OBITUARY

Otto F. E. Mühlbock
1906–1979

Otto F. E. Mühlbock, a prominent staff member for 33 years of the Netherlands Cancer Institute, the Antoni van Leeuwenhoek Huis, died on June 18, 1979, after a short illness. Educated at the University of Berlin, he obtained a Ph.D. in chemistry in 1927 and an M.D. in 1933, for which he specialized initially in gynecology and endocrinology. In 1934, he moved to the Netherlands where, until 1940, he worked under Professor E. Laqueur at the famous Pharmacological Laboratory of the University of Amsterdam in the field of the biology of the newly discovered estrogenic hormones.

After a difficult period during World War II, he joined the Netherlands Cancer Institute, where he became head of the Biological Department in 1948. A few years later, he obtained Dutch citizenship.

His early interest centered on the induction of tumors of various organs such as the ovary, hypophysis, thyroid, and the mammary gland in rodents, due to disturbance of the hormonal balance by various means. Much attention was also paid to the hormone dependence of the tumors and hormone production. Gradually, he focused his interest on the study of the factors responsible for the induction of mammary tumors in mice. For this species, it was established that four main factors or groups of factors may be involved, namely, genetic, hormonal, viral, and environmental. Each of these factors occupied his attention in the building of his department.

Almost simultaneously in 1933, Little in the United States and Korteweg of the Netherlands Cancer Institute discovered an extrachromosomal factor responsible for the induction of mammary tumors in mouse strains with a high incidence of these tumors. This factor, later named the mammary tumor virus (MTV), was found to be transmitted through milk from mother to offspring. It was shown later to be an RNA virus. Mühlbock found that variants of the MTV existed which induced different tumor incidences and degrees of virus expression in dissimilar strains. Serendipitously, he developed the GRS strain, which proved to be of special interest because it carries a MTV variant which can be transmitted not only through the milk but also genetically, by both sperm and ova. This provided one of the first models for the study of a viral genome incorporated into mammalian DNA. The GRS also was exceptional in that the mammary tumors of this strain are hormone dependent and thus represent a model more related to human tumors.

The hormonal induction of mammary tumors held Mühlbock spellbound throughout his career. In his early work, he established dose-response relationships for estrogen treatment of gonadectomized MTV-carrying animals, clearly differentiating hormonal carcinogenesis from chemical carcinogenesis. After discovering the prolactin-producing pituitary isograft technique, he opened a fruitful new field of investigation with the finding that prolactin is a major carcinogenic agent for the mammary gland in mouse strains, also in the absence of the MTV as a biological entity. A new technique, the transplantation of mammary glands of both parent strains into the F_1 hybrids, showed that at least part of the genetic susceptibility for mammary tumors is localized in the gland itself; this proved to be true in viral as well as hormonal carcinogenesis.

In the late 1960's, Mühlbock initiated extensive genetic studies on the role of histocompatibility genes in resistance to mammary tumor virus infection. These experiments provided one of the first indications for the biological role of the D-region of *H-2*. These investigations and administrative duties occupied him until a few months before his death.

Mühlbock served in many national and international organizations and devoted great efforts to promotion of cancer research in countries with lesser traditions in this field. In 1958, he became Professor in Experimental Oncology at the University of Amsterdam. He was for many years chairman of the Scientific Council of the Netherlands Organization for the Fight against Cancer, which was instituted by the Netherlands Royal Academy of Sciences. His international activities included: membership on the Cancer Panel and various other committees, including the committee for the foundation of the International Agency for Research on Cancer, Lyon, France of the World Health Organization; president of the Cancer Research Commission (1958–1966) of the Union International Contre Cancer; consultant to the Life Science Department, member-founder, and chairman from 1962 to 1966 of the International Cell Research Organization, UNESCO; and a member-founder of the European Association for Cancer Research.

Dr. Mühlbock was honored on many occasions. In 1958, he became a member of the Netherlands Royal Academy of Sciences. On his 65th birthday (1971), a symposium on "RNA Viruses and Host Genome in Oncogenesis" was organized in Amsterdam in his honor. In 1970, he received the Award of Merit for outstanding service to the Union International Contre Cancer; in 1978, he received the Meyer and Anna Prentis Award of the Michigan Cancer Foundation; and, in the same year, he was elected an Honorary Member of the American Association for Cancer Research.

Finally, and for him a great moment, on March 14, 1979, he received, together with Dr. A. Graffi and Dr. W. P. Rowe, the highest German award for scientific work, the Paul Ehrlich Prize. On this occasion, he gave his last lecture on the causative factors in mammary cancer.

Mühlbock was a good and esteemed friend of many scientists throughout the world. He will be missed not only by his friends and colleagues but by the worldwide cancer community.

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Cancer Res 1980;40:190.