# Systematics '75

## A Report on a Workshop Assessing the Current Status of Systematics Collections



S. R. Edwards and
L. D. Grotta, *Editors*

association of
systematics collections

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# PREFACE

In December 1973 the Association of Systematics Collections (ASC) published a report entitled America's Systematics Collections: A National Plan. This report included a statement of the goals of the systematics collections community for improving the condition of the collections and the services they provide; a review of problems affecting systematics collections; specific recommendations (comprising the "National Plan") to resolve these problems; and a statement of priorities and estimated costs for implementing them.

In March 1975, with support from the National Science Foundation, the ASC convened a Workshop of representatives of the systematics collections community to assess progress toward implementation of the National Plan. The Workshop was attended by 33 individuals representing: a) the many disciplines comprising systematic biology (chairmen of professional society Advisory Committees); b) specific problem-solving groups (chairmen of ASC Councils); c) the major institutions supporting systematics collections (ASC Board of Directors); and d) federal agencies that provide support to systematics collections and systematics in general.

The Association of Systematics Collections, in bringing together representatives of the aforementioned groups and encouraging them to act in concert toward common goals, sought to expedite solutions to some of the fundamental problems now confronting the systematics collections community.

## Participants

1. Advisory Committees: The Advisory Committees seek out and organize interested individuals from their respective disciplines, represent their constituencies, and serve as a means of communication among individuals, disciplines and the ASC in matters involving the National Plan.

Advisory Committees provide "intra-disciplinary" coordination.

2. ASC Councils: The ASC Councils draw upon the inter-disciplinary resources represented within the systematics collections community and address themselves to specific tasks. These Councils were established by the ASC because further development of systematics collections as a national resource requires a strong working collaboration between those responsible for systematics collections and those who use them.

The ASC Councils provide "inter-disciplinary" coordination.

3. ASC Member Institutions: The institutional members of the ASC represent all categories of systematics collections and serve as the repositories for more than 85% of the systematics collections in the United States. Individuals

who represent these institutions in the affairs of the ASC are primarily senior administrators.

4. Federal Agencies: Because the federal government provides a major source of support for research in systematic and evolutionary biology in the United States, representatives of federal agencies were invited to participate in the Workshop, particularly in discussions of funding priorities, funding limitations, and sources of funding.

## Preliminary Survey

During 1975 the ASC conducted a survey of all its member institutions, Councils, and professional society Advisory Committees and provided copies of the results to each participant prior to the Workshop.

As a result of these surveys, the major topics considered during the Workshop were: organizational relationships of the different elements of the systematics collections community represented (Session I), current issues that will (or could) affect the systematics collections community (Session II), and problems and resolutions for action (Sessions III and IV) herein summarized without attribution.

ACKNOWLEDGMENTS

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Thanks is also extended to Porter M. Kier, Director of the National Museum of Natural History, Smithsonian Institution, for graciously providing the facilities and other support services for convening the Workshop.

Special acknowledgments are given the several individuals who consented to review the pre-publication draft of this report. Their keen judgment and valuable suggestions contributed greatly. In particular, we express special thanks to Craig C. Black, Philip S. Humphrey, Howard S. Irwin and E. Leland Webber.

A special vote of thanks is also due to all the persons who attended and contributed to the Workshop. Without their dedication and interest there would have been no Workshop, let alone progress which has already and is continuing to be made.

Finally, this report would not have been possible without the dedicated effort of Sally J. Cool who patiently transcribed the tape recordings of the Workshop proceedings and typed the several subsequent drafts of the manuscript.

S.R.E.

L.D.G.

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# INTRODUCTION

Howard S. Irwin

President, Association of Systematics Collections

To succinctly describe our present situation I quote from a recent issue of "Playboy" Magazine:

> And the Lord spake unto Moses, saying: "There is both good news and bad news. The good news is that plagues shall smite your Egyptian oppressors. The Nile shall be turned to blood, and frogs and locusts shall cover the fields, and gnats and flies shall infest the Pharoah's people, and their cattle shall die and rot in the pastures, and hail and darkness shall visit punishment upon the land of Egypt! Then will I lead the children of Israel forth, parting the waters of the Red Sea so that they may cross, and thereafter strewing the desert with manna so that they may eat."
>
> And Moses said, "O Lord, that's wonderful! But tell me, what's the bad news?"
>
> And the Lord God replied, "It will be up to you, Moses, to write the environmental impact statement."

We of the Association of Systematics Collections (ASC) received the good news some weeks ago that the National Science Foundation would provide funds so that the Association could convene this Workshop to exchange information and views on several aspects of the relationships among and progress by systematics collections users, collection stewards, and collection supporters. Some of us represent professional societies of biologists; some of us are concerned with special problems of collection management and access; some of us are responsible for permanently housing and maintaining collections as an essential resource for diverse scientific and societal benefits; some of us are looking for rationales for the application of public funds to support biological collections in light of their unique importance to research and their potential to help mankind find ways to make the painful, elusive, but increasingly necessary adjustments to the realities of a fragile, finite planet.

For this opportunity presented us we are grateful to the National Science Foundation for its support and also to Dr. Porter Kier and the National Museum of Natural History for making these facilities available.

The two-day agenda will be divided into four parts--the first a functional review of the systematics collections community and its support bases in the federal government; the second a summary review of collections-oriented projects underway, largely under the aegis of the ASC; the third a discussion among us of project priorities and sources of support; and finally the development of recommendations for future action, based on questionnaire returns and the strong views and concensus emerging at this meeting.

To be successful and have value, this Workshop should reveal the problems and progress of the systematics collections community. The need for coordination among these collections should become apparent to us all--representing diverse disciplines and points of view as we do--and, more important, the resolutions we adopt should provide clear, realistic, feasible guidance to collection users, managers and funding agencies.

Finally, this is a Workshop, which means everyone is invited and encouraged to participate.

## SESSION I: ORGANIZATIONAL RELATIONSHIPS

### THE PERCEIVED ROLE OF INSTITUTIONS

Howard S. Irwin

President, Association of Systematics Collections

At a recent meeting of biological society presidents sponsored by the American Institute of Biological Sciences, at which I represented ASC, Guyford Stever observed that biological sciences are not only continuing their multifaceted investigations into the makings and workings of living nature, but are moving to center stage in dealing with man's societal problems. He saw implications of this new focus of activity for scientific manpower, for federal support of research, and for the involvement of mission agencies in basic research. He welcomed this expanded participation and urged intensified efforts to exchange information among biological disciplines in order to provide a basis for interdisciplinary attacks on problems of societal significance and to adopt systems approaches to their resolution. He particularly stressed the desperate need for institutions of biological research to drop the arrogance of competitive hubris in favor of regrouping functionally and structurally to deal with problems besetting a society on the brink of disaster.

Dr. Stever's exhortation was the latest in a long series of admonitions from many sources to universities, research institutes, museums and similar organizations to step back and look at their purposes and priorities in light of today's tensions and urgencies, recognizing that ambient, alarmist cries of "wolf" and promises of the impossible are just as irresponsible as is a scientist's blind disregard for human sensitivities to his undertakings. It is an institutional responsibility to foster a dual awareness; to help carry the scientist's absorption in the intrinsic value of science to society at large, and to bring home to the scientist the existence and innate worth of other kinds of human experience. If this awareness was successfully realized, today's unfortunate prejudice against science and technology would lose much of its force, and recognition of the validity of alternate modes of thought and approach would preclude the blossoming of astrology and ESP--pseudo-sciences that arise in response to the stiff-necked insistance that the scientific approach in all matters is the only valid and serious way to deal with human experience. In short, institutions have a role to moderate between their professional staffs and the lay public which the institutions were created to serve. In today's world this communication is vital.

Institutions have an obvious capsular function--to provide a protected environment to house collections and to facilitate their use. As usage intensifies, institutions need formats to communicate experience on modes of housing and maintenance, on trends of use, and on operational economy. They also need to reach concensus on acceptable standards of access and management in the interest of responsibly serving national and international needs in the most economical way, but nevertheless recognizing that, just as there is great

diversity in the collections themselves, there will be pressures on them for diverse routes of access and modes of management.

Institutions also have an important responsibility to educate--to provide the people, the setting, and the tools to train professionals to the highest possible standards and to set them in pursuit of legitimate goals. Today too many institutional administrators fail to appreciate that ignorance of history and isolation from sympathetic professional advice seriously compromise wise policy. How many budding professionals are being taught by example that status and celebrity-seeking promote their careers? If greatness is a goal in education, it takes great thinking and consummate honesty to achieve it. Wisdom in the management of collections involved in education requires open senses and analytical intellect.

Some institutions serving as collections stewards are entering directly into the arena of application. They are encouraging the use of collections and collection-based data in the solution of a broad array of land-use problems (ranging from hydroelectric dams to endangered species habitat protection), in which data on biological diversity is germane to wise decisions. In some instances such involvement has proved burdensome or even disruptive. In others it has enriched the intellectual atmosphere of the institution and demonstrated the value of collections in hitherto unanticipated ways.

Looking at institutional responsibilities a different way, it is by now the most tedious of banalities to say that the place of the natural sciences in our culture is problematic, uncertain, and shifting. A powerful, popular vision of rationality, mathematics, theoretical natural philosophy, and experimental physics has molded the course of Western civilization over the last two centuries since the onset of the Industrial Revolution --which itself summarized the social utility of that vision. One enduring fiber in the natural philosophical plank of this vision is the traditional emphasis on the similarity of natural phenomena and the unity of natural sciences--that the reality of the scientific method, the coherence of scientific theory, the supremacy of mathematical models, and the uniquely cummulative character of scientific knowledge all bespeak oneness, against which our concern with diversity has seemed to run counter, emphasizing differences and weighing them in evolutionary terms.

But today the ground is shifting. We are faced with an appeal to utilize and live with natural ecosystems, not fight and destroy them, lest the gloomy list of dire predictions comes to be. We are, of course, up against serious economic and social change, and the timetable for its arrival has been moved steadily forward by mounting pressures. We are into the process of creating an economy, society, and culture that break sharply with those we've known for more than a century. But our future is being created in large part outside of human institutions, through cultural innovation and social conflict stimulated by new and unaccustomed constraints.

What is difficult for many to accept is the apparent need to wipe clean a good deal of cultural slate in preparation for time ahead. Fundamental change is in order since the ancien regime is what got us here. In science, an integrated, holistic, interdisciplinary approach must be mixed

with what Russell Train called "humanistic wisdom"--not simple reactionism against technology.

In our domain--the relationships of institutions exercising stewardship over systematics collections--this change in cultural vision will have profound repercussions not only in such critical enterprises as ecological prediction but in others as well. It will go beyond the mere offering of new information to professional users through the parameter of taxonomic name to the provision of refined operational data in at least some taxonomic subsets--data responsive to much broader questions as can be accomplished only through electronic data processing. In this way institutions can help collections become instruments of a new public policy that will surely call upon the data they harbor, even to carry out the logical, broad first step: a national biological inventory. It is a job, however, that must be coordinated at the national level, and will depend on the interplay of all the elements that comprise the ASC.

It is a correct approach because it addresses the goal of ecological balance upon which any policy for the future continuation of mankind must be based. To me, the basic components of that policy must be, first, that the relationships of man and environment--specifically man and nature--have changed from exploitation to nuturing; interlinking societal, agricultural, and industrial activities into regenerative complexes. Second, that whatever is decided upon and done in one place will produce effects everywhere--whether it be population control, resource distribution, work-leisure balance, preservation of biological diversity or whatever. Thirdly, the idea of ecological balance should, at long last, reach a level in human consciousness so as to be recognized as an explicit human responsibility and an essential ingredient in the values of the future, and not relegated to some exogenous power or vaguely viewed as the hidden purpose of nature. If the ecosystem of which we are a part has no outside, then there is no way of viewing our own destiny as separate from what we are able to do within, and as a part of, our system. This central concept should finally convince us that the responsibility has come to rest fully and squarely upon the shoulders of today's man, for there are no other shoulders on which it can rest. If people can become convinced of this, the new conviction should greatly help in changing and discarding obsolete values, inventing and adopting new ones, and embedding such principles into the fabric of our institutions. The concept of balance, in the ecosystematic sense, must be at the heart of any nomative planning for our future.

In summary, institutions in the ASC are the instruments housing biological collections, using them for research by internal and external professionals and for education, sensitive to their heightened societal significance, increasingly broadening their application to problems outside basic taxonomic disciplines, conscious of the organizational limitations to access, and anticipating new demands that will surely accompany the change underway in man's perception of his role in nature.

Paraphrasing the recent words of Congressman Emilio Daddario; the time is upon us as stewards, users, and supporters of systematics collections to address appropriate questions of public policy with all the knowledge and wisdom we can muster and help in the formulation of a new national science policy.

Now, before closing, some specifics about the members of the ASC: There are 56 institutions thus far in the Association. These members are highly varied in both administrative and fiscal arrangements. Based upon the principal source of support, half of the collections in these institutions are maintained by state universities, 20% by private or non-university institutions, 11% by private universities, 3% by the Federal government, 7% by state or provincial governments, 7% by city governments and 2% by county governments.

In the advance survey undertaken in preparation for this Workshop, (see Appendix II), a number of questions were directed toward institutional detail. For example, "Does your institution have a stated goal or goals for: the use of collections" (over half said yes); or "the development of collections in the future?" (again, about half said yes), but half either had no policy or at least the respondent didn't know.

Another question was "Does your institution support an active research program in conjunction with the collections?" The vast majority of the collections were created to promote research and it's not surprising that 86% said yes. Another 11% didn't answer, and only 3% said no.

Beyond serving as an instrument of research, collections offer a great array of scientific and educational services. For example, 90% of them provide identification services; 80% storage or depository services; 90% taxonomic-related information. Similar percentages are reported for specimen-related storage and preservation services, fumigation services, and field collection of specimens. These are all services that are provided by the collections quite apart from their original purpose of supporting research.

Another question: "If available, what fee schedules are used for the provision of the various services?" One institution charges $10.00 an hour for identification services. Another, $25.00 an hour for ecological consulting services.

"Does your institution have a stated policy regarding the provision of consulting services?" Three-fourths said they had no stated policy. Institutions may provide consultative services, or they may not, but frequently it's left up to an individual curator or collection administrator rather than determined by the institution.

"Does your institution provide educational services to special interest groups?" About eight out of ten institutions do provide such services.

"What significant accomplishments have been realized within your institutions during the past two years?" Sixteen out of the 56 indicated an increase in available space for collections. Other gains cited were: increased recognition (however that's perceived), increased use, and improvements in collections.

"What is the most critical problem that affects your collection?" The most critical problem is still the need for more space and/or the need for more personnel. And yet, rather gloomily, in response to "do you foresee a resolution of this problem in the near future?" the majority said "no they didn't," neither in space nor in personnel.

"What, in your opinion, is the greatest single problem your institution will be facing in the next five years?" Again, most said "inadequate funding" and a large percentage noted "lack of space."

"What problems, from the institutional point of view, should the ASC and its members be looking into?" The majority felt that obtaining funds for both collections and hiring and training technical assistants was a major function the ASC should be pursuing.

These are some of the perceptions of the institutions. None of this, of course, is new. This was the backdrop against which the Association was founded: "to foster the care, management, preservation, and improvement of systematics collections." The purpose of the Association are to "facilitate the use of systematics collections in science and society: by providing representation for institutions housing these collections; by encouraging direct interaction among these institutions and among those who are concerned with their use; by providing a forum for considering mutual problems; and by promoting the role of systematics collections in research, education, and public service."

Most of you know that the Association is limited to institutional membership, and where many collections are housed at one institution they are represented in the affairs of the Association by a single designated representative. Full membership is open to institutions in North America, and associate membership to those outside North America. As noted earlier, the Association has 56 members. In February, two years ago, the Board established a permanent Secretariat under the authority of the Secretary. The Secretariat consists of two full-time employees and a part-time editor. The objective of the Secretariat is the implementation of the goals of the Association which I have described. To this end the Secretariat supports four major program functions: communication, grant and contract development, organizational support, and administration.

In the two-and-one-half years of its existence, the ASC has played a vital role in a coordinated effort among the institutions and has already made its mark.

In summary, the institutions see themselves as implementors of national policy with respect to collections and their maintenance, growth, and use; and they see the ASC as a coordinating and communication body helping to: form policy; disseminate information; improve collection quality; improve access to collections; and document the relevance of collections to significant scientific and societal problems.

Reed Rollins: The results of the questionnaire have indicated that raising money for collections and training technicians are extremely important functions. Collections, when viewed as specialized libraries, form a very important resource for studies dealing with evolution, ecology, population biology, and so on. Therefore, they play a singular role in the training of graduate students.

One problem that has arisen in the last year or two is a decline in support for graduate students. Many funding sources for advanced training have been terminated. We ought to concern ourselves not only with the training of technicians but also with the problems of advanced graduate students.

Robert Inger: Don't you think the production of Ph.D.'s in our fields exceeds the job opportunities for such people?

Rollins: There is never an over-supply of top-notch people. Furthermore, I think there is an under-supply of top notch-people in our fields right now. We do need to improve the quality of the training, but I don't think our market is that saturated.

Irwin: Do you feel that it is time to look upon professionals in a somewhat different light because the demands that are being made in systematics today call for a different kind of training?

Rollins: Yes, we have been struggling for greater breadth and substance in biological training as a whole for a number of years.

Inger: I would like to address the need for, and training of, specialized personnel. There is an enormous need for trained personnel in systematics to work in environmental assessment and impact studies. As a consequence, many of these studies are not very meaningful because trained personnel are not available to do the work.

Robert Ornduff: Many of the most important systematics collections in the United States are housed in state-supported universities financed principally through tax dollars. In these days of declining enrollments, with budget cutbacks, university administrators are critically looking at these expensive operations. Collections now have to be justified in terms of their role in the educational program of the university and not as prestigious luxuries which provide some "international glitter" for the campus. Further, this role in education must go beyond the limits of the university to include public education programs for adults, high school and grammar school students, and others. This will insure that the maximum number of people are aware of the value and contributions of the systematics collections.

David Bates: Traditionally taxonomic training has been a rather narrowly conceived program. As a consequence, we're training people that, in response to societal needs, represent a very limited resource.

By expanding the concept of training in systematic biology, sources of support that are now lacking would become available. It's very interesting that most universities now perceive a need to relate basic research to practical applications; however, this hasn't changed graduate programs significantly. Until this climate changes, I don't believe financial support is going to improve.

Some institutions are already set up to introduce applied concepts in their training programs. I think a teacher can develop such programs, particularly in state universities with a defined mission to serve the

needs of the state. However, it's difficult to gain the support of the graduate faculties because they view basic science as a prerequisite to the Ph.D.

Irwin: Free standing institutions have more flexibility in dealing with changes in training programs. We have found it possible to find young professionals with both systematic training and a commitment to the applied research.

## THE PERCEIVED ROLE OF ASC COUNCILS

Craig C. Black

Chairman, ASC Council on Standards for Systematics Collections

Most of us are familiar with the Association of Systematics Collections and the Councils which were formed in January 1974. The reasons for the formation of these Councils are presented in America's Systematics Collections: A National Plan.

ASC Councils are comprised of individuals representing ASC member institutions, various disciplines in systematic biology and various federal and state agencies that use systematics material and need information from systematics collections. The ASC Councils provide an integrating mechanism for solving the problems that affect biological collections.

To date, three Councils have been established by the ASC. One is concerned with systematics collections and environmental quality; the second is concerned with systematics collections as a national resource; and the third is concerned with standards in systematics collections for both data and specimens. Other Councils are planned for later implementation.

One possibility is a Council on Systematics Collections and the Law. Such a Council is not named in the "National Plan" report, but there are many matters now emerging that involve the legal aspects of the collection of living material--their care and management; who is legally entitled to be a steward of such material; importation; exportation; etc. These are problems that involve everyone: professional societies, institutions, and the government.

Other Councils may be established to deal with problems of graduate education, electronic data processing, and other emerging concerns.

Sydney Anderson: Aren't these Councils established to focus on issues or problems, prepare a report, and then dissolve?

Philip Humphrey: Not necessarily. In the "National Plan" there is an intent, where appropriate, that the Councils monitor problem areas and provide updated information.

Inger: It is indicated to some extent by the results of the questionnaire (see pp. 53 - 66) that a Council should be established on technical training and graduate education. This Council could study the whole problem of where collections fit into college and university training and graduate education programs.

Black: I think that's a very good recommendation. Two Councils were proposed in the "National Plan" that touch on this: Personnel Needs in Systematics Collections, and Research and Graduate Education in Systematics Collections.

Ornduff: Another Council referred to in the "National Plan" that should be considered in light of today's discussion is the Council on Systematics Collections and Public Awareness.

## THE ROLE OF THE ADVISORY COMMITTEES IN PROFESSIONAL SOCIETIES

Welton Lee

Chairman, Joint Committee for Systematic Resources in Invertebrate Zoology

I've been asked to speak on the general topic of the perceived role of the advisory committees in professional societies. My immediate inclination was to embark on a lengthy and somewhat grandiose list of charges and duties of such advisory committees and the roles of these committees as I saw them. It may initially seem somewhat arrogant to use one's own opinions as sole criterion for deliniating the roles of these committees, yet in retrospect it is not unreasonable, for any chairman of such a committee faces problems and frustrations similar to those confronted by most other chairmen. And while there might well be small differences of opinion between individual chairmen, the overview should indeed have more than a thread of similarity. Having thus conveniently disposed of any apprehensions about giving this talk, I began to organize it. It was at this point that I suddenly came face-to-face with the real problem--I found I was preparing answers to questions not yet really defined. In effect, I had assumed the basic issues being addressed by the advisory committees were generally appreciated. While such an assumption might be an accurate one, it is none the less essential for us to attempt to define the problems to which we seek answers. Assumptions supercede facts far too often. We find ourselves launched on campaigns to solve problems either not yet identified or insufficiently elucidated to be of real value.

Let's begin by trying to anticipate the problems which can realistically be identified, and hope we arrive at some concept of the role of advisory committees and professional societies. Each advisory committee is identified with a so-called discipline; the size and scope of which is determined more by history and happenstance than by outcome of any plan for development.

The first problem is a simple matter of identifying what, in effect, we are dealing with. For the sake of simplicity let's separate the human resource from the physical resource and focus on the collections themselves. What do they contain of value and how large are they? One would initially think that the answers to these questions would be relatively simple to guess. But it is here that a committee chairman faces his first major problem. In most disciplines, there is little or no communication relative to who has what. Assumptions--even rumors--sometimes substitute for facts, and there is no central place where one can ascertain the size and scope of the many hundreds of collections now in the United States. In fact, it is very often assumed that size is equal to importance. That is, that the largest collections are indispensable resources. There are numerous small, often private, collections where exceedingly valuable material is housed. What is sad is that these are rarely known and often not considered or used because of their obscurity. They are lost resources.

These considerations are essentially defined. The first job of the advisory committee is to identify the size, scope and distribution of the physical resource--the collections. The mere existence of the physical resource (i.e., systematics collections) is not enough to make them valuable. A specimen inadequately prepared or preserved is next to useless. Therefore the standards utilized in collecting, preparing, and preserving specimens are as important as any other feature. However, the specimen is only one third of the total picture.

There are two other equally important elements that must be present for a complete view. These are the data accompanying the specimen and the availability of that data to whoever needs it. One must be able to retrieve both components of this information; the data and the specimen. Otherwise it is useless or nearly so. The preservation and the preparation of this specimen and the records that go with it and the mode in which that information is maintained and retrieved are essential to its value as a resource. These things fall under the general category of collection management. The second major objective then is to determine how the physical resource is managed. Such information permits evaluation of the present and potential usefulness.

Our next category consists of the human resources; those individuals both maintaining these collections and using them. The chief concern relative to the collection managers is the available supply of qualified professionals and technical support personnel, and the degree to which training programs exist to provide such personnel now and in the future.

The next concern, and most important consideration, is the assessment of the way in which these resources, both physical and human, are utilized. The needs of society and the scientific community will determine the adequacy and usefulness of these resources. Here we are faced with an enormous spectrum of possibilities since new and unique demands are constantly being made on the country's systematics resources. It's easy to become provincial at this point and assess the use of collections from the perspective of those most closely associated with them. Yet in the long run it will be to the advantage of the

systematics community and to society-at-large to have an evaluation based on a much broader sampling of those now using and anticipating use of this resource.

In summary, the first role of advisory committees is to put together a comprehensive picture of the resource or resources under their jurisdiction including assessment of: 1) the size, the scope and distribution of the physical resource; 2) the status of the management of that resource; 3) an assessment of the personnel maintaining the resource, their training and the training of future resource managers; and finally, 4) a picture of the actual and anticipated use of the resource by both society-at-large and by the systematics community. The accumulation of such data will permit assessment of special problems within the disciplines and thereby generate some thought as to how to correct these problems. It is no surprise that each discipline has its own particular problems. Nevertheless, discussions with other committee chairmen indicate to me that there are more than a few problem areas that transcend disciplinary boundaries.

In a report from the Advisory Committee for Systematics Resources in Entomology [Bull. Ent. Soc. America 20(3):237-242], a statement was made that applies to the systematics community as a whole. In a very concise manner, the statement sets out the real basis of the problems we so often find or expect to find: "The need for such a National Plan derives from the very circumstances it is designed to correct--the lack of adequate coordination in the development of collections, the inadequate care and use of those assembled, a failure to manage systematics resources effectively in support of experimental and applied biology, and a lack of the flexibility that is necessary to adjust to the ever-changing demands of society (page 237)." I think in a way it is inappropriate and probably misleading to continue to refer to these committees as advisory committees. It is my strong conviction that their real role is: 1) assessment; 2) communication; 3) coordination; and 4) planning. To be sure there is an "advisory" role which is consistent with all of this; but these committees are a means to an end, not an end product in themselves.

Let me elaborate on this somewhat. The first suggested role is assessment. Here we're speaking of the gathering of information on the resource itself. Once that has been done it is possible to assess the problems peculiar to the discipline and its physical and human resources. The second step is perhaps the most important. I see these committees acting as a central communication center, communicating the results of assessment, receiving input from the systematics community and facilitating a discipline-wide dialogue. Its next job is to coordinate its findings into a set of stated problems and priorities. Finally, I view these committees in a role of planning the steps to be taken to solve the problems which have been identified. How do such committees relate to the professional societies? One might ask why not have the professional societies themselves do the job of the committee? The answer is simply a matter of their large and unwieldy size. Large societies are not yet up to handling such problems. They are, however, an important adjunct to this entire system.

The societies represent a national gathering of those with similar interests; a collection of scientists with similar activities and concerns.

I see the professional societies more as supportative agencies than anything else. They play an immense role in facilitating the activities of the advisory committees. They provide access to the resources under consideration, they can facilitate very important and very necessary communications, and they can help in the coordination and approval of final plans and priorities. While such a role may seem on the surface to be rather subservient to the advisory committees, it is not. The professional societies, through cooperation or lack of cooperation, can serve as a direct line of communication between the scientist and the committee or stand as a barrier between them. In my experience, the professional societies have been an immense help.

In closing, I would like to explore an additional point: no amount of advertising or extension of the present mode of serving society will change the current status of our nation's systematics resources. The driving force of any such change must come from within the discipline itself. And that requires a very high degree of commitment from those who are already comfortable with things the way they are. Change also requires a high degree of insight on the part of funding agencies which ultimately determine whether or not change will take place. Perhaps then the most important and yet unstated role of the so-called advisory committees will be to effectively communicate, to both the funding agencies and those within the systematics community, the importance and urgency of such changes. Without a firm commitment within the systematics community, no change will take place and without a commitment to provide the funding for such a change, no change can take place. Comments?

Inger: When referring to the planning and coordinating functions of advisory committees, how should communications be handled with the directors of those institutions who support the systematics resources? These committees are not directly responsible for the collections and neither are the societies.

Lee: The ASC and its Councils could be a very important factor in facilitating communications between the societies and the administration of the institutions housing the collections. I see the ASC acting as a coordinator between the societies and the administrators. Very often those within a particular discipline are more aware of the problems and priorities in their discipline than the administrators. Both needs have to be satisfied.

Willard Payne: It is very important that advisory committees serve as the focal point of communications. Advisory committees must establish good relationships and communication with their disciplines and with the ASC.

Jerry Choate: Advisory committees, through interactions within their own disciplines and the institutions housing the collections, can also serve as action groups to improve the quality of collections.

Inger: What actual connection has there been between the professional society advisory committees on the one hand, and the ASC Council on National Systematics Collections Resources on the other?

Choate: There has been an attempt to insure representation of as many advisory committees on the Council as feasible. Further, we have received

input from most committees on matters that pertain to our goals; e.g., survey of collection resources.

Ernest Lachner: The advisory committees sponsored by the American Society of Ichthyologists and Herpetologists were established as ad hoc committees to examine the resources in these fields and outline their needs. This is the first session I've attended at which all advisory committees were represented. To date, the advisory committees have not tried to identify common goals. This meeting could provide that opportunity.

Inger: I'd like to comment on the advisory committees and how they interact, or might interact, with the ASC Councils. A strong recommendation in this area might well be presented for consideration. There are certain common problems affecting the various disciplines, the collections, and research in these areas. Ideally the ASC Councils can focus on these common problems. Advisory committee members from many disciplines do serve on the three ASC Councils, but whether they represent their discipline, their advisory committee or themselves is an open question at this time. There is a need for a defined mechanism for passing information from the disciplines through the advisory committees to the ASC Councils.

## PERCEIVED ROLE OF FEDERAL FUNDING AGENCIES

Eloise E. Clark

Division of Biological and Medical Sciences,

National Science Foundation

Although the National Museum Act administered by the Smithsonian Institution provides some support to museums, the National Science Foundation is the major source of federal support for systematics collections. The Foundation, with its recently inaugurated program for supporting Biological Research Resources, now has the designated responsibility for assisting collections. Today about three million dollars annually are budgeted for this program, and I don't foresee that this budget is likely to increase very much in the next several years.

Further, the level of support of systematics research, independent of the collection resources support, is approximately six million dollars annually. So in effect, 33 percent of the NSF support of systematics is invested in collection resources and 66 percent in research.

We have the problem of increasing the budget in both areas--research and collection resources. The Office of Management and Budget has allowed a modest increase in support of these areas in the NSF budget for FY 76, which starts in July. However, the average support for biological research was increased only 4 percent--less than the current inflation rate.

It is important for the Foundation to continue to provide support for basic research. Such support is important to maintain a strong intellectual base in science, including biology. However, I don't expect any major increases in the federal funding situation during the next three years. If there is an increase in the NSF budget, it will probably be little more than the current inflation rate. I see no major change in support of collections by the Foundation for the next several years.

It is obvious that NSF will not be able to bear the entire financial responsibility. Therefore, it is important to educate other federal agencies in the needs of systematic collections. In addition, these agencies should be informed of the services the collections could provide for them. A sense of commitment must be developed in other areas of the federal government despite the fact that their budgets, too, are being overextended.

There are other aspects of systematics that the Food and Drug Administration might be interested in supporting. Do you have a standard brochure listing contracts or proposals?

Rosa Gryder: The Food and Drug Administration supports research by means of our grants and contracts program. There are aspects of systematics research that the Food and Drug Administration might be interested in supporting; for example, parasitology, drug-producing plants, toxic dinoflagellates, etc. Because this is a regulatory agency, most research which we support is directed towards procuring the specific scientific information required to write meaningful regulations or to develop new or improved analytical methods.

Our contracts are advertised in the "Business Commerce Daily" and through the standard government "Request For Proposals" (RFP) which are mailed to university offices upon request. Furthermore, questions can be directed to myself or my colleagues in the Office of the Associate Commissioner for Science of the Food and Drug Administration, and we will be happy to answer them.

E. Leland Webber (to Clark): Can you see any specific ways of narrowing the educational gap between science and the public which could effect the goals of governmental agencies?

Clark: Educational efforts should start in the grade schools so that scientific knowledge becomes part of the lifesytle.

Writing Congressmen and talking with university presidents and boards of directors are also very important efforts in communicating the value of scientific study.

J. C. Dickinson: A lot of us have intentionally not taken an active role in communicating with people in Congress for fear of alienating colleagues in the Foundation. It is understood that these pertinent support programs must be "sold" in the Foundation first. However, many of us would welcome the opportunity to informally discuss how this could be done in a productive way.

Clark: After you have worked out a plan, I think you should feel free to call on Dr. Stever directly. He could advise you. People at the top of the totem pole have been responsive in the past; they are aware of your needs and would be interested in your perceptions and comments.

Dickinson: We should probably also be "touching base" with people in the Education Division of NSF.

Clark: It wouldn't hurt.

Webber: If we assume that many of the problems facing biological collections result from growth, then we also have to recognize that a major portion of that growth has come about as a result of Federal funding of research activities. Have you thought that this might provide a mechanism for insuring support of the collections? Shouldn't collections be provided support to maintain the specimens after the research is completed?

William Sievers: In part the fault lies at our door in that we have not considered that these problems were associated with research activities.

Inger: This problem extends beyond research support derived from NSF. Contracts with the Department of the Interior, Office of Endangered Species, can also result in large collections. Yet these contracts do not provide any support for handling the specimens once they arrive at a museum. Whenever a contract, grant or program has a potential impact on the collections, we ought to charge for that impact.

Lachner: However, we have established a precedent that implies that our major concern is the acquisition of more specimens, not insuring on-going support for the specimens accessioned through these activities.

Furthermore, while it is clear that we have more specimens than we need (or can afford) from certain areas, there are thousands of specimens and populations not represented in our collections. Accessory field studies in evolutionary biology and natural history are also needed.

Do you have any idea how much money is needed? In fishes alone we need over $100 million. If you include all other specimen-oriented fields we are talking about over $1 billion. This kind of money cannot come from NSF. It requires interacting with Congress directly.

Irwin: You are quite right, and the magnitude of the problem is staggering.

Black: The only way we can get substantial funding for the kinds of things you have mentioned is to convince Congress of the need for a National Biological Survey. If the ASC, and the different groups represented here, could place their support behind this concept, regardless of philosophical background, we would have a common denominator for interacting with Congress. If we could do this, the National Biological Survey would serve as a vehicle for securing the kinds of support identified, on an on-going basis.

R. Jack Schultz: You could start by developing standards for impact studies which would clearly state the need to have a professional scientist do the work. This would then funnel more money into your community. It would also provide a source of support for the collections derived from these surveys.

Choate: Don't these contracts go to the lowest bidder? If so, I am sure that there will always be somebody willing to do the work for less than the professional.

Irwin: However, the standards mentioned earlier by Jack [Schultz] would circumvent this problem.

Humphrey: I think the annual expenditure in environmental assessment by the federal government alone is between three and five hundred million dollars. Part of this should be spent in direct support of the collections and associated resources. However, we will not get any of this support unless we act in a very constructive, yet aggressive, way.

William Osburn: Another point: much of the work you are talking about is contracted to State agencies, and they do the work. Therefore you need to address that level also in our educational processes.

Stan Shetler: The ASC Council on Environmental Quality has set, as its highest priority, the development of a very basic and simple set of guidelines on how to improve the quality of systematics information in impact statements. These guidelines would define minimal standards.

Payne: While the systematics community has prepared great numbers of "major reviews" and monographs on various taxonomic groups, we have been negligent for some time, in seeing that this information is made available to federal agencies and to the public.

Choate: This is true, but those of us that have prepared checklists and lay-oriented publications have been criticized by our colleagues and local administrators.

Robert Chenhall: Archaeologists are faced with many of the same problems and issues we have discussed here today. The American Society of Archaeologists has worked with various federal agencies in establishing standards that are mutually acceptable. These standards require the employment of professional archaeologists to perform certain kinds of contract work. This has introduced a new problem of major consequence--professional registration. How do you set the qualifications for citing an individual on the registration list? How do you vouch for the credibility of someone on the list? These are major points that you will have to face in time.

Lee: This leads to yet another problem. How should an individual who is employed in an institution handle one of these contracts when a fee is involved? How do such contracts affect institutional policies?

# SESSION II

## CURRENT AND PROPOSED PROJECTS

J. C. Dickinson, Jr.

Director, Florida State Museum

It is important, before starting this session, to bring you up to date on the past activities of the various advisory committees. The ASC has established liaison with 13 professional society advisory committees, representing the disciplines of arachnology, botany, culture collections (viruses and bacteria), entomology, herpetology, ichthyology, invertebrate paleontology, invertebrate zoology, malacology, mammalogy, ornithology, parasitology, and vertebrate paleontology. Of these 13 advisory committees, seven have received support from the National Science Foundation, totaling a little over $73,000 over the past three years. This is an average of over $10,000 per committee. Eight committees have prepared reports; four with assistance from NSF and four by support from their respective professional societies and the author's institution.

In general, these eight reports have addressed one or more of the following concerns: surveys and rankings of collections, preparation of national plans, and/or preparation of recommendations for the use of collection resources. Of these 13 advisory committees, 7 are recognized as standing committees by their own society. Six committees are recognized as functioning on an ad hoc basis.

Since 1974, four new advisory committees have been formed, representing culture collections, invertebrate paleontology, invertebrate zoology and parasitology.

There has been a long standing tradition in certain professional societies, particularly for birds and mammals, to survey collections periodically within their own disciplines. In recent years the National Science Foundation with limited resources has needed a basis for allocating support to systematics collections and has relied heavily on evaluations of collections by the societies. The ASC in turn has recognized a need for continued interaction between disciplines and advisory committees and has encouraged the formation of new committees and/or continued functioning of ad hoc advisory committees. The ASC, through its Annual Meeting and the ASC Newsletter, has provided a forum for advisory committees to present periodic status reports. In short, the National Science Foundation, through its funding activities, and the Association of Systematics Collections, through its interaction and support of advisory committees, have effectively brought about an expanded role for professional society advisory committees. Earlier committees restricted their activities to evaluation of collections within their fields. Today the advisory committees are preparing long-range proposals for more effective use of their resources including the collections, personnel, and facilities. Also, sound recommendations for future development of the disciplines are the principal goals of the committees as they stand today.

With this brief review of the advisory committees we will turn to the major activities of the systematics collections community which were identified as a result of the preliminary survey (see Appendix II). First, Bill Payne, Chairman of the Advisory Committee on Systematic Resources in Botany, will describe basic survey activities undertaken by his committee.

## DISCIPLINE-ORIENTED SURVEYS

Willard W. Payne

Chairman, Advisory Committee for

Systematic Resources in Botany

I have not had opportunities to review copies of all eight advisory committee reports that have been prepared, so my remarks are based principally on my own experience with the Advisory Committee for Systematic Resources in Botany. The goals of our surveys centered on the responsibilities cited this morning--to put together a comprehensive picture of the resource or resources under the jurisdictions of the various institutions. This included assessment of: 1) the size, the scope and distribution of the physical resources; 2) the status of the management of each resource; 3) assessment of the personnel maintaining the resources, their training and training activities; and 4) a picture of the actual and anticipated use of the resources by society-at-large and by the systematics community. In addition, we wanted to develop a favorable attitude toward national goals on the part of systematists in botany, particularly curators, and also to help the federal government understand our needs and their responsibilities.

The survey that our Committee administered dealt only with dead plants; we did not address the problems of living collections or libraries. Both libraries and living collections tend not to be under the authority of professional taxonomists and the goals of these resources are somewhat different from those of preserved collections. These resources are being studied at present.

To address the goal of developing a favorable climate in the community, we initiated a preliminary survey to find out whether the community was interested. We also set up a special section of the American Society of Plant Taxonomists (ASPT) for which we solicited membership by inserting advertisements in various journals. In this manner we developed a group of people all expressing enthusiasm for collaboration with the advisory committee. Representatives in each state were asked to develop expanded lists of extant collections. Every state has people who are well known both as curators and as users of collections; we asked the best known in each state to contact other people in the state and develop a liaison at that level.

We selected the membership of the Advisory Committee to provide representation of large and small institutions and specialized and generalized

collections to be sure that diverse ideas and opinions would be expressed without inhibition. The Committee also served as the American arm of the editorial group that revised the International Directory of Botanical Collections [Index Herbariorum, Ed. 5, J. and F. A. Stafleu. 1964. I.A.P.T. Utrecht] and it was through us that information was funnelled to the publisher for the sixth edition.

The committee then developed a questionnaire that was sent to every institution we could locate. In the previous International Directory, 244 institutional collections were cited from the U.S. As a result of our survey this number was increased to 1123, an enormous jump. We received responses from more than 600 institutions, about half of which chose not to participate in a national competitive ranking system. The latter institutions chose only to provide information acknowledging their roles in educational activities. The final report presented the data with very little editorial embellishment. Every attempt was made to avoid anything that could be construed as criticism. It is principally a straightforward presentation of information.

This report completes phase I. It has been our concern for some time that the weakness in our reiterated pleas for Federal assistance has been the lack of factual information on which the plea is based. A request for 19 million dollars falls on deaf ears when you have no data to support it. Therefore, the second phase of our efforts will be to establish a factual foundation for our assessment of financial needs in Botany. This phase will include a further look at the roles and needs of library resources and living collections. But, most importantly, the Committee's next step will be to gather data on the collections distinguished as National Resource Collections--those collections that carry significant federal responsibility that can be translated into dollar needs. Designation of these Resource Centers has to be followed by the recognition by the federal agencies of their responsibility for funding them, and by acceptance by the ASC of responsibility for overseeing the whole Resource Center concept. Both of these groups must have information from the disciplines before they can do anything, and I suspect this information will differ from discipline to discipline. Questions?

Inger: Is this approximately what all Advisory Committees are doing?

Payne: I think so, but I haven't studied all of their reports.

Schultz: Are the National Resource Centers in Botany regionalized?

Payne: Yes and no. We have not recommended establishment of centers by geographic region; however, the proposed sites are distributed throughout the country.

Also, on another level, within a geographic area there may be a number of institutions that might collaborate in a Resource Center program. For example, the herbaria at Harvard, although administratively separate, may cooperatively serve as a National Resource Center.

Black: The problems in paleontology are considerably different. The Society of Vertebrate Paleontology will never be able to rank collections or designate resource centers, because each paleontological collection is considered a unique resource. In vertebrate paleontology there are 2 1/2 million specimens in 50 institutions. The duplication of material in collections of fossils is nowhere near as great as in other disciplines. Further, there is really no way to evaluate which collections should be designated as resource centers. In the vertebrate paleontology report we essentially said that our list of the top ten was based on numbers of specimens in a collection which says nothing at all about the scientific value of these collections.

Payne: In Botany there are 45 million specimens in 1100 collections; 105 have been designated as National Resource Collections.

Richard Zweifel: From the standpoint of herpetology, it would not be difficult to rank the collections; however, certain of these collections, while ranking relatively low on a national list, may be of extreme value in a particular impact study--of greater value than a high ranking collection. These collections cannot be disregarded because they don't rank high.

Payne: The regional centers concept in Botany does not preclude or minimize the value of smaller collections. They should be recognized for their importance in serving their state, local community or educational institutions. Our point is to distinguish those institutions that have important responsibilities to the federal government.

## INTERDISCIPLINARY SURVEYS: THE REGISTRY CONCEPT

Jerry R. Choate

Chairman, ASC Council on

National Systematics Collections Resources

Fundamental differences exist between disciplinary and interdisciplinary surveys of systematics collections. These differences relate not only to the methodology employed but even to the perceived need for and the objectives of the surveys. To illustrate what I mean, I will briefly compare the disciplinary and interdisciplinary approaches with which I am most familiar.

On the disciplinary basis, the American Society of Mammalogists' Committee on Systematic Collections recently undertook a disciplinary survey of North American collections of Recent mammals. The perceived need for the survey related primarily to management--mammalian systematists were aware of the location and relative size of most of the North American collections of Recent mammals because previous surveys had been undertaken, but up-to-date data were needed so that curatorial and managerial practices could be evaluated and so that recommendations regarding future managerial practices could be formulated. The motivation behind the survey pertained to electronic data processing--current data on the location and extent of the disciplinary collection holdings

in North America were needed so that plans could be made to establish a computerized retrieval network for data on those holdings. The principal benefactors of the data retrieval network would be the mammalogists themselves, in that the most important objectives of the proposed data retrieval network are to facilitate greater efficiency and economy in curation and research. A secondary (albeit extremely important) objective is to provide a mechanism whereby mammalogists can more readily provide certain kinds of data needed in environmental assessment.

On the interdisciplinary basis, speaking now of the undertakings of the ASC Council on Resources, the perceived need for surveys must be divided into two categories: immediate need and potential need. In order to discuss these two categories of need, we must consider the society that our science serves and we must think in terms of how our science might better serve that society.

Systematics has always served society in various largely intangible ways, usually on a gratis basis. However, clearly tangible products of systematics have been less readily discernible by society. This has made little difference (especially at academic institutions, but to a lesser extent at other museums) to practicing systematists who continued merrily to do their own thing and societal applications be damned! An individual can get away with doing this, but an administrator of a systematics institution cannot. The administrator recognizes that systematists are accountable for what they do and, more importantly, he recognizes that the availability of funding to do our own thing is determined by how well we show that our own thing is needed, at least indirectly, by society.

Passage of the NEPA legislation initiated an important new era in the societal need for systematics. NEPA resulted in a dramatic increase in the need for ecological services. Most of you recall the jokes of a few years ago about how everyone, from public health officers to engineers, suddenly proclaimed themselves ecologists so that they could harvest a share of the funding available for environmental assessors. We systematists sat in our ivory towers and laughed; that is, we laughed until it became apparent that such poorly-trained individuals were receiving funding to provide taxonomic services!

With regard to the provision of taxonomic services, three problem areas deserve recognition:

1) Non-taxonomists frequently are being funded to do taxonomic work.
2) Needed taxonomic services often are not being used simply because they cannot readily be located.
3) Taxonomic services that are being provided by systematists frequently are being contracted on an individual rather than an institutional basis.

These three problems serve to illuminate the relationships between institutions housing systematics collections and the perceived need for interdisciplinary surveys. More than at any other time in the past, our society actually needs the services that systematics can provide. More than at any other time in the past, society potentially needs taxonomic services but is not getting them because there exists no mechanism for readily accessing them. Finally, more than at any other time in the past, the institutions housing

interdisciplinary collections need, if they are to survive economically, the funding that would result if they were to cooperatively provide these actually and potentially needed taxonomic services.

Accordingly, the perceived need for interdisciplinary surveys relates primarily to economics. The objectives are to provide a readily accessible mechanism for the provision of taxonomic services to agencies involved in environmental assessment. The benefactors of an interdisciplinary survey will include not only those involved in the survey but also those who use the results of the survey in the best interest of society.

In order to discuss the methodology that might be employed in what has come to be termed a Registry of Taxonomic Resources and Services, I am going to refer briefly to the so-called "Systematics Store Model."

The administrators of systematics collections, acting through the ASC, can be collectively regarded as a storekeeper. The commodity they have for sale is taxonomic information and services. However, they haven't tried very hard in the past to make their product either attractive or useful, with the result that there is little market for the product now even though there is a pronounced and increasing need for it. So, what can the storekeeper do? The two most obvious things he can do are to repackage the product in a desirable manner and to restock his shelves so that the product can be readily accessible. If the storekeeper is successful and manages to get out of the red, he can then plow his profits back into the store so to further upgrade his product.

So, how does he repackage his product? Obviously, the first thing he must do is inventory the resources and services that constitute the product; only after he fully understands what these essential ingredients of his product are can he label it in an attractive and descriptive manner. The next thing he must do is obtain administrative or institutional commitment to the involvement of personnel and facilities in environmental assessment--this is comparable to checking with the managers of the chain of stores to make sure that they all want to market the product. The final step in repackaging the product is to attach a price tag and to insure that the indicated price is equitable both to the store and to the purchaser.

After the product is inventoried and attractively packaged, the shelves of the taxonomic store must be stocked in such a manner that the needed taxonomic services can be readily found. This necessitates the establishment of a computerized referral system for the available taxonomic services. This referral system would be designed so that, by inputting an inquiry, specific and accurate information regarding taxonomic services could be obtained.

So, when I refer to the Registry of Taxonomic Resources and Services, what I really mean is a centralized data base containing information on the whereabouts, diversity, and extent of taxonomic resources, and the whereabouts, diversity, and expense of taxonomic services.

More specifically, information relating to taxonomic services should include at least the following:

1) Institutions that would agree to accept and maintain environmental voucher specimens;
2) Institutions that are willing to commit their facilities and personnel to the provision of taxonomic services;
3) Institutions and individuals who are willing to provide taxonomic sorting services;
4) Individuals who are willing to provide taxonomic identifications;
5) Institutions that are able and willing to train personnel to conduct sampling and monitoring projects; and
6) Institutionally-determined costs for these taxonomic services.

These are a few of the kinds of taxonomic information that could be readily obtained from the interdisciplinary survey I propose. Now, what if this registry of taxonomic resources and services were merged with a registry of environmental scientists and their areas of expertise? Such a merger, involving the ASC and The Institute of Ecology, is in the making. This merger would enable user agencies to obtain information regarding both taxonomic and ecological services by availing themselves of data stored together in a single data bank. This capability, in the long run, would result in greatly reduced costs, both in terms of dollars and time, for those who need both ecological and taxonomic information.

Cased in these terms it would seem that the taxonomic storekeeper has much to gain and little to lose by taking part in an interdisciplinary survey. So why doesn't he get started? The problem is that the storekeeper doesn't have sufficient capital to inventory and repackage his product. As a result, he must approach his potential customers to see if they are willing to invest their funds for upgrading the product so that it will be available for them to use. It remains to be seen which of the potential users of the Registry will deem it a worthwhile investment to provide such funds.

I believe that the interdisciplinary registry is a key concept that will open new and productive discourse between systematics, which certainly must be regarded as one of the purest of the pure sciences, and environmental assessment, which is one of the most applied of the applied sciences. This discourse is bound to lead to mutual benefits for both sciences, and will enable systematists to contribute to the well-being of society in highly visible and tangible ways.

Bates: I have one reservation: building a better mousetrap does not mean that we will catch better mice. If we develop this registry, will it be used? Professionals are going to be more expensive and therefore there is less likelihood that they will be contracted to do the work. Further, academicians have a greater obligation to their institutions (and the reasons for which they are hired; that is, teaching and research) than they have to do environmental impact statement contract work.

Choate: This is valid only if we assume that this work will be done at present staff levels. Agreed, most professionals in universities are not going to become instant applied systematists. We need to train technicians to handle much of this work.

Bates: Universities are still charged first with educating students, not providing applied services to a federal agency.

Humphrey: The registry, as it is foreseen today, will be just a listing of those people willing and able to provide these services. Those that are not interested in providing such services won't be listed.

Shetler: Nevertheless, it seems to me that the expert in a particular area must be consulted when difficult taxonomic problems or identifications arise. Much of this work, especially preliminary sorting, can be handled by technicians, but ultimately the experts will have to be consulted.

## DISCIPLINE-ORIENTED EVALUATION OF SYSTEMATIC COLLECTIONS: MAMMALOGY

Jerry R. Choate
Co-Chairman, Advisory Committee for
Systematic Resources in Mammalogy

The American Society of Mammalogists' Advisory Committee for Systematic Resources in Mammalogy originally set out to provide answers to three fundamental questions: 1) What and where are the systematic resources of our discipline? 2) How should they be maintained? and 3) How can they be made more accessible and used more effectively? The answer to the question "What and where are the resources?" was obtained by a means of a survey of North American collections. At the same time this survey was being conducted, guidelines were being established for the use and maintenance of the resource.

Our disciplinary committee regards a collection of scientific specimens to be not only a storehouse of established facts but also a dynamic source of new information. As such, the existence of a collection is justifiable from the standpoint that new knowledge continually can be derived from it and made available to other researchers in both the pure and applied sciences. Accordingly, to satisfy its purpose a collection must be used by the scientific community and must be maintained in a manner that facilitates this use. To our way of thinking, the key factors to consider in maintaining collections are safety, order, accuracy, and accessibility.

Safety (from the many physical hazards such as fire, water, dust and excessive light or heat, and from organisms such as insects or untrained humans which might damage or destroy specimens) was judged to be the most important consideration. Specimens must be kept in containers and buildings that provide adequate protection against these hazards, and periodic inspection and fumigation of collections are essential for their continued biological utility.

Order is of utmost importance if safely preserved materials are to be useful. Accordingly, our disciplinary committee urges that all materials in a

collection be arranged according to a specific plan that is recorded and posted so that needed specimens can be readily located. Whatever system of order within a collection is employed, simplicity and clarity are fundamental to its utility--a complicated system can be almost as frustrating and impracticable as no system at all.

Accuracy is necessary for an orderly and safe collection to have any scientific value. To say that information embodied in collections should be accurate might sound trite, but too often it is found that recorded information is suspect. This becomes critical when the information is stored in a computer where it might be used by persons who would not recognize the mistakes. Accordingly, our disciplinary committee urges that every effort be made to insure the accuracy of all information recorded in collections and that the information be handled in such a way that it is not degraded.

Accessibility facilitates the use of a safe, orderly, and accurate collection. Collections must be accessible for use, either in-house or by loan, by competent investigators whose proposed use accords with collection policies.

With safety, order, accuracy, and accessibility in mind, our disciplinary committee prepared guidelines pertaining to growth of collections, maintenance and use of type specimens, in-house use of collections, limitations that must be placed on access to collections, loans between collections, permanent transfers of materials between institutions, and mechanisms for the prevention of unnecessary or uneconomical duplication of collection resources.

After completing these guidelines, we assessed their utility and came to the conclusion that they amounted to nothing more than a useful exercise that would be read and filed by many of the managers of well-maintained collections but that might not even be read by many of the overworked managers of poorly-maintained collections. We agreed that systematic collections must be regarded as the property of science, regardless of their present whereabouts and legal technicalities, and that these collections must be preserved for future generations.

In order to promote the perpetuation of this national resource, our disciplinary committee decided that minimal standards of maintenance should be established and that all systematic collections of mammals should be urged to meet these standards. The initial minimal standards that we established are simple and basic--they consist primarily of items that most curators of mammals take for granted:

1) Collections of mammals should be administered by non-profit public or private institutions unless an individual or a profit-making organization is willing to establish a perpetual trust returning a reasonable per-specimen, per-year maintenance cost for the collection.

2) A collection must have at least one professional curator who is directly responsible for it.

3) Collections must be housed in buildings that provide adequate protection from fire, water, dust, excessive heat or light, and other physical hazards. We further recommended that important permanent records (such as

catalog and field notes) be kept in a fireproof or fire retardant safe or its equivalent.

4) Specimens must be stored in insect, dust, and light proof containers.

5) Collections must be periodically inspected and fumigated.

6) Specimens must be prepared in a manner that insures their utility. It is particularly critical that osteological material be properly prepared.

7) Specimens must be arranged according to a specific plan that is recorded and, preferably, posted.

8) Field notes and ancillary data must be preserved as a part of the permanent record for each specimen.

9) Data on specimen labels, in field notes, in the permanent catalogs, and wherever else data are recorded in the collection must be accurate.

10) A permanent catalog of all specimens in the collection must be maintained. The catalog must include at least the minimal data required for the proposed data retrieval network for mammals: catalog number; genus; species; sex; country, continent, or ocean of capture; state or province of capture; method of preservation; date of capture.

11) Collections must be accessible to all qualified users.

12) Accessibility to collections by unqualified persons must be restricted. We recommended the formation of separate teaching collections for use in basic courses, and the restriction of cataloged specimens for research purposes.

13) Loans with other institutions must be handled in a professional manner.

14) Type specimens must be identified as such, stored in cases marked accordingly, and made accessible to qualified scientists. They should not be sent on loan.

By the time these minimal standards were established, the survey of North American collections of Recent mammals had been completed. Drawing heavily on information gathered in that survey, the disciplinary committee next prepared an initial list of collections of mammals that we knew met those standards. This initial list was published in the February, 1975, issue of the Journal of Mammalogy along with a statement that our committee hoped that by setting minimal standards (and by assisting administrators of collections to meet those standards) that future deterioration of collections can be prevented.[1] We stated further that administrators of collections not included in the list could contact the committee for input regarding changes and improvements needed in order to qualify for inclusion in the next list.

We intend to use the list in two ways to promote improved maintenance of collections. The first way can be described as "in-house." We are going to encourage the curators of collections of mammals to use the absence of their collection from the list as a form of leverage to attempt to pry new support and/or positions out of their administrators. In fact, one or more of us may actually make site visits and talk directly to administrators about the deficiencies that exist with regard to their collections and how these deficiencies might be rectified.

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[1] Committee on Systematic Collections of the American Society of Mammalogists, Jerry R. Choate, Chairman. 1975. Collections that meet minimal standards. J. Mammalogy, 56 (1): 293-295.

The second way in which we intend to promote improved maintenance of collections is referred to as the "outhouse" method. Reprints of the list of collections that meet minimal standards will be sent to selected federal, state, and private funding agencies together with a recommendation that these agencies require all voucher specimens collected using their funds be deposited only in one of the collections that meet minimal standards. Additionally, reprints will be sent to all federal and state agencies that grant collecting permits together with a recommendation that they also require that all research specimens collected under the auspices of those permits be deposited only in the collections that meet minimal standards. Finally, we are going to urge the administrators of zoos, primate centers, and research laboratories to establish the policy of providing for the eventual deposition of their mammals only in the collections that meet minimal standards.

Russell Stevens: I note in reviewing the Botany report,[2] page 46, Table 19, "Backlog..." that one institution will require 65 years to catalog material on hand at its present rate. Are mammal or other vertebrate collections faced with this same dilemma?

Choate: No. There are mammal collections in North America that have a backlog of uncataloged specimens, but not to the extent cited for the botanical collections.

Solem: In molluscs, 73% of the 71 million known specimens are cataloged; the remaining 23% (or 16.3 million specimens) are uncataloged. At some institutions the specimens are coming in at the rate of 2.1%/year while the cataloging rate is only 1.6%/year.

Hurd: In entomology we have found that only 5.5 million specimens have not been cataloged. The current accession rate is 1.5 million per year, and only about half of these specimens are cataloged.

Black: Are any other disciplines considering taking steps similar to those implemented by the mammalogists?

Mary Clench: In ornithology we have thought of developing collection standards, but we are so controlled by the Federal and State laws that we have felt it inappropriate at this time. The collections receive ample policy from Federal agencies, such as the Bureau of Sport Fisheries and Wildlife.

Choate: However, the laws require depositing bird specimens in a "public" collection, not necessarily a good public collection.

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[2] Advisory Committee for Systematic Resources in Botany, of the Section for American Systematics Collections of the American Society of Plant Taxonomists. 1974. Systematic resources in America. Part I. Survey and preliminary ranking. New York Botanical Garden: New York. i-v + 88 pp.

## EVALUATION OF NSF SUPPORTED COLLECTIONS

EDITORS' NOTE: The National Science Foundation has provided support for systematic collections as tools in research. Twelve such collections have received support for three or more years. When this program was initiated, the National Science Board charged the program with evaluating its effectiveness in three years. The proposed criteria for evaluating these collections are: the development of the facilities; the continuing commitment of the institution; the acquisition policies; curatorial procedures; status of collection-related data; and how the collection is being used for scientific and societal purposes.

Reed Rollins: The Foundation's goal in supporting these collections was to bring them up to a state of excellence, yet the evaluation of these previously supported collections will take into account their general contributions to the public and applied problems. This implies that the Foundation views these collections for more than their value in basic research. What is the basis of the Foundation's actions today?

Sievers: This program [Biological Research Resources Program] can only support collections as tools in research. However, to date the great emphasis on justification for enhanced support for collections has not only been their important role in research in evolutionary biology, but their importance to society.

The Steere Report[3], Post Report[4], Belmont Report[5], and the National Plan[6] all make a strong point for the value of these collections in serving the public. The Foundation is now requesting specific information as to how these are used in this area.

The data provided by the professional society surveys might document the applied uses of collections, but I am not sure that it is being

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[3]Conference of Directors of Systematics Collections. 1971. The systematic biology collections of the United States: An essential resource. Part I--The great collections: Their nature, importance, condition and future. New York Botanical Garden, New York. 33 pp.

[4]Panel on Systematics and Taxonomy of the Federal Council for Science and Technology, Office of Science and Technology, Executive Office of the President. 1969. Systematic biology: A survey of federal programs and needs. Washington, D.C. 106 pp.

[5]The American Association of Museums. 1968. America's museums: The Belmont report. Washington, D.C. 81 pp.

[6]Irwin, H.S., Payne, W.W., Bates, D.M. and Humphrey, P.S. 1973. America's Systematics Collections: A National Plan. Association of Systematics Collections, Lawrence, Ks. xiii + 63 pp.

used correctly. Maybe this information isn't available; I don't know. However, from what I know today, I don't think collections are used to a great extent in these applied areas.

Black: I agree, insofar as direct use of existing collections is concerned; however, today collection managers are faced with enormous problems resulting from the deposition of specimens acquired through environmental impact studies. These studies are in the public interest, and the collections, while providing a service, are inheriting major problems as a consequence.

Sievers: The Biological Research Resources Program is not the only umbrella in the federal government that supports collections. Our focus must remain on the value of these collections as tools in research in systematic biology. Other federal agencies (EPA, ERDA, HEW and others) should accept the responsibility for supporting the applied aspects of these collections.

Payne: In short, these data are lacking, because we have not taken the time nor developed adequate systems to collect them. It is clear that a popular manual on the flora of an area will be used by a number of people. But how do you measure this contribution to the public?

## CENTERS FOR RESEARCH ON LIVING ORGANISMS

Ernest Lachner

Chairman, ASIH Advisory Committee For the

Development of a National Plan for Ichthyology

Speaking as coordinator of the Advisory Committee for Systematics Resources in Ichthyology, we have found that a major area in collection-related research has been completely ignored--the need for facilities to study live organisms. My comments today are primarily in support of facilities for live aquatic organisms. Research facilities for live aquatic organisms, and in particular fishes, would be of extreme value. There are no adequate existing facilities for comprehensive studies of living fishes. Seaquaria, aquaria, and oceanaria are largely exhibit or profit oriented. Researchers in ornithology, mammalogy and herpetology make good use of zoos. Botanists have arboreta. The culture organisms used by entomologists require relatively small places and insect reproduction cycles are generally short.

Centers for living aquatic organisms would have a combined function. They could support studies of comparative behavior, ecology, genetics, pathology, comparative physiology, and community ecology. Also, basic studies on community structure, competittion, territoriality, and communication could only be initiated in such a facility.

These centers would provide facilities for field and laboratory work; with such facilities one could simulate or alter natural environments (both physically and chemically). In short, we need facilities with the scope and strength to support long-term studies on living aquatic organisms.

Ornduff: I think the ASC should expand its emphases to include extant collections of living organisms. There is one such collection represented in the ASC membership (the American Type Culture Collection) but there are many more. The University of Indiana has a very large and valuable collection of living algae and there are numerous botanical gardens that could qualify for membership.

Irwin: I agree, but the major problem is the lack of documentation associated with the specimens. Without such documentation, the specimens are not of much value in research and further, the institution would not qualify for membership in the ASC.

## INSTITUTIONAL IMPLEMENTATION OF ELECTRONIC DATA PROCESSING

Robert G. Chenhall

Chairman, Museum Data Bank Committee

The discussion of "institutional implementation" vis-a-vis "discipline-oriented implementation" of EDP cannot be debated. These are simply two viable approaches to solving a problem and the one most appropriate to one set of circumstances would not necessarily be adequate elsewhere. The beginning point should be a discussion of what is meant by EDP.

Actually, EDP is not the term to use. What really is meant is Electronic Cataloging of Collections: Data banks or information systems applied to the control of data about collections.

Data banks have two distinct facets: (1) the computer system--the package of computer programs (SELGEM, GRIPHOS, TAXIR, etc.); and (2) the data--the content of the information to be recorded using the computer system. Much work has now been done on computer systems, but the system alone does not make the data bank. At least an equal amount of time and effort must be also spent on the data.

Working groups such as the ASC Council on Standards are extremely important to the implementation of data bank systems. The work of the Council in establishing standards for minimal data sets and procedures for recording data must be the beginning point. Until such time as standards are developed, discussion of institutional or discipline-oriented implementation is academic. Begin by defining information needs for a particular collection or institution or discipline in terms that are clear, precise and objectively defensible. Once this is done, it is relatively easy to look at alternative ways of meeting those needs and to select the one that does the job most economically.

One of the best examples of what I consider to be the correct procedure is the ISIS (International Species Inventory System) data bank, developed for the American Association of Zoological Parks and Aquariums. First, the need was clearly expressed: "inability to acquire new specimens from

foreign countries has forced U.S. zoos to learn the location of all potentially breedable specimens within this country." This particular need dictated a centralized data bank, and the computer system was developed accordingly. In another situation, the information needs might be quite different from the ISIS need, and a different computer system would be more appropriate.

As a general rule, it is more efficient (i.e., less expensive) to implement computerized data banks on a local or institutional level unless there is some compelling reason to establish a centralized or discipline-oriented system. Set the standards rationally, but let them be implemented locally unless there is a national need that demands an inter-institutional system.

Clench: Do you think a hand written catalog is better than a computerized catalog at finding where things are in a collection?

Chenhall: To answer that, one has to know how many specimens are involved, how many people will be using it, and what field we are talking about.

In reference to the mammalogists, there are probably only three or four hundred individuals who are going to benefit from a computerized catalog. I don't think this justifies the expense required to create a centralized data system.

Lachner: In mammalogy and ornithology the base-line information on most species is already available, while in ichthyology and botany there is considerable information that has yet to be collected. I think that it would be a waste of money to computerize data on ichthyology collections. At the present time we are trying to catalog all new accessions on the computer system at the USNM [=SELGEM]. We are barely able to keep up. Three or four years ago we used a flexowriter to produce a card catalog. The cost was much less than it is today. Further, the ASC Newsletter carried an article on the computer activites in the USNM Division of Ichthyology [see Vol. II(1): p. 13, Table 1]. As a result we received a request for a print-out on the fishes of Missouri. This could not be done. We are only cataloging material that is currently being accessioned.

Also we are required to work with both systems now; the old and new. All inquiries must be checked in two different catalog systems.

Chenhall: You are getting at a very important point: the value of an EDP system is ultimately determined in economic terms. You cannot start with the assumption we are going to have an EDP system; you have first to study the needs of those who use the collections, and develop a system to fulfill these needs--and it may not be an EDP system.

# DISCIPLINE-ORIENTED IMPLEMENTATION OF ELECTRONIC DATA PROCESSING: *THE TAXON APPROACH*

Stanwyn Shetler
Chairman, ASC Council on Systematics Collections and Environmental Quality

In the Flora North America (FNA) project, the distinction between the computer programs and the data was clearly made from the outset. There is no point in looking at a computer until you first know what kind of data you are planning to accumulate. Another important consideration is whether the necessary resources to accumulate the data are available. It is clear from our experience, that in preparing a data base the intellectual rigor and the processing steps required to produce a computer file are exactly the same as for a book.

When these necessary conditions are met, the key question is what is the basic unit for the system? The specimen could be the basic unit or the taxon could serve as the basic unit. Geographic location also could serve as the basic unit.

Looking at the data needs, visualize a matrix, the columns being specimens and the rows species. There are two ways to proceed in building up a data base. One is to proceed with a particular species and get all data possible on all the specimens of that species. This is the institutional or museums approach, because repositories of collections are concerned about specimen data. The other approach is to take a shallow sampling of specimens over a large scope of species. This is the disciplinary approach, because synthesis of data by taxa across specimens is the concern of the specialist.

For ASC, the question at the level of institutions and advisory committees is: "Should resources be concentrated on accumulating all data from all specimens in a particular institution, or should the resources be concentrated on a particular group of organisms across the range of institutions?"

The Flora North America system is based on the taxon as basic unit. The core of this system is a taxon data bank--a taxon-by-taxon cataloging of information. This may be viewed as one file even if it comprises many files. "Authority files" govern the data that go into the taxon data bank. For example, an authority file on morphological terminology provides 28,000 possible combinations of terms governing the kinds of character descriptions that go into the taxon data bank. A third file category of documentary files allows for the storage of supporting data such as specimen-related data. The lines between the "authority" and "documentary" files are not sharp.

Finally, the data bank also must include something about the people who do the work: "Who are they? Where do they live? What are their specialties?

What do they want to do?" We, therefore, developed an authority file of specialists that would permit us to address these questions.

## DISCIPLINE-ORIENTED IMPLEMENTATION OF ELECTRONIC DATA PROCESSING: *THE SPECIMEN APPROACH*

Sydney Anderson
Co-Chairman, Advisory Committee for
Systematic Resources in Mammalogy

A discipline-oriented advisory group desiring to implement EDP programs must first identify and define the needs and priorities of the workers within that discipline. The Committee also can coordinate and expedite communication between the practitioners in that discipline. The types of institutional forums that must be developed to implement specific proposals remains to be seen. Obviously many things are best done through the local institution; however, the Committee can also stimulate interest and commitment at an inter-institutional level.

The Advisory Committee in Mammalogy was made up of two previously established standing committees of the American Society of Mammalogists; one on Systematics Collections, and one on Information Retrieval. These committees will continue as standing committees of the Society. One of the priorities identified by the advisory committee was a need for information and data specifically related to collections. In response to this, the committee proposed to develop a computer retrieval system that would meet this need at a minimal level. We therefore tried to identify those data elements that were of highest priority and the greatest utility to the most people--not just systematists, but all users of collections.

It is important to remember that we are really interested in information about animals and not just specimens or collections--appearances to the contrary. Therefore, the collections, publications and specialists are all very important sources of information. Furthermore, society-at-large serves as our real clientele and it is with this information that we can help them understand the universe in which they live.

Inger: Who are we creating data banks for?

Humphrey: At KU the initial focus has been on the staff and students in the museums, and associated professionals. In the long run we hope the system will be used by a greater number of people.

However, part of our problem is that a lot of institutions are still struggling to get a system started. But this in itself will lead to greater understanding of what we are trying to do.

Black: Yet the larger question remains: Whom do we serve? The products we prepare may be in the form of a monograph or an electronically generated data base. The computer, being a tool, can serve as a means for developing some of these products. However, this means that we need a common lauguage so that we can communicate between institutions and disciplines. This requires the adoption of mutually acceptable standards.

The primary function of a computer is to save time.

Humphrey: Also, use of an EDP catalog system has vastly improved the quality and credibility of the data. The data are available to anyone, once they are computerized and this enhances the honesty of the scientific enterprise.

Chenhall: While I am sure that my comments have been interpreted as being very negative with respect to EDP, let me assure you that has not been my intention. What I am trying to say is that, before you develop a system, make sure it is going to be used.

Clench: There are two basic reasons for developing a computerized catalog in mammalogy: first, as a group, the mammalogists are an important resource in basic research in science (which the National Science Foundation has a responsibility for supporting); and two, they are also of extreme importance to environmental assessment work. That leads me to another question: Who has the responsibility for supporting these catalog systems? Who is going to hire this new crop of "sub-systematists?"

And lastly, having used some existing catalog systems (Harvard, U.S. National Museum, American Museum of Natural History), I feel that there is a great need for an improved system.

Choate: We are addressing two issues. The first kind of EDP activity is managerial, and its purpose is to serve in a particular discipline at a particular institution. The second is service-oriented for traditional as well as non-traditional users. The second system is independent from the first.

## USE OF SYSTEMATICS COLLECTIONS IN ENVIRONMENTAL IMPACT ASSESSMENT

William Osburn

Energy Resources and Development Administration

The National Environmental Policy Act does call for knowledge about plants and animals--you must describe the environment before a change is initiated and discuss whether or not this perturbation will have a significant impact. Federal agencies quite often satisfy this requirement by including species lists of plants and animals in an impact statement. I daresay not one

individual here has looked at a species list in an impact statement that was completely adequate. But who is going to insure that they are adequate? Russell Train has said that the National Environmental Policy Act might not have any teeth and that it would be up to the public to determine its effectiveness. Therefore, you are the ones that have to determine if an environmental impact statement is deficient and challenge it if necessary.

My feeling is that this group has to establish guidelines for the citation of animals and plants in environmental impact statements. Do you document each group of organisms that you list with voucher specimens? Are authoritative identifications of species required? Is a site-visit mandatory? I think these should be mandatory.

Today there is much emphasis on indicator species in biological monitoring. Therefore, if you are doing biological monitoring you must know very precisely what organisms you are dealing with. Taxonomists definitely have something that is needed by those agencies dealing with environmental impact statements. As long as an agency can get by with sloppy species lists, they're going to--it's much cheaper. Stop philosophizing; state your position in publications, and start challenging environmental impact statements. You are the authorities and you are the ones who should be challenging the contents of impact statements.

Humphrey: In a practical sense, how does one challenge an impact statement?

Osburn: By monitoring the Federal Register, which lists those statements that have been prepared. You should also emphasize those impact statements in your region. Then write the sponsoring agency and get a copy. Usually preliminary impact statements are circulated for review, and a time limit is stipulated in which you can respond.

You will not stop a project by challenging the use of a common or scientific name. But, as a result, the quality of the reports will improve in time.

Also you can communicate directly with CEQ, suggesting a revision of their guidelines. Similar inquiries could be made directly to other agencies.

Dickinson: Some time ago I asked the Corps of Engineers to be placed on their mailing list for projects being considered in Florida. We received five or six outlines for such projects and these were circulated among the curators for comments. The comments were summarized and returned. In most cases the criticisms were rather extensive. Shortly thereafter the district engineer wrote me asking how we got on the mailing list. I responded by telling him by written request. We have received no more communications from the Corps. They solved their problem very easily.

Black: We (Texas Tech) had a very good experience with the Bureau of Outdoor Recreation. A criticism of a project led to their granting us a contract to do a proper environmental assessment for the project.

Inger: The Institute of Ecology has a Ford Foundation Grant to evaluate environmental impact statements. The objective was to improve the quality of those reports by providing federal agencies with a demonstration of their weaknesses.

Choate: In reference to the Inter-Agency meeting in November, you indicated that ERDA would be willing to support a contract for at least some of what has been discussed today. What is the general feeling today regarding this support?

Osburn: In view of the country's increasing needs for energy, and the relationship between energy and the environment, I think there is a great need to support a test and demonstration project now. This kind of project has been delayed year after year, and it is time to get it going.

Irwin: What is being done in the way of follow-up monitoring after a construction project is completed?

Osburn: At the present, very little. That is a major flaw in the National Environmental Policy Act. Without such monitoring, there is little proof, one way or the other, whether the predictions cited in an impact statement are borne out.

SESSIONS III and IV

PROBLEMS AND RESOLUTIONS FOR ACTION

E. Leland Webber

Treasurer, Association of Systematics Collections

Craig C. Black

Chairman, ASC Council on Standards for Systematics Collections

## A. Communication

While the term "systematics collections community" was used throughout the Workshop, this "community" is not well defined. Rather, it is a loose-knit group of individuals, institutions, and professional organizations with a common interest in systematics collections. While a number of common issues affect the various elements of this community, there are no formally established mechanisms for jointly addressing them; however, the ASC Councils, if supported, could provide this mechanism.

Further, there are no defined mechanisms for professional societies to communicate with the directors of the institutions housing systematics collections. Professional societies (or their Advisory Committees) have a responsibility for communicating advances in research in the disciplines that use the collections. Nevertheless, institutions have the full responsibility for the continued support and development of collections. In the last three years, the Association of Systematics Collections has established itself as the primary representative of institutions maintaining collections, yet there are no formal mechanisms whereby professional societies can communicate with the ASC, its Councils, or each other. As a consequence of the interactions between the administrators of collections and Advisory Committee chairmen in addressing mutual problems for the first time, mechanisms were developed to assure ongoing communications and sound working relationships between these two groups.

In response to these problems, Workshop participants drafted and considered three resolutions. All three resolutions were unanimously approved by the participants.

*RESOLUTION #1*

*WHEREAS, a more formal, long-term interaction is desired among the Association of Systematics Collections, its Councils, and the various professional society advisory committees,*

*BE IT RESOLVED THAT THIS WORKSHOP RECOMMEND THAT:*

*The Board of Directors of the Association of Systematics Collections draft an appropriate amendment to the Association's By-Laws to establish a category of membership for biological societies.*

*RESOLUTION #2*

*WHEREAS, it has been stated that the Advisory Committees of the several professional societies should engage in planning and coordination related to the collections; and*

*WHEREAS, these functions are also concerns of the Association of Systematics Collections (ASC) and the Association's member institutions; and*

*WHEREAS, it is important that there be close coordination between the several advisory committees on the one hand and the ASC-sponsored Council on National Systematics Collections Resources on the other:*

*BE IT RESOLVED THAT THIS WORKSHOP RECOMMEND THAT:*

*The Board of Directors of the Association of Systematics Collections (ASC) move to ensure that the ASC Councils include, within their membership, a number of the Chairmen or members of professional society Advisory Committees.*

*RESOLUTION #3*

*BE IT RESOLVED THAT THIS WORKSHOP RECOMMEND THAT:*

*The Association of Systematics Collections (ASC) assist in the publication and communication of the results of studies by professional society Advisory Committees and develop data on distribution requirements that advisory committees can use when preparing to publish their reports.*

NOTE: In response to these resolutions, the following actions have been taken:

The ASC amended its By-Laws to provide a membership category for professional societies with a commitment to systematics collections. By allowing the membership of these professional societies as well as institutions maintaining biological collections, it is expected that a more formal relationship and better communications between the Association and the various Advisory Committees and the professional societies they represent will result.

The membership of the ASC Councils has been reviewed by the ASC Board of Directors with careful attention paid to ensuring that membership on each Council includes representatives of as many professional society Advisory Committees as possible. As a result, appropriate appointments to serve as Council members for 1976 have been (or are being) made.

The ASC provided financial assistance to the Council for Systematic Malacology for publication of a report on North American malacological resources in October, 1975. Also, a complete library of Advisory Committee reports has been developed by the ASC. A complete bibliography of these reports was published in the ASC Newsletter [Vol. III(4): Special Insert; October, 1975] with an order form. Since the notice was published the ASC has filled 33 requests for copies of reports. This is an example of a pivotal and inexpensive role that can be filled by the ASC--communications. The publication of the bibliography of Advisory Committee reports brought together for the first time this information which can be of importance to both the users and managers of collections.

As resources permit, the ASC will continue to provide clerical, editorial, and financial assistance in the publication of such reports for the various Advisory Committees, with priority given to instances where such assistance is essential to publication (i.e., no other resources are available).

## B. Education

About half of the institutions maintaining systematics collections represented in the ASC are affiliated with universities. These collections are first charged with supporting the educational goals of their universities, generally in systematic biology. Those collections not affiliated with universities nevertheless depend on students of the university-related collections for new curators and technical staff. Therefore, concern was expressed over the decline in support for graduate students in systematic biology over the past three years. Today there is a need for highly qualified personnel in systematic biology, and this need is going to increase in the future.

Systematics collections in state-supported universities with declining enrollments (and budget cutbacks) must be justified, first in terms of the educational program of the university, and second by providing public education programs for primary students, secondary students, and adults.

Further, in relation to finding new applications for collections (and hence, new sources of support), specific training programs are needed for specialized personnel to work in environmental assessment and impact studies. While most universities now see a need to relate basic research to practical applications, graduate programs have not changed significantly. Training programs for graduate students in systematics are not broad enough to enable the students to respond to changing societal demands--students in systematic biology are a very specialized resource.

One resolution was considered (and unanimously adopted) in relation to this topic area.

*RESOLUTION #4*

*The Board of Directors of the Association of Systematics Collections will initiate the establishment of an ASC-sponsored Council on Education to address the role of systematics collections in relation to both technical training and education in biology. This Council should consider all aspects of the field, including elementary, undergraduate, graduate and continuing education in all appropriate biological, technical and recreational areas.*

NOTE: This resolution was considered by the ASC at its 3rd Annual Meeting (May 1975). As a result, an inter-disciplinary Council was established. It is expected that the Council will begin its work during 1976.

## C. Collection Growth

A major problem facing systematics collections is that of collection growth. Many collections have a tremendous backlog of uncataloged specimens. To a great extent this uncontrolled growth has come about from federal support of research projects. In the past, research grants have not provided support for the long-term maintenance of specimens collected during the course of the research, yet the institutions are obligated to add the specimens to their collections and provide for their continued maintenance. Systematics collections have established a precedent that implies that our major concern is the acquisition of more specimens and not continued or enhanced maintenance of existing collections. Also, proprietary behavior on the part of curators has contributed to the problem of uncontrolled collection growth.

To further add to this problem, several collections have more specimens than they need (or can afford to maintain) from a few areas, yet thousands of species and populations are not represented at all in collections. To remedy this situation represents a very expensive undertaking. Also, a view was expressed that criteria must be developed for eliminating specimens and/or entire collections; a more critical evaluation of the need for, or quality of, specimens must be used before specimens are accessioned. The recent financial restrictions now facing collections have forced examination of this problem.

A resolution was considered in relation to collection growth. After extensive debate the resolution was withdrawn from consideration and not approved or disapproved. This resolution identifies an important problem for which the systematics collections community has not identified an adequate solution. The text of the resolution follows:

*RESOLUTION #5*

*WHEREAS, the systematics collections community has available only a finite, limited amount of total resources--in funding, in storage space, in physical facilities, and in personnel; and*

*WHEREAS, systematics institutions have little control of the input into their collections--collection, identification and deposition have tended to be defined by the motivation of individual collectors and/or the objectives of funding sources;*

*BE IT RESOLVED THAT THIS WORKSHOP RECOMMEND THAT:*

1. *Systematics institutions compress their requirements for resources by eliminating redundancy--storing data on specimens rather than the specimens themselves where appropriate, etc.; and*

2. *The Association of Systematics Collections establish an appropriate working group within the Council on Standards for Systematics Collections to establish criteria for the elimination of specimens and/or entire collections in working toward the ends described.*

## D. Electronic Data Processing Standards

Computer systems for collection cataloging and managementare an area of high interest among the systematics collections community. Systematists realize that existing catalog systems are inadequate to respond to new demands being made on collections and associated personnel, and that electronic data processing (EDP) offers one solution to this problem. However, there is great concern over the cost of implementing EDP systems for collection management and cataloging. If only a small number of people are going to benefit from the implementation of a computer management system, it is not worth the expense of developing such a system. It was also observed that in certain collections there is insufficient base-line information on the specimens in the collections (e.g., identifications, locality data) to justify spending money on a computer management system at this time.

Aside from basic economic considerations, discussion was also directed toward the mechanisms of implementing EDP management systems for systematics collections. The information needs of an institution and/or discipline must be identified before a computer system is developed. Lengthy discussion was devoted to the necessity and difficulty of determining these information needs before beginning to plan an EDP cataloging system. Also, before a computer management system is implemented, exact standards for recording data should be established and agreed to by the curators of the collections used in each discipline.

In summary, while computer management systems may save time and money in the long run, implementation costs and the lack of agreed-upon standards are still the most immediate and basic problems.

A resolution was presented and adopted in regard to Electronic Data Processing and the subsequent need for standards.

*RESOLUTION #6*

*BE IT RESOLVED THAT THIS WORKSHOP RECOMMEND THAT:*

*The ASC Council on Standards for Systematics Collections, in collaboration with the various professional society Advisory Committees, work as rapidly as possible to develop publishable standards for recording specimen-related data in relation to:*

1. *The establishment of institutional catalog systems;*

2. *The establishment of computerized data files with special attention paid to making the data readily available for use in environmental assessment; and*

3. *The establishment of standards for minimal data to be associated with the founding of any new collections and the addition of new material to established collections.*

*Be it further resolved that the Board of Directors of the Association of Systematics Collections prepare a proposal for funding for the activities of the Council on Standards for Systematics Collections to be submitted to appropriate federal agencies.*

NOTE: The ASC Council on Standards for Systematics Collections, as directed by this resolution, published standards for recording specimen-related data in relation to establishment of institutional catalog systems in the ASC Newsletter [Vol. III, (3): Special Insert; August, 1975]. No action has yet been taken on the additional charges to the Council on Standards enumerated in the above resolution, but it is expected that these will form the core for the Council's work during the coming year.

## E. Environmental Assessment

Some participants felt that there is an unbalanced preoccupation with the use of systematics collections (and associated resources) in environmental impact statements as a means to increase financial support for collections. Relatively few institutions can at present contribute to environmental impact work; whereas all systematics collections are committed to education. In the long run, academicians have a greater obligation to their institutions than they do to environmental impact statement contract work. Universities are first charged with educating students--not providing applied services to federal agencies.

However, this view was not shared by all participants. Many perceived a need to increase the quality of environmental impact statements by involving professional systematists and the resources represented by systematics collections in the preparation of such statements. It was further pointed out that if

collections and collection-related resources were used in other environmental quality problems and for the protection of threatened and endangered species (as well as in the preparation of environmental impact statements) then the total support base for systematics would be increased.

With the country's increasing need for energy, and the relationship between energy and the environment being of major importance, there is a great need for systematic and ecological information. There is at present very little monitoring to determine the actual effects of construction activities after an environmental impact statement has been filed. This type of information is essential to developing accurate predictive ecological models.

Further, there are no recognized standards for the use of taxonomic information or systematics resources (collections or personnel) in environmental studies. The development of a protocol for the use of systematics resources in environmental studies will require defining "qualified" personnel and registration of professionals.

If a Registry of Taxonomic Resources and Services was developed without the requirement of adequate standards for taxonomic work, it would be of little use. As long as environmental contracts are awarded to the lowest bidder and no standards for taxonomic work are required, the quality of the work will suffer.

It was also noted that if environmental consulting by individuals associated with institutions maintaining systematics collections becomes common, this could affect institutional policies. Institutional policies in regard to individual consulting should be established and made known.

Two resolutions resulted from consideration of the role of systematics collections in environmental assessment and related work. These two resolutions, both adopted by the participants in the Workshop, are:

*RESOLUTION #7*

*BE IT RESOLVED THAT THIS WORKSHOP RECOMMEND THAT:*

*The Association of Systematics Collections' (ASC's) Council on Systematics Collections and Environmental Quality:*

1. *Develop guidelines for the applied use of systematics collections and skills in the preparation of environmental assessment and monitoring documents;*

2. *Develop mechanisms (registry, etc.) for providing appropriate taxonomic assistance to those agencies responsible for preparing and reviewing environmental assessment and monitoring documents;*

3. *Develop mechanisms for studying and challenging environmental assessment and monitoring documents on the basis of the systematic information they contain in accordance with the guidelines developed in point #1 above; and*

4. *Communicate to the President's Council on Environmental Quality (CEQ) recommended guidelines for the use of systematic information and skills in the preparation of environmental assessment and monitoring documents.*

*RESOLUTION #8*

*WHEREAS, several funding agencies--both at the 25 November Inter-Agency Meeting[7] and in subsequent communication--have expressed the need for a referral system whereby they can learn of the availability of systematic services; and*

*WHEREAS, the systematics collections community, as represented by the Association of Systematics Collections (ASC) and the various disciplinary Advisory Committees, has the unique capability to develop such a referral system; and*

*WHEREAS, no other such assemblage of expertise exists that has this capability;*

*BE IT RESOLVED THAT THIS WORKSHOP RECOMMEND THAT:*

1. *The professional society Advisory Committees be requested to complete disciplinary surveys as soon as possible;*

2. *The Advisory Committees be requested to collaborate closely with the ASC Council on National Systematics Collections Resources in this regard;*

3. *The systematics collections community, as represented at this Workshop, endorses the registry concept for referral of information regarding systematics resources and services; and*

4. *The systematics collections community, acting through the ASC Council on National Systematics Collections Resources, proceed immediately to take steps toward establishment of that referral system.*

NOTE: The charge outlined for the ASC Council on Systematics Collections and Environmental Quality was considered and adopted by the Association at its annual meeting in May, 1975. No concrete products to date have come out of the Council's work in regard to this resolution.

The ASC also considered this resolution at its annual meeting. In relation to point #1 (above), the Advisory Committees for Entomology, Herpetology, Malacology, and Mammalogy have published reports on collection resources within

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[7] A meeting convened by the ASC in collaboration with The President's Council on Environmental Quality (CEQ) and The Institute of Ecology (TIE) to determine the need of federal agencies for taxonomic and ecological services.

their disciplines since the Workshop. Also, the Advisory Committees for Invertebrate Paleontology and Invertebrate Zoology have initiated surveys of collection resources and will be publishing such reports in the coming year. Points #3 and #4 have been accepted by the ASC Council on National Systematics Collections Resources.

Progress toward implementing the referral system for systematics resources and services has been good. Currently, a proposal for support of the computerized registry system has been approved by the Energy Research and Development Administration (ERDA) and the Association has been assured that the proposal has been given a high-priority for funding in 1976. In the meantime, a survey has been published in the ASC Newsletter that has permitted initial qualification of people on the mailing list according to employment, discipline, and area(s) of research specialization.

## F. Financial Support

As indicated by the survey performed prior to the Workshop, and further reinforced by near unanimous comment during the Workshop, perhaps the primary area of concern of institutions maintaining systematics collections is that of declining financial support.

A National Science Foundation (NSF) spokesman noted that current Foundation support for collections is limited to three million dollars per year, with another six million dollars per year devoted to research in systematics. Further, it is likely that the Office of Management and Budget will recommend level funding (or only a modest inflation-related increase) for the NSF over the next few years. There is little chance that the Foundation can increase support to collections. Further, the NSF can only support systematics collections as tools in research.

It was suggested that future research proposals should specifically budget for the maintenance of any specimens collected in the course of such research, either as an indirect cost or a line-item in the budget. Applied studies, such as preparation of environmental impact statements, should also budget for maintenance of any voucher specimens collected. Other federal agencies should accept their obligations to support the applied aspects of collections.

If systematics collections are to garner new sources of financial support, they must first develop new means of interacting with the public either directly or indirectly. At present systematists cannot effectively justify the kinds of interactions they have with the general public or with the broader scientific community.

It was also noted that individuals that prepare lay-oriented publications and checklists were often criticized by their peers within the scientific community. There exists a real need to make systematists themselves aware of their need to provide services to society; perhaps even their obligation to

provide such benefits, since many collections are supported with public funds. In addition to informing the public of what collection-related services can be provided, it is necessary to inform them of those services that collections cannot provide (or what further development is necessary to enable the collections to provide such services). Once information is gathered on the kinds of benefits provided by systematics collections, it needs to be "advertised."

Perhaps the primary reason good data (quantified as opposed to anecdotal) on the contributions of collections to the public are lacking is that adequate systems for collecting and evaluating such data have not been developed.

In recent months Advisory Committees for certain disciplines have provided the NSF with a list of the more important collections in their field. Some felt that it was not realistic to rank collections as to their importance (and the benefits they provide) in all disciplines. For example, all collections of vertebrate fossils are composed of unique specimens. In other disciplines a collection may represent a specialized resource for a particular geographic region or taxonomic group.

One resolution was proposed and considered in relation to financial support and the benefits provided to the public by systematics collections. Furthermore, several of the resolutions presented herein are, in part, a result of the concern expressed for increased financial support.

The following resolution was adopted:

*RESOLUTION #9*

*BE IT RESOLVED THAT THIS WORKSHOP RECOMMEND THAT:*

*A committee of the Board of Directors of the Association of Systematics Collections (ASC) survey the ways in which systematics collections provide benefits to society and develop a roster of these benefits. Further, the committee would define criteria for evaluating the levels of the various benefits identified and list those areas in which the systematics collections community is not able to respond to societal needs. Finally, the committee should recommend how and to whom its report of benefits shall be distributed. These recommendations should take into consideration the roles of other biologically-oriented professional and lay associations and societies.*

NOTE: The above resolution has been considered and discussed by the ASC Board of Directors. The Board agrees that the actions recommended in the above resolution should receive relatively high priority, although as of present, no definitive action on these recommendations has been taken.

## G. The National Academy of Sciences

The desirability and possibility of recognition of the Association of Systematics Collections by the National Academy of Sciences was discussed. While all participants agreed that affiliation with the National Academy of Sciences would be beneficial to the Association, the National Academy did not recognize organizations as a matter of policy. The Academy did, however, have a mechanism for responding to issues presented by organizations.

Three resolutions, representing slight variation on the same theme, were offered, discussed, and subsequently rejected by the participants.

*RESOLUTION #10*

*BE IT RESOLVED THAT THIS WORKSHOP RECOMMEND THAT:*

*The Association of Systematics Collections seek the collaboration of the National Academy of Sciences in identifying appropriate projects of high scientific and societal significance, such as a National Biological Survey, that would merit the active promotion of both the Association of Systematics Collections and the National Academy of Sciences.*

*RESOLUTION #11*

*BE IT RESOLVED THAT THIS WORKSHOP RECOMMEND THAT:*

*The National Academy of Sciences be asked to consider endorsing the efforts of the Association of Systematics Collections and affiliated organizations to implement the National Plan report and the resolutions and recommendations of the Association of Systematics Collections' Workshop of 20-21 March 1975.*

*RESOLUTION #12*

*BE IT RESOLVED THAT THIS WORKSHOP RECOMMEND THAT:*

*The ASC organize a national committee (5-7 persons) to develop and present plans to the National Academy of Sciences that will:*

1. *Enable the Association of Systematics Collections to identify sources of funding for the rehabilitation and maintenance of museum collections required in biological investigations in the United States;*

2. *Lead to the establishment or designation of centers in the United States for the study of living organisms;*

3. *Identify current needs in evolutionary biology of all organisms in order to obtain broad base-line data in the natural sciences; and*

4. *Suggest appropriate projects of high scientific and societal significance, such as a National Biological Survey, that merit the active promotion and pursuance of the Association of Systematics Collections and its components.*

## H. A National Aquatic Research Laboratory

Another area of interest culminated in a resolution calling for the establishment of a National Aquatic Research Laboratory. Today no center for the study of living, aquatic organisms has been established in the United States. Although the topic received considerable discussion, it became apparent that Workshop participants viewed it as marginal to the priorities of the systematics collections community as a whole, and it was subsequently withdrawn by the author. The text of this resolution is included below.

*RESOLUTION #13*

*WHEREAS, experimental studies in systematics, genetics, behavior, physiology and ecology can contribute importantly to our Nation's pressing need for knowledge of fishes and other aquatic organisms; and*

*WHEREAS, there are no adequate laboratory facilities for the study of large aquatic orgamisms or for large-scale studies of aquatic organisms; and*

*WHEREAS, the existing National Aquarium, under the administration of the Department of the Interior, is small and inadequately housed, and therefore, unable to accommodate the educational public exhibits worthy of this Nation's citizens; and*

*WHEREAS, the Smithsonian Institution is the national center for natural history research and exhibitions, now, therefore,*

*BE IT RESOLVED THAT THIS WORKSHOP RECOMMEND THAT:*

*The administration of the Smithsonian Institution be encouraged to confer with officials of the Department of the Interior to initiate the development of a National Aquatic Research Laboratory and Aquarium as a unit under the auspices of the Smithsonian Institution, the Secretary of the Department of the Interior, and the Director of the Fish and Wildlife Service.*

## EDITORIAL SUMMARY

In summary, the Workshop resulted in several major advances toward solution of problems affecting biological collections:

- It provided significant progress toward greater cooperation among the various elements of the systematics collections community. As a result of the Workshop the ASC has moved to accept biological societies as members, further strengthening the relationship between the Association and the Advisory Committees. Also, the memberships of the ASC Councils have either been changed or enlarged to ensure representation of as many systematic disciplines as possible.

- It provided the systematics collections community with an up-to-date assessment of those projects of highest priority to the community at large. These include documenting the contributions of systematics collections to the public and to education as a necessary foundation from which to seek new sources of support for collections. Within the community itself, high priority projects identified during the Workshop included the use of systematics collections and associated resources in environmental assessment, and the promise, problems and costs of electronic data processing for collection cataloging and management. As one product of these discussions, the ASC Council on Standards for Systematics Collections has published standards for specimen-related data. The ASC has also completed a preliminary survey of the needs of private environmental consulting firms for taxonomic data, and submitted a proposal to the Energy Research and Development Administration for establishing a computerized Registry and Directory of Taxonomic Resources.

- The Workshop greatly stimulated thinking within the systematics collections community on alternative sources of support. In the past, support of systematics collections and systematics research has been almost exclusively the domain of the National Science Foundation. However, during the Workshop it was made obvious that to accomplish the objectives of the systematics collections community, NSF support was not sufficient (and was available only to support systematics collections as tools in research). As mentioned above, action was taken to thoroughly document the benefits accruing from systematics collections as a prerequisite to seeking out non-traditional sources of support. In addition, the ASC has recently moved to make other federal operating agencies aware of their need for taxonomic information and services (e.g., the Energy Research and Development Administration proposal mentioned above and liaisons with such groups as the Council on Environmental Quality, The Institute of Ecology, and others).

- The Workshop has given added impetus to the systematics collections community as a whole, as has been especially important in directing the energies and efforts of the Association of Systematics Collections toward those areas identified as most critical. Every resolution submitted and discussed during the Workshop addressed the ASC as the primary group to coordinate and pursue the actions stated. The recognition of the ASC as a means of coordinating projects of the systematics collections community is in itself a major

result of the Workshop and many resolutions defined and clarified organizational relationships within the systematics collections community.

● Lastly, there is evidence that the Workshop has generated considerable optimism and enthusiasm in the systematics collections community. The ultimate value of the Workshop will be borne out in the months ahead as the systematics collections community continues to confront problems discussed during the Workshop.

# APPENDIX I: LIST OF PARTICIPANTS

ALLEN, J. FRANCES; Science Advisory Board, Environmental Protection Agency

ANDERSON, SYDNEY; Mammalogy Advisory Committee

BATES, DAVID; ASC Board of Directors

BLACK, CRAIG C.; ASC Board of Directors; ASC Council on Standards; Invertebrate Paleontology Advisory Committee

CHENHALL, ROBERT; Museum Data Bank Committee

CHOATE, JERRY R.; ASC Council on Resources; Mammalogy Advisory Committee

CLARK, ELOISE; Biological and Medical Sciences, National Science Foundation

CLENCH, MARY H.; Ornithology Advisory Committee

DICKINSON, J. C.; ASC Board of Directors

DOWNS, THEODORE; Society for Systematic Zoology

GRYDER, ROSA; Food and Drug Administration

HUMPHREY, PHILIP S.; ASC Board of Directors

HURD, PAUL D.; Entomology Advisory Committee

INGER, ROBERT F.; The Institute of Ecology

IRWIN, HOWARD S.; ASC Board of Directors

JAMES, FRANCES; General Ecology Program, National Science Foundation

KIER, PORTER; National Museum of Natural History

KRICHEVSKY, MICAH; Culture Collections Advisory Committee

LACHNER, ERNEST; Ichthyology Advisory Committee

LEE, WELTON; Invertebrate Zoology Advisory Committee

LEVI, HERBERT; Arachnology Advisory Committee

OLIVER, WILLIAM; Invertebrate Paleontology Advisory Committee

OLSON, JERRY; Energy Research and Development Administration

ORNDUFF, ROBERT; American Society of Plant Taxonomists

OSBURN, WILLIAM; Energy Research and Development Administration

PAYNE, WILLARD; Botany Advisory Committee

PRITCHARD, MARY; Parasitology Advisory Committee

ROLLINS, REED C.; ASC Board of Directors

LIST OF PARTICIPANTS (Continued)

SCHULTZ, R. JACK; Systematic Biology Program, National Science Foundation

SHETLER, STANWYN; ASC Council on Environmental Quality

SIEVERS, WILLIAM; Biological Research Resources Program, National Science Foundation

SOLEM, ALAN; Malacology Advisory Committee

STEVENS, RUSSELL; National Research Council

WEBBER, E. LELAND; ASC Board of Directors

ZWEIFEL, RICHARD; Herpetology Advisory Committee

# APPENDIX II: SUMMARY OF PRELIMINARY QUESTIONNAIRE TO ASC MEMBER INSTITUTIONS AND ADVISORY COMMITTEES

## PART 1: QUESTIONNAIRE FOR INSTITUTIONAL REPRESENTATIVES

### Methodology

Questionnaires were sent to the 56 institutional representatives of the ASC Member Institutions in January 1975. Due to local variations in institutional administrative situations, certain of these institutions provided more than one set of responses to the questionnaire. A total of 65 responses to the questionnaire were received representing 49 institutions.

All respondents did not answer all questions. Therefore, the number of respondents (N) is given for each question. Certain questions required an opinion or a listing. In such cases, the general theme of the most commonly cited responses are listed in order of frequency of reference. The number of respondents listing any particular response is listed in parentheses where appropriate.

### Breakdown of Respondents by Funding Source

| | |
|---|---|
| State Universities | 50% |
| Private or Non-University Institutions | 20% |
| Private Universities | 11% |
| Federal Government | 3% |
| State or Provincial Government | 7% |
| City Government | 7% |
| County Government | 2% |

# RESULTS

## QUESTIONNAIRE FOR INSTITUTIONAL REPRESENTATIVES

### II. Collection Information

A. *Can you quickly (with a single reference) provide current information on the following characteristics of all or some of your collections?*

| | Yes, all | Yes, some | No | N |
|---|---|---|---|---|
| 1. Collection size: | | | | |
| a. No. of specimens | 46% | 39% | 15% | 65 |
| b. No. of lots | 30% | 42% | 28% | 54 |
| 2. Number of specimens cataloged last year | 59% | 21% | 20% | 65 |
| 3. Number of collections accessioned last year | 63% | 25% | 12% | 65 |
| 4. Taxonomic diversity (% of form in group) | 26% | 23% | 51% | 65 |
| 5. Number of loans (last year) | 80% | -- | 20% | 65 |

B. *In the event that you were authorized funds for renovation, expansion or construction of collection-related facilities, what sources of information would you consult in planning for the provision of:*

1. *Storage Equipment?*

| | |
|---|---|
| Other appropriate institutions | 21 |
| Equipment suppliers/catalogs | 16 |
| Own staff/in-house expertise | 14 |
| No answer | 12 |

2. *Storage and preparation facilities?*

| | |
|---|---|
| Own staff/in-house expertise | 17 |
| Other appropriate institutions | 13 |
| Equipment suppliers | 8 |
| Architects | 4 |
| No answer | 13 |

3. *Research facilities?*

| | |
|---|---|
| Own staff/in-house expertise | 25 |
| Other appropriate institutions | 18 |
| Architects/consultants | 5 |
| No answer | 11 |

C. *Does your institution have a stated goal or goals for:*

1. *Use of the collections?* Yes: 57%; No: 43% N = 65
2. *Development of collections in the future?* Yes: 51%; No: 49% N = 65

## III. Collection Standards

A. *Does your institution have stated standards pertaining to:*

1. *Acquisition of new specimens?* Yes: 40%; No: 60% N = 64
2. *Collection growth?* Yes: 30%; No: 70% N = 64
3. *Maintenance of collections?* Yes: 42%; No: 58% N = 64

B. *Who makes the decision as to whether or not new specimens are accessioned?*

| | |
|---|---|
| Curator | 71% |
| Director | 3% |
| Director and Curator | 17% |
| No answer | 9% |

N = 65

C. *Do you foresee a time when you will no longer be able to accession new specimens due to lack of storage space?* Yes: 75%; No: 25% N = 65

1. *If yes, when?*

| | |
|---|---|
| Unknown | 16% |
| Now | 16% |
| 1-5 Years | 41% |
| 5-10 Years | 14% |
| 10-20 Years | 13% |

N = 49

2. *If no, why not?*

| | |
|---|---|
| Unknown | 25% |
| "Optimism" | 19% |
| New Building | 25% |
| Space Available | 31% |

N = 16

D. *Does your institution have stated standards governing the data maintained on cataloged specimens?*

Yes: 45%; No: 26%; Qualified No:* 23%; No answer: 6% N = 65

1. *If yes, how are these data maintained?*

| | w/stated standards |
|---|---|
| a. Numerical catalog | 82% |
| b. Taxonomic catalog or file | 91% |
| c. Geographic catalog or file | 59% |
| d. Computer-based file | 41% |
| e. Other: Field notes, accession cards, host file, label | 24% |

*Within an institution one or more collections may have stated standards, but as an "institution," no standards are recognized.

**The percentages are based on the total number of data systems used; most institutions utilize more than one data management system.

*D. Does your institution have stated standards governing the data maintained on cataloged specimens? (Continued)*

2. *If no, how are these data maintained?***

| | w/o stated standards |
|---|---|
| a. Numerical catalog | 57% |
| b. Taxonomic catalog or file | 57% |
| c. Geographic catalog or file | 20% |
| d. Computer-based file | 13% |
| e. Other: Accession cards | 3% |

## IV. Collection Resources

*A. What resources are most urgently needed by your institution for optimal use of your collections? (Ranked as to priority)*

NOTE: Responses within each priority are ordered as to frequency.

| | Frequency | Frequency as a % of N |
|---|---|---|
| 1st Priority N = 46 | | |
| 1. Technical Staff | 24 | 52% |
| 2. Curators | 10 | 22% |
| 3. Laboratory Space | 7 | 15% |
| 4. Administrative Support | 5 | 11% |
| 2nd Priority N = 42 | | |
| 1. Part-time Hourly | 9 | 21% |
| 2. Storage Containers | 8 | 19% |
| 2. Curators | 8 | 19% |
| 3. Technical Staff | 7 | 17% |
| 4. Laboratory Space | 5 | 12% |
| 4. Administrative Support | 5 | 12% |
| 3rd Priority N = 34 | | |
| 1. Storage Containers | 11 | 32% |
| 2. Exhibition Space | 7 | 20% |
| 3. Curators | 6 | 18% |
| 3. Laboratory Space | 6 | 18% |
| 4. Part-time Hourly | 4 | 12% |

**The percentages are based on the total number of data systems used; most institutions utilize more than one data management system.

B. *In reference to the goal(s) for future collection development, what resources would you require to insure realization of your first-listed or principal goal within the next five years?*

| | | Frequency | Frequency as a % of N |
|---|---|---|---|
| | 1st Priority N = 30 | | |
| 1. | Technical Staff | 14 | 47% |
| 2. | Curators | 11 | 37% |
| 3. | Laboratory Space | 5 | 16% |
| | 2nd Priority N = 22 | | |
| 1. | Technical Staff | 10 | 45% |
| 2. | Curators | 8 | 37% |
| 3. | Laboratory Space | 4 | 18% |
| | 3rd Priority N = 19 | | |
| 1. | Storage Containers/Shelving | 9 | 47% |
| 2. | Laboratory Space | 6 | 32% |
| 3. | Curators | 4 | 21% |

C. *Does your institution support an active research program in conjunction with the collections?*

Yes: 85%; No: 4%; No answer: 11% N = 65

*If yes, what is your primary source of support for this program?*

N = 94*

| | | Frequency | Frequency as a % of N |
|---|---|---|---|
| 1. | Federal | 28 | 30% |
| 2. | Private foundations | 21 | 22% |
| 3. | State (Provincial), County Support | 19 | 20% |
| 4. | Institutional Budget | 15 | 16% |
| 5. | Miscellaneous | 11 | 12% |

*Many respondents listed more than one source of support.

*If no, why?*

Lack of local administrative recognition of the value of research; Tax dollars cannot be used to support a University museum--by law.

## V. Collection Management

A. *Has your institution adopted a policy that insures appropriate recognition of curatorial activities as an important factor in tenure and/or promotion decisions?*

Yes: 48%; No: 40%; Don't Know: 3%; No Answer: 9% N = 65

A. *Has your institution adopted a policy that insures appropriate recognition of curatorial activities as an important factor in tenure and/or promotion decisions? (Continued)*

1. *If yes, how is this evaluated?*

   Generally by an annual review or evaluation; 53% of the respondents in this category were from universities.

2. *If no, why?*

   Tenure is a status acquired as a result of academic activities; 87% of the respondents in this category were from universities.

B. *Are the curators in your institution involved in the decision-making process in matters pertaining to the collections?* N = 65

   Yes: 85%; No (qualified): 2%; Not applicable: 3%; No answer: 10%

   *If yes, how?*

   --formal curator or staff meetings
   --informal communications
   --committee activities

C. *How are good communications maintained between the departments to insure equitable support for all collections?*

| | | |
|---|---|---|
| Have a systematics collections committee | 18% | |
| Have no mechanism | 16% | |
| Not applicable or no answer | 34% | N = 65 |
| Answers not appropriate to question | 32% | |

D. *In your institution, are there special funds identified for support of the collections?*

   Yes: 72%; No: 23%; Some: 5% N = 65

1. *If yes, a) how are these funds appropriated?*

   --line item in budget/direct appropriation
   --chairman/director allocates

   *b) how are these funds allocated to the various collections within your institution?*

   --director/chairman makes decision

2. *If no, how are funds allocated for support of your collections?*

   --departmental (university) budget
   --grants

*E. Electronic data processing (EDP) has been recommended for managing collection-related data. Is implementation of such a project feasible at your institution?*

Yes: 51%; Qualified Yes: 14%; No: 29%; No Answer: 6% N = 65

1. *If yes, what procedures are you (or will you be) following to implement EDP?*

Yes--SELGEM was referenced by ten (10) respondents and various other systems were referenced by ten (10) respondents.

Qualified Yes--given increased funding and more personnel.

2. *If no, why?*

--lack of funds
--lack of qualified personnel

*F. What benefits do you foresee accruing from the implementation of such an EDP program?*

--enhances value and potential use of collection-related data
--provides a number of collection-management benefits
--will permit increased coordination between institutions

*G. What problems do you foresee resulting from the implementation of such an EDP program?*

--increased costs
--increased time commitments
--increased needs for storage space
--inter-institutional incompatibility
--"competitive exclusion," personnel will be replaced by machines; budgets will be changed to support the EDP programs at the expense of the collections

## VI. Collection Support

*A. In reference to the on-going projects that depend on systematics collections (research, graduate education, public education, exhibits, etc.) supported by your institution, what is the area that is in greatest need of extramural financial support?*

a) collection-related facilities and support
b) research
c) graduate education
d) public education and exhibits

1. *How much money is needed?*

With new construction: Total \$46,949,600 ($\bar{x}$ = \$1,235.500; N = 38)
Without construction: Total \$18,046,824 ($\bar{x}$ = \$474,918; N = 38)

*How long do you anticipate the need continuing for outside support?*

$\bar{x}$ = 7 years

B. *If applicable, has your institution operated on a deficit during the past year?*

Yes: 14%; No: 77%; No Answer (all universities): 9% N = 65

1. *If yes, how much (both dollar amount and approximate percentage of total operating budget)?*

$10,000 - $3,000,000; 0.9% - 26% of operating budget
(N - 9; 6 private non-universities; 3 state institutions)

2. *Why has your institution operated on a deficit?*

Generally due to increased costs (inflation) and decreased income.

C. *Has your institution received support from a federal agency for the maintenance or development of one or more of your collections?*

Yes: 34%; No: 55%; No Answer: 11% N = 65

1. *If yes, from whom?*

a. 17 have received support from NSF
b. 4 from other sources

2. *If no, have you applied for support in the past and been turned down?*

Yes: 33%; No: 67% N = 36

3. *To whom?*

NSF

D. *In general, would you say that funding agencies are aware of the activities and financial needs of the systematics collections of your institution?*

Yes: 38%; No: 51%; No Answer: 11% N = 65

1. *If yes, how have you communicated this information?*

a) site visits, grant progress reports, grant applications
b) personal communications
c) ASC

2. *If no, why?*

Generally a lack of knowledge of sources of funds, and mechanisms for making application.

## VII. Scientific and Educational Services

A. *During the past year, which of the following services have been provided to individuals or organizations outside of your institutions?* N = 65

| | YES | NO | NO ANSWER |
|---|---|---|---|
| 1. Identification services | 92% | -- | 8% |
| 2. Storage or repository services | 77% | 17% | 6% |
| 3. Taxon-related informational services (e.g., do skinks carry rabies?) | 92% | -- | 8% |
| 4. Specimen-related data storage, management and retrieval (e.g., how many genera of amphibians from Oaxaca, Mexico are represented in your collections?) | 77% | -- | 23% |
| 5. Preservation or conservation services | 72% | 23% | 5% |
| 6. Fumigation or pest control services | 46% | 48% | 6% |
| 7. Field collection of specimens | 68% | 23% | 9% |
| 8. Training services | 68% | 25% | 7% |
| 9. Ecological consulting services | 75% | 17% | 8% |

B. *If available, attach appropriate institutional fee schedules for each of the services listed above.*

a) 1 institution cited $10.00/hr for identification services
b) 1 institution cited $25.00/hr and a second $80.00/hr for services; a third cited $300.00/day.

C. *Does your institution (museum/systematics collections) have a stated policy regarding the provision of consulting services?*

Yes:* 18%; NO:** 72%; No Answer: 10% N = 75

*7 non-university museums
**covered by university regulations, but not stated, per se

D. *Does your institution (museum/systematics collections) provide educational services to special groups (i.e., public school classes, special interest groups) in your community?*

Yes: 80%; No: 11%; No Answer: 9% N = 65

## VIII. Legal Problems

A. *Has your institution faced any legal problems pertaining to the use, maintenance or development of your collections in the past two years?*

Yes: 11%; No: 80%; No Answer: 9% N = 65

*If yes, please describe briefly.*

a) problems in securing permits in general
b) problems in importation of specimens (live and preserved)
c) problems in acquisition of threatened and/or endangered species
d) problems in legal ownership of collections

B. *What sources (U.S. only) would you consult in regard to the legal aspects of:*

| | Frequency |
|---|---|
| 1. *Importation of live specimens?* | |
| a. U.S. Department of Interior | 20 |
| b. U.S. Department of Agriculture | 19 |
| c. U.S. Public Health | 3 |
| d. U.S. Customs Office | 4 |
| e. Miscellaneous (embassy, authorities in country of origin, local officials) | 7 |
| f. Not applicable/no answer | 3 |
| 2. *Importation of preserved specimens?* | |
| a. U.S. Department of Interior | 16 |
| b. U.S. Department of Agriculture | 13 |
| c. U.S. Customs Office | 6 |
| d. U.S. Public Health | 1 |
| e. U.S. Department of Commerce (National Marine Fisheries Service) | 1 |
| f. U.S. Postal Service | 2 |
| g. Miscellaneous (authority in country of origin, local officials) | 3 |
| h. Not applicable/no answer | 10 |
| 3. *Importation of endangered or threatened species?* | |
| a. U.S. Department of Interior | 22 |
| b. U.S. Department of Agriculture | 4 |
| c. Miscellaneous (EPA, Commerce, Customs, local authorities) | 6 |
| d. Not applicable/no answer | 14 |
| 4. *Use of restricted drugs?* | |
| a. U.S. Justice Department | 1 |
| b. Federal Bureau for Narcotics and Dangerous Drugs | 3 |
| c. Federal Drug Administration | 4 |
| d. Public Health Department | 3 |
| e. Local authority | 8 |
| f. Miscellaneous (including USDA, USDI, state narcotics officials) | 4 |

B. *What sources (U.S. only) would you consult in regard to the legal aspects of: (Continued)*

| | Frequency |
|---|---|
| 5. *Bird banding permits?* | |
| a. U.S. Department of Interior | 23 |
| b. State Fish and Game Departments | 3 |
| c. Miscellaneous (USDA, local authority) | 3 |
| d. Not applicable/no answer | 15 |
| 6. *Field work in foreign countries?* | |
| a. Embassy of foreign government | 22 |
| b. Colleague in foreign country | 7 |
| c. Miscellaneous (USDI, UN, Customs, USDA, U.S. Fish and Wildlife Service, international science agencies) | 14 |
| d. No answer | 8 |
| 7. *International exchange of specimens?* | |
| a. Embassy of foreign government | 10 |
| b. Colleague in foreign country | 6 |
| c. U.S. Fish and Wildlife Service | 6 |
| d. U.S. Customs | 5 |
| e. Miscellaneous (Smithsonian Institution, USDI, USDA, ICOM, IAPT, U.S. Department of Commerce, local authority, U.S. Post Office) | 18 |
| f. Not applicable/ no answer | 11 |
| 8. *Insurance on collections?* | |
| a. Local authority (including business office) | 14 |
| b. Insurance companies | 4 |
| c. Miscellaneous (professional society advisory committees, Post Office, AAM) | 4 |
| d. Not applicable/no answer | 17 |
| 9. *Collecting specimens?* | |
| a. State Fish and Game Departments | 12 |
| b. Federal agencies | 7 |
| c. Miscellaenous (local authority, land owners, specialists, Department of Environmental Conservation, Park officials) | 17 |
| d. Not applicable/no answer | 10 |

C. *Please comment on the problems your institution has faced in securing the proper permits for:*

1. *Importation of preserved specimens:* Too much red tape, combined with constant changes in the regulations.

2. *Importation of a threatened and/or endangered species:* Red tape and confusion over regulations and authority.

C. *Please comment on the problems your institution has faced in securing the proper permits for; (Continued)*

3. *Importation of live specimens;* Red tape, unknown changes in the regulations, and generally non-supportive regulations for the biological sciences.

4. *Purchase of restricted drugs:* Red tape.

5. *Collecting specimens:* Too much time required to secure permits due to state restrictions and federal regulations which must be followed.

## IX. General Remarks

A. *What significant accomplishments have been realized within your institution during the past two years that pertain to the use, maintenance or development of your collections?*

| | Frequency |
|---|---|
| 1. Increase in available space for collections | 16 |
| 2. Increased recognition | 10 |
| 3. Increased use | 8 |
| 4. Improvements in collections and personnel | 7 |
| 5. Implementation of EDP | 7 |
| 6. Other | 17 |

B. *At present, what is the most critical problem that affects your collections?*

| | Frequency |
|---|---|
| 1. Need more space | 27 |
| 2. Need more personnel | 22 |
| 3. Need more money | 13 |

C. *Do you foresee resolution of this problem in the near future?*

| | YES | NO | UNSURE | NO ANSWER | TOTAL |
|---|---|---|---|---|---|
| 1. Space | 3 | 10 | 8 | 6 | 27 |
| 2. Personnel | 2 | 15 | 5 | - | 22 |
| 3. Money | 1 | 6 | 4 | 2 | 13 |

D. *What, in your opinion, is the greatest single problem your institution will be facing over the next five years?*

| | Frequency |
|---|---|
| 1. Inadequate funding | 39 |
| 2. Lack of space | 13 |
| 3. Lack of proper personnel | 5 |

*E. List one or two problems that you believe the ASC, and its members, should be looking into.*

| | Frequency |
|---|---|
| 1. Obtaining funds for collections | 23 |
| 2. Improving communications between institutions and the public, including funding agencies | 21 |
| 3. Coordinating EDP projects between institutions | 10 |

# APPENDIX II: SUMMARY OF PRELIMINARY QUESTIONNAIRE TO ASC MEMBER INSTITUTIONS AND ADVISORY COMMITTEES

## PART 2: QUESTIONNAIRE FOR PROFESSIONAL SOCIETY ADVISORY COMMITTEE CHAIRMEN

### Methodology

Questionnaires were sent to 14 individuals representing 13 professional society advisory committees in the disciplines of: arachnology, botany, culture collections, entomology, herpetology, ichthyology, invertebrate paleontology and zoology, malacology, mammalogy, ornithology, parasitology and vertebrate paleontology. All 14 individuals responded. Certain questions required an opinion or listing. In such cases, the most commonly cited responses are listed in order of frequency of reference. The number of respondents listing a particular response is listed in parentheses where appropriate.

# RESULTS

## QUESTIONNAIRE FOR ADVISORY COMMITTEE CHAIRMEN

### II. Organizational Relationships

A. *With reference to the six elements represented at the Workshop, list in descending order of priority, to whom your Committee has been responsible for the following activities:*

1. *Development of Goals*

1st Priority
- a) Professional Societies and their Constituencies (9)
- b) Systematics-oriented Institutions (2)
- c) Professional Society Advisory Committees (1)

2nd Priority
- a) Association of Systematics Collections (4)
- b) Federal Funding Agencies (4)
- c) Professional Societies and their Constituencies (2)

3rd Priority
- a) Association of Systematics Collections (4)
- b) Systematics-oriented Institutions (2)
- c) ASC Councils (1)

2. *Progress Reports Toward Achieving Your Goals*

1st Priority
- a) Professional Societies and their Constituencies (10)
- b) Systematics-oriented Institutions (1)
- c) Professional Society Advisory Committees (1)

2nd Priority
- a) Federal Funding Agencies (4)
- b) Association of Systematics Collections (2)
- c) Professional Societies and their Constituencies (2)

3rd Priority
- a) Association of Systematics Collections (2)
- b) Federal Funding Agencies (2)

3. *Communicating Recommendations*

1st Priority
- a) Professional Societies and their Constituencies (10)

2nd Priority
- a) Federal Funding Agencies (5)
- b) Association of Systematics Collections (4)

3rd Priority
- a) Association of Systematics Collections (4)
- b) Federal Funding Agencies (2)

B. *List, in descending order of importance, those organizations that have influenced the activities of your Committee:*

[The answers are ranked according to a value derived by summing the score (1 = first importance; 2 = second importance, etc.) for each category of organization and dividing by the total number of references within that category. The lower the score, the higher the priority.]

| Organizational Element | Score |
|---|---|
| 1. Professional Societies (national and international) | 1.56 |
| 2. Association of Systematics Collections (including Councils) | 2.18 |
| 3. National Science Foundation | 2.71 |
| 4. Community at large (including institutions) | 3.00 |

## III. Current and Proposed Projects

A. *What are the principal activities of your Committee (in descending order of priority)?*

| | Preliminary Phase | | Implementation Phase | |
|---|---|---|---|---|
| 1st Priority | | | | |
| | General survey of collections and resources (money and personnel) | (7) | a) EDP System | (3) |
| | | | b) Evaluation with recommendations for funding | (1) |
| | | | c) Implement national plan | (1) |
| 2nd Priority | | | | |
| | Identify National Resource Centers with recommendations for funding | (3) | a) Implement an EDP system | (1) |
| | Nature and extent of human resources | (2) | | |
| 3rd Priority | | | | |
| | Present and future needs | (2) | a) Develop standards for data | (2) |
| | | | b) Coordinate activities between institutions | (1) |
| | | | c) Develop an EDP system | (1) |
| | | | d) Increase funding for collections | (1) |

A. *What are the principal activities of your Committee (in descending order or priority)? (Continued)*

| Preliminary Phase | Implementation Phase |
|---|---|
| 4th and 5th Priorities | |
| | a) Specialized surveys (2) |
| | b) Coordinate activities (including development of a national plan) (2) |

B. *If your Committee is supported by a Federal agency, what were the principal goals cited in the request for support?*

1. To determine the nature and extent of resources in the discipline (4)
2. To develop a National Plan for the discipline (2)
3. To consider the use of collections and of collection-related information (1)
4. No answer/not applicable (7)

C. *If applicable, which of the above goals have been accomplished?*

1. Goals completed (4)
2. Preparing final report (2)
3. No answer/not applicable (8)

D. *If applicable, what policies or recommendations resulting from the activities of your Committee have been adopted and by whom?*

| Policy | Adopted by |
|---|---|
| Minimal standards for collections | State agencies, institutions |
| Full report | Professional society membership |
| Collection rankings | National Science Foundation (presumably) |
| Fee schedules for taxonomic services | Under consideration |
| National plan | Professional society membership (unanimously approved) |

[No answer/not applicable (8)]

E. *What benefits will be derived from implementing your recommendation of highest priority?*

1. An awareness of the extent and concentration of collections resources will provide a basis for seeking support for EDP of collection-data in a form for ready use in environmental impact and endangered community or species projects.

*E. What benefits will be derived from implementing your recommendation of highest priority? (Continued)*

2. The systematics resources represented in museum collections will be better managed and, hence, of greater value to the community now and in the future.
3. Establishment of a national data retrieval system (on a limited scale) for specimen-related information will result in more efficiency, greater service capability and better collection management.
4. An increased availability of collections for research in systematics.
5. Ranking of collections will help funding agencies to direct support to those collections that have the greatest need.

[No answer/not applicable (3)]

*F. What policies or recommendations resulting from the activities of your Committee have not been adopted, and why?*

No Advisory Committee has presented a recommendation or policy that has not been adopted. However, recommendations have been delayed in their implementation due to a lack of funds.

*G. What do you foresee as the future status of your Committee?*

1. 7 committees will continue their basic advisory activities to their respective societies.
2. 3 committees will accept responsibility for initiating and developing discipline-oriented EDP projects.
3. 2 committees will cease to exist after completing their current charge.
4. 2 committees, no answer.

*H. What products, recommendations or policies do you foresee being prepared and/or developed in the future as a result of your Committee's activities?*

1. A functioning national EDP system (National Information Retrieval Network) for systematic biology.
2. A general policy of federal support for major systematic collections including: a) funding for technical assistance, and b) funding for special curatorial projects such as frozen tissue collections and EDP projects; support of research and development in husbandry projects.
3. Collections becoming more available for research.
4. Establishment of a system of review for judging future needs of collection maintenance and conservation.
5. Recommendations for federal support; development of resource centers.

*H. What products, recommendations or policies do you foresee being prepared and/or developed in the future as a result of your Committee's activities? (Continued)*

6. Reports on collections and specialists; standards for collections, established procedures for collective purchase of supplies and equipment used in collections and better support for and management of collections.

[No answer (2)]

## IV. Sources of Support and Priorities for Funding

*A. Indicate (in descending order of priority), the order in which the policies, recommendations or projects cited in questions III-F and/or III H should be implemented.*

1st Priority

1. Provide improved support for collections.
2. Initiate EDP projects.
3. Initiate expanded inventories of collections.

2nd Priority

1. Identify National Resource Centers for collections and research on living organisms.
2. Institute a National EDP Network for systematic biology.

3rd Priority

1. Establish a society body to advise funding agencies on proposals for collection maintenance and improvement.
2. Coordination of discipline-based activities including purchase of supplies and equipment.

*B. To implement the above recommendations, what sources of funding have you considered?*

a) National Science Foundation (6)
b) Other Federal agencies (NMA, USDA, etc.) (5)
c) Professional Societies (2)
d) Miscellaneous (private sources, local institutions) (2)

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- The ASC Newsletter. Published bimonthly (Feb., April, June, Aug., Oct., Dec.) by the Association of Systematics Collections. Editor: L. D. Grotta.

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