

## Molecular evidence and the origin of the domesticated sunflower

In their article on the history of domesticated sunflower in Mexico, Lentz *et al.* (1) claim that two recent molecular genetic studies (2, 3) failed to examine indigenous Mexican cultivars. In fact, two such cultivars, *maiz de teja* and *maiz negro* (2, 3), were included in both studies. These cultivars were purchased in Teocaltiche, Jalisco, by Carl O. Sauer and are considered “without much doubt” to represent indigenous strains (4). In addition to their Mexican provenance, achenes from both cultivars exhibit a “beak” shape that is absent in cultivated material from outside of Mexico (4). Despite their unique phenotype, these Mexican cultivars were inferred to have arisen from wild populations within the east–central United States with >98% confidence based on nuclear microsatellite data (2). They also had the chloroplast DNA haplotype that is characteristic of domesticates from the United States (3). Thus, it is clear that they were derived from the same domestication event in eastern North America (5) that produced all other sunflower cultivars examined to date (2, 3). Although we have previously noted that such analyses can-

not exclude the possibility of a second, unsampled origin of domestication (2, 3), the available molecular data are indicative of a single origin outside of Mexico. Given the relatively young age of the latest discoveries ( $\approx 290$  cal B.C.) and the possibility of dissemination from eastern North America accompanied by ongoing selection for increased achene size, it seems premature to conclude that there was a second origin of sunflower domestication.

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1. Lentz DL, Pohl MD, Alvarado JL, Tarighat S, Bye R (2008) Sunflower (*Helianthus annuus* L.) as a pre-Columbian domesticate in Mexico. *Proc Natl Acad Sci USA* 105:6232–6237.
2. Harter AV, *et al.* (2004) Origin of extant domesticated sunflowers in eastern North America. *Nature* 430:201–205.
3. Wills DM, Burke JM (2006) Chloroplast DNA variation confirms a single origin of domesticated sunflower (*Helianthus annuus* L.). *J Hered* 97:403–408.
4. Heiser CB, Jr (1951) The sunflower among the North American Indians. *Proc Am Philos Soc* 95:432–448.
5. Smith BD (2006) Eastern North America as an independent center of plant domestication. *Proc Natl Acad Sci USA* 103:12223–12228.

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