leaving was his wish to free himself to speak out more candidly about the magnitude of the domestic crises that face this nation.

While philosophic in approach, Gardner has some of the admirable qualities of a crusader. When he took office in 1965 he threw himself with great energy into President Johnson's crusade against poverty, urban decay, and inadequate educational and health services. But since 1965, the Administration's activities in Asia have somewhat unexpectedly drained off the financial and executive resources which were to have been used for expansion of the crusade against the nation's domestic ills. When asked why Gardner had resigned, one of Gardner's HEW colleagues replied, "The country can't seem to conduct two crusades at once."

A month ago Gardner gave a major speech in which he talked of "the coming crunch between expectations and resources." This Administration has done much to raise expectations of domestic reform and improvement, but now, in light of the great demands of Vietnam, neither the President nor a major part of the Congress and the American public is willing to fulfill those expectations by allocation of adequate resources. For Gardner and for the rest of the nation, the crunch is no longer "coming" but is here. Secretary Gardner is only the latest, and perhaps the most illustrious, of a group of talented officials who have concluded that they can do more for their country outside the federal government than they can as members of this preoccupied Administration.

—BRYCE NELSON

International Cancer Research: New Horizons for Epidemiology

Lyons. The International Agency for Research on Cancer has a tie with the UN, and the sign on the door and the office stationery accordingly carry the name in English and French. The staff of IARC tends to favor the French version, *Centre Internationale de Recherche sur le Cancer*, because *centre* suggests an organization directly involved in research, whereas "agency" might mean a bureaucratic intermediary. This question of participation in research has been the crucial one for IARC since it was established by the World Health Assembly in 1965 after a prenatal period untypical of international scientific organizations.

The origin of IARC can be traced to a proposal in 1963 by a group of French intellectuals that major nations contribute ½ percent of their defense budgets to cancer research, specifically to an international cancer research organization. President de Gaulle endorsed the idea with apparent enthusiasm, and it was made known that the French would welcome creation of such an institute on French soil.

One difficulty was that nobody with a knowledge of cancer research had been a member of the original group of savants. Scientists who knew the field tended to feel that cancer research needed funds less than manpower and ideas. In December of 1963, a meeting of experts was held to see what could be done to make the proposal scientifically useful, complementary to national programs, and acceptable to governments. The consensus was that an international research organization stressing geographical epidemiology was the most promising possibility.

Since the United States defense budget was the world's biggest, a point which the French progenitors of the idea seem to have had very much in mind, U.S. action on the proposal was carefully watched. Official feelings about IARC were mixed. The U.S. was already spending nearly the equivalent of ½ percent of its military budget on cancer research in those pre-escalation days. There was a reluctance to divert major funds from national research programs, and doubt that vast new funds could be spent effectively. But it was hard to oppose an idea that was against cancer and for disarmament.

A formula was ultimately fashioned under which the principle of basing contributions on defense expenditures was abandoned, and the scale of the project was reduced. A cancer research organization was proposed to which nations could belong voluntarily on payment of an annual contribution of $150,000. As the grandeur of the original conception dimmed, de Gaulle's ardor is said to have cooled, but French sponsorship of the project was sustained when the energetic mayor of Lyons offered a site for the center in his city and French governmental support for a building.

From five participating states at the start, membership has grown to nine: Australia, Federal Republic of Germany, France, Israel, Italy, Netherlands, the Soviet Union, United Kingdom, and the United States. The group of expert advisers has evolved into IARC's scientific council, appointed because of their scientific competence by the governing council. This governing council is made up of one representative of each participating state and the director general of the World Health Organization. IARC is an autonomous agency within the framework of WHO.

Given a mission—"to promote international collaboration in cancer research"—a base, and a budget, the next question was what should an international cancer research organization do which would not simply duplicate the work of national programs. Expert opinion had pointed to cancer epidemiology, but there were doubts that the new IARC could justify itself simply as a statistical bank.

Clearly, the first director and staff members would have a decisive influence on the development of IARC. The directorship went to John Higginson, a pathologist with an interest in cancer epidemiology, who had a firm belief in a multidisciplinary approach for IARC and who in his first memo to the governing council said that

field activities should be backed up with a laboratory program at headquarters.

Higginson, 45, came to IARC from the University of Kansas where he held an American Cancer Society professorship in geographical epidemiology. Born in Belfast, he received his medical education in Dublin and completed his training in pathology in Glasgow. He spent most of the 1950's in South Africa working at the South African Institute of Medical Research and serving as pathologist in charge of the morbid-anatomy department of a non-European Hospital in Johannesburg where his interest in disease patterns in human cancer became focused. He went to Kansas in 1958.

Higginson took the IARC director's job on a 2-year leave of absence from Kansas. In the initial stages IARC's role was far from clearly defined, and Higginson went to the job convinced that IARC could perform a unique and valuable function, but that the key was permission to perform laboratory research.

What was needed for the IARC staff, Higginson argued, were people with real research competence. Without them, he said there was a danger that an epidemiology institute would become "a repository of dead statistics." Those competent in a scientific field are more likely to develop successful programs; it was necessary to have people at headquarters with sufficient professional stature to win cooperation from researchers in the field. In Higginson's view it was imperative that the staff remain "academically active." "Unless we can create a university atmosphere," he said, "we're a dead duck as far as research is concerned."

The proposal that IARC staff should have a laboratory role, however, ran counter to the prevailing tradition in international scientific agencies and at first encountered the same sort of resistance that permitted the World Health Research Center in WHO epidemiology and communications science divisions, but blocked formation of a division of biomedical research (*Science*, 3 March 1967). Fear at home of seeing funds and manpower diverted has been the chief bogey. However, IARC is organizationally more like the regional European organizations for nuclear research (CERN) and space than like the UN agencies where major contributors have sometimes been outvoted on major questions.

Last February, IARC's scientific council recommended some laboratory work for the staff, and the governing council, in effect, accepted the principle in November when it asked that the director submit a written statement defining lab work which could be regarded as meeting the terms of IARC's function of "identifying etiological factors in human cancer utilizing all aspects of environmental biology."

IARC's mission is to prove what causes cancer in man. As the stress on environmental biology suggests, IARC is unlikely to be deeply involved in, for example, cancer chemotherapy or virological research, which figure large in major national cancer research programs. The emphasis will be on the study of human cancer. Patterns of high or low incidence of specific types of cancer in particular populations invite study. Epidemiology and laboratory research on cancer have customarily been separated, and an attempt is being made at IARC to integrate them so that it will be possible to follow up in the lab what has been learned in the field. Accurate identification of carcinogens in the environment should lead, where possible, to their elimination.

Higginson admits that environmental biology has not, at least until recently, been a popular specialty and that cancer epidemiologists and biostatisticians with medical training are hard to find. IARC will try to recruit those who are competent in cancer research or related fields and interested in the integration of field work and lab research.

Medical School Nearby

Higginson's view is that good people won't come unless they have a good place to work. Whether Lyons will give IARC the facilities and the atmosphere required is therefore an important question. The city has bought a site for IARC a stone's throw from the medical school, and cordial relations are developing with both a regional cancer hospital and a new government-supported national virus research lab in Lyons. A commercial firm, which is a major supplier of experimental animals, is located in the city. IARC's headquarters building is scheduled for completion in 1970. It is a 14-story tower with auditorium attached. Plans call for ten floors to be used at first, with the rest sealed off. City, department, and national governments are to share the cost of construction equally.

With its income from memberships now at $1.35 million a year, IARC has a budget of $1.6 million for 1968. A deficit budget is possible because IARC spent little of its income in the first 2 years, and its statutes permit it to accumulate these funds. It is proposed to spend some of these accumulated funds over the next 2 years to increase staff to a "critical mass" and raise the number of operational programs.

The staff now numbers about a dozen professionals at headquarters and in the field. The range of background, nationality, and experience is fairly wide; and sections have been set up for analytical environmental carcinogenesis, biological carcinogenesis, biostatistics, chemical carcinogenesis, epidemiology, experimental pathobiology, and for the administration of a fellowship program.

Under this fellowship and training program an average $320,000 is budgeted annually for the next 3 years. The program includes 1- or 2-year research-training fellowships for postdoctoral-level scientists and travel fellowships for established cancer researchers. An announcement notes that IARC is "especially interested in applications for training in epidemiology, biostatistics and all aspects of environmental biology." The fellowships could provide some future staff members.

IARC will not give research grants. It would be hard to justify awarding research funds over which it would exercise little control. Besides, it is axiomatic among international agencies that, when discretionary funds are distributed, major contributing nations are soon asking for a "just return."

On the other hand, IARC is prepared to do work on contract and expects to carry through cooperative projects in countries where governments are interested in the sort of research undertaken by IARC. Higginson's view is that "we'll cooperate with anybody." A special effort is being made to choose projects that present a special opportunity for an international organization.

Not surprisingly, the choice of early projects has been influenced by the experience of the staff. Dr. C. S. Muir, chief of the epidemiology section, for example, was a reader in pathology at Singapore University before joining IARC. Compared with other population groups, South Chinese show a high incidence of nasopharyngeal cancer, and Muir had become interested in the phenomenon when he was in Singapore. The temptation is to suspect a genetic factor, since Indians and Pakistani—living in Singapore, for example—have

a much lower incidence than Chinese of cancer of the nasopharynx. South Chinese have migrated in great numbers, and the study of the variation of cancer patterns in migrant populations may yield etiological clues. It would be significant if it were possible to demonstrate, for instance, that among those who migrated to California cancer incidence fell—and there is some indication that it has among the second and third generation. Such a result would not rule out a genetic factor, but would encourage the search for other factors. IARC does plan such a population study, and also contemplates research on the possible role of adenovirus in human nasopharyngeal cancer.

Liver cancer is unusually common in some parts of Africa. Suspicion has collected around aflatoxin, which appears to be a waste product of fungi associated first with peanuts. Research indicates that aflatoxin is a powerful liver carcinogen. Peanuts are an important source of protein in diets of people in areas where liver cancer incidence is high in Africa. Blaming aflatoxin makes an attractive theory, but work establishing the tie has been done largely by agricultural and veterinary researchers. The problem of relating aflatoxin to human disease has hardly been touched. It is not easy to design an experiment to test the hypotheses, but it is to solve this sort of problem that IARC was formed.

In cooperation with the Tropical Products Institute in London IARC will try to answer the question whether a given population is demonstrably exposed to aflatoxin. An area near Nairobi where peanuts are a staple item in the diet has been chosen, and a field station is being established there. A chemist will be part of the field team seeking to learn what people actually eat in the area and, therefore, what to sample and analyze. A scheme of sampling food ingested will run for 2 years. Some 2000 specimens a year from kitchens will be taken and analyzed by random selection and at different seasons. The disposal of waste and spoiled food will also be watched. If a meaningful average level of intake of aflatoxin can be obtained it may be possible to correlate this with the incidence of cancer in this area compared with other areas where levels are different.

In IARC's early days, when it became clear that only affluent countries were joining the special-purpose organization, misgivings were expressed

NEWS IN BRIEF

● **PROPOSED AUTO POLLUTION STANDARDS:** Regulations which would reduce the level of allowable automotive exhaust by one-third for 1970-model motor vehicles, as compared with the emission levels of 1968 models, have been proposed by Health, Education, and Welfare (HEW) Secretary John W. Gardner. The standards would require the control of 77 percent of hydrocarbon emissions and 68 percent of the carbon monoxide. The proposed regulations would also require cars and light trucks to control 90 percent of the evaporation of hydrocarbons from gas tanks and carburetors; require control of 35 percent of the hydrocarbons and 37 percent of the carbon monoxide of gasoline-powered heavy trucks and buses; and would limit smoke from diesel-powered vehicles. The effect of the standards would be to limit exhaust emissions from automobiles and light trucks to 2.2 grams of hydrocarbons and 23 grams of carbon monoxide per vehicle mile; 1968 models may legally emit 3.2 and 33 grams, respectively, per mile. HEW will accept comments on the proposed regulations through 4 February. After that date, the new standards, as amended, will become the 1970 standards.

● **CORNELL LAB SEVERANCE:** The Cornell University Board of Trustees has accepted the recommendations of a special committee and has voted to end the university's association with the Cornell Aeronautical Laboratory (CAL) (*Science*, 12 January). Among the reasons cited by the committee for its recommendations were the overlap and potential conflict between CAL's overseas research projects and the university's expanding program of international studies. CAL does applied research valued at about $30 million annually—more than two-thirds of which is performed under contract to the Department of Defense (DOD). Of the DOD contracts, about one-half are classified. The special committee, headed by W. David Curtiss, professor of law, was appointed by the Cornell trustees last summer to study the relationship of the laboratory with the university. Although faculty concern over CAL's classified research was one of the reasons for the study, the committee did not directly cite such research as basis for its recommendation.

● **DENTAL X-RAYS:** The American Dental Association, which defended dental x-rays during congressional hearings on radiation as "an essential component of the modern dental practice," has advised dentists that x-rays "should be kept at a minimum and should only come after careful consideration of both the dental and general health needs of the patient." Eleven recommendations on dental x-rays were listed in the February issue of the *Journal of the American Dental Association*. The association also emphasized that x-rays should not be conducted periodically or be a part of every dental checkup.

● **NEW PUBLICATIONS:** The National Science Foundation has released two new publications. *Scientific Activities of Nonprofit Institutions, 1964,* is the result of NSF's first broad survey of nonprofit institutions with the exception of hospitals and voluntary health agencies. According to the report, nearly 1600 institutions, of the 4700 surveyed, reported some type of science program. In 1964, operating expenditures for research and development by independent nonprofit organizations totaled $610 million—two-thirds of which was financed by the federal government. The second report, *Scientific and Technical Personnel in the Federal Government, 1964,* is a survey of scientific and technical personnel employed by the federal government. Both studies are available from the Superintendent of Documents, Government Printing Office, Washington, D.C.; the nonprofit study costs 60 cents; the personnel study costs 30 cents.

● **COMMISSION ON ENGINEERING:** The Commission on Engineering Education will be dissolved by 1 March 1969 and its functions will be assumed by a newly established committee within the National Academy of Engineering. The commission was founded in 1962 as an independent organization to develop programs for the improvement of undergraduate education in engineering. The membership of the new Committee on Engineering Education in the academy is the same as that of the board of directors of the commission. John R. Whinnery, University of California, Berkeley, is chairman of the board of directors of the commission and of the committee.

about IARC being a "white-man's club." Because of shorter life expectancy in less-developed countries, cancer was viewed as a problem of rich countries. Many so-called "third-world" countries have insufficient resources to deal even with the most pressing traditional public health problems. When several early IARC projects included research in less-developed countries there was an undercurrent of complaint about ex-colonial people being used as "guinea pigs."

IARC explanations seem to have satisfied the skeptics and its architects insist that cancer must be treated as a world problem, and that a fundamental aim of the organization is to enable environmental biology to be carried out regardless of national frontiers. A lot of relevant research on cancer is already being done in industrialized countries, but very little in the nonindustrial rest of the world. Much of IARC's work will be done in the industrialized nations; a multifaceted program to determine possible etiological factors in gastrointestinal cancer and studies on carcinogenic effects of DDT will be major efforts. The special attraction of research in underdeveloped areas is that enormous variations in disease patterns can still be found among groups of people living relatively close together, but under different environmental conditions. This is no longer true in the industrialized countries and is unlikely to be true much longer in the nonindustrialized ones.

At headquarters, IARC hopes to go beyond conventional descriptive epidemiology, not to give it up. The plan is for IARC to seek to advance the cause of world standardization of cancer reporting. Efforts will also be made by IARC to get together all cancer statistics in WHO archives and bring them into conformity.

IARC has set itself an ambitious program. About 1970, it will find itself at a financial crossroads. Funds to equip the new building will have to be found, and the costs of supporting an expanding program will have outdistanced present resources. An increase in the number of member nations would raise income of course, but even with a healthy boost in membership, other sources of income will probably be necessary. (No membership campaign has been pressed and Higginson takes the view that a good performance is the best persuasion.)

The IARC staff members recruited so far hold solid professional credentials, and most were attracted by the organizing principle of linking field work and laboratory research. As applied on the scale of the IARC, however, the idea is a new one, and staff members agree that the organization must succeed to survive.

Future recruiting will be influenced by the attractiveness of Lyons as a place for foreigners to live and work. Lyons lays strong claim to the title of gastronomic capital of the world and is a pleasant city; but its airport is really not yet in the international class, no international schooling is available, and prospective staff for international agencies do consider such factors. On the other hand, IARC's host-country agreement with France is typical of such agreements with UN agencies in granting such quasi-diplomatic privileges as remission of French income taxes. Housing is generally more readily available and cheaper than in Paris. Perhaps most important, the cooperativeness of city authorities has been exemplary for a project of this kind.

IARC is the first international biomedical research organization permitted to undertake laboratory studies and able to operate on a worldwide basis. At the same time, its voluntary character gives it greater flexibility than the mass international scientific organizations that may have to struggle to find a common denominator for policy. For the same reasons, IARC will be easier to liquidate if it disappoints its backers. Especially if it succeeds, however, IARC could be the prototype of a new kind of international scientific enterprise.

—JOHN WALSH

APPOINTMENTS

Roland F. Smith, chief, branch of shellfisheries, Bureau of Commercial Fisheries, to assistant director for biological research at the bureau. . . . **Rex E. Lothrop**, assistant director of the Eastern Utilization Research and Development Division, Department of Agriculture, Wyndmoor, Pa. has retired after 30 years of service. . . . **Richard M. Head**, manager of the Aeronautics Programs Office, Electronics Research Center, NASA, to chief scientist at the center. . . . **Gerald J. Mossinghoff**, director of the Office of Legislative Planning, U.S. Patent Office, to director of the Congressional Liaison Division, Office of Legislative Affairs, NASA. . . . **Ernest D. Riggsby**, professor of science, Troy State College, to visiting professor, Auburn University. . . . **Scott C. Daubin**, head of the marine sciences section of General Motors Corporation, to senior scientist and chairman of the department of ocean engineering, Woods Hole Oceanographic Institution. . . . **William Todd**, acting chairman of the department of microbiology, College of Basic Sciences, University of Tennessee Medical Units, to chairman of the department at the university. . . . **John T. Ellis**, chairman of the department of pathology, Emory University School of Medicine, to chairman of the department of pathology at the New York Hospital-Cornell Medical Center. . . . **David F. Kefauver**, acting associate director of the National Library of Medicine, to associate director of the library. . . . **Arpad Puszati**, principal scientific officer, Rowett Research Institute, Aberdeen, Scotland, to visiting associate professor of biological chemistry, College of Medicine, University of Illinois. . . . **Sidney F. Borg**, professor of civil engineering, Stevens Institute of Technology, has been awarded a visiting professorship by the National Academy of Sciences and the Polish Academy of Science to lecture at several institutions in Poland. . . . **Norman F. Ramsey**, Higgins professor of physics, Harvard University and president of the Universities Research Associates, Inc., to visiting professor of physics, Middlebury College during the second semester of the 1968–69 academic year. . . . **Milford E. Barnes, Jr.**, director of the Des Moines Child Guidance Clinic, to director of the Children's Service Center of Wyoming Valley, Wilkes-Barre, Pa. . . . **Thomas J. Campbell**, associate director, Kansas City, Missouri, Medical Center, to director of the Medical Center Cost Allocation Study Program sponsored by the Association of American Medical Colleges and HEW. . . . **Leo H. von Euler**, biochemist, National Institute of Arthritis and Metabolic Diseases, NIH, to program administrator for research training in pathology, Research Training Grants Branch, National Institute of General Medical Sciences, NIH. . . . **Joseph M. Yoffey**, professor emeritus, department of anatomy, University of Bristol, England, to visiting professor, Laboratory of Radiobiology and department of anatomy, University of California Medical Center, San Francisco. . . .