Darwin's mentors

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The young Charles Darwin did not make a success of his education. He wasted his time and lacked motivation to develop any professional skills. Three mentors can be credited with bringing about a remarkable transformation over a period of just a few years. This article is concerned with these people and their differing influences on Darwin's life and subsequent career. Conclusions are drawn regarding these influences and their relevance for today.

Darwin's childhood was lacking in parental warmth and support. His mother was bedridden and unable to provide much mothering. She died when he was only 8 years old. He wrote in his autobiography: "I can remember hardly anything about her except her death-bed, her black velvet gown, and her curiously constructed work-table." Robert Darwin, his father, was a medical doctor who was fully occupied with professional activities. He was big in stature, weighing more than 24 stone, and Charles revered him. He had a reputation for being a closet freethinker who had imbibed the revolutionary libertarianism of his father, Erasmus Darwin. In later years, Emma Darwin (Charles' wife) spoke of Robert Darwin as someone who found boyish noise and untidiness to be unpleasant, and that he did not understand Charles or show him much sympathy. The whole household was not at ease when the Master was at home.

Charles was sent to a boarding school in Shrewsbury, but did not gain much from it. Learning Greek and Latin was a persistent and unwelcome chore for him, for languages did not come easily. After a year, his father realised that a change was needed. Darwin wrote (in his autobiography):

> "When I left the school I was for my age neither high nor low in it; and I believe that I was considered by all my masters and by my father as a very ordinary boy, rather below the common standard in intellect. To my deep mortification my father once said to me, "You care for nothing but shooting, dogs, and rat-catching and you will be a disgrace to yourself and all your family"."

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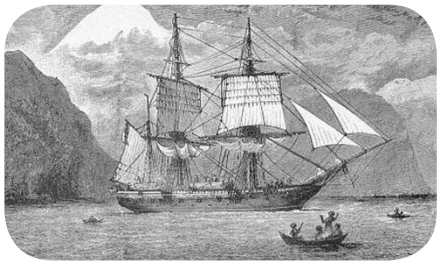
Consequently, in 1825, when Charles was only 16 years of age, he was sent, with his brother, to Edinburgh University (still the seat of Enlightenment thinking) to study medicine. However, Charles lacked any motivation for these studies also and was hopelessly distracted by other pursuits. He had come to believe that his father would set him up for a comfortable life, and this prospect "was sufficient to check any strenuous efforts to learn medicine." It was during this period that Charles' interest in natural history flowered. The catalyst for this was Robert Edmund Grant, an expert on sponges. According to Desmond and Moore (1992, p.34):

> "nothing was sacred for Grant. As a freethinker, he saw no spiritual power behind nature's throne. The origin and evolution of life were due simply to physical and chemical forces, all obeying natural laws."

Grant had cited *Zoonomia,* Erasmus Darwin's book on evolution, in his doctoral thesis, and it is known that Charles had read the book during his second year (at the behest of his father). Its contents would, no doubt, have been a topic of conversation between them.

Charles recalled the next step in his life:

> "After having spent two sessions in Edinburgh, my father perceived, or he heard from my sisters, that I did not



H.M.S. Beagle in Straits of Magellan.

> like the thought of being a physician, so he proposed that I should become a clergyman. He was very properly vehement against my turning into an idle sporting man, which then seemed my probable destination."

Bearing in mind that Robert Darwin came from the tradition of atheism, we can infer that he must have been a desperate man! After some deliberation, Charles consented with the plan and moved to Cambridge University. However, things did not go well there either.

> "During the three years which I spent at Cambridge my time was wasted, as far as the academical studies were concerned, as completely as at Edinburgh and at school."

Nevertheless, it was during this time, that Charles met a remarkable man who befriended him and helped him find his feet in the world.

Mentor No. 1: Revd Professor John Stevens Henslow

J. S. Henslow became an influential figure because of his numerous

This portrait of John Stevens Henslow accompanied his obituary in 'The Illustrated London News' of 22 June 1861.
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academic contributions to the University of Cambridge. In 1819, he co-founded the Cambridge Philosophical Society as a focus for discussion and scientific communication. Among the other co-founders was Adam Sedgwick, who appears later as Mentor no. 2. Henslow became Professor of Mineralogy in 1823 and then took a chair in Botany in 1827. He was an activist in reorganising the way science was taught at Cambridge – encouraging practical laboratory work and field excursions to develop hands-on expertise. He played a major role in establishing the Botanic Gardens as a resource for teaching and research.

Henslow was a Christian and he appears to have been an Evangelical. He declared himself happy with the wording of the 39 Articles of the Church of England, which capture the spirit of the Reformation and historic Biblical Christianity. As an academic, he did not compartmentalise his Christianity so that "beliefs" were separated from the disciplines of mineralogy or botany, but he sought to develop an integrated perspective. In this, he is a fine role model for Christian academics – but this thought cannot be developed further in this article.

Henslow was aware that many people considered species to be stable entities, so that the species today appear much the same as when they came from the hand of the Creator. He was also aware that informed creationists, like Linnaeus in his mature years, had moved away from this position and were prepared to think of speciation (the development of new species) within the boundaries of created kinds. This would put the created kind at the taxonomic level of Genus, Family or even higher. As a scholar in the Baconian tradition, Henslow knew that the only way to gain a greater understanding of these natural variations was to document them, analyse them and develop hypotheses to test. This is exactly what Henslow set out to do. His botanical research was carried out from a creationist perspective by first documenting natural variations. The first edition of his "A Catalogue of British Plants" appeared in 1829, the same year that Darwin arrived at Cambridge. Henslow researched hybridisation, recognising that some hybrids had been given a separate species name rather than being designated a variety:

> A further attempt to determine the natural lines of cleavage in species came in 1830 […]. Henslow showed that, by manipulating moisture, manuring and shade in garden-grown primulas, he could experimentally reproduce morphological variants observed in the field. Again, the stability of created species is the assumption underlying this work. Henslow supported the linnaean analysis of *Primula* veris with its three varieties: gamma acaulis (primrose) in opposition to J. E. Smith's more modern 'splitting' view. (Kohn *et al.* 2005).

> Darwin could not have found a better mentor and father-figure. *The Beagle* voyage helped to strengthen the relationship.

It is hard to overstate the importance of Henslow's work. His theoretical concept (variation within the Created Kind) was distinctively different from other botanists. Henslow employed the word "collation" to describe the way he catalogued plants and compared their variants. Recent work by Kohn *et al* (2005) has shown just how much Henslow was a pioneer in the way he was thinking about speciation:

> "Thus Henslow was not just identifying plants: he was organizing his herbarium to emphasize variation within species. Remarkably, he seems to have been the only British botanist at the time doing this. We have surveyed the herbaria of C. C. Babington, J. H. Balfour, William Borrer, W. A. Bromfield, John Downes, R. K. Greville, W. J. Hooker, Leonard Jenyns, W. A. Leighton, N. J. Winch and William Wilson. Henslow's fellow botanists seldom placed more than one plant on a sheet and none practised 'collation'. In Henslow's hands, however, plants received from these same people were collated in a comparative display that illustrated natural variation. This rigorous attention to variation throughout the 1820s was unique to Henslow."

An interesting link between Henslow's botanical research and his earlier role as Professor of Mineralogy has been suggested. He brought skills to his studies of botany that he had used to advantage in studying minerals.

> "But Henslow recognized that the inherent tension between the stability and variability of species posed a major problem: "Our knowledge…has not been hitherto sufficiently advanced, to furnish us with any precise rule for distinguishing the exact limits between which any given species of plant may vary." What distinguished Henslow's practice from that of his contemporaries was his intention systematically to turn the creationist species concept into a precise instrument of scientific analysis. This difference of approach may have arisen because Henslow had originally been a physical scientist – a professor of mineralogy who applied the rigour of contemporary crystallography to the species problem." (Kohn *et al.* 2005)

Darwin brought his personal interest in natural history from Edinburgh to Cambridge. This soon led to him meeting Henslow and feeling the excitement of what he was doing. There must have been something about Darwin that Henslow liked, because they spent a lot of time together. Indeed, Darwin became such a

regular companion of the professor that some of the university dons began calling him *"the man who walks with Henslow."* (Darwin, 1887, p.9). He encouraged Darwin to attend some geology lectures delivered by Adam Sedgwick, and recognised the impact that geology was making on his thinking. After graduation, it was Henslow who persuaded Sedgwick to take Darwin with him on his planned trip to familiarise himself with the geology of North Wales. After this trip, when Darwin arrived back at his home in Shrewsbury, it was a letter from Henslow that brought the invitation to travel on *The Beagle* as companion of the ship's captain.

These opportunities came about because of Henslow's winsome personality and his very large circle of contacts. Darwin could not have found a better mentor and father-figure. *The Beagle* voyage helped to strengthen the relationship:

> "During *The Beagle* voyage, Darwin and Henslow corresponded as often as the primitive postal system would allow. Henslow became the main recipient of Darwin's massive collection of scientific samples, despatched home at irregular intervals during the voyage. He saw to it that these samples were passed on to the appropriate experts for analysis, and took it upon himself to publish extracts of Darwin's letters in respectable scientific journals." (Carter, 2007)

When Darwin returned home in 1836, his name and his work were known in the scholarly world. He was a personality in his own right. People recognised him as a man with potential and he was treated with respect. "Henslow had made him what he was, not only by giving him the chance of a lifetime with the invitation for *The Beagle* voyage, but also by his kindly attentions and support thereafter" (Browne, 2002, 153).

Over the next two decades, Darwin's thinking diverged substantially from Henslow. The two men continued to communicate, but Darwin did not consider Henslow someone he could confide in regarding his thinking about evolutionary transformation. When *"On the Origin of Species"* was published, he sent Henslow a copy, and wrote: "I fear you will not approve of your pupil in this case" (Browne, p.84). Henslow did not approve. In a letter to Leonard Jenyns dated 26 January 1860, he wrote:

> "The book is a marvellous assemblage of facts and observation – and no doubt contains much legitimate inference but it pushes hypothesis (for it is not a real theory) too far." (cited in Armstrong, 2000, 69).

> "I fully believe a better man than Henslow never walked this earth."

Nevertheless, Henslow was always the gentleman, willing to allow others to get a hearing for their views and slow to condemn. He chaired the famous 1860 debate between Wilberforce and Huxley, knowing that debate about the meaning of evidence should be encouraged:

> In 1860, at a meeting at the Cambridge Philosophical Society, both Sedgwick and Henslow were to be found debating the merits of Darwin's new book. Henslow "vigorously defended Darwin's right to investigate the question of living origins, although he, like the others, balked at jettisoning divine creation." […] In this, Henslow showed the mettle that his friends still admired. Elderly he might be, but he retained his inner fire. Yet his affection for Darwin evidently pushed him further than his heart would otherwise have taken him." (Browne, 2002, 117)

He was prepared to bring Darwin's evolutionary ideas into his own botany lectures to students. This is probably the earliest example of someone "teaching the controversy" about evolution. "While telling them of his own unshakeable religious faith, he nevertheless encouraged them to respect intellectual endeavour wherever it might lead." (Browne, 2002, 118). He died the following year.

Henslow was universally acclaimed as a scholar and gentleman. He was reputed to be a person tolerant of any view as long as it was held sincerely. His son-in-law attributed this to his own strong convictions, which were not threatened by others having a different view (Armstrong, 2000, 64). Darwin's view was expressed to J. D. Hooker, 18th May, 1861:

> "I fully believe a better man than Henslow never walked this earth."

As an indication of this esteem, Charles and Emma Darwin named three of their children (Annie, George, and Leonard) after Henslow's children.

Mentor No 2: Revd Professor Adam Sedgwick

Adam Sedgwick was the Woodwardian Professor at Cambridge (1818-1873) and President of the Geological Society (1829-1831). He was a specialist in stratigraphy, and had a detailed knowledge of Palaeozoic fossils. As noted above, Darwin attended his lectures and found them very stimulating. These lectures laid the foundations of his geological knowledge.

After gaining a BA degree, Charles spent the early part of 1831 broadening his interests in natural history and geology. From 3-20 August, Sedgwick took Darwin on a 3 week field excursion: the Welsh Marches, Snowdonia and Anglesey. This had the merit of introducing Sedgwick to Henslow's "hands-on" approach to teaching applied science – something that Sedgwick himself adopted as standard practice later in his career. Darwin recorded the trip as follows:

> "Professor Sedgwick intended to visit N. Wales…and slept at my father's house…Next morning we started for Llangollen, Conway, Bangor and Capel Curig. This tour was of decided use in

> teaching me a little how to make out the geology of a country… We spent many hours in Cwm Idwal…"

There is more to this fieldwork than is apparent in the above quote – a useful detective exercise is by Roberts (2001). During this tour, Darwin gained the foundations of how to do field work, how to recognise rocks in the field, how to interpret the findings, and how to provide documentation. This was an invaluable experience that gave Darwin the head start he needed for working independently. All was put to good use on *The Beagle* expedition. This laid the foundations for the next 10 years when Darwin saw himself primarily as a geologist.

> "Darwin used in his geological researches during *The Beagle* voyage – in South America, the Falklands, in Australia – almost every aspect of what Sedgwick had taught him that summer in Wales: the direct line of transect across country, the inspection of sections or exposures, the marking of stratification on a map, the collection of rock specimens, and the careful use of a compass." (Armstrong, 2000, 121).

Sedgwick was an important mentor of Darwin, imparting conceptual and practical skills in geology. He took a rather different position from that of Henslow, in that he drew a line of demarcation between biblical revelation and his geological researches. The words "integration" and "synthesis" were written, if at all, in very small letters. Apart from the Bible revealing God's creative acts, Sedgwick looked exclusively to the geology of his day to answer the "how?" questions. Darwin found this approach one he could work with. But in other respects, Darwin's thinking went in a different direction. Sedgwick was a catastrophist, a position that was reinforced by his familiarity with rocks and fossils through field work. He invoked catastrophism to explain extinction and he was a progressive creationist in his thinking about new species (Roberts, 2009). He held to the reality of Divine acts of creation in the geological past.

How much of this impacted on Darwin? He did not follow Sedgwick either in his catastrophism, or in his thinking about creative acts of God in Earth history. In later years, Sedgwick, who is reputed to have had a fiery temperament, opposed Darwin's ideas on evolution by natural selection, describing the book as "false and mischievous" and claiming that when he read it, he laughed until his sides ached. (Armstrong, 2000, 122).

> "Lyell's *Principles* set out to free geological science from Moses and from the catastrophists, and this was the fountain from which Darwin drank deeply during his Beagle travels.

Mentor No 3: Charles Lyell

Lyell's family had achieved considerable wealth and fame, and the youthful Charles studied for the Bar at Oxford University. But his interest in geology became a passion and he spent the rest of his life developing geological ideas as a gentleman scientist. He visited the volcanic region of the Auvergne in 1828, followed by a trip to Mount Etna. The first volume of his influential "Principles of Geology" appeared in 1830. The subtitle of the book explained his distinctive approach: he attempted to explain the former changes of the Earth's surface by reference to causes now in operation. This approach became known as uniformitarianism. Whatever Lyell might have said positively about his attitude to Christianity, his worldview was thoroughly secular. He adopted Enlightenment values and his methodology involved gaining knowledge exclusively through the senses. He considered any appeal to biblical authority to support any understanding of Earth history as an intrusion into the discipline of geology.

Darwin's geological teachers were interested in stratigraphy rather than in models, although they pointed out that depositional mechanisms involved catastrophism. Darwin is likely to have heard about Charles Lyell before he left Cambridge, but he appears not to have sought out his newly published *"Principles of Geology, Volume 1"*. The book, however, was passed to him by Robert Fitzroy, Captain of *The Beagle,* before the ship set sail. Evidently, Fitzroy had had a communication from Lyell requesting feedback on the geological features to be discovered during the voyage.

"Principles of Geology" proved to be Darwin's constant companion. The book enabled Lyell the teacher to steer from a distance a very willing student; Darwin found the uniformitarian framework to be compelling. A decade later, Darwin described the effect the book had on him:

> "The great merit of the *Principles* was that it altered the whole tone of one's mind, & therefore that, when seeing a thing never seen by Lyell, one yet saw it partially through his eyes." (Darwin, 1844).

The effect was dramatic. It was as though Darwin soaked up Lyell's interpretative framework and made it his own.

In assessing the significance of *"Principles",* it is important to recognise that Lyell intentionally set out to weaken the influence of catastrophism in geology and specifically to draw a line of separation between geological history and biblical history. On 11 August 1829, he wrote a letter to Roderick Murchison, friend and fellow-geologist:

> I trust I shall make my sketch of the progress of geology popular. Old Fleming is frightened and thinks the

> age will not stand my anti-Mosaical conclusions and at least that the subject will for a time become unpopular and awkward for the clergy, but I am not afraid. I shall out with the whole but in as conciliatory a manner as possible. (Cited in Mortenson, 2006).

So, Lyell's *Principles* set out to free geological science from Moses and from the catastrophists, and this was the fountain from which Darwin drank deeply during his Beagle travels. He arranged for the other volumes of the Principles to be sent out to him.

Within a month after *The Beagle* returned to Britain, Darwin met up with Charles Lyell. Both were keen to be introduced. Darwin wanted to converse with the author of the book that had influenced him so deeply, and Lyell was already proud of his disciple. Through his writings, Darwin had become something of a celebrity and he was introduced to numerous members of the scientific elite in Britain. Lyell and Darwin became close friends, often corresponding and meeting. Darwin was never comfortable unless he had Lyell's approval. He never departed from uniformitarianism, extending it from geology to biology. It was to Lyell that he turned in 1858, when Wallace set out his thinking on the origin of species by natural selection in a short paper, and it was Lyell who arranged the joint presentation at the Linnaean Society that led to Darwin being credited with precedence for the theory.

Statue of Adam Sedgwick in the Sedgwick Museum of Earth History, Cambridge. © Paul Garner.

Discussion

The two Christian mentors who provided early influences in Darwin's life gave him skills, opportunities and some clear pointers for developing his intellectual life. Darwin accepted the skills and opportunities, but not the pointers. He chose instead to follow the lead given by Lyell: Enlightenment values, secularised science and uniformitarianism. More specific aspects of this choice are considered below.

1. **Speciation and variability in nature.** Henslow was a pioneer in thinking about variation in nature. His approach was not to speculate, but to observe and document! He had already embarked on a programme of investigation, recognising that living things have the ability to vary/adapt. Darwin should have been very conscious that informed believers in creation did not accept the fixity of species. However, there is no trace of this in his "historical review" of previous work on variation. All variation, for Darwin, was evidence against creation. The incongruity of this situation is so striking that it is hard to give Darwin any benefit of the doubt. It appears it was necessary to ignore Henslow's work in order to present an argument he thought he could win. Significantly, evolutionists have been adopting the same strategy ever since! Despite extensive research into the limits of

variation and the identification of created kinds by creation-oriented biologists (Marsh 1976, Lester & Bohlin 1984, Scherer 1993, Wood and Murray 2003), mere variation is still presented by Darwinists as evidence for their theory.

2. **Patterns in the fossil record.** Sedgwick showed Darwin that organisms appeared abruptly in the fossil record, persisted relatively unchanged and then became extinct. This was the basis of Sedgwick's work on stratigraphy and Darwin knew that Sedgwick interpreted these patterns in terms of Special Creation followed by catastrophe/extinction. Instead of facing up to these facts, Darwin developed a hypothesis about the extreme impoverishment of the fossil record. This proved to be so influential (because researchers were loyal to the theory) that it persisted for nearly 150 years. The trigger for puncturing the bubble was pulled when Gould and Eldredge revisited the issue with their theory of Punctuated Equilibrium (1972). More recently, evolutionary biologists are realising that neoDarwinism as it stands at present cannot account for the relevant data, and the EvoDevo movement is actively seeking ways of moving evolutionary theory closer to the punctuated pattern of change seen in the fossil record.

Charles Lyell. © iStockphoto.com/Hulton Archive.

3. **Extreme reluctance to test uniformitarianism.** With hindsight, it is easy to see that Lyell's uniformitarianism was imposed on the data. Geology has taken many years to start shedding the straightjacket introduced by Lyell, and there is now a much greater openness to consider catastrophist explanations for a great variety of geological phenomena. Lyell did bring some positive contributions to geology, but the doctrinaire way he advanced uniformitarianism has hindered scientific progress. The lesson to be learned from this is that scientists are not immune from ideologies that masquerade as science. The health of science is threatened by dogmas becoming "orthodoxy" and defended by a supposed "consensus" within the scientific community. Everything should be subject to the testing and challenging processes of science. What we are seeing today is a consensus about evolutionary theory rejecting all attempts to critique its main concepts and its handling of data. Evolutionary theory is still being presented as "pure" science, free of ideology and dogma. However, Darwin could never have developed his ideas without the underpinning of uniformitarianism, and *"On the Origin of Species"* is actually a good example of Kuhnian "normal science", where data is force-fitted to the conceptual model.

4. **Metaphysical foundations for science.** Darwin was able to compare the differing methodological approaches of his three mentors. He should have been able to see the importance of metaphysics to science and to recognise that his three mentors came to different conclusions because they were building on different foundations. Yet in Darwin's own work, there is no sensitivity to these issues. He claimed to be Baconian in the way he collected data and built theory by induction – yet the reality was quite different. Darwin's theory is primarily deductive, based on his presuppositions. This

was what Henslow perceived when he commented: "[The book] no doubt contains much legitimate inference but it pushes hypothesis (for it is not a real theory) too far." Many of the scientific critiques of Darwin's book made similar points. There is more to be said on this matter. Lyell had an agenda that was shared only with friends. Writing to George Scrope (geologist and Member of Parliament) on 14 June 1830, Lyell confided that he was adopting a particular strategy for striking a blow against Moses and the confessing Church:

> "I was afraid to point the moral, as much as you can do in the Q[uarterly] R[eview] about Moses. Perhaps I should have been tenderer about the Koran. Don't meddle much with that, if at all. If we don't irritate, which I fear that we may (though mere history), we shall carry all with us. If you don't triumph over them, but compliment the liberality and candour of the present age, the bishops and enlightened saints will join us in despising both the ancient and modern physico-theologians. It is just the time to strike […]" (Cited in Mortenson, 2006).

This is Lyell's Enlightenment agenda surfacing. He was intent on secularising science and equating naturalism with the scientific mindset. But he realised that a head-on battle was not the way to succeed in Victorian Britain, so he advocated a policy of developing Enlightenment thinking in a non-confrontational way and congratulating those "bishops and enlightened saints" who join with the project. History reveals how successful he was! Darwin's enthusiasm for Lyell's uniformitarianism and his naturalism reveals that Darwinism is contingent on non-scientific assumptions. Those who portray Darwinism as a triumph of empiricism are seriously astray. Those who fail to see the secularised worldview as underpinning Darwinism may consider themselves "enlightened saints" but they are actually victims of the delusion whose architect was Charles Lyell.

5. **The Long Shadow of Erasmus Darwin.** The historical material on the youthful Darwin provides the background for appreciating his particular need for mentoring, but it also provides us with an additional discussion point. Ideas have roots. The seeds of Darwin's thinking were first sown by his grandfather. Charles Darwin grew up in a home that promoted a materialistic worldview. His values were moulded by his freethinking father. It was not an accident that he was sent to Edinburgh University, the home of Enlightenment philosophy. Darwin warmed to Grant, and later to Lyell, as these men nurtured his secularised mindset. Whilst he benefited enormously from Henslow and Sedgwick, their willingness to acknowledge the hand of God in the history of life made almost no impression on Darwin. In 1837, he commenced his 'B' notebook on transmutation and gave it the title *Zoomania,* recalling the book Erasmus Darwin had written to promote evolutionary thinking (Desmond & Moore, 1992, 229). Darwin was a child of the Enlightenment project and he consciously trod in the footsteps left by his grandfather. He was no dispassionate observer of the natural world. ■

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