Archaeology

Pollen probe of early Maya farming

In the late 1970s, researchers established that by about 2300 B.C. the ancient Maya were making pottery and growing maize. But the origin of these Maya farmers of lowland regions in what is now Belize, Guatemala, Honduras and the Yucatan Peninsula has been unclear. Did they migrate from outside the Maya lowlands with agricultural and ceramic skills in tow, or were they longtime lowland dwellers?

An analysis of pollen extracted from a lake shore in western Honduras supports the latter contention. David J. Rue of Pennsylvania State University in University Park identified the types of pollen preserved in a 5-foot-deep cut of soil. Burned wood fragments from the deepest part of the cut were radiocarbon-dated to nearly 3000 B.C., he reports in the March 19 NATURE. That there was no pollen from the trees known to flourish in the same area suggests that much of the surrounding forest was cleared and "slash-and-burn agriculture" was practiced. The farming method, in which trees are cut down and burned to create fields that are planted just before the rainy season, has been documented in later phases of the Maya civilization.

The pollen data indicate that "agriculture existed long before the rise of complex societies in the lowlands and did not have a [short] history of development," notes Jeremy A. Sabloff of the University of Pittsburgh in the same NATURE.

Pollen analysis at another Honduran site, says Rue, indicates that there was widespread clearing of the forest in the region around the Classic Maya city of Copan at the time of its collapse. Signs of human agricultural activity at what is now a swamp just outside of Copan extend from A.D. 950 to A.D. 1200.

The urban centers and majestic artwork of the Classic period flourished from A.D. 250 to A.D. 900, when the "golden era" of Maya society foundered (SN: 6/7/86, p.360). Rue's finding fits in with recent archaeological studies of several Maya regions indicating that reduced rural populations remained near some urban centers after the collapse.

The pollen evidence also fuels the argument that the depletion of soil available for farming due to slash-and-burn techniques was important in the downfall of some southern lowland centers, says Sabloff. As a result, he suggests, northern lowland cities on the Yucatan Peninsula may have become more attractive to the Classic Maya population in the south, as well as to Maya traders. However, the spectrum of political, social and economic reasons for the great changes in the Maya world at the end of the Classic period remains unclear.

Border project may flood Maya sites

A coalition of Mexican scientists and others concerned with ecological issues, known as the Group of 100, announced last week that the governments of Mexico and Guatemala are planning to build a series of dams along their border that would destroy two Classic-era Maya archaeological sites. The dams would be built along the Usumacinta River and its tributaries and would create a lake that would immerse the ruins at Yaxchilan and Piedras Negras, according to the group. The discovery of other nearby Maya sites in the remote jungle, it added, would be prevented by such flooding.

Yaxchilan and Piedras Negras were major centers during the Classic period. They were first investigated about a century ago, and it is now recognized that artwork discovered among their ruins provides clear evidence for the Maya preoccupation with battle and blood offerings. Numerous temples, palaces and other structures also have been uncovered at the two sites.

Locations for the proposed dams are still being considered by government officials. Yaxchilan and Piedras Negras lie in impoverished areas that both governments have promised to help develop.

Biology

Fingerprinting the mean bees

The bullies of the honeybee world come from Africa, where centuries of human raids on hives for honey, rather than beekeeping, encouraged the survival of the very meanest bees. African bees and their "Africanized" offspring — hybrids of African and the more gentle European bees — are infamous for their aggressive swarming attacks on chickens, furred animals and humans. Since the African honeybee was introduced to Brazil in 1956, there's been much concern that Africanized bees, also known as killer bees, would spread and come to dominate the bee populations in the Americas. Researchers say the bees have now migrated to southern Mexico and far into Argentina.

An essential part of monitoring the spread of Africanized bees is distinguishing between them and their similar-looking European cousins. The most commonly used method for identifying a bee's race has been to measure the length of its wings. But according to Dave Carlson at the U.S. Department of Agriculture in Gainesville, Fla., there is considerable variation in wing length within each race. So Carlson, an organic chemist, has pursued what he feels is a more exact method of identifying bees.

In the March 15 ANALYTICAL CHEMISTRY, he and Barry Lavine, from Clarkson University in Potsdam, N.Y., describe a method of examining the relative amounts of different hydrocarbons found in beeswax and in a bee's cuticle, the sheath that covers the entire body of the adult insect. After studying bees collected in Central America, Venezuela and Florida, they conclude that "information derived solely from the cuticular hydrocarbons could correctly categorize the bees by race. . . ."

Carlson says he has been asked to use this technique in a number of cases,including one in which a swarm of bees killed a horse in Florida. At this week's International Africanized Bee and Bee Mite Conference, held at Ohio State University in Columbus, he reported his findings on another case, in which a group of 500 to 600 angry bees was seen attacking a rabbit near Bakersfield, Calif., a year and a half ago. The bees, which some people suspected were Africanized bees carried to California in oil drilling equipment, were destroyed and their burrow filled in, but state officials worried that some had escaped to join local populations. Applying his technique to beeswax found in their nest and to a few bees in the vicinity, Carlson concludes that Africanized bees had indeed lived in the burrow for some time, but the hydrocarbon patterns of local bees do not contain an Africanized signature.

How honest is your honey?

The honey business is sweeter in the United States than in some other nations because the U.S. Department of Agriculture (USDA) subsidizes the industry through government loans to beekeepers, who put up their honey as collateral. Occasionally, people try to sting the USDA by putting up foreign honey purchased at lower prices. Honey in Mexico, for example, typically sells for less than does honey in the United States.

Luckily for the USDA and the honest honey companies, biologist Vaughn Bryant at Texas A&M University in College Station has a way out of this sticky problem. Bryant and his students examine the pollen that bees carry from local plants to the honey they make. Since each plant species produces a unique pollen grain, the researchers can usually use the known distribution of different plants to tell where the pollen and the honey originated. Often, they can also tell the kind of honey — whether, for example, a sample is orange blossom honey or not. "It's kind of like playing Sherlock Holmes," says Bryant, who recently investigated his 300th honey sample in the last six years. Of that number, he says, less than 5 percent have been "very suspicious."