Darwin and Inheritance

Darwin's Burning Question

PETER CAPALDI:
Charles Darwin, the great naturalist, Victorian gentleman and evolutionary biologist, died in 1882 without the faintest idea how his great theory worked. He believed that all living things had evolved over millions of years through a process he called “natural selection”. Along with competition, it was this process that had produced us - and the extraordinary variety of life we see around us. But evolution, through natural selection, is all about inheritance; the legacy that one generation passes on to the next. But just how that happened puzzled Darwin to the end of his life.

STEVE JONES:
If you read the origin of species today….there are a number of surprising things about it. First of all it’s very easy to read, it was after all a popular science book. What’s most astonishing about it is how up to date most of it seems, and that’s true of all of it except for one chapter, and that’s the chapter on laws of inheritance which is a complete mess, he has no idea what’s going on.

COLIN TUDGE:
He says in the origin of species, in one sort of rather doleful passage, you know, nobody can say why a character is sometimes inherited and sometimes not, and why a child will sometimes inherit a character apparently from his grandfather rather than from his parents, you know, why a character misses several generations.

PETER CAPALDI:
Darwin’s theory of evolution had been over twenty years in the making and is still considered to be one of the great ideas of modern science. But by the turn of this century it was all but discredited. Without a credible mechanism for explaining inheritance, it could be no more than interesting speculation.The key to Darwin’s dilemma was, of course, what we now call genetics. Unknown to Darwin, two of his contemporaries had already taken the first steps towards resolving the problem.

STEVEN ROSE:
The 1850’s and 1860’s were an extraordinary decade. There you had Darwin in his garden at Downe, just outside London, you have Mendel in his monastery, and away in a laboratory in Tubingen you have Friedrich Miescher extracting nucleic acid from pus cells. Now, at first sight these three things have nothing in common with one another, and yet the three of them represent what a century and plus later has come to be realised the synthetic core of modern biology.

PETER CAPALDI:
Miescher, with a microscope, and pus drawn from the wounded of the Franco-Prussian war, identified the molecule we now call DNA. Gregor Mendel, in a monastery in Central Europe, was coming to some remarkable conclusions about inheritance in peas. Darwin’s contribution was to provide the big idea the overall scheme which might explain the complexity of life and how it came to be. Change was at the heart of his theory. Gradual changes, from one generation to the next, as the fittest and the best adapted survived and prospered, passing on these favoured characteristics. But how were these changes passed down from one generation to the next?

STEVE JONES:

He had a kind of mechanism where males and females produced little sort of spores in their blood called gemules that mixed together as fluids and the offspring were a kind of average of their parents a sort of blending idea. First it didn't seem to him much of a problem … he was wrong, of course. Because, let's imagine that one of the parents had some advantageous character favoured by natural selection. Well if that was passed on by dilution then it would be just diluted out of existence over the next several generations. And that means that Darwin's machinery wouldn't work.

PETER CAPALDI:
Uncovering the machinery of inheritance would take more than a hundred years. It's a story of big ideas and laboriously detailed investigation. And a story of competition between scientific ideas - a notion that might have intrigued Darwin who made competition the cornerstone of our understanding of evolution - and a contest that he was by no means always tipped to win.