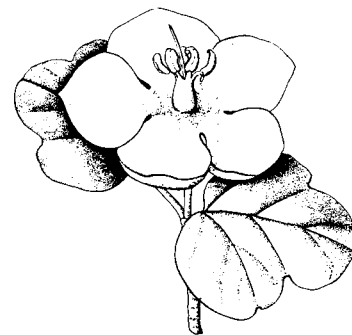


# FREMONTIA

A Journal of the California Native Plant Society



CNPS 25th ANNIVERSARY

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# WILLIAM BURKE CRITCHFIELD

by Connie Millar

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William B. Critchfield died July 11, 1989. He left a legacy unparalleled in forest genetics. Bill made major contributions to understanding genetic variation, hybridization, growth and development, biogeography, paleobotany, systematics, and taxonomy of forest trees, especially pines. In each of these fields, Bill's pioneering work earned him the position of world authority. These studies were mainly spinoffs from groundwork Bill was meticulously laying for his primary interest: unraveling the evolutionary history of conifers. And it is his evolutionary syntheses that best reveal Bill's breadth as geneticist and scholar.

Bill was born November 21, 1923, in Minneapolis, Minnesota, but grew up in North Dakota, where his father had been among the state's pioneering settlers. He attended North Dakota Agricultural College (now North Dakota State University) before serving in the Navy during World War II. Upon returning from the South Pacific, he entered the University of California at Berkeley, where he completed his bachelor's degree with honors in forestry in 1949 and his doctorate in botany under Herbert Mason in 1956.

Bill's first position after receiving his doctorate was at Harvard University, where he worked from 1956-1959 as a geneticist with the Maria Moors Cabot Foundation for Botanical Research. In 1959, he moved back to Berkeley, California, to join the Pacific Southwest Forest and Range Experiment Station of the U.S. Forest Service. He divided his time for the next twenty-eight years between his office in Berkeley and the herbaria and arboreta of the Institute of Forest Genetics in Placerville. In 1972, he was appointed a Pioneering Research Scientist, an honor reserved by the Forest Service to promote the work of its most outstanding scientists. As one of only seven pioneering scientists in the agency, Bill was given *carte blanche* to pursue research of his own choice and design.

Bill's inferences about conifer evolution were grounded in an intimate knowledge of genealogical variation. His early work on geographic variation and subspecific differentiation in lodgepole pine was seminal in western conifers. He observed and measured morphological, physiological, and biochemical variation, and their relation to the environment. He was convinced of the importance of studying species in their natural habitat, despite difficulties of access. In his studies of lodgepole pine in the 1950s, for example, he traveled the range of the species from California to Canada to Colorado by public buses, setting off from remote terminals to reach his forest destination on foot.



Bill Critchfield in May 1979. Photograph by Lauren Fins.

He was alone on one collecting trip woods in British Columbia when he fell out of a tree, broke his back, and had to crawl to a road for help.

When Bill first joined the Forest Service, the Institute of Forest Genetics was engaged full-swing in a program of interspecific hybridization. Pine hybrids were being produced *en masse* and tested for their use in forestry and tree breeding. Jack Duffield, who had been at the Institute from about 1945-1955 had begun to use crossability as a measure of phylogenetic relationship among taxa. Bill continued this work with his own program of hybridization among pines and firs. Bill was unrelenting in his demand for experimental controls in this work. He insisted that only crosses using the same seed parent were comparable, and he was not willing to measure crossability by accepting the convention of counting the number of cones or seeds produced after artificial pollinations. He insisted instead on growing progeny in the nursery to confirm or reject their hybrid condition himself.

## An Authority on Pine Hybridization

Bill soon became the leading authority on interspecific hybridization of pines. In publications from 1963 to 1988, he shed light on hybridization and evolutionary relationships among almost all of the

subsections of *Pinus*, including the southern and western yellow pines, *Contortae*, *Sylvestres*, the California big-cone and closed-cone pines, the foxtail pines, and the white pines. He even studied hybridization among the western firs.

Bill's quest to determine evolutionary relationships among pines led him also to study their biogeography. Bill became the world's foremost authority on the geographical distribution of pines, and, with Elbert Little, he published a monumental book of maps that detailed the range of every pine species. This book may well be the most widely cited reference in forestry. At a regional level, Bill undertook the enormous task of mapping all eighty-six tree species in California. In this book, Bill and co-author Jim Griffin mapped the species in great detail, including both major and minor populations of the species, and even stands of only a few trees. For anyone who has relied on finding disjunct or tiny stands of California trees, Bill's map book is meticulous in its accuracy. The availability of such detailed information has allowed a standard of accuracy unprecedented elsewhere. These books are widely used references in many fields in addition to forestry, and although they were published years ago, they are still being requested.

Bill was a world authority on pine systematics and taxonomy. Since pines were first scientifically described by Linnaeus in 1753, over 400 classification systems have appeared. Of these, George Russell Shaw's evolutionary treatment of pine classification in 1914 set a new standard. With Elbert Little, Bill continued in the line of Shaw, and published a revised evolutionary classification of pines in 1966 and 1969. This system incorporated modern information on genetic variation in pines and on evolutionary relationships based on pine hybridization work. Furthermore, Critchfield and Little brought the nomenclature of the genus up to botanical code, an awesome task because invalid Latin names for pines proliferate wildly in the literature.

Critchfield and Little's classification stands as the accepted authority for pines. New species that have been discovered since its publication corroborate the classification. Bill became the world authority in identifying pine species, and he spent many hours with razor blade and dissecting scope making identifications for colleagues. Bill's botanical training amply prepared him for investigations of anatomy, and he had lifelong interests in morphology and ontogeny as subjects in themselves.

In later years, Bill realized that only when genetic information is combined with the paleohistoric record can present phylogenetic relationships of taxa be elucidated. This came as a personal revelation to Bill, and he would shake his head in amazement when he recounted how, as a graduate student in evolution, the thought of taking a course in paleobotany had never occurred to him.

Bill more than made up for that lack in his past during his last ten years. With unbridled enthusiasm, he dissected the literature on the Quaternary history of North American conifers, and, in case after case, made sense of anomalous patterns of genetic variation by documenting historic migrations and refugia. His seminal papers on this topic, culminating in "Impact of the Pleistocene on North American Conifers," were ahead of their time, with implications still not fully appreciated by the scientific community. He had begun work on similar topics for Japan and Western Europe that unfortunately he will be unable to write.

## A True Scholar

Bill's scientific contributions went far beyond the professional papers he published and lectures he presented. He devoted long hours to related botanical efforts. At the Institute of Forest Genetics in Placerville (now named in his honor), he reorganized and expanded the collection of herbarium specimens into what is probably the most complete pine herbarium in the world. To the National Forest System of the Forest Service, he contributed much of his time promoting the Research Natural Areas program, a system of ecological reserves that protects representative vegetation communities of the region. And when the California Native Plant Society was first documenting the extent of rare and endangered plants in California, Bill was a major contributor.

The many scientists who were peers or apprentices of Bill remember him as much for how he conducted science as for his accomplishments. Bill was foremost a scholar. He was relentlessly thorough and devastatingly honest. His literature searches left no lead untraced; his reviews of manuscripts were incisive. Once when he was showing me around the basement of the Institute of Forest Genetics, he pointed to a large collection of musty boxes containing cones from an old study. "I'm glad I kept those," he said, "because when I reviewed a manuscript recently, the author was building a shaky hypothesis that I wanted to test independently. I brought out all these old cones and measured them, and sure enough, the hypothesis didn't hold water." After his death, in poking through the herbarium, I came across an old note on a napkin from a colleague, asking Bill a casual question about pine morphology. Bill's five-page typed reply, complete with references, was stapled to the napkin.

Bill was one of the best investments the Forest Service ever made, if for no other reason than the cost/benefit ratio was so high. He made his most significant contributions without recourse to highly technical equipment. His most sophisticated laboratory tool was a dissecting scope, and his annual supply budget consisted mostly of new packs of razor blades. His most well-honed tool was the English language. He had a life-

long love affair with words. He treasured them, savored them, and used them with precision.

The epithet most often used for Bill in addition to “scholar” is “mentor.” Bill gave equally of his time and scholarship to others. Although he was never formally a professor or teacher, his professional judgment was sought by peers and students alike, but students especially would beat a path to his door, and he always received them. He had a warm and generous relationship with students, and was equally capable of being serious or frivolous with them. Completely missing from Bill was any formal facade or aloofness that drives students from seeking counsel of many established scientists. Bill loved his adventures with students, and he enjoyed telling jokes on himself as much as they did. Over the years, summer interns at the Institute of Forest Genetics developed nicknames for Bill, including “Critch,” “Mr. Bill,” and “Mr. Institute.” These names show the range of feeling students felt for Bill, from endearment to profound respect.

Bill was the glue that held his colleagues together in the Forest Service. They gathered around him at coffee,

they gravitated toward his raspy voice in the hall. He was the one who regularly gave parties for his colleagues at his small bachelor apartment in Berkeley. His hospitality was legendary, despite his grumbling about people “staying past 10 p.m.”

After his retirement from the Forest Service in early 1988, Bill set forest genetics aside. He had too much to do. He had his lifelong loves of theater and mystery novels to indulge. And he had ambitions for many new pursuits. He began taking college courses in literature, history, and art; he was working on a world gazetteer of maps for famous crimes, fictional and real, at the time of his death. In his hobbies as well as his profession, Bill applied his characteristic thoroughness and honesty.

Bill had a bad heart. In 1974, and Christmas 1988, he had major heart attacks. A three-way bypass after his last attack gave the promise of many more productive years. On July 11, 1989, however, a sudden massive heart attack took his life. Critch died doing one of the things he loved best, attending theater in San Francisco.

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Connie Millar, *Institute of Forest Genetics, Berkeley, California*

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## GROWING NATIVES: THE PACIFICA IRIS

by Nevin Smith

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Most of the plant subjects in this column have come directly from the wild or, at most, they have only grown in nurseries for a few generations. We are about to consider one of the happiest exceptions to the norm: the Pacifica, or Pacific coast hybrid, iris. Unlike the manzanita, ceanothus or many other popular natives, iris long ago captured the fancies of systematic amateur and professional hybridizers, with spectacular results. Though they still retain many more visible links to their ancestors than do, say, the modern tea roses, their flowers now come to us in colors and forms never contemplated by Mother Nature.

### Iris in the Wild

Let us begin with a look at the ancestral species, each well worth growing in its own right. Three species have figured most prominently in the Californian hybrids, and another three or so have made minor contributions to the rich variety we now see. All belong to the sub-genus *Californicae* within the much larger genus *Iris*. Fortunately for would-be hybridizers, they are remarkably interfertile, making abundant natural hybrids where their ranges overlap. Each provides

variations on an easily identifiable theme in growth and bloom: they are long-lived perennials with fountains of tough, evergreen, rather narrow and tapered leaves astride a branched rhizome at or just below ground level. Blooming stems arise in spring or early summer, each tipped by two or more bracts from which the flowers emerge. The floral structure is a bit confusing at first, but really quite simple. There is a basal tube, three falls, or downward-curving outer segments, three standards (the upright, inner segments), and three spreading, petal-like style-branches, ending in forked crests, which hover over the falls and nearly hide the stamens. Colors range from deep purple to white or yellow; often there is an eye, or pencilling, of contrasting color on each fall.

The best known of the ancestral species is Douglas or coast iris, *Iris douglasiana*. It is a familiar sight on hills and bluffs facing the coast from beyond the Oregon border to Santa Barbara County. It seems to thrive equally in woods and coastal meadows, though the more exposed plants seem more prolific in both growth and bloom. It may be encountered as a six-inch-high mat or as a narrow fountain two feet or more tall. In or out of bloom, it is most easily recognized by relatively broad (to about one inch) leaves, each dark and shiny

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## California Native Plant Society

### Dedicated to the Preservation of the California Native Flora

The California Native Plant Society is an organization of laymen and professionals united by an interest in the plants of California. It is open to all. Its principal aims are to preserve the native flora and to add to the knowledge of members and the public at large. It seeks to accomplish the former goal in a number of ways: by monitoring rare and endangered plants throughout the State; by acting to save endangered areas through publicity, persuasion, and, on occasion, legal action; by providing expert testimony to government bodies; and by supporting financially and otherwise the establishment of native plant preserves. Much of this work is done through CNPS Chapters throughout the State. The Society's educational work includes: publication of a quarterly journal, *Fremontia*, and a quarterly *Bulletin* which gives news and announcements of Society events and conservation issues. Chapters hold meetings, field trips, and plant and poster sales. Non-members are welcome to attend.

The work of the Society is done by volunteers. Money is provided by the dues of members and by funds raised by chapter plant and poster sales. Additional donations, bequests, and memorial gifts from friends of the Society can assist greatly in carrying forward the work of the Society. Dues and donations are tax-deductible.

## EDITORIAL

1990 is the California Native Plant Society's twenty-fifth anniversary. We are like a hiker on a trail through flowery mountains, pausing to look back from where we have come and ahead to where we are going.

We are proud of what we, as a far-flung statewide group, have accomplished over the past years; it has been a tremendous group effort. There are many small contributors and many heroes and heroines. The sum of individual, chapter and state efforts warrants a celebration and a moment of reflection.

The Society recently has embarked on a long range planning process that will enable us to establish priorities for our program and set our course for the next few years. In reviewing the past work of the Society, the long range planning committee has identified four broad goals of CNPS:

- to provide a knowledge base about California's native flora
- to promote the beauty and benefits of our native flora
- to generate greater awareness of threats to California flora
- to protect the native flora and its habitat

With the population of California growing so fast, we face a major challenge to carry out our mission of preserving California's native flora. To increase our effectiveness, we must have new sources of funds to expand our program; we need to grow in size and influence. We also want to retain the volunteer character and "extended family" atmosphere that we enjoy today. We will need every member's help, their ideas, imagination and participation.

The flowers along the trail ahead need wise stewardship now more than ever.

Suzanne Schettler, CNPS President

## NOTES ON CONTRIBUTORS

**Ken Berg**, former CNPS botanist, directs the Endangered Plant Program of the Department of Fish and Game.

**Catherine Caufield**, well-known journalist and author of *In the Rainforest*, lives in San Francisco.

**Gary M. Fellers** is research biologist at Point Reyes National Seashore and research associate, University of California at Davis.

**Steve McCormick** is vice-president and regional director of the California field office of The Nature Conservancy.

**Mary Meyer** is the CNPS Forest Planner working on U.S. Forest Service planning.

**Connie Millar** is research geneticist at the Institute of Forest Genetics, Pacific Southwest Range and Experiment Station, Forest Service, USDA, Berkeley.

**Virginia Norris**, a botany student at Sonoma State, leads the CNPS rare plant monitoring project at Point Reyes.

**Jake Sigg** is president of the Yerba Buena Chapter of CNPS and former head gardener of Strybing Arboretum.

**James P. Smith, Jr.**, Dean of the College of Science at Humboldt State University in Arcata, was chairman of the Rare Plant Program from 1978 to 1986.

**Nevin Smith** is a frequent contributor to *Fremontia* and proprietor of the Wintergreen Nursery in Watsonville.

**Ledyard Stebbins** is Professor Emeritus in Genetics, University of California at Davis, and a past president of CNPS.

THE COVER: The Panamint daisy (*Enceliopsis covillei*), once thought to be extinct and now on the CNPS list 1b, is represented on the CNPS logo and is shown in this photograph by William T. Follette.