human groups devise distinctive customs (*SN: 9/3/05, p. 158*).

In the late 1970s, bits of bush baby bones turned up in fecal studies by Marchant and her colleagues at a site near Fongoli. The researchers concluded that chimps ate bush babies, although the team observed no hunting such as that now reported at Fongoli.

"We want to compare this surprising behavior of the Fongoli chimps to that of chimps living in other habitats," Pruetz says.

Anthropologist Adrienne Zihlman of the University of California, Santa Cruz says that the new evidence supports her view that females played a major role in the evolution of tool use. The Fongoli study shows that "females are innovators, socially central, and maintain traditions because they nurture and socialize the young," she says. —B. BOWER

The New Black

A nanoscale coating reflects almost no light

The velvet background on a painting of Elvis looks black because it reflects so little light. But getting a surface to reflect no light at all is surprisingly difficult. Now, researchers have created a virtually reflectionfree surface by coating it with filaments only a few billionths of a meter thick.

Improved antireflective surfaces might have many uses. For example, they could eliminate light-wasting reflections in fiberoptic telecommunications, or the surfaces could brighten low-power light-emitting diode (LED) lamps.

Applied to a clear surface, the coating would make a lens absorb more light, increasing its transparency. On an opaque surface, the filaments would make a silicon solar cell, for example, almost perfectly absorbing.

The coating creates "really a new class of materials," says E. Fred Schubert, a member of the research team at Rensselaer Polytechnic Institute in Troy, N.Y.

Schubert and his colleagues set out to minimize light's reflections. Light rebounds when it strikes the boundary between two materials that have different "refractive indices"—measures of how fast light travels through the substances. For example, sunlight bounces off the surface of a pond because light travels more slowly in water than in air. The greater the difference between the refractive indices of any two materials, the more light is reflected.

To prevent reflections, the team put a transparent piece of aluminum nitride in a vacuum and coated the surface with five layers of nanoscale filaments made either of silicon dioxide or titanium dioxide. Each layer resembles a rug with the yarns leaning at 45°. Together, the five layers are only about 700 nanometers thick—the wavelength of red light. The individual filaments are 20 to 30 nm wide, the team reports in the March *Nature Photonics*.

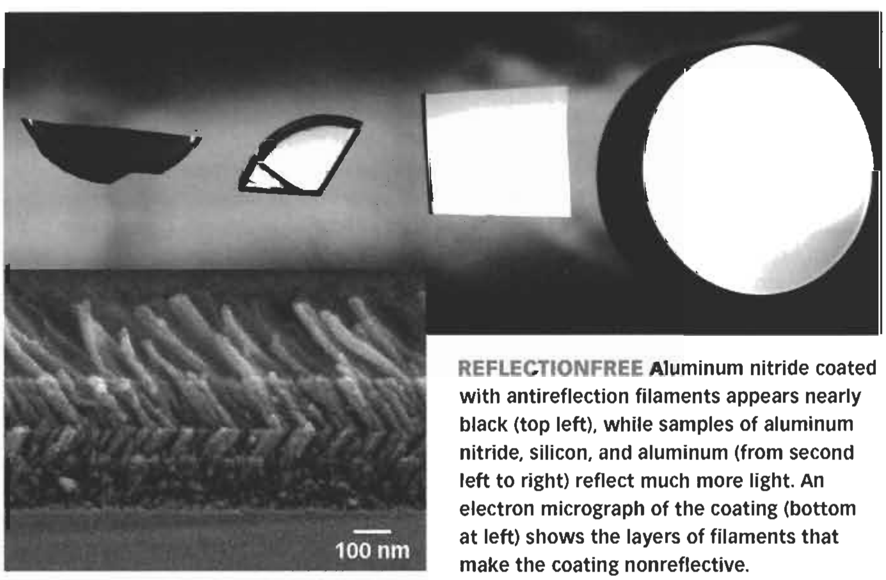
By altering the spacing between the filaments, the scientists gave each layer a slightly different refractive index. The top layer has so much space between filaments that its refractive index is nearly the same as that of air. The filaments in the other four layers are progressively denser, so the layers have increasing refractive indices. The bottom layer's index of 2.15 is the same as that of the underlying surface.

This staggered transition replaces an abrupt boundary with gradual ones, greatly reducing the reflection of light. At its surface, the coating has a refractive index of 1.05, which is close to air's index of 1.0. Even transparent solids such as glass have indices of at least 1.4.

The low-reflection coating works for visible light and all other wavelengths between near ultraviolet and near infrared.

"It certainly is an improvement over the existing state of the art," comments Sri Sridhar, who studies nanophotonics at Northeastern University in Boston.

The current coating has a faint blue tinge, however. Schubert says that this results from diffraction, not reflection. He explains that the thickness of the layers happens to equal the wavelength of the blue light. His team is currently making the layers thinner to avoid this problem. —P. BARRY



REFLECTIONFREE Aluminum nitride coated with antireflection filaments appears nearly black (top left), while samples of aluminum nitride, silicon, and aluminum (from second left to right) reflect much more light. An electron micrograph of the coating (bottom at left) shows the layers of filaments that make the coating nonreflective.

SCHUBERT/RENSSELAER POLYTECHNIC INST.

Snail Highways

By following trails, periwinkles save slime

A seaside snail crawling along the gooey streak left by another snail is saving a lot of energy, say researchers, because it doesn't have to ooze so much slime itself.

Scientists have observed various kinds of snails following each others' paths, says Mark S. Davies of the University of Sunderland in England. Now, he proposes that followers are economizing on mucus. Davies and his colleague Janine Blackwell have measured the thickness of new and reused trails of a common periwinkle (*Littorina littorea*), which creeps along rocky Atlantic shores. Following a fresh trail, it secretes much less slime than it expends when laying a new trail, the researchers report in a paper now online for an upcoming *Proceedings of the Royal Society B*.

"It's much, much more expensive to go around on a carpet of mucus than to run, walk, swim, or fly," Davies says. He has calculated that a periwinkle uses more than 35 times as much energy making mucus as it does crawling along it. And he finds that a limpet creeping along seashore rocks spends roughly a third of its total energy intake producing that mucus.

To study snail mucus, Davies and Blackwell permitted a periwinkle to crawl over microscope slides in the lab and measured the thickness of its slime. A second periwinkle following a trailblazer secreted, on average, only 27 percent of the mucus typically laid down in a new trail. After a slide had been exposed to one or more tide cycles along the shore, the streaks deteriorated, and a snail coming along later had to do more resurfacing.

Saving energy by following trails "sounds plausible," says mathematician Eric Lauga of the Massachusetts Institute of Technology. Last year, he and a colleague made a mathematical model of a