Genetic markers provide unprecedented primate link in human evolution

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(Phys.org) —Genetics provides stunning new answers to the question of human evolution, according to Auckland cancer researcher, Dr Graeme Finlay.

Genetic markers that are used to follow the development of populations of cells have exactly the same character as those that track the development of species, says Dr Finlay who has just published a book on genetics and human evolution.

His book, 'Human Evolution: Genes, Genealogies and Phylogenies', was published by Cambridge University Press late last year.

Dr Finlay is senior lecturer in Scientific Pathology at the Department of Molecular Medicine and Pathology, and an Honorary Senior Research Fellow at the Auckland Cancer Society Research Centre, in the University of Auckland.

"Controversy over human evolution remains widespread, but the human genome project and genetic sequencing of many other species have provided myriad precise and unambiguous genetic markers that establish our evolutionary relationships with other mammals," says Dr Finlay.

This book identifies and explains these identifiable, rare and complex markers including endogenous retroviruses, genome-modifying transposable elements, gene-disabling mutations, segmental duplications and gene-enabling mutations.

These new genetic tools also provide fascinating insights into when and how many features of human biology arose: from aspects of placental structure, vitamin C dependence and trichromatic vision, to tendencies to gout, cardiovascular disease and cancer.

The book brings together a decade's worth of research and ties it together to provide an overwhelming argument for the mammalian ancestry of the human species.

Dr Finlay says he hopes the book will be of interest to professional scientists, undergraduate and college students in both the biological and biomedical sciences, and to anyone including theologians concerned with the scientific evidences for evolution.

He says when he entered University he was fascinated by cells and DNA, but had no interest in evolution.

"I was aware of conflict over evolution from people who were very suspicious of science and I found a lot of their arguments were very disturbing because they were simply not true," he says.

"In my early days as a cancer researcher, the early 1980s, a whole new understanding of cancer arose, from people working with a type of viruses called retroviruses. These are viruses that are very cunning parasites."

"I read avidly about retroviruses because they were telling us so much about the genes that cause cancer. That was in the days when the AIDS virus was discovered and also a leukaemia virus was discovered, and they are both retroviruses too. They were fascinating times," says Dr Finlay.

"As part of that reading, I stumbled on the fact that we all inherit pieces of retroviral DNA in our genomes," he says. "They are part of our

genomic structure. In fact eight per cent of our genome is contributed by retroviruses, whose strategy is to insert their DNA into our DNA," he says.

"To discover that we share particular retroviral sequences with chimps, gorillas, orang-utans, gibbons and other primates, was to me extraordinary, because it was an overwhelming demonstration of common ancestry."

"I've spent a bit of time writing and trying to spread these ideas in church circles. I decided we need a book so people can really appreciate the compelling nature of the evidence," says Dr Finlay.

Finlay is himself a Christian and believes that there are excellent theological reasons why the evolution of the created order should be acceptable to all Christians.

"This book was the result and was extended into other areas, like jumping genes that make up another 40 per cent of our DNA and have just been accumulating there over our evolutionary history."

"Jumping genes are like tiny little parasites that insert themselves into our DNA and every now and again they copy and paste. Some cut and paste. Again we share millions of those with chimps and other primates," he says. "And this is even more interesting because we share some with rats and mice, bats and whales. It enables us to develop very extensive evolutionary family trees."

He says it is the same logic in cancer research, because jumping genes are increasingly implicated in cancer. They also establish how you can map out the development of cancers.

"You can work out the evolution of cancers, by looking at how cancer

cells express genetic markers. They indicate, for example that most cancers are monoclonal. The cells might share a single mutation, so you know they came from a single cell in which that mutation occurred."

More information: www.cambridge.org/us/academic/ … gies-and-phylogenies

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