What is Important to Biological Societies at the Start of the Twenty-First Century?

Authors: Musante, Susan, and Potter, Sheri

Source: BioScience, 62(4) : 329-335

Published By: American Institute of Biological Sciences

URL: https://doi.org/10.1525/bio.2012.62.4.3

What Is Important to Biological Societies at the Start of the Twenty-First Century?

SUSAN MUSANTE AND SHERI POTTER

Research in the life sciences is a large, diverse enterprise conducted by hundreds of thousands of individuals, who are supported by thousands of organizations, including academic departments; research institutes; museums; state and federal government agencies; state, regional, and local associations; and a host of consortia and coalitions. Among those organizations, scientific societies have played an integral role in advancing biological research for centuries. However, the twenty-first century has ushered in a series of economic, social, and technological changes, the impacts of which are changing the fundamental nature of how these societies fulfill their roles and are threatening the continued existence of some of those organizations (Travis 2010).

Conversations in the community of biological scientists—especially in the executive councils of scientific societies—have suggested to the American Institute of Biological Sciences (AIBS) that individual societies are facing acute challenges and that these might be widespread. Indeed, AIBS itself is experiencing challenges that echo those being discussed by its member organizations. Declines in AIBS's individual membership counts, along with the changing economics of the scientific enterprise and especially that of academic publishing, have raised significant questions about the sustainability of many of our products and services, which range from publishing *BioScience* to maintaining the Public Policy Office.

These challenges led us to ask questions such as the following: How can AIBS best serve its members, both individuals and organizations? Are we leveraging current technological tools to realize our mission effectively? Do the purposes stated in the AIBS Constitution (AIBS 2012) still correspond to the needs of today's scientific community? Does AIBS truly "foster and encourage research and education in the biological sciences, including the medical, environmental, and agricultural sciences" (p. 1) as the constitution states it should? Are AIBS's current programs the best mechanisms for serving the community?

To answer these questions, AIBS formally embarked on long-range planning in 2009. The process has been long and deliberate in order to allow us time to gather and analyze the data that would help us thoroughly assess our organization. The institute's two most recent presidents discussed the progress made and next steps for AIBS in their end-of-term *BioScience* editorials. Joseph Travis (2010) invited us to consider how the community is collectively adapting in a time of change and revealed that during his leadership, he began "guiding AIBS toward defining how we can better serve the life science community, and how to develop the financial and structural means to sustain that activity" (p. 867). James P. Collins (2011) looked at the historical context in which our societies were created and what that means for how these organizations define themselves today.

We began the process by collecting information about our internal programs and from the community within which we operate. During the summer of 2010, we surveyed a representative group of organizations that serve the biology community and individual biologists to begin to build a better understanding of the dynamics of the people and organizations that advance biology in the United States. The responses we received were used to inform decisions about the future directions of AIBS as an organization (Collins 2011).

We also quickly realized that the information that we learned through our surveys would be useful to others. We did not find evidence that data of this nature had been previously collected in this manner or shared with the community to achieve similar goals at any time in the past. For both historical and informational purposes, we felt that it was important to share our observations and findings from these surveys with the broader community through *BioScience*.

In addition to the surveys, we reviewed the literature about the history of AIBS and its member organizations and, in late 2011, began to

BioScience 62: 329–335. ISSN 0006-3568, electronic ISSN 1525-3244.
doi:10.1525/bio.2012.62.4.3

catalog information about biology organizations so that we could ultimately describe the types of scholarly and professional societies that constitute our community and the roles they play and to quantify the ways in which the community has grown over time. We will present the results in a series of articles that will describe the culture and milieu in which biology is practiced today. In this article, we describe what we learned from representatives of scientific societies.

Survey of biology societies and organizations

In August 2010, AIBS surveyed the presidents, executive directors, and other representatives of societies and organizations that advance biology research and education. Two versions of the survey were distributed to 241 organizations, including scientific societies, professional societies, museums, natural-science collections, and university departments.

One survey was distributed to 286 individuals, representing 183 current and recently lapsed AIBS member societies and organizations (AIBS Member Organization Survey) and had 16 questions. This survey was designed to provide insights into the organizations that AIBS serves, the nature of the relationship between AIBS and those organizations, and what the organizations perceived to be the greatest challenges facing biology.

A second survey was distributed to 88 individuals who were presidents and executive directors of 58 biology organizations that were not AIBS members (Non-AIBS Member Organization Survey). This survey was similar to the first but had only nine questions, with fewer about the organizations' relationships with AIBS. This survey was sent to all member societies of the Federation of American Societies for Experimental Biology, as well as to societies that do not belong to any metasociety.

Who took the survey? Eighty-six individuals took part in the AIBS Member Organization Survey. Sixty-six percent of the respondents were presidents or executive directors of their organization, and the remaining 34% served in another role, such as past president, executive council member, committee chair, director, vice president, or staff member.

Twenty-four individuals took the Non-AIBS Member Organization Survey. Ninety-six percent of the respondents were the president or executive director of their organization.

Between the two instruments, 110 respondents participated, for a response rate of 29% (table 1).

Although AIBS has many types of member organizations (including, e.g., academic departments and synthesis centers), the majority are either scientific societies or museums and institutions that house natural-science collections. Nearly all of the 58 organizations invited to participate in the Non-AIBS Member Organization Survey were scientific societies with a national scope of activity. Therefore, the invited pool of participating organizations was weighted toward these organization types.

The two instruments varied in the number and nature of the questions. The AIBS Member Organization Survey contained several questions about the relationship between the respondents' organizations and AIBS. These questions were not included in the Non-AIBS Member Organization Survey version. The surveys had four questions in common, and these will be the focus of this article: (1) What do you consider the most important role of your organization? (2) Does your organization have, or is your organization interested in developing, programs in the following areas: a journal, undergraduate education initiatives, K–12 education initiatives, career resources for students, professional recognition or awards, career resources for professionals, diversity programs, programs that connect biology to society, annual meetings, media such as video and podcasts, public policy programs, online professional development opportunities, or webinars? (3) What is the greatest challenge your organization faces? (4) What are the top three challenges facing biology?

For the last question, the respondents were asked to select three from the following list: Biology majors are not prepared for biology careers; decisionmakers (e.g., Congress) are not informed about biological research or issues; science coverage in popular media is decreasing; there is a failure to educate nonmajors to engage in a lifelong appreciation of biology; biological disciplines are fragmenting; there are issues with scientific data—access, raw data publication, disclosure; there is a lack of advocacy for science funding; there is a lack of funding for research; there is a lack of people entering biological fields for employment; the public lacks

Table 1. Size of the organizations represented by the survey respondents.

	AIBS Member Organization Survey	Non-AIBS Member Organization Survey	Total participating individuals
Number of respondents	86	24	110
Organization membership size			
0–100	11	0	11
101–500	19	4	23
501–1000	14	1	15
1001–5000	26	11	37
5001–8000	3	4	7
More than 8000	8	3	11
Other	4	0	4
Unknown	1	1	2

appreciation for biology; there is a lack of support for biologists to spend time on teaching or community-outreach activities; the quantity and quality of jobs for existing, trained biologists; evolution has been rejected as the central tenet of biology; or some other challenge.

Question 1: What do you consider the most important role of your organization? One hundred survey takers responded to this open–ended question. To quantify the responses, themes in the responses were identified, and the individual entries were keyed to common themes that emerged from the responses and were tallied. Some respondents included more than one role in their response; therefore, there was a total of 192 tallied responses to the question.

The majority of responses indicated that the primary role of the respondents' organization is to advance research or to transfer knowledge about the biological sciences. The second most frequent responses were that the organization's primary role is to facilitate and promote networking and collaboration among scientists or to advance education about their discipline. The themes are detailed in table 2, with an indication of the frequency of response occurrence.

Question 2: What types of programs do organizations implement? This question provided insight into the nature and number of programs implemented by the respondents' organizations. The respondents were given a menu of 13 program types, randomized for each respondent, and were asked to choose one of four responses to identify their organization's investment in that programmatic work. For each program type, the respondents were asked to choose from among the following five responses: (1) This is a cornerstone program of our organization, (2) we have a program in this area, (3) we collaborate on a program in this area, (4) we are interested in having a program in this area, or (5) we do not have a program in this area and do not plan on starting one in the next 12 months. Figure 1 shows the responses to this question for each program type.

Most of the respondents considered their society's cornerstone programs to be annual meetings (62 respondents of 102 total) and journals (73 respondents of 105 total). These responses correspond with what we learned about the organizations through question 1—that their cornerstone programs support the roles they play in advancing research or knowledge transfer, promoting networking, and advancing education.

We next examined the data another way: summing the values in figure 1 for response selections 1, 2, 3, and 4 (those that indicated programmatic

Table 2. Primary roles of the respondent organizations.

Response theme	Percentage of respondents who indicated this role
Advance research or knowledge transfer	68
Promote or facilitate collaboration or networking	23
Advance education	23
Build public understanding or informal education	18
Promote informed policy or advocacy	15
Empowering student success for future of field	15
Promote conservation or the wise use of resources	8
Represent or support professionals	4
Promote interdisciplinary research across natural sciences and other biological subdisciplines	4
Membership services or communication	3
Managing or stewardship of collections	3
Empower biology educators	3
Promote the success of the institutions that advance biology	2
Promote discipline	2
Career placement	1

Note: There was an average of 1.9 responses per respondent.

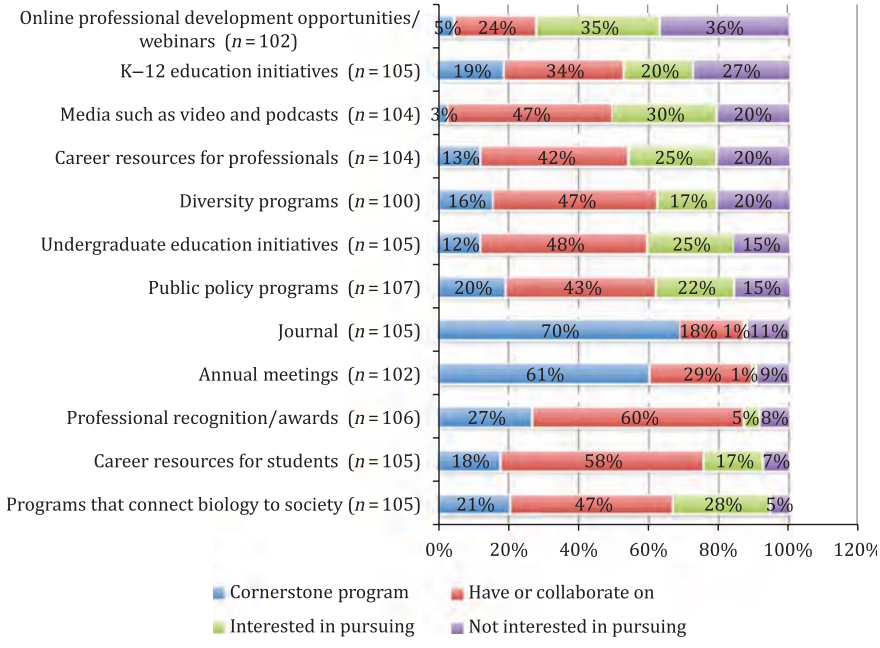

Figure 1. Programs implemented by biology societies and organizations.

Table 3. Percentage of each of the respondent societies' programmatic interests.

Programmatic interest	Percentage of respondents
Programs that connect biology to society	95
Career resources for students	93
Professional recognition or awards	92
Annual meetings	91
Journal publication	89
Public policy programs	85
Undergraduate education initiatives	85
Diversity programs	80
Career resources for professionals	80
Media such as video and podcasts	80
K–12 education initiatives	73
Online professional-development opportunities or webinars	64

activity or interest), to reveal activity prevalence and programmatic interest (table 3). Eighty percent or more of the organizations that responded to the survey currently administered their own program in an area, collaborated on a program in the area, or were interested in initiating new programs in 10 different core areas.

The respondent organizations, on average, developed programs in 7.8 response areas and were interested in adding programs in another 2.3 areas. This illustrates that, overall, biology organizations are working in or are interested in developing programs in areas beyond their core services.

Question 3: What are the greatest challenges that organizations face? The survey included another open-ended question to identify what the representatives of biology organizations see as the greatest challenges to their organizations today. One hundred two respondents completed this question. The responses were categorized into themes and tabulated for the frequency of their occurrence. Some responses contained more than one challenge, so there were a total of 141 responses.

Three major themes emerged: funding, membership, and journal publication.

Funding. The respondents reported concern about many issues related to funding, including support for research, the availability of jobs, decreased fundraising potential, a lack of institutional support for professional-association memberships and meeting travel, and declining institutional subscriptions. A total of 39% of the respondents explicitly stated that these concerns were their organization's primary concern. Here are some sample responses:

One respondent wrote, "Growing membership, financial viability in the light of economic downturns, and operating at peak levels of organizational effectiveness and efficiency [are our main concerns]." Another answered with the following response:

> Short term, the society is thriving… Long term, the biggest threats/challenges are the difficulties its younger members are facing in getting their careers started and sustained due to [a] lack of consistent research funding. Not only does the current funding environment put those who are now in the beginning phases of their careers at risk, it is undoubtedly discouraging able students from even considering a life in science. The current model for research funding in the biological sciences is broken. Something major will have to be done to ensure that able people are attracted to the biological sciences and [to] enable them to have decent, productive careers.

Another responded that their organization's primary concerns are "budget problems resulting from funding for research and falling support for memberships, travel, and journal subscriptions by universities and national labs."

Membership. Declining membership, the retention of existing members, a desire to increase membership, a lack of a diverse membership, challenges in recruiting young scientists, figuring out how to serve a diverse membership, and engaging their membership in society leadership were the issues concerning membership identified by the organization representatives. A total of 47% of the respondents stated that these issues were their greatest organizational challenge. Again, here is a sample of the replies: One respondent wrote "Demographics! We are an aging organization with declining membership. We see declining recruitment in younger age groups that, if not reversed, could spell the end of the organization." A major concern for another organization is "trying to grow our organization while still maintaining the close relationships of those already in the organization." "Increasing membership" was another category of concern: "The younger generation of researchers does not support societies like previous generations [did]. They just get information from the Internet and do not care too much about supporting journals or societies." Finally, one respondent wrote that "keeping membership in the digital age" [is a major concern].

Journal publication. Organizations are grappling with changes to their publication model, including those related to changing from print to digital or becoming open access and those related to declining institutional subscriptions. A total of 18% of the respondents indicated that this was their organization's most pressing

concern. One wrote, "We are moving to electronic publication and open-access for the journal, which will completely change the business model for the society." Another responded that "At present, dealing with the transition from print to electronic publication for our journal [is our most pressing concern]." Finally, another wrote that "The greatest challenge is the challenge of open-access publication. Like many professional societies, our publishing program provides revenue that supports a variety of activities in addition to the revenue necessary to continue publishing."

These three major themes are interconnected and are central to the broad challenges facing scientific societies; they cannot be examined in isolation. For example, in many instances, membership is decreasing because being a member of a society is no longer necessary to access scientific journals. In addition, some colleges and universities are cancelling institutional subscriptions because of decreased budgets. These issues are pervasive: 95 of the 102 respondents to this question identified one of these issues as their organization's greatest challenge.

There were some intriguing minor themes that also emerged from the data, involving public understanding, the changing nature of science, and reaching consensus among an organization's members.

Public understanding. Eight percent of the representatives felt that their organization's greatest concern was tied to the perceptions that the general public does not adequately appreciate their research, grasp the need for conservation, or understand the value that science contributes to society. For example, one respondent wrote that the "lack of public interest/awareness of the relevance of our sciences, leading to decreasing numbers of people going into the disciplines and decreased funding for research and education" was of greatest concern.

Changing nature of the science. Biological research has been shifting toward both more specificity and more interdisciplinarity in recent years. For 9% of the respondents, the changing nature of science is raising questions about how their organizations identify with professionals today. For example, some sciences are becoming so broad that the respondents fear losing their identity, and some organizations are losing their members to larger, more interdisciplinary groups. In particular, one respondent wrote that "membership [is declining] as scientists and scientists in training become more focused and allied with subdisciplines and organizations [become] more focused on very specific areas of research." Another responded, "Our field is so pervasive in science that we fight to retain our clear and separate identity."

Consensus. Seven percent of the responding organizations would like to find strategies to be more cohesive and to obtain consensus among their membership, or among organizations similar to theirs, to promote the discipline's priorities. One respondent wrote that "building consensus across a large membership in order to take meaningful actions with regards to [the] application of our science to issues" was their main concern. Another wrote the following response:

> Marketing the importance of science leadership [is our primary concern]. As a group of biology-related societies, we need to find common platforms promoting biology and science across the board. Science has been our "golden-egg-laying goose" from 1945 to 2000. If we fail to maintain our role of leadership in the world, we may well lose our scientific society base. In a note to [an earlier point], publishing will go where the science and the science leaders go.

Question 4: What are the top three challenges facing biology? In the last question, we asked the respondents to select 3 items from a menu of 13 to indicate which issues they felt were the greatest challenges facing the biological sciences. The options were randomized for each individual survey. The 13 items are listed in table 4, together with total number of responses each received and the percentage of the respondents who selected it.

Table 4. The greatest challenges to biology.

Number of responses (n = 96)	Frequency (percentage)	Selected item
50	52	Decisionmakers (e.g., Congress) not informed about biological research or issues
47	49	Lack of funding for research
40	42	Public's lack of appreciation for biology
32	33	Rejection of evolution as the central tenet of biology
23	24	Quantity and quality of jobs for existing, trained biologists
21	22	Lack of advocacy for science funding
14	15	Failure to educate nonmajors to engage in a lifelong appreciation of biology
14	15	Lack of support for biologists to spend time on teaching or community-outreach activities
12	13	Fragmentation of biological disciplines
11	11	Decreasing science coverage in popular media
9	9	Issues with scientific data—access, raw data publication, disclosure
5	5	Lack of people entering biological fields for employment
3	3	Biology majors are not prepared for biology careers

Note: Ninety-six respondents each selected 3 of the 13 items.

Conclusions

Our survey of 110 leaders representing biological societies and organizations provided a snapshot of how today's rapidly changing cultural, sociological, and economic environments are impacting the organizations—in particular, the scholarly societies that advance the biological sciences. This information was collected in order to inform AIBS's long-range planning efforts and has led to significant changes in our understanding of the institute's role as a metasociety for the biological sciences in the twenty-first century.

We focused our analysis of the results on responses to the four questions that both forms of the survey had in common. From the first question, we learned that most respondent organizations consider the primary role of their biological society or organization to be advancing research. Approximately 25% told us that their organization's primary role is to advance education, and an equal percentage said that it is to facilitate networking. The respondents identified 12 additional primary roles, covering a broad range of services to society and to the biology community.

From the second question, we learned that for most respondents, their organizations' cornerstone programs are publishing journals (70%) and convening annual meetings (61%). In addition, we learned that societies are complementing their core mission activities with a wide range of additional programs. In addition to journals and annual meetings, 80% or more of the organizations are administering on their own, collaborating on, or desire to initiate supplementary programs in all of the following areas: career resources for students and professionals, professional recognition or awards, public policy programs, programs that connect biology to society, undergraduate education initiatives, diversity programs, and media such as video and podcasts. Organizations are, on average, developing programs in eight different areas and wish to add additional programs in two areas on average.

The third question revealed the concerns that are emerging because of today's rapidly changing society. The representative organizations' greatest challenges were expressed as concerns about funding (39%), membership (47%), and journal publication (18%). Ninety-five of 102 organizations indicated that their greatest challenge was in one or more than one of these areas. These challenges are significant and interconnected. Additional organizational challenges included those related to the changing nature of science (9%), difficulties in building consensus among members and similar organizations (7%), and concerns about the public interfaces where biological knowledge informs societal decisionmaking (8%).

The fourth question revealed similar concerns in the representatives' opinions about the greatest challenges to biology as a whole. They told us that the top three of these were decisionmakers (e.g., Congress) not informed about biological research or issues (52%), the lack of funding for research (49%), and the public's lack of appreciation for biology (42%).

In this article, we summarize an important piece of what we have learned about the roles, programmatic activities, and challenges of organizations that support biology, as well as the greatest challenges facing biology as a discipline. Professional organizations of all types are facing similar challenges (Coerver and Byers 2011), and our research confirms that organizations advancing research in the biological sciences are not immune. As with all professional associations striving to thrive in today's rapidly changing culture (Albrecht 2006, Coerver and Byers 2011, AIBS 2012), economic, social, and technological changes are not only changing the way scientific societies serve professionals but are forcing scientific organizations in particular to consider how best to adapt their fundamental work to achieve their mission. The ways of the past are clearly not the ways of the future.

The process of gathering and analyzing these data has allowed AIBS to take proactive steps to refine the institute's programs and direction and to also inform conversations around the next set of big questions to be answered that will determine its future as an organization advancing biology. In November 2011, the AIBS membership voted to approve a set of constitutional changes that will strengthen AIBS's leadership and broaden its representation of the biological sciences (O'Grady 2012). In December 2011, AIBS reformatted its annual Council of Representatives meeting. The event provided a forum for leaders of biological organizations to discuss the challenges that are affecting professional societies, to hear from experts in the field, and to learn about strategies they can implement to adapt and thrive (Potter 2011). Audio recordings and slides from these presentations may be accessed online through the AIBS Web site (AIBS 2011).

In 2012, AIBS will share results of additional research through articles in this series, building on and extending from this set of survey results. Through these articles, we will continue to explore and describe the set of core issues impacting biology societies, the needs and external challenges that concern biologists about the discipline, and the dynamics of the people and organizations that advance biology in the United States. As a result, in the coming years, AIBS will be more agile in our response to change in the future and will be positioned to help others to build their capacity to do so and to build the community around "such matters of common concern as can be dealt with more effectively by united action" (AIBS 2012).

References cited

[AIBS] American Institute of Biological Sciences. 2010. AIBS Annual Report. AIBS. (6 February 2012; *www.aibs.org/about-aibs/index.html*)

———. 2011. 2011 Council Meeting. AIBS. (6 February 2012; *www.aibs.org/events/2011_council_meeting.html*)

———. 2012. American Institute for Biological Sciences, Inc.: Constitution. AIBS. (6 February 2012; *www.aibs.org/about-aibs/documents.html*)
Albrecht K. 2006. Mapping the Future of Your Association. The Center for Association Leadership.
Coerver H, Byers M. 2011. Race for Relevance: 5 Radical Changes for Associations. The Center for Association Leadership.
Collins JP. 2011. A forum for integrating the life sciences. BioScience 61: 935.
Hylander CJ. 1951. The American Institute of Biological Sciences: A historical résumé—continued from January. AIBS Bulletin 1: 13–15
O'Grady RT. 2012. AIBS enacts governance changes to advance strategic plan. BioScience 62: 105–111.
Potter S. 2011. What is the place of the scientific society in the 21st century? American Institute of Biological Sciences. (6 February 2012; *www.aibs.org/about-aibs/what_is_the_place.html*)
Travis J. 2010. Change is constant. BioScience. 60: 867.

Susan Musante (smusante@aibs.org) is educations programs manager, and Sheri Potter (spotter@aibs.org) is business and programs development manager and membership and community programs manager, at AIBS.