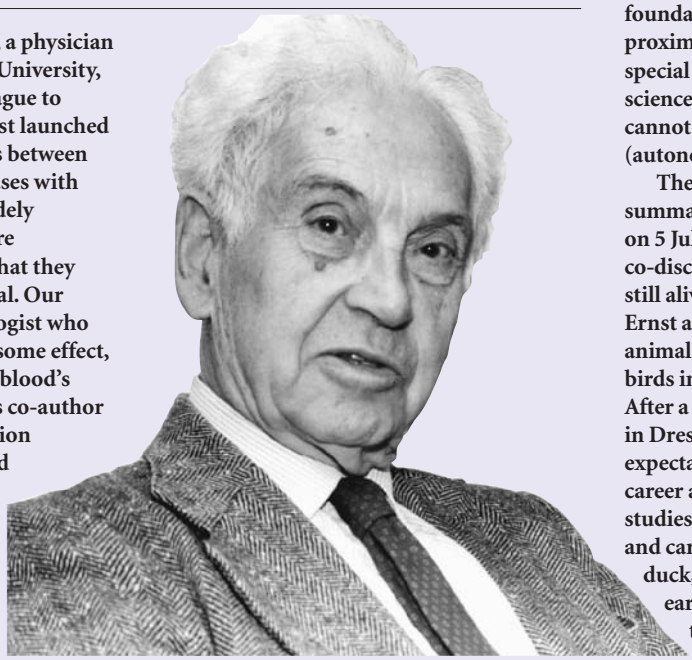
Obituary

Ernst Mayr (1904–2005)



HARVARD UNIV.

Evolutionary biologist, ornithologist and philosopher

One Sunday in 1953, my father, a physician and haematologist at Harvard University, invited a newly recruited colleague to lunch at our house. Dad had just launched a study of possible associations between human blood groups and diseases with him. At that time, scientists widely assumed that blood groups were 'selectively neutral' — that is, that they had no effect on human survival. Our guest was an evolutionary biologist who suspected that they must have some effect, perhaps one far removed from blood's familiar functions. Dad and his co-author went on to discover an association between ABO blood groups and stomach cancer, one of the first studies to show that blood groups are indeed influenced by natural selection. The co-author was Ernst Mayr, widely regarded as the greatest evolutionary biologist of the twentieth century, who died on 3 February 2005.

When I met Mayr that Sunday, I was a 16-year-old schoolboy. He later inspired me to launch a second career, parallel to my work as a membrane physiologist, on the evolutionary biology of New Guinea birds, his own early speciality. For 30 years he and I collaborated on analysing a mammoth database that he had accumulated on the distributions of island birds. The result was a co-authored 556-page book published soon after his 97th birthday. That Sunday lunch and its consequences illustrate many keys to Mayr's greatness: his capacity for close friendships and collaborations with younger scientists as well as with peers; his broad perspective that let him recognize new significance in the work of many specialists; and his capacity for sustained hard work and complex analysis.

The achievements for which Mayr is best known fall into six areas. First, as an ornithologist he was the leading expert on birds of New Guinea and the tropical southwest Pacific; he described more species and subspecies of living birds than anyone else of his or subsequent generations. Second, as a systematist he was a principal architect of what is termed the 'evolutionary synthesis', which finally succeeded in showing how the adaptive changes that natural selection produces in single populations result in the evolution of biodiversity. That synthesis fused the hitherto separate research programmes of geneticists and field naturalists, and explained how evolution has given rise to organisms ranging from microscopic bacteria to redwood trees.

In that process lies Mayr's third major achievement, his assembly of overwhelming evidence that most species are not collections of individuals arbitrarily delineated by taxonomists but real entities: "a group of actually or potentially interbreeding natural populations reproductively isolated from other such populations", to quote his widely cited formulation. He also demonstrated that new species of birds and mammals arise through allopatric speciation (geographical isolation of initially conspecific populations) — thereby in effect solving the problem of the origin of species that had eluded Charles Darwin despite the title of Darwin's great book.

Fourth, as a biogeographer Mayr's studies of a fauna's composition, origins, history and boundaries have served subsequent biogeographers as models for testing their own results. Fifth, as an evolutionary biologist, Mayr traced in detail the combined operation of population genetics and evolutionary processes in diverse phenomena throughout the animal kingdom, as illustrated by the study of blood groups that resulted in my meeting him.

Finally, as a historian and philosopher of science, in recent decades Mayr clarified the regularly misunderstood central concepts of biology: teleology; the foundations of biological classification; proximate and ultimate causation; the special problems posed by historical sciences to which experimental methods cannot be applied; and the distinctness (autonomy) of biology as a science.

The facts of Mayr's career can be briefly summarized. He was born in Germany on 5 July 1904, at a time when evolution's co-discoverer, Alfred Russel Wallace, was still alive. On weekends, his parents took Ernst and his brothers on walks to observe animals, plants and fossils, among which birds in particular kindled his interest. After a rigorous high-school education in Dresden, Ernst obeyed Mayr family expectations by preparing for a medical career and completed his preclinical studies in 1925. However, his observation and careful description of a pair of a rare duck, last recorded in Germany 77 years earlier, led to his introduction to the Berlin ornithologist Erwin Stresemann. Recognizing Mayr's talent, and also his thirst to visit the tropics, Stresemann offered Mayr two irresistible enticements: a position in the Berlin Museum, and prospects of a bird-collecting trip to the tropics, if Mayr could complete an entire PhD programme within 16 months.

Mayr accepted the challenge, worked 16 to 18 hours a day to receive his PhD in 1926, and took up the promised museum position. In 1928 Stresemann, now armed with money from Lord Rothschild and from the American Museum of Natural History (AMNH) in New York, delivered on his second promise by sending Mayr to the southwest Pacific for more than two years. The instructions given to Mayr were to explore five New Guinea mountain ranges, to solve the long-standing mystery of New Guinea's apparently rarest birds of paradise (he did, and they proved to be hybrids), and to collect birds on islands in the Solomon group that had been considered too dangerous to visit by previous collectors. Mayr succeeded beyond everyone's expectations. Having re-explored six of those mountain ranges and islands between 1974 and 2004, under the less-threatening conditions of the late twentieth century, I can testify that they are physically gruelling even today. Mayr managed to amass comprehensive bird collections there from 1928 to 1930, despite the perils of diseases, capsized canoes, forced descents of waterfalls and periodic threats of natives to kill him.

Soon after his return from New Guinea, in 1931 Mayr was appointed by the AMNH

to curate the museum's overflowing collections of Pacific island birds. For the next decade, all of his publications were technical taxonomic studies of birds, giving few signs of his broader interests, until the publication in 1942 of his first book, *Systematics and the Origin of Species*, which completed the evolutionary synthesis.

In 1953, a desire for contact with students and for wider intellectual horizons led Mayr to move to Harvard, as Agassiz Professor of Zoology, where he also served as director of the Museum of Comparative Zoology from 1961 to 1970. Following his official retirement from Harvard in 1975, he continued to publish with undiminished productivity. Fourteen of his 25 books were published after the age of 65, including one of his most important ones, *The Growth of Biological Thought*, which appeared when he was 78. He celebrated his 100th birthday with the publication of *What Makes Biology Unique?* in 2004. Whenever I talked to him during his nineties, I would ask him: "How many books are you working on now?" The answer was never less than two nor more than four.

What accounted for Mayr's remarkable originality and productivity? I came to realize that there wasn't a single explanation but the combination of a dozen of them — cognitive, organizational, emotional and social. Among the cognitive ones, he had an outstanding memory. When, in 1965, 24 years after the peak of Mayr's work on New Guinea birds, John Terborgh and I asked him to identify the stuffed bird specimens that we had just collected in New Guinea, we saw that, for each of the 1,400 species and subspecies of birds that he had discussed in his 1941 *Checklist of New Guinea Birds*, Mayr still remembered who had described it — and when and in what journal, its differences from its relatives, and its alternative names. To that memory for facts were allied outstanding visual recall (for example, he was alert to slight subspecific differences between bird specimens seen at different times in different museums) and auditory recall (the ethologist Klaus Immelmann related how, while he and Mayr were sitting on a garden bench in Germany in the 1970s, Mayr correctly identified a brief call note of an unseen bird as a grey wagtail, which he had not encountered since leaving Germany 40 years previously).

Mayr was also a quick learner: in the month before he reached New Guinea in 1928, he learned to speak Malay and Neo-Melanesian, to shoot a gun, and to skin and stuff birds. Like Darwin, he was a constantly curious field observer; also like Darwin, his wide interests let him

ERNST MAYR LIBRARY

Ernst Mayr in the field: Mayr in 1928, with (left) his assistant, Sario, following two months of surveying birds in the mountains of New Guinea.

reinterpret the work of specialists, as he did with my father's data on blood groups. In my own collaboration with him, I was struck by his comfort with complexity: unlike many other scientists, he did not force facts into a one-factor explanation, but acknowledged the possibility of different multi-factor outcomes (such as different evolutionary trajectories for different bird populations).

Mayr himself spoke of his *Sitzfleisch* or capacity to stick to a job, just as the composer J. S. Bach attributed his prodigious musical output to mere *Fleiss* (industriousness). During Mayr's years as a museum director at Harvard, a job that absorbed his daytime hours, he maintained his scientific output by writing each morning from 4:30 until 7:30 a.m., then spending the evening reading. In the 16 months that it took him to complete his PhD by age 21, he took all of the required courses in zoology, learned and passed an exam in botany, completed a minor in philosophy, and researched and wrote his thesis. When he arrived at the AMNH on 20 January 1931, he was given a one-year appointment with the understanding that reappointment would depend on productivity. He published his first paper two months later (a reclassification of kingfisher subspecies based on measuring hundreds of specimens), and finished 11 more papers by the year's end. (That convinced the AMNH to renew his appointment.)

Despite not visiting an English-speaking country until his twenties, Mayr mastered English as a second language to the point where his English prose style was widely admired for its clarity. In addition to publishing 25 books and more than 700 papers and directing Harvard's museum for nine years, he designed the AMNH's bird exhibit hall, integrated the Rothschild collection of 280,000 bird specimens into the AMNH collection, and edited the last eight volumes of the *Checklist of the Birds of the World* (a critical reassessment of all bird taxa down to the subspecies level). Each of those 'additional' achievements was a mammoth undertaking in itself.

Mayr was self-confident without being overconfident. And he could change strongly held views when presented with new evidence, as when he abandoned his initially lamarckian belief in the inheritance of acquired characteristics. His confidence in his abilities included recognition of their limitations: for instance, he resisted friends' suggestions that he expand his 1963 book *Animal Species and Evolution* to include plants and microorganisms, because of his insufficient familiarity with them. Those limitations also involved mathematics beyond algebra, which he did not use. He maintained a low opinion of the value of the cladistic methods now dominant among taxonomists. That contributed to the distance, in his later years, between his views and those of some other evolutionary biologists now active. They felt that his work belonged to the past; he felt with exasperation that they ignored much of the knowledge already gained in the past.

A widespread misconception is that great scientists tend to be loners. Actually, outstanding success in most areas of science requires outstanding social skills, as illustrated by Mayr's relationships with a wide variety of people. He achieved such good understanding with New Guinea and Solomon tribespeople in the 1920s that they not only led him in and out of areas where other Europeans feared being killed, but they also taught him their local names for birds and brought him hundreds of specimens of bird species missed by other European collectors. He once explained to me that a secret of living happily past age 90, after most friends of the same generation have died, is the continued willingness to forge friendships with younger people.

All of these qualities contributed to Ernst Mayr's scientific greatness and his productivity. They also lie at the root of the love felt for him by several generations of colleagues and friends.

Jared Diamond

Jared Diamond is in the Department of Geography, University of California, Los Angeles, California 90095-1524, USA.
e-mail: jdiamond@geog.ucla.edu