

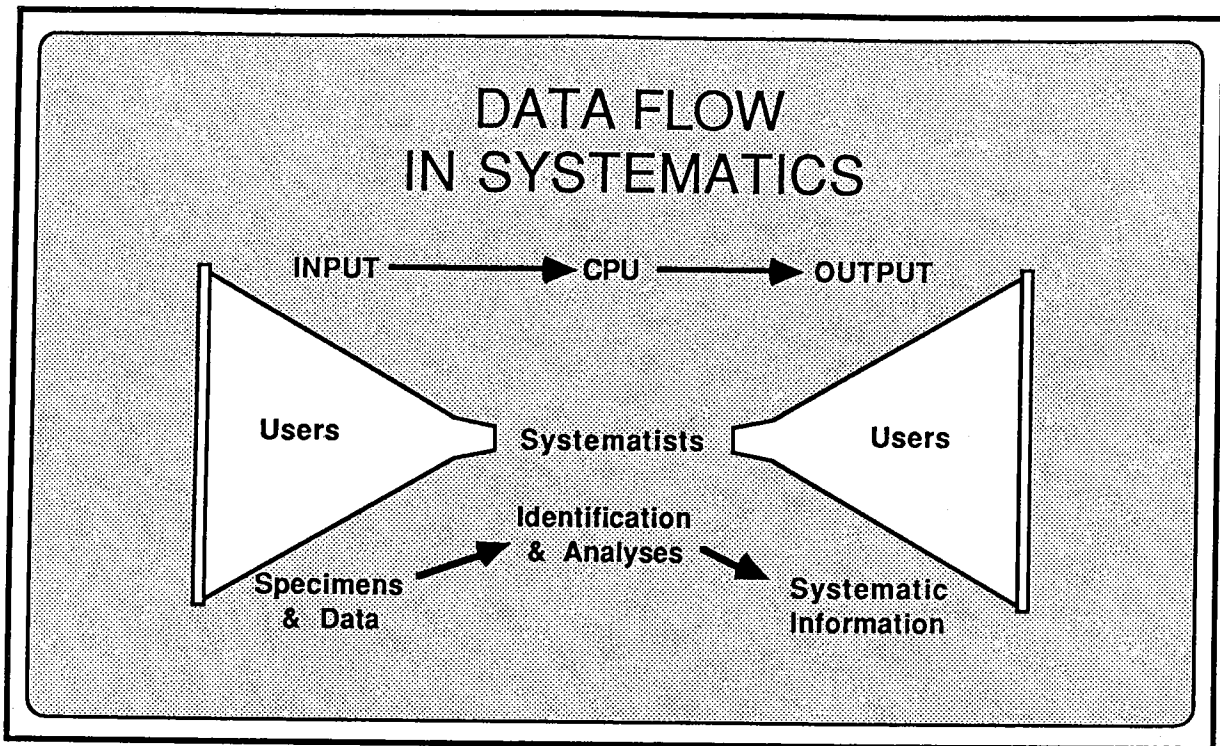
Biosystematic Information Systems

A Contribution
to
the Solution
of
the Crisis
in
BioDiversity
and
Systematics



The integration of relational database, expert system, CD-ROM storage technologies will create a biosystematic information environment capable of dramatically increasing and diffusing knowledge about organisms.

November 1989



What is Biosystematic Information?

Biosystematic Information is all data that may be useful to man about organisms, such as what is it, what is it called, what does it look like, where does it occur, what does it do, when does it do it, and what does all this mean to me (= economic importance).

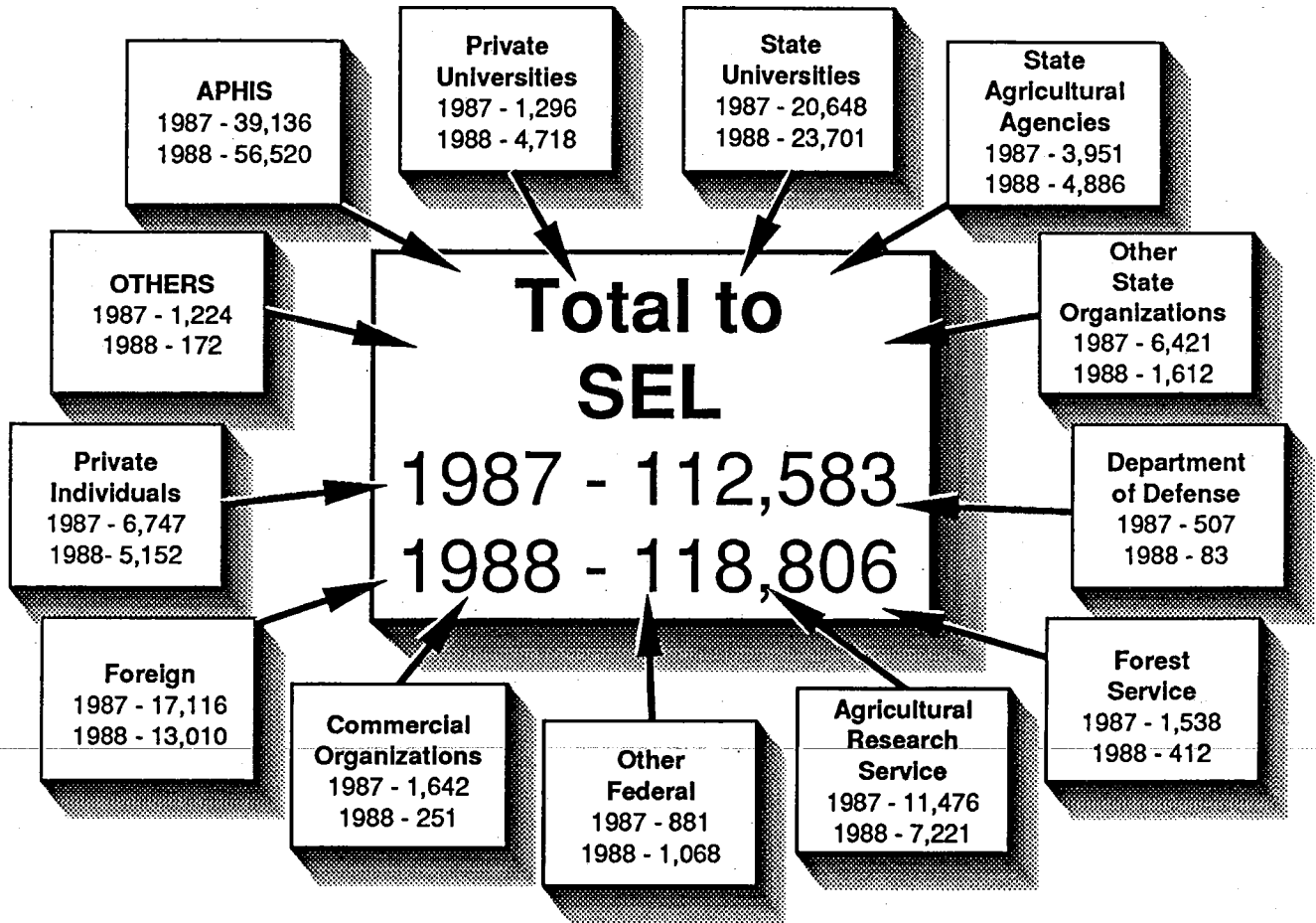
Biosystematic Information is organized by names arranged in an hierarchical classification based on shared (synapomorphic) similarities. Hence, Biosystematic Information can be obtained with a name, a specimen, or names of associated objects. Names are obtained by identifications, and identifications are made by matching attributes of unknown with known organisms. While that is all a logical sequence, what is reality? In reality, most users obtain Biosystematic Information merely by asking systematists for it!

How is Biosystematic Information produced and distributed?

All the raw data along with users' inquiries are funneled into the systematists. Systematists synthesize the data, creating the information which is distributed in technical publications. They either answer the inquiries or provide identifications so users can obtain the information directly. So, everything goes to the systematists and everything must now come from them. Thus, they are the classic "bottle-neck" in the flow of biosystematic information.

IDENTIFICATION SERVICES

Number of Specimens

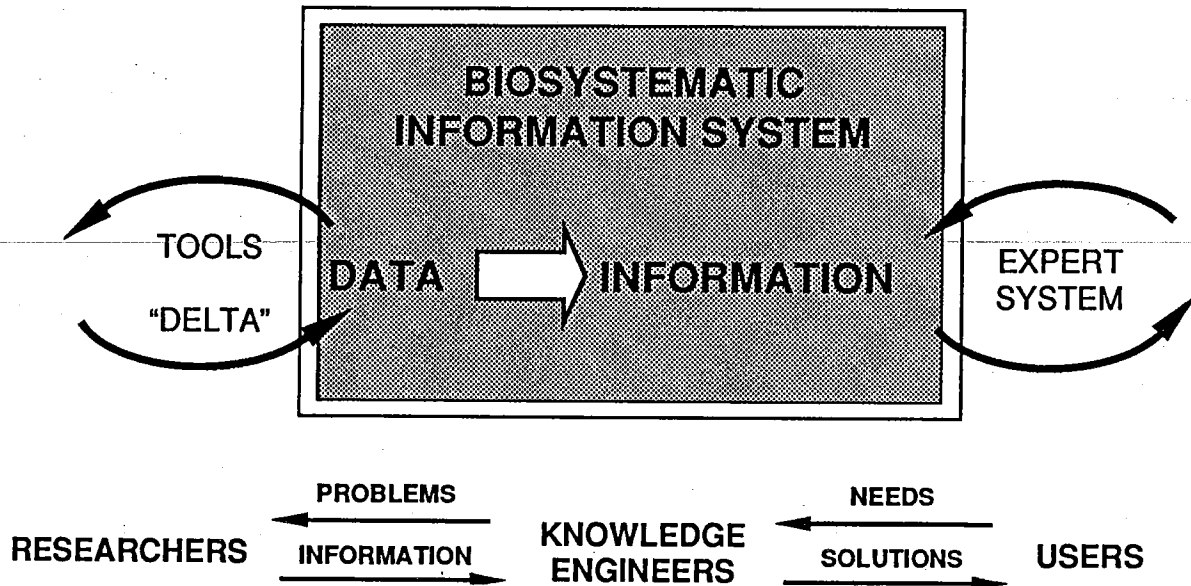


Systematic Entomology Laboratory

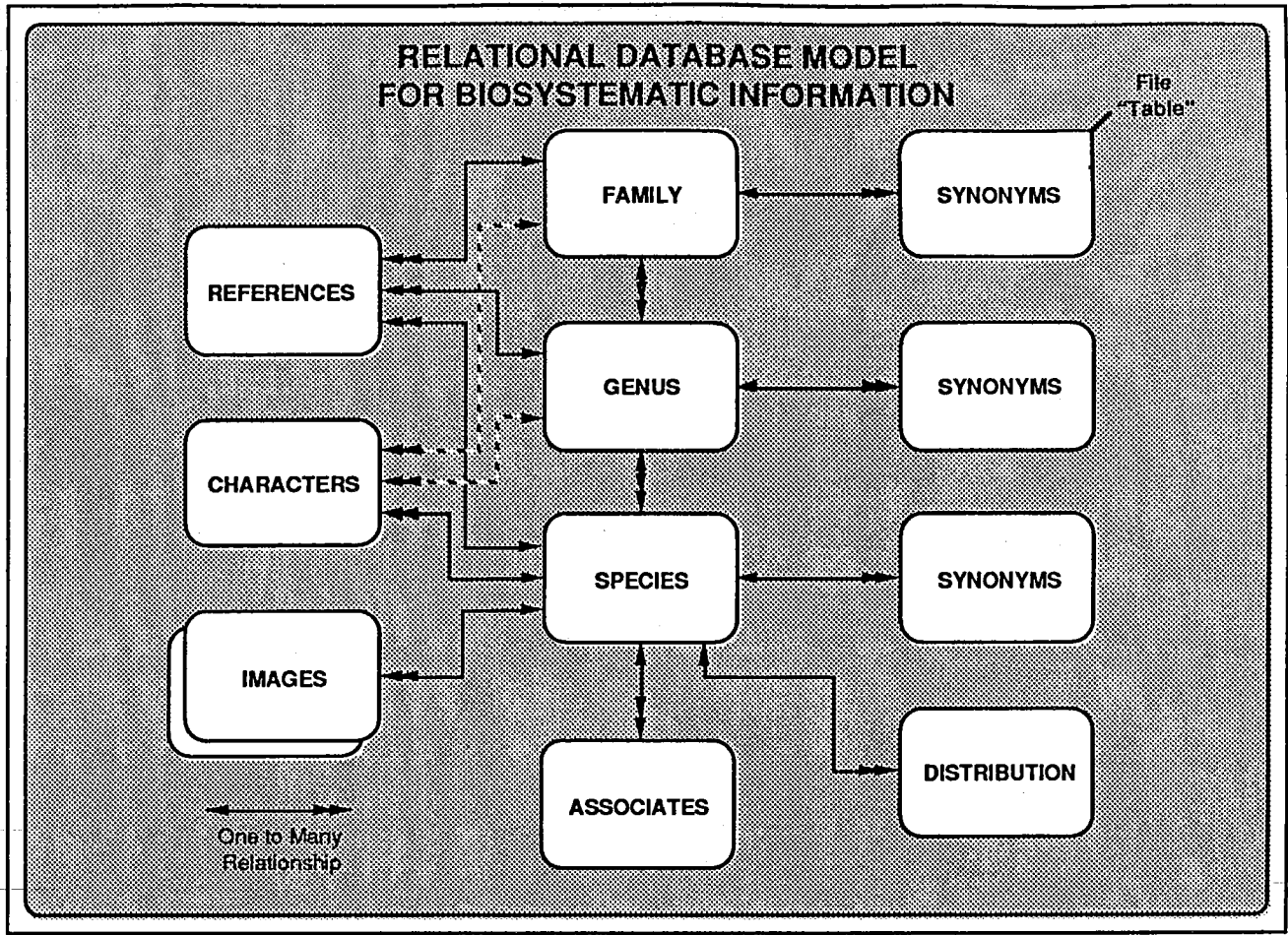
The Systematic Entomology Laboratory has been America's primary source of Biosystematic Information about insects and mites for more than a century. The information provided has been a critical component to our agricultural success. Today increased concern for preservation of biotic diversity and environmental quality along with the traditional needs of agriculture has increased the demand for Biosystematic Information, while fiscal problems have seriously eroded the resources available to meet the demand. One merely needs to note that over the last few years the Systematic Entomology Laboratory has lost 4 scientific positions and 7 technical support positions, while the number of identifications requests has been stable. These statistics clearly document the problem. As additional base funding is unlikely given the current deficit, the Systematic Entomology Laboratory must explore new technologies for solutions to this crisis. The situation is similar at all other major centers for systematics (Australia, United Kingdom, Canada, etc.).

What Can Be Done?

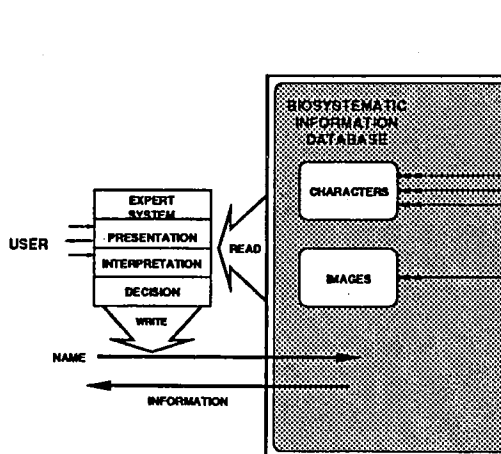
Given the flow of data, the obvious target to concentrate on is the systematist. Relieve the demands on the systematists and increase their productivity and the flow of biosystematic information will increase. Demand can be reduced if the users' needs can be answered directly. Thus, providing more direct access to Biosystematic Information in a format that users can understand and work with is one critical task. Productivity can be increased by reducing redundant data handling and more efficient data sharing. We can't waste valuable manpower, so literally every keystroke must be preserved and shared so together the diminished few can do what once many did and now every everyone wants! So, a Biosystematic Information system is proposed as a major contributor to resolving the crisis in Biosystematics.



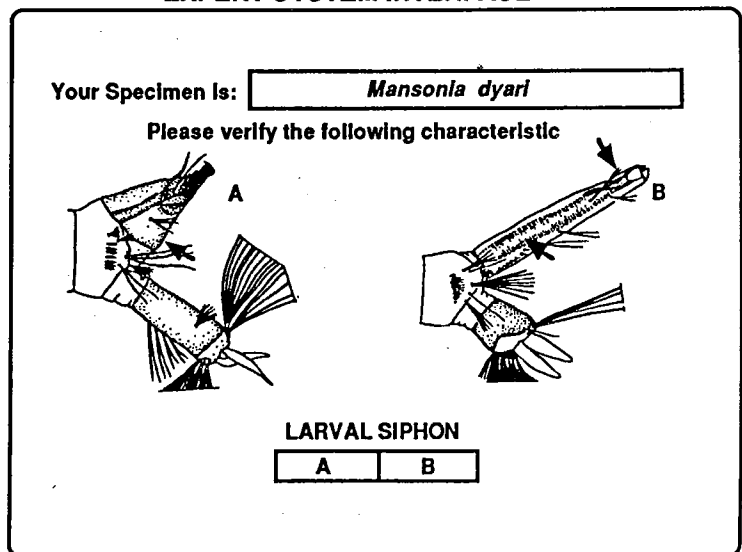
A Biosystematic Information system will provide tools to make the systematists more efficient, store and integrate the knowledge of the systematists (experts), and provide that knowledge to users as needed.



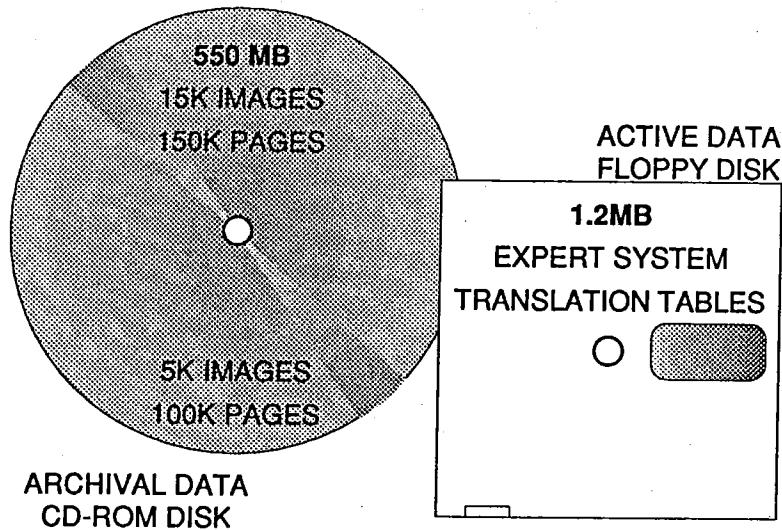
The core of a Biosystematic Information system is a relational database. As Biosystematic Information is already organized hierarchically, a simple relational database model can be generated for it.



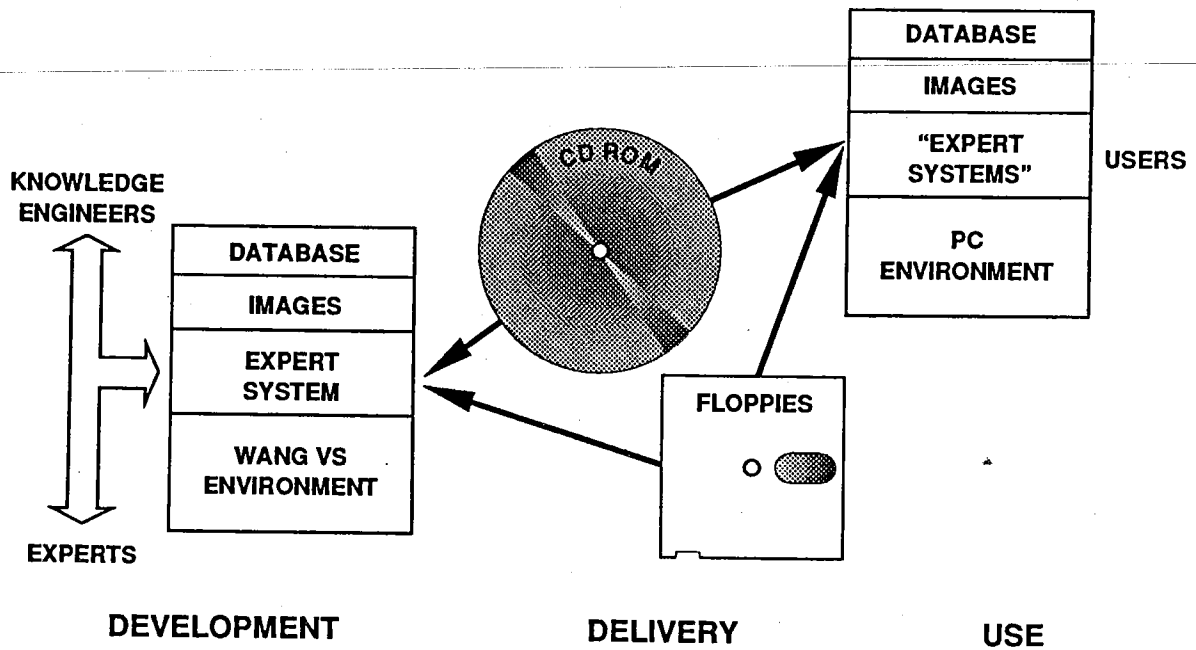
For users, an expert system interface would be developed so that the technical data would be presented in a "user friendly" manner.



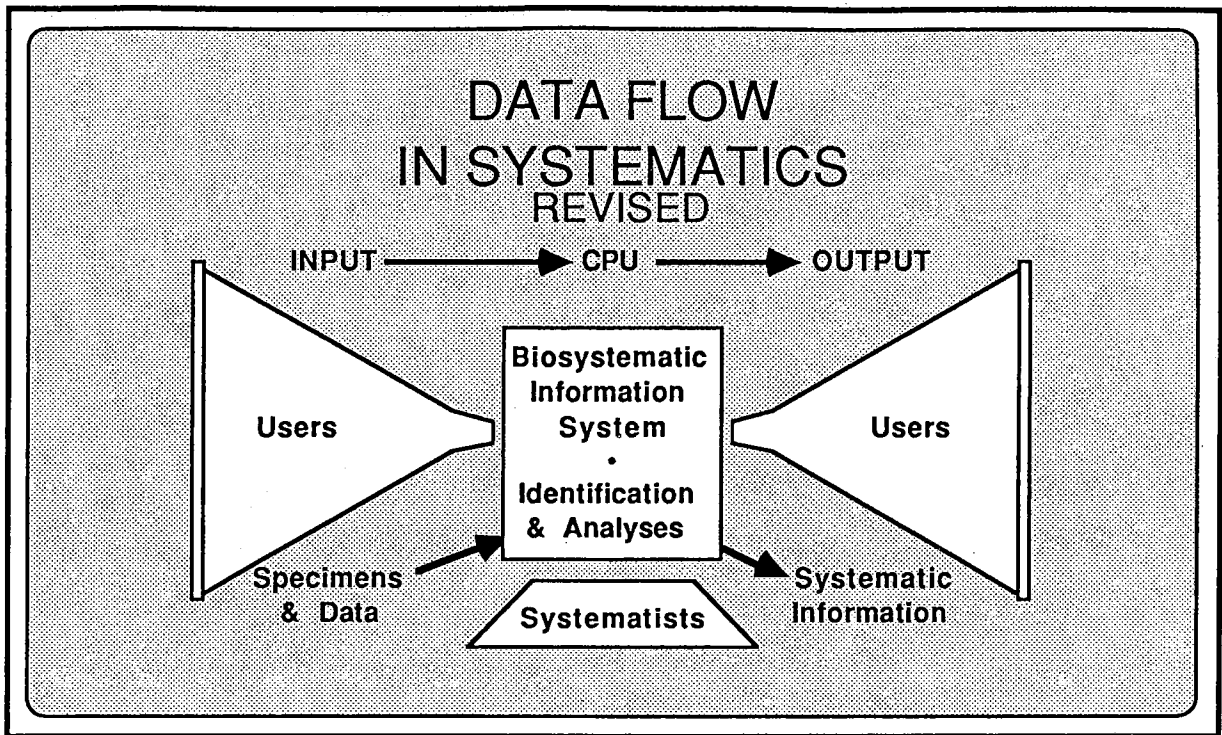
BIOSYSTEMATIC INFORMATION STORAGE MEDIA



CD-ROM (Compact Disk--Read Only Memory) provides the capacity to store immense amounts of data. On CD-ROM regular text based data could be stored with images and sound-recording. A single 5 1/4 inch CD-ROM disk could contain more than 15,000 pictures of fruit flies and some 150,000 pages of information about them.



The data needed for a Biosystematic Information system would be assimilated by systematists as they worked, and when sufficient amount was accumulated, that data would be automatically formatted and distributed to the users to be used on their microcomputers. A pilot test project using fruit flies as a group and for the Animal and Plant Health Inspection Service of USDA is being developed now by the Systematic Entomology Laboratory.



A Biosystematic Information system could do much to resolve the Biological Diversity crisis. The simple integration of expert systems, relational databases, and image processing provides a solution to this crisis:

Systematists will be:

- more efficient
- more productive
- have more freedom to pursue critical research

Users will get:

- more immediate access
- more information
- more independence

Biosystematic Information systems will:

- divert the demand for information from the systematists
- increase the rate of flow of information through the system

Additionally, automation will:

- eliminate redundant data handling
- maximize data sharing
- increase rate of data processing
- reduce cost and bulk of data storage

For more information, please contact:

F. Christian Thompson
 Systematic Entomology Laboratory, ARS, USDA
 Washington, D. C. 20560
 (202) 382-1800

[Cited as Thompson, F. C. 1989. Biosystematic Information Systems. 7 pp. Systematic Entomology Laboratory, USDA, Washington.]