only with a more delicate balance."

The sudden emergence of a real, live technology assessment bill has sparked many emotions—from the fatigue of legislators tired of wheedling facts from executive agencies to the fears of some scientists that Congress may now embark on a clumsy, destructive attempt to manage national R & D.

The fact is that no one—neither scientists nor lawmakers—has a clear idea of what sort of creature the OTA will be or what it will and will not do. But Congress seems prepared to rush ahead anyway. —DEBORAH SHAPLEY

Carlsberg Laboratory: Ferment over Future of Copenhagen Lab

The Copenhagen breweries, which are the fount of one of Denmark's premium exports, have also been the source of support for a research laboratory of international standing. For a year or more, however, misgivings have been mounting among Carlsberg Laboratory alumni in the United States and elsewhere that changes in the laboratory's status threaten its essential character.

Special concern appears to center on the laboratory's chemical section, which was headed successively by two remarkable men, S. P. R. Sørensen and Kaj Lindstrom-Lang, in the period spanning the first six decades of the 20th century. Particularly in the 1950's, when Lang was director, the Carlsberg Laboratory provided an important formative experience for a generation of distinguished researchers during a vital period for protein chemistry.

A clear prognosis for the Carlsberg Laboratory is hard to establish, since its future hinges on decisions in which the Danish government and academy of sciences, the Carlsberg Foundation (which has funded the lab), and the Carlsberg-Tuborg breweries must all participate. Furthermore, negotiations are being carried on so deep in the Danish establishment that there has been no real airing of the matter in the press and even researchers in the laboratory are uncertain of how things are going.

Most important of the known facts, however, is that control of the laboratory has been transferred from the foundation to the breweries. Under the terms of the transfer, the laboratory is to retain its character as a separate entity, but the transfer, combined with the lack of information about future plans, has raised apprehension among scientists that the lab will lose its autonomy and its identification with fundamental research.

The transfer follows the merger of the Carlsberg and Tuborg breweries. This merger changed the Carlsberg Foundation from owner of the Carlsberg brewery to majority stockholder in the combined operation. According to those involved in working out the new relationship between the laboratory and the breweries, it is not the merger that forced changes in the lab's operations but the costs of running the laboratory. These costs have risen rapidly in recent years and have exerted a financial strain on the foundation, which has other heavy commitments.

The issue is complicated by historical, legal, and personal factors, and this account is necessarily incomplete because it is based primarily on conversations with alumni of the laboratory who are now in the United States and on access to correspondence with individuals involved in the negotiations. It is clear, however, that the Carlsberg Laboratory occupies a special place in Danish science, and its fate is not likely to be settled simply by reference to a profit and loss statement.

The Carlsberg Laboratory was established nearly 100 years ago by J. C. Jacobsen, founder of the Carlsberg brewery. Jacobsen was a quintessential 19th-century figure, with scientific interests which he applied to brewing with spectacular success and philanthropic inclinations which he followed to the considerable benefit of Danish science and culture. Jacobsen created the Carlsberg Foundation in the 1870's and ultimately made it heir to his brewery. Foundation funds now go to the support of three departments—the laboratory; a program of grants in the physical sciences, mathematics, and the humanities; and a national museum in a Copenhagen palace that was restored through the foundation.

The Carlsberg Laboratory was created in 1875, when Jacobsen replaced a small lab serving the brewery with a separate laboratory that was to have two sections devoted to work on chemical and physiological problems broadly related to the brewing process. Jacobsen meant his brewery as a model for the industry and decreed that there would be no proprietary secrets, including the improved fermentation process that contributed much to Carlsberg's success. In the laboratory, the same rule was applied to results of experiments, and the Carlsberg Laboratory had its own journal almost from its earliest days.

Jacobsen's assumption seems to have been that the interests of brewing should be primary in the laboratory, but he specifically allowed scientists to work in a "second direction," thus recognizing the value of free research.

Starting with Johann Kjeldahl, who is remembered for his development of techniques of nitrogen analysis and who first headed the chemical section, Carlsberg scientists pushed the founder's concept to the limits. In 1901, Sørensen took over the chemical section; in the first decade of the century, he gained international notice for enzyme studies and achieved the first really accurate method for the determination of *p*H. He established the laboratory's traditional interest in protein chemistry, and during the 1930's an increasing flow of visiting scientists came to the Carlsberg lab to work with Sørensen and with Linderstrom-Lang. Lang, who was trained as a chemical engineer, came to the laboratory immediately after World War I as Sørensen's assistant. A versatile scientist with a special gift for conceiving and designing experiments, Lang's interests moved from colloidal chemistry to the structure of proteins. Then, in the 1930's he collaborated with Heinz Holder, who later became

head of the physiology section, on work in developing micro methods which gained wide attention.

After World War II, Lang's interests refocused on protein structure, and, as the decade of the double helix developed, the atmosphere that Lang's special gifts generated in the chemistry section was to attract a flood of interesting visitors to the Carlsberg Laboratory. Rollin D. Hotchkiss, of Rockefeller University, who first visited the Carlsberg Laboratory in the middle 1930's, says that Lang recognized that "the traditional approach is not necessarily the shortest route" for the researcher and that Lang also applied discipline and precision to sometimes unorthodox attacks on problems. Lang had a knack of working with younger scientists and coming up with a crucial insight or practical suggestion. Christian B. Anfinsen, now chief of the laboratory of chemical biology, National Institute of Arthritis and Metabolic Diseases, says Lang "could turn a good idea into a terrific idea," and that the ingredients of the Carlsberg's success were "charisma plus bright visitors." And the Carlsberg became a model for those who went on to run labs of their own.

The Carlsberg Laboratory at its apogee was, as one alumnus puts it, "literally the center of protein chemistry." Hotchkiss recalls that "if one said you'd been at the Carlsberg, there was an immediate response. It was like a lodge membership." And it amounted to much more than a pleasant year in Copenhagen for bright post-docs in the postwar easy days for research. In a letter to a Danish academician who is involved in the deliberations over the lab, John A. Schellman of the University of Oregon wrote, "The achievements of the laboratory have been truly remarkable. Just page through any journal that deals with biochemical topics and look for the words: *p*H, buffer, titration curve, *p*H stat, cartesian diver, hydrogen exchange, constriction pipette, polyelectrolyte, density gradient, melting curve . . . helix coil transition, limited proteolysis, motility, gradient tube, rotatory dispersion curve, primary, secondary, and tertiary structure, etc. These concepts or major applications of them were produced at the Carlsberg laboratory. The whole spirit of biophysical chemistry, a discipline of great importance today, appears to have had its inception at the Carlsberg laboratory."

Throughout the period, the lab was a small, modestly financed enterprise. Typically, Lang and three or four Danish colleagues worked with a dozen or more visitors in the basement and on the first floor of the aging, two-story building at 10 Carlsbergvej. Small Rockefeller grants through the 1950's helped, but even in the 1960's the lab's total annual budget remained below $200,000.

It is commonly agreed that the excitement at Carlsberg has waned. Lang died in 1959, and his successor, Martin Ottesen, has interests of a more applied sort than Lang's; and it was inevitable, after all, that the heady days of protein chemistry in the 1950's would give way to an era of consolidating research.

Uncertainty about the future of the chemistry section has been compounded by the question of whether, or in what form, the physiology section will be continued. After the retirement of Holter, the remnants of that lab have been at least temporarily merged with the Biological Institute, another lab funded by the Foundation. As for the chemistry section, the odds seem to favor a compromise that will allow it to survive as something more than an industrial lab, but something less than a center of fundamental research.

Alumni of the Carlsberg agree that the name and tradition are worth saving, and there have been discussions on ways to revive the Carlsberg in its earlier incarnation. But at a time when U.S. federal research funds have been repatriated and foundations have reordered priorities, even fund-raising prospects seem bleak. Some of the alumni concede that they may be moved more by nostalgia and gratitude than by a sense of the practical possibilities; the future of the Carlsberg is, after all, up to the Danes.—JOHN WALSH

APPOINTMENTS

Albert Ax, professor of psychology, Wayne State University, to chairman, psychology department, University of Detroit. . . . At Florida International University; **Abraham M. Stein**, associate professor of biochemistry, University of Florida, to chairman, biology department and **Robert C. Fisher**, professor of mathematics, Ohio State University, to chairman, mathematics and statistics department. . . . **Guido H. Daub**, acting chairman, chemistry department, University of New Mexico, named chairman. . . . **C. Lawson Crowe**, dean, Graduate School, University of Colorado, to provost and vice president for research at the university. . . . . . **Reimar Lüst**, director, Max Planck Institute for Extra-Terrestrial Physics, to president, Max Planck Society, succeeding Adolf Butenandt. . . . **Arnold Allentuch**, professor of mechanical engineering, Newark College of Engineering, to director of research at the college. . . . **Lee Holder**, director, planning and evaluation division, Association for the Regional Medical Program of North Carolina, to dean, College of Allied Health Professions, University of Tennessee, Memphis. . . . **Melvin M. Ketchel**, professor of physiology, School of Medicine, Tufts University, to director, proposed Population Research Center, Oak Ridge Associated Universities. . . . **Abe Rubin**, dean, Ohio College of Podiatric Medicine, to president of the college. . . . **George M. Volkoff**, head, physics department, University of British Columbia, to dean, faculty of science at the university. . . . **Robert D. Coye**, professor of pathology, University of Wisconsin Medical School, to dean, School of Medicine, Wayne State University. . . . **William R. Drucker**, chairman, surgery department, University of Toronto, Canada, to dean of medicine, University of Virginia School of Medicine. . . . **Joseph H. Appleton**, professor of engineering, University of Alabama, Birmingham, to dean, School of Engineering at the university. . . . **George H. Handelman**, chairman, mathematics department, Rensselaer Polytechnic Institute, to dean, School of Science at the institute. . . . **Richard A. Moore**, associate head, mathematics department, Mellon Institute of Science, to chairman of the department. . . . **Richard W. Heckel**, professor of metallurgical engineering, Drexel University, to head of metallurgy and materials science, Carnegie Institute of Technology. . . . **A. Kent Christensen**, associate professor of anatomy, Stanford University Medical School, to chairman, anatomy department, Temple University School of Medicine. . . . **Maureen Henderson**, professor of preventive medicine, University of Maryland School of Medicine, to chairman, preventive medicine department at the university. . . . **Paul B. Pearson**, retired president, Nutrition Foundation, appointed chairman, nutrition and food department, Drexel University. . . . **James H. Zumberge**, professor of geosciences, College of Earth Sciences, University of Arizona,