

The Theory of Evolution - What have we learnt since Charles Darwin?

In Darwin's time, the late 19th century, relatively few fossils had been studied in detail compared to today's extraordinarily rich record held in museums around the world. His 'Theory of Evolution' (1859) was formulated largely from his observation of the living natural world, combined with his masterful geological knowledge. Since Darwin's time we have developed greatly refined methods for dating the Earth and its fossils, developed innovative new methods of studying fossils and can now give accurate estimates for rates of evolution and the possible causes and effects of extinction events. We have now filled in almost all the major missing gaps from Darwin's day in the big story of our own vertebrate evolution, through a series of stunning new fossil finds. These include new insights detailing the origins of fishes, the origins of jawed vertebrates, the transition from fishes to land animals (tetrapods), the origins and diversification of reptiles, dinosaurs, birds and mammals, plus a complete series of specimens showing the critical steps in human evolution. Darwin's 'Theory of Evolution' (1859) is today an established fact that underpins all medical and biological research globally.

Prof John Long

Dr Long was born in Melbourne and began collecting fossils there at age 7. He graduated with PhD in Earth Sciences from Monash University in 1984, and spent 6 years as a postdoctoral researcher in palaeontology at universities in Canberra, Perth (as a prestigious QEII fellow) and Tasmania before being appointed at the Western Australian Museum in 1989 as Curator of Vertebrate Palaeontology. In 2004 Dr Long became the Head of Sciences for Museum Victoria, Melbourne. In 2009 he was appointed as the Vice President of Research and Collections at the

Natural History Museum of Los Angeles County, USA; and in 2012 was appointed as Strategic Professor in Palaeontology at Flinders University in Adelaide.

Prof Long's research has focussed on the early evolution of vertebrates and general evolutionary theory. He has collected fossils and studied past environments in Antarctica, Africa, throughout Asia, and has worked extensively in North America and Europe and in every part of Australia. He has published over 250 scientific papers and general science articles, and some 28 books. He has named more than 80 new species of prehistoric creatures. His most recent major papers contributed to solving some of the biggest problems in palaeontology- what killed the Australian megafauna, how fish contributed to the origins of the first land animals, and 4 papers on the origins of sex in vertebrates, all 6 published in the journal *Nature*.

He is a recipient of the 2014 Verco medal for research (R Soc SA), the 2011 Research medal of the Royal Soc of Victoria, the 2008 Australasian Science prize and the 2001 Eureka prize for Promotion of Science.