him eligible to vie for grants on his own. This awkward age, incidentally, is one in which many scientists do their best work, and the agencies feel that it is to everyone's advantage that a promising researcher find a bridge to a productive career.

The NIH development awards might be termed post-postdoctoral awards. To be eligible, a nominee must have 3 years or more of postdoctoral research or relevant professional experience behind him. The awards are made on the basis of a national competition and go either to those who require additional training or experience in preparation for research careers or to those who have demonstrated a capacity for independent research but do not yet qualify as candidates for career research awards. (In fiscal '64, 188 development awards and 60 career awards were made. This year money is available for only about 100 development awards.)

The career awards were also based on national competition. These awards grew out of an earlier idea calling for the establishment of 200 research professorships in health sciences (*Science*, 3 Nov. 1961). One strong reason for NIH abandonment of the idea after the original program was in the works was that many applicants were distinguished men well advanced in their careers and securely placed in their institutions, and it was decided that the cause of increasing the stability of careers in health sciences research would not have been well served.

In the research career awards preference is given to researchers of high competence who do not have what NIH calls stable, full-time research opportunities.

A source of misgivings about the career award program is just the fact that it creates what appears to be a system of national professorships which tends to set the recipient apart from, and, some would say, above, his university. (Awards are made in 5-year increments, and the recipient's activities are reviewed periodically to assure that he is fulfilling the purposes of the award. The recipient may not receive additional income for professional services from any source, but is entitled to keep honoraria, royalties, and fees so long as these are "incidental" to his research. Holders of awards may apply to "any appropriate source for support of their research activities.")

The terms of the award are explicit enough in making each recipient directly responsible to his institution (universities and other nonprofit research organizations must nominate candidates). And the recipient is subject to local regulations on such things as salary, rank, sabbatical leave, and staff privileges. The program achieved relatively great popularity in the few years after it was established, and the awards carry substantial prestige, in part, it seems, because they are believed to give the researcher increased independence of action.

Some fairly widely held assumptions about the awards have no foundation in fact. If an investigator leaves his university for another he is required to relinquish his award; it seems fairly generally assumed, however, that the regaining of his career award at his new post is largely a formality. Not so, says NIH. There has also been a belief current in the existence of an unwritten escalator clause which permits the holder of a development award to move up to a career award. This is not the design nor the practice in the program, say NIH officials. Some universities feel that their nomination of a qualified researcher for one of the awards should be tantamount to selection, but this is not the way the program has ever worked, says NIH.

Inside the universities there have been some hard feelings because award recipients do not pull their share of the teaching load. An award holder's "primary responsibility" is for the conduct and direction of research and research training. While NIH has no hard and fast rule, the award holder in many places expects to spend 80 percent of his time on research. Administrative duties, incidentally, are also ruled out by the terms of the awards.

Focus on Career Awards

Changes, when they are made in the program, are expected to affect the career awards much more decisively than the development awards, which replaced similar awards available earlier. It is likely, however, that NIH will continue, in one way or another, to support some medical researchers from the graduate school to the grave, so to speak. Also likely, however, is that forms of aid will be reevaluated and revised.

The career awards, for example, are regarded as being not so urgently needed as they were when they were established. NIH's general research support program (commonly called "institutional grants"), set up after the career awards were launched, provides, as the name implies, general support, as distinguished from project support, for health research institutions and serves many of the same purposes as the career awards. The general support program among other things helps to finance an increased number of career positions, establish new departments, and support new investigators. Funds are substantial—about $40 million a year is available—and many of the jurisdictional and policy problems engendered by the career awards are avoided.

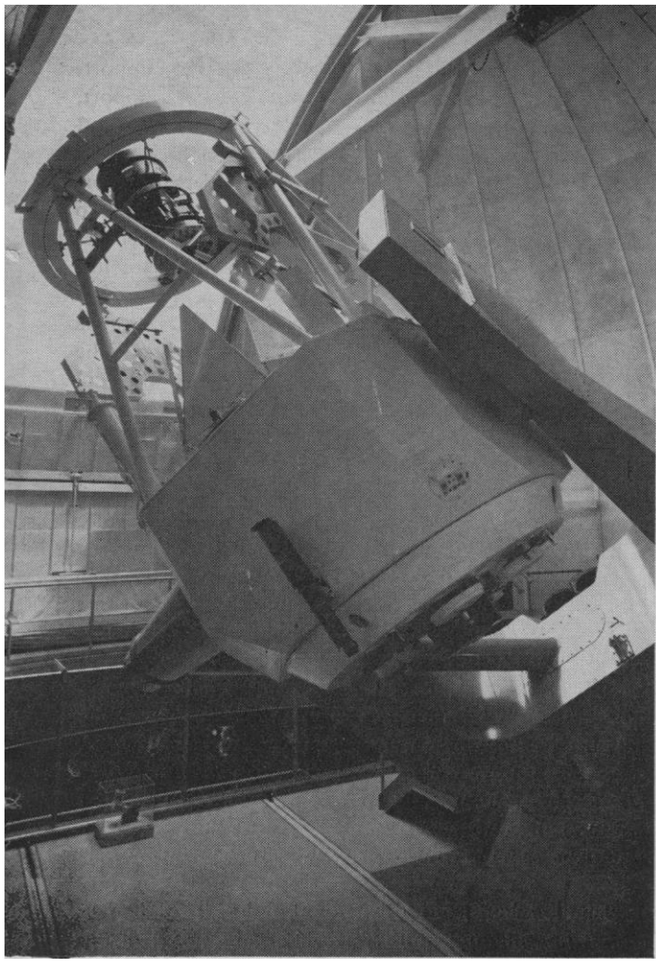
The Public Health Service–NIH, far and away the dominant patron of health sciences research in the United States now and in the foreseeable future, has been moving to broaden its support beyond project research to provide a kind of compensatory support to be applied selectively to the whole structure of medical research. And the moratorium and review can be viewed from this perspective as a sign of one PHS–NIH effort to devise a treatment with maximum benefit and the least harmful side effects to the research community.—JOHN WALSH

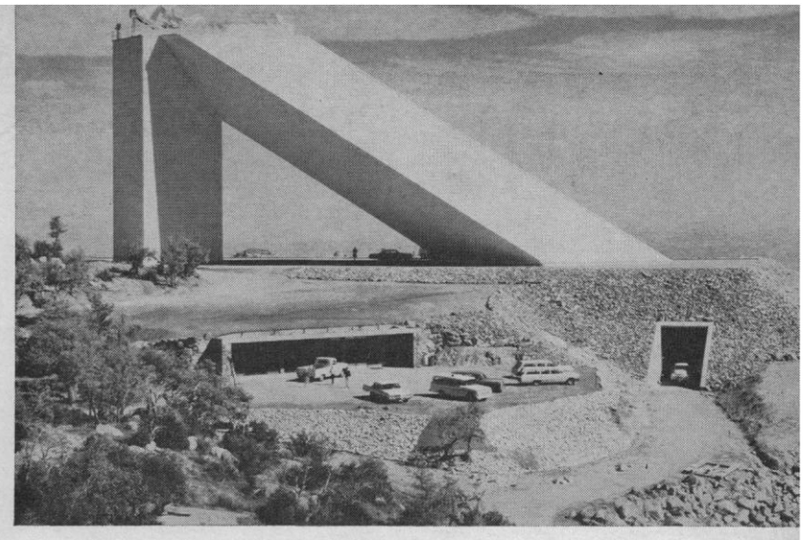
Drug Safety: Industry-Sponsored Study Commission Recommends Expansion of Research Activities

With the recent publication of its final report*, the Commission on Drug Safety completed its mission and went out of existence, leaving behind a string of recommendations calling for more research on the problems whose study it had just begun.

Formally, the task of the 14-member body headed by Lowell T. Coggeshall, vice president of the University of Chicago, was "to broaden scientific knowledge of the predictability of action to drugs in human beings." But the commission had a less explicit mission, too. It was established with a grant from the Pharmaceutical Manufacturers Association (PMA), in the summer of 1962, shortly after the disclosures about thalidomide, a period in which the industry was beset by a rising tide of congressional and public ill will. To counter the common attitude of suspicion, and to help ward off the stringent regulation which was being suggested by industry's critics in and out of Washington, it was neces-

* *Report of the Commission on Drug Safety*, available from the Federation of American Societies for Experimental Biology, 9650 Wisconsin Avenue, NW, Washington, D.C. 20014. $5.





The Kitt Peak National Observatory announces that its new facilities are now available for use. The 84-inch stellar telescope (left) has an *f*/7.6 Cassegrain camera and photoelectric photometer. The coudé (2 to 24 Å/mm) and Cassegrain (40 to 400 Å/mm) spectrographs will be in partial operation during the late fall and spring. The McMath solar telescope (above) (*f*/60 300 feet focal length) is now available for solar, planetary, and stellar work with a vacuum spectrograph that has a resolving power in the 5th-order green of nearly 700,000 and a dispersion of 5 mm/Å. The observatory's space division program with sound rockets is also open, under certain conditions and at the observatory's expense, to scientists interested in participating. Information and applications are available from the Office of the Director, Kitt Peak National Observatory, Box 4130, Tucson, Arizona.

sary for the industry to prove its claim that it could clean up its own house, and that it was capable of undertaking an objective study of the difficulties surrounding the development and marketing of new, safe drugs. The commission included many of the country's best-known experts in drugs and medicine, serving without compensation to help solve problems they all agreed were serious, but it was also a decoy designed to distract critics while the industry tended its wounds and thought about what to do next.

The dual nature of the commission is reflected in its report. On the one hand, it is a remarkable handbook of original studies and coherent suggestions pertaining to certain highly technical aspects of drug development. Commission members and their consultants gave harder thought than had ever been given before to a variety of difficult problems—how to make animal tests more predictive, how to develop accurate measures of drug toxicity, how teratogenic properties of drugs can be uncovered, how trials of new drugs on human beings can be most safely undertaken. Their recommendations, though neither radical nor particularly controversial, are exceedingly useful. But at the same time, to read certain sections of the report you would never know that drug development had an economic as well as scientific side, that the practices the report implicitly seeks to revise did not arise by chance but were the results of decisions taken by live men, representing real companies, whose sales in 1963 totaled around $3.5 billion. Most of the suggested procedures selected by the commission for greatest attention would not have prevented those events of recent years which have done most to discredit the industry. Of the motives that lead companies to withhold information about adverse drug reactions from the Food and Drug Administration (FDA), or the process by which an investigator could turn in to five companies phony statements of "results" on clinical tests he had failed to perform—and have this discovered only by chance by an alert FDA staff member—of these, the report says nothing. Instead, it stresses the view that "the drug safety issue, in all of its aspects, quickly reduces to a question of knowledge: the need for greater understanding of the fundamental mechanism of drug action; the need for better exchange and distribution of information; the need for better use of available information." The report is long on suggestions for advancing scientific knowledge of these questions but short on analysis of the socio-economic factors that might hinder the translation of knowledge into practice.

Not all sections of the report share this difficulty equally. The commission chose to do its work by dividing into 17 separate subcommittees, which ranged from the Subcommittee on Basic Research: Animal Experiment to the Subcommittee on Principles of Institutional and Investigator Competence and the Subcommittee on Responsibilities of the Public in Drug Safety.

The sections met separately, with separate consultants, and the results are published in the report as a collection of separate studies, with a relatively cursory summary from the commission as a whole. The results varied. The Subcommittee on Responsibilities of Medicine in Drug Safety, describing the complex and shifting relation between the AMA and the drug industry, asserts blandly that "organized medi-

Commission on Drug Safety

The members of the Commission were:

Lowell T. Coggeshall, vice president of the University, University of Chicago, *Chairman*

Paul R. Cannon, chief editor, *Archives of Pathology*, American Medical Association, Chicago

Thomas Francis, Jr., chairman, Department of Epidemiology, School of Public Health, University of Michigan, Ann Arbor

Philip S. Hench, emeritus professor of medicine, University of Minnesota, Minneapolis

Hugh H. Hussey, Jr., director, Division of Scientific Activities, American Medical Association, Chicago

Chester S. Keefer, Wade Professor of Medicine, Boston University School of Medicine, Boston

Theodore G. Klumpp, president, Winthrop Laboratories, New York

John T. Litchfield, Jr., director of research, Lederle Laboratories, Pearl River, New York

Maurice R. Nance, medical director, Smith Kline & French Laboratories, Philadelphia

Leonard A. Scheele, senior vice president, Warner-Chilcott Laboratories, Morris Plains, New Jersey

Leon H. Schmidt, director, National Primate Center, University of California, Davis

Austin Smith, president, Pharmaceutical Manufacturers Association, Washington, D.C.

Thomas B. Turner, dean of the School of Medicine, Johns Hopkins University, Baltimore

Josef Warkany, professor of research pediatrics, Children's Hospital Research Foundation, University of Cincinnati, Cincinnati

Duke C. Trexler, executive secretary, Commission on Drug Safety, 825 New Hampshire Avenue, NW, Washington, D.C.

cine has always actively sought to meet its responsibilities in relation to drug evaluation and drug safety and continues to do so," and makes rather vague and general recommendations. Another subcommittee, however, on Acceptance of Drugs for Clinical Trial, makes a searching study of the problems within its area and produces at least two unusual suggestions: that "an independent agency or committee be established with the purpose of (*a*) stimulating research in standards for drug investigation, and (*b*) providing financial support for basic research," supported by funds pooled by the industry and channeled through PMA. The subcommittee also suggested that retrospective studies be conducted, "using information now in the files of pharmaceutical firms, aimed at correlation of studies that predict toxicity on the basis of animal studies and on the basis of toxicity that actually occurred clinically." Industry in the past has not always been too anxious to circulate information on the adverse effects of its products; to make such material accessible would be a major step.

Among the recommendations endorsed by the commission as a whole are the following:

—More fundamental research across a broad base of biology and chemistry is imperative to gain needed understanding of the implications of drug therapy.

—Present animal tests must be reassessed to determine the value of the information they provide, and more predictive animal tests must be developed.

—More financial support and professional encouragement must be channeled to the university to stimulate both basic research and the training of investigators.

—The immediate and long-range problems in providing sufficient scientific manpower are linked inseparably with procedures for assuring maximum drug safety.

—The short-term scientific manpower shortage can be offset, in part, by greater cooperation in recognizing manpower priorities among governmental, industrial, educational, and medical establishments; by pooled research efforts in non-competitive areas; by the elimination of the necessity to conduct obsolete and outmoded but time-consuming tests to meet Federal requirements governing New-Drug Applications.

—Greater emphasis must be placed on drug studies in the medical curriculum, and a few medical schools should establish centers for intensified training in the disciplines associated with clinical testing and drug development.

—The information requirements of research scientists, clinical investigators and all other physicians need to be reviewed thoroughly, especially in the light of the data-retrieval and statistical-analysis potentials of modern information systems.

—Vast quantities of filed-away drug research information should be re-examined and re-evaluated.

At least one of the recommendations of the commission, made before the publication of its report, is certain to be an enduring one. Early in their deliberations, members of the commission became convinced that the combination of their sponsorship by a partisan industry with the absence of independent roots in the universities or medical schools would make the commission unsuitable to serve as a continuing body for the evaluation of drug problems. Feeling that such a body was needed, the commission recommended that the National Academy of Sciences–National Research Council set up a permanent committee to take over where the commission ended. Last November an Academy committee was established, supported by a grant from the Department of Health, Education, and Welfare. The committee, known as the Drug Research Board, is headed by William S. Middleton, the recently retired chief medical director of the Veteran's Administration. The Board's function is to "maintain a broad surveillance of the policies, principles, and practices that influence the course of therapeutic research . . . [and to] provide a forum in which the problems, responsibilities and opportunities of investigative medicine, industry and government can be ventilated and directed toward a coherent and productive national and international effort." Like the Commission on Drug Safety, the successor body will neither conduct research nor undertake the evaluation of specific drugs, but will serve as a deliberative and advisory body for government and industry. (One of the first functions of the Board, in fact, is to review the suggestions made by the commission.) Whether the Drug Research Board will find itself more able than the commission to consider drug problems in their

political and economic context is not yet clear. Nor is it clear, as yet, what steps will be taken by industry and government to see that the recommendations made by the commission are adopted, or how much they would affect drug safety if they were.

—ELINOR LANGER

Announcements

The National Academy of Sciences is accepting applications from U.S. scientists who wish to conduct **research in the U.S.S.R.** for periods of up to 10 months during the 1965–66 academic year. Applicants must be U.S. citizens and must hold the doctoral degree or its equivalent by the time the visit begins. Participants in the program will receive round-trip transportation to the U.S.S.R., per diem allowance, and reimbursement of salary, but not of consulting fees. Persons whose visits will be longer than 5 months may receive additional support to allow their families to accompany them. Applications are due by 20 November. Information is available from the Section for U.S.S.R. and Eastern Europe, Office of the Foreign Secretary, National Academy of Sciences, Washington, D.C. 20418.

Meeting Notes

A symposium on **short-term frequency stability** will be held 23–24 November at the Goddard Space Flight Center, Greenbelt, Maryland. Papers are invited on system requirements, theory of oscillators' bearing on short-term stability characteristics, and device characteristics and measurement techniques. (C. Boyle, Goddard Space Flight Center, Greenbelt, Md.)

The call for papers has been issued for a conference on **aerospace vehicle flight control**, scheduled next 13–15 July in Los Angeles. The meeting will be sponsored by NASA and the Society of Automotive Engineers. It is intended as a review of recent advances and of the major problems confronting the industry on piloted aircraft, missile and launch vehicles, space vehicles, sensing and information systems, computation and control, and actuation. Abstracts of 100 to 200 words are required. Deadline: *23 October*. (F. J. Favata, SAE, 485 Lexington Avenue, New York 10017)

The second national conference on **cardiovascular diseases** has been rescheduled from next January. It will be held in Washington, 22–24 November, so that the results may be coordinated with a report planned by the President's Commission on Heart Disease, Cancer, and Stroke. Emphasis of the meeting will be on developing recommendations concerning research, unmet needs in professional and public education, and using existing medical and public health facilities. (Mrs. H. B. Lemp, 9650 Wisconsin Ave., NW, Washington, D.C.)

Courses

Three institutes on **reliability engineering and management** will be held at the University of Arizona, Tucson, 30 November to 18 December. The courses, sponsored by the University and Northrop Space Laboratories, are designed to meet the needs of government agencies and industry as reflected in a survey of participants in a similar institute last year.

Sessions will include a week each on engineering probability and statistics; reliability engineering and practice; and reliability program implementation and management. Registration is open for any or all of the institutes. The fee for the first week is $150; for the second and third, $200 each; for all three weeks, $450. Deadline for applications: *16 November*. (Conference Coordinator, Division of Continuing Education, University of Arizona, Tucson)

Georgia Institute of Technology plans a course in methods of **operations research**, 30 November to 4 December, in Atlanta. It is designed for persons interested in the quantitative analysis of operational problems. Participants should have a bachelor's degree in engineering, science, or management, and at least a year's work in calculus. The $150 registration fee includes textbook and supplies. (Registration deadline: *18 November*. Director, Department of Continuing Education, Georgia Institute of Technology, Atlanta 30332)

The Instrument Society of America will sponsor a course on **gas chromatography** for practicing chromatographers 30 November to 4 December at Carnegie Institute of Technology, Pittsburgh. The course will include lectures and discussion sessions covering recent theories and advances related to chromatographic operation and application. Registration is limited to 100 persons, and the fee is $100. Deadline: *13 November*. (C. J. Borchers, Graduate Institute of Technology, University of Arkansas, Little Rock)

Scientists in the News

David P. Earle, professor of medicine at Northwestern University medical school, has been named chairman of the school's department of medicine.

Lee Anna Embrey, formerly in the public relations program of the National Science Foundation, has joined the National Academy of Sciences–National Research Council, in charge of the Academy publication, *News Report*.

Charles G. Overberger, head of the chemistry department at the Polytechnic Institute of Brooklyn, has been named dean of sciences and director of the Polymer Research Institute at the school.

Recent Deaths

Charles O. Appleman, 85; professor emeritus of botany and dean emeritus of the University of Maryland graduate school; 11 August.

F. E. Denny, 81; retired plant pathologist at Boyce Thompson Institute for Plant Research; 1 September.

Samuel A. Goldberg, retired director of the department of laboratory medicine and chief pathologist at Presbyterian Hospital, Newark, New Jersey; 29 August.

William Herman Powers, 64; associate dean of the college of science and professor of chemistry at Pennsylvania State University; 29 August.

Wolfhard Weidel, 47; managing director of the Max-Planck Institute for Biology; 10 August.

Robert E. Wilson, former commissioner of the U.S. Atomic Energy Commission; 1 September.

Nikolai N. Yelansky, 70; head of the department of surgery at the First Moscow Medical Institute and former chief surgeon of the Soviet Army; 31 August.

Erratum: The last sentence of the author note to the articles by J. C. Eccles (p. 1140, 11 Sept.) and A. L. Hodgkin (p. 1148, 11 Sept.) should have read "It will also be included in the complete volumes of Nobel lectures in English, published by the Elsevier Publishing Company, Amsterdam and New York." The author note to the Eccles article should also have included "Copyright © 1964 by the Nobel Foundation."