

fornia coast on the peninsula between Monterey Bay and Carmel Bay. This shows that the knobcone pine is, at least in part, living in the same general area it occupied in Pleistocene time, whereas the cypress has retreated for some hundreds of miles up the coast, where apparently it has made its last stand.

It is perhaps presumptuous with the data available to venture to draw any conclusion as to the climatic and other conditions that obtained when these cones were entombed in the Rancho La Brea deposits, but such as it is it may be presented. According to Sudworth the knobcone pine now occurs usually on dry, exposed, steep southern slopes, but often in deep gulches and protected ravines, growing on poor, dry, rocky, or gravelly and sandy soils. It endures seasonal changes of temperature from zero to 95° F., with occasional heavy snows and an annual rain fall up to 45 inches.

The Monterey cypress in its natural state appears to require quite different conditions. It grows on rocky sea cliffs in clay loam soil, under a mild equable temperature, never at freezing point and rarely above 90° F. The annual rain fall is about 17 inches, but the moist sea winds keep the air humid for the greater part of the year. As it is often planted in other parts of California for wind-breaks, it has been found that it will not only thrive in fresh soils away from the influence of the sea, but is capable of withstanding a greater range in temperature than that of its native range. If planted in dry soils, where the temperature falls below freezing, it will grow well and mature its wood before frost.

Inasmuch as the trees themselves, judging from these two cones, appear to have changed very little between the Pleistocene and the present time, it at least suggests that their climatic requirements have likewise suffered little change.

ETHNOBOTANY.—*Quichua names of sweet potatoes.* O. F. COOK, Bureau of Plant Industry.

Quichua was the language of the Incas at the time of the Spanish conquest of Peru, and is still spoken by a large native population. The ancient center of the Quichuas is in the region about Cuzco on the eastern slope of the Andes, from an altitude of

over 14,000 feet at the Pass of La Raya, down to Santa Ana, at an altitude of 3000 feet. The lower valley of the Urubamba river was visited by the writer in May, June, and July, 1915, as a member of the Yale Peruvian Expedition conducted by Prof. Hiram Bingham, of Yale University, in cooperation with the National Geographic Society and the United States Department of Agriculture.

At 6000 feet and below, the sweet potato (*Ipomoea batatas*) is one of the principal root-crops. At Santa Ana it appears to be somewhat less important than *rumu* (Manihot) or *uncucha* (Xanthosoma), but much more important than *achira* (Canna). Two classes of sweet potatoes are recognized under separate names, *apichu* for the sweet varieties and *cumara* for the starchy. A similar distinction is often made in the United States between "sweets" and "yams." The Quichua language seems to have no inclusive term that can be applied to all kinds of sweet potatoes. For this purpose Spanish-speaking Quichuas use the word "*camote*."

Both cumaras and apichus are represented by numerous varieties differing in shape and color of roots and foliage. At San Miguel, in the valley under Machu Picchu, with an altitude of 6000 feet, three varieties of cumaras were noted: *yuracjcumara* (white), *pucacumara* (red), and *compillicjlla*, the last a very short turnip-shaped purple root. Of apichus there were also three varieties, *yuracjapichu*, *pucaapichu*, and *azulapichu* (blue, a combination of Spanish and Quichua). Other names, learned at Santa Ana, are *oqquechuto*, *cusicumara*, and *pucacusicumara*, the last mentioned said to mean "red-long-cumara." Another with deep purple flesh like a beet, that stains the tongue, is called *incampamaccascan*. At Lima the Quichua names are not recognized, only *camote* being used. Two varieties grown between Lima and Callao are called *supano* and *luriniano*, the former with leaves very deeply cut, the latter with nearly entire leaves. Supe and Lurin are places on the coast not far from Lima.

Wild sweet potatoes are said to be of common occurrence in the valleys of the interior. At San Miguel a plant identified by the Indians as *кусиapичу* was found growing spontaneously

in a place not recently cultivated. At Santa Ana three distinct kinds, to judge from the foliage, were found as common weeds in cultivated land. But to certify that any plant is a genuine native species seems out of the question in a region where all of the land has probably been cleared many times and cultivated intermittently for centuries. On the other hand, there is no reason to deny that the sweet potato may have been domesticated in the Peruvian region, as many other plants appear to have been.

The words *apichu* and *cumara* have been recorded before, but without indications of their concurrent use and distinct applications among the Quichuas. Markham's *Quichua Vocabulary* gives *apichu* as the name of the sweet potato, but overlooks *cumara* altogether. Reference might also be made to Holguin's *Arte y Diccionario* without finding *cumara*, since the word does not appear in its alphabetic position, but under *apichu* we find: "Apichu, cumar, *nom.* Camote." Martius's *Ethnographie* has neither *apichu* nor *cumara*, but gives *camote* as the Quichua name, with a derivation from the Mexican *camotli*. Cobo, whose *Historia* was written in Peru less than seventy years after the conquest (though not published till 1890), recorded *apichu* as the Quichua name, *tutuca* as the Aymara name, and *camote* as the name used by the Spaniards of Peru, borrowed from the language of Mexico. Cobo appears to have visited the interior of Bolivia, but not the interior of Peru.

No reason is apparent for questioning the status of *apichu* and *cumara* as genuine Quichua words. Etymologies would be easy to invent. For *apichu* such a combination as *api* (maize pudding) and *pichu* (flesh) or *pichi* (root) would be appropriate, while *cumara* might be related to *ccumu* or *kumu*, meaning crooked or hunch-backed. Other Quichua names analogous to *cumar* or *cumara* are *pallar* (*Phasaeolus*), *quiñuar* (*Buddleia*), *quisuar* (*Polylepis*), *ancara* (gourd), *sara* (*Zea*), *tara* (*Caesalpinia tinctoria*), and *achira* (*Canna*).

The sweet potato was not known to Europeans before the discovery of America. The first name that the Spaniards learned and carried back to Spain was *batata*, the original of our word potato, but the Mexican name *camote* is now more widely

known in Spanish America. Many names in local languages have probably been lost, but some have been placed on record. Martius collected the following series from native tribes of Brazil: *coutarouti*, *coundi*, *gnunana*, *hetich*, *ictig*, *imazaka*, *jetica*, *joto*, *mapas* (?), *māporu*, *mapuey*, *mouka*, *napi*, *orairai*, *quaiu*, *tsa*, and *zamaygua*.

In the Kekchi language of eastern Guatemala, a member of the Maya family, the sweet potato bears the name *is*. The Kekchis do not raise many sweet potatoes, this crop being distinctly less important than *osh* (*Xanthosoma*) or *piyak* (*Dioscorea*), yet sweet potatoes often grow as weeds in cultivated lands. The potato (*Solanum tuberosum*) is called by the Kekchis *kashlanis*, meaning "foreign sweet potato."

Several of the early Spanish historians of the West Indies recorded the name *age* or *aje*, but whether this belonged properly to the sweet potato or to some other root-crop has been uncertain. Some of the accounts evidently refer to *Manihot*, but Gray and Trumbull settled upon *Dioscorea* as the correct application.¹ Gomez de la Maza claims both *age* and *boniato* as indigenous Cuban names of sweet potatoes. More than a score of Cuban varieties are listed, mostly with names derived from native languages of the Island. *Boniato* is the name in regular use in Cuba, *batata* being scarcely known.² *Batata* is used in Puerto Rico, Venezuela, and Panama; but two indigenous names, *araba* and *deki*, are reported by Pittier from primitive tribes living on the Atlantic slope of Costa Rica.³

Among all these names of sweet potatoes in other parts of America there appears to be no definite resemblance to either of the Quichua words, *apichu* and *cumara*. Perhaps the nearest approach to similarity is between *cumara* and the Mexican *camote* or *camotli*. Yet the number and diversity of the native names are not without significance as indications of the American

¹ Gray A., and Trumbull, J. H. Review of de Candolle's Origin of Cultivated Plants; with annotations upon certain American species. American Journal of Science, Third Series, 25: 250. 1883.

² Gomez de la Maza, M. Diccionario Botanico de los Nombres Vulgares Cubanos y Puerto-Riqueños. 1889.

³ Pittier, H. Plantas Usuales de Costa Rica, 165. 1908.

origin of the sweet potato or, at least, of its wide distribution in prehistoric times.

The general interest of the Quichua names lies in the fact that *cumara* or *kumara* is also the name of the sweet potato in the Polynesian Islands. This was first pointed out by Seemann, a botanist who had visited the Pacific Islands and the west coast of South America about fifty years ago. Seemann's observation appeared as a brief editorial note in connection with a statement by the ethnologist Crawford, to the effect that no communication could have taken place between the American continent and the Pacific Islands.⁴

The presence of the Quichua name in Ecuador is readily understood, the native kingdom of Quito having been conquered and occupied by the Incas. Some of the early Spanish historians of Peru recorded Inca traditions of voyages to islands in the Pacific, but such a possibility of communication between the American continent and the Pacific Islands has not seemed worthy of serious consideration. Nevertheless, cultivated plants of American origin appear to have crossed the Pacific before the arrival of Europeans. Among these trans-Pacific plants are the coconut palm, the bottle-gourd, and the sweet potato. Coconuts and gourds may be supposed to have floated to the Islands and established themselves without human assistance, but the sweet potato and its name could hardly be conveyed in this manner. Nor is it to be taken as a mere coincidence that a Quichua name not shared with other American languages should be associated with the same crop in the Pacific Islands.

⁴ Crawford, John. On the migrations of cultivated plants in reference to ethnology. Seemann's Journal of Botany, 4: 328. 1866.

"The Sweet Potato, or tuber-yielding *Convolvulus*, appears to be a native of many parts of the tropical Old and New World. Some have alleged that it was first made an object of cultivation by the native Americans, but when the South Sea Islands, which had assuredly no communication with the American people, were discovered, the sweet potato was found to be in cultivation, and known by a native name throughout, the word being essentially the same, and a native one varying only in pronunciation, as *kumava*, *humaa*, and *gumala* abbreviated *mala*."

Seemann's comment on the above statement was as follows: "[*Kumara* or *umara*, of the South-Sea Islanders, is identical with *cumar*, the Quichua name for sweet potato in the highlands of Ecuador.—Ed.]