Vegetation & Ecological Restoration

Yosemite Bog-orchid: A Long Journey to Discovery

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On a summer morning in 2003, two biologists hiked into a remote meadow south of Yosemite Valley to do a botanical survey and found an unknown species of orchid. This particular orchid species had been growing in this and surrounding meadows for tens of thousands of years. It likely survived at least one glacial event, safe in its ancient boggy meadow habitat while the glaciers that carved Yosemite Valley wound their way around its montane redoubt. The orchid kept company with several other species of meadow wildflowers that are also known only from the central Sierra Nevada in and around Yosemite National Park. One of these, the rare Bolander's clover (*Trifolium bolanderi*), was what had brought the two U.S. Geological Survey biologists, Charlotte Coulter and Alison Colwell, into the

meadow in the first place. This event set in motion the final phase in the long journey between the original discovery of the orchid and its official recognition as the Yosemite bog-orchid, *Platanthera yosemitensis*. The story illustrates both the history and the future of botanical exploration in the Yosemite region.

The journey first started with a Claremont school-teacher, George Henry Grinnell, who had an abiding passion for orchid and stamp collecting. Grinnell spent his summers roaming Cali-

In 2003, the Yosemite bog-orchid was discovered in Yosemite National Park's botanically-rich meadows. This orchid is the only known orchid species endemic to California's Sierra Nevada range. fornia in search of native orchids. The specimens he collected on his trips reside largely at the Rancho Santa Ana Botanical Garden in Pasadena. In 1923, Grinnell visited Yosemite and made several plant collections in the park (in those days it was legal to do so), including two specimens of an orchid that he labeled *Habenaria hyperborea*. Grinnell apparently did not realize that he had collected something unique, so the two specimens spent the next seven decades filed in a folder with other collections that they did not entirely match, waiting for the state of knowledge of bog-orchids to gradually improve.

The wait was long, but not in vain, for in 1993, Ron Coleman and Leon Glicenstein, doing research

for Coleman's book The Wild Orchids of California inspected the collections at Rancho Santa Ana. By this time, many more bogorchid specimens had been collected and several western United States species had been described. Coleman and Glicenstein looked closely at Grin-



George Henry Grinnell collected a Yosemite bog-orchid specimen from Yosemite National Park in1923. Its relationship to other bogorchids remained misunderstood for 70 years.

nell's specimens, compared them to the dozens of other California specimens and saw that Grinnell's were distinct. Excited by what they had seen, they departed for Yosemite to try to find the orchid. Despite Grinnell's somewhat vague description of the collection location, they were able to locate a small group of plants. They sent a flower sample to the current expert on bog-orchids, Dr. Charles Sheviak of the New York Museum in Albany, to confirm the identity of their find. Sheviak found the flowers to be unlike any known in California, but very similar to a species from the southwestern United States, purple bog-orchid (*Platanthera purpurascens*), so he assigned that name. The plant appears in Coleman's book under the synonym *P. hyperborea* var. *purpu*rascens.

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The next clue to the new bog-orchid came from an ambitious botanical project, the *Flora of North America*. Eventually to comprise 30 volumes, this massive and largely volunteer effort seeks to definitively describe every plant species described in the United States and Canada. Dr. Sheviak, as the author of the chapter on bog-orchids, condensed his expertise into a series of detailed descriptions, complete with a range map and illustrations. On the range map, Sheviak placed a dot to represent the *Plathanthera purpurascens* in Yosemite; but following a review of the volume, Dr. Dean Taylor, an expert on the flora of the central Sierra Nevada, noted the anomalous east-west disjunct nature of this occurrence.

Meanwhile, in 2003, with support from the National Park Service Inventory and Monitoring Program, the park, in partnership with the U.S. Geological Survey, embarked on an effort to determine the status of Yosemite's rare plants. With the benefit of the Sheviak description, biologists were on the lookout for the anomalous orchid. Thanks to the clues gathered over previous decades, the plant was recognized in the field a few months later.

A complete botanical specimen was made of the find in July 2003 and sent to Sheviak. He found that the leaves did not match those of *Platanthera purpu*rascens and agreed that it was possibly a new species. When he traveled to see the plant himself, he was certain of its novelty. His confirmation started the process of documenting this new species. The meadows in the vicinity of the first collections were scoured for additional populations and several herbaria were searched to examine other bog-orchid specimens for previous collections. An additional specimen, collected in 1936 by Yosemite ranger naturalist, Enid Michael, was found in the Yosemite Museum herbarium. Once the surveys were completed and the species' presence, or lack thereof, was verified in herbarium collections, *Platanthera yosem*itensis was formally described as a new species in an article published in the journal of the California Botanical Society, Madroño. The name was chosen to



The Yosemite bog-orchid (background) shares wet meadow habitat with the more common white-flowered bog-orchid (foreground).

commemorate the place of its discovery and the location of all known populations at the time—Yosemite National Park.

The Yosemite bog-orchid is the only known orchid species endemic to California's Sierra Nevada range. To date, it has been found in only ten wet montane meadows between the main stem and the South Fork of the Merced River and, more recently, in three meadows in the Sierra National Forest south of the



Features that distinguish the Yosemite bog-orchid from the more common bogorchid species in Yosemite meadows are its yellow flowers and short sack-shaped nectar spur.

park. Additional locations in the region are expected to be found now that it has been described. It is listed by the California Native Plant Society as a rare plant.

We know a moderate amount of information at this point about its biology. Its blooming time is July to August. Its musky smell and short nectar spur suggest pollination by short-tongued insects such as flies or mosquitoes, but none have yet been observed in the act of pollination. Genetic studies to determine its closest relatives are pending. Geologic evidence suggests that the meadows where it grows are ancient environments that escaped the last glacial surge—about 10,000 years ago. The area around these meadows, possibly a result of habitat stability, supports at least seven other species of rare plants known only from the central and southern Sierra Nevada. These include Yosemite onion (Allium yosemitense), Yosemite woolly sunflower (Eriophyllum nubigenum), short-leaved hulsea (Hulsea brevifolia), Yosemite ivesia (*Ivesia unguiculata*), and Bolander's clover.

The saga that led to this new species coming to light highlights the importance of maintaining plant specimen collections. If the Rancho Santa Ana Botanic Garden had not maintained Grinnell's specimen for decades and other contributors had not added new specimens to the botanic garden's collections, the clues necessary for solving the puzzle would not have been available. Contrary to the common impression that new species are found by explorers in remote locations, it is now increasingly common for discoveries to be made upon examination of dried specimens in herbaria. Recently it has been proposed that more than half of the world's

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"undiscovered" flowering plants already exist as specimens in herbaria worldwide. It is often the case that decades elapse between a plant's first collection and an encounter by a plant taxonomist with sufficient expertise to recognize and describe it.

The year after the new bog-orchid species description was published, a new first chapter in this story emerged. George Henry Grinnell followed in the footsteps of an earlier collector in this region whose specimens had not yet come to light at the time of publi-



Joseph Whipple Congdon, who was a Mariposa attorney and an avid plant collector, made the earliest collection of Yosemite bog-orchid from

cation. This was Joseph Whipple Congdon, a lawyer who practiced in Mariposa County from 1882-1905. Congdon was respected in his profession, but its how he spent his free time that has since won him immortality in California botany—several species bear his name. He was a dedicated field botanist whose personal collection of some 12,000 plant specimens, primarily from the Sierra Nevada foothills and Yosemite, was purchased by the University of Minnesota upon his death. In 2008, the University of Minnesota herbarium curator sent Congdon's orchid specimens to Sheviak for inspection. It was soon learned that the honor for the first collection of the Yosemite bog-orchid goes to Congdon who brought it back from an expedition to the "Mariposa Big Trees" (now Mariposa Grove of giant sequoias) in 1895. Congdon's specimen bore the name Habenaria huronensis, after the species known at the time that Congdon thought it most closely resembled. The specimen at University of Minnesota now bears the correct name. As herbaria put their holdings online in searchable databases, the task of finding such specimens becomes much easier and many more such finds are occurring. (For an example, see the Consortium of California Herbaria searchable database: http://ucjeps.berkeley.edu/consortium/ about.html).

If reserve managers are to protect rare species and overall biological diversity, they need the fullest accounting possible of the biological diversity within their jurisdiction and of the potential threats to



Yosemite Museum registrar Miriam Luchans displays a type specimen of the Yosemite bog-orchid in the Yosemite Museum herbarium in Yosemite Valley. Although the Yosemite Museum herbarium is relatively small with just more than 7,000 specimens, it is a significant collection of Yosemite region specimens, both historic and current. Used as a reference by park staff, the Yosemite Museum herbarium will soon join the online searchable database Consortium of California Herbaria, which will make information on its holdings accessible to the world.

populations, species, or overall diversity. New species of plants, animals, fungi and microbes continue to come to light in Yosemite and elsewhere in California. The age of discovery has not vanished from even our most iconic parks and our most well-studied reserves. Since the Yosemite bog-orchid was discovered and its populations mapped, park managers have taken protective measures to ensure it's survival.

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