

USE OF WILD CHERRY PITS AS FOOD BY THE CALIFORNIA INDIANS

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ABSTRACT.—Central and southern California Indians prized the fruit of Holly-Leaved Cherry, *Prunus ilicifolia* (Nutt.) Walp. [Rosaceae], much more for its seed kernel or pit than for the surrounding fleshy pulp. A survey is made of *Prunus* pit consumption by various California groups, and preparation methods are described. Though these pits contain poisonous hydrocyanic acid, it is shown that native people recognized the danger and, through proper treatment, were able to produce a safe and desirable food. Subsistence, social, economic and ritual roles of *Prunus* pits in California Indian life are discussed, followed by comments on changes in recent times.

INTRODUCTION

The genus *Prunus*, a member of the Rose Family [Rosaceae], contains a number of our cultivated fruit trees: plum, peach, apricot, almond and cherry. There are several wild shrubs in the same genus which are native to California, and it is not surprising that the fruits of these were eaten by the indigenous peoples. What is surprising is that in some areas the pits were eaten, for they contain potentially dangerous levels of cyanide. This paper discusses these wild *Prunus* pit foods in California, the methods of dealing with their toxicity, and the roles they played in California Indian life.

NATIVE SPECIES AND THEIR USE

Prunus in California

There are seven species of *Prunus* indigenous to California. The following brief descriptions, summarized from Munz and Keck (1959), emphasize distribution, plant size and nature of fruit; season of ripening is not given but can be estimated from flowering times.

P. emarginata. Bitter Cherry. Mountains throughout California from San Diego County north, elevations up to 2700 m; in Yellow Pine and Red Fir Forests and Chaparral. Shrub to small tree, 1-6 m high. Drupe red, bitter, 6-8 mm diameter. Flowers April to May.

P. subcordata. Sierra Plum. Coast Ranges from Santa Cruz Mountains north, and Sierra Nevada from Kern and Tulare Counties north to Modoc County, elevations below 1800 m; Yellow Pine Forest. Shrub to small tree, 1-6 m high. Fruit 1.5-2 cm long, red-purple, edible. Flowers March to May.

P. fremontii. Desert Apricot. Colorado Desert from Palm Springs south to Baja California. Shrub to small tree, 1.5-4 m tall. Fruit yellowish, hairy, 8-14 mm long, dry. Flowers February to March.

P. andersonii. Desert Peach. East side of the Sierra Nevada from Kern and Inyo Counties north, 1100-2700 m elevation. Shrub 1-2 m tall. Fruit 12 mm long, hairy, with thin, dry pulp. Flowers March to April.

P. fasciculata. Desert Almond. Mojave and Colorado Deserts at 750-2000 m elevation; variety *punctata* occurs in Santa Barbara and San Luis Obispo Counties. Shrub 1-3 m tall. Fruit dry, hairy, 8-12 mm long. Flowers March to May.

P. virginiana var. *demissa*. Western Chokecherry. Coast Ranges and Sierra Nevada, below 2500 m; Yellow Pine Forest, Chaparral, Foothill Woodland. Shrub or small tree, 1-5 m high. Fruit 5-6 mm across, dark red, bitter but edible, especially late in the season. Black-fruited variety *melanocarpa* occurs in northernmost California. Flowers May to June.

P. ilicifolia. Holly-Leaved Cherry, Islay. Coast Ranges from Napa County south to Baja California, Santa Catalina and San Clemente Islands. Similar-appearing Catalina Cherry, subspecies *lyonii*, is

restricted to the Channel Islands of Anacapa, Santa Cruz, Santa Rosa, Santa Catalina and San Clemente (Smith 1976:164); below 1500 m in Chaparral and Foothill Woodland. Shrub or small tree, 1-8 m tall. Fruit red (rarely yellow), 12-15 mm long, with thin, sweetish pulp. Catalina Cherry fruit is darker and larger, 12-24 mm long. Flowers April to May.

Distribution of Prunus Foods

Fruit. — The fruit of all these wild *Prunus* species is characterized by having a large stone and relatively little pulp. What pulp there is is often rather dry. Nonetheless, Indian peoples throughout the state did make use of this fruit pulp, and many are stated to have prized it as a food source. The Cahuilla were fond of Desert Peach (Bean and Saubel 1972:119); the Mendocino County Indians relished Sierra Plum and made long trips to get it since it was not common in their region (Chesnut 1902:356). The species most used for fruit appear to have been Sierra Plum, Western Chokecherry and Islay. The fruit was usually eaten fresh from the trees, but it was sometimes dried and stored for later use (Bean and Saubel 1972:119-121; Chesnut 1902:356; Barrett and Gifford 1933:162; Zigmond 1981:54; Harrington, n.d.). The Luiseño preferred to let the fruit sit for a few days before eating it, to improve the taste (Sparkman 1908:194, 232).

Pits. — Some groups, particularly those in central and southern California, preferred to throw the fruit pulp away and eat the pits.

To find out which groups made significant use of *Prunus* pits for food, a survey was made of Culture Element Distribution lists (C.E.D.) compiled for California in the 1930s and 1940s. These lists vary widely in the degree of detail they provide. Usually, plants are merely described as "eaten", without specifying the exact part used or the method of preparation. A further difficulty is that botanical names are rarely included in this type of anthropological literature, and common names are often incorrectly applied. Nonetheless, C.E.D. lists can still give some indications of traits important in a cultural group. Other ethnographic sources were also checked where they were available.

Though *Prunus* fruit was eaten in many areas, there is virtually no evidence of use of pits in northeastern California (Voegelin 1942; Beals 1933; Gifford and Klimek 1936), central Sierra (Aginsky 1941; Barrett and Gifford 1933; Gayton 1948a, 1948b), southern Sierra (Driver 1937a; Gayton 1948a; 1948b; Voegelin 1938; Zigmond 1981), northwestern California (Driver 1937b; Curtin 1957; Foster 1944; Schenck and Gifford 1952), or Round Valley (Essene 1942; Chesnut 1902; Goodrich et al. 1980). Some groups, such as the Maidu (Hill 1972), Shastan (Silver 1978), Northern Paiute (Kelly 1932), Atsugewi (Garth 1953), and Yana (Elsasser 1981), may have made flour of the fruit pulp or mashed whole *Prunus* fruit, seeds and all, but most of this information is ambiguous. Great Basin and Plateau groups did make a pemmican-like food of mashed *Prunus* fruit and seeds (Stewart 1940; Ray 1942), and this practice may have extended slightly into northeastern California. In addition, one northern Pomo consultant said "wild plums" — presumably *Prunus* pits — were stored in grass-lined pits indoors, but this was not mentioned by other Pomo, and no further information was given (Gifford and Kroeber 1937:181).

In contrast to the rest of the state where evidence is scanty, in the central coast and southern California every tribe is listed as preparing "wild plum seed meal" (Harrington 1942; Drucker 1937). This concentration of *Prunus* pit foods seems rather curious until it is compared with the distribution of the seven *Prunus* species in California.

The practice of making "wild plum seed meal" coincides quite closely with the range of Holly-Leaved Cherry or Islay, *Prunus ilicifolia*, as shown in Figure 1. The name "Islay" is a Hispanicized version of *slay*, the Salinan word for the plant, and is the common name historically used by most Indian people to refer to the plant, the fruit, and the food made from the pits (Harrington 1944:38). This species was used by all peoples within its range south of San Francisco Bay. It is the only one which was consistently specified as being sought for its kernel or pit everywhere it occurs. Although some groups like the Cahuilla (Bean 1972; Bean and Saubel 1972) used other species as well, *P. ilicifolia* was

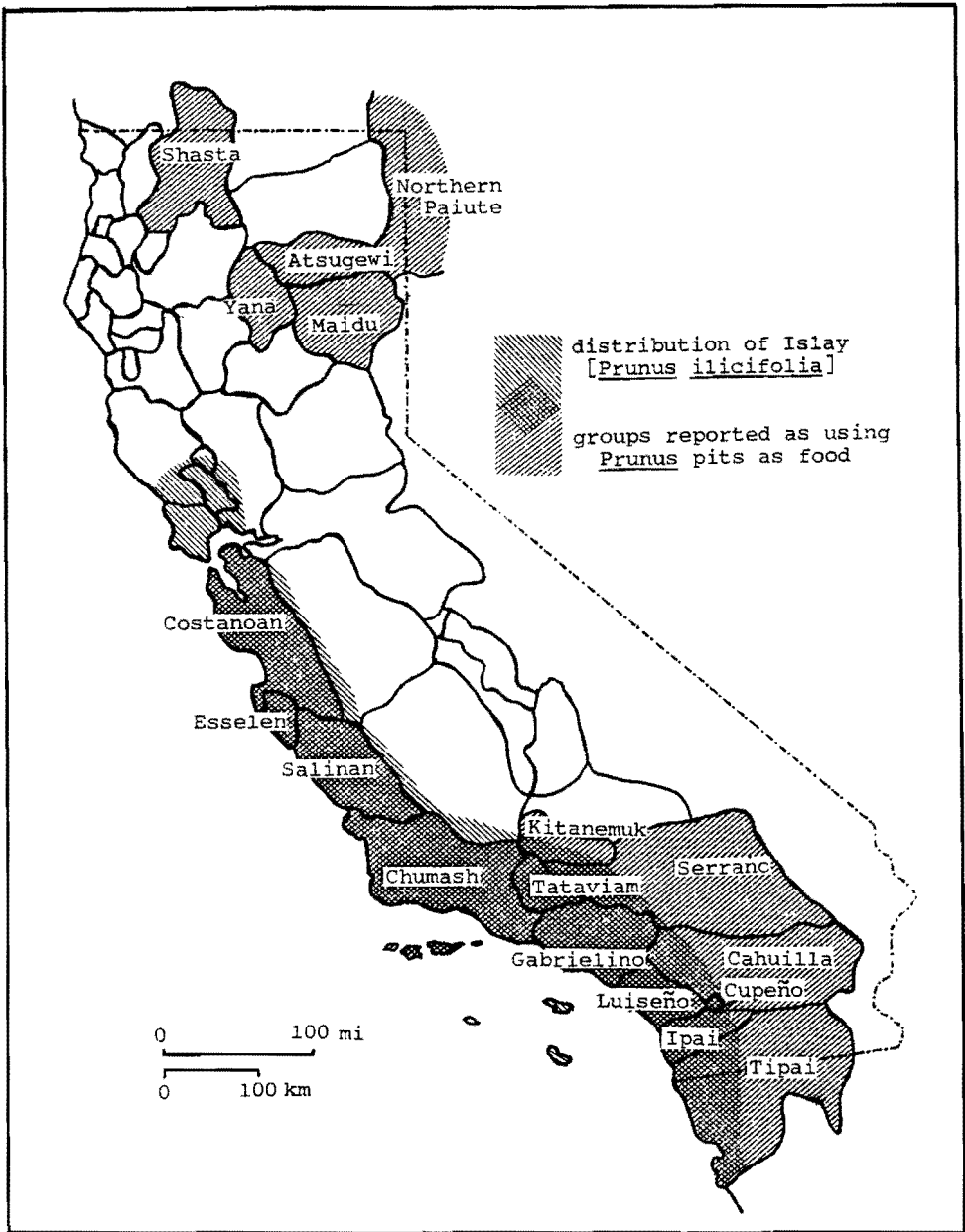


FIG. 1—Comparison of *Prunus ilicifolia* range with consumption of *Prunus* spp. pits by California Indian groups. Northern California tribes outside the range of *P. ilicifolia* may have used *P. subcordata* and *P. virginiana* var. *demissa*. Other species were available but not used.

the most important one for pit exploitation. Thus, “wild cherry pit meal” would be a more appropriate designation than “wild plum seed meal.”

Prunus Pit Preparation

Methods of preparing foods from the seeds of *Prunus* will now be described as they were practiced by each tribe within the range of *P. ilicifolia*. These methods are briefly

TABLE 1.—Patterns of *Prunus pit* preparation on the central coast and in southern California.

Tribe	Leached	Roasted	Mush	Cakes*
Costanoan	(-)	+		(+)
Salinan				+
Esselen				(+)
Chumash	(-)			+
Tataviam				
Kitanemuk	+			+
Serrano	+			
Gabrielino	(+)		(+)	
Luiseno	+		+	
Cahuilla	+	(+)	+	+
Cupeño	+			
Ipai	+	+	(+)	+
Tipai	+		+	(+)

*"Cakes" includes balls, patties, "tamales," "tortillas"

+ stated as present by at least one source

(+) probably present

(-) probably not present

blank space indicates lack of information

summarized in Table 1. No information was encountered for Patwin, Wappo, Pomo or Coast Miwok, all at the northernmost end of the range of Islay.

Costanoan. — Seeds of the Islay, or Holly-leaf Cherry (*Prunus ilicifolia*) were ground to produce a meal that was eaten (Levy 1978b:491). Details are provided in the ethnographic notes of John P. Harrington (n.d.), now being prepared for publication by Barbara Bocek of Stanford University. The Islay pits were heated in warm water to remove the clinging fruit pulp, following which they were dried for a while, then opened by hitting with a stone. At this point the two consultants disagreed: one said the shelled pits were further dried and then eaten with no additional preparation; the other said the kernels were put in water, sugar added to sweeten¹, then roasted overnight in a grass-lined hole. They could then be eaten, or one could "take them to people." The taste was compared to that of beans or chestnuts. No mention was made of the form of the final product—bread, mush, or cakes—or of storage, although the fruit was apparently gathered in some quantity. Isabel Meadows, Harrington's primary Rumsen consultant, told him that the term "Islay" did not include Western Chokecherry, *P. virginiana* var. *demissa* as identified from specimens. She also said that the fruit of this latter species was eaten but that the pits were not (Bocek, pers. comm.).

Esselen. — "Cherry stones" were given as an item of the diet (Hester 1978:497). No further details were found, but the method was probably similar to that of the Salinans.

Salinan. — As noted, the common name Islay is a Salinan loan word. According to early Spanish explorer Fages, an item of Salinan diet was "a fruit like a red plum or cherry, from the seed or pit of which, with its surrounding substance they make good tamales. They call it *yslay*, and they eat the little meat which the pit contains" (Priestley 1937:59). Mason (1912:121) refers to "chuckberries" being eaten; this may refer to chokecherries, but no preparation method is given.

Chumash. — The diarist of the 1542 Cabrillo voyage recorded that the Indians of the Santa Barbara Channel made “tamales” of a white seed the size of maize; these were good food (Bolton 1925:30). When the fruit pulp is removed, the shells of the Islay pits fit this description. Other observers indicated that Islay was still being used as a food as late as the 1890s; they said it was ground, cooked, and made into balls which were esteemed highly (Caballeria y Collell 1892:17-18; Bard 1894:4).

While other authors merely mention that the Chumash ate Islay pits (Orr 1943; Grant 1978), Harrington's unpublished field notes provide considerable detail about the exact preparation methods they followed. These notes form the substance of a major Chumash ethnobotanical study by the present author, to be published at a later time.

Harrington's principal Ventureño Chumash consultant, Fernando Librado, commented that the Chumash ate the fruit, but that the kernel was the “really esteemed” part of the Islay. The fruit was gathered by hand, picking into a large bag hung around the neck. It was piled up until the pulp rotted, then the pulp and skin were rubbed off and the shells cracked open. Another consultant said that the pits were first boiled “until done,” then allowed to sit overnight before cracking. After the kernels were removed, they could be used right away or stored for later use in a big basket in the house.

Leaching was mentioned by only two consultants in the Chumash area, and they disagreed on the method used. Fernando Cardenas, a non-Chumash man of Santa Ynez, said the whole kernels were placed in a sack and repeatedly dipped into hot water, then ground into meal (Saunders 1934:59). Harrington's last Barbareño Chumash consultant, Mary Yee, said the Islay was leached after it was “mashed” [=ground?] by letting water run through it in a basket in the creek. Neither of these methods is the same as that used by the Chumash for leaching acorn meal, which was usually done in a twined tray. None of Harrington's older consultants, who had been living in an earlier time when Islay was being prepared regularly, mentioned any leaching process. If the Chumash did leach Islay, they probably followed the method used by the Kitanemuk, described below.

To cook, the Islay was boiled for a long time—one person said three hours—in a stone olla. Acorn mush, by contrast, was cooked in baskets with heated stones. After it was cooked, the Islay was mashed like beans using a wooden paddle-like implement, and molded into cakes or balls which were sometimes rolled in pinole flour (Timbrook 1980:277). All of the Chumash consultants mentioned these balls; apparently Islay was eaten only in this form, never as mush. If a person had been gathering Islay a long way from home, the entire preparation process could be done in the field, but it was more usual to do it at home.

The finished Islay balls were arranged on a tray ready for eating; they could be kept for a week or more. Chumash consultants compared the taste to beans, as the Costanoans did, and commented that they liked it very much. Most indicated that Islay was usually eaten as an accompaniment to meat such as baked gopher or squirrel.

Of the plant specimens collected by Harrington's Chumash consultants, all of those labeled as Islay were *Prunus ilicifolia* (Fig. 2). This is by far the most common species in Chumash territory. Obispeño Chumash Rosario Cooper mentioned gathering two kinds, but no corresponding specimens are extant, and there is no evidence that the Chumash used more than one species in the manner described. Cooper may have meant green and ripe Islay fruit, which were segregated by the Kitanemuk (see below).

Tataviam. — Very little published information is available about this group. “Berries of Islay (*Prunus ilicifolia*)” have been listed as the fifth most important vegetable food for the Tataviam, after yucca, acorns, sage seeds and juniper berries (King and Blackburn 1978:536). This inference was drawn from Harrington's (n.d.) notes on the Kitanemuk, Gabrielino, Chumash and San Bernardino Mountain Serrano; presumably the Tataviam were like these neighboring groups in making more use of the Islay pits than of the fruit itself. No information is given on preparation.

Kitanemuk. — Once again the major source of information is Harrington's (n.d.)



FIG. 2—Specimen of *Prunus ilicifolia* collected and labeled by Harrington's Barbareño Chumash consultant Lucrecia Garcia, ca. 1928. Photo courtesy of the National Anthropological Archives, Smithsonian Institution.

field notes. Tejon area consultants said that only the ripe and sweet islay fruits were chosen for eating fresh, as some were not sweet. Usually they threw the pulp away, for the kernel was the really esteemed part of the Islay [a phrase also used in Harrington's Chumash notes].

They would begin picking the Islay when it was still green and keep on until after it ripened, and even pick it up off the ground. They picked the fruit by hand but never beat the tree or hit it with a stick, for it was considered to be delicate. They kept the green and the ripe, including fallen, fruit in separate piles; the shells of the green Islay were used at a later stage of preparation. The fruit was brought home and piled on a

swept dirt floor in the house for several days until the pulp rotted. It was then washed off in the creek by rubbing it between the hands.

For the initial preparation stage, water was heated in baskets with hot stones and either poured over the Islay or the Islay put into the water. The water was not boiling, and the Islay remained in it only a short time, about ten minutes. Then someone would break open a pit and pinch the kernel to see if it was "done." The water was poured off and the pits spread in the sun to dry for two or three days. The shells were cracked by rolling on a metate with a stone held horizontally in both hands² and the hulls removed from the kernels.

At this point the shells of the green Islay, which had been kept separate, were burned and the ashes moistened to make a dough which was molded into cakes like soap. The kernels of both the red and green Islay were mixed together after this. Only the green fruit shells were used to make the ash cakes. The shelled kernels were stored in sacks or in big storage baskets to keep them for winter use.

The Islay kernels were cooked in an olla with water, which was changed two or three times during the cooking process. One consultant said the kernels were boiled for awhile before the water was poured off, but another said the water was poured off before it boiled. New cold or lukewarm water was added, heated and changed twice when the kernels were old, and three times when they were new because the latter were more bitter. This changing of water was thus both a cooking and a leaching process.

Following this leaching stage, hot or cold water was added and the kernels boiled until done. This was said to take a long time, from morning till afternoon, for the kernels were very hard. While the pot of Islay was boiling, an amount of the prepared ash cake equal to the last joint of two fingers was added to the pot so the Islay would not be bitter; this was added only to Islay, not to any other food³. One consultant said they added no salt or anything to the Islay, indicating that different cooks had somewhat different recipes.

When the Islay was done and the water had almost all cooked away, it was mashed in the cooking olla and molded into little balls the size of biscuits. They were reddish colored like beans. The balls were put into a tray and would keep about three days without souring. They were considered fine to eat with roasted meat.

Kitanemuk consultants knew nothing of there being two kinds of Islay, which had been mentioned by the Obispeño Chumash woman; "when ripe there are many kinds, white, black, purplish, etc., but it is all Islay" (Harrington, n.d.). It is not known whether Harrington obtained voucher specimens for this area, or whether other species in addition to *P. ilicifolia* were prepared in a similar way.

Serrano. — The Culture Element Distribution indicates that the Serrano made "wild plum seed meal" and that the seeds were leached whole (Drucker 1937:9). Further details are no doubt to be found in Harrington's notes, now being studied by Michael Lerch of the San Bernardino County Museum.

Gabrielino. — Both Gabrielino and Fernandeno are listed as having made wild plum seed meal (Harrington 1942:8). Johnston (1962:33) notes that "the pits of the wild plum bushes yielded a good seed for grinding into meal. In fact the native fruits were more useful in this fashion than for their pulp, which was often rather sour and dry." At present the species of this "wild plum" is unknown, although perhaps later investigation of Harrington's notes and specimens will be revealing.

Luiseno. — Hollyleaf Cherry or "Islaya" (*P. ilicifolia*) was one of many types of seeds used by the Luiseno, and was formerly an important article of diet in some parts of their territory (Bean and Shipek 1978:552; Sparkman 1908:194). The pulp of the fruit was eaten, but the kernel was the principal part used. The fruit was spread in the sun until thoroughly dried, when the shells were cracked and the kernels extracted. These were ground into flour which was leached and cooked in exactly the same manner as acorn meal: leached in a basket or sand basin with hot or warm water, cooked in a pottery vessel into a mush which was eaten cold (Sparkman 1908:193-194). Some

Luisseño groups leached the seeds whole (Drucker 1937:9). Chokecherry fruits were eaten, but the pits were apparently not used (Sparkman 1908:194, 232).

Cahuilla. — The kernel of Islay, *P. ilicifolia*, was used much more than the fruit pulp. These “plums” were gathered in large quantities in August and spread in the sun until the pulp was thoroughly dried. The shells of the pits were then broken open and the kernels extracted. These were crushed in mortars, leached in sand basins, and boiled into mush (Barrows 1900:60-61). At least one Cahuilla group was said to leach the seeds whole, before preparing the meal (Drucker 1937:9). The ground meal was sometimes made into a tortilla-like food (Bean and Saubel 1972:120), reminiscent of the “tamales” of the Salinans or the Chumash and Kitanemuk Islay balls.

The pits of Western Chokecherry, and possibly also Desert Apricot and Desert Peach, were ground into a meal and prepared in the same way (Bean 1972:43; Bean and Saubel 1972:119-121). This is one of a very few instances where the use of *Prunus* pits is explicitly ascribed to any species other than *P. ilicifolia*, though all species were used for their fruit.

These fruits were gathered by women. The plants are often found near villages and acorn gathering sites. It has been speculated that *Prunus* fruits may have been sought during the acorn harvest (Bean and Saubel 1972:120), but Islay ripens as much as two months earlier, so this is doubtful.

Cupeño. — The Cupeño made “wild plum seed meal” and leached the seeds whole (Drucker 1937:9). They were observed soaking acorns and “plum seeds” in Warner’s Hot Springs to leach them (Bean and Saubel 1972:128). No further information was found.

Ipai/Tipai (Diegueño). — Two species of “plum” and three of “cherry” were gathered (Luomala 1978:600). These may have been, respectively, Desert Peach and Desert Apricot [plums] and Chokecherry, Bitter Cherry and Islay [cherries]; but there is no ethnographic documentation of Kumeyaay [=Tipai] use of pits of species other than *P. ilicifolia* (Hedges 1980:132). Bitter seeds like those of plums were treated like acorns: pounded in a bedrock mortar, sifted, and leached. Seed flours in general were made into mush, cakes, and stews with vegetables (Luomala 1978:600). All Diegueño groups were listed as leaching the seeds of “wild plum” after grinding (Drucker 1937:9).

The Santa Ysabel Ipai ate the fresh fruit of *P. ilicifolia*. The large seed was then cracked, the kernel extracted and pounded in a mortar, and the meal made into patties and roasted (Hedges 1967:34). Leaching is not mentioned here. The roasted patties may be similar to the Cahuilla tortilla-like food made from Islay.

The Southern Diegueño [=Tipai] also used “wild plum” seeds, probably Hollyleaf Cherry (Hedges 1980:131). These were cracked with a mano and metate. The meats were spread in the sun to dry, then rubbed between the hands and tossed in a coiled basket to remove the hulls. After grinding in a rock mortar, they were leached in a basket like acorns, but with only cold water. They were then cooked into a mush in a pot directly on the fire (Spier 1923:334-335). Clan ownership of patches of wild plum trees has been reported in Tipai territory (Spier 1923:307).

The Tipai of Baja California continue to use *P. ilicifolia* seeds even to the present day. The outside pulp is eaten and then the seeds are broken and ground up, and the inner meat is leached [and cooked?] to make a mush. Consultants say it is a harsh food, does not taste very good, and gives them a stomach ache if they have to eat it regularly. But it forms a staple when families are too poor to buy food (Hinton 1975: 217-218).

Historical Sources. — It was noted that Spanish explorers described Salinan and Chumash as making “tamales” of a seed which could only be Islay, *P. ilicifolia*. Natural historian Longinos Martinez wrote in 1792: “The [seeds] most commonly consumed by the gentiles [unconverted Indians] of New California [include] a large seed they call *silao* which, although it is somewhat bitter, they wash, dry, and roast; it is one of their most important foods” (Simpson 1961:46). Surely this also refers to Islay.

The widespread importance of the food to the natives of California is also indicated in the *Diccionario de Mejianismos*, translated: "Islay, *Prunus ilicifolia*. Tree of both Californias which produces a kernel, called by the same name, which the Indians gather and dry for food, first grinding and sifting it, although it is rather small" (Santamaria 1978:620).

TOXICITY OF *PRUNUS*

Islay, and possibly other *Prunus* species as well, were obviously important in California Indian life. Before considering the diverse roles played by this plant, the problem of its toxicity must be discussed. Several *Prunus* species contain the cyanogenic glycoside amygdalin, which reacts with hydrolyzing enzymes in plant tissue to form hydrocyanic acid [HCN] (Kingsbury 1964:23-26). This "cyanide" is often associated with a bitter taste and distinctive smell also noticeable in pits and leaves of domestic *Prunus* species. Indian consultants always commented on the bitter taste of *Prunus* fruits, recognized the fact that they could make one sick, and said that special preparation was necessary to avoid this. As one Chumash woman noted, "it is a trick to make the Islay. It is poisonous. If you don't know how to make it, it turns out bitter" (Harrington, n.d.).

Most studies of HCN toxicity in *Prunus* have been done on the leaves, because of the danger of livestock poisoning. Before anything definite can be said about its danger to humans, more work must be done on the fruit since that is the part people eat. Related cyanogenic glycosides are also found in cassava or manioc, an important root crop of the tropics which has been thoroughly studied (Lancaster et al. 1982). This plant may be assumed to be somewhat comparable in its toxicity, at least until *Prunus* seeds can be more thoroughly studied. In this section, native statements and practices will be compared with what is known of the toxic characteristics of *Prunus*.

Severe symptoms and even deaths are reported in ruminant animals that consumed *Prunus* leaves. However, human digestive systems are quite different so our symptoms would not necessarily be the same; humans are less susceptible than animals to cyanide poisoning (Kingsbury 1964:24-27). Native consultants [Chumash, Kitanemuk, Tipai and others] usually noted that Islay could give one stomach aches or cause one to spit up blood or poisonous phlegm. One Chumash said that when the Indians had tuberculosis they were spitting up blood, but they blamed it on the Islay (Harrington, n.d.). This indicates that people had been known to get quite ill from eating it.

Cyanide content of plants varies widely, depending both on environmental factors and on the plant part used. Environmental factors include climate, rainfall, soil fertility and season of the year, so that plants growing in different areas or even next to one another can have different amounts of toxins (Kingsbury 1964:26; Lancaster et al. 1982:15). The Cahuilla have another way of explaining this: a shaman was angered by his people so he caused a bitterness to enter the Islay fruits, and ever since then the fruit has been better in some areas than in others (Bean and Saubel 1972:120). The Kitanemuk selected the less bitter fruit to eat raw (Harrington n.d.); this practice was probably widespread.

Differences in HCN content are also found in different parts of the plant. In cassava, the peel has substantially higher content than the flesh of the same root (Lancaster et al. 1982:15). In *Prunus*, large tender leaves on vigorous new shoots have much more HCN than do the leaves on old woody growth (Kingsbury 1964:366). Consultants from several California groups warned against eating too much fresh Islay fruit, an indication it may have high HCN content.

Related to this is the volatility of the cyanide molecule. The HCN content is much lower in dried *Prunus* leaves than in fresh ones, the free cyanide having been lost in the drying process (Kingsbury 1964:366, 368). That this might be true of the fruit as well is indicated by the Luiseño practice of letting Chokecherries sit for a few days to improve

the taste before eating them (Sparkman 1908:194). And the Kitanemuk changed the Islay leaching water three times for the more bitter new kernels, but only twice for old ones (Harrington, n.d.).

Cyanide is eliminated rapidly from the animal body; it is not dangerous if amounts consumed are small and spaced over a period of time (Kingsbury 1964:24, 25, 368). This too is reflected in native statements on *Prunus*: "It makes one very sick to eat lots of raw Islay, but not if one doesn't eat it like a hog" [Costanoan]; "If you sit and eat much of the ripe Islay you can get sick" [Kitanemuk] (Harrington, n.d.).

In the case of cassava, most native preparation methods appear designed to bring about contact between the cyanogenic glycosides and the hydrolyzing enzymes which are also present. This is done by breaking the cell wall, for example by pounding or grating. The HCN is then eliminated by volatilization or by solution in water. Drying, boiling and steeping cassava were all found to remove the free cyanide rapidly and effectively (Lancaster et al. 1982:16).

These same methods—pounding, drying, steeping and boiling—were also elements of native Californian Islay preparation. In general the fruit was first piled up until the pulp rotted and could be discarded, then the pits were shelled and further dried. This drying, both before and after shelling, might contribute to natural HCN volatilization. The next step was usually grinding or pounding the kernels to meal, which would break down the cell structure and permit hydrolysis and volatilization of the cyanogenic glycoside molecules. Although leaching was not practiced by all groups, steeping the kernels in several changes of water or pouring water through the ground meal would put more of the free cyanide into solution and carry it away. Finally, cooking the Islay would remove more cyanide. Although the glycoside amygdalin in *Prunus* is not identical to the linaramin and lotaustralin in cassava, the above preparation methods could well be a factor in the edibility of both potentially dangerous plants.

The technology for exploitation of poisonous, tannin-rich acorns has an antiquity of at least 5000 years in California (Harrison and Harrison 1966:77). Perhaps leaching techniques were developed first for acorns and then extended to other large seeds like *Prunus* and the even more poisonous Buckeye (*Aesculus californica*). It has already been noted that many California groups, especially the southern ones, prepared Islay in the same manner as they did acorns.

In summary: despite the lack of much available information on the toxic effects of HCN in *Prunus* pits, several things are clear. People ate these pits and even enjoyed them. The bitter taste and poisonous properties vary widely with environmental conditions and seem to have been dealt with effectively by preparation methods of the Native Californians.

IMPORTANCE OF ISLAY IN CALIFORNIA INDIAN LIFE

Seeds of Islay (*Prunus ilicifolia*) and possibly other species were a staple food of Indian groups along the central coast and southern California. Chumash consultants frequently mentioned Islay in the same breath as acorns and Chia, their two other most important foods. Islay pit foods seem to have occupied a place in the meal similar to that of acorns, usually being eaten as an accompaniment to meat.

The importance of certain foods in peoples' lives is revealed in their oral tradition. When animals were people, in a time before humans appeared on earth, they had many human characteristics and engaged in many of the same activities that the Indians themselves later did. Islay is included among major plant foods in Chumash myths. In one story, Coyote was stronger than his opponent in a battle because he had had a good breakfast of meat and *shukuyash*, Islay balls (Blackburn 1975:216). In another story, Coyote demanded supper from Widow Toad, and she gave him acorn mush and Islay followed by two freshly caught birds (Ibid.:227). There are many other examples.

Diversity of food resources characterized native Californian life, but in many areas "failure of the acorn crop was the most dreaded disaster" (Loeb 1926:175). Storage and trade of foodstuffs helped to avert seasonal and local shortages. Islay was gathered in late summer or fall; most groups shelled and dried the kernels and stored them for later use. While Islay was usually less abundant and less concentrated than acorns, it could have been especially important in poor acorn years. More northern groups considered Buckeye as starvation food when acorns were unavailable (Levy 1978a:402). Islay could have filled this role in the south, although most native consultants said they enjoyed eating it any time.

Nutritional analyses of *Prunus* kernels are few, since the pits have usually been considered poisonous. However, one study (Earle and Jones 1962) indicated that seeds of an unnamed *Prunus* species have 33.4% protein and 43.3% oil by dry weight. These quantities are greater than the highest value for acorns, and well over double the average value for acorns. There is probably some variation between species, but the Rose Family as a whole ranks higher than acorns in protein and oil. In contrast to acorns, *Prunus* seeds were found to contain virtually no starch.

Although processing and cooking might change nutrient value, the above analysis indicates that Islay pits probably have high food value. Being very high in protein and oil but low in starch, Islay would thus play a different role in nutrition from that of acorns, even though the two were eaten in the same context within the meal. Quality of Islay protein and oil should be analyzed and eating practices further studied before conclusions can be drawn.

But the role of "wild plum seeds" in central and southern California Indian life cannot be fully understood if they are merely seen as a more or less nutritious, storable resource that was eaten like acorns. Islay pits were also important in many less immediately material ways.

One of these functions was social. Costanoans prepared Islay foods which could be taken to people (Harrington, n.d.), presumably as a gift or friendly gesture. A similar function can be attributed to the Chumash and Kitanemuk Islay balls, which kept well and would be easy to carry to others or to have readily available to offer to visitors. The importance of sharing food is well known. Simple hospitality also imposes an obligation, however subtle, upon the recipient to return the favor at a later date. In this way a person who once gave food could be more assured of being able to get food in times of scarcity. Barbareño Chumash Luisa Ygnacio told Harrington (n.d.) how to say, "Give me a piece or cake of boiled Islay," a phrase which would stand a visitor in good stead.

Large-scale, organized economic exchange between groups functions to distribute goods, including food, more evenly in space as well as in time. This sort of trade was very important to many California Indian groups, and trading was most intensive between peoples who lived in different habitats. The inhabitants of the Northern Channel Islands, for example, were great traders. According to mainland Chumash consultants, the islanders had Islay and Chia but they were lazy and did not bother to gather them. They spent their whole time drilling shell-bead money, which they traded to the mainlanders for large quantities of Islay, Chia and acorns. The basket hat was the standard for measuring seeds for purchase; one hatful of Islay was worth two of acorns (Harrington, n.d.; King 1971).

Although the island Chumash probably did in fact gather some local *Prunus*, manufacturing specialization is often found in areas where food resources are not concentrated or not reliable. It was important for the islanders to make money to keep the trade networks operating, so that they could count on having access to staple plant foods in the event of a shortage on the islands. The population of the Santa Barbara Channel area was extremely high, and it was sustained largely by trade. Islay played a prominent role in this economic activity.

Major ceremonial gatherings which drew people from over a wide area were often the context for trade (Blackburn 1976). Among the Chumash, Islay was one of the foods that people brought whenever there was to be a festival or ceremonial gathering. It was given as offerings or obligatory ritual gifts, scattered on the ground before the dancers, or thrown over the assembled crowd of onlookers, either in the form of shelled dried kernels, or as cakes prepared in advance. Offerings of Islay, Chia and other seeds were made at the fall harvest and winter solstice ceremonies (Hudson et al. 1977; Hudson et al. 1978:141).

Collections were also taken at Chumash secular dances, one of the most interesting of which was the Fox Dance. As the Fox Dancer was performing, the singer sang in the Santa Rosa Island language that the Fox would desire to eat balls of cooked Islay. At this point, the ceremonial leader would begin to carry around a big burden basket and collect Islay and other things from the people (Hudson et al. 1977:71). Foodstuffs thus obtained would be saved by the local chief to distribute to his people in times of need. Similar practices were probably followed by other California groups as well.

Islay and other food items like acorns and Chia that played a role in ceremonial situations were therefore more than just food. They were of symbolic importance and constituted a sacrifice or contribution made by each person toward the welfare of the whole group. This contribution was perceived in a religious way. Because of the power that Sun and other supernaturals had over human life, prayers, rituals, sacrifices and offerings of food were essential to human survival (Hudson et al. 1977).

Throughout California, "first fruits ceremonies" were held for major resources such as salmon and acorns (see C.E.D. lists already cited). This was apparently not done for *Prunus*, although the Chumash, and probably others, held harvest ceremonies at the end of the season (Hudson et al. 1977:43). Santa Ynez Chumash families would go at different times to gather Islay on a local ranch. They built fires "to keep the bears away," and met at night for singing, dancing and praying. Similar special ritual behavior associated with food gathering was also described for piñon nuts (Harrington, n.d.). It is probable that these practices were intended to thank the earth, *khutash*, for the harvest.

Prayers were addressed to plants of extreme religious importance, such as *Datura*, before gathering them (Applegate 1975:10). There is no indication that *Prunus* was such a plant, but its potential spiritual power for Native Californians is shown by the fact that Islay could become one's dream helper, as has been reported among the Kumeyaay [=Tipai] (Hedges, pers. comm.).

Change

Beginning with missionization in the 18th century, life for central and southern California Indians changed dramatically.¹ Restricted mobility and dependence on mission agriculture encouraged conversion to the white man's diet, but many people continued to gather their favorite wild foods whenever possible. Despite population decline and acculturation, some individuals still used Islay after 1900. But native consumption of such wild plant staples has virtually died out in this century for several reasons (Cook 1941). Plants are less accessible due to private ownership of property, and much land has been cleared for suburban development. One Costanoan sadly described having her "orchard" taken away from her when a house was built next to some big Islay trees she used to harvest (Harrington, n.d.). Another factor is that Indian people who hold regular jobs lack time to gather and prepare traditional foods. And the dominant culture has imposed social sanctions against "Indian food," reducing the motivation to continue its use.

On the Santa Ynez Reservation, most of the old traditional seed foods fell into disuse when the last generation of Chumash language speakers died (Gardner 1965:285-286). People living on the reservation now seem to have no recollection of the Islay kernel balls which their ancestors so relished, and which once played a multifaceted role in Indian life. Although food is an important way of asserting one's cultural identity, it

is unlikely that the new generation of activists will revive the difficult process of Islay preparation.

Abandonment of traditional foods is true of surviving California Indian people in other areas as well. Even the Cahuilla, some of whom occasionally eat native foods for variety, no longer prepare Islay pits (Bean and Saubel 1972:25-26). The only people who still eat *Prunus* seeds appear to be the Tipai of Baja California, and they do so only to stave off starvation when they cannot afford to buy store food (Hinton 1975:217-218). Soon Islay mush, balls and cakes will be forgotten altogether.

SUMMARY AND CONCLUSIONS

It has been the purpose of this paper to draw attention to a food which was formerly of great importance to Indian peoples over a large section of California. Although potentially poisonous, the kernel of *Prunus ilicifolia*—called Holly-Leaved Cherry, Islay, or "wild plum seed"—was rendered safe to eat by native preparation methods, and it was even considered delicious. This food was a staple for many Indian groups, providing variety in taste and nutrient content from the more famous acorn.

It was also stressed that food is more than just something to eat. It is a focus for social interaction, brings wealth to its providers, and gives one a better relationship with the supernatural. It is also a statement of cultural identity. Though unnoticed by most people today, the humble wild cherry pit once did all these things.

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NOTES

¹ Sugar was introduced in mission times, but there was a widely used native sweetener: honeydew deposited by aphids on certain grasses (see, e.g., Voegelin 1938:19).

² The two-handed mano, operated with a rolling motion on a flat metate, may have been

introduced by Mexicans. The aboriginal form was probably a smaller, one-hand mano used on a basin milling stone.

³ An analogous practice was followed by the Miwok, who used oak bark ashes to "sweeten" acorn bread (Barrett and Gifford 1933:38).

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