



Open Letter from the Ecological Society of America and the American Institute of Biological Sciences

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Living and Non-living Natural Science Collections: Irreplaceable International Resources

Natural science collections are essential infrastructure supporting the global research, development and educational enterprises. The collections gathered and held by many institutions over the past half millennium are fundamental reference points for measuring and monitoring human health, safety, and the state of our planet. Many living collections, for example at agricultural research and experiment stations, are essential to our collective efforts to develop, conserve and cultivate sustainable and nutritious food crops. Unfortunately, too many natural science collections around the world are in danger of being closed or losing the biological resources and data they contain – the knowledge that explains the history of life on earth and will help society advance into the future.

Immediate Concern: Pavlovsk Experiment Station, Russia

Currently unfolding in Russia is the potential loss of over 5,000 distinct varieties of fruit trees and plants, most of which are found nowhere else and which have been cultivated at a scientific field station since 1926. Established by the internationally acclaimed Russian botanist, Nikolai Vavilov, the 200 acres which the Pavlovsk Experiment Station (part of the Vavilov Institute of Plant Industry) occupies, are set to be auctioned off for real estate development in late September 2010. The destruction of the living plants at the field station will be the equivalent to intentionally extirpating endangered species. The loss of these species is a loss for humanity. This collection of plants is raw material from which new plant varieties can be bred for disease resistance or the ability to withstand drought or warmer temperatures. These plants offer insurance against food scarcity due to disease, changing climate, or other, unforeseen disaster.

The impending loss of this scientific collection is not an isolated case. Around the world, valuable natural science collections are facing significant threats, which, if left unaddressed, will weaken our ability to rebound from future disasters and natural hazards.

The Importance of Living and Non-living Natural Science Collections

Scientific collections range from dinosaur fossils to insects and human pathogens. They are acquired for scientific study ranging from biomedicine to global change. Science collections play significant roles in foreign trade, agriculture, public health, and national security. For example, in 1996, a fungus collection held by the U.S. Department of Agriculture (USDA) was instrumental in keeping open international markets for U.S. wheat. The \$6 billion dollar U.S. wheat industry faced economic disaster when reports of Karnal bunt spores from multiple U.S. wheat producing areas began to appear.

Thanks to the USDA fungal collection, it was discovered that the spores were not Karnal bunt but rather a harmless rye grass fungus.

In another example, preserved samples of influenza virus extracted from bird specimens and compared with human tissue samples of the 1918 Spanish flu pandemic were used to determine that the disease is related to strains that commonly infect pigs and humans, not, as previously suspected, a type of avian flu. Understanding the pandemic's vectors was instrumental in devising an effective containment policy and improving vaccines.

Repositories such as the living collection of plants at the Vavilov Institute serve multiple purposes. A major one is that they are a type of insurance against future animal or plant diseases or against disasters—either natural or human-caused—that could threaten existing sources of food or pose severe threats to human populations. For example, seedbanks, germplasm, and living plant collections provide a way to reintroduce critical food sources, should the need arise.

Science Collections at Risk Worldwide

Worldwide, the future of scientific collections is precarious. Many suffer from insufficient funds leading to deterioration of facilities and loss of technically trained staff. Others, such as Russia's Vavilov Institute, suffer from lack of support, but also find themselves in the way of commercial development. Still others are threatened by physical damage, whether slow and steady degradation of specimens due to lack of proper facilities or natural disasters, such as this year's accidental fire that destroyed Brazil's collection of venomous snakes, scorpions, and spiders, housed at the Butantan Institute in San Paulo. Containing some 500,000 preserved specimens, amassed over 100 years, the collection has contributed to the development of vaccines and serums. Roughly 80,000 specimens were destroyed by the fire; the building lacked alarms or sprinkler systems.

Recommendations for Action

Scientific collections provide humanity with the potential to understand and adapt to future threats—to new diseases, climatic changes such as drought, and consequences of natural and human-caused disasters. Scientific collections should not be sacrificed for short-term economic gains nor allowed to slowly degrade by lack of funding. It is imperative that governments around the world recognize the value of these collections and act accordingly. Organizations holding scientific collections should treat them as research infrastructure and governments around the globe should recognize science collections are essential research infrastructure. Government and non-government organizations that fund scientific research should increase investments in the physical and human infrastructure of living and non-living natural science collections for the advancement of science and the benefit of society.

More immediately, the Russian government should work to conserve the vital biological resources held at the Pavlovsk Experiment Station.