Theodosius Dobzhansky: A Great Inspirer [1]

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At any given time, many scientists can be found working in any area of scientific research. Of these, a small handful end up doing work that is so far-reaching that they achieve the intellectual equivalent of immortality: thus we have our Newtons, Einsteins, Mendels and Darwins. The work of these intellectual giants no doubt inspires many who come after them, but often the direct personal influence of some of these great scientists on their peers and successors is relatively small. A very small number of scientists, however, enrich their fields of work not only through their own research but also through inspiring others to work in that field. Amongst this small group of great inspirers, Theodosius Dobzhansky stands tall as a scientist who influenced evolutionary biology not only through his own work but also through the very large number of outstanding scientists who received their training and, more importantly, their inspiration from him.

Dobzhansky's own contributions to evolutionary biology (especially evolutionary genetics) are immense and some of these are summarized in two other articles in this issue by Francisco J Ayala (perhaps Dobzhansky's most distinguished student) and Bimalendu Nath. In this article, I will focus on Dobzhansky's almost incredible achievement as an inspirer of future evolutionary geneticists through his writings and his personal contact. This achievement is truly colossal: a very large proportion of outstanding evolutionary geneticists of the twentieth century are Dobzhansky's intellectual children and grandchildren, as he liked to refer to his doctoral students and their students. Dobzhansky's influence on the development and direction of evolutionary genetics research extended from Finland to North Africa, and from Chile to India (*Box* 1). Scientists in Mysore studying the evolutionary genetics of speciation in *Drosophila*

[1] Most of the material and quotations in this article have been gleaned from the edited volume *Genetics of Natural Populations: The Continuing Importance of Theodosius Dobzhansky* published by Columbia University Press in 1995.

Box 1. Dobzhansky in the Words of Those who Knew Him

This small collection of quotes from evolutionary biologists who were influenced by Dobzhansky through working with him as graduate students or post-doctoral researchers will, I think, convey far better than I could, the impact that Dobzhansky had on people.

"This great man (Dobzhansky) left mankind a very generous heritage. It will be inscribed together with his name on the monument of the history of biological sciences." (Chia-Chen Tan, Dobzhansky's first Ph.D student, China)

" ..to interact with Dobzhansky the scientist always meant interacting with Dobzhansky the human being, and all who did so were affected by the experience." (Louis Levine, USA)

"Dobzhansky was one of the leaders of the modern synthesis (in evolutionary biology), one of his major contributions being the initiation of experimental studies of the Darwinian process." (Timothy Prout, USA)

"In his 1937 book...Theodosius Dobzhansky indicated the way to transform the study of evolution into an experimental scientific program." (Costas Krimbas, Greece)

"The intellectual curiosity and drive of Theodosius Dobzhansky led the way for us into the morass of evolutionary genetics. He stayed around long enough for us to profit immensely from his pioneering approaches. More than making any single key discovery, he led us along the tangled path in what now appears to emerge as the most profitable direction." (Hampton L Carson, USA)

"..this influence (of Dobzhansky on his students) never consisted to any great extent of direct transmission of facts in lecture sessions.....almost all the 'lecturing' was done by the students.....He was the quintessential teacher, for he showed the way, he inspired by his example, in addition, of course, to his masterful ability to synthesize and organize the pieces of knowledge from many species and many sources into hypotheses and theories that continue to guide evolutionary study even when his physical presence is gone." (Max Levitan, USA)

"His contributions to the experimental study of evolution are monumental....His fluency in English, Spanish and Russian was legendary. There was his love, kindness and affection for his pupils. There was his love for art, travel and music...He has left us, but his contributions to Evolutionary Genetics which shaped the future of biological thought stay with us eternally." (M R Rajasekarasetty, India)

"All the work ... was accomplished owing to the personal involvement, the keen interest, and masterly competence of Dobzhansky in both field and laboratory research. He was not only the friendly, attentive mentor but also the dynamic hard worker enjoying all activities and inspiring us with his example. Brazil was his greatest beneficiary, since several research centres in population genetics and evolution that are now well-developed departments were started by his former students." (Antonio R Cordeiro and Helga Winge, Brazil)

"I began to study the Chilean species of *Drosophila* after my stay at Columbia University in Dobzhansky's laboratory." (Danko Brncic, Chile)

Box 1 continued ...

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"There are crucial times in one's life. My twentieth birthday was one of them ... (because of a) most thoughtful present, a Spanish edition of *Genetics and the Origin of Species*. The book appeared to me as such a strong argument for evolution that my intellectual life has been imprinted ever since. Later...I had the privilege of interacting for two years with Doby and to appreciate his excellence as both a scientist and a humanist." (Antonio Fontdevila, Spain)

"...he invited us to his laboratory in Rockefeller University, New York City, where I spent one year. Dobzhansky and the research in his laboratory inspired me so much that I am still working with *Drosophila* and the processes of evolution." (Seppo Lakovaara, Finland)

species are direct intellectual descendants of Dobzhansky (*Box* 2), and I am myself an intellectual great grandson of his, having worked as a graduate student and post-doctoral researcher with a former student of a former student of Dobzhansky's.

Among those who got their doctoral degrees working with Dobzhansky are many well-known geneticists and evolutionists

Box 2. Dobzhansky's Legacy in Mysore

The Department of Studies in Zoology at the University of Mysore was founded in 1960 and led for almost two decades by M R Rajasekarasetty, a *Drosophila* worker after whom the tropical fruit-fly species *Drosophila rajasekari* is named. Rajasekarasetty obtained his Master's and Doctoral degrees from Columbia University, New York, working with L C Dunn, one of the pioneering workers in the first few heady decades of genetics in the 20th century. While at Columbia, Rajasekarasetty also came under the influence of Dobzhansky who taught him *Drosophila* genetics and population genetics. N B Krishnamurthy, a successor of M R Rajasekarasetty, who obtained his Ph D under the guidance of W S Stone in Texas, was also greatly influenced by Dobzhansky through attending a series of lectures he gave during a visit to Texas. The influence of Dunn and Dobzhansky had a lasting effect: the Department founded by Rajasekarasetty remains unique among the zoology departments in Indian universities in that it has a strong and continuing tradition of evolutionary genetics research and teaching.

In 1959 Dobzhansky visited Central College, Bangalore (then affiliated to the University of Mysore), at the invitation of Rajasekarasetty and delivered a series of lectures. After the passing away of Dunn and Dobzhansky, the Department of Studies in Zoology organized *the L C Dunn and Th. Dobzhansky Memorial Symposium on Genetics* in December 1976. The Dobzhansky heritage is alive even now in this Department and is particularly illustrated by ongoing research on cytogenetic and other aspects of the processes of race-formation and speciation in *Drosophila*, an area of research close to Dobzhansky's heart .

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who, in turn, founded schools of research and influenced generations of evolutionary geneticists worldwide. Francisco Ayala, Richard Lewontin, Monroe Strickberger, Bruce Wallace, Lee Ehrman, Timothy Prout, Crodowaldo Pavan, Wyatt Anderson, Louis Levine, Chia-Chen Tan, Sergey Polianov, Abd-el Khalek Mourad, Max Levitan and Eduardo Torroja all did their doctorates with Dobzhansky, as did Colin Pittendrigh, one of the most influential scientists in the relatively young field of chronobiology. Among people who did post-doctoral work with him, Claudine Petit, Antonio Fontdevila, Danko Brncic, Costas Krimbas, Abd-el Azim Tantawy, Seppo Lakovaara, Anssi Saura and Antonio Prevosti gave rise to flourishing schools of evolutionary genetics in their respective countries. Well-established research groups with long term interests in understanding the mechanisms of evolution, and usually working with *Drosophila* as a model system, came into being in Spain, Portugal, Egypt, Germany, Switzerland, Austria, Greece, Yugoslavia, Sweden, Finland, Brazil, Mexico, Chile and India, largely as a result of Dobzhansky's inspirational influence on other scientists.

Among those who got their doctoral degrees working with Dobzhansky are many well-known geneticists and evolutionists who, in turn, founded schools of research and influenced generations of evolutionary geneticists worldwide.

Two facets of Dobzhansky's persona that are invariably mentioned by those who worked with him and knew him whenever they write or talk about him are his personal warmth and his enthusiasm for work. Unlike many great scientists, Dobzhansky was not only respected and revered by those who came into contact with him, but loved with an unusual intensity. Former students and associates fondly recollect their personal interactions with him, his wife Natasha and his daughter Sophie, who often accompanied him on field trips. His intense involvement in his work can be seen in his own letters: writing to his friend Milislav Demerec during a field trip to Mexico in 1936, Dobzhansky stated "Sturtevant and myself are gone crazy with the geography of inversions in *pseudoobscura*, and working on this whole days – he with crosses and myself with the microscope ... As to our inversions, Mexico seems to be an inexhaustible source of them, and I am beginning to regret that last year only relatively few Mexican strains were collected." In another letter to Demerec the following month, he wrote "Sturtevant

and myself are spending the whole time studying the inversions in the third chromosome in geographical strains of *pseudoobscura*. We are constructing phylogenies of these strains, believe it or not. This is the first time in my life that I believe in constructing phylogenies, and I have to eat some of my previous words in this connection." Howard Levene, a doctoral student of Dobzhansky's has described their first meeting when he went to Dobzhansky and introduced himself. "Levene, I am delighted to see you", said Dobzhansky, "I have a lot of problems for you...".

It is possible to go on and on about Dobzhansky's influence on people and, indeed, much has been written about it. In conclusion, let me just recount my own progression from a young undergraduate studying botany to an evolutionary geneticist working with *Drosophila*, as my own experience demonstrates well Dobzhansky's impact on the development of evolutionary genetics. In 1982, when I joined BSc (Hons.) in Botany at Delhi University, I knew very little about either evolution or genetics. In 1983, when I first studied genetics and fell in love with the subject, the catalysts were two books: '*Genetics*' by Strickberger, and '*Modern Genetics*' by Ayala and Kiger. Both Ayala and Strickberger were Dobzhansky's students. In 1984 I was awarded a scholarship by Delhi University that was to be used for purchasing books. The first book I bought with the scholarship money was '*Genetics and the Origin of Species*' by Dobzhansky. It was the first book on evolution I had ever read, and it sparked off my continuing interest in evolution. In 1987 I went to Washington State University to pursue doctoral studies in evolutionary genetics and worked with Larry Mueller, himself a student of Ayala. In Larry's laboratory I learnt how to work with fruit-flies and how one could rigorously study the evolutionary process at work in the laboratory. The work my students and I do today uses *Drosophila* as a model system to understand various aspects of the evolutionary process. Large expanses of space and time separate us from Dobzhansky, but the main topic of our interest – the mechanisms of evolution – and the model system and approaches that we use are not much different from those pioneered and pursued by the great man himself.

Suggested Reading

[1] L Levine, (ed.), ***Genetics of Natural Populations: The Continuing Importance of Theodosius Dobzhansky,*** **Columbia University Press, New York, 1995.**

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