UC SANTA BARBARA
THE Current

September 21, 2021
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Sharing Seaweed

UC Santa Barbara hosts a large and historic seaweed collection archived for long-term preservation. Unfortunately, this wealth is largely hidden from public view. Scientists at the university's Vernon and Mary Cheadle Center for Biodiversity and Ecological Restoration (CCBER) were determined to make this valuable data freely available through a recently funded digitization program.

By painstakingly imaging and transcribing the data associated with each specimen, they aim to make the collection of nearly 10,000 Pacific Coast seaweeds available in an online database. To this end, CCBER was recently awarded $112,000 from the Institute of Museum and Library Services to help meet this goal, which will be completed with the participation of staff, university students and community volunteers.

"Freely sharing the seaweed collection in a digital format will provide researchers and citizen scientists with a new source of data to investigate a variety of questions, such as understanding seaweed diversity, tracking the spread of invasive species, modeling ecological processes and predicting impacts from the changing ocean environment," said Gregory Wahlert, the project's principal investigator and manager of the UCSB herbarium, which houses the seaweed collection.

The Cheadle Center is an independent, multidisciplinary research center located at UC Santa Barbara. One of its guiding missions is the long-term preservation of the nearly half a million specimens that make up the university's natural history collections. "A major goal of CCBER is to make the natural history and biological

data that are contained in these collections accessible to the public," Wahlert said.

The seaweed specimens form a large and historically valuable collection. "Over the years, several seaweed collections from other museums in Southern California have been incorporated into the UCSB herbarium," Wahlert explained. In it are some of the earliest seaweed samples from the state — the oldest date to the 1870s — making the collection an excellent record of the West Coast marine flora.

A mounted feather boa kelp specimen from 1896

This feather boa kelp was classified as Egregia laevigata when it was collected around San Diego in 1896. Now classified as Egregia menziesii, this historical specimen resides in the CCBER seaweed collection.

Photo Credit: UC SANTA BARBARA

The grant will support digitization of the entire seaweed collection. "Our eventual goal is to have all of our collections digitized," Wahlert said. "We focus on digitizing collections separately as resources and funding become available." The project is slated for completion in the summer of 2023.

The endeavor will produce high-resolution digital images and standardized collection information for each of the roughly 10,000 specimens. The center will share the collection via the internet using a Symbiota-based portal that users can query for a number of variables. Scientists will be able to combine CCBER's resources with other algal databases to obtain a sufficiently large sample size for research.

It is estimated that there are more than 3 billion specimens archived in natural history museums around the world. The data inherent in these collections can help answer many questions about the natural world. And when collections contain historical specimens, they offer an extraordinary opportunity to look into past and understand how communities and ecosystems have changed though time.

Digitization has increased accessibility, fostering connections between researchers and collection curators who otherwise may not have been able to collaborate. As a botanist, Wahlert frequently makes use of biodiversity databases himself. "I rely on the digitized specimens from the major herbaria in North America and Europe to conduct my studies on plants in Madagascar," he said. "This allows me to virtually consult many smaller collections around the world that I would not otherwise be able to examine."

Digitization also has opened to the general public many domains that were once exclusive. Normally, only specialists can access natural history collections. By imaging the physical specimens, transcribing the associated data and distributing the information online, many interesting research questions can be addressed by scientists and citizen scientists alike. “Digitizing CCBER’s collections helps fulfill our duty as keepers of the irreplaceable specimens that we hold in trust for the benefit of the public,” Wahlert said.

Studying seaweeds is important for understanding ocean systems and responding to the threats they face. Algae form the basis of many marine food webs. Some species — such as those that form kelp forests — support a vast array of marine life. Ecosystems along the Pacific Coast are imperiled by a number of factors, including coastal development, invasive species and the recent onset of anomalously warm water masses. A well curated and digitized seaweed collection will provide marine biologists and ecologists with new sources of evidence to better understand these threats.

Through the engagement of undergraduate students and the public, the impact of the digitization effort will reach well beyond research. CCBER staff plans to invite student interns, paid workers and community volunteers to participate in the project. In the process, they’ll learn how specimens are digitized and used in research. The project also will enable seaweed experts to provide up-to-date species identification and to conduct public workshops. The staff hopes that this outreach will generate enthusiasm for seaweeds and marine biology, enhance knowledge of specimen-based research and help increase awareness of threatened marine environments in the Pacific and around the world.

“Digitizing the seaweed collection will contribute a large dataset for study by marine scientists at UCSB and elsewhere,” said CCBER Director and project co-lead Katja Seltmann. “It will also enable Cheadle Center staff to train students and community volunteers in biodiversity data science.”

About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society.

All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.