

Book review

Evolution: Fact

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Why Evolution Is True Jerry A. Coyne,
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As we're all aware, evolution is under attack. Whilst human society displays a reassuring tendency towards enlightenment – racism, sexism, homophobia and suchlike decline as civilisations develop – some things don't seem to be going in quite the right direction. Whilst formerly orthodox beliefs in witchcraft, the healing power of bleeding and the evil of being left-handed have been more or less left behind by the modern world, a rational take on the genesis of biodiversity remains a minority view in many otherwise developed countries. As Jerry Coyne points out in the introduction to his new book *Why Evolution is True*, only 40 percent of Americans rate as true the statement 'Human beings, as we know them, developed from earlier species of animals' and a UK poll of over 2,000 people earlier this month found that over half were unconvinced of the fact of evolution. Satirists have suggested that, if these percentages were adjusted for stupidity, the number of people rejecting evolution would drop dramatically, but, in the face of such a worryingly regressive trend, it is difficult to justify such complacency. The fact is that an alarmingly large number of intelligent and well-educated people, whilst being perfectly happy to accept that lights come on because of the movement of electrons, prefer a supernatural explanation for the most important questions in biology.

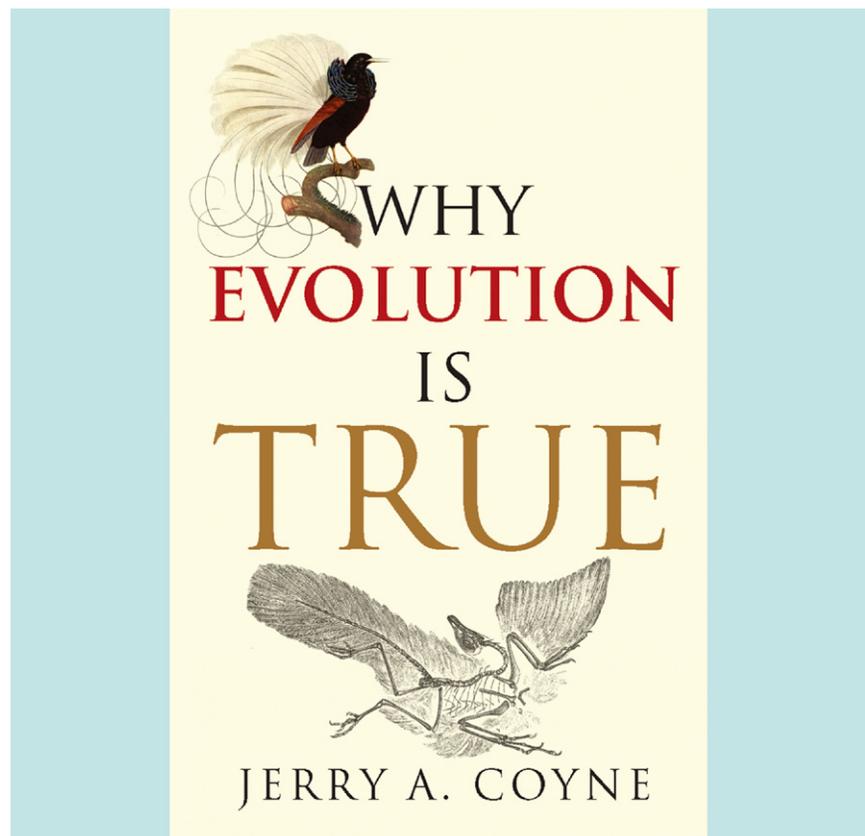
Like many biologists, I occasionally panic that if the appeal of religious dogma can prevail over such a well-supported and rigorously tested theory as Darwin's, then it can only be a matter of weeks before we're all wearing sandals and the next breakthrough in oncology is expected to come from making offerings to a parsnip with a resemblance to the Virgin Mary. At such times, I vow that I will drag myself out of my ivory

tower and try to explain what I do to the (surely fairly rational?) man in the street. Similarly, reading the manifestos of those seeking election to offices of the European and American Evolution Societies, there is universal agreement that evolutionary biologists need to do more to explain their work to the public. The fact is, however, that we're still not very good at delivering on these good intentions. So, it is terrific to see a biologist of Jerry Coyne's standing writing a book with the specific aim of explaining to any reasonably bright reader just why the theory of evolution is no more in doubt than the theory that tides are caused by the moon.

Coyne acknowledges the existence of religious accounts of biology, but by and large, doesn't get sucked into addressing the arguments put forward by the religious proponents of intelligent design. This allows the book to stand as a scholarly, yet delightfully readable account of the state of the art, avoiding the tedious and fatuous debates beloved of the proponents of 'intelligent design'. The dependence of arguments in favour of intelligent design upon a wilful disregard for evidence means that even the most comprehensive demolition brings

little satisfaction, so Coyne is wise to stick to the facts. Once the idea of evolution by natural selection has been pointed out, the natural world suddenly makes sense: if individuals vary in how well equipped they are to survive and reproduce, if this variation is heritable and if more offspring are produced than survive to adulthood, then evolution is inevitable for as long as new variants arise. The challenge is not for biologists to explain where biodiversity comes from, but rather for creationists to explain how evolution could possibly be avoided.

It is difficult not to envy Coyne the material he has at his disposal. The incredible power of natural selection to explain the otherwise bizarre patterns of life has inspired a mountain of research in genetics, palaeontology, biogeography and myriad other fields. There are so many examples of predictions made and tested that Coyne can pick the most elegant and instructive of them: something he does with obvious and infectious relish. The riches at his disposal mean that even if you are lucky enough to have a job description with evolution in it, you will find yourself repeatedly smiling at the gems on display. Is the archaeopteryx



still your go-to example of a missing link? Well, it turns out that palaeontology has made great strides since you were at school and there are now numerous beautiful examples of transitional forms, from fossilised creatures linking land and marine mammals to half-ant-half-wasps preserved in amber and many others. What is more, these transitional forms are always dated to the right point in history.

Similarly, you know that the appendix is a vestige of our more herbivorous ancestors, but there are numerous more eloquent examples of evolutionary history preserved in living organisms. These include the laryngeal nerve which runs from the neck down the chest and loops around the aorta before returning to almost where it came from in the larynx. No designer could come up with such a tortuous route, but its provenance is easily understood once the evolution of the larynx from what was a gill arch in our aquatic ancestors is understood. Just as informative are the pseudogenes or 'dead genes' that litter genomes throughout the living world and turn up almost wherever DNA sequencing allows us to look, revealing past capacities now lost through lack of use and lack of selection: silent genes for detecting airborne odours in dolphins, and nearly everything we primates need for making vitamin C apart from one tiny piece of the chain which we have lost (as have a few other mammals who can generally rely on getting vitamin C in their diet).

Coyne marshals the biogeographic evidence with no less effect — where do we expect to find fossil kangaroos? Where are they found? Australia. Islands have far fewer species — does God dislike islands or is it because they're hard to colonise if you can't swim or fly? If it is just that He dislikes them, how come the plants and animals missing from islands are the ones that have trouble crossing water, and why are the organisms on islands invariably most similar to those on the neighbouring continents? The distribution of life also teaches us about the capricious nature of evolution — the same problem has many solutions, some of them more elegant than others. The forms we see depend on the vagaries of chance events that brought different animals and plants to different areas,

and of the chance mutations that allowed them to adapt to the new opportunities on offer.

Having provided us with eloquent testimony for natural selection, Coyne turns his attention to sexual selection, speciation and the emotive subject of human evolution, again illustrating the fact that not only did Darwin get it right, but that we now have several orders of magnitude more evidence: a dramatically better fossil record, DNA sequencing and the sheer volume of work in biology as a whole, all of which (to paraphrase Dobzhansky) only makes sense in the light of evolution. Coyne's narrative achieves an evenness of tone and complexity that is often missing from popular science books (who understood the last chapter of *A Brief History of Time?*), and conveys the excitement he cannot help but feel for his subject. He emphasises the volume of predictions that evolutionary theory makes, beginning with Darwin's anticipation that our species evolved in Africa (before any fossil evidence had been found) and through to predictions that can only now be tested as we unravel the genetic code. If I was being picky, I might comment that his explanation of the difference between selection favouring traits that act for the good of a gene (ubiquitous), or for the good of the species as a whole (very rare) might have warranted more than a couple of pages (since this is a distinction that is frequently misunderstood). But in general, this is a book that is a pleasure to read, and that even professional biologists will find energising and exciting. The fact that Darwin's theory makes so many predictions, none of which has ever been falsified, and the prospect of the mountain of supporting evidence becoming ever higher, makes it easy to make a further prediction: it is only a matter of time before the religious proponents of intelligent design make it a fundamental tenet of their ideology that the pattern of life has been made that way specifically to fool biologists. In which case, evolutionists can take comfort in knowing that the creator specifically had them in mind at every step of the process.

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Desert hopes

A team of British researchers left for Syria earlier this month to help track the critically endangered Northern Bald Ibis, following the discovery of a relic population of just a handful of birds at a site near Palmyra in 2002.

The move follows a successful workshop last year, organised by the Syrian Society for the Conservation of Wildlife, the Syrian ministry of agriculture, with participants also from BirdLife International, the UK's Royal Society for the Protection of Birds and Germany's Hanns Seidel Foundation.

The aim is to build on the success of a project at Birecik in Turkey, where semi-captive birds have been maintained for the past 20 years. The birds have been kept in aviaries during the winter to prevent them from a perilous migration south to Africa and Arabia but are released in spring to nest locally in natural sites or man-made boxes, and recaptured at the end of summer.

Between 1990 and 1998 the number of birds in the breeding colony fluctuated between 32 and 60 but declined to 41 by the end of 2001, after little or no recruitment in the previous years. It was then that the RSPB and BirdLife in Turkey became involved. They had two short-term objectives: improve the husbandry and management of the aviaries so that local conditions would improve; and develop and improve local education and tourist facilities and strategies to increase knowledge and awareness about the ibis and promote income-earning related to this economically deprived region of Turkey.

The revived project has been a success with the population reaching more than 100 birds last year. And in Turkey, the project is one of the few known at the national level, and the breeding centre has become a major tourist attraction.

Locally, the importance of the ibis is increasing — it is the main symbol of Birecik. Images of the bird form part of the local