

The Making of a Flora for Arizona, 1901-1951, or, Why Arizona Flora is Published by the University of California¹

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Professor John James Thornber, who came to Arizona in 1901 and was among the first resident botanists in the Territory, quickly recognized the need for a flora of Arizona. In a memo to the President of the University of Arizona, he wrote, "Little is known concerning the number and distribution of our flora and fauna and practically nothing with respect to their ecological significance and biological relations. Up to this time no systematic study of the plants or animals has been attempted, and though many scientists, some of note, have made extensive collections from time to time during the past forty or fifty years within the present territorial limits, the work has always, of necessity, been of a fragmentary nature. . . . Considering the above and also the fact that no advanced scientific progress can be made until something proximate is known as to the number, character and distribution of species within our borders. . . . I have felt justified in beginning the Botanical Survey of Arizona."² While begin it he did, end it he did not, and Arizona did not have its first flora for forty years.

After he received a master's degree at the University of Nebraska in 1901, Thornber worked at the University of Arizona until his retirement in 1943, as botany teacher, botanist of the Agricultural Experiment Station, and Dean of the College of Agriculture. In spite of his busy schedule, he devoted himself to building up the University of Arizona herbarium, and added 100,000 specimens in the 42 years of his tenure at the University.³ He was well regarded in the

community. D. T. MacDougal, director of the Carnegie Institution's Desert Laboratory on Tumamoc Hill just west of Tucson, characterized Thornber as "a man of very good common sense" whose opinions on irrigation and plant cultivation were well worth listening to.⁴

In pursuit of his work on the flora of Arizona, Thornber took a leave of absence from the University in 1911 and 1912 to visit major herbaria in the eastern United States, particularly the Gray Herbarium at Harvard and the U.S. National Herbarium at the Smithsonian Institution, both of which had extensive holdings of Arizona plants. But after his return to Arizona, Thornber became bogged down, as has many a botanist before and since, in the taxonomy of cacti. At one point, MacDougal wrote to J. N. Rose, who, with Nathaniel L. Britton, wrote a magnificent, multi-volume treatment of the Cactaceae, "Professor Thornber is busy trying to make a key of the cacti and especially of the opuntias for his 'Flora of Arizona' and seems to be paying a good deal of attention to the seeds and seems also to be very much disturbed about a lot of material that will not go into any of the present species."⁵ Two years later, Thornber was still hung up on the cacti, and Rose complained to MacDougal that Thornber claimed he had fifty new species of *Opuntia* from Arizona.⁶ MacDougal replied that Thornber "is disposed to complicate matters a little bit with respect to cacti, and I am losing enthusiasm about his work and his scheme for a flora of Arizona."⁷

Little was heard about the flora of Arizona until 1927, when Ivar Tidestrom, a Swedish-born botanist who had already written *Flora of Utah and Nevada* (1925), appeared on the scene, evidently eager to take up the task of preparing a flora for Arizona. Forrest Shreve, plant ecologist at the Desert Laboratory, was to write a chapter on the vegetation of Arizona for Tidestrom's book, and Thornber was to prepare keys and descriptions of the grasses.⁸

Tidestrom's career is closely tied to that of Edward L. Greene, one of the great mavericks of American botany. Greene was independent of mind and tireless in pursuit of new species, but in the long run, his contributions were overshadowed by his eccentricities, which included his belief in the fixity of species; his insistence on strict priority of plant names going back before the time of Linnaeus, even though such a policy is virtually unworkable; and his publication of hundreds of new species without any attempt to work them into the fabric of existing knowledge (Ewan 1950).

Tidestrom appears to have been a satellite in Greene's rather eccentric orbit. In 1891 Tidestrom enrolled at the University of California in Berkeley, where Greene taught botany. Although Tidestrom started out as an engineering student, he took botany courses from Greene and soon switched from engineering to botany. Greene left the University in 1895 for a teaching position at the Catholic University of America, and Tidestrom followed in 1897,

¹Letters quoted in this paper are in the archives at the Arizona Historical Society, Tucson (AHS), the University of Arizona Library Special Collections (SC), or the Herbarium of the University of Arizona (H).

²J. J. Thornber to F. Y. Adams. 31 December 1901 (H).

³University of Arizona News Bureau, 23 November 1962 (H).

⁴D. T. MacDougal to F. W. Oliver, 24 March 1910 (AHS).

⁵D. T. MacDougal to J. N. Rose, 24 June 1914 (AHS).

⁶J. N. Rose to D. T. MacDougal, 20 May 1916, (AHS).

⁷D. T. MacDougal to J. N. Rose, 24 May 1916 (AHS).

⁸F. Shreve to D. T. MacDougal, 23 May 1927 (SC).



J. J. Thornber



Ivar Tidestrom



Thomas H. Kearney

receiving his Ph.D. a year later. Their paths diverged for a few years, when Greene left the Catholic University to go to the Smithsonian Institution in 1903, and Tidestrom went to the U.S. Department of Agriculture's Bureau of Plant Industry in 1904. While at the Smithsonian, Greene identified plant collections made on Forest Service land. It was a large project, and Tidestrom took over the work in 1915, shortly before Greene died (Ewan 1950, Tidestrom and Kittell 1941, Dayton and Blake 1957).

In the meantime, Tidestrom had collected in the West, in Utah in 1907 and 1908, in Arizona in 1908 and 1909, and in Colorado in 1910. In his job at the Bureau of Plant Industry, he found the lack of floristic manuals for the western states frustrating and often had to "search volumes of Railroad Surveys and other books for descriptions of species" (Tidestrom and Kittell 1941). This frustration led him to work on keys for a series of floras of western states (Dayton and Blake 1957), which resulted in publication of *Flora of Utah and Nevada* in 1925 and to further work on a flora for Arizona and New Mexico.

By the time he started field work on the Arizona flora, he was just seven years away from retirement and had been behind a desk for many years. Evidently he was no longer much of a field botanist, and he nearly became lost in the Santa Catalina Mountains on a visit to Tucson in May 1927. Shreve wrote to MacDougal that Tidestrom "left the trail about 100 yards below Mud Springs and went down to the stream to get water. He then kept along the stream and bore off to the east, apparently making no effort whatever to get back to the trail. His descent soon brought him into Sycamore Flats in the Bear Canyon drainage, where he spent Friday night. On Saturday morning he climbed a hill and decided to go down Bear Canyon to the desert. As you well know, this is a difficult operation, and it took him about a day and a half to accomplish it. I believe that he must have been somewhat affected by the heat or by unaccustomed exercise. . . I am afraid that he is not quite as tough as we had believed, nor as capable of looking out for himself under the blue sky as we had supposed."⁹

Tidestrom continued to work on a flora for Arizona for

the next 14 years. By 1931, he had made enough progress that Shreve could inform a colleague, "Tidestrom is apparently just about ready with his parts of his flora of Arizona but is having difficulty in getting Blake to finish up the composites. Hitchcock has finished the grasses and Maxon refuses to move on to ferns until Blake makes further progress. I fear that I shall not live long enough to see the book."¹⁰ The following year Shreve wrote W. R. Maxon at the U.S. National Herbarium, "I am still hoping that Tidestrom will come along with his Flora of Arizona before I am too old to sit up and use it."¹¹ Three years later in 1935, Shreve wrote to A. S. Hitchcock at the Smithsonian Institution, "We are still hoping very much that Tidestrom's work on the Flora of Arizona is making progress and that we will soon have it. After working so many years in this region without a manual or a flora it will indeed be a welcome book."¹² Long-time Arizona botanists must have been disheartened indeed at the news from Hitchcock that Tidestrom had retired in 1934 and that Thomas H. Kearney was starting work anew on the flora of Arizona.¹³

Kearney had arrived at this point in a round-about way. A childhood interest in wildflowers—"and not always the handsome or showy ones, either," as he said—led him to study botany at the University of Tennessee and at Columbia University. He worked under several of the leading botanists of the day—N. L. Britton, F. Lamson-Scribner, F. V. Coville—from 1893 to 1900. However, his conscience bothered him because his work had so little useful application, and he turned from taxonomy to agriculture. For the next 44 years he worked in the Bureau of Plant Industry as a cotton breeder. (In recognition of his work in breeding long-staple Pima cotton, which proved to be of great benefit to Arizona agriculture, the University of Arizona awarded him an honorary doctorate in 1920). Kearney, who was stationed at Sacaton, Arizona, became interested in the Arizona flora around 1925, and with Robert H. Peebles and other colleagues, made many plant collecting trips around

⁹F. Shreve to P. C. Standley, 22 September 1931 (SC).

¹⁰F. Shreve to W. R. Maxon, 15 January 1932 (SC).

¹¹F. Shreve to A. S. Hitchcock, 1 May 1935 (SC).

¹²A. S. Hitchcock to F. Shreve, 9 May 1935 (SC).

⁹F. Shreve to D. T. MacDougal, 23 May 1927 (SC).



Forrest Shreve



Robert H. Peebles



John Thomas Howell



Elizabeth McClintock

the state on weekends while working at breeding cotton the rest of the week (Kearney 1958a, 1958b).

In 1935, Kearney wrote to Shreve that he hoped to complete the manuscript of the flora within two or three years. He added, "I have heard rumors that Professor Thornber is working actively on the same project and I would like to have your opinion, confidentially, as to whether there is any likelihood of his completing the undertaking. In a way, he has priority in the matter, having begun working on the flora of the state long before Peebles and I started collecting."¹⁴ Shreve, ordinarily a patient man, responded, "Professor Thornber is not actively working on the same project and there is no likelihood of his attempting it. He has recently been given a heavier teaching schedule and there is no chance for him to go to the eastern centers for work. He has been planning and promising to prepare a flora of Arizona for the last 27 years, and I think his intentions are no better now than they were in 1908."¹⁵

Although Kearney and Peebles had officially taken over the work on the flora of Arizona, the situation was far from simple, as Shreve informed MacDougal in 1937. "Tidestrom has a manuscript which is nearly complete and took it with him when he retired from the Agricultural Department. Thornber says he is working on a Manual of the Arizona Flora. Kearney and Peebles are working very energetically with the National Herbarium as their principal foundation and they are so reticent that neither of them has been near the herbarium at the University of Arizona."¹⁶ Thus, 36 years after Thornber first proposed his Botanical Survey of Arizona, there were not one, but three, separate floras of the state in the making.

In 1940, Arizona was one of seven states that had never had a statewide floristic manual (Blake and Atwood 1942), and Arizona botanists were desperate. In teaching his botany classes at the University of Arizona, Lyman Benson was forced to use the manuals prepared by Philip A. Munz and by Willis L. Jepson for California. Although 60 percent of the spring-flowering plants were covered by these books,

no more than 20 percent of the summer-flowering plants were, and for woodland and forest plants, he was forced to depend on Wootton and Standley's *Flora of New Mexico*, by then 25 years old, or on Gray's Synoptical Flora of North America, which was then 45 years old (Benson 1944).

Finally, in 1941, Tidestrom's flora appeared. Co-authored with Sister Teresita Kittell, who collected in southern Arizona for Tidestrom after his retirement, the book was a flora of both Arizona and New Mexico. It treated 3,975 species and included a brief summary of important plant collectors in Arizona and New Mexico and a discussion of vegetation belts, written not by Shreve, but by Tidestrom himself.

The book was not well received. Herbert L. Mason, then professor of botany and director of the herbarium at the University of California, Berkeley, wrote, "the work is ambitious and as such worthy but one cannot read it without a feeling of regret. Much of the advance in botany of the past fifteen years is ignored" (Mason 1942). Cornelius H. Muller, taxonomist of the genus *Quercus*, cited examples of such work: Philip A. Munz on Onagraceae, Carl Epling on Labiatae, and C. Leo Hitchcock on *Lycium*, among others. Muller pointed out that the species descriptions were too brief to be useful and that many of the keys did not work and some even contradicted the species descriptions. Nomenclatural flaws also spoiled the usefulness of the book. Muller concluded that the price—\$6.00—was excessively high considering the book's content and appearance (Muller 1942).

Luckily, Arizona botanists did not have to wait long for Kearney and Peebles' flora of the state. In 1942, *Flowering Plants and Ferns of Arizona* was published by the U.S. Department of Agriculture and sold for \$2.00. In addition to keys, the book contained a chapter on the vegetation of Arizona by Forrest Shreve and a history of plant collection in Arizona. Twenty-two experts prepared taxonomic treatments of various groups: for example, S. F. Blake did the Compositae, Carl Epling the Labiatae, Ivan M. Johnston the Boraginaceae, Jason R. Swallen the Gramineae.

Flowering Plants and Ferns of Arizona was marked by Kearney's humane and scholarly touch throughout. His

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¹⁴T. H. Kearney to F. Shreve, 9 May 1935 (SC).

¹⁵F. Shreve to T. H. Kearney, 28 May 1935 (SC).

¹⁶F. Shreve to D. T. MacDougal, 1 May 1937 (SC).

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continued interest in the useful aspects of botany was shown by the hundreds of references to economic botany, including forage plants, poisonous plants, Indian uses of plants, tree products, wildlife food, erosion control, hay fever plants, honey plants and weeds. No detail was too small to escape his interest. He reported that Mrs. Collom found that the fruits of *Berberis haemaetocarpa* make a delicious red jelly, and noted that the violet flowers of *Lupinus sparsiflorus* color extensive areas in favorable seasons.

Lyman Benson, who reviewed *Flowering Plants and Ferns* for *Madrone* and for *American Midland Naturalist*, said that the book was "as welcome as one of the torrential rains which come now and then in the desert and break the long intervening periods of drought" (Benson 1944). He described the manual as up-to-date and comprehensive and praised Kearney and Peebles for their wide knowledge of plants in the herbarium and in the field (Benson 1942).

Almost as soon as the book was published, Kearney began preparing a revision, and in 1946 he wrote to L. M. Pultz, head of the botany department at the University of Arizona, that he had completed the first draft of the revision of *Flowering Plants and Ferns of Arizona*.¹⁷ (Kearney had retired from the U.S. Department of Agriculture in 1944 and since then had lived in San Francisco and worked out of the California Academy of Sciences.) He hoped that the USDA would be able to publish the second edition, too, although the assistant chief of the Bureau of Plant Industry warned him that no funds for publication would be available for 12 to 18 months.¹⁸ By June 1948 it became apparent that the Bureau of Plant Industry could not publish the revision "owing to the increased cost of publishing and the large backlog of manuscripts accumulated during the war,"¹⁹ and Kearney began to search for another publisher. The Smithsonian Institution could not publish the manuscript for similar reasons.²⁰ W. S. Phillips, the new head of the botany department at the University of Arizona, approached the University of Arizona Press on Kearney's behalf. Phillips stressed that the first edition of *Flowering Plants and Ferns* (2,500 copies) had sold out in five years and that botany classes at the state-run university and colleges would use 100 copies of the new flora each year.²¹ The Press, however, estimated that the cost of publishing the book would be \$20,000, and they reluctantly turned the project down because of its expense.²²

Finally, in 1949, Kearney turned to the University of California Press. To reduce the cost of publication, he had made extensive changes in the format of the book, including use of numbered rather than indented keys, omission of citation of place of publication of species, and omission of Shreve's "Vegetation of Arizona." Such changes justified the selection of a new title for the book, and he called it

Arizona Flora.²³ Later that year the University of California Press accepted the manuscript for publication,²⁴ and up to the time it went to press, Kearney continued revising it, putting in new distributional information and adding more species.

All did not go smoothly, however. In August 1950 Kearney reported to Phillips, "They told me at the University of California Press last week that they were ready to start printing the Flora of Arizona when their printers walked out because the University janitors are on strike and are picketing the buildings. What foolishness!"²⁵ When galley proof began arriving for correction in April 1951, Kearney was still adding species, including a new species of *Castilleja* collected by Phillips in the White Mountains the summer before.²⁶ Finally Kearney was able to tell Phillips that copies of *Arizona Flora* would be on sale for \$7.50 on August 30, 1951.²⁷ The first edition sold out by 1959.

After the edition was exhausted, *Arizona Flora* was issued with a supplement prepared by John Thomas Howell and Elizabeth McClintock of the California Academy of Sciences. The supplement was based largely on notes and papers written by Kearney before his death in 1956. Many of the same collaborators who had contributed to the first edition supplied additional information. *Arizona Flora* still sells steadily, according to the University of California Press, and neither its value nor its price (\$38.50) have diminished.²⁸

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¹⁷T. H. Kearney to L. M. Pultz, 26 March 1946 (H).

¹⁸T. H. Kearney to L. M. Pultz, 3 June 1946 (H).

¹⁹T. H. Kearney to J. R. Schramm, 23 June 1948 (H).

²⁰T. H. Kearney to J. R. Schramm, 23 June 1948 (H).

²¹W. S. Phillips to R. L. Nugent, 17 June 1948 (H).

²²R. L. Nugent to M. P. Vosskuhler, 23 June 1948 (H).

²³T. H. Kearney to J. R. Schramm, 23 June 1948 (H).

²⁴T. H. Kearney to W. S. Phillips, 15 September 1949 (H).

²⁵T. H. Kearney to W. S. Phillips, 22 August 1950 (H).

²⁶T. H. Kearney to W. S. Phillips, 13 April 1951 (H).

²⁷T. H. Kearney to W. S. Phillips, 27 June 1951 (H).

²⁸Since this paper was written, *Arizona Flora* has gone out of print.