

Darwin and Edinburgh

by Walter M Stephen

‘In the nineteenth century even Charles Darwin would graduate from Cambridge University believing that the world was six thousand years old, give or take.’

Stephen Baxter, in *Revolutions in the Earth* (2003)

Can we believe this? And if we do, how could Darwin have come through two years of the Edinburgh system of his time—still ‘a hotbed of genius’—untouched by the currents of thought around him?

In 1805 John Playfair described a short journey by boat, carried out by three gentlemen of the Enlightenment. They were John Playfair, James Hutton and Sir James Hall and in 1788 they had sailed from Dunglass round the Berwickshire coast to Siccar Point. Playfair’s monument on Calton Hill is one of those which helped give Edinburgh its title of ‘Athens of the North’. As Professor of Natural Philosophy, Playfair (1748–1819) was: “cast in nature’s happiest mould, acute, clear, comprehensive, and

having all the higher qualities of intellect combined and regulated by the most perfect good taste, being not less perfect in his moral than in his intellectual nature. He was a man every way distinguished, respected, and beloved.” Sir James Hall (1761–1832) was the first to demonstrate experimentally how limestone was metamorphosed into marble, while Hutton (1726–1797) was a doctor who had studied agriculture and taken up the practical applications of chemistry, moving into geology in 1768.

They landed at Siccar Point and, in a splendid passage of descriptive prose, Playfair wrote: “On landing at this point, we found that we actually trode on the primeval rock. Dr Hutton was highly pleased with appearances that set in so clear a light the different foundations of the parts which compose the exterior crust of the earth”... and proceeded to interpret the ‘palpable evidence’ that lay before them.

What was this palpable evidence that changed people’s view of the past forever? In Silurian times mudstone

and sandstone were laid down under water. This must have taken a long time. These rocks were then tilted, uplifted and partially worn away by wind and water. This also would have taken a long time. In the Devonian (Old Red Sandstone) period the Silurian rocks were covered by water and more strata were laid down. These included sandstone and a conglomerate that contained fragments from the Silurian rocks. Again, this process must have taken more than six days. The unconformity separating the Silurian rocks below from the Old Red Sandstone strata above represents a period of uplift and erosion, then submergence and deposition: in short, a very long time. The Old Red Sandstone was horizontal and under water when its sediments were accumulating. Now it is slightly tilted and above sea level. This tilting and uplift must also have taken a long time.

Playfair was clearly moved by the processes being revealed to him so clearly: “We often said to ourselves, What clearer evidence could we have had of the different formation of these rocks, and of the long interval which separated their formation; had we actually seen them emerging from the bosom of the deep?... We felt ourselves carried back to the time when the schistus was still at the

bottom of the sea...”

“An epoch still more remote presented itself...”

“Revolutions still more remote appeared in the distance of this extraordinary perspective...”

“The mind seemed to grow giddy by looking so far into the abyss of time ...”

Playfair’s conclusion was that:

“How much further reason may sometimes go than imagination can venture to follow.”

Hutton, of course, was not alone, nor the first, in his speculation about the very fundamental origins of the planet. For him ‘the present was the key to the past’ — there was no need for supernatural explanations. His: ‘We find no vestige of a beginning, no prospect of an end.’ — was an uncomfortable thought which many, at the time and later, have chosen to misunderstand and which some have still not had the courage to accept. At the risk of appearing pedantic, I note that Hutton did not say: ‘There is no beginning and no end’, but: ‘We find no vestige... no prospect...’ — a very different kettle of fish.

Since that day there has been a steady trickle of pilgrims to ‘Hutton’s Unconformity’, not least among them being Charles Lyell who, in 1824, as a keen young geologist, was taken there by Sir James Hall. It was

the first volume of Lyell's *Principles of Geology* (1830) that the young Darwin took with him on the *Beagle* and which he said opened his eyes to geology, repeatedly referring to it and the two later volumes, which were sent out to him.

Hutton's *A Theory of the Earth* of 1795 did not immediately command universal acceptance but it certainly caused a ferment of ideas about Creation and the age of the Earth. Many prominent 'philosophers' retained some sort of belief in Biblical creation and catastrophic interventions and vigorously counter-attacked. One such was Richard Kirwan, who was to become Life President of the Royal Irish Academy, President of the Dublin Library Society and Inspector-General of His Majesty's Mines in Ireland. After his death his personal copy of *A Theory of the Earth* was found with many of its pages uncut. He had written a whole book about Hutton's ideas without troubling to familiarise himself with them! 'Kirwan knew Hutton was wrong without even having to check.'

Hutton died in 1797 and was thus spared much vilification, and having to read Kirwan's *Geological Essays* of 1799. Playfair took up the campaign on behalf of Hutton and his ideas. By the time that Darwin came to

Edinburgh University, although Playfair had died in 1819, there would still have been a scientific community who had known Playfair and his campaigns on behalf of Hutton, and who tacitly accepted the evidence and arguments for a very distant creation and a long, slow geological history. There was still, however, a kernel of prominent diehards. Such were Cuvier in France, Werner in Germany and Professor Jameson in Edinburgh, teaching the geology course, which was 'the largest course of its type in the world.'

Charles Darwin (1809–1882) followed his elder brother Erasmus to Edinburgh University in 1825, at the age of sixteen, and spent two academic sessions here as a medical student. For his student days there are three main sources:

1. His note-book, begun in March 1827, has survived;
2. His *Autobiography*, published in 1876—when he was 67—devotes six pages to his Edinburgh days;
3. J H Ashworth, Professor of Zoology at Edinburgh, in 1935 gave a substantial paper on *Charles Darwin as a Student in Edinburgh, 1825–1827*.

Darwin found the lectures 'intolerably dull'. 'Dr Duncan's lectures on *Materia Medica* at 8 o'clock on a winter's morning are something fearful to remember.' 'Dr' (Monro) 'made his lectures on human anatomy as dull as he was himself.' On two occasions Darwin was present at 'very bad operations' and 'rushed away before they were completed.' He considered that 'there are no advantages and many disadvantages in lectures compared with reading'. In the second year Robert Jameson, Professor of Natural History, which then included zoology and geology, was 'incredibly dull.' 'The sole effect they [Jameson's lectures] produced on me was the determination never as long as I lived to read a book on Geology, or in any way to study the science.' On the positive side, Darwin was elected first to the Plinian Natural History Society, then to its Council (of five). He attended all but one of the nineteen meetings held during his time at Edinburgh and took part in discussion on four of the evenings. He communicated to the Society two discoveries he had made.

Dr Robert Grant (who became, in 1827, the first Professor of Zoology in University College, London) was Secretary of the Plinian Society and a considerable influence on

Darwin. With zoology (rather than geology) as a focus they investigated together the shores of the Forth at Leith, Portobello, Joppa and (it is said) Dalmeny/Queensferry, but the nearest we find of thinking beyond description and identification is a reported outburst by Grant on Lamarck and his views on evolution. Darwin listened in 'silent astonishment' but does not seem to have let it affect him.

There is no doubt that Darwin was a good student. He attended the classes, however dull. He took part in cognate activities beyond the core curriculum. He kept a good notebook ('perhaps slight, as judged by modern standards'). Some writers make much of his squeamishness at operations, not realising that part of a medicine course was learning not to be sickened by the horrors of early nineteenth century surgery. The same Darwin, when he was in Edinburgh, took lessons in taxidermy from a negro ex-slave. A good shot, when he was on the *Beagle* voyage he hunted for food as well as shooting specimens, preserving them and sending them back to England. But the Edinburgh experience was not enjoyable for him and he did not complete the course. He was fortunate to have a father understanding and wealthy enough

to allow him to drop medicine at Edinburgh in favour of the more congenial BA course at Christ's College, Cambridge, which would probably lead to his taking orders and entering the Church of England, an ideal cover for a young man interested in biology.

There is a clear disparity between Darwin's recollections of his Edinburgh studies and the experiences of his contemporaries. Darwin's opinion of much of his course work was 'dull, dull, dull'. Other gifted students of the same period did not necessarily agree. Robert (later Sir Robert, successive occupant of two medical chairs at Edinburgh) Christison found that Monro: "gave a very clear, precise, complete course of lectures on anatomy... and certainly I learned anatomy well under him." Christison attended Jameson's course in 1816, when: "Lectures were numerous attended in spite of a dry manner, and although attendance on Natural History was not enforced for any University honour or for any profession, the popularity of his subject, his earnestness as a lecturer, his enthusiasm as an investigator, and the great museum he had collected for illustrating his teaching, were together the causes of his success'."

In the course that Darwin took in his second year there were about 100 lectures, five days a week, 'conversations' with the Professor in the Museum and excursions. The 'incredibly dull' Jameson, as Professor of Natural History, covered mineralogy, zoology and geology. He also edited the *Edinburgh Philosophical Journal* and the *New Philosophical Journal*, and developed the extensive and important Natural History Museum in the University. Notable for: "the excellent state of preservation of its specimens and their scientific arrangement and for its large collection of birds", the entire museum collection 'second only to that of the British Museum' was handed over to the new Government Museum of Science and Art, later the Royal Scottish Museum and now the Royal Museum of Scotland, a year after his death. He attacked Hutton in print and before his students in the field — Salisbury Crags. On Hutton's death his specimen collection passed to the University Museum, where it was not displayed and gradually disappeared.

Edward Forbes took Professor Jameson's course in 1832 and succeeded him as Professor in 1854. He found: 'Jameson's collection wonderful, even palaeontologically' and the illustrative material 'very

great'. He spoke of his Professor's: 'enthusiastic zeal, his wonderful acquaintance with scientific literature'. More—"The value of professorial worth should chiefly be estimated by the number and excellence of disciples. A large share of the best naturalists of the day received their first instruction in the science from Professor Jameson... And where else in the British Empire, except here, has there been for the last half century a school of Natural History?" Later, in the context of Darwin's suitability for the *Beagle* project, Desmond and Moore in *Darwin* (1991) rather patronisingly concede that: 'Jameson's Edinburgh course, as luck would have it, had catered for colonial travellers.' Luck had nothing to do with it, Jameson's course was a vocational one aimed at equipping young men with the wherewithal to make their way in the world furth of Scotland.

A quarter of Darwin's fellow medical students at Edinburgh were English, unable or unwilling to attend Oxford or Cambridge for reasons of religion but welcome in a city where, with all its faults, the clergy had mainly contrived to balance scientific thinking with religious principle. So why was Cambridge more congenial? Darwin was, of course, more mature: with the

experience behind him of working at something he did not enjoy. He must have responded better to the relaxed English way, as opposed to the stern drive of the lean and hungry Scots. At Edinburgh he had lodged in a top flat in Lothian Street; college life at Cambridge—with its gracious buildings, peaceful quadrangles and unctuous servitors—suited 'a young man with easy manners and a cheerful disposition who could ride and shoot.' We hear little of his course work but can see developing a Cambridge University network which stood him well in later years. It is illuminating to examine a series of episodes, on either side of the *Beagle* voyage and spread over eleven years, which others have described but do not seem to have considered worth commenting on, but which I find very difficult to understand.

Darwin was a favourite student of Adam Sedgwick, Professor of Geology at Cambridge University and President of the Geological Society of London. In 1831 Sedgwick planned a visit to North Wales to clear up some stratigraphical problems of the region. Darwin 'worked like a tiger at geology' and was taken along as assistant and pupil. The pair spent a week on fieldwork, working separately during the day and pooling their information in the evenings, trying to clarify what

had happened in the area before the Old Red Sandstone was laid down.

Later, in South America, Darwin came across the full expression of mountain glaciation—frost-shattered arêtes, corries, roches moutonnées, U-shaped and hanging valleys, ribbon lakes, moraines, erratics, outwash and the rest. From his *Journal* we can trace the beginnings of some kind of commitment to the concept of ‘deep time’, with a couple of ‘eureka moments’, one reminiscent of Playfair’s account of Hutton’s revelation at Siccar Point. Having taken the first volume of Lyell’s *Principles of Geology* with him and having had the others sent out, Darwin attributed his new clarity of vision to his reading of the Edinburgh man.

Post-*Beagle*, in 1838, he had ‘eight good days in Glen Roy’, trying to solve the riddle of the Parallel Roads and coming up with an answer (which was, sadly, wrong) based on his South American experience. Then, in 1842, he returned to North Wales. In his own words: “Eleven years ago, I spent a whole day in the valley, where yesterday everything but the ice of the glacier was palpably clear to me, and then I saw nothing but plain water and bare rock.” Lyell was an influence—but surely his own

practical experience must have been crucial to his new understanding. And what was his mentor, the Professor of Geology at Cambridge and President of the Geological Society of London, doing in 1831 when the pair of them were sorting out the day’s findings? Did he know that the despised Jameson had already, in the 1820s, ‘expressed the view in his lectures that glaciers had once existed in Scotland’ (*Land of Mountain and Flood: The Geology and Landforms of Scotland*, McKirdy, Gordon and Crofts, 2007)? (Based on lecture notes of a contemporary student.) Were they so concerned about fossils and the detailed composition of the rocks that they could not stand up and look around?

Coming back to Baxter’s comment, with which we started, I think there are two explanations for Darwin’s apparent reluctance to ‘come out’ on the deep time issue:

1. When I was young there were many young lads—seldom girls—who collected the numbers and names of railway engines, who could go on for hours about A4 Pacifics, Stanier Black Fives and the Scott class and could even spell ‘Walschaert’s Valve Gear’, without conceptualising their knowledge by asking questions like: Why?

or Why there? Similarly, Darwin's enthusiasm at sixteen was for observing and collecting in the field—'bug-hunting'—rather than for concern about the big picture. For much of the 20th century Jean Piaget's ideas about how children learn held sway. He saw an array of concepts, each to be mastered in turn as children developed. The good teacher understood that there was a 'readiness for learning' to be recognised and utilised in a progressive way. With no commitment to medicine as a career, Darwin may quite simply have been unready for the full understanding of the studies offered to him. Yet his time at Edinburgh was not wasted, because he acquired there the basic skills of scientific investigation without losing his enthusiasm for natural history.

2. At Cambridge, Darwin was on a course that would mean conformity with, and eventual subscription to, the 39 Articles of 1571. Whatever Darwin thought about deep time, he had to conform on the surface to the society around him. Many years later, the reaction of the Reverend Adam Sedgwick, Senior Proctor, to *Origin of Species* was: 'I have read your book with more

pain than pleasure.' Reverend Professor Henslow (Mineralogy, 1822, Botany 1825), a major influence who was instrumental in getting Darwin the *Beagle* appointment, was made Rector of Hitcham in 1839. An excellent clergyman, complaints were made within the university of neglect of his academic duties there. With mentors like these it is understandable that Darwin felt it necessary to keep his cards close to his chest.

We know how cautious, even diffident, Darwin could be, seeking the approval of Henslow and others. He sat on the *Beagle*-inspired ideas on the *Origin of Species* for many years before an imminent publication by Wallace forced him into action. He avoided time-wasting and often contentious committees and the like (although he reluctantly took up the Secretaryship of the Geological Society). Later in life, when things got too hot he took to his bed and left the public fight to Hooker and Huxley. It could be that Darwin for many years was quite content to play the part of Expedition Naturalist, to record and collect, to send plant and animal material home, and, quite simply, keep out of areas where nothing but controversy would result.

Patrick Geddes, another Edinburgh man, contributed an article on *Variation and Selection* to *Encyclopaedia Britannica*. He summed up Darwin's situation quite neatly by stating that, pre-*Origin of Species*, there was: "a tendency to concentrate upon more concrete and smaller problems alone, since of these the solution was comparatively sure". ■

Since 2004 Walter Stephen has produced several publications on 'Interesting Victorians' like Patrick Geddes ("Think Global, Act Local", "A Vigorous Institution") and Willie Park Junior ("The Man who took Golf to the World"). His latest work — "Darwin and the Vestiges of Creation" — will be published in 2009.

Stob Dearg, the northernmost peak of Buachaille Etive Mòr at the head of Glen Etive.

