

Moreover, he notes, refinishing a home's floors with this product could saturate other surfaces—walls, furniture, carpeting, even toys—with formaldehyde, allowing it to reenter the air long after the floors had dried.

Wet fingernail hardeners and polishes also proved to be big emitters. A 3-inch-square coating emitted far more formaldehyde—between 50 and 800 micrograms—than did an equal area of particleboard or veneer-covered plywood, the Battelle scientists report in the Jan. 1 ENVIRONMENTAL SCIENCE & TECHNOLOGY. While this can offer individuals—from fashion-conscious teens to professional manicurists—a big slug of the toxicant, nail treatments coat small ar-

eas and the exposures are short-lived. By contrast, plywood, particleboard-cabinets, and new plastic-laminate counters not only cover relatively large areas but also emit measurable formaldehyde continuously for days to weeks.

Other major sources of formaldehyde included permanent-press shirts and draperies. While a single washing reduced a shirt's formaldehyde emissions by 60 percent, Kelly notes that draperies might never get washed. Pre-pasted wallpaper, while wet, also emitted substantial amounts of the toxicant—nearly 700 µg per square meter per hour.

Kelly's data on the effect of washing permanent-press fabric "is nice informa-

tion that we can pass along," notes Peggy L. Jenkins, who manages the Indoor Air Quality Program at California's Air Resources Board in Sacramento. The main use of the new data, she says, "will be to improve and revise our guidance to the public" regarding what to buy.

While the recommended exposure limit of 0.5 parts per million in air will not change, she says, "we have, with this new information, a little more meat and potatoes" on where big exposures may occur. For instance, she says, consumers may want to ask more questions about floor finishes or cabinet materials, instructing their contractor to use products that emit less formaldehyde. —J. Raloff

Young plants prepare to see the light

Researchers have found what may be the key steps that allow newborn seedlings to burst out of the soil without a spot of ray-catching chlorophyll but still start using light.

While underground, seedlings rely on lunches their mothers packed, nutrients in the seed. Although conifer sprouts under soil prepare for daylight by making chlorophyll, flowering plant sprouts cannot synthesize it in the dark.

As soon as they emerge, these pale sprouts can nevertheless harness light to power their shift to adult metabolism, thanks to a novel complex of compounds, report Christiane Reinbothe of Bayreuth University in Germany, and her colleagues. They and other researchers had identified some bits of the system. Now, coauthor Steffen Reinbothe says, "we put them together to find a way out of the dark." The results appear in the Jan. 7 NATURE.

Studying barley seedlings grown in darkness, the researchers focused on two enzymes called PORA and PORB, which catalyze a step in the transformation of precursor pigments into chlorophyll. Researchers had not known how the activity of these two forms of the enzyme protochlorophyllide oxidoreductase differs. Reinbothe was surprised to find that PORA and PORB bind different chlorophyll precursor pigments having extremely similar structures. "It was very unexpected," he says.

Reinbothe's group proposes that in a seedling, the two enzymes and the pigments form part of a complex that waits for the first blast of light. Mixing ingredients in the laboratory, the researchers did find such a complex. When they flashed light that only the pigment bound by PORA could absorb, they saw reactions in the PORB-pigment pair. They suggest that the pigment bound by

PORA acts as an antenna, soaking up rays and passing along energy to power PORB's step in making chlorophyll.

The work "took a number of leaps over the current dogma," says Robert Willows of Macquarie University in Sydney, Australia. He says the most dramatic change is the new role for protochlorophyllide *b*, the pigment bound by PORA. Most physiologists assumed it didn't show up so early in development, Willows says. However, he speculates that "the main reason no one's found it is that no one's looked very hard."

Timothy W. McNellis of the University of California, Berkeley was intrigued by the way the complex protects seedlings. Without chlorophyll, "it's as if an albino person goes out in bright sunlight without sunblock," he says. Reinbothe, however, found that if protochlorophyllide *b* receives more energy than the complex can use, it fluoresces, emitting the excess harmlessly. —S. Milius

Fossil ape's grasp gets two thumbs way up

Ancient apes, like their modern counterparts, typically had hands equipped for tree climbing and branch swinging. But a little-studied set of fossil remains tells a gripping tale of surprisingly dextrous digits in an apelike creature that lived 9 million to 7 million years ago on what was once a Mediterranean island.

The animal, known as *Oreopithecus bambolii*, boasted an opposable thumb and a grasping ability much like that exhibited by members of the human evolutionary family 3 million to 4 million years old, according to a new report.

Possession of such a hand, which may have given this primate an advantage in gathering sometimes scarce food supplies, laid the groundwork for the evolution of its ability to walk upright (SN: 10/18/97, p. 244), propose anthropologist Salvador Moyà-Solà of the M. Crusafont Paleontological Institute in Sabadell, Spain, and his colleagues.

A two-legged gait may have evolved similarly in ancient human ancestors, such as the australopithecines, after they developed a grip suitable for extensive food gathering and rapid feeding, the scientists suggest.

Moyà-Solà's team studied *Oreopithecus* fossils previously found at an Italian site and now held at the Natural History Museum in Basel, Switzerland. The collection includes many isolated hand bones, several partial hands, and a nearly complete right hand.

Several features of the *Oreopithecus* hand signify the presence of a thumb-assisted grip capable of precise manipulations, the researchers report in the Jan. 5 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES. First, short hands relative to estimated body weight combine with long thumbs, considered essential for forming a humanlike grip. *Oreopithecus* thumb bones also exhibit large, deep pits for the

attachment of what was apparently an unusually strong muscle for flexing that digit.

Moreover, the fossil ape's finger joints show no evidence of having supported knuckle-walking, the investigators say.

Overall, *Oreopithecus* hands display evidence of the improved finger control and greater ability to exert force observed in early members of the human evolutionary family, they contend.

"I have doubts about that conclusion," remarks anthropologist Peter Andrews of the British Museum of Natural History in London.

Hand and foot bones that in some ways resemble those of australopithecines do not conclusively show that *Oreopithecus* preferred to walk upright and use its hands for precise manipulations, Andrews argues. The few hand bones recovered from other fossil apes look much like those of *Oreopithecus*, he notes, although those creatures are generally thought to have dwelled in trees and knuckle-walked while on the ground. —B. Bower