same as those now offered by the Executive agencies.

Each of the two science advisory groups would be composed of a director and two associates. The salary of the director would be $21,500, and the salaries of the associates, $20,000 a year. The Sibal bill specifies that the triumvirates be appointed on the basis of merit and "without reference to political affiliation," but adds an insurance clause which provides that the director and one associate shall be appointed by the ranking majority officer of the house in question and that the other associate shall be appointed by the minority leader.

The potential difficulties in organizing a science secretariat for Congress, even one of modest size, are not far to seek. First, it might be difficult to prevail on first-rate scientists to leave their laboratories or university posts to work in the highly charged political atmosphere of Congress.

Some way would have to be found to protect the science advisory staff from becoming an answering service for the not inconsiderable flow of congressional mail touching on matters of science and science policy. Most of these letters from constituents would be trivial scientifically, but for legislators they are anything but trivial politically.

A further difficulty is the absence of a precedent. No staff agency in Congress performs functions similar to those which would be expected of the science advisory staff. The closest thing to a model is probably the Office of the Legislative Council, a bill-drafting service which employs a staff of lawyers to embody the members' legislative intentions in proper form. But the counsel's men are not called upon for the evaluative work which would be expected of the science staff.

Perhaps most significant, the science staff, working in Congress, with its many strong magnetic fields, might develop its own loyalties to persons and programs and lose the objectivity which is the chief reason for its being there.

The Sibal bill anticipates some of these difficulties. Terms for the advisers would be 3 years, and no adviser would be permitted to serve more than 6 years. There would be a top age limit of 55, "to keep an emphasis on youth and creativity," according to Sibal.

To qualify for one of the three top positions on either staff, a scientist would have to hold a doctorate or its equivalent. The bill also specifies that one staff member hold his degree in biology, one in chemistry, and one in physics.

The best chance for innovation in the apparatus of providing Congress with advice on science would probably come at a time of general reform of the structure and rules of Congress. While discussion of such a reform is planned (but not yet scheduled) in the Senate Rules Committee, the pressure for reform, which seemed strong at the beginning of the session, now appears to have slackened.

Nevertheless, Congress is showing interest in sound scientific dissent against official policy set by the Executive agencies—the lunar landing program is an example—and is looking increasingly to the scientific community for help in seeing the other side of the question.—J.W.

Krebiozen: A Dozen Years after Introduction, Controversy over Cancer Treatment Still Flares

For 12 years, a drug called Krebiozen, claimed by its proponents to be effective in treating cancer, has had about the same relation to organized medicine that the Holy Rollers have to the Archbishop of Canterbury. In the latest sideshow, 2 weeks ago, frightened cancer victims and their relatives picketed the White House, pleading for continued distribution of the drug on which they think—rightly or wrongly—their lives depend. Earlier extravaganzas have featured a full-scale investigation by the Illinois legislature and the forced resignation of the president of the University of Illinois, a $300,000 libel suit, and serious tests of both academic freedom and freedom of the press. A continuous attraction has been a series of violent, public attacks on the integrity of science and medicine, both in and out of government.

The Krebiozen controversy is so complex, and so much of it remains unresolved, that any discussion of it is bound to be incomplete and perhaps even misleading; much of what follows has been disputed at one or another time by one or another of the principals. But it is worth looking at, because when the carnival tents are taken down, at least one question of profound importance to science is left standing. The question, not fully answerable, is whether the procedures that have been developed to protect science against frauds may not also make it difficult for unorthodox, but nonfraudulent, propositions to get a fair hearing—and what category, unorthodox or fraudulent, Krebiozen comes under. At this stage, about the only safe prediction is that when—if ever—the schism is finally healed, Krebiozen will probably tally as many casualties in both science and politics as adherents among the victims of cancer.

Krebiozen's troubles began in March 1951 when Andrew C. Ivy called a semipublic meeting at Chicago's Drake Hotel to present the results of his preliminary experimentation with Krebiozen on 22 human patients with advanced cancer. At that time Ivy was vice president of the University of Illinois in charge of the Chicago Professional Colleges, distinguished professor of physiology, and head of the department of clinical sciences. He had also served as executive director of the National Advisory Cancer Council of the Public Health Service and had represented the Allied governments on the subject of medical ethics at the Nuremburg trials of Nazi physicians accused of war crimes. Ivy had been working with Krebiozen since the summer of 1949 when it was brought to him by Stevan Durovic, a Yugoslav political refugee who was carrying on medical research at a laboratory in Argentina. The laboratory was set up for him there by his brother Marko, who has continued to play a financial role in the Krebiozen story.

If Durovic did discover an anticancer agent in his South American lab, it would be, as the New York *Post* once said, a little like "a high school physics teacher smashing the first atom all alone in his basement," but Ivy was impressed—mainly because Durovic's product squared with a theory he himself had long been interested in. The theory, roughly, is that the body itself contains an anticancer agent that explains the occasional spontaneous disappearance of the disease, and that the agent can be stimulated, extracted from the tissues, and used in treatment. Durovic obtained the substance indirectly, from the blood serum of horses in which

it was stimulated by injections of an extract of the fungus *Actinomyces bovis*. Although the original substance is toxic, the extracted material (which Durovic named Krebiozen from the Greek, meaning "that which regulates growth") presumably is not.

Krebiozen's Original Sin

The Chicago meeting was Krebiozen's first disaster. Whatever scientific formalities were left unviolated by the unusual character of the meeting itself (to which not only cancer specialists but medical writers and politicians had been invited) were completely dissipated by a press release, of still unexplained origin, that trumpeted to the world that "the battle of medical science to find a cure for cancer" was over. Ivy disclaimed any knowledge of the release, and his own report was modest, claiming only that "the substance merits a thorough clinical study." But he did report beneficial results on 20 out of 22 patients, and he was also open to the charge that—due mainly to a certain furtiveness which began then and has continued to characterize Durovic—Ivy was reporting on a substance about which he knew comparatively little, and on which relatively little animal experimentation had been done.

The reasons for the meeting are still obscure. Ivy claims it was intended as an inducement to other researchers to begin working with the drug; the agitation was useful, too, in getting the Durovic brothers' visas extended. Later, in the summer of 1952 they obtained U.S. citizenship through the efforts of Senator Paul Douglas (D.–Ill.).

Whatever the reasons, the Krebiozen cat—barely more than an embryo—was out of the bag. The publicity was intense. The University of Illinois, and everyone connected with the drug, were besieged with requests they were unable to fill; a nonprofit institution, the Krebiozen Research Foundation, with Ivy temporarily as its head, was established to begin experimental distribution of the fairly small amount of Krebiozen Durovic had; two drug companies negotiated with Durovic, each offering more than $1 million for Krebiozen rights, and they were rejected; and the medical profession became alarmed.

If Ivy can be accused of haste and poor judgment in reporting his first results, the accusation must fall with equal weight on the medical profession for the speed and style in which it proceeded to discipline one of its most eminent members. Seven months after Ivy's announcement, in October 1951, the *Journal of the American Medical Association* published a "Status report on Krebiozen," which reviewed the case histories of 100 patients treated with Krebiozen and concluded that 98 of the patients had "failed to show objective improvement" and that the "beneficial effects" reported by Ivy were not confirmed. In an exchange of letters in *Science* (September, 1951) with C. P. Rhoads of New York's Memorial Center for Cancer, Ivy had agreed with criticisms that in his original report "there were no controls reported, the clinical material was not uniform, the results were irregular, [and] the effects were not established as due to the treatment employed," and stated again that he was asking only for further study. Since, in Ivy's estimation, work on Krebiozen had just begun, the finality of the AMA report came as a shocking setback.

The A.M.A. vs. Krebiozen

This document, thick with "secret remedy" charges, became a *cause célèbre* in the Krebiozen controversy; its findings have been bitterly challenged. Of its 100 cases, 24 have been alleged fraudulent in that the conclusions reported contradicted those of the physician actually administering the drug. For several of the remaining cases, Ivy accused the AMA—as it has now so often accused him—of unscientific procedures on the grounds that 58 of the patients were so near death that they received less than four injections, and that none of the patients had been on Krebiozen for very long.

Pressing requests for information doubtless played a role, but the AMA's initial haste in discrediting Krebiozen had several unfortunate results. Although it by no means ended experimentation, it certainly prejudiced the atmosphere to a point where nothing short of miraculous performance could have redeemed Krebiozen in the suspicious eyes of those to whom the AMA *Journal* is a rule-book; it made, and has continued to make, it very difficult for Krebiozen supporters to get anything but covert cooperation from the 3000 or so physicians who have administered the drug; and it gave rise, and many would say credence, to the jungle-thick theories that a financial conspiracy against Krebiozen existed, spearheaded, it was claimed, by the then treasurer of the AMA, who hoped somehow to discredit Durovic and exploit the new discovery for himself.

The AMA report appeared on 27 October 1951. On 12 November, Ivy was suspended from the Chicago Medical Society on "secret remedy" charges. On 24 November, a letter appeared in the *Journal* of the AMA from the National Research Council's Cancer Therapy and Diagnosis Committee reporting that its review of 63 Krebiozen-treated patients (in several cases there was overlapping with the AMA study) revealed "no evidence of any curative effect."

Opposing the increasingly united scientific front against Krebiozen, was only Ivy's personal distinction and his deep conviction that Krebiozen warranted further study. The medical faculty of the University of Illinois was growing restive about the uproar and Ivy's role in it. With Ivy's approval, the university president, George Stoddard, appointed a "Research Validation" committee, headed by Warren Cole, head of the university's department of surgery, to review a report Ivy was preparing on 500 Krebiozen-treated cancer patients. The committee was to concentrate on the "scientific validity of the results thus far obtained," not on the "chemical nature of the drug . . . or of its method of manufacture."

Ivy turned over his material in April 1952; the Cole Committee report emerged the following September, and like every other exhibit in the Krebiozen controversy it has become a *cause célèbre* in it own right, each side claiming that the report validates its contentions. It appears from the report's conclusions (the only part released) that the committee was at least a bit uncertain about Krebiozen and was particularly distressed by its ignorance about the substance itself. It ended by recommending further trials in animals and man—but only under carefully controlled conditions, and only if Krebiozen could be reproduced and if enough was available for chemical study.

In a pattern since repeated several times, Ivy agreed to the test, but the Durovics held back. They claimed that

no Krebiozen was available and suggested a 6-month delay until more could be produced in Argentina; to them, the university's desire to produce Krebiozen itself, signified its participation in the conspiracy to take Krebiozen away from them.

President Stoddard interpreted the Durovics' reluctance as proof of chicanery and concluded that, except possibly as a "common, harmless, inexpensive ingredient, Krebiozen does not exist." Two months after the appearance of the Cole report, in November 1952, Stoddard proclaimed the "end of the road for Krebiozen insofar as any staff member of the University of Illinois is concerned," and he prohibited further experimentation with it there.

Stoddard was acting in the face of considerable pressure from the Illinois legislature, which had allied itself with Ivy in the internecine war. Ivy, a midwesterner and successful money raiser for the university, was a great court favorite; Stoddard, who had tangled with the legislature on several previous occasions—mainly to his credit—was not. For his resistance to the politicians' interference with academia, Stoddard received, in 1954, the Academic Freedom Citation of the American Civil Liberties Union—in some ways a perverse award, since the matter at issue could be intepreted as freedom of scientific research. In the hectic drama, Stoddard was fully supported by the university faculty, though not, it turned out, by the politically elected board of trustees, who forced his resignation the following summer (1953). Ivy had by that time already lost his position as vice president in a rather precipitate reorganization action suggested by Stoddard in November 1952; he retained his other posts until late in 1961, when, on reaching retirement age, he accepted a position with tenure at Chicago's Roosevelt University.

For another year, starting in March 1953, Illinois remained the Krebiozen battlefield as the state legislature conducted intensive hearings that wandered through the mud of various conspiracy theories and exonerated everybody of everything, except President Stoddard, whom it admonished for lack of tact. Krebiozen did not become a national issue until a few years later.

—ELINOR LANGER

(This is the first of two articles on the Krebiozen controversy.)

Announcements

The American Society for Microbiology's Committee on Aquatic Microbiology (CAM) is compiling an international **list of aquatic microbiologists.** Scientists who wish to be listed and to receive the CAM publication, *Aquatic Microbiology Newsletter*, should write S. P. Meyers, Marine Laboratory, University of Miami, Miami 49, Florida. The newsletter was previously sponsored by ASM's Aquatic Microbiology Interest Group, whose functions were recently merged with those of CAM.

The **University of British Columbia** will divide its faculty of arts and sciences effective 1 July. The new faculty of sciences will be headed by Vladimir J. Okulitch, head of the school's geology department. S. N. F. Chant, now head of the combined faculties, will be dean of the arts division.

In Philadelphia a committee has been organized to "encourage continued progress in the fields of **drug and medical research.**" Composed of representatives from Philadelphia medical schools and pharmaceutical firms, the committee will be concerned with all phases of medical and pharmaceutical research; its plans call for efforts to strengthen the U.S. Food and Drug Administration, including the "establishment of a national advisory council; development of sound means to evaluate new drug safety and effectiveness; and the problems of compliance with the 1962 amendments to the Food, Drug and Cosmetic Act and the new regulations issued by the F.D.A. concerning drugs." The Greater Philadelphia Committee for Medical-Pharmaceutical Sciences is headed by Thomas M. Durant, president, College of Physicians, Temple University medical school, Philadelphia.

Courses

The Armed Forces Institute of Pathology plans its tenth annual course on the pathology of **diseases of laboratory animals** 23–27 September in Washington. The course is designed for scientists who are responsible for the recognition and interpretation of spontaneous or induced lesions in experimental animals. Deadline for receipt of applications: *15 August.* (Director, AFIP, Washington 25)

An institute on **nutrition** in maternal and child health is scheduled for 8–19 July in New Brunswick, N.J. It is open to nutritionists, physicians, dieticians, health educators, and social workers. Graduate and advanced undergraduate students also are eligible to attend. (Director, Summer Session, Rutgers University, New Brunswick, N.J.)

A NATO summer course on **semiconductors** is scheduled for 5–30 August in Salonica, Greece. The first 2 weeks will include graduate-level work followed during the final weeks by sessions on the latest advances in semiconductor physics. Discussions and lectures will be conducted in English or French. Deadline for receipt of applications: *15 July.* (N. Economou, Dept. of Physics, Univ. of Salonica, Greece)

A graduate-level course on **electromagnetic measurements and standards** will be offered by the National Bureau of Standards graduate school and the University of Colorado, Boulder, 22 July to 9 August. Applicants must have a bachelor's degree in electrical engineering, physics, or the equivalent academic or practical experience. Tuition is $350, plus an additional $15 for those wanting graduate credit at the university. Deadline for applications: *1 July* (E. H. Brown, Boulder Laboratories, NBS, Boulder, Colo.)

Publications

The U.S. Public Health Service should give leadership to efforts to improve communication of scientific research, according to a report by the Surgeon General's conference on **health communications.** The meeting was held in November.

The 119-page report makes 23 recommendations for ways to improve communication of health information to scientists, practitioners, and the public. It emphasizes educational aspects, international implications, and goals for communication improvement. Single copies of the report (PHS publication No. 998) are available at no charge. (PHS, Washington 25)

A review of **information facilities for engineers** is available from the Engineers Joint Council. The 32-page publication describes current and planned information activities of the Engineering Societies Library, Engineering In-