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1 The Origin of the *Origin*

Charles Robert Darwin was born in 1809. His great book, *the Origin of Species*, was published in 1859, when he was fifty. He was to live another twenty-plus years, dying in 1882, by which time the *Origin* had gone through six editions and been extensively revised and rewritten. It used to be the case that it was the sixth edition of 1872 that was most frequently reproduced, but more recently scholars have insisted that the first edition is the really important one – we not only see Darwin's thinking in its original form but the revisions today are often judged to have been made for less than worthy reasons (in the sense that the criticisms now no longer seem so forceful). It is therefore the first edition that will be the focus of this piece, and my question opening this volume is about its genesis, and the implications that this had for the actual book that Darwin produced. While I do not think that the *Origin* is a particularly mysterious book, I believe that there are aspects to it that are not quite as obvious as we today often assume.

THE ROUTE TO DISCOVERY

Undistinguished at school, Darwin went first to the University of Edinburgh to study medicine and then (after that proved not to be to his liking) to the University of Cambridge to prepare for the life of an Anglican clergyman. (Janet Browne's [1995, 2002] biography is definitive.) We know now that, although Darwin had no formal training as a biologist, by the time he graduated (in 1831) he not

The late Sydney Smith once wrote a paper with the same title, and in using it again I show how much I owe to his friendliness and scholarship.

only was showing an aptitude for science but also was long versed in the ways of empirical study and research. From early years, Charles and his older brother Erasmus had played with chemical ideas and experiments, and at both universities he had immersed himself in the active groups of naturalists and empirical inquirers. At the end of 1831, Darwin joined HMS *Beagle*, about to start what proved to be a five-year trip mapping the coast of South America and then going on around the world before returning home. Darwin started as a kind of gentleman companion to the captain, Robert Fitzroy, but soon became the de facto ship's naturalist, in which role his earlier scientific activities and training served him very well. The notebooks that he kept show that he was serious and competent right from the start. (Sandra Herbert [2005] is very insightful on Darwin's move into serious science.)

The time on the *Beagle* was important for many reasons, not the least of which was that, being away from his Cambridge mentors, Darwin was forced to think independently. This was shown particularly in geology, the science that was most important to him in these early years. Darwin became enthused with the uniformitarian thinking of Charles Lyell in his *Principles of Geology* (1830–33) and broke with the catastrophism of people like Adam Sedgwick (1831), a professor of geology at Cambridge and the man who had taken Darwin on a crash course in Wales in the summer of 1831. In religion, the trip was important because Darwin's rather literalistic Christianity started to fade and he became something of a deist, believing in God as unmoved mover and that the greatest signs of His powers are the workings of unbroken law rather than signs of miraculous intervention.

Most significantly, perhaps because he was now thinking of God as someone Whose greatness is evidenced by unbroken law rather than by miracle, Darwin started on the path to evolution. It is generally agreed that Darwin (who knew about evolutionary ideas from reading *Zoonomia*, an evolution-favoring book by his grandfather Erasmus Darwin, as well as from encounters at Edinburgh with the future London professor of anatomy Robert Grant, and from Lyell's discussion of the thinking of Jean Baptiste de Lamarck) did not actually become an evolutionist on the voyage. But his encounter with the different reptiles and birds on the Galápagos Archipelago shocked him. How could one have different-but-similar forms on islands only

a few miles apart? When, on his return to England, Darwin learned that the birds were undoubtedly of different species, this was enough to tip the balance. In the spring of 1837, Charles Darwin slipped over to transmutationism.

For eighteen months, until the end of September 1838, Darwin worked hard looking for a cause of evolution. One suspects that it was the ideal of Newton – much praised by the day's scientific methodological gurus, especially John Herschel (1830) and William Whewell (1837) – that spurred Darwin here. He wanted to find a force for evolution akin to Newton's force of gravitational attraction. For all that we have Darwin's detailed notebooks – perhaps because the notebooks are so detailed – there has been debate about the exact course of Darwin's thinking. Darwin himself always claimed that he started with artificial selection, realizing that this was the way in which breeders change their animals and plants. Then he started to look for a natural equivalent, and this he found at the end of September 1838 after he had read Thomas Robert Malthus's (1826) treatise on population. More organisms are born than can survive and reproduce. Those that get through will, on average, be different from those that do not. And it is these differences – shaggier coats, stronger legs, sharper eyes – that are crucial. Given enough time, there will be overall change – descent with modification (what we call "evolution") – and, moreover, this will be in the direction of adaptive advantage. Shaggier coats keep sheep warm; stronger legs let the wolf catch the deer; sharper eyes mean that the eagle can spot the rabbit.

Through a careful reading of the notebooks that Darwin kept while he was searching for his mechanism – a mechanism that, when discovered, he clearly did think was akin to a Newtonian force – some scholars have concluded that, although in his various sketches and published versions of his theory Darwin does use artificial selection to lead into natural selection, it is unlikely that he really did have the analogy in mind on his way to natural selection (Barrett et al. 1987; Herbert 1971; Limoges 1970). He never really thought that artificial selection could do the job, or at least that a natural equivalent would be sufficiently powerful to get full-blooded change. Whether this interpretation is correct is something that has been argued for some time now. My own feeling, looking at some of the material that Darwin read during the crucial discovery

months – some material, incidentally, that not only drew attention to artificial selection but also showed that one might expect a natural equivalent, some material that Darwin highlighted particularly[1] – is that he probably did have the analogy in mind. But I would agree that he was more hesitant at the time than his confident later recollections suggest (Ruse 1979).

Darwin did not at once write things up in any formal way. Indeed, we have to work rather carefully through the notebooks to see that he did appreciate the full worth of natural selection. (He did. Jottings later in 1838 about human mental evolution put this fact beyond doubt.) Moreover, it was to be another four years before he actually wrote out what was a thirty-five-page, penciled *Sketch* (as we now call it) of his ideas (Darwin and Wallace 1958). This was then extended in 1844 to a 230-page *Essay*, which Darwin had fair-copied by the local schoolmaster. It should be added that in his *Autobiography* and elsewhere Darwin referred to 1838 as the point at which he first thought up his species theory, and this may well be true, although there seems to be no written record (nor indeed should there necessarily be).

THE LONG DELAY

Darwin then put things on hold, and having written a letter to his wife asking that in the event of his death she arrange that some competent biologist bring the *Essay* to publication, he turned to a massive eight-year-long study of barnacles (Darwin 1851a, b, 1854a, b). It was not until around 1854 that he turned back to his evolutionary theory. It is clear that, by this time, word was starting to get out that Darwin was an evolutionist – and he was in the habit of showing bits of his writings to some of the young men he was encouraging around him. His friends urged him to get back to the job and to go public, lest he be scooped. Darwin therefore started to write a massive book about his theory. This was interrupted by the arrival, in the early summer of 1858, of the essay by Alfred Russel Wallace,

[1] Like most people who actually take seriously the task of uncovering Darwin's thought processes, rather than triumphantly holding up something as evidence that he was both unoriginal and a plagiarist, I do not in any sense suggest that Darwin pinched natural selection from someone else, or that someone else should get the real credit. None of his precursors were seeing natural selection as a mechanism of evolutionary change, and some indeed denied that it could be.

a naturalist and collector in the Malay Archipelago – the essay in which Wallace captured almost exactly the ideas that Darwin had discovered twenty years before.

Extracts of Darwin's writings along with Wallace's essay were at once read at the next meeting of the Linnaean Society and published. Despite stories about the ideas being disregarded, there was immediate interest. Later in the summer, in his presidential address to the British Association for the Advancement of Science, quite favourable notice was made of the papers by Richard Owen (for all that he later was cast as the Darth Vader of the *Darwin Wars*). By now, Darwin had launched frenetically into the writing of what he wanted to call an "abstract" of his thinking – a qualification that his publisher, John Murray, wisely declined to accept for a work that in print extended to 490 pages – and so finally *On the Origin of Species by Means of Natural Selection, or the Preservation of the Favoured Races in the Struggle for Life*, by Charles Darwin, M.A., appeared in November 1859.

There has been and still is considerable controversy over the reasons why Darwin took so long to bring his theory into print. Recently it has been suggested that this is a bit of a pseudo-problem, because the delay was not really that long and because Darwin was, after all, working away for much of the time on matters evolutionary (Van Wyhe 2007). Those who apparently do not consider it a pseudo-problem have included Thomas Henry Huxley (1893), who praised Darwin for spending so much time on the barnacles and turning himself into a real zoologist before he published; the late Dov Ospovat (1981), who thought that Darwin moved from an ultra-natural theological stance of seeing all adaptation as perfect to seeing it as relative; and Robert J. Richards (1987), who thinks that Darwin was so worried about the sterility of the hymenoptera (seemingly a counterexample to a process that stresses reproduction) that it was not until he had seen (in the early 1850s) that breeders could get desired traits possessed by animals that do not breed (steers killed for food, for instance) by going back to the family stock, that he realized that something comparable could happen in nature and so felt free to get cracking again on his theory.

For the record, I have been marked as one who thinks there was a genuine delay, and I continue to think so (Ruse 1979). I am not too bothered by the jump between 1839 and 1842 or between 1842 and 1844. Darwin was working flat out on other projects, the geology

in particular. Most notably, making him into a household name, Darwin wrote up his account of the trip around the world on the *Beagle*, and what started as a formal report for the Admiralty turned into one of the most popular of travel books at a time when society just loved stories of exploration in distant and strange lands (Darwin 1839). Darwin was also newly married, moving to the house in Kent (and having it extended), starting a family, and feeling sick. He had more than enough on his plate at that time.

It is the gap between 1844 and 1858 that fascinates me. I am happy to accept the bits and pieces of new information that come into Darwin's thinking between 1844 and 1859. I have always been impressed by the way that the barnacle work so convinced Darwin of the variation that exists in all natural populations, something that was crucial for a mechanism like natural selection. And let us not forget the "principle of divergence," tied to the tree-of-life metaphor, where Darwin saw that divergence is the way in which selection maximizes the use that organisms can make of resources. Although I think that in fact there are hints of it even in his notebooks of the late 1830s, I accept fully that Darwin did not really realize the problem and the solution until much later.

However, I have to say that none of this alone or in conjunction really convinces me that this yields the solution. Two things always strike me. First, Charles Darwin was always so ambitious. Never let the friendly, warm, almost-casual man and his style deceive you. At the beginning of her biography, Janet Browne speaks of the sliver of ice in the heart of Charles Darwin. I have always thought that this is so. He was not a nasty man in any way, but he did want to make his mark as a scientist, and nothing was going to stand in his way. The sickness was genuine, but he used it to advantage to avoid boring jobs and people. His massive letter writing was sincere, but again and again it was a medium through which Darwin could get others to do jobs for him. And above all, he was going to get into print. Just after the *Beagle* voyage, Darwin dashed up to Glen Roy in Scotland to look at the parallel roads around the sides of the valley, arguing that they were of marine origin. Unfortunately, the subsequent paper in the *Transactions of the Royal Society* turned out to be a bit of a disaster. Louis Agassiz was soon to point out that the parallel roads were produced by a lake dammed by a glacier, not by the now-receded sea. But the drive to get a paper on a hot topic

into a prestigious journal certainly fits the pattern: a young man on the make. I am not criticizing Darwin for this. If I did, I would have to extend my comments to every successful scientist I have ever met – in science as in love, being reticent gets you nowhere. So I just cannot see Darwin, a man who knows he has solved the mystery of organic origins, sitting on his hands for fifteen years.

My second point is that truly I cannot find all of that much difference between the *Essay* of 1844 and the *Origin* of 1859. I have long argued – and continue to argue – that Darwin's theory is a very skilful piece of work. It is, as he truly said, one long argument, not simply one damn thing after another. I am convinced that the men influencing him on matters of methodology – William Whewell particularly, but also John F. W. Herschel – taught Darwin that he had to find a *vera causa* if he was to solve the organic origins problem. Darwin knew that natural selection could do the trick. It was a force-like phenomenon that explained adaptation, something that both scientists and theologians (often one and the same person) were trumpeting. But selection had to be set in the right justificatory framework. Satisfying Herschel, who as an empiricist demanded direct or analogical evidence, Darwin made much of the analogy between artificial and natural selection – this is so whatever the role of artificial selection in finding natural selection. Satisfying Whewell, who as a rationalist demanded that one's cause be at the apex of a consilience of inductions (Whewell 1840, Herschel 1841) – the cause explains the phenomena, the phenomena make reasonable the cause – the whole of the second part of his theory is a trip through the sub-branches of biology (paleontology, biogeography, systematics, anatomy, embryology) as Darwin shows that selection provides explanations in such areas and in turn is justified by such areas. The point I make here is that this structure is in the *Sketch*, the *Essay*, and the *Origin* – identical in form and presentation – and much of the evidence is just the same. Even the sub-bits, like the introduction of sexual selection along with natural selection, are the same.

ANSWERING THE QUESTION

So I still have the question of the delay. Why did Darwin not publish the *Essay* back in 1844? My answer is twofold. First, he was scared. Not of his wife or anything like that; and I doubt that being labeled

a materialist much bothered him. He came from a family and a set (particularly connected with his brother Erasmus) where that was not much of a taunt. In any case, Darwin was not a materialist. He was a deist, and the various writings up to and including the *Origin* make that very clear. (He even added additional references to the Creator in later editions.) It was precisely the leaders of his scientific set – those very men who had nurtured him and made his early career possible – whom Darwin feared offending. 1844 was the year in which the notorious evolutionary work the *Vestiges of the Natural History of Creation* was published, and the set went after the work with a vengeance. Adam Sedgwick raged against it in the *Edinburgh Review* – it was so vile it must have been written by a woman, but surely no woman could pen such filthy muck. David Brewster (physicist, biographer of Newton, and the inspiration for the flowery passage with which Darwin ends the *Origin*) declaimed against it in the *North British Review*. And Whewell thought it so disgusting that he did not write against it but merely collected selected passages from earlier writings for a little book – *Indications of the Creator*. The first edition did not even mention the *Vestiges* by name. I realize that the reception of *Vestiges* was by no means uniformly negative – Tennyson, for instance, was to use its ideas to finish *In Memoriam* – but for Darwin's group it was anathema. So he knew that he had better stay silent.

The second reason is simply, as many have noted, that Darwin just did not expect the delay to be so long. He set out on his barnacle work thinking that it would take but a year, and it kept stretching on and on as he worked obsessively on the project. One year stretched to eight. The species book – which in the light of the reactions would need very careful documentation – did not get written. I should say that I see here, balancing the ambition, the other side of Darwin's character. He was selfish – call it self-centered if you like – because, as a rich man who had been favoured in his youth, he was accustomed to doing what he liked. He became obsessed with a project, and nothing was going to stop him. To put the matter in modern terms, he did not have to write research grants to show that his work would cure cancer. He could just amuse himself, although perhaps "amuse" is not the right word for someone who did work so hard. I see this pattern again after the *Origin*. Why did Darwin

not set up a selection lab at Down? He had the money, and there were those who wanted to join him in doing just that. He could see that selection was being downgraded by people like Huxley, but he did not really fight back. Although Darwin did write the *Variation* as an extension of the *Origin* and was sufficiently threatened by Wallace's apostasy (arguing that human evolution demanded divine intervention) that he felt compelled to write the *Descent*, scientifically Darwin went on doing what he had always done, namely, working away on projects – orchids (1862), climbing plants (1880), earthworms (1881) – that caught his fancy.

A final comment. I see Darwin's sharing his evolutionary ideas with others as part and parcel of this picture. He was not about to share them with Sedgwick and Whewell – still the people who really controlled science – but the younger members of the set had long been discussing origins in a potentially naturalistic way. As soon as he came back from the *Beagle* voyage, Darwin and Owen began chewing the fat over such things. (Pertinently, Owen, the best scientist of them all at this time, was probably well on the way to some kind of Germanic evolutionism, but dared not publish his work because he was so dependent on the established powers. He did not dare accept a knighthood lest he appear too uppity.) Darwin knew full well that when he did publish he would need supporters. So it was quite natural to talk about these things with those who were potential supporters and who, although they may have been cowed by people like Whewell, certainly did not necessarily agree with them.

THE *ORIGIN* AS ANACHRONISTIC

In a way, talking about the long delay is a bit like speculating on whether Queen Victoria had sex with John Brown or whether the heir to the throne was Jack the Ripper. Fun to do, but not really that important, and probably ultimately futile. I would truly query only whether it was not that important. If the *Origin* is fundamentally different from the earlier versions, then it should be judged on its own terms. I would hate, for instance, for someone to judge my present taste in food and drink on my convictions as a small child in postwar England. It would be baked beans and sliced white bread all

the way, washed down by a rather revolting fizzy concoction called *Vimto*. But if the *Origin* is more a product of the late 1830s and early 1840s, then we should judge it on those terms.

Let me make five points showing that such an approach pays explanatory dividends. First, take the book's topic. Of course, Charles Darwin was not the first to ask about organic origins. His grandfather Erasmus had done so, for one. And in the 1840s and 1850s people went on asking about the topic – Chambers (1844) in the first decade and Herbert Spencer (1852) in the second. However, I wonder if this was something on the front burner of the top professional biologists. Huxley was happy to get on board when the time came, although it took through the 1860s for him to accept that the fossil record showed evolution, and he never taught the topic in his classes (Ruse 1996). For him, it was indeed the materialism and like elements that were attractive. In the 1830s, however, Darwin's set did rather obsess about the topic – usually very negatively! It was described as the "mystery of mysteries" in a letter from Herschel to Lyell – a letter that became very public thanks to its being reprinted in Charles Babbage's *Ninth Bridgewater Treatise* (1838). My sense is that Darwin brought the issues back into discussion – incidentally, just at the time when Pasteur was showing the impossibility of spontaneous generation, and so in a way making the whole question of origins a bit iffy.

Second, consider the style of the *Origin*. From the beginning, everyone recognized that it was a remarkably easy read, especially for a work that was doing so much and claiming to be scientific. Richard Owen (1860) in his review in the *Quarterly* was quite nasty about this, congratulating Darwin for writing in a way that we have come to expect from the author of travel books and the like – the implication being that, written as it was, this could not be a serious work. Darwin was certainly capable of writing stuff that could be read only by the expert, if at all. Look at the barnacle monographs, for example. But we must think of Darwin's patrons. He may not have had to work, but there were those whose approbation he sought, namely his father and his Uncle Josh (later his father-in-law). Darwin had a rather rocky start – second-rate at school, and dropping out of medicine – and his father was rightly skeptical of his abilities and his willingness to get down to things.