



Museum careers – so much more than curating collections!



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Working in the field of biological science is a critical way to make a difference in the stewardship of our planet. When we were both in graduate school during the 1970s, we and our fellow graduate students not only were passionate about understanding the natural world but also shared a strong conviction that we could make the world a better place. We saw that human-caused degradation of global habitats was on the rise and had high hopes of stopping rainforest destruction, reversing coral reef decline, saving endangered species, and ensuring clean air for everyone. Forty years later, the planet has lost over 50% of its primary forests, atmospheric concentrations of carbon dioxide have exceeded 400 parts per million, and 70% of coral reefs are bleached or destroyed. In short, the efforts of dedicated scientists worldwide have failed to stop – much less reverse – global environmental degradation (Racelis and Barsimantov 2013). Perhaps it could have been worse without those efforts, but we are far from a solution. There is a critical need to adjust the way in which scientists serve society – maybe that starts with the recognition and pursuit of diverse careers outside of colleges and universities.

While ecology positions in academia are declining, the world of museums, botanical gardens, and arboreta is burgeoning. At present, only 8% of new PhDs in biology are able to obtain a tenure-track academic position, which offers a relatively narrow audience of predominantly undergraduates (or graduates), rather than putting them in a position to reach primary and secondary students, families, policy makers, and senior citizens. Approximately one museum per day is opening (mostly in Asia, especially China), and museum staffing is expected to double in the next decade. Each year, an estimated 900 million visits to museums are undertaken by Americans alone. Most importantly, museums are considered by the public-at-large as a trusted broker for objective science and as strong and supportive community pillars.

It is no secret that America's science literacy is waning (Lubchenco 1998; NAS 2010), and that the effectiveness of formal science education is in decline. Americans spend less than 5% of their lives in the classroom. Our country's science education has been the butt of late-night talk show jokes, such as this snippet from former TV host Jay Leno: "According to a study by the National Science Foundation, 70% of Americans do not under-

stand science. Here's the sad part: 30% do not even know what 70% means". Even more discouraging is the general decline in appreciation for scholarship and knowledge of any kind, not just in science. On a brighter note, informal science education is proving increasingly effective for science literacy, and science museums and botanical gardens are at the forefront of this movement. More Americans visited museums in the past decade than sporting events. Museums provide science for an enormous audience, ranging from children in kindergarten through senior citizens (so-called "K-through-gray"). If museums can keep their messages relevant, objective, exciting, and cutting-edge, they could be the future stewards of both science education and local or even regional decision making. By harnessing their role as a forum for community engagement, exploration, and sustainability solutions, museums have the opportunity to be a major player in changing the planet for the better.

Career choices in museums are diverse and flexible. For the next generation of ecologists, the museum pathway offers opportunities as curators of collections, research scientists, laboratory technicians, environmental educators, science communicators, marketing experts, and/or administrators. The traditional role for a scientist in a museum has been curator of collections and objects. As the technological capabilities in digitizing these objects become commonplace, curatorial positions are even more critical in making the information contained in these objects accessible to a broader audience. Curators and research scientists in museums also publish about biodiversity, oversee exhibit content, lead expeditions to important biomes, check specimens and information housed by the museum, and interact with education, marketing, and administration staff to provide clear and objective science to the museum's mission. Recently, institutions such as Missouri Botanical Garden and the California Academy of Sciences are re-titling and expanding the job descriptions of curators to ensure that the influx of museum-based researchers who study issues such as climate change, extinction, and ecological health are not merely categorized as collections-care staff. In addition, museums and botanical gardens are hiring conservation biologists to safeguard hotspots of biodiversity.

Many museum scientists are involved with training the next generation of scientists through partnerships with local

universities and colleges. Although most museums do not grant academic degrees in science (the American Museum of Natural History in New York City is a wonderful exception), undergraduates, graduate students, and post-doctoral fellows are welcome visitors and residents in the scientific collections, working directly alongside museum scientists to understand the natural world. However, the more common museum career is as an educator of the public, with a focus on many age ranges. Public education is usually offered through museum exhibits, which have the capacity to reach millions of visitors each year. Researchers work closely with artists and graphic designers to check the scientific content in exhibits, thereby providing accurate and verifiable facts and interpretations to the public. It is also becoming common for museum scientists to interact with the public by directly demonstrating and explaining objects in exhibits (Figure 1), and educational internet portals associated with specific exhibits are reaching much larger audiences online.

Ecology graduate students who have a passion for communicating science, through scientific content, graphics, marketing, or education pathways, should look toward science museums and botanical gardens for their future careers. In many positions, demonstrated success in public education can be more valuable than authorship of scholarly publications. All science museums will benefit from hiring ecology-literate staff. There is no absolute prerequisite coursework, but any classes in local ecology (for regional museums) or global ecology/conservation (for museums with international scope) will make a candidate more competitive for hiring. Even the museum advancement and development (fundraising) teams, financial managers, and administrators will benefit from hiring employees with ecological training. Museum staff overall reflect a variety of scientific and academic backgrounds and training – ranging from ecology to environmental education to communication to language specialists and experts. Almost all museums post their available jobs online, which makes the searching and application process easy. Volunteering in a museum is another excellent pathway for getting an “in” to obtain a position.

True, a museum career does not always offer a tenure-track opportunity like conventional academic positions. However, such a career does offer a lively, relevant, action-packed workplace, where every day is different. In a single day, a museum scientist can go from speaking to kindergarten students about plant collections, to giving a seminar to donors about the importance of conserving



Figure 1. Terry Gosliner of the California Academy of Sciences with museum guests.

habitats, to designing an exhibit to teach families about the value of forests. In between all of the outreach, you are charged with executing a research portfolio or specialty.

In the next decade, museum staffing has the potential to increase substantially. For example, a new Vietnamese science museum has been proposed for Hanoi; Jimma University in Ethiopia is currently designing a botanical garden; a new outdoor museum or natural history park in Penang (Malaysia) is hiring naturalists; and China is experiencing an unprecedented growth of science museums and science centers, as is obvious from tracking the ads in *Science Magazine* over the past several years.

Both of us have enjoyed an amazing diversity of opportunities in our museum careers. Do we regret not having tenure? No way! Our careers have put us in a multitude of unique situations, giving us the opportunity to contribute to both public awareness and global conservation.

Author biographies may be found in the online version of this article at <http://onlinelibrary.wiley.com/doi/10.1002/fee.1524/supinfo>

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doi:10.1002/fee.1524