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A Curator's Perspective

The Erosion of Collections-Based Science: Alarming Trend or Coincidence?

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Over the last few years many visitors have passed through the doors of the U.S. National Herbarium (Herbarium Code: US) bringing depressing news about some of our fellow botanical institutions and research centers. Institutions, which house historic and otherwise important botanical specimens, have been closed. The scientists who study, preserve, and curate them, have been fired, downsized, forced into retirement, or had their focus directed away from taxonomy and systematics. When reasons are given they usually involve budget shortfalls; unfortunately, collections and research are easy targets. But when I mentioned this to one former museum director who was visiting, his reply was, "When I was a director and had a budget shortfall I went out and raised more money, I did not fire my staff!"

Is this a trend or a coincidence? Perhaps a more detailed examination of events will provide an answer and so we begin with the Milwaukee Public Museum and continue up to the ongoing recent troubles at the Royal Botanic Gardens, Kew.

In 2005 *Milwaukee Public Museum* (MIL; established in 1882; 250,000 specimens) eliminated science and fired most of its staff. If you check the museum's website it seems they no lon-

ger have much of a science presence, just a few collections managers, emeritus curators and adjunct curators who have jobs elsewhere. At the time, most of us thought this was a unique event. How could an institution with 4.5 million objects and specimens, spread over a broad array of departments go out of the research business? How did they think they would keep their collections, exhibits and education programs up to date? But in the nearly 10 years since that event, additional examples of this type of nearsighted administrative behavior has become more frequent as research program after research program has taken the brunt of budget shortfalls; we have become increasingly more alarmed.

Fairchild Tropical Botanic Garden (FTG; established in 1936; 165,000 specimens)

Fairchild has long been active in systematic research. The board and administration decided to move to a different model where they would no longer pay the salaries of research staff but rather have Florida International University faculty work out of Fairchild. They currently have only one research scientist working there. Over a period from 2007 to 2009, the emphasis for research seems to have shifted from tropical systematics to ecology and conservation. In fact, you cannot even find the herbarium on the Fairchild website. If you search for it on Google all you can find is the FTG Virtual Herbarium which contains only about half the collec-

New York State Museum, Albany (NYS; established in 1836; 279,000 specimens)

Most of the research staff was let go a few years ago, including all of the botanists. According to the staff directory, there are four curators, all zoologists, one of which appears to be a state employee. They do have collection managers listed for most collections, including botany, but the herbarium does not appear to have an active research program.

Brooklyn Botanical Garden (BKL; established in 1910; 300,000 specimens)

In August 2013, Brooklyn Botanic Garden suspended its research program and shuttered its herbarium. All members of the Garden's Science Department were laid off, except for one herbarium assistant who was transferred elsewhere and a part-time plant mounter. The Science Department's director was on sabbatical at NSF and she has since left the Garden for a position elsewhere. The Director of Living Collections was made the Director of Collections with the additional responsibility of managing the herbarium. The staff laid off had 60 years of combined experience with BKL. Currently no scientific research is being conducted at Brooklyn Botanic Garden. The herbarium, once widely used by scientists especially those doing research in New York City and Long Island, remains essentially inaccessible to the public.

* With contributions by many individuals in the botanical community.

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Instituto Nacional de Biodiversidad (INBio) (INB; established in 1989; 183,000 specimens)

In 2011 INBio announced that it was going out of the collections and research business. The herbarium was rapidly moved into another building because the building built specifically for the herbarium, had been sold. Recently, the entire staff was let go. This important collection is completely databased and available on line and together with the herbarium at the Museo Nacional de Costa Rica (CR; 215,000 specimens) they make Costa Rica the best botanically documented country between Mexico City and Bogota. Fortunately, the Museo has agreed to take charge of the herbarium; although, currently, they do not have the space to incorporate the specimens. So far, there is no guarantee that there will be jobs for the staff. Hopefully, there will be a new building constructed so that both collections can be combined and additional trained staff will be hired to manage it.

Field Museum of Natural History (F; established in 1893; 2,700,000 specimens)

Staffing for research and collections at the Field Museum had been on the decline for years. Beginning in 2009, between buyouts and staff leaving for other jobs, science staffing took a steep turn downward. Currently, there are only two curators in Botany and three support staff to study and manage the enormous resource. Fortunately there are three emeriti that continue to work. There are no science departments, just one "Action Science Center." The collections are well maintained because of the dedication of collections staff but there is no real growth. However, the emphasis seems to be on marketable skills and plant taxonomy does not seem to be on the list. There is no announced plan to hire additional staff.

California Academy of Sciences (CAS; established in 1853; 2,000,000 specimens)

Recently the administration of CAS has decided to shift the focus of the museum. Established scientists were pressured into retiring, new people will be hired but they will have a significant focus on outreach using social media. Oddly this comes after the construction of a new building to house the collections.



A good model to follow: Muséum National d'Histoire Naturelle in Paris, which has recently renovated its herbarium, has imaged about 8 million specimens. All of their herbarium specimens are now stored in new compactors, organized by the phylogenetic system.

Royal Botanic Gardens, Kew (K; established in 1759; became a government institution in 1841; 7,000,000 specimens with well over 350,000 types)

For months rumors have been in circulation about the drastic changes that are taking place at Kew. Finally enough people have visited and others have passed through US, that we are getting a better picture of what is happening. Kew, long a premier botanical institution for research and collections, is under serious attack. Reports indicate that the Herbarium, Jodrell Laboratory, and Millennium Seed Bank are to undergo drastic administrative changes and a significant reduction in science staff. The major structural change is that these three administrative units will be replaced by six focal areas: Collections, Identification and Naming, Comparative Plant and Fungal Biology, Conservation, Natural Capital, and Biodiversity Informatics. Nine people have been appointed to guaranteed new positions. Everyone else is being forced to apply for open new positions that are made available.

When this crisis at Kew started 25 people decided to retire and those positions were lost altogether. That left 200 staff members in the three units. The scientific staff is scheduled to be reduced

from 200 to 176 which makes it seem as if only 24 positions will be lost. However this number is misleading—the 176 positions include 12 new positions in Biodiversity Informatics, at least some of which may need to be hired from outside Kew, which would further reduce the number of current Kew staff to be retained. Also, the new positions include 27 'Career Development Fellows,' which are fixed non-renewable term (3-5 years) appointments designed to develop researchers from current Kew staff. These staff members are then apparently expected to seek research positions at Kew, attract independent funding, or simply become redundant and have to leave Kew.

Except for the heads of the new focal areas and a limited number of new slots that are very close to existing ones, everyone else will have to apply for one or more of the positions that have been created in the new structure. Any new positions that are not filled by current Kew staff will be opened to a wider pool of applicants. It appears then that at a minimum, 24 current Kew staff members in science will lose their jobs by December 1 but reason suggests that the number could be significantly higher. Taking all of this into account, the total loss of permanent jobs

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in science at Kew will probably be at least 50 or 25 percent of the current permanent science positions. However, if you include the 25 that took retirement the loss of science positions would be 34 percent.

Equally disturbing is the division of the remaining herbarium staff into three areas: Americas, Africa, and Asia. Systematic groups such as the “Legumes” will no longer exist and the leaders and staff of these groups will have to compete for jobs with everyone else. What is striking about this is that most of the world (including Kew scientists) has been moving to synthetic work with a global focus and yet the administration at Kew is choosing to balkanize their research into areas. It is amazing that Muséum National d’Histoire Naturelle in Paris (P) has just worked hard to break down such barriers while Kew is building them. It makes it difficult for specialists in a particular family to view a plant group from a global perspective. Will we no longer have “world experts” at Kew?

In addition, the loss of support staff at Kew will be great and that will mean that curators will have to spend more time doing technical work and less time on science. Those scientists that are able to obtain one of the herbarium positions may very well find themselves overwhelmed with collections work as well as mentoring and teaching and as a result have very little time to do research. Certainly Kew has a budget shortfall but when you balance the budget by gutting research and collections staff you fail to recognize that expertise in a group of plants is built up over many years and cannot be replicated once it is lost.

Biological specimens are critical for the next frontiers of climate change studies: they provide the evidence of past as well as present distributions. A deeper understanding of life on Earth in the past can help us predict and possibly mitigate the worst impacts of climate change in the future. Such information is not readily available but it is becoming more so. For some collections it is now possible to view their data and images online and this allows us to use advanced modeling techniques to predict which species may survive and which may go extinct.

Images alone are not enough. Names



The U.S. National Herbarium will soon begin using a scanner, similar to the one pictured here, to capture images of herbarium specimens. The first project will scan 280,000 fern specimens and 20,000 Onagraceae specimens.

of organisms change frequently and these proposed changes need to be evaluated and either accepted or rejected. More importantly, a specimen is only useful if it has a proper identification. Many specimens are misidentified. Insuring that something is correctly identified requires a detailed examination of the actual specimen, usually under a microscope. As a result, all collections require constant curation to make them useful for climate change studies and other biodiversity studies. Collections that are not studied and maintained, even if they are physically well cared for, can become out-of-date and less useful.

The utility of collections does not stop with climate change. If you search for “Biological Collections” in Google Scholar, you will find a host of references on the use of such specimens ranging from phenological data to populations trends, utility of vouchers, DNA based phylogenies, biodiversity estimates, and trait evolution.

Lastly, the actions of these gardens and museums fail to take into account that to be relevant and useful collections must continue to grow as new discoveries are made. Expeditions to poorly understood areas are critical for filling in holes in our data and for collecting new material in ways that allow the preservation of genome quality tissue for new methods of investigation. It seems that just when the world is beating a path to our door and asking for help and collaboration we are closing our doors and turning them away.

Here at the Smithsonian Institution we

are not immune. Since I was hired in 1981, our scientific staff has shrunk by about 50 percent and our collections staff even more. The Botany staff at the Smithsonian is concerned about our colleagues and the collections they study, at Kew and around the world. It is troubling that there seems to be an alarming trend in museum and garden administrations to devalue collections and the staff who study and care for them. This is a critical point in time to work toward a world-wide effort to stop and reverse this attrition.

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