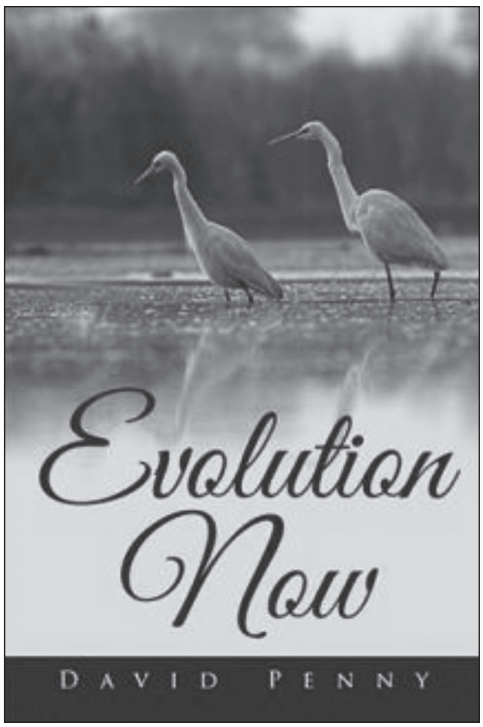
Book review

David Penny

Evolution Now

Reviewed by Mike Berridge*



There is no mistaking the engaging and unconventional conversational writing style used by David Penny in his book *Evolution Now* that traces the development of current evolutionary theories, and provokes thought on unresolved questions. Through undergraduate studies at the University of Canterbury where he was exposed to the teachings of Karl Popper, Penny embraces the Popperian school of science philosophy, in which the words 'believe' and 'prove' are anathema to the scientific method and progress occurs through falsification involving exhaustive testing of hypotheses. Too often today, scientists seek to prove their ideas right rather than testing strong hypotheses, and multiple weak hypotheses are frequently formulated around highly specific objectives, sometimes bordering on anti-science. To a large extent, this is due to our failure to understand the basis of scientific methodology, fuelled by a science funding system where preliminary results, often near publication, are rewarded, and novel game-changing hypotheses are relegated to the bottom of the pile. This is perhaps a lesser problem with Mardsen funding, and with Health Research Council Explorer grants where qualifying transformative applications are subjected to a lottery process.

I first met David Penny in the late 1960s in another life, when as a graduate student working on plant growth hormones under Dick Matthews and Ray Ralph at Auckland University's DSIR Mt Albert campus; I was searching for research opportunities. With a newly minted PhD from Yale, Penny was gaining an international reputation for asking critical questions about stem elongation in plant seedlings at Massey University and my work on another group of plant hormones was a good fit. Although our research interests diverged, mine into developmental biology and David's into the use of phylogenetic trees to investigate evolution, we shared common interests, through the New Zealand Association of Scientists, on several projects including several surveys of scientists perceptions of science, genetic modification, and more recently genes involved in early eukaryotic evolution and the derivation of mitochondria .

So it was a pleasure to again be provoked by David's thoughts on paper, his knowledge and critical thinking about evolution, and his confronting aspects of current evolutionary theory. It was great to be reminded of the cultural context and geological training that moved Darwin to tentatively formulate a testable theory of evolution that has largely stood the test of time, and to see that Darwin painstakingly consolidated his model with further observation and data. The fact that Alfred Russel Wallace independently came to similar conclusions about the mechanism of evolution by natural selection is mentioned briefly. Darwin's awareness of Wallace's specimen collections and notes appear to have been a motivating force behind his publication, but Darwin's status, financial security and links to the Royal Society were also contributing factors. The explanatory detail and mechanistic underpinning of Darwin's theory of evolution by natural selection is then explored in some detail. The following chapter on human evolution is well-presented, and given recent developments, could perhaps already do with an update.

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Challenging current populist dogma about the role of an extraterrestrial impact on dinosaur extinction, and questioning the cellular events that gave rise to complex organisms, a moving target that may continue to challenge scientists for decades to come, leads on to the final chapters about what we don't know about evolution, and speculation on what we don't know we don't know.

Some areas of evolution such as brain complexity are superficially covered, and the new and extremely challenging areas of epigenetics, non-coding RNAs, DNA (both nuclear and mitochondrial) that does not encode proteins, and inheritance of acquired traits are briefly mentioned, but are perhaps the stuff of future writing projects.

In summary, this book is as much about the processes of science and about scientific culture surrounding evolution over many centuries as it is about the mechanism of evolution itself, and will provoke discussion and frame further thought on this evolving subject, and the consequences of human intervention in natural evolutionary processes.