curred in most industrial countries in the 1950's and 1960's, when physicians were attracted to what seemed then the more interesting and certainly more lucrative specialties. With a combination of controls and incentives the NHS has made progress in increasing the number of physicians in "underdoctored" areas and in making primary care accessible to most people in Britain under circumstances satisfactory to both patients and doctors.

Physicians have retained a substantial measure of professional independence in the NHS, and in this respect two ideas have been important in Britain. The first is "clinical freedom," meaning the doctor's right to treat his patient as he sees fit. The second is the distaste for "directed labor," a leftover World War II phrase with a totalitarian overtone which denotes government power to determine how and where individuals should work. British doctors generally appear to feel they have maintained clinical freedom, some critics say at the price of clinging to inefficient practices. The GP's, however, seem to have been somewhat more insulated than consultants who practice in hospitals, and therefore are in the thick of things in what is, in effect, the biggest nationalized industry of all, with the frictions that implies.

Part of the present angst among consultants is attributable to a feeling that the role of the physician as head of the health team is being challenged. The dispute over pay beds in NHS hospitals brought this issue to the fore. The Labour party had made phasing out of private beds an issue in the campaign before the 1974 parliamentary elections. When Labour won the election, however, unions representing ancillary workers in the hospitals (orderlies, aides, food service and maintenance workers) seized the initiative by refusing to provide service to private patients.

Observers note that competition among rival unions for members may have contributed to the action, but there is little doubt that antipathy to pay beds was widely shared among nonprofessionals on hospital staffs. British trade union attitudes tend to have nonconformist, egalitarian, anti-elitist foundations, and many union members obviously felt that pay beds represented a double standard of care which constituted an affront to them and a danger to a national health service. Some of the most militant trade unionists are Marxists and, in the pay beds matter, these activists sharpened the element of class conflict in the dispute.

Physicians have always identified with the professional classes in Britain. Most physicians have regarded it a duty to provide unpaid public service which would be likely to include such things as teaching of medical students and care of the poor; the physician would expect a measure of status recognition in return. Many doctors were unsettled at being pointedly treated by union members as "fellow workers" during the pay beds controversy and were deeply disturbed when the junior doctors initiated industrial action during their own pay dispute.

As a result of the events of the past few years, morale among physicians, particularly consultants, is unquestionably at a low point. Some consultants feel that the dispute over private beds heralds a campaign aimed at eventually abolishing private medicine in Britain.

The trade unions generally consider that private medicine inevitably undermines the NHS and sentiment there for abolition of the private sector is fairly strong and widespread. The Labour party and Labour government, on the other hand, specifically accept the continued existence of private medicine and, in fact, included some mild measures to encourage it in the agreement concluded with the consultants. The fortunes of private medicine in Britain would appear to depend on the ideological cast of subsequent British governments.

At the beginning of the NHS 30 years ago, doctors reached a compromise with the government which ensured that the health service would be run along lines largely to their liking. More recent government actions in the name of efficiency and equity and chronic disappointment over pay have damaged doctors' morale. But if many doctors feel thwarted in their desires to qualify in a particular specialty or do research, or are torn by the dilemma of whether or not to emigrate, the great majority continue to support the NHS idea.

Numbers of British physicians criticize their American counterparts for exploiting a monopoly position to enrich themselves, and British doctors tend to view their colleagues in other European health services as sacrificing clinical freedom. It is fair to say that to most British doctors, the NHS still appears to represent a desirable middle way, although current tensions are certainly putting that attitude to the test.

—JOHN WALSH

Biological Warfare Fears May Impede Last Goal of Smallpox Eradicators

One last obstacle is assuming greater importance as the World Health Organization's remarkably successful campaign to eradicate smallpox nears its final goal. Once the virus is eliminated from the wild, the stocks of virus held by research organizations will be the only possible source of the disease breaking forth again. Yet some laboratories have so far not heeded WHO's recommendation that they dispose of their stocks. Fears of biological warfare may be one reason why the U.S. Army Medical Research Institute of Infectious Diseases—the successor to the Army's Biological Warfare Laboratories at Fort Detrick in Frederick, Maryland—still maintains stocks of smallpox virus.

Possession of smallpox virus by USAMRIID is, on the face of things, unexpected. Offensive biological warfare was renounced by the United States in 1969, and for defensive purposes, a vaccination program would require not smallpox virus itself but, as Jenner discovered long ago, the related virus of cowpox. "The only reason to have smallpox virus is for offensive purposes. USAMRIID has not at this point been requested to turn it over, but that time will surely come," says John H. Richardson, director of biosafety at the Center for Disease Control in Atlanta, Georgia, and a consultant to the WHO eradication program.

Defense Department officials, however, say the virus has been retained up to now for diagnostic purposes, in case there should be a need for rapid identification. USAMRIID has not yet decided whether to retain, destroy, or transfer its stocks to CDC. "At this time we have not yet come to a decision pending a

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technical evaluation in cooperation with the Department of Health, Education and Welfare," says a defense official. American laboratories were first asked by CDC in 1976 to transfer or destroy their stocks of smallpox virus. WHO sent a follow-up letter on 6 July 1978 to the Walter Reed Army Institute of Research (a polite alias for USAMRIID) and is awaiting a reply.

Porton Down, the British biological warfare establishment, gave up its stocks of smallpox virus in April this year. Military medical sources argue that there are good reasons why USAMRIID should wish to retain the virus. Smallpox is not on the usual list of biological warfare agents because vaccination is a sure defense against it. But when the WHO eradication program is successful, and smallpox vaccinations cease, populations will be increasingly vulnerable. Smallpox is the ideal biological warfare agent since it is stable, easily aerosolized, simple to grow, and is a terrifying disease with high lethality. Should such an agent be deployed, whether by foreign powers or terrorists, the army would require immediate access to the virus for diagnostic purposes. The Center for Disease Control has been designated by WHO as one of the four labs that should retain stocks, but Army scientists fear that the virus might in time be lost through accident or error. "USAMRIID maintains stocks in the event that at some future time they can no longer rely on CDC," says one expert.

The WHO smallpox eradication program began in 1967, largely at the initiative of the Soviet Union. The disease has now been eradicated from all continents except Africa, where the last known case occurred in October 1977. If no further cases occur for 2 years from that date, a group of experts will meet to declare smallpox eliminated from the world. Foreseeing this possibility, WHO took steps to bring all laboratory stocks of smallpox virus under closer control. All nations except Kampuchea responded to a WHO survey in 1975. As a result of this and of a literature survey going back to 1950, some 75 laboratories were identified as possessors of smallpox virus.

The WHO goal is to have only four laboratories holding smallpox virus by the end of 1980. These are the Center for Disease Control, the Laboratory for Smallpox Prophylaxis in Moscow, St. Mary's Hospital Medical College in London, and the National Institute of Health in Tokyo. All other holders of smallpox virus have been urged either to destroy their stocks or to transfer them to one of the four centers. The wisdom of this policy was foreshadowed by a fatal laboratory-caused outbreak in London in 1973.

WHO has no powers of enforcement. "We are just using our persuasive skills," says Joel Breman, a CDC smallpox expert detailed to WHO in Geneva. "We have had no outright refusals and a very positive attitude from the labs which still retain viruses."

WHO's persuasive skills have reduced the number of holding laboratories from 75 to 14. Three of these are in the United States: they are the Center for Disease Control, "Walter Reed"—in other words USAMRIID—and the American Type Culture Collection in Rockville, Maryland.

The board of the American Type Culture Collection has discussed the smallpox virus issue several times, and on each occasion has decided to maintain its stocks. The collection does not dispense smallpox virus, as it does the other viruses, bacteria, and cell lines it stores, but wishes to retain smallpox for archival purposes. ATCC officials would like to keep their collection complete, consider that their possession of the virus is a hedge against CDC's being somehow destroyed, and note that they have a perfect safety record. "I am in complete agreement with the position ATCC has taken," says Adrian Chapell, chief of the viral and rickettsial products branch of CDC. Speaking as a former board member of ATCC, and not for CDC, Chapell says that ATCC's right to store the virus would certainly be above the military's reasons for keeping it, and that "I personally feel that ATCC is probably the best place in the world for preserving things of this sort."

But John Richardson, Chapell's colleague at CDC, says that, if ATCC does not turn over its stock voluntarily, it will be categorically asked to do so by the Public Health Service at some time in the future, probably when smallpox is officially declared to be eliminated. "For damned sure, the ATCC storage area does not meet the recommended WHO standards for containment of smallpox," says Richardson. WHO says this has not been confirmed.

Neither ATCC nor USAMRIID has refused outright to comply with the WHO recommendation. Discussions are still continuing. But if they are still continuing by the time the world is declared officially free of smallpox, WHO's recommendations may become more insistent unless the two laboratories and their counterparts in other countries can show exceptional cause for retaining the virus.—NICHOLAS WADE

Budget-Cutting Mood in Congress Begins to Hit Science

The impact of California's tax-cutting Proposition 13 hit the Washington science community several weeks ago, as the U.S. Senate, led by Senator Orrin Hatch (R-Utah), beat back a proposal to permit a $16 million boost in the President's budget request for the National Science Foundation (NSF). The incident marked the first time that the Senate has voted a reduction of the NSF budget ceiling approved by the Subcommittee on Health and Scientific Research, chaired by Senator Edward Kennedy (D-Mass.).

It also came at a time when President Carter is directly urging members of congressional appropriations committees not to reduce his requests for spending on basic research. The impact of the Senate action, however, is to make it likely that some reduction in the President's request for the science agency will be made. "Congress has me worried," the director of NSF, Richard Atkinson, told *Science*. "I don't expect the budget to fare too well."

Although the NSF funding saga is not yet over, the significance of the action thus far lies in the fact that the Kennedy subcommittee and the Senate appropriations committee usually approve an increase in the Administration request, and their counterparts in the House approve a decrease. Ultimately, after the NSF budget bill goes through each House twice—once to set a ceiling and once to fix the exact amount—a compromise is reached at or about the Administration's requested level.

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