The idea of evolution: celebrating 150 years of *The Origin of Species* *

To commemorate 150 years of publication of *The Origin of Species* by Charles Darwin, a one-day symposium was held at the Indian Institute of Science (IISc), Bangalore. The symposium had three sessions, each followed by an interaction of the speakers with the audience.

The symposium began with a talk by Vidyannand Nanjundiah (IISc, Bangalore) on ‘Where are we today?’ He reminded the audience that it was on 24 November 1859, exactly 150 years ago, that Charles Darwin published the *Origin*. The concept of ‘natural selection’ in the light of evolution was an independent contribution of two eminent scientists, Alfred Russell Wallace and Charles Darwin. Natural selection occurs because of three causes – variability, heritability and differential reproduction. Changes in organisms happen in the course of time. This gives rise to diversity, which offers not only a rationale but also a natural basis for the classification of organisms. The causes of variation and the basis of heredity were not known in the days of Wallace and Darwin. Darwin, in his writings, had agreed that use and disuse could lead to gain or loss of a trait passed on to the offspring. Nanjundiah observed that after the re-discovery of Mendel’s work, the scientists of the world were divided into two groups – Mendelians, and Darwinists or biometricians. He also highlighted the Neo-Darwinian aspect of natural selection, according to which selection acts on the phenotype to affect the genotype. He ended his talk with the role of molecular biology in changing our view of life, and the importance of ‘Junk DNA’, a very unfortunate term ascribed to non-coding DNA.

Ashok Sahni (Punjab University, Chandigarh) presented a talk on ‘Planet earth: An oasis in space’. He gave a new perspective for climate change, and stressed the need for considering evolution of the biosphere in terms of millions of years. He mentioned that the current perspective of the evolutionary pattern goes only a few thousand years into the past. Temperature is an essential aspect governing evolution, and earth has witnessed a wide range of temperatures in the past. ‘Climate change’ has been constantly happening, and earth is known to have had ‘icehouse’ and ‘greenhouse’ fluctuations. Sahni mentioned that the highest reduction of biodiversity took place during an anoxic event 250 million years ago, when 96% of all life became extinct. He cited volcanic activities as the main cause of high temperatures during past ‘greenhouse’ events. He supported the fact that earth was warmer in the past than it is today by comparing two charts – one describing sea level changes over time and the other relating glacial events and temperature. Sea levels are low when ‘icehouse’ prevails and high in ‘greenhouse’ periods on earth. Currently, earth is in an ‘interglacial’ period. Sahni pointed out that only once before in the history of the earth have the sea levels been lower than what it is today.

K. N. Ganeshaiah’s (University of Agricultural Sciences, Bangalore) presentation centred on the conservative view of science that ‘animals behave, plants do not’, and Darwin’s response to this outlook. He gave examples where plant behaviour is comparable to that of animals. Vaginal sealing exists in animals and plants – stigmatic sealing of pollen grains has been detected in *Kleinhovia hospita*, the ability to sense signals, integrate them and exhibit adaptive responses has been observed in *Haemelina patens*. Ganeshaiah compared *swayamwara* in Indian epics with that in peacocks and subsequently in *Lenaecora leucomela*, the consequence of *swayamwara* is the female’s choice of a genetically strong male. In *Dalbergia*, parent–offspring conflict and kin favouring have been noticed. A study of food search strategy in *Cuscuta* has revealed that the investment of energy per unit length of the host by *Cuscuta* was more in the case of a ‘higher quality’ host. Darwin believed that natural selection as a force shapes life uniformly and does not differentiate plants and animals. He viewed life as a continuum. But biologists have failed to appreciate this ‘onestness’ of life. According to Ganeshaiah, Darwin would view those who differentiate animals and plants based on strategies and adaptive behaviours, as suffering from the ‘disease of self importance of man over animals, and of animals over plants’. If anything, plants do behave and behave better than animals!

Rohini Balakrishnan (IISc) presented the essence of Charles Darwin’s book *The Expression of the Emotions in Man and Animals*, and her impressions of the same. In this book, Darwin suggests three principles to account for most of the involuntary expressions and gestures used by man and lower animals: (i) The principle of serviceable associated habits, (ii) The principle of antithesis, and (iii) The principle of actions due to the constitution of the nervous system, independently from the first of the will, and independently to a certain extent of habit. The eight chapters on human emotions discuss facial expressions, muscles involved, the physiological basis, origin of evolution, ontogeny, pathology, expression of emotions in the insane, and universality. The two chapters on expression in animals discuss the involuntary erection of hairs, feathers and dermal appendages, evolution of expression, and acoustic communication, to name a few. Darwin also talks about Duchenne’s galvanization experiments, origin of human speech, the role of will and consciousness in development of various movements of expression, and the role of communication. The purpose of this book, according to Darwin, is to support the idea of evolution, to ‘dethrone’ humans from their special status, and to establish a single evolutionary origin for the human species. But Balakrishnan is unsure of how the three principles achieve this aim, and believes that Darwin has used the terms ‘will’, ‘consciousness’ and ‘intentions’ loosely. However, his conclusions are anti-racist and assert the oneness of human nature and the human species. Echoes of Darwin’s thinking can be found in Niko Tinbergen’s and Konrad Lorenz’s works.

Renee Borges (IISc) began her talk, ‘The descent of a man: the influence of
Hofmann Medal for C. N. R. Rao

C. N. R. Rao has been awarded the August-Wilhelm-von-Hofmann Medal for his outstanding contributions in the field of chemistry. He happens to be the first Indian to be awarded the medal, which is given by the German Chemical Society once in every two or three years. Rao will be given the prestigious medal at the Third Chemistry Congress of the European Association for Chemical and Molecular Sciences at Nürnberg, Germany on 29 August 2010.

The medal is named after the founder of the German Chemical Society, August Wilhelm von Hofmann, known in the scientific community for his ‘Hofmann degradation’ concept. The medal has been earlier awarded to Nobel Laureates and leaders of chemical research.

In an interview with Current Science, Rao stated, ‘I have received many awards in my life but I consider this to be the highest recognition that I have in chemistry. My friends in Germany tell me that this is the highest international recognition that Germany can give to a chemist’.

Rao is the Chairman of the Scientific Advisory Council to the Prime Minister of India and the honorary President of Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore. He is also the Chairman of the Vision Group of Science and Technology constituted by the Karnataka State Government. He is a fellow of national and international academies of science and has received several distinguished awards such as the Padma Vibhushan, India Science Award, Albert Einstein Gold Medal by UNESCO, Hughes Medal, Royal Society of London Medal and Dan David Prize, to name a few. He also heads the Nano Mission Council of the Department of Science and Technology, Government of India. His contributions towards this initiative are well known.

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