Entomologists in the Medfly Maelstrom

Some scientists say California's effort to get rid of the Mediterranean fruit fly is based on an incorrect assumption; the state, they say, has refused to hear their criticism

THE MEDITERRANEAN FRUIT FLY is back, the Golden State is spraying, and Californians are picketing. But that's not news. What is news is that this time some scientists have cropped up among the critics.

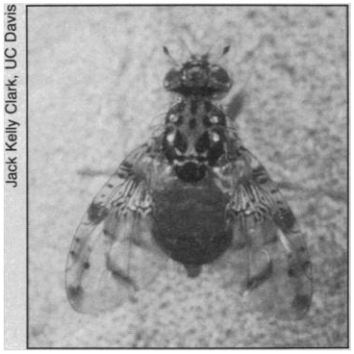
In 8 of the last 10 years, the tiny pest, feared for the damage it could do to California's fruit and vegetable harvest, has popped up in Los Angeles County. Five times this decade the state has tried to wipe out the medfly, mounting controversial eradication campaigns that involve spraying the pesticide malathion from helicopters and releasing millions of sterile flies to mate the surviving population into extinction. This year's campaign is ten times the size of recent ones, covering 1000 square miles.

Predictably, L.A. residents, angered by repeated dousings with malathion, are pitted against farmers who are desperate to prevent the fly from reaching the agricultural regions, where it hasn't yet been sighted. Less predictably, some entomologists have now come forward to argue that the state's approach is wrong.

The eradication campaign, these scientists say, is based on the faulty premise that past eradication efforts have succeeded and that the fly keeps reappearing only because it has been brought in anew from places like Hawaii and Central America, where it is endemic. But the dissenters believe the medfly is already an L.A. resident and that each reappearance is just a new sighting of the same old hometown population. If that is correct, eradication hasn't worked in the past and is not likely to work now. What is more, these entomologists claim the state is turning a deaf ear to their views.

The strongest champion of the hypothesis that the medfly now perennially lives and dies in L.A. is James Carey, associate professor of entomology at the University of California at Davis. Carey's scientific specialty is insect demography, and he is a member of the scientific advisory panel to the medfly eradication project run by the California Department of Food and Agriculture (CDFA). Since joining the panel in 1987, Carey has suspected that the medfly has already set up permanent residence in the L.A. basin.

Carey's fears were aroused by the pattern of medfly reappearances since the first sighting in 1975. The state maintains traps throughout the Los Angeles area, and, working with scientists at the CDFA, Carey has plotted the sites of all trappings. The map shows that the medfly tends to reappear very close to where it has been seen before. Since 1988, flies have been trapped in all six of the cities where they were found in 1980–82, sometimes within a few blocks of the earlier sites. In East Los Angeles, flies were found in 1988, eradication was declared, and they were back in 1989. In 1987 a single medfly was found in neighboring Orange County, in the city of Westminster; in 1989 another fly was found in the same city.



Tinseltown resident? *The Mediterranean fruit fly.*

According to Carey, the chances that flies are repeatedly reintroduced to the same places is nil. "Does lightning strike the same spot twice?" he deadpans. He thinks medfly populations have been simmering in the basin undetected and at low levels since the 1970s. "I think they've knocked them way back [with eradication efforts]," he says, "but I don't think they've eradicated them."

Carey's view has begun to receive support both inside and outside the Southern California medfly maelstrom. UC Davis entomologist Richard Rice, also a member of the CDFA scientific advisory panel, says, "I think we have had a continuing population development in L.A. at least since 1986. It shows up again a year or so later, not 50 miles away . . . but right next to [the previous site]. They are called new introductions, but they are not."

Daniel Simberloff of Florida State University, who studies the biology of invading insect populations, concurs: "From a probabilistic standpoint alone, it would be highly unlikely for independent invasions to be at the same sites." Perhaps even more telling, a CDFA scientist, who asked not to be named, called Carey's maps "devastating" to the hypothesis that each outbreak is independent.

In spite of Carey's views, state officials maintain that past eradication programs have worked—and that the flies continue to be reintroduced. According to the Sacramento *Bee*, CDFA assistant director Isi Siddiqui last week told a legislative hearing in Southern California that this year's eradication effort is essentially complete.

And within the scientific advisory committee, the notion that the medfly is endemic in the L.A. basin has met stiff resistance. Roy Cunningham, a Department of Agriculture entomologist in Hawaii, chairs the five-member panel and puts little credence in Carey's views. "Jim Carey has no data to support his hypothesis," Cunningham says. Cunningham acknowledges the existence of Carey's maps, but denies that they constitute anything like sufficient proof.

Cunningham argues that pockets of medflies could not be present for years at levels low enough to escape detection by the five traps per square mile distributed throughout Los Angeles and the neighboring counties. "There is no logical explanation that these populations would not expand," he says. "What mysterious force keeps them down?"

Cunningham, along with CDFA officials, believes medflies are repeatedly reintroduced into the L.A. basin in smuggled fruit brought by air travelers or in mail packages arriving from infested areas. He attributes the reappearance of flies in Westminster, for example, to illegal importation of Hawaiian fruit by the large Asian population living there. His view is supported, he says, by the fact that the USDA has intercepted illegal shipments of fruit from Hawaii to Asians in the area.

Carey finds that explanation inadequate. He notes that, compared to the 400 flies that have been captured in Los Angeles County since 1980, only 7 flies have been

captured in all seven other Southern California counties. L.A. County's population of 8.6 million is matched by the combined total of the seven other counties, and those counties have three quarters the number of Asians and Hispanics Los Angeles does. Advisory committee member Rice agrees: "The laws of probability say [medflies] should be coming up in other areas."

Carey feels that, whether he is right or wrong, the advisory committee should at least give his hypothesis serious consideration. He told *Science* that whenever he brings up his hypothesis at advisory panel meetings, it is quickly dismissed. Those meetings are generally carried out by means of conference telephone calls. Minutes of such calls in September and November obtained by *Science* suggest that in those meetings there was little extended discussion of the concerns raised by Carey.

Indeed, scientists at CDFA (who asked that their names not be used) say the department is not open-minded about Carey's hypothesis. "They don't want to consider the fact that they might be wrong," said a scientist who has advised CDFA on the medfly project. "I'd like to see a little more open-minded attitude. All we get [told], time and time again, is that it is a new introduction."

A CDFA scientist told *Science* that the department is not much interested in historical trends. Medfly data from the years prior to 1987 are not accessible by computer, he said, and can be assembled only through a painstaking search of index cards and looseleaf notebooks. He added that he doubted anyone in CDFA had searched the data for trends such as those Carey had found. "It's inexcusable," he said. "[The past data] should have been analyzed. There should be more of a scientific effort going on."

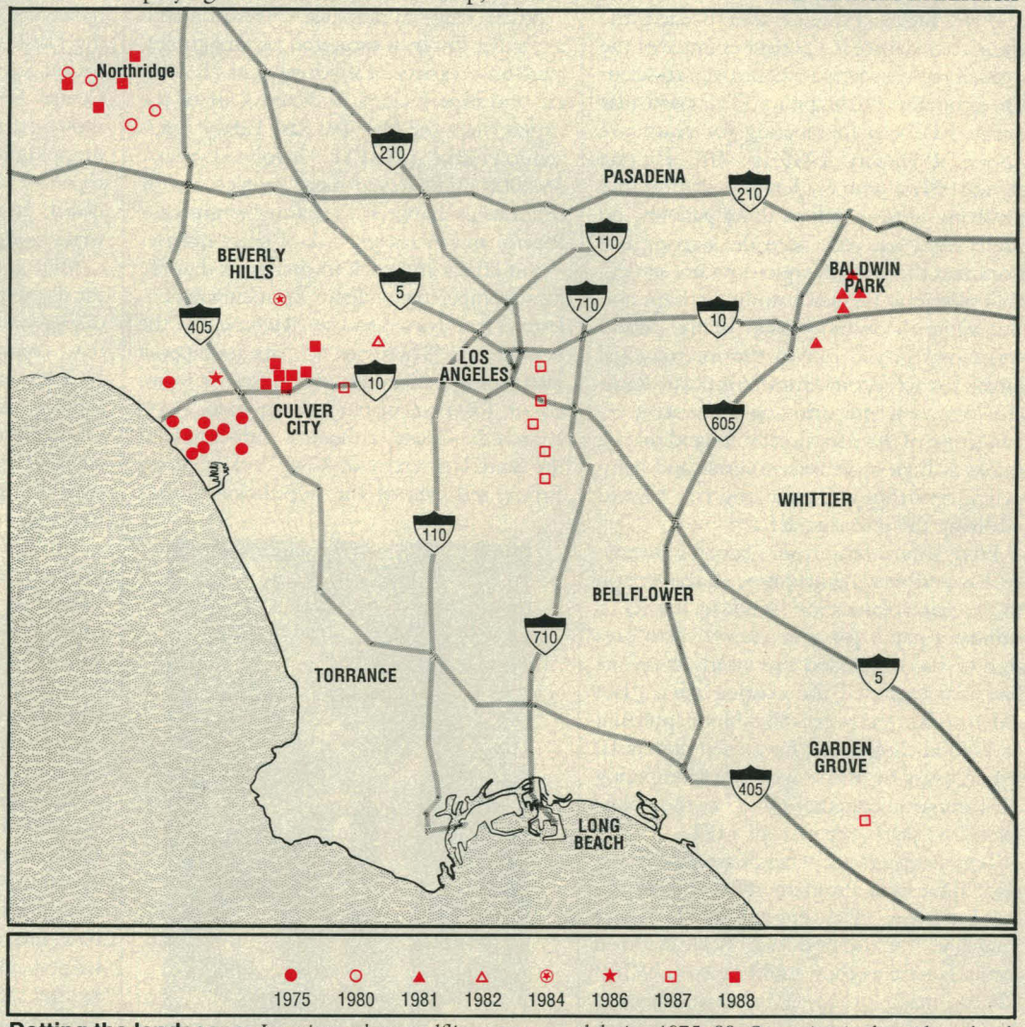
Those on the other side, however, counter that Carey has indeed received a full and fair hearing. They say that they have repeatedly asked him for a plan—number and location of traps, and so on—for proving his hypothesis. George Loughner, primary state entomologist for CDFA and CDFA liaison to the advisory panel, says, "I'm sorry that Jim thinks he isn't getting his hypothesis aired, but he is. We've asked Jim to come up with some type of a sampling scheme with which he could test his hypothesis, and I hope he's working on it."

Carey thinks the data he's already gathered and plotted on the maps are enough to start a process of reconsideration. If he's right, it's likely that much time and money are being wasted on current eradication efforts—time and money that could be spent planning for the real threat. Because if the medfly is endemic, it may be only a matter of time before it spreads to California's 250 susceptible types of fruits and vegetables, valued at more than $2 billion a year. To protect them farmers might have to greatly increase their use of pesticides. And the 25% of the harvest that goes to foreign countries would be subjected to additional measures such as fumigation and cold storage. "It would get very expensive," said B. J. Lewis of the USDA.

But Carey feels that the magnitude of the problem is no excuse for the state to put its head in the sand. He isn't ready to say the spraying of malathion should stop, but he does think his hypothesis needs to be heard. "I've drawn my own conclusions, but [the data] should be subjected to scrutiny by other scientists," he says. Should those scientists agree that the fly is endemic, then it would have to be determined whether there is any chance of eradicating it. And if the medfly can't be eradicated, perhaps milder forms of control such as integrated pest management are the appropriate response.

And scientists are not the only ones Carey is trying to interest. Last week he took his case to the agriculture deans of the University of California; UC spokesman Alvin Donner says the university is considering putting together a scientific task force to analyze the problem. Carey has also been invited to present his data to a joint session of the state legislature that is being convened as *Science* goes to press to hear both sides in the medfly battle.

As Roy Cunningham, who is on the other side of the lines in that fight, says of Carey: "He squeaks loud enough that we hear him." ■ MARCIA BARINAGA



Dotting the landscape. *Locations where medflies were trapped during 1975–88. Some sites in the wide outbreak of 1989–90 (not shown) are close to ones on the map—in Baldwin Park, for example. The proximity of sites has led some entomologists to argue that the reappearances of the medfly are merely new sightings of the same population.*