

## Evolution is the unifying theory of biology

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According to Theodosius Dobzhansky<sup>1</sup>, 'Nothing in biology makes sense except in the light of evolution'. Kalinowski *et al.*<sup>2</sup> mentioned 'Nothing in evolution makes sense except in the light of DNA'. Ranganath and Lakhotia<sup>3</sup> stated that 'Power of synthetic theory of evolution is aptly reflected in the famous statement of Dobzhansky, "nothing in biology makes sense except in the light of evolution".' In their concluding remark they mentioned 'We may expand Dobzhansky's famous statement "nothing in biology makes sense except in the light of evolution" by adding "and nothing in evolution makes sense except in the light of genes"<sup>3</sup>.'

Biology is a dynamic and essential discipline of science. In one of the most astonishing ideas in the history of science Charles Darwin<sup>4</sup> proposed that all species living and extinct descended from one or few original forms of preexisting species (descent with modifications). Based on this idea, it follows that every characteristic of every species: the number and sequence of its genes, feathers of a peacock, functions of enzymes, structures of the cells and organs, their nutritional requirements, physiological tolerance, life-history traits, longevity, reproductive mechanisms, the behavioural patterns, etc. are an outcome of evolutionary history<sup>5</sup>. Thus evolutionary perspectives illuminate every field in biology from molecular biology and genetics to ecology. In fact, evolution is the unifying theory of biology. Based on this fact, Dobzhansky<sup>1</sup> stated that 'Nothing in biology makes sense except in the light of evolution'. Dobzhansky<sup>1</sup> mentioned 'One of the great thinkers of our age, Pierre Teilhard de Chardin, wrote the following "Is evolution a theory, a system, or a hypothesis? It is much more it is a general postulate, to which all theories, all hypotheses, all systems, much henceforward bow and which they must satisfy in order to be thinkable and true. Evolution is a light which illuminates all facts, a trajectory which all lines of thought must follow this is what evolution is"<sup>6</sup>.'

Dobzhansky<sup>6</sup> published the book: *Genetics and the Origin of Species* in 1937, and with the publication of this book, the synthetic theory of evolution was born although the term synthetic theory was coined later in 1942 by Huxley<sup>7</sup>. Dobzhansky is con-

sidered the architect of the synthetic theory of evolution, although others like Mayr, Stebbins, Huxley and Simpson also contributed to its development. Since Dobzhansky provided the genetical basis of evolution, laying the foundation of the synthetic theory of evolution and demonstrating the role of natural selection as a guiding force of evolution acting on genetic variations in natural and experimental populations, Marinkovik<sup>8</sup> suggested that the former should be named as the 20th century's Darwin<sup>9</sup>. Darwin published his book *Origin of Species* in 1859 and Dobzhansky published his book in 1937 (ref. 6). Thus he integrated genetics with evolution<sup>10</sup>. Ranganath and Lakhotia<sup>3</sup> have commented that the power of synthetic theory of evolution is aptly reflected in the famous statement of Dobzhansky.

In the 1920s and 1930s, population geneticists such as Fisher, Haldane, Wright and others suggested mathematical accounts demonstrating the action of natural selection as a guiding force of evolution and as a genetic process. The book of Dobzhansky refashioned their formulations in a language that biologists could understand and extend the synthesis to speciation solving certain problems which were omitted by population geneticists<sup>11</sup>. Dobzhansky's book provided a complete account of the evolutionary process demonstrating the genetic basis of evolution. It also extended experimental evidences supporting the theoretical propositions, having an enormous impact on naturalists and evolutionary biologists. This created interest in evolutionary studies extending the synthesis of genetics and natural selection to a variety of famous biological fields<sup>11</sup>. Thus Dobzhansky's<sup>1</sup> above-mentioned statement is important considering his contributions to the field of evolutionary biology even after 50 years of publication.

Based on several examples of genes and preliminary evidences from their classroom teachings, Kalinowski *et al.*<sup>2</sup> stated 'Nothing in evolution makes sense except in the light of DNA'. They also emphasized which concepts in the book students need to learn. According to Kalinowski *et al.*<sup>2</sup> some concepts are so useful that almost every instructor will include in their topics to be covered during a conventional two-semester

sequence of introductory biology. Three such topics include: relationship between organism form and functions, the role of DNA in inheritance, and theory of evolution. The inclusion of the theory of evolution in this list is undeniable. Kalinowski *et al.*<sup>2</sup> have attached much importance to evolution and have stated that Dobzhansky famously argued that 'nothing in biology makes sense except in the light of evolution'. Campbell *et al.*<sup>12</sup> described evolution as the 'over-arching theme of biology'. Kalinowski *et al.*<sup>2</sup> have also stated that every instructor should clarify the genetic basis of natural selection by mentioning examples from DNA sequences that alter fitness. Such examples are meant to demonstrate how natural selection works to establish a connection between genetics and evolution. Interestingly, Kalinowski *et al.*<sup>2</sup> have also quoted Bromham<sup>13</sup> who wrote 'Darwin would have loved DNA: celebrating Darwin 200'.

Ranganath and Lakhotia<sup>3</sup> have also considered the contribution of Dobzhansky to be important and stated that the power of synthetic theory is aptly reflected in the famous statement of Dobzhansky, 'Nothing in biology makes sense except in the light of evolution'. They conclude, 'We may expand Dobzhansky's famous statement "nothing in biology makes sense except in the light of evolution", by adding "and nothing in evolution makes sense except in the light of genes"'. Thus, Kalinowski *et al.*<sup>2</sup>, and Ranganath and Lakhotia<sup>3</sup> have given importance to Dobzhansky's<sup>1</sup> famous statement. However, they have emphasized the importance of genes/DNA in evolution.

In conclusion, evolutionary perspectives illuminate every field of biology, from molecular biology and genetics to ecology. Thus evolution is the unifying theory of biology. In this context, the Dobzhansky's<sup>1</sup> famous statement is more important and has a broader perspective than 'nothing in evolution makes sense except in the light of DNA/genes'.

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## COMMENTARY

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