

The Impact of Information Science on Biology; A Possible Society Role

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Lacking the central unified structure of sciences like physics and chemistry, the disciplines of biology have gone about with many voices in attempts to cope with the problems of communication. With each attempt it becomes more apparent that any solution is dependent upon the interest and enthusiasm devoted to the problems by the more than 50 separate biological societies.

In an effort to determine, among members of the various societies, the feasibility and possibilities of society cooperation, the Entomological Society of America and the Biological Sciences Communication Project of the George Washington University Medical Center cosponsored a day-long roundtable on the Role of the Societies in the Communication of Information in Biology. This roundtable was held at the 1968 meetings of the American Institute of Biological Sciences and was attended by the designated representatives of 20 of the 48 adherent societies of that Institute.

The morning session was devoted to informal discussions of society problems with the communication of information. The topic was introduced with a presentation by Dr. Peter Woodford of Rockefeller University on society activities such as annual meetings, symposia and journal publications and how these activities can be coordinated better to improve communication (Woodford, 1969). In the afternoon, the representatives from those societies with some existing information

program were invited to discuss their programs. If the discussions of the AIBS roundtable were summarized in a few words, the consensus of the participants was that each society acknowledge its recognition of the problem by the appointment of a standing committee to examine areas of society activity concerning communication and then, and this is a crucial point, the societies coordinate activities at a top level to avoid a continuation of the splintering and duplication of effort that has so characterized the field of biology (Gordon, 1969). Prior to this meeting, only 4 AIBS societies had a standing committee concerned with information and communication. It is encouraging to note that since the roundtable, 3 more societies have appointed such committees. A sequel to this roundtable, sponsored by COBSI (Council on Biological Sciences Information) and organized by the Biological Sciences Communication Project, was held at the 1969 AIBS meetings in Burlington, Vermont and consisted of 2 parts, (1) Organization of biological information: what is the need? what is the best approach? and (2) Society and Institute reports.

At its 1969 meetings, the American Society for Microbiology, through its *ad hoc* Committee on Information, sponsored a roundtable on the Impact of Information Science on Microbiology. The author presented the present paper, modified for the occasion, to the roundtable to ask what microbiologists were doing with the tools provided by information science to help

solve their problems and to suggest a possible role that a society might take. Such a role might be to duplicate the activity of a sister society, the Entomological Society of America.

In 1964, the Entomological Society established a Special Committee for the Retrieval of Scientific Information to evaluate the information problems of the discipline. The committee found, after 2 years of study, that scores of entomologists were using some form of mechanized information storage and retrieval system. However, no coordinated effort was evident that would make one system compatible with another or even available to others. The Committee concluded that, "The need for an information center capable of coding, storing, retrieving, and disseminating all entomological data is acute and increasing year by year" (Foote, personal communication).

In December 1967, the Committee proposed a feasibility study for a system-designed entomological data center. This study is being supported by a National Science Foundation grant to the Society with a subcontract from the Society to the Biological Sciences Communication Project (BSCP). The BSCP provides office space and personnel other than the director of the project, as well as the benefit of its experience in information activity. The completed study will present a detailed investigation of information systems available to entomologists, of sources of information being utilized by members of the profession, as well as the feasibility of a society directed or sponsored information activity.

Like ancient Gaul, this study is divided into three parts: (1) A user study, (2) a study of extant systems, and (3) an evaluation of the coverage provided to entomology by abstracting and citation journals. You immediately recognize that answers to the questions presented by these three areas are basic to the development of any information activity. A specialty must be delineated, the literature coverage of the

disciplines must be determined, and the needs of the profession must be developed.

The user study develops the needs of the profession by identifying the kinds of information used by the scientist so the kind of information to be stored in a data center can be determined. In other words, what journals are considered by the entomologist to be primary or core journals, *i.e.*, journals that he reads or scans habitually and which contain 75–100% papers on entomology, what journals are considered to be secondary in importance, *i.e.*, journals carrying occasional articles of interest to his specialty. Are other sources of information used such as directories, symposia, annual meetings and personal communications? To what extent does the scientist consult existing information services like BioSciences Information Service or Science Information Exchange? It is essential also in a user study to determine how best to present the information to the user. Is he satisfied with titles only? Does he prefer abstracts? Should foreign literature be translated? How much time can elapse from receipt of the request to receipt of the answer? Would the user be willing to pay for the service or how should it be financed? In the entomology study, a carefully designed questionnaire was prepared to elicit answers to these questions and mailed to each member of the society. To date more than 2,400 questionnaires have been returned (a 44% response), and some of the preliminary trends are interesting to note. The majority of entomologists state that they spend an average of 5% of their time searching the literature. The primary publications of the Society receive the highest use of any publication and among the secondary abstracting and indexing publications, the *Annual Review of Entomology* receives the heaviest use followed closely by *Biological Abstracts*. For depth of coverage, the majority of those responding prefer abstracts to citations and indicate a preference for the complete text or hard copy over microfiche or microfilm.

To the question, "Would you use an Entomology Information Center were one established?", 85% of the entomologists said "yes," and 56% of them thought the Society should sponsor the center if there was to be one.

An information activity that duplicated step by step the activities of an existing center would be indefensible. Therefore, a study of the extant systems must be made to determine such aspects as how the information is packaged or presented to a user, what literature sources are covered, how the literature collected is prepared for storage, how one requests an answer to a specific question, and so on. This aspect of the entomology program is in progress and involves a study of such large information centers as the Military Entomological Information Service, BioSciences Information Service, Chemical Abstracts and others.

Finally, it is important to evaluate the coverage provided to the discipline by the abstracting and citation journals. Such evaluation can be performed in various ways. The procedure chosen in the entomology study involves compiling data from the bibliographic records of a statistically sound sample of papers published in primary journals for a 3-year period. The data collected includes the field of entomology concerned, the journal source, date, number of pages, authors, title, volume, number, the abstracting and citation journal which includes references to this serial and the lagtime between issues of a paper and its citation in the secondary journal. By comparison of this data for the 3 years the scope and growth of coverage can be determined and the future rate of growth can be predicted.

There will be 2 interesting and valuable by-products of this study. One, a Biological Sciences Information Directory, will list and describe briefly the mission, scope, objectives, information services, user qualifications and directions for use of as many general and specialized information activities (both government and non-government) as possible. Although the

directory will emphasize the nature and extent of entomological data stored by these services, it will be useful to all biologists and, present plans call for a series of articles on the information centers to be published in *BioScience*.

A second by-product will be a BSCP Communique analyzing in depth the serial literature considered to be primary or core literature for the field of entomology. This study will present a complete title list of all journals publishing 50% or more of their scientific content in the field of entomology. They will be analyzed giving the country of origin, language of publication, frequency of issue, type of sponsorship, content characteristics, abstract coverage and subject content.

Part of the effort of one biological society to grasp the horns of the information dilemma has been described briefly. The data concerning the entomology literature and the needs of the entomologist is data that must someday be gathered for all the biological disciplines if they are to cope adequately with the problem. Never for one moment would anyone advocate that each develop a computer-based information center. But who is better qualified to evaluate the needs of the scientist and the sources of information available to him than the society itself? What source is more knowledgeable to present information in greater depth than is available from the broadly-based information services than the society itself? If, as the past chairman of COBSI, Dr. Robert Gordon (personal communication), stated, "If we are ever to join together to produce a workable system embracing the existing generalized information services, with modification and supplementation where needed, the societies must lead and co-operate."

References

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