



The Edinburgh Geologist

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Cover Illustration

Salisbury Crags, a fine example of Edinburgh's geology
(Detail from British Geological Survey photograph number P001171)

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Spanish ammonites, geology by penguin, and Charles Darwin—the Edinburgh connection (with a thought on the extinction of dinosaurs).

An editorial ramble by Phil Stone

For Edinburgh Geologist to thrive—survive even—there is a need for copy. That means that someone, somewhere, needs to be thinking now about what they are going to contribute to the next issue. Stumped for ideas? Well, here are a couple of suggestions that can surely prove inspirational—and an illustration that once you start there is no knowing to where you might ramble off.

Whilst on holiday we must all have at some time or another come across something unexpected, curious or downright bizarre with a geological connection. So let's hear about it and perhaps stimulate a few more visits. I came across 'The finest collection of ammonites in Spain' quite by chance in the small dusty town of San Mateo, about 50 km NNE of Castellón de la Plana, itself on Spain's Mediterranean coast north of Valencia. Heading north from Castellon most traffic follows the coastal routes, the A7 motorway or the busy N340. But inland from the coastal mountains

the CV10 follows a coast-parallel valley through imposing crags of Cretaceous limestone and allows for a rather more relaxed journey. It leads, eventually, to San Mateo—or Sant Mateu as the local signposts will have it. We (my wife and I) stopped for a wander-about and a coffee, and whilst enjoying the latter and the ambience of the Plaza Mayor I was intrigued by a small, faded sign that pointed down a side street: it said "Museo Paleontológico". Could you have resisted the invitation?

A short walk along Arrabel de Barcelona brings you to the museum—which masquerades as a private house. The collection therein is the life's work and passion of Señor Juan Cano Forner, who has had to move out of the house to make room for his fossils and now lives next door. This you learn from the note pinned to the museum door, number 23, which invites you to enquire about visiting at number 25. There we learnt that Señor Forner was not at home but might be back later. So,

back to the Plaza Mayor for more coffee and then a successful return to the Museo Paleontológico, where Señor Forner had indeed returned and let us in. And what a collection he had: the walls festooned with massive ammonites, display cases stuffed with snails and echinoids. It was a wonderful assemblage of the local Cretaceous fauna, augmented by all sorts of material from further afield, some the result of his own collecting and some acquired by exchanges. Idiosyncratic yes, but fascinating and well worth a visit, the collection certainly aspired to its civic slogan—‘The finest collection of ammonites in Spain’.

Then again, quite apart from the unexpected finds, we all visit more conventional museums. Many of these have been sanitised over the past few years and now feature glittering displays of interactive ‘activities’, but I’m sure that I’m not alone in preferring the weird and wonderful ‘stuff’ that can still be found in forgotten corners. It’s not just in museums that you come across geological exotica either. I have a vague memory of a display in Hopetoun House that features a lump of rock thrown at a military scion of the family during a riot in Dublin. Have I got that right? Has anyone else seen it? Please confirm.

Could it have been a granite sett from Galloway? Anyway, back to the museums.

So what is your favourite exhibit? I have a special fondness for a good old-fashioned showcase in The Natural History Museum, London, up on the gallery above the main hall, south-east corner. Therein you can see some of the rocks dragged unto death by Scott’s ill-fated polar party in 1912, but it’s not these poignant fragments that really grabbed my attention. Alongside them is a collection of coarse gravel brought back by the James Clark Ross, *Erebus & Terror* Antarctic Expedition, 1839–1843. When deep in the ice-bound Weddell Sea the expedition caught and killed an emperor penguin—‘taken on sea-ice’ as the euphemistic description goes—and the gravel was found in the poor bird’s gizzard. Nothing remarkable about that you might think, except that the emperor penguin was known to live on the ice to the south. At the time there was little knowledge of a southern continent. Isolated headlands and volcanic islands had been sighted but there was still uncertainty as to whether or not an extensive continent existed. Yet here, inside a penguin, were rock samples of a clearly terrestrial nature—granite and gneiss from the Antarctic

landmass and sure proof that within it there were outcrops of a wide range of 'basement' rock types. Was this the original remote sampling exercise in geology? Long may that exhibit survive the attention of the design consultants.

It is a nice, topical touch in this year of Darwin anniversaries that the penguin was caught and cut up by Robert McCormick, then surgeon on HMS *Erebus* but previously, at the start of her voyage in 1831, surgeon on HMS *Beagle*. McCormick would have sailed on the *Beagle* with the expectation that normal naval practice would apply and that he would be responsible for the ship's natural history collections. Feeling rather upstaged by Darwin, he had left the *Beagle* in Brazil perhaps thereby contributing, albeit inadvertently, to Darwin's success. That affair notwithstanding, McCormick went on to have a long and distinguished naval career. To complete the small world of Victorian science, McCormick's assistant on *Erebus* was Joseph Hooker, later to become Britain's pre-eminent botanist and close confidante of Charles Darwin.

Incidentally, whilst on the subject of museums—and London's Natural History Museum in particular—may

I recommend to you Richard Fortey's book 'Dry Store Room No.1', subtitled 'The Secret Life of the Natural History Museum'. Now there's another idea—recommend a good read.

But let's get back to Charles Darwin. It will not have escaped your notice that this year, 2009, there are being celebrated a couple of Charles Darwin anniversaries: he was born on 12 February 1809, and his seminal work 'On the Origin of Species by means of Natural Selection' was published on 24 November 1859. It's a fair bet that if you asked anyone, anywhere, to name a few famous scientists, Charles Darwin is likely to be one of those cited. But even though 2009 marks 150 years since publication of *The Origin of Species*, controversy continues with various creation myths or pseudo-scientific notions of 'intelligent design' still preferred by many of the world's religious faithful to the Darwinian theory of evolution driven by natural selection. Perhaps it is the enduring controversy that has ensured Darwin's scientific pre-eminence. *The Origin of Species by means of Natural Selection* was certainly explosive stuff and Darwin, mindful of its likely impact and reception by the religious establishment, delayed publication for years—until he was finally

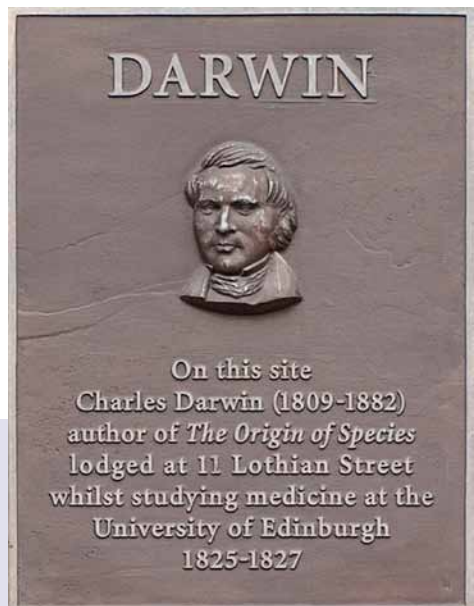
forced into action by the intimation of similar views by Alfred Russel Wallace.

Fundamental to Darwin's ideas were his experiences during the round-the-world voyage of HMS Beagle. The voyage changed his life—gone were thoughts of becoming a country parson - and laid the foundation for the revolutionary work on evolution that has made him a household name. Whilst the Beagle experiences must have been the pre-eminent factor, what of other influences on Darwin's work? We know that he studied for a while at Edinburgh University so can we claim him as one of our own? Dr Walter Stephen provides one view on this in his article 'Darwin and Edinburgh', which features elsewhere in this issue of *Edinburgh Geologist*.

Darwin came to Edinburgh in 1825 to study medicine. He and his elder brother Erasmus, also a medical student, took lodgings at 11 Lothian Street, a site now occupied by the back of the Royal Museum.

This plaque above the back door of the Royal Museum commemorates Charles Darwin's two years in Edinburgh as a medical student.

Edinburgh at the time was something of a scientific maelstrom and Charles would have been exposed to all manner of new ideas. He hated his medical studies but avidly attended other courses. Perhaps his most important mentor was Robert Grant, who introduced Darwin to the joys of marine invertebrates—and to early, Lamarckian ideas of evolution. Darwin tried geology too, but with less success. He attended lectures given by Robert Jameson, Regius Professor of Natural History, but found Jameson's style not to his liking. He was later to write of Jameson's lectures: 'The sole effect



they 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'. Nevertheless, Darwin must have benefited from Jameson's field excursions—even if the professor did propound a sedimentary origin for Salisbury Crags—and the course also gave him free access to Jameson's extensive natural history museum collection. Then, working in the museum, there was John Edmonstone, a freed black slave from whom Darwin took lessons in the stuffing of birds—an invaluable skill on the *Beagle*. Conversation with John (the Edmonstone derived from his owner in Guiana) brought to Charles the wonders of the South American tropical forests and the iniquities of the slave trade; he was later to encounter both at first hand—inspired by one and repelled by the other.

After two years Darwin fled from the horrors of medical studies and settled on the less barbaric option of a theology degree at Cambridge University. Again, it was the extra-curricular courses that he enjoyed most and his interest in geology was restored by John Henslow and Adam Sedgwick: from the latter he received valuable field instruction whilst Henslow, Darwin's most

important mentor, was instrumental in getting him aboard the *Beagle*. Once there, the Scottish influence was re-established through Charles Lyell's 'The Principles of Geology', volume 1 of which was presented to Darwin by Robert Fitzroy, captain of the *Beagle*. Surprisingly, in view of his later reputation, during the *Beagle*'s voyage Fitzroy was a keen amateur geologist with quite advanced, non-biblical views. Darwin received the second and third volumes of Lyell's 'Principles' during the course of the voyage, which lasted from December 1831 to October 1836.

The voyage of the *Beagle* is a well-known, seminal event in the history of science. By Darwin's own acknowledgement 'The voyage of the *Beagle* has been by far the most important event in my life, and has determined my whole career.' However, he did not return to Britain a confirmed evolutionist and most of his first publications arising from the voyage were geological. His broad-ranging 'Journal of Researches' appeared first, in 1839, but was then followed by 'The structure and distribution of coral reefs' (1842), 'Geological observations on volcanic islands' (1842) and 'Geological observations on South America' (1846). The last of these contained his description of

the uplift of marine features, which he had recorded on a vast scale in Patagonia, and had seen dramatically demonstrated before his very eyes in Chile during the 1835 Concepción earthquake. Perhaps with these phenomena in mind, Darwin returned to Scotland in the summer of 1838 to study the ‘parallel roads’ of Glen Roy, travelling on a coastal steamer from London to Edinburgh. On this trip, despite having been racked by seasickness for the entire duration of the Beagle voyage, he ‘enjoyed the spectacle, wretch that I am, of two ladies and some small children quite sea sick, I being well’.

Darwin enjoyed excellent weather in the Highlands but perhaps inevitably came to the wrong conclusion in Glen Roy. His account of the ‘parallel roads’ as uplifted marine shorelines was published in the Philosophical Transactions of the Royal Society of London, 1839; he

The parallel roads of Glen Roy, view to the north. Charles Darwin visited the area in the summer of 1838 and thought the features to be uplifted marine shorelines, an interpretation that he later sadly admitted as ‘one long gigantic blunder’.



would later refer to this as ‘one long gigantic blunder’.

By the time the Glen Roy paper was published Darwin had married his cousin, Emma Wedgwood. He had also read Thomas Malthus’s ‘Essay on the principle of population’ and this critique of the limits on population growth provided the catalyst to his burgeoning ideas concerning competition and selection in nature. From then on he filled notebooks with evolutionary speculation and evidence and in June 1842 completed a 35 page outline of his evolutionary theory. Darwin knew he was dealing with intellectual dynamite and the pressure began to tell. He became chronically sick and increasingly withdrew from society, yet maintained a prodigious correspondence with all manner of people, steadily amassing evidence for his theory of evolution. He created his own evidence too, breeding pigeons, keeping bees and experimenting with patterns of plant growth and distribution.

Maybe he did have thoughts of publishing but, if so, these were soon dashed by a bombshell from Edinburgh. In November 1844, there appeared an anonymous book entitled ‘Vestiges of the Natural History of Creation’. This

was a real blockbuster, brilliantly written if scientifically unsound, that championed transmutation of species—evolution. It was actually the work of Robert Chambers, an Edinburgh journalist, publisher and keen golfer, but contemporary speculation even suggested Darwin himself as the author. The work was castigated by the scientific and religious establishments with the author, whoever he was, damned and ridiculed. Adam Sedgwick produced the ultimate scornful put-down. The book, he said, was so uninformed, so inaccurate, so contentious and so unsupported by fact, that it could have been written by a woman. Charles took the hint and kept his head down for the next 14 years. But all the while he quietly accumulated an overwhelming body of evidence to support what he had started to call ‘natural selection’, and by 1857 he was discretely distributing to trusted friends chapters of a projected 3-volume *magnum opus*, requesting comment and review.

The arrival of the fateful letter from Alfred Russel Wallace in 1858, and all that it provoked, is now well documented and the stuff of legend. Darwin’s triumvirate of influential friends—Thomas Huxley, Joseph Hooker and Charles Lyell (just to stress the Scottish influence)—arranged for

the joint presentation of papers by Darwin and Wallace at a meeting of the Linnean Society in London on 1 July 1858. Thereafter, Darwin worked frantically to reduce his 3 volumes to a shorter, popular account. ‘On the origin of species by means of natural selection’ was published on 24 November 1859: it has never been out of print since.

Was Wallace ripped-off? But for the intervention of Chambers he may never have featured at all, but he was certainly a remarkable character. Lacking all of Darwin’s social and financial advantages he still made a name for himself, but as far as natural selection was concerned he also lacked something crucial that Darwin possessed in abundance—evidence. Wallace had the same brilliant idea as Darwin but had he published independently he would most probably have suffered the same fate as Chambers and been battered into obscurity by the religious establishment. In contrast, Darwin’s ‘Origin’ provided an overwhelming mass of unanswerable evidence—resistance was futile. That didn’t prevent it though and some of the most bitter came via Edinburgh. Richard Owen, the most eminent comparative anatomist of the day, published a critique of ‘Origin of Species’ in *The Edinburgh Review*

that was described by Darwin in a letter to Charles Lyell: “I have just read the *Edinburgh*, which without doubt is by Owen. It is extremely malignant, clever and I fear will be very damaging”. Another problem came from Scotland in the shape of a claim by Patrick Matthew, a landowner with a fruit-farming estate near Dundee, that he had first proposed the idea of natural selection in an obscure 1831 article titled ‘On naval timber and arboriculture; with critical notes on authors who have recently treated the subject of planting’. But as with Wallace’s paper, a good idea unsupported by any evidence was insufficient and history has unequivocally favoured Darwin.

When it came to the scientific discussion of Darwin’s ideas bad news once again came from Scotland. At the time, inheritance was thought of as a blending of parental characteristics and it was not long before Fleeming Jenkins, a Scottish engineer and friend of Robert Louis Stevenson, demonstrated that any variation that developed would, on this model, be rapidly diluted and lost. The casual racism of Jenkins’ examples has perhaps tended to overshadow the accuracy of his objection, which remained a problem for Darwinian evolution until resolved by the proper understanding of

genetics. Worse came from Glasgow University where the eminent physicist William Thomson (later to become Lord Kelvin) was Professor of Natural Philosophy. Thomson's calculations of the time it would have taken for the Earth to cool from an original molten ball showed that at most 100 million years could have elapsed since its creation; not enough time for Darwinian evolution to work. This problem had to await the discovery of radioactivity—providing both a heat source and a means of dating rocks—before Darwin was vindicated.

Not that scientific verification has meant an end to attacks on Darwin and all his work, and nowhere is this currently more vehement than in another museum...

the Creation Museum in Petersburg, Kentucky. I've never been there but have a kind of fearful fascination with the place. If I should turn up, would I be seized at the door, carted off and burnt at the stake for being a geologist? It was with great interest therefore that I discovered in the Edinburgh Metro newspaper for Friday 6 February (pages 16–17) a tourism article by Chris Coplans describing a visit and giving some idea of what can be found there. Most unexpected of all was the information that dinosaurs were

once all friendly vegetarians that contentedly co-habited with our human ancestors and sailed with them on Noah's Ark. As Chris Coplans notes, this maritime colossus must clearly have been even bigger than we had imagined, but sadly for the Creationists good old Darwin had got in first with a pre-emptive strike. When 'Origin of Species' was first published Robert Fitzroy, who by then had discovered serious religion, wrote a letter of protest to The Times denouncing his former shipmate. In an unusually exasperated comment, the mild-mannered Darwin responded 'It is a pity he did not add his theory of the extinction of Mastadon etc from the door of the Ark being made too small'.

Still, despite the unqualified success of Darwin's evolutionary biology—now backed up by a vastly improved fossil record and DNA analyses—we have to admit that some of his geology was a bit dodgy. For example, he took a lot of flack over the estimation of erosion rates that appeared in the first edition of 'Origin'; they were hastily revised in subsequent editions. Which leads neatly into my favourite quotation, not *by* Darwin, but *about* Darwin. It comes from a letter written in 1846 by Leopold von Buch to Sir Roderick Murchison and has particular resonance today, as the future role

of the British Geological Survey, Murchison's pride and joy, is again debated:

"A map is always a decisive criterion of they who aspire to the rank of geologist. Everyone who has not compiled a map, wants the necessary talent of combination. The spirited

Darwin, with all his remarkable vivacity of mind, is for me no Geologist, only an able history maker of what nature as he believes has done, and what never she did... This man could never make a tolerable geological map." *Sic transit gloria mundi.* ■

Filling the gaps

Appropriately enough 'Darwin Year' has seen the discovery of some remarkable fossils—all described as 'missing links'—that would undoubtedly have delighted Charles. Late in 2008, CT scans of an early fish fossil revealed 'previously-overlooked digit-like bones in its fin'; headlines along the lines of 'Fossil Fish Fingers' abounded. Slightly earlier in 2008, a Devonian fish had been discovered in Latvia with tetrapod features about its head. Then, in March 2009, a spectacular feathered dinosaur came to light in China, followed closely by an ancestor of *Trex* that was much smaller than everyone's favourite monster. Perhaps best of all was April's 'fishibian' from upper Devonian strata in the Canadian Arctic. This beast, *Tiktaalik roseae*, had a fish-like body but a flat, crocodile-like head with the eyes positioned on top, the beginnings

of a neck, and joints inside the fin that were adapted to support the animals weight. Still in April—a good month for fossils evidently—and also from northern Canada, came a fossil seal with webbed feet rather than flippers. This animal originated around the Palaeogene-Neogene boundary and is the oldest seal ancestor yet found: appropriately enough for its year of discovery it was named *Puijila darwini*. Last, but by no means least, was the late September announcement of the results of many years research on *Ardipithicus ramidus*, a 4.4 million-year-old hominid from Ethiopia. Summing-up, one of the leading scientists involved claimed "This is not an ordinary fossil. It's not a chimp. It's not a human. It shows us what we used to be." So, three cheers for Darwin (and Thomas Huxley)—and a raspberry for Bishop Wilberforce. ■

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 Crag. 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.



Another Charles Darwin at the University of Edinburgh and his father's links with James Hutton

by Andrew McMillan

Coincidences are there to be exploited. The 'dull' Dr Duncan referred to in Walter Stephen's fascinating article is the same medical man who taught Charles Robert Darwin's uncle, also Charles, at the University of Edinburgh in the 1770s. Andrew Duncan MD, FRCP (1744–828) was Professor of Theory of Medicine at the university, President of the Royal College of Physicians, and founder of the Royal Public Dispensary, Edinburgh (1776), the Royal Edinburgh Hospital (Lunatic Asylum) (opened in Morningside in 1813—the Andrew Duncan Clinic was opened in 1965), and the Royal Caledonian Horticultural Society (1809), amongst others. So his dullness of presentation seems not to have been reflected by his catholic interests!

Uncle Charles Darwin was born in Lichfield in 1758 and died prematurely in Edinburgh, in 1778. Son of Erasmus Darwin (who also studied at the Medical School in Edinburgh between 1753–56), his epitaph is cut in marble on a

tombstone in Dr Duncan's burial plot in Buccleuch Parish Church* (Old) (St Cuthbert's Chapel of Ease) and suggests that had he lived to maturity the benefit to medicine and science might have been considerable:

*Charles Darwin
was born at Lichfield
September 3 1758;
and died at Edinburgh
May 15 1778.*

Possessed of uncommon abilities and activity, he had acquired knowledge in every department of medical and philosophical science much beyond his years. He gained the first medal offered by Aescupalian Society for a criterion to distinguish matter from mucus; and had prepared a thesis for his graduation on the retrograde motions of the lymphatic vessels in some diseases. He cultivated the friendship of ingenious men and was buried by favour of Dr A Duncan in this his family vault.

*Fame's boastful chisel, Fortune's silver plume,
Mark but the mouldering urn, or deck
the tomb.*

The circumstances of the tragic death of this promising medical student are well-documented. At the end of April 1778, Charles cut his finger while dissecting the brain of a child who had died of ‘hydrocephalus internus’, and on the same evening was seized with severe headache followed the next day by ‘delirium, petechiae, haemorrhage, paralysis of the bladder and other circumstances of extreme debility’ (see King-Hele, 1999). His father Erasmus was summoned to Edinburgh, and for a few days after he arrived he had hopes that Charles might recover but this was not to be. Whilst in Edinburgh, Erasmus met James Hutton—indeed it is probable that Erasmus stayed with Hutton (King-Hele, 1999). Erasmus entrusted Hutton with supervising the cutting of the above inscription and on 3rd July he wrote to him (see next page).

As can be seen from this letter the two men were good friends. In fact they had first met when Hutton visited Lichfield and stayed

with Erasmus in early June 1774, using Erasmus’s home as a base for geological expeditions to the Peak District of Derbyshire. Over the next twenty years they corresponded, discussing and debating many scientific topics and exchanging ideas on mineralogy, geology, evolution and the earth’s origins. In the only preserved letter from Hutton to Darwin in the 1780s Hutton discusses the absolute zero of temperature, the connection between light and heat, the temperature of hell and whether the soul can feel it without sense organs! Erasmus’s enthusiasm for and knowledge of geology owe much to his friendship and correspondence with Hutton and two other leading protagonists of the 18th century, John Whitehurst of Derby and John Michell, tutor at Queens College, Cambridge. But there was to be no conversation, geological or otherwise, between Erasmus and his grandson Charles Robert Darwin. The former died in 1802. The latter was born in 1809. Thus was lost an opportunity for Charles Robert to become familiar

* The burial ground surrounds Buccleuch Parish Church at the junction of Chapel Street and Buccleuch Street. It was originally in St Cuthbert’s parish and was opened as an adjunct to the Chapel of Ease in 1756; the consecration of the burial ground by an Episcopalian bishop in 1764 aroused some adverse comment. About 1907 the ground suffered desecration by the removal of several gravestones and the erection of an unsightly hall which was used as a roller skating rink.

"Dear Sir,

I esteem myself highly obliged to you on many accounts. I have inclosed an inscription, which I wish to be put in marble, ornamented so as to cost between five and ten pounds, in a manner that shall be most agreeable to Dr Duncan, whom you will please to consult on this manner—I prefer English inscriptions to latin—hope you will see that it is cut deep in the marble, and not simply painted on the marble, as is the practise of workmen here, if not look'd after. I must beg in your next you will mention the name of the place he is buried in, that I may some years hence direct his brother to find his tomb!

- Now let me add how sorry I am to hear you complain of headach'd [?] and giddyness. The former generally proceed from a decaying tooth, or a tooth about to decay—if it is one temple only that gives the pain, it is the last tooth in the upper jaw on the same side. Giddyness frequently proceeds from taking food too seldom—solid food, of the flesh kind often relieves it.

Vinous spirit from small beer to alcohol destroys us all.

I will send you coal full of vegetable seeds, turned to iron, and some Kenal coal. Coal with spar in it, or with pyrites in it, are too common to send you.

And if Don—what's his name—comes this way I shall be glad of his company for some days at my house, and will accompany him to see the wonders of Derbyshire.

I wish yourself and Dr Black would come to England. – I shall not send a bill till I receive another letter from you, with the additional expense.

I intend shortly to publish my poor Charles's treatise on pus and mucus, and his thesis on the retrograde motions of the lymphatics, and will send you a few copies.

You will please transmit the inclosed to Dr Duncan and to Mr Broughton and believe me dear Doctor

Your much obliged friend

E Darwin

Jul 3–78

Pray see Dr Duncan about the inscription before you direct it, to whom I am so much indebted".

with James Hutton's ideas at an early age.

I am grateful to Valerie McMillan, my sister-in-law, for researching (Uncle) Charles Darwin and locating the tombstone, tasks which she undertook in 1981 to assist Desmond King-Hele who was then working on his latest book on Erasmus Darwin (see below). I should also like to thank

Dr Charles Waterston who also visited the graveyard in 1981 and recorded details of other unfortunate students for whom Dr Duncan acted as host.

Further reading

Desmond King-Hele. 1999. *Erasmus Darwin — a Life of Unequalled Achievement*. Giles de la Mare Publishers Limited, London, and references therein. ■

***Limestone pavement and
glacial erratic, Cill Chriosd,
near Torrìn, Skye.***



A rock for winter

One beneficial side-effect of the transport chaos caused by early February's snowfall was the sudden interest in geology shown by all sections of the media. Everyone wanted to know where the salt spread on the roads—or which should have been spread there—came from. Remarkably, and probably thanks to some good PR by the producers, most of the resulting press cover was more-or-less right. The BBC's web-site was pretty typical, describing rock salt as a brownish gravel dug out of underground mines: the Salt Union's Winsford mine in Cheshire, the Cleveland Potash mine in Teeside, and the Irish Salt Mining and Exploration Company's mine in County Antrim. These mines we were told all exploited deposits formed millions of years ago when parts of the UK and Ireland were covered by inland seas. As the seawater slowly evaporated, vast salty residues were left behind which were then buried beneath subsequent layers of sediment.

Not surprisingly, just about everything we know about the stuff known as halite in geological circles

comes from borehole records and underground workings. The deposits are of Permian and Triassic ages, with formation about 275–225 million years ago. Of the Permian deposits, those at Teeside (part of the Zechstein Group) formed in the Zechstein Sea, those in County Antrim (within the Belfast Group) in the Bakevellia Sea; the two marine areas were separated by a proto-Pennines land ridge. The Triassic deposits in Cheshire (part of the Mercia Mudstone Group) seem to be a bit more complicated, with an aeolian origin apparently more likely than formation as *in situ* marine evaporites. Naturally enough 'The Media' didn't get into that debate, but were keen to tell us about the other use of salt mine workings, with their dry environment and restricted access, as sites for secure document storage. If you have a criminal record it could well be deep underground in Cheshire.

Finally, the inevitable piece of comparative statistics: from the Salt Association, via the BBC, we learn that there are about 225 km of tunnels in the UK's salt mines, which makes them cumulatively almost as long as the M5. ■

Fishy fornication

How do you get the tabloid press to run a story about an obscure Devonian fish fossil? Easy... sex. Just about everyone covered the *Nature* paper, published in late February, which demonstrated that “Sex started sooner than we thought”. The lucky subject was a 365 million-year-old placoderm from Australia, now resident in The Natural History Museum, London. Re-examination of this specimen had established that what was originally thought to be the skeleton of the placoderm’s last meal, was in fact a fully-developed embryo within a female fish. Better still, from the Tabloid’s point of view, were features on the male of the species that suggested “the beginning of erectile male fertilisation”. Unfortunately there was disagreement as to precisely what the species was called. Quoting Dr Zerina Johanson, curator of fossil fish at the NHM, the BBC announced that the specimen had been bestowed with the scientific name

Incisoscutum ritchei. The Sunday Times News Review disagreed; also quoting Dr Johanson, it claimed the fish was called *Materpiscis attenboroughi*, after Sir David. Maybe in view of the press interest, and feeling uncomfortable in her role as a late Devonian porn star, the wise fish had adopted an assumed name.

There is though one important aspect to this story that went unremarked. The crucial specimen has been in the NHM collection since the 1980s but only now has the necessary combination of opportunity, interest and expertise come together and allowed its full potential to be realised. Hopefully we can rely on the support of the tabloid press when it comes to proper financing for the future housing and curation of national scientific collections. Not to mention some investment in basic taxonomy so that we actually know which species is which. ■

***What’s in a name?
This Devonian fish
is called Osteolepis
macrolepidotus.***

*British Geological Survey
photograph P257496*



So were we conned?

Up on Blackford Hill there is a memorial plaque commemorating the first recognition of glacial features in Scotland, a feat credited to Louis Agassiz during his visit in 1840. Legend has it that when Agassiz was shown the grooved and striated rock face close to the Braid Burn he threw his hat in the air and declared 'This is the work of ice!' But now, in his article on 'Darwin and Edinburgh' Dr Walter Stephen tells us that as early as the 1820s Robert Jameson was lecturing at Edinburgh University on the former presence of glaciers in Scotland. So what actually happened? Should the Blackford Hill memorial be discretely removed?

A key figure is clearly Charles Maclaren, editor of *The Scotsman* newspaper at the time of Agassiz's visit and himself a geologist. It was Maclaren who took Agassiz

to the Blackford Hill site and he also features in the following account of the affair, taken from John Gordon's introduction to 'Reflections on the Ice Age in Scotland', published in 1997 by the Scottish Association of Geography Teachers and Scottish Natural Heritage. This account stresses that Agassiz's travels in Scotland took in the Glasgow district and the West Highlands, including Glen Roy and Glen Spean.

Magnus Magnusson unveiling the plaque at 'Agassiz Rock' on Blackford Hill in 1993.

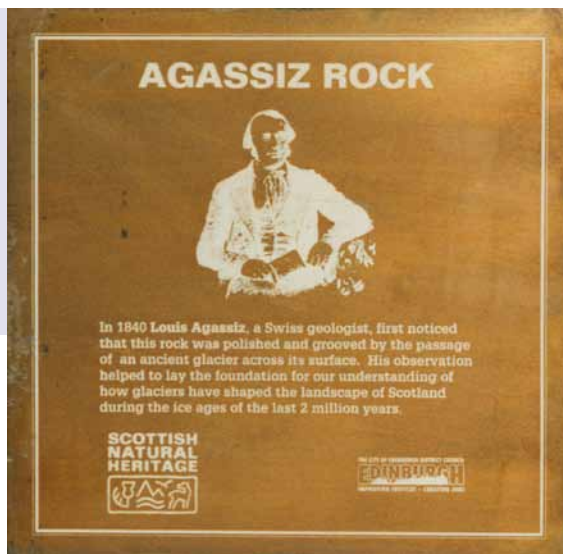
*British Geological Survey
photograph MNS5417-19*



Detail of the 'Agassiz Rock' plaque. It is interesting that the wording selected by Scottish Natural Heritage is quite circumspect.

British Geological Survey photograph MNS5420-17

“Although Agassiz is widely credited with the origin of the glacial theory, his ideas were a development of earlier work by de Charpentier, Esmark and others... Robert Jameson was aware of the new ideas emerging from Europe and their potential significance, and as editor of the *Edinburgh New Philosophical Journal*, he was influential in their dissemination. Also, in his lectures at Edinburgh University in the 1820s, as recorded in the lecture notes of James Forbes, Jameson expressed the view that former glaciers might once have existed in Scotland, but regrettably he did not publish his own ideas. It was therefore Agassiz who was the first to assemble detailed field evidence that glaciers had once existed... During a visit to Scotland in 1840 Agassiz found clear evidence of glaciation... [and]... wrote to Robert Jameson about his



discoveries. Jameson passed the information to Charles Maclaren, editor of *The Scotsman* and on 7 October 1840 that newspaper announced to the world the former existence of glaciers in Scotland.”

David Land wrote a comprehensive account of Agassiz’s Scottish tour for *Edinburgh Geologist* No. 37 (Autumn 2001). It seems that the visit was at the invitation of William Buckland and the first port of call was Glasgow, for a meeting of the British Association for the Advancement of Science. Thereafter Buckland and Agassiz travelled north, noting evidence for glaciation. By October 3rd they had reached Fort Augustus

and Agassiz had seen enough to write to Jameson proposing that Scotland had once been covered by a great ice sheet; it was this information that Jameson passed on to Maclaren. Agassiz did not arrive in Edinburgh until October 27th, nearly three weeks after publication of his ideas in *The Scotsman*, which makes the visit to Blackford Hill something of an afterthought. That probably explains the rather low-key inscription chosen by Scottish Natural Heritage for the 'Agassiz Rock' plaque.

So maybe the plaque can stay in place after all, but the affair does strangely foreshadow the later circumstances surrounding Darwin and Wallace, but in the case of Jameson and Agassiz it was the young upstart who got the credit. Who ever said that pressure to publish was a modern phenomenon. All credit to *The Scotsman* though. That was probably the first article on climate change ever published by the popular press. ■

Darwin on the Fringe

... accompanied by Phil Stone

It came as no surprise to see Darwin featuring in this year's Edinburgh Festival Fringe. He had three tributes at least, but there may well have been more—checking the entire Fringe programme would require dedication on a geological time-scale. Tangram Theatre Company offered the longest title: 'The origin of species by means of natural selection or the survival of (r)evolutionary theories in the face of scientific and ecclesiastical objections: being a musical comedy about Charles Darwin (1809–1882)'. No room for any misunderstanding there then but I was a bit put off by the tag line 'Bring your own monkey'. So what

else was there? Pentabus Theatre performed 'Origins', described as 'an inspirational comedy about Darwin's early life'. This sounded as if it might miss all the best bits and I have to admit being wary of 'inspirational comedies' on the Fringe. Which left number three, and this sounded promising—'The rap guide to evolution', an exploration of Darwin's theory through the medium of hip-hop storytelling. What's more, it claimed to be the only peer-reviewed show on the Fringe, so along I went.

I had never been to a rap performance before, let alone one that required audience participation.

We were led along by Baba Brinkman, a Canadian rapper from Vancouver, and his performance was simply brilliant. The science was good too, more ‘Descent of Man’ than ‘Origin of Species’, fully justifying the peer-reviewed claim. I ‘sang’ along with ‘I’m A African’, the aggression inherent in the style was appropriately unleashed in ‘Creationism is ...’ (with a hefty side-swipe at post modernism), and there was plenty of focus on ‘Sexual Selection’. Altogether a most satisfying and entertaining experience ... and which other show provided a description of the reproductive habits of slime moulds? Or a ‘further reading’ list for that matter. My only disappointment was in the age profile of the audience ... too many old folk like me attending out of curiosity. Baba Brinkman

could usefully be on the syllabus for Highers biology.

Post-Fringe, the Canada/Evolution connection was kept up when the film ‘Creation’ premiered at the Toronto Film Festival on 10th September. Directed by Jon Amiel and starring real-life married couple Jennifer Connelly and Paul Bettany as Emma and Charles Darwin, the film is based on Randal Keynes’s biographical work ‘Annie’s Box’. This is definitely something to look out for when it is released in Britain—and how about writing a review for Edinburgh Geologist. Apparently it has not been possible to find a distributor for the film in the USA, a demonstration of the influence there of the creationist lobby and in itself reason enough to buy a ticket—and to encourage the likes of Baba Brinkman. ■



Stop Press . . . *Creation* screened in Edinburgh

Creation got to Edinburgh at the beginning of October and I went along with high hopes, but came away a little disappointed. It works well enough as a period romance, but somehow fails to capture the scientific excitement. Paul Bettany does pretty well as young, post-*Beagle* CD—I particularly enjoyed his face-to-face with Jenny the orang-utan—but most of the other portrayals are caricatures. The intermixing of *Beagle* and family flash-backs might confuse anyone not familiar with the story so to counter that we have the ghost of Annie Darwin (favourite daughter who died young, here promoted to eldest child for dramatic effect) re-appearing

regularly to clarify the issues and chivvy her father along. That would surely irritate anyone who did know the story, but Charles certainly needed a prod, with his well-documented recurring illness here taking centre-stage in a rather overwrought and exaggerated interpretation. Linking the fates of Annie and Jenny was a nice, sentimental touch, but eventually the film became more about reconciling Charles and Emma (played rather harshly by Jennifer Connelly) than about getting that wretched book finished. All in all, I thought *Creation* a bit superficial and a missed opportunity. Any contrary opinions? ■

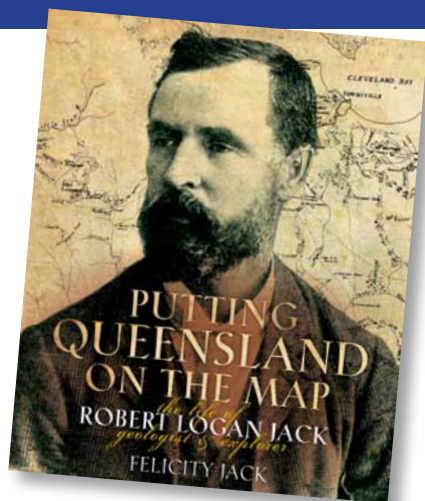


Book review

Putting Queensland on the map: the life of Robert Logan Jack, geologist and explorer by Felicity Jack. University of New South Wales Press, Sydney, 2008. Hardback, 275 pp. and CD. Price £35 (available from BGS Bookshop)

Last November I attended a reception in the Glasgow Vennel of Irvine held to launch this beautifully produced book. It was a fitting occasion on many counts. Robert Logan Jack was born in September 1845 in a cottage in the Vennel and it seemed so appropriate that members of the Jack family and their friends, townsfolk and civic dignitaries should all gather in this place to honour an outstanding Scottish-born geologist and explorer and acknowledge the publication of his biography written by his great-granddaughter, Felicity Jack.

Felicity has written a scholarly account of the life of this man. Painstakingly researched, the book recounts Jack's formative years in Scotland and his brief, yet productive employment with the Geological Survey of Scotland from 1867 to 1877. During this time he surveyed in the Fintry Hills, travelled in Europe and became well-respected by



his fellow geologists who included his illustrious colleagues Archibald Geikie, John Horne and Ben Peach. His lasting friendship with Robert Etheridge, palaeontologist also proved valuable for his future career. Jack was a Fellow of the geological societies of Edinburgh, Glasgow and London.

Physically fit and intellectually able, Jack enjoyed travelling and it was no real surprise that he took the opportunity to develop his geological skills abroad. He accepted the position of Geological Surveyor for Northern Queensland in 1877, and took with him his newly wedded wife, Janet Love whom he had met in Fintry. The book describes their voyages, home life in Townsville, and

exploration. Bureaucracy also gets a mention and, throughout, there are fascinating insights into internal politics brought out by correspondence with government officials. Jack's surveying and exploration parties, for example to the Cape York Peninsula, are vividly described with the aid of archival material including notebooks, letters, maps and photographs. His exploits nearly cost his and his companions' lives and on one occasion he experienced a very near miss by an aboriginal spear which penetrated his tent. Such events serve to emphasise the hazardous and arduous nature of his field work, so different from the Geological Survey of Scotland! Jack's discoveries were significant in the development of Queensland's mining industry and included the discovery of coal and gold fields. He also discovered the Great Artesian Basin of great importance as a source of water for sheep farming which contributed so much to Queensland's economy at the beginning of the 20th century. Following his resignation from his Queensland post in 1899, Jack undertook some brief mineral exploration in Korea and China in 1899, starting from near Shanghai. This biography and his own account (*The Back Blocks of China*, published in 1904) describes the expedition, cut short by the Boxer Rising of 1900, and his escape to Burma.

Jack's explorative career was matched by an enthusiasm to educate, and the biography describes his work locally to open a geological museum in Townsville which was then translated to Brisbane, and later, his contributions to major exhibitions both in Australia and in Britain. For example, as a consultant geologist in London from 1901–03 he was appointed Commissioner at the Glasgow Exhibition of 1901. Back in Australia, in later years Jack worked in both Western Australia and Queensland, latterly living in Sydney where he and his wife are buried. His book *Northernmost Australia*, published just a few weeks after his death in 1921 is a fine descriptive legacy of exploration in northern Queensland. At £35, the book may be out-of-reach for some readers although it does come with a CD with wide-ranging contents including Korea, geological notebooks, maps, images and family letters. Whether or not you buy it, I commend the book (ask for it in your library) as a superb account of an unsung hero of geology and mineral exploration, a pioneering Scotsman and his supportive family willing and able to travel and explore the world.

Andrew McMillan ■

