Thomas H. Morgan

The Nobel Prize in Physiology or Medicine 1933

Biography

Thomas Hunt Morgan was born on September 25, 1866, at Lexington, Kentucky, U.S.A. He was the eldest son of Charlton Hunt Morgan.

He was educated at the University of Kentucky, where he took his B.S. degree in 1886, subsequently doing postgraduate work at Johns Hopkins University, where he studied morphology with W. K. Brooks, and physiology with H. Newell Martin.

As a child he had shown an immense interest in natural history and even at the age of ten, he collected birds, birds' eggs, and fossils during his life in the country; and in 1887, the year after his graduation, he spent some time at the seashore laboratory of Alphaeus Hyatt at Annisquam, Mass. During the summer of 1888, he was engaged in research for the United States Fish Commission at Woods Hole. In 1890 he spent the summer at the Marine Biological Laboratory (MBL) in Woods Hole, thus beginning a long-term association with the MBL as a summer investigator and trustee. In 1890 he obtained his Ph.D. degree at Johns Hopkins University. In that same year he was awarded the Adam Bruce Fellowship and visited Europe, working especially at the Marine Zoological Laboratory at Naples which he visited again in 1895 and 1900. At Naples he met Hans Driesch and Curt Herbst. The influence of Driesch with whom he later collaborated, no doubt turned his mind in the direction of experimental embryology.

In 1891 he became Associate Professor of Biology at Bryn Mawr College for Women, where he stayed until 1904, when he became Professor of Experimental Zoology at Columbia University, New York. He remained there until 1928, when he was appointed Professor of Biology and Director of the G. Kerckhoff Laboratories at the California Institute of Technology, at Pasadena. Here he remained until 1945. During his later years he had his private laboratory at Corona del Mar, California.

During Morgan's 24-years period at Columbia University his attention was drawn toward the bearing of cytology on the broader aspects of biological interpretation. His close contact with E. B. Wilson offered exceptional opportunities to come into more direct contact with the kind of work which was being actively carried out in the zoological department, at that time.

Morgan was a many-sided character who was, as a student, critical and independent. His early published work showed him to be critical of Mendelian conceptions of heredity, and in 1905 he challenged the assumption then current that the germ cells are pure and uncrossed and, like Bateson was sceptical of the view that species arise by natural selection. «Nature», he said, «makes new species outright.» In 1909 he began the work on the fruitfly *Drosophila melanogaster* with which his name will always be associated.

It appears that Drosophila was first bred in quantity by C. W. Woodworth, who was working from 1900-1901, at Harvard University, and Woodworth there suggested to W. E. Castle that Drosophila might be used for genetical work. Castle and his associates used it for their work on the effects of inbreeding, and through them F. E. Lutz became interested in it and the latter introduced it to Morgan, who was looking for less expensive material that could be bred in the very limited space at his command. Shortly after he commenced work with this new material (1909), a number of striking mutants turned up. His subsequent studies on this phenomenon ultimately enabled him to determine the precise behaviour and exact localization of genes.

The importance of Morgan's earlier work with Drosophila was that it demonstrated that the associations known as *coupling* and *repulsion*, discovered by English workers in 1909 and 1910 using the Sweet Pea, are in reality the obverse and reverse of the same phenomenon, which was later called *linkage*. Morgan's first papers dealt with the demonstration of sex linkage of the gene for white eyes in the fly, the male fly being heterogametic. His work also showed that very large progenies of Drosophila could be bred. The flies were, in fact, bred by the million, and all the material thus obtained was carefully analysed. His work also demonstrated the important fact that spontaneous mutations frequently appeared in the cultures of the flies. On the basis of the analysis of the large body of facts thus obtained, Morgan put forward a theory of the *linear arrangement* of the genes in the chromosomes, expanding this theory in his book, *Mechanism of Mendelian Heredity* (1915).

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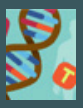
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In addition to this genetical work, however, Morgan made contributions of great importance to experimental embryology and to regeneration. So far as embryology is concerned, he refuted by a simple experiment the theory of Roux and Weismann that, when the embryo of the frog is in the two-cell stage, the blastomeres receive unequal contributions from the parent blastoderm, so that a «mosaic» results. Among his other embryological discoveries was the demonstration that gravity is not, as Roux's work had suggested, important in the early development of the egg.

Although so much of his time and effort was given to genetical work, Morgan never lost his interest in experimental embryology and he gave it, during his last years increasing attention.

To the study of regeneration he made several important contributions, an outstanding one being his demonstration that parts of the organism which are not subject to injury, such as the abdominal appendages of the hermit crab, will nevertheless regenerate, so that regeneration is not an adaptation evolved to meet the risks of loss of parts of the body. On this part of his work he wrote his book *Regeneration*.

Apart from the books previously mentioned Morgan wrote: *Heredity and Sex* (1913), *The Physical Basis of Heredity*(1919), *Embryology and Genetics* (1924), *Evolution and Genetics* (1925), *The Theory of the Gene* (1926), *Experimental Embryology* (1927), *The Scientifc Basis of Evolution* (2nd. ed., 1935), all of them classics in the literature of genetics.

Morgan was made a Foreign Member of the Royal Society of London in 1919, where he delivered the Croonian Lecture in 1922. In 1924, he was awarded the Darwin Medal, and in 1939 the Copley Medal of the Society.

For his discoveries concerning the role played by the chromosome in heredity, he was awarded the Nobel Prize in 1933.

Among his collaborators at Columbia may be mentioned H. J. Muller, who was awarded the Nobel Prize in 1946 for his production of mutations by means of X-rays.

Morgan married Lilian Vaughan Sampson, in 1904, who had been a student at Bryn Mawr College, and who often assisted him in his research. They had one son and three daughters.

Professor Morgan died in 1945.

From *Nobel Lectures, Physiology or Medicine 1922-1941*, Elsevier Publishing Company, Amsterdam, 1965

This autobiography/biography was written at the time of the award and first published in the book series *Les Prix Nobel*. It was later edited and republished in *Nobel Lectures*. To cite this document, always state the source as shown above.

Thomas H. Morgan died on December 4, 1945.