called the study "not conclusive enough to call for a precipitous ban on nitrites," although he emphasized that he was not critical of the study itself.

What he and even the study's author, Newberne, have recommended is that it be replicated in another animal species prior to any regulatory action. Newberne has been quoted recently as saying that replication would ensure the carcinogenic effects are not unique to the Sprague-Dawley rats. Howard Roberts, the director of FDA's Bureau of Foods, told *Science* that "Newberne's remarks on our regulatory action are inappropriate. There is a remote possibility that the Sprague-Dawley strain is exquisitely sensitive to nitrite but no doubt that nitrite is a bad actor. My interpretation of the law is that it has to go. Although we would like to have tests in more than one species, Newberne's test was thorough and well done." William Lijinsky, an expert in nitrosamines at the Frederick (Md.) Cancer Research Center, echoed Roberts' appraisal of Newberne's test, although he said he had reservations about an absolute nitrite ban. "Newberne is very reputable, and if anything, rather conservative," Lijinsky said. "He used more animals and more prolonged treatment than anyone has before; moreover, the idea is to deliberately select a species that will be sensitive. While it is difficult to calculate the risk to humans, we know now that nitrites are not safe."

If nitrites are eventually banned, the impact on industry is uncertain. The American Meat Institute claims that the retail value of cured meats and poultry is $12.5 billion, but several alternatives to nitrite are available, including refrigeration, irradiation, freeze-drying, and possibly the additive potassium sorbate—all of which are in limited use now. Only one corporation, Du Pont, supplies sodium nitrite for use in U.S. foods, and company spokesmen have termed the impact minimal. On the opposite side, the impact the ban will have on human health is equally uncertain, although it may not be all that much. Researchers have estimated that less than 20 percent of all nitrite entering the stomach is derived from cured meats.

If the ban's effect on human cancer will be small, however, its impact on relations between the FDA and its parent, HEW, could be significant, depending on the outcome of the Justice Department review. The existence of the review is itself unsettling to FDA officials; if the result is a loosening of the FDA and USDA phase-out proposal, additional sparks can be expected to fly between the agencies.—R. JEFFREY SMITH

NSA Slaps Secrecy Order on Inventors' Communications Patent

At the request of the National Security Agency (NSA) the Commerce Department has placed a secrecy order on a group of private inventors in Seattle concerning their patent application for an advanced communications privacy device.

The inventors are fighting to have the order overturned so that they can market their device commercially. They regard their struggle as a test of whether the government will allow the burgeoning of cheap, secure communications technology to continue in the private sector or whether it will keep a veil of secrecy over the work—effectively reserving it exclusively for military and intelligence applications.

The case may result in a test of inventors' rights under the secrecy order laws, of whether the laws protect their right of due process, or place outside commercial inventors such as the Seattle group at an unfair disadvantage with defense contractors.

The government issues secrecy orders under some obscure laws passed in 1917, 1941, and 1952. Some have questioned whether these laws are even constitutional; they may be in for more public scrutiny and even a court test in the future.

The group's fight with the Commerce Department and the NSA appears to be unprecedented. Of the 200 to 300 secrecy orders Patent Office officials estimate are issued each year, the vast majority cover classified patent applications filed by government defense contractors. These are not contested, as far as Patent Office officials know. Officials could not recall the last formal challenge to a secrecy order, but one official told *Science* he thought that there had been such a challenge in 1962.

The technique involved in the patent is considerably beyond the voice scrambler technology now familiar in police and other communications. The technology that it embodies is related to spread spectrum communications. The inventors say they had hoped to sell the device for inclusion in citizens' band and maritime radios. But they declined to tell *Science* anything further about the device or the technology involved because of the secrecy order.

But the Seattle group's protests are the second challenge to the secrecy laws this year. Earlier, George I. DaVida, a university professor who filed for a patent on a new cryptographic scheme, was issued a secrecy order. DaVida protested and got the order rescinded, but officials at the National Science Foundation, which sponsors DaVida's research, explained that the order was lifted because the government had not intended to classify university research, and did not know that the work had been done at a university when the order was imposed (*Science*, 14 July, p. 141).

Whereas the DaVida case was a test of whether the government plans to classify university work on cryptography—a subject that is also spurring private sector interest in communications privacy—the Seattle case raises a different issue. This is whether the growing interest by private firms and private inventors in developing commercial communications privacy equipment will also run up against a roadblock of government classification.

"I feel my freedoms are being taken away" says Carl R. Nicolai, 35, one of the inventors. "But I also wonder if it is in the government's interest to suppress people's privacy."

Nicolai worked for different employers as a "job shopper" or what he calls a technical "Kelly girl" for several years while developing the device in his spare time. The other inventors, David Miller, 32, Carl R. Quale, 30, and William M. Raike, 35, who lives in Monterey, California, have been also employed in regular jobs while collaborating on the invention in their spare time. Together they estimate they have spent $33,000 of their

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own funds in developing the device and more recently in responding to the unexpected twist that their development plans have taken. Under the 21 April secrecy order, discussion, publication, marketing, and manufacture of the invention are all prohibited.

Nicolai says he recently moved into a house costing only $10,000 in order to free up funds to spend on the project. The other inventors, some of whom have advanced degrees and one of whom is a professor at the Naval Postgraduate School, tell similar stories of volunteered hardship in order to pay for the development project done on their own time.

Their lawyer, Stephen Baldwin of San Francisco, told *Science* that the inventors are first seeking a "procedure" by which they can have an opportunity to rebut the government's conclusion that "disclosure" of the application "might be detrimental to the national security." Baldwin said the inventors may then decide to protest the order through formal channels, and ultimately to the courts, although this would be "expensive." He admitted, however, that a court test "might" involve questioning the legality of aspects of the 1952 law under which secrecy laws are issued. (At the time of the DaVida incident, the Chancellor of the University of Wisconsin, Werner Baum, noted that the law might be unconstitutional.)

In addition, the inventors have maintained their dialogue with the government through a Washington representative, Peter Olwell, and through the office of their Senator, Warren Magnuson (D–Wash.), who has inquired into the matter on their behalf.

These inquiries have turned up the fact that the NSA requested the secrecy order to be issued, along with other information about a completely obscure government procedure that may receive more public scrutiny, and perhaps even a court test, if other inventors begin protesting secrecy orders too.

In interviews with *Science*, Patent Office officials stressed that they do not make the judgment as to whether a secrecy order should be issued for a given patent application. Under the terms of the 1952 law, the office merely makes the applications "available for inspection" by defense agencies and follows their instructions as to whether an order should be issued. In reality, this is done by categorizing the 100,000 applications that come in yearly by technical field. Applications that fall into certain technical fields are shown to representatives of the Army, Navy, Air Force, and NSA, and Department of Energy, who review them at the patent office. These officials can request secrecy, or forward applications to a Pentagon group, the Armed Services Patent Advisory Board, whose member agencies use their own technical experts to judge them. If any agency judges a secrecy order to be needed, one is issued. In the case of the Nicolai patent application, for instance, Olwell, the inventors' Washington representative, has learned that the NSA recommended secrecy, the Army found no reason for it, and the Navy and the Air Force concurred with the NSA.

However, everyone seems to agree that there is great confusion over what a secrecy order entails. This is an area in which the Seattle inventors are concerned that their rights may be violated. Most importantly, the order is issued without any explanation or justification, a position that some people maintain is a denial of the right to due process. This is the reason that Baldwin, the inventors' attorney, believes that a fair procedure should be developed whereby the inventors can learn the justification for the order and have a chance to rebut it if they wish.

Raike, the inventor who is also a tenured professor, is also concerned about what the order implies for his research. The order's language says "you are ordered in nowise to publish or disclose the invention or any material information with respect thereto . . . in any way to any person not cognizant of the invention prior to the date of the order."

New Smallpox Case Seems Lab-Caused

Another laboratory accident involving smallpox has occurred in Britain, the second such incident in 5 years.

The victim is Janet Parker, a 42-year old laboratory photographer who works in the Birmingham University Medical School.

The world's last known case of endemic smallpox occurred in Merka, Somalia, on 26 October 1977. If no further cases are found for 2 years from that date, the World Health Organization will be able to crown its decade-long eradication program by declaring the world free of smallpox.

Laboratories would then be the sole remaining source of smallpox virus, and WHO has been trying for the last 3 years to persuade researchers to turn in or destroy their stocks (*Science*, 28 July 1978). The Birmingham laboratory is one of 14 in the world which still maintain stocks.

An unusual feature of the Birmingham case is that the technician was not working in the laboratory where smallpox virus was being handled but in a room on the floor above. Airborne transmission of this sort has occasionally been reported to occur in hospitals but in a laboratory setting is "very unusual," says Stanley O. Foster, a smallpox expert at the Center for Disease Control in Atlanta.

Janet Parker developed a fever on 11 August and was confined at home. She was admitted to hospital on 24 August, where her disease was diagnosed as smallpox. All people she came in contact with are now under surveillance.

The smallpox virus was being manipulated in the department of medical microbiology of the Birmingham medical school. The researchers are understood to have been trying to characterize a smallpox variant known as white pox by comparing it with a standard strain. Parker has contracted the standard strain. The laboratory had been planning to destroy its stocks of virus before the end of the year.

An earlier laboratory-related accident with smallpox occurred in 1975 at the London School of Hygiene and Tropical Medicine. A laboratory worker became infected and transmitted the disease to two outsiders, both of whom died.

The new case is likely to give impetus to WHO's campaign to confine laboratory stocks of smallpox virus to four designated reference centers. "We must be even more strict and the laboratories must be even more careful than ever," says Joel Breman, a smallpox expert at the WHO in Geneva. Besides the CDC, which is designated one of the four reference centers, the two other American laboratories still maintaining smallpox virus are the American Type Culture Collection and the U.S. Army Research Institute of Infectious Diseases.—N.W.

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Raike wonders whether this prohibits him from collaborating on research in any of the technical fields on which his invention draws.

A patent cannot be issued until after the secrecy order on an invention is lifted—a procedure which further muddles the issue of the inventor's rights. According to Patent Office officials, the government can proceed to manufacture a device while it is covered by a secrecy order, and to use it, and can reimburse the inventor for any use made of it during that time. However, the law does not appear to obligate the government to tell the inventor in the first place that his invention is being used. In discussing this point, one official explained: "Suppose the inventor were a Russian?"

(The remark, intended seriously, nonetheless recalls the old joke about how sad it is that so many fine American products are patented to a single great Russian inventor—Reg U.S. Patoff.)

The Seattle group is also concerned that, as a result of the way the secrecy laws are implemented in practice, outside commercial inventors like themselves may be put at an unfair disadvantage to defense contractors. Many defense industries, such as Motorola Communications and Electronics Inc., are bringing out communications privacy devices for the commercial market, and apparently have experienced no serious patent problems. In fact, a patent department spokesman for Motorola, Victor Myer, told *Science* that one recent offering, the Digital Voice Protection system (which encrypts digital voice transmissions and is compact enough to fit into a walkie-talkie), is being marketed now even though patents on parts of the equipment are still pending.

"Why is theirs being permitted to go forward when ours is not?" asks inventor Raike. He says that the Seattle group's device would sell for dramatically less than the $2600 to $6000 Motorola is asking for its system.

Most secrecy orders are issued on classified patent applications filed by government defense contractors. According to Patent Office officials, in the vast majority of cases, the author of the invention is the employee of a defense contractor, and has forfeited his chance to make his hurt feelings known. "They've already made their deal, and so we never hear from them."

And because they hold security clearances, defense contractors have less difficulty finding out the justification for a secrecy order as well as the government's plans for use.

But the Seattle group says it is bogged down on the matter of getting a meeting with NSA representatives to learn of the justification for the order and any plans for government use. Says one: "They haven't been willing to meet with us on the West Coast. But they say that of course, if we're willing to come East, at our own expense, they'll meet with us. Then they turn around and won't assure us we will learn anything substantive at such a meeting."

Because they have other defense business, the defense contractors are in a position to negotiate the fate of the secrecy order as part of their ongoing government business. A retired government attorney, who worked with secrecy orders during his 27-year career, says that often companies find that secrecy orders help their plans for commercial introduction of a new invention. "The government can be the only user until the year in which it might be timely in which to introduce the invention commercially," he says. At that time, the patent can be issued and the clock starts running on the company's 17-year entitlement to royalties from the invention's use. The attorney gave as an example the Norden bombsight, which was under secrecy in the 1940's, while it enabled American precision bombing during World War II. It was not released commercially until later, when it became used in commercial aviation.

One explanation for the peculiarities of the secrecy order laws may lie in their history. They have been passed in wartime or times of national emergency—when foreign espionage rather than inventors' rights have seemed to be uppermost in the lawmakers' minds. The laws have then drifted on in force in peacetime, without any new rewriting to better serve peacetime conditions. The first such law was passed in World War I, in 1917, and, although technically emergency legislation, it was neither repealed nor updated until 1941, at the outbreak of World War II. This law remained in force after 1945 and was most recently updated in 1952, at the time of the Korea crisis and the McCarthy era concerns about foreign infiltration of the United States. Indeed, the legislative report accompanying the rewrite of the 1952 law shows more concern with industrial espionage among company employees on loan to the government, stalking the corridors of the Patent Office looking for competitors' secrets, than with the rights of the individual inventor who filed the application.

Finally, the secrecy order received by the Seattle group raises questions about the future of communications privacy technology—a field which is rapidly developing thanks to new developments in cryptography, a new range of devices made possible by the adoption of digital voice communications (the Motorola device takes advantage of this), and by spread spectrum technology (of which the Seattle work is an offshoot).

The inventors regard their device as a specific application of an entirely new branch of this growing field, and are uncertain whether to proceed with other applications in the light of the secrecy order. A defense department spokesman familiar with the Nicolai application said he did not know of any policy regarding the entire field, but said that decisions to classify certain applications were being made on an ad hoc basis.

—DEBORAH SHAPLEY

RECENT DEATHS

Benjamin Alexander, 68; head, Coagulation Laboratory, The New York Blood Center; 13 February.

Edward G. Begle, 63; professor of mathematics and education, Stanford University; 2 March.

Charles H. Best, 79; former head, physiology department, University of Toronto; 31 March.

James C. Braddock, 65; professor emeritus of zoology, Michigan State University; 21 March.

Ian Campbell, 78; former California State Geologist; 11 February.

Donald P. Costello, 68; professor emeritus of zoology, University of North Carolina, Chapel Hill; 6 February.

Clara Deasy, 62; associate professor of chemistry, College of Mount St. Joseph; 12 February.

Helmuth Etzold, 68; professor of electrical engineering, University of Rhode Island; 15 March.

Thomas H. Goodding, 87; professor emeritus of agronomy, University of Nebraska; 6 February.

C. Sherman Grove, Jr., 72; professor emeritus of chemical engineering, Syracuse University; 8 February.

Hardin B. Jones, 64; professor of medical physics, University of California, Berkeley; 16 February.

Russell M. Kerchner, 78; former head, electrical engineering department, Kansas State University; 26 March.

John E. Kouba, 65; adjunct professor of biology, College of Mount St. Vincent; 27 March.

Elizabeth McCoy, 75; professor emeri-