



March 31, 2020

Joanne S. Tornow, Ph.D.
Assistant Director
Directorate for Biological Sciences
National Science Foundation
2415 Eisenhower Avenue
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RE: Biological Collections - Enabling Science to Inform Responses to Public Health and Environmental Problems

Dear Dr. Tornow:

The Biodiversity Collections Network (BCoN) is a national initiative led by the American Institute of Biological Sciences, Natural Science Collections Alliance, and Society for the Preservation of Natural History Collections. Through the membership of its founding organizations, BCoN represents the diversity of biological science societies, natural history museums and arboreta, living collections, and other research centers and organizations. We represent the scientists, administrators, curators and collection managers, and other professionals who work in or use scientific collections and their associated data in research and education. Our community has developed a research and education blueprint that will help the nation respond to the economic and public health crisis we now face and will again face as a consequence of future global health and environmental problems.

The COVID-19 pandemic is having significant impacts on the scientific research community. Natural history museums and arboreta, for example, are increasingly worried about the effects that long-term closures will have on their organizational budgets and their ability to sustain scientific and education programs. Some of our institutions are furloughing scientists and collections staff and others are reducing salaries. These are regrettable, but understandable, short-term responses to a difficult situation. Assuming closures continue into early summer, it is likely that some institutions will be forced to fire staff, including scientists and collections and data management personnel. We have begun to hear from some university-based institutions that are gravely concerned about the potential elimination of positions as a result of an anticipated need to absorb large budget cuts. Depending upon how long the COVID-19 pandemic limits operations, the effects on our scientific and educational enterprise will be severe and long-lasting. BCoN is now preparing to survey biodiversity collections to help

identify current and developing concerns. We will share these findings with you and others as information becomes available.

These potential effects of the COVID-19 crisis are concerning in part because of the importance of biological collections-enabled research to our nation and the world. These collections, their extended data, and the experts that build and study them are globally important for understanding where viruses such as SARS-CoV-2 exist in nature or when they cross from their current hosts to humans. Viruses and other known and potential pathogens are hosted across all of biodiversity, and we have much to learn about the ways in which the rest of biodiversity has evolved to fight such pathogens. We are in a new era, where we can mobilize data in our collections to address zoonotic diseases, agricultural pathogen control, the spread of invasive species, biological responses to environmental change, and biodiversity conservation. This research benefits from new fields of fundamental discovery, ranging from modeling and understanding the distribution and interaction of living organisms, bio-inspired engineering, advances in data science and cyber-infrastructure, and evolutionary processes. Indeed, members of our community in the U.S. and collections networks in Europe are mobilizing to identify and share collections data related to coronaviruses and their occurrence in mammals to increase our understanding of these viruses.

The COVID-19 pandemic is but one example of where, with proper support and effort, natural history collections are critical to improving our understanding of our interactions with the rest of biodiversity. What species was the reservoir for SARS-CoV-2, and is it found in other species? Are there similar or worse viruses in this species that can jump to humans causing future global health crises? Biodiversity hosts a wide array of viruses, bacteria and parasites – and has for millions and millions of years. It should be expected that more pathogens will again jump to humans in the future. With modern research tools more accessible and integrated databases associated with well-curated collections, we can document how pathogens evolve across biodiversity through time and space, and learn what kinds of solutions biodiversity has come up with to combat such viruses.

Now is the time for critical investments in biodiversity collections and the research and education they enable.

The Biodiversity Collections Network has developed a community-informed blueprint for future research and education using biodiversity specimens and their data. This plan, the Extended Specimen Network (ESN, see <https://doi.org/10.1093/biosci/biz140>), builds on the advances we have made as a nation as a result of the National Science Foundation's investments in the Advancing Digitization of Biodiversity Collections program. In brief, the ESN seeks to rapidly mobilize data and develop new linkages within the scientific community to associate and integrate myriad data sources with physical specimens in our natural science collections. Mobilizing these data allows us to understand how species interact with each other, humans, and the environment. This understanding is key to our efforts to better model the potential spread of pathogens and parasites, to monitor and forecast changing distributions of economically significant invasive species, and to more efficiently identify significant genes or

chemical compounds that offer promise for new pharmaceutical applications. Our efforts to digitize specimens and to integrate their data with other sources will stimulate advances in computer and information science that can improve logistical management of products -- a challenge we now see routinely reported in the news as public health and emergency managers are endeavoring to ensure that appropriate resources are identified and positioned where they are needed.

A federal commitment of \$1 billion toward these efforts over the next 10 years will make the United States the global leader in biological collections-enabled research, and spur new scientific discoveries that grow our economy, improve our public health and well-being, and increase our national security. This investment would support continued efforts to digitize biodiversity, particularly entomological collections which still require significant attention despite their importance to public health and food security. The investment would support the rapid development and implementation of new cyberinfrastructure and information management tools, a rapid global biodiversity survey to collect and properly document biodiversity, additional biodiversity-related and biodiversity-enabled research, efforts to educate and train a new generation of scientists, and increased global coordination and collaboration.

The rapid development of an Extended Specimen Network will help science inform and guide future actions to promote improved public health, economic well-being, and national security. We welcome an opportunity to discuss this matter more fully with you and others at the National Science Foundation at your earliest convenience. Please do not hesitate to contact Robert Gropp at rgropp@aibs.org for more information.

Sincerely,



Robert Gropp, Ph.D.
Executive Director
American Institute of
Biological Sciences



Barbara Thiers, Ph.D.
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Society for the
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