

# The Dudley Herbarium

*Including a case study of Terman's restructuring of the biology department*

B Y S A R A T I M B Y

**T**he history of the Dudley Herbarium embodies an intellectual tradition that spans a hundred years of fieldwork and publishing. The herbarium's curators trained several generations of researchers, educators, and public and private land-use managers and fought hard to protect our forests, rangelands, and wetlands. It is exciting history, full of tales of exploration, political fights, and personal conflicts. The herbarium's fate at Stanford is also a fascinating story, illuminating aspects of university decision-making and changes in the discipline of the biological sciences.

Provost Frederick E. Terman's decision in the early 1960s to terminate support for the Division of Systematic Biology is still a sore point for some faculty in the Department of Biological Sciences. The major result of the funding loss was the eventual transfer, by long-term loan, of the two most important of Stanford's rich Natural History Museum collections to the California Academy of Sciences in San Francisco. These were the plant and fish collections, both dating back to the beginning of the university. The merger of the 850,000-specimen Dudley Herbarium into the then 600,000-specimen California Academy Herbarium took place in 1976 after the completion of a state-of-the-art facility to house the collections and staff, funded in large part by a National Science Foundation grant.

Although planned years in advance, the herbaria merger decision was made official at the June 1974 meeting of the Board of Trustees. The letter of transfer written a month later by Vice President and Provost and Acting President William F. Miller reflects an expectation of a

better combined research facility than either institution could maintain alone, and the hope of increased intellectual contact between members of Stanford's biology department and the California Academy of Sciences. Furthermore, the hope was expressed that students would benefit from contact with Academy scientists and from contact with scientists from the University of California.<sup>1</sup> But Provost Miller didn't touch on the real reason behind the transfer, that the university administration wanted to terminate support for an institution that was costly and, at the time, had no role in the kind of biological research that would bring in large federal grants.

Twenty-five years later, we can say that Provost Miller was certainly correct about creating an outstanding research facility (California Academy of Sciences Herbarium is now the sixth largest in the United States), and possibly he was correct about the increased faculty contacts. However the hope of increasing student use has not yet come to pass. And it is now also questionable whether the premise that federal funding would come only to cellular and molecular biology still holds. With the growing

recognition that some of humanity's biggest problems are environmental as well as medical, the premises that directed past decisions about departmental priorities are changing.

### *The changing study of botany at Stanford*

Why did President David Starr Jordan think plant systematics important and bring a herbarium and its new curator, William Russel Dudley, to Stanford? And, to follow through, what led Provost Terman to believe that Stanford should stop funding the herbarium seventy years later, in the early 1960s?

As is common to all science, the study of botany in 1891 was changing and would continue to change as the university grew. Academic departments reflect these "paradigm shifts" in their hiring choices, their course offerings, their departmental structure and naming, and even the physical size and location of buildings dedicated to research and teaching. These decisions are not made at the department level alone. Tenure, new and replacement hires, appointment of department heads, funding per student; all these are university administrative matters, of particular importance under presidents Tresidder and Sterling when Stanford experienced major growth.

At the end of the nineteenth century there were two important branches in the discipline of botany. Up to the 1870s botany had been primarily a descriptive science, particularly in North America where it, like geology, had been directly tied to the exploration of the West. It was classic systematic botany; one looked for new species, studied the relationship between plants, and worked on classification, distribution, and theories of evolution. Herbaria are essential to this type of study. The 1870s (the time when Dudley was being trained) brought the "new botany" from Germany, an experimentally rigorous and laboratory-oriented science seeking to understand the individual organism, its chemistry and physiology.

The important distinctions in biology today are based on principles of organization, not on whether something is a plant, animal, or insect. This means that few universities still maintain botany, zoology

or entomology departments, and such designations as "botanist" and "zoologist" are currently anachronisms in academia. But the difference in studying the single organism versus studying relationships between whole organisms has been maintained and is alive and well at Stanford and other universities. The Stanford biology department is not unusual in having two branches of study, one focusing on cell and developmental biology and the other on ecology and evolution (population biology). The cell biologist is as likely to be treating plant as animal material; certainly the population biologist is; and the molecular biologist could be working with either individual organisms or groups of organisms. The divisions are artificial but useful, and will undoubtedly continue to change in the future.

In 1894 the Stanford botany department had three faculty: Douglas Houghton Campbell, trained in the "new botany," who studied the spore reproducing plants (fungi, mosses, ferns and algae); William Russel Dudley, who wanted to further the classical systematic studies of the largely undescribed California flora; and George James Peirce, who was the plant physiologist (again, "new botany"). The department was divided in two separate divisions: general, under Campbell, and systematic and ecological, under Dudley. For a short while there were even two departments.

Through the next hundred years the departmental structure would change. We no longer have a Botany Department; it has been under the wing of the Department of Biological Sciences since 1934. In 1962, in a last-ditch attempt to save itself, the Natural History Museum became the Division of Systematic Biology. The Division of Systematic Biology is now gone, but today Stanford has, according to the National Research Council, the number one ranked ecology and evolution faculty group, the intellectual heirs of the Natural History Museum.

### *What is a herbarium?*

In many ways one can compare a herbarium to a library. Roxana Ferris, who was on the payroll at the herbarium for forty-seven years, liked to explain to those who might not have first-hand experience in their use that herbaria are to botanists "what original source material is to historians." The dried plant specimen arrives at the institution (given usually by those who actually collected it, but sometimes by trade, gift, or purchase) with data about who collected it, where and when, and what it most likely is (family, genus, species, perhaps subspecies). It is then properly mounted, labeled, and filed according to family, genus, and species. A herbarium will have numerous examples of any one plant, collected from different places, at different times of the year, over a range of years, and reflecting local conditions. The specimens, properly curated, will keep indefinitely. Researchers using specimens are interested in a variety of issues, including identifying material they are currently working on, reworking prior classifications through specimen comparison, studying range distributions, studying evolutionary relationships between species, and documenting extinct populations.

The herbarium curator is charged with building collections,

preserving them, and making them available to users. Almost without exception, curators are in academic positions, doing research, sometimes teaching, and overseeing a staff who will insure that all the basic curatorial tasks get done. All herbaria have libraries, some even have librarians. Most have at least basic lab facilities. There are private herbaria which serve their owners' particular research needs, just as there are teaching collections such as has lately been brought together by the Jasper Ridge Biological Preserve to aid in Stanford class use. Institutional herbaria are comprised of many individual collections (as was the Dudley Herbarium and as is the Academy Herbarium) that reflect staff research interests, both past and present, and are available to any qualified researcher. Most specimens are consulted in the institution but a good number are loaned to researchers around the world.

### *The beginning*

The Stanford Herbarium, as it was known before being named in honor of its first curator, began with what was probably the university's first gift. Mr. David Pell Secor, a friend of the Stanfords, presented the 70,000 duplicate specimen herbarium of the recently deceased botanist William H. Harvey of Trinity College, Dublin, to the university the summer before it first opened for classes. The oldest specimens in the Dudley Herbarium are from the Harvey collection and date from 1758. They include Australian and South African cape region plants that share with California, but few other places in the world, a Mediterranean-type climate (warm, dry summers; cool, wet winters). This gift enabled President Jordan to write to William Russel Dudley on July 23, 1891, "This will give a splendid start in Systematic Botany, a subject in which there is here especial need of serious work . . . , and to make this place a center for systematic work." <sup>2</sup> Dudley would not be able to tie up his teaching and other obligations at Cornell until the following year and thus was not in the starting line of President Jordan's first-year team. But, without access to a herbarium, Jordan might not have been able to entice Dudley to Stanford.

### *William Russel Dudley*

David Starr Jordan, later particularly noted for his studies of fishes, had in 1870 been an instructor of botany at Cornell. Young Dudley came to him as a freshman—at twenty-one a bit older than most—wanting to be a botanist. He chose Cornell over Yale, in spite of family connections, because of the advantages that the newly established Cornell promised in science. During the 1870s there were few American professorships in botany; Cornell was one of the first universities to establish a distinct chair of botany. Dudley and Jordan roomed together, living in a student-built cottage appropriately called "The Struggle for Existence." He became Jordan's successor as instructor in botany in 1872, his botanical knowledge outweighing the fact that he had not yet received his degree. He stayed on at Cornell after his degree, and from 1876 to 1892 was assistant professor of botany.

By the time Jordan recruited Dudley to Stanford, Dudley, at age forty-two, was well into his career. He had trained some



*David Starr Jordan, left, and William Russel Dudley at Stanford, ca. 1905.*

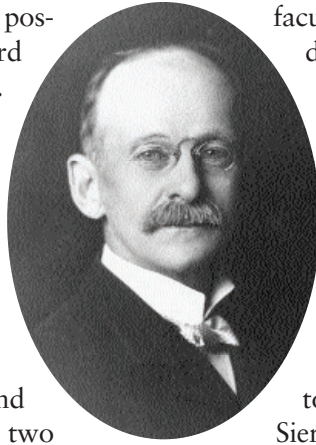
twenty-eight professionals (a similar list for his next thirteen years at Stanford would show seventy-four), published seventeen journal articles and two floras, and co-authored a *Manual of Histology*. In 1887 he had traveled to Europe where he studied with some of the foremost experimental botanists in Strasburg and Berlin.

The nature of Dudley's research and publishing changed considerably at Stanford. Here he focused on collecting the diverse and still relatively undocumented flora of California that was so different from that of the rest of the United States. Every weekend and all the spring and summer breaks he spent botanizing; weekends were usually devoted to the local Santa Cruz Mountains, springs to southern California, and summers to the Sierra Nevada. He roamed the hills with pack and saddlehorses, occasion-

ally horse and wagon. When possible, he made use of the Stanford connection with the railways. In reading his carefully documented and minutely written collecting notes, trip observations, and expense accounts, you can't help but admire the overwhelming dedication with which he pursued the task of collecting specimens.

Dudley had no wife and little family. He did have two nephews, both of whom attended Stanford at his urging. Harry graduated in 1901, his brother Ernest in 1908. Ernest Dudley often accompanied his uncle on botanical excursions. He would eventually work for the U.S. Forest Service, which would have pleased his uncle had he lived to know of it. And the headline of *The Palo Alto Times* obituary for Ernest in 1955 lauds him as a conservation leader, again fulfilling the example set by his uncle. Ernest had only a moderate income but with the help of his more comfortably-situated brother, Harry, the two continued to aid the herbarium after their uncle's death and financially backed some of the Baja California expeditions led by Stanford Professor of Botany Ira Wiggins in the early thirties.

During his time in California, William Russel Dudley's intellectual foci were the study of trees, the evolutionary relations of forms (something current Stanford biology



William Russel Dudley,  
ca 1900

faculty are still actively studying today, albeit by vastly different methods) and the problems of geographical distribution. Conifers were his particular love, and the protection of the coast redwood and giant sequoia became a consuming mission. Logging in the Santa Cruz Mountains was in full swing at this time and Dudley played a key role in protecting the coast redwoods in Big Basin as a state park. Later he helped establish the Pinnacles National Monument in San Benito County. He was awed by the giant sequoia groves in the Sierra Nevada and also realized the need to protect them. For some years he was an officer of the Sierra Club, working on conservation issues. From 1899 through 1908 he wrote a column for the *Sierra Club Bulletin* titled "Forestry Notes" in which he would assess and try to influence legislation to protect the state's forests. He often wrote for newspapers and forestry magazines, trying to educate Californians

about their forest treasures. Because he felt training was key to effective conservation, he wanted to establish a series of courses in forestry at Stanford. Unfortunately the 1906 earthquake wiped out realization of the plan just as it was about to get started.

There were other disappointments. Less than a year after Dudley arrived at Stanford, Leland Stanford died, and the resulting financial straits for the university meant that the planned botany building in the outer quadrangle would not be built for some time. Instead, systematic botany occupied the attic of the furthest shop building near the geology corner, with herbarium, laboratory, office, and student work space all set up under three huge, lengthwise-running beams that had to be ducked under as one negotiated the space. For ten years Dudley conducted his classes under such handicaps, often supplying the laboratory from his own salary. Shortly after the earthquake Dudley contracted tuberculosis. His prize student, LeRoy Abrams, returned to Stanford at Dudley's request to help with teaching. By 1910, knowing he wouldn't recover, he retired, giving his personal herbarium to the Stanford collection. The entire collection, numbering some 120,000 sheets, was named in his honor and LeRoy Abrams became curator. Dudley died early the following summer.

Professor Dudley is remembered today for three major efforts: his superb teaching, which resulted in many of his students getting important teaching posts or administrative positions, his conservation work, and his scientific work, the most lasting value of which was the collection of the extensive herbarium to which he devoted so much time and effort during his years in California. It was this collection that would eventually enable Abrams to publish the four-volume *Illustrated Flora of the Pacific States* and a later heir to Dudley's position at Stanford, John Hunter Thomas, to publish *A Flora of the Santa Cruz Mountains*. Their publications could not have been accomplished without the diligent collecting done by Dudley.



LeRoy Abrams with "specimen cup," Mojave Desert, 1927. Photograph by G.T. Benson.

## LeRoy Abrams

When Abrams returned to Stanford in fall of 1906 as an assistant professor of botany, it was in part because he admired and felt a debt of gratitude to Dudley. He received his A.B. and M.A. degrees under Dudley in 1899 and 1902 respectively, and then took a graduate fellowship in botany at Columbia University, studying at both the New York Botanical Garden and the United States National Herbarium before getting his Ph.D. from Columbia in 1910. Abrams first concentrated on the southern California flora, in 1904 writing the *Flora of Los Angeles and Vicinity*, and in 1910 publishing his dissertation *A Phytogeographic and Taxonomic Study of the Southern California Trees and Shrubs*. While in New York he had been inspired by his colleagues N.L. Britton and A. Brown's handsome three-volume work, *An Illustrated Flora of the Northern United States and Canada*. Abrams decided he would do a similar work for the Pacific states of California, Oregon, and Washington. When President Jordan agreed to back this effort it sealed Dudley's efforts to recruit Abrams.

The task of producing the *Illustrated Flora of the Pacific States* was prodigious; every known plant was described and illustrated. It is not the kind of work that one man alone can



LeRoy Abrams and Roxana Ferris press specimens on a collecting trip near Willits, California, May 1943.

accomplish and, in fact, Abrams was extremely lucky to have the able help of Roxana Ferris, the student whom he had first hired to help in the herbarium in 1913. (She would eventually become curator one year before her retirement in 1963.) The meticulous work needed on the manuscript, combined with his teaching and professional responsibilities, and finally the lack of adequate funding for the herbarium during the Depression, often left Abrams stressed and discouraged. Salaries were low at this time and had been reduced at least once. He and his wife also underwent the personal tragedy of their twenty year-old daughter's death. Volume 1 of the Pacific states flora was published in 1925, but it was 1937 before the second volume was ready, and by then the money was unavailable to publish it until 1944. In 1948 a heart condition prevented Abrams from climbing the stairs to his office on the second floor of the museum. Not only were there no elevators at the time, but

even through the 1960s there were not even hot water taps. In 1951 the third volume was published, and it was not until 1960, four years after Abrams' death, that Ferris finally completed the fourth and final volume. It is a worthy memorial to Abrams, and we also owe much to Roxana Ferris for its successful completion.

Abrams was busy with many tasks other than publishing during his thirty-year stint as a professor. The herbarium collections grew from 35,000 to 279,000 mounted sheets. Dudley had given some 50,000 specimens which had been added to the 70,000-specimen Harvey Herbarium, but only a fraction of these had been mounted by 1910. In 1916 Abrams acquired the Samuel B. Parrish herbarium of some 30,000 specimens from southern California, and in 1928 he acquired the Elmer I. Applegate collection, some 15,000 specimens from the Cascades and Siskiyou in Oregon. Meanwhile, students Gilbert T. Benson and Ira Wiggins collected, Benson in southwestern Oregon and Wiggins in San Diego County, Baja California and the Sonoran Desert. Staff member Roxana Ferris collected probably more than anyone in numerous places including California, the arid southwest, eastern Oregon, Baja California, and mainland Mexico. Abrams himself led student field trips to the Sierra Nevada and the Channel Islands, and forestry trips to northern California, Oregon, and Washington.

## The Natural History Museum

In 1924 the collections of plants, insects, and fish all came together in the south wing of the Stanford Museum, with each collection on a separate level. The Natural History Museum was never meant to be a public display or educational exhibit. This, like most natural history museums of the day, was a place to teach, study, and publish on biological systematics and distributions. The museum would also sponsor many collecting expeditions. Abrams began the publication *Contributions from the Dudley Herbarium* in 1927. It continued through the golden era of the herbarium, issuing its final number in 1961. Sponsored by



*The Dudley Herbarium, ca. 1925, on the second floor of the south wing of the Stanford Museum.*

Abrams' student, Gilbert T. Benson, and continued by a bequest after his untimely death, it published the major research occurring at the herbarium during these years.

The improved space and official recognition occasioned by the herbarium's move into the museum prompted Abrams to codify the herbarium's collecting and research priorities, to wit: 1. trees and shrubs (Dudley's original interests); 2. Lower California and Mexico; 3. Great Basin and Arid Southwest; 4. Alaska and British Columbia (to better understand our own alpine flora); and 5. the Pacific States. The move also allowed a reorganization of the collections and the acquisition of at least fifteen of the thirty double-unit metal cases requested. By the 1960s the Natural History Museum, or Division of Systematic Biology as it soon would be named, was a unit of five faculty members, a graduate student population of at least fifteen on average, and large systematic collections of plants, fish, reptiles, and insects.

Income from both the Benson and Dudley funds is still available to the biology department. The Benson fund has recently

**Herman Knoche** entered Stanford as a freshman in 1895 and received his A.B. in botany in 1899. He was born to German parents who had emigrated to San Jose just after the gold rush. They invested in land in downtown San Jose; when they both died shortly after the turn of the century, Herman, the only surviving son, found himself relatively wealthy. He decided to do further botanical study in France and received a degree from Université de Montpellier in 1923. He was particularly interested in the effect of islands on plant evolution and published the major work on the Balearic Island flora.

While in Europe in 1930 Knoche purchased the 126,000-sheet Gaston Gautier herbarium. Gautier was a French botanist whose collection is rich in specimens from the Mediterranean region. Knoche was also a collector of fine botanical books; in the same year he purchased the Adolf Engler (a German plant systematist) reprint collection, some 25,000 titles, many of them privately printed doctoral dissertations not otherwise found in the United States. In 1931 Knoche returned to settle permanently in San Jose. No longer able to do fieldwork, he constructed a separate building for his library and herbarium and spent much of his time working with them. He never married and when he died of heart disease in 1945, this outstanding book collection and herbarium was willed to Stanford. Some of the books went with the Dudley Herbarium library on loan to the California Academy of Sciences; most of the Engler titles are there. Other of his books are in the biology library, and the rare books of both the Dudley and Knoche collections are now housed in the Stanford Libraries' Department of Special Collections.

been put to use as a source for competitive grants for Stanford graduate students in the areas of systematics and comparative biology. The Dudley fund, augmented by a large bequest from Helen L. Dudley in 1972, has contributed to direct support of the herbarium at the Academy and is currently covering some herbarium expenses for the teaching collection at Jasper Ridge Biological Preserve.<sup>3</sup>

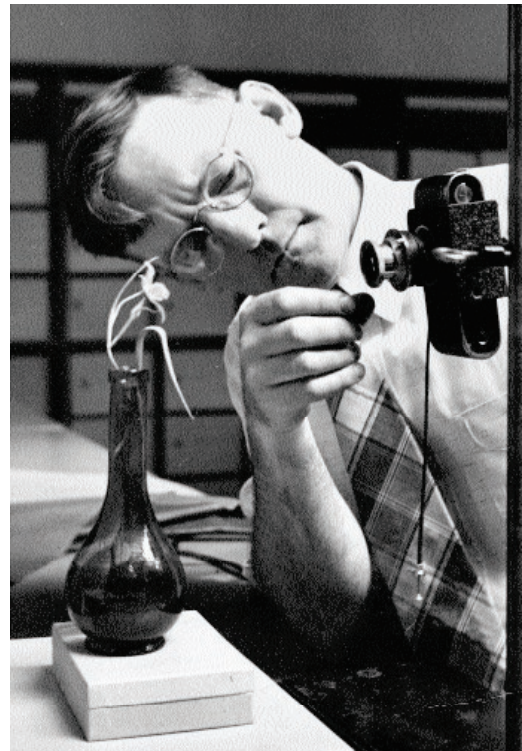
### *Ira Loren Wiggins*

When Abrams officially retired in 1940, his place as director of the Natural History Museum was filled by Ira Wiggins. Wiggins was Abrams' favored student, having come to Stanford in 1924 with a philosophy and teaching degree from Occidental and a desire for a masters in botany. This he received in 1925, working on the mallow family at Abrams' suggestion since it was needed for the Pacific States *Flora*. Wiggins returned to Occidental to teach botany for a couple of years, and then returned to Stanford in 1927 to work on his Ph.D., again under Abrams. His dissertation fieldwork was on the flora of San Diego County. He joined the

Stanford faculty as assistant professor in 1929, finished his doctorate in 1930, and proceeded to carry a heavy teaching load for the next thirty-five years. Harry and Ernest Dudley, who had become close friends with LeRoy Abrams, paid Wiggins's university salary for the first three years, freeing Abrams from teaching duties so he could work on the Pacific States *Flora*. In 1936 Wiggins was promoted to associate professor, and in 1940 to full professor. He served as associate curator, then curator, of the Dudley Herbarium, from first hire in 1929 to 1940, when he inherited Abrams' museum directorship.

Wiggins led the 1930s herbarium expeditions to Baja California. He and former student John Wynn Gillespie paid \$210 for a Model T Ford pickup and set off into what was unknown territory. Wiggins had to reline the brake and transmission lines several times during the trip. But this expedition was only the first in a lifelong fascination with the peninsula. He would return many times, later with a Model A Ford station wagon donated by Harry and Ernest Dudley. On one trip when dishonest customs officials impounded his vehicle, Wiggins stubbornly slept by it for nineteen nights until President Wilbur of Stanford had contacted the embassy in Mexico requesting its release.

Other adventures followed. In 1944 Wiggins was one of a dozen American botanists sent to Ecuador and Peru by the Foreign Economic Administration to study and sample *Cinchona* trees for the alkaloid quinine which is obtained from their bark. Quinine was used as an anti-malarial drug in the Pacific theater of war. The botanists worked hard at high altitudes, from 5,500 to 14,500 feet; one of the Americans died of a heart attack.



*Ira Loren Wiggins in the Dudley Herbarium, spring 1940. Photograph by Roxana Ferris.*

In 1949 Wiggins received a National Science Foundation grant to study the flora of Point Barrow, Alaska. He took along



*Abrams (standing), Wiggins and Ferris with their adapted field vehicle, the Model A Ford station wagon, May 1943.*

## Reed C. Rollins

After Abrams' retirement in 1940, Reed Rollins was hired as instructor and curator at the Dudley Herbarium. He came from Harvard where the staff had been keen to keep him on at the Gray Herbarium. But he wanted an opportunity to teach, and besides, he had noted, "The people who seem to get places around here are those who have been here, go away for a number of years and are brought back. Not that anything like that would happen to me, but I'd rather take a chance on that than to try to fight the system . . . which consists of loading everything on to the younger staff or faculty members then firing them because they don't turn out any research."<sup>13</sup>

Rollins learned a lot from working with Wiggins, among other things accompanying him on a six-week trip to the state of Sonora. He became interested in and later worked on several Mexican genera. During the war years he accepted a position as associate geneticist with the Guayule Rubber Project at Salinas. Although synthetic rubber was already available, there were still uses for plant-based rubber, and strains had to be developed that could be grown in the United States on land not otherwise designated as agricultural land.

In 1948 Rollins was offered, and accepted, the directorship of the Gray Herbarium.



Reed C. Rollins in the  
Dudley Herbarium, ca. 1946.

John Thomas and Harry Thompson, both graduate students at the time. Then, in the early 1950s, Wiggins spent several years at Point Barrow as director of the Arctic Research Laboratory. He and John Thomas published *A Flora of the Alaskan Arctic Slope* in 1962. Only two years later he published *Flora of the Sonoran Desert*, based on thirty-three field trips over thirty-one years, with Forrest Shreve as co-author. Next came an opportunity for Galapagos Islands studies in 1964 and 1967. He made the latter trip with Duncan Porter who was his co-author for the *Flora of the Galapagos Islands* in 1971. Wiggins officially retired in 1964, but only because those were still the days when retirement was obligatory at age 65. He had immense energy. Even at age eighty-one, when interviewed for his oral history in 1980, he insisted on biking to the library for the interview rather than do it at home.

Wiggins was able to accomplish so much in the early 1960s in part because in 1959 he had become scientific director of the Belvedere Scientific Fund, sponsored by Kenneth K. Bechtel, brother of the Bechtels who founded the Bechtel corporation. This in effect made him a research professor (with no teaching duties) and freed up money for the department to hire Peter Raven.

Through the years Wiggins had continued his field work in Baja California. Albert M. Vollmer, a San Francisco doctor interested in lilies, financed five more trips in the 1940s. Don Patterson of Atherton financed two trips, and Ken Bechtel financed a number of trips. Wiggins had planned to write the *Flora of Baja California* with John Thomas, but Thomas had too many teaching commitments and was by that time also curator of the herbarium. Wiggins did it himself, as well as nearly 500 drawings; it was published by Stanford University Press in 1980. Altogether, Wiggins had over 200 publications. He died just short of his eighty-ninth birthday in December of 1987.

### *Richard W. Holm and the beginnings of population biology*

Holm came to Stanford at Wiggins's behest in 1949. Wiggins had been impressed by Holm's work as a graduate student at Washington University in St. Louis, and knowing he would be absent in Alaska the coming year, Wiggins had been on the lookout for a temporary replacement. In the autumn of 1950, his Ph.D. only four months old, Holm found himself supervising thirteen graduate students when Wiggins stayed on two years in Alaska as director of the Arctic Research Laboratory. Holm was curator of the Dudley Herbarium from 1950 to 1961, and followed Wiggins as director of the Natural History Museum through the difficult years of 1961 to 1971. According to his longtime friend and next door neighbor, John Thomas (who was a graduate student at Stanford when Holm arrived), Dick taught more courses in the biology department than any other faculty member. He worked hard at teaching and received the Dean's Award for Distinguished Teaching in 1983.

Holm was known as an original thinker. His idea to implement the "levels of organization" approach to the teaching of introductory biology was influential in biology and biological education at the time and for some time thereafter. His 1962 paper in



*Science*, “Patterns and Populations,” coauthored with Paul Ehrlich, laid the foundation for the discipline of population biology. He and Ehrlich co-authored several books, and together with Peter Raven, all three had a profound influence on the burgeoning student interest during the sixties in ecology and conservation biology. Holm died suddenly in 1985 at age sixty-two.

### *The sixties: Repercussions of Terman’s “steeple of excellence”*

With Ira Wiggins’s retirement in 1964, and Roxana Ferris’s in 1963, the herbarium was approaching the end of an era, although given the lack of funding the main players might not have called it “golden.” Two separate attempts to get their own herbarium building on campus failed. To understand what would happen next we have to look at the larger university setting, the post-war financial problems of Stanford, and the tactics that would be used to bring the university from second or even third tier to the top of the heap. The recent (1997) book by Rebecca S. Lowen, *Creating the Cold War University: The Transformation of Stanford*, documents the background to these events.

A central figure to the story is Frederick E. Terman, selected as provost by President Sterling in 1954, who came with a background of demonstrated success in obtaining federal contracts. Stanford’s engineering school, of which Terman was dean, had well over \$1.5 million in government contracts by 1955 and was recognized as one of the best in the country. The physics and statistics departments also had significant government patronage. To insure this kind of success, university administrators (according to Sterling and Terman) had to concentrate on “steeples of excellence,” that is, fields of research that had national importance and would attract government grants. Faculty should produce more Ph.D.s, and they should support them by obtaining outside funding. Four departments had this potential but were not fulfilling it: biology, chemistry, geology, and economics. They were told to change.

Victor Twitty, head of the biology department in 1962, objected directly to President Sterling about pursuing only the “steeples” in biology, citing the importance of breadth in undergraduate instruction and the importance of the department’s grants from private donations. Twitty, however, was at a disadvantage. In 1957 the department had ranked only thirteenth on a nationwide survey. Terman planned to rectify this by creating steeples in the fields of oceanography, biomedicine, and biochemistry—all nationally significant fields in which there were strong funding possibilities. He had little interest in the Natural History Museum and had not funded it for years.

In 1964 tensions in the department were high. Rumors had been circulating in other biology departments that Stanford would eliminate its Division of Systematic Biology. Some curators from other institutions even wrote asking about the distribution of certain collections. The biology faculty, who seem to have had no idea any such plan was contemplated, now appear exceedingly naive when one reads their letters. As late as May 6, 1965, Richard Holm, then division director, responded to Wil-



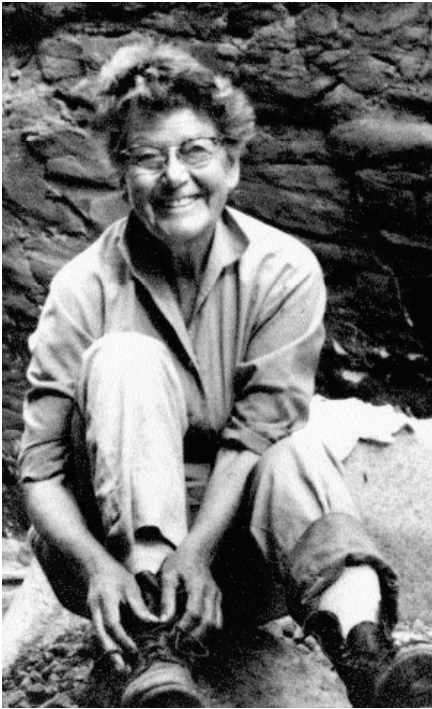
*Richard W. Holm, ca. 1950-1951.*

liam Steere, director of the New York Botanical Garden, that “there is no intention of disposing of or putting on indefinite loan any part of the Herbarium. . . . Only the, as yet unforeseen and unforeseeable, action of the higher administration could put an end to systematics.”<sup>4</sup>

Twitty had retired in 1962 and the new head, Clifford Grobstein, was a developmental biologist who was sympathetic to the administration’s plans to de-emphasize morphology, descriptive ecology, and systematics. However, Grobstein left Stanford in less than two years, becoming dean of the newly-formed school of medicine at UC-San Diego. Donald Kennedy became acting chair and initiated the search for a new head. The department’s choice was rejected by the administration, even after it had been made public. This wrist-slapping was repeated when President Sterling called together an outside review committee in the early summer of 1965 to assess the biology department in the context of the entire university, including particularly its interactions with the chemistry department and various departments in the Medical School.<sup>5</sup> The big players on the committee included biochemist Arthur Kornberg and geneticist Joshua Lederberg, both from the Medical School.

Curator of Zoological Collections George Myers, a respected ichthyologist who brought in grant money and produced numerous doctoral students, complained strongly to Sterling about the push toward biomedical and biochemical fields to the exclusion of the more traditional biological

## Roxana Stinchfield Ferris



*Roxana Stinchfield Ferris collecting in the Arroyo San Antonio, Sierra Gigante, Baja California. March, 1960. Photograph by Annetta Carter.*

Ferris, as can be inferred from hints previously given, was a mainstay of the herbarium. Her official, full-time job lasted 47 years, but she was a student assistant three additional years, and she continued in many capacities after her retirement. John Thomas, her colleague and staunch admirer, wrote “Although the titular curators came and went, Roxy ran the place.” That is not to say she was always there; she did a tremendous amount of fieldwork, collecting some 14,000 specimens, often with many duplicates that were traded to other herbaria.

Ferris received her A.B. degree in 1915 and her A.M. in the following year with a thesis on the “bird beaks,” otherwise known as *Cordylanthus* and at the time as *Adenostegia*. Her husband, Gordon Ferris, was an entomologist who studied the scale and sucking insects such as lice and aphid. They married in 1916, when both started working for Stanford. They had one daughter, Beth, born in 1917. Roxy’s mother lived with them and cared for Beth. Roxy’s professional titles did not come as quickly as the men around her, but eventually she did become Assistant Curator, Associate Curator, Curator, and finally Curator Emeritus. In addition to co-authoring Abrams’ *Flora of the Pacific States*, Ferris wrote three popular books, *Death Valley Wildflowers*, *Flowers of the Point Reyes National Seashore*, and *Shrubs of the San Francisco Bay Region*. Ferris officially retired in 1963, and shortly thereafter had a heart attack. But she kept working at the herbarium until the early seventies and died at age 83 in 1978.

studies. On June 26, 1965, after hearing of the outside review committee he wrote, “Many men — even in the street — recognize that the greatest biological problems of the human race no longer involve biomedicine, but instead overpopulation, food resources, and the destruction and poisoning of man’s complex biological and physical environment by man himself. Because it is the most insidious and imminent, and least understood by biomedical men, the last of the three is the worst and most pressing of all. . . . To attack these associated problems of environment, increasing numbers of ecological-taxonomic biologists who know whole floras and faunas and who operate in muddy boots instead of lab coats, are and will be necessary. . . . These are not worked-out fields. They are new and challenging ones. . . . Is Stanford to discard the training of such highly necessary men in favor of adding eagle-feathers

to administrative headdresses, according to the number of Nobel scalps hung on the Stanford Indian’s belt?”<sup>6</sup>

Sterling was not persuaded by Myers’ arguments. In a memo to Fred Glover, the president’s assistant, Terman outlined how he felt a response to Myers should be worded. As way of introduction he wrote the following, “Myers is a hard working but not particularly bright biologist in the Jordan tradition who specializes in fish. Among his colleagues he is noted as an individual who easily gets all worked up about an issue, and who is therefore at times a difficult personality. . . . Systematics is the present day version of the old naturalist type of biology of Jordan, Campbell, Peirce, etc., and I know that the people in this field at Stanford (and also elsewhere) are on the defensive and feel underprivileged and underrecognized.”<sup>7</sup> On at least one other occasion Terman had belittled faculty who differed with him rather than addressing their concerns. When senior member of the classics department Hazel Hansen begged to differ with his standards for department funding, he privately dismissed her as a “single woman—lonely—frustrated.”<sup>8</sup>

In any event, the upshot of the review committee was a decision endorsing Terman’s vision of the department’s future, encouraging the elimination of the department’s work in systematics, and suggesting Paul Berg, a biochemist in Stanford’s medical school,

for department chair. Berg made his acceptance of the offer contingent on nine new appointments and the construction of a new, million-dollar laboratory. Whether Terman would have met Berg's requests is unclear because Berg soon withdrew his name from consideration. In the vacuum it was agreed to appoint the acting chair permanently; Donald Kennedy had proven adept at interaction skills. Nevertheless, Kennedy was obligated by lack of support funds to find appropriate homes for the natural history collections; there was no way to keep them without caring for them properly.

Terman, in his determination to do what he felt best for the university, had failed to talk with the scientists and department he wanted to change. There is evidence that none of the systematic biologists at Stanford knew of Terman's and Sterling's plans even as late as January 1965. Ehrlich, Holm, Myers, Raven, and Twitty all wrote memos to department head Grobstein in answer to his request as to how best answer a letter of concern about the rumor of the division's demise.<sup>9</sup> Not one of them had any idea the rumor was accurate. Grobstein left Stanford before answering the letter and it fell to Kennedy as acting head to write, "I can see no cause for concern over the fate of systematics at Stanford."<sup>10</sup> Of course, by June of the same year, the cat was out of the bag after Sterling's review committee made their official recommendation for the termination of the division.

### *Recent developments*

As we have seen, population biology survived the Terman years and, indeed, flourished, albeit in a direction that necessitated doing without the specimen collections. It didn't work for some; Peter Raven left, George Myers retired, John Thomas attempted to work at both Stanford and the Academy. Several faculty kept small teaching collections, such as the herbarium at Jasper Ridge started by Thomas and the butterfly collection that Paul Ehrlich maintains. The loss of the collections has hurt the department in a variety of ways, as one might expect.

David Ackerly, who studies aspects of plant evolution by means of DNA sequencing, can receive one-day air delivery of iced plant specimens from far-flung botanical gardens for his molecular work. Fresh material works better for his DNA work than dried specimens. But he adds, "molecular systematics, which has grown enormously in the last decade or so, is always strongest at institutions that have large collections. Specimens are the basic library. . . . It would be difficult right now for Stanford to build a program in molecular systematics if it wanted to, because we have no collections as a foundation."<sup>11</sup>

The proximity of the Academy and Berkeley collections is important to Ackerly and his students. There is currently an effort to get plant specimen data from herbaria on-line; some specimens will even be scanned. When this comes to pass, access to the data from participating institutions will be easier to use but will not be a substitute for a physical specimen.

## Peter H. Raven

As a high school student in San Francisco, Raven had received early encouragement for his interest in botany from the staff at the Academy of Sciences; in fact, he had become a member at age eight. Later he majored in botany at UC-Berkeley, did his doctoral work at UCLA, and post-doctoral work at the British Museum and Kew Gardens. After coming to Stanford in 1959, Raven participated in anthropologist Kimball Romney's studies in Chiapas, Mexico, where he worked with Dennis Breedlove and Brent Berlin on the ethnobotany of the Tzeltal Indians. All the Chiapas specimens eventually came to the Dudley Herbarium.

Raven considers the work of conservation biologists and systematists crucial to understanding the species and habitat extinctions that we are currently undergoing. He is an expert on the evening primrose family, *Onagraceae*, but he has become equally well-known as a generalist who sees the importance of relationships between fields.

In 1971 Raven left Stanford to become professor of botany at Washington University and director of the Missouri Botanical Garden. Under his leadership, the Garden has sponsored the largest private research effort in tropical plant biology in the world, and has gained a reputation as one of the pre-eminent botanical gardens in the country. Raven has become known as a world leader in conservation efforts in the tropics. He retains his contacts at Stanford and usually returns once a year to give a lecture.

Ward Watt also regrets the loss of the natural history collections. He, too, is interested in the mechanisms of evolutionary change, and uses butterflies as his medium rather than plants. Though he agrees that the collections had to be transferred once the university stopped their funding, he

## John H. Thomas

John Thomas came to Stanford as a graduate student in 1948 after four years at the California Institute of Technology, having spent his youth in Poland and New England. In 1949 he did his masters thesis on the taxonomy and distribution of the *Onagraceae* of the Sonoran Desert. In 1950 he worked with Ira Wiggins in Alaska. He was a curatorial assistant in the Dudley Herbarium during his graduate student years, with a break for active duty in the United States Naval Reserves, 1951-1952. In 1956 he took a position as instructor at Occidental College. In 1958 the Dudley Herbarium received a National Science Foundation grant to curate some of the larger collections and Thomas was hired back as assistant curator to work on the Harvey and Gautier herbaria and the Engler reprint collection.

Thomas's Ph.D. dissertation on the vascular plants of the Santa Cruz Mountains was completed under Wiggins in 1959. It was published two years later by Stanford University Press. At the end of the first paragraph in the preface he writes, "This flora will, I hope, acquaint at least a few more people with the plants around them, and perhaps thus serve as a stimulus, however slight, toward more permanent protection of our environment." Twenty years later, in a summary of his research interests he wrote, "A comprehensive, competent, and current understanding of the biota of the world is a necessary basis for all of biology. One aspect of

this is the preparation of manuals dealing with the plants and animals of particular areas. Such works are increasingly necessary for ecological studies, sound conservation practices, utilization of biotic resources, realistic land-use planning, etc. as well as being of intrinsic interest and worth in themselves." This, of course, was not the kind of work that Provost Terman had in mind for the biology department.

Nevertheless, Thomas moved up the professional ladder. In 1962, Ferris's last year, Thomas was made associate curator of the Dudley Herbarium. Then, on her retirement, he became curator, 1963-1972; and director, 1972 to his retirement in 1995. His teaching responsibilities reflect similar advancement: lecturer, 1961-1969; associate professor, 1969-1977; and professor, 1977-1995. After the herbarium was transferred to the Academy, Thomas spent approximately one day a week there. Throughout his university career he was active on many university and professional committees. He was a book collector and friend of the library, amateur hand-press printer, and historian (he maintained the archives of the botany segment of the Division of Systematic Biology in his office, including correspondence files all the way back to Dudley). Using his own Roman Catholic faith as leverage, he criticized Pope Paul VI's encyclical forbidding the use of contraceptives for birth control and lectured both Catholic and public audiences about the dangers of the world's overpopulation. Since his retirement he has been incapacitated by chronic illness.

*In 1996, the year after his retirement, John Thomas transferred to the University Archives the papers that he and his predecessors had maintained of the botanical branch of the Division of Systematic Biology. This includes some 120 linear feet of correspondence, subject files, department records, teaching files, and photographs. The correspondence dates back to Dudley and includes complete files for Abrams, Ferris, and Thomas himself. The collecting notebooks for all Dudley Herbarium personnel were transferred with the specimens to the California Academy of Sciences.*



*John H. Thomas leads a class field trip (on mosses and ferns), Big Basin Redwoods State Park, November 22, 1981. Photograph by Richard Jeffers.*

feels the decision not to fund them was ill-advised. There was “a very narrow-minded view of systematic biology that was prevalent among many experimental biologists at the time . . . and the trouble with that misapprehension (and it was a misapprehension) was that though the subject had stagnated for a long time it was just about to go into a major conceptual overturn of which Paul [Ehrlich] was one of the early pioneers. . . . Paul’s innovation was a renewed emphasis on multiple character sets and the quantitative handling of characters with digital computers . . . [his] thesis was on the higher classification of the butterflies, and was one of the first doctoral theses ever to use large numbers of morphological characters and to use the computer as an explicit tool in the analysis.”<sup>12</sup>

Watt is currently involved in creating a Stanford- and Academy-based Center for Evolutionary Studies that would emphasize, on the one hand, the strengths in systematics of the Academy collections and staff and, on the other hand, the Stanford faculty who are involved in the study of ecological process and evolutionary dynamics. He believes the two facets are essential for effective environmental management. “People who are studying evolutionary and ecological dynamics [must] learn more about the systematics of their creatures and assimilate those viewpoints more into their own approaches. And in turn, systematists [must] understand more about process. . . . In order to do that, you need both a world-class museum and a world-class group of people looking at the dynamics.” He is hoping the two institutions will eventually offer a joint advanced degree program. If he is successful, it will fulfill Provost Miller’s hope that students might benefit from the transfer of the herbarium to the Academy.

#### ENDNOTES

- 1 William F. Miller to George Lindsay, California Academy of Sciences, letter, 7/26/74. In John H. Thomas papers, Stanford Univ. Archives, 96-174
- 2 David Starr Jordan to William R. Dudley, letter, 7/23/1891. In *The Stanford Illustrated Review*, June 1932, p. 386
- 3 David Ackerly interview, 1/27/98. Stanford Univ. Archives, 98-266
- 4 Richard Holm to William Steere, letter, 5/6/65. Stanford Univ. Archives, Division of Systematic Biology records, SC256/2/5
- 5 President Wallace Sterling to Dean Robert Sears, memo, 6/15/65. Stanford Univ. Archives, F. Terman papers, SC160/III/4/11
- 6 George Myers to Wallace Sterling, letter, 6/26/65. Stanford Univ. Archives, F. Terman papers, SC160/III/4/11
- 7 Frederick Terman to Fred Glover, memo, [ca. 6/27/65]. Stanford Univ. Archives, F. Terman papers, SC160/III/4/11
- 8 Frederick Terman, notes on conversation with Hazel Hansen, 11/25/55. Stanford Univ. Archives, Wallace Ster-

- ling papers, SC216/II/1/22
- 9 Paul Ehrlich, Richard Holms, George Myers, Paul Raven, and Victor Twitty to Clifford Grobstein, letters, 12/22/64 - 1/13/65. Stanford Univ. Archives. Division of Systematic Biology papers, SC256/2/5
- 10 Donald Kennedy to James E. Bohlke, et. al., letter, 1/27/65. Stanford Univ. Archives, F. Terman papers, SC160/III/4/10
- 11 David Ackerly interview, 1/27/98. Stanford Univ. Archives, 98-266
- 12 Ward Watt interview, 2/25/98. Stanford Univ. Archives, 98-266
- 13 Constance, Lincoln, “The Years of Preparation, 1911-1948.” *Taxon* 31(3): p. 403. August 1982.

All photographs used are from John Thomas’s papers (96-174), with the one exception of the interior of the Dudley Herbarium, ca. 1925, which is from the University Archives’ general photograph collection. The drawing of *Dudleya farinosa* is reproduced with permission of the publisher, from John Hunter Thomas, *Flora of the Santa Cruz Mountains of California* [Stanford University Press, 1961].



*Dudleya farinosa* (Lindl.) Britt. & Rose  
(The powdery dudleya). Drawing by  
Jeanne Russel Janish.

### A plant named to honor Dudley

In 1903, Dudley’s colleagues N. L. Britton and J. N. Rose at the New York Botanical Garden published a scientific reworking of the genus *Echeveria*, splitting the genus to include their newly-named *Dudleya* which is distinguished from *Echeveria* by flower-form and by having persistent basal leaves. It is a genus of about thirty species, all inhabiting western North America. Since Dudley supplied many of the specimens for them to work with, it was a particularly fitting honor.

Sara Timby, trained in anthropology and ethnobotany at UC Berkeley, has published on material culture of Athabascans, NWT, Canada; indicator plant species of uranium ores; and historical vegetation of the bay area. She also wrote the book *The Orchid Observed: Five Centuries of Botanical Illustration . . .* (1983). She is a life-long mountaineer who has made numerous ascents in the U.S., Canada, and Europe. She catalogs manuscripts for Stanford’s Department of Archives and Special Collections.