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Data Guy

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Almost like a Whale: 'The Origin of Species' Updated by Steve Jones
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In the introduction to *Almost like a Whale*, Steve Jones calls *The Origin of Species* 'without doubt, the book of the millennium'. Jones is an evolutionary biologist, so this judgment could merely reflect disciplinary bias. But not only did *The Origin of Species* disabuse us of the notion that we humans are in some way set apart from the natural world, it also provided a mechanism, natural selection, to explain how the exquisite fit of organisms to their environment can arise without divine intervention: man deposed, God disposed of, and all in a single volume.

Almost like a Whale is Jones's update of *The Origin of Species*. He has followed the basic structure of the book, even retaining the subheadings, and written a modern treatment of each topic. It is thus not a simple revision of the original: Jones has done more than merely correct Darwin's mistakes. Rather, he has written his own book about evolution, but draped it over what Darwin himself referred to as his 'one long argument'. The product is a hybrid: part Darwin, part Jones. It has also created a new genre of literature, the non-fiction rewrite.

It's not entirely clear why Jones undertook this eccentric project. He points out that *The Origin of Species* is 'a work of high Victorian seriousness' but himself adopts a tone more in keeping with what he calls 'these more flippant times'. But do we really need a Darwin of short sentences and the occasional witticism? Jones claims on the other hand never to have met a biology undergraduate who has read *The Origin of Species*, and it may be that *Almost like a Whale* is his attempt to deal with the fact that the book is widely cited but largely unread. It's no paean to Darwin, however, and is unlikely to inspire students to rush to the original; one 'one long argument' in a lifetime is probably enough for most people.

Almost like a Whale may also be aimed at evolution's persistent sceptics. Jones cites a sobering 1991 opinion poll which revealed that 100 million Americans believe that 'God created man pretty much in his present form at one time during the last ten thousand years.'

So *Almost like a Whale* could be intended to take over from *The Origin of Species* as evolution's prime anti-creationist polemic. Just as missionaries prefer modern or idiomatic translations of the Bible over the King James version when trying to convert the heathen, Jones may have hoped that evolutionists would find his update a more effective evangelical tool than Darwin. His book, however, will be read only by the converted; it is not going to sell well in the Bible Belt. Creationism percolates up from deeper wellsprings than Middle American discomfort with Victorian prose.

One reason for wanting to update *The Origin of Species* is to correct Darwin's mistakes. A lot has happened in the 140 years since its publication, and maybe Darwin is now out of date. Although plenty of details need revision, however, Darwin's message remains essentially intact. If anything, he has been vindicated by history. After all, the biological establishment was initially reluctant to embrace natural selection, which became recognised as the accepted mechanism of evolutionary change only half a century after *The Origin of Species* was published. Conventional Darwinism is today as healthy as it has ever been, as Jones happily admits: 'this book emerges (somewhat to my surprise) as a work of refreshing conventionality. Darwin's thesis is perfectly able to support a century and more of scientific advance.'

Darwin's survival is the most remarkable message of *Almost like a Whale*. Jones discusses any number of post-Darwin phenomena – the HIV virus, pest-resistance genes in genetically modified food plants, DNA analysis of extinct species using museum specimens – yet they all fit comfortably into the Darwinian framework. This is especially surprising in view of the major advances made in areas with which Darwin was directly concerned. The interesting question is how he managed to be so resoundingly right overall despite being wrong about, or ignorant of, much of what underpins his theory.

Take genetics. Darwin recognised that inherited variation is necessary for natural selection, but he had only foggy notions about how heredity works. The prevalent view at the time was an intuitively appealing one, 'blending inheritance', whereby Junior's characteristics are about halfway between – or a blend of – those of his parents. Darwin's problem was that blending inheritance renders natural selection unworkable. It's a little like the plasticine a child is given for Christmas, packaged as a series of multi-coloured corrugated strips. By the New Year, all that remains is an unattractive brownish lump, the product of too much blending together of red, blue and yellow; no chance now of recovering any of the original colours. Under blending inheritance, the same thing happens to genetic variation: everything converges on a nondescript middle ground. Natural selection accordingly has no variation – no yellows, no reds – to act on. This so disturbed Darwin that he proposed his own theory of genetics, 'pangenesis', which was essentially a version of the mode of inheritance posited by Lamarck, who, in 1809, had advanced his own evolutionary theory. This, like pangenesis,

required that acquired characteristics be passed on to the next generation; thus the stretch imparted to a giraffe's neck over a lifetime of straining towards the highest vegetation would be transmitted to its offspring.

Both blending inheritance and pangenesis are wrong. Mendel debunked blending with his now famous, but then ignored, experiments, published shortly after *The Origin*. And August Weismann showed in 1882, the year of Darwin's death, that the segregation of reproductive tissue from the rest of the body prohibits the inheritance of acquired characters. If Darwin's every stab at a theory of genetics was so flawed, how did he manage to hit the bull's-eye with a theory that is dependent on genetics? Ernst Mayr has pointed out that, for Darwin, the simple knowledge that variation is out there was sufficient: 'As a naturalist and reader of the animal breeding literature', Darwin 'knew that variation was always present, and this was all he *had* to know'.

Then there's the question of species and speciation. Ironically, *The Origin of Species* is singularly short on information about the origin of species. Indeed, Darwin refers to it as 'that mystery of mysteries'. Yet speciation – whereby one species splits into two – is integral to evolution: without it the planet would today be inhabited by just one species. Darwin's lack even of a concrete notion of what constitutes a species was a major handicap: you cannot describe a transformation process if you do not know what is transforming into what. Today we have the 'biological species concept', which defines a species as a group of organisms that will breed with each other but not with other species. Thus speciation involves the loss by the members of one group of the ability to breed with the members of another. We know that such 'reproductive isolation' can arise by a variety of mechanisms, ranging from divergent mate choice to genetic factors that result in the inviability of hybrids.

Again, how did Darwin manage to derive a satisfactory theory of evolution when he was unable to conceptualise the process underlying diversification? Once more, the answer lies in his myopic attention to the facts, and the facts alone. He recognised that the different forms – varieties – that exist within a species are analogous to closely related species, like the different finches on the Galapagos, within a genus. For him, therefore, a variety was an incipient species. That the transformation, or speciation, occurred was a logical necessity, and his theory required no detailed understanding of the process.

Finally, there's biogeography. The study of the geographic distribution of plants and animals contributes two meaty chapters to *The Origin of Species*, in what is, in many ways, the most synthetic of the book's sections because much of the planet's natural history was at that time uncatalogued. Darwin had to make generalisations based on relatively thin data, though his biological Grand Tour on board the *Beagle* also provided useful first-hand experience. We know now that a major biogeographic determinant has been continental drift, that

agonisingly slow dance performed by land masses through geological time. It was not until the Sixties that this idea became established, and what a relief that was to biologists: no end of otherwise anomalous biogeographic patterns suddenly had a simple historical explanation. Australia, South Africa and South America have biological similarities because until about a hundred million years ago they were all stuck together in a single supercontinent, Gondwanaland.

Given Darwin’s ignorance of such a force in determining the distribution of animals and plants, how could he hope to make any sensible generalisations concerning biogeography? Again, he concentrated on what he could see and what he could explain. Hence, for example, his emphasis on oceanic islands, whose geological history he understood. He noted that they are usually biologically depauperate, and that their inhabitants typically resemble the more mobile components of the nearest mainland’s flora and fauna. Darwin concluded that chance colonisation and subsequent evolutionary diversification account for an island’s biological complement.

In all three instances where biology has made significant conceptual progress since Darwin’s day, he has survived unscathed for one basic reason: he let the facts speak for themselves. He was concerned about the consequences of blending inheritance for his theory, but his observation of abundant variation in natural populations was in the end more important to him than understanding its source. In modern scientific parlance, Darwin was a ‘data guy’: *The Origin of Species* is a monument to the power of empiricism.

Darwin’s love of facts is reflected in his life story. He conceived the basic premise of natural selection more than twenty years before publishing *The Origin of Species* but preferred to sit on his idea while he amassed facts in its support. He even dedicated eight years to the taxonomy of barnacles – surely a case of taking empiricism to a cruel and unusual extreme. It was only Alfred Russel Wallace’s letter from South-East Asia, in which he announced his independent discovery of natural selection, that precipitated the publication of *The Origin of Species*. Even then Darwin insisted that the book was only an abstract of a fuller work. Indeed, it took the intervention of the publisher to remove ‘Abstract’ from the title. With the publication of their joint Linnaean Society paper of 1858, Wallace and Darwin formally became the co-discoverers of natural selection, but it is now universally regarded as Darwin’s theory. The reason is simple: Darwin sat astride a mountain of facts, while Wallace’s facts, impressive though they were, amounted only to a small pile. Those facts ensured that Darwin’s thesis was taken seriously when *The Origin of Species* first appeared, and they are the reason for its remarkable longevity.

The title, *Almost like a Whale*, is even more apposite than Jones implies in his introduction. It’s a direct quotation from *The Origin of Species* and refers to Darwin’s hypothetical

explanation of the evolution of whales. North American black bears, he notes, have been observed swimming around 'for hours with widely open mouth, thus catching, almost like a whale, insects in the water'. Such, for Darwin, was the first step in the bear-into-whale transition. The evolution of whales is surely one of the more remarkable chapters in the history of life. Vertebrates went to a great deal of trouble to crawl out of the water and set up shop on land, and mammals, gestation and all, represent a high degree of terrestrial specialisation. And yet whales forsook life on land and reacquired – over, by evolutionary standards, a relatively short time – many of the fish-like adaptations that had been laboriously lost when the first amphibians left the water. This alone is a beautiful illustration of evolution's quixotic path. Surely no Designer – whether upper or lower-case 'd' – would go about things in so eccentric a manner.

The swimming bear is one of the details Darwin got wrong. Whales were not derived from bear-like ancestors; rather, they are related to Artiodactyls, the group of mammals that includes pigs and cows. Exactly how they are related to this group is a matter of debate, and illustrates nicely the richness of Darwin's legacy. There are fossil whales, and since the Sixties, palaeontologists have carefully reconstructed a hypothetical route from terrestrial mammals to modern whales via an extinct group, the mesonychians. The story has changed with the application of DNA sequencing to the business of sorting out who is related to whom in the natural world. Whales are derived from a specific group within the Artiodactyls, the hippopotamuses. In retrospect, this makes a lot of sense: you might expect fully aquatic mammals to be derived from semi-aquatic ones. But it is only through the combination of two hugely disparate strands of biology – palaeontology's interpretation of ancient rocks, and molecular biology's exploration of a microscopic world – that the mystery surrounding one of evolution's greatest triumphs, the mammalian return to water, has been solved. Darwin, himself a genuine polymath, competent in geology, palaeontology, systematics, ecology, animal behaviour and developmental biology, would be proud.

Whales have a further major claim to evolutionary fame. Vestigial organs are the remnants of hardware that was useful in an ancestor, but is now no longer functional; natural selection has simply not finished the job of eliminating them. Their presence implies an evolutionary process – 'descent with modification' in Darwin's words – that results in today's species being distinct from their ancestors: why else would an organism be carrying around defunct relics from its antecedents? Whales' fore limbs (the front legs of hippos) have become modified into swimming flippers, but the hippos' hind limbs are functionless in a whale, whose propulsion is provided by its tail fin. Those hind legs, vestiges of a genealogically distant four-limbed ancestor, have atrophied to such an extent that they merely put in a brief appearance in the whale's embryonic development as cartilagenous stubs that are rapidly reabsorbed. That they appear at all, however, is testimony to the inertia inherent in the evolutionary process. A

more striking instance of this came to light off Vancouver Island in 1919 when whalers killed a female humpback whale with a pair of bizarre protrusions on either side of its tail. These were four feet long and unmistakably those ‘lost’ hind limbs. Evolution has eliminated them by somehow switching off hind limb formation, but a freak event – a mutation, or some developmental quirk – had restored that particular whale to the four-legged state of her distant ancestors. Atavisms – literally, evolutionary throwbacks – are compelling evidence of an organism’s past, and indicate that much of it remains locked away in unexpressed genes.

Jones’s Darwinian borrowings are not limited to the title of his book. Throughout it, unmarked, slipped in between Jones’s own sentences, are occasional chunks of *The Origin of Species* that he ‘filched in the hope of improving the tone of my own work’. This is weird: Jones’s and Darwin’s prose are not comfortable paragraph-fellows, and inserting someone else’s prose into your own offends my stuffy sense of what constitutes proper citation. Jones may now agree, having recently suffered the consequences of this peculiar strategy. The *Spectator*’s review of *Almost like a Whale* quoted a whole paragraph as ‘an example of the heights to which his’ – Jones’s – ‘style can rise’. Jones did the noble thing and wrote in sheepishly to point out that part of the quoted paragraph was Darwin.

Its awkward Jones-cum-Darwin aspects notwithstanding, *Almost like a Whale* provides a fine overview of modern evolutionary biology. Even so, I wish that Jones had exorcised his *Origin* fixation before putting pen to paper, and written instead a stand-alone Jones-on-evolution book. Deftly informative and a pleasure to read, *Almost like a Whale* is almost like that book.

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