Who's On Board: Early Career Researchers Hold Scarce, yet Valuable Roles Within Scientific Societies

Adriana Bankston¹, Stephanie M. Davis¹, Elisabeth Moore², Caroline A. Niziolek^{1,3} and Vincent Boudreau^{1,4,5,6}*

¹ Future of Research, Pittsfield, MA, USA

² Center for Information and Study on Clinical Research Participation (CISCRP), MA, USA

³ Department of Communication Sciences and Disorders, University of Wisconsin–Madison, Madison, WI

⁴ Department of Plant & Microbial Biology, University of California, Berkeley, CA, USA

⁵ Howard Hughes Medical Institute, Berkeley, CA, USA

⁶ Department of Biochemistry & Biophysics, University of California, San Francisco, CA, USA

* Direct all correspondence to this author at viboud@gmail.com or the Future of Research at info@futureofresearch.org

Early career researchers (ECRs) represent a large proportion of the research enterprise, yet they are largely excluded from decision-making opportunities including conference organization, funding administration, and manuscript peer review. As organizers of the research community, scientific societies are particularly well-positioned to incorporate ECRs into leadership roles. To assess the landscape of scientific societies that include ECRs within their organizational structures, we surveyed executives, tenured faculty, and ECRs in leadership positions within these structures. Of the queried scientific societies, ECR involvement in leadership varied greatly; while some ECRs participated in specialized committees, others were incorporated as full board members with decisional voting responsibilities. Both senior and ECR members reported having had positive experiences within ECR-inclusive committees, in which both scientific societies and ECRs benefited from ECR inclusion. Here, we highlight the accomplishments of several societies in incorporating ECRs in leadership positions, summarize the mutualistic benefits of including ECRs within decision-making structures, and present recommendations for establishing these positions throughout different organizations. Taken together, this work underscores the contribution of ECR leaders to scientific societies and to the research enterprise despite the relative scarcity of these positions.

INTRODUCTION

The absent voices of early career researchers

The majority of research carried out in academia is performed by graduate students, postdoctoral researchers, and pre-tenure faculty, collectively known as Early Career Researchers (ECRs). This group is the strongest driver of the increasing diversity of the research enterprise and provides a constant influx of new talent, skills, and ideas^{1,2}.

However, most organizations in the research enterprise (such as universities, funding agencies, publishers, and professional societies) center their decision-making power in committees consisting solely of senior academics, without the participation of ECRs, specifically those who have not attained an independent research position. As the next generation of the scientific workforce, ECRs have little say in the policies that will shape the scientific community, diminishing the potential of those who drive the system to positively impact society³. The absence of ECRs from the decision-making process in the research enterprise limits its potential for growth and excludes the voice of its largest demographic^{4,5}.

Scientific societies as agents of change

Scientific societies provide scientists at all career stages with the opportunity to network, contribute to scientific meetings and conferences, and participate in numerous professional development activities^{6,7}. Scientific societies are particularly well-positioned to incorporate ECRs into positions of leadership for the following reasons:

- Societies are engaged and influential in policy discussions;
- Societies provide opportunities for researchers to interact across career stages, institutions and countries;
- Societies are eager to recruit and retain the next generation of leaders in their field.

Unsurprisingly, some societies already have ECRs in their leadership, providing a strong proof-of-principle that their inclusion is possible and beneficial. Here, we highlight the existence of several initiatives to enable ECR leadership within scientific societies across multiple STEM disciplines, despite the scarcity of such programs across the whole research enterprise. These organizations demonstrate the power of scientific societies in using their position to elevate the careers of ECRs while ensuring the continuation of the society's leadership. By investing in the professional development of ECR leaders, societies may better retain members who will eventually become leaders in their respective fields. With knowledge of how some of these organizations operate, we sought to 1) understand how widespread ECR leadership positions are across scientific societies, 2) determine the characteristics, benefits, and origins of these positions, and 3) identify best practices in establishing and operating these positions. Taken together, our survey of the ECR leadership landscape across STEM scientific societies aims to encourage societies to establish and develop these positions.

METHODS

To obtain data about leadership positions within scientific societies, we initially crowdsourced information from the community on voting ECR board positions and ECR attendance at board/council meetings, as well as the type and number of such leadership positions, through the Future of Research Twitter network and mailing list. This initial survey (Supplementary Table 1) identified several scientific societies that had placed ECRs in leadership positions. To determine the nature and extent of ECR leadership positions within scientific societies, we interviewed nine senior society leaders and seven ECR leaders in different positions.

Models for increasing ECR involvement in society leadership

Figure 1. ECRs contribute to scientific society activities through different degrees of decisional involvement. Of queried societies, approximately half included ECRs on their board of directors, while societies with no ECRs on their boards encourage ECRs to participate on other committees or on ECR-specific committees.

Through interviews, we compiled information to highlight various accomplishments by ECR leaders and ways in which societies highlighted their leadership. All survey questions are available with this article as Supplementary Table 2.

RESULTS

Societies manage early career leadership differently

We identified several scientific societies engaging ECRs as leaders (on boards or committees) via crowdsourcing. In a survey of the leadership landscape across 20 scientific societies, we initially identified nine ECRs in leadership positions (voting and non-voting positions on councils and boards) across six societies with 532 such leadership positions available. Across the 20 societies, fewer than 2% of leadership positions were held by ECRs.

Through our crowdsourced data, ECRs were found to be engaged through several mechanisms of varying degrees of responsibility (Figure 1). The most impactful approach was to allow and encourage ECRs to become full voting members of the Board of Directors or Council (full board member). However, ECRs also held more moderate responsibilities in scientific societies, ranging from attending and contributing to Board meetings without voting privileges (non-voting board members) to serving on society committees or on an ECR-specific committee. The creation of a specialized ECR-specific committee can help create a foundation for ECR contributions in addition to being a regular society member, but it can also limit ECR impact by impeding their exposure to other sections of the society.

Given the diverse possible models of ECR leadership, we evaluated the state of ECR leadership within scientific societies. We identified scientific societies already engaging ECRs in leadership

roles and interviewed executives and ECR leaders within these societies in order to identify the details of these positions, what societies gain from ECR involvement and their recommendations for building this type of leadership in similar organizations.

Of the scientific societies with ECR leadership represented in our survey, most established ECR leadership positions within the last ten years (Figure 2A). Additionally, these positions had a median term length of 2-3 years. The seven ECRs we interviewed from six societies included a graduate student, postdocs and assistant professors, with postdocs representing the majority of leaders (Figure 2B). Most organizational roles held by ECR leaders within scientific societies did not have voting rights within society Board of Directors meetings (Figure 2C). Taken together, these data suggest that these ECR leadership positions have been established relatively recently, with most positions occupied by postdocs.

Benefits of ECR leadership identified by the survey

In addition to assessing the distribution of ECR leadership position characteristics across scientific societies, our survey sought to identify how societies incorporated ECRs into their leadership structures, how they benefited from this incorporation, but also how ECRs benefitted from these positions for their own professional development. Interview responses from both society executives and ECR society leaders suggested that having ECR leaders benefits societies and ECRs alike in several ways (Figure 3).

Quoted below are examples of how ECR involvement in scientific society leadership was beneficial for professional development.

Figure 2. Characteristics of ECR leadership positions within scientific societies. A. The number of years for which scientific societies have had ECRs in positions of leadership as board members (8 societies). B. Career stage of identified ECRs in leadership positions within scientific societies (7 societies). C. The proportion of surveyed scientific societies with voting or non-voting ECR board member positions (9 societies).

“This position has greatly broadened my professional network, which helped me find my current postdoc position, get reference letters for an NIH fellowship, and provided a crucial support network.” —Heather Richbourg, Ph.D., Postdoctoral Board Member (American Association of Anatomists)

“I highly value the role that I serve, since it plays a crucial role in advocating for the support of the young scientists across the society. Without proper support and engagement of these young scientists, there is a limited future for the society.” —Chris Banek, Ph.D., Chair, Trainee Advisory Committee (American Physiological Society)

Recommendations for setting ECRs up for success

Given the diversity of ECR leadership roles across scientific societies and the many benefits these provide to both ECRs and societies uncovered in our survey, we asked the surveyed organizations to share strategies for ensuring that both ECRs and the scientific societies they serve are set up for success. Their suggestions may be found in Table 1.

DISCUSSION

Early career researchers make up the largest demographic of the research enterprise. Scientific societies are particularly well-positioned to engage and empower ECRs, addressing a significant lack of ECR representation at this level.

To determine how societies function with ECRs in leadership positions and the outcomes of these positions, we surveyed both executives and ECRs from scientific societies. As an organization focused on biomedical science and given the small number of societies with ECR leadership positions, our study was limited to surveying nine societies most closely related to biomedical sciences. The lack of ECR representation was noticeable both throughout societies across disciplines, as well as within societies. As the most prominent demographic of the research workforce, ECRs represented 3% of all available leadership positions across 16 societies, supporting the lack of ECR representation within scientific societies.

Figure 3. Benefits of ECR leadership positions within scientific societies for both ECRs and societies. A. Reported benefits of ECR leadership positions for ECRs. B. Reported benefits of ECR leadership positions for scientific societies

Nonetheless, many societies have successfully incorporated ECRs in leadership roles. ECR leadership positions were found to be within ECR-specific committees, any society committee, on society boards without voting rights, on society boards with voting rights, or a combination of these (Figure 1). While ECR-specific committees provide a voice to graduate student and postdoc members, this model of leadership potentially creates silos between the ECRs and senior members of the society. By contrast, incorporating ECR leadership into general committees and the Board of Directors removes organizational boundaries between ECR and senior leadership. Regardless of the multiple models of ECR leadership, all ECRs reported positive outcomes from these positions, mainly in gaining professional working experience, building professional independence and contributing to the direction of their research communities. In addition to the professional development and networking benefits to ECRs mentioned above, these positions have also often led to ECR leader recruitment into different roles within the society or in other organizations, illustrating their significant contributions. Similarly, society executives reported having had positive experiences incorporating ECRs in leadership positions. These outcomes indicate that having ECRs in these positions is mutually beneficial for both ECRs and societies.

Given the relative scarcity of leadership positions reserved for ECRs across the research enterprise and mutually beneficial outcomes for both societies and ECRs (Figure 3), one may ask why more societies have yet to incorporate ECRs in leadership positions across the board. Interestingly, the majority of queried societies only created these positions within the last 10 years, while fewer than half of these societies allow ECRs to vote in board meetings (Figure 2), which suggests that incorporating ECRs into these roles is a developing phenomena. Given the

success of ECRs in these positions and the role ECRs play in driving the diversity of the research enterprise, it would be beneficial for more societies to adopt similar positions in the future. In order to empower societies in establishing ECR leadership positions, society executives shared their tips in successfully engaging their ECRs, which we summarized in Table 1. A summary of successful practices and beneficial outcomes has been compiled in Table 2 below, which exemplifies efforts by many societies in empowering ECRs within their organizations. With these guidelines and the beneficial outcomes highlighted here, scientific societies are ideally positioned to leverage ECRs and establish ECR-specific leadership positions.

Taken together, our survey-based investigation of the landscape of ECR leadership positions in scientific societies illustrates the lack of ECR representation in positions with decisional power across the research enterprise, while suggesting that societies that do engage ECRs in such positions benefit from doing so. Incorporating ECRs within the organizational structures of scientific societies presents a unique mechanism to increase the representation of ECRs in leadership positions across the research enterprise while affording societies several operational benefits. Given the critical role of ECRs in driving the diversity of the research enterprise, increasing the representation of ECRs in decision-making roles stands to benefit individual societies and the enterprise as a whole.

Highlighting ECRs in leadership roles in scientific societies

From our surveys, a few societies stood out regarding the level of influence allotted to their ECR leaders. Several societies stood out in terms of giving voting rights to their ECR leaders, other stood out for their diversity & inclusion initiatives, or overall

Principles of ECR success in scientific society leadership positions

Build a pipeline	Start by including ECRs on committees. When ready, add ECR-specific board member positions.
Train and mentor	Prepare society staff to support new ECRs on the board.
	Train ECRs on administrative tasks associated with the position.
	Stagger ECR positions to provide a perpetual peer mentorship structure.
Set term limits	Allow for training specific to the position and mastery of needed skills. Many societies have 3-year terms with one year of overlap.
Offer a range of activities	e.g. written and online communication (blogs, newsletters, social media posts), award application review, and fiscal responsibility.
Set equal responsibilities	Give ECRs the same responsibilities as other board members in the same society.
Obtain buy-in from advisors	Board membership can take time away from “regular” research and training. Address barriers at the departmental level.
Value ECR voices	Provide a safe and inclusive space for ECRs, starting at orientation.
Accommodate ECR needs	Be aware of the needs of ECRs at different life stages than their senior colleagues (e.g. childcare for meetings and travel).
Survey ECR leaders	Seek feedback to learn how the experience benefits ECRs.

Table 1. Recommendations for establishing leadership positions for ECRs within scientific societies, as recommended by successful programs.

Highlighting ECRs in leadership roles in scientific societies

	AAA	ASM	GSA
Voting Rights	Two ECR members serve as voting members of the Board of Directors.	Two voting ECR members, who were elected in 2017 and 2018, currently serve on the Board.	ECR members have served on the Board since 2014 and a voting ECR position was created in 2019.
Diversity & Inclusion Initiatives	Made D&I plans public and are currently tracking demographic data of ECR members.	Actively tracks demographic data of ECR leaders within the society.	Elected an early-career Puerto Rican scientist to the Board who works for the nonprofit Ciencia Puerto Rico.
At-Large Society Engagement	APS	ASPB	GSA
	A total of 23 ECR leaders serve on committees. In 2018, ECR leaders created the "Trainee Talk" blog.	ECR leaders played a major role in restructuring the Ambassador Program and updating its bylaws.	ECR leaders have published a weekly newsletter and 28+ articles on careers for genetics PhDs.

Table 2. Society accomplishments in engaging and incorporating ECRs in leadership positions. Particular highlights include giving voting rights to ECRs on society boards, diversity and inclusion initiatives, and broader society level ECR engagement. AAA- American Association of Anatomists; ASM- American Society for Microbiology; GSA- Genetics Society of America; APS- American Physiological Society; ASPB- American Society of Plant Biologists.

at-large society engagement (Table 2) Specifically, AAA, GSA, and ASM were noteworthy for having multiple ECR members with voting privileges serve on their Boards or Executive Leadership. Other societies demonstrated their commitment towards promoting diversity and inclusion within their structures. AAA and APS, for instance, reported actively tracking demographic data of ECRs within their leadership and membership. AAA also made sure to publish their diversity and inclusion plans on their website⁸. Finally, to promote outreach to the general membership, GSA⁹, APS¹⁰, and ASPET¹¹ leaders published blogs directed towards ECR members, while ASPB¹² leadership helped update the bylaws for their Ambassador Program.

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CONFLICTS OF INTEREST

Stephanie Davis also provided an interview on behalf of ASPET as an ECR leader in addition to her work as an author.

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SUPPLEMENTARY MATERIAL

Supplementary Table 1. Crowdsourced scientific society ECR leadership data.

Society/organization	Societies interviewed	Number of Council/ Governing leadership positions	Number of ECR Council/ Governing Board leadership positions	Number of ECR leadership positions throughout organization	ECR attendance at board/council meetings (non-voting)	Voting ECR board position?	ECR committee or subcommittee	Your ECR definition (e.g. grad student/postdoc/junior PI?)
American Association for Anatomy (AAA)	✓	118	2	21	Yes	Yes	Committee for Early-Career Anatomists (CECA)	
American Association for the Advancement of Science (AAAS)		100	0	0	None identified	None identified	None identified	
American Chemical Society (ACS)		16	0	0	None identified	None identified	None identified	
American Institute of Physics (AIP)		16	0	0	None identified	None identified	None identified	
American Physiological Society (APS)	✓	13	0	0	No	None identified	Trainee Advisory Committee	
American Society for Biochemistry and Molecular Biology (ASBMB)	✓	28	0	0	None identified	None identified	None identified	
American Society for Cell Biology (ASCB)	✓	n/a	n/a	n/a	Yes	None identified	Committee for Postdocs and Students (COMPASS)	
American Society for Investigative Pathology (ASIP)		n/a	n/a	n/a	None identified	Yes	None identified	
American Society of Microbiology (ASM)	✓	14	1	n/a	None identified	One identified		
Association for Molecular Pathology (AMP)		18	0	21	No	None identified	None identified	Associate Members (students, postdocs, fellows) & Early Career (first few years of practice; some committees only)
								Advanced Graduate Students: Individuals in their final years of advanced (masters, doctoral) studies; Early Professionals: Individuals holding a professional degree (obtained within the past 5 years); Postdoctoral Trainees: Individuals holding a doctoral degree (obtained within the past 5 years); Medical Interns, Residents, or Fellows: Individuals engaged in final stages of graduate medical training. Individuals holding a medical degree (M.D. or equivalent professional degree).
American Society for Nutrition (ASN)		17	0	0	No	None identified	Early Career Interest Group	
American Society for Pharmacology and Experimental Therapeutics (ASPET)	✓	n/a	n/a	n/a	No	No	Young Scientists Committee	
								Anyone who self-identifies as an ECR & is currently going through or graduated within 10 years of any plant-science (or related) degree.
American Society of Plant Biologists (ASPB)	✓	110	2	17	Yes	No	Early Career Plant Scientists Section	
British Society for Neuroendocrinology		17	2	n/a	Yes	Yes	None identified	
European Society of Endocrinology		n/a	n/a	n/a	Yes	None identified	European Young Endocrine Scientists	
								Grad students, postdocs, junior faculty (academia); scientific professionals less than or equal to 10-years post graduate training or PhD completion.
Genetics Society of America (GSA)	✓	19	1	138	Yes	No	Early Career Scientist Leadership Program	
Organization for Human Brain Mapping		n/a	n/a	n/a	None identified	None identified	OHBM Student and Postdoc Special Interest Group	
Society for Neuroscience (SfN)		16	0	n/a	None identified	None identified	Trainee Advisory Committee	
Society for the Neurobiology of Language (SNL)	✓	13	1	1	Yes	Yes	None identified	Student/Postdoc Representative
The Physiological Society		17	0	2	Yes	None identified	None identified	Grad students, postdocs, research associates

Supplementary Table 2. List of survey questions sent to scientific society executives and ECRs in leadership positions within societies:

For society leaders/Presidents/EDs

- **Background on these positions:**
 - How long have you had ECRs in leadership positions within your society?
 - What type of positions are these? Are ECRs voting members?
 - Can you share any demographic data (career stage, gender, geography, race/ethnicity) about the ECRs in these positions?
 - Why was it important to add an ECR on the board for your society?
- **Experiences in these positions:**
 - What were the criteria for selecting the ECRs in these positions; what did you look for?
 - How long do ECRs serve in these positions and what are their responsibilities?
 - What have ECRs in your society been able to accomplish in these positions?
 - Have you surveyed their experience and whether these positions helped them in their careers?
- **Barriers and successes in these positions:**
 - Were there particular challenges *during the process* of adding an ECR to your board or other leadership position?
 - Who did the opposition come from (if any?) and how did you overcome this?
 - What has the society gained from having ECRs in these positions?
 - Did you find any drawbacks to having ECRs in these roles, and what would those be?
 - Are there any pointers from these experiences to pass on to other societies?

For ECR leaders

- **Background on these positions:**
 - How long have you served on the board and how long are these terms typically? Are you in a voting position? If yes, do you value that? If not, would you want that? If not on the board, do you hold a leadership position in the society?
 - Can you share any demographic data (career stage, gender, geography, race/ethnicity) about yourself and/or other ECRs in these positions?
 - What value did this position bring to you professionally?
- **Experiences in these positions:**
 - What are qualities of successful ECR board members within this society?
 - What have your responsibilities been in your position?
 - How have you contributed to the mission and success of the organization from this position?
 - Has your experience in this position been positive or negative, and why?
- **Barriers and successes in these positions:**
 - How has serving as an ECR leader impacted your career?
 - Are you the only ECR leader in this position, or are there others, and how did that impact you?
 - Have you encountered struggles to making your voice heard among leadership?
 - Are there any pointers from these experiences to pass on to others who want to join?