A resolution supporting the North American Checklist of Insects was read. After discussion, the resolution was slightly amended. A motion was presented by Mike Ivie to accept, seconded by Jim Woolley and passed.

A second resolution on standards for Bar-codes was read. Minor changes were discussed and accepted. A motion to approve the amended version was made by Steve Ashe and seconded by Jim Whitfield. The amended resolution was approved by voice vote.

A letter drafted to Secretary Babbitt supporting the National Biological Survey was read by the Chair. After some discussion, a motion to accept was made by Ron Hellenthal and seconded by Jackie Miller. The motion was passed by voice vote.

The Chair noted that there was sentiment that a membership list be formed as a means of formalizing who and what institutions belonged to ECN. After discussion, a motion was made to send membership applications to all on the mailing list and any other interested individuals or institutions. Mark O'Brien moved to accept, seconded by Larry Speers. The motion was approved on voice vote.

A proposal to form a Public Affairs Committee was made. After some discussion a slate composed of Jackie Miller, Mike Ivie, Scott Miller, Chris Thompson, and Mike Schauff was put forward. Steve Ashe made a motion to nominate those individuals, seconded by Margaret Thayer and approved by voice vote.

Larry Speers asked for suggestions for the program for the 1994 meeting.

Meeting was adjourned at 11:05 a.m.

Entomology Collections Network Annual Meeting, Dallas 11-13 December 1994

Hosted by: Dallas Museum of Natural History

Meeting Site: The 1994 Annual Meeting of the Entomology Collections Network will be held Sunday evening, Monday, and Tuesday morning, December 11-13, 1994 at the Dallas Museum of Natural History, Dallas, Texas. This is just prior to the Annual Entomology Society of America meeting in Dallas which begins on Tuesday the 13th at the Loews Anatole, Dallas.

Registration materials and additional information will be mailed in Mid-September. Please pass this notice along to colleagues and other interested parties.

Anyone wishing registration materials who is not currently on our mailing list should contact: Larry Speers, ECN Steering Committee, Centre for Land and Biological Resources Research, Agriculture and Agri-Food Canada, K.W. Neatby Building, C.E.F., Ottawa, Ontario, Canada K1A 0C6. Phone 613-957-4347 Ext. 7319 FAX 613- 947-5974; SPEERSL@NCCCOT.AGR.CA.

A block of rooms has been reserved for ECN registrants (Dec. 10-16) at the Marriott Courtyard, 2150 Market Center Boulevard, Dallas, TX; 214-653-1166. This hotel is right across the street from the Loews Anatole (the ESA meeting hotel). Special Group Rates: Single - $59.00 with breakfast; Double - $65.00 with breakfast. Shuttle service between the hotel and the Dallas Museum of Natural History has been arranged. Reservations should be made prior to Nov. 16, 1994, by contacting Gabrielle in the Sales Office and identifying your association with the ECN. After Nov. 16 the block of rooms will be released.

Tentative Program Outline:

Specimen level databases

Impact on collections of restrictions on naphthalene and PCB

Networking collections data

Priorities for Research on Fluid Preservation

Update on the Lacey Act

Committee reports

Business Meeting - Election of Officers

NOTE: See Entomology Collections Network Membership Notice on the last page of this issue of ICN.

Bar Codes for Specimen Data Management

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Systematic Entomology is built on massive collections of specimens and associated data. Where other disciplines have collections of a few thousand specimens, entomology collections typically contain millions. These numbers mean greater problems, but are the source of greater promise. Terrestrial arthropods provide more data points as there are more clades, species and individuals with longer histories and broader variation. Terrestrial arthropods are the glue that binds ecosystems together. So, for Society we need to manage the data associated with our entomological specimens efficiently and effectively, so we can benefit from information derived from them (McGinley 1993).

The world is changing, people are more interested in the environment, worried about climate change, loss of biodiversity, and other matters for which much of the scientific data are ultimately derived from museum specimens. Appreciation of this has lead to increased concern about, and unfortunately regulations for, biological specimens. Authorities are now demanding that accession history of a particular specimen be documented to ensure that each and every specimen was legally acquired (Lacey Act). Nations value their biodiversity and are granted legal rights to it by the Convention on Biodiversity. Some are, and more will demand that biodiversity information, if not the specimens from which it was derived, is repatriated. The impact of these matters will be great on entomology.

All biosystematic information is derived from specimens. Objective, scientific results require that observations can be repeated. So, for biosystematics, there is a need to tie the data derived from a specimen to that particular specimen. Traditionally this has meant that specimens have unique identifying numbers. Unfortunately, due to the high costs and the large number of specimens involved, entomologists have been reluctant to individually number specimens. Today for legalistic reasons alone entomologists must begin doing this. Barcodes while still expensive allow for the identification of individual specimens and greatly reduce the cost of subsequent data handling. Many organizations have now begun bar-coding specimens as they are initially labelled (prospective data capture, see Thompson 1990). However, there remains a large backlog of existing specimens that do not have bar codes or other unique identifiers. So, as these existing specimens are handled in the course of research activities, they should be bar-coded so that the scientific observations can be easily verified (retrospective data capture, Thompson 1990).

The problem of prospective data capture has been solved by one collection (INBio; Janzen 1992). As new material is processed, bar codes are attached as part of the labeling process. The data on locality, time, collectors, etc., are captured when the print order for the labels is generated. Now anyone working with INBio may get these data electronically and need not re-keyboard them. Some of us are working with INBio specimens and get these data on floppies when we borrow the material. However, INBio is on INTERNET and soon one should be able to get the data interactively. The INBio approach is fast becoming the standard. The University of Georgia has adopted it and the Bishop Museum is considering doing so. So this approach is recommended to the Entomological Community. Billions of keystrokes will be saved in the future by doing so now.

Gary Hevel estimates that about 100,000 specimens are labeled each year for the USNM. At this rate, the annual costs for bar code labels would be about $2,000. There are probably 60-100 characters per label. I estimate that I extracted label data from more than 4,000 specimens this past year for my research. Bar coding would have saved me a quarter million or more keystrokes. Multiply that by the number of scientists using USNM material and billions of keystrokes saved over the years is probably a conservative estimate.

The problem of retrospective data capture can be solved by using a similar approach. We (Entomological Collections Network; Thompson 1990) endorsed the view that retrospective data capture should be done as part of the research process. When researchers study previously collected specimens, they capture the specimen label data. Terry Erwin (and a few other scientists) has been doing this for years for his various projects (Erwin 1976). Each specimen that is handled, new or old, gets a unique ADP number that links the specimen to Terry's electronic data record. In the past, scientists linked specimens studied to their work with determination labels. Unfortunately, determination labels did not UNIQUELY identify a specimen with individual observations (these being, for example, a character state noted, measurement, etc.). Combining the Erwin ADP number idea, the traditional determination label and the INBio Bar code approach can generate a solution to the retrospective data capture problem. As the researcher captures specimen label data from old material (that is, material without bar codes), the researcher would affix a standard bar code. To make this work effective, the community and organizations must set standards and policy. Such standards and policy are outlined below with the resolution passed by ECN. The hardware needed to implement this approach is also briefly described.

Bar Codes for Entomology would consist of an unique ALPHAbetic identifier followed by a sequential number. The unique identifier is the key to the organization and/or person that captured the data. Community standards for such organizational identifiers exist and will be followed. USNM, for example, has been accepted as the standard acronym (abbreviation) for National Museum of Natural History. This should be modified as USNM ENT to uniquely identify the entomological collections. The Systematic Entomology Laboratory is uniquely identified as USDA SEL. Terrestrial arthropods are small, so there isn't much "real estate" associated with a specimen to which to attach a bar code. Hence, for Entomology there are two important considerations for Bar Codes: That they be as SMALL as possible and that there be only ONE per specimen. The bar code known as Code 49 fulfills these required.

Organizations will have to accept the responsibility for specimen label databases, seeing that their data standards conform to community standards and that the data are accessible to all qualified users. At the moment, there are various data models and standards for specimen label data. Essentially these are all the same, allowing for storage of the basic data elements ALREADY mandated by our ADP Standard for Systematic Entomology (locality including coordinates, date, collector, and additional data as appropriate; Thompson 1990).

Sources of bar codes and bar code scanning equipment. The smallest bar code in the public domain is Code 49. At the present only one company (INTERMEC) prints these bar codes and provides scanners able to read them. The approximate costs of the initial order of 150,000 labels is about $2,700, with subsequent orders some $500 less. The scanner and associated peripherals to attach it to either a MacIntosh or PC computer runs about $2,200. The scanner is attached between the keyboard and the computer, so it acts merely as an extension of the keyboard. Check your local yellow pages for details on INTERMEC. If you can't find a local sales office or they need further information, then contact William McKenna, 3 Bala Plaza, Suite 117, Bala Cynwyd, PA 19004, (215) 668-2075).

References:

Erwin, L. J. M. 1976. Application of a computerized general purpose information management system (SELGEM) to natural history research data bank (Coleoptera: Carabidae). *Coleopt. Bull.* 30: 1-32.

Janzen, D. H. 1992. Information on the bar code system that INBio uses in Costa Rica. *Insect Collection News* 7: 24.

McGinley, R. 1993. Where's the management in collections management? Planning for improved care, greater use and growth of collections. Pp. 309-33. In Rose, C. L. et alia (eds), International Symposium and First World Congress on the preservation and conservation of Natural History Collections. Vol. 3, Madrid.

Thompson, F. C. (coordinator). 1990. Automatic Data Processing for Systematic Entomology: Promises and Problems. A report for the Entomological Collections Network. [48] pp. Washington

Entomological Collections Network
Bar Code Standard Resolution

Whereas Society is increasingly concerned with biological diversity and the sustainable use thereof;

Whereas Terrestrial arthropods provide the broadest and finest-scale description of the biosphere as they provide more data points as there are more clades, species and individuals with longer histories and broader variation;

Whereas Terrestrial arthropods are the glue that binds ecosystems and therefore, the biosphere, together;

Whereas entomological collections contain the largest and most diverse sample of terrestrial arthropods and associated data;

Whereas entomological collections accept the responsibility to provide Society with the critical information for the understanding and sustainable use of biodiversity that their collections contain;

Whereas scientific information must be verifiable and therefore requires that specimens be uniquely identified;

Therefore the Entomological Collection Network adopts the following standard for the use of Bar Codes for the proper, effective and efficient management of specimens and their associated data.

1) a bar code will be an unique identifier that consists of a string of alphabetic characters that identifies the organization that created the associated data record followed by a sequential number;

2) as bar code labels need to be as small as possible so as not take up too much space and must also encode sufficient data to uniquely identify specimens, code 49 uniform symbology will be used;

3) organizations will maintain computer files of specimen associated data that the bar codes uniquely identify, making the information available to users following the appropriate community standards (such as the ASC Database Policy);

4) organizations and individuals will respect bar code labels by leaving them attached, by not covering them with other labels, and by using existing bar codes, rather than adding new bar codes, so that only ONE bar code is used per specimen and that bar code is always clearly visible; and

5) finally, organizations and individuals will provide the originator (the organization maintaining the computer files of associated data) of bar code with the scientific name and identifier, if so requested.

The above resolution was passed unanimously at the 1993 Annual Meeting of the Entomological Collections Network.

The Information Age and Agricultural Entomology

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[This article was originally published in the Bulletin of Entomological Research 83: 471-474, 1993; because many ICN readers may have missed this contribution it is reproduced here with the permission of the author and Bulletin editor, Annette Walker.]

Prevention and resolution of agricultural entomology problems relies on current and accurate information, part of the overall information on biological diversity. The popular news media provide daily examples of how the information age is rapidly revolutionizing the way information is compiled, managed, and distributed. But what does the information age mean to agricultural entomology? What lies beyond CD-ROM? Within a few years, farmers in many countries will be able to call up a knowledge base on biological diversity, identify their pest organism, and see what is known about it. Using this same system, they could communicate with farmers in other regions who are struggling with the same pest or interact with an international research team working on the problem. How will these farmers progress from having no access to telephones to having access to a biodiversity knowledge base? The technologies to provide these services are rapidly becoming available on a world scale. While these technologies present tremendous opportunities, they also present challenges to the traditional systems of compiling, archiving, and distributing information.

Problems: Some of the major problems preventing local identifications and systematics research in tropical countries include scarcity of correctly identified reference collections; scattered type and voucher specimens and taxonomic literature, not easily accessible because of physical location, lack of indexing, and language; and inadequacy of communication (Hawksworth and Ritchie, 1993; Miller, 1994); and, in some countries, a lack of trained personnel.

Solutions: Emerging technology, such as distributed networks, can cut through some of these problems, and empower local users to resolve their own problems, as well as to facilitate training. Distributed networks provide each user with a fully functional system able to work independently and the ability to use data from other members of the network. For example, an end user could be simultaneously connected to specimen data bases at several herbaria. The system can be de-