

## Ernst Walter Mayr – The Grand Vizier of Evolutionary Biology (1904-2005)

On 23 March 1923, a young medical student at the University of Greifswald, Germany, spotted a pair of ducks while cycling down to the countryside of Moritzburg. He was an ardent birdwatcher, but had never seen these birds before. He cycled over to Dresden but couldn't find anyone who could confirm his sightings. On consulting books he discovered that the ducks he had seen were a pair of Red-crested Pochards (diving ducks), a species that had not been sighted by anyone in nearly eighty years. This incident was about to change the life of the nineteen-year-old, Ernst Walter Mayr.

Mayr was born on 5th July 1904 in Kempton to Otto and Helene Mayr. Otto Mayr was a judge and an amateur naturalist. Otto and Helene subscribed to a popular journal of natural history to get their three teenage sons to take an interest in the subject. The boys were taken on Sunday natural history walks by their father, and by the age of ten Mayr could recognize all the local bird species by sight as well as by call. After graduating from the Dresden secondary school, Mayr enrolled for a career in medicine at the University of Greifswald, a place he chose for its rich ornithological diversity. However, fate had something else in store for him.

Coming back to the story of the pochards, Mayr's bird-watching friends did not believe what he claimed to have seen. Obviously upset by this, he poured out his heart to a stranger at a party soon after. This turned out to be a streak of luck, because this person happened to know the greatest ornithologist in Berlin, Prof. Erwin Stresemann. Armed with a letter of introduction from his new friend, Mayr traveled to Berlin, but met with a rough reception from Stresemann, "who quizzed him mercilessly on his knowledge of natural history and demanded to see his earlier notes and journals of field observations." At last convinced by Mayr's observational skills, Stresemann asked him to report the sighting. This was Mayr's first scientific paper, published in "*Ornithologische Monatsberichte*". Impressed by the young man, Stresemann invited him to work as a volunteer in the Berlin Museum during his summer vacations. Mayr was to classify the bird specimens received from the tropics. The young Mayr was so fascinated by the immense diversity of the rain-forest wildlife that he thought he had been given the "keys to heaven". He continued to work in the museum during breaks from medical school. Just before he passed the candidate of medicine examinations,



Stresemann offered him a dream job – a position at the Berlin Museum, and the chance to lead an ornithological expedition in the tropics. But there was a catch – Mayr had to complete a PhD in 16 months, a feat that seemed quite impossible to achieve by normal standards. However, Mayr was far from “normal”, and completed his PhD under Stresemann himself at the age of 21. He got his promised job and went on the expeditions to Dutch New Guinea and German Mandated New Guinea, an experience that fulfilled “the greatest ambition of (his) youth”. Over a span of two-and-a-half years he collected about 700 bird skins. Mayr has recounted an anecdote from the New Guinea expedition: he tried to increase his standing with the New Guinea natives by using a little trick from Mark Twain (*A Connecticut Yankee in King Arthur’s Court*). He had learnt from his almanac that there would be a lunar eclipse. So he announced to the natives that the moon was about to darken totally. Unlike Twain’s characters, however, they were not impressed, and the elderly chief told Mayr, “Don’t worry, my son, it will soon be light again.”

Mayr returned from the trip to the Southwest Pacific islands and went on the Whitney South Sea Expedition to the Solomon Islands. In 1931, he was hired by the Department of Ornithology at the American Museum of Natural History (AMNH) as a visiting curator. He was to catalogue the Whitney Expedition collection. He accomplished the mammoth task of describing 12 new species and 68 new subspecies of birds in 12 research papers within one year. The next year, Sir Walter Rothschild, a noted collector, sold his large ornithological collection (280,000 bird skins) to the AMNH under financial difficulties. This secured Mayr’s job at AMNH. He was appointed the curator of the Whitney-Rothschild collection, a position he held for the next 20 years. During this tenure he described 26 new bird species and 410 subspecies!

A species in those days was defined as a group of individuals sharing a common morphology. This was called the morphological species concept. It is not very difficult to see that this definition can be quite problematic. Consider a peacock with its beautiful train and a drab peahen – a taxonomist, who only sees them dead and knows nothing about their biology, would classify them as different species, based on the morphological species concept. On the other hand, one could classify a mimic and its model as the same species. Mayr realized this problem, and based on his experience with the large number of birds that he had studied, he formulated the biological species concept. He defined species as groups of interbreeding populations in nature, reproductively isolated from each other. Mayr thus made the “species problem” a central question in biology, and the study of the mechanism of speciation an impor-



tant facet of modern biology. This is one of the major contributions that Ernst Mayr has made to the understanding of biodiversity.

At AMNH, Mayr had worked up a series of related species from different islands, which was a convincing and dramatic demonstration of geographic speciation. In 1936, he invited Theodosius Dobzhansky to study the series. Dobzhansky will perhaps be best remembered by generations of students of biology by his statement, "Nothing in biology makes sense except in the light of evolution." He was an evolutionary geneticist, whose life's work has centered round the theme of evolution. Darwin's theory of evolution by means of natural selection considered inheritance as a fact, but lacked the means to explain how variations within the populations survived through generations. The rediscovery of Mendel's laws in 1900 provided an explanation for the transmission of heredity. In the 1920's and 1930's, Haldane, Fisher and Wright had formulated mathematical accounts of natural selection as a genetic process. However, doubts remained in the minds of the naturalists whether this represented evolution within species or across species. Dobzhansky's famous book *Genetics and the Origin of Species* (1937) succeeded in elucidating the same ideas in the language of biologists, using natural history and experimental population genetics to supplement the theoretical arguments. The interaction with Dobzhansky influenced Mayr to play a major role in the evolutionary synthesis. Mayr's 1942 classic *Systematics and the Origin of Species*, along with Dobzhansky's 1937 opus and George Gaylord Simpson's *Tempo and Mode in Evolution* (1944) laid the foundations for the modern evolutionary synthesis that unifies Darwin's concept of evolution by natural selection and Mendel's laws of heredity.

The modern evolutionary synthesis is not a single theory or hypothesis. It is an amalgamation of established theories and working hypotheses, along with experimental and observational evidences in their support that try to explain evolutionary processes. The 'synthesis' has brought together knowledge gained in fields like genetics, botany, zoology, embryology, paleontology, systematics, molecular biology and mathematical modeling to build a unified theory of evolution.

Ernst Mayr was probably one of the most prolific of scientists. He has published over 700 papers and 25 books, 14 of them after he turned 65 and 5 of them after he turned 90! Mayr's achievements are numerous, and he has been honored with many awards and prizes in his long and productive life. He has received the 'triple crown of biology' – The Balzan Prize (1983), the International Prize for Biology (1994) and the Crafoord



Prize (1999). Mayr was well known for his legendary self-confidence, which is probably best highlighted in the preface of, *What Evolution Is* (2002). He claims that this book surpasses all of the existing books on evolution. The others, he says, "are rather poorly organized and fail to present a concise, reader-friendly account." Many are too technical, and none "quite fills the niche I have in mind." His book addresses both readers who want to know more about evolution and those who reject evolution but may want to learn more "if for no other reason than to be able to better argue against it."

Hailed as the Darwin of the 20th century, the similarities between his life and that of Darwin are uncanny. Both were naturalists from a very young age, one specializing in beetles and the other in birds. Both gave up a medical career to return to their avocations. Darwin's famous *Beagle voyage* is again a parallel with Mayr's trip to the New Guineas. Darwin had carefully monographed his barnacles, while Mayr wrote a large number of papers on the variation and distribution of birds. Both these great men achieved their fame through synthesizing a large number of scattered facts that supported their theories.

Mayr wrote an autobiographical sketch for *Science* on his 100th birthday. The resulting "80 Years of Watching the Evolutionary Scenery" is a brilliant piece of work that gives us a glimpse of the history of the modern evolutionary thought. Yes, he has been around for a very long time, and his relentless arguments have spurred many a scientist to work harder to disprove his pet hypotheses. Perhaps that is the greatest contribution of a scientist to the world of science – to inspire thought in the generations that follow.

Ernst Mayr's death on 3rd Feb 2005 at a retirement community near Bedford marks the end of an era in the history of evolutionary biology. But Mayr was like a great banyan tree that lives on for ages after the main trunk dies. Those eighty years' work and thought remain with us to inspire many generations of biologists to ask questions and strive to find answers about the world around us.

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