



FREMONTIA

A JOURNAL OF THE CALIFORNIA NATIVE PLANT SOCIETY



IN THIS ISSUE:

WHITE ROOT (*CAREX BARBARAE*) *by Michelle L. Stevens* 3

ETHNOECOLOGY OF SELECTED CALIFORNIA WETLAND PLANTS
by Michelle L. Stevens 7

INTO THE SUNLIGHT: FROM FUNGUS TO FLOWER IDENTIFICATION
by Bob and Barbara Sommer 16

THE RARE CALIFORNIA CLUB-MOSSES *by Gordon Leppig* 20

AUGUST FRUGÉ, 94, DEAN OF UNIVERSITY PRESS PUBLISHERS
by Harlan Kessel 23



FREMONTIA

VOL. 32, NO. 4, OCTOBER 2004

Copyright © 2004
California Native Plant Society

Distributed in November 2004

Linda Ann Vorobik, Editor
Bob Hass, Copy Editor
Susan Cotterel, Designer
Justin Holl & Jake Sigg, Proofreaders

CALIFORNIA NATIVE PLANT SOCIETY

Dedicated to the Preservation of the California Native Flora

The California Native Plant Society (CNPS) is a statewide nonprofit organization dedicated to increasing the understanding and appreciation of California's native plants, and to preserving them and their natural habitats for future generations.

CNPS carries out its mission through science, conservation advocacy, education, and horticulture at the local, state, and federal levels. It monitors rare and endangered plants and habitats; acts to save endangered areas through publicity, persuasion, and on occasion, legal action; provides expert testimony to government bodies; supports the establishment of native plant preserves; sponsors workdays to remove invasive plants; and offers a range of educational activities including speaker programs, field trips, native plant sales, horticultural workshops, and demonstration gardens.

Since its founding in 1965, the traditional strength of CNPS has been its dedicated volunteers. CNPS activities are organized at the local chapter level where members' varied interests influence what is done. Volunteers from the 33 CNPS chapters annually contribute in excess of 87,000 hours (equivalent to 42 full-time employees).

CNPS membership is open to all. Members receive the quarterly journal, *Fremontia*, the quarterly statewide *Bulletin*, and newsletters from their local CNPS chapter.

Fremontia logo (by L.A. Vorobik) reprinted from The Jepson Manual, J. Hickman, Ed., 1993, with permission from the Jepson Herbarium, UC. © Regents of the University of California.

CALIFORNIA NATIVE PLANT SOCIETY

CNPS, 2707 K Street, Suite 1; Sacramento, CA 95816-5113

(916) 447-CNPS (2677) Fax: (916) 447-2727

cnps@cnps.org

MEMBERSHIP

Membership form located on inside back cover;
dues include subscriptions to *Fremontia* and the *Bulletin*

Mariposa Lily	\$1,000	Supporting	\$75
Benefactor	\$500	Family, Group, International . . .	\$45
Patron	\$250	Individual or Library	\$35
Plant Lover	\$100	Student/Retired/Limited Income .	\$20

STAFF

Sacramento Office:

Executive Director Pamela C. Muick, PhD
Development Director Michael Tomlinson
Membership Coordinator Marin Lemieux
Sales Manager Paul Maas
Finance Manager Lois Cunningham

At Large:

Fremontia Editor Linda Ann Vorobik, PhD
Sr. Policy Analyst Emily Roberson, PhD
So. California Regional Botanist Ileene Anderson
East Bay Conservation Analyst Jessica Jean Olsen
Interim Rare Plant Botanist Misa Ward
Vegetation Ecologist Julie Evens
Vegetation Ecologist Anne Klein
San Bruno Mtn. Project Coordinator Joe Cannon
Legislative Advocate Vern Goehring
Legal Advisor Sandy McCoy
Website Coordinator John Donaghue
Bulletin Editor Michael Tomlinson

BOARD OF DIRECTORS

Carol Baird, Jim Bishop, Vern Goehring, Steve Hartman, Diana Hickson, Lynn Houser, Lynne Kada, David L. Magney, Sandy McCoy, J. Spence McIntyre, Carol Witham (President)

PROGRAM DIRECTORS

CNPS Press Holly Forbes and Gail Milliken
Conservation David Chipping
Horticulture Peigi Duvall
Posters Bertha McKinley and Wilma Follette
Rare Plants Ann Howald
Vegetation Todd Keeler-Wolf

CHAPTER COUNCIL

Alta Peak (Tulare) Joan Stewart
Bristlecone (Inyo-Mono) Sherryl Taylor
Channel Islands Lynne Kada
Dorothy King Young (Mendocino/Sonoma Coast) Jon Thompson
East Bay Joe Willingham
El Dorado Amy Hoffman
Kern County Laura Stockton
Los Angeles/Santa Monica Mtns Betsey Landis
Marin County Bob Soost
Milo Baker (Sonoma County) Reny Parker
Mojave Desert Tim Thomas
Monterey Bay Robert Hale
Mount Lassen Jim Bishop
Napa Valley Marcie Danner
North Coast Larry Levine
North San Joaquin Gail Clark
Orange County Sarah Jayne
Redbud (Grass Valley/Auburn) Chet Blackburn
Riverside/San Bernardino counties Katie Barrows
Sacramento Valley Diana Hickson
San Diego Dave Flietner
San Gabriel Mtns Lyn McAfee
San Luis Obispo Charles Blair
Sanhedrin (Ukiah) Chuck Williams
Santa Clara Valley Georgia Stigall
Santa Cruz County Janell Hillman
Sequoia (Fresno) Warren Shaw
Shasta Dave DuBose
Sierra Foothills (Tuolumne, Calaveras, Mariposa) Patrick Stone
South Coast (Palos Verdes) Barbara Sattler
Tahoe Michael Hogan
Willis L. Jepson (Solano) Allison Fleck
Yerba Buena (San Francisco) Mark Heath

MATERIALS FOR PUBLICATION

CNPS members and others are welcome to contribute materials for publication in *Fremontia*. See the inside back cover for manuscript submission instructions.

Printed by Business Point Impressions, Concord, CA

CONTENTS

GUEST EDITORIAL	2
-----------------------	---

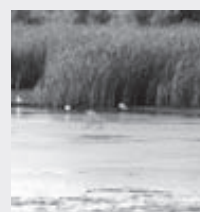


WHITE ROOT (*CAREX BARBARAE*) by Michelle L. Stevens 3

White root (Carex barbarae) is a cultural focal species, important to both California Indian basketweavers and restoration ecologists. Traditional resource management of white root produces long, straight rhizomes to make baskets. Additionally, historic tending of sedge beds created an open and park-like riparian physiognomy. Continued sedge bed tending and gathering is both culturally and ecologically important.

ETHNOECOLOGY OF SELECTED CALIFORNIA WETLAND PLANTS by Michelle L. Stevens..... 7

California wetlands were as much the breadbasket of indigenous culture as Mesopotamia was to the Middle East. Common wetland plants provide food, medicine, habitat for fish and wildlife, and provide the natural resources for clothing, houses, boats, cordage, and beautiful California Indian baskets. This article reviews some of the more common wetland plants along with their ecological traits and traditional uses.

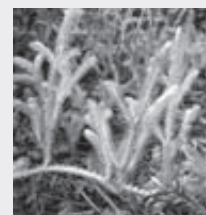


INTO THE SUNLIGHT: FROM FUNGUS TO FLOWER IDENTIFICATION by Bob and Barbara Sommer..... 16

After 30 years in amateur mycology, the authors became interested in wildflowers. They compare the two fields in terms of locations where items are sought, collecting practices, methods of identification, sensory properties, field guides, and sketching.

THE RARE CALIFORNIA CLUB-MOSSES by Gordon Leppig..... 20

Club-mosses are distant spore-bearing cousins of ferns and conifers. This diverse lineage is at least 300 million years old and occurs throughout much of the world. California, however, has only two species and both are rare. The author describes the life history of these unusual species, their habitats, and the conservation strategies employed to protect them.



AUGUST FRUGÉ, 94, DEAN OF UNIVERSITY PRESS PUBLISHERS by Harlan Kessel 23

August Frugé, director of University of California Press, passed away in July of this year. Along with being a California Native Plant Society founding member and past president, he was an amazing individual, a great champion of the environment, and considered by many to be the dean of university press publishers.

THE COVER:

This ethnobotanical cornucopia includes Miwok coiled baskets, a soap root brush, a pine needle basket, necklaces made of dried madrone berries, a necklace made of gray pine nuts and beads, and basket materials. Photograph by M.L. Stevens.

GUEST EDITORIAL: LIVING IN A TENDEd LANDSCAPE—"RESTORYING" NATURE AND CULTURE

The restorying of landscape means bringing back the language and oral maps encoded in stories, recreating the sacred ecology of native lands. For example, the Nez Perce coyote stories recreate trails along the Columbia River, with key landmarks, inhabited areas, hunting and fishing grounds, and even major disturbances like volcanoes, fires, and floods included in the story. Consider the words from Agnes-Baker Pilgrim, spiritual leader and elder of the Takilma Indians from Grants Pass, Oregon, who encourages us to "be spiritually strong and speak out for those who cannot speak." She said: "When our ancestors left this earth, leaving us their unfinished job, you know they walked in beauty by the evidence of their care for our Mother Earth. Rivers were pristine, habitats carefully kept in balance, used only in moderation, knowing all things were connected and part of the fabric of life and had a spirit. They knew how to use fire in an ethnic way of reforestation and the times of rotation of cycles using the cool burnings. Every year the salmon rites were traditionally experienced, teaching reciprocity, honoring the salmon. Their villages were near rivers and streams; in so doing their tables were always set, always giving thanks in prayer."

California is largely a culturalized landscape. The biological and landscape diversity is equaled by cultural diversity. At the time Europeans began recording events on the landscape, large scale landscape changes, disease, and cultural decimation had largely erased the historic indigenous signature. We are now experiencing both a cultural and ecological renaissance in California. However, these two great healing efforts, healing the people and healing the land, are dancing to very different drums.

The paradigm of a tended landscape, largely influenced by indigenous people, is missing from the dominant ecological restoration paradigm. Historical ecology recognizes the significance of culturalized ecosystems that have been influenced and modified by human activities to varying degrees over time. Restoration goals need to incorporate human-influenced reference communities and the historic range of variability influenced by human activities. Eco-cultural restoration improves restoration success and conservation of culturally important species, and enhances cultural identity and integrity.

California marshes provided a rich bounty of materials, food, and medicine. California baskets, a cultural icon, represent connection to ancestors, community, and future generations. Plant resource use is imbued with ecological knowledge that takes many forms, spiritual as well as physical (Turner et al 2000—see resources listed on page 15). In addition, that knowledge has direct consequences—if harvesting is not sustainable, people cease to survive. Dennis Martinez says that old people burned every year so that "there would not be any widows." Fire was a tool for rejuvenation—it rejuvenated you, made you strong and healthy, made you live right. "We have an obligation to participate in world renewal—as we use up we give back" (Martinez 2002).

The knowledge that the California landscape was historically tended, culturally significant resources were sustainably harvested, and world renewal ceremonies such as the first salmon ceremony are still offered, provides a legacy of hope for all Californians. Humans have been and can be good stewards. Incorporating the resource knowledge and cultural practices of indigenous cultures may lead to more effective ecosystem restoration and management. Additionally, indigenous land management and gathering practices provide cultural benefits to California's diverse first nations.

Michelle L. Stevens

USEFUL WEBSITES AND CONTACT INFORMATION

Ethnobotanical resources:
See p. 15

**California Native Plant
Society (CNPS):**

www.cnps.org, with links to conservation issues, chapters, publications, policy, etc.

To sign up for "NPCC News," e-mail news on native plant science and conservation, send a request to npcc@cnps.org.

**For updates on conservation
issues:**

Audubon Society
www.audubon.org

Center for Biological Diversity
www.sw-center.org

Natural Resources Defense
Council
www.nrdc.org

Sierra Club
www.sierraclub.org

Wilderness Society
www.wilderness.org

For voting information:

League of Women Voters
www.lwv.org, includes online voter guide with state-specific nonpartisan election and candidate information.

US Senate
www.senate.gov

US House of Representatives
www.house.gov

California State Senate
www.sen.ca.gov

California State Assembly
www.assembly.ca.gov

To write letters:

President of the United States
The White House
1600 Pennsylvania Ave. NW
Washington, DC 20500

Senator Barbara Boxer or
Senator Dianne Feinstein
US Senate
Washington, DC 20510

Your CA Representative
US House of Representatives
Washington, DC 20515

WHITE ROOT (*CAREX BARBARAE*)

by Michelle L. Stevens

White root (*Carex barbarae* Dewey) is a significant basketry material for central California Native Americans, who use the long white rhizomes for the sewing strand in coiled baskets. Basketweaving continues to be a significant part of contemporary ethnic and spiritual identity for many California Indian people, and for many provides a critical connection to the land.

Prior to European settlement, white root was used by over one-third of California tribes for basketweaving (Merrill 1923). Baskets and basketweaving were central to the daily lives of California Indians, and contributed to over 50% of the entire material culture (Anderson 1996). This means that baskets or fiber comprised over half of all items made or used for clothing, bedding, cooking, eating, storage, harvesting, or hunting and fishing.

White root is a grass-like herbaceous perennial plant found in the understory of valley oak riparian woodlands of California (Figure 1), and is one of the most difficult plants for basketweavers to obtain due to privatization and elimination of traditional gathering sites. Today, riparian woodlands occupy only 5% of that known before Europeans settled California. Intact understory in riparian woodlands represents a small subset of remnant riparian habitat. Traditionally tended cultural sites represent an extremely scarce and non-renewable resource, with only a handful of continuously tended beds remaining.

Carex barbarae grows from Ventura County in southern California to southern Oregon (Hickman 1993), from sea level to just over 900 meters. The plants grow in riparian areas along streams

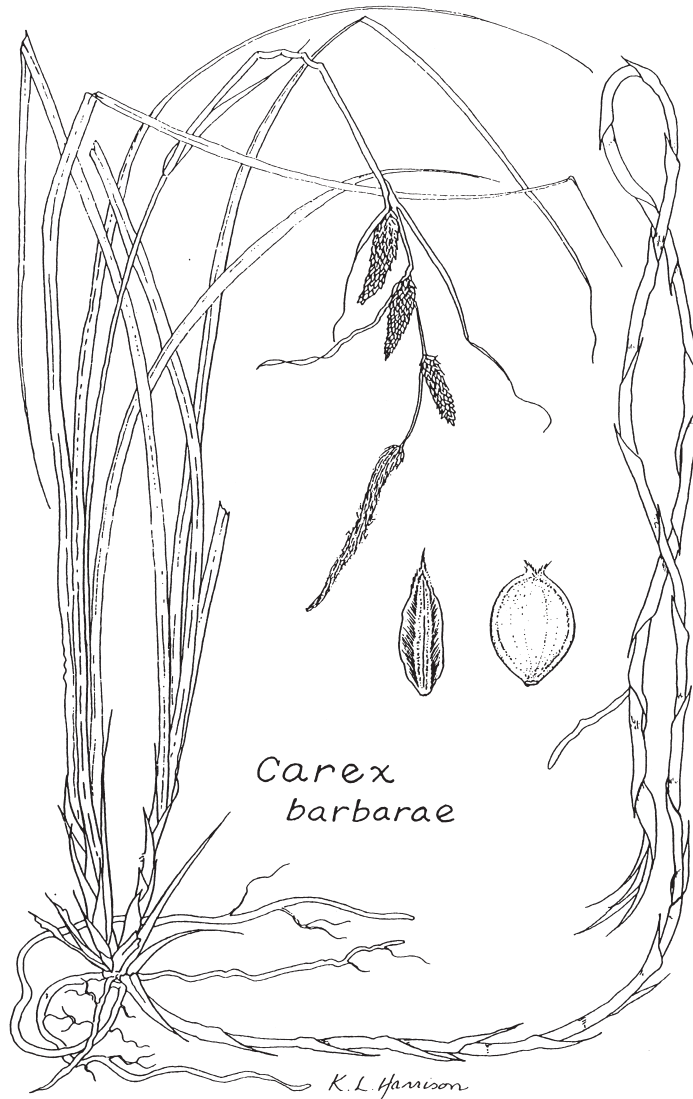


Figure 1: Botanical illustration of *Carex barbarae*. Note the long rhizome, used for basketweaving. Note also the awned scale subtending the perigynium, a diagnostic feature distinguishing *C. barbarae* from other sedge species. The culms are 3-10 dm tall. Illustration by K. Harrison.

ACKNOWLEDGEMENTS

The author would like to express appreciation to the many knowledgeable teachers who contributed to this and the following article: Members of the Sierra Native American Council, Kat Anderson, Mary and Sam Baugh, Patty Baye, Judy and Pete Bunting, Doris Case, Sarah Coran, Gen and Bob Denton, Ramona Dutschky, Arvada Fisher, Irene Huss, Gladys McKinney, Rita Nunes, Betty Shannon, Julie Tex, Norma Turner, and many other individuals that the author would like to thank personally. Thanks also to Kathleen Harrison for providing the exquisite illustration of *Carex barbarae*.

TABLE 1: CALIFORNIA INDIAN TRIBES USING WHITE ROOT IN BASKETS

Tribes Using White Root	Merrill (1923)	Kroeber (1925)	Elsasser (1978)	Bibby (1996)
Cahto			•	
Coast Miwok			•	
Costanoan			•	
Esselen			•	
Foothill Yokuts	•	•	•	
Kitanemuk	•			
Konkow				•
Lake Miwok	•		•	
Miwok	•			
Monache			•	
Nisenan				
Nomlaki				
Northern Chumash			•	
Northern Valley Yokuts	•	•	•	•
Panamint	•			
Patwin			•	•
Pomo	•	•	•	
Salinan				
Sierra Miwok			•	
Southern Valley Yokuts	•			•
Tubatulabal	•		•	•
Wailaki			•	
Wappo	•			•
Washo			•	•
Yuki	•			

and occasionally in areas that border on marshes, and on open or brushy slopes and valley bottoms that are wet in the spring. There is a strong overlap between tribes that use white root and the distribution of *Carex barbarae* (Figure 2). Twenty-two tribes within the range of *C. barbarae* are recorded as using white root in coiled baskets (Table 1). Altogether, 14 California tribes have territories that overlap the range of *Carex barbarae*, but do not use white root in their baskets.

PLANT CLASSIFICATION

The western scientific classification of plants differs from indigenous classification systems. From a Native American perspective, it is likely that rhizomes from as many as 13 different species were used for basketweaving, and all are known as “white root.” These species include *Carex amplifolia* Boott, *C. barbarae* Dewey, *C. buxbaumii* Wahlenb., *C. hassei* L. Bailey, *C. lanuginosa* Michaux, *C. lyngbyei* Hornem., *C. nebrascensis* Dewey, *C. obnupta* L. Bailey, *C. senta* Boott, *C. utriculata* Boott (previously *C. rostrata*), and *C. simulata* Mackenzie. Different species of sedges are impossible to distinguish in finished baskets, with the exception of *Carex obnupta*, which has distinctive protuberances on the rhizomes (Craig Bates, personal communication, 1998).

Many Indian people distinguish or classify white root by the color of the rhizomes and the location where the plants grow. The color of the rhizome is considered to be an important distinguishing feature in white root classification. In most cases, basketweavers prefer white-colored rhizomes over darker or brown rhizomes (Stevens, unpublished field notes, 1995–1998). Rhizomes growing in fine-textured soils such as clays and silts yield a darker rhizome (from off-white to brown),

and the rhizomes do not grow as long or straight. Indian people refer to these as “dirt roots,” and this material is not suitable for basketweaving.

TRADITIONAL RESOURCE MANAGEMENT

Traditional Resource Management (TRM) and Traditional Environmental Knowledge (TEK) are based on a tradition of respect and interconnection with the land. Dennis Martinez (1995) defines Traditional Environmental Knowledge as “an integrated body of spiritual and practical knowledge that has evolved over vast stretches of time through the successful adaptation of an indigenous people to their particular ecosystem.”

Traditional Resource Management practices include multiple species management, resource rotation, succession management, landscape patchiness management, and other ways of responding to and managing environmental uncertainty and optimizing sustainable cultural resource extraction (Berkes et al. 2000; Berkas 1999). These traditional systems have similarities to adaptive management with its emphasis on feedback learning, and its treatment of uncertainty and unpredictability intrinsic to all ecosystems (*Ibid.*).

In California, sedge beds are managed through selective harvesting, thinning, weeding, and digging to stimulate desired rhizome length and morphology. Traditionally-tended white root plants have rhizomes as long as 2 meters, whereas untended plants have short, twisted rhizomes. Figure 1 on page 3 illustrates the long, straight, peeled rhizomes gathered from traditionally-tended sedge beds, compared to the shorter rhizomes from untended beds.

Sedge bed management results in loose, homogeneous soil that allows free expansion of the rhizomes

and roots (Stevens, unpublished field notes, 1985–1988). White root plant density is maintained at approximately 0.5–1.0 meter spacing. Extra plants are removed and often transplanted into adjacent areas. Tending practices aerate the soil and may stimulate rhizome growth through pruning. Plants are harvested every two to four years; less than one-third of the plants are removed in any given harvest. The season for harvesting sedge rhizomes differs among California Indians and is dependent on where the plant is growing and its substrate. In general, rhizomes are harvested in the spring after the rains have subsided and when the ground is still moist.

Prayer, thanksgiving, and asking permission to dig are intrinsic components of traditional resource management, although the specifics vary among individuals and local traditions. Common elements include respect for life and recognition of the spirit and power in the plants. One Pomo basketweaver says, “You can’t separate the prayers and ceremonies and how you feel inside from the basket. Plants say, ‘I want human beings, when they harvest me, I want them to give me prayer. They have to sing songs for me, give me a ceremony.’ Ceremony is too important not to pass it on. All that information must be passed on to the younger generation.”

MATERIAL PREPARATION/WEAVING

White Root Gathering. Before digging the rhizomes, the shoots (leaves) of the sedge plants are cut to approximately 30 centimeters to avoid cutting hands on the sharp-edged leaves.

Preparation of Rhizomes. Rhizomes are debarked and split in two while fresh. Coils of 50–100 split rhizomes are coiled together, tied, and stored for approximately one

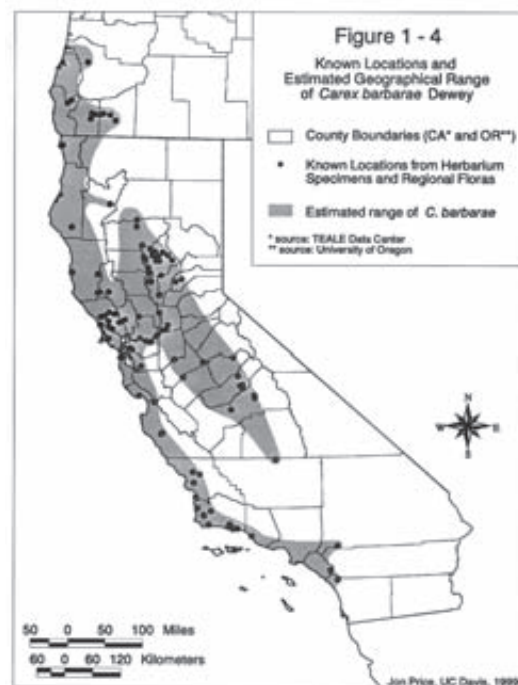


Figure 2. Map of distribution of generalized tribal territories of California Indians and the distribution of *Carex barbarae*. Basketweavers and basket weaving styles were specific to families, interspersed small tribelets among larger tribal or linguistic affiliations, and the specifics of local watersheds and plant materials. Sedges are not identified to species in finished baskets. Sedge rhizomes were often traded across relatively large distances.

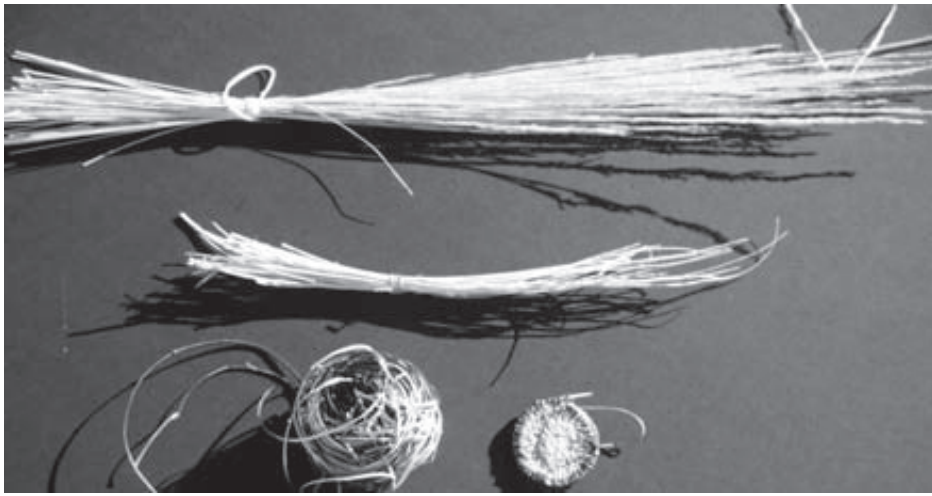
year to dry. Basket materials are stored in a semi-prepared state.

Weaving. Rhizomes are scraped and sized prior to weaving. The prepared rhizomes are then dipped in water and used as the sewing strand for coiled baskets.

Other Ethnobotanical Uses. Other uses of white root include gathering the shoots into a loose knot to hold worms for fishing or to gather eggs.

ECOLOGICAL IMPACTS

In the past, hundreds of thousands of rhizomes were harvested annually at a scale that preserved species diversity and ecosystem function in riparian areas (Stevens 2003; Stevens 1999). Sedge beds were managed for desired rhizome length and



Basketry materials for use in baskets. On the top, deergrass culms (*Muhlenbergia rigens*) are wrapped into the center of coiled baskets, often using white root for the sewing strand. Willow stems (*Salix* species), shown in the middle, are used for both warp and weft of all types of baskets, all over the world. Red bud (*Cercis occidentalis*) bark, shown on the bottom, is used as reddish brown design elements or for whole basket construction. Photographs by M.L. Stevens.



Weaving a coiled basket with white root. Willow sticks to be woven into the basket are tied in the foreground. Baskets are displayed at the monthly second Saturday basket demonstrations at Indian Grinding Rocks State Park.

morphology for basket weaving. A significant portion of the riparian forest understory was tended prior to European settlement.

The sedge bed area harvested would be equal to 2.4 hectares (5.9 acres) per tribelet (small extended family group) per year (Stevens 1999). It is likely that most areas with desirable rhizomes were harvested every two to four years, which maintained a lawn-like, grassy appearance under California riparian forests. Preferred white root sites would be tended each year by the same family group. Others could harvest in these areas only with permission. Ownership of sedge beds promoted careful tending and long-term sustainable harvests. Each area was cared for from generation to generation, and accountability was both to the ancestors and future generations.

Given the high population of native people in California, particularly in the low-elevation range of *Carex barbarae*, it is probable that most available plants in suitable soils were sustainably harvested. This Traditional Resource Management approach also reduced the roughness coefficient of California low-elevation rivers, which in turn expanded channel capacity and re-

duced flooding impacts. Due to its extensive underground root and rhizome system and high root-to-shoot ratio, *Carex barbarae* is frequently used as an understory plant in riparian vegetation, and as a non-structural bank stabilization plant. It is able to withstand drought and flooding, so it is very adaptable to California's highly variable Mediterranean climate.

REFERENCES

- Anderson, M.K., and M.J. Morotto. 1996. Native American land-use practices and ecological impacts. Sierra Nevada Ecosystem Project: Final report to Congress, Vol II. Assessments and scientific basis for management options. Centers for Water and Wildland Resources. University of California, Davis, CA.
- Berkes, F., J. Colding, and C. Folke. 2000. Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications* 10(5):1251-1262.
- Berkes, F. 1999. *Sacred Ecology—Traditional Ecological Knowledge and Resource Management*. Taylor and Francis Publishing. Philadelphia, PA. 209 pp.
- Clarke, C.B. 1977. *Edible and Useful Plants of California*. University of California Press. Berkeley, CA. 280 pp.
- Hickman, J.C. (ed.) 1993. *The Jepson Manual. Higher Plants of California*. University of California Press. Berkeley, CA. 1399 pp.
- Martinez, D. 2002. Indian burning. Traditional Indian burning, fire hazard reduction, and restoration forestry. *The New Settler*. P.O. Box 702. Mendocino, CA 95460.
- Merrill, R.E. 1923. Plants used in basketry by the California Indians. *University of California Publications in American Archaeology and Ethnology* 20:215-242.
- Stevens, M.L. 2003. Traditional Resource Management of White Root (*Carex barbarae*) by California Indians: Implications for Restoration. In Faber, P.M. (ed.). 2003. *California Riparian Systems: Processes and Floodplain Management, Ecology, and Restoration*. 2001 Riparian Habitat and Floodplains Conference Proceedings, Riparian Habitat Joint Venture. Sacramento, CA. 557 pp.
- Stevens, M.L. 1999. *The Ethnobotany and Autecology of White Root (Carex barbarae): Implications for Restoration*. PhD Dissertation. University of California. Davis, CA. 52 pp.

Michelle L. Stevens, 3349 St. Mathews Drive, Sacramento, CA 95821. mlstevens@prodigy.net



Wetlands of Liberty Island, Solano County, California. Photograph by D. Aldridge.

ETHNOECOLOGY OF SELECTED CALIFORNIA WETLAND PLANTS

by Michelle L. Stevens

Ethnoecology is defined as the study of human relationship with the local environment, whereas ethnobotany is the study of the direct inter-relationships between people and plants. Attributes of ethnoecology include “knowledge of ecological principles; use of ecological indicators; adaptive strategies for monitoring...and harvesting resources; effective system of knowledge acquisition and transfer; respectful and interactive attitudes and philosophies; close identification with ancestral lands; and beliefs that recognize the power and spirituality of nature” (Turner et al. 2000).

Wetlands in California have been tended and resources sustainably harvested for many generations. California Indians manipulated individual plants, plant populations, and habitats to change plant abundance, diversity, growth, longevity, yield, and quality to meet long-term cultural needs (Anderson 1996; Stevens 2003). These activities created a shifting mosaic of vegetation types. Intermediate-scale anthropogenic disturbance, including both species and habitat management by indigenous peoples, are likely to be key factors in influencing biodiversity, sustainability, and optimum resource utilization.

Traditional land management practices include multiple species management, resource rotation, succession management, landscape patchiness management, and other ways of responding to and managing environmental uncertainty and optimize sustainable cultural resource extraction (Berkes et al 2000; Berkes 1999). Traditional resource management by California Indians includes selective harvesting and burning of tules, multiple species management (cattails, rushes, sedges, bulrushes, fish, waterfowl, bird eggs), resource rotation, selective reed harvesting on a phenological and seasonal basis, burning



Cache Slough wetland, Solano County, California. Photograph by D. Aldridge.

senescent vegetation to stimulate new growth, spatial and temporal restriction of fish harvest during spawning, and landscape patchiness management. These traditional systems have similarities to adaptive management with its emphasis on feedback learning, and its treatment of uncertainty and unpredictability intrinsic to all ecosystems (*Ibid.*).

Burning and tending created open, structurally diverse wetland habitats with interspersed areas of open water, and emergent and seasonal wetland vegetation, with perennial grasslands and riparian woodlands on levees and terraces. Burning the landscape helped facilitate tule boat access and increased production of culturally significant plant and animal species. New shoots that emerged after burning were edible, sweet, and tender. Burning also produced supple stems for baskets, mats, lodges, boats, duck decoys, nets, clothing, and regalia.

Wetland tending practices also included the following: coppicing or pruning woody plants for straight stems; tilling and weeding soils to dig for and harvest rhizomes and geophytes; and seasonal and self-regulating sustainable harvest practices. Piecing together the presettlement extent and ecological impacts of burning and other tending practices must be done by a combination of the following: ethnographic interviews; soil profile and pollen analysis; a comparison of historic photographs and records; knowledge of wetland ecosystem suc-

cession; and knowledge of traditional uses of wetland plants and animals.

Culturally important plants and animals are important ecological indicators of good ecosystem health. The relationship that Native American Indians maintained with plants included protecting and “tending” favored plant species, using an array of pragmatic horticultural techniques and spiritual practices. On a larger scale, diverse communities of plants were managed to attract wild game, distract dangerous predators like grizzly bears, and encourage a variety of food crops, medicines, and plants used to support the material culture (Martinez 2002).

The California Indian Basketweavers Association (CIBA) has put a high priority on obtaining access to plant materials and prohibiting the use of herbicides on basketry materials. Land managers and restoration ecologists are beginning to incorporate traditional tending and gathering practices on both public and private lands.

RESPECTFUL RELATIONSHIPS WITH PLANTS

Traditional relationships with plants include asking permission to harvest and being grateful for the opportunity to gather and tend plants in the area. I have never been in the field with Indian people without witnessing this respectful attitude. We botanists often experience a reverent relationship with plants; there is still much more to learn from the traditional First Nation people of the area in which we live.

In my experience as both a student and professor, botany and plant ecology classes include the following: collecting plants; looking closely at them under a hand lens; dissecting them carefully to key them out; pressing specimens in a plant press; and further dissecting and identifying in the herbarium or

lab. I always teach my students to take a moment, ask permission, and express gratitude in their own ways before picking plants. This ensures they do not simply objectify the plants, but maintain a reverent connection despite a laboratory setting.

TRADITIONAL USES OF WETLAND PLANT SPECIES

The following ethnobotanical information on wetland plants in California is provided with great respect for the ancestors of place, the indigenous people who have taught me so much, and the plants themselves who have their own destiny and ancestors. The cultural diversity in the California landscape translates into a great deal of variability in uses of plants by the diverse language groups, tribelets, and regions in the state. The following information is a generalized synthesis of some of this information. All illustrations used are created by Ruth Mazur (<http://arimexpression.com>), except those for rush, camas, and wapato, from *The Jepson Manual*, used with permission from the Regents of the University of California.



The author, collecting respectfully. Photograph by B. Hare.

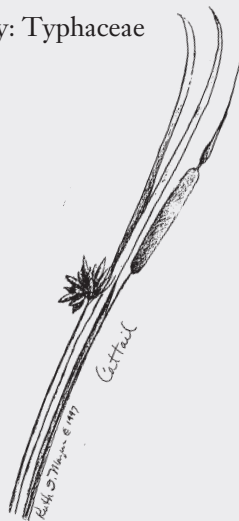
CATTAIL

Typha latifolia L.
broad-leaved cattail

T. angustifolia L.
narrow-leaved cattail

T. domingensis Pers.
southern cattail

Family: Typhaceae



All parts of the cattail are edible when gathered at the appropriate stage of growth. The young shoots are cut from the rhizomes (underground stems) in the spring when they are about 4 to 16 inches long. The raw young shoots are tasty both raw and steamed, and the stem base can be boiled or roasted like potatoes. The young flower stalks can be taken out of their sheaths and boiled or steamed just like corn (Clarke 1977; Roos-Collins 1990). Cattail pollen is a fine substitute for flour; it is a bright yellow or green color, and turns baked goods a pretty yellow color (which children love). The rhizomes (underground stems) and lower stems have a sweet flavor and can be eaten raw, baked, roasted, broiled, or ground into flour. One acre of cattails would yield about 6,475 pounds of flour (Harrington 1972). This flour would probably contain about 80% carbohydrates and around 6% to 8% protein (*Ibid.*).

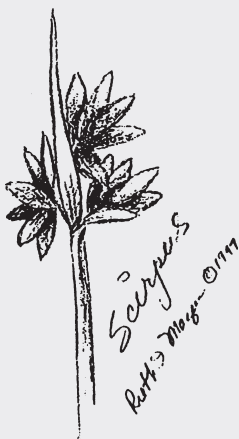
Flexible baskets are made of twined cattail (Barrett et al. 1933). Cattails and bulrushes were also twined to form mats of varying sizes for sleeping, sitting, working, entertaining, covering doorways, for shade, and a myriad of other uses. Some tribes used the leaves and sheath bases as caulking materials. Apaches used the pollen in female puberty ceremonies (Strike 1994). After dipping the spike in coal oil, the stalk makes a fine torch. The fluff can also be used as tinder, insulation, or for lining baby cradle boards. Lengths of cattail were plied into rope or other size cordage, and cattail rope was used in some areas to bind bundles of tule into tule boats. Air pockets or aerenchyma in the stems provide the buoyancy that makes cattail and tule good boat-building material.

TULE OR BULRUSH

Scirpus acutus Bigelow var.
occidentalis (S. Watson) Beetle
hardstem bulrush

S. californicus (C. Meyer) Steudel
California bulrush

Family: Cyperaceae



Bulrush is similar to the cattail in edibility, although it is purportedly sweeter.

The rhizome is used for the black element in basket design. Rhizomes are initially creamy white; they are soaked from 3 to 6 months with acorns and a piece of iron, ashes, or walnut husks until a dark brown to black color is obtained. The black and brown fibers are stored to dry, then woven as design elements into coiled baskets.

Both cattails and tules were used as insulating thatch for structures, large and small. Tule houses were common throughout many parts of California; the overlapping tule matters were well-insulated and rain-proof. Willow poles, arched and anchored into the ground and tied with cordage or bark, formed the framework. The walls are thatched with mats of tule or cattail and secured to the frame. Bulrush stalks are used to weave matting, as well as for bedding and roofing material.

Several California Indian tribes make canoes of tule stems bound together with vines from wild grape. Groups located near the California coast, on mud flats and in marshes, used tule to make large round mudshoes for their feet so they could walk without sinking. Duck decoys were made of tule.

Shredded tule was used for baby diapers, bedding, and menstrual padding. Women made skirts from tule. During inclement weather, men wore shredded tule capes, which tied around the neck and were belted at the waist.

RUSH

Juncus lesuerii Bolander
salt rush

J. effusus L.
soft rush

J. balticus Willd
baltic rush

J. textilis Buchenau
basket rush

Family: Juncaceae



Coiled basketry prevails in Southern California, with the mottled yellowish brown of basket rush providing a natural colored and variegated background (Turnbaugh and Turnbaugh 1986; Barrows 1977; Murphy 1959). Chumash baskets, from southern California, are made with rush stems for the tan color and roots for the black color (Timbrook 1997). The sewing material is made of basket rush (*Juncus textilis*) and the foundation material is made of Baltic rush (*Juncus balticus*).

Rushes are cut off at ground level, or at the length desired. The rush, in its natural state, furnishes a variety of colors: a deep red near the base, lightening in color upwards, passing through several shades of light brown, and ending at the top in a brownish yellow. Rush stems can be bleached in the summer sun for light tan uniform color. The deep brick-red color occurs under the leaf thatch or blanketing vegetation mat, and is often used alone as a design element.

Some southern California basketweavers dye the mature rushes black by steeping them for several hours in an infusion of either horned sea-blite (*Suaeda calceoliformis* (Hook) Moquin) or bush seepweed (*Suaeda moquinii* (Torrey) E. Greene). Rush species are also dyed yellow in an infusion of indigo bush (*Psoralea emoryi* (A. Gray) Rydb.) (Barrows 1977; Merrill 1923).

Rush stems can be harvested throughout the year. Preparation for basketweaving involves splitting each rush stalk into three equal portions. The individual pieces are then trimmed to a uniform thickness, then soaked in water before weaving baskets.

WAPATO

Sagittaria latifolia Willd.
tule potato, wapato

Family: Alismataceae



Wapato tubers were collected in shallow water from a canoe, or people waded into ponds or marshes in the late summer and loosened the roots with their toes. The roots would rise to the top of the water where they were gathered and tossed into floating baskets. Today the tubers are harvested with a hoe, pitchfork, or rake. Tubers are baked in fire embers, boiled, or roasted in the ashes. Tubers are skinned and eaten whole or mashed. After roasting, some tubers were dried and stored for winter use. Wapato has been used medicinally as a headache remedy, for rheumatism, as a dermatological, and as a laxative.

The tubers of *Sagittaria* species were eaten by many different indigenous groups in the Pacific Northwest (Kuhlein and Turner 1991). The tubers were also widely traded from harvesting centers to neighboring areas. Families owned large *Sagittaria* patches, and ownership was claimed by clearing the patches. Family groups would camp beside their claimed harvesting sites for a month or more.

The Chinese, on coming to California, used *Sagittaria* for food and are believed to have cultivated and extended its range (Mason 1957), as a species of *Sagittaria* grows in China and is harvested there. *Sagittaria latifolia* is extensively cultivated in the San Francisco Bay area in California to supply the Chinese markets, and the tubers are commonly found for sale.

CAMAS

Camassia quamash (Pursh)
E. Green ssp. *breviflora* Gould
camas

C. quamash (Pursh) E. Green
ssp. *quamash*
camas

Family: Liliaceae



Warning: Death camas (*Zigadenus venenosus* S. Watson var. *venenosus*) can be confused with edible camas bulbs and is toxic; be sure of your identification of camas bulbs before eating them!

Camas is one of the most important “root” foods or geophytes of western North American indigenous peoples, from southwestern British Columbia to Montana, and south to California (Kuhnlein and Turner 1991; Turner and Kuhnlein 1983). The two subspecies of camas mentioned above occur in California. People traveled great distances to harvest the bulbs, and bulbs may have been transplanted beyond their range (Turner and Efrat 1982). Except for choice varieties of dried salmon, no other food item was more widely traded (Gunther 1973).

Traditionally, camas bulbs were almost always cooked in earth ovens for 24-36 hours. Within the past 100 years camas bulbs have also been cooked by stovetop methods (Turner and Kuhnlein 1983). The lengthy cooking enhances the sweetness of camas, converting inulin to fructose. Before sugar and other sweets were introduced by European traders, sweetening agents were in short supply among native peoples, and camas was highly valued in this capacity (*Ibid.*).

Annual controlled burning was used to maintain an open prairie-like habitat for optimum camas production. Areas were harvested only every few years. Turf was lifted out systematically in small sections and then replaced after only larger bulbs had been removed. The bulbs were dug with a pointed digging stick; bulbs were broken up and replanted.

Many of the traditional camas gathering sites have been converted to agriculture, and camas bulbs are now hard to find. Restoration of camas prairies and access to camas bulbs are priorities of many Indian people. At one time, according to ethnobotanist Eva Murphy (1959, page 14), “When camas was in bloom in wet meadows, the flowers grew so thickly that they looked like a blue lake.” Horticulturally, this plant is used for cut flowers, beds, borders, ground cover, rock gardens, and prairie restoration.

NUTSEdge

Cyperus esculentus L.
golden nutsedge

Family: Cyperaceae

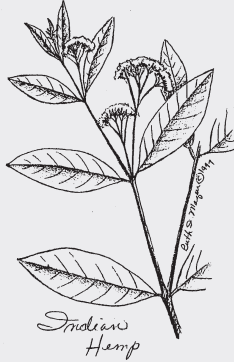


Embraced in the fine, shallow roots of the nutsedge are small tubers, the size of dried currants. These tubers make an excellent meal, either raw or steamed, and resemble water chestnuts. They are hard and crisp when eaten raw, and taste like water chestnuts. When reduced to meal and cooked as cereal, nutsedge is both nourishing and appetizing. The nutlets can be soaked in water, then pounded to release the milky juice which can be mixed with alcohol or water and sugar to make a delicious drink. Peeled and roasted, the tubers can be ground to become a coffee substitute or a sweet flour. The base of the stem may be eaten raw. The Yokuts in California ate the grass-nut of *Cyperus* species and the seeds of the same.

Golden nutsedge is used as both sewing and wrapping material in coiled baskets by some Native Americans, but is not preferred as it doesn't have the tensile strength of many other species. Nutsedge leaves were also used as components for making seats.

INDIAN HEMP OR DOGBANE

Apocynum cannabinum L.
Indian hemp, dogbane
Family: Apocynaceae



Indian hemp, or dogbane, is harvested for fiber. In California, Indian hemp and milkweed are used somewhat interchangeably for cordage. The stems are cut in the fall, then split open and the long, silky fibers removed. The fibers are then twisted into string which provides cordage; the bast fibers of the Indian hemp are silky soft yet extremely strong (Gunther 1973). Cordage was then used to make tump straps, belts, netted bags, hairnets, and ceremonial regalia (capess, skirts, and head-dresses). Indian hemp is relatively uncommon in California, and high quality material is actively sought by basketweavers.

The biochemical constituents in Indian hemp are apocynin, apocynamarin, cymarin, and androsin (Kindscher 1992). Indian hemp acts as a vaso-constrictor, slows and strengthens the heartbeat, and raises blood pressure. The root can also be used as an emetic, diaphoretic, antispasmodic, cathartic, anodyne, hypnotic, or laxative. It treats vomiting, diarrhea, urinary difficulties, jaundice, liver problems, and it stimulates the digestive system. A wash made of the crushed root can be shampooed into the hair to stimulate growth, and to remove dandruff and head lice. The milky juice can remove warts.

WILLOW

Salix exigua Nutt.
narrow-leaved willow
S. laevigata Bebb
red willow
S. lasiolepis Benth.
arroyo willow
S. lucida Muhlenb.
shining willow
S. lutea Nutt.
yellow willow
Family: Salicaceae



The value of willow as the raw material necessary for the manufacture of a family's household goods cannot be overestimated; virtually all California tribes use willow in their baskets (Bates 1982; Bibby 1996; Chestnut 1902; Yamane and Aguilar 1997). Willow branches are used as the warp for twined baskets and the foundation in coiled baskets. Willows are used to weave water jugs, cradles for newborn infants, hats, cooking vessels, serving bowls, trays, seed beaters, and storage baskets (Barrett et al. 1933). Willow is gathered from the time the leaves fall in autumn until the buds begin to swell in spring; it is much easier to strip bark in the spring when the sap rises. A green dye for coloring buckskin was created from boiling willow (Strike 1994). Willow roots have also been used to create a rose-tan dye.

The Paiute built houses with a willow frame covered with mats of cattails or tules. For shade, they constructed shed roofs thatched with willows. Other light construction uses would have included the roofs of storage bins and drying racks.

A bed or sleeping bench of willow poles raised high off the ground indicated a wealthy man in the Miwok culture (Barrett and Gifford 1993). Sweat lodges are made with willow. The ribs and gunnels of tule boats were constructed of willow poles. Games such as a women's shinney game and counting games are played with willow sticks. Other implements made from willow include fire sticks twirled as a spindle. Inner willow bark is used in spring for cordage.

Young willow shoots and young leaves may be eaten in case of emergency. The inner bark can be eaten raw or made into flour. Aspirin is the pharmaceutical equivalent of willow bark tea which is an effective remedy for headache, fever or sore throat (Moore 1979). In 1839, salicylic acid was isolated from wild plants and manufactured synthetically. Tea made from willow leaves will cure laryngitis, reduce joint and membrane inflammation, treat urethra and bladder infections, and alleviate skin disorders. Willow is used to treat many diseases, including hay fever, diarrhea, prostatitis, and relief of ovarian pain.

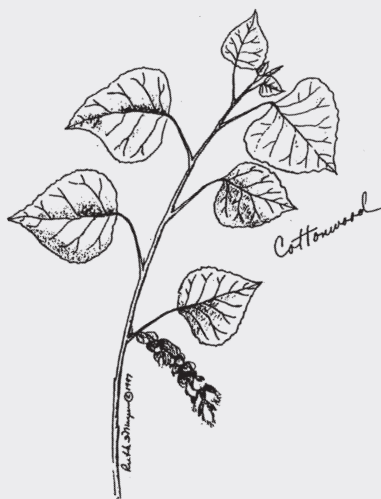
COTTONWOOD

Populus fremontii S. Watson
ssp. *fremontii*

Fremont's cottonwood

P. balsamifera L. ssp. *trichocarpa*
(Torrey & A. Gray) Brayshaw
black cottonwood

Family: Salicaceae



The sweet and starchy sap of cottonwood can be consumed raw or cooked. The bark is bitter but edible. It can be scraped off and eaten, cooked in strips like soup noodles, or dried and powdered as a flour substitute. The inner bark of cottonwoods and aspens was eaten by people and horses in hard times.

The Hopi Indians of Arizona consider the cottonwood tree sacred and carve Kachina dolls from the roots of the tree. They believe the rustle of the wind through the quaking leaves to be the gods speaking to people (Strike 1994).

Several California tribes used cottonwood roots to make loosely twined baskets. The Maidu and Yokut Indians occasionally use cottonwood twigs in their basketry (Strike 1994). Skirts were made of cordage from fibers of cottonwood inner bark. Sometimes small teardrop-shaped pieces of asphaltum, shell beads, or pine seeds were used as weights to make the fibers hang properly.

The active biochemical constituents are salicin and populin, the precursors of aspirin which are useful wherever a fever needs reducing or an anti-inflammatory is appropriate (Moore 1979). The bark is the most effective part for tea, but is rather bitter; for this reason the leaves are often preferred. Taken internally, cottonwood is reputed to have the following medicinal uses: reduces fever; is an anti-inflammatory; aids coughs from colds and indigestion; expels worms and intestinal parasites; alleviates excessive menses and urinary tract infections; and is used to prevent premature birth. Burns and skin irritants can be alleviated through use of an ointment made of leaf buds or a wash of cottonwood bark. A poultice can be used for sprains, muscle pain, and swollen joints, and a salve can be made that cleanses and conditions the skin when used regularly.

IRIS

western blue flag

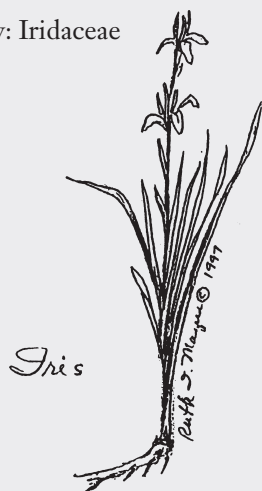
I. douglasiana Herbert

I. fernaldii Foster

I. macrosiphon Torrey

I. missouriensis Nutt.

Family: Iridaceae



Warning: Fresh iris roots and rhizomes may be toxic.

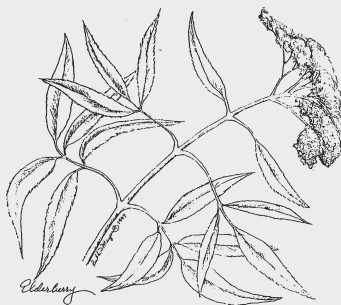
Iris fibers make some of the finest cordage; the fibers are fine and silky, but surprisingly strong and flexible (Gunther 1973). The Hoopa, Karuk, Yurok, and other northern California First Nation's people gather iris leaves in large bundles, and a single silky fiber is taken from each margin of the leaf; only these two fibers are used. Huge bunches of leaves were harvested in the fall and stored until needed. Iris fibers were used to make fishing nets, string, rope, camping bags, hair nets, regalia and snares for catching deer, birds, and other game (Murphy 1959; Strike 1994). In spite of the tremendous labor of preparing this material, the iris fiber was one of the most generally employed in north-western California.

A poultice of the raw rhizome is especially effective against staph sores (Moore 1979). Externally, iris rhizomes are successfully used on infected wounds, ulcers, fistulas, and to remove freckles. Only the dried iris root or rhizome should be used internally. Iris is active as a cathartic, has a stimulating effect on the production of both pancreatic enzymes and bile, is a strong diuretic, and will stimulate both saliva and sweat. Iris is a useful medicinal plant, but in general it should be used with care, and preferably in combinations where less energetic plants form the bulk of a medicinal formula.

BLUE ELDERBERRY

Sambucus mexicana C. Presl
blue elderberry

Family: Caprifoliaceae



Note: red berries of other *Sambucus* species are toxic. The blue elderberries are edible and choice. The berries can be made into elderberry wine, jam, syrup, and pies. The entire flower cluster can be dipped in batter and fried, while petals can be eaten raw or made into a fragrant and tasty tea. The flowers add an aromatic flavor and lightness to pancakes or fritters.

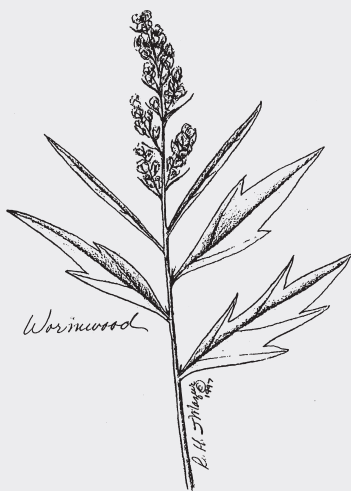
Elderberry twigs and fruit are employed in creating a very deep black dye for basketry (Barrows 1977). Elderberry branches are used to make the shaft of arrows, flutes, and whistles. Elderberry flutes are difficult to play, and only a few people still know how. Clapper sticks are made by splitting the stem and clapping the two halves against each other; they are used ceremonially in the round-house to accompany singing and dancing. The pith of the stems is used as tinder, and the stem is employed as a twirling stick for starting the fire.

All parts of the elderberry plant are considered to be valuable for healing in many folk medicine traditions (Barrett and Gifford 1933; Clarke 1977; Moore 1979).

MUGWORT OR WORMWOOD

Artemisia douglasiana
Besser mugwort

Family: Asteraceae



Artemisia has been used as a powerful medicine plant wherever it grows. The medicinal properties of mugwort are both spiritual and physical. Like its medicinal “cousin” white sage (*Salvia apiana*), which grows in southern California, the plants are often gathered together and tied into a “smudge stick,” which was and still is burned and used for cleansing and purification. Mugwort is used in ceremonies, to carry prayers, to cleanse and purify, and to create good thoughts and protection. Leaves from this plant are often put into a pillow to stimulate good dreams. Necklaces were made with pieces of mugwort leaves to prevent dreaming of the dead (Barrett and Gifford 1933). Corpse handlers smear the leaves on their bodies so the ghosts of the dead will not haunt them (*Ibid.*)

After childbirth some California tribes warm mugwort leaves and place them on the baby’s navel after the umbilical cord has been severed. This was applied repeatedly for four days until the remainder of the cord came off.

A bitter tea is made by boiling and steeping the leaves to stop excessive menstruation, ease menstrual cramps, and to aid stomach ache and intestinal cramps. Care should be observed with mugwort because it can cause upset stomach and will increase heart and artery function, possibly dangerously if taken too frequently or made too strong. Mugwort oil can be used as a liniment for sprains, bruises, and lumbago. A decoction of the leaves works against rheumatism, swelling, sprains, and inflammation. Combined with the root of yellow dock, this powerful fungicide is a good cure for athlete’s foot. Mugwort and California bay (*Umbellularia californica*) are used to prevent insect infestation from food stores cached in acorn granaries, baskets, ceremonial items, and other household uses. Leaves can be scattered around to repel insects.

ETHNOBOTANICAL RESOURCES

- Anderson, M.K., and M.J. Morotto. 1996. Native American land-use practices and ecological impacts. Sierra Nevada Ecosystem Project: Final report to Congress, Vol II. *Assessments and Scientific Basis for Management Options*. Centers for Water and Wildland Resources, University of California. Davis, CA.
- Barrett, S.A., and E.W. Gifford. 1933. Miwok Material Culture: Indian life of the Yosemite region. *Bulletin of the Milwaukee Public Museum* 2(4):120-377. Reprinted by the Yosemite Natural History Association. Yosemite National Park, California.
- Barrows, D.P. 1977. *Ethnobotany of the Coahuilla Indians*. Malki Museum Press. Morongo Indian Reservation. Banning, CA.
- Bates, C.D. 1982. *Coiled basketry of the Sierra Miwok*. San Diego Museum Papers No. 15. San Diego Museum of Man. San Diego, California. 225 pp.
- Bates, C.D. 1996-1998. Curator of Ethnography, Yosemite National Park. Personal communication.
- Berkes, F. 1999. *Sacred Ecology—Traditional Ecological Knowledge and Resource Management*. Taylor and Francis Publishing. Philadelphia, PA. 209 pp.
- Berkes, F., J. Colding, and C. Folke. 2000. Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications* 10(5):1251-1262.
- Bibby, B. 1996. *The Fine Art of California Indian Basketry*. Crocker Art Museum. Sacramento, CA. In association with Heyday Books. Berkeley, CA. 109 pp.
- Chestnut, V.K. 1902. Plants Used by the Indians of Mendocino County, California. *Contributions from the United States National Herbarium, 1900-1902*. Vol. 7: 295-422. Government Printing Office, Washington, D.C. Reprinted in 1974 by the Mendocino County Historical Society Inc. Fort Bragg, CA.
- Clarke, C.B. 1977. *Edible and Useful Plants of California*. University of California Press. Berkeley, CA. 280 pp.
- Gunther, E. 1973. Ethnobotany of western Washington. *University of Washington Publications in Anthropology* 10(1). University of Washington Press. Seattle, WA. 71 pp.
- Harrington, H.D. 1972. *Western Edible Wild Plants*. The University of New Mexico Press. Santa Fe, NM. 156 pp.
- Hickman, J.C., Ed. 1993. *The Jepson Manual: Higher Plants of California*. University of California Press. Berkeley, CA. 1399 pp.
- Kindscher, K. 1992. *Medicinal Wild Plants of the Prairie: An Ethnobotanical Guide*. University Press of Kansas. Lawrence, KA. 340 pp.
- Kuhnlein, H.V. and N.J. Turner. 1991. *Traditional Plant Foods of Canadian Indigenous Peoples: Nutrition, Botany and Use*. (Food and Nutrition in History and Anthropology Vol 8). Gordon and Breach Science Publishers. New York, NY. 633 pp.
- Martinez, D. 2002. Indian Burning. Traditional Indian Burning, Fire Hazard Reduction & Restoration Forestry. *The New Settler*. P.O. Box 702. Mendocino, CA 95460.
- Mason, H.L., Ed. 1957. *A Flora of the Marshes of California*. University of California Press. Berkeley, CA. 878 pp.
- Merrill, R.E. 1923. Plants used in basketry by the California Indians. *University of California Publications in American Archaeology and Ethnology* 20:215-242.
- Moore, M. 1979. *Medicinal Plants of the Mountain West*. Museum of New Mexico Press. Santa Fe, NM. 200 pp.
- Murphy, E.V. 1959. *Indian Uses of Native Plants*. Mendocino County Historical Society. Fort Bragg, CA. 81 pp.
- Nazarea, V. 1999. *Ethnoecology: Situated Knowledge/Located Lives*. University of Arizona Press. Tucson, AZ. 299 pp.
- Roos-Collins, M. 1990. *The Flavors of Home. A Guide to Wild Edible Plants of the San Francisco Bay Area*. Hey Day Books. Berkeley, CA. 224 pp.
- Stevens, M.L. 1999. *The Ethnoecology and Autecology of White Root (Carex barbarae): Implications for Restoration*. PhD Dissertation, University of California. Davis, CA. 182 pp.
- Stevens, M.L. 2003. Traditional Resource Management of White Root (*Carex barbarae*) by California Indians: Implications for Restoration. In Faber, P.M. (ed.). 2003. *California Riparian Systems: Processes and Floodplain Management, Ecology, and Restoration*. 2001 Riparian Habitat and Floodplains Conference Proceedings, Riparian Habitat Joint Venture. Sacramento, CA. 557 pp.
- Stevens, M.L. and A. Ryan. 1997. Ethnobotany of the Putah and Cache Creeks Eco-Region. Public Service Research Program. University of California. Davis, CA. 52 pp.
- Strike, S.S. 1994. *Ethnobotany of the California Indians*. Volume 2: *Aboriginal Uses of California's Indigenous Plants*. Koeltz Scientific Books. Champaign, IL. 210 pp.
- Timbrook, J.J. 1997. An Introduction to Chumash Basketry. Newsletter #19. California Indian Basketweavers Association. Nevada City, CA.
- Turnbaugh, S.P. and W.A. Turnbaugh. 1986. *Indian Baskets*. Schiffer Publishing, Ltd., West Chester, PA. Pages 194-205 out of 210 pp.
- Turner, N.J. and B.S. Efrat. 1982. The Ethnobotany of the Hesquiat Indians of Vancouver Island. British Columbia Provincial Museum Cultural Recovery Paper No. 2. Queen's Printer. Victoria, BC. 99 pp.
- Turner, N.J. and H.V. Kuhnlein. 1983. Camas (*Camassia* spp.) and Riceroor (*Fritillaria* spp.): Two liliaceous "root" foods of the northwest coast Indians. *Ecology of Food and Nutrition* 13:199-210.
- Turner, N.J., M.B. Ignace, and R. Ignace. 2000. Traditional ecological knowledge and wisdom of aboriginal peoples in British Columbia. *Ecological Applications* 10(5):1275-1287.
- Yamane, L., and D. Aguilar. 1997. *Weaving a California Tradition. A Native American Basketmaker*. Lerner Publications Company. Minneapolis, MI. 48 pp.

Michelle L. Stevens, 3349 St. Mathews Drive, Sacramento, CA 95821. mlstevens@prodigy.net

INTO THE SUNLIGHT: FROM FUNGUS TO FLOWER IDENTIFICATION

by Bob and Barbara Sommer

We came to wildflowers after 30 years of amateur mushrooming. We sketched, identified, catalogued, and occasionally ate the fungi we collected. We could identify the easy varieties. Those that remained (such as *Cortinarius* sp. or *Collybia* sp.) required microscopic analysis beyond our capabilities.

This was an engaging hobby for the wet, cold months. We eagerly awaited the start of rains each year, but it left little to do during hot dry summers. Local mycology clubs fold up shop between June and October. Although occasional fungi fruit on watered lawns and golf courses throughout the summer, there is nothing like the profusion of fungi fruiting after the autumn rains. So we began spending our summers engaged in another favorite activity, hiking the Sierra.

For years as hikers, we had noted the colorful wildflower displays without attempting to become more knowledgeable about them. Our attitude changed a few years ago as we sought a new hobby for the hot dry summers. In Northern California, identifying wildflowers and



Harvest from mushroom foray. Photographs by Bob Sommer.

fungi are complementary activities in season and habitat. We soon discovered we could hunt for mushrooms in the damp coastal forests in late fall and winter, and then seek out wildflowers in the high mountains during spring and summer.

Both hobbies have sensitized us to aspects of the natural environment that would otherwise be missed. Although we have at times described fungi as “winter flowers,”

we have been struck by the many differences between flower collecting and mushrooming. Flora and fungi vary in key respects, and these differences influence who, when, how, and why people seek them.

Flowers are generally found in more pleasant locations—at least for humans—than are fungi. They thrive in open, sunny meadows, a striking contrast to the shady, dark, wet alcoves preferred by most mushrooms. We never need to wear sunglasses when looking for fungi.

Identifying species of the Sierran flora, at least at an amateur level, has been easier than identifying fungi. The flower guides we purchased are organized by immediately recognizable characteristics, notably blossom color and leaf shape; most mushroom guides are organized by less obvious characteristics such as spore color. No spore print or microscope is needed for amateur flower identification. On the other hand, with fungi we must often bring specimens back to the motel to drop spores overnight



Enjoying fungi at a local fungus fair.



Identifying mushrooms in a motel room.



The fungus *Scleroderma geaster*. All illustrations by Bob Summer unless otherwise indicated.

on white and black cards before we can establish a genus.

Wildflower field guides are more geographically specific than are those for fungi, which also aids identification. For instance, we were able to purchase three guides just on Sierra wildflowers, and could have acquired additional ones. There is even a field guide for the portion of the Sierra we visit most often (*Wildflower Walking in the Lakes Basin*). In contrast, there are no field guides in local bookstores specific to Sierra fungi. The downside is that we will probably end up buying a lot more flower guides than mushroom guides to cover the locations where we hike.

In studying wildflowers, we have not bothered to learn their Latin names, as our minds are not as gluey as they used to be. In the field, we go from flower to picture to common name. With fungi, we proceed from spore color to genus and then to species, where the Latin name is critical. The common names for many fungi are not formalized and vary among field guides. To tell a mushroomer that one found a fat-footed *Clitocybe* or graying yellow *Russula* (both common names in the Audubon Field Guide) would be meaningless. Nor would these common names be included on a foray list of identified mushrooms.



The fungus *Sarcodon leucopus*.

Since flowers depend on other species for pollination, they are easier to see against their backgrounds than are fungi, most of which spread spores without the aid of animal vectors. With notable exceptions such as the phallales, and underground fungi such as truffles that depend on odor recognition rather than visual discovery, most fungi gain no survival advantage in being noticed by other species.

While fungi come in all colors, most appear in shades of dull gray, tan, and brown, hues which help them to blend in with their surroundings. Some develop and fruit underground or under duff. The broad range of wildflower colors relative to mushrooms also makes them stand out more prominently from the background.

We don't carry a basket for flower specimens. A small notebook is all that is needed, and is used for recording names, making field sketches, and occasionally pressing a blossom to bring back for further examination. One cannot press mushrooms as one can flowers. Many fungi are slimy and buggy, quickly lose color after being picked, break apart while being transported, and stain the paper in which they are wrapped. We'll never forget the time the beefsteak fungus (*Fistulina hepatica*) that we had been carrying dyed a backpack brick red.

However, there are features that make it easier to locate mushrooms. Association with tree species is not as important for flowers as for fungi.



The gilled mushroom *Stropharia aeruginosa*.



Geranium (*Geranium* sp.), from Negro Canyon Trail. Illustration by Barbara Sommer.



Monument plant (*Swertia radiata*), seen at Carson Pass.



Stickseed (*Hackelia* sp.) seen at Carson Pass.

We search near oaks for chanterelles and under pine for boletes.

The common names for fungi reflect these mycorrhizal associations, e.g., redwood rooter, oak-loving *Collybia*, and so on. We have not yet encountered such specific tree associations for Sierra wildflowers. With mushrooms, we started out collecting both terrestrial and arboreal fungi. Growing on wood was one important characteristic among several in field guides. With flora, we have concentrated our attention exclusively on terrestrial flowers. Interest in flowering shrubs or trees may come later or not at all.

Curiously, most mushroom field guides are written by men while many flower field guides are written by women. Not one of the 20 mushroom field guides on our bookshelf has a woman as the sole or senior author. Field guides to fungi make more frequent reference to smell, taste, and bruising than do flower guides. Discoloration is a critical feature in identifying many fungi, e.g., the pores stain blue or the stipe bruises brown.

Our flower guides did not employ a refined vocabulary of odors comparable to Arora's best-selling field guide to fungi. Nor do flower guides show comparable interest in gustatory qualities. Many fungi are

specifically known for having a bitter or acrid taste. Popular articles about mushrooms, which typically cover only edible varieties, generally include recipes.

Mushroom fairs feature display tables devoted to gastronomy and toxicity (although placed at some distance from one another). One does not expect young people to show up at flower shows inquiring about psychedelic properties, although certain species of blossoms are hallucinogenic. However, the popularity of *The Orchid Thief* may change this. Friends who look askance at our mushroom collecting show no similar reservations about our wildflower interests, and indeed feel some relief that we are not likely to poison ourselves, or worse, poison them with wildflower dishes.

Flower clubs schedule walks (derivation: to roll, rove about, to ramble) while mushroom clubs organize forays (derivation: a raid, typically for pillage). Looking for flowers is not as competitive as collecting mushrooms, where one is up against commercial foragers vacuuming the forest floor to sell to gourmet restaurants, and pothunters collecting edible species, measuring their hauls in pounds rather than specimens.

This is another reason for our switch to wildflowers. Many of our best mushrooming locations are now off-limits. Along the Sonoma and Mendocino coasts, "No Mushrooming" signs have popped up like mushrooms—the result of too much pressure on a limited resource. Thus far we have not encountered commercial foraging of Sierra wildflowers. Of course there is no predicting the next discovery in herbal medicine.

When mushrooming, we are frequently distracted by pseudo-fungi, such as light-colored leaves, a round white pebble, or a discarded candy wrapper. When we search for chanterelles, any yellow object is likely to attract our attention. Once we thought we had discovered a new ochre fungus until the banana slug whose nap we had rudely interrupted started moving. Probably because flowers are sought in bright light and have more intense chroma, including contrasting bright green foliage, we are less subject to these misperceptions. We have, however, mistaken pinedrops (*Pterospora andromedea*) and snow plant (*Sarcodes sanguinea*)—both of which lack green parts—for mushrooms.

We sketch unfamiliar fungi and flowers as an aid in identification.

Drawing sensitizes us to nuance and detail that might otherwise be overlooked. Brazilian landscape architect Roberto Burle Marx remarked that he sketched in order to see more clearly.

There are differences in sketching flowers and fungi. The subsurface portion is always included in mushroom sketches, because of the possibility of a bulbous stipe, a cup, or mycelial mat. Dirt on a mushroom can be helpful in painting, as it outlines white portions on white drawing paper. The dark wet places where fungi fruit are not conducive to onsite painting, so specimens must be carried back to the motel to be painted near a window or under artificial light, which makes it necessary to check carefully for color distortions.

Saturation and brightness are critical for painted fungi, as the palette is comprised mostly of shades of browns, grays, and white. In painting mushrooms, tubes of blue, green, red, and violet go largely untouched. Floral hues in the Sierra are the reverse, and contain abundant reds, yellows, blues, and purples, with green stalks and leaves.

Since wildflowers bloom in bright open places, they can be painted where they are found. The

light is excellent, though one must remember to remove sunglasses to capture the correct hue. Their fragility is another reason to paint them where they grow. Except for flowers low to the ground, only a portion is drawn, sufficient to show blossoms, leaf form, and leaf attachment. Flower parts tend to be more delicate, ethereal, and two-dimensional than mushroom features, which seem by comparison relatively crude.

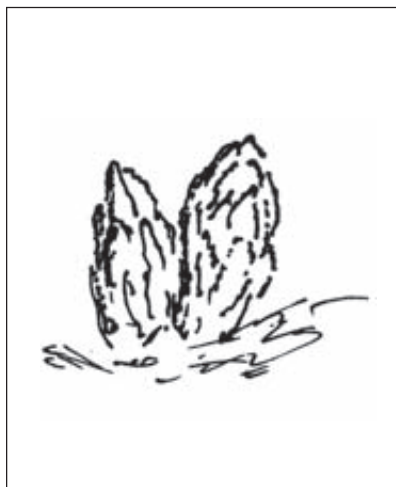
In flower sketches, hue is more critical than brightness or saturation. A painted iris will be recognizable regardless of whether the purple is bright or dull, weak or strong. Flower names such as violet, rose, and pink are by themselves hues, while this is not true of mushroom names. There are red russulas and golden chanterelles, but no color words used by themselves to designate mushroom species. Most flowers leave seed pods which make interesting sketches while this is not true of most fungi. Because we sketch flowers in the field, painting is done on small, pocket-size pads, while fungi are painted in a more leisurely fashion at a motel table in eight by ten inch sketchbooks.

Given the variety of forms

among fungi and flowers, there are exceptions to these differences. Meadow mushrooms and inky caps, for example, fruit in open grassy locations with excellent light for painting (although we don't carry paints or sketch pads when searching for fungi). Some fungus varieties rapidly deteriorate, autodigest, or discolor, and must be painted in the field or from photographs. Other fungi have cups and veils which are as fragile as flower parts, and some, such as the crimson *Amanita muscaria* (fly agaric), are as colorful and noticeable in the dark forest as any blossom in the meadow.

While mushrooming in Mexico last summer, we saw wildflowers blooming alongside mushrooms on the slopes of La Malinche volcano. Hiking in Idaho in late August, we found late summer flowers overlapping with early autumn fungi. Our region of California may be atypical in its non-overlapping seasons of fungi and flower production. For us, the result is a varied and challenging suite of outdoor discovery, extending across all seasons.

Bob and Barbara Sommer, 626
Georgetown Place, Davis, CA 95616.
rosommer@ucdavis.edu



Snow plant (*Sarcodes sanguinea*) seen at Lakes Basin. Illustration by Barbara Sommer.



Wild carrot or Queen Anne's lace (*Daucus carota*) seen at Carson Pass.



Yarrow (*Achillea millefolium*) seen at Carson Pass.



Bog club-moss (*Lycopodiella inundata*) at Big Lagoon Bog, Humboldt County. All photographs by the author.



Bog club-moss with round-leaved sundew (*Drosera rotundifolia*).

THE RARE CALIFORNIA CLUB-MOSSES

by Gordon Leppig

Present-day club-mosses, like ferns and horsetails, are from an ancient and diverse spore-bearing lineage which was globally dominant during the Paleozoic Era. These lingering remnants of the Coal Age are members of the Lycopodiaceae or club-moss family. The name *lycopod* means “wolf’s foot” in ancient Greek and refers to the resemblance of the branch tips to a wolf’s paw. Today, this family of creeping rhizomatous evergreens is comprised of about 400 species in 10-15 genera; the family is represented worldwide except Antarctica. In temperate and arctic areas, club-mosses inhabit various forest and wetland habitats and prefer acidic

soils. In the tropics, club-mosses are often epiphytic. Individual plants can live for centuries and some species form fairy rings.

Though there are 27 species in North America and 11 in the Pacific Northwest, California has only two taxa: running-pine (*Lycopodium clavatum* L.) and the bog club-moss (*Lycopodiella inundata* (L.) Holub). Both species are on the California Native Plant Society (CNPS) List 2—“rare in California but more common elsewhere.” In North America, both species have bicoastal distributions, occurring in the Pacific Northwest as well as in the northeast including the Great Lakes region. The bog club-moss also

occurs across Eurasia, and running-pine, the most cosmopolitan lycopod, has a near-global distribution. Like many plants which are rare in California but common elsewhere in the northern hemisphere, these taxa have Pacific Northwestern distributions which terminate in the cool climate and moist habitats of northern California.

As spore-bearing plants, club-mosses have two life forms, a minute subterranean gametophyte (gamete producer) and the more obvious mat-forming sporophyte (spore-producer). Spores, which are wind-dispersed, can persist in the soil for many years before germinating into gametophytes. (Incidentally, club-

moss spores are flammable and were the original flash powder in olden day photography; they continue to have diverse industrial uses.) Gametophytes as well as spores can be very long-lived, taking 10-15 years or more to develop (Andrews 1947) and requiring a mycorrhizal symbiont to reach sexual maturity. Bisexual gametophytes produce both eggs and biflagellate sperm. Despite their bisexuality, self-fertilization is quite rare in many species (Gifford and Foster 1987). Club-moss sperm therefore swim underground through wet soil to fertilize other gametophytes—not a life stage usually considered in rare plant conservation!

BOG CLUB-MOSS

Lycopodiella inundata, which is also rare in Oregon, has an enigmatic distribution in California of two disjunct populations. It occurs at sea level in Humboldt County at Big Lagoon County Park, and at about 900 meters in elevation in Nevada County at The North Columbia Diggings, an abandoned placer mine in the Sierra foothills. The Big Lagoon site is a rare coastal peatland or fen (known locally as Big Lagoon Bog). The peatland formed in the swale of a paleo-sand dune on a brackish marsh on Big Lagoon and is surrounded by Sitka spruce (*Picea sitchensis*) forest. This small population occurs mostly on sparsely vegetated organic soil (peat and muck) of regularly inundated pool edges and stream banks. Big Lagoon Bog is a biodiversity hotspot with occurrences of several other CNPS List 2 taxa: flaccid sedge (*Carex leptalea*), green sedge (*C. viridula*), and marsh pea (*Lathyrus palustris*), the CNPS List 4 Buxbaum's sedge (*Carex buxbaumii*), and the locally rare sundew (*Drosera rotundifolia*).

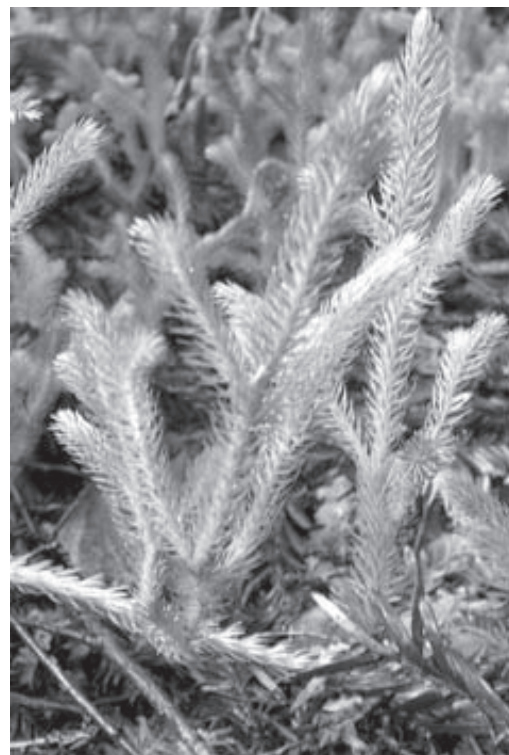
The Diggings is a 2,300-acre



Running-pine (*Lycopodium clavatum*) cones produce flammable spores with a number of industrial and scientific uses. Spores can live for years underground before germinating.



Closeup of running-pine cones.



Stolon, or runner, and aerial branches of running-pine.

former ponderosa pine foothill forest that was “moon-scaped” by decades of intensive hydro-mining for gold in the late 1800s (Pendall 1984). Aside from the catastrophic sedimentation of the Yuba River and San Francisco Bay, this mine also resulted in the so-called Valley of the Moon, a barren wasteland of bare hillsides and a mineral-soil wetland slowly being colonized by acid-loving montane and peatland plants. A large bog club-moss population now occurs in this bare-soil wetland. How this species arrived is unclear but it is presumably the result of wind-borne spore dispersal. An unusual occurrence of cranberry (*Vaccinium macrocarpon*) occurs at the Diggings, and while at one time it was considered a rare disjunction (Pendall 1984), it is now thought to be introduced. Because the Diggings is still owned by mining interests, the present status of the bog club-moss is unknown and this population is potentially threatened by future gold mining.

RUNNING-PINE

Lycopodium clavatum is restricted to redwood and coastal mixed evergreen forests in Del Norte, Humboldt, Mendocino, and Sonoma counties. It forms a large meta-population in Humboldt County from Big Lagoon to the Elk River south of Eureka. In Mendocino County it is much less common, occurring in and around Jackson State Forest. It was only recently discovered in Del Norte and Sonoma counties, where it is quite scarce.

Running-pine almost exclusively inhabits gaps in forest canopy with partial shade such as roadsides, trails, and forest edges. The majority of occurrences are on managed redwood timberlands where large mats commonly occur

with salal (*Gaultheria shallon*) and evergreen huckleberry (*Vaccinium ovatum*).

CONSERVATION

In the eastern United States, club-moss gathering for holiday garlands and the floral trade is a common hobby and “non-timber forest products” industry. However, over-collecting has resulted in local rarity of some taxa and is considered a threat to others (Nauertz 1999). In Wisconsin and Michigan alone over 85 tons of club-moss is harvested annually from local forests (Nauertz and Matula 2002).

In California, club-mosses are too rare for collecting. Conservation efforts focus on total avoidance of bog club-moss populations and on forestry practices that maintain running-pine populations in managed timberlands (Golec 2000). Club-mosses are difficult to cultivate and attempts to transplant running pine as a mitigation strategy by Redwood National and State Parks and others have had little success. Cultivation and transplantation may be hampered by the disruption of its mycorrhizal relationship. Indeed, the development of the critical relationship between gametophytes and their fungal associates may be an important factor in the rarity of these species and in their habitat requirements. A life-cycle that can require more than 20 years to complete may also contribute to their rarity.

To conserve the bog club-moss in California, maintenance of water quality and hydrologic regimes and avoidance of other impacts, such as invasive plants, appears to be the best management strategy. Running-pine has low survivorship in clearcuts and after other forest stand replacement events. Because of its shallow root system it does not tolerate direct impacts from heavy equipment and extensive ground

disturbance. The persistence of running-pine mats on managed timberlands necessitates partial canopy retention strategies and the avoidance of mats by heavy equipment. The California Department of Fish and Game is currently working with private timberland owners to develop strategies that best maintain this species and its habitat on the North Coast. These strategies include leaving shade trees, excluding heavy equipment, and not applying herbicide near running-pine occurrences.

REFERENCES

- Andrews, H.N. 1947. *Ancient Plants and the World They Lived In*. Comstock Publishing. Ithaca, NY. 279 pp.
- Gifford, E.M., and A.S. Foster. 1987. *Morphology and Evolution of Vascular Plants*. W.H. Freeman. New York, NY. 626 pp.
- Golec, C. 2000. Simpson Timber Company's Running-pine Assessment and Survey. Unpublished Report, Natural Resource Management Corporation. Eureka, CA. 14 pp.
- Nauertz, E.A. 1999. Impact of Various Silvicultural Practices on the Abundance and Frequency of *Lycopodium* Species in Northern Hardwood Forests. Master of Science in Forestry Thesis, Michigan Technological University. Houghton, MI. 164 pp.
- Nauertz, E.A. and C. Matula. 2002. *Lycopodium* Management. USDA Forest Service. Wisconsin Department of Natural Resources. www.extension.umn.edu/specializations/environment/components/lycopodium1.html.
- Pendall, D. 1984. A freshwater marsh at the North Columbia Diggings. *Fremontia* 12:11-14.

Gordon Leppig, California Department of Fish & Game, Habitat Conservation Program, Northern California-North Coast Region, 619 Second Street, Eureka, CA 95501. gleppig@dfg.ca.gov



Susan and August Frugé at the dedication of the sculpture "Geokinetic" in October 1995 at Joshua Tree National Park. This Steven Riemann mobile sculpture was commissioned by August and Susan and donated to the Joshua Tree National Park Interpretive Center at Twentynine Palms, California. Photograph by P. Dunham.

AUGUST FRUGÉ, 94, DEAN OF UNIVERSITY PRESS PUBLISHERS

by Harlan Kessel

Often called "the Alfred Knopf of university press publishing," August Frugé died in Twentynine Palms, California, on July 6 after a series of strokes. He is considered one of the great publishers of the Twentieth Century. His entire life was devoted to books, publishing, classical history, scholarship, and the environment. After graduation from Stanford he earned his master's degree at the Library School, University of California, Berkeley and

worked at the California State Library, Sacramento. A few years later he was lured away by Samuel Farquhar, then director of the University of California Press (UC Press), Berkeley, as assistant director and sales manager.

Upon Farquhar's sudden death in 1951, Frugé was appointed to succeed him. Thus began an extraordinary growth of the University Press from a small, monograph-oriented press to a world-class scholarly publisher of numerous

works, many of them best sellers, averaging some 250 titles annually.

He established the first University Press paperback list, Cal Paperbacks, in 1957, eventually issuing over 1,000 paperback titles during his tenure. A committed environmentalist and Sierra Club leader, he established the California Natural History Guides, a series now numbering in the hundreds, to fill a void in books on California's environment. Until that time, most natural history books reflected set-

tings from the eastern United States.

A million-copy seller for the Press was *Isbi in Two Worlds* by Theodora Kroeber, a classic biography of the last wild Indian of North America. Frugé's work with Kroeber in the early stages of the manuscript resulted in a publishing triumph that also established Kroeber as a major writer on Native Americans and history of the American West.

Another million-copy seller was *The Teachings of Don Juan: A Yaqui Way of Knowledge*, by Carlos Castaneda, a book that precipitated considerable controversy over the years. But the greatest academic heat was generated by the long-delayed, three-volume, monumental *The Plan of St. Gall*, by Walter Horn and Ernest Born, published in 1983. It is a heated saga of publisher versus author that did not end until three years after Frugé's retirement from the press in 1977. Frugé's successor, James H. Clark, told the story in *Publishing the Plan of St. Gall*, privately published but included in Frugé's own monumental account of his publishing years, *A Skeptic Among Scholars: August Frugé on University Publishing*.

Frugé was also a noted scholar. He was fluent in French and Spanish, and comfortable reading Greek and Latin. He built UC Press's classics list to its zenith and also translated and edited several works on the exploration and early history of California. One of these was a fundamental work on early California history, especially the Jesuit Missions: *A Voyage to California, the Sandwich Islands, and Around the World in the Years 1826-1829* by Auguste Duhaut-Cilly. Frugé's translation marked the first book

publication of this work in English.

He had few illusions about publishing as a noble calling. He would often quote Mark Twain's description of a publisher: "A tall, lean, skinny, yellow, toothless, baldheaded, rat-eyed professional liar and scoundrel." Of course, the Press published, and still does to the present day—the complete works, letters, and papers of Mark Twain, another monumental scholarly publishing project established during Frugé's tenure.

Frugé served for years on the board of directors of the Sierra Club and was a key player in the publishing struggles during David Brower's stormy administration. Brower had entered publishing at UC Press, so his relationship with Frugé was a lengthy one and, in the end, friendly.

He is a Fellow (along with his late wife Susan) of the California Native Plant Society (CNPS); a member of the Publishing Hall of Fame, New York; and past-President, Association of American University Presses, New York. His reorganization of the California Native Plant Society transformed the organization into one of California's leading environmental organizations and set the standard for other native plant organizations around

the country. Frugé also championed moving the Society's headquarters to Sacramento where the close proximity to legislators and government agencies has facilitated more strategic protection of California's flora.

August's wife, Susan, died in 2001. Susan Frugé was also a California Native Plant Society Fellow, and was equally dedicated to the environment and scholarly books. She began her career at the UC Press Los Angeles office where she edited the monumental *A California Flora*, by P.A. Munz—a project many years in the making. She was also a gifted artist, particularly of California landscapes, and several of her paintings have been used in book illustration. She was a founder of the California Native Plant Society.

August Frugé stated upon his inauguration as president of CNPS that he was probably "the only President of CNPS who didn't know a columbine from a redwood." Fittingly, August and Susan are interred in a small redwood grove in Mountain View Cemetery, Oakland, California. Several of their friends maintain a columbine bouquet in the gravesite vase.

Harlan Kessel, 376 Bellevue Avenue, Oakland CA 94610. HarlantheK@netscape.net

Donations in August Frugé's memory may be made to the Associates of the University of California Press and to the California Native Plant Society.



Columbine (*Aquilegia formosa*) and coast redwood (*Sequoia sempervirens*). Illustrations from *The Jepson Manual*, used with permission from the Regents of the University of California.



Please Join Today!

CNPS member gifts allow us to promote and protect California's native plants and their habitats. Gifts are tax-deductible minus the \$12 of the total gift which goes toward publication of *Fremontia* and the CNPS Bulletin.

- | | | | |
|--|--|--|--|
| ☐ \$20 Limited Income | ☐ \$35 Individual | ☐ \$45 Family/International | ☐ \$75 Supporting |
| ☐ \$100 Plant Lover | ☐ \$250 Patron | ☐ \$500 Benefactor | ☐ \$1,000 Mariposa Lily |

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

- | | |
|--|--|
| ☐ Enclosed is a check made payable to CNPS | Membership Gift: _____ |
| ☐ Charge my gift to ☐ Mastercard ☐ Visa | Added donation of: _____ |
| Card Number _____ | TOTAL ENCLOSED: _____ |
| Exp. date _____ | |
| Signature _____ | ☐ Enclosed is a matching gift form from my employer |
| Phone _____ | ☐ I would like information on planned giving |
| Email _____ | |

Please make your check payable to "CNPS" and send to: California Native Plant Society, 2707 K Street, Suite 1, Sacramento, CA 95816-5113. Phone (916) 447-2677; fax (916) 447-2727; www.cnps.org.

MATERIALS FOR PUBLICATION

Members and others are invited to submit material for publication in *Fremontia*. Instructions for contributors can be found on the CNPS website, www.cnps.org, or can be requested from *Fremontia* Editor, Linda Ann Vorobik, vorobik@rockisland.com, or c/o University and Jepson Herbaria, 1001 Valley Life Sciences Bldg. #2465, University of California, Berkeley, CA 94720-2465.

FREMONTIA EDITORIAL ADVISORY BOARD

Ann Bradley, Susan D'Alcamo-Potter, Ellen Dean, Kathleen Dickey, Phyllis M. Faber, Bart O'Brien, John Sawyer, Jim Shevock, Teresa Sholars, Nevin Smith, Dieter Wilken, John Willoughby, Darrell Wright

CLASSIFIED ADS

Classified ad rate: \$1.00 per word, minimum \$15; payment in advance. Address advertising inquiries and copy to: CNPS, 2707 K St., Suite 1, Sacramento, CA 95816-5113. (916) 447-2677 or fax (916) 447-2727.

NURSERIES AND SEEDS

Telos Rare Bulbs. Bulbs for your garden, restoration projects, landscaping. Many Calif. native species, including *Calochortus*, *Fritillaria*, *Brodiaea* relatives, *Erythronium*. Catalog \$3.00. Free shipping in USA. P.O. Box 4978, Arcata, CA 95518. www.telosrarebulbs.com.

SERVICES

Nature landscape design. Landscape Design that celebrates the rich heritage of California's native flora. Duber Landscape Design, CA license #4316. (510) 524-8665.

ART

Notecards, Prints, and Originals. Visit www.VorobikBotanicArt.com. PO Box 866, Lopez Island, WA 98261.

Botanical prints, note cards, postcards, *Plants of the Lewis and Clark Expedition* notecards, books, fruit crate labels, hand towels, and T-shirts focusing on California native plants from *Sierra Nature Prints*. Animal puppets, too. Visit www.sierranatureprints.com.

PUBLICATIONS

Flora & Fauna Books, 121 First Avenue South, Seattle WA 98104, Tel. (206) 623-4727, Fax (206) 623-2001, ffbooks@blarg.net, Specializing in Botany, Gardening, Birding, and Ecology, both new and out-of-print. We carry a large inventory of floras, keys, and field guides for the west coast and worldwide. A large selection of our inventory is now available on the web: www.abebooks.com/home/FFBOOK/.

ECOLOGICAL RESTORATION

Native California grassland and desert ecological restoration standards and costs, plus pictures showing results. www.ecoseeds.com/standards.html.

FROM THE EDITOR

As yet another year reaches its end, and the days become shorter and shorter, what better time to delight in reading. Like an autumn garden basket, this issue of *Fremontia* offers a varied assortment of interesting morsels. To start the issue, Michelle Stevens delves into the subjects of ethnobotany and ethnoecology with her guest editorial and two articles.

In her first article, Stevens examines white root (*Carex barbara*), a significant basketry material to California Native Americans and explores the tending of California sage beds as important examples of Traditional Resource Management and Traditional Environmental Knowledge. In her second article, she describes the ethnoecology of a diversity of wetland plants and includes a page of resources for those who wish to learn more

about this fascinating subject. With the publication of these articles, Michelle receives two 50th birthday presents: a physical manifestation of her work with wetlands, and the occasion to voice her thanks to those who have taught her about Native American uses of and attitudes towards native plants and their environment.

In the next article, Bob and Barbara Sommer share their story of how two veteran fungi foragers became interested in wildflower identification while waiting for the autumn rains. They share their joy in sketching and identifying both wildflowers and fungi and note that the hobbies are quite complementary. One can appreciate the wildflowers in spring and summer, and revel in fungi in fall and winter.

A recent issue of *Fremontia* (Volume 32, No. 2) included a wonderful ar-

ticle about ferns and fern allies by Guenther Machol. If you are intrigued by the overlooked and rarely sought you will enjoy Gordon Leppig's article on two club-mosses, each of which is rare in California.

This issue closes with a tribute to August Frugé, who passed away last summer at the respectable age of 94. During many of those years August was the director of the University of California Press. He and his wife Susan were California Native Plant Society Fellows, founding members of CNPS, and strong advocates for the environment. Harlan Kessel's tribute inspires me with the reminder that there are those among us who work hard all of their lives to protect our beautiful world.

Linda Ann Vorobik
Fremontia Editor

CONTRIBUTORS

Harlan Kessel, now retired, was editor of The Book Club of California *Quarterly Newsletter* and marketing director and paperback editor for the University of California Press.

Gordon Leppig is an environmental scientist with the California Department of Fish and Game in Eureka, where he works on regional conservation planning on managed timberlands. He is the workshop chair for the North Coast Chapter of the California Native Plant Society.

Bob Sommer and Barbara Sommer are each retired faculty from the Psychology Department at the University of California, Davis. Barbara is currently coordinator of instructional programs at the UC Davis Teaching Resources Center. Bob writes a column for *Mushroom*, the Journal.

Michelle L. Stevens works as a restoration ecologist for California Department of Water Resources and as an adjunct faculty member at San Francisco University. She is also affiliated with the Iraq-AWARE project through the University of Miami, supporting the eco-cultural restoration of the Mesopotamian Marshes in southern Iraq. Michelle is currently completing a book on the ethnoecology of riparian and wetland areas of California.

CALIFORNIA NATIVE PLANT SOCIETY,
*dedicated to protecting native plants
and their habitats.*



California Native Plant Society
2707 K Street, Suite 1
Sacramento, CA 95816-5113
Address Service Requested

Nonprofit Org.
U.S. Postage
PAID
Oakland, CA
Permit # 3729