Christiane Nüsslein-Volhard (1942- ) [1]

By: Resnik, Jack May, Catherine


Nüsslein-Volhard was born in Magdeburg, Germany, on 20 October 1942, in the midst of World War II. Her mother, Brigitte Volhard, was an artist and musician and her father, Rolf Volhard, was an architect. Early in her life Nüsslein-Volhard vacationed at a farm where she became studied plants and animals, and by the age of twelve she worked to become a biologist. She attended primary school in Germany and she later recalled often neglecting subjects not related to her interests, resulting in mediocre grades overall.

Nüsslein-Volhard began attending Goethe Frankfurt University in Frankfurt, Germany, in 1962. Nüsslein-Volhard later said that the transition to university was difficult for her as she missed her friends and wasn't challenged by the biology program. Seeking more interesting classes, Nüsslein-Volhard broadened her studies to include physics and mathematics. In the summer of 1964, Nüsslein-Volhard left Frankfurt to study at the University of Tübingen in Tübingen, Germany, where a new biochemistry program had been established. Although she said that her accommodations in Tübingen were sparse—no central heating or warm water—she also said that she enjoyed the curriculum, especially genetics and microbiology. Furthermore, Tübingen housed the Max Planck Institute for Virus Research, which gave Nüsslein-Volhard the opportunity to attend lectures by many leading scientists such as Gerhard Schramm, and Heinz Schaller. She said that these lectures shaped her understanding of science. During this time she married briefly, resulting in her hyphenated last name. When she divorced she decided to retain her hyphenated name as it had begun to be associated with her scientific publications. In 1968, Nüsslein-Volhard graduated from University of Tübingen with a degree in biochemistry.

In 1969 Nüsslein-Volhard began her doctoral work in Heinz Schaller’s Laboratory at the Max Planck Institute for Virus Research. She launched her thesis work on phage RNA-DNA interactions, but quickly discovered limitations with the tools available for experimentation. Subsequently, she developed a technique for purifying RNA polymerase, the molecule that transcribes RNA from DNA. By capturing the molecule where it binds to DNA at specific regions called promoters, she characterized promoter regions and described the molecular mechanisms that activate the process of transcription.

When Nüsslein-Volhard finished her PhD in 1973, she said that molecular biology work had lost much of its appeal to her. Interested to apply genetics to more complex phenomenon than those in viruses, she studied cellular biology, pattern formation [17], and regeneration in the hydra [18], a genus of freshwater polyps. In 1973 Nüsslein-Volhard met Walter Gehring, who had just published a paper on the gene bicaudal in Drosophila [19]. Interested in genes [8] like bicaudal that controlled the establishment of polarity [19] in embryos, Nüsslein-Volhard asked to join his lab at the University of Basel [20] in Basel, Switzerland. Gehring agreed, and in 1975 she moved to Switzerland.

Supported by a fellowship from the European Molecular Biology Organization (EMBO) in Heidelberg, Germany, Nüsslein-Volhard began postdoctoral work at the Biozenstrum, a research institute within the University of Basel [20]. She began large-scale genetic screens [21] of mutant Drosophila [19] embryos that lacked the bicaudal gene. Nüsslein-Volhard performed a type of genetic screen called a saturation screen, in which researchers work to identify all the genes [8] involved in a particular phenotype by exposing flies to mutagens and finding the genetic mutation that caused phenotypic abnormalities. By examining a cohort of flies missing the bicaudal gene, she could determine all the other genes [8] involved in the mutant bicaudal phenotype. Due to the tedious task of collecting and harvesting embryos, the large number of mutants needed for the screens, and the difficulties associated with identifying mutant phenotypes, Nüsslein-Volhard later reported that bicaudal was the most challenging gene she ever researched. However, after developing several techniques to facilitate her work, she identified a second gene which appeared to influence pattern formation [17] in fly embryos, a gene later called dorsal. Her work on bicaudal culminated in the
Nüsslein-Volhard's later career has focused on social, ethical and philosophical issues in the sciences. She served on the German Research Foundation. In 1989, she received the Carus Prize of the German Academy of Sciences. In 1990, Nüsslein-Volhard received the Rosenstiel Medal. In 1991 she was awarded with the Lasker Basic Medical Research Award. In 1994 a newly discovered asteroid in the main asteroid belt of our solar system was also named after her: 15811 Nüsslein-Volhard.

Nüsslein-Volhard's later career has focused on social, ethical and philosophical issues in the sciences. She served on the
Christiane Nüsslein-Volhard (1947–) is a German developmental biologist. Nüsslein-Volhard studied how genes control embryonic development in flies and in fish in Europe during the twentieth and twenty-first centuries. In the 1970s, Nüsslein-Volhard focused her career on studying the genetic control of development in Drosophila. In 1995, along with Eric F. Wieschaus and Edward B. Lewis, she received the Nobel Prize in Physiology or Medicine for the discovery of genes that establish the body plan and segmentation in Drosophila. Nüsslein-Volhard also investigated the genetic control of embryonic development to zebrafish, further generalizing her findings and helping establishing zebrafish as a model organism for studies of vertebrate development.

Sources


Christiane Nüsslein-Volhard studied how genes control embryonic development in flies and in fish in Europe during the twentieth and twenty-first centuries. In the 1970s, Nüsslein-Volhard focused her career on studying the genetic control of development in the fruit fly Drosophila melanogaster. In 1988, Nüsslein-Volhard identified the first described morphogen, a protein coded by the gene bicoid in flies. In 1995, along with Eric F. Wieschaus and Edward B. Lewis, she received the Nobel Prize in Physiology or Medicine for the discovery of genes that establish the body plan and segmentation in Drosophila. Nüsslein-Volhard also investigated the genetic control of embryonic development to zebrafish, further generalizing her findings and helping establishing zebrafish as a model organism for studies of vertebrate development.

Subject