ton, members of the Lunar Soil Characterization Consortium reported that micrometeorite impacts and the solar wind cause reddening, at least for the only rock exposed to space weathering that they could get their hands on—lunar "soils" returned by Apollo astronauts. Microscopist Lindsay Keller of MVA Inc. in Norcross, Georgia, and consortium colleagues showed how specks of iron less than 10 nanometers in size revealed by transmission electron spectroscopy account for most of the mysterious lunar reddening. "We've identified the culprit behind the space-weathering effect," said Keller.

On the moon, according to the picture developed by the members of the consortium, micrometeorites and the charged particles of the solar wind release the iron of rock particles. It is reduced to the metallic state and deposited as "nanophase iron" on soil particle surfaces. Planetary scientist Bruce Hapke of the University of Pittsburgh told the LPSC that, according to his calculations, the solar wind alone can create enough nanophase iron to redden asteroids. "His model and the lunar soil results fit together perfectly," says planetary scientist Carlé Pieters of Brown University and the consortium. "S asteroids fit with what you'd expect for a space-weathered ordinary chondrite." Meteoriticist Harry McSween of the University of Tennessee, Knoxville, agrees. "I thought space weathering was a rather bizarre idea when I first heard it," he says, "but I can't see any way around it now. It's exciting that NEAR Shoemaker is orbiting a body that is like the most common type of meteorite that falls to Earth."

–RICHARD A. KERR

PLANT GENETICS

From Genome to Functional Genomics

Plant scientists are an impatient lot. They are about to complete the first genetic sequence of a flowering plant, a wild mustard called *Arabidopsis thaliana*. But even before the last A's, C's, G's, and T's are deposited in GenBank, a group of plant scientists has hatched an ambitious plan for the next phase: figuring out the function of all 25,000 genes. Announced last week, the plan, which has the blessing of the National Science Foundation (NSF), came with another bit of good news for the *Arabidopsis* community: the unexpected release of a set of molecular markers for finding those genes.

The 130-million-base-pair *Arabidopsis* genome is expected to be fully sequenced in July and published by year's end, 3 years ahead of schedule. Already, information gleaned from decoding this simple plant—the equivalent of the lab mouse—has made "a quantitative change" in research, says Carnegie Institution plant scientist Chris Somerville, whittling the time for isolating genes from years to weeks and thus speeding genetic discoveries ranging from more healthful soybean oil to a protein that may lead to faster growing crops.

All in one. Biologists want to probe the functions of all 25,000 *Arabidopsis* genes.

Not content to rest on their laurels, *Arabidopsis* experts now want to determine what proteins are expressed by every single gene, each protein's job within the cell, and their biochemistry—a task that could take 10 years and cost $500 million. The 2010 Project, as it's called, was fleshed out at a January workshop at the Salk Institute for Biological Studies in La Jolla, California; it was recently released on the Web (www.arabidopsis.org/workshop1.html) and is also summarized in this month's issue of *Plant Physiology*. Proponents say the multinational project will shed light on a host of questions—from how gene expression in any species is influenced by environment to the minimum number of genes needed to make a plant.

The group's ultimate goal is to create a "virtual plant" on the Internet, where scientists can click on an *Arabidopsis* cell at any stage of development, from seed to seed-dropping adult, and see every protein being expressed and the connections among them. However, plan co-author Joe Ecker of the University of Pennsylvania in Philadelphia cautions that the 2010 Project will take them only partway there; for now, they will settle for knowing what all the individual proteins do.

That alone is an enormous job. The 2010 Project will first support "genome technology centers" that will supply the necessary tools, such as DNA chips for studying gene expression, libraries of cloned genes, and knockout strains. The project is likely to draw on the talents of labs already gearing up to do high-throughput functional genomics of the nematode *C. elegans*, fruit fly, and human. Firmly behind the proposal, NSF has asked for $25 million for the 2010 Project for fiscal year 2001, an amount that Ecker hopes will grow or be supplemented by other agencies.

Also last week Cereon Genomics LLC, a subsidiary of Pharmacia Corp., released a set of more than 39,000 SNPs, or single-nucleotide polymorphisms, gene hunters' new favorite tool (www.arabidopsis.org/cereon/index.html). Until now, only about 400 SNPs have been publicly available for *Arabidopsis*. "It's a huge number if you consider the genome size," says David Meinke, an *Arabidopsis* researcher at Oklahoma State University in Stillwater—enough to isolate nearly all the genes. What's more, says Somerville, Cereon is releasing the SNPs with virtually "no strings," as academic and nonprofit users are free to patent discoveries made with these SNPs. With that and a major functional genomics project in the works, *Arabidopsis* researchers are clearly on a roll.

–JOCELYN KAISER

BIOTECHNOLOGY

Disease Group Invests In Do-It-Yourself Drugs

Chafing at the slow pace of commercial drug development, a disease advocacy group set out last week to finance new medicines for its constituency. On 31 May, the Cystic Fibrosis (CF) Foundation of Bethesda, Maryland, announced that it will invest at least $30 million in a small biotech firm, Aurora Biosciences of San Diego, to identify compounds that might prove useful in treating CF. This project, fueled initially by a donation of $20 million from the Bill and Melinda Gates Foundation, marks a new departure in the growing trend of patient groups taking charge of biomedical research.

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