the tragic Apollo fire in 1967, in which the deaths of three astronauts were blamed in part on the pure oxygen atmosphere, a change was made so that a mixture consisting of 60 percent oxygen and 40 percent nitrogen was used in the cabin on launch. Postflight tests on crews led to the conclusion that the nitrogen which persisted in the cabin atmosphere exerts a moderating effect on loss of red blood cell mass.

From the time of the earlier flights there has been some accumulation of blood in the astronauts' legs which seemed ascribable to relative inactivity. Signs of "cardiovascular deconditioning" have also been noted with high heart and pulse rates persisting for rather short periods after flights.

As NASA looks ahead to longer missions —1- and 2- month missions in the orbiting workshop—there seem to be no medical specters haunting NASA, but some things will have to be watched. The implications of long periods of weightlessness for motion sickness of vestibular origin are not fully understood. Cardiovascular deconditioning and a decline in work capacity observed in the immediate postflight period require study. In the longer run, the radiation effects of nuclear power sources or nuclear rockets will also require study.

As the duration of flights increases, so does the need for research of a more fundamental kind. Berry and his colleagues are acutely aware that longer flights will bring new dimensions of physiological and psychological stress, and they cite studies on the vestibular and endocrine systems as examples of basic research offering opportunities to gain results useful beyond space operations.

The NASA answer to why a formal basic research program wasn't flown seems to be that finite resources and operational priorities prevented it. It is pointed out, however, that very extensive medical records have been kept on the astronauts, as well as detailed data from the in-flight monitoring of vital functions and from a careful biological sampling program. This has been done to accumulate a data base necessary for the development of space medicine as a science, and the data and samples are available for future study.

The PSAC panel's report last November, however, represents the kind of criticism that will surely grow more insistent.

The report rather sharply observes "It has been customary for investigators to explore the stresses of a new environment by cautious empirical approaches and withdrawals, solving the immediate problems which become apparent and procrastinating over the risk of injury from chronic or delayed effects of the new environment."

What the panel asks is that NASA participate in a rapid development of the science of environmental medicine. They urge that the clinical medicine, the general biology, and the fundamental physiology divisions of the agency be linked more closely and that more emphasis be given to the latter. One suggestion is that biomedical-scientist astronauts be attracted to the program, since the kind of testing and experimentation needed in space will require specialists. In general the panel wants to see NASA establish more substantial ties with the biomedical community and find ways to give scientists outside the agency an active role in biomedical policy-making for the manned spaceflight program.

There appear to be practical limits other than the budgetary ones on the expansion of basic studies in the manned space program. It will be a long time before astronauts on missions operate in conditions anything like those of the laboratory. Berry and his staff have been responsible for establishing medical protocols for the missions, in a way that balances the need for biomedical data with operational demands and the willingness and ability of the astronauts to cooperate. Some medical procedures are tedious, unpleasant, and even humiliating, and, when the work load on astronauts is heavy, data gathering has to be limited. For this reason in part, then, tension between biomedical insiders and outsiders is likely to continue. At the same time the interests of the two groups are nearer to converging than ever before.—JOHN WALSH

Fisheries Research: Rejuggling of Priorities Is Assailed

According to some biologists and certain members of Congress, the Bureau of Commercial Fisheries (BCF), an agency of the U.S. Department of the Interior, is behaving as though it were deaf to all the talk by President Nixon about arresting environmental deterioration and using resources wisely. A major case cited in point is the bureau's plans, which are part of the President's fiscal 1971 budget, to reduce research activities at its Ann Arbor Biological Laboratory, an institution which has had a major part in identifying and combating problems threatening the Great Lakes.

And the bureau is closing altogether its biological laboratory at Milford, Connecticut, a shellfish research facility which has been doing pioneering work in aquaculture since 1940. The decision to close the Milford laboratory has brought an outcry from a number of fishery biologists who feel that top officials of the BCF are foolishly emphasizing fishing for diminishing stocks of wild fish in the open ocean. What BCF should be doing, these critics contend, is devoting increasing attention to aquaculture, or the production of fish and shellfish under controlled conditions.

The fund cutback at Ann Arbor, which will reduce the laboratory's research effort by nearly a third, is being justified largely as a part of the administration's program to check inflation. But it also reflects the BCF's intention to give less emphasis to biological research in the Great Lakes. The Great Lakes no longer have an important commercial fishery, and BCF officials clearly would like to turn the Ann Arbor laboratory over to a sister Interior agency, the Bureau of Sport Fisheries and Wildlife (BSF&W). The possibility of such a transfer is now under consideration by the two bureaus and the Fish and Wildlife Service, of which they are a part.

Scientists at the laboratory fear that the transfer could be ruinous because the BCF will not, if it can be avoided, give up any of its own funds to the BSF&W; rather, this latter agency (which is having its own budgetary problems) would be left to seek new appropriations for the laboratory. Whatever the laboratory's ultimate fate, its prospects in the short run are plainly discouraging. According to Ernest D. Premetz, the BCF's deputy regional director for the Great Lakes, dismissal notices have gone out to 19 of the 82 people on the research staff and nine of those being dropped are professional biologists.

The Ann Arbor laboratory is the only major fishery research institution on the Great Lakes, and its scientists were the first to warn that Lake Erie was in desperate trouble from pollution. Also, this laboratory is credited with having developed methods for control of the lamprey, a predator which devastated the lake trout fishery in the upper Great Lakes during the 1940's and 1950's. And, at present, the laboratory is deeply engaged in research on questions such as the population dynamics of the alewife (a herring whose massive die-offs have been a major nuisance) and the effect of pesticides on the Great Lakes fishery.

Ties with Universities

Karl F. Lagler, professor of fisheries and zoology at the University of Michigan's School of Natural Resources, told *Science* that any setback to the laboratory's research will be keenly felt by the Great Lakes research programs at the University of Michigan and at other institutions. According to Lagler, the laboratory has long had close ties with universities in the Great Lakes area with respect to research and the training of graduate students.

U.S. Representative Marvin L. Esch of Ann Arbor is seeking to rally members of Congress from the Great Lakes area against any action impairing the laboratory's effectiveness. Esch, a Republican, notes that President Nixon recently visited pollution-control facilities in Chicago to dramatize his interest in environmental protection. "Surely this administration [does] not intend to drain the vitality of the country's only major freshwater research facility," he says.

William M. Terry, BCF's acting deputy director, replies that, while BCF does not question the importance of the Great Lakes as a national resource, its research program at Ann Arbor could not escape reductions. This year the agency has a budget of $52 million, of which far more is for research (over $20 million) than for any other activity; in the President's budget for next year, Terry points out, BCF has been cut to $45 million. A BCF budget document explains that $1.5 million of this $7 million reduction in agency funds will come from "low-priority biological research programs [including those at Ann Arbor and Milford] not critical to programs planned for major emphasis." The same document states that the agency will focus primarily on assessing stocks of fish and shellfish and developing better and cheaper methods to enable fishermen to locate and harvest them.

Rallying Opposition

The BCF's biological laboratory at Milford, on Long Island Sound, is scheduled to be closed in May, with a budgetary saving of $150,000 for next year resulting. Its staff, which includes six Ph.D.'s and seven other biologists, has been attempting to forestall the closing by rallying the support of scientists and others who know the laboratory. In a letter sent out last month, the staff pointed out that the laboratory, which only 3 years ago moved into a new $1.3-million building, is unique among fishery research facilities, having been designed specifically for aquacultural research.

Recently, a number of scientists have written members of Congress and various administration officials protesting the plans to close the laboratory. In one such letter, Myra Keen, president of the Western Society of Malacologists and professor of paleontology at Stanford, has observed: "Most fisheries' work is on a par with the hunter state of human cultural evolution—taking food where it is found. Aquaculture or mariculture corresponds to the agricultural stage of nomads who settled down to produce food and in the process began civilization. It is tragic that, just when we as a nation are realizing the need to increase food production from the sea, a facility that has pioneered in sound [aquacultural] methods should be . . . scuttled."

BCF officials have said that, except for the work in genetics (which they hope somehow to continue), the research at Milford should be taken over by industry and the coastal states. Commenting on this, Melbourne R. Carriker, director of the systematics-ecology program at the Marine Biological Laboratory at Woods Hole, told *Science* that, even if much of the laboratory's applied research should be left to others, the laboratory should not be closed but, rather, its program should shift to ecological investigations in which shellfish behavior, physiology, and genetics are studied in relation to environmental conditions. Carriker said that the laboratory could, for example, use its exceptional facilities for the spawning and rearing of mollusks in testing the effects of pollutants on the larval stages.

The BCF has had a program of aquacultural research at its biological laboratory at Oxford, Maryland, but this work too is being phased out. However, the Oxford laboratory, where work has been primarily in the field of shellfish diseases, has been spared a budget cut and is in no imminent danger of being closed; it is located in the district of Representative Rogers C. B. Morton, the Republican National Chairman. The Milford laboratory's lack of immunity to closing orders may perhaps be partly explained by the fact that his facility is situated in a district and state represented in the House and Senate by Democrats.

Reversal Possble

The decisions to close the Milford laboratory and to cut back research at Ann Arbor may well be reversed in Congress. Representative Robert N. Giamo (D–Conn.), whose district includes Milford, is a member of the House Appropriations Committee and has appealed for help to Representative Julia Butler Hansen (D–Wash.), the chairman of the Appropriations subcommittee handling the BCF budget. According to one of her aides, Mrs. Hansen, who represents part of the Puget Sound area, takes a keen interest in fishery problems and hopes to see the programs of the Milford and Ann Arbor laboratories continue.

If both of these laboratories should be dismantled, the skies will not fall. And one would not have trouble finding other equally worthy federal research activities that are in jeopardy for lack of funds. However, the case for providing the relatively modest funds necessary to continue the programs at Milford and Ann Arbor is a strong one, especially when the Nixon administration is requesting billions for highly debatable projects such as the supersonic transport and the antiballistic missile.—LUTHER J. CARTER