Mississippi Inc., Pesticide Manufacturer

The state wants to attack fire ants with a cheap version of Mirex; safer alternatives may be held back as a result

Several years ago, Mississippi leaped into the chemical business as the producer of an insect poison called Ferriamicide, a variant of Mirex, the infamous pesticide used against fire ants. Now, after a series of frustrated attempts to override environmental objections, the latest in October, the state is learning the hard way that its officials may not have had the acutest business sense in taking this gamble.

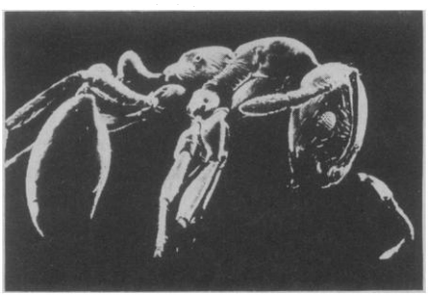
Allied Chemical quit the field in 1976, leaving Mississippi its factory, its stocks, and the rights to Mirex. The deal took place just as the Environmental Protection Agency (EPA) was moving to ban Mirex because of its cancer-causing potential. The arrangement may have seemed a bargain to state officials, for they got Allied's formula free of charge. (They had to pay for the land and supplies.) Now, 6 years later, Mississippi is not much closer to manufacturing or selling a pesticide than when Allied got out. The state seems to be failing as chemical merchant, but not for lack of trying.

In the latest setback, a federal judge on 19 October issued a temporary restraining order blocking the sale of Ferriamicide. Judge Harold Greene of the U.S. District Court for the District of Columbia granted the request of four environmental groups seeking to block an "emergency exemption" from the pesticide regulations granted by EPA to Mississippi in September. The judge said there was little evidence of an emergency and that EPA may have circumvented legal procedures in granting the permit. He also questioned the distinction being made between Mirex and Ferriamicide, and challenged the agency's decision to grant the permit without holding a hearing or giving public notice. Ferriamicide's use has been blocked pending a full legal review in November.

Even if Mississippi wanted to get out of the Ferriamicide business at this point—and there is no indication that it does—reversing course might not be easy. States are not as flexible as corporations. Local officials have promised that the investment in the Allied factory will pay off in the production of Ferriamicide, which they call a cheap, effective, and toxicologically safe weapon to be used against the fire ant.

This South American insect appeared in an Alabama port in 1918 and now infests about 226 million acres in the South. It is detested as a pest and a nuisance and, because of its mound-building, as a wrecker of farm machinery. It is also a health hazard for people allergic to its burning stings. For these reasons, many Southerners view Mississippi's campaign as a valiant one. It is more difficult for the state than it would be for an ordinary investor to write off the Ferriamicide project, for votes as well as money are at stake.

It is possible that Mississippi's well-intentioned project is doing the opposite of what was intended. It may be slowing the deployment of a new generation of pesticides that might be widely accepted because they are nontoxic. Marion Ueltschey, who has been director of the Mississippi Authority for the Control of Fire Ants since its creation in the Allied deal, concedes that what he does has a big impact on the pesticide market. With pride, he says that Mississippi owns the only full-scale plant for making fire ant poison. He intends to sell Ferriamicide at the low price of 29 cents a pound. *Science* asked if this might not scare off new investors, including those with safer products. Ueltschey agreed that this was "entirely possible." But, he said, "If somebody will come on with a product that's safe, economical, and effective, we'll be glad to back out of the business." In fact, he added, "We'll be glad to assist them," perhaps by lending the use of the Allied plant. The catch-22 in his list of conditions is the term "economical."



Solenopsis invicta

No company has proposed a joint venture with Mississippi, but several have developed interesting compounds that might do well in the South if they did not have to compete with a subsidized state product. One of the most intriguing, called MV 678, was invented by Meyer Schwarz, a U.S. Department of Agriculture chemist. He and the USDA sold the patent to Stauffer Chemical, which has put MV 678 in a product known as Pro-Drone. Unlike Mirex, which is a stomach poison, MV 678 is nontoxic—even for ants. It is a synthetic mimic of an insect hormone. Its effect is to disrupt the ant's physical development on contact. It produces a shortage of workers, upon whom the entire ant society depends for food collection. A small, 24-hour exposure to MV 678 will induce irreversible social chaos, leading to the destruction of the colony, Schwarz says.

Stauffer has applied for a limited EPA registration of Pro-Drone and hopes to get approval by the end of the year. So far the chemical has had moderate success in field tests, but Stauffer claims that if properly applied, it should destroy 80 to 90 percent of the anthills in a treated area, just as Ferriamicide does. Pro-Drone's virtue is that it seems completely nontoxic. Its weaknesses are that it is slow-acting; it must be applied twice; it is more expensive than Ferriamicide; and it must be applied with skill and with attention to the weather.

Ueltschey is not enthusiastic about this potential new competitor. "It could very well work, if it is used in wide-area application," he says. "But for the individual homeowner, it takes entirely too long." Besides, he says, none of the competitors will be as cheap or as easy to apply as Ferriamicide, an important factor in Mississippi.

To evaluate Ueltschey's criticism of the hormone-like products, one must know something of Ferriamicide's faults, which Mississippi, the manufacturer, is not inclined to stress. The chief problem is that it is 0.05 percent Mirex. Although additives have been blended with Mirex to speed its breakdown in the environment, preliminary data suggest that the improvement is small.

Perhaps the sharpest critique of the claims made for Ferriamicide appears in an internal EPA memo written in September by a Hazard Evaluation Division (HED) scientist. Mississippi claimed that the half-life of Mirex in the new formula

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was only 0.15 year. One of the worst aspects of the old Mirex was that its half-life was estimated to be 12 years. The EPA staff, noting that Mississippi's experiments with Ferriamicide are only 3 years old, concluded as follows:

> Mirex even in this formulation is quite persistent, and . . . it appears to degrade by a two-stage process. The halflife of the first stage is about two months but the second halflife is estimated to be at least three years. In fact, a long halflife is intuitively obvious from the [Mississippi] statement that 20 percent of the Mirex remains after three years. The HED review concluded that as much as 40 percent, or 94 percent including degradates, may remain after three years. . . . HED does not believe that the rapid field degradation of Mirex (in Ferriamicide) has been demonstrated.

In addition to being persistent, Mirex is a proved carcinogen in rats and mice. It degrades into—among other substances—Kepone, which is neurotoxic in humans and a proved carcinogen in rats and mice. Because of its stability and resistance to metabolic elimination, it is passed upward through the food chain and concentrated particularly in fish and dairy products. An EPA survey of human tissue in 1976 found that 23 percent of all the samples taken from Mirex-treated areas contained Mirex. Given this record, it is surprising that Mississippi sought, and that EPA agreed to allow, a form of Mirex back on the market. According to Ueltschey, the decision came about in the following way.

After Allied dropped the business and while Mirex was being phased out, Mississippi made about $2.5 million on the sale of Mirex. As required by state law, the income was applied to developing a new, biodegradable ant poison. The state announced after a short period of experimentation that it had such a product: Ferriamicide. The EPA granted an emergency use permit under Section 18 of the Federal Insecticide Fungicide and Rodenticide Act (FIFRA), allowing the use of Ferriamicide for 6 months ending on 30 June 1979. The permit was not used because new Canadian data indicated the chief breakdown product of the new formula was more toxic than Mirex. Mississippi challenged the accuracy of the data, and in October 1981, EPA's scientific advisory board notified the state that the breakdown product was in fact no more toxic than Mirex.

Eager to get on with production, Mississippi in December asked EPA for a "conditional" registration permit to allow the use of Ferriamicide in Mississippi and eight other ant-infested states. The permit was meant to tide the state over until it had enough toxicological

Sharing Credit for the Nobel

"Yes I was very surprised and especially so that I'm getting the prize alone." That was the sentiment of Kenneth G. Wilson of Cornell University when the Associated Press called early on the morning of 18 October to congratulate him on winning the Nobel Prize in Physics.

In an interview with *Science*, Wilson, 46, one of the world's younger laureates, explained his views on dividing credit and giving awards in an era increasingly marked by teamwork. On several previous occasions, the award of the Nobel Prize has been controversial because it has been argued that the prize should have been shared by others who made major contributions. An unusual aspect of this year's award is that the issue of shared credit has been forcefully addressed by the recipient.

What led to Wilson's astonishment was that he fully expected two other scientists to share the prize, since all three in 1980 had shared a taste of scientific glory when they received Israel's Wolf Prize. Given for work in agriculture, mathematics, chemistry, physics, and medicine, the Wolf Prizes carry a cash award of $100,000 each. Wilson shared the physics prize in 1980 with Leo P. Kadanoff of the University of Chicago and Michael E. Fisher of Cornell University. "I was very happy with that," says Wilson, "and it was my sense that the community was happy with it as well."

Wilson, rather than questioning the wisdom of the Nobel committee in singling him out, directed his remarks to the general question of allocating credit. "The unraveling of work and awards is a very serious problem, especially in experimental physics but even in theoretical physics. When you have theories like quantum chromodynamics, which in many ways evolved through a world collaborative effort, dividing up the credit is a difficult problem at best." And the problem in some branches of physics is likely to get worse. For example, CERN, the European center for high energy physics near Geneva, is in the process of building an accelerator known as LEP, a behemoth that will stretch for 16 miles under the French-Swiss border and have teams of 250 scientists taking data from each detector. A dilemma the Nobel committee may one day face is who will get credit for the discoveries.

And even with his theoretical work in phase transitions, Wilson says sharing a Nobel among three workers would not do justice to the spadework of many. "It is a general problem with scientific awards. And certainly, in my nobel lecture, I will be mentioning more people than Leo and Michael."

In the long history of the physics prize, the Nobel Foundation has made a few controversial omissions. The 1923 prize, for example, went to Robert A. Millikan for measuring the charge on an electron. Yet it omitted Harvey Fletcher, a graduate student who performed many of the experiments and, according to the June 1982 *Physics Today*, suggested the critical idea of suspending oil drops between charged plates.

Deserving individuals have clearly been left out in the cold, but the democratic process can go too far, Wilson believes. At some point individuals must be singled out. "The most powerful results must get their do, even relative to other important results. This is especially the case with the Nobel Prize, which has the unique character of being recognized by both the scientific and general community. It's extremely important the community at large sees the very best science has to offer."

Moreover, Wilson takes exception to an editorial that appeared in the *New York Times* on 15 October in which a hypothetical Nobelist renounced the prize. "My discovery," said the newspaper's fictitious laureate, "is a small development of the work of 15 colleagues. Most of my experiments have been carried out by my loyal and unassuming graduate students."

Wilson argues that although points in the editorial are relevant, it missed an important consideration. "Obviously there are difficulties of all the kinds they said, but it is necessary to recognize what the Nobel committee has done despite those difficulties. An atmosphere of trust surrounds the Nobel Prize. Nobody else has come close to that, to achieving the recognition that the award holds among scientists and the general public. There's a very important form of communication that would be lost to the world if you went along with that editorial."—**WILLIAM J. BROAD**

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data to apply for a "permanent" registration. To anticipate all the problems that might arise, EPA convened a special review conference in Atlanta in June. The final report,* now in press, was to represent the consensus of experts from the scientific and industrial communities, state and federal officials, and environmentalists.

During the conference, it became clear that Mississippi's point of view might not prevail. Ueltschey recalls that "Out of that symposium came a suggestion from EPA that we ask for an emergency use permit rather than a conditional label." Why? "EPA said we'd be in better shape to ask for that than to push for the conditional." He declines to name the officials who made the recommendation.

Thus, before EPA had ruled on the conditional application, Mississippi filed in August for an emergency exemption under Section 18 of FIFRA to allow the use of Ferriamicide. On 29 September, EPA granted the emergency exemption in a telegram signed by John Todhunter, assistant administrator for pesticides and toxic substances. Arkansas and Texas received identical emergency waivers, all of which expire on 30 June 1983.

Neither Todhunter nor the director of pesticide programs, Edwin Johnson, could be reached for comment. Johnson's staff assistant, James Roelofs, told *Science* that EPA does not try to decide whether or not an emergency is genuine if a state says one exists. That assertion is generally taken at face value. EPA limits its review to technical issues: the extent of hazard posed by the use of a product and the availability of alternatives. Roelofs was asked why EPA overruled in-house objections to the use of Ferriamicide. He answered that the staff's concerns were amply reflected in the restrictions on its use in Todhunter's telegram, the "tightest ever imposed," he said, on a Section 18 exemption.

What is the nature of the emergency? In short, Ueltschey says, "There are more ants." This means "more emergency trips to the health authorities," more broken farm equipment, and greater economic losses. He mentions a survey taken in 1980, showing that since Mirex use was stopped in 1978, the number of anthills at selected sites had grown by 3 to 1000 percent. As for alternative pesticides, Ueltschey says they are all 10 to 20 times more expensive than Ferriamicide and more difficult to apply. Because of their cost, they are not really available to Mississippi, he says.

However strong the economic argument may seem in Mississippi, it has not impressed outside observers. The draft executive summary of the proceedings in Atlanta notes: "Data concerning the agricultural impact of the IFA [imported fire ant] do not support a conclusion of its being an economic pest, although reports indicate livestock losses from IFA stings." It also mentions, in the ant's favor, that it is a predator of pests that attack cotton, soybeans, sugarcane, beets, and potatoes. Its greatest fault, the study notes, may be its sting, a hazard to allergic humans.

Turning to the options for treatment, the summary notes that Mirex is not the only chemical available:

> Ten insecticides are currently registered for IFA control by broadcast application on nonagricultural crops, for mound treatment, and for treatment of nursery stock; several have conditional registration or have registration pending. In addition, five insect growth regulators are being developed for possible use as IFA control agents.

One of the symposium panels examined the options in detail and concluded that the cost of using American Cyanamid's rapidly degradable poison, Amdro, might be as low as $5 an acre if applied over a wide area. Using Ferriamicide would cost about $2.50 an acre under similar conditions, the panel concluded. If correct, Amdro might cost double, not ten times the price of the state-manufactured product. This issue is difficult to analyze because the state plays such a large role in determining price.

EPA's handling of the matter has roused the old enemies of Mirex: the National Audubon Society, the Environmental Defense Fund, the National Wildlife Federation, and the Sierra Club. They brought the suit against EPA that resulted in the temporary restraining order. In Congress, they have gained the sympathy of, among others, Representative George Brown (D–Calif.), chairman of the House agriculture subcommittee on operations, research, and foreign agriculture. He called the EPA decision "a classic example of how government actions dictated by political pressure can make a mockery of scientific principles and commonsense."

Brown's staff on the subcommittee has begun a broad investigation of the possible overuse of Section 18 waivers for hazardous pesticides. The number of state emergency applications has grown from 282 in 1979 to 749 in 1982. As subcommittee staffer Charles Benbrook says, "It's beginning to look like a national emergency."—ELIOT MARSHALL

**Proceedings of the Symposium on the Imported Fire Ant*, sponsored by EPA and USDA, Atlanta, Georgia, 7–10 June 1982.

IOM Votes Statement Against Nuclear War

The Institute of Medicine (IOM) has joined the ranks of physicians and scientists who have issued proclamations against the use of nuclear weapons. At its annual fall meeting in Washington, D.C., IOM members called for a halt to the "continued build-up of nuclear arms" and urged a "mutually verifiable" agreement between the United States and the Soviet Union to stop the arms race.

"Nuclear war is the single event that could terminate all our efforts to improve the human condition," the IOM statement says. "That possibility seems particularly ironic at a time when great strides are being made in alleviating human ills, and even greater advances are in prospect. A nuclear war would instantly kill tens of millions of people . . . ," it continued, adding that no civil defense programs proposed so far would do much to protect war's victims.

—BARBARA J. CULLITON

NIOSH Backs Down on Portsmouth Study

The National Institute for Occupational Safety and Health (NIOSH) has withdrawn its proposal for a cytogenetic study of nuclear workers at the U.S. Navy's shipyard in Portsmouth, New Hampshire. A highly critical review of the NIOSH protocol by a committee of the National Academy of Sciences (NAS) apparently quashed any possibility that the Navy would agree to let NIOSH study the Portsmouth workers (*Science*, 29 October, p. 454).

In a letter to Vice Admiral E. B. Fowler, Philip J. Landrigan of NIOSH said, "We still sincerely believe the conduct of the proposed study would have generated occupational health data important to the [Portsmouth] workers, and other workers in similar occupations. However, since [the NAS] position clearly would not convince you that we should proceed . . . , we will therefore not pursue this effort. . . ." From the start, the Navy has opposed the study.

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