

**The following resources related to this article are available online at [www.sciencemag.org](http://www.sciencemag.org) (this information is current as of July 18, 2009 ):**

**Updated information and services**, including high-resolution figures, can be found in the online version of this article at:

<http://www.sciencemag.org/cgi/content/full/314/5806/1683a>

A list of selected additional articles on the Science Web sites **related to this article** can be found at:

<http://www.sciencemag.org/cgi/content/full/314/5806/1683a#related-content>

This article **cites 3 articles**, 1 of which can be accessed for free:

<http://www.sciencemag.org/cgi/content/full/314/5806/1683a#otherarticles>

This article appears in the following **subject collections**:

Anthropology

<http://www.sciencemag.org/cgi/collection/anthro>

Technical Comments

[http://www.sciencemag.org/cgi/collection/tech\\_comment](http://www.sciencemag.org/cgi/collection/tech_comment)

Information about obtaining **reprints** of this article or about obtaining **permission to reproduce this article** in whole or in part can be found at:

<http://www.sciencemag.org/about/permissions.dtl>

# Comment on “Early Domesticated Fig in the Jordan Valley”

Simcha Lev-Yadun,<sup>1\*</sup> Gidi Ne’eman,<sup>1</sup> Shahal Abbo,<sup>2</sup> Moshe A. Flaishman<sup>3</sup>

Kislev *et al.* (Reports, 2 June 2006, p. 1372) described Neolithic parthenocarpic fig fruits and proposed that they derive from trees propagated only by cuttings and thus represent the first domesticated plant of the Neolithic Revolution. Because parthenocarpic fig trees naturally produce both seeded and seedless fruits and are capable of spontaneous reproduction, we argue that the finds do not necessarily indicate cultivation, nor horticulture predating grain crops.

Kislev *et al.* (1) described 11,200- to 11,400-year-old carbonized parthenocarpic figs from the early Neolithic village Gilgal I. All known types of parthenocarpic figs have a longer fruiting season than non-parthenocarpic ones, and as elegantly shown in (1), Neolithic people noticed this superior type. The authors proposed that because modern fig varieties with parthenocarpic second summer crop produce no seeds, and hence can only be propagated by cuttings, the fossil figs represent the first domesticated species of the Neolithic Revolution. We suggest an alternative

explanation, namely that the parthenocarpic figs described by Kislev *et al.* (1) may be parthenocarpic wild female figs. The common fig *Ficus carica* is dioecious, with male trees having three generations a year of inedible seedless figs that maintain the pollinating wasps (*Blastophaga psenes*) (2, 3). Only one male generation (Profichi), which ripens in June in Israel, produces substantial amounts of pollen (4). Domesticated female fig trees may have one to two fig crops: (i) parthenocarpic spring breba, which grow on branches from the previous season and are parallel to the male Profichi; and (ii) a second main summer crop on current-year branches that may continue into autumn. Female figs can be pollinated only by wasps emerging from the male Profichi crop in June. Breba figs are never pollinated, because they develop before the ripening of male Profichi (2, 3). The second main summer crop may be pollinated or not, depending on the presence of adjacent Profichi figs, which emit pollen-loaded *B. psenes* wasps upon ripening (4). There are three domesticated female

fig tree types: Smyrna, which produces no breba and must be pollinated to have a summer crop with viable seeds; San Pedro, which produces breba and must be pollinated to have a main second summer crop with viable seeds; and common traditional fig varieties, which may produce parthenocarpic breba, a facultative parthenocarpic second main summer crop, and some parthenocarpic autumn figs. The facultative seedless parthenocarpic second main summer crop of common traditional fig varieties in Israel and elsewhere can be pollinated and produce seeds when male trees are present. Hence, fig parthenocarpy may occur in more than one way, and all known parthenocarpic *F. carica* types are able to produce seeds and may thus be independent of planting by farmers for propagation. The case described in (1) is, however, true for another cultivated species, *Ficus sycomorus*, in which a local parthenocarpic variety never sets seeds and all such trees are planted by farmers (5). Because all parthenocarpic fig types can produce seeds, the finds described in (1) cannot serve as an unambiguous sign of cultivation and lend no support to the notion that horticulture predated grain crops in the Near East.

## References and Notes

1. M. E. Kislev, A. Hartmann, O. Bar-Yosef, *Science* **312**, 1372 (2006).
2. I. J. Condit, *The Fig* (Chronica Botanica, Waltham, MA, 1947).
3. J. C. Crane, in *CRC Handbook of Fruit Set and Development*, S. P. Monselise, Ed. (CRC Press, Boca Raton, FL, 1986), pp. 153–165.
4. J. Galil, G. Ne’eman, *New Phytol.* **79**, 163 (1977).
5. J. Galil, D. Eisikowitch, *New Phytol.* **67**, 745 (1968).

17 July 2006; accepted 2 November 2006  
10.1126/science.1132636

<sup>1</sup>Department of Biology, Faculty of Science and Science Education, University of Haifa–Oranim, Tivon 36006, Israel.

<sup>2</sup>The Robert H. Smith Institute of Plant Science and Genetics in Agriculture, The Hebrew University of Jerusalem, P. O. Box 12, Rehovot 76100, Israel. <sup>3</sup>Department of Fruit Tree Sciences, Institute of Plant Sciences, Agricultural Research Organization, The Volcani Center, P.O. Box 6, Bet Dagan, 50250, Israel.

\*To whom correspondence should be addressed. E-mail: levyadun@research.haifa.ac.il.