Adolf Butenandt

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Prof. Dr. Adolf Butenandt, Honarary President of the "Max-Planck-Gesellschaft zur Förderung der Wissenschaften", Nobel Laureate 1939, celebrates his 75th birthday in 1978.

Adolf Butenandt was born on March 24th 1903 in Bremerhaven. After graduating from high school, he studied chemistry first in Marburg, then in Göttingen. He was interested not only in chemistry but also in biology; among his academic teachers in biology were F. von Wettstein and Alfred Kühn. The supervisor of the Ph. D. thesis of Butenandt was Adolf Windaus, known for his work on cholesterol, ergosterol and vitamin D. Though the topic of Butenandt's Ph.D. thesis was the elucidation of the structure of a non-steroidal compound, i.e. rotenone, he became well acquainted with steroid chemistry during his work in Windaus' laboratory. This was to be of great importance for his later work on hormones.

Butenandt's first great biochemical achievement was the isolation of oestrone in 1929. He began to work in this field

in 1927. The starting material was a concentrate of tens of thousands of litres of urine prepared by the pharmaceutical company Schering AG, which was then further fractionated. Since the fractionation methods were rather poor in the 1920's, it was a difficult task to purify the active substance which was present only in small amounts and could only be detected and estimated by the Allen-Doisy bioassay of mice.

After isolation of oestrone, Butenandt continued, together with his collaborators U. Westphal, K. Tscherning and J. Schmidt-Thomé, to isolate hormonal steroids from urine. Among the substances isolated were pregnandiol and androsterone; the latter was the first substance obtained in pure form which was active as a male sex hormone. In 1934, Butenandt and coworkers isolated progesterone, the hormone of the corpus luteum, and shortly afterwards the structure of progesterone was elucidated. For his work on the isolation of these hormones and the elucidation of their structures, Butenandt was honored with the nobel prize for chemistry in 1939.

From 1933-1936 Butenandt was professor of organic chemistry at the Technical University of Danzig. In 1936, he became Director of the Kaiser-Wilhelm-Institute of Biochemistry in Berlin-Dahlem; this institute was later moved to Tübingen and renamed the Max-Planck-Institute for Biochemistry. From 1946-1956 Butenandt also served as professor of physiological chemistry at the University of Tübingen.

Already in Dahlem, Butenandt became interested in other fields of biological chemistry. Starting from his work on steroids, he investigated the relationship of steroids to carcinogenic substances, asking the question: "Could steroids give rise, during metabolism, to the occurrence of carcinogenic substances within the organism?" This field was later followed by his pupil H. Dannenberg, who answered the question in the negative.

Another field of interest was virus research. He interested his student Gerhard Schramm to work on the tobacco mosaic virus. One of the highlights of virus research in Dahlem was the disruption of TMV into subunits and the reconstitution of the virus particle from its components, the first example of self-assembly of nucleoproteins.

Also in Dahlem, a close collaboration between A. Butenandt and A. Kühn developed in the field of biochemical genetics. E. Caspari and A. Kühn had shown that after transplantation of wild-type tissue into mutant insect strains, wild type eye-colour developed. In 1941, Butenandt and Weidel showed that kynurenine, a metabolite of tryptophan, was the precursor of the eye pigment of insects. Already in 1944, Butenandt postulated that genes act by influencing metabolism of amino acids and other body constituents, a hypothesis which was later developed into the well known one gene-one enzyme theory by G. Beadle.

His work on kynurenine brought Butenandt into close contact with japanese workers in this field, especially Y. Kotake; there was a long-standing tradition in Japan in the elucidation of the metabolism of various amino-acids, notably histidine and tryptophan.

Butenandt and his co-workers also elucidated the chemical nature of the eye pigments, xanthommatin, rhodommatin and ommatin D. But the field of insect eye pigments and their biogenesis was not the only field in insect biochemistry in which Butenandt had done outstanding work. The metamorphosis hormone, ecdysone, was isolated (Butenandt and Karlson, 1954) and later shown to be a steroid. Also, the first insect sex attractant was isolated by Butenandt and co-workers (E. Hecker, R. Beckmann, D. Stamm) and the structure of this substance, named bombykol, was elucidated. The starting material for the isolation of this sex attractant - a large number of abdomen tips of female silk-moths - was shipped from Japan; only in this country, silk industry was still flourishing. Bombykol and its synthetic analogues later became very important in the research of D. Schneider and his colleagues in the physiology of chemo-reception; this field developed in close contact with Butenandt and his co-workers.

In 1953, Butenandt became professor of physiological chemistry at the University of Munich, and he also moved the Max-Planck-Institute for Biochemistry from Tübingen to Munich. Parts of

the scientific achievements mentioned above were done in Munich. But in the many divisions of the Munich Institute, other fields of Biochemistry were developed: protein research with the elucidation of the primary structure of haemoglobin (Braunitzer), research on nucleic acids and their biosynthesis (Zillig) and again virus research (Hofschneider).

Butenandt was an excellent academic teacher. He lectured in Göttingen and Danzig, later in Tübingen and in Munich. Of special importance to his Ph. D. students were the small seminars, where the young students were also trained in scientific lecturing. But even more important was his close and friendly contact and leadership to his post-doctoral students. He developed an excellent school of scientific thinking.

In 1960, Butenandt was elected president of the "Max-Planck-Gesellschaft zur Förderung der Wissenschaft". Under his presidency, the Max-Planck-Gesellschaft developed considerably; many new institutes were founded. He himself said that he had changed his profession; this is true in a sense, he was no longer a university professor, and teaching was not his main duty. On the other hand, he was still acting as a scientist in a very responsible way and was doing his best for the sciences in Germany in developing the Max-Planck-Gesellschaft to the big organization that it is nowadays.

After having served two terms in his position as president, Butenandt retired in 1972, and became Honorary President of the Max-Planck-Gesellschaft.

It was characteristic in Butenandt's scientific career that he was always willing to attack biologically interesting new problems with biochemical and chemical methods. He was not discouraged by experimental difficulties; on the other hand, he always had a clear judgement if a given biological problem was ripe for biochemical investigations. His main interest was always in the isolation and characterization of substances of biological activity - the action of a hormone, the action of a gene product, a pheromone, or a virus. One of his great lectures was entitled "life as an object of chemical research". This was the aim of his scientific work throughout his active career.