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# Upriver and Downriver: A Gradient of Tobacco Intensification Along the Klamath River, California and Oregon

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*This paper identifies the types of locations where coyote tobacco (*Nicotiana attenuata*) has been found along the Upper Klamath River and demonstrates how that information illuminates the regional ethnographic record of Native American tobacco use and culture. Locations where coyote tobacco has appeared within the Upper Klamath River vicinity were documented during a fourteen-year period. These data are supplemented by observations from the surrounding region. The aggregate of these observations suggests that coyote tobacco is an ancient, widespread, and potentially common species over a large portion of the landscape within the Cascade Mountain section of the Upper Klamath River watershed. This information, when combined with ethnographic, biogeographic, and experimental data for another tobacco species, Indian tobacco (*Nicotiana quadrivalvis*), helps to reconstruct a regional history of the horticultural intensification of tobacco by indigenous peoples living along the Klamath River. Several lines of evidence indicate the Shasta Indians were intermediate in the transition from less intensive to more intensive methods for procuring tobacco. The evidence also indicates the Eastern and Western Shasta relied on different species of tobacco.*

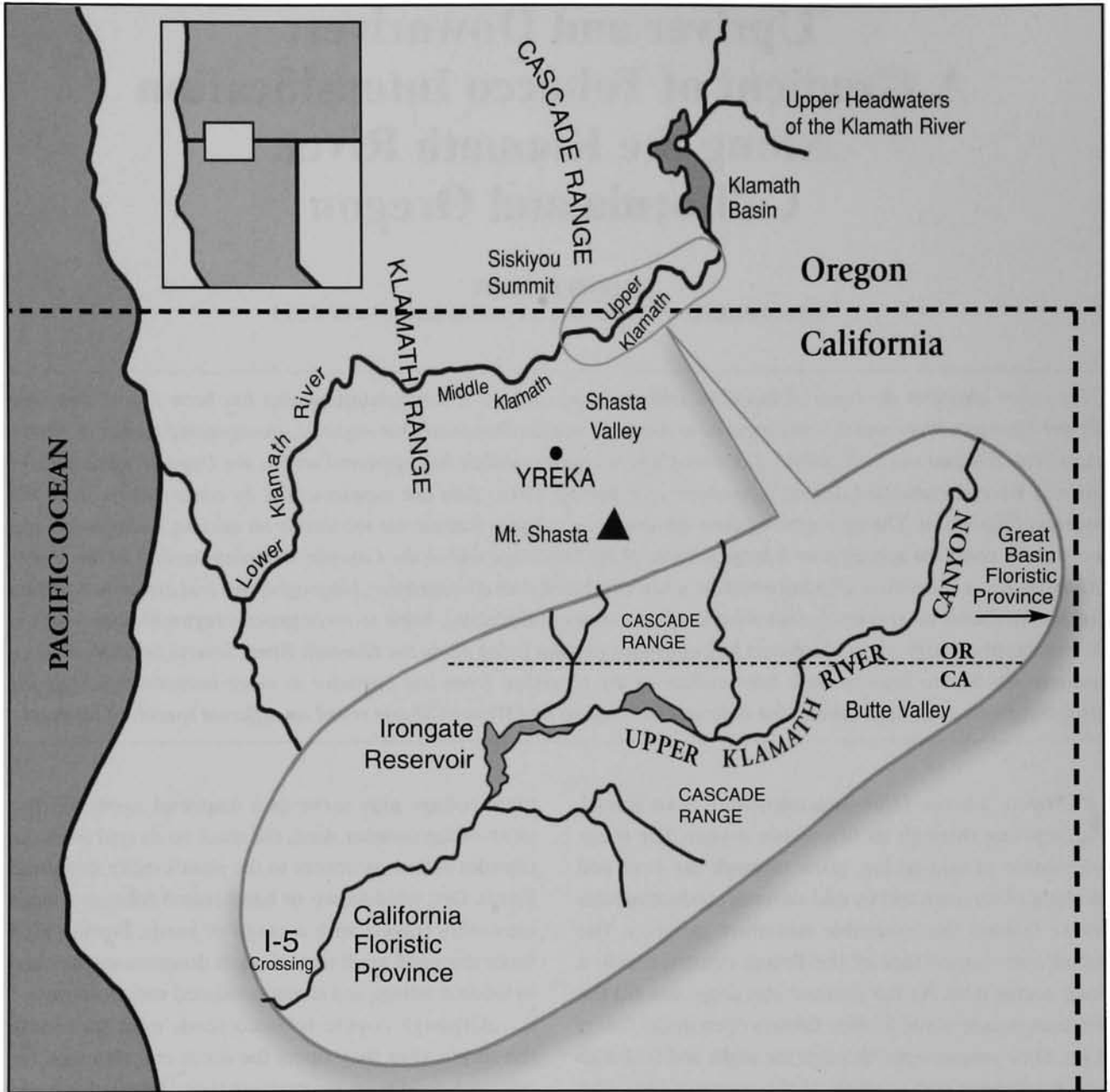
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Coyote tobacco (*Nicotiana attenuata*)<sup>1</sup> is an annual, cycling through its life within a year. The seeds germinate in mid-spring, grow through the heat and drought of summer, and by mid-summer produce tubular white flowers that resemble miniature clarinets. The small, star-shaped face of the flower constricts into a long nectar tube. As the summer sun drops toward the horizon, wands of small white flowers open in the fading light. They remain open through the night and fold with the brightness and warmth of the morning sun. The flower's form and crepuscular-to-nocturnal period of receptivity makes it seem as if the plants should be moth-pollinated, and to some extent they are, but individual flowers are also consistently self-fertile when appropriate pollinators are unavailable (Sime and Baldwin 2003).

Coyote tobacco is capable of ripening copious amounts of seed. Each seed capsule contains more than one hundred seeds and a thriving plant may ripen hundreds of capsules. Diminutive seed size confers certain advantages. Tiny seeds incorporate into soil and are insulated from the scorching effects of fire. Tobacco

plant foliage may serve as a dispersal agent. With a swish of the summer wind, the small seeds spill from the capsules and many adhere to the plant's sticky stems and leaves. Dry, wind-blown or hand-tossed tobacco foliage inevitably travels with a cargo of seeds. During high water the small seeds may also raft downstream attached to tobacco foliage and stems associated with flotsam.

Although coyote tobacco seeds may germinate the spring after they ripen, the seeds can also wait for optimum conditions, maintaining their viability for many years—perhaps more than one hundred (Preston and Baldwin 1999:482). Careful investigations reveal that the coyote tobacco seed bank is finely tuned to disturbance, especially by fire. Maximal seed germination is triggered both by an organic compound found in smoke and by the effects of fire, which remove potential competitors and their germination-inhibiting chemicals. Most large stands of coyote tobacco result from range and woodland fires. In the absence of fire, other triggers influence seed germination. Soil disturbance, the removal of plant debris, and competitive vegetation result in a hedge-betting



**Figure 1. The Oregon-California border, Klamath River vicinity, showing locations mentioned within the text. Enlargement: the Cascade Mountains portion of the Upper Klamath River.**

strategy: i.e., the germination of a much smaller portion of the seed bank. Thus, without fire, coyote tobacco sometimes appears along graded roadsides, in washes, sand dunes, stock corrals, and in other disturbance-prone environments where the seeds persist (Baldwin et al. 1994:2345–2371; Baldwin and Morse 1994:2373–2391; Preston and Baldwin 1994:481–494).

## THE BIOGEOGRAPHY OF COYOTE TOBACCO

### *Distribution within the West*

Coyote tobacco has a vast, mostly inland range that extends from Mexico north to Canada, and from the east slope of the Rocky Mountains to the rain-shadowed lower east slopes of the Cascade Mountains



**Figure 2. The small population of coyote tobacco in this campground mushroomed into a much larger population the year after a fire.**

of Washington and Oregon. Coyote tobacco is the only native species of tobacco found throughout much of the Great Basin. In California its range extends west across the Cascade and the Sierra Nevada mountains to include much of the state (Hall 1985:104; Winter 2000:133).

#### *Distribution along the Oregon-California Border*

The scattered populations of coyote tobacco along the Oregon-California borderland (Fig. 1) nearly surround the vicinity of the Upper Klamath River and illustrate the wide diversity of environments to which the species is adapted. East of the Upper Klamath River in southeastern Oregon and northeastern California, coyote tobacco behaves as it does throughout much of the basin and range country, populating burned rangeland and then disappearing a few years later. In the absence of fire, it appears primarily along graded roadsides, occasionally in dense stands that dwindle within a year or two (L. Housley, personal communication 2003). Not far to the southeast of the Upper Klamath River, the campground and roadsides

of Lava Beds National Monument host a scattered crop of tobacco nearly every year (Fig. 2). When a fire swept through the area in 1999, the number of plants increased dramatically and then declined to the occasional scattered individual (author's observations, 1996–2002).

A short distance to the northwest of the Upper Klamath River, but well above it, coyote tobacco may be found on Siskiyou Summit, the highest point on Interstate 5. On this pass the vegetation is wind-scoured in winter, but the summer season is generally mild with occasional showers that tend to skirt the drier valleys on both sides. In the summer of 2003, coyote tobacco plants, like a line-up of hitchhikers, occupied both sides of the highway. With access to open habitat, and fertilized with trucker-supplied nitrogenous waste, the plants set tens of thousands of seeds among the roadside foam cups, wads of paper, and plastic bags (Fig. 3). To the south and southwest of the study area, coyote tobacco is also found in the Shasta Valley, and in the vicinity of Mt. Shasta (Hall 1985:104; author's observations, 2000–2006).



**Figure 3. Coyote tobacco growing more than 650 m. above the Klamath River along I-5 at Siskiyou Summit near the Oregon-California border.**



**Figure 4. Without fire, coyote tobacco sometimes appears along graded roadsides, in washes, sand dunes, and stock corrals.**

#### *Distribution within the Study Area*

The Klamath River is one of only three rivers that cut entirely through the Cascade-Sierra uplift. Along the southern Oregon and northern California borderland, the Cascade Range serves as a semi-permeable biogeographic boundary between two biogeographic regions: the Great Basin Floristic Province and the California Floristic Province (Raven 1988:111; Hickman 1993:45). The trough created by the Klamath River as it slices through the Cascade Mountains functions as a corridor connecting portions of the two provinces. The study area includes the landscapes adjacent to and above the Upper Klamath River where the river transitions from the Great Basin Floristic Province to the California Floristic Province. Throughout the Cascade Mountains portion of the Upper Klamath River, the ranges of species characteristic of each region interweave, influencing the kinds and abundance of plants available for cultural use.

Since the seed banks of coyote tobacco are seldom manifest as actual plants in the landscape, it is difficult to assess the geographic range of the species on the basis of a single season of observations. For instance, an intensive one-season plant survey of the Irongate Reservoir vicinity in 1996 did not note coyote tobacco, although under the right circumstances the plants are quite common. The Upper Klamath River Project<sup>2</sup> allowed participants many opportunities to access vast portions of the landscape for many consecutive growing seasons, enabling us to spot widely dispersed and infrequently occurring stands of wild tobacco.

Within the study area, coyote tobacco is a regular summertime resident to the east, on the edge of the dry, Great Basin-like Butte Valley along the Oregon-California border. Most August mornings, a sharp eye spots a few small, dusty plants flowering just off the local dirt access roads. The plants respond well to the soil



**Figure 5. Mary Carpelan, of the Shasta tribe, showing Japanese botanists how to harvest coyote tobacco, 1998.**

disturbance associated with machine-piled logging slash. One year, robust plants were confined to the vicinity of these piles; the next year, except for a hidden seed bank, they were as absent as the loggers.

A dusty ranch with aged outbuildings, adjacent to the Upper Klamath River, is the locale for another small, semi-permanent population. Each year a few plants germinate in the cow- and ATV-churned soil. Single plants and small patches of plants appear and disappear along the rough roads that parallel the river along the Oregon-California border (Fig. 4). On one occasion, when a culvert pipe was replaced upslope from Irongate Reservoir, hundreds of plants densely carpeted the area disturbed by the backhoe; the next year there were only two plants. The following year there were none, and none have been observed at this location since.

While recently burned areas and roadsides are recognized as common habitats for tobacco, riversides are seldom considered to be accommodating to the plants. However, where the Upper Klamath River cuts

through the Cascades, coyote tobacco occasionally appears just below the winter-spring high-water line along the banks of the river. After the flood of 1997, a patch of just a few large plants grew up in a silted side channel not far above the I-5 crossing. Large leaves from these flood-awakened plants were cheerfully harvested by local Shasta tribal member Mary Carpelan (Fig. 5). One small gravel bar along the river seems to grow a crop of coyote tobacco year after year. The plants grow best between the river's high-water mark and its summer low-water edge, holding to the places where occasional floods scour shade-producing riparian shrubs and trees from the bank. Plants have flowered and seeded here for at least the past thirty years, serving as a ready seed source for downstream dissemination.<sup>3</sup>

In 2004, an event occurred which ultimately helps clarify the relationship between regional riverine and roadside-growing plants and the surrounding flora by providing a biogeographical context for the meager ethnographic information regarding tobacco use by



**Figure 6. Coyote tobacco growing above the Upper Klamath River where a range and woodland fire burned the previous year, 2005.**

Native Americans living in the vicinity of the Upper Klamath River. During the summer, a fast-moving, wind-driven range and woodland fire swept parallel to, but well above, the north side of the Klamath River and Irongate Reservoir. In the summer of 2005, coyote tobacco appeared, scattered through the burned area. The plants grew most abundantly where fire intensity and duration were relatively high, such as through brushfields and around the bases of charred juniper trees. Because of favorable growing conditions, many plants were especially robust, growing to a height of about two meters, and setting enormous quantities of seed (Fig. 6).

Prior to the fire, tobacco plants within the study area had only been encountered in association with machine disturbance along roads or with water disturbance along the river. In locations such as these, tobacco seeds may have been recently transported from elsewhere into the

zones of disturbance, where seeds were apt to germinate. It is now obvious that tobacco plants exist as a hidden seedbank across large portions of the landscape above the river within the Cascade Mountains. Thus, while seeds may be transported by river from headwater sources in or near the Klamath Basin to the east, seeds may just as likely derive from the surrounding landscape. Likewise, roadside plants may derive from the locally indigenous seedbank in addition to being transported by road maintenance vehicles from more distant sources. The 2004 fire demonstrated that through and below the Upper Klamath River Canyon, coyote tobacco is not a recent or localized introduction, but is an ancient and widespread but cryptic component of the indigenous flora. These observations supplement and illuminate the regional ethnographic record regarding the cultural use and propagation of native tobacco(s).

#### **REGIONAL ETHNOGRAPHIC EVIDENCE FOR TOBACCO USE**

At least thirty Native American tribal groups used or use coyote tobacco (Winter 2000:115). The territory of these tribes, following the plant's geographic distribution, paints a broad swath through the interior West from Mexico to Canada. Along the Oregon-California border, this species is used by the Paiute (Couture 1978:67; Kelly 1932:181; Stewart 1941:402–403, 429), the Klamath (Coville 1897:105), the Modoc (Ray 1963:218), the Achomawi (Voegelin 1942:203), and the Shasta peoples (M. Carpelan, personal communications 1995–2006; Merriam 1918:RI. 1022–1053).

While coyote tobacco may have been opportunistically gathered, it was also encouraged through the intentional use of fire. Omer Stewart (1941:402) recorded that the Northern Paiute of eastern Oregon's Great Basin country set fires to produce an abundant crop of tobacco, a practice followed by nearly every band in the Great Basin (Fowler 1986:93; Kroeber 1941:16–17; Winter 2000:39). West of the hydrologic Great Basin, in northeastern California, burning to favor tobacco was also practiced by the Modoc (Voegelin 1942:92). Ben Bridge of the Achomawi tribe in northeastern California described how coyote tobacco could be encouraged. As he explained it, burning for tobacco was incidental to burning brush to encourage an edible seed crop:

Next spring some wild tobacco grew there. This is gathered. While gathering, tobacco pods rolled between hands, thus sprinkling the seeds into ashes; ashes kicked over seeds with feet. Next year pick tobacco from this spot. Tobacco continues to grow at this place for 2–3 years, then very little comes up, so another brush patch is burned off, as there is no brush left at the first patch to burn [Voegelin 1942:202].

### *Transitional Aspects of Shasta Culture*

The Shasta people lived and continue to live in a variety of environments along what is now the Oregon-California border (Hall and Hall 2004:10; Holt 1946:301–302; Gleason 2001:98). This paper is concerned primarily with the ethnographic Shasta groups living along the Klamath River and in the nearby Shasta Valley. A strong east-west climatic gradient along the Klamath River results in comparatively lush vegetation in the western portion of Shasta territory, where average annual rainfall may be greater than 102 cm. (40 inches). To the east, in the Shasta Valley and along the lower reach of the Upper Klamath River, the yearly rainfall average may be as little as 30 cm. (12 inches) (USDA 1941:787), resulting in open, lightly vegetated landscapes where trees are confined to the more mesic locations.

Although the Shasta are a distinct people with a common culture and language, the ethnographic Western Shasta (downriver) and Eastern Shasta (upriver) adapted some aspects of their culture to their differing environments and adopted some cultural practices from their respective neighbors. There are notable differences between the Western and Eastern Shasta involving such significant cultural elements as house styles (Mack 1996; Voegelin 1942:4), basketry materials and techniques (Gogol 1983:14), and diet (Gleason 2001:179–594; Todt and Hannon 1998:278). The Shasta not only responded to the different environments in which they lived, they were also influenced by their immediate neighbors, with whom they traded and intermarried. The Western Shasta shared many cultural attributes with their Karuk, Hupa, and Yurok neighbors, while the Eastern Shasta had many practices that corresponded to those of the indigenous peoples who lived to their east: the Klamath, Modoc, and Achomawi. The ethnographic Shasta culture, up and down the river, was attuned to the widely different environments through which the river coursed.

### *Elements of Tobacco Culture Recorded for the Eastern Shasta*

Although there is little ethnographic information pertaining directly to tobacco use by Native Americans living along the Upper Klamath River, regional information is useful and pertinent. The most robust source of information is Voegelin (1942:92–93, 202–203), who recorded tobacco growing and harvesting practices from two Shasta sources. Her Eastern Shasta source of information was Emma Snelling, who was familiar with the Shasta Valley and Upper Klamath River traditions. (My annotations follow the tobacco-related practices recorded by Voegelin.) A comparative summary of the following information is presented in Table 1.

**Table 1**

#### **COMPARISON OF EASTERN AND WESTERN SHASTA REGARDING THE BIOGEOGRAPHY AND HORTICULTURE OF TOBACCO**

| Characteristic                                     | Eastern Shasta | Western Shasta  |
|--|----------------|-----------------|
| cultivated or semi-cultivated <sup>a</sup>         | X              | X               |
| sown   | X              | X               |
| sown in ashes                                      | X              | X               |
| area burned for a volunteer crop                   | ? <sup>b</sup> | X               |
| thinned  | X              |                 |
| irrigated  |                | X               |
| pruned   |                | X               |
| gathered from wild                                 | X              |                 |
| gathered when green                                | X              | X               |
| species identified as coyote tobacco <sup>c</sup>  | X              |                 |
| species identified as Indian tobacco <sup>d</sup>  |                | X               |
| proximate to peoples who cultivated Indian tobacco |                | X               |
| proximate to peoples who gathered coyote tobacco   | X              |                 |
| widespread seed bank of coyote tobacco             | X              |                 |
| widespread seed bank for Indian tobacco            |                | X? <sup>e</sup> |

<sup>a</sup>The first nine categories are derived from Voegelin (1942:92–93).

<sup>b</sup>Not positively categorized by Voegelin (1942:92–93). However, since a widely distributed seed bank of coyote tobacco exists within Eastern Shasta territory, it is likely that this seed bank was stimulated into growth by intentional fire, as practiced by most peoples within the Great Basin Floristic Province (Kroeber 1941:16–17; Fowler 1986:93, Winter 2000:39).

<sup>c</sup>Merriam 1918: RI. 53.

<sup>d</sup>Harrington 1932: 30.

<sup>e</sup>It is likely that if Indian tobacco had been grown for a long period of time, a local seed bank would have been in place. Nevertheless, the ethnographic record indicates some tobacco seed was imported from the Karuk (Holt 1946:340).



*Tobacco Was Cultivated or Semi-Cultivated.* This pattern was shared by most Native Americans living west of the Cascade-Sierra Nevada uplift (Kroeber 1941:15–16). Regionally it was also shared with the Modoc and Achomawi who resided east of the Cascade Mountains crest (Voegelin 1942:92).

*Tobacco Was Sown.* Seed was intentionally planted. This could have been done in the manner quoted previously for the Achomawi, where wild tobacco seeds were scattered at grass-seed harvest time. More intensive practices, where seed was saved from year to year and sown specifically in areas devoted primarily or exclusively to tobacco horticulture, were also likely possibilities.

*Tobacco Was Sown in Ashes.* This follows the practice described for nearly all peoples who grew tobacco in the Far West. If the seeds were not sown where there had recently been a fire, the germination rate would be low and those seeds that did sprout might result in small plants, either because of competition for sunlight and water or lack of sufficient readily available nutrients.

*Tobacco Was Thinned.* Thinning is a departure from the normal pattern of tending coyote tobacco, the native tobacco of the region; it usually does not involve intensive methods of cultivation. Of the sixteen groups in northeast California that Voegelin (1942: 92–93) surveyed, only two gave a positive response to “thinning.” However, where coyote tobacco plants seed naturally from the previous year, they often germinate thickly near the parent plant, with the close competition between individuals resulting in small plants. Thinning favors fewer plants, resulting in a more robust stature for those plants not removed.

*Tobacco Plants Were Not Irrigated.* Irrigation is not recorded for any of the peoples who lived in close proximity to the Eastern Shasta except the Western Shasta. During normal summers, coyote tobacco—the indigenous tobacco of the region—usually grows well without supplementary irrigation.

*Tobacco Plants Were Not Pruned.* Pruning is not recorded for any of the people who lived in close proximity to the Eastern Shasta except the Western Shasta.

*Tobacco Was Gathered From the Wild.*<sup>4</sup> This practice matches the method of tobacco acquisition by peoples who live east of the Shasta and who gathered and still gather coyote tobacco from the wider landscape. The gathering of wild tobacco would necessarily be

associated with a widespread tobacco seed source, such as occurs within the landscapes occupied by the Eastern Shasta and by tribes located to the east.

In summary, practices documented for the Eastern Shasta indicate that they were using both more intensive and less intensive methods to procure tobacco. They practiced horticultural methods—such as sowing seeds in ashes and thinning—but also gathered tobacco from the wild. While intentionally sowing tobacco seed into ashes matches the practice of the Western Shasta, the practice of gathering from the wild allies the Eastern Shasta closely with those peoples who lived to their east: the Klamath, Modoc, and Paiute. These groups are ethnographically recorded as using coyote tobacco, the species widely distributed throughout Eastern Shasta territory and points east. The use of coyote tobacco by the Eastern Shasta is confirmed by the unpublished notes of C. Hart Merriam (1918: RI. 1022–1053) who provided the Latin name *Nicotiana attenuata* (coyote tobacco) within the context of information provided by Upper Klamath River Shasta people.

#### *Elements of Tobacco Culture Recorded for the Western Shasta*

Voegelin’s downriver Shasta source of information regarding tobacco was Sargent Sambo, who lived on Horse Creek, a tributary of the Klamath River about 56 km. (35 miles) below the Upper Klamath River Canyon. Sargent Sambo described the horticulture of tobacco as being an intensive practice dependent primarily on intentionally grown plants. The following annotated cultural elements regarding tobacco are derived from Voegelin (1942:92–93) and Holt (1946:340).

*Tobacco Was Cultivated or Semi-Cultivated.* This practice duplicated that of the Eastern Shasta and of most native peoples who lived west of the Cascade-Sierra Mountains crest.

*Tobacco Was Sown.* This practice also followed that of the Eastern Shasta and of the neighbors of the Western Shasta to the south and west.

*Tobacco Was Sown in Ashes.* This practice was shared by the Eastern Shasta and by most peoples who cultivated tobacco in the Far West.

*Tobacco Was Not Thinned.* Thinning was not recorded for the Western Shasta, although it may have occurred if seedlings sprouted too thickly.

*Tobacco Was Irrigated.* The irrigation of native tobacco in the region was uncommon. In northeastern California, it was only recorded for one out of sixteen groups: the Western Shasta (Voegelin 1942:92). Voegelin commented that “in dry weather plants [were] watered by hand with water from [a] basket” (1942:202). Irrigation, only practical where plants are concentrated and near a water source, would assure that valuable plants continued to produce large leaves during the characteristic mid- to late-summer drought. The size of newly produced leaves diminishes rapidly under drought conditions.

*Tobacco Plants Were Pruned.* Voegelin suggested that “the stems [were] snipped off near [the] upper end, so growth goes into the leaves” (1942:202). Pruning the stem tips would not only encourage larger leaves below the “pinch,” it would also make the plant more compact and increase its drought tolerance. Pinching would also likely increase nicotine content (Baldwin and Ohnmeiss 1993:1143–1153).

*Tobacco Was Not Gathered From the Wild.* This followed the prevailing cultural prohibition on gathering wild tobacco plants that extended downriver from the Shasta to include the Karuk, the Hupa, and the Yurok (Kroeber 1941:16). However, Voegelin did note that areas were burned for a volunteer crop, a practice indicating that a tobacco seed bank was widespread within at least those portions of the landscape devoted to tobacco procurement.

*Source of Tobacco and Tobacco Seed.* Additional information regarding the use of tobacco by the Western Shasta is derived from Holt (1946:340), who also interviewed Sargent Sambo. Holt observed that tobacco seeds “were obtained from the Gamutwa [a downriver branch of the Shasta] who got them from the Karuk [who lived farther downriver], who in turn got them from the Yurok [who lived farthest downriver and along the Pacific Coast].” In a related statement Sargent Sambo stated: “The people here on the lower Klamath had the most tobacco, so if anyone from Oregon or Shasta Valley [upriver, near the study area] visited them they gave them tobacco. That is why the best and strongest medicine was made down here” (Holt 1946:340).

Why should the Shasta have acquired tobacco seeds from these downriver peoples when, as we have noted, there was a perfectly good supply upriver? Why should they have intensively cultivated and irrigated a plant that

grows perfectly well with little or no attention under a much drier climatic regime to the east and throughout the Great Basin?

## INDIAN TOBACCO

It is obvious from ethnographic data that Western Shasta people were practicing a very intensive form of tobacco horticulture that paralleled and—with the addition of irrigation—perhaps even surpassed the intensity of horticulture practiced by their western neighbors, the Karuk. The ethnographic Karuk and other nearby tribal peoples grew a species of tobacco that was not coyote tobacco but a closely related species that is sometimes called Indian tobacco (*Nicotiana quadrivalvis*) (Harrington 1932:44–278).<sup>5</sup> It is highly likely, based on the intensity of their tobacco cultivation, that the Western Shasta cultivated Indian tobacco as well. J. P. Harrington, an anthropologist well versed in Native American tobacco culture, provides confirmation, observing that “the Takelma [an interior southwest Oregon tribe] tobacco was the same as that of their Shasta neighbors, *Nicotiana bigelovii*” (Harrington 1932:30). *Nicotiana bigelovii*, which is currently classified as *Nicotiana quadrivalvis* (Indian tobacco), is the species used ethnographically by the Shasta’s downstream neighbors. It is clear from Harrington’s unpublished notes regarding the Shasta that he was most familiar with the plants and Western Shasta people occupying the downriver portion of the Shasta territory (Harrington 1981: RI. 12, Fr. 7-231).

Indian tobacco has never been identified within the Cascade Mountains portion of the Upper Klamath River or within the dry Shasta Valley. The most proximate location for which there is a herbarium specimen is, however, less than 44 km. (20 miles) downstream from the western perimeter of the Cascades Mountains (Wheeler: 1934). Indian tobacco has a natural range that appears to be concentrated in the southern half of the California Floristic Province (Hall 1985:77). It seems to have a disjunct distribution along the Lower Klamath River, and it has been recorded as far north as the Queen Charlotte Islands in Canada (Turner and Taylor 1972:249–257; Turner 2004:165–168). Its northerly recorded locations seem not to rely upon natural biogeographic corridors but rather appear to be the result of cultural distributions along Native American travel and trade routes.

Hall (1985:76) provides evidence that Indian tobacco has been introduced within its more northerly range within California. She performed a diachronic analysis of the frequency with which tobaccos, including Indian tobacco, were collected by botanists in California and demonstrated a “continuous regression in the range of this species” in Northwestern California during the historic period. With the attenuation of tobacco cultivation by Native Americans and the curtailment of a frequent fire regime, Indian tobacco’s range—in the absence of intentional cultivation—seems to be relaxing back toward its region of origin and the climatic/vegetation patterns to which it is best adapted.

### COMPARISONS BETWEEN COYOTE TOBACCO AND INDIAN TOBACCO

Why might Indian tobacco have been preferred to coyote tobacco? As Shasta Elder Sargent Sambo suggested, it tends to be stronger. Chemically, it has a higher alkaloid content than does coyote tobacco (Winter 2000:321). Indian tobacco is also more amenable to human manipulation than is coyote tobacco (Hammett 2000:134; Winter 2000:140). When seeds of both species are sown in the spring, Indian tobacco evidences much more consistent germination than does coyote tobacco. In the late summer, when whole plants are harvested, Indian tobacco has a strong tendency to keep many seed capsules closed, facilitating easier storage, while coyote tobacco seed capsules are consistently dehiscent, spilling the tiny seeds from stalks hung up to dry.

While Indian tobacco may have been culturally preferred and more easily cultivated, the Upper Klamath River-Shasta Valley region may be near the climatic limits for the successful cultivation of this species. Data provided by Hall (1985:161) indicate that Indian tobacco is less tolerant of frost or high temperatures during the growing season than is coyote tobacco. These data are supported by the author’s tobacco growing experiments. Spring temperatures below zero degrees C. (32 degrees F.) damaged seedlings of Indian tobacco, while coyote tobacco seedlings were unaffected. Low soil moisture, high temperatures, and desiccating winds also have a greater effect on Indian tobacco than on coyote tobacco. In the spring of 2004, Indian tobacco was sown in fresh ash near the Upper Klamath River. Only a

few plants in especially protected locations grew to maturity, while hundreds of coyote tobacco plants, in very exposed locations nearby, grew well through the summer and early autumn. Late spring frosts and high maximum summer temperatures accompanied by wind are characteristic of the vicinity of the Upper Klamath River and Shasta Valley, while climatic extremes are less pronounced downstream in Western Shasta territory. Climatic constraints within the area occupied by the Eastern Shasta may have prompted them to place a greater reliance on gathering coyote tobacco from the wider landscape than primarily or exclusively cultivating the more cold- and desiccation-sensitive Indian tobacco. Regionally, there is a correlation along the Klamath River between using coyote tobacco and “gathering from the wild,” as well as a correlation between using Indian tobacco and practicing intensive cultivation (Table 2).

### CONCLUSIONS

The sinuous Klamath River is a biogeographic corridor connecting the plants and peoples of the Great Basin Floristic Province with those of the California Floristic Province. It connects the climates, plant associations, and cultures of the Great Basin and the Klamath Basin with those of California and the Northwest Coast. Tobacco, in its cultural manifestations and degrees of intensification, demonstrates the richness, intricacy, and diversity of the relationships between plants, landscapes, and peoples along the river’s naturally and culturally variegated course.

The Klamath River facilitates the movements of plants and people both upstream and downstream. Coyote tobacco seeds raft downstream with the river’s current, while Indian tobacco made its way upstream, influenced by the flow of Native American culture. When the variety of methods used by the Eastern and Western Shasta to procure tobacco are combined, it appears that the Shasta used a wide spectrum of practices to insure a supply of tobacco. Downriver, well within the California Floristic Province, the ethnographic Western Shasta sowed, pruned, and irrigated the culturally valuable and regionally exotic Indian tobacco in small plantations. The species of tobacco they preferred was the same as that preferred by their downriver neighbors the Karuk,

Table 2

**METHODS FOR OBTAINING TRADITIONAL TOBACCOS<sup>a</sup> AND THE PRIMARY SPECIES USED, FROM THE EASTERN HEADWATERS OF THE KLAMATH RIVER WEST TO THE PACIFIC OCEAN**

| Tribal Group | Position on River | Floristic Province | Gathered From the Wild <sup>b</sup> | Cultivated or Semi-cultivated <sup>c</sup> | Primary Species             |
|--------------|-------------------|--------------------|-------------------------------------|--|-----------------------------|
| Klamath      | Headwaters        | Great Basin        | Yes                                 | No   | Coyote Tobacco <sup>d</sup> |
| Modoc        | Headwaters        | Great Basin        | Yes                                 | Yes  | Coyote Tobacco <sup>e</sup> |
| E. Shasta    | Upper             | Transition         | Yes                                 | Yes  | Coyote/Indian?              |
| W. Shasta    | Middle            | California         | No                                  | Yes  | Indian Tobacco <sup>f</sup> |
| Karuk        | Middle            | California         | No                                  | Yes  | Indian Tobacco <sup>g</sup> |
| Hupa         | Lower             | California         | No                                  | Yes  | Indian Tobacco <sup>h</sup> |
| Yurok        | Lower             | California         | No                                  | Yes  | Indian Tobacco <sup>i</sup> |

<sup>a</sup> Exclusive of trade.

<sup>b</sup> Elements derived from Voegelin 1942: 92–93.

<sup>c</sup> Elements derived from Voegelin 1942: 92–93.

<sup>d</sup> Coville 1897: 105.

<sup>e</sup> Ray 1963: 218.

<sup>f</sup> Merriam 1918: RI. 1022–53.

<sup>g</sup> Harrington 1932: 30. See also endnote 5.

<sup>h</sup> Harrington 1932: 44–278.

<sup>i</sup> Setchell 1921: 405.

<sup>j</sup> Heizer and Mills: 1952:196.

Hupa, and Yurok. Indian tobacco was used as well by the majority of native peoples living within the northern portion of the California Floristic Province and by those living west of the Cascade Mountains within the northwest portion of the Far West.

Upriver, the Cascade Mountains section of the Upper Klamath River is a transition area between the California Floristic Province and the Great Basin Floristic Province. Within this transitional zone the Eastern Shasta opportunistically gathered coyote tobacco from the wider landscape, as did the Klamath, Modoc, and Paiute peoples living to their east within the climatically dry Great Basin Floristic Province. Like the Modoc and Northern Paiute, the Eastern Shasta probably burned portions of the landscape to encourage germination of the indigenous fire-following coyote tobacco. Like the Karuk, they also burned brush or logs to prepare specific locations for sowing tobacco. The species of tobacco sown may have been coyote tobacco, as in the Achomawi tradition. The Eastern Shasta may have also sown Indian tobacco into favorable protected locations where the plants could be watched over and tended. Farther upriver, throughout the Klamath River's vast upper headwaters region and within the Great Basin Floristic Province, coyote tobacco was used exclusively, and it was most commonly gathered from areas where it had been encouraged to grow by intentional burning.

Each degree of intensification, from lesser upriver to greater downriver, accommodated to the contingencies of local seasonal rounds, available seed sources, cultural traditions, and prevailing climatic constraints. The gradient of tobacco intensification corresponds closely with the climatic gradient along the Klamath River where it transitions, downstream, from the Great Basin Floristic Province to the relatively moist and mild northern portion of the California Floristic Province. Along the Klamath River and its headwaters, there is a strong correlation between the cultural practice of gathering from the wider landscape and using coyote tobacco. The intensive cultivation of tobacco correlates most strongly with the use of Indian tobacco.

Of the two species of tobacco traditionally used along the Klamath River, coyote tobacco, the long-term indigenous species, was likely the first tobacco to be smoked, nurtured, and used for medicinal, psychotropic, and ceremonial purposes. At some time in the ancient past, Indian tobacco was introduced to the Klamath River country; it likely supplanted the use of coyote tobacco along the lower course of the river, while coyote tobacco continued to be used along the river's upper reach. The use of both of these traditional tobaccos was largely eclipsed by the introduction of "European" style smoking tobacco (*Nicotiana x tabacum*) during the latter half of the nineteenth and early twentieth centuries.

More than one hundred years ago, for example, Curtin (1883:104), in reference to the Eastern Shasta, noted that “only some old men use the [traditional] tobacco now.”<sup>6</sup>

## NOTES

<sup>1</sup>The botanical nomenclature used follows Hickman (1993).

<sup>2</sup>The Upper Klamath River Project has investigated the history, archaeology, landscape history, and ethnobotany of the Upper Klamath River vicinity from the I-5 crossing (near the border between the Cascade Mountain Range and the Klamath Range) upriver to the edge of the Klamath Basin. Dr. Joanne Mack, University of Notre Dame, is the principal investigator.

<sup>3</sup>In the northern portion of the Far West, west-flowing rivers such as the Klamath may serve as conduits for coyote tobacco range extensions. River-borne seeds may establish transient or more permanent populations along disturbance-prone banks and on gravel bars within regions where tobacco would normally not be competitive with existing native vegetation. Range extensions may be assisted and expanded by human agency.

<sup>4</sup>As has been well documented by Blackburn and Anderson (1993) and Anderson (2005), “gathering from the wild” is a somewhat misleading phrase, since much of the landscape occupied by Native Americans was managed. Although this paper follows the terminology used by ethnographers delineating cultural elements, a more accurate phrase might be “gathered from the wider landscape.”

<sup>5</sup>Compared to coyote tobacco, relatively little has been documented regarding the specific ecological attributes and responses of Indian tobacco. Indian tobacco is presumed to be closely related to coyote tobacco and the two species share many characteristics. However, while coyote tobacco has a relatively uniform morphology over an expansive range, Indian tobacco’s morphology is more diversified, reflected in its somewhat confusing division into at least four varieties. The tobacco given the Latin name *Nicotiana bigelovii* in much of the ethnographic literature is currently classified as a variety of *Nicotiana quadrivalvis*. Additional descriptive information regarding Indian tobacco and its varieties may be found in Hammett (2000:128–140) and Winter (2000: 115–120).

<sup>6</sup>Native peoples up and down the river have revived the gathering, cultivation, and use of traditional tobaccos for medicinal and ceremonial purposes (Lang 1995:28). Sites along the river where populations of tobacco are located are not mapped or specifically described here, since tobacco at these locations is currently being used by native peoples.

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