



A Letter to the Editor

Two extraordinary Evolutionary Biologists of the last century- Ernst Mayr and Theodosius Dobzhansky

There are two extraordinary evolutionary biologists of the last century: Ernst Mayr and Theodosius Dobzhansky who have made very important contribution in the previous century in the area of evolutionary biology and both have been called as Darwin of twentieth century. Ernst Mayr was born on 5th July, 1904 in Kempten, Bavaria, Germany and died on 3rd February, 2005 (aged 100) in Bedfordm, Masachusetts, US. He had citizenship of Germany and U S. Theodosius Dobzhansky was born on 25th January, 1900 in Nemirov, Russian Empire (now Nemyriv, Ukraine) and died on 18th December, 1975 in Davis, California, US (aged 75). He immigrated to US in 1927 and was a Russian-born American geneticist and evolutionary biologist. Thus both, Mayr and Dobzhansky were American biologists and received numerous awards and medals who have been called as Darwin of twentieth century ^{1, 2, 3}.

Charles Darwin published his book: Origin of species by means of natural selection in 1859 ⁴. He explained his theory of evolution in his book which has two components: descent with modifications-all species living and extinct descended from one or few original forms of pre-existing species, and natural selection is a causative factor in evolutionary change. Biology is a dynamic and essential discipline of science. Darwin proposed one of the most astonishing ideas in the history science that all the species living and extinct descended from one or few original forms of preexisting species (descent with modifications). This idea gives the evidence that every characteristics of every species are outcome of evolutionary history. Thus, evolution is unifying theory of biology ⁵. It has been remarked by Dobzhansky that “Nothing in biology makes sense except in the light of evolution”. Both Mayr and Dobzhansky were strong supporter of Darwinism. Darwin’s theory of evolution was very important theory and was acceptable to a large number of evolutionary biologists. However, it has certain demerits such as it does not explain the origin of variations on which natural selection operates in the process of evolutionary change. Later on,

when Modern Synthesis was proposed it incorporated both mutations and selection so it was called as two factors hypothesis -Modern Synthesis as it was called by Huxley in 1942⁶. In fact, the idea of natural selection was integrated with Mendelian genetics. Although modern synthesis was born in 1937⁷ as a generally accepted way of approaching the problems of evolutionary biology with the publication of Dobzhansky's book *Genetics and the origin of species*. That is why it has been commented by Singh⁸ that Dobzhansky integrated genetics with evolution.

Mayr who was originally Ornithologist studying speciation in birds also got inspiration from Dobzhansky's book. Mayr's important contributions in the field of evolutionary biology are development of biological species concept, allopatric mode of speciation (geographic speciation) and modern synthetic theory. He has published a large number of articles and books in the area of evolutionary biology. His two books: *Systematics and the origin of species*⁹ and *Animal species and evolution*¹⁰ are very important which incorporate his philosophy and ideas of Species, definition, speciation, biological species concept, geographic isolation which are very important in evolutionary biology. He was professor of Zoology in Harvard and also the Director of the Museum of Comparative Zoology. He retired from there in 1975. Under biological species concept, Mayr (1942) defined a species as a group of potentially or actually interbreeding natural populations which are reproductively isolated from other such groups.



Ernst Mayr (1904 - 2005)



Theodosius Dobzhansky (1900-1975)

Dobzhansky's two very important books: *Genetics and the origin of species*⁷ and *Genetics of the evolutionary process*¹¹ contributed immensely on genetical basis of evolution, reproductive isolating mechanisms, population genetics, inversion polymorphism, Hardy-Weinberg Law, and different evolutionary forces. He followed Thomas Hunt Morgan in California Institute of Technology from 1930 to 1940. Based on his experimental work, he articulated the idea of reproductive isolation in animals, synthesis of evolutionary biology with Mendelian genetics, and defining evolution as a change in the frequency of an allele within a gene pool. The work of Dobzhansky was instrumental in spreading the idea that it is through mutations in genes that natural selection operates. Dobzhansky¹² being an evolutionary geneticist, defined species as a reproductive community of sexually and cross-fertilizing individuals which share in a common gene pool. He returned to Columbia University (1940 to 1962) and did extensive work on population and evolutionary genetics of *Drosophila* particularly *Drosophila pseudoobscura* in which he demonstrated for the first time that inversion polymorphism is subject to natural selection and has adaptive functions in natural and experimental populations. He gave the concepts of ecological niche hypothesis, heterosis, balanced polymorphism and genetic coadaptation associated with inversion polymorphism in different species¹³ which are of considerable significance in evolutionary biology. He also contributed significantly in the development of biological species concept along with Mayr. Finally, he moved to Rockefeller Institute (now Rockefeller University) until his retirement in 1971. Dobzhansky's work in the field of evolutionary and population genetics with the help of Sewall Wright integrated the standards of theoretical, natural historical and experimental work. If one compares the contribution of Mayr and Dobzhansky, renowned evolutionary biologists of the last century, contribution of Dobzhansky is more important because he integrated genetics with evolution which is apparent from the title of his book "Genetics and the origin species although the title of Darwin's book is Origin of species.

-
1. Haffer, J. and Bairlein, F. *J. Ornithol.*, 2004, **145** , 161-162.
 2. Marinkovic, D., *Arch. Biol. Sci.* , Belgrade, 2006. **58**, 141-143.
 3. Singh, B.N., *Curr, Sci.*, 2012, **103**, 125.
 4. Darwin, C., *On the Origin of Species by Means of Natural Selection*, John Murray, London, 1859.

5. Singh, B.N., *Curr. Sci.*, 2023, **124**, 289-290.
6. Huxley, J. S., *Evolution, the Modern Synthesis*, Allen and Unwin, London, 1942.
7. Dobzhansky, Th., *Genetics and the Origin of Species*, Columbia University Press, New York, 1937.
8. Singh, B.N., *Curr. Sci.*, 2021, **121**, 201-204.
9. Mayr, E., *Systematics and the Origin of Species*, Columbia University Press, New York, 1942.
10. Mayr, E. *Animal Species and Evolution*, The Belknap Press of Harvard University Press, Cambridge, 1966.
11. Dobzhansky, Th., *Genetics of the Evolutionary Process*, Columbia University Press, 1970.
12. Dobzhansky, Th., *Am. Nat.*, 1950, **84**, 401–418.
13. Singh, B.N., *J. Genet.*, 2018, **97**, 1039-46.

B. N. Singh

Distinguished Professor

Department of Zoology,

Institute of Science,

Banaras Hindu University.

Varanasi-221005, India

e-mail: bnsingh@bhu.ac.in, bnsinghbhu@gmail.com