

# The ARCHAEOLOGY of POTATOES

## Understanding the transition from wild to domesticated to market

By Bruce Pavlik, Cynthia Wilson, John Bamberg, Alfonso del Rio & Lisbeth Louderback

What does archaeology tell us about the antiquity of potatoes as food? In southern Chile, near the limits of potato-forming *Solanum* species along the Andean Cordillera, small pieces of tuber have been excavated from a 15,000-year-old hearth at a site called Monte Verde. Although it's still unclear as to the identity of those fragments, this use of a wild potato species is at least 7,000 years older than the domestication of *Solanum tuberosum*, the modern cultivated potato species.

In the opposite hemisphere, at the northern limit of all potato-forming *Solanum* species, starch grains of the native *Solanum jamesii* were identified on the surface of a 10,900-year-old grinding stone from a rock shelter in southern Utah. Soon after that, a live population comprised of 22 robust plants was found within 100 meters of that ancient habitation. Subsequent field work has identified at least eight remnant populations of this "Four Corners Potato" in the Escalante region and four within Bears Ears National Monument in southeastern Utah. At least nine of these 12 are associated with archaeological features, including habitations, storage

granaries, pottery sherds, stone tools and petroglyphs.

Is it possible that *S. jamesii* had been domesticated, given its long history and strong association with human activity? Our project is designed to answer that question through a collaboration between a botanic garden, a natural history museum, the tribes of the Four Corners region (Utah, Colorado, New Mexico and Arizona), and a government potato genebank. If native people had transported, cultivated and selected tubers away from the center of distribution (in south-central Arizona, New Mexico and Texas), we would expect to find genetic, ecological and reproductive traits that reflect past manipulation. In that case, this would be the only known plant species to be domesticated in the western United States. Comparisons could then be made with the domestication of *S. tuberosum* as it is understood in South America, as well as with other important crops (e.g., corn, beans, squash and peppers) from Mesoamerica.

The USDA's Potato Genebank in Wisconsin holds a vast collection of tubers from many species in the Western Hemisphere

as part of an effort to understand how potato diversity was created and how that diversity can be perpetuated. Over 100 populations of *S. jamesii* are represented, containing genes that confer greater blight and nematode resistance, as well as tolerance to freezing. Hybrids of *S. jamesii* and other species have potential to improve *S. tuberosum* and to develop new useful strains. In some ways, this research mimics the mixing and selection conducted by Andean people that resulted in the more than 4,500 cultivars of *S. tuberosum*. We even suspect that the ancient Puebloan city in southwest Colorado known now as Mesa Verde, may have served as the *S. jamesii* genebank of its time, owing to high levels of genetic diversity that appear to have been transported and cultivated there long ago.

In addition to exploring the question of ancient domestication, we are also engaged with tribes in the Four Corners region who have a long cultural relationship with *S. jamesii* and detailed knowledge of its biology. Elders still eat these small tubers, gathered from carefully tended populations. Some grow the species in gardens and regard it as a



Examples of *S. jamesii* tubers propagated from Escalante (left) and Bears Ears sources after four months in the greenhouse. Each mother tuber can produce up to 1.5 pounds of new tubers in that amount of time. Scale is in millimeters.

sacred food, lifeway medicine and gift of the holy people. Consequently, the Four Corners potato reconnects tribes to intact landscapes and traditional agricultural practices, helping revitalize indigenous food heritage. Understanding the ancient potato heritage from the native perspective includes the spiritual and traditional aspects of bringing old teachings back to life with the intention of healing and nurturing, protecting whole and natural systems of the land, and strengthening tribal cultures and knowledge systems for future generations.

We also see great potential for practical benefit of the Four Corners Potato to tribes

who can grow and market it, landowners who conserve it on their properties, and restaurants that offer it as part of a burgeoning food movement. Plants in cultivation grow rapidly during summer months, and one individual is able to produce hundreds of new—albeit small—tubers by late fall. They store well when refrigerated, maintain integrity when cooked for prolonged periods, and have twice the protein, zinc and manganese and three times the calcium and iron content of most white potato cultivars.

They are also delicious, but some populations contain more of the bitter glycoalkaloids known from all *Solanum*

species. These can be removed using traditional cooking techniques, but we are also searching for the best-tasting strains to use as source material for commercialization. Those strains often occur on private land, so landowners will be contacted and included in development of this product, especially if they implement simple measures that protect populations as well as the archaeology. Finally, we have the enthusiastic support of restaurants in the region who recognize the ancient culinary history and are excited to add this 10,900-year-old food to their menus.



Growth is prolific under greenhouse conditions; these two photos were taken just 28 days apart.



Serving the Four Corners Potato at Slot Canyons Inn in Escalante, Utah, will continue a 10,900-year tradition that began with native people on this very site.

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When grown in pots, the stolons of *S. jamesii* circle around, and most tubers are formed on the outside edge of the root mass.

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