



INTRODUCTION OF SARAH BUSH, RECIPIENT OF THE HENRY BALDWIN WARD MEDAL FOR 2021

Vasyl V. Tkach

Biology Department, University of North Dakota, 10 Cornell Street, Stop 9019, Grand Forks, North Dakota 58202-9019.
Correspondence should be sent to: vasyl.tkach@und.edu

Dear colleagues, it is my true pleasure and honor to introduce an amazing scientist and this year's Henry Baldwin Ward medalist, Dr. Sarah Bush. I have collaborated with Sarah long enough, so please forgive me if I sometimes call her by her first name. I will try to keep it short to save time for the main attraction—her speech. After all, for most ASP members, Sarah Bush does not need much introduction since she has been part of this society for a long time and served ASP in multiple capacities including, but not limited to, the student awards committee member, the chair of the Nomination Committee, and the Council member-at-large. There are some recent and new members, of course; therefore I would like to say a few words before yielding this virtual podium to the awardee.

The eligibility criteria state that “the recipient shall be a member of the Society for no less than 3 years at the time of the nomination and in mid-career, and who, by self-directed investigations, shall have attained a position of leadership in some phase of parasitological research. The field of parasitology is considered to include, in general, those aspects of the science that are represented by reports published in the official organ of the Society, *The Journal of Parasitology*.” In my view, Sarah Bush perfectly meets these criteria. I am glad that my personal extremely high opinion of Sarah Bush's work coincides with the assessment offered by the distinguished group of colleagues from all walks of parasitology life who enthusiastically supported the nomination. I am grateful to John Janovy, Sam Loker, Jessica Light, Lance Durden, Kevin Lafferty, Kevin Johnson, and Jason Weckstein for taking their valuable time to reflect on Sarah's work, achievements, and standing in the field. I would like to express my appreciation to the Awards Committee for their hard work. It is not only time consuming, it is very difficult to decide on the winner among outstanding, highly deserving scientists nominated in any given year.

My biggest challenge in the nomination and today's brief introduction was to try to fully grasp Dr. Bush's achievements in several areas of parasitology while keeping the length of the nomination and today's talk reasonably concise.

Sarah Bush received her B.S. degree in biology in 1999 from the University of Utah and her Ph.D. in 2004 from the same university. I have known Sarah professionally since 2008 when I started working on very interesting material collected during her project in China, and then we continued our collaboration during

a project on the diversity of terrestrial vertebrates and their parasites in the Philippines. The collaboration continues to this day. We published together a variety of new taxa of digeneans, tapeworms, acanthocephalans, and nematodes. Courtesy of Sarah, I am now officially a lousy professor after she named a beautiful new species of lice after me.

Dr. Bush perfectly fits the “mid-career parasitologist” definition. She received her Ph.D. only 16 years ago, which is hard to believe considering her accomplishments in terms of publications, grants, students mentored, and service to the ASP, other societies, her university, and broader community.

She is an exceptionally talented and productive researcher. There is a stunning fact that is easy to overlook in her busy resume. Very recently (2016–2018) she published 3 monographs, only one of them multi-author. Anyone who wrote just a book chapter knows how incredibly time consuming this work is, not even mentioning the expertise necessary to take on a fundamental task like this.

Dr. Bush clearly attained a position of leadership in more than one area of parasitology research. She is widely recognized as an expert in Phthiraptera. The utmost respect for her in the field is best illustrated by the fact that she was elected the president of the International Society of Phthirapterists and is currently in the middle of her 4-year term. She also received the Golden Commemorative Badge from the University of Brno for her research of Phthiraptera. Sarah Bush is an accomplished taxonomist and systematist. She has described more than 100 new species and supraspecific taxa of lice and published many significant works on their phylogenetics and systematics including a 443-page monograph on the hyperdiverse and very complex genus *Brueelia*. That alone would provide a sufficient ground for awarding her the H. B. Ward medal.

However, this is not even the area Sarah Bush is best known for. She is one of the few parasitologists I know who is an excellent systematist and an accomplished ecologist and evolutionary biologist. She uses bird lice as a model to study important questions of parasite ecology and evolution. Her research, especially in ecomorphology, seamlessly bridges these major fields of biology. She has published a number of well-cited, often groundbreaking works on the louse ecology and evolution based on field and laboratory data and experiments. While reading her publications or listening to her talks, I cannot help but marvel at

how original and well formulated the hypotheses are, and how sophisticated and elegant the experimental work is. Answering questions posed by her research team requires resourcefulness and a lot of innovation. Some of the solutions address such non-trivial things as “How do we obtain louse-free doves in a lab” or, even more challenging, “How do we guarantee a complete de-lousing of a wild bird in mark-re-capture experiments?” In recent years Sarah Bush was also involved in ecological and evolutionary research using genomic data that were supported by two “Dimensions” grants.

Many of Sarah Bush’s works have appeared in major, high-impact journals with broad readership such as *PNAS*, *Ecology*, *Evolution*, *Evolution Letters*, *Functional Ecology*, *Molecular Ecology*, and *Molecular Phylogenetics and Evolution*, to name a few. Her co-authored monograph *Coevolution of Life on Hosts: Integrating Ecology and History* is the must-read book for everyone who studies parasite-host co-adaptation and co-phylogeny. It beautifully puts a lot of experimental evidence and field observations in an evolutionary perspective and has instantly become a go-to reference for many of us. As mentioned in some of the letters of support, that monograph, as well as multiple co-authored papers, is the best illustration of the highly collaborative nature of Dr. Bush’s research; nevertheless, the leading or a very important role of Sarah Bush in these collaborations is evident and well documented.

As a researcher, not an administrator, I judge the research productivity by the outcomes, not money. Nevertheless, the amount of research funding that Sarah Bush was able to secure is astounding, with more than 4 million dollars received as a PI/co-PI. This is even more impressive keeping in mind that she does basic science and several of her grants were for research in systematics. This speaks volumes to the quality of her research and her ability to generate exciting ideas.

Dr. Bush’s research falls within the scope covered in the *Journal of Parasitology*. Moreover, despite many options for publishing her research, the *Journal of Parasitology* is clearly Sarah Bush’s favorite. She published 16 of her 76 journal papers (more than 20%) in the official organ of the ASP. In this respect she also sets a great example to many other members of our Society.

Sarah Bush’s role in the advancement of our field of science goes far beyond her own research. She has tirelessly served ASP and several other scientific societies and institutions. She has ASP and its interests at heart and has 10 years of service on the Society’s committees including leadership roles. She is one of the driving forces in the International Society of Phthirapterists and served that society in many capacities including as a meeting organizer and president. Sarah Bush gave many invited talks around the United States and the world. She is a passionate speaker, and her talks are always intellectually engaging and very well received by the audiences. Everyone in my department loved her seminar.

Another very important aspect of Sarah Bush’s research is her extensive field collecting and museum curation of specimens. She

personally participated in numerous expeditions on different continents. A strong believer in the value of biological collections, she puts a lot of time and efforts into their preservation and improvement. She received funding for museum work and currently is a co-PI on a very large grant aiming at digitizing collections to trace parasite-host associations and predict the spread of vector-borne diseases.

The trademark feature of Sarah Bush’s research is the combination of methodological and taxonomic breadth. Besides aforementioned prowess in everything related to lice, Sarah Bush has established herself as a parasitologist with broad training and research interests. She authors descriptions of a variety of non-arthropod parasites, from coccidia to helminths.

Sarah Bush has taught a variety of undergraduate and graduate courses. She has also mentored and supported in different ways a large cohort of graduate and undergraduate students. I have met and co-worked with some of her students, and they developed into excellent researchers with a strong background in several areas of parasitology and ecology.

This very brief account of Sarah Bush’s accomplishments provides ample evidence that she indeed attained a position of leadership in several areas of parasitology, general ecology, and evolutionary biology, as well as leadership in professional organizations. She is in high demand as a reviewer for funding agencies and numerous journals. There is no doubt that Sarah Bush will remain among the leaders in her field of parasitology for many years to come since her research productivity keeps accelerating.

It was easy to notice that, while reflecting on different aspects of Sarah’s research and career, letters of support uniformly showed respect of her as a colleague. The quality of science and the position in the field discussed above are without doubt the most important factor in the award decision making. At the same time, I cannot finish this introduction without mentioning that a good deal of Sarah Bush’s most important work was done, papers published, and grants received (and successfully completed) around the time when she gave birth to twins. Think about it. Undoubtedly, all women experience difficulties and a lot of stress trying to combine motherhood and career. However, this particular mom managed to fully maintain, or increase, her productivity while taking care of babies and very young children. I cannot imagine how she could do that even with all possible support and help from her family.

To conclude, Sarah Bush and her contributions fit perfectly all eligibility criteria. She is an outstanding scientist in the middle of her career, has clearly attained a position of leadership in several areas of parasitological research, and has published very extensively on the subjects covered by the *Journal of Parasitology*. In Dr. Sarah Bush I have a great colleague, and our Society has an outstanding recipient of the 2021 Henry Baldwin Ward Medal. She will keep making our Society proud.