

Columbines: So different, yet so much alike

One of nature's more sharply dressed wildflowers, the columbine boasts of cousins worldwide. From the soaring peaks of the Himalayas to the deserts of the U.S. Southwest, each comes bedecked in different attire. They vary not only in color and how they point their blossoms, but also in the size and shape of their tubular petals, called nectar spurs.

Tomato biotechnology heads for the market

Move over, microwave oven. Step aside, 24-speed food processor. Your days as the highest-tech items in the kitchen are numbered. The Flavr Savr tomato is here.

The Food and Drug Administration announced last week that the genetically altered Flavr Savr tomato developed by Calgene of Davis, Calif., "is as safe as tomatoes bred by conventional means." Armed with this stamp of approval, Calgene began selling its prized tomato within days, beginning in California and Illinois.

Flavr Savr ranks as the first genetically altered whole food (as opposed to food ingredient) to hit supermarkets, but more will soon follow, food experts say.

The new tomato softens less readily than regular tomatoes because researchers have altered one of its genes to produce less of a ripening enzyme, Calgene says (SN: 11/28/92, p.376). Thus Flavr Savr can be left longer on the vine and develop a home-grown flavor without spoiling on the way to market. Growers usually pick firm, green tomatoes and ripen them using ethylene gas.

As part of a separate review, FDA also approved the use of a genetic marker in the Flavr Savr and other crops, says the FDA's Laura Tarantino.

The marker, located near the new enzyme gene, distinguishes plant cells that take up the gene from those that don't by making cells resistant to antibiotics. Thus, by dousing plant cells with antibiotics, Calgene can identify the engineered cells and avoid growing plants lacking the enzyme gene.

Calgene asked FDA in 1991 to examine data on the Flavr Savr to determine the tomato's safety, although FDA did not require the review, says Tarantino. "All companies developing [genetically altered foods] have been good about coming in and talking to us," she says.

Calgene says it will also voluntarily label the Flavr Savr and provide information on how it's produced.

Such precautions fail to satisfy Jeremy Rifkin, a long-standing opponent of genetically engineered foods. He plans to file a lawsuit in Federal court challenging FDA approval of the tomato. — T. Adler

Throughout North America, four or five kinds with drooping red flowers attract hummingbirds. One of Colorado's columbines greets moth pollinators with upturned yellow petals and spurs; another is blue and white. In Europe, a purple-blue version with a particularly stylish spur lures bumblebees. In Siberia, flies pollinate a columbine with pale green and brownish-purple petals.

Such distribution and variety suggest that this genus, *Aquilegia*, has been around a while. However, these species also interbreed readily, suggesting that their genes are fairly compatible and therefore that they share a recent ancestor.

A genetic study of more than 14 columbine species bears out this latter notion, says Scott A. Hodges, a botanist and geneticist at the University of Georgia in Athens. He and Georgia colleague Michael L. Arnold obtained two species from Europe, two from Asia, and 10 from North America. They analyzed DNA from the chloroplast — the plant cell's photosynthetic center — and from the cell nucleus of each species.

Then they performed similar analyses for four species of *Thalictrum*, commonly called meadow rue, and *Isopyrum*, or false rue anemone, and a few other members of the buttercup family, of which the columbine is a member.

The *Thalictrum* and *Isopyrum* had 3 to 45 times the genetic variation of the columbine species, Hodges and Arnold



Variety, spice of the columbine's life.

report in the May 24 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.

That the columbine failed to show much difference in DNA from either the chloroplast or the nucleus strengthens the argument that this flower has evolved recently, Hodges adds. The data also suggest that European and Asian columbines predate North American species.

He suspects the nectar spur provided the flower with the means for this rapid diversification, or radiation. The color, shape, and length of the spur makes the nectar deep inside accessible to certain animals, enabling columbines to specialize and consequently diversify based on what pollinates them.

Until now, scientists have studied

rapid, recent radiation in isolated lakes or islands, such as Hawaii. Supposedly, these restricted habitats encourage radiation because they offer new arrivals lots of new food and habitat opportunities. "This study says you don't have to have that kind of setting," Hodges says. Columbines spread and changed throughout the whole world, in particular throughout North America. "There may be other factors that we haven't thought about," he adds. — E. Pennisi

Hominid bone found in U.K.

Excavations at a quarry in southern England have yielded a fossil bone from one of the earliest known members of the human evolutionary family in Europe, according to a report in the May 26 NATURE.

The shaft of a lower left leg bone, in the shin area, turned up last year at a quarry near the village of Boxgrove. Extinct animal bones and hominid-fashioned stone tools previously found at the site indicate that the fossil is approximately 500,000 years old, contend Mark B. Roberts, an archaeologist at University College, London, and his coworkers.

The only European hominid specimen of comparable age, a partial lower

jaw, turned up in 1907 near Heidelberg, Germany. Some investigators assign that find to the species *Homo heidelbergensis* (SN: 6/20/92, p.408). Roberts' team provisionally places the Boxgrove fossil in the same species.

However, the bone bears some resemblance to later European Neandertals, they note. Further discoveries of early hominids at sites such as Atapuerca, a Spanish cave that contains the remains of early Neandertals from around 300,000 years ago (SN: 4/10/93, p.228), will help clarify the species of the Boxgrove find, the team says.

Based on the shin bone's dimensions, Roberts' group estimates that the ancient hominid was a male who stood about 6 feet tall and weighed at least 176 pounds. — B. Bower