Comment

Our own petards

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My father, who worked for the US government, told me that he once received a memo from the Pentagon stating that too many trivial documents were being classified TOP SECRET and that the practice must stop. The memo was labeled TOP SECRET. He told me this story, he said, for two reasons: to remind me that a sense of irony is not commonly found in the military, and to persuade me never to work for the government. I depend on federal grants to support most of my research, so I suppose one could say that I never really learned the second lesson, but the first one sunk in. If it hadn't, though, a recent report by Debora MacKenzie in *New Scientist* **174(23442):**4-5, 11 May 2002, would probably do the trick. Headlined "US Non-Lethal Weapon Reports Suppressed", the article describes a set of projects, most of them funded by the Pentagon's Joint Non-Lethal Weapons Program (JNLWP), designed to develop chemical and biological weapons that would do everything short of killing people to incapacitate soldiers and civilians and cripple infrastructure. The projects she mentions include engineering microorganisms to corrode roads and runways; to eat paint - especially the stealth anti-radar kind used on aircraft - and rubber; and to attack lubricants, fuels, and protective material like the Kevlar used in body armor. Other educational activities include establishing odor response profiles according to ethnic, racial and cultural influences; developing "harassing, annoying and 'bad-guy' identifying chemicals"; formulating lubricant and grease additives for immobilizing machinery; and designing "loaded speed bumps" (to which one who is constantly intimidated by those signs that threaten "severe tire damage" if one backs up can only ask, "Loaded with what?").

Now some of these sound silly and some sound impossible, but one should never underestimate what can be done if enough money is thrown at it - and no one has as much money to throw as the military, even in most democracies. If the sun were a weapon, we would have had widespread civilian use of solar power fifty years ago. Genomics is likely to help some of these projects to happen. The complete genome sequences of dozens of different microorganisms, with a wide range of metabolic characteristics, are now available. So the chances are pretty good that at least a few of these things will actually get developed over the next decade or two. What's wrong with that, you may well ask - especially in the light of the events of September 11, 2001, and the continuing threat from terrorist organizations and the 'rogue states' that shelter them.

Well, I think there are two things very wrong with that. The first, as pointed out by MacKenzie, is that many, if not most, of these research projects are probably illegal. Several international treaties on chemical and biological weapons expressly prohibit the development, production, stockpiling or acquisition of such weapons, regardless of whether they are lethal or non-lethal. One US law, introduced last year, specifically bans the possession of microbes designed to attack materials. The illegality of these activities may be why the US National Academy of Sciences, which collected information about 147 such projects for a report on research funded by the JNLWP, has thus far refused to release the documents, even though the information is supposed to be a matter of public record. The Academy's suppression of the data is the focus of MacKenzie's article.

But the second problem is something that MacKenzie doesn't point out. It's something my father would understand, because to see it requires that sense of irony that he believed was missing from so much of what governments do. The second problem is that all too often, the weapons we invent end up being used against us. One could argue, I suppose, that the Soviet Union would eventually have developed its atomic bomb without the aid of Klaus Fuchs and the other atom spies. But the fact is, it didn't. The hydrogen bomb, too, was our own creation. The nuclear weapons of mass destruction that have menaced us, and all mankind, for so many years were designed by us for our own protection. The anthrax strain that killed in Florida and elsewhere and terrified the US for months was our own weapons-grade strain, developed at home by our own scientists. All too often, when

our troops go into battle, they are attacked, as they were in the Gulf War, by weapons we ourselves conceived and manufactured. The poison gas sarin that Aum Shinrikyo released in the Tokyo subway was invented in Europe. The botulism toxin that they tried to spread over Tokyo before that was developed as a bioweapon by the US and Russia.

Nothing can be kept secret forever, as the National Academy will soon learn, and anything we create our enemies can make, buy or steal. The world is filled with things we wish we could un-invent. Why haven't we learned from that? Why do we, in the name of security, fill the world with dangerous objects? And are we so arrogant, and so stupid, as to think that we can control a biological organism once it is released? Do we really believe that we can keep it from falling into the hands of our enemies - something that has never been achieved with any weapon in human history? Or that it won't expand into the nearest available ecological niche, to plague us in ways we never foresaw? The archive of folly is replete with stories of that blunder: the introduction of starlings into North America, and of rabbits - and then cane toads - into Australia; the obliteration of native flora and fauna in many countries by exogenous species, many brought in for decorative or commercial purposes. The list is long and sorrowful.

Shakespeare, who has a metaphor for almost everything, has a marvelous one for such hubris: "The engineer hoist with his own petar[d]" (*Hamlet,* Act III Scene iv, line 206). The words are even more apt when one realizes that a petard is not, as one might think, some kind of construction crane, but rather a bell-shaped case containing an explosive, used to break down a door or gate or breach a wall. In other words, Shakespeare has given us a phrase that describes a non-lethal weapon being turned against its inventor. MacKenzie's article warns us that there are still people out there making petards, heedless of the fact that they, and we, may eventually be hoist - blown up - by these very ones. Continue to develop engineered organisms of the type referred to, and the odds are that some day it will be our own roads that will be corroded, our own fuel that will be degraded, and our own rubber, plastics and paint that will be attacked.

The development of all bioweapons, worldwide, should cease immediately. The United Nations should make it a war crime, punishable by trial before the the newly established International Criminal Court, to develop, produce, stockpile or acquire such weapons. Enforcement will not be easy, but a good signal would be for the US to stop the biological and chemical activities of its own JNLWP. As long as such research goes on in the US, US condemnation of other countries' bioweapons programs will be ignored for the hypocrisy that it is. And those who might consider developing biological weapons, whether lethal or non, would do well to remember the words of Walt Kelly's wise cartoon possum Pogo: "We have met the enemy, and he is us."