Yosemite Nature Notes

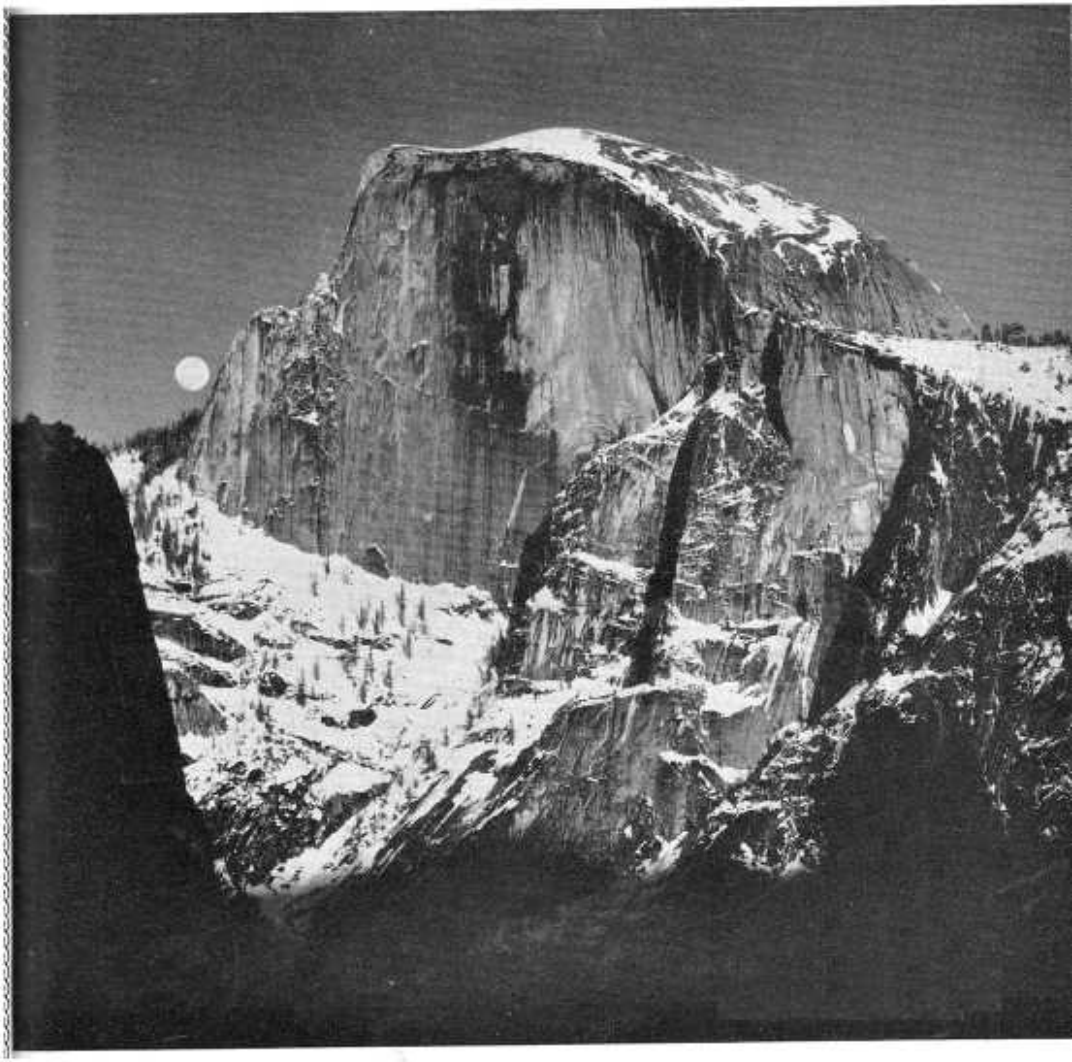

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Photo by Ralph Anderson

Mrs. H. J. Taylor

Cover Photo: Half Dome, moonrise, Yosemite Valley. By Ansel Adams from "Yosemite and the Sierra Nevada," text by John Muir, 64 photographs by Ansel Adams. Reproduction by kind permission of Houghton Mifflin Company.

Yosemite Nature Notes

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VOL. XXX — FEBRUARY, 1951 — NO. 2

MRS. H. J. TAYLOR, 1863-1951

By Carl P. Russell, Park Superintendent

At a time when research and interpretive work in national parks was struggling to make a beginning as a regular part of the program of the National Park Service, there came to Yosemite a volunteer worker who for several years remained here in residence for months at a time and contributed her services as Yosemite Museum librarian and docent. This collaborator was Rose Schuster Taylor (Mrs. H. J. Taylor) of Berkeley, California.

Not the least of her contributions to Yosemite conservation work was her leadership in orienting the students of the Yosemite School of Field Natural History and in maintaining the esprit de corps of ranger-naturalists and others who served the public as guides and lecturers. Mrs. Taylor lived in the naturalist camp in Yosemite Valley and associated intimately with students of the school and with staff members in their home life as well as in the library, laboratory, classroom, and in the field. During this time she made a very tangible contribution which endeared her to hundreds of men and women now active in the field of nature teaching.

A further gift which she made to the cause of conservation was her literary contribution. From 1927 through 1934 she was a frequent contributor to *Yosemite Nature Notes*. One of her outstanding pieces of work grew out of her friendship with Maria Lebrado, the ancient Indian woman who was present in Yosemite when the Mariposa Battalion entered the valley in 1851. In addition to the short articles prepared on her studies of Yosemite Indians for publication in *Yosemite Nature Notes*, Mrs. Taylor wrote a very useful volume, *Yosemite Indians and Other Sketches*, which was published in San Francisco in 1936. She also contributed articles on her interviews with Maria in the *University of California Chronicle* in 1932. Maria was the subject of Mrs. Taylor's *The Last Survivor*, also published in 1932.

Her literary work did not begin until she was more than 50 years old. From 1915 until 1945 she was a steady contributor to nature study publications and conservation journals. Many of her articles appeared in *Condor*, *Bird Lore*, *Wilson Bulletin*, *Iowa Bird Life*, *Bios*, and the *Wisconsin Magazine of History*. Her writings reflect her industry in pursuing original research in history, natural history and biography, and they show her fine intellectual qualities and her abiding love for her fellow man. Her interest in ethnology was not-

able also and was exceeded only by her general humanitarianism. In Yosemite she was instrumental in launching numerous research projects which were conducted by others, yet she never posed as a professional scientist or teacher.

From the National Park Service standpoint, Mrs. Taylor made a significant mark upon the history of our progress in defining objectives and in devising procedures in interpretive work. These particular accomplishments were achieved after she reached the age of 60. Her work in behalf of nature protection and the history of nature protection persisted during more than a quarter of a century. This friend and benefactor of the Yosemite interpretive program found it possible to extend her span of constructive work far beyond the time limits to which most of us are restricted. She was 88 years old when she passed away in her Berkeley home on January 25 of this year.

Mrs. Taylor was the recipient of honors bestowed upon her by her Alma Mater, the University of Wisconsin, and by Phi Beta Kappa. Surviving her is her daughter, Ethel Rose Taylor of Berkeley with whom she lived, and three sons—Sterling Taylor, State Bank Examiner of Berkeley, Dr. Paul Taylor, distinguished economist at the University of California, and Dr. Arthur Taylor, a physician and surgeon of Appleton, Wisconsin.

POISONOUS PLANTS USED FOR FISHING†

By James W. McFarland, Ranger Naturalist

By midsummer the winter snows in the Sierra Nevada had melted and the waters of the Merced River and its tributaries were low; deep shadowed pools had only a trickle of water connecting them. Here the wary rainbow trout could no longer escape capture until high water came again. The Miwok Indian with his fish poison, *buyapna*, would "stupefy" him! Dried in the sun, the trout were food for the white winter ahead.

The stupefying or killing of fish in ponds and streams in order to catch them is known historically in most countries of the world. In the United States the Iroquois, Chippewa, and Cherokee Indians used poisonous bark.[10] However, the use of fish poisons was largely confined to central California. Here fish were plentiful and so were eaten often.

Of all the methods of capturing fish kown to the Indian, that of using poisonous plants was the most ingenious, as well as the laziest.[2,13,14] Fish poisoning is of such a nature that it has no doubt been independently discovered time and again. That the California occurrences represent discoveries independent of the practice elsewhere in America seems reasonable to believe. There is no record of how the Indian found that he could saturate the water with poisonous plant juices to such an extent as to be fatal to the fish. However, reason also suggests that the technique was accidentally discovered while leaching out the "bitterness" from various plants which

†Editor's note: A State of California fishing regulation, which applies in Yosemite National Park, prohibits fishing in any other way than with hook and line, the rod or line being held in the hand.

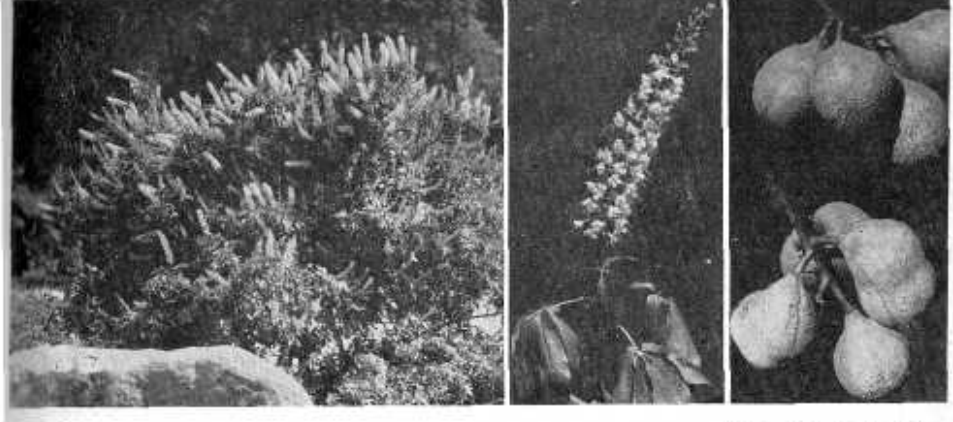
were used for food, or had other uses. For example, the large seeds of the California buckeye were first mashed and leached out in fresh water before being eaten like mashed potatoes or soup.[1,3] On observing their drugging effect on fish in the stream, some Indian, no doubt, performed the first act of capturing fish by this method. Again, the Indians of central California of both sexes usually wore their hair long.[3] Believing that it promoted more luxuriant growth, the hair was lathered and washed with soaproot every few days. Thus the use of soaproot as a fish poison may have been discovered. Among the Pueblo Indians the practice of washing the hair prior to a religious rite, with the pounded root of the yucca which contains a similar active principle,[10] may have been the occasion of a like discovery.

The success of fish poisoning was increased by the coincidence of the annual season of low water in streams and the period of maximum concentration of the active principles in the plants used. Thus it was comparatively easy to get an effective concentration of soaproot poison in a slow moving, shallow stream of late summer, at a time when the saponin content of the soaproot was greatest.

The flora of Yosemite National Park includes seven of the species of plants used by the Indians of central California in "stupefying" fish. In order to determine the relative effectiveness of the different kinds of plants used, simple experimental tests were run last summer by the author, using for each test 20 fingerling brook trout under controlled conditions of temperature, volume, and flow of water. Further, the amount of material and the manner in which it was prepared was recorded. The results are tabulated on page 19. A more complete description of the reactions observed is included in the discussion of each plant as follows:

1. California Buckeye (*Aesculus californica* (Spach) Nutt.)
(Miwok: *siwu*)

The California buckeye, a small, broad-crowned tree up to 40 feet high, has opposite, compound leaves with 5 to 7 leaflets. The fruit is a large pear-shaped capsule, a leathery-textured husk surrounding one or rarely two large glossy seeds



Photos by N. B. Herkenham

California buckeye: tree in blossom; flowers and leaves; fruit.

which are sometimes nearly 2 inches in diameter. The tree grows on dry hills or canyon sides from the coast to the Sierra Nevada foothills, up to 4,000 feet. In Yosemite it is found in the Merced Canyon below Arch Rock and in the Tuolumne Canyon below Hetch Hetchy. The active principle, esculin, is a crystalline bitter glucoside slightly soluble in water and alcohol.[7]

Used as a fish poison by the Indians, the buckeye seeds or nuts were mashed and then put in small creeks or pools. The fish gradually came to the surface and floated belly up.[3] Two preliminary tests were run last summer, using the somewhat immature fruits of August 20. The mashed nut meats seemed to cause immediate distress in the fish. However, it was 25 minutes, using a high concentration of 4 ounces of nut meats to 3 gallons of water, before the fingerling brook trout turned belly up and died. Using half this concentration of the fruit husks instead of the seeds, all the fish were dead in 5 minutes. With the material used, results indicate that the buckeye fruit husks are ten times as potent as the nut meats in poisoning fish. In Indian practice, it would seem to have been more economical to eat the leached nut meats and use the husks for fishing, except that the preparation of the nuts for food was so tedious and time-consuming that it was resorted to only when other foods were scarce.[3]

2. Soaproot (*Chlorogalum pomeridianum* (Ker) Kunth.)

(Miwok: *patawi*. Other names: soap plant; amole—Mexican for soap)

This is a tall, slender-stemmed lily. Stalks bearing purple and white flowers rise from a subterranean bulb rich in saponin, which is a detergent, becoming soapy in water. Saponin is also the active poisonous principle, a glucoside. The bulb, about 3 inches in diameter, is enveloped in a thick coating of brown, matted, hair-like fibers. the plant is abundant below 5,000 feet in open valleys and foothills, especially in stony ground. Locally it is found at Wawona and Hetch Hetchy, but is rare in Yosemite Valley.

Soaproot

The soap plant had a greater variety of uses in the culture of the Miwok than did any other plant. It was used as food, soap, brush, medicine, glue, and as a poison to "stupefy" fish.[1,3,15]

The root produces a rosette of long, undulate-margined, grass-like leaves that rest flat upon the ground. These were sometimes eaten green in the spring while they were still tender.[6] The bulb itself was sometimes leached in fresh water to remove the bitterness, then roasted and eaten.[1,4] Having the detergent

properties of soap, it cleans the hands, clothing, or hair quite as well as, and much more pleasantly than, the coarse kinds of soap.[13]

Soaproot was used as a fish poison often. In summer when the water was low the Indians would dig several bushels of the bulbous roots. These were carried to a suitable place on the streambank. There the roots were pounded to a pulp and mixed with fine soil and water, producing a frothy mass. This mixture was rubbed by the handful on the rocks out in the stream, causing a frothing and discoloration of the water. The fish were soon affected by it and became "stupid" from a sort of suffocation, and reputedly "rose to the surface" where they were easily captured by the Indians with their open-work scoop baskets. It is reported that in a stream the size of the South Fork of the Merced River at Wawona, by this one operation every fish in it for a distance of 3 miles downstream would be taken in a few hours. These were sun-dried by frequent turning and stored for future use.[5,8,9,15]

Recent observations of test results, using soaproot in poisoning fish, differ in several particulars from those recorded in the literature. The fish were not only "stupefied," but killed. In no case was it possible to revive a fish. Further, the fish did not rise to the surface, but each fish without exception sank to the bottom. Death very probably was due to the hemolytic effect of the saponin absorbed into the blood stream through the gills, producing respiratory failure.[16] Finally, the results of the tests indicate that an effective concentration of the poison could not be maintained very far downstream from the immediate pool in which it was placed.

3. Durango Root (*Datisca glomerata* Brew. & Wats.)

(Miwok: *isnotayi*)

The stems of this plant arise in clusters up to 10 feet high from a perennial root, with leaves much divided, giving a fern-like appearance. The flowers are mostly dioecious in clusters in the axils of the leafy branches. The fruit is a capsule, opening at the top.

Durango root is found in streambeds along the foothills up to 5,000 feet. It is abundant and extremely luxuriant in moist draws, forming dense thickets on both sides of the Merced Canyon just within the park boundary at about 2,600 feet elevation.

The active principle, datiscin, a substance having the appearance of grape sugar, was first extracted by Braconnet from the leaves of *Datisca cannabina* of southern Europe. It has been used as a yellow dye,[7] and as a medicine by the Miwok.[8]

Although it was used as a fish poison by the Pomo Indians,[8] in last summer's tests, using a high concentration of the crushed leaves and stems, it took 35 minutes to kill the fish. However, in 5 minutes the fish moved sluggishly, appeared to be drugged, and could easily be caught by hand.

4. Common Manroot (*Echinocystis fabacea* Naudin)

(Miwok: *tawukna*. Other names: old-man in-the-ground; bigroot; wild cucumber; chilicothe)

This perennial-rooted member of the gourd family has an enormous bitter root often as large as a man's body. Stems that may climb by tendrils to 30 feet bear leaves deeply 5- to 7-lobed. The peculiar and conspicuous fruit is a big prickly green ball, measuring 2 inches across.

Identity of the active principle in the root apparently is unknown.

Common manroot grows on hillslopes or high sandy places in valleys of central California up to 4,000 feet in elevation. Only one specimen was found by the author in Yosemite Valley, near Government Center.

In the recent tests, using an extremely high concentration of pulped root, all the fish turned belly up and floated within 7 minutes. Although Chris Brown (Chief Leemee) states that this was done by the Yosemite Indians, it would seem that there is insufficient quantity of the material available in this area for it to have assumed much importance in Yosemite. On the other hand its use in this way may be the reason for its almost total absence locally in Yosemite Valley.

5. Turkey Mullein (*Eremocarpus setigerus* Benth.)
(Other names: doveweed; yerba del pescado)

This is a low-branched annual forming leafy mats 1 or 2 feet wide, densely stiff-hairy throughout, giving a whitish appearance to the whole plant. The active principle, crotonin, is a vegeto-alkaloid which was first isolated from seeds of *Croton tiglium*. Death has resulted in man from a dosage of only 20 drops.[16]

Turkey mullein grows commonly in California on dry open areas up to 4,500 feet, reaching the vicinities of El Portal and Hetch Hetchy; it has been found near Ahwahnee Meadow in Yosemite Valley.

The California Indians used the heavy-scented herbage to stupefy fish so that they might be caught by hand, whence the Spanish name, yerba del pescado.[1,8,11,12] When tested last summer, such high concentrations were necessary as to appear impractical for this purpose. Moreover, the fish did not float but sank to the bottom. In no case was it possible to revive a fish. Again the use of the word "stupefy" in the written accounts does not accurately describe their reaction.

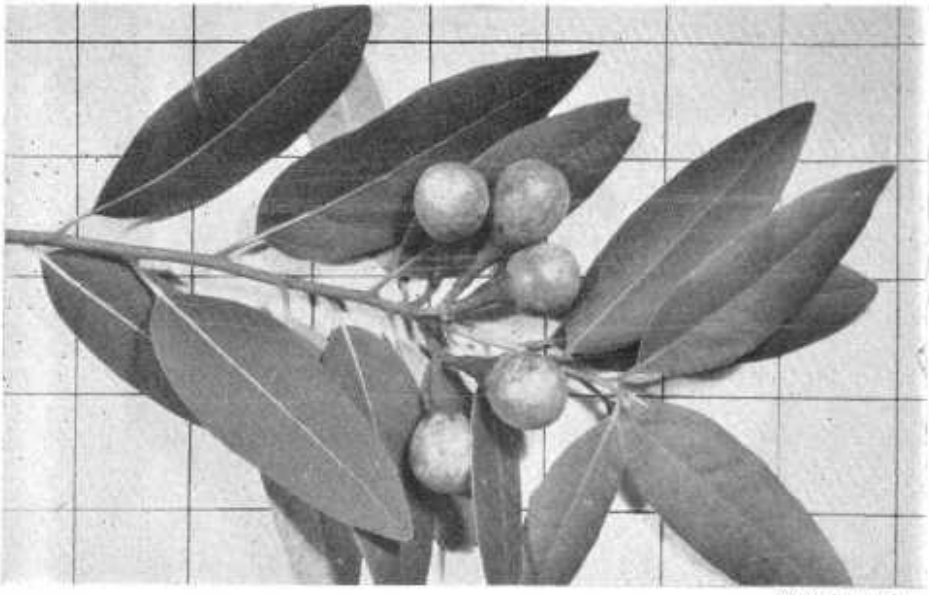


Photo by Brockman

Foliage and fruit of California laurel (Inch squares on background)

6. **Blue Curls** (*Trichostema oblongum* Benth.)

(Miwok: *teukuteu*. Other names: camphor weed; vinegar weed)

This mint grows to 18 inches in height, with soft-pubescent herbage of exceedingly unpleasant scent. Its blue flowers grow in small lateral clusters. The active principle apparently is unidentified.

Blue curls grows in open grassy places in the foothills, and has been found up to 8,500 feet in the western area of the park, including Yosemite Valley. There are several records of its having been used as a fish poison.[4,8] The recent tests showed this plant to be of a potency similar to that of turkey mullein.

7. **California Laurel** (*Umbellularia californica* Nutt.)

(Miwok: *loko*. Other names: California bay, pepperwood; Oregon myrtle)

This handsome evergreen laurel may range from a shrubby form to a medium-sized tree of 80 feet height, or even 175 feet in southwestern Oregon. The leaves contain a volatile essential oil that is highly aromatic. It is this spicy quality which makes them important as the "bay leaves" used in cooking, as for flavoring meats and soups.

California laurel is one of the most abundant and characteristic trees of California, growing in moist places and on hillsides up to 5,000 feet. It is commonly found at the base of the cliffs bordering Yosemite Valley.

"Pepperwood" leaves were used for fish poisoning by the Yosemite Indians and by the Mono Indians of the North Fork of the San Joaquin River in California.[1] The active principle is umbellulone, a powerful antiseptic that has marked hemolytic properties, being a depressant of

TABULATED RESULTS OF FISH POISONING TESTS

Plant Used	Part Used	Quantity	Water Volume	Reaction	Elapsed Time	Active Principle
1. **California Buckeye** (*Aesculus californica*)	a. nut meat crushed	4 oz.	3 gal.	distress belly up	immediate 25 min.	esculin
	b. husks crushed	2 oz.	3 gal.	belly up	4 min.	esculin
2. **Soaproot** (*Chlorogalum pomeridianum*)	bulb peeled & crushed	4 oz. mixed in water & soil	4 cu. ft.	belly up and sank	30 min.	saponin
3. **Durango Root** (*Datisca glomerata*)	leaves & stems crushed	2 oz.	3 gal.	drugged belly up, some sank	5 min. 27 min.	datiscin
4. **Common Manroot** (*Echinocystis fabacea*)	root crushed	4 oz.	3 gal.	belly up & floated	7 min.	unknown
5. **Turkey Mullein** (*Eremocarpus setigerus*)	leaves & stems crushed	8 oz.	3 gal.	belly up and sank	30 min.	crotonin
6. **Blue Curls** (*Trichostema oblongum*)	leaves & stems crushed	8 oz.	3 gal.	belly up and sank	30 min.	unknown
7. **California Laurel** (*Umbellularia californica*)	leaves crushed	4 oz.	3 gal.	drugged no change all recovered	10 min. 1 hour	umbellulone

These preliminary tests were made in the fish hatchery at Happy Isles, Yosemite National Park, California, using 20 fingerling brook trout for each test. The tests were run on August 9, 10, 11, and 22, 1950. A demonstration using about 50 legal size rainbow trout was made in a large pool of Yosemite Creek on August 18, 1950, using the bulb of the soap plant.

both respiration and circulation.[16] The experimental tests of last summer showed that this material drugged the fish so that they could easily be caught by hand, but that it was incapable of killing them.

Conclusions

Preliminary tests in the use of plants for fish poisoning have yielded some interesting facts but few definite conclusions. It may be said that the word "stupefy" frequently used in the literature inaccurately describes the reaction of the fish in these tests. Essentially, stupefy means to deprive of motion and sensibility, but not to kill. This is descriptive only of the reaction of the fish to California laurel. All other plants used resulted in the death of the fish. However, it is reasonable to assume that in sufficient dilution the others might also "drug" rather than kill the fish.

The phrase "turn belly up and float" appearing in written accounts does not consistently describe the effect on the fish in the experiments. It is true that all fish turned belly up; a fish killed by almost any means will so react. However, not all of the plant poisons caused the fish to float. The fact that only common manroot caused all fish to float, while soap plant, turkey mullein, and blue curls caused them to sink, and buckeye and durango root were indeterminate, may have some significance as to the physiological effect on the fish, especially on the amount of air in the air bladder controlling buoyancy.

Capturing fish by the use of plant poisons was certainly a lazy way of fishing. However, it was effective only under a number of coincidental conditions. This method yielded good results only at times of very low water. In order to maintain a potent concentration for a sufficient length of time, it would be almost necessary to build a dam to prevent the dilution of the plant poison. A dam would also prevent the escape of fish seeking healthier waters. Chris Brown states that this was the technique used by the Yosemite Indians. Perhaps the greatest limitation lay in the degree of abundance of the plant, which would determine whether it could be gathered in sufficient quantities to make an effective concentration in a large pool of water.

The author was unable to discover any record of previous experiments utilizing poisonous plants to stupefy fish. One of the major questions yet to be answered concerning any specific plant poison is: "What is its minimum effective concentration for stupefying fish?"

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From kodachrome by J. W. McFarland

Chief Leemee gathering fish killed by soaproot poison.

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Dan Anderson