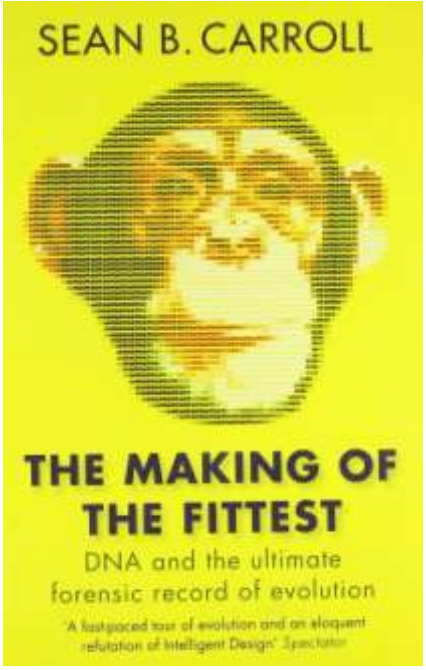
The Making of the Fittest – DNA and the ultimate forensic record of evolution by Sean B Carroll, Quercus, London, 2009.



This book is based on genomics and as such it relates well to the *DNA and the Genome* Unit of Higher Biology and the *Human Cells* unit of Higher Human Biology. It is also relevant to the *Organisms and Evolution* Unit of Advanced Higher Biology. Although the chapters in the book follow a theme they are relatively self contained and written in an essay type style making them suitable for reading in isolation or for using as excerpts to support lessons. Good use is made of interesting examples that illustrate the theory and could be used as mini case studies for pupils. Overall the text is accessible enough in style for pupils to use this as pre reading (say over the summer break) once started on a Higher course but before they start on genomics.

Equally the book (or parts of it) could be used to support and extend their learning of genomics during the course. Portions of the text could lend themselves to discussion/interpretation/research type activities and as they are related to issues and applications of biology may be relevant for the new requirements for a research investigation in CfE Unit assessment. A selection of free downloadable video clips and teaching resources based on the book are also available from the Howard Hughes Medical Institute, educational materials website: http://www.hhmi.org/biointeractive/browse?field_bio_format_type[0]=23449 (accessed 22 July 2013).

"The study of genomics explains the main ingredients of the machinery of evolution – variation, selection and time – so that we fully appreciate how they interact in the making of the fittest."

The book has clearly been written with an American audience in mind although this is no more than a minor irritation. The main tenet of the book is to refute the creationist assertion of intelligent design. In Scotland, the teaching of evolution in schools does not have to face such a forceful lobby from creationists as there is in the USA and so the central tenet of the book is more one of interest than a campaign relevant in a Scottish educational context. However the real strength of the book lies in the genomic evidence (*the DNA forensic record* referred to in the title) it puts forward that supports evolution. Using interesting examples of known evolutionary adaptation, the genomic evidence of variation in DNA sequences brought about by mutation is examined and how natural selection can act on these mutations over a geological time scale.

"Each step in evolution, we now know, is taken and recorded in DNA."

The author shows how 'fossil genes' (genes which no longer have a functioning role in the organism) provide a forensic record of evolutionary change including being able to place changes in geological time. He also shows how natural selection not only selects mutations that lead to new favourable genes but also acts to conserve or maintain genes against

spontaneous mutations. In addition he uses genomic evidence to show that similar adaptations have occurred in different species at different times in response to selection pressures. He further shows how the genomic evidence for these adaptations illustrates examples of the convergent evolution of homologous structures and the divergent evolution of analogous structures. Genomic evidence is also used to show how several small changes in DNA sequences can accumulate without any adaptive change over an evolutionary time scale and then result in major changes in a species in response to a selection pressure. The author also shows how genes can be 'fine tuned' to respond to a changing environment. Another strength of this book is that it deals well with the concept of evolutionary time scales and how they can be estimated by taking into account reproductive capacity, natural selection and sexual selection. Overall the value of this book in understanding evolution is that the evidence of DNA sequences in the genome shows the steps of evolution in a way that was previously somewhat abstract. By following changes in DNA sequences, the concepts of how these changes occur become much more clearly evident.