00/hour

\$50.00

Labeling:

To cut and place labels (2/ specimens) it takes an average of one hour to label 75 specimens. 13200 specimens takes 176 hours @ \$5.00/hour

\$880.00

Labor Cost for Collecting and Sorting:

Salary of collector on the actual

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expedition and time spent sorting collection (includes sorting to order, then family, then in many cases genus, then to species and for the entire collection to morphospecies and finally dividing the collection into three parts).

Collection Manager - 420 hours
Museum Director - 6 hours
Curatorial Assistant - 10 hours
Museum Assistants - 60 hours
\$5149.34

Preparation of final report took 4 hours @ \$10.00/hour
\$40.00

Mailing Costs:

Twenty Schmitt boxes @ \$5.00/box
\$100.00
Postage (library rate)
\$12.55

Postage would be considerably higher with overseas or out of country mailing which would usually be the norm.

Packing Schmitts with specimens and putting in needed brace pinning and mailing them in 5 separate packages. 16 hours @ \$5.00/hour
\$80.00

The Costs:

The cost to the Snow Entomological Museum of collecting, preparing and sorting the 13200 specimens from the Bolivian Expedition was \$9358.39. 404 hours of professional expertise and 777.3 hours of Work Study assistance was used. It should be mentioned that all of these costs were taken from the Museum's normal operating budget and not from grant sources. This report should serve to underscore the fact that the vast majority of the cost of an expedition is in preparation, sorting and curation of material. These costs must be taken into full account in any collaborative arrangement among museums.

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ENTOMOLOGICAL SUPPLIES

William H. Rowe
Department of Entomology
National Museum of Natural History
Smithsonian Institution
Washington, DC 20560

For the past three years, poly-porous has not been commercially available to us in the United States as most of you well know. If anyone out there knows of a source, it would be much appreciated as many people still prefer the polyporous over substitutes. One proven substitute is silicon rubber. The U.S. National Museum has been using General Electric's RTV-11 kit for at least 24 years and finds that it works well in that it grips the pin and minuten nadeln. There are other formulas available which are tougher but do not come in white which is definitely beneficial from the aspect of light reflection. It can be purchased in as little as a one pound kit from foam, plastics and adhesive specialty stores. It is a two part product using a catalyst for curing. After thoroughly mixing, pour a 1/8" thickness of the mixture into plastic containers. Those in which trinkets are packaged are about the right size. Use those that are about 2"-4" wide and absolutely flat so that a uniform thickness can be maintained. Plate glass with dams made of clay work well for larger pieces. Silicone will stick to plate glass so you must use a mould release. Silicon spray works well. Make sure that your work area is absolutely level, otherwise the mixture will migrate to one end, resulting in an uneven product. After the 24 hour curing time, remove and cut into appropriately sized strips using a very sharp razor blade. Because it is silicone we can expect it to last at least 50 years, more likely several hundred years. This is not long in the hopefully eternal life of a scientific specimen but without polyporous we would have to use cork which tends to crumble and balsa wood which can easily become loose on the pin, a trait also attributable to polyporous. Another item with which we are experimenting is the cross-linked polyethylene foam such as "Volara" and "Minicel" made by

Voltek. It is very fine textured at 2 pounds density per cubic foot. There are many different brands available. If you have had success with this foam or any other product, I would be very interested in knowing about them as I am sure would others that have only used polyporous.

REAGENT SUBSTITUTES

Many of the reagents that scientists use in pursuit of research activities have been deemed cancer causing, or, in one way or another, deemed extremely hazardous to the health of themselves and others in the environment. As a result, we are being asked to find alternative non-hazardous reagents such as "Histoclear" for "Xylene" and using "cold" instead of fumigants for pest control. Does anyone know of any other substitutes? The only reagent I know of is "Histoclear" which is of vegetable origin and is advertised as duplicating xylene in almost every aspect without a change in protocol. It is generally regarded as safe by the U.S. Food and Drug Administration, but since it is intended to dissolve paraffins and fats, it will dehydrate epidermal tissue, so it is best not to let it come in contact with your skin. Several of our staff have used Histoclear with good success. If you would like to try this product, you can purchase or inquire from:
National Diagnostics
198 Route 206 South
Somerville, NJ 08876
Telephone (201) 874-8696,
Catalog number is HS-200.

I would like to put together a list of such substitutes that can be offered to the many visitors that pass through the Smithsonian Institution. This information is slow to get distributed and a list put together and published in the ICN would further our efforts to provide a safe environment. You can write me care of the Smithsonian Institution, Department of Entomology, MRC-NHB 165, Washington, DC 20560.

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SEQUENTIALLY NUMBERED LABELS — ONE METHOD

Gordon M. Nishida
Department of Entomology
P.O. Box 19000-A
Bishop Museum
Honolulu, Hawaii 96817-0916

We've recently received queries on how to generate sequentially numbered insect collection labels, where each specimen receives a unique number. To better understand our way of automatically producing these sequential labels, it might be helpful to briefly describe our label production method.

At the Bishop Museum we routinely produce our insect labels on a Macintosh Plus and an Apple Laser Writer NT using Microsoft Word and Aldus PageMaker. This method of making labels has been a tremendous time saver, allowing production within minutes, eliminating staging of unlabeled specimens, and reducing the opportunity for error.

We type the labels into Microsoft Word (a maximum of 22 characters per line for capital letters and circa 30 for lower case) in a single column and save it as a text file (named "labels," of course). PageMaker is opened to a file ("labelform"), which we've previously set up and saved as a template. The template has 9 columns and the font is Times (the smallest serif font available) in 4.5 point. Our experience has been that sizes below 4.5 point reduce definition and readability. The Word text file is brought into PageMaker using the Place function on the File menu, and with Autoflow on the Options pull-down menu selected.

When we decided to give unique numbers to each specimen processed on the PNG Canopy Fogging Project, we had to find a way to produce sequentially numbered labels quickly and without duplication. We could have produced the labels manually, of course, but we chose to automate the process. We took advantage of the capabilities of Fox Software's FoxbaseMac, a database program for the Macintosh that has a procedural language similar to Ashton-Tate's dBase.

The sample program in FoxBase to produce the sequentially numbered labels follows:

```
Clear
:clears screen

Set talk off
:turns off the on-screen progress
report (speeds operation)

Accept "ENTER starting number: "to strt
:places keyboard entry into
variable "strt"

Accept "ENTER ending number: "to end
:places keyboard entry into
variable "end"

Store &strt to num
:stores contents of variable "strt" into an-
other variable "num"

Set alternate to seqnos
:sets up capability to save output of pro-
gram into a text file called "seqnos"

Set alternate on
:turns on this capability

Do while num<&end+1
:sets up a loop that will continue until the
last number is surpassed

? "No. "+str(num,5)
:prints 1st line of label thus—No. 367 (if
your largest number will exceed 5 digits
(99999) then replace the 5 in (num,5) to
however many digits you need.

? "PNG Canopy"
:2nd line of label (enter your copy or
delete)

? "BISHOP Museum"
:3rd line of label (enter your copy or
delete)

?
:places empty line between labels

Store num+1 to num
:increments the number by 1

Enddo
:sends the do while loop when the last
number is surpassed
```

After the program stops running, we exit Foxbase and open the PageMaker label template ("labelform"). Next we select Place from the File menu and open the Foxbase text file called "seqnos." After placement, one other house-keeping chore remains—making sure that each label does not break at the bottom of each column. Under the Page window, we select 200% size and adjust the bottom handle on each column up or down to ensure each label is complete. Finally we can load our Laserwriter with label paper, select Print from the File menu, and produce those labels.

Sequential numbering can be done in any number of ways using any program with a procedural language or those programs that permit the use of macros.

COMPUTERIZATION OF SPECIMEN BACKLOG:
Department of Entomology,
NMNH, Smithsonian Institution
Gary F. Hevel and Diane T. Valsamis
Department of Entomology
National Museum of Natural History
Smithsonian Institution
Washington, DC 20560

During the past two decades, entomological material in the backlog at the National Museum of Natural History at the Smithsonian Institution has been listed in various formats a number of times. Recently, a practical d-Base program has been developed that permits continual entry and deletion of information items. This program includes the following elements: Sequential Number, Requester, Collector, Collecting Locality, Collecting Method, Collecting Date, Estimated Number of Specimens, Availability of Labels, Storage location, Storage Condition (alcohol, pinned, layered), Sorted status, Cullible estimate, Accession Number, Percentage of Orders, Remarks, and Progress. Enhancement of this databank will continue, especially as a result of sorting large alcoholic accumulations to Orders and Families.

Questions on material in our backlog (of several million specimens) can now be answered much easier. Inquiries regarding this system or specific listings of taxa may be addressed to: Gary F. Hevel, Mail Stop NHB 165, Smithsonian Institution, Washington, D.C., 20560, USA.

INTERNATIONAL BIOLOGICAL FAX DIRECTORY

Neal Evenhuis
 Department of Entomology
 P.O. Box 19000-A
 Bishop Museum
 Honolulu, Hawaii 96817-0916

(country codes are in parentheses; city codes are included in fax number)
 ** an asterisk indicates a number new since 1991 Entomological list **

AUSTRALIA

(61) Agriculture Department of Tasmania
 Australian Centre for International Agricultural Research
 Australian Museum—all departments
 Australian National Museum—Division of Plant Industry
 Australian National University—Biology
 Australian National University—Forestry
 Canberra C.A.E.
 Capricornia Institute—Biology
 CSIRO
 CSIRO—Division of Entomology
 CSIRO—Division of Entomology (ANIC)
 CSIRO—Entomology
 CSIRO—Tropical Ecosystems Research Centre
 CSIRO—Tropical Forest Research Centre
 CSIRO—Wildlife & Ecology Division
 Department of Lands—Alan Fletcher Research Station
 Department of Plant Protection—Entomology Section
 Department of Primary Industries—Entomology
 Department of Primary Industries—Entomology
 Department of Primary Industries—Entomology
 Department of Primary Industries—Entomology
 Griffith University
 Hawkesbury Agric. College—Faculty of Agriculture
 James Cook University—Australian Institute for Tropical Rainforest Studies
 La Trobe University—Zoology
 Macquarie University
 Monash University—Zoology
 Mt. King Ecological Surveys
 Museum of Victoria—Division of Natural History
 National Parks & Wildlife Service
 Northern Territory Museum of Arts and Sciences
 NSW Agriculture & Fisheries
 Plant Research Institute
 Queensland Museum
 South Australian Museum—Entomology
 University of Adelaide—Dentistry
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 University of Melbourne—Botany
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 University of New England
 University of New England—Ecosystems Management
 University of New South Wales—School of Biological Sciences
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 University of Queensland—Medical School
 University of Sydney—Department of Public Health
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 University of Tasmania
 Veterinary Research Institute
 Victoria College
 Western Australia Dept. Agriculture—Entomology
 Western Australian Museum—all departments
 Westmead Hospital—Medical Entomology Unit

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 Canberra 62-57-3051
 Sydney 2-360-4350
 Canberra *62-46-5000
 Canberra 62-48-9062
 Canberra 62-49-8377
 Belconnen 62-52-2999
 Rockhampton 79-361-361
 Hobart 02-24-0530
 Indooroopilly 7-870-7034
 Canberra 62-46-4000
 *62-46-4264
 Wembley 9-387-6046
 Winnellie 89-47-0052
 Atherton 70-91-3245
 Lyneham 62-413-343
 Brisbane 7-379-6611
 Darwin 89-470-749
 Kingaroy 71-623-238
 Toowoomba 76-347-421
 Indooroopilly 7-870-3276
 Mareeba 70-923-3593
 Nathan 7-277-3759
 Richmond 45-70-1322
 Townsville 77-796-371
 Bundoora 3-479-1188
 Sydney 2-887-4752
 Clayton 3-565-3813
 Bathurst 63-322-767
 Abbotsford 3-416-0475
 Darwin 89-813-497
 Darwin 89-411-258
 Rydalmere 2-683-9714
 Burnley 3-819-5653
 South Brisbane 7-846-1918
 Adelaide 8-232-1714
 Adelaide *8-224-0464
 Adelaide 8-224-0464
 Parkville 3-344-5104
 Parkville *3-344-7049
 Parkville 3-344-5139
 Armidale 67-23-3122
 Armidale 67-73-3084
 Kensington 2-662-2918
 St. Lucia 7-371-5896
 Brisbane 7-252-4521
 Sydney 2-692-4179
 Sydney 2-692-4203
 Hobart 02-20-2186
 Parkville 3-347-0747
 Clayton 3-544-7413
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 Westmead 2-633-5314
 *2-633-4984

AUSTRIA (43)

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BERMUDA (1)

Department of Agriculture

Paget 809-236-7582

BRAZIL (55)

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 Museu Paraense Emílio Goeldi
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 Manaus 92-236-0255
 Belém 91-229-1412
 Sao Paulo 11-815-4272
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BRUNEI (673)

Forestry Department
 University of Brunei—Faculty of Science

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 Bandar Seri Begawan 2-27003

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 Concepción 41-222-712
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 Santiago *2-2225-3005
 *2-22271-2983
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CHINA [PRC] (86)

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 Lanzhou University
 Sichuan University
 Zhongshan University (formerly Lingnan Univ.)—Biology

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| GUAM (1) University of Guam—Agric. Exp. Station University of Guam—Marine Biology Department | Mangilau Mangilou | 671-734-6842 *671-734-3118 |
| HONG KONG (852) University of Hong Kong—Zoology | Hong Kong | 5-479-907 |

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 Program Nasional Pengendalian Hama Terpadu
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University College—Zoology
 University of Dublin, Trinity College—Zoology

Cork 21-273-428
 Dublin 1-772-694

ISRAEL (972)

An-Najah National University

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FAO

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 Università degli Studi—Animal & Human Biology
 Università degli Studi—Forestry
 University of Naples—Biology
 USDA—Biocontrol of Weeds Laboratory c/US Embassy

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 6-5797-3152
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 Palermo 91-584-767
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 Padua 49-8072213
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 Hokkaido University—Marine Zoology
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 Kyoto University—Center for Southeast Asian Studies
 Kyoto University—Zoology
 Kyushu University
 Kyushu University—Biological Laboratory (H.Shima)
 Kyushu University—Biological Laboratory
 Kyushu University—Ecological Laboratory
 Kyushu University—Entomological Laboratory
 Nagoya University—Faculty of General Education
 National Institute of Health
 Ogasawara Subtropical Agricultural Research Center
 Tokyo Medical and Dental University—Laboratory of Medical Zoology
 Tokyo Noko University—Faculty of Agriculture
 UN Center for Regional Development
 University of the Ryukyus—Department of Biology
 University of Tokyo, Faculty of Agriculture Veterinary Medicine
 Yamagata University—Biology

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 Sapporo 11-716-5968
 Hokkaido *138-43-5015
 Saitama *3-3-769-1717
 Kurume 942-43-0574
 Kyoto 75-751-6149
 Kyoto 75-753-7350
 Kyoto 75-753-7810
 Fukuoka 92-862-4431
 Fukuoka 92-712-1587
 Fukuoka 92-731-8745
 Fukuoka 92-631-4233
 Fukuoka 92-641-2928
 Nagoya 52-781-5111
 Tokyo *3-3-446-6286
 Chichi jima 4998-2-2565
 Tokyo *3-3-813-6292
 Tokyo 423-608-830
 Nagoya 52-561-9375
 Nishihara 9889-5-2247
 Tokyo *3-3-813-2776
 Yamagata 236-24-7550

KENYA (254)

Garamba National Park c/o AIM/MAF
 International Centre for Insect Physiology and Ecology
 International Council for Research in Agroforestry
 Moi University—Zoology
 National Museums of Kenya
 United Nations Environmental Program
 Yoder Kenya, Ltd.

Nairobi 2-503-511
 Nairobi 2-803360
 Nairobi 2-521-001
 Eldoret 321-430-49
 Nairobi 2-741424
 Nairobi 2-520711
 Embu 254-272-9435

MACAU (853)

University of East Asia

Macau 594468

MADAGASCAR (261)

FAO

Antananarivo 2-402-84

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| | | (ask for fax) |
|--|---|--|
| MALAWI (265) National Herbarium and Botanical Gardens | Zomba | *522-108 |
| MALAYSIA (60) Department of Wildlife & National Parks Forest Research Institute University of Malaya University of Pertanian—Biology Wisma Sumber Alam—Forestry Department | Kuala Lumpur Kuala Lumpur Kuala Lumpur Pertanian Kuching | 3-293-6006 3-636-7753 3-757-3661 3-948-3244 82-442-691 |
| MEXICO (52) Instituto de Ecología Instituto Tecnológico y de Estudios Superiores de Monterrey Malaria Research Center Universidad Autónoma de Nuevo León Facultad de Agronomía Universidad Autónoma de Nuevo León Ciencias Biológicas Universidad Nacional de México—Estación de Biología Los Tuxtlás Universidad Regiomontana | Xalapa Monterrey Tapachula San Nicolás de los Garza Nuevo León San Andrés Tuxtla Monterrey | 281-86-910 83-58-89-31 962-657-82 824-8-00-22 83-76-28-13 5-548-8207 83-44-34-70 |
| NETHERLANDS (31) National Natuurhistorisch Museum Research Institute for Nature Management Research Institute for Nature Management Universiteit van Amsterdam Universiteit van Amsterdam—Zoological Museum—Institute for Taxonomic Zoology University of Nijmegen University of Utrecht | Leiden Den Berg Leersum Amsterdam Amsterdam Nijmegen Utrecht | 71-133-344 71-274-900 2220-19235 3434-56454 20-525-2136 20-525-5802 80-553-450 30-52-1818 |
| NEW CALEDONIA (687) ORSTOM South Pacific Commission | Noumea Noumea | 26-43-26 26-38-18 |
| NEW ZEALAND (64) Cawthron Institute Department of Conservation DSIR—Ecology Division DSIR—Lincoln Research Centre DSIR—Mt. Albert Research Centre Forest Research Institute Forest Research Station Invermay Agricultural Centre National Museum of New Zealand Ruakura Research Centre University of Auckland—Environmental Science University of Canterbury University of Otago University of Waikato | Nelson Dunedin Lower Hutt Lincoln Auckland Christchurch Rotorua Mosgiel Wellington Hamilton Auckland Canterbury Dunedin Hamilton | 54-69-464 24-778-626 4-663-683 3-252-074 9-863-330 3-517-091 73-479-380 24-893-739 *4-857-157 71-385-012 9-302-0259 3-642-999 24-741-607 71-560-135 |
| NORWAY (47) Norwegian Institute for Nature Research University of Bergen—Zoology University of Tromsø—Ecology | Trondheim Bergen Tromsø | 7-915-433 475-328585 83-71961 |
| OMAN (968) Conservation of the Environment Oman Aquarium—Marine Science and Fisheries Oman Natural History Museum | Muscat Muscat Muscat | 740-550 *793-809 602-735 |
| PANAMA (507) Smithsonian Tropical Research Institute | Balboa | *625-942 |
| PAPUA NEW GUINEA (675) Department of Agriculture and Livestock—Agriculture Protection Division Department of Forests, Forest Research Institute Papua New Guinea Department of Environment and Conservation Papua New Guinea University University of Papua New Guinea—Biology Department Wau Ecology Institute | Kikila Lae Port Moresby Lae Waigani Wau | 21-4630 42-4357 27-1044 27-1900 42-4067 24-5187 44-6381 |
| PERU (51) | | |

INSECT COLLECTION NEWS

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|--|------------------|------------------------|
| Universidad Nacional Agraria | Lima | 14-410-258 |
| Universidad Peruana Cayetano Heredia-Instituto de Medicina Tropical Alexander von Humboldt | Lima | 14-823-404 |
| PHILIPPINES (63) | | |
| International Rice Research Institute | Manila | 2-817-8470 |
| National Museum | Manila | 2-494054 |
| POLAND (48) | | |
| Jagiellonian University | Cracow | 12-22-63-06 |
| University of Lodz | Lódz | 42-78-3958 |
| University of Wroclaw | Wroclaw | 71-402-800 |
| PORTUGAL (351) | | |
| Universidade do Lisboa—Zoologia & Anthropologia | Lisbon | 1-759-7716 |
| Universidade do Porto | Porto | 2-698736 |
| PUERTO RICO (1) | | |
| Energy & Environmental Research Center | San Juan | 809-767-5330 |
| SAUDI ARABIA (966) | | |
| National Commission on Wildlife Conservation and Development | Riyadh | 1-441-0797 |
| SENEGAL (221) | | |
| ORSTOM | Dakar | 324-307 |
| SOUTH AFRICA (27) | | |
| Durban Museum | Durban | 31-300-6300 |
| J.L.B. Smith Institute of Ichthyology | Grahamstown | *461-22403 |
| Kruger National Park | Skukuza | 131252-6 ext 219 |
| National Museum—Entomology | Bloemfontein | 51-479-681 |
| Rhodes University | Grahamstown | 461-25049 |
| South African Museum—Entomology | Cape Town | 21-24-6716 |
| Transvaal Museum | Pretoria | 12-322-7939 |
| University of Cape Town | Rondebosch | 21-685-5931 |
| University of Durban | Durban | 31-820-2383 |
| University of Natal—Entomology | Pietermaritzburg | 331-63497 331-61627 |
| University of Natal—Biology | Durban | 31-816-2214 |
| University of Natal—Biology | Durbanville | 21-902-4594 |
| University of Port Elizabeth | Port Elizabeth | 41-531-1280 |
| University of Pretoria | Pretoria | 12-432-185 |
| University of Pretoria—Entomology | Pretoria | 12-342-3136 |
| University of Pretoria—Zoology | Pretoria | 12-342-2453 |
| University of Stellenbosch | Stellenbosch | 2231-77-2484 |
| University of Stellenbosch—Botany | Stellenbosch | 2231-77-4336 |
| University of Witswaterand—Medical School | Johannesburg | 11-643-438 |
| SOUTH KOREA (82) | | |
| Chonbuk National University | Chonbuk | 652-76-0429 |
| Keimyung University | Taegu | 53-623-9935 |
| Kyung Hee University—Zoology | Seoul | 2-962-4343 |
| SOVIET UNION (7) | | |
| Academy of Sciences of the USSR—General Offices | Moscow | 95-230-2741 |
| Academy of Sciences of the USSR—Insitute of Geography Laboratory of Biogeography | Moscow | 95-230-2090 |
| SPAIN (34) | | |
| Estación Biologica de Donana | Sevilla | 54-229-555 |
| Estación Experimental de Zonas Aridas | Almeira | 51-266-299 |
| Govern Baleara—Conselleria d'Agricultura | Palma | 71-719-260 |
| Museo Nacional de Ciencias Naturales | Madrid | 91-564-5078 |
| Universidad de Barcelona | Barcelona | 3-3025947 |
| Universidad de Cordoba | Cordoba | 57-471-346 |
| Universidad de La Laguna—Dept. Zoology | Tenerife | 22-259628 |
| Universidad de Navarra—Zoologia | Pamplona | 948-17-3650 |
| SURINAM (59) | | |
| Suriname Forest Service LBB | Paramibo | 7-72911 |
| SWEDEN (46) | | |
| Goteborg Natural History Museum | Goteborg | 31-136-097 |
| Lund University—Ecology | Lund | 4-710-4716 |
| Lund University—Zoological Museum | Lund | 4-610-4541 |

INSECT COLLECTION NEWS

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|---|--|---|
| SWITZERLAND (41) CAB—International Institute of Biological Control | Delamont | 66-22-48-24 |
| SWITZERLAND (41) Cont. IUCN—World Conservation Centre Naturhistorisches Museum University Neuchâtel—Institut Zoologie | Gland Basel Neuchâtel | 22-64-29-26 61-29-55-46 38242695 |
| TAIWAN (886) Academy of Sciences National Defense Medical Center National Taiwan University—Zoology | Taipei Taipei Taipei | 2-783644 2-321-5794 2-362-9913 |
| THAILAND (66) Ciba—Geigy Thailand, Ltd. Mahidol University—Biology Royal Forestry Department | Bangkok Bangkok Bangkok | 2-552-1539 2-246-3026 2-579-8611 |
| TRINIDAD (809) Caribbean Agricultural Research and Development Institute | Port of Spain | 645-1208 |
| TURKEY (90) Ankara University Dokuz Eylül Üniversitesi—Buca Eğitim Fakültesi University of Anatolia | Ankara Buca-Izmir Eskisehir | 4-223-63-70 51-220-978 53616 |
| UGANDA (254) Uganda Institute of Ecology | Kampala | 2-503-511 |
| UNITED ARAB EMIRATES (971) United Arab Emirates University—Desert and Marine Environment Research Center | Al Ain | 3-664-524 |
| UNITED KINGDOM (44) CAB International—Institute of Biological Control CAB International—Institute of Entomology Furzebrook Research Station Imperial College, Silwood Park Imperial College—Center for Environmental Technology Institute of Terrestrial Ecology International Development Centre IUCN—Conservation Monitoring Centre London School of Hygiene and Tropical Medicine Ministry of Agric., Fisheries & Food, ADAS Central Science Laboratory National Museum of Wales Natural Resources Institute Polytechnic of East London—Environmental Sciences Royal Holloway and Bedford New College—Biology The Natural History Museum—Entomology The Natural History Museum—Library Services University of Aberdeen—Zoology University of Cambridge—Genetics University of Cambridge—Zoology University of Dundee—Biological Sciences University of East Anglia University of Edinburgh University of Essex—Biology University of Kent—Rutherford College—Institute of Conservation & Ecology University of Kent—Biological Laboratory University of Leeds—Pure & Applied Sciences University of London—Imperial College University of Newcastle Upon Tyne University of Oxford—Zoology University of Southampton—Biology University of Stirling Weston Research Laboratories Zoological Society of London—Institute of Zoology | Ascot London Wareham Ascot London Banchory Oxford Cambridge London Slough Cardiff Chatham London Egham London London Aberdeen Cambridge Cambridge Dundee Norwich Edinburgh Colchester Canterbury Canterbury Leeds London Newcastle Oxford Southampton Stirling Maidenhead London | 990-872901 71-581-1676 9295-51-087 990-20094 71-589-5319 3302-3303 865-273-3607 223-277-314 71-436-5389 753-824-058 222-373-219 634-880066 81-519-3740 784-37520 71-938-8937 71-938-9290 224-488-611 224-487-048 223-333-992 223-336-676 223-334-748 382-201-604 603-58-553 31-667-7938 206-873-598 227-459-025 227-763-912 532-336-017 71-584-7596 91-261-1182 865-310-447 703-558-163 786-63000 628-783-152 71-483-4436 |
| UNITED STATES (1) Academy of Natural Sciences—Entomology Alabama State Department of Agriculture Alaska State Department of Agriculture—Forest Service American Association of Museums American Association of Zoological Parks and Aquariums | Philadelphia, PA Montgomery, AL Sitka, AK Washington, D.C. Bethesda, MD | 215-299-1170 205-534-7175 907-747-6671 202-289-6578 301-907-2980 |

INSECT COLLECTION NEWS

| | | |
|--|----------------------|---------------|
| American Mosquito Control Assoc. | Santa Ana, CA | 714-971-3940 |
| American Museum of Natural History—Entomology | New York, NY | 212-769-5233 |
| UNITED STATES (1) cont. | | |
| Arizona State University—Zoology | Tempe, AZ | 602-965-2012 |
| Arkansas State University | State University, AR | 501-682-3713 |
| Auburn University—Entomology | Auburn, AL | 205-844-4814 |
| Austin Peay State University | Clarksville, TN | 615-648-7475 |
| Baylor University—Strecker Museum | Waco, TX | 817-755-3843 |
| Bee Research Laboratory | Tucson, AZ | 602-629-6493 |
| Bishop Museum—Entomology | Honolulu, HI | 808-841-8968 |
| Boston University | Boston, MA | 617-353-9323 |
| Boyce Thompson Institute | Ithaca, NY | 607-254-1242 |
| Brigham Young University | Provo, UT | 801-378-2800 |
| Brown University—Biology | Providence, RI | 401-863-3700 |
| California Academy of Sciences—Entomology | San Francisco, CA | 415-750-7106 |
| California Dept. Food & Agriculture—Insect Identification Laboratory | Sacramento, CA | 916-322-5913 |
| California Institute of Environmental Studies | Sonoma, CA | 415-332-6211 |
| California Polytechnic University—Biological Sciences | San Luis Obispo, CA | 805-756-1279 |
| California State Department of Agriculture—Forest Service | Gasquet, CA | 707-457-3131 |
| California State Fish & Game—Natural Heritage Div. | Sacramento, CA | 916-324-0475 |
| Carnegie Museum of Natural History | Pittsburgh, PA | 412-622-8837 |
| Case Western Reserve University | Cleveland, OH | 216-368-5088 |
| Center for Disease Control—Medical Entomology | Fort Collins, CO | 303-221-6476 |
| Chiquita Brands, Inc. | Cincinnati, OH | 513-784-8030 |
| City University of New York | New York, NY | 212-794-5325 |
| Clarkson University | Potsdam, NY | 315-268-38782 |
| Clemson University—Archbold Tropical Research Center | Clemson, SC | 803-656-0231 |
| Clemson University—Entomology | Clemson, SC | 803-656-5065 |
| Cleveland Museum of Natural History | Cleveland, OH | 216-231-5919 |
| Colorado State University | Fort Collins, CO | 303-491-7904 |
| Columbia University | New York, NY | 212-280-3295 |
| Conservation International | Washington, D.C. | 202-887-5188 |
| Cornell University—Entomology | Ithaca, NY | 607-255-3075 |
| Dartmouth College Museum | Hanover, NH | 603-646-2850 |
| Denver Museum of Natural History | Denver, CO | 303-331-6492 |
| Dow R/D—Human Resources | Indianapolis, IN | 317-870-7290 |
| Drexel University | Philadelphia, PA | 215-895-1714 |
| Duke University | Durham, NC | 919-684-5959 |
| Duke University—Forestry & Environmental Studies | Durham, NC | 919-684-5412 |
| East Carolina University | Greenville, NC | 919-757-4155 |
| Eastern Washington University | Cheney, WA | 509-359-6946 |
| EG & G Energy Measurements—Environmental Studies Project | Boulder City, NV | 702-293-7879 |
| Emory University | Athens, GA | 404-727-7845 |
| Entomological Society of America | Lanham, MD | 301-731-4538 |
| Field Museum—Entomology | Chicago, IL | 312-427-7269 |
| Florida Museum of Natural History | Gainesville, FL | 312-922-2572 |
| Florida Museum of Natural History—Natural Sciences | Gainesville, FL | 904-392-8793 |
| Florida State Department of Agriculture Soil Conservation Service | Gainesville, FL | 904-392-8508 |
| Florida State University | Gainesville, FL | 904-392-9367 |
| Florida State University—Biological Sciences | Tallahassee, FL | 904-377-1063 |
| Georgia Southern University—Arthropodology | Tallahassee, FL | 904-644-2515 |
| Gonzaga University | Tallahassee, FL | 904-644-9829 |
| Harvard University—Concord Field Station | Statesboro, GA | *912-681-5279 |
| Harvard University—Museum of Comparative Zoology | Spokane, WA | 509-484-2804 |
| Hawaii State DLNR—Aquaculture Development Program | Bedford, MA | 617-275-9613 |
| Hawaii State Department of Agriculture | Cambridge | 617-495-0500 |
| Idaho State University | Honolulu, HI | *808-548-5510 |
| ILJ Agric. Prod. | Honolulu, HI | 808-548-6100 |
| Illinois Natural History Survey—Biodiversity Center | Pocatello, ID | 208-236-4000 |
| Illinois State University—Biological Sciences | Wilmington, DE | 302-886-1553 |
| Indiana University | Champaign, IL | 217-333-4949 |
| Iowa State Department of Agriculture | Normal, IL | 309-438-3722 |
| Iowa State University | Bloomington, IN | 812-335-5678 |
| Iowa State University—Entomology | Des Moines, IA | 515-862-4768 |
| Johns Hopkins University—Immunol. Infectious Diseases | Ames, IA | 515-294-0907 |
| Kent University | Ames, IA | 515-294-8027 |
| Lamar University | Baltimore, MD | 301-955-7407 |
| Louisiana State University | Kent, OH | 216-672-2121 |
| Louisiana State University—Entomology | Beaumont, TX | 409-880-8404 |
| Maryland State Department of Agriculture | Shreveport, LA | 318-674-5449 |
| Michigan State University—Entomology | Baton Rouge, LA | 504-388-1643 |
| Milwaukee Public Museum | Beltsville, MD | 301-344-3675 |
| | East Lansing, MI | 517-353-9581 |
| | Milwaukee, WI | 414-223-1396 |

INSECT COLLECTION NEWS

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|--|---------------------------|--|
| Mississippi State University—Entomology Museum | Mississippi State, MS | 601-325-8837 |
| Missouri Botanical Garden | St. Louis, MO | 314-577-9595 |
| UNITED STATES (1) cont. | | |
| Missouri State Department of Agriculture | Kansas City, MO | 816-926-6381 |
| Montana State Department of Agriculture—Forest Service | Missoula, MT | 406-329-3347 |
| Montana State University | Bozeman, MT | 406-994-5133 |
| Montana State University—Entomology Research Laboratory | Bozeman, MT | *406-994-6029 |
| Montclair State College Upper | Montclair, NJ | 201-893-5455 |
| National Park Service—Hawaii Volcanoes Natl. Park—Research Division. | Volcano, HI | 808-967-8186 |
| National Park Service—Research Division | Yellowstone Nat. Park, WY | 307-344-7381 ext. 2323 |
| Natural History Museum of L.A. County | Los Angeles, CA | 213-746-2999 |
| New York Botanical Garden | Bronx, NY | 212-220-6504 |
| North Carolina State University | Raleigh, NC | 919-737-3787 |
| North Dakota State University—Entomology | Fargo, ND | 701-237-8557 |
| Northeast Missouri State University—Science Division | Kirkville, MO | 816-785-4181 |
| Ohio Biological Survey | Columbus, OH | *614-292-1538 |
| Ohio State University | Columbus, OH | 614-292-1538 |
| Ohio State University—Entomology | Columbus, OH | 614-292-2180 |
| Ohio State University—OARDC—Entomology | Wooster, OH | 216-265-3213 *216-263-3686 *405-889-7347 |
| Oklahoma State University—WWAREC | Lane, OK | |
| Old Dominion University | Norfolk, VA | 804-683-4505 |
| Orange County Vector Control | Garden Grove, CA | 714-971-3940 |
| Oregon State Department of Agriculture | Portland, OR | 503-423-2272 |
| Oregon State University—Entomology | Corvallis, OR | 503-737-3479 |
| Pacific Science Association | Honolulu, HI | *808-841-8968 |
| Pennsylvania State University—Entomology | University Park, PA | 814-865-3048 |
| Prairie View University | Prairie View, TX | 409-857-4956 |
| Princeton University | Princeton, NJ | 609-243-2032 |
| Providence University | Providence, RI | 401-865-2583 |
| Purdue University—Entomology | Purdue, IN | 317-494-0535 |
| Rutgers University | New Brunswick, NJ | 201-932-3407 |
| Saint Bonaventure University | St. Bonaventure, NY | 716-375-2005 |
| San Diego Natural History Museum | San Diego, CA | 619-232-0248 |
| San Diego State University | San Diego, CA | 619-265-5642 |
| Sandoz Crop Protection | Palo Alto, CA | 415-857-1125 |
| Santa Barbara Museum of Natural History | Santa Barbara, CA | 805-569-3170 |
| Savannah Riv r Ecology Laboratory | Aiken, SC | 803-725-3309 |
| Slippery Rock University | Slippery Rock, PA | 412-794-7507 |
| Smithsonian Institution—Assistant Director for Research | Washington, D.C. | 202-357-4482 |
| Smithsonian Institution—Botany | Washington, D.C. | *202-786-2563 |
| Smithsonian Institution—Entomology | Washington, D.C. | 202-786-2894 |
| Smithsonian Institution—Natural History Library | Washington, D.C. | 202-357-1896 |
| Southern Oregon State University | Ashland, OR | 503-482-6429 |
| Stanford University—Biological Sciences | Stanford, CA | 415-723-5920 *415-723-9253 915-837-8334 |
| Sul Ross State University | Alpine, TX | |
| Tennessee Valley Authority | Montgomery, AL | 205-832-3311 |
| Texas A&M University | College Station, TX | 409-845-4373 |
| Texas A&M University—Agric. Extension Service | College Station, TX | 409-845-6305 |
| Texas A&M University—Biology | College Station, TX | 409-845-2891 |
| Texas Agric. Extension Service | Lubbock, TX | 806-746-6528 |
| Tulane University | New Orleans, LA | 504-587-7417 |
| U.S. Department of Fish & Wildlife | Honolulu, HI | 808-548-2443 |
| U.S. Department of Fish & Wildlife—Pacific Is. Office | Honolulu, HI | *808-541-1216 |
| University of Alabama—Department of Biology | Tuscaloosa, AL | 205-348-6544 |
| University of Alaska | Anchorage, AK | 907-276-6156 |
| University of Arizona—School of Renewable Resources | Tucson, AZ | 602-621-7196 |
| University of California | Irvine, CA | 714-856-5814 |
| University of California | Los Angeles, CA | 213-206-6030 |
| University of California | Santa Barbara, CA | 805-961-4445 |
| University of California—Entomology | Berkeley, CA | 415-642-4612 *415-642-7428 |
| University of California—Entomology | Davis, CA | 916-752-7519 |
| University of California—Entomology | Riverside, CA | 714-787-3086 |
| University of California—Museum of Paleontology | Berkeley, CA | 415-642-1822 |
| University of California—Zoology | Davis, CA | 916-752-1449 |
| University of Cincinnati—Biological Sciences | Cincinnati, OH | 513-556-5299 |
| University of Colorado—Geography | Boulder, CO | *303-492-5105 |
| University of Dayton | Dayton, OH | 513-229-3433 |
| University of Delaware | Newark, DE | 302-451-6772 |
| University of Evansville | Evansville, IN | 812-479-2320 |

INSECT COLLECTION NEWS

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|--|--------------------|---------------|
| University of Florida | Gainesville, FL | 904-392-1582 |
| University of Florida—Agricultural Research & Educ. Center | Lake Alfred, FL | 813-956-1596 |
| UNITED STATES (1) cont. | | |
| University of Florida—Program for Studies in Tropical Conservation | Gainesville, FL | 904-392-9605 |
| University of Florida—Zoology | Gainesville, FL | 904-392-9166 |
| University of Florida—IFAS-CFREC | Leesburg, FL | 904-392-8940 |
| University of Georgia—Entomology | Athens, GA | 404-542-2279 |
| University of Georgia—Horticulture | Athens, GA | 404-542-0624 |
| University of Hawaii, Hilo—Biology Department | Hilo, HI | 808-933-3355 |
| University of Hawaii, Manoa—Entomology | Honolulu, HI | 808-956-2428 |
| University of Hawaii, Manoa—General Sciences | Honolulu, HI | 808-956-2191 |
| University of Hawaii, Manoa—Genetics | Honolulu, HI | 808-956-5506 |
| University of Hawaii—Cooperative Extension Service | Lihue, HI | 808-245-4473 |
| University of Idaho | Moscow, ID | 208-885-6424 |
| University of Idaho—Plant Soil & Entomological Science | Moscow, ID | *208-885-7760 |
| University of Idaho—Forestry | Moscow, ID | 208-885-6226 |
| University of Illinois—Entomology | Urbana, IL | 217-244-1224 |
| University of Illinois—Chicago | Chicago, IL | 312-413-3393 |
| University of Iowa | Iowa City, IA | 319-353-0381 |
| University of Kansas—Dept. Biological Sciences | Lawrence, KS | 913-864-5321 |
| University of Kansas—Snow Entomological Museum | Lawrence, KS | *913-864-5321 |
| University of Kentucky | Lexington, KY | 606-257-4000 |
| University of Kentucky—Entomology | Lexington, KY | *606-258-1120 |
| University of Maine | Bangor, ME | 207-947-0336 |
| University of Maryland—Entomology | College Park, MD | 301-454-0167 |
| University of Maryland—Zoology | College Park, MD | 301-454-1572 |
| University of Massachusetts | Amherst, MA | 413-545-2328 |
| University of Massachusetts—Entomology | Amherst, MA | 413-545-2532 |
| University of Miami | Coral Gables, FL | 305-361-9306 |
| University of Miami—Biology | Coral Gables, FL | 305-284-5425 |
| University of Michigan—Biology | Ann Arbor, MI | 313-747-884 |
| University of Minnesota | Minneapolis, MN | 612-331-5660 |
| University of Minnesota—Ecology & Behavioral Biology | Minneapolis, MN | 612-625-8946 |
| University of Mississippi | University, MS | 612-432-2757 |
| University of Missouri—Entomology | Columbia, MO | 601-232-7731 |
| University of Montana | Missoula, MT | 314-882-1469 |
| University of Nebraska | Lincoln, NB | 406-243-6899 |
| University of Nebraska—Entomology | Lincoln, NB | 402-472-5110 |
| University of Nevada—Reno | Lincoln, NB | 402-474-4687 |
| University of New Hampshire—Entomology | Reno, NV | 702-784-1300 |
| University of New Mexico | Durham, NH | 603-862-2030 |
| University of New Mexico—Biology | Albuquerque, NM | 505-277-2026 |
| University of North Carolina | Albuquerque, NM | 505-277-0304 |
| University of North Dakota | Chapel Hill, NC | 919-962-1102 |
| University of Notre Dame | Grand Forks, ND | 701-777-3761 |
| University of Oklahoma | South Bend, IN | 219-239-6775 |
| University of Pennsylvania | Norman, OK | 405-271-3297 |
| University of Pittsburgh | Philadelphia, PA | 215-898-6619 |
| University of Rhode Island | Pittsburgh, PA | 412-624-1526 |
| University of Rhode Island—Zoology | Kingston, RI | 401-789-3342 |
| University of Rochester | Kingston, RI | 409-792-2892 |
| University of San Diego | Rochester, NY | 716-275-4118 |
| University of San Francisco | La Jolla, CA | 619-452-2720 |
| University of South Carolina | San Francisco, CA | 415-386-1074 |
| University of South Dakota | Columbia, SC | 803-777-5204 |
| University of Southern California | Vermillion, SD | 605-677-5073 |
| University of Southwestern Louisiana—Biology | Los Angeles, CA | 213-747-4176 |
| University of Tennessee | Lafayette, LA | 318-231-6521 |
| University of Texas | Knoxville, TN | 615-247-6536 |
| University of Texas—Zoology | Austin, TX | 512-471-9241 |
| University of Utah | Austin, TX | 512-471-6078 |
| University of Utah—Biology | Salt Lake City, UT | *512-471-9651 |
| University of Washington—Burke Museum | Salt Lake City, UT | 801-581-3007 |
| University of Wisconsin | Seattle, WA | 801-581-4668 |
| University of Wisconsin—Entomology | Stevens Point, WI | 206-545-8049 |
| University of Wyoming | Madison, WI | 715-346-2742 |
| USDA APHIS—PPQ | Laramie, WY | 608-262-3322 |
| USDA Fruit Fly Laboratory | Hyattsville, MD | 307-766-2256 |
| USDA—FS | Honolulu, HI | 301-436-8584 |
| USDA—IABBBRL | Hilo, HI | 08-988-7290 |
| USDA—SEL at Smithsonian Institution | Gainesville, FL | *808-935-9801 |
| USDA—SEL-Administrative Offices | Washington, D.C. | 904-374-5781 |
| | Beltsville, MD | 202-786-9422 |
| | | 301-344-5482 |

INSECT COLLECTION NEWS

| | | |
|---|------------------|---------------|
| Utah State University-Natural Resources Building | Logan, UT | 801-750-2963 |
| Utah State University—Utah State Department of Agriculture | Logan, UT | 801-750-3070 |
| UNITED STATES (1) cont. | | |
| Vermont State Department of Agriculture Soil Conservation Service | Winooski, VT | 802-951-6327 |
| Villanova University | Villanova, PA | 215-645-7033 |
| Virginia Museum of Natural History | Martinsville, VA | 703-632-6487 |
| Virginia Polytechnic Institute & State University | Blacksburg, VA | 703-231-7826 |
| Virginia State Department of Agriculture | Alexandria, VA | 703-756-3896 |
| Waikiki Aquarium | Honolulu, HI | *808-923-1771 |
| Wake Forest University | Wake Forest, NC | 919-759-5669 |
| Washington State University | Pullman, WA | 509-335-6532 |
| Washington University | St. Louis, MO | 314-425-3326 |
| West Virginia State Department of Agriculture | Morgantown, WV | 304-291-4628 |
| West Virginia University—University Arthropod Collection | Morgantown, WV | 304-293-2462 |
| Western Washington University College of Environmental Studies | Bellingham, WA | 206-676-3037 |
| Widener University | Chester, PA | 215-876-9751 |
| World Wildlife Fund—Biodiversity Support Program | Washington, D.C. | 202-293-9211 |
| Yale University | New Haven, CT | 203-432-6770 |
| VATICAN CITY (39) | | |
| Pontifical Academy of Sciences | Vatican City | 6-698-5218 |
| VENEZUELA (58) | | |
| Agro Industria el Babo C.A. | Caracas | 2-283-8042 |
| Universidad Central de Venezuela | Caracas | 2-662-2486 |
| Universidad Simon Bolivar—Biologia de Organismos | Caracas | 2-962-1695 |
| YUGOSLAVIA (38) | | |
| University of Maribor | Maribor | 62-212-013 |
| ZIMBABWE (263) | | |
| University of Zimbabwe | Harare | 4-303-292 |