CHEMISTRY

Linda Garmon reports from the meeting in Atlanta of the American Chemical Society

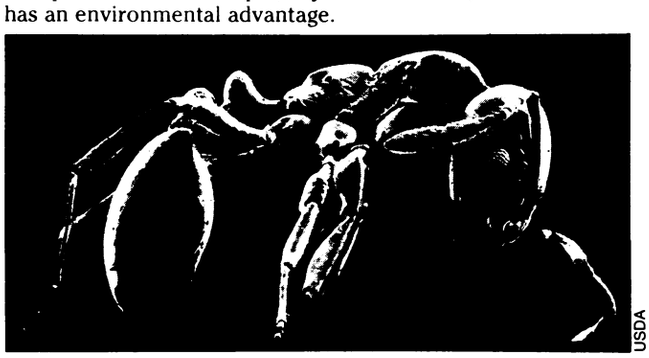
Sulfur: Life on the fast lane

Sulfur is on the road. Various research groups — including Donald R. Muir and colleagues of Sulphur Development Institute of Canada in Calgary, Alberta, and Donald Saylak of Texas A&M University at College Station — are investigating, and in some cases commercially using, this element in concretes for highway construction. Improved technologies for sulfur removal from coal-based fuel production and certain natural reserves, for example, coupled with recent advances in improving the concrete's durability, bring the sulfur road closer to being a practicable alternative to the oil-based, and therefore energy expensive, asphalt pavements. While sulfur shows promise in other building applications, its flammability does impost certain limitations.

Ant-agonize

Researchers increasingly are taking cues from nature in developing safe and effective pest control methods. Scientists devoted to ant control are no exception.

For example, Robert Vander Meer of the U. S. Department of Agriculture's Gainsville, Fla. office has isolated, identified and begun reproducing synthetically the fire ant's (below) own pheromone — a substance secreted by this social insect to lead its peers to food and guide them back to the nest. (In addition to being infamous for its sting, the fire ant also is an agricultural menace, destroying southeastern U.S. crops.) Added to an effective fire ant pesticide, Vander Meer's synthetic version of the trail pheromone would be the chemical Pied Piper of fire ants, leading the pests to their deaths. Moreover, the first fire ant to fall for such a pheromone-baited pesticide trap would mark its route with real pheromones, enticing other ants to the site. Less fire ant pesticide would be required using the more controlled fake-pheromone technique, says Vander Meer, so the method has an environmental advantage.



USDA

A second research effort aimed at developing an environmentally safe method for controlling ants is headed by David Wiemer of the University of Iowa at Iowa City. Wiemer is searching for the chemicals responsible for the ability of certain tropical plants to resist the attack of the leafcutter ant — a major agricultural pest found from Texas and Louisiana south to Argentina.

"Past studies have shown that the ants exhibit definite and reproducible preferences for some plant species over others, and that these preferences are quite constant from colony to colony," Wiemer says. "We hypothesized that some native plants might have evolved defenses against this important herbivore, and predicted that defended plants would be attacked less often." All evidence pointed to a chemical rather than a physical defense, so Wiemer is busy analyzing tropical plants for the ant-defensive needles in their chemical haystacks. Thus far Wiemer and colleagues have isolated several and identified two active compounds from plant species that can ward off the leafcutter ants.

BIOLOGY

Julie Ann Miller reports from Reston, Va., at the Battelle Memorial Institute conference on genetic engineering

Industry should regulate itself

The genetic engineering industry should instigate some form of self-policing to ensure acceptable standards of safety, says Congressman George E. Brown Jr. (D-Cal.). Brown, who is the chairman of the House of Representatives Subcommittee on Science, Research and Technology, told the conference that Congress had used good judgment in not passing any legislation governing use of recombinant DNA. An industry council, he believes, would be effective in winning public trust, reassuring people that the guidelines developed by the National Institutes of Health will be followed by the commercial sector. Brown says that the council should include members of the public, especially clergy. Setting up such a council will take some effort, but Brown promises, "It will be less burdensome than a regulatory system forced on industry in the heat of public reaction."

Proliferating gene companies

Biotechnology firms are still "snow-balling," says J. Leslie Glick, president of the Genex Corp. in Rockville, Md. In 1978 there were four specialized firms with capital of about $20 million. About 90 percent of that was in one company, Cetus (SN: 3/29/80, p.202). Today there are an estimated 50 small genetic engineering firms with capitalization of near $400 million. In addition, at least 50 large industrial companies around the world have made substantial investments in the new biotechnology. Some have created their own facilities, while others have bought equity in the smaller firms. A list of industrial companies with biotechnology investment has been compiled by Nelson Schneider of E.F. Hutton. It includes chemical industries (such as Kodak and Allied Chemical), pharmaceutical companies (including Rohm and Haas, Bayer and Alza), the major oil companies (such as Phillips Petroleum and Exxon) and electric companies.

New crops from old

Plant breeders have long strived to improve on nature by developing new varieties of crop and ornamental plants, but they were limited by their inability to cross plants of different species. That barrier now is being broken down by advances in cell genetics. Oluf L. Gamborg of the International Plant Research Institute Inc. in San Carlos, Calif., gave examples. One promising technique involves fusion of cells of two different species after the cell walls have been removed. Such fusions already have been performed on a variety of plant combinations including maize and sorghum or tobacco and soy. In most cases the hybrid cell grows a new cell wall and is capable of cell division. "Any incompatibility is not expressed at the cellular level," Gamborg says. The tricky part of this approach is growing a whole plant from the hybrid cell. There are no tobacco-soy plants yet, but there are examples of interspecies hybrids of the *Solanaceae* (nightshade) family. Members of this family, which include tomato, potato and petunia, are especially easy to regenerate from a single cell. Gamborg reports that a German scientist has succeeded in regenerating a tomato-potato plant from an intergenic cell fusion. The new plant has a tuber similar to the potato and also has flowers. Martin Apple, also of IPRI, points out that the genes of the hybrid do not appear to be stable. So the plant is not ready to go into this spring's garden.

Other methods for creating new plants are also under development. One involves transferring chloroplasts among plants. These organelles of photosynthesis contain some of the genes for their own synthesis, so they could produce a long-term change in a plant. Another approach is the insertion into a higher plant of individual genes for specific characteristics. "I expect things to happen here in a very few years," Gamborg says.