



ranges and their periods of occurrence. Major projects are continuing using the collections in a wide range of biological investigations in the broad field of evolutionary studies; these include host relationships with both plants and animals, the evolution of mimicry and sexual dimorphism, studies on functional anatomy, ecological associations in a wide range of habitats from corpses and dung to tree tops and birds' nests, and faunal studies in various parts of the world contributing to broader zoogeographical analyses. But all these are only possible because of our rich data base. The collections, comprising 25 million insect specimens and over 800 thousand species together with an unrivalled library are continuously used for basic taxonomic and systematic work which attempts to make both species recognition and classifications approximate more closely to biological reality. This work, involving careful pinning, setting, labelling, dissecting, mounting and drawing of many thousands of specimens annually, together with endless sorting of earlier material and both published and unpublished data, ultimately provides the basis for classifications which all other biologists use when communicating their information internationally on insects and living systems.

The oldest collections in the Department are those of Leonard Plukenet (1642-1706), James Pettiver (1668-1718) and Joseph Banks (1743-1820). Historic collections such as these, together with our large holdings of primary type material (30% of described insect species) and the vast library, permit a particular type of research, much of which is basic to the production of stable classifications that can be used by other biologists. Some groups are particularly well represented - we have about 90% of the described species of fleas and butterflies whereas others are poorly represented, such as hymenoptera, with only 25% of described species. Modern collections, usually resulting from field work by members of staff, bear more extensive and more accurate biological data than is found in older collections, and such material can be

used for more exacting scientific studies.

Expanding these collections cannot be our greatest priority because of the work involved. At present we loan about 50 thousand specimens each year most of which need laborious cross-pinning before being carefully packed and despatched - and then equally careful handling on return. Moreover we receive about 4,000 visitors to the Entomology collections each year. For practical reasons such as these, as well as other scientific reasons including our position with respect to nature conservation, we expand the collections in limited areas only. This policy of structured growth, adding material where it is particularly required for current research, or to fill major lacunae in representation, involves sufficient problems to stretch our resources. At present we add about 250 thousand specimens annually to the collections - any more would require more staff; more staff and more collections would require more accommodation including more buildings.

Purposeful structured growth, and clearly defined objectives in the use of the collections accumulated, are the operative concepts in our Department. An alternative point of view, that we should be obtaining specimens of every possible species from endangered tropical forests, is impractical; we could not deal with the specimens. Moreover, if such species are really likely to become extinct, is it desirable that large amounts of public money should be committed to their storage and study? What would be the benefit to the taxpayer of accumulating and storing such extinct species - when there are so many more co-existing with us that are little understood? Similarly, active participation in large ecological surveys has to be carefully considered, and often rejected on sound financial and scientific grounds. Accumulating additional material which would divert efforts from our own research output would reduce us simply to a storehouse, despite our desire to acquire voucher specimens from other biologists' research. Even purchases of new collections can be

counterproductive in scientific terms - it can spur the professional collector to greater efforts at the expense of the environment.

Collections are often regarded in terms of prestige - the pride of possession. I have attempted to indicate why we have collections of insects - what they are used for. In the words of the 1940 poster - is your collection really necessary? Or would the world have been a better place if the organisms had been left to live and breed?

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### Bishop Museum Initiates Rainforest Canopy Insect Research in Papua New Guinea

Scott E. Miller,  
Department of Entomology,  
Bishop Museum, Honolulu

With a grant from the New England Biolabs Foundation, the Bishop Museum's Departments of Entomology and Zoology are initiating the first phase of a long-term project to explore the diversity and ecology of insects in the tree-top canopies of rainforests in Papua New Guinea. The program, which is a cooperative venture with the Wau Ecology Institute (Wau, Papua New Guinea), is led by the Chairmen of the Museum's Departments of Zoology and Entomology, Drs. Allen Allison and Scott Miller, respectively. This effort is an outgrowth of earlier work by Dr. Allison and late Museum entomologist Dr. Wayne Gagne.

Along with developing a database on New Guinea diversity and ecology, results will be compared with those of Dr. Terry Erwin (Smithsonian Institution) in South America, Dr. Nigel Stork (British Museum) in Southeast Asia, and Dr. Wayne Gagne in Hawaii. Erwin's work has revised basic concepts in tropical ecology, especially by postulating that there may be as many as 30 million species of insects in the world.

**Parasitic Hymenoptera Course**

Scott E. Miller,  
Department of Entomology,  
Bishop Museum, Honolulu

The Hymenopterists (USDA Systematic Entomology Laboratory, Biosystematics Research Center, and the American Entomological Institute) who produce the annual Parasitic Hymenoptera identification short course for the Maryland Center for Systematic Entomology are considering holding their course in Honolulu, probably in the summer of 1989. The course would be co-sponsored by the Bishop Museum and the University of Hawaii. Please let the Bishop Museum know if you are interested in participating: a mailing list is being developed for further information.—Department of Entomology, Bishop Museum, P.O. Box 19000-A, Honolulu, HI 96817, U.S.A.

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**Program Symposium:  
Diversity and Dynamics of  
North American Insect and  
Arachnid Fauna - at the ESA  
National Conference,  
Galt House, Louisville, Kentucky,  
December 4-8, 1988**

**Session I: Endopterygota**

- Opening Remarks - M. Kosztarab  
(VA Polytech Inst & St Univ)
- Session Moderator - R. McGinley  
(Smithsonian): Taxonomic Resources  
and the Two Biodiversity Crises
- Neuroptera Systematics: Present Status  
and Future Needs - C. Tauber  
(Cornell) and P. Adams
- Present and Future Systematics of  
Coleoptera in North America -  
R. Arnett, Jr. (Florida State Collection  
of Arthropods)
- Present Status and Future Prospects of  
Our Knowledge of North American  
Trichoptera - G. Wiggins  
(Royal Ontario Museum)
- Current Status of our Knowledge of  
Lepidoptera in North America -  
C. Covell, Jr. (University of Louisville)
- Biosystematic Information-Dipterists Ride  
the Third Wave - F.C. Thompson  
(USDA/SEL)
- Status Report on Biosystematics of  
Nearctic Hymenoptera: Prospects and  
Problems - L. Masner (BCR - Agr.  
Canada - Ottawa)

**Session II: Exopterygota and Acari**

- Opening Remarks - L. Knutson  
(USDA/ARS)
- Session Moderator - J. Coddington  
(Smithsonian): Non-Acarine Arachnid  
Systematics and Resources in North  
America
- The Status and Future of the  
Ephemeroptera, Plecoptera and  
Odonata Systematics - W. McCafferty  
(Purdue), B. Stark (Mississippi College),  
A. Provonsha (Purdue)
- Speciation and Biogeography of United  
States Orthoptera - D. Otte  
(Philadelphia Acad Sci)
- Diversity of Parasitic Insects-Anoplura,  
Mallophaga and Siphonaptera -  
K.C. Kim (Penn State Univ),  
K.C. Emerson (Sanibel, Florida),  
R. Traub (Smithsonian)
- Hemiptera of North America: Whence  
and Whither - C. Schaefer (Univ  
Connecticut)
- Problems and Needs in the Study of  
Homoptera - M. Kosztarab  
(VA Polytech Inst & State Univ),  
L. O'Brien (Florida Agr & Mech Univ),  
M. Stoetzel (USDA/SEL),  
P. Freytag (Univ Kentucky)
- Small and often Neglected Insect Orders -  
D. Nickle, S. Nakahara (USDA/SEL)
- Status of North American Acari -  
B. O'Connor (Univ Michigan)

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**Update on the  
U.S. National Biological  
Survey (NABIS)**

Michael Kosztarab, Virginia  
Polytechnic Institute and  
State University

Since the publication of the "Founda-  
tion for a National Biological Sur-  
vey" (215 pp.), Kim, K.C. and Knut-  
son, L. (eds.), by the Association of  
Systematics Collections in 1986, our  
progress with the survey initiation ef-  
fort was temporarily halted due to the  
Gramm-Rudman-Hollings Federal defi-  
cit control legislation.

In the mean time the number of  
scientific associations and organizations  
endorsing the NABIS concept increased  
from 33 to 39. Over 200,000 scientists  
are represented by the endorsing organi-

zations in the United States today.

It would be a great mistake for this  
nation to wait with the survey until the  
deficit reduction legislation fades away.  
Unfortunately, U.S. biologists have  
failed to emphasize and publicize  
strongly enough in the past - another  
**NATIONAL DEFICIT THAT GROWS  
BY GEOMETRIC PROGRESSION** -  
it is the neglect of our biota! We have  
to start inventorying and monitoring  
our living natural resources and ecosys-  
tems now before it is too late and be-  
fore more habitats are irreversibly al-  
tered. Therefore, initiating a national  
biological survey is an issue in morali-  
ty because future generations will bene-  
fit or be harmed accordingly.

Fortunately, a Bill (H.R.#4335)  
was introduced on March 31, 1988 by  
Congressman J.H. Schiner (D-NY) and  
co-sponsored by 16 other congressmen,  
for the "National Biological Diversity  
Conservation and Environmental Re-  
search Act" that will establish an inde-  
pendent "National Center for Biological  
Diversity and Environmental Research".  
When passed, it will provide \$25 mil-  
lion for the initial three years for bio-  
logical survey and conservation related  
activities. Scientists and private citi-  
zens should write to their legislators to  
request co-sponsorship or at least sup-  
port for the Bill.

More information on the Bill may  
be obtained from Dr. David Blockstein,  
Congressional Fellow, at (202) 226-  
6980, who has been instrumental in  
drafting the Bill, and is being supported  
by AIBS and AAZ.

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**Florida State Collection of Arthropods (FSCA)**

Harold A. Denmark, FSCA,  
Gainesville

The Florida State Collection of Arthropods (FSCA), Florida Department of Agriculture and Consumer Services, had its beginning in 1915 with the inception of the State Plant Board of Florida. It became the Division of Plant Industry in 1960. There was little emphasis in developing the collection the first 40 years. Since the middle 1950's it has grown to over six million curated arthropod specimens, which places it about fifth in size in U.S.A. arthropod collections. Other than two compactors (one for slide mounted specimens and one for alcohol preserved specimens) the FSCA has been developed from State funds. The physical plant of the FSCA consists of a total of 13,588 square feet in a wing of the Doyle Conner Building located next to the campus of the University of Florida. The pinned collection is housed in 14,838 Cornell-type drawers. There are approximately 30,000 pints of alcohol preserved specimens collected primarily in the southeastern U.S.A. and the Caribbean basin. However, it contains samples world wide collected primarily in blacklight traps. There are also over 160,000 processed vials of specimens. The slide mounted specimens exceed 235,000 and 250,000 envelopes of processed specimens. The FSCA contains 3,500 primary types and 15,000 paratypes. It is also developing a voucher collection, especially parasites and predators that are being cleared through its biological control laboratory for release into the environment.

There are nine staff entomologists and over 275 research associates affiliated with FSCA. Approximately 150,000 identifications are made annually, primarily by the staff, with a smaller number identified by the research associates. The FSCA is equipped with a Halon 1301 gas system in each museum room for fire protection. The system is activated within 95 seconds after the fire alarm is sounded. Both museum rooms have its walls

extended to the ceiling providing air tight rooms that are fumigated twice a year with methyl bromide gas rather than using PDB or naphthalene repellents. All specimens are fumigated before being added to the collection. The FSCA probably is the most fire-proof and pest-proof museum anywhere.

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**Bishop Museum  
Department of  
Entomology Remodelling**

Scott E. Miller, Bishop Museum

Progress continues in remodelling the department. The collections are being concentrated onto the first floor in three compactor systems (pinned, fluid, and slides), while staff is being moved to new offices on the second floor. The compactors have been installed with NSF funding, and most of the collection has been moved. The two floors are being sealed and air conditioned. This effort will provide a firm foundation for major curatorial efforts in the future. Prior to this remodelling, the department endured removal of acoustic ceilings which contained asbestos fibers.

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**Entomological Staff at the  
Smithsonian Institution (SI)**

Ron McGinley, SI

The entomological collections of the Smithsonian Institution are worked on by a diverse group of researchers employed by four different agencies. All Smithsonian staff and most USDA personnel are located at the National Museum of Natural History on the mall in Washington, D.C. 20560. Different areas of the Museum have different mail stops that are listed below, e.g., NHB-105; the mail stop should be included on all mailing addresses. Some USDA

staff, indicated with an \* are located at USDA, Building 004, BARC-West, Beltsville, Maryland 20705. The medical entomologists (Army's WRBU mosquito unit, the NIH supported tick unit and Robert Traub) are located at the Smithsonian's Museum Support Center, 4210 Silver Hill Road, Suitland, Maryland 20746 [indicated below by \*\*]. The area code for telephone numbers in Washington D.C. is 202, it is 301 for Maryland numbers. Only research interests are listed; collection assignments will be provided at a later date.

**ARACHNIDS/MYRIAPODS:**

SMITHSONIAN: Jonathan Coddington Araneoidea (357-4148; NHB-164); Assistant: Scott Larcher (357-4108).  
USDA: \*Edward Baker [retired], Acari (344-3890); \*Robert Smiley, Cunaxidae (344-3891).  
NIH: \*\*James Keirans, Ticks/Ixodoidea (423-1085); Assistant: \*\*Richard Robbins (423-5693).

**COLEOPTERA:**

SMITHSONIAN: Terry Erwin, Carabidae (357-2209; NHB-169); Paul Spangler, aquatic Coleoptera (357-2061; NHB-169); Assistants: Robin Faitoute (357-3072); Gloria House (357-3072); Linda Sims (357-2469).  
USDA: Donald Anderson, immature Coleoptera (382-1794; NHB-169); \*James Dogger, Elateridae (344-3974); Robert Gordon, Coccinellidae, Scarabaeidae (382-1792; NHB-169); \*John Kingsolver, Bruchidae (344-3229); Theodore Spilman [retired] Elateridae (382-1789); Richard White, Anobiidae, Chrysomelidae (382-1793; NHB-169); Donald Whitehead, Curculionoidea (382-1790; NHB-169).

**DIPTERA:**

SMITHSONIAN: Wayne Mathis, Ephydriidae (357-1566); Assistant: Hollis Williams (357-2355).  
USDA: Raymond Gagne, Cecidomyiidae (382-1796; NHB-169); Lloyd Knutson, Sciomyzidae (382-1799; NHB-169); Allen Norrbom, Tephritidae, Agromyzidae (382-1795; NHB-169); Robert Peterson, Simuliidae (382-1797; NHB-169); George Steyskal

[retired] (382-1798); F. Christian Thompson, Syrphidae (382-1800; NHB-169); Norman Woodley, Stratiomyomorpha, Tachinidae (382-1802; NHB-169); Assistant: Nit Malikul (357-2355).

WRBU (Mosquito Unit; all 238-3165): \*\*E.L. Peyton; \*\*Daniel Strickman; \*\*Ronald Ward; \*\*Richard Wilkerson. WRBU/SMITHSONIAN contract: Yiau-min Huang (238-3165).

**HEMIPTERA/HOMOPTERA:**

SMITHSONIAN: Richard Froeschner, Tingidae (357-2365; NHB-127); Assistant: Ludmila Kassianoff (357-2844). USDA: Thomas Henry, Miridae, Berytidae (382-1780; NHB-127); \*Douglass Miller, Coccoidea (344-3183); \*Sueo Nakahara, Thysanoptera, Aleyrodidae (344-3893); \*Louise Russell [retired] (344-3896); \*Manya Stoetzel, Aphididae, Phylloxeridae (344-3168).

**HYMENOPTERA:**

SMITHSONIAN: Karl Krombein, Aculeate Hymenoptera (357-2289, NHB-105); Ron McGinley, Apoidea (357-2834, NHB-105); Assistants: Mary Jo Molineaux (357-1821), Beth Norden (357-2604). USDA (all NHB-165): Robert Carlson, Ichneumonidae (382-1806); Eric Grissell, Chalcidoidea: Torymidae, Pteromalidae, (382-1781); Paul Marsh, Braconidae (382-1782); Arnold Menke, Aculeate Hymenoptera, especially Sphecidae (382-1803); Michael Schauff, Chalcidoidea: Eulophidae, Mymaridae (382-1784); David Smith, Symphyta (382-1783); Assistant: Terry Nuhn (357-1856).

**LEPIDOPTERA:**

SMITHSONIAN: John Burns, Hesperidae (357-2268; NHB-169); J.G. Gates Clarke [retired] Microlepidoptera, esp. Oecophoridae (357-2086; NHB-127); Donald Davis, Ditrysia and Monotrysia, (357-2367; NHB-127); Robert Robbins, Lycaenidae (357-2353; NHB-127); Assistants: Donald Harvey (357-2648), Vichai Malikul (786-2069); Adrienne Venables (357-2648). USDA (all NHB-127): Douglas Ferguson, Geometroidae, Pyraloidea (382-1777);

Ronald Hodges, Gelechioidea (382-1778); Robert Poole, Noctuidae (382-1786); Alma Solis, Pyralidae (382-1785); Assistant: Rebecca Stanger (382-2648)

**MISC.:**

SMITHSONIAN: Oliver Flint, Trichoptera, Megaloptera (357-2169; NHB-105); Assistant: Nancy Adams (357-1897).

SMITHSONIAN COLLECTIONS MANAGER: Gary Hevel (357-2317; NHB-165).

SMITHSONIAN INFORMATION/COMPUTER MANAGER: Jerry Louton (357-1867; NHB-165).

SMITHSONIAN RESEARCH ASSOCIATE: \*\*Robert Traub, Siphonoptera (238-3161).

USDA: David Nickle, Orthoptera, Isoptera (382-8982; NHB-105).

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**COLLECTION NEWS**

**Linnavuori Collection Purchased by American Museum of Natural History**  
Norman Platnik, AMNH, New York

The American Museum of Natural History recently purchased the collection of Rauno Linnavuori. Beginning in the 1950's Dr. Linnavuori began to study Heteroptera and Homoptera and assemble a collection of these groups. In the intervening years he has put together a collection that is unmatched in its coverage of north Africa and the Middle East. Much of the material in Linnavuori's collections comes from his own field work, but he has also acquired representatives of many taxa through exchange. This material complements the already strong holdings of the American Museum in the Heteroptera and greatly strengthens its collections of Homoptera. At present the Museum has received over 1500 holotypes, about equally divided between the Heteroptera and Homoptera, and an additional 30,000 specimens of Homoptera. Enquires about borrowing Linnavuori

types or specimens of Homoptera should be directed to Dr. Randall T. Schuh, Department of Entomology, American Museum of Natural History, New York, New York 10024.

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**Tsuneki Hymenoptera Collection**

Beth B. Norden, Smithsonian Institution, Washington, D.C. USA

The NMNH has recently acquired about 45,110 specimens of Sphecoidea and Apoidea from the outstanding personal collection of Dr. Katsuji Tsuneki. For over 40 years, Dr. Tsuneki has been a leading Hymenoptera taxonomist in the oriental region, collecting and publishing prodigiously. He amassed extensive material from Japan, China and Korea during his military service in the late 1930's, and from Taiwan during two trips of six months in the mid 1960's. During the 1950's, a letter to Dr. Karl Krombein initiated a professional acquaintance that over the years grew into a deep friendship. This permitted Dr. Krombein during a 1972 visit to Japan to discuss the possibility of depositing the Tsuneki material into the Smithsonian's collection. In 1985 Dr. Tsuneki made a donation of 38,322 bees and wasps (including 42 holotypes and numerous paratypes) from Japan, Korea, China, Mongolia, and the Philippines. Then in 1987 the museum purchased his Taiwanese collection of 6,785 specimens which included 122 holotypes and 893 paratypes. Our research base has been greatly expanded by the acquisition of the Tsuneki collection.

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**MCZ "Ant grant"**

James M. Carpenter, MCZ/Harvard University, Cambridge

(NSF grant BSR-8617129; \$142,438 from March 1, 1987 - August 31, 1989; with E. O. Wilson, J. M. Carpenter, M. D. Bowers and S. R. Shaw as Co-PIs)

This is a facilities grant, intended to upgrade the curation of the MCZ Formicidae collection, the largest in the world. Our estimate of the size of the collection prior to obtaining the grant was over one million prepared specimens, with some 7000 species represented. NSF funds have been used for hiring a visiting curator (Dr. Mark W. Moffett, who received his PhD from Harvard in 1987), hiring a curatorial assistant (Stefan Cover) and student help, and purchasing steel cabinets and insect drawers for expansion. During the first year we've concentrated on reorganization of the collection into the new cabinets and drawers, and preparation of uncurated material. To support this effort, the MCZ has paid for renovation of two collection rooms (413A & B), and is sponsoring the visits of formicid specialists (Andre Francour, Phil Ward and Steve Shattuck so far; more to follow this summer). Those who remember the cramped conditions in the old ant room will be pleasantly surprised to see it now. The wall between this room and the next has been knocked out, the floor and walls redone, and a great deal more space added. Those attending the ESA annual meeting in Boston last December have already seen the "new look", since we sponsored a workshop in neotropical ant identification (organized by Diana Wheeler and Mark Moffett), which about 50 people attended. An auspicious start!

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**1988 CNC Collection Status Survey**

Lubomir Masner, Biosystematics Research Institute, Agriculture Canada, Ottawa

Natural history collections can be evaluated either numerically (census) or qualitatively (status). The merits of both methods are obvious for both internal and external users. The Census of the Canadian National Collection (CNC) of Insects, Arachnids and Nematodes was carried out in 1982, yielding an approximate figure of 12.5 million specimens. The 1988 Status Survey of the CNC was done for the first time in the history of the Collection (established in 1886). The objectives of the Survey were (a) in depth, fact finding mission, (b) evaluation of the entire CNC by new collection codes (see below), (c) prospects and problems, (d) introduction of curatorial achievements as a criterion in annual performance appraisals, (e) introduction of incentives for high achievers, (f) solution of existing problems with new strategies and approaches, (g) evaluation of manpower, space and safety. The new collection codes (1-6) used in the Survey are those proposed by the Smithsonian Entomology Collections Committee (Smithsonian Institution, Washington, D.C.; R. McGinley and L. Masner, in prep.). A total of 1,201 cabinets with 26,782 drawers, 213,131 vials and 396,000 slides were examined during the period of January-April 1988. Each unit (drawer, slide box, vial rack) was individually inspected, evaluated and data entered on a stencil. Data from stencils were compiled on family, superfamily and order levels and projected into computer generated bargraphs. Copies of individual bargraphs (e.g., family level) are available for interested clients upon request (write to L. Masner). The total figures show that the CNC in 1988 is a relatively mature collection (50% at code 6), growing dynamically (codes 2 and 3 with 15% and 18% respectively), with relatively small backlog of semi-processed material (2% of code 1) and only a small portion requiring formal curation (codes 4 and 5 with 8% and 7% respectively). Thus,

the overall consensus of the Survey is positive and reasonably optimistic. Most of the CNC consists of freshly collected material, collected predominantly in the past 30 years, processed with modern technology and housed in modern steel cabinets. This trend continues at the present time especially with the increased use of new or improved collecting and processing techniques developed by the staff members in the past decade. New strategies in use of manpower (e.g., team approach) as well as more effective use of curatorial and field budgets were essential for the success..

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**Specimen Preparation Costs: Time and Money**

Gary F. Hevel, Department of Entomology, Smithsonian Institution

In recent evaluations of time and cost factors relative to specimen preparation, personnel at the Smithsonian Institution suggest the following figures, considering 100 specimens:

Pinning.....	30 minutes
Further handling, especially positioning appendages, placing on and removing from drying boards.....	14 minutes
Label cutting and placement on pins.....	26 minutes
<hr/>	
Pointing.....	120 minutes
Label cutting and placement on pins.....	26 minutes

Considering interruptions, processing should take place at the rate of one specimen per minute when pinning, and 1.6 specimens per minute when pointing. Two other common procedures evaluated were spreading Lepidoptera (approximately 20 specimens per hour), and sorting to Order from alcohol (approx. 400 specimens an hour). Current cost at basic technician salary (\$14,822. per year):

- Pinning.....one specimen charge is 12 cents.
- Pointing.....one specimen charge is 8 cents.
- Sorting from alcohol....one specimen charge is .02 cents.
- Spreading Lepidoptera...one specimen charge is 36 cents.

It would be valuable to receive comparative ideas on this data.— Gary F. Hevel, Collections Manager, Department of Entomology, NHB 165, Smithsonian Institution, Washington, D.C. 20560.

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VENDOR NEWS

Entomology Supply Vendors

Gary F. Hevel, Department of Entomology, Smithsonian Institution

Locating a dependable vendor of certain entomological supplies can be difficult at times. Smithsonian Institution entomology staff have found the following companies to be consistently satisfactory for the products listed:

- Wild Microscope Bulbs, Osram 8018: Bulbtronics, Inc., 45 Banfi Plaza, Farmington, New York 11735. Telephone number is 1-800-654-8542. Current Price: \$8.50 each—\$7.50 at 50 bulbs—\$5.75 at 100.
- Vials, Patent Lip: Arrow Glass of Vineland, 1217 Garrison Road, P.O. Box 2308, Vineland, New Jersey 08360. Tele. 609-691-1350. Current Price: (3 dram vials), \$17.90 per gross.
- Acme Vial & Glass Co., Inc., 1601 Commerce Way, Paso Robles, California 93446. Tele. 805-239-2666. Current Price: (3dm vials), \$147.90 per case of 1,490 vials.

- Unit Pinning Trays: Quincy Paper Box Company, Vermont & Third Streets, Quincy, Illinois 62301. Tele. 217-222-7400. Current Prices: (with purchases of 5,000 or more units): 4" x 1 7/8" x 1 3/8" at \$149.89 per 1000. 4" x 3 7/8" x 1 3/8" at \$170.00 per 1000. 7 13/16" x 4" x 1 3/8" at \$200.38 per 1000.

Comparative information on these and other supplies would be greatly appreciated.

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CATALOG AND DATABASE PROJECTS

Catalog of Australasian/Oceanian Diptera

Scott E. Miller, Department of Entomology, Bishop Museum

The Catalog of Australasian/Oceanian Diptera, edited by Neal L. Evenhuis, is in the final phases of production. The manuscript is being finalized and should be sent to the printer this fall with an estimated publication date of early 1989. Over 15,700 valid species are treated in this catalog, which will mark the completion of regional catalogs for the Diptera. The geographical scope encompasses Australia, New Guinea, New Zealand and oceanic islands north to Hawaii and east to Easter Island. In addition, a comprehensive bibliography will accompany the catalog text, which will contain over 4,000 citations giving accurate publication dates for virtually all articles mentioned in the catalog.—Scott E. Miller, Chairman, Department of Entomology, Bishop Museum.

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Smithsonian Hymenoptera Catalog Project, From ELECTRONIC PUBLISHING FOR SI RESEARCH

a Report of the Working Group on Electronic Publishing (1988) Chair: Barbara Spann, Smithsonian Institution Press

Under the auspices of NMNH, entomologists from SI, United States Department of Agriculture, and major universities have collaborated for many years on this compendium of knowledge concerning a major group of insects that includes ants, bees, and wasps. The Catalog of Hymenoptera in America North of Mexico was published in 1979 by SIP as the successor to a 1951 version and two subsequent supplements in 1958 and 1967.

The Catalog reflects the considered judgments of entomologists as to the valid species, genera, and families of Hymenoptera; it compiles distribution data and descriptions of morphology, behavior, and biological functioning; it indicates where type specimens (which define species) are housed; it provides bibliographical references to earlier studies and a listing of all the names that have been applied to these insects in previous publications.

The 1979 publication (2725 pages in 3 large volumes) was generated from a database that resided under the SELGEM software on SI's Honeywell mainframe. Literature coverage for some sections of the printed catalog had stopped in 1972, in others there were citations for works published as late as 1976. There have been efforts since 1979 to continue entering data in some sections of the database but progress has been uneven. Revision and expansion of such a catalog is a never-ending necessity: new species of insects are identified; certain insects are reported in areas where they had never been observed before; and new insights are advanced concerning reproductive cycles. However, revising, expanding, or querying this database was exceedingly cumbersome under SELGEM.

SI has shown its support for the Hymenoptera Catalog by recently committing over \$100,000.00 to a project that is converting the database from its SELGEM format on the Honeywell to the INQUIRE database management system running on SI's IBM 4381 mainframe. This conversion will allow the participating hymenopterists to log on to the new system and make direct updates and queries to the database. SI's commitment to the conversion project was made as a result of a ground-swell of interest in the Catalog that was expressed by SI and USDA staff, other hymenopterists worldwide, botanists, parasitologists, pollination ecologists, and others interested in this important group of insects.

The "migration" to the 4381 involves a new appreciation for the Catalog in its electronic existence apart from the variety of ways its information may be communicated. No longer is the computer file regarded as simply a precursor to a printed publication. Much of the free-form text of the SELGEM file is being honed to the standards of a highly structured database so that interactive queries may be addressed to it by end users. Certainly the Catalog in its revitalized form will give rise to printed publications in the future, but it is apparent already that some of the most valuable ways to communicate its information will be electronic.

This project fits the criteria for electronic publication described in this report in the following ways. (1) Even with repeated revisions and supplements it has been impossible to keep the printed Catalog up to date because it accumulated thousands of new citations annually. (2) It is already large and will grow larger to the point of being enormously expensive to print in its entirety. (3) It is now being put into precise database form and will be easily searchable in INQUIRE; scientists outside SI will want to have the same ability to query the database as that which will be afforded to the hymenopterist contributors. (4) Users will want not only to search the Catalog electronically, they will also want to extract and appropriate

subsets of the database directly into their own computerized activities.

Supporters of the Catalog can visualize ways its information might be communicated by every medium of electronic publishing described in this report. [Conversion of the database is expected to be completed by October 1988.—Ron McGinley]

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### Hawaii Arthropod Database and Hawaiian Invertebrate Survey Pilot Program

Scott E. Miller,  
Department of Entomology,  
Bishop Museum

Bishop Museum's card file on Hawaiian arthropods has been converted into a computer database covering basic taxonomic and distributional information. Gordon Nishida and Al Samuelson are coordinating efforts to check and update data on over 8000 species (over 13 Mb of data so far). This database will provide the foundation for renewed efforts to survey the Hawaiian fauna.

The John D. and Catherine T. MacArthur Foundation has just awarded a grant to the Museum's Departments of Entomology and Zoology to develop the means for filling the major gaps in conservation efforts that are currently overlooked owing to lack of knowledge of the invertebrate fauna of Hawaii (some 8000+ arthropods and 1000 land snails).

This pilot program supports the completion of the arthropod database, establishing a baseline from which the foundation of a large scale project may be launched. It will sponsor a definitive workshop to establish the problems, discuss approaches, and develop the directions to implement the larger project.

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### Automation of Biosystematic Services at the Systematic Entomology Laboratory, USDA

Douglass R. Miller, Research Leader,  
SEL/USDA,  
Room 4, Building 003, BARC-West,  
Beltsville, Maryland 20705

The mission of the Systematic Entomology Laboratory (SEL) is to develop, organize, and disseminate namebased information about insects and mites of importance to U. S. Agriculture. The development phase of the mission is research; organization phase is information and curation; and dissemination phase is identification. In fulfilling this mission, SEL seeks to maximize the use of ADP technology. In future newsletters more details about the ways we are doing this and the projects themselves will be provided. However, these projects are summarized below, and further information can be obtained by writing directly to individuals named.

Identifications are provided by SEL staff and associates. This service has been automated since 1982 and is run by our Taxonomical Services Unit. More than 18,000 identifications, representing some 85 thousand specimens were processed last year. The core of the system is a set of COBOL programs that manage the data and generate letters reporting the identifications. Enhancements, such as electronic reporting of identifications via computer networks (TELMAIL, BITNET), are constantly being made [Contact - Mary Lacey].

Catalogs have been and are one of the mainstays of our program, although today we more appropriately refer to them as databases! While the scope of our efforts vary from individuals efforts on single families to cooperative projects for entire orders, and from traditional card-based to fully automated systems, we are working toward the establishment of the "catalog for all seasons," first envisioned twenty years ago by Dick Foote. A generalized



relational database model has been developed, and efforts have been started to transfer all our data to it. Hence, we will be able to provide researchers and other users with the biosystematic information they need. Current status of our major databases is:

### Catalog of Coleoptera of America north of Mexico:

This, the "granddaddy" of ADP catalog projects, has been recently converted so all processing is now done within SEL on our Wang minicomputers. Three fascicles were issued last year and twice as many are expected this year [Contact - Bob Gordon].

### Biosystematic Database of Flies of the World:

Design work is being done, with test data accumulated for four families (Anisopodidae, Syrphidae, Tephritidae and Braulidae, some 12K records). As this project is contingent on completion of the various regional Diptera catalogs, the final form of the project has not been established [Contact - Chris Thompson].

### Checklist of the Lepidoptera of America north of Mexico:

This checklist, which is part of the Moths of America north of Mexico project, was published in 1983. As computer tapes used from type-setting the work have been salvaged, the information will be converted into our generalized database and will be available to researchers for revision [Contact - Ron Hodges].

### Lepidopterorum Catalogus:

The first part, Noctuidae or "cutworms" of the World, is in press. This is the largest single family catalog ever completed, containing some 45K names. While the data were originally accumulated on cards, the manuscript was prepared with word-processing software. That has allowed for automated production of the printed version and will permit eventual conversion of the information into a world Lepidoptera database [Contact - Bob Poole].

### Heteroptera of Canada and the United States:

A comprehensive catalog coauthored with Richard Froeschner (Smithsonian Institution), will be published shortly. Again, the information in the word-processing version will be converted from type-setting files into a database [Contact - Tom Henry].

Systematics is data intensive, especially in entomology with more than 30 million species believed to exist. Many individuals have realized this and have sought to utilize ADP technology to ease the burden and make data useful in multiple contexts. Today, many programs have been developed to automate description and key writing (DELTA), identification (PANKEY, DELTA), phenetic (NTSYS) and cladistic analyses (PHYSYS, PAUP), and cataloging (see above and elsewhere). New technologies, such as powerful microcomputers, CD-ROM storage systems, etc., hold promise of making ADP resources available to all. Hence, SEL has started a Biosystematic Information System project to integrate all these programs and to investigate the new technology. We want to demonstrate that ADP will increase research productivity on one hand and information dissemination on the other. A three year pilot project has been funded and will use the fruit flies (Tephritidae) as the test group [Contact - Chris Thompson].

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### **Computer Breakdown at CAS**

Norman D. Penny,  
Department of Entomology,  
California Academy of Sciences,  
San Francisco

In December 1987 The Entomology Department of the California Academy of Sciences experienced a serious loss of data from their computer system and it is hoped that by writing about this experience similar problems can be avoided in other major collections.

During the past three years The Entomology Department has been trying

to increase efficiency by utilizing a network of desktop computers. This network has utilized the Wordstar 4.0 word processing program and Microrim's RBase database program for most functions. By the latter part of 1987 most letters, some manuscripts, and some reports were being written and stored in the Wordstar program. The department's entire loan system, with data concerning 8300 present and past loans were on the RBase 4000 database program data files. This system also had recorded data for about 13000 (nearly 75%) of the insect primary types housed within the department and general collection holdings for various groups, including the Auchenorrhynchous Homoptera, Neuroptera, Ichneumonidae, Galapagos Island Coleoptera, Mecoptera and Plecoptera. This whole system was recorded on a central hard disk in the IBM-AT file server. Backup for this system consisted of a streamer tape system housed within the same IBM-AT unit. Backup tapes were made every day and at the end of every month. Two older backup tapes were made that by late 1987 were 12 and 18 months old. A surge protector had been installed on each computer on the network.

At that time the system began to show intermittent error messages, the most common one being a full disk, even though plenty of room was indicated on the hard disk in the directory. However, subsequent attempts to use the same commands would proceed normally. Then during a routine backup of the system, the system froze up, not allowing the backup tape to proceed. A copy was then attempted using a series of floppy diskettes. These floppy diskettes were then used to recover data from all Wordstar files. However, all attempts to call up and recover information from the database program proved futile. Scrambled data were found to occur in all daily and monthly backup tapes. The 12 month old tape would not read to the hard disk for data recovery. The 18 month old tape had intact information from the general collection holdings and primary types data, but the loan system data had some scrambled

columns in major fields, making these fields difficult to decipher. The amount of work necessary to correct these scrambled letters in the middle of the fields would have corresponded to completely reentering the data. Thus, all letters, reports, and manuscripts were recovered, as were database files for all general collection holdings and about 8000 of the 13000 entries for the primary type holdings.

Reconstructing what had happened proved difficult. The most reasonable scenario that we have been able to put together is that a storm passing through the San Francisco area in early October sent a bolt of lightning into a nearby transformer, and thus sending a surge of electricity through the circuits within the CAS. Apparently this power surge jumped through the surge protector, entering both the IBM-AT file server and the backup tape system. The damage to both parts of the system was not immediately recognized. In fact, the deterioration appeared to proceed slowly at first, progressively building up within the system. When the backup tape would not proceed in mid-December, the file server was taken apart and various components analyzed for defects. The 70 megabyte hard disk appeared to physically be in good shape - that was not the problem. However, defects were found on DMA circuits on one board and this board was replaced. Subsequent attempts to replace data onto the hard disk proved frustrating. Even though data was being read onto the hard disk, every time a backup tape was made of this data and reentered, the data were scrambled. There appeared to be a second problem on the backup tape system. This accounts for the fact that all tapes made after the surge went through the system contained only scrambled data. We still have not been able to account for the reasons why the 12 month old tape would not read to the hard disk, nor why the 18 month old tape had only certain columns in certain key fields of the loans database scrambled. We also are perplexed by the fact that the breakdown of the system took about six weeks, during which time all tapes recorded only scrambled information.

Although personnel working with the system were confident that they had adequate protection against system failures, there were three fatal flaws in the system being used: 1) there was no test file associated with the backup tapes, 2) the system memory disk and backup system were housed in the same unit, and 3) there was not hard copy backup to facilitate recovery. In retrospect, the third flaw seems to be an obvious error, but a full printout of the database as it stood in October, 1987 would have taken more than 15,000 pages and 125 hours of typing time. Production of such printouts on a routine basis seemed wasteful to us at the time.

Anyone working with a large database system should have the following items: 1) a hard copy printout of all entered data, 2) a tape or diskette backup with included test file, 3) a printout of the database scheme, and updates every time the scheme changes, 4) an occasional copy made to an ASCII file.

The loss of data was painful. All data will not be completely replicated before the end of 1988, causing a precious loss of time for already overburdened staff. However, it is hoped that by indicating how major losses of data can occur and be avoided, the entomological community can better utilize this important new technology without fear of time and effort being wasted.

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### SI Entomology Collections Information Systems

Jerry A. Louton, Department of Entomology, Smithsonian Institution

Collections inventories. The Department of Entomology continues its congressionally-mandated inventories projects. These "mainframe" data base management projects have centered on inventory of its primary type holdings. S.I. collections inventories are funded via a special inventory "line item" from the federal budget, in effect, decoupling

considerations as to the allocation of resources for specimen preparation versus collections inventories. The inventory has proceeded to the point of capturing label data but records generally lack publication, current taxonomic placement and other non-label data. For the moment most of the staff's effort is diverted to conversion from the old SEL-GEM database management system to INQUIRE, a new DBMS with custom collections information utilities. Congressional inventory funds are dwindling but we still hope to mount a species-level inventory of the collections, at least in the areas where interest in this project is high. The species-level inventory will be a micro-computer based project using dBASEIII (or dBASEIV).

Other collections projects. We are producing unit tray header labels via departmental IBM PC's. Specimen data is entered and the user is queried for the number of header labels needed. Indexed files are produced that can be used to generate a sorted list of holdings. The Department is developing multi-user registration (loans, accessions) software for BUGNET, a local area network linking the departmental workstations. This represents an upgrade of the single-user registration system that has been in place for about a year.

The Department also maintains a Collections Information File, a 2000 record file of collection-level data with records roughly equivalent to family. This file contains information useful to the Chairman and Collections Manager, such as, location of the collection, number of drawers, responsible curator, etc.

Collections information standards. The departmental Data Manager is currently working on a unit-wide data dictionary that will serve to guide research and collections management staff in setting up new data bases. The aim is to insure future data compatibility across all departmental files, whether they reside on mainframes or micros.

PERSONNEL NEWS

Field data acquisition projects. Staff members are using battery-powered laptop computers to collect and process data in the field. Biodiversity in Latin America (BIOLAT) participants are generating forest plot maps and associated faunistic data in the lowland tropical rain forests of Peru. All is proceeding well except that the laptops develop read/write disk problems when the ambient temperature exceeds 95 degrees F.

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Wayne Gagne, Museum Entomologist and Education Specialist at the Bishop Museum, passed away 23 May 1988 of an apparent heart attack. He was a specialist in Hawaiian Hemiptera (especially Miridae), made major contributions to conservation and natural history education in Hawaii, and spent several years in Papua New Guinea. At the time of his death, he was working on Hawaiian rainforest canopy

insect ecology, preparing his *Nesiomiris* monograph for publication, and heading a Hawaiian natural history curriculum development program. Further details will be provided later. —Scott E. Miller, Bishop Museum.

Lloyd Knutson has been appointed Director of the Biological Control of Weeds Laboratory, ARS-USDA, in Rome, Italy, replacing Paul Dunn, who retired in June. Dr. Knutson will assume leadership of the Rome laboratory around September 1, 1988.

**Insect and Spider Collections of the World:**

**Updates and New Entries**

(From The Insect and Spider Collections of the World, R.H. Arnett, Jr. and G.A. Samuelson, assisted by J.B. Heppner, G.M. Nishida, J.C. Watt and R.E. Woodruff. 1986. E.J. Brill/Flora & Fauna Publications, Gainesville, Florida 32606 USA, 220 pages.)

[The instructions on the following page and the questionnaires may be photocopied and used for the submission of data for future editions of this directory.]

**QUESTIONNAIRE FOR PUBLIC COLLECTIONS OF INSECTS AND SPIDERS**

Name of public collection: \_\_\_\_\_

Mail address: \_\_\_\_\_

(Postal codes & country) \_\_\_\_\_ Phone (with access codes) \_\_\_\_\_

Collection coden, see instructions ( \_\_\_\_\_ ).

Director of insect and spider collection, i.e., head curator, etc., include Dr., Mr., Ms., etc.: \_\_\_\_\_

Professional staff: \_\_\_\_\_

(List additional staff on separate page.)

Description of collection (include number of specimens in collection or number of storage containers and an estimate of no. of specimens; include information about primary and secondary types, and special collections, including separate collections of vouchered specimens, attach additional pages): \_\_\_\_\_

Periodicals or series sponsored by institution: \_\_\_\_\_

Please return original promptly to Dr. Ross H. Arnett, Jr., 4300 NW 23rd Avenue, Suite 100, Gainesville, Florida 32606, U.S.A. [Phone: (904) 371-9858]

The purpose of this directory is to provide a standard, worldwide, list of collections of insects and spiders useful for the location of specimens and, with the assigned codens, a uniform way to cite the location of specimens in publications treating the species stored in these collections.

Each collection is described by giving the size of the collection, either by citing the number of drawers, boxes, slides, and vials, or by the number of specimens they contain. The names of the curators are listed, along with notes on special collections, the regions covered, and similar data. Each collection is assigned a coden (composed of four letters) unique to that collection. This coden is, of necessity, four letters in order for enough unique codens to be available for the number of collections now known to occur throughout the world. If some of the previously used three-letter codens are continued, large blocks of letters become unavailable for the existing collections. Four letter codens provide enough possible combinations to add new collections as needed. The present list of codens has been adopted by several publications, particularly those used by coleopterists. The compilers hope that this list will continue to be the "standard".

Recognizing as we do, that many public, and especially, private collections have been omitted, either because we do not know of their existence, or because we did not reach the proper curator, we ask our readers' help in getting the following forms to the proper people for completion and filing in our computer data base for use in revised editions of the work. Meanwhile, we are continuing our attempts to reach the proper person and to complete (or delete, as the case may be), those collections listed here that have not responded. Curators of collections listed are invited to resubmit the form or photocopies of updated listings.

Please note that two forms are used, one for "public" collections, i.e., those collections owned and maintained by organizations instead of individuals, and the other used by "private" owners of collections, generally, individuals, as opposed to museums, foundations, government institutions, and other groups that are expected to outlive individuals.

We will NOT include any private collection unless it is registered with a public collection. The reason for this is apparent when you see the number of private collections that have been lost even though listed in previous literature. The data reported can no longer be confirmed and the vouchered specimens represented are lost.

Registering private collections: Several museums have offered to register private collections which we include in this directory. To register, the private collector contacts a curator at a public collection of his choice, submits a copy of the private collection form reproduced herein, and asks if the collection can be registered. If accepted, then the original copy is submitted to us for recording. This registration does not imply or require the donation of the collection to the registering institution now or in the future. It is only an agreement to keep track of the collection, record movements of the material, other changes, and final disposition through sale, donation, abandonment, or destruction. Thus vouchered specimens may be found even after the collection owner no longer has them.

## QUESTIONNAIRE FOR PRIVATE COLLECTIONS OF INSECTS AND SPIDERS

Name and address of collection owner

(Dr., Mr., Mrs., Ms., etc.): \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

(Postal codes and country) \_\_\_\_\_

Phone number (including access codes): \_\_\_\_\_ Coden: \_\_\_\_\_

Description of collection (include number of specimens, type of housing, and specialty, if any, and any special collection (particularly of vouchered material) maintained, and any primary or secondary types included (Attach additional pages if necessary)). \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

This collection is registered with: (Give name and address of a public collection and the name of the curator accepting the registration.) \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Please return original promptly to: Dr. Ross H. Arnett, Jr., 4300 NW 23rd Avenue, Suite 100, Gainesville, Florida 32606, U.S.A. [Phone: (904) 371-9858]