

Smallpox case: Glaring gaps in safety nets

On Aug. 24 Henry Bedson of Birmingham University in England identified smallpox viruses in blood samples from university photographer Janet Parker (SN: 9/9/78, p. 182). Immediately, it seemed likely that she had been infected from Bedson's laboratory. On Sept. 6 Bedson committed suicide, and on Sept. 11 Parker died. The confidential report of the official inquiry into that smallpox outbreak has reached the British press, and it lays blame on careless laboratory procedures and also on governmental and World Health Organization committees charged with protecting the public. In addition, the official report points to that same laboratory as a likely source for the 1966 Birmingham outbreak of a milder form of smallpox that infected at least 45 persons.

Parker's death is a sad epilog to the global eradication of virulent smallpox, variola major, announced more than a year ago (SN; 12/17/77, p. 407). What WHO officials called "the last case of variola major on earth" had been identified in Bangladesh in 1975. Because investigators have found no reservoir for the virus in animals, they believe the virus to be extinct except for small quantities in research laboratories.

During the past two years heated discussions have focused on the question of whether laboratory stocks should be destroyed or whether research on smallpox should continue, to guard against the possibility of a related epidemic threatening people in the future. WHO recently decided to limit research using those viruses to a few, highly contained, facilities. Bedson's laboratory was not one of the facilities chosen and was scheduled to end, by December 1978, its research in identifying smallpox viruses by their coat proteins. That deadline was not soon enough to avoid Parker's death.

The Jan. 4 *NEW SCIENTIST* describes the probable route of Parker's infection, according to the official report by a committee chaired by Reginald Shooter. Both the tiny room used for smallpox experiments and the surrounding laboratory have vertical ducts carrying wires and other services to rooms on the floors above and below the laboratory. Those ducts have inspection covers that fit badly, leaving gaps through which airborne viruses can leak, the report says. Careless laboratory procedures made the division between the smallpox room and the outer laboratory insignificant. The researchers routinely moved between the rooms to use essential equipment and did not remove their gowns or disinfect their gloves when they left the smallpox area. The airflow in the laboratory was such that, instead of preventing airborne material from leaving the inner room, it transported materials to an adjacent seminar room, into the corridor and to a little-used room upstairs.

Detective work by Shooter's committee revealed that the room above the animal pox room, connected by a service duct, contained a telephone with a direct outside connection. On July 25 Parker made a large number of calls from that telephone ordering photographic supplies. On that same day experiments on the floor below used three strains of smallpox virus — Abid, Jumma and Taj. Abid was the strain that infected Parker (and her mother, who recovered). This appears to be the first recorded case of airborne spread of virus from laboratory culture, although in 1970 in a West German hospital a patient transmitted the disease apparently via an air route. However, it is also possible that a staff member who visited both the animal pox laboratory and Parker carried the virus to her on clothing.

Physical containment is supposedly only the first line of defense against infection. Everyone who might come into contact with the virus should have been vaccinated. The university offered vaccination to all staff of the Medical Microbiology Department, but not to workers in the Anatomy Department, which was housed on the floor directly above. Parker had not been vaccinated since 1966.

And where were the safety inspections that should have monitored Bedson's laboratory? The university's subcommittee on pathogenic organisms, chaired by Bedson, did not report his laboratory's shortcomings, implement an extensive vaccination policy or train experimenters in special precautions. An inspector for the national committee, Dangerous Pathogens Advisory Group (DPAG), of which Bedson was a member, briefly visited Bedson's laboratory and approved it, although their inspector must have seen that the facility was not up to governmental standards (for instance, it did not have showers and changing facilities). DPAG approval rested on Bedson's good research reputation and mistaken beliefs that staff members worked under Bedson's direct supervision and that vaccination was extensive.

Finally, WHO inspectors visited the laboratory last May and noted the absence of many recommended facilities and procedures. (In correspondence with WHO, Bedson had already admitted his laboratory did not meet WHO requirements.) The inspecting team made procedural recommendations and expressed "considerable reservations" about safety. However, WHO did approve Bedson's work, on the condition that it end in 1978. Bedson reassured WHO with statements that "the risk must be minimal" and pointed out a decrease in the scale and diversity of smallpox work in his laboratory.

According to *NEW SCIENTIST*, Bedson clearly lied to WHO about his work's scale and diversity. The workload in the laboratory had increased ten-fold, and he had

just received 22 strains of smallpox virus to add to the 14 held previously. Finally, neither WHO nor Bedson told the other safety groups of the results of the WHO inspection.

Bedson in 1966 co-authored a report of a Birmingham epidemic of the milder smallpox, variola minor. That epidemic may also have spread from his laboratory. According to Shooter's report, the first person affected in that outbreak was the photographer holding the same position in the Anatomy Department that Parker was later to fill. That photographer had worked on the floor above Bedson's laboratory during a period in which Bedson was experimenting with variola minor. Although no cases were identified among overseas travelers, the investigators at the time believed the outbreak stemmed from an unidentified immigrant.

What now? Lawrence McGinty in *NEW SCIENTIST* calls for abolishment of DPAG and policing of the research by an agency more independent of the scientists. The Shooter committee recommends having DPAG re-inspect laboratories and move out of London the only laboratory in Britain still working on smallpox. The Jan. 11 *NATURE* reports that Keith Dumbell, head of that remaining smallpox research unit, believes that the extensive safeguards included in their custom-designed London laboratory make arguable the wisdom of moving the facility. Meanwhile, a director of the Medical Research Establishment, Porton, offers to store the smallpox virus there.

According to WHO, only ten laboratories in the world are known to now hold smallpox viruses, including, in the United States, the Center for Disease Control in Atlanta, the American Type Culture Collection in New York and the Army Medical Research Institute of Infectious Diseases at Ft. Detrick, Md. WHO favors consolidating those stocks even further to just three laboratories, those in Atlanta, London and Moscow. □

How diet can prolong life

No one knows if fat rats are considered jolly by their fellow rodents, but four decades of research strongly suggest that the weighty rat dies relatively young. More than 40 years ago, Cornell University's C. M. McCay reported that restricting food increases the length of life of laboratory rats — a finding that has been repeatedly confirmed to include other rodent species over the years. "Moreover, food restriction delays the occurrence of most age-related diseases," says Edward J. Masoro of the University of Texas Health Science Center at San Antonio.

But the exact mechanisms of the diet-lifespan link have remained puzzling. "Surprisingly little work has been done on

the effects of food restriction on age-related physiological changes," says Masoro, a physiologist. Now, Masoro and his colleagues report that several key factors may be involved in the life-lengthening properties of calorie-restrictive diets.

In a study of 520 male rats, the researchers found that the sub-group placed on low-calorie diets far outlived those permitted to eat freely — 95 percent of the food-restricted animals lived beyond the median age of the free-eaters.

Beyond that, however, Masoro reports distinct physiological differences between the two groups. As an animal ages, it becomes less responsive to the hormones glucagon and adrenalin, which promote fat metabolism by releasing fat from adipocytes (fat cells). In the rats whose caloric intake was restricted from early life, however, this hormone responsiveness decline — which could lead to obesity — was significantly delayed, Masoro reported in a paper presented at the recent meeting of the American Association for the Advancement of Science.

In addition, he reports that the bloodstream's accumulation of serum lipids, which increases with age, is also delayed in early food-limited rats. Finally, Masoro and his group found that the dietarily restricted rats developed fewer and smaller fat cells in tissue surrounding the kidneys than did their nonrestricted counterparts. The results suggest that, contrary to much widely held belief, the lifelong number of fat cells is not determined only by preweaning nutrition in the first few weeks of life but is also influenced by dietary restrictions after that.

The findings indicate that "one mechanism by which food restriction increases the length of life of rats relates to the delay in the time of onset and a change in the chronologic course of age-related physiologic decline," Masoro says. "... it can be theorized that by delaying physiologic decline, food restriction delays the onset of [age-related] diseases, thus prolonging life." □

HEAO-1 runs out of gas

After operating for nearly three times its intended six-month lifetime, the HEAO-1 satellite, first in NASA's High Energy Astronomy Observatory series, finally ran out of gas in its attitude-control system on Jan. 9. Since its Aug. 12, 1977, launching, the device had approximately quadrupled the list of known celestial X-ray sources (from about 350 to almost 1,500), as well as discovered a new possible black-hole candidate and evidence for a widespread hot plasma possibly indicating the cyclic, or "closed" nature of the currently expanding universe. A second HEAO, launched Nov. 13, 1978, is still operating, and HEAO-3 is scheduled for a September liftoff. HEAO-1 is expected to burn up during atmospheric reentry in late March. □

Reactor-safety study discredited by NRC

In a statement issued Jan. 19, the Nuclear Regulatory Commission renounced its previous endorsement of a five-year-old reactor-safety study known alternately as WASH-1400 and the Rasmussen Report. NRC's statement follows a technical, and in places severely critical, reevaluation of the study by a panel it commissioned in 1977.

"Despite its shortcomings, WASH-1400 provides at this time the most complete single picture of accident probabilities associated with nuclear reactors," the panel said. While praising the study's general methodology and recognizing its contribution to assessing the risks of nuclear power, however, the review panel leveled serious criticism.

For example, the panel said it was unable to determine whether absolute probabilities of accident sequences were high or low, but that error bounds on those estimates were in general understated. The reason, it said, was partly due to many cases being based on inadequate data, partly due to an inability to quantify common-cause failures, and partly due to some questionable methodological and statistical procedures.

The panel questioned the peer-review process, which it said in places failed to acknowledge or merely evaded cogent comments from critics. And WASH-1400's lack of clarity made it difficult to trace a line of thought throughout the study, thereby crippling many efforts to accomplish responsible peer review.

The executive summary — the only section understandable to most laymen — was a poor description of the larger tome, the panel said, because it did not indicate the full extent of the consequences of reactor accidents nor sufficiently emphasize the uncertainties involved in achieving probability calculations.

As a result, NRC said it "withdraws any explicit or implicit past endorsement of the executive summary"; agrees the peer-review process was "inadequate"; and accepts the panel's conclusion that absolute values of risks "should not be used uncritically either in the regulatory process or for public-policy purposes." In particular, NRC said it "does not regard as reliable the report's numerical estimate of the overall risk of reactor accident." Where possible, however, NRC will continue to use parts of the study that are based on adequate data and verified analytical techniques.

Morris K. Udall (D-Ariz.), who chairs the House Interior subcommittee with oversight of nuclear regulation, announced he will hold hearings on the study. "Nuclear proponents have for years used the study to assure the public that nuclear power is safe. [NRC] has now made clear that the report is useless for this purpose," Udall

said. "[Its WASH-1400] statement is a hopeful sign that the NRC is becoming the objective regulator that Congress had sought." NRC credits Udall's criticisms of WASH-1400 with its call for a reevaluation of it. □

Smoking imperils the unborn

The Surgeon General reported, on the basis of 30,000 scientific articles, that there is "overwhelming evidence connecting cigarette smoking with disabling and fatal diseases" (SN: 1/20/79, p. 39). Now still more damaging evidence against cigarette smoking has emerged — evidence so new that it couldn't be included in the Surgeon General's report. It is that maternal cigarette smoking can imperil the health of unborn and newborn children — even if women quit smoking before becoming pregnant.

The indictment comes from the U.S. Collaborative Perinatal Project, headed by Richard L. Naeye of Pennsylvania State University Medical Center. It was released last week at the American Heart Association's annual science writers' forum and was based on the results of a study of more than 50,000 pregnancies at 12 U.S. medical centers. The study results are essentially the following ...

- Cigarette smoking during pregnancy significantly increases the risk of miscarriages, especially by causing a premature separation of the placenta from the womb, by causing Rh blood disease or by contributing to malformation of the fetal heart or other organs.

- Cigarette smoking during pregnancy strongly increases the risk of fetal birth defects that are usually fatal.

- Cigarette smoking during pregnancy increases the chance of a newborn dying from crib death, although smoking is not the major risk factor in such deaths.

- Even if a woman gives up cigarette smoking before becoming pregnant, her previous smoking increases the risk of placenta praevia, a condition in which the placenta is attached abnormally low in the womb and that leads to dangerous complications during labor and birth. □

Fish lives, dam dies

The verdict is in and the snail darter wins. The new Cabinet-level Endangered Species Committee met for the first time Tuesday. In unanimous votes, it exempted the Graylocks dam in Wyoming from provisions of the Endangered Species Act as long as builders protect the whooping crane's habitat, and did *not* exempt the Tellico Dam in Tennessee so that the snail darter, a two-inch fish, might live. Sen. Howard Baker (R-Tenn.) will try to annul the Committee and its Tellico ruling. □