## Title

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# Ethnobotany of Devil's Claw (*Proboscidea parviflora* ssp. *parviflora*: Martyniaceae) in the Greater Southwest

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THE importance of devil's claw (*Proboscidea parviflora* [Woot.] Woot. and Standl. subsp. *parviflora*: Martyniaceae) to the native cultures of the Greater Southwest has been generally unrecognized for several reasons. First, although the use in basketry of fibers from the claw-like appendages of the fruit of this plant has long been known (see Tanner [1983] for a review), it only recently has been demonstrated that these cultures domesticated devil's claw (Yarnell 1977; Nabhan et al. 1981; Bretting 1982). The domesticate (var. *Hohokamiana* Bretting) has white seeds and disproportionately long, thin claws; the wild plants (var. *parviflora*) have black seeds and generally shorter and thicker claws (Nabhan et al 1981; Bretting 1986). Variety *Hohokamiana* occurs almost always under cultivation or close to fields cultivated by native Americans. Variety *parviflora* is rarely cultivated; usually it grows "wild" in disturbed soil of arroyos, pastures, roadcuts, etc.

Second, the widely available anthropological, botanical, and ethnobotanical literature often gives the misconception that devil's claw occurs and is cultivated only in the Pimería Alta, the Papago-Pima (or *O'odham*) region of Arizona and northern Sonora. Gumerman and Johnson (1971), for example, thought that devil's claw was a key cultural resource found only south of the Mogollon Rim and thus served as an indicator species for Sonoran desert cultures. Also, the few herbarium specimens of devil's claw collected outside of southern Arizona led to inaccurate estimates by floristic workers of its ecogeographical distribution (with the notable exception of Hevly [1970]).

During our ongoing research (Nabhan et al. 1981; Bretting 1982; Nabhan and Rea n.d.) we found that devil's claw has a much wider ecogeographical distribution and is (or was) important to many more native groups throughout the Greater Southwest than is commonly known (Fig. 1). This report summarizes the native names, uses, and cultivation practices for devil's claw for that region. Herbarium specimens, ethnohistorical, archaeological, and ethnological literature were first surveyed; these references were complemented and updated by recent extensive fieldwork (by Nabhan) at more than 30 different Indian reservations. With this information it is possible to detail the widespread use of devil's claw in basketry and its enigmatic role in the rituals of Pueblo cultures. Hypotheses regarding the chronology and locality for the domestication of this plant are also suggested. Processes and routes of diffusion for the cultural trail of devil's claw cultivation and use are hypothesized; these may be valuable to ethnologists and others perhaps not interested in devil's claw *per se*.

## USE OF DEVIL'S CLAW IN BASKETRY BY THE PIMA-PAPAGO

The interrelationship of the Pima and Papago with devil's claw is profound and

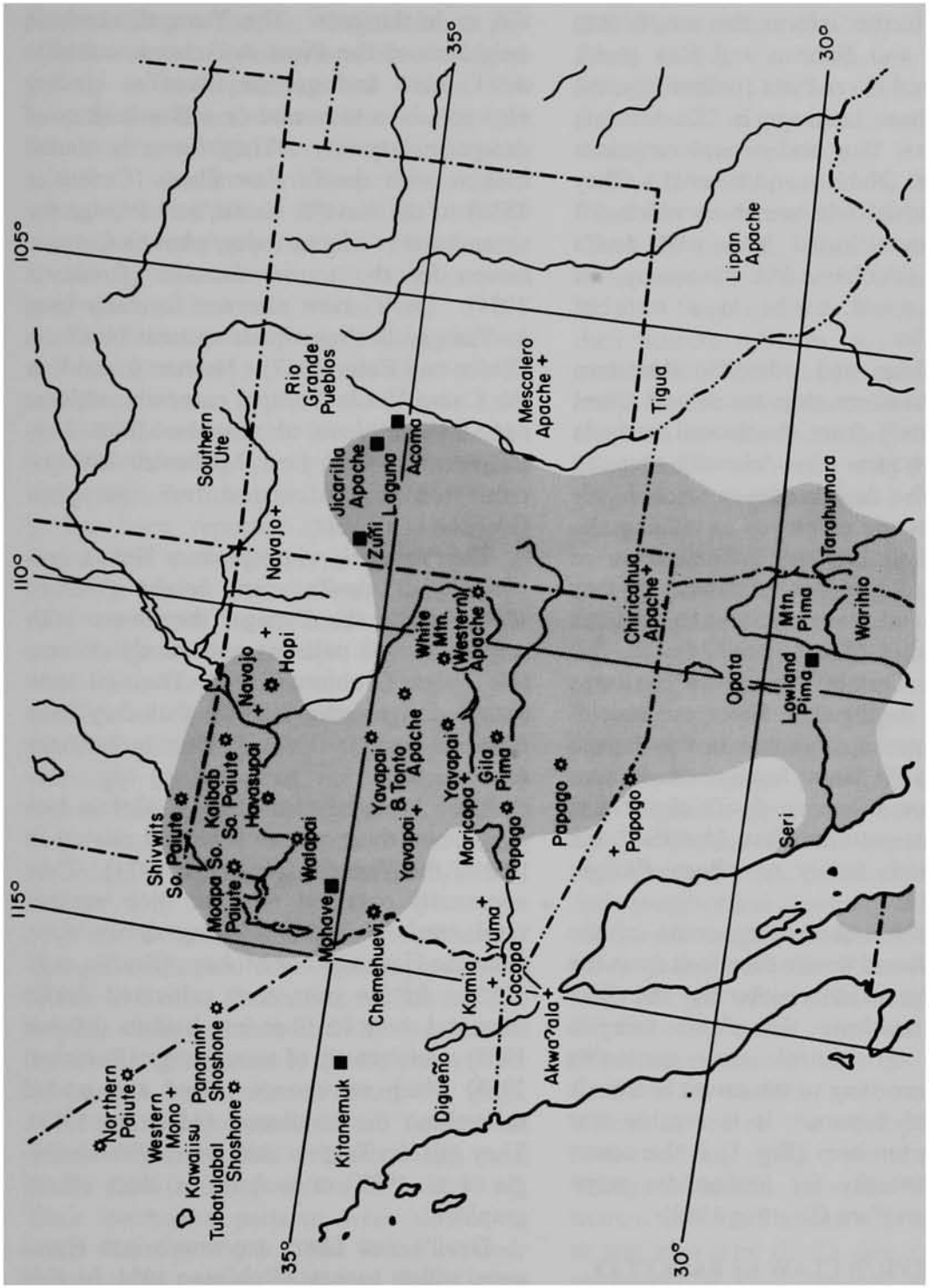


Fig. 1. Occurrence of devil's claw in archaeologic and ethnographic contexts in the Greater Southwest.

complex. Indeed, here we can only summarize it; for further information see Nabhan et al. (1981) and Nabhan and Rea (n.d.). The Papago and River Pima (collectively, the O'odham), whose language is Uto-Aztecan, call devil's claw *'ihug* and several variations upon this name (Nabhan and Rea n.d.). They have a hierarchial folk taxonomy which differentiates domesticated from wild devil's claw. The O'odham folk taxonomy for devil's claw seems to be in a state of transition or flux.

The O'odham and other Southwestern Indian basketmakers strip bundles of fibers (called "splints") from the lateral surfaces of the two rostra (the "claws") that tip each fruit. The dark brown or black, highly durable splints are employed as binding elements in coiled basketry. They serve as decoration, or to improve durability as they are stronger and more resistant to abrasion than are other fibers available to the O'odham. Certain decorative patterns created with devil's claw fibers are considered sacred, perhaps because in the Papago creation myth the Great Spirit showed Papago women how to weave devil's claw fibers into different patterns that identified the baskets of each family or village (Wright 1939).

Even in the last century, some of the O'odham gathered devil's claw fruit from the wild. Now the majority either buy the claws or fruit or cultivate the plants using a variety of agricultural and gardening techniques, according to the extant economic and ecological factors. It is notable that the O'odham territory (Fig. 1) is the center of genetic diversity for *Proboscidea parviflora* subsp. *parviflora* (Bretting 1982).

## USE OF DEVIL'S CLAW IN BASKETRY BY OTHER GROUPS

Many other native Southwestern groups cultivate and use devil's claw in basketry, or did so in the past. The Yavapai, northern neighbors of the Pima in Arizona, cultivate devil's claw and use its fibers as binding elements in cottonwood or willow baskets of exceptional quality. They formerly traded baskets with devil's claw fibers (Corbusier 1886) to the Navajo, Yuma, and Papago for agricultural products; today, most baskets are woven for the tourist demand (Robinson 1954). Devil's claw also was formerly used in Yavapai healing rituals to treat blindness (Euler and Euler 1967). Nabhan found that the Camp Verde Yavapai currently cultivate var. *Hohokamiana*, whereas the Middle Verde, Prescott, and Fort McDowell Yavapai cultivated or protected var. *parviflora* (Nabhan et al. 1981).

The Yavapai, who speak a Hokan language, call devil's claw *helaka* (Gifford 1936). Like the Papago, they wove both specific sacred patterns and purely decorative designs (Robinson 1954). Their intricate sacred designs may indicate that they have gathered and used devil's claw in basketry for some time.

The Walapai also speak a Hokan language, and their culture is closely related to that of the Yavapai (Newcomb 1974). They apparently obtained most of their agricultural seed, perhaps including devil's claw, from the Havasupai or Mohave (Kniffin et al. 1935). In the past, they cultivated devil's claw and wove its fiber into baskets (Mason 1904) made mostly of sumac twigs (Robinson 1954) which were once prized and traded throughout the Southwest (McGuire 1983). They call devil's claw *mak dtuny* (Watahomigie et al. 1982) or *makatiu* in older ethnographies.

Devil's claw fibers are woven into Havasupai willow baskets (Robinson 1954; McKee et al. 1975). Basketry has long been a very important trade item for the Havasupai

(Schwartz 1983), who traditionally have farmed Havasu Canyon, where both var. *parviflora* and var. *Hohokamiana* have been collected. Their plantings of devil's claw (usually var. *Hohokamiana*) bear enough fruit for local use; therefore, plants are rarely gathered today from wild populations. However, Nabhan (*Nabhan 889* and *900*, ARIZ)[1] recently found that plants probably referable to var. *parviflora* were protected, or even cultivated, in Havasupai fields.

The Havasupai apparently imported var. *Hohokamiana* or a non-local type of var. *parviflora* about a century ago. Spier (1929:232) was told that it was introduced by "a Walapai wife, who procured it from a sister, who in turn got it from the Paiute." It has been reported that the Havasupai began to manufacture a new type of basketry tray coetaneously with their adoption of the "new" devil's claw, and the availability of its perhaps superior fibers may have contributed to this innovation (McKee et al. 1975). These reports and morphological evidence (Bretting 1982) seemingly confirm that var. *Hohokamiana* arrived among the Havasupai recently, where it is termed *halaa' kaki-yula* 'hooked-long' according to Whiting (specimen 1045/B4504, MNA).[2]

West of the Papago-Pima and Walapai-Yavapai territories, other Hokan groups, the Mohave, Yuma, Halchidhoma, Kamia, Kohauana, Halyikwamai, and Cocopa, farmed the alluvial floodplains of the Colorado River or hunted and gathered along its edge. According to some accounts, the Yuma wove coiled basketry with willow, reeds, and devil's claw (called *gwoxtó n* or *kwaxató n*). Their decorative patterns were similar to some Pima patterns. The bases of their baskets were always made of devil's claw fiber because it was ". . . suppler and easier to work" and "being tough, would stand dragging across the ground" (Spier 1933:122-123; Forde 1931: 124-125). According to Forde (1931), the Yuma no longer weave baskets. There is no evidence that these Colorado River groups cultivated devil's claw during recent times.

The Maricopa currently live near the Pima in south-central Arizona, but until about 150 years ago their homeland lay west along the Gila River (Castetter and Bell 1951). They speak a Hokan dialect, like their western relatives, and call devil's claw *gwoxotó n*. In Maricopa coiled willow basketry, devil's claw fibers serve as binding elements on the base and on the sides. Pima baskets were also used by the Maricopa, and are highly prized household items (Lamb 1972).

According to Castetter and Bell (1951), the Gila Pima, Papago, Maricopa, and the Hokan speakers of the southern Colorado River Valley comprise a single, large cultural province, differentiable into two subgroups by their different assemblages of crops. Interestingly, the lower Colorado River tribes and the Maricopa (recent immigrants from that region) apparently have not grown devil's claw, nor has this species been found in the lower Colorado River Valley. Despite their geographical proximity, cultural similarities, and frequent contacts, the Colorado River groups and the Pima-Papago apparently did not share this trait, just as they did not share some other cultivated plants. Nevertheless, more than a century ago, devil's claw baskets were traded to the Yuman tribes or the nearby Chemehuevi, both residents of the lower Colorado River Valley. Nabhan recently found a Pima woman who was married to a Maricopa healer and who grew devil's claw in the Mohave settlement at Fort Mohave, so we may be witnessing the integration of two different crop assemblages (Nabhan et al. 1981).

The Apache and Navajo speak Athapascan dialects and migrated into the American Southwest fairly recently (A.D. 1200-1400 [Newcomb 1974]). Their use of devil's claw in basketry may predate trade with Anglo-Americans as there are oral reports of trade with the Zuñi (Goodwin MS). The Apache probably began cultivating devil's claw fairly recently, as most bands returned to farming after the 1880s. Roberts (1929) reported several Apache names for devil's claw and claimed that in the 1920s it was not cultivated at San Carlos.

Lamb (1972) reported that the Navajo wove baskets containing devil's claw fiber, but Underhill's (1953) comments are contrary to this report. The Northern Tonto, Warm Spring, and Mescalero Apache also wove devil's claw fiber into their baskets (Palmer 1871; Mason 1904; Gifford 1940; Lamb 1972). *Tahuate* or *ta-gate* are Apache words for devil's claw (Mason 1904; Nabhan et al. 1981), and its fruit once served as a famine food for these people (Palmer 1871).

San Carlos Apache now cultivate both var. *parviflora* and var. *Hohokamiana* and decorate cottonwood baskets with devil's claw fibers (Nabhan et al. 1981). They named it *tsi gol ca xa* (Goddard, in Roberts 1929). Many designs were "borrowed" from other tribes, especially from the Yavapai. It is believed that the Yavapai taught basket weaving to these Apache (Robinson 1954) and to the Camp Verde Apache, where at present the plant is called *tsi gol sheh heh* (Nabhan et al. 1981). The White Mountain Apache currently grow var. *parviflora* and weave coiled bowls and trays from willow or cottonwood twigs and devil's claw fibers. These baskets are produced primarily for commerce (Dobyns 1971). The Cibecue and Clarkdale Apache now cultivate both var. *Hohokamiana* and var. *parviflora* for their basketry fiber (Nabhan et al. 1981).

North and west of the Walapai, Havasupai, and Navajo territories, various Paiute groups formerly subsisted by hunting and gathering augmented by horticulture. The Shivwits and Kaibab Southern Paiute grow both varieties of devil's claw in their garden plots, and weave the fiber into basketry (Steward 1938, 1941, 1942; Kelly 1964; Nabhan et al. 1981). The Southern Paiute have called it *sah oo binump* (Bye 1972). The Southern Paiute may obtain up to twelve fiber splints per devil's claw fruit, whereas the Papago and several other groups obtain only four. The Shoshone and Northern Paiute also cultivated devil's claw and used it in their basketry (Coville 1892; Merriam 1903; Steward 1941; Murphy 1959; Smith and Simpson 1964). Possibly, the Southern Paiute introduced the domesticated variety to several other groups. It is uncertain whether the Paiute cultivated and independently domesticated devil's claw in ancient times, or whether they also adopted this trait recently like neighboring tribes.

Forbes (1904), Mason (1904), Weltfish (1930), and Lamb (1972) reported that the Chemehuevi, relatives of the Southern Paiute who lived along the Colorado River, ornamented their willow baskets with devil's claw. Their basketry style, formerly similar to Yavapai and Havasupai, has become highly commercialized, with no legends linked with particular "sacred patterns" (Lamb 1972). Nabhan et al. (1981) recently collected var. *Hohokamiana* under cultivation by the Chemehuevi, as had been reported previously (Forbes 1904).

California Indians who spoke Numic dialects (Newcomb 1974) used devil's claw fibers in basketry (Coville 1892; Steward 1938). Jaeger (1941) recorded that the plant was introduced to Death Valley by a Shoshoni ca. 1860. The desert-dwelling Panamint Shoshoni now grow var. *Hohokamiana* (Nabhan

et al. 1981) and have woven its fibers into both coiled and twined baskets of willow, *Rhus* twigs, and yucca stems (Coville 1892; Kroeber 1925; Lamb 1972). The Shoshoni from Lida, Nevada, and Fish Springs, California, planted devil's claw in their gardens (Steward 1941). Nabhan et al. (1981) recently confirmed that the Shoshoni of Rawlings Creek, California, also grew it for basketry fiber. According to Steward (1938), the Southern Paiute introduced horticulture, and possibly devil's claw, to the Shoshoni during historic times.

Other California Indians such as the Western Mono also decorated their willow baskets with devil's claw fiber (Merrill 1923; Lamb 1972) as did the Koso, Kitanemuk, Kawaiisu, and the Tubatulabal near Kern River, California (Merrill 1923; Voegelin 1938; Zigmond 1978). The latter group also was reported to cultivate devil's claw (Voegelin 1938).

## USES OF DEVIL'S CLAW BY THE PUEBLO CULTURES

The interrelationship between devil's claw and several Pueblo cultures, such as the Hopi, was quite different from the situation among other Indian groups. The Hopi conserved many ancient beliefs and cultural traits, and their life revolved around a seasonal calendar of rituals that included sun worship (Fewkes 1896, 1898, 1899). Perhaps the most important ritual was the *Soyaluña*, or winter solstice ceremony. According to legend, the *Patki* clan brought this ritual from the "giant cactus [saguaro?] land in the far south" (Fewkes 1898:67) during one of the frequent human migrations that characterized Southwestern prehistory. Many *pahos* (prayer sticks) fashioned for this ceremony included parts of plants or animals that inhabited wet places (Fewkes 1896). Fruit of devil's claw (in Hopi, *mümi* or *tümo ala* 'sandhorn') were used in the *Soyaluña paho* to "hookdown" the clouds (Voth MS; Hough 1897, and his herbarium specimens *Hough 2* and *25* [US][3]; Whiting 1939). Devil's claw was used especially during severe droughts because it supposedly had "special influence" over rain clouds (Dorsey and Voth 1901). A devil's claw *katsina* (ceremonial statuette) with clouds affixed to its head and devil's claws painted on its cheeks "catches the rain clouds with the claws and draws them to the Hopi mesas" (Colton 1949:72).

The Hopi also attached the "claws" of devil's claw fruit to a wooden disc to form a frame very similar to the skeleton of an umbrella. They then twined colored string from claw to claw to form artificial squash blossoms placed on the ritual altars used in several ceremonies. Sometimes, the yarn and stick assembly was daubed with white clay and then painted various colors (Fewkes 1898; Dorsey and Voth 1901; Whiting 1939).

Hough (*Hough 2*) and Whiting (1939) noted that devil's claw grew as a weed in Hopi fields. Whiting (1939:16) termed this plant "semi-cultivated," probably because although the Hopi did not sow it, they did let "wild" plants remain in their fields, as they believed that the claws acted as lightning rods to attract rain storms.

Recently, Nabhan et al. (1981) collected var. *parviflora* growing as a widespread weed in Hopi fields, but var. *Hohokamiana* was found under cultivation only at Lower Moenkopi. Interviews with Hopi craftsmen suggest that var. *Hohokamiana* was introduced to the Hopi at Tuba City (Moenkopi), Arizona, from the nearby Kaibab Southern Paiute, who had recently received it from the Moapa Southern Paiute. The Kaibab traditionally have visited Hopi fields at Moenkopi and, with permission, collected the devil's claw there. Edna Dallas, a Hopi

basketmaker from Moenkopi, has recently started weaving Southern Paiute-style baskets decorated with devil's claw fiber (Nabhan et al. 1981).

Nabhan's recent fieldwork, plus earlier reports (Weltfish 1930) that the Hopi purchased coiled baskets from the Havasupai rather than weaving their own, suggest that the domesticated var. *Hohokamiana* entered Hopi culture recently. Biosystematic analyses showing that Hopi populations of var. *Hohokamiana* are more similar to Pima-Papago populations of this variety than to nearby populations of var. *parviflora* also suggest a recent introduction to the Hopi (Bretting 1982). It must be stressed that, in contrast, the wild var. *parviflora* may have a very long history as an "encouraged weed" in Hopi fields, because of its supposed ability to attract or "hook" rain, much like lightning.

Stevenson (1915) gave a good account of devil's claw among the Zuñi Indians. They, like the Hopi, made artificial blossoms from devil's claw fruit and yarn. These blossoms were attached to headdresses worn by women during ceremonial dances. But, according to Stevenson,

> Students have described it as symbolizing the squash blossom, an error only too pleasing to the Zuñi as the blossom of *Datura* is most sacred to them [1915:46].

*Datura*, a potent hallucinogen, was of course proscribed by the Spanish authorities, so that its use in religious ceremonies became surreptitious. Recent fieldwork (Nabhan et al. 1981) revealed that residents of the Zuñi and Laguna pueblos still gather devil's claw from distant stands, because it is rare near the pueblos.

## FIRST USE OF DEVIL'S CLAW IN THE GREATER SOUTHWEST

Only a few *Proboscidea* fruits have been recovered in archaeological sites. Several were found in strata dating A.D. 300-1100 at Cordova Cave, New Mexico. Using photographs in Kaplan's article (1963), we identified them as *P. parviflora* ssp. *parviflora*. Morphologically, these fruits seemed to resemble the wild variety more than the domesticate. Baskets recovered at this site and at nearby Tularosa Cave contained no devil's claw fiber. M. R. Harrington collected a fruit of domesticated devil's claw from a cave site in the Southern Paiute territory near Parowan, Utah. No basketry was recovered from this apparently prehistoric site.[4]

Extensive excavation of Hohokam (considered the probable ancestors of the Papago and Pima by some scholars) sites in southern Arizona has uncovered only a few *Proboscidea* fruits in Ventana Cave (Haury 1950, 1976). Haury (1950:488) remarked that these fruits were small and likely came from wild, not cultivated plants. Weltfish (1932) found devil's claw in basketry trays from the Hohokam site of Casa Grande in Arizona, but recent, intensive archaeobotanical salvage between Tucson and Phoenix has not uncovered additional Hohokam basketry with devil's claw. It has been suggested that devil's claw cultivation was not an ancient trait among the Pima and Papago (Castetter and Bell 1942). Archaeological investigations of the Hohokam culture have not disproved that hypothesis. For example, specimens of the white-seeded domesticate recently were recovered from an Ak-Chin Papago site, but the site dates only to the 1800s (Charles Miksicek, personal communication 1980). Furthermore, the fact that the earliest ethnohistorical report of devil's claw used in southern Arizona (Alamán 1825; cited in Ezell 1983) occurs about 150 years ago supports Castetter and Bell's viewpoint. The apparent novelty of devil's claw cultivation

among the Pima and Papago is nevertheless incongruent with the high frequency with which they now cultivate it, plus their rich folklore and complex folk taxonomy associated with this plant (Nabhan et al. 1981; Nabhan and Rea n.d.).

Outside of the Pima-Papago region, devil's claw fiber was reported in prehistoric basketry from archaeological sites in the upper Gila River region of New Mexico, and at Ceremonial and Hueco caves in southwestern Texas (Cosgrove 1947). In the latter site, devil's claw fiber was reported in the rim coil and sides of yucca and sotol baskets. Two basketry fragments apparently were constructed entirely from devil's claw. They date to the transition between the Archaic and the appearance of wide-scale farming (ca. A.D. 1-600 [Jennings 1978:48]).

The sparse archaeobotanical evidence suggests that devil's claw probably was used in baskets long before the Southwestern Indians began to cultivate it for that purpose. It is unlikely that selective pressures strong enough to produce a distinct type of devil's claw were exerted until long after the first appearance of devil's claw fiber in archaeological basketry from southwestern Texas or north of the Pimería Alta. Perhaps devil's claw may have been first *used* in basketry outside the Pimería Alta; nevertheless, the richest folk taxonomy for devil's claw, the plant's greatest genetic variability, highly derived (fruit with very long, thin claws [Nabhan et al. 1981; Bretting 1986]) cultivated types, and the earliest ethnohistorical record for devil's claw *cultivation* occur in the Pimería Alta. This region thus would appear the most probable center of origin for the domesticate var. *Hohokamiana*. It is possible that devil's claw was domesticated rapidly here during historic times (ca. 1700-present), a period of rapid economic, cultural, and environmental change during which wild devil's claw may have become increasingly scarce. The process of disruptive selection (Thoday 1972) may be responsible for the seemingly rapid evolution of the domesticate despite the potentially impeding effects of gene flow from nearby wild populations.

Notably, though, our most recent field work revealed that many groups outside of the Pimería Alta now cultivate both domesticated and wild devil's claw. If devil's claw were traded to these tribes living outside the plant's current "natural" ecogeographical range, it is likely that it would be maintained by the recipients via cultivation. Current evolutionary theory holds that genetic differentiation probably occurs more rapidly at the periphery of a plant's range (Levin 1970). Perhaps the Chemehuevi, Havasupai, or other groups obtained wild devil's claw via trade, initiated or actually totally domesticated the plant, and then traded the improved source of basketry fiber back to the O'odham. Until further studies of basketry, excavations of early historic and late prehistoric archaeological sites, and population genetic analyses uncover further clues, neither of these provocative theories can be dismissed.

The time and place that devil's claw first was incorporated into the rituals of the Pueblo cultures has not yet been investigated in even the most preliminary way. The techniques noted above must also be applied to this problem. The most fruitful preliminary work would involve reexamination of museum specimens of ritual paraphernalia in the light of devil's claw's importance in rain-making rituals.

## NOTES

1. Specimens deposited in the herbarium of the University of Arizona.

2. Specimens deposited in the herbarium of the Museum of Northern Arizona.

3. Specimens deposited in the collections of the Department of Anthropology, Museum of Natural History of the United States (Smithsonian).

4. Specimen 2F 916 deposited in the collection of the Southwest Museum, Los Angeles. We thank Dr. Paul Minnis for this information.

5. Much of this paper is derived from a dissertation submitted by PKB to the Department of Biology, Indiana University, in partial fulfillment of the requirements for the Ph.D. We thank C. B. Heiser, V. Bohrer, A. Rea, P. Ezell, H. Dobyns, R. Euler, R. Bye, and the late A. Whiting for their help and comments. We gratefully acknowledge the financial support of the Coleman Fund, the Wenner-Gren Foundation for Anthropological Research, the Department of Biology, Indiana University, and the Department of Crop Science, North Carolina State University.

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