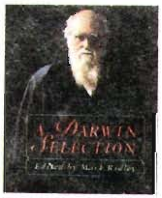
A Darwin Selection

A Comprehensive Darwin Anthology

Shailesh Deshpande and Milind Watve



A Darwin Selection
Edited by Mark Ridley
Harper Collins Manufacturing,
Glasgow, 1994, p.311, paperback

The most celebrated scientist who has influenced both science and society is undoubtedly Charles Darwin. His theory of 'evolution by natural selection', is the most debated and misinterpreted of all theories in science. What makes Darwin unique is not only his tremendous contribution as a rebel scientist but also the fact that he wrote for common people. His books can be appreciated by scientists and laymen alike. Such works of first generation scientists, are of immense importance as they give us unparalleled opportunity to witness those great minds at work and enable us to experience the 'evolution of science'.

Although we all know the historical value of Darwin's work, very few of us make the effort to read his original writings. An instant solution is *A Darwin Selection* by Mark Ridley. This is a comprehensive Darwin anthology, containing a chapter each on his nine most important books. The editor has carefully selected the 'key passages' from the books so as to bring out Darwin's ideas and thought process. These passages are preceded by thorough introductions which include the context of the selection and a general outline of the whole book. In addition, the editor has also narrated corresponding prevailing theories and the general mindset of the scientific community at Darwin's time and his remarks about them. This has greatly enriched the book. For those who know Darwin only for his theory of evolution, this book presents a surprise because it contains Darwin's work on an eclectic range of subjects, from coral reefs to earthworms and from animal behaviour to photosensitivity of plants.

The book opens with a precise, informative life sketch of Darwin. The other nine chapters can be roughly divided into two groups - the first, comprising evolution and behavioural studies and the second one, a mixed bag of subjects such as coral reefs, botany, earthworms and *The Voyage of Beagle*.

In *The Origin of Species* (Ch.4) and in *The Descent of Man, & Selection In Relation To Sex* (Ch.6) we see Darwin, and his popular theory of evolution by natural selection with the original flavour. The clarity and grasp with which he applies the concepts of variation, competition, diversity and selection is amazing. Today we have very elegant theories of sociobiology, altruism, evolution of cooperation, sex and sexual selection, among other issues. One finds a seed of almost all these in Darwin's writings, though not explicitly. In many other places, he is prophetically close to mathematical modeling although he himself remarks, "... my power to

follow a long and purely abstract thought is very limited; and therefore I could never have succeeded with metaphysics or mathematics."

We see Darwin grappling with the riddle of heredity and putting forward his ingenious theory of 'pangenesis', in *The Variation of Animals & Plants Under Domestication* (Ch.5). The reader must remember that he was writing this at a time when nothing about the mechanisms of heredity was known. Darwin assumed that heredity is effected by small particles called *gemmules*. His prophecy that the elements of heredity are particulate turned out to be correct but not in the way he predicted. He thought that each cell of an organism produces gemmules which then pass via the circulatory system to the reproductive system. Then, they can pass on to the next generation and control the offspring development. This makes inheritance of acquired characters possible. Here, Darwin clearly subscribes to the Lamarckian theory. The historical battle between Darwinian and Lamarckian schools was not yet on the horizons.

In the *Voyage of Beagle* (Ch. 3) we meet Darwin, the adventurous field naturalist, studying Galapagos Archipelago. This is probably the most captivating chapter of the book. We witness the scientist's thorough observation power and crucially important ability to understand the significance of the observed facts. This fascinating chapter has got many lighter tones and even poetic passages. While stating the differences between the tortoises from different islands, he quotes, "Captain Porter has reported that tortoises from James island are rounder, blacker and have a better taste, when cooked". The account of *The Voyage of Beagle,* was written much before Darwin had the idea of evolution, explicitly in his mind. He remarks, ".... one is astonished at the amount of *creative force, if such an expression may be used,* displayed on these small, barren rocky islands." This does not mean that Darwin was a creationist then, but was probably yet to find a substitute for the word. What is most striking in this chapter is the quest for the question – why. Almost every naturalistic description is followed by the question why and an exploration for its answer. For example, he wonders why no frogs are found in any of the oceanic islands and immediately thinks "may this difference not be caused by the greater facility with which the eggs of lizards, protected by calcareous shells, might be transported through salt water than could the slimy spawn of frogs?" The Galapagos iguanas never jumped in water even if driven and cornered on a rock, facing the sea. Darwin wonders about this apparent stupidity and traces it back to the fact that they had, so far, no enemy on land but could fall prey to sharks in the sea. This contrasts so much with the teaching in most of our schools where students are often told – never ask the question why in biology!

The remaining book includes Darwin's work on coral reefs, heterostyly, movement in plants

and the role of earthworms. Some of these are placed after the more interesting chapters and this makes them a little boring to read. But they demonstrate an important fact that Darwin was not only a naturalist and a theorist but also an experimental biologist.

Is there any cost associated with being such a genius and original thinker? May be there is. Darwin probably paid it thus "My mind seems to have become a kind of machine, for grinding out general laws, out of large collection of facts.... For many years, I cannot endure to read a line of poetry: I have tried lately to read Shakespeare, I found it so intolerably dull that it nauseates me..... It is a horrid bore to feel, as I constantly do, that I am a withered leaf for every subject, except science."

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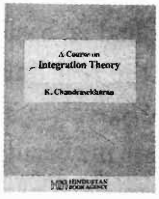
A Course on Integration Theory

B J Venkatachala



A Course on Integration Theory
K Chandrasekharan
Texts and Readings in Mathematics trim(8)
Hindustan Book Agency, Delhi, 1996, pp.118.

A mathematician normally associates the word integration with the names of Riemann and Lebesgue. Lebesgue's theory still remains an esoteric subject at the undergraduate level though the theory of Riemann integral is studied in detail.

The first evidence of integration can be traced back to early Greek geometers. They employed the 'method of division' to give meaning to and calculate areas of plane figures with circular or parabolic boundaries. The first definitive formulation of differential and integral calculus was put forth by Newton and Leibnitz. However they primarily focused on the inverse nature of differentiation and integration. While Gauss and Euler confined themselves to more practical matters of evaluation of integrals, it was Dirichlet, Riemann and Cauchy who gave a conceptual framework for the definite integral as the limit of a sum.

Stieltjes, at the close of the 19th century, showed that the integral is a linear functional and hence was able to generalize Riemann's theory to introduce *Riemann-Stieltjes integrals*. However, there were many shortcomings in Riemann's theory and it was felt that an integration theory which could encompass a larger class of functions was needed. This paved the way for the concept of measure, which was introduced by Borel and Lebesgue at the beginning of 20th century. It was the brilliant idea of Lebesgue of partitioning the range of a function rather than the domain which led to the *Lebesgue*