the Turopolje pigs of Croatia. While remaining under their owner's loose control, these hardy, free-ranging swine normally spend 10 months a year in meadows and forests.

The breed was already severely endangered when civil war swept through the pig's native range 6 years ago. None of these animals would likely have survived the war without some outside intervention, says Hans-Peter Grünenfelder of SAVE's St. Gallen, Switzerland, office. His organization lobbied the Croatian government to provide about $120 per sow to help defray the extra costs incurred as farmers were instructed to move their pigs into barns for year-round feeding and protection from poachers.

Three years ago, SAVE also collected three young boars and three sows to begin a breeding program at the Zagreb Zoo. As hostilities worsened, these animals were eventually evacuated to Vienna. Today, as a first step toward the management of Turopolje breeding to preserve what genetic diversity remains, SAVE is coordinating efforts for DNA testing of the 40 or so pigs known to remain.

Heroic as SAVE's efforts are, most of them take place out of the public eye. To build an appreciation for what the world risks losing, it helps to have representatives of these animals firmly in view, says Elaine Shirley, a livestock conservator at the Colonial Williamsburg (Va.) Foundation, the nation's oldest and largest outdoor living-history museum.

The 173-acre center, which preserves—and recreates through activities—pre-Revolutionary America, has long made livestock a part of its programs. But for years, there had been no effort to use breeds that had been raised during the colonial period. For instance, "the sheep we had were basically a crossbreed that looked like sheep in paintings and drawings of the 18th century," Shirley says. "While they had the right look, heaven knows what their [genetic constitution] was."

Colonial Williamsburg Foundation

This pair of American Cream draft horses constitutes about 2 percent of the breed's global population.

Fifteen years ago, she says, a decision was made to begin raising authentic 18th century breeds. "And while we're at it, we decided, let's work with the animals that need the most help." Within 3 years, their first heritage breeds arrived—extremely endangered Leicester Longwool sheep and Milking Devons (which have died out in Great Britain but number about 150 throughout North America). Since then, they've added some chickens, and they plan to acquire appropriate horses.

Unlike farmers, who may be best suited to raising these animals, Shirley says, museums and zoos have enough time and resources to educate the public about the growing rarity of such breeds and about the potentially valuable genetic resources they carry. In fact, ALBC observes, agriculture's "unwanted breeds" increasingly hold much of the genetic diversity in livestock. As such, "their conservation is an insurance policy necessary for agriculture to face the challenges of an unknown future."

While Jorgensen agrees, he would argue that they should be conserved as more than an insurance policy. "They are just as important a historical artifact as any movies, paintings, or Frank Lloyd Wright house that we go to great expense to preserve. As living artifacts of the greatest agriculture in the world, they deserve at least some little corner where they can be appreciated by our descendants." □

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Biology

Hidden virus suspected in diabetes

A genetic remnant of a viral infection in humanity's distant past may underlie type I diabetes, the autoimmune disorder in which the body's immune cells somehow destroy the insulin-producing cells in the pancreas. In 1994, investigators seeking the cause of this betrayal implicated a superantigen, a protein or protein fragment with the ability to stimulate the activity of a large number of normally quiescent immune cells. Yet the evidence for this theory stemmed from just two people with diabetes, and it was indirect. The identity of the superantigen remained a mystery

Some of the same researchers think they have finally fingered the culprit.

In the July 25 CELL, Bernard Conrad of the University of Geneva Medical School and his colleagues argue that the superantigen is part of a protein used to construct the outer surface of a virus. Moreover, the virus under suspicion appears to be an endogenous retrovirus, a virus that infected people long ago and incorporated its genes into the human genome.

Though usually dormant, some genes of this endogenous retrovirus were active in all 10 people recently diagnosed with type I diabetes whom Conrad's group had examined. The researchers didn't find similar viral gene activity in a group of people without the disease.

Conrad and his colleagues speculate that the production of superantigens by the activated endogenous retrovirus triggers the immune system to attack the pancreas. Still, it's unclear what stimulates the viral genes. Moreover, their activity may just serve as a marker for a hidden cause of type I diabetes.

"These results are exciting. [They] do not yet prove a direct role in diabetes for the retroviral superantigen, but it will not take long until we know whether such retroviruses are responsible for some or many of the cases," says Hans Acha-Orbea of the Ludwig Institute in Epalinges, Switzerland. —*J.T.*

A flowery toxin reveals its petals

Now that physicians have grudgingly conceded that the bacterium *Helicobacter pylori* is responsible for most ulcers, and probably for some stomach cancer as well, the next step is to determine how it wreaks such havoc. In the spotlight is VacA, an *H. pylori* molecule with proven toxicity to cells in test-tube experiments. It causes large, fluid-filled spheres, called vacuoles, to appear in the cells.

While VacA's involvement in ulcers remains unclear, it does appear to be most active in acidic environments, which may help explain why *H. pylori* is destructive to the stomach. With the aid of a technique called deep-etch electron microscopy, developed by John E. Heuser of Washington University School of Medicine in St. Louis, investigators have recently analyzed the structure of VacA and its response to acid.

VacA normally assumes a flowerlike shape consisting of petals joined to a circular ring. In an acidic solution, however, the toxin breaks up into a dozen teardrop-shaped subunits, Timothy L. Cover of the Vanderbilt University School of Medicine in Nashville and his coworkers report in the Aug. 25 JOURNAL OF CELL BIOLOGY. According to their model of VacA, the toxin consists of two interlocked, six-petal rings. The researchers have not yet determined whether VacA's acid-induced toxicity results from the petals themselves or from their reassembly into some altered configuration. —*J.T.*