Belief Blowers

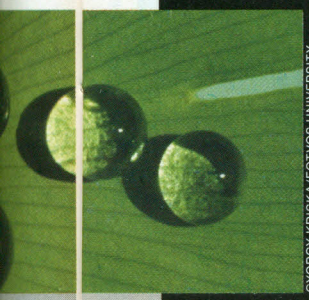
Many gardeners hold that watering plants in the midday sun is ill advised, because droplets on the leaves can act as lenses, focusing sunlight and producing intense rays that can burn the leaf surface. Surprisingly, this belief has never been properly tested—until recently.

Graduate student Ádám Egri, biophysicist Gábor Horváth, and two colleagues at Eötvös University in Budapest, Hungary, placed water drops on ginkgo and maple leaves and exposed them to full sunlight until the drops evaporated. No sunburn marks appeared, presumably because the drops, which naturally flatten when they contact a smooth surface, could no longer focus the light on the leaves. In addition, the water had a cooling effect on the plant tissue.

But what about water-repellent leaves—for example, those with wax hairs that elevate drops, keeping them at a distance from the leaf surface and maintaining their spherical shape? Egri's team repeated the test with leaves of the floating fern, which fits the bill, and sure enough, some scorching did take place.

In their experiments, the scientists had kept the leaves horizontal and undisturbed by wind. In nature, however, leaves move and hang at different angles, so it's unlikely that even elevated water drops would remain in place long enough to cause sunburn. Gardeners, take heart: your charges are safe—and so are sunbathers, hairy or not, who get a sprinkling. (*New Phytologist*)

—S.R.



GYORGY KRISKA/EOTVOS UNIVERSITY

Water drops on a ginkgo tree leaf

Polar Exit Poll

Biologists sometimes engage in quaint activities. Take Trine Glad, a microbiologist at the University of Tromsø in Norway, and a few of her colleagues. Recently, to document the heretofore unknown microbial flora of polar bear guts, they traveled to the Arctic archipelago of Svalbard to take rectal swabs and fecal samples from polar bears. A special goal of the investigation was to find out if bla_{TEM}, a bacterial gene that confers resistance to the antibiotic ampicillin, had reached the far north. The bears were, for everybody's sake, blissfully sedated.

Resistance genes have been spreading among bacteria living in or around humans. This is thought to be the result of the profligate use of antibiotics, not only to treat human and animal diseases, but also to boost cattle growth. However, those genes have also been found in bacteria taken from the feces of such wild animals as deer and foxes, indicating that perhaps resistance springs up naturally.

JERZY STRZELECKI

Polar bear

Glad's team found little sign of the bla_{TEM} gene in the gut flora of wild polar bears, which suggests that humans are indeed at the root of the problem. The deer and foxes that acquire the resistance gene probably do so because those wild animals live in closer proximity to humans. (*BMC Microbiology*)

—S.R.

The Bug Who Came in from the Cold

To survive cold winters, insects must either tolerate freezing or avoid it. Some in the "avoid" camp rely on antifreeze chemicals to "supercool"—that is, to keep their body fluids liquid even when the mercury dips below freezing. Dehydration can help by concentrating the antifreeze solution. Now researchers have found a beetle with a new trick for beating the cold: its fluids become so concentrated they turn to glass.

With several collaborators, Todd Sformo, then a graduate student at the University of Alaska, Fairbanks, investigated the supercooling abilities of the North American red flat bark beetle, *Cucujus clavipes puniceus*. The insect can overwinter above the Arctic Circle, in places where temperatures drop below –76 degrees Fahrenheit. The team collected beetle larvae during three autumns and held them in outdoor containers throughout the subsequent Alaskan winters. Periodically, the researchers brought some larvae into the lab, cooled them down even further, and then measured their thermal properties and their water and antifreeze-chemical content.

More than half of the beetle larvae remained unfrozen even below –76 degrees. The team found evidence that the larvae's fluids had "vitrified"—they remained in a liquid (irregularly structured, noncrystalline) state, but had become what you might call a "solid liquid," just like ordinary window glass.

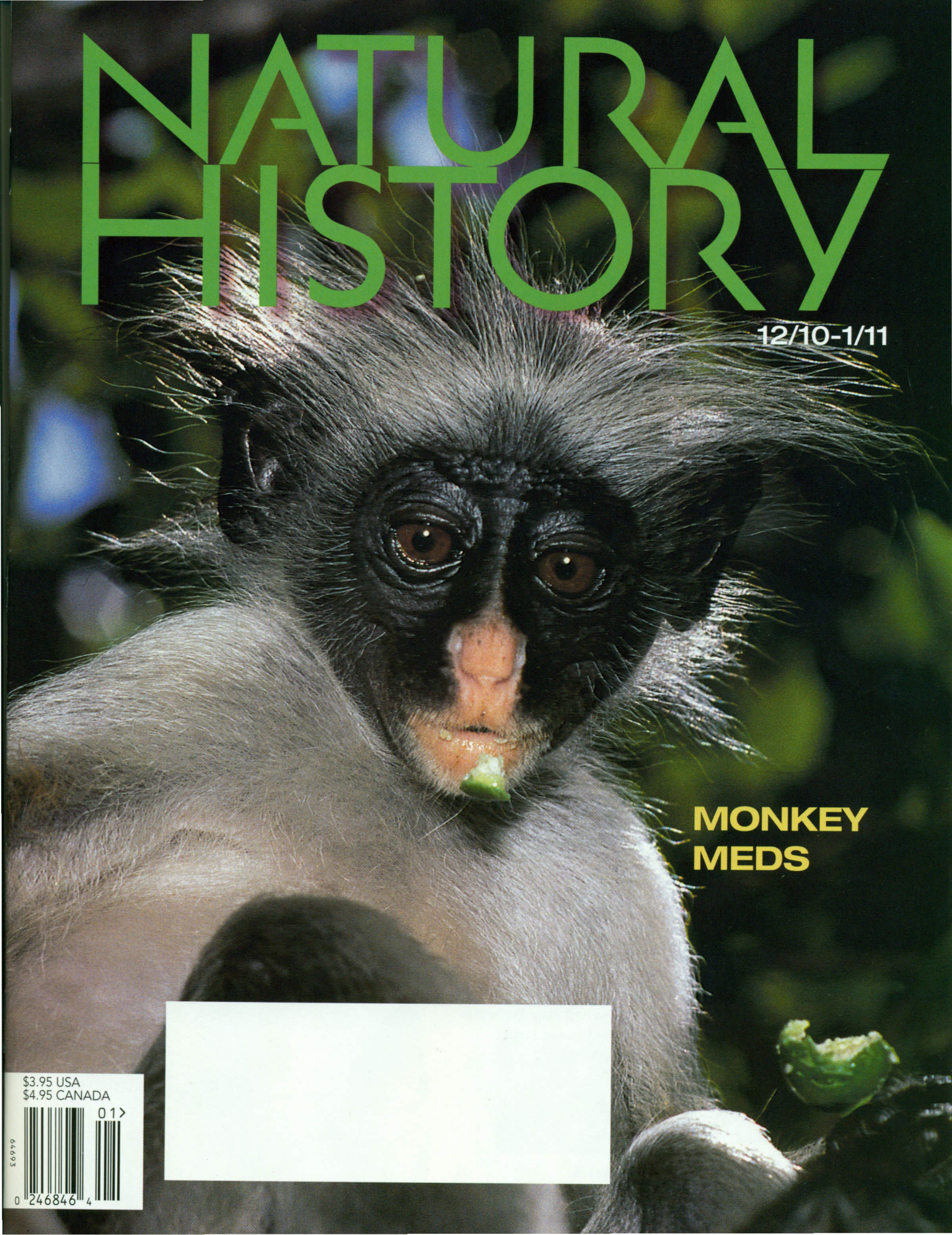
JOHN DUMA/UNIVERSITY OF NOTRE DAME

North American red flat bark beetle larvae remain unfrozen under the bark of a poplar tree in Alaska.

The trick? A combination of antifreeze chemicals and dehydration concentrate the insects' body fluids into such a viscous solution that the water molecules within stop moving before they can line up in an ice crystal lattice. If the fluids simply froze, they would expand, wreaking cellular damage and killing the larvae.

Half of the larvae survived experimental cooling to –94 degrees, and a few even withstood –148 degrees. Now that's a supercool bug! (*Journal of Experimental Biology*)

—*Lesley Evans Ogden*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