Editorial

This issue contains an appeal (page 14) for the preservation and refurbishment of Wallace's grave at Broadstone Cemetery in Poole, Dorset. Coincidentally, in the account of Darwin's friend Lubbock which precedes this letter we note that Darwin is buried in Westminster Abbey, but that on the Abbey wall close to the grave there are two plaques – commemorating both Darwin and Wallace. Lubbock greatly admired Wallace's achievements, in particular his 1864 paper on the "Origin of Human Races" (see also *The Linnean* 15(2):1), and it was Lubbock's championing that caused Darwin to reconsider Wallace's contribution to natural selection and the much more contentious issue of man's origin.

Lubbock, primarily an entomologist although in awe of Darwin, might well have added that Wallace was the first person to formulate and publish a true species concept. This Wallace articulated in his 1865 paper to the Linnean Society "On the Phenomena of Variation and Geographical Distribution as illustrated by the Papillionidae of the Malay Region." He wrote:

> "Species are those strongly marked races or local forms – which when in contact do not intermix, and when inhabiting distinct areas are generally believed to have had a separate origin – and to be incapable of producing a fertile hybrid offspring."

In this paper Wallace also goes on to discuss polymorphism and mimicry as well as discontinuous distribution and allopatric speciation.

Although it was Hooker who founded the science of plant geography, Wallace made major contributions to the distribution of animals. In retrospect it is fair to conclude that Wallace and Hooker were among the greatest tropical naturalists of the nineteenth century.[1]

Society News

Dr. Laurence Cook Hon. FLS writes: "I believe Cyril Clarke's assistant Sally Thompson has been in touch with you about putting a note in *The Linnean* regarding his peppered moth (and possibly scarlet tiger moth?) records. This is just to say that I now have in my possession the data books, some temperature records etc., for the peppered moth samples made at his home site since 1959. They can be made available to anyone interested on contacting me here. A recentish entry in *The Linnean* was:

Clarke CA, Grant B, Clarke FMM, Asami T. 1994. A long term assessment of *Biston betularia* (L.) in one UK locality (Caldy Common near West Kirby, Wirral), 1959–1993, and glimpses elsewhere. *The Linnean*, 10: 18-26.

I'm not sure if anything went in later. Sadly, Cyril is now in a nursing home, the house has been sold and everything is being dispersed."

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1 Moreover, Wallace came to his theory of evolution not through domestic animals, but through his observations of the distribution of animals and plants (see Wallace 1859, On the Zoological Geography of the Malay Archipelago. *J. Linn. Soc.*, 172-184).

Sir Cyril Clarke FRS is a Fellow *Honoris causa* of the Society. Dr. Cook can be contacted at The Manchester Museum, University of Manchester, Manchester M13 9PL or at lcook@fsl.scg.man.ac.uk.

Immediately after the end of the War in 1945, huge numbers of displaced people were on the move in Europe. One Fellow, Patrick James, has told us that one of the major sources of food for such unfortunates was field mushrooms, which they collected in the countryside. Large cooking pots were used to prepare mushroom soup from the harvest, which must inevitably have included toxic mushrooms, most likely *Amanita phalloides*, which looks like the common edible mushroom. Apparently some of those consuming them were aware of the potentially toxic effects of what they were eating, but either did not care, or hoped that the toxic substances would be abated by the edible fungi. Was this optimism justified? Apparently not, for a fortnight after ingesting *Amanita phalloides*, the liver more or less disappears. Any information on this matter from Members would be appreciated.

Someone who has survived a lifetime of working with higher fungi is Professor Roy Watling OBE FLS, who has been awarded the Patrick Neill Medal of the Royal Society of Edinburgh for his "outstanding contribution to our understanding of the natural history of higher fungi and for work on the taxonomy and ecology of fungi".

And staying with mycological survivors, the Society's rooms are very occasionally used at weekends by Fellows for such events as wedding receptions. On 8th May, one such was that of two mycologists, David Hawksworth CBE FLS and Patricia Taylor. Gastronomes should note that Patricia is the authoress of an excellent book on cooking fungi, from truffles to common mushrooms. There is a brief section on identification. We are, naturally, only too happy to offer our congratulations to the happy couple.

Continuing the fungal toxicity theme a few lines more, the Society received from the widow of a late Fellow a paper (Tainsh A.R., 1998. Beriberi – Historical Perspective. *Intern. J. Environmental Studies* **55:** 141–159) which noted that the prevailing view of this disease was that it was caused by a mould toxin which came from harvesting wet rice grains. The toxin is an antimetabolite to Vitamin B_1. Much the same applies to Vitamin B_6, to whose deficiency was attributed pellagra, now strongly suspected of being the result of an antimetabolite toxin of *Fusarium*. Fungi continue to receive short shrift from funding bodies, who should note that they are a lot more relevant to humankind than may be immediately apparent.

Meetings

Our opening meeting of the new session is *Under the Microscope: Plant Anatomy and Systematics,* held jointly with the Royal Botanic Gardens, Kew on 9/10th September 1999. There will be a Society Business Meeting in the Society's rooms at 5.30pm on Thursday, 9th September at which, in addition to the admission of new Fellows, the following presentations will be made: Linnean Medal for Botany to Professor Philip Barry Tomlinson FLS, Harvard University and the Irene Manton Prize for a PhD in plant sciences to Dr. Melissa Spielman, University of Oxford.

The Society entertained three members of the Chinese Academy of Sciences during the week 15–19th March. Prof. Tong Fengqin, Mr. Chen Hui and Prof. Ma Ke-Ping

discussed with Fellows of the Society with a special interest in the area the possibility of a joint Chinese Academy of Sciences–Linnean Society meeting in China in 2000. The party also visited a number of institutions in the UK in the course of the week, which was ably orchestrated by the UK Foreign Office. The aim of the conference is to improve international understanding of biodiversity by considering the experience gained from scientific research on biodiversity matters in China, in the context of the experiences in other countries around the World. The conference should mark a new era of understanding and collaboration between China and the UK on biodiversity matters. The agreed dates for the conference are 17–19th September 2000.

In addition to plenary sessions featuring distinguished biologists of international status, the conference will cover plant, animal, genetic and ecosystem diversity and biological database management in separate workshops. Biological safety, palaeontology, and alien species will also feature in the programme.

This will be followed by a one-week field trip to the sub-tropical and montane regions of China. Members should note that further fieldwork may be arranged on an individual basis and there is also the possibility of further meetings of special interest groups after the field trip.

Clearly the Society's priority (and that of the Academy) is in obtaining support for the conference to cover speakers' and hopefully some delegates' costs. It is to be hoped that both public and private funds will become available; suggestions for sponsorship are most welcome. It should be an interesting couple of weeks.

We are very happy to give our members notice of meetings of cognate societies and scientists in these columns free of charge. We imagine that 2000 will see a punishing schedule of events to mark this particular (ebb?) tide in the affairs of men (and women). Unfortunately we tend to receive information rather late in the day. Relevant copy for inclusion in our editorial material needs to with be us at least six weeks before the issue dates (January, April, July and October).

The Society's Programme Card is in this mailing to Members. The Executive Secretary's view is that it is better to travel hopefully than to arrive. Members should check that scheduled meetings in which they are interested are actually taking place. Other meetings of which we are aware are the Bat Conservation Trust's Annual Conference on 10–12th September 1999 (contact Jill Bradley at jbradley@bats.org.uk) and the 2nd International Conference on Africanized Honey Bees and Bee Mites 10–12th April 2000 (contact Deborah A. Schulte at schulte@tucson.ars.ag.gov or see http://gears.tucson.ars.ag.gov).

The UK Systematics Forum has been incorporated into the Society as a committee of the Council. In botanic gardens, museums and universities the Forum has acted to promote the care and use of collections, identified research priorities and sought to improve the training and the numbers of systematists in these institutions. It was set up by the Office of Science and Technology in 1993 at the Natural History Museum. In 1998 it produced The Web of Life, a strategy for systematic biology in the UK. Its committee consists of 18 members largely from museums and botanic gardens. Our congratulations to its present chairman, Professor Stephen Blackmore, currently Keeper of Botany at the Natural History Museum, who is shortly to become the

Director of the Royal Botanic Gardens at Edinburgh. He has offered to remain its chairman into the new millennium, and we are grateful to him for this and wish him well north of the border. Professor Blackmore is co-opted on to the Council as a chairman of one of its committees. Further information on this important committee of Council will be provided from time to time.

New Telephone Numbers

Please note that from 1st June 1999 the Society's new telephone numbers are

Telephone: 020 7434 4479 Fax: 020 7287 9364

Picture Quiz

The April Quiz (**15**(2):13) featured John Lubbock (1834–1913), banker, politician, anthropologist, botanist, entomologist and author. The eldest son of Sir John William Lubbock of Norfolk and Harriet, daughter of Colonel George Hotham of York, he was born at 29 Eaton Place, London on 30 April 1834. After initial education by his mother his normal schooling began at Mr Warring's boarding school in Abingdon; he went to Eton in 1845. On his father's succession to the baronetcy in 1840 the family moved to High Elms, Down, and two years later (1842) his father's friend, Charles Darwin, also moved to Down.

In 1849 the failing health of his father's banking partner brought about his withdrawal from full-time education at Eton and entry at the age of 15 into the family banking house.

In 1856 he married Ellen Hordern who bore him three sons and three daughters. She died in 1879. Five years later he married Alice Pitt-Rivers daughter of General Augustus Pitt-Rivers, the distinguished archaeologist. His second family consisted of three sons and two daughters.

He joined the Linnean Society on 21 January 1858; being a banker, he compounded his annual payments, an investment which has hardly ever been equalled, for during some 55 years the use he made of our library has not been approached by any other recorded Fellow. Later that same year he was elected FRS, having been proposed by Charles Darwin (see letter to Lubbock Nov. 22, 1857). He worked hard at his banking business while devoting his leisure time to the pursuit of natural science.

Lubbock's main scientific interest was clearly anthropology/archaeology on the subject of which he published five books (including *A Short History of Coins and Currency*, [1902]) and some 30 papers. His related geological researches included three books (including *The Scenery of England* [1902]) and three papers. Although Arthur Keith later considered Lubbock to have laid the foundation of modern anthropology, his contribution to zoology, particularly entomology, appears to have

been the greater. He published six books (including *The Senses of Animals*, 1888 and *The Origin and Metamorphosis of Insects*, [1873]) and more than 60 papers mainly on insects and other arthropods, which caused Donisthorpe (in Duff, 1924) to remark:

> "Of all the varied scientific work undertaken by Lord Avebury his researches on ants are probably the most important"[1].

But Lubbock's contribution to natural history did not end here for he also published eight books on botany including *A Contribution to our Knowledge of Seedlings*, 1892 (2 vols.) and eighteen papers in which he considered the method of pollination of flowers, the production of fruit and seeds and the diverse methods by which they are disseminated – paying particular attention to animal dispersal.

Lubbock's great interest in anthropology was stimulated by George Busk. Earlier in 1855 on the advice of John Prestwich, Lubbock and the Rev. Charles Kingsley started a dig in the large gravel pit near Maidenhead station where they uncovered the skull of a Musk Ox – a typically Arctic mammal, whose remains had not previously been found in Europe. Lubbock and Busk became friends the following year (1856) with Busk helping him at first with his publications[2] and then eventually becoming his mentor. Busk took Lubbock over Easter 1860 to visit Boucher-de-Perthers to see at first hand the variety of hand-axes he had extracted from the old gravel-terraces of the Somme Valley. The following year Busk took him to Denmark, where they studied the ancient crania found in the various mounds or tombs together with the associated flint implements and stone tools. They examined the shell heaps or kitchen-middens and debated whether or not they were contemporaneous with the tumuli. Finally they visited the Copenhagen Museum of Antiquities. The following year (1862), Lubbock spent a whole month examining buried villages along the Swiss lakes and in 1863 made a hurried visit to the Moray Firth to examine some recently discovered shell-mounds.

All of these visits, including that to the Somme Valley and the kitchen-middens of Denmark with Busk, were written up and published in the *Natural History Review* of which he, Lubbock, was both editor and part-proprietor. These papers proved so popular that he decided to put all his evidence together in a book with the title: *Prehistoric Times*, 1865, in which he introduced two new terms: Palaeolithic and Neolithic.

Meanwhile Lyell had drawn heavily on Lubbock's *Natural History Review* papers for his own, highly successful book *The Geological Evidence of the Antiquity of Man* (1863). Nevertheless Lubbock's book was even more successful (he was an original thinker of a high order) and as late as his 79th year he spent time in the preparation of the seventh and last edition of *Prehistoric Times*.

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1 Lubbock demonstrated that bees and wasps have colour vision, whereas ants could also perceive ultra-violet rays. He also showed that ants collected and *milked* aphids and described two species of Diptera, a blind Collembola and one mite, which are associated with ants. He also described several new species of honey ant sent him from Australia as well as the *replete* worker cast.

2 On the arrangement of the cutaneous muscles of the larva of *Pygaera bucephala*. *Trans. Linn. Soc.*, **22**: 173: 1858.

In 1878 he was appointed a Trustee of the British Museum and in 1905 received on his colleagues' behalf Mr Carnegie's gift of the cast of the *Diplodocus*. Ironically on February 22, 1913 he attended a meeting of the Trustees at which the remains of Piltdown Man were exhibited. He remarked:

> "Piltdown Man is the most simian fossil yet found".

His other popular book *The Origin of Civilization, and the Primitive Condition of Man: Mental and Social Conditions of Savages* (1870), went into six editions in his life-time. In it he attempted to reconstruct our cultural evolution.

Over and above his banking career and his scientific work John Lubbock "made for himself a position of importance and usefulness in public life".

He first stood for parliament for West Kent in 1865 as a Liberal candidate, but was defeated. After declining the invitation to stand for London University in 1867 he again stood for West Kent in 1868 and once more was defeated. However his liberal views had been recognised and in 1870 Mr Lee, M.P. for Maidstone, retired in his favour and he entered Parliament. He retained that seat until his defeat in 1880 whereupon he was chosen to succeed Mr Lowe as member for London University. There he remained for the next 20 years until his elevation to the peerage (1900).

His first Parliamentary success was the Bank Holiday Act of 1871. Lubbock later wrote:

> "the modest name of Bank Holiday attracted no attention and roused no opposition. It is often said that the Bill was intended for Banks only. This is quite a mistake. It expressly enacts that no person shall be compellable to do anything on a Bank Holiday which he could not be compelled to do on Christmas Day or Good Friday."

Bank Holidays were acclaimed with immense enthusiasm and August Bank Holiday Monday half humorously and half gratefully dubbed St Lubbock's Day.

In 1881, when Sir John Lubbock was President of the British Association and gave his address "Fifty years of Science", *Punch* featured a cartoon representing Sir John as a bumble bee, with the legend:

> "How doth the Banking Busy Bee
> Improve the shining hours?
> By studying on Bank Holidays
> Strange insects and wild flowers."

In 1882 he gave up regular attendance at the bank in order to devote himself to scientific and political work.

In 1865 Lubbock had decided that Stonehenge was a Bronze Age monument whereas Avebury Circle was still older.

He wrote of Avebury:

> "On the whole this appears to be the finest megalithic ruin in Europe, but unfortunately for us the pretty village of Avebury, like some beautiful parasite, has grown up at the expense and in the midst of the ancient temple."

Thus in 1871 he started his campaign for the state to step in and save our ancient

monuments. At this point in time he received a letter from the Rector of Avebury informing him that the site of the stone circle was to be used for building purposes. Lubbock's answer was to immediately purchase the site and then to introduce his first Bill for the Preservation of Ancient Monuments in 1873. The Bill was eventually passed in 1882. Not surprisingly, when raised to the Peerage in 1900 he adopted the title of Lord Avebury.

From 1884–1913 he was President of the Proportional Representation Society and in 1886 he tried to bring about an Arbitration Treaty with the U.S.A. That same year he split with Gladstone over Home Rule.

He was an ardent parliamentarian and by the end of his life had introduced some 30 bills all of which passed into law – including the Shop Hours Regulation Act, 1886 and the Sunday Closing (Shops) Bill of 1908. He was also responsible for the Wild Birds Protection Act of 1880 and the Importation of Plumage Prohibition Bill of 1908. Finally, at a reception he gave to delegates at the 1st International Moral Education Congress held in London in 1908, his speech included the following comment:

> "Our ideal is to give Peace in our time – and that not only between nations, but in families."

Lubbock and Darwin

Lubbock was just eight years old when his father's friend, Charles Darwin, moved to Down in 1842. Lubbock senior remarked at the time that it was good news for his son who, however, little realised how it would alter his whole life (Lubbock: Darwin/ Wallace celebration 1908).

Darwin persuaded Lubbock senior to purchase a microscope for his son, then aged fifteen, who the following year (1850) delivered his first lecture to the villagers of Down on the wireworm. It is said that Darwin liked the lad and discovered his great abilities. He also introduced him to Lyell and Hooker.

Soon young Lubbock was acting as Darwin's assistant, going through the *Beagle* crustacean collections with him and helping with the illustrations for his great work on barnacles (published in 2 vols., 1851 & 1854). Meanwhile, Lubbock discovered a new genus of Calanidae in that collection which he described in 1853 (*Labidocera darwinii* – *Ann. Mag. Nat. Hist.*, **11:** 25) as well as several subgenera and new species of *Pontella* and *Monops*.

Although he had become a member of the Linnean Society in January 1858 Lubbock did not attend the Darwin/Wallace Meeting of July 1st. Nevertheless he diligently read the published Transactions. In the course of doing so he realised that the idea of natural selection had been independently published by Wallace as well as Darwin. However, by the time that the *Origin of Species* had been published (1859) he was an ardent follower of Darwin.

> "My neighbour & excellent naturalist J. Lubbock is (an) enthusiastic convert".
> (Darwin to Wallace April 6, 1859)

So much so that at the Meeting of the British Association held 30 June 1860 in Oxford he contributed to the Huxley vs. Wilberforce debate, speaking after Fitzroy.

As Huxley later noted

"Lubbock and Hooker spoke after me ... and among us we shut up the Bishop and the laity." (Huxley to F.D. 9 September 1860)

In the event Lubbock spoke for more than 10 minutes in support of Darwin's theory.

First he declared that many of the arguments by which the permanence of species was supported came to nothing. And because Wilberforce had ranged on about Egyptian mummies he instanced some wheat which was said to have come off a mummy and had been sent to him to prove that wheat had not changed since the time of the Pharaohs, but which proved to be made of French chocolate! Then he put forward the main defence:

"That the embryology of the individual in many cases represents the past history of the species.[1]"

Lubbock's development of this theme in the debate pleased Darwin greatly. However, apart from Lubbock, very few of the reviewers had commented on what he, Darwin considered the strongest evidence (see letter to Gray, 10 September 1860). As he earlier wrote to Hooker (Dec. 1859):

"Embryology is my pet bit in my book confound my friends not one had noticed this to me ..."

Then in his autobiography Darwin notes:

"I had material for a whole chapter on the subject and I ought to have made the discussion longer, for it is clear that I failed to impress my readers."

Towards the end of 1860 Lubbock attended the parish church of Down when Darwin was also present. The vicar preached a violent sermon against the:

"infidel and the naturalist in our midst."

According to Lubbock's biographer, there was no doubt as to the identity of the one, while young Lubbock proudly hoped that he might share the partnership by representing the other!

That same year Darwin wrote to Lubbock about pangenesis – concluding:

"for I settled some time ago that I should think more of Huxley's and your opinion ... and the cleverness of your mind than of any other man in England."

Just two years later in 1862 Darwin asked Lubbock to assist him once again by watching hive-bees sucking clover flowers:

"I cannot think of any other naturalist who would be as careful."

Thus although Lubbock found himself the bodyguard of Darwinism he could not forget Wallace's contribution. Cogently in his book *Prehistoric Times* (1865: 479) he points out in reference to Wallace's *Origin of human races* (1864):

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1 Whetham referred to it in *Science and the Human Mind* pointing our that most of those present were unable to appreciate the embryological evidence for evolution on which Lubbock insisted.

"that Mr Wallace with characteristic unselfishness ascribes it (the idea of natural selection) unreservedly to Mr Darwin although, as is well known, he struck out the idea independently and published it, though not with the same elaboration at the same time."

This quote from his young friend clearly touched a chord in Darwin who in *The Descent of Man* (1871) after quoting from Wallace 1869 (post spiritualism) to the effect that he did not understand how Mr Wallace could now maintain that natural selection alone was not enough to account for man's superior brain – added a footnote (p.49) about Wallace's celebrated 1864 paper which continued:

"I cannot here resist quoting a most just remark by Sir J. Lubbock (*Prehistoric Times* 1865: 479) in reference to this paper, namely "that Mr Wallace with characteristic unselfishness ascribes it (i.e. the idea of natural selection) unreservedly to Mr Darwin, although, as is well known, he struck out the idea independently ....."

Following the publication of *Prehistoric Times* (1865) Darwin wrote to Lubbock to congratulate him:

"It has quite delighted me, for now the public will see what kind of man you are, which I am proud to think I discovered a dozen years ago. ..."

Since it was largely from Darwin that Lubbock learned love and respect for science and truth, the quotation from Wallace (1864) appears all the more relevant.

Darwin died about four o'clock on Wednesday, 19 April, 1882, in the 74th year of his age and in accordance with the family wishes he was laid out in a rough oak coffin ready for interment at Down Churchyard.

The following day, however, Galton (Darwin's half cousin) at the conclusion of a Royal Society meeting persuaded the President, William Spottiswoode, to telegraph the Darwin family, in the name of the Society, to ask their consent for an interment in Westminster Abbey. The telegram arrived at Down on Saturday morning. On the evening of Friday 21st Huxley met Spottiswoode at the Athenaeum where they discussed Galton's plan. They were joined by F.W. Farrar, canon of Westminster who wanted to know why they had not yet approached the Dean of Westminster for his permission. Huxley replied to the effect that they imagined it would be refused. Farrar assured them that the Dean (George Bradley) would undoubtedly grant permission for an Abbey burial and that he Farrar would make the necessary enquiries. Spottiswoode followed up his earlier telegram with a letter written from the Athenaeum that night, addressed to William Darwin:

"I consulted with Huxley, one Bishop, 2 canons (one of whom has a very extensive acquaintance with clergy metropolitan & other), one public school master. All heartily encouraged the proposal being carried out. I saw the Ld. Chancellor who was naturally more cautious. Lord Aberdare, on his own part, & on that of the Geograph. Society, was most urgent that the thing should be done, & expressed his sincere hope that your family would consent. –

There is a place beside Lyell where your father could be laid; arrangements could, so far as would be done in & from London, be easily completed for Wednesday next".

The letter reached Down the next day (Saturday 22nd)

When word of Darwin's demise reached Lubbock on Thursday 20th, as President he adjourned the Linnean Society Meeting as a mark of respect. The next day he went to the House of Commons having agreed with Spottiswoode that he would put parliamentary pressure on Dean Bradley. Accordingly he drew up a letter (signed by 20 MPs including two ministers, the Speaker and Deputy Speaker) suggesting that Darwin be buried in Westminster Abbey. The letter was telegraphed to Dr George Bradley, Dean of Westminster, who gave his cordial acquiescence.

The family were informed that agreement had been reached for an Abbey burial on the Saturday morning and this coincided with the arrival of Spottiswoode's offer of a place beside Lyell. That same morning the *Standard's* editorial called for an Abbey burial:

> "His proper place is amongst those other worthies whose reputations are landmarks in the people's history, and if it should not clash with his own expressed wishes, or the pious feelings of the family, we owe it to posterity to place his remains in Westminster Abbey, among the illustrious dead who make that noble fane unrivalled in the world".

The family finally relented and William and George set about deciding on pall-bearers and guests. However, Lubbock ever mindful of the family wishes, and hearing he was to be a pall-bearer, wrote a placatory letter to the family:

HOUSE OF COMMONS, April 25, 1882

MY DEAR DARWIN, – I quite sympathise with your feeling, and personally I should greatly have preferred that your father should have rested in Down amongst us all. It is, I am sure, quite understood that the initiative was not taken by you. Still, from a national point of view, it is clearly right that he should be buried in the Abbey. I esteem it a great privilege to be allowed to accompany my dear master to the grave.

Believe me, yours most sincerely,
JOHN LUBBOCK.

W.E. DARWIN, ESQ.

Huxley echoed Lubbock's nationalistic view:

> "50 or 100 years hence it would seem absolutely incredible to people that the state had in no way recognised his transcendent services to science."

So the rough oak box was replaced with a lead-lined coffin with the *Times* arguing that the Abbey needed the burial more than it needed the Abbey!

There were 10 pall-bearers among whom were T. H. Huxley, William Spottiswoode, John Lubbock and Joseph Hooker (all members of the X-club[1]) two Dukes and one Earl, while Cannon Farrar represented the Abbey establishment. George Darwin also invited Huxley's friend, the American Ambassador James Russell Lowell. In a letter

1 The X-club (name suggested by Mrs Busk) comprised nine members: Hooker, Busk, Spenser, Tyndall, Huxley, Frankland, Hirst, Lubbock and Spottiswoode. A small scientific dining club who dined at 6 pm on the first Thursday of the month before the meeting of the Royal Society either at St George's Hotel, Albermarle St., or the Athenaeum. The club carried on more or less unchanged until 1893. Note: only Spenser was not a member of the Royal.

to Huxley confirming the Ambassador's consent to be a pall-bearer (22 April 1882) he added:

> "It has suddenly flashed across me that Wallace is a man whom it w^{d}. be gracious to ask to be a pall-bearer. What do you think? The only objection that I know of is that H. Spenser might think it more his place."

In the event Wallace, at the age of 59, became the tenth pall-bearer.

Thus Darwin was buried, not alongside Lyell, but beside the grave of Sir John Herschel and a few feet from the grave of Sir Isaac Newton close to the angle of the choir screen.

Surprisingly, Herbert Spenser did attend the funeral, much to George Darwin's embarrassment. An exchange of letters between the two concluded with this eloquent expression of consolation:

> TO GEORGE DARWIN.
>
> 4 May, 1882.
>
> Thank you for your explanatory letter. I regret that any misunderstanding should have entailed on you the trouble of writing it. I fancy some remark of Huxley's (made probably to Galton and then to you) to the effect that my very pronounced non-conformity in the matter of ecclesiastical ceremonies (which he knew had prevented me from being present at Tyndall's marriage) might perhaps be an obstacle to my attendance. But I felt the occasion of your father's funeral to be so exceptional that I could not let this feeling prevent me from manifesting my great respect .....
>
> If anything could serve as adequate consolation to Mrs. Darwin and yourself it would be the immense manifestation of sympathy – a manifestation which I should think has never been paralleled in the case of any man of science.
>
> HERBERT SPENSER

Finally, at the Darwin/Wallace Celebration of 1908, Lubbock concluded his address with these words:

> "I am one of thousands whom Darwin inspired by his writings, and of the few living who have had the inestimable privilege of his friendship.
>
> Often and often when feeling overworked or discouraged, an hour with him has proved a wonderful cordial and brushed away the cobwebs of the imagination like a breath of sea air."

Sequel

Wallace died on November 7th 1913 after a long illness. It was suggested that he might be buried in Westminster Abbey, perhaps near to Charles Darwin; however, neither he nor any of his family wished it. On Monday November 10th, he was laid to rest with touching simplicity in Broadstone cemetery.

In 1822 a Memorial Committee Fund commissioned both a bronze medallion of Darwin for placement in Westminster Abbey, close to his tomb, and a marble statue for erection at the head of the stairs in the central hall of the Natural History Museum,

South Kensington (installed 1889). An appeal to the public raised over £4,500; the statue by J.E. Boehm R.A. cost £2,500.

Soon after Wallace's death a Memorial Committee was also formed with the objective of having a medallion placed in Westminster Abbey:

> "We, the undersigned, earnestly desiring a suitable national memorial to the late Alfred Russel Wallace, and believing that no position would be so appropriate as Westminster Abbey, the burial-place of his illustrious fellow-worker Charles Darwin, petition the Right Reverend the Dean and Chapter for permission to place a medallion in Westminster Abbey. We further guarantee, if the medallion be accepted, to pay the Abbey fees of £200."

ARCH. GEIKIE	JOHN W. JUDD
WILLIAM CROOKES	OLIVER J. LODGE
A.B. KEMPEE	B. POULTON
E. RAY LANCESTER	A. STRAHAN
D.H. SCOTT	H.H. TURNER
D. PRAIN	J. LARMOR
A.E. SHIPLEY	W. RAMSAY
RAPHAEL MELDOLA	SILVANUS P. THOMPSON
P.A. MACMAHON	JOHN PERRY
	JAMES MARCHANT (Hon. Sec.)

The medallion was fashioned by Mr Bruce-Joy and it was unveiled, by a happy coincidence, on All Soul's Day, November 1st 1915, together with medallions to the memory of Sir Joseph Hooker and Lord Lister: fittingly, Wallace's medallion was placed alongside that of Darwin. The residue of the Wallace Memorial Fund was used to commission a portrait which was eventually presented to the Natural History Museum (June 23rd 1923). The portrait which initially graced the wall of the central

The memorial tablets to Wallace and Darwin, Westminster Abbey.

Clue: only went a very little way with Darwin and Wallace?

hall, has now been relegated to the Spencer Gallery, while the statue of Darwin (together with that of Huxley) which once graced the great stairway is now under it, facing the Science Museum!

B.G. GARDINER

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Lubbock produced our first E-mail winner: Richard Fitter, and our first three-in-a-row winner: Geoffrey Fryer. Two other Fellows who correctly identified Grant in the October issue were Paul Mitchell and T.H. Nicolson.

Correspondence

A. R. WALLACE MEMORIAL FUND

Chairman: Dr G. Beccaloni
Secretary: Miss J. Margerison
Officers: Prof. B. Gardiner
Mr R. Wallace

Entomology Department,
The Natural History Museum,
London SW7 5BD

10.5.99

Dear Brian,

I thought that members might be interested to learn that an organisation named the "A.R. Wallace Memorial Fund" has recently been established in order to restore and protect the hitherto neglected grave of the great naturalist Alfred Russel Wallace (1823–1913). Wallace and his wife Annie are buried in Broadstone Cemetery, Dorset. The grave is marked by an unusual and striking monument – a 7 foot tall fossilised conifer trunk from the Portland beds mounted on a large square base of Purbeck stone. Unfortunately, the monument has not been properly maintained for many years and is now in poor condition. Furthermore, the lease on the grave has only 14 years left to run before it expires, after which there is a danger that the plot could be used for another burial.

The primary aims of the Fund are to restore the monument, apply for it to be

officially listed by the Department of Culture, Media and Sport, and to extend the lease on the plot. A.R. Wallace's grandson Mr Richard Wallace (who is the Treasurer of our Fund) plans to transfer the lease to The Linnean Society once the restoration work has been completed. This will ensure the grave's long term protection.

A secondary aim of our project is to commission English Heritage to produce a commemorative blue plaque and install it on "The Dell" (Grays, Essex), where Wallace lived from 1871 to 1876. This is the only surviving one of three houses which Wallace built (it is currently a convent) and he wrote his important book *The Geographical Distribution of Animals* there. It is also notable in being one of the first houses in Britain to have been constructed of concrete.

Contributions to date total £840 leaving £3960 to be raised. If any members of the Society would like to make a donation then cheques should be made out to "The A.R. Wallace Memorial Fund" and sent to Dr. G.W. Beccaloni, A.R. Wallace Memorial Fund, c/o Entomology Department, The Natural History Museum, Cromwell Road, South Kensington, London SW7 5BD (Tel. 020 7938 9073), E-mail: g.beccaloni @nhm.ac.uk).

The total cost of the project will be approximately £4,955. This breaks down as follows.

Repair base of monument & replace existing badly damaged crazy paving around base	£1500
Professionally clean & repair fossil tree trunk	£ 800
Produce brass plaque outlining Wallace's achievements & affix to base	£ 400
Extend lease on plot by 50 years	£ 455
Estimated legal costs of transferring lease to The Linnean Society	£ 400
Professional maintenance of memorial & grave (25 years)	£ 600
Commission Blue Plaque & install it on "The Dell"	£ 800
Total Cost	£4955

The link between Wallace and The Linnean Society is well known and we feel that this project provides a excellent opportunity for the Society to continue its association with one of the greatest naturalists of all time.

Yours sincerely,
GEORGE BECCALONI

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24 St. Mary's Avenue,
Finchley, London N3 1SN

29.4.99

Dear Brian

Picture Quiz, Vol. **15**(2) April 1999

Sir John Lubbock (1834–1913) in 1896, four years before he was created 1st Baron Avebury. He made his living as a banker but he was also a scientist and a prominent public figure: Liberal MP 1870–1900, at first for Maidstone and later for the University of London. Vice Chancellor of London University 1872–80 and very many other appointments. He was President of the Linnean Society 1881–86; also FRS from 1858 and later Vice President. He lived at High Elms, Down, and from childhood his interest in natural history was encouraged by a neighbour, Charles Darwin. He later wrote many hugely successful popular books on zoology, botany, geology and archaeology as well as publishing much original research. By a series of ingenious experiments he demonstrated visual sensitivity to ultraviolet light in insects and he also speculated on the use of ultrasound by animals, drawing up a specification for an ultrasound detector that was only realised 59 years later. In 1871 his Bank Holiday Bill was passed by Parliament and for some years the August Bank Holiday Monday was widely known as St Lubbock's Day – hence your clue to the Quiz picture. In 1872 he purchased part of the megalithic monument of Avebury in order to save it from destruction by builders and later took that name as his title when raised to the Peerage. (An interesting appreciation of Lubbock was given by Sir V.B. Wigglesworth in *Proc. Roy. Entomol. Soc. C.* **29,** 55-60, 1964–5).

Yours sincerely
DAVID PYE

Department of Zoology,
The Natural History Museum,
London SW7 5BD

27.4.99

Dear Brian,

I am writing with regard to your article on George Busk (*Linnean* **15**(2):6).

Whilst I found the piece, on a man whose work I have literally followed, fascinating, I must confess to having two complaints about it.

Firstly, the term Polyzoa is no longer used for the Phylum Bryozoa. Although Polyzoa was used widely in both the 19th and early 20th Centuries, particularly in Britain and its Commonwealth, most of mainland Europe and the rest of the World used the term Bryozoa. This term has now been universally adopted for the phylum due to majority usage.

Secondly, and less pedantically, the article seemed to gloss over Busk's enormous contribution to Bryozoology. Busk was arguably the most important bryozoan worker of the 19th Century. He produced many outstanding works, such as the catalogue of the British Museum (Nat. Hist.) Collections, many studies of Recent bryozoan material which yielded numerous new species, the description of the Pliocene Coralline Crag fauna and many ideas on higher bryozoan systematics. This work has provided the backbone not only for the collections of the Natural History Museum, including the type material for all the new species he described, but also the relationships between many of the higher taxa within the phylum itself.

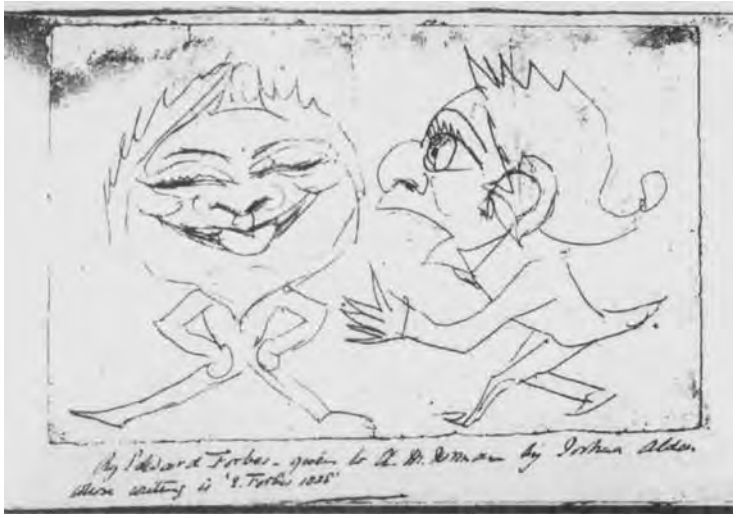
This man certainly was a "Jack of All Trades", but unlike most, appeared to master all "trades" he applied himself to. His output was undoubtedly prodigious, the quality seminal and his extra-curricular activities essential to the many societies to which he belonged.

My only regret is that although there are a great many scientists with the obvious enthusiasm Busk showed, it is shameful that, unlike Busk who was ostensibly self-funded, these scientists have to compete for ever decreasing financial resources. There is only a certain amount of enthusiasm that can be financed by soft money or even the dole. Investment in systematic studies seems to have been increasingly limited of late, whilst the advent of new technology has provided new tools for the taxonomist's arsenal. In bryozoology, the area I know best, the use of the scanning electron microscope, for instance, has almost brought about a revolution in bryozoan taxonomy unravelling and expanding upon previous studies made using light microscopes solely.

I live in hope that the need for investment in taxonomists will be recognised shortly, before the "enthusiasm" has gained non-academic employment.

Yours sincerely,

KEVIN J. TILBROOK



An Edward Forbes Vignette

Some years ago I bought a good copy of the large paper edition of *A History of British Mollusca and their Shells* by Edward Forbes and Sylvanus Hanley (1853), a well-known and still respected standard work. I thought I had got a bargain at the time, but the more so when I found the enclosures inside it: it carries the book-plate of Canon A.M. Norman, another distinguished marine zoologist of the last century, and bound or glued into it are two letters from Forbes to yet another marine zoologist, Joshua Alder, and best of all a pencil vignette by Forbes which is so good that it ought to be shared.

His own vignettes are of course an attractive feature of the works of this exuberant zoologist. In the corner of this one are the words 'E. Forbes 1838' and under it in Canon Norman's hand, 'By Edward Forbes – given to A.M. Norman by Joshua Alder whose writing is E. Forbes 1838.' Who are the gentlemen depicted, and what was the occasion for their contrasting expressions?

The letters are of more specialist concern. The first, from Douglas, Isle of Man, dated August 1st 1837 (when he must have been about 22), apologises for a delayed reply to a letter of Alder's. Forbes appears to be travelling a lot, referring later to having been in Paris the previous winter and in the south of France and Algiers in the Spring. His open nature is reflected in his opening response: "I am sorry to think that you should have had any scruples about the circumstance I communicated in regard to the *Clausilia papillaris*; whatever notes of any value whatsoever I may be possessed of are at your service and at the service of every naturalist – the science can only be placed on its true basis through the medium of unrestrained confidence." There follows a discussion of specimens of *Vitraria, Pupa* and *Natica* species including a neat coloured drawing of *Natica rufa.* He mentions a list of land and water shells of Algiers which "is at Sir Wm. Jardine's service if he wishes it," asks about "*Montacuta purpurea*" Alder and "*Patella albicosta* Rev. Mr Marks". He is preparing a catalogue of Manx Mollusca as part of a fauna of the Isle of Man, which he intends "to complete in the course of time."

The second, more scribbled letter from the 'Geol. Soc London' Aug. 23 (no year) does not say that it is to Alder. Forbes writes "that the *Emarginula* which Jeffrey, yourself and Mr McAndrew were all so fortunate as to find so nearly about the same time (within a year) is not new, but better than new, being the long lost representative of a well marked fossil, the *Emarginula crassa* of Sowerby's Mineral Conchology .... This I have proved perfectly to my satisfaction by comparison with suites of specimens. . . in Mr Lyell's cabinet.... Mr Lyell is in great glee at the resurrection of this beautiful shell."

There is a third letter from Newington Green, March 8 1845, signed by Sylvanus Hanley, urging the addressee (it is not clear if this is also Alder) to compile a catalogue of the British Tellens (*sic*).

How do these letters conform with the history of British conchology?

JOHN SMYTH

From the Archives

ANON

A constant attendant upon Dr. Smith's lectures at the Royal Institution, entreats him to publish a Botanical Work adapted to the understanding of the English Ladies; the Writer of this entreaty being convinc'd from the terms Dr. Smith makes use of in his lectures, a publication from him wou'd be free from the indelicacy of those already published.

The President, and Council
of The Linnean Society

1 November 1886

Gentlemen

I have wished for some years past to be allowed to join the Linnean Society, but was informed by Dr. Murie that Ladies are excluded by your Act of Incorporation.

Could I be permitted however to subscribe for your publications. I know something of Botany, and wish to pursue this study a little to bring my knowledge up to the more recent methods. If by so doing at Fellows rate – could I have occasional use of the Library and borrow books. I remain yours respectfully

(Miss) Mary H. Beal

Larch Grove, Woodchester, Stroud, Glos.

Read in Council 4 November 1886: Deferred consideration.

MARGOT WALKER

Junk DNA, Again

In the August 1991 issue of *The Linnean* (7(3): 20–22), it was suggested that prevention of deleterious mutations might be the reason for the apparently excessive abundance of otiose genetic material – junk DNA. Well, up to a point, Lord Copper. What has emerged latterly is that mutation of junk DNA sequences may have survival value. The junk DNA sequences involved are called microsatellites, and consist of up to six DNA bases repeated many times in the genome[1]. Minisatellites are composed of rather longer repeated sequences. These micro- and mini-satellite sequences undergo mutation at a much enhanced frequency, as compared, say, to those sequences coding for proteins, which are generally highly conserved, lest the protein become non-functional. The mutation rate, generation on generation, may be 10000 times greater for microsatellites. The changes which occur can be in the sequence but more likely in the number of the repeats (see below). Such changes within a species may allow relatively unique identification of individuals, so-called genetic fingerprinting. And, given that mutation is a frequent occurrence in these sequences, there is a fair probability of at least some of the DNA reverting to an earlier sequence – back mutation.

These microsatellite sequences occur in human genes. In inappropriate circumstances, they affect the coding of proteins, introducing repeating sequences of a single amino acid. Long (up to over 150) glutamine repeats are a feature of a protein of unknown function, huntingtin, in Huntington's chorea, an inherited disorder of the nervous system. A number of diseases of similar origins are known. Clearly, such mutations are not beneficial, although it should be pointed out that huntingtin in normal individuals contains glutamine repeats, but rather less than 50 at a time. A plausible mechanism for the extension or contraction of these glutamine repeats relies on the fact that the codon for glutamine – GTC – is able to form projecting hairpin-like structures from the DNA double helix (Fig. 1). The hairpin loop of nine glutamine codons represents a puckering of strand 1; it means that somewhere on strand 2, there will be a single-stranded region of nine complementary anticodons. During replication these nine anticodons will, if strand 1 is acting as the template for DNA synthesis, be deleted on strand 2, or, if strand 2 is acting as the template, nine codons will be added to strand 1. It is also possible that DNA repair will excise the hairpin loop, with replication also then leading to an anticodon deletion on strand 2.

What possible benefit could accrue from such situations, apart from their use for forensic purposes (both in Man and other species)? In the case of the opportunist pathogen *Neisseria gonorrhoeae*, microsatellites interfere with the sequences of proteins responsible for the infectivity of the organism. This increase in diversity may be of value in enabling at least some *N. gonorrhoeae* to avoid being destroyed by phagocytes which they might otherwise attempt to infect. Or the host may die. Lack of infectivity in such situations allows some of the organisms to survive, full infectivity subsequently being restored by back-mutation. Mutations in the junk sequences may also occasionally result in increased virulence. Possession of microsatellite sequences is thus seen as a means, if a somewhat capricious one, of enhancing survival in a changing environment.

Human mutation is in the news again[2,3]. It has been calculated that the number of

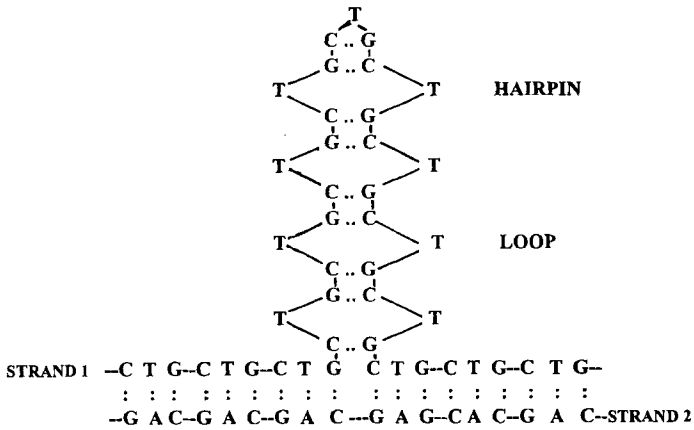


Figure 1

deleterious mutations per diploid per generation is 1.6. Deleterious mutations are defined as those leading to malfunctioning proteins. According to the paper, the proportion of individuals eliminated from the population (genetic deaths) as a consequence of this level of deleterious mutation is sufficiently high to lead to an inexorable decline in human populations, something which is certainly at variance with current experience. And there may be other mutations, e.g. in control regions of the genome, which are equally damaging, about which we know little (but see below). This has led the authors to conclude that mutations may cooperatively attenuate each other (*synergistic epistasis*), but a more reasoned explanation may be that of heterozygous advantage in recessive or sex-linked conditions. Many inborn errors of metabolism in Man occur at levels well above the random mutation rate, suggestive of some advantage to heterozygotes (carriers) of these conditions. We know that some of the abnormalities in haemoglobin structure and synthesis, such as sickle cell disease, are associated with resistance to malaria in heterozygotes, if mostly lethal in homozygotes. The definition of deleterious becomes somewhat strained at this point.

Vertebrates have long put mutation to good use in their immune systems to generate antibody diversity. So it is of interest to learn that control regions of the animal genome responsible for, e.g. development, are more mutable than might have been supposed[4,5]. Conventional wisdom has it that such control regions are so important to survival that mutations in these regions of DNA are almost unthinkable. Not so. Within the genome, sequences of DNA can be cut and pasted rather like sections of this text in a word processor and, as for microsatellites, appropriate sequences can be duplicated or deleted. Sometimes this is due to transposons, mobile sequences originally identified in maize, but which may be the result of the incorporation into genomes of retroviruses (RNA viruses, whose replication involves the production of a DNA copy, such as the HIV virus responsible for AIDS). New combinations of bases lead to changes in gene expression and structure, a situation sometimes referred to as *genome plasticity*. For similar reasons to those offered for the value of mutating microsatellite DNA to *N. gonorrhoeae,* mutations in the genes responsible for the control of development might provide at least some organisms in a population with improved chances of withstanding

environmental modification at the same time as increasing the rate of evolutionary change. Given that there seems to be so much genetic change going on, presumably in all nucleated cells, one must ask whether cellular turnover does not owe a great deal to this phenomenon, since generally the effects of mutation are harmful. It also highlights the importance of sexual reproduction as a means of maintaining some semblance of coherence within species from generation to generation and may also provide some explanation for the high failure rate (80%) of fertilised ova to come to term.

JOHN MARSDEN

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Further nightly conversations with Linnaeus

After several years absence (due to serious illness – a cerebral stroke) I recently stayed in the guest room in Uppsala again, and Linnaeus looked sternly at me this time:

"No more mistakes of mine – but one grave one of yours! Why did you not follow my advice to avoid working late at night? Did you not know that I had a series of strokes, and that your compatriot, my dear student Martin Vahl, died from a stroke while trying to complete a new Systema?"

"I assure you, Sir, that I am not trying to write a new "Species Plantarum", only to get a better understanding of the lichens of Scandinavia and some genera on a world scale."

"You are lucky to have more to discover. After I had my first stroke, I could not find much new to engage me. I had already in my youth discovered what was possible with the methods of that time, and my students did not provide me with much more material. There I sat, more or less in isolation at Hammarby, only revising the works of my youth with an embittered wife who felt neglected and now burdened with a crippled husband, an impossible son and three unmarried daughters."

"Forgive me, Sir, but this must be an exaggeration! You had several students at the end of your life, and they must have been an inspiration; tradition says that you wrote their theses."

"You may be right, but please, look carefully at these works – they are not as innovative as in earlier days; you may believe what you want about the authorship, but you should now be in a position to understand how much a patient who has suffered a stroke is able to contribute. These students indeed kept me going, but they were also a problem. They often came out to Hammarby from Uppsala, stayed for the day, had

to be fed, and accommodated overnight, as there was no public transport in those days. Sara Lisa hated these casual visits, and tried to keep the students and other visitors away. She sometimes even denied them access to the house, so they had to return to Uppsala. A most painful experience, which gave us, and particularly her, a bad reputation."

"Back to something more pleasant – our *scientia amabilis*. Have you any comments on its development and state of affairs?"

"Botany appears to be less *amabilis* than in my day; it is becoming more and more technical, moving away from contact with Nature itself. I must warn you about that trend!"

"But, Sir, even you sat with your specimens indoors. Think of all the foreign specimens which were sent to you, which you treated even if you had not seen them growing in the field yourself. Today we must look closer at them in our labs with microscopes at details which reveal their true relationships."

"The intentions are good, the same as mine, the methods are superior to mine, but nevertheless the floristic knowledge is vanishing. Don't you see that modern botanists are on the wrong track, neglecting the plants and what will be left of botany then?"

With these words Linnaeus closed the conversation, and as the Botanical Department in Uppsala is going to move to new and better buildings, it is not certain that I shall be able to continue this contact with him.

PER M. JØRGENSEN

Linnaeus in Uppsala

Around 1655 Olof Rudbeck the Elder (1630–1702) established the University of Uppsala Botanic Garden on the southern side of what is now Linnégatan. The garden was estimated to contain some 1,650 species and varieties at its peak.

By the eighteenth century, however, it was falling into decay and by Linnaeus' time there were only 300 species still in cultivation. Linnaeus (now a first-year student at Uppsala University) was eagerly studying the remnants of this collection in the Spring of 1729 when he met Olof Celsius the Elder, Professor of Theology and Dean of the Cathedral. Celsius, who was most impressed by Linnaeus' knowledge of the Swedish flora, offered him board and lodgings in his own house, as well as the run of his library. Subsequently Linnaeus presented Celsius with a thesis in his honour entitled *Præludia Sponsaliarum Plantarum,* 1729. The flattered Celsius showed Linnaeus' thesis to the revered Professor of Medicine, Olof Rudbeck the Younger (1660–1740). Like Celsius, Rudbeck was most impressed by Linnaeus' botanical knowledge and in the Spring of 1730, needing someone to give botanical instruction in the garden, appointed this second year student as Botanical Demonstrator. Linnaeus proved to be a popular lecturer, with audiences of between 300–400. Rudbeck's patronage did not finish there, for he arranged for Linnaeus to tutor his three botanist sons, housed him in his own house and then arranged for a Senate Grant towards his support! Despite

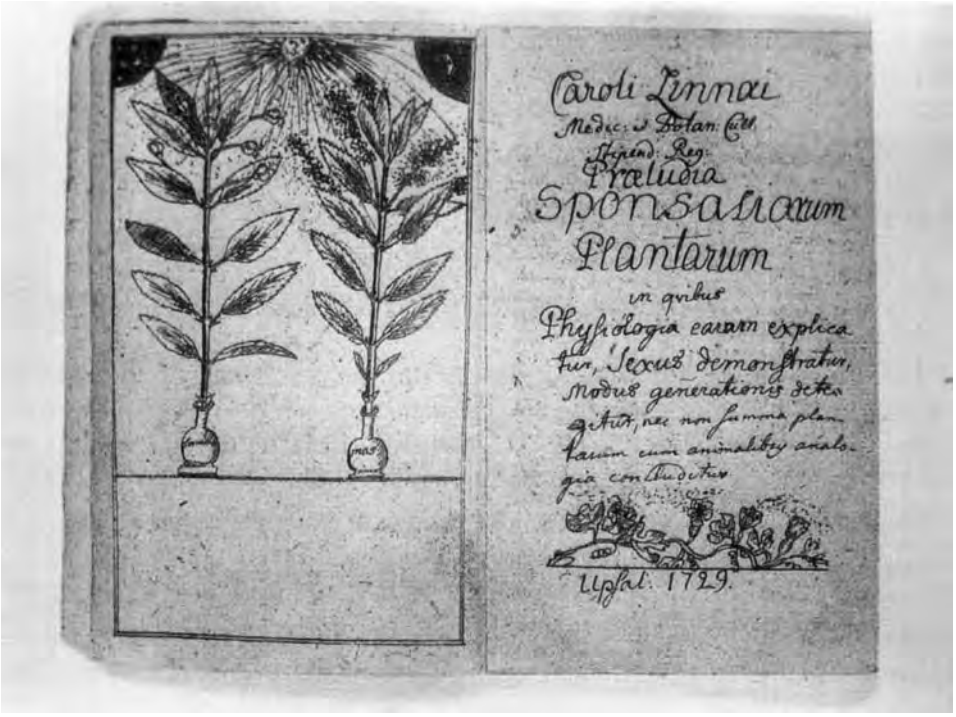

Figure 1. *Præludia Sponsaliarum Plantarum.*
[In which Linnaeus gives an account of the reproductive system of plants.]

several years abroad, mostly in Holland (1735–38), and setting up practice as a physician in Stockholm (1738–41), Linnaeus was still Botanical Demonstrator when he was appointed Professor of Medicine at Uppsala in 1741.

Linnaeus took up the position (in succession to Lars Roberg) in October 1741, when he moved with his wife and young son to Uppsala, but did not move into the professorial residence in the Botanic Garden until 1743. The house had originally been built by Olof Rudbeck the Elder, but when Linnaeus and family were about to move in Linnaeus commented that it was in such a state of disrepair that it looked:

"more like an owl's nest or a den of thieves than a Professor's Residence."

The house was, however, quickly renovated by Carl Hårleman a prominent Swedish architect. The walls were insulated and the ceilings re-plastered, and then the arrangement of the rooms substantially altered.

In 1739 Linnaeus had recommended Dietrich Nietzel to Rudbeck as a most suitable person to oversee the Uppsala Botanic Garden. Following Rudbeck's death (1740) and Linnaeus' appointment as Professor in 1741 the supervision of the Botanic Garden was assigned to Linnaeus. Nietzel (now the head gardener) and Linnaeus together offered Hårleman advice on the construction of an orangery which was completed in the baroque style, with the rustic façade of the central section harmonising with the pavilions added to the greenhouses in the wings. The *frigidarium* or hall which occupied

Figure 2. Linnémuseet in Uppsala.

the central section was a cool greenhouse used in summer for lectures and demonstrations. The northern wing housed the *caldarium* or warm greenhouse, with a sloping glass wall and a system of hot pipes in which such exotic plants as bananas, sago palms, coconuts, cocoa, ginger and coffee were grown, and the *tepidarium* for succulents. Behind the *tepidarium* Linnaeus housed the University's zoological collection; today, the survivors of this collection are on display on the upper floor of the museum.

The garden itself was laid out according to Linnaeus' sexual system with 24 Classes and included 2,157 species. Linnaeus was now firmly in control of the renovated garden, which also involved looking after a small menagerie. An inventory for 1768 showed eight species of monkey, a racoon, an agouti, numerous guinea pigs as well as parrots, ducks, peacocks, guinea fowl and a cassowary. In order that visitors might be drawn into his garden, Linnaeus had two monkey cotes erected on poles either side of its entrance: the monkeys were Linnaeus' favourites!

Olof Rudbeck the Elder had also been responsible for laying out the impressive Palace garden. This was set out as in typical baroque style, with rows of clipped spruce trees and an ornamental fountain. This garden was donated to the University in 1787 by Gustav III, whereupon Carl Peter Thunberg, the new Professor of Botany, transferred the title of University Botanic Garden to the Palace Garden. "Botan", as this garden is quaintly referred to, is now the centre of the University's botanical research and home to some 11,000 species and varieties of plant.

Figure 3. Linnaeus' bed.
[Not the one slept in by Per Jørgensen who is well over six foot.]

As a consequence, Linnaeus' Botanic Garden again went into decline and throughout the nineteenth century was used as a park. Luckily for posterity, the Swedish Linnean Society, soon after its foundation in 1917, used their initiative (and money) to take it over and meticulously restore it to its former state, including the restoration of the orangery (1955). Finally, in 1978 the University of Uppsala took over the responsibility of running the garden, leaving the Society with the house.

Until 1937 the house was used by the University's music department; it was the residence of the Director of Music. In that year the house was taken over by the Swedish Linnean Society who, with the help of donations and gifts transformed it into the present Museum. The Museum is on two main floors with the ground floor given over mainly to the kitchen, adjacent dining room and Fru Linnaeus' bedroom. Apparently, the smooth running of Linnaeus' home was entirely due to his wife, Sara Lisa Moraea who, while in the house, bore him a further six children: Lisa Stina (Elizabeth Christina) (born 1743), Sara Magdelena (born and died 1744), Lovisia (born 1749), Sara Christinia (born 1751), Johannes (1754–1757) and finally Sophia (born 1757) who was not breathing at birth, but was given artificial respiration by her father. She became Linnaeus' favourite and he took her along to his lectures in the Botanic Garden as well as on botanical forays[1].

The whole house has been carefully renovated and is full of Linnaeus' family memorabilia. There are playing cards, china, beautiful damask tablecloths, Fru

1 The botanical forays took place every Saturday in summer and were very colourful events, with the participants returning to town with banners waving and horns and kettledrums playing.

Figure 4. The Garden and Orangery.
[Note the use of spruce as edging]

Linnaeus' yellow silk coat, and Linnaeus' embroidered waistcoat and rapier. Amongst the silver on display in the sitting room is a large bowl, which was a gift from a family friend, Abraham Bäck, Physician to the King in 1851. According to tradition the bowl was filled with wild strawberries when in season. The reason given was that in the summer of 1850 Linnaeus had so severe an attack of gout that he felt himself close to death and had not eaten for 14 days, when he was brought a bowl of wild strawberries. Having devoured the strawberries he fell asleep. When he awoke the pain had gone and he was able to leave his bed (see dissertation *Fraga vesca* 1772). From then onwards Linnaeus ate as many wild strawberries as he could each year and apparently by the fifth summer his gout was completely cured!

From the entrance hall stairs lead up to a separate vestibule on the first floor from which the lecture room is reached. This allowed students access without upsetting the daily routine of the rest of the house. Here Linnaeus gave both private lectures as well as public ones. He was a very popular lecturer and had many students. It is said that over half the student body attended his lectures, many of which were delivered in the Gustavian building. Since students paid for their tuition, Linnaeus was probably one of the richest Professors. His lecturing style was to pace up and down; the floor of the lecture room has a worn depression in the back corner where he turned.

> "I lecture every day for an hour in public and afterwards give private instruction to a number of pupils."

Initially in 1745 the University's natural history (zoological) collections were housed upstairs, but three years later with the increase in his family they were moved to the newly built orangery (1745). Today much of the original collection is back in its

Figure 5. The summerhouse, now the Museum, at Hammarby.

former quarters (in the room to the right of the lecture room) including the albino squirrel caught near Kungsör in the 1690s and a large dried sturgeon donated by Alströmer.

The end room on the first floor was used by Linnaeus as his study. Today it contains one of his medicine chests, his writing table and his insect cabinet. The original collection of insects it once housed is now in London but it has been restocked with a collection of Swedish butterflies. There is a bed by the wall in which Linnaeus is said to have died. It is quite small, no more than 166 cm (5′6″), whereas Linnaeus was said to be only 154 cms tall (= less than 5′1″). The room in front of the study Linnaeus used for his library, which on his death contained more than 1,600 volumes (see Smith's inventory[1]). From this room Linnaeus could watch over his beloved garden. Two of the original bookcases remain and one of the original herbarium chests.

1 However, by that time most of his more valuable books had been removed to the summer house (museum) at Hammarby for safe keeping.

Figure 6. The interior of the Museum, at Hammarby, showing herbarium chest, lectern-chair ('*plugghäst*') and benches for the pupils.
[From *Linnaeus* by R.N. Gullers of Biger Strandell: Gullers International, Chicago 1977.]

There is a second herbarium chest in the Summer House at Hammarby while a third stands outside the 'strong room' in London. The Swedish Linnean Society have donated a further herbarium cabinet, which contains plants from Stenbrohult where Linnaeus was born. (Linnaeus' geological hammer and axe are also on display in the library.)

The two remaining rooms facing the forecourt are devoted to a display of Linnaeus' scientific works and to miscellaneous collections; many of the latter came to light when the house was being converted into a museum in the 1930s; they include Linnaeus' Lapland pouch, a Lapp shoe and Linnaeus' notebook with Finnish phrases.

In 1758 Linnaeus decided to buy the two small country estates of Hammarby

Figure 7. Linnaeus' study at Hammarby [Note the picture of a whale above the door leading into the bedroom and walls papered with Plumier's drawings].

(including a part of Edeby) about 6 miles from Uppsala and Sävja about 3 miles from Uppsala. He built a completely new house at Hammarby which became his beloved summer retreat. The family lived in a single storey, turf-roofed building while the new house and the barn, opposite, were completed.

A disastrous fire in Uppsala in 1766 so alarmed Linnaeus that he had constructed a kind of summer house, 16′ square (4.8 m^2), small and unheated, on the rocky knoll behind his new house in which to house his collections (including his herbarium and books). This was completed in 1769. Moreover, up until his death he always ensured that the vegetation around his Museum was kept neatly trimmed.

During the summer months Linnaeus would regularly make the journey from Uppsala to Hammarby on foot, while the family would go by horse drawn coach, at the beginning of summer and remain for much of the year. Today, because of the draining of the old glaciated plain between Uppsala and Hammarby and the advance of agriculture, the journey is somewhat monotonous – far different from the pleasant country ramble it would have been in Linnaeus' day.

Figure 8. View from above Hammarby looking across the glaciated plain.

Linnaeus also took with him to Hammarby some of his devoted and favoured pupils, such as Fabricius, who stayed in a local farmhouse.

When staying at Hammarby Linnaeus went to the parish church at Danmark every Sunday. He would walk through the woods (some 4 km) and part way would sit on a glaciated boulder which had a bench-like ledge and smoke his pipe. Secreting his pipe in the bushes he would continue to church accompanied by his dog Pompe. He always sat in the very front right hand pew with his dog (women parishioners sat on the left). If through illness he was unable to attend the dog went alone, and like his master would leave after one hour, regardless of whether or not the sermon had finished! Today the church walls display some 14th century paintings but these had all been whitewashed over in Linnaeus' day[1].

1 In his instructions for burial Linnaeus stipulated that only two bells were to be tolled: the great bell of the Cathedral and the bell in Danmark church.

Figure 9. Linnaeus' grave, Uppsala Cathedral. He lies at rest together with his wife and son, just to the right of the main entrance. In 1798 a 30' (9 m) monument of Älvdal porphyry, incorporating a bronze medallion by Sergel, was placed in a chapel near the grave.

The house and gardens at Hammarby were purchased by the state from Linnaeus' descendants in 1879, and have been restored as far as possible to their original condition, recreating an 18th century domestic setting. This has not been too difficult because all the fireplaces and original wall coverings remained, while on the walls hang portraits of Linnaeus and his wife, daughter, son and family friends.

Linnaeus' study and bedroom are on the first floor and above the door leading into his bedroom is a drawing of a whale and offspring joined by the umbilical cord (see Fig. 7). The walls of the study are papered with proof copies of engravings made from Plumier's original drawings for Burman's *Plantarum Americanarum* (*Bromelia, Theophrasta Tournefortia, Sloanea Myrtus, Solanum, Ipomea* etc. etc.), one of which is a type! – A prize will be awarded to anyone who can tell me which it is. The walls of Linnaeus' bedroom, on the other hand, are papered with coloured proof copies from Ehret, Sloane etc.

Figure 10. Hans Odöö, dressed for the part, on the stone bench on which Linnaeus rested.

Elsewhere in the house are several packs of playing cards, reminding us that card games such as trissett were Fru Linnaeus' obsession (see also Fru Linnaeus' drawing room in the Museum at Uppsala where there are playing cards and a counter box). Despite her ability to run Hammarby as smoothly as the house in town, both Beckmann and Fabricius considered Fru Linnaeus a crude and tiresome woman and Linnaeus to be hag-ridden. Perhaps that is why Linnaeus spent so much time in his "pleasure pavilion on the hill" and regularly took his meals either in his garden or in the nearby grove he had planted at Hammarby.

Acknowledgements

This article is a direct result of a visit to Uppsala I made last summer at the invitation of Hans Odöö, the organiser of Linnaeus Week, and is meant to complement Per Jørgensen's 'Nightly Conversations with Linnaeus'.

Information has been extracted from the Swedish Linnean Society's guide to the Museum and Garden (*Linnaeus and his Garden*, by Gunnar Broberg, Allan Ellenius and Bengt Jonsell) and from notices within the Museum itself. The Museum opens on the 3rd Sunday in May and closes on the last Sunday in September. Note that it is closed on Mondays.

B.G. GARDINER

Library

Readers are warned that from mid July to the end of August we will again have a team of student helpers working in the Library. Inevitably this will mean a certain amount of background noise, dust and the smell of polish as we remove the accumulated grime from the next section of the Library stock. Each time we attempt to bring together books on a particular subject area (we have now done the floras, faunas, cryptogams and evolutionary biology books) we also have to find new locations for the other books which used to occupy those shelves. Thus we have a growing number of books in temporary locations and inevitably these take longer to find as we have to follow a "trail" of clues rather like a treasure hunt. Advance warning can give us a chance to find the book you were hoping to use before you arrive and so minimise the time you may be kept waiting. We always also clean some of the journal stock housed in basement stores, taking a different section each year. This gives us a chance to check on their condition and also to move things around to make room for new accessions. Again, you may find that the journal you want is in a heap on a trolley midway through the polishing process.

The first steps in making some kind of "on-line" catalogue available have been taken. The records of Library accessions over the past ten years have been transferred to a searchable database and we are looking at ways of adding those to the Society's web site. It has not been accomplished yet due to various software and hardware updates now in hand. Keep checking and one day soon you will be able to find out what we have added to the Library. We are currently working on the possibility of an electronic catalogue of the works of Linnaeus. This is an international project with input from a wide number of libraries with holdings of Linnaean material.

Visitors to the Library will have noticed a vast pile of incoming books awaiting cataloguing. This is partly due to lack of time to catch up with much new material which arrived in the early part of the year, but also reflects a number of large donations of material for the autumn book sale: these always yield a considerable number of additions to the Library as we fill gaps in our holdings. John Burton recently brought in material from him and Richard Fitter on conservation and wildlife; Dr Henry Gee has contributed greatly to our material on early man and evolutionary biology and Prof. Brian Gardiner donated a number of entomological and other works. We hope to make some progress in reducing the backlog . Meanwhile we thank all the above and also all those who give us journals, which we do not have space to list separately.

Donations. 1 January to 30 April 1999

Academic Press	Birkhead, T.R. & Moller, A.P. *Sperm competition and sexual selection.* 826 pp., illustr., San Diego, Academic Press, 1998.
Dr D. Baker	Severin, Tim, *The spice island voyage: in search of Wallace.* 367 pp., illustr. some col., map, London, Little, Brown & Co., 1997.
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M. Costello	DUBLIN, Trinity College Environmental Sciences Unit, *An indexed bibliography of Irish Marine literature* compiled by K.S. Kelly, M.J. Costello and others. 243 pp., map, Dublin, Trinity College, 1997.
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Marie de Lourdes David de Freitas	Freitas, Marie de Lourdes David de, *Amazonia, heaven of a New World.* 315 pp., col. illustr., maps, Rio de Janeiro, Editora Campos, 1998.
M.D. Gallagher	Gallagher, Michael, *Snakes of the Arabian Gulf and Oman.* 16 pp., col. illustr., map, Muscat, Michael Gallagher (privately) 1993.
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	Rogers, T.D., *A new list of the birds of Masirah Island, Sultanate of Oman* 48 pp., Oman, Oman Bird Record Committee 1988.
Dr H. Gee	Gorman, James, *The man with no endomorphins, and other reflections on science.* 174 pp., London, Heinemann, 1989.
	Reneham, E.J. Jr., *John Burroughs, an American Naturalist.* 356 pp., illustr., Post Mills VT., Chelsea Green Publishing Co., 1992.
	Rivinus, E.F. & Youssef, E.M. *Spencer Baird of the Smithsonian.* 228 pp., illustr., Washington DC., Smithsonian Institution, 1992.
	Wilbur, K.M. ed., *The Mollusca*, Vol. 12: *Paleontology and neontology of cephalopods* ed. by M.R. Clarke & E.R. Trueman. 355 pp., illustr., maps, San Diego, Academic Press, 1988.
Dr K. Harrison	Mills, R.A. & Harrison, K. eds., *Modern ocean floor processes and the geological record* (*Geol. Soc. Special Publ.* no 148). 303 pp., illustr. some col., maps, London, Geological Society, 1998.
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Prof. A. Lucas	Home, R.W. & others. eds. *Regretfully yours, selected correspondence of Ferdinand von Mueller* Vol. 1, *1840–1859.* 842 pp., illustr, col. frontisp., maps, Berlin, Peter Lang, 1998.
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G.B. Ritchie	EDINBURGH, Royal Zoological Society of Scotland, *The Darwin maze.* 63 pp., illustr., Edinburgh, Royal Zool. Soc. of Scotland, 1995.
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Prof. W.T. Stearn	Stearn, W.T. ed., *John Lindley 1799–1865, Gardener-Botanist and pioneer orchidologist.* 232 pp., illustr. some col., Woodbridge, Antique Collectors' Club & RHS, 1999.
Prof. B. Valdes	Aguilar, Francesco Pinal & Valdes, Benito Castrillo, eds., *La Obra Botanica de Trigueros en Carmona, 1779–1785 ...* 322 pp., Carmona, Ayuntamento de Carmona, 1998.
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J.C. Yaldwyn	Yaldwyn, J.C. & Hobbs, J. eds. *My dear Hector, letters from J.D. Hooker to James Hector, 1862–1893.* 292 pp., illustr, col frontisp., Wellington, Museum of New Zealand, 1998.

Book Reviews

Evolution (Second Edition) by Colin Patterson. Natural History Museum, London, UK, 1999, ix + 166 pp., colour plate, monotones line drawings, maps, H/B ISBN 0-565-09134-4, £28.00, P/B ISBN 0-565-09133-6, £14.99.

"It is only in multicellular organisms, in which reproductive potential is confined to the gametes, that there evolved the burden we all carry – the certainty of death" (p. 139). With an unintentional irony that would no doubt have greatly amused him, Colin Patterson mailed these words to his publisher three days before his own untimely demise. Thus, this second edition of his well-regarded evolutionary textbook must

stand as the last testament to his formidable will. Is it a fitting tribute to one of the great biological polymaths of the 20th Century.

The 21 years separating the second edition from the first have witnessed many relevant advances that allowed Patterson to double the size of the book and expand many sections. Wholly new chapters cover neutral evolution and the molecular clock plus gene families and gene evolution, while new sections compare selection with genetic drift, contrast science with politics, elucidate the "RNA world", and tackle human and linguistic origins; in short, the main additions to the book predictably document the nucleic acid sequencing revolution of the recent past.

Patterson's glossary-supported prose is characteristically lucid and entertaining, and he unashamedly deploys the first person to emphasise his sometimes radical views. Yet anyone familiar with his more conceptual papers and uncompromising long-term advocacy of his own brand of Cladistic philosophy may be surprised at the open-mindedness and paucity of evangelism exhibited here (most notably, the crucial choice between "traditional" and phylogenetic classifications is left open on p. 105). On the surface, much of the book is as traditional as the cover image of an aged, quizzical Darwin. Phenotype variation precedes mechanisms of heredity, which is followed by genotypic variation, mutation and natural selection. The switch to empiricism inherent in 'Selection in action' reintroduces many old (and, typically for mainstream evolutionary tomes, zoocentric) favourites such as sickle-cell anaemia, industrial melanism, haemophilia among European 'blue-bloods' and the evolution of social structure in gregarious insects. Although familiar territory, each case-study is refreshed by Patterson's supercritical eye.

At this point, explanatory boxes are phased out and the text becomes more heterodox. Chapters grade into largely self-contained essays that cover topical issues such as neutral molecular evolution, gene trees versus species trees, evolutionary case-studies from the Galapagos, the origin and early evolution of life, and human evolution.

The blood pressures of many orthodox neoDarwinians will probably rise in response to the author's provocative open-mindedness. In the preface he contrasts the first and second editions as reflecting a switch in his own mind from "the knowledge ... that neoDarwinism is certainty" to "the knowledge ... that evolution is certainty," adding that "the ignorance in this [second] edition is of the completeness of neoDarwinism specifically, of natural selection, especially directional selections as an explanation of evolution." Patterson's omission of the otherwise ubiquitous Hardy-Weinberg equation for allele frequencies, his cautionary comments regarding supposed measures of fitness, his advocacy of drift *sensu lato* and (obliquely) of eukaryotic endosymbiosis as major evolutionary forces, and his willingness to consider the merits of saltational evolution (my own predilection, albeit here mischievously labelled 'hopeful monsters') and of the possible extra-terrestrial origin of life, may earn further brickbats. Others will deplore occasional deviations into politics (both academic and real), or the author's characterisation of cultural evolution as Lamarckian within the concluding critique of sociobiology. Yet for me these deliberate acts of intellectual bravery are the strengths rather than the weaknesses of the book, eliciting much thought and extensive emarginations.

Rather, my concerns focused not on what is in the book but on what is not. Despite Patterson's overt scepticism of "panselectionism", several credible supraDarwinian evolutionary mechanisms escape explicit discussion: examples, of varying degrees of controversy and supporting evidence, include shifting balance (despite the incorporation of a microbiography of its 'founder', Sewall Wright), species selection, adaptive mutation, meiotic drive, chromosomal rearrangements and shifted reading frames. Also, it seems to me a pity that a leading Cladist should omit the increasingly used phylogenetic falsification tests for adaptation, preadaptation and saltation, and for determining the number of origins of specific features of organisms – admittedly these tests are philosophically weak, but they are nonetheless the best currently available. And lastly, the desire for brevity has left no room for meaningful citation – to choose a non-random example, the final figure in the book, which compares a putative phylogeny of human races with an even more speculative phylogeny of their languages, is attributed to a secondary source; neither the primary source (L.L. Cavalli-Sforza *et al.*, 1988, *Proc. natl. Acad. Sci. USA* 85: 6002–6006) nor subsequent detailed critiques (e.g. R. M. Bateman *et al.*, 1990, *Current Anthropol.* 31: 1–24, 177–183) are mentioned.

For me, these few perceived flaws are more than outweighed by the fact that this book contains all the essentials of evolutionary theory in a single, enjoyable, original, utilitarian and affordable volume. Dog-eared copies of *Evolution* should adorn the bookshelves of all evolution-oriented researchers, and will surely provide unusually stimulating set reading for those undergraduate classes that escape the constraints of faint-hearted tutors.

RICHARD M. BATEMAN

A Naturalist's Shetland by J. Laughton Johnston, illustr John Busby, publ. Academic Press, San Diego, Calif., USA for Poyser Natural History, (1998), xii + 506pp., line drawings, colour plates, maps, H/B ISBN 0-85-661105-0, $US49.95, £27.95.

The publication in 1980 of *The Natural History of Shetland*, by R.J. Berry and J.L. Johnston in the Collins New Naturalist Series brought the first comprehensive account of the natural history of Shetland. J. Laughton Johnston's *A Naturalist's Shetland* is an updated version of this; but it also brings current preoccupations with bio-diversity and conservation into sharper focus.

For the authors of the 1980 book Shetland is "a gigantic field laboratory giving fundamental information about the reaction and resistance of living organisms to their environments." This theme is brought to fruition in the current volume with chapters on the natural processes affecting colonisation by plants and animals in the early post-glacial, seen in the context of Shetland's isolation in a northern ocean, together with detailed treatment of the impact of man on this "fragile skin."

The book is well-served by its other contributors. There is a masterly study of the geology and geomorphology of Shetland by D. Flinn and a comprehensive account by R. Riddington and D. Okill of bird migration in relation to Fair Isle. John Busby's sketches unerringly capture the jizz of Shetland's landscapes.

There are chapters which identify the important plants, birds and animals of Shetland, both terrestrial and marine, and also its specialities. Other sections explain the roles of generations of Shetlanders in shaping their environment; others relate the increasing impact of the outside world, not least that of the oil industry.

The bibliography, glossary of Shetland words, suggestions for places to visit and comprehensive lists of species make this an indispensable reference book. It has to be said that those species lists which indicate frequency are much more helpful than those that do not.

Shetland is fortunate in having a distinguished naturalist who is also a splendid communicator. No community, natural or human, could find a better ambassador.

R. WESTON

A guide to the official archives of the Natural History Museum, London by John C. Thackray publ. by the Society for the History of Natural History on behalf of the Natural History Museum, London, 1998, xix + 174 pp. 14 b/w photographs, H/B. ISBN 0-901-843-08-3, £25 (US$42) reduced price of £18.75 (US$32) to members of the Society for the History of Natural History.

This attractively bound, slim dark green hardback is much more than a mere listing of archives held by the Natural History Museum and will be an indispensable tool to anyone working on anything relating to the history of natural history in Britain. After a preliminary discussion on "scope", "arrangement" and "access" a concise history of the museum to 1997 is squeezed into 4 pages, including a striking picture of one of the old fossil mammal Galleries. Nine sections follow on each of the administrative divisions within the Museum, including a short description of the way each section operated, its history and sometimes brief biographies of key personnel and a list of periods of service, together with any bibliographic sources. This is followed by a list of the Classes into which the archives are divided, giving their class number. Each of these in turn has a descriptive text and a listing of the date of transfer, the number of items, the shelf length, the code and whether or not the material has been microfilmed.

Obviously the size of each section varies greatly, from 36 pages from the Section B: the Directors Office to a more representative 18 pages for Section G: Department of Botany. The last two Sections, H and J deal with the unofficial archives and the Zoological Museum at Tring. A 10 page index by personal, institutional and ship names gives the different section numbers in which entries may be found. The text is illustrated by 14 fascinating black and white photographs showing galleries, people and collections. The binding looks strong and will need to withstand constant use as a essential sourcebook.

G. DOUGLAS

Lichen Atlas of the British Isles, edited by M.R.D. Seaward, Fascicle 1. Introduction and Parmelia (1995), ISBN 0-9523049-2-9. Fascicle 2. Cladonia Part 1 (59 species) (1996), ISBN 0-9523049-3-7, Fascicle 3. The foliose Physciaceae (Anaptychia, *Heterodermia*, *Hyperphyscia*, *Phaephyscia*, *Physcia*, *Physconia*, *Tornabea*, and eight miscellaneous small genera (1998), ISBN 0-9523049-6-1. London, British Lichen Society. Unpaginated, price £8.50 per fascicle, ring binder £5.50.

These three volumes represent just a part of over 30 years labour. In August 1964 the British Lichen Society (BLS) launched its lichen mapping scheme, inviting the entire Society membership to submit distribution records on the familiar A5 'tick-off' record cards. A further decision, in the mid-1970s was made to collate records by computer. So the Society's Mapping Recorder (this Atlas's editor) gathered enormous numbers of records from a project which actually stimulated considerable fieldwork. The Society also deliberately based field meetings in under-visited parts of the country. In the meantime, data were made available for production of several county floras by independent authors, and for the British lichen floras of Duncan (1970) and Purvis *et al.* (1992) and the checklists of 1980 and 1993. The project, however, always sought to answer the question of how to publish large numbers of maps at an affordable price and how to compile efficiently the necessary descriptive sections. As an interim measure, provisional maps of selected species were published in the Society's journal *The Lichenologist* or were privately circulated, and a slim volume funded by NCC appeared in 1982.

Why was this task of collating records and publishing the information so enormous? Firstly, over 1700 lichen taxa exist in the UK, from potentially 3853 10-km grid squares. Secondly, lichen specialists, unlike those concerned with flowering plants, are somewhat scarce. Thirdly, the so-called 'lower plants' seem rarely to merit sufficient attention from funding bodies.

About 20% of the British and Irish BLS membership submitted records over the years. By December 1994 some 95.6% of the 10 km squares in mainland Britain had been visited and the project was felt mature enough for an authoritative publication. This was designed to be a modest production, consistent with the labour available for its compilation. It was also to be inexpensive, as around 4000 pages will need to be produced eventually, and further pages of updates and revisions will be included as new information comes to light. The maps are therefore being issued as fascicles of around 50–60 taxa, three having appeared so far. They are of loose-leaf format, A4 in size with two sides per taxon. One side bears the map, date, name and major synonyms, while the reverse offers invaluable summary details. The large maps bear black dots and white circles indicating post- and pre-1960 British and Irish distribution. This date interval is particularly useful for assessing the impact of air pollution and its subsequent amelioration since the clean air legislation of the 1960s. The reverse of each page includes details of Substrate (*sic*, substratum), Ecology, Phytosociology and associated species. Status (in the UK), Conservation (estimate of threat), World distribution, identification notes, Other observations and Key literature sources.

Fascicle 1 includes an account of the history of the project, while the introductions to subsequent fascicles are necessarily brief. However, some genera such as *Lobaria*,

are accorded additional pages of introductory material apparently depending on the author's interests.

The pages are un-numbered to allow alphabetical insertion of further genera and species to be distributed in future fascicles. This format also allows inclusion of updates for previously published taxa. Finally the Society provides a large spine-printed four-'D shaped' ring binder capable of taking about 4–5 fascicles. The whole production is notably inexpensive.

Many authors have been involved in the Atlas' production. The Mapping Recorder prepares maps when the data appear mature enough for dissemination. These are then circulated to various experts who write the details and are suitably accredited in the latest fascicle. Finally, considerable revision is done by the contributors to ensure accuracy and consistency.

It is difficult to find fault with a product of such worthy aims and comprehensive cover. The maps themselves justify the price as their geographical coverage is obviously extremely thorough, with no sign of the suspicious white holes that suggest under-recording, at least in mainland Britain. But the absence of dots in Ireland is very noticeable. The text guides the reader to the main distributional features of each taxon. Thereafter the reader can make his/her own assessments. To help in this, especially to guide students and overseas users, it would be nice to see some summary maps included giving background information such as geology, climate, altitude, population, etc. Maybe a future fascicle could address this? It is also a pity that the conservationist cannot find the endangered status of the lichens here. We need to look this up elsewhere in the Habitats Directive, National Red Data Book and Wildlife and Countryside Act Annexes.

The policy of the society seems to be to produce fascicles regularly, about every year or two. The volumes are actually very good value for money, especially as a wealth of precise data is included for each taxon. This information is as useful to the phyto-sociologist, ecologist and conservationist as to the Lichen specialist, and is presented in a very readable form.

Costs have obviously precluded colour pictures which would surely round off this production. However, this far-sighted society is preparing a series of CD-ROMs, that for Fascicle 1 (*Parmelia*), being already available, again at a very reasonable cost. So, with the availability of a recent and comprehensive British flora, CD-ROMs and this Atlas, no-one can complain about lack of information as far as the lichens are concerned.

ANTHONY FLETCHER

Obituary

Eulogy for Emeritus Professor Brian William Fox FLS
(Read at his funeral)

Brian was born in Ammanford in South Wales in 1929 and as a boy attended Ammanford Grammar School. The family then moved to Lancashire in 1941 where Brian continued his grammar school education. He then became an undergraduate at Kings College, Durham University in 1947 where he read Chemistry and went on to obtain his doctorate in Chemistry in 1954.

Brian did his national service in the army for 2 years, based mainly in Chester after which he worked at the Christie Hospital and Holt Radium Institute in Manchester. He was briefly recalled for service in Egypt when the Suez crisis broke out but then returned to the Christie where he began his career in cancer research in earnest. As a result of an interview at the institute, he met Margaret Partington who was later to become his wife and work colleague. Years later, Margaret and Brian enjoyed several well earned and exciting trips abroad cruising on the Caledonian Star.

Brian had a long and distinguished career in the Paterson Institute at the Christie Hospital spanning nearly 40 years from 1956 to 93. His contribution to cancer research was recognised by the award of a personal chair by the University of Manchester in 1980 and by his appointment as Deputy Director of the Paterson Institute in 1984. His achievements are legion, but he will be best remembered for his inspirational role in the establishment of the Cancer Research Campaign phase 1 and 2 Clinical Trials Group, where he served as the operational Secretary from 1980 until 1992. The methods established by this group are internationally recognised as setting new standards for the introduction of drugs into the clinic. Many countries have subsequently adopted similar systems based on this model, which serves as a suitable mark of Brian's contribution to cancer therapy. His involvement in international drug research was reflected in his membership of a number of bodies including the European Organisation for Research in the Treatment of Cancer and the Screening and Pharmacology Group, of which he was vice chairman and then chairman. He was a member of the New Drug Development Committee of the European Organisation for Research in the Treatment of Cancer and a member of its council. He was also involved in the Joint Steering Committee of a prestigious body involving the National Cancer Institute of the USA, the Cancer Research Campaign and the European Organisation for Research in the Treatment of Cancer. Brian's death has meant the loss of an irreplaceable encyclopaedic knowledge of anti-cancer drugs. However, his scientific philosophy and integrity live on in the work of the many students and colleagues who thrived under his guidance.

In addition to his major interests and important contributions at the Christie, Brian had many interests and hobbies. These covered the arts, science and sport. Brian was a keen skier and cyclist and enjoyed music and the theatre and was an accomplished pianist and organist and after the sad death of Margaret in 1993 he learnt yet another new skill... cooking. He was a full active member of the Manchester Artists and Alderley Edge Artists groups and of course of the Stockport Art Guild to whose inner circle he most recently was awarded membership. He was also a member of the

Manchester Philosophical and Literary Society. However, it is in natural history and especially the study of lichens that Brian made the most significant contributions. Brian's work was as extensive and as respected as that of any of those involved in the full time study of these subjects. He was a founder member and active president of the New Mills Natural History Society and past president of the North Western Naturalists' Union. On the international scene Brian was a past president and active member of the British Lichen Society and a member of the prestigious Linnean Society with special responsibilities for the Jill Smythies prize (for published botanical art); he was also the Reviews Editor. Brian led study groups and meetings of all of these learned societies in Manchester, London and Liverpool and on walks in all parts of the British Isles and especially in his beloved Derbyshire. His books, papers and reports will form a substantial contribution to the annals of natural history to be consulted by many who follow in his footsteps.

Professor Brian Fox was therefore a loving brother, son and husband, a scientist, a teacher, a mentor and above all a friend. He will be sadly missed, greatly respected and fondly remembered by his sister Mary, relatives, friends and by colleagues who knew Brian over the years and who now live and work in all parts of the world.

Truly, this was a remarkably full and busy life, a life's work well done.....

NIGEL PACEY
