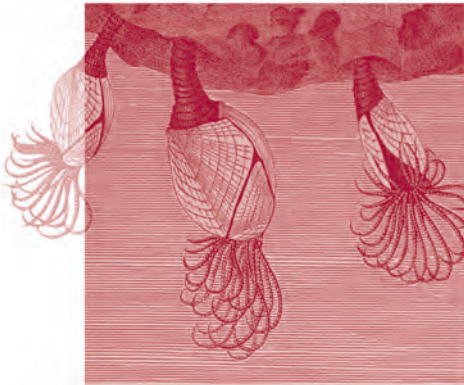




The Linnean



Carl Linnaeus
1707-1778

NEWSLETTER AND PROCEEDINGS OF THE LINNEAN SOCIETY OF LONDON

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A forum for natural history

THE LINNEAN SOCIETY OF LONDON

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THE LINNEAN

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Editorial

This issue marks the 150th anniversary of the publication of the *On the Origin of Species* (24th November) and contains three articles, two of which were commissioned.

The first article gives a graphic account of Darwin and his encounters with the hunter-gathering people of eastern Tierra del Fuego. Apparently he could not believe that such wretched savages belonged to the human race! Later he noted that their language was inarticulate “according to our notions” and describes their wigwams as being the size of a haycock, thatched on one side and used only for a few days since they were nomadic hunter-gatherers, compelled to wander from spot to spot. The article concludes with a short note on the differences between Bates’ and Darwin’s approach to the human dimensions of their experiences in South America.

The article on Darwin’s lichens recounts how they came to light and then sets them in their correct historical and geographical perspective (Acharius – Linnaeus’ last student recorded 906 species in 43 years). Darwin, with his collection of lichens, proved to be the catalyst of Southern Hemisphere Lichenology, not only collecting from Tierra del Fuego but also from the rain forests of Chiloé and the Chonos archipelago. Darwin’s lichens were sent to Kew where Hooker made use of them in his *Flora Antarctica*. Finally, Darwin also collected three new lichen species on the Galapagos.

The third article points out that the theory of evolution by Natural Selection is the keystone of modern life sciences. It later traces the impact Darwin had on the fixity of species, an idea which goes back to Linnaeus himself who used it in his search for a ‘Natural Classification’. It then deals with the problem of perfection in living organisms and the implication of stasis. From there it confronts the struggle for existence and the relationship between genotype and phenotype, not terms used by Darwin although he was well aware of the importance Natural Selection had for/on ontogeny. The article concludes with Paley’s watch and earthworm activity.

This issue also contains the Minutes of the Anniversary Meeting 2009 plus, as usual, news from the Executive Secretary and the Library. In addition there are three obituaries of Fellows who have died recently and a review of the English translation of *Musa Cliffortiana* – *Clifford’s Banana plant*. I have to remind you that this is the last issue of *The Linnean* for this year. Next year (and thereafter) there will be only two issues – in March and September – but *Pulse* will be circulated in the gaps.

BRIAN GARDINER

Editor

Society News

By the time this issue of *The Linnean* is published, we will be almost at the end of Darwin 200! We will, however, still have one of the most significant dates within the year to look forward to. November 24th 2009 marks the 150th anniversary of the publication of *On the Origin of Species*, a volume that challenged and changed many people’s thinking and continues to create debate today!

I'm writing this, having just turned over the calendar; it's September 1st – a year to the day since I took up the role of Executive Secretary. This too has been a time of challenge and change (and much enjoyment!), and this provides a further opportunity to say thank you for everyone's support and forbearance in this first year! The last twelve months have been a time of personal change – including a house move, and a wedding! – and the Society's meetings programme, particularly over the last 6 months has focused on the many challenges and changes affecting science, scientists and us all.

In April, the Government Chief Scientific Adviser, Professor John Beddington gave the Annual Biodiversity Policy Lecture, "Biodiversity in a Changing World" highlighting the importance of understanding biodiversity in developing policies to meet the many global challenges we face. Our joint meeting with the World Land Trust "The Great Ape Debate" focused on how to best ensure the survival of Orangutans – rehabilitation and reintroduction or preservation of natural habitat? This meeting was "live-streamed" from our website enabling many who could not attend in London to view the proceedings.

Our meetings in May continued the theme of change and challenge as Professor Janet Browne reflected on "Two Hundred Years of Evolution" as part of the Burlington House Lecture Series (see p68 for information about the next lecture), and in a meeting organised by Dr Sandra Knapp, "The Future of Plant Genetic Resources", in honour of Professor Jack Hawkes, PPLS, a programme of international speakers reflected on the critical importance of genetic resources to a growing human population. In June, the Earl of Selborne reviewed the House of Lords Reports on Systematics and Taxonomy produced over the last decade, highlighting the continuing challenges facing



The President and his wife with the bride and (left) *Linnaea borealis* painted on her wedding dress.

these fields, and challenging the taxonomic and systematic communities to work for positive change. Patricia Wiltshire reflected on the significant role of Forensic Ecology in contributing to criminal investigation and in a two-day meeting with the Royal Society of Tropical Medicine and Hygiene, organised by Professor David Molyneux and Dr Vaughan Southgate, speakers reflected on the issues facing the future development of policies and their relevance in the area of biodiversity, infection and global health.

It was a great delight to see so many assembled on July 3rd to celebrate the life of John Marsden, who brought such significant and dynamic change to the Linnean Society! Our *Conversazione* on July 9th was an opportunity to celebrate further innovation within the Society with the launch of the new Virtual Tour; this can be downloaded from the homepage of the Society's website.

The Virtual Tour, the digitisation of the Linnean Collections and our meetings programme all serve to increase the accessibility of the Society and to underline its important role as a Society steeped in tradition, but with a significant contribution to make to contemporary science, debate and discussion during these times of change and challenge. The Society's Fellows constitute a very large body of experts within the broad field of Natural History which Council feels could have a very significant impact on future developments in the Biological world. Would you be prepared to share your expertise and encourage others to get involved? If so, please complete the Fellows Survey enclosed with this issue and help us to meet the challenges!

RUTH TEMPLE
Executive Secretary

Call for Nominations for Medals and Awards 2010

Nominations are now sought for the Society's Medals and Prizes to be awarded in 2010. These are the **Linnean Medal for Botany**, the **Linnean Medal for Zoology**, the **Darwin-Wallace Medal**, the **Bicentenary Medal** (to be awarded to a Botanist in 2010), the **HH Bloomer Award** (to be awarded to a Zoologist in 2010), the **Irene Manton Prize** and the **Jill Smythies Award**.

If you would like to nominate an individual for either of the Linnean Medals, the Bicentenary Medal or the HH Bloomer Award, please forward their details and the reasons for their nomination (no more than 1 side of A4) with names and confirmation of the proposer and a seconder to the Executive Secretary by 31st December 2009. The proposer and seconder must both be Fellows of the Linnean Society of London. (The proposer and seconder may submit electronic signatures/verification via e-mail to the Executive Secretary.)

If you would like to nominate an individual for either the Irene Manton Prize or the Jill Smythies Award, please see the Society's website for more detailed guidelines and/or nomination forms <http://www.linnean.org/index.php?id=330>.

Library

I am delighted to report that our bid to the Wellcome Trust, for funding to catalogue the correspondence of Sir James Edward Smith, was successful. As a consequence, a lot of our time and energy over the past few months has gone into planning for the start of the project. The advertisement has gone out for an Archivist to work here part-time for nine months and we hope to have the successful candidate in post by mid- to late October. Cataloguing of the letters will be the first stage in making this material much more accessible and links will be created from the catalogue records to other resources, such as the biographical and biological content already available in databases created for the Linnaean and Smithian biological collections. Once the cataloguing is completed, we shall be looking for funding for the conservation and eventual digitisation of the letters.

The digitisation of the Linnaean insect collection has now been completed and the last of the specimens were returned to the Society in July. It is hoped that the images will go up online later this year after they have been checked and all the relevant data has been attached.

During the summer, we became concerned about changes in the appearance of the Collier portrait of Charles Darwin, which hangs in the Meeting Room. The canvas seemed to have developed some gentle undulations. We consulted a picture conservator who recommended that the canvas needed re-lining and that the work should be carried out without too much delay. We agonised over losing Darwin during his anniversary year, but it was decided that the work could not wait. The portrait has had to be removed to the conservator's studio and some of you will have seen the forlorn empty frame hanging in the Meeting Room. We expect that the work will be completed and Darwin will be back in his rightful place by mid-October.

Several other items from the Society's collections have also been on the move recently. The Lincecum letter that was on loan to the Darwin exhibition at the Natural History Museum was safely returned to us in April when the exhibition closed. The focus then switched to items associated with Robert Brown, President of the Society from 1849-1853. Professor Cutler transported Robert Brown's microscope to Kew in order to re-create the experiment which resulted in the discovery of Brownian Movement. The experiment was filmed and formed part of the programme *The Cell* which was broadcast in August. The Sedgwick Museum of Earth Sciences in Cambridge has borrowed Brown's seal for the exhibition *Darwin the Geologist* which opened at the beginning of July.

Requests for tours of the Society's rooms and collections are on the increase. We have given tours to the usual summer school groups from Michigan, Harvard, Georgia and Maryland and we have also hosted visits from the Anglo-Swedish Group, the Stanmore Strollers, Kensington and Chelsea National Trust Group, the London Committee of the Heritage Lottery Fund, the Friends of Sydney Botanic Gardens, the British Association of Paper Historians and library staff from the Royal Society, the London Library and Kings College Special Collections.

Members of the Library staff have recently attended two excellent seminars at the Royal Society; one examining the interpretation of museum exhibits and displays and

the other entitled *The changing face of learned and professional societies' libraries*.

Our volunteers continue to do sterling work for us. The cataloguing backlog has been dealt with, thanks to Lucy and Pia. Lucy has now joined Janet to work on cleaning the Smith herbarium specimens and Pia is concentrating on adding details of early 20th century Fellows to the database. John Sellick has completed the transcribing of the large Swainson and MacLeay correspondence collections and has now started work on some smaller collections. Alan Brafield is about to start on sorting and listing a collection of material on John Hooper and his bat-ringing research.

LYNDA BROOKS

Librarian

Donations March - August 2009

Dr José Antonio Amaya. Amaya, J.A. *Mutis, apóstol de Linneo: historia de la botánica en el virreinato de la Nueva Granada, 1760-1783*. 2 vols. Bogotá: Instituto Colombiano de Antropología e Historia, 2005. ISBN 9588181321.

Janet Ashdown. Lyle, T. and Wheeler, S. *The wildlife of the Mudchute*. 35p. London: The Mudchute Association, 1983.

David Atty. Atty, D.B. *Coleoptera of Gloucestershire*. 136p. Cheltenham: The author, 1983.

Dr Halina Bednarek-Ochyra. Bednarek-Ochyra, H. [et al]. *The liverwort flora of Antarctica*. 236p. Krakow: Polish Academy of Sciences, Institute of Botany, 2000. ISBN8385444742.

Professor R.J. Berry. Berry, R.J. and Noble, T.A. [eds]. *Darwin, Creation and the Fall*. 208p. Nottingham: Apollos, 2009. ISBN 9781844743810.

Dr Heather A. Binney. Battarbee, R.W. and Binney, H.A. [eds]. *Natural climate variability and global warming: a holocene perspective*. 276p. Chichester: Wiley-Blackwell, 2008. ISBN 9781405159050.

Anders Björck. Franklin, A. and Ullhagen, B. *Isblommor*. 106p. Växjö: Artea, 2008. ISBN 9789185527175.

Botanical Society of the British Isles. Murphy, R.J. *Fumitories of Britain and Ireland*. 121p. London: Botanical Society of the British Isles, 2009. BSBI handbook no.12. ISBN 9780901158406.

Bristol Cultural Development Partnership. Padel, R. *A voyage round Charles Darwin*. 40p. Bristol: Bristol Cultural Development Partnership, 2008. Kelly, A. and Kelly, M. [eds]. *Darwin: for the love of science*. 250p. Bristol: Bristol Cultural Development Partnership, 2009. ISBN 9780955074226.

Jeff D. Bull. Attenborough, D. *The first Eden: the mediterranean world and man*. 240p. London: Collins/BBC Books, 1987. ISBN 0002198271.

Margaret Campbell. Campbell, M. *The tree of life*. 229p. Hobart: [s.n.], 2009. ISBN 1876261528.

Eric J. Clement. Poland, J. and Clement, E.J. *The vegetative key to the British flora: a new approach to naming British vascular plants based on vegetative characteristics*. 526p. Southampton: John Poland, 2009. ISBN 9780956014405.

Kevin Collins, Cathy Collins and Alex George. Collins, Kevin, Collins Kathy and George, Alex. *Banksias*. 376p. Melbourne: Bloomings Books, 2008. ISBN 9781876473686.

Joan Cramphorn. Cramphorn, J. *A guide to the classification and distribution of living fishes frequenting fresh and brackish waters*. 17p. London: The author, 2008.

Hui, Tam Hoek. *The Borneo suckers: revision of the Torrent Loaches of Borneo (Balitoridae, Gastromyzon, Neogastromyzon)*. 245p. Kota Kinabalu: Natural History Publications (Borneo), 2006. ISBN 9838121053.

Professor Giovanni Cristofolini. Cristofolini, G. and Managlia, A. *Il giardino di Darwin: l'evoluzione delle piante = Darwin's garden: the evolution of plants*. 239p. Torino: Umberto Allemandi & Co., 2009. ISBN 9788842217411.

Helga Crouch. Crouch, H. *Drawn to nature*. 38p. [London: Jonathan Cooper, Park Walk Gallery], 2008.

David Donaldson. Donaldson, D. "A really good gardener": *Thomas Corbett, head gardener at Pencarrow (1837-1848)*. 30p. [s.l: s.n, s.d]. Pencarrow occasional paper no.4.

Professor Desmond Donovan. Bizikov, V.A. *The shell in vampyropoda (cephalopoda): morphology, functional role and evolution*. 88p. Moscow: Ruthenica, 2004. ISBN 5873171823.

Ragg, Lonsdale. *Some of my tree friends*. 31p. London: De La More Press, [s.d.].

Gina Douglas. Du Chatenet, G. *Faune et flore de Martinique*. 64 p. Paris : Editions Gallimard, 1998. ISBN 2070514668.

Pouillot, G. *Apiculture en Loiret*. 168p. Gien: Le Cercle de Cartophiles du Loiret, 2006. ISBN 2951761732.

Seth-Smith, D. *Adventures with the zoo man*. 224p. London: Sir Isaac Pitman & Sons Ltd., 1937.

Dr John Edmondson. Dann, P. *One for the pot: a small book about tea*. [53]p. London: Elm Tree Books, 1985. ISBN 0241116910.

Dr Brent Elliott. Stove, D.C. *Darwinian fairytales: selfish genes, errors of heredity, and other fables of evolution*. 345p. New York: Encounter Books, 2007. ISBN 1594031401.

Joel T. Fry. Dion, M. *Travels of William Bartram reconsidered*. 111p. Philadelphia, PA: Bartram's Garden, 2008. ISBN 9780615257488.

Jeanette Fryer. Fryer, J. and Hylmö, B. *Cotoneasters: a comprehensive guide to shrubs for flowers, fruit and foliage*. 344p. Portland, OR: Timber Press, 2009. ISBN 9780881929270.

Professor Brian Gardiner. De Rijke, V. *Duck*. 191p. London: Reaktion Books, 2008. ISBN 9781861893505.

Dr A.C. Hamilton. Hamilton, A.[ed.]. *Medicinal plants in conservation and development: case studies and lessons learnt*. 84p. Salisbury: Plantlife International, 2008. ISBN 9781904749158.

Hamilton, A. and Hamilton, P. *Plant resource conservation*. [In Chinese.] 312p. 2008. ISBN 9787802098763.

Dr Melissa Hardie. Dare, D. and Hardie, M. *A passion for nature: 19th century naturalism in the circle of Charles Alexander Johns*. 275p. Penzance: Patten Press and Jamieson Library, 2008. ISBN 9781872229584.

Dr S.M. Haslam. Haslam, S.M. *The reed: Phragmites australis (CAV.) Trin. ex Steud.* 28p. Norwich: British Reed Growers Association, 2009.

Haslam, S.M. *The riverscape: and the river*. 404p. Cambridge: C.U.P., 2008. ISBN 9780521839785.

J.D.M.H. Henderson. Gould, J.L. and Gould, C.G. [eds]. *Life at the edge*. 162p. New York: W.H. Freeman, 1989. ISBN 0716720116.

Dr J.M.I. Klaver. Klaver, J.M.I. *European scientific expeditions to the Arab world, 1761-1881*. 255p. Oxford: OUP, 2009. ISBN 9780199568895.

Dr Sandra Knapp. McNulty, E. *Missouri Botanical Garden: green for 150 years, 1859-2009*. 214p. St Louis: Missouri Botanical Garden, 2009. ISBN 9780615249667.

Professor Dr H.W. Lack. Lack, H.W. *Franz Bauer: the painted record of nature*. 130p. Wien: Verlag des Naturhistorischen Museums, 2008. ISBN 9783902421302.

Lack, H.W. *Alexander von Humboldt and the botanical exploration of the Americas*. 278p. Munich: Prestel Verlag, 2009. ISBN 9783791341422.

Dr Hugh Loxdale Thompson, D'Arcy W. *A bibliography of Protozoa, sponges, coelenterata and worms including also the polyzoa, brachiopoda and tunicata for the years 1861-1883*. 284p. Cambridge: Cambridge University Press, 1885.

Professor Gren Lucas. Lindley, J. *The vegetable kingdom ...* 3rd ed. 908p. London: Bradbury & Evans, 1853.

Loudon, J.C. *An encyclopedia of plants ...* 1159p. London: Longman, Rees, Orme Brown & Green, 1829.

Iain McCalman. McCalman, I. and Erskine, N. [eds]. *In the wake of the Beagle: science in the southern oceans from the age of Darwin*. 192p. Sydney: University of New South Wales Press, 2009. ISBN 9781921410949.

James McCarthy. McCarthy, J. *Monkey puzzle man: Archibald Menzies, plant hunter*. 223p. Dunbeath: Whittles Publishing, 2008. ISBN 9781904445616.

Michael McCarthy. McCarthy, M. *Say goodbye to the cuckoo*. 243p. London: John Murray, 2009. ISBN 9781848540639.

James MacEwan. Amory, Michael Heathcoat. *The oaks of Chevington Barton*. 219p. London: Adelphi Publishers, 2009. ISBN 9780956238702.

Professor Conley McMullen. McMullen, C. *Flowering plants of the Galápagos*. 370p. Ithaca, NY: Comstock Publishing, 1999. ISBN 9780801486210.

Richard Milner. Milner, R. *Darwin's universe: evolution from A-Z*. 488p. Berkeley, Calif.: University of California Press, 2009. ISBN 9780520243767.

Dr Masahiko Miyata. Natural History Museum and Institute, Chiba. *Carl von Linné as the root of natural history*. 297p. Tokyo: Bun-ichi Sogo Shuppan Co. Ltd., 2008. ISBN 9784829901298.

Dr Staffan Müller-Wille. Müller-Wille, S. and Rheinberger, H.-J. [eds]. *Heredity produced: at the crossroads of biology, politics and culture, 1500-1870*. 496p.

Cambridge, Mass.: MIT Press, 2007. ISBN 9780262134767.

Dr E.C. Nelson. Drake, J. *Wood & Ingram: a Huntingdonshire nursery, 1742-1950.* 260p. Huntingdon: Cambridgeshire Gardens Trust, 2008. ISBN 9780953854219.

Green, P. *Flora of County Waterford.* 401p. Dublin: National Botanic Gardens of Ireland, 2008. ISBN 978075776078.

Miskerry, C. [ed.]. *Chatham Islands: heritage and conservation.* 205p. Christchurch, NZ: University of Canterbury, 2008. ISBN 9781877257780.

Dr Henry Noltie. Noltie, H.J. *Raffles' ark redrawn: natural history drawings from the collection of Sir Thomas Raffles.* 180p. London: The British Library and RBG Edinburgh, 2009. ISBN 9780712350846.

Dr Ryszard Ochyra. Bednarek-Ochyra, H. *A taxonomic monograph of the moss genus Codriophorous P. Beauv. (Grimmiaceae).* 276p. Krakov: Polish Academy of Sciences, Institute of Botany, 2006. ISBN 8389648407.

Alexandra Papdakis. Stuppy, W. and Kessler, R. *Fruit: edible, inedible, incredible.* 264p. London: Papadakis, 2008. ISBN 9781901092745.

D.A. Pearman. Pearman, D.A. [et al]. *The flora of Rum: an Atlantic island reserve.* 480p. Cornwall: [The authors], 2008. ISBN 9780953811137.

Dr K. Sankara Rao. Sankara Rao, K. *Flowering plants of Indian Institute of Science: a field guide.* 2 vols. Bangalore: Indian Institute of Science, 2009.

Dr Elaine Robson. *50 years of zoological research: reflection and insights: 50th anniversary conference of the Zoological Society of Southern Africa.* 94p. [s.l.]: Zoological Society of Southern Africa, 2009.

Dr Frank Ryan. Ryan, F. *Violution.* 390p. London: Collins, 2009. ISBN 9780007315123.

Wim Snoeijer. Snoeijer, W. *Clematis cultivar group classification with identifying key and diagrams.* 204p. [Gouda: The author], 2008.

Judith M. Taylor. Taylor, J.M. *The global migrations of plants: how the world got into your garden.* 312p. St Louis, Mo.: Missouri Botanical Garden, 2009. ISBN 9781930723696.

Dr Maximilian J. Telford and Dr D.T.J. Littlewood. Telford, M.J. and Littlewood, D.T.J. [eds]. *Animal evolution: genomes, fossils, and trees.* 245p. Oxford: OUP, 2009. ISBN 9780199549429.

Professor Nancy Turner and Professor Patrick von Aderkas. Turner, N.J. and Von Aderkas, P. *The North American guide to common poisonous plants and mushrooms.* 375p. Portland, OR: Tomber Press, 2009. ISBN 9780881929294.

Madeleine von Essen. Von Essen, M. *Bogstad : park og hager til nytte og behag* 256p. Oslo: H. Aschehoug & Co., 2009. ISBN 9788203236204.

Colin Watkins. Watkins, C., Kolehmainen, J. and Schulman, L. *The wild African violet Saintpaulia (Gesneriaceae): an interim report.* 52p. Cambridge: Worldstage, 2002. ISBN 0954408101.

Watkins, C. [et al]. *A walking and wildlife guide to the Uluguru Nature Reserve.* 200p. Cambridge: Banson, 2009. ISBN 9987911838.

David Alexander Whyte Henderson. Whyte Henderson, D.A. *Alexander Whyte FLS FZS, botanist, naturalist, zoologist: a study of his life and travels in Ceylon and Africa.* 2 vols. Gloucestershire: [The author], 2009.

Dr Anne Wilkinson. Wilkinson, A. *The passion for pelargoniums: how they found their place in the garden.* 302p. Stroud: Sutton Publishing, 2007. ISBN 9780750944281. Wilkinson, A. *The Victorian gardener: the growth of gardening and the floral world.* 236p. Stroud: Sutton Publishing, 2006. ISBN 075094043.

Book Review

Musa Cliffortiana – Clifford’s banana plant. Carl Linnaeus, 1736. Translated into English by Stephen Freer with an introduction by Staffan Müller-Wille, 264 pp. illus., 2007. Regnum Vegetabile. 148 ISSN 0080-0694. Gantner Verlag, Liechtenstein. Distributed by Koeltz Scientific Books, Koenigstein Germany. ISBN 978-3-906166-63-6. Price 80 EUR (hardback).

The precious original copy of *Musa Cliffortiana* in the library of the Leiden branch of the National Herbarium of the Netherlands (better known perhaps as the Rijksherbarium) is still uncut: only the large hand-coloured plate by Hoffman of a large developing infructescence can be unfolded from its hiding place. Does this lack of interest by Dutch botanists in Linnaeus’ first ever botanical monograph, written in Holland, reflect on its limited scientific value as insinuated by an English contemporary, Thomas Knowlton, cited in Wilfred Blunt’s biography? Or is it because everything written by Linnaeus before 1753 is irrelevant to practicing botanical nomenclaturists, who are even on record as referring to all Linnaeus’ publications before *Species Plantarum* (1753) as pre-Linnaean? Whatever the explanation, Stephen Freer’s translation and Staffan Müller-Wille’s extensive and in-depth introduction are now available to show what philistines we have been in Holland by not studying this masterpiece more closely.

The story of Clifford’s banana has been told numerous times: during his visit to Holland (1735-1738) Linnaeus, enjoying the patronage of the rich banker and East India Company director, George Clifford, on his estate, the Hartenkamp near Haarlem, not only catalogued part of Clifford’s botanical collections and library to be published in *Hortus Cliffortianus* (1738) but it would remain his finest book, thanks to the beautiful illustrations by Ehret and Wandelaar. Together with Clifford’s gardener Dietrich Nietzel he also succeeded in inducing banana plants to flower and set fruit, and in doing so, attracted attention from the Dutch intelligentia. The 45 pp. monograph *Musa Cliffortiana*, published by Linnaeus four weeks after the onset of the first flowering of Clifford’s banana, far from just being a coffee table book in honour of George Clifford (it must also have served that purpose rather well), appears to epitomize all Linnaeus stood for in terms of scientific methodology, botanical insights and networking skills. Following his own prescription for describing any natural subject, as published in his one folio page *Methodus* (1736), Linnaeus comprehensively deals with the names, theoretical matters, the genus, the species, its attributes, its uses, and

literary matters associated with the banana plant. The English translation by itself makes for good reading. Especially the later handwritten notes by Linnaeus in his personal copy, are enlightening about his progressing knowledge and insights into the systematic position, reproductive biology, and traditional knowledge of *Musa*, including the reference to Syrian and Egyptian Christians who called the banana the pome of Paradise, because its phallic shape must have aroused Eve to unbridled lust by its appearance. Stephen Freer aptly comments in a footnote “Again, a remark highly revealing of Linnaeus’ fixation with sex”. As Müller-Wille convincingly demonstrates, *Musa Cliffortiana* foreshadows Linnaeus’ later masterpieces such as *Classes Plantarum*, *Fundamenta Botanica*, *Species Plantarum* and the later editions of *Systema Naturae* and can be seen as a key to understanding Linnaeus’ scientific agenda. I found the introduction on Linnaeus’ early career, and the links between botany, patronage and global trade also very insightful and erudite. The translator and the introductory author have done us a great service by unlocking this treasure box of Linnaeus’ heritage for a wide audience. No Fellow of the Linnean Society or Member of the International Association of Plant Taxonomists (who made this publication possible and enjoy a discount price of 64 EUR) should miss reading it.

PIETER BAAS FLS
LEIDEN

Charles Darwin, Live at the Linnean!

**A Lecture and Performance by
Richard Milner FLS
for the launch of his book
“Darwin’s Universe”
followed by a wine reception
10th November 2009, 6.00pm**

To register please e-mail events@linnean.org

Join anthropologist and historian Richard Milner for a multimedia roundup of his favourite stories in the history of science, taken from his new authoritative and entertaining book *Darwin’s Universe: Evolution from A to Z*, published by University of California Press. Written and performed by *The New York Times*’ favourite “singing Darwinian scholar”, Milner’s entertaining and scientifically rich lyrics span musical styles from Gilbert and Sullivan to Tom Lehrer and the blues.

Copies of the book will be available for signing after the lecture.

In the Footsteps of Charles Darwin on Tierra Del Fuego

Tim Cloudsley

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“While entering (the Bay of Good Success) we were saluted in a manner becoming the inhabitants of this savage land. A group of Fuegians partly concealed by the entangled forest, were perched on a wild point overhanging the sea; and as we passed by, they sprang up, and waving their tattered cloaks sent forth a loud and sonorous shout. The savages followed the ship, and just before dark we saw their fire, and again heard their wild cry.”

Charles Darwin, *Voyage Of The Beagle*.

This is how Darwin described his first encounter with the Haush, or Selk'nam, a hunter-gathering people of eastern Tierra del Fuego, on December 17th 1832, in his *Journal Of Researches Into The Geology And Natural History Of The Various Countries Visited By H.M.S. Beagle, Under The Command Of Captain Fitzroy, R.N. From 1832 To 1836*, the book which subsequently became known as *Voyage Of The Beagle*.

David Wilson, in his book *Indigenous South Americans of the Past and Present*, writes thus of Darwin's account of meeting Fuegian peoples:

“.....upon encountering the (Fuegian) people, this nineteenth-century European gentleman could scarcely believe that such 'wretched savages' belonged to the human race. Nevertheless, the scientist in him was able to rise above narrower nineteenth-century English prejudices, permitting him to see that these people, so different from any indigenous peoples to the north (i.e. in the Andes and Brazil), must have come down from the north at some remote time in the past to adapt, and thus endure, in the Fuegian climate.”

Of course, one must understand Darwin's observations in the light of his social and historical context: as a member of the English upper classes of the 1830s, but also as a 'member' of the fraternity of European scientist-travellers of that period who visited and reported on their observations in South America. Nevertheless, his perceptions are striking, partly because of the precise and exact prose he used in his accounts of the native peoples he met, which is quite as limpid and superb as are his geological and biological descriptions. Darwin's attitudes can surprise today's readers perhaps, because it was not inevitable that a European gentleman-scientist of his period should think in his way. Humboldt for example, in his writings about his experiences in Colombia and Venezuela some thirty or so years earlier, stressed a universalistic humanism which united peoples of the Old and New Worlds; and although convinced of the cultural inferiority of South American 'natives' in certain respects in comparison with Europeans, he adopted a different tone from Darwin, and constantly affirmed his belief that slavery was the greatest evil in the world. He put his Kantian ethics where his mouth was, so to speak. And H.W. Bates, Darwin's contemporary and fellow countryman, in his book *The Naturalist On The River Amazons*, speaks of Amazonian

Indians and what would today be called *caboclos* in much more sympathetic and respectful terms, noting particularly how beautiful the women of the region were! (See the NOTE at the end of this essay.)

Let us follow Darwin's account further:

"In the morning, the Captain sent a party to communicate with the Fuegians. When we came within hail, one of the four natives who were present advanced to receive us, and began to shout most vehemently, wishing to direct us where to land. When we were on shore the party looked rather alarmed, but continued talking and making gestures with great rapidity. It was without exception the most curious and interesting spectacle I had ever beheld. I could not have believed how wide was the difference, between savage and civilized man. It is greater than between a wild and domesticated animal, in as much as in man there is a greater power of improvement."

The extraordinary thing about this passage is not really the snobbery of comparing a 'savage' with a wild animal, in comparison with a 'civilized' man who is compared with a domesticated animal. It is rather that, as Darwin would later show in *On the Origin of Species*, in the course of man's domestication of animals and plants from wild precursors, their original 'natures' are lost, and replaced by artificial races that can no longer survive in nature. The latter owe their existence entirely to the species *Homo sapiens sapiens*; they are wholly dependent upon man, having been manipulated through breeding to yield what man wants, and to be tame, obedient, and subservient to man. In a sense of course, they are no more nor less 'natural' or 'artificial' than wild species, and no less 'free' or 'unfree'. The only relevant criterion within the theory of evolution is survival. Nevertheless, it is strange that this man, Charles Darwin, should prefer being similar to a domesticated animal than to a 'wild', 'authentic', 'natural' one, especially when it is he who will unlock the great secret of biology, the theory of evolution, as driven by 'natural selection'. That human 'improvement' within 'civilization' should seem analogous to being shaped into an obsequious and dependent condition by others purely for their exploitative convenience, might in fact be a very apt insight into the condition of the vast majority of people in civilizations based on social classes and hierarchical domination; yet for the fearless, rebellious scientist who was to enter with his mind into the wildest truths of organic nature, in an era still largely dominated by religious dogmas and unquestioned traditions, it cannot but appear amazing.

Darwin continues:

"The chief spokesman was old, and appeared to be the head of the family; the three others were powerful young men, about 6 feet high. The women and children had been sent away. These Fuegians are a very different race from the stunted miserable wretches further to the westward, They are much superior in person, and seem closely allied to the famous Patagonians of the Strait of Magellan. Their only garment consists of a mantle made of guanaco skin, with the wool outside; this they wear just thrown over their shoulders, as often leaving their persons exposed as covered. Their skin is of a dirty coppery red colour."

Darwin's observations become contradictory here: though these people are according to him 'superior' to the 'stunted miserable wretches further to the westward' (in fact the first group must have been Haush or Selk'nam, the second Yámana). They

(the Haush) are described as being of a ‘dirty’ colour. (No doubt Darwin thought the Yámana were still dirtier.) Yet at the same time Darwin creates a picture of dignified people, ‘powerful’, and ‘six feet high’. These people were adapted to a tough climate and geography, and made effective use of the only large mammal available, the guanaco, from which they obtained their food and their clothing. Yet the latter is described disdainfully by Darwin, as representing ‘their only garment’.

“The old man had a fillet of white feathers tied round his head, which partly confined his black, coarse, and entangled hair. His face was crossed by two broad transverse bars; one painted bright red from ear to ear, and included the upper lip; the other, white like chalk, extended parallel and above the first, so that even his eyelids were thus coloured. Some of the other men were ornamented by streaks of black powder, made of charcoal. The party altogether closely resembled the devils which come on stage in such plays as *Der Freischutz*.”

Strangely paradoxical is this passage. The old man is wonderfully depicted, though to use the word ‘coarse’ to describe his hair rather than perhaps ‘thick’ seems a little contemptuous. But the picture of his and the other Haush men’s painted faces is brilliant, and would suggest that Darwin, like any intelligent observer, realizes how difficult it must be to enhance facial features with access only to substances available in the immediate environment, and how strongly this fact testifies to a powerful aesthetic and imaginative urge, no less strong than that witnessed in ‘Civilization’. With respect to these men being compared with the devils in *Der Freischutz*, one wonders whether for Darwin this is a compliment or a condemnation! For are not these ‘devils’ the product of a great Romantic European imagination? To find their archetypes at the other end of the earth might have been as exciting to Darwin as his discovery that Lyell’s theories of geology, derived from the latter’s studies in Europe, applied admirably to the mountain ranges of South America.

“Their very attitudes were abject, and the expression of their countenances distrustful, surprised, and startled. After we had presented them with some scarlet cloth, which they immediately tied around their necks, they became good friends. This was shown by the old man patting our breasts, and making a chuckling kind of noise, as people do when feeding chickens. I walked with the old man, and this demonstration of friendship was repeated several times; it was concluded by three hard slaps, which were given me on the breast and back at the same time. He then bared his bosom for me to return the compliment, which being done, he seemed highly pleased. The language of these people, according to our notions, scarcely deserves to be called articulate. Captain Cook has compared it to a man clearing his throat, but certainly no European ever cleared his throat with so many hoarse, guttural, and clicking sounds.”

These people, faced with the unexpected appearance of a shipful of Europeans on their land, were friendly, communicative, and eager to display and share their customs with Darwin and his colleagues. Certainly, they might be ‘surprised’, ‘startled’, and indeed ‘distrustful’, unsurprisingly. Yet they were courageous and welcoming enough to ‘advance’ and ‘receive’ the strangers. One wonders how Darwin and the crew of the *Beagle* would have reacted if they had been walking one day in the hills on the coast of North Devon, when a shipload of men from Tierra del Fuego suddenly arrived from the sea and disembarked before their eyes. Darwin’s description of ‘their very attitudes’ as ‘abject’ seems indeed an unsympathetic and unimaginative one.

But it is at the point where Darwin describes their language as ‘inarticulate’ that he displays pure bigotry, even though he qualifies his words with the phrase ‘according to our notions’. ‘No European ever cleared his throat with so many hoarse, guttural, and clicking sounds.’ Now would the man who discovered the theory of evolution compare the wings of one species of finch on the Galapagos Islands with another in the way he here compares a Fuegian language with a European one? He would surely not compare the morphological adaptations of two different finch species in a way that was derogatory to one and praising of the other, inasmuch as they differed. He would not take one as a desirable norm, the other as deficient in some way.

“They are excellent mimics: as often as we coughed or yawned, or made any odd motion, they immediately imitated us. Some of our party began to squint and look awry; but one of the young Fuegians (whose whole face was painted black, excepting a white band across his eyes) succeeded in making far more hideous grimaces. They could repeat with perfect correctness, each word in any sentence we addressed them, and they remembered such words for some time. Yet we Europeans all know how difficult it is to distinguish apart the sounds in a foreign language. Which of us, for instance, could follow an American Indian through a sentence of more than three words? All savages appear to possess, to an uncommon degree, this power of mimicry. I was told almost in the same words, of the same ludicrous habits among the Caffres: the Australians, likewise, have long been notorious for being able to imitate and describe the gait of any man, so that he may be recognized. How can this faculty be explained? Is it a consequence of the more practised habits of perception and keener senses, common to all men in a savage state, as compared to those long civilized?”

Darwin here admires the ability of these Haush to mimic his and his companions’ gestures, sounds, and words. He admits they are better at this than ‘we Europeans’, and even commences, for a moment, to enter into a scientific speculation into the reasons for this. Yet he describes this facility as a ‘ludicrous habit’.

“When a song was struck up by our party, I thought the Fuegians would have fallen down with astonishment. With equal surprise they viewed our dancing; but one of the young men, when asked, had no objection to a little waltzing. Little accustomed to Europeans as they appeared to be, yet they knew, and dreaded our fire-arms; nothing would tempt them to take a gun in their hands. They begged for knives, calling them by the Spanish word ‘cuchilla’. They explained also what they wanted, by acting as if they had a piece of blubber in their mouth, and then pretending to cut instead of tear it.”

Here again, Darwin observes and apparently admires these Indians’ interest in, and openness to entering into his and his colleagues’ way of dancing. He observes their sensible reluctance to play around with fire-arms. And he shows how well they know which piece of European technology they want, the knife, and how they can communicate very well both their desire for this and the use to which they will put it.

“It was interesting to watch the conduct of these people towards Jemmy Button (one of the Fuegians who had been taken, during the former voyage, to England. Captain Fitzroy has given a history of these people. Four were taken to England; one died there, and the three others – two men and one woman – were now brought back and settled in their own country): they immediately perceived the difference between him and the rest, and held much conversation between themselves on the subject. The old man addressed a long harangue to Jemmy, which it seems was to invite him to stay with them. But Jemmy understood very little of their language, and was, moreover, thoroughly ashamed of his

countrymen. When York Minster (another of these men) came on shore, they noticed him in the same way, and told him he ought to shave; yet he had not twenty dwarf hairs on his face, whilst we all wore our untrimmed beards. They examined the colour of his skin, and compared it with ours. One of our arms being bared, they expressed the liveliest surprise and admiration at its whiteness. We thought that they mistook two or three of the officers, who were rather shorter and fairer (though adorned with large beards), for the ladies of our party. The tallest amongst the Fuegians was evidently much pleased at his height being noticed. When placed back to back with the tallest of the boat's crew, he tried his best to edge on higher ground, and to stand on tiptoe. He opened his mouth to show his teeth, and turned his face for a side view; and all this was done with such alacrity, that I dare say he thought himself the handsomest man in Tierra del Fuego. After the first feeling on our part of grave astonishment was over, nothing could be more ludicrous or interesting than the odd mixture of surprise and imitation which these savages every moment exhibited."

To us today, these observations must evoke some sadness, now that these peoples have been exterminated or wholly assimilated, by a combination of genocide and ethnocide. It is not clear with whom Darwin's sympathies lie in this fatefully significant and tragic encounter between the minimally acculturated Haush and the three Yámana who had previously been wrenched from their land and culture and dragged over to England. Darwin had come to know these 'Europeanized' Yámana on the voyage from England, before reaching Tierra del Fuego where he met their 'savage countrymen'.

Darwin says that the old Haush man 'addressed a long harangue to Jemmy (a Yámana) which it seems was to invite him to stay', indicating that he disapproved of these Fuegians being taken away to become 'Europeanized'. He and the other Haush tell York Minster that he ought to shave, rather than grow a beard like Englishmen. The Haush wonder whether, having been some time with the Englishmen in their country, York Minster's skin has changed colour, to become like theirs. This passage of Darwin's is full of most pertinent observations, though it is peppered with prejudices: the Haush men's surprise is once again described as 'ludicrous', whilst their examination of an Englishman's skin is assumed to express 'admiration at its whiteness'. But perhaps the saddest remark of all that Darwin makes, and let us assume he is correct in his assessment, is that Jemmy was 'thoroughly ashamed of his countrymen'. The observation is made in a ruthlessly cold, 'objective' manner, though Darwin seems unconscious of this.

Let us emphasize again that Jemmy and York Minster were Yámana, whilst the Fuegians they met here with Darwin were Haush, or Selk'man. It is significant that Darwin considers the Yámana living in Tierra del Fuego to be more degraded than the Haush living there, although Jemmy Button, the captured Yámana that had been taken to England, he sees as loftier than the Haush.

The account given by Darwin so far, has all been from his journal entry for December 17th 1832. Let us now move on to that of December 25th, when he encountered some Yámana Indians further to the west of the island:

"This part of Tierra del Fuego (called Kater's Peak) may be considered as the extremity of the submerged chain of mountains already alluded to. The cove takes its name of 'Wigwam' from some of the Fuegian habitations; but every bay in the neighbourhood

might be so called with equal propriety. The inhabitants living chiefly upon shellfish, are obliged constantly to change their place of residence; but they return at intervals to the same spots, as is evident from the pile of old shells, which must often amount to some tons in weight. These heaps can be distinguished at a long distance by the green colour of certain plants, which invariably grow on them. Among these may be enumerated the wild celery and scurvy grass, two very serviceable plants, the use of which has not been discovered by the natives.

“The Fuegian wigwam resembles, in size and dimensions, a haycock. It merely consists of a few broken branches stuck in the ground, and very imperfectly thatched on one side with a few tufts of grass and rushes. The whole cannot be so much as the work of an hour, and it is only used for a few days. At Goeree Roads I saw a place where one of these naked men had slept, which absolutely offered no more cover than the form of a hare. The man was evidently living by himself, and York Minster said he was ‘very bad man’, and that probably he had stolen something. On the west coast, however, the wigwams are rather better, for they are covered with seal-skins.”

Darwin provides a good description here of the Yámana mode of life. It is strange though, that the ‘wigwam’ he observed is described as ‘merely consisting of a few broken branches’, and as ‘very imperfectly thatched’. No doubt these houses sufficed; they would have represented a bad adaptation to a hard environment if more labour-time than was necessary were expended on their construction. In a case like this, a direct comparison might reasonably and legitimately be made between adaptations to the environment developed by human beings on the one hand and by other animals on the other.

These people were nomadic hunter-gatherers, spending ‘only a few days’ in any particular ‘wigwam’; if ‘on the west coast the wigwams are rather better, for they are covered with seal-skins’, presumably this is either because seals are more available on the west coast than at Kater’s Peak, or because the weather on the west coast is that much more inclement, making it worthwhile or necessary to undertake the effort of protecting homes with seal-skins.

It is unreasonable perhaps to dispute the validity of Darwin’s observations of Yámana houses. Nevertheless, when one looks at the replicas of typical Yámana houses outside the *Museo Del Fin Del Mundo* in Ushuaia, or at old photographs of real ones, one can only say that they appear extremely well-built, sturdy, functional, and attractive. Just as the bows and arrows, harpoons, baskets and other utensils on display in the museums at Ushuaia are very beautifully made; exemplary instances of objects made both for use and in accordance with aesthetic principles, as William Morris believed is true of all authentic art and craft.

The comment made by York Minster that Darwin records, indicates that the former’s English acculturation has turned him into something of a snob, as well as encouraging him apparently to accuse a man of a crime without evidence or proof.

It is striking that amidst the close and accurate account that Darwin gives of the Yámana lifestyle, he describes their evidently effective solution to the challenges of their environment as obliging them ‘constantly to change their place of residence’. This mode of expressing it implies it is undesirable and abnormal so to live; to stay in one place indefinitely is desirable and normal. Is it not odd that Charles Darwin, the

man who discovered who and what humanity really is, should consider the mode of life that predominated over the vast majority of its existence – the mode moreover that undoubtedly represents a direct continuity from our ‘natural’ and animal past – as undesirable and abnormal?

“At a subsequent period the Beagle anchored for a couple of days under Wollaston Island, which is a short way to the northward. While going on shore we pulled alongside a canoe with six Fuegians. These were the most abject and miserable creatures I any where beheld. I believe, in this extreme part of South America, man exists in a lower state of improvement than in any other part of the world. The South Sea islander of either race is comparatively civilized. The Esquimaux, in his subterranean hut, enjoys some of the comforts of life, and in his canoe, when fully equipped, manifests much skill. Some of the tribes of Southern Africa, prowling about in search of roots, and living concealed on the wild and arid planes, are sufficiently wretched. But the Australian, in the simplicity of the arts of life, comes nearest the Fuegian. He can, however, boast of his boomerang, his spear and throwing-stick, his method of climbing trees, tracking animals, and scheme of hunting. Although thus superior in acquirements, it by no means follows that he should likewise be so in capabilities. Indeed, from what we saw of the Fuegians, who were taken to England, I should think the case was the reverse.”

One feels like asking Darwin, why are people who live in, and are adapted to, a tough environment, in which they have very likely survived for millenia, to be considered ‘abject’ and ‘miserable’? No doubt, if seen canoeing on a cold, stormy day, elemental wear and tear would be expressed on people’s faces; but would not this be equally true for Cornish fishermen in a storm, or for Lancashire workmen walking to the cotton-mill on a cold, rainy morning? In his comparisons of the Fuegians with South Sea Islanders, Eskimos, and peoples from Southern Africa and Australia, he is scientific again (except in his use of the word ‘wretched’). Interestingly though, in his statement that native Australians are ‘superior in acquirements’ to the Fuegians, he also suggests that Fuegians are superior to Australians in ‘capabilities’. This judgement apparently rests on Darwin’s assessment of how well the Fuegians who had been taken to England ‘improved’. Here he seems to be in a real confusion. If it was the entry into civilized English culture and society that ensured these Fuegians’ ‘improvement’, then he does not assume their deficiencies are intrinsic to their ‘race’, that is, as a biological given. But on the other hand, in suggesting that the Australians, in spite of their ‘superiority in acquirements’, are intrinsically inferior in ‘capabilities,’ he implies in their case the opposite.

Of course Darwin can hardly be blamed for not having resolved the nature/nurture, biology/culture dilemma in the understanding of human societies: that issue remains far from resolved to this day. But it is striking that his observations of different forms of human adaptation to different natural, ecological environments should be so filled with pejorative value judgements and unscientific preconceptions; again, in a fashion so different from his mode of analysing and comparing geological and biological phenomena. The fact is, as David Wilson has shown in the book cited above, that different societies become adapted to different natural environments in more or less effective ways. Terms such as ‘simplicity’ or ‘complexity’ of adaptation, where they refer to population sizes typical of human groups, their technologies, or their forms of shelter and so on, should be used absolutely neutrally, for they do not register or imply

any cultural, ethical, or aesthetic inferiority or superiority at all. A small-scale, technologically 'simple' society that is well-adapted to existence in its environment is in scientific terms merely successful at surviving in its natural environment.

Clearly however, Darwin's implicit view of humanity, though contradictory, rests on one conspicuous presupposition. Whether it is a cultural or biological process, humanity engages in, or can engage in, a process of 'improvement' of a kind which Darwin will not build into his theory of the biological evolution of non-human living organisms. It seems worth noting therefore, that a presupposition of human history involving a kind of 'linear progress', an ideology that many have taken to result from the uncritical translation of the fully developed Darwinian theory of organic evolution onto human society – by such late nineteenth-century thinkers as Herbert Spencer for example – was evidently in Darwin's mind well before he had made the scientific breakthrough into his theory of biological evolution.

"On the east coast the natives, as we have seen, have guanaco cloaks, and on the west, they possess seal-skins. Amongst these central tribes the men generally possess an otter-skin, or some small scrap about as large as a pocket-handkerchief, which is barely sufficient to cover their backs as low as their loins. It is laced across the breast by strings, and according as the wind blows, it is shifted from side to side. But these Fuegians in the canoe were quite naked, and even one full-grown woman was absolutely so. It was raining heavily, and the fresh water, together with the spray, trickled down her body. In another harbour not far distant, a woman, who was suckling a recently-born child, came one day alongside the vessel, and remained there whilst the sleet fell and thawed on her naked bosom, and on the skin of her naked child. These poor wretches were stunted in their growth, their hideous faces bedaubed with white paint, their skins filthy and greasy, their hair entangled, their voices discordant, their gestures violent and without dignity. Viewing such men, one can hardly make oneself believe they are fellow-creatures, and inhabitants of the same world. It is a common subject of conjecture what pleasure in life some of the less gifted animals can enjoy: how much more reasonably the same question may be asked with respect to these barbarians. At night, five or six human beings, naked and scarcely protected from the wind and rain of this tempestuous climate, sleep on the wet ground coiled up like animals. Whenever it is low water, they must rise to pick shell-fish from the rocks; and the women, winter and summer, either dive to collect sea eggs, or sit patiently in their canoes, and, with a baited hair-line, jerk out small fish. If a seal is killed, or the floating carcass of a putrid whale discovered, it is a feast: such miserable food is assisted by a few tasteless berries and fungi. Nor are they exempt from famine, and, as a consequence, cannibalism accompanied by parricide."

Darwin seems to imply here that the 'small scrap' the men wear is insufficient, just as he assumes that the nakedness of other men and women is lamentable. His own morality and preconceptions prevent him from asking whether these are not once again effective adaptations to the environment. Attitudes like these of Darwin are perfectly borne out in photographs of Yámana taken by missionaries later in the nineteenth century, in which both men and women have been coerced humiliatingly into hiding their genital regions with their hands.

Yet in a climate where rain is frequent, the Yámana found that not wearing clothes, but instead applying oil or grease to their skins, was a better form of protection. Clothes can often remain permanently wet when one is exposed to such an environment, whereas water 'trickles down' a body covered in grease.

Why Darwin thinks ‘these wretches were stunted in their growth’, rather than having adapted their average height to the physical exigencies and pressures of their existence, is also strange. But his finding their faces ‘hideous’ is merely prejudice, whilst his observation that their skins are ‘greasy’, which should answer his bewilderment that they go naked, means to him that they are merely ‘filthy’, all of which is in accord with his judgement that their hair is ‘entangled’, ‘their voices discordant’, ‘their gestures violent and without dignity’. The passage that follows these remarks is rhetorical, and perhaps it is more a poetry of (unnecessary) pity and sympathy than of arrogance, as the prejudice and sense of superiority appear to be unconscious and gentle: ‘Viewing such men, one can hardly make oneself believe they are fellow-creatures.....’. But then comes the suggestion that people often wonder what pleasure in life ‘some of the less gifted animals can enjoy’.

Do people so wonder, or did they really in Darwin’s time? There seems to be something false in the rhetoric here: according to the religious view, all animals are created to fulfil their particular, humble purposes, as part of God’s larger, transcendent plan. This is true of Man as well, but since he alone among living things has Free Will, his situation is distinct from that of the other animals. The question posed here by Darwin could have no meaning for animals; indeed it might even be blasphemous in terms of traditional Christian theology.

Now, according to Darwin’s theory of evolution, which at the time of his voyage on the *Beagle* he had not yet arrived at, the question must be even more meaningless. Animals, except for Man, have no consciousness, self-awareness, sense of purpose, ethical principles, moral, aesthetic, or sensual ambitions, nor criteria for comparisons over such values or pleasures. They are driven by a blind, non-conscious will to survive, in order to reproduce biologically. In Man alone, because of the emergence through evolution of intelligence, mind, and consciousness, can issues of pleasure or purpose arise. Precisely how Darwin understood these issues in 1832 is not clear, but the movement of his thoughts from ‘the less gifted animals’ to ‘these barbarians’, is hardly a ‘reasonable’ one, on the basis of any consistent system of thinking available in his time. But when Darwin’s account moves once again onto the naked Fuegians sleeping unprotected from the elements (although he has already shown that they are *not* wholly unprotected, due to the grease they apply to their bodies), ‘coiled up like animals’, comparison between animal and savage, savage and animal (‘how much more reasonably the same question may be asked with respect to these barbarians’) is turned around again, in such a way that, given we are considering the thought processes of one of the greatest geniuses in recorded human history, we are moved to conclude that he is sacrificing intelligence here to some kind of spiteful contempt, or at least, to a deep human insensitivity.

“Whenever it is low water, they *must* rise to pick shellfish”, Darwin says (emphasis added). One might equally say that at every dawn, every maid and servant in every house in England that has maids and servants, *must* perforce rise to work for their masters and mistresses. Or that on those days when a University lecturer has morning lectures, he or she *must* rise to deliver those lectures. And animals *must* go to feed when opportunity arises. What is Darwin’s point? Perhaps he, as a Victorian gentleman from a wealthy background with a large unearned income, was one of the very few

organisms of any species who did not need to work or make any effort in order to eat, and one is not sure which fact is more extraordinary: that the scientist who would later make one of the most important discoveries of the modern age could be so intellectually limited in his choice of words here, or that this very scientist should have nevertheless come from the particular class of human beings that he did come from.

Darwin is appalled, and contemptuous, that people should make a feast out of a 'putrid whale', but surely since time immemorial human beings have had to eat the meat of animals that have been dead for a greater or lesser period of time. Refrigeration is a relatively new phenomenon, whilst the arts of meat preservation have been very gradual in their historical development. And perhaps taste is in the mouth of the eater: certainly, even in 1832 Darwin must have been aware that taste in food is culturally extremely relative, as it is in other things. To put it simply, the Yámana may not have found their berries and fungi 'tasteless'.

At the end of this passage, Darwin makes reference to issues of food shortage and cannibalism. The ethnographical literature does not record cannibalism (nor 'parricide') as being practiced by Fuegian peoples at any known time. There is some debate within the literature concerning whether infanticide was practiced at any time as a form of population control and/or as a response to food shortage. The following conclusions arrived at by David Wilson (*op. cit.*) concerning the Yámana might be worth quoting here:

".....overall Yahgan (Yámana) population densities were low and probably always had been so, since the environment and their subsistence adaptation would not permit any higher numbers of people. We may thus hypothesize that over the hundreds and thousands of years of their presence in the archipelago the Yahgan must have had to practice one or another form of population regulation..... (but also) children between the ages of two and ten years old were especially at risk in this difficult setting. In light of this, prior to the arrival of the European diseases in pre-Contact times high infant mortality may have been a major factor in the regulation of population numbers. In other words, the rigorous environment itself may have been regulatory in keeping Yahgan numbers adjusted to the carrying capacity of the subsistence-settlement system."

Let us continue with Darwin's account:

"The tribes have no government or head, yet each is surrounded by other hostile ones, speaking different dialects; and the cause of their warfare would appear to be the means of subsistence. Their country is a broken mass of wild rock, lofty hills, and useless forests: and these are viewed through mists and endless storms. The habitable land is reduced to the stones which form the beach; in search of food they are compelled to wander from spot to spot, and so steep is the coast, that they can only move about in their wretched canoes. They cannot know the feeling of having a home, and still less that of domestic affection; unless indeed the treatment of a master to a laborious slave can be considered as such. How little can the higher powers of the mind be brought into play! What is there for imagination to picture, for reason to compare, for judgement to decide upon? to knock a limpet from the rock does not even require cunning, that lowest power of the mind. Their skill in some respects may be compared to the instinct of animals; for it is not improved by experience: the canoe, their most ingenious work, poor as it is, has remained the same, for the last 250 years."

The beginning of this passage invites no controversy, until we arrive at the word 'useless,' which comes before the word 'forests.' Surely, even a gentleman from

domesticated England in 1832 would be aware that forests have many resources, and that numerous nomadic peoples had inhabited them, and still did in 1832. The Yámana extracted among other things wood and tree bark from the forests, from which they fashioned many items including buckets, and the ‘wretched’ canoes that Darwin denigrates. The Argentinian archaeologist Luis Albert Borrero has written of the Yámana (in an article called *The Origins of Ethnographic Subsistence Patterns in Fuego-Patagonia*), that:

“Canoes were the mainstay of their maritime adaptation. They were not only an indispensable means of transportation, but also formed the focus of family life. Families moved everywhere by canoe, some even carrying fires burning inside them almost permanently, and they have been observed consuming mussels on board”.

The territory of the Yámana was limited to areas where maritime and forest environments were close by, as they depended crucially on both. Habitable land was not only to be found among the stones on the beach; though why Darwin should think such a location beneath contempt is anyway extraordinary.

Now there may have been a particular aspect of the European mind-set which influenced Darwin in his choice of the word ‘useless’ to describe the forests. We know that a dominant perception of forests throughout the European Middle Ages was that they were dangerous, Satanic, wicked places. In the *Confessions*, Saint Augustine includes mountains, rivers, and oceans in the category of nature’s fallen matter, admiration of whose sights was capable of distracting a Christian from the proper contemplation of God and one’s own soul. One can easily imagine forests could have joined the list, if he had extended it further. As a realm of material nature, standing over and against the spiritual realm and that of civilization, forests for centuries symbolized both sinful temptation and a chaotic, unproductive world that must be tamed and brought under control by hard work and godliness, that is, under human control – meaning also human self-control. In the modern era, up to the emergence of the (first) Romantic Movement and its associated Romantic sensibility, much of this way of thinking persisted, and was indeed intensified by the new imperatives of capitalism, science, technology, urbanism, and modernizing agriculture. Francis Bacon, the first major philosopher of modern science, considered that Nature should be interrogated like a harlot to yield up Her secrets. Descartes considered that for the rational scientific mind, inorganic and organic nature must be regarded as machine-like, and they would yield up infinite resources if treated in that way.

But from about 1770 some of these attitudes began to change, especially in Germany and Britain, under the influence especially of the Romantic poets Wordsworth, Coleridge, Blake, Byron, Shelley, and Keats; and of artists like Constable and Turner. In Germany, analogous sentiments are to be found in much of Goethe’s poetry, and in the art of Caspar David Friedrich, but especially in the great German and Austrian composers, Beethoven and Schubert. All these people were dead or old by 1832; had Darwin not been influenced by them at all? His view of the vast, stupendous forests of Tierra del Fuego is closer to the aesthetic attitude to nature of Dr. Samuel Johnson as expressed in his account of travels in 1773 to the Highlands and Islands of Scotland, *A Journey to the Western Isles of Scotland*, than to that expressed in the numerous Guides to the English Lake District that were available by the 1830s, let alone to the

poetic imagination of William Wordsworth, who was a student at Cambridge University, like Darwin, though roughly fifty years earlier. To the Romantic mind forests, like all 'wild' nature, offered excitement, adventure, and challenge to the over-ordered, one-sidedly rational character of modern man: they mirrored the strange and unfathomable depths of the human mind and soul, as otherwise only art, poetry or music could, or the emotions of love, or the realm of dreams. 'Wild', 'chaotic', 'raw' nature was something awesome and sublime, as Emanuel Kant had it, because it was 'infinite' and beyond any narrow usefulness. It displayed 'final form' as art did, precisely through its apparent chaos. To use Ehrenzweig's phrase, 'untamed' nature expressed 'the higher order of chaos'.

Once again, we are amazed that the young Darwin, who would later give the world the Theory of Evolution, thought thus in 1832. For Evolution was to provide a most powerful impetus to the second great wave of Romanticism in the second half of the Nineteenth Century, and in the Twentieth Century up until the First World War. Friedrich Nietzsche, Rimbaud, and Lautréamont are among those who were thrilled and enthralled by the subversiveness, the struggle and challenge forced upon the human mind by Darwin; the complete decentering of man that his theory entailed – far more even than the Galilean-Newtonian revolution had, and the final defeat of theology that it appeared to them to represent.

As for the influence of these last upon subsequent artists, poets, composers, and philosophers the list would be almost impossible to complete. Among them Otto Dix, Scriabin, Mahler, Richard Strauss, and the Surrealists stand out. But the influence of Nietzsche especially on art and culture was and is immeasurable.

These remarks pertain to the worlds of literature, art, and philosophy: how equally much did Evolution transform all science itself, and none less than the human sciences. In his influence upon, and the admiration he induced in Karl Marx and Friedrich Engels, and in the emergence of Sociology and Anthropology as disciplines, Darwin was the Copernicus of the modern mind.

But of course, the whole nature of the Beagle's voyage must be borne in mind, as this is well summarized here by Gillian Beer (in an essay called *Travelling The Other Way*):

“(Such) voyages.....were those whose prize was represented as knowledge rather than treasure. The categories are, however, not altogether separate. Although the nineteenth-century journeys that set out from Britain to survey the sea and coasts around the world were not piratical, not part of that unconcerned predation that earlier centuries justified as exploration or discovery, they were nevertheless an expression of the will to control, categorise, occupy and bring home the prize of samples and of strategic information. Natural history and national future were closely interlocked. And natural history was usually a sub-genre in the programme of the enterprise, subordinate to the search for sea-passages or the mapping of feasible routes and harbours.”

Indeed, in their historical study *Tierra del Fuego*, Luiz and Schillat show that the Beagle voyages under Captain Fitzroy's command were largely concerned with garnering information for the British Admiralty, as part of a widely-embracing concern in regard of strategies for British conquest, colonization, and control of trade in the Southern Atlantic.

But to return again to Darwin's account. The assertion that the nomadic Yámana "cannot know the feeling of having a home" needs no further comment in the light of the above; but that they know "still less that of domestic affection" enters the bizarre once again. Affections are dependent on staying indefinitely in one place? But in any case the touching accounts in the ethnographic literature about how Selk'nam and Yámana men would set about looking for a wife, and how a woman indicated 'yes' or 'no' to a man's proposal (to be found in Wilson, *op. cit.*), suggest Darwin was wrong in assuming a lack of romantic affection among Fuegians. But his following phrase, "unless indeed the treatment of a master to a laborious slave can be considered as such", I confess baffles me entirely. Who is the master and who the slave in the egalitarian societies of Tierra del Fuego? Perhaps Darwin means the people are like slaves before their natural environment, but in that case they are at least equal in their servitude, unlike in the England of 1832, where the majority of people were slaves towards both Nature and their human rulers.

Gillian Beer (*op. cit.*) sees these aspects of Darwin's reactions in a rather different way from me. She considers that:

".....one of the most pressing issues raised by travels and their narratives in the nineteenth century (was).....what are the boundaries of natural history? Are human beings within its scope? Are they one species or several? Are they separate from all other species because created as souls by God? And do all, all savages, have souls? Or are they – here danger lies – a kind of animal? (If they, then we?)

"Over and over again the narratives of voyages demonstrate how the borders of natural history were blurred by human encounter and how evolutionary theory profited from that growing uncertainty about the status of the human in knowledge and in nature."

She thus sees Darwin's prejudices in relation to the scientific revolution he would later undertake:

"Darwin's encounters with Fuegians in their native place gave him a way of closing the gap between the human and other primates, a move necessary to the theories he was in the process of reaching."

Elsewhere she suggests:

"Darwin's much later *The Expression of the Emotions in Man and Animals* (1872) may owe much to his puzzling experiences on the *Beagle* and be in part a final attempt to regulate the irregularities he had there encountered."

But, though it may be that on some unconscious level Darwin's scientific mind was fomenting the utterly novel worldview he would eventually promulgate, his account of Fuegian peoples in *Voyage of the Beagle* includes many tedious and prejudiced ideas about primitive people being inferior and degraded. The terms he deals in are ethical, and assume 'civilization' represents an indisputable improvement upon 'primitiveness', which implicitly justifies arrogant and dictatorial behaviours, such as snatching people and taking them to England, or missionary activity intended to convert 'savages' to Christianity and Western ways of behaving. The fact is that Darwin, neither in 1832 nor later when he formulated the theory of Evolution, had any clear idea of the relationship between *biological evolution*, which had brought into being Man from its animal antecedents, and *human history*, the development of different cultures and civilizations within the general biological framework of the human species. And

though it may be necessary now, in the context of neo- or post-Darwinism, to understand that *biological evolution* can continue in interwoven relationship with the cultural and historical development of humanity, generally Darwinism has in the past failed, and still does fail now, to distinguish between the two processes. From Darwin himself to Herbert Spencer, through to many Darwinian biologists who today attempt analyses of human history and society, the confusions are deep, and persist, as many writers have attempted to show. Darwin's 'swerving', his 'disturbance' (to use Beer's words), in his meditations on the Fuegians, and their imagined similarity or difference from animals, is conducted in a confused, moralistic, and derogatory mode of thinking which is as common today as it was in Darwin's own. It absolutely fails to see that different human societies have different cultures, different behaviours and different ethical systems and attitudes: conditioned greatly by natural and environmental factors and processes, in ways that are extremely complex, but again, *not* in ways that mirror the environmental determinism of other animals' physiology or behaviour.

Human societies can only be judged one against another according to the taste of he or she who judges or according to ethical principles which should be made absolutely explicit in the course of making such judgements, and according to which certain Western cultures, vis-a-vis the morality of killing other human beings for example, would rank very low in any pan-human table of ethical comparison. Human beings are animals, yes, but as members of one animal species, *Homo sapiens*. Yet it is remarkable how often European or Neo-European individuals and nations that want to justify and rationalize their nastiest kinds of behaviour (ethically speaking), draw upon the fact that human beings are, after all animals.

Major differences between human beings are either individual, or culturally based; though it is true that the roles of biology and genetics in understanding these differences are only just beginning to be understood.

A NOTE ON H.W. BATES

Two quotations from H.W. Bates' science-cum-travelogue book *The Naturalist On The River Amazons* may suffice to indicate some of the differences between Bates' and Darwin's approaches to the human dimensions of their experiences in South America. Bates certainly has some stereotypical European prejudices, and his perceptions are often constructed through characteristic nineteenth-century tropes, themes, vistas, and metaphors belonging to a British colonial view of 'tropicality', with his readership at home always in mind. But, like Alfred Russel Wallace, who also displayed "a somewhat baffling mixture of the conventional and the unconventional (in an attitude of) unsettled ambivalence" (as explained in Nancy Stepan's book *Picturing Tropical Nature*), Bates has at the same time a spontaneous sympathy and empathy with people, and a more admiring attitude towards the people he meets, than Darwin evinces:

(I) "On the morning of the 28th of May we arrived at our destination (Belém de Pará). The appearance of the city at sunrise was pleasing in the highest degree. It is built on a low tract of land, having only one small rocky elevation at its southern extremity; it therefore affords no amphitheatral view from the river; but the white buildings roofed with red tiles, the numerous towers and cupolas of churches and convents, the crowds of

palm trees reared above the buildings, all sharply defined against the clear blue sky, give an appearance of lightness and cheerfulness which is most exhilarating. The perpetual forest hems the city in on all sides landwards; and towards the suburbs, picturesque country houses are seen scattered about, half buried in luxuriant foliage. The port was full of native canoes and other vessels, large and small; and the ringing of bells and firing of rockets, announcing the dawn of some Roman Catholic festival day, showed that the population was astir at that early hour.

“The impressions received during our first walk, on the evening of the day of our arrival, can never wholly fade from my mind. After traversing the few streets of tall, gloomy, convent-looking buildings near the port, inhabited chiefly by merchants and shopkeepers; along which idle soldiers, dressed in shabby uniforms, carrying their muskets carelessly over their arms, priests, negresses with red water-jars on their heads, sad-looking Indian women carrying their naked children astride on their hips, and other samples of the motley life of the place, were seen; we passed down a long narrow street leading to the suburbs. Beyond this, our road lay across a grassy common into picturesque lane leading to the virgin forest. The long street was inhabited by the poorer class of the population. The houses were of one story only, and had an irregular and mean appearance. The windows were without glass, having, instead, projecting lattice casements. The street was unpaved, and inches deep in loose sand. Groups of people were cooling themselves outside their doors – people of all shades in colour of skin, European, Negro and Indian, but chiefly an uncertain mixture of the three. Amongst them were several handsome women, dressed in a slovenly manner, barefoot or shod in loose slippers; but wearing richly decorated ear-rings, and around their necks strings of very large gold beads. They had dark expressive eyes, and remarkably rich heads of hair. It was a mere fancy, but I thought the mingled squalor, luxuriance and beauty of these women were pointedly in harmony with the rest of the scene; so striking, in the view, was the mixture of natural riches and human poverty. The houses were mostly in a dilapidated condition, and signs of indolence and neglect were everywhere visible. The wooden palings which surrounded the weed-grown gardens were strewn about, broken; and hogs, goats, and ill-fed poultry wandered in and out through the gaps. But amidst all, and compensating every defect, rose the overpowering beauty of the vegetation. The massive dark crowns of shady mangoes were seen everywhere amongst the dwellings, amidst fragrant blossoming orange, lemon, and many other tropical fruit trees; some in flower, others in fruit, at various stages of ripeness. Here and there, shooting above the more dome-like and sombre trees, were the smooth columnar stems of palms, bearing aloft their magnificent crowns of finely-cut fronds. Amongst the latter the slim assai-palm was especially noticeable, growing in groups of four and five; its smooth, gently-curving stem, twenty to thirty feet high, terminating in a head of feathery foliage, inexpressibly light and elegant in outline.”

(II) “I suffered most inconvenience from the difficulty of getting news from the civilized world down river, from the irregularity of receipt of letters, parcels of books and periodicals, and towards the latter part of my residence from ill health arising from bad and insufficient food. The want of intellectual society, and of the varied excitement of European life, was also felt most acutely, and this, instead of becoming deadened by time, increased until it became almost insupportable. I was obliged, at last, to come to the conclusion that the contemplation of Nature alone is not sufficient to fill the human heart and mind. I got on pretty well when I received a parcel from England by the steamer once in two or four months. I used to be very economical with my stock of reading, lest it should be finished before the next arrival, and leave me utterly destitute.....

“During so long a residence I witnessed, of course, many changes in the place (the village of Ega, modern Tefé). Some of the good friends who made me welcome on my first arrival died, and I followed their remains to their last resting-place in the little rustic cemetery on the borders of the surrounding forest. I lived there long enough, from first to last, to see the young people grow up, attended their weddings, and the christenings of their children, and before I left, saw them old married folks with numerous families.....

“The people became more ‘civilized’, that is, they began to dress according to the latest Parisian fashions, instead of going about in stockingless feet, wooden clogs, and shirt sleeves; acquired a taste for money-getting and office-holding; became divided into parties, and lost part of their former simplicity of manners.....

“Many of the Ega Indians, including all the domestic servants, are savages who have been brought from the neighbouring rivers; the Japurá, the Issá, and the Solimoens..... most of whom had been bought, when children, of the native chiefs. This species of slave dealing, although forbidden by the laws of Brazil, is winked at by the authorities, because without it there would be no means of obtaining servants..... But the boys generally run away and embark on the canoes of traders; and the girls are often badly treated by their mistresses.....”

There is a marvellous illustration in Bates’ *The Naturalist On The River Amazons* called *Masked Dance And Wedding-Feast Of Tucuna Indians*. Bates is pictured inside a Tucuna *maloca*, graciously and gratefully accepting something to eat from a handsomely depicted naked Indian woman with long black hair, which he seems to find delicious. He seems wholly at ease in the huge interior of the *maloca*, in which is taking place, without reference to him, a masked dance in costumes very like those one can see today in ethnographic museums in Manaus or Leticia. The whole scene is certainly idealized and shaped into a European stylized ‘interior’, but it is also authentic in its depiction of someone in a hammock, and others up on a typical kind of structure made of wooden poles, from which also hang animal skins and on which a parrot perches. The whole scene is warm and convivial, suggesting that Bates’ hosts enjoy his presence as much as he enjoys their hospitality. And though it is slightly sentimentalized, the scene somehow resembles very much the indoor life of Amazonian Indians even today.

POSTSCRIPT

On a retrospective reading of this essay I wondered if I had been hard on Charles Darwin both in the sense of suspending recognition of the extent to which he, like anyone else, was a prisoner of his socio-historical context (though I tried to show that he could have embraced different attitudes), but also in the sense that further reading undertaken after I had already written the bulk of this essay indicated to me the extent of his enlightened, liberal, and humanitarian attitudes in certain other situations outside of his account of the Fuegians, both during the voyage of the *Beagle* and at other periods of his life. His argument with Captain Fitzroy in Brazil over slavery – Darwin against, Fitzroy in defence – which Darwin feared at first might require him to leave the voyage, is only one rather noble example.

Nevertheless, the central purpose in writing the essay was to show how narrow a view of the Fuegian Indians even a great genius could have, and how the contrast

between his genius for scientific understanding of nature and his socially prejudiced views of a culture very different from his own, might be seen as deeply symptomatic of the horrible, tragic fact that one hundred years after Darwin's encounter with them, 'progress' in the surrounding and intruding semi-Westernized forms of society would result in their complete genocidal extermination or assimilation. It also allowed me, briefly at the end, to refer to the great importance of distinguishing biological evolution from human, social and cultural history, a highly problematical area that concerns the interface between the biological and the social sciences.

The Shadow of Perfection

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The Jardin des Plantes faces the Quai St. Bernard and the River Seine to the N.E. Its other three sides are bounded by the Rue Cuvier, Rue Geoffroy St. Hilaire and the Rue Buffon. Just inside the main entrance stands a statue (erected by public subscription) of Lamarck. Leading to the whole complex is the Rue Linné. In contrast, our own Natural History Museum is confined by Exhibition Rd., Queen's Gate and Imperial College. Of course, the French did have a Revolution in the wake of which all references to the monarchy were swept away. Even the Jardin itself had its name changed from du Roi to des Plantes. Does our lack of such a Revolution explain why Darwin Boulevard is not a major thoroughfare in South Kensington's 'Albertopolis'? Alfred Waterhouse's incredible romanesque masterpiece was intended as a 'temple' to the vision of Darwin's critic, Richard Owen, and poor Darwin's statue until recently presided over the tea room whilst that of Owen commanded the grand staircase. In addition, the whole of the South Kensington site was a development celebrating imperialism, empire and the march of Human, specifically British, progress. The museum was a 'Bridgewater Treatise' in terracotta or, as the *Times* of April 18th 1881 put it, '...a true Temple of Nature, showing, ... beauty of Holiness'. And yet, it is worth sounding a *sotto voce* note of paradox. The mighty 675 foot eastern entrance facade, originally with a statue of Adam atop its central gable, fronts the Cromwell Road named after Oliver, Lord Protector during England's Interregnum. This period saw the repudiation of Divine Rights and of the perfect, static hierarchical structure which underlay both human society and, indeed, all of Nature. In addition, the Ruskinian ornamentation, which covers the museum, celebrates Nature's diversity. It is, of course, the generative mechanism of that very diversity which Darwin made his life-long study and the heretical answers at which he arrived served, in no small measure, to dismantle the philosophy of 'The rich man in his castle ...'. So, perhaps, we do not need a Darwin Boulevard after all or, indeed, any obvious public tokens of Charles Robert Darwin MA FLS FRS. His work and thoughts are still so much a part of the philosophy of the life sciences that he requires neither street names nor monumental statuary to celebrate his memory.

By contrast, the works of the naturalist-philosophers, whose names surround the Jardin des Plantes, are now only read by historians of science. Lamarck's *Philosophie Zoologique*, published in the year of Darwin's birth, 1809, the massive works of Buffon and the transcendental anatomy of St. Hilaire have all been sidelined. These men were influential in their time but their approaches and philosophies have become superannated. The works of Charles Robert Darwin, however, remain a living presence, embedded in our subconscious and, as Jim Secord has said, 'his theory of evolution by natural selection is the coping stone of the modern life sciences' although the January issue of the *Scientific American*, continuing the architectural analogy, depicts the *Origin* rather as the keystone. Most of Darwin's twenty nine volumes are still available as hard copy and *all* are on the web. Darwin himself called the *Origin* 'One long argument'; he was right, and although it is the '*Origin*' whose sesquicentenary we celebrate this year, we should remember that, taken together, all his works form one long argument and the '*Origin*' should be placed in this context if we are to attempt any understanding of Darwin's thinking. To this end, over the years, much ink has been spilt in analysing the evolution of this truly incredible work. Again, there has been much scholarly speculation as to why Darwin delayed publication for twenty years. Due regard for his wife, Emma's religious sensitivities? No. A digression on barnacles? Yes, to some extent. An attempt to distance himself from the radical left? Almost certainly. Darwin, although he denied it, was a very clever man, so perhaps the real answer is that he foresaw that by waiting, the bicentenary of his birth and the sesquicentenary of the *Origin* could be conveniently and therefore economically – he'd read his Adam Smith – concelebrated in 2009 in the illustrious company of Henry VIII and the 500th anniversary of his accession along with the 250th of the founding of Kew Gardens as we know them. Whatever Darwin may or may not have foreseen, these other events have, like the *Origin of Species*, opened the doors to two new worlds, the vernacular Bible and tropical biodiversity respectively. A web of connections link these events but our focus here is on Charles Darwin and on the doors *he* opened for us.

In the late 1960's an engineer colleague asked me 'what was all this fuss about evolution?' and could I recommend a book to enlighten him. The nearest to hand happened to be '*Genetics, Palaeontology and Evolution*' edited by Jepsen, Simpson and Mayr, first published in 1949 but reprinted, *unrevised*, in 1963, four years after the centenary of the *Origin* celebrations. I lent my colleague this work and, several weeks later, he handed it back with the pithy comment 'They don't know much do they?' He did have a point and he followed in the tradition of engineers asking biologists awkward questions; remember Fleeming Jenkin and the famous opening line of François Jacob's paper at the 1982 centenary conference: 'If an engineer were askedto manufacture a frog, it seems unlikely that he would first design such a swimming precursor as a tadpole....'. The stated purpose of *Genetics, Palaeontology and Evolution* was to reunite the, by then, disparate specialisms of the title and to harness the results of such a reunification to clarify the mechanism of evolution. It was an ambitious task as, 'The genetics of today traces the fact of evolution back to the existence of ultramicroscopic bodies, the genes,' (p.422). There was no mention of nucleic acids, ribo- or deoxyribo- and, of course, no Hox boxes etc. etc.. True, these 'ultramicroscopic bodies' were, by this time, firmly located in cell nuclei and, unlike Darwin's hypothetical 'gemmules', they did not float about freely and then fortuitously

assemble in the reproductive organs at the right moment. Post the rediscovery of Mendel's work and A.C. Hardy's mathematical analysis of gene flow, changes in gene frequency were measured using their phenotypic expression, but understanding at the molecular level had advanced little since Darwin's day. It is indeed remarkable, in hindsight, that the 'New Synthesis' was achieved using this 'Black Box' approach in complete ignorance of what the gene actually was. Just as Dalton's atomic theory had offered a numerical approach to chemistry in complete ignorance of the nature of atoms, so the 'New Synthesis' provided a mathematical tool for analysing Darwin's Natural Selection; his preferred evolutionary mechanism. Moreover, these mathematics both underpinned gradualism and reconciled it with the existence of Mendel's discrete particles, so long a contentious issue between the 'Mendelians' and the 'Biometricians'. It is, perhaps, ironic that Hardy's formulation, now known as the Hardy-Weinberg rule, rests on the binomial theorem with which, Darwin said, he '...had a special quarrel' (AB. p.114). So successful and influential did Population Genetics and the 'New Synthesis' become, – together they dominated the 1959 centenary despite a warning, a decade earlier, from C.H. Waddington that something was missing – that Ron Amundson, in his ground-breaking book *The Changing Role of the Embryo in Evolutionary Thought* (CUP 2005) argues that, what he calls, 'Synthesis Historiography' (S.H.) has tinted the spectacles through which the real Charles Darwin and his predecessors are now viewed. As a consequence, Amundson suggests that this S.H. bias has led evolutionists and historians alike to see both nonexistent philosophical flaws in Darwin's approach and to downgrade the work of the comparative anatomists and embryologists. The two centenaries of 2009 and the concurrent rise of the discipline of 'Evo-Devo' provide an opportunity, Amundson suggests, to reassess the master's work using a new pair of spectacles and to trace the changes in perception through the centenaries of 1909, 1959 and 1982. We must, however, be careful not to emulate George Orwell's Winston Smith, in *Nineteen Eighty Four*, who constantly rewrote history in order to satisfy contemporary prejudices.

Of his Cambridge days Darwin wrote, in his Autobiography, William Paley's *Natural Theology* '... gave me as much delight as did Euclid' (p.19). He went on to write that he regarded the works of these two authors as '...the only part of the academical course which, was of the least use to me in the education of my mind.' Although it was Paley's *Evidences of Christianity* and his *Moral Philosophy* rather than his 'Natural Theology' which were the set texts, it was this latter which really impressed Darwin. It was Paley's 'clear language' and 'logic' in all his works that Darwin admired although, he adds, 'I did not at that time trouble myself about Paley's premises' (AB p.59). So, 'By answering well the examination questions in Paley, by doing Euclid well, and by not failing miserably in Classics, I gained a good place among the *hoi polloi*...' (January 1831). He collected his degree in April of that year; '...it cost £15: there is a waste of money,' he wrote to his sister Caroline (Corr. Vol. I p.122). So, what next? Lord Goring, in Oscar Wilde's *Ideal Husband*, says that, if a gentleman does not go into politics then there is '...nothing left for him as a profession except Botany or the Church'. Darwin was certainly a gentleman and, having become disillusioned by medicine at Edinburgh, his Cambridge years were intended to enable him to establish himself as a country vicar. Politics, it seems, was never an option so, to use one of Darwin's favourite expressions, 'in a large sense' Botany it had to be. At

this time there was no professional career structure in the Natural Sciences, as we would understand it. Only those peripheral to medicine offered any sort of opportunity, a fact that was to have important repercussions. Lord Goring was, however, wrong in seeing the Church and Botany as being mutually exclusive alternatives. Many country clergymen were also botanists *vide* Darwin's Cambridge mentor, Rev. John Stevens Henslow, who held the University Chair in the subject. Darwin, as we know, inherited sufficient wealth and, by his own financial acumen acquired more, so as to obviate any need for him to earn a living at all. If it had been otherwise I would not be writing this! Indeed, if Wedgwood had had to call in the administrators 200 years before they did (*Times* 7 Jan. 2009) or if Darwin *had* taken a fancy to medicine and followed his grandfather, father and elder brother into that profession, if Capt. Pringle Stokes had not shot himself and/or Lieutenant Skyring had been ratified as the *Beagle's* captain, or, even, if the *Beagle* had been able to explore the southern shores of Gondwanaland, who knows where we would be? The 'ifs' of history are frowned upon by historians but sometimes attempts to reconstruct these virtual scenarios enable us to focus on the reasons as to why certain things *didn't happen*. One of the best of the crop of anniversary books this year is Nick Spencer's *Darwin and God*. This work, by tracing in detail the reasons for the gradual erosion of Darwin's faith, such as it ever was, prompts us to question how things would have worked out had Darwin *not* been disillusioned by Christianity. However, the unexpurgated version (Nora Barlow, 1958) of the *Autobiography* makes it quite clear that he was so disillusioned and the rest is history.

Darwin himself was not averse to framing historical 'if' questions and certainly one of these, occasioned by his visit to Chile in March 1835, was to initiate a train of thought the fruits of which we are still reaping. While near the town of Concepcion he witnessed an earthquake that devastated the area. This prompted Darwin to speculate on what sort of mayhem such a catastrophe would produce if it were to hit the British Isles. It would, he says, result in the destruction of private property, public buildings along with their records and, in short, destroy the whole, apparently stable, perfect and internal infrastructure of society within a few minutes and '...violence and rapine would remain uncontrolled. In every large town famine would go forth, pestilence and death following in its train'. He was deeply moved by what he saw and it '...cast shadows over the stable, ordered vision of nature that supposedly pointed directly to the deity that Darwin imbibed at Cambridge' (Spencer p.27).

The 'Darwin Industry' has provided us with an overwhelmingly massive literature on Darwin's 'Sea Change'. However, in summary, albeit an over simplistic one, by the time he docked at Falmouth on October 2nd 1836 he had begun to ask how it was that clear evidence pointed to the fact that Nature was not perfectly harmonious, anthropocentric, and stable, presided over by a benevolent Deity as depicted in the popular painting, by Edward Hicks. 'The Peaceable Kingdom' (1820). Nature was, in fact, dynamic, capricious and, above all, indifferent to human life. In fact, the very opposite to what his Anglican upbringing had led him to believe and which, up to that point, he had indeed believed. Charles Darwin had begun to frame some very difficult questions many of which we are still attempting to answer.

It was the received wisdom surrounding the intertwined ideas of stability, perfection and purpose about which Darwin came to have doubts. Furthermore, he came to be



Of making many books there is no end!

acutely aware of the risks he ran by voicing these doubts. Perhaps too much has been made of Darwin's confrontation with the *Consensus Fidelium per se*. Pius IX's (1846-1878) *Syllabus errorum* and *Quanta cura* had made it quite clear that Holy Church set its face against all aspects of 'Modernism'. Moreover Papa Ferretti conferred an Honorary Doctorate (1876) on St. George J. Mivart, one of Darwin's most perceptive critics who, according to Darwin himself, says '...with uncommon cleverness all that is most disagreeable' (Darwin to Hooker Sept. 16th 1871) which was his way of saying 'well bowled!' In fact, Darwin took Mivart's criticisms very seriously indeed particularly the one concerning the use of incipient stages of organs. Despite all this neither the *Origin* nor yet *The Descent of Man* was ever placed on the *Index Librorum Prohibitorum*. The Anglican Church may have huffed and puffed a little over doctrinal issues but the real conflict lay beneath these superficial posturings and is perhaps best encapsulated in Voltaire's prophetic observation that one should not blaspheme in front of the servants lest one day 'they should cut all our throats' (Quoted in Desmond p.120).

In his *Autobiography* Darwin recollects that, on his return from his Beagle Voyage, he '... was also ambitious to take a fair place among scientific men, ...'. But whom? The medical school Radicals or the Conservatives of the "Athenaeum"? London, in the 1830s and 1840s, was in as much of an intellectual ferment and political conflict as Paris had been in the 1130s. Kenneth Clark, in his magisterial work, *Civilisation* (1969), quotes the revolutionary writings of Peter Abelard – 'I must understand in order that I may believe' and, 'By doubting we come to questioning, and by questioning we perceive the truth'. He could well have been quoting Darwin when he opened his first notebook on transmutation in July 1837 and not Abelard in 1122. This understanding, however, had many facets and all of them had social and political price tags.

Darwin was in an ambivalent position. He was a Whig gentleman with private

means, a Cambridge graduate and, for five long years, had been the sailing companion of the aristocratic FitzRoy. In short, Charles Darwin was 'blue chip' Establishment yet he had begun asking those questions whose answers, whatever the final technical details turned out to be, he knew full well had the potential to blast away the foundations of that very society of which he was a member. Of course, having independent means meant that he did not require either approval or patronage from anyone and yet, as a human being, neither did he seek to attract opprobrium. He took pains to distance both himself and his nascent theory from any associations with the radical Left. The idea of evolution, as distinct from its various postulated mechanisms, had been 'in the air' as Lyell put it, for nearly a century. Unfortunately its proponents had been those very maverick thinkers from whom Darwin wished to disassociate himself. One such maverick was William Lawrence whose book *Lectures on Physiology, Zoology and the Natural History of Man* (1822) had been denounced as blasphemous and associated with the writings of the 'Infidel' Tom Paine. It was refused copyright by the Lord Chancellor and was, of course, pirated (Darwin had a copy) and became hugely popular. Nevertheless it ruled out the possibility of 'Evolution' being judged dispassionately. To make matters worse Lawrence had been inspired by the works of Darwin's own Grandfather, Erasmus, whose writings conveyed a suspicious scent of atheism and, as for his erotic botany..... In addition, the infamous 'Vestiges' was to give Darwin pause.

Darwin thought of himself primarily, at least to start with, as a geologist and, on his return from the Voyage much of his work was geological and he became closely associated with his idol, Charles Lyell and with the London Geological Society with its 'official' inductive or Baconian approach, a philosophy which Darwin claims to have adopted in his work on evolution. This was in sharp contrast to his Grandfather, Erasmus' work in which, says Darwin '...the proportion of speculation being so large to the facts given.' (AB p.49). Darwin wanted *his* theory to be seen to arise *de novo* from objective observations unsullied by presuppositions and speculation. It wasn't to be. Is it any wonder that he had his wife, Emma, place the 1844 Essay under lock and key, avoided the word 'evolution' and made only passing reference to man's descent in the *Origin*? Darwin had become a reluctant subversive, a 'Fifth Columnist' masquerading as a respectable country gentleman. Whether this 'mimicry' was, in the end, Batesian or Mullerian is, perhaps, an issue future historians may wish to debate. However, whether he liked it or not Darwin's theory was, as T.H. Huxley put it, to become 'a veritable Whitworth gun in the armoury of liberalism'. (Huxley's review of the *Origin* in *Westminster Review* NS 17 1860 pp.541-70. Quote p.541)

No one, including Charles Darwin, can totally divest themselves of the beliefs which are part of their upbringing. One such belief was the doctrine of the fixity of species and the trials and tribulations which Darwin underwent to dispose of it – 'it is like confessing a murder' – have been fully, if not over, documented. It seems, in retrospect, that neither Darwin nor his biographers need have borne such a burden, because Ron Amundsen has convincingly argued that the fixity of species, as an idea, goes back only as far as Linnaeus, who used it as a taxonomic tool in his search for a 'Natural Classification'. It never was, it seems, a Divine edict. However, it is fair to speculate that, if Darwin had not begun with this apparently 'Straw Man', Evolution and Natural Selection would have been still-born!

The concept of Perfect adaptation is much more difficult and is very far from a satisfactory analysis. Darwin himself was loath to relinquish this belief as, indeed, are most of the natural history programmes aimed at the general public. Despite ‘The Spandrels of San Marco’ (or were they really pendentives?) we still cling tenaciously to the notions of purpose and of perfect adaptation perhaps because the alternatives to this ‘Panglossian paradigm’ are so subtle, complex and/ indeed, unacceptably bleak. ‘The shadow of perfection’ is long and getting longer. It certainly was for Darwin.

Whether or not Darwin’s attitude to Perfect Adaptation stems from his youthful admiration of Paley’s works or whether he was, as Andrew Cunningham puts it, ‘provisionally converted’ (Cunningham. 1981 p.96) is a matter for debate. However, it should be noted that Paley himself presented the matter in a qualified manner. ‘Contrivance, by its very definition and nature, is the refuge of imperfection’ (Paley vol.1 p.112). He felt that organisms were as perfect as they could be, given the constraints of the general laws of Nature ordained by God. In fact, what Paley was saying is that God was demonstrating his Wisdom and Intelligence to mankind by creating perfection *despite* those constraints but that this perfection could never be absolute. Paley’s discussion of the famous watch on the heath underlines this point. This qualification was, however, lost on his disciples and was far too subtle to use as a tool for ‘crowd control’. So it was that Paley’s ‘Natural Theology’ became a rich seam of examples illustrating perfect adaptation and the ‘Argument from Design’. The product of this mine were the nine volumes of the *Bridgewater Treatises*.

Perfection is a difficult concept to apply to living organisms and its reality has usually been taken as an article of faith, based on the assumption that, since God had created all things, they could not be other than perfect. This assumption often flew in the face of evidence to the contrary. Furthermore, in the pre-Darwinian world all organs and organisms were assumed to have purpose or ‘Final Cause’ and this was sufficient to explain all structure and function. This teleological approach, as it was called, had begun to be perceived as sterile some thirty years before Darwin’s final demolition, but it left, supposedly, perfect adaptation without an explanation. Erasmus Darwin’s co-member of the ‘Lunar Society’, James Watt, could define perfection very

precisely in respect to his steam engines. One cylinder, full of steam, condensing to a perfect vacuum would yield maximum work. It was neat and numerical and suggested a route for achieving this ideal in engineering terms. In fact, via the Carnot cycle, steam engine technology was to lead to the



The earthworm’s challenge.

discipline of thermodynamics; a discipline which, in the 1980s, began to shed new light on the organisation of living organisms. The perfection of buildings also had a mathematical definition. Leon Battista Alberti, in the fifteenth century, defined perfection in architecture as a geometric construction in which all elements are proportioned exactly. These proportions could, of course, be expressed mathematically as Euclidean ratios. On this definition, nothing could be added, diminished, or altered but for the worse. It could have been George Cuvier defining the body plan of one of his *embranchments* and closing the gates on transmutation and, consequently, on evolution. The problem with the concept of perfection is that it implies stasis; systems at, or close to, equilibrium. Living organisms are systems very far from equilibrium and do not behave like perfect engines and, unlike buildings, they have a life cycle. Jacob's frog has no option but to be first a tadpole. Perfection, then, faced Darwin with three problems. First, was there any objective measure of perfection in living organisms? Second, how could a chancy process, such as Natural Selection, produce 'organs of extreme perfection'? How could that watchmaker have *possibly* been blind? Third, if organisms were indeed perfect, Cuvierian logic tells us that no further change is possible. Cuvier's answer was, of course, catastrophism but, wedded as he was to Lyellian gradualism, this answer would not do for Darwin. How to answer and to reconcile these conflicts was Darwin's life's work and, in the absence of any known mechanism for heredity, his achievement is no less than breath-taking.

Perfection, as we now realise, does not exist in the way that Paley, the authors of the *Bridgewater Treatises* and Darwin himself, at least for a time, believed. The eye, Darwin's *bete noire*, is 'jury rigged', so are orchid flowers. Hiccups are the legacy of our aquatic ancestry, diabetes is a hangover from leaner times and surely a rotary heart is mechanically preferable to a reciprocating one. Indeed, the whole new discipline of Darwinian medicine is a scion of Darwin's realisation that evolution, by Natural Selection, could *not* result in perfection but is only a mechanism for tracking environmental change given its inherited potential; remember those 'ten thousand wedges'? Darwin well knew that Natural Selection was 'Daily and hourly scrutinising, throughout the world, every variation;' (*Origin* p.84). Furthermore those variations, although their causes were unknown to him, Darwin knew that they were expressed at *all* stages in the life cycle of an organism and that, therefore, the scope for Natural Selection to act was enormous. This resulted in 'The Struggle for Existence' being far more complex than his contemporaries ever realised, preferring, as we still do, Tennyson's poetic, if simplistic and wholly misleading, 'Nature red in tooth and claw'. The power of Natural Selection and the resulting evolutionary divergence was very clear to Darwin but, he lamented, his contemporaries, even his staunchest allies, never really grasped the significance of it. Asa Gray even congratulated Darwin for reintroducing teleology and Lyell saw Natural Selection and the Principle of Divergence as alternatives! It was all too novel. Darwin's arguments lay outside the accepted philosophical framework and yet the language available to him was derived from that very framework. His term 'Natural Selection', as Gillian Beer has pointed out was '...poised on the edge of metaphor...' (Beer p.xviii).

Darwin had come a long way from Paley's watch, whose perfection, or approach to it, could only be assessed in the final product. When Darlington warned, in 1951, that something was missing from the 'New Synthesis' he was quite right; with

population genetics, and its seductive mathematical underpinning, we had forgotten the organism and the relation between genotype and phenotype. Of course, Darwin did not, could not, use these terms but he was fully aware of the importance Natural Selection had for ontogeny. With the advent of ‘Evo-Devo’ Darlington’s missing part has been found, but of course, it was there all the time, lying quietly in Chapter XIII of the *Origin*. Perhaps, in this double-centenary year, we should all re-read the *Origin* with new eyes, without preconceptions, be open to Darwin’s plurality of thought and, above all, be thankful that Wallace wrote that letter and that the resulting publication wasn’t called ‘The Origin of Pigeons’. Who knows what treasures still lie there.

Paley’s watch is probably still lying on that heath, as Darwin, late in life, showed that earthworm activity on heathland is poor (the pH is too low). It probably isn’t still ticking, it wasn’t perfect, after all, but if it were perhaps it would take us to the sesquicentenary of Darwin’s forgotten work on orchids in 2012. Who knows what revelations that might bring.

This work is dedicated to my wife, Judith who has provided the commas, just as Emma did for Charles.

SOURCES

- TITLE: Shakespeare’s *Two Gentleman of Verona*¹ Act III Sc.i. Valentine speaking of Sylvia.
- AMUNDSEN, R. (2005) *The Changing Role of the Embryo in Evolutionary Thought: Roots of Evo-Devo*. Cambridge University Press.
- ARTIGAS, M., CLICK, T.F. and MARTINEZ (2006) *Negotiating Darwin: The Vatican confronts Evolution 1877-1902*. John Hopkins Univ. Press. Chap 7 deals with Mivart.
- BARLOW, N. (1958) *The Autobiography of Charles Darwin*. Collins. All quotations are taken from this, the first complete version.
- BEER, G. (1983, 2000, 2009) *Darwin’s Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth Century Fiction*. Cambridge Univ. Press. 3rd Ed.
- CARROLL, S.B. (2006) *The making of the fittest: DNA and the ultimate forensic record of evolution*. Quercus. One of the best available works which links Darwin with modern genetics.
- CUNNINGHAM, A. (1981) Sydenham versus Newton: the Edinburgh fever dispute of the 1690s between Andrew Brown and Archibald Pitcairne. *Med. Hist. Suppl.* no.1 pp.71-98.
- DARWIN, C. *The Correspondence of Charles Darwin*. Cambridge Univ. Press.
- DARWIN, C. (1859) *On the Origin of Species*, facsimile of the First Edition. All quotes and pagination refer to this work.
- DESMOND, A. (1989) *The Politics of Evolution: Morphology, Medicine, and Reform in Radical London*. Univ. Chicago Press.
- GOULD, S.J. and LEWONTIN, R.C. (1979) The spandrels of San Marco and the Panglossian paradigm: A critique of the adaptationist programme. *Proc. Roy. Soc. Lond. B* 205 pp. 581-598.
- NICHOLLS, H. (2009) A Flight of Fancy. *Nat.* 457. no. 7231. Feb. 12th. pp.790-791. In this article the author poses the ‘if’ question: what if Murray had accepted the advice that the *Origin* “should have been entitled ‘The Origin of Pigeons’?”
- SPENCER, N. (2009) *Darwin and God*. SPCK.

Darwin's Lichens

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Introduction

In 1992-1993, I helped the late Prof. David L. Yudilevich (1930-2006) (see Mann 2006) coordinate an international symposium, "Darwin and the *Beagle* in Chile: Evolution Today", at the University of Chile in Santiago, Chile (29 September-1 October 1993) as part of the ICSU General Assembly meetings held at that time in Santiago. The symposium was wide-ranging, covering the major themes of Geology, Palaeontology, Evolution & Genetics, Botany, Zoology, Ecology, Medicine & Psychology, Anthropology, History, Philosophy and Religion. To this symposium I contributed an account of Darwin's lichens (Galloway 1993a). Although David Yudilevich later produced a fine book on *Darwin in Chile* (Yudilevich & Castro Le-Fort (1995), based very much on the Symposium and its associated Darwin Exhibition (to which the Linnean Society contributed a life-size copy of the Collier portrait of Darwin from the Society's Meeting Room) which was assembled in the Patio Ignacio Domeyko of the University of Chile, none of the papers contributed to the Symposium were published, hence this account of Darwin's lichens in a revised form in this his bicentennial year.

How I first became aware of, and interested in, Darwin's lichens is quite a diverting story. Early in 1973 when I began work on a New Zealand Lichen Flora at the then British Museum (Natural History), I was disappointed at not being able to find any of Banks and Solander's New Zealand lichen specimens, even though the Slip Catalogue in the Botany Library indicated that they had collected a few lichens from New Zealand on the *Endeavour* voyage (Galloway 1998a). Peter James, then Head of the Lichen Section, suggested that I look in the Botany storeroom at the top of the western central tower above the Museum entrance, as he thought that there could be early, unincorporated material to be found there. Early material there certainly was, in crazily stacked and disintegrating cardboard boxes perched on rusting shelving under one of the large water tanks. Occasional leaks from the tanks over the years, plus debris from starling nests (a broken window pane had allowed easy entry for the birds!) contributed to the scene of mild devastation and chaos, almost more reminiscent of Miss Havisham's dining room than a Museum storeroom. But what treasures were forthcoming! There I found the missing Banks and Solander lichens and a box marked "Darwin's Lichens". When I brought this box down to the Lichen Section Peter said disarmingly "Oh, I rather thought they must have been somewhere"! The box, evidently Henslow's specimens that had been sent to Kew, contained a number of specimens on small pieces of yellow paper with inked annotations and also a full sheet of *Sticta divulgata* (Fig. 1) collected by Darwin from the Chonos Archipelago, that I was later to select as lectotype (Galloway 1992a: 97). But it was not until my first collecting visit to Chile in 1986, that I realised just how important these old abandoned Darwin lichen specimens might be.



Fig. 1. Darwin's 1834 collection of *Pseudocyphellaria divulsa* from the Chonos Archipelago, southern Chile (BM)

In order to set Darwin's lichens in their correct historical and geographical perspective, a few basic questions should be considered. (1): What was known of lichens worldwide and who were the leading lichenologists in the early 1830s when Darwin was contemplating his forthcoming long voyage on the *Beagle* from 1832-1836? (Barlow 1945; Keynes 1988, 2002; Browne 1995); (2): What was known of the lichens of South America at the time of Darwin's visit? (3): How much might Darwin have known about lichens at the time of the voyage?

(1) As a student at Cambridge (1828-1831), Darwin was greatly influenced by the Professor of Botany, John Stevens Henslow, who was both his mentor and friend (Barlow 1967; Browne 1995; Walters & Stow 2001). Lichenology in Britain was then at a low ebb (Hawksworth & Seaward 1977; Laundon & Waterfield 2007). Three decades earlier, the Swedish lichenologist, Erik Acharius (1757-1819), Linnaeus's last student (Kärnefelt & Frödén 2007), had set systematic lichenology on a bright new path when he segregated Linnaeus's collective genus *Lichen* into smaller independent genera, consolidating his new arrangement in three important foundational books, the *Methodus* (Acharius 1803), *Lichenographia Universalis* (Acharius 1810) and the *Synopsis methodica lichenum* (Acharius 1810). His ideas were quickly taken up in Britain by Dawson Turner and William Borrer, and then W.J. Hooker (Hooker 1829-1866; Turner & Borrer 1839; Hawksworth & Seaward 1977; Galloway 1981a, 1988; Seaward 2002; Laundon & Waterfield 2007), but much less enthusiastically by James Edward Smith, who, while admiring Acharius's knowledge and industry, would not subscribe to the new segregate genera. On receiving a copy of Acharius's *Methodus* he wrote to Acharius in 1804 explaining his conservative position "... do not blame me if my opinion on speculative points differs sometimes from yours. Neither dare I change names so freely as you have done. I must keep in view those Laws of Linnaeus which are sanctioned by experience and founded in justice... It is easy enough to use new words. Genius appears best in using old ones properly... I regret that there should be a word in your excellent book that I cannot zealously defend as a friend ought: but I know we cannot all think alike in philosophy any more than in religion..." (Galloway 1988: 165).

Acharius's world view of lichens in 1814 amounted to 906 species in 43 genera (Acharius 1814; Kärnefelt & Frödén 2007) and by the early 1830s, the number of species was slowly starting to grow, when the impetus for lichen taxonomy passed from Sweden to France and Germany, with the work of such lichenologists as Fée (1824-1837), Eschweiler (1824), Wallroth (1824) and Delise (1825a, 1825b) creating new names and opening up new vistas. But lichenology remained poised, waiting for a catalyst to open the still-closed book of Southern Hemisphere lichenology. As we shall see, Darwin was to be very much part of that necessary catalyst.

(2) When the *Beagle* sailed from Plymouth on 27 December 1831 bound initially for southern South America via the Cape Verde Islands and Brazil, what in fact was known of the lichens of South America? Not a lot. From Commerson's collections made from the Straits of Magellan in 1767, Jacquin (1781) described *Lichen aurantiacater* [= *Usnea aurantiaco-atra* (Walker 1985: 62)] and *L. antarcticum* [= *Nephroma antarcticum* (White & James 1988)]. Cook's three voyages yielded several collections from Banks & Solander, the Forsters & Sparrman and Anderson, but only one species

was named from these collections, George Forster's *Lichen berberinus* [= *Pseudocyphellaria berberina* (Forster 1787; Galloway & James 1977; Galloway 1981b)]. The Scottish botanist Archibald Menzies, Captain Colnett's surgeon, spent 17 days in New Year's Harbour, Staten Island early in 1787 and during that time he collected 32 taxa in 19 genera (Galloway 1995b), with 5 of these subsequently being described by Acharius (1803). Delise (1825a, 1825b) named two species of *Sticta* from the southern zone, *S. endochrysa* [= *Pseudocyphellaria endochrysa*] from the Falkland Islands (see also Gaudichaud 1827) and *Sticta faveolata* [= *P. faveolata*] from the Straits of Magellan (Galloway & James 1986). Several tropical species are found in the works of Kunth (1822), Fée (1824) and Hooker (1829; Galloway 1995a), and that was pretty much the lichen record for South America. It is therefore very apparent just what a clean slate, in lichenological terms, Darwin had as a collector.

(3) It is likely that Darwin would have known only very little about lichens when he boarded the *Beagle*. Perhaps he may have skimmed through the 5th edition of James Edward Smith's Botany textbook that Henslow used in his courses at Cambridge (see Walters & Stow 2001). This book – *Introduction to Physiological and Systematical Botany* – originally published early in the 19th century (Smith 1807), discussed lichens as part of the Algae (as did Linnaeus) and although acknowledging the recent works of Acharius (Acharius 1799, 1803) Smith was cautious, if not suspicious, of the Swede's radical ideas and terminology and maintained his conservative view of Lichens being classified in the collective genus *Lichen* (see also Smith & Sowerby 1790-1814; Galloway 1981a, 1988; Laundon 2005). The *Beagle* library had the 17-volume *Dictionnaire Classique d'Histoire Naturelle* edited by Bory de Saint-Vincent (1822-1831) on its shelves (Burkhardt & Smith 1985: 558-565), and in this work the account of Lichens was written by the Strasbourg lichenologist, Apollinaire Fée (Fée 1826) an altogether more progressive account. In the *Dictionnaire* essay, Fée adopted the system of classification used in his two-volume work on the lichen epiphytes of *Cinchona* bark and other trees with pharmaceutical properties (Fée 1824). His arrangement incorporated contemporary results of Fries (1821), Eschweiler (1824) and Wallroth (1824) and benefited from Fée's own discussions with Bory, Delise, Dufour and Persoon. For its time, it would have been one of the most modern treatments of lichens available. In addition, the *Dictionnaire* also contained accounts of individual lichen genera compiled by Bory (often from his own collections and containing many novelties) and by Fée, so that Darwin, should he have felt the need to consult these, would have been reasonably well catered for in terms of what was known of non-European lichens. But that is not really saying very much, for in 1832 comparatively little was known of the lichens of the southern zone and the Pacific (Galloway 1985). It was still largely "terra incognita", but Darwin and a little later, Joseph Hooker, were soon to change all that.

Darwin's lichen collections

For most of the *Beagle* voyage Darwin was an industrious and conscientious collector (see Porter 1980, 1985, 1987; Browne 1995; Keynes 2002), so it is scarcely surprising that his collecting canvas should extend to lichens, especially in places (e.g. in Tierra del Fuego and in the dripping rainforests of Chiloe and the Chonos Archipelago) where they form prominent and characteristic components of the

vegetation, a view encouraged by Henslow in a letter to Darwin written on 15 January 1833 "...The Lichens are *good things* as scarcely any one troubles himself to send them home..." (Burkhardt & Smith 1985: 294; Porter 1987: 149). Darwin's lichens were sent by Henslow to the mycologist M.J. Berkeley, Darwin noting in a letter to Joseph Hooker on 11 January 1844 "...My cryptogamic collection was sent to Berkeley; it was not large; I do not believe he has yet published an account but he wrote to me some year ago that he had described & mislaid all his descriptions. W^d it not be well for you to put yourself in communication with him; as otherwise some things will perhaps be twice laboured over. – My best (though poor) collection of the Cryptogam. was from the Chonos Islands..." (Burkhardt & Smith 1987: 2).

On 29 January 1844 Hooker wrote to Darwin "...M^r Berkeley was with us shortly before your letter arrived, & I gave him all my Fungi, he has returned me for M^r Henslow your Lichens, which he had; but said nothing about the other orders in his possession..."(Burkhardt & Smith 1987: 6). Thus, Darwin's lichens went to Kew where Hooker made extensive use of them during the preparation of his *Flora Antarctica*, the first part of his *Botany of the Antarctic Voyage*. Hooker enlisted the help of the Irish lichenologist, Thomas Taylor for determination of his lichen collections from the southern zone (Hooker & Taylor 1844), and Taylor later described several new species from Darwin's *Beagle* collections (Taylor 1847 – see below).

Taylor's lichens, which include duplicates of some Darwin collections, are held in the Farlow Herbarium of Harvard University (FH), but the bulk of Darwin's lichens are to be found scattered through the General Collection, and in the unincorporated collections of the Lichen Section of the Natural History Museum in London (BM). An additional, and as yet untapped, source of Darwin lichens is also in the Natural History Museum. On Darwin's rock specimens held in the basement corridor drawers of the Department of Mineralogy, many of them from remote places never visited (or likely to visited) by a lichenologist, there are sometimes mosaics of lichens present. These Darwin specimens would richly repay a lichenologist's attention. Notes on the various Darwin lichen collections that I was able to find in the BM between 1973 and 1994, supplemented with relevant accounts from the literature are given below.

1. *Fernando de Noronha*: On 19 February 1832, the *Beagle* was off Fernando de Noronha, Darwin noting in his Diary "... An hour before sunset Fernando was clearly visible – it appears an extraordinary place, – there is one lofty mountain that at a distance looks as if it were overhanging...". The next day Darwin spent a few hours on the island, commenting his Diary "...I spent a most delightful day in wandering about the woods. – The whole island is one forest, & is so thickly intertwined that it requires great exertion to crawl along....I am glad that I have seen these islands, I shall enjoy the greater wonders [of the tropical rainforest] all the more from having a guess what to look for..." (Keynes 1988: 39). And in his Journal he noted "...The whole island is covered with wood; but from the dryness of the climate there is no appearance of luxuriance..." (Darwin 1845). From the highest peak he collected the basidiolichen *Dictyonema glabratum* (Berkeley 1842: 445 – recorded as *Cora pavonia* – see also Porter 1987: 158).

2. *Brazil*: on 5 April 1832 the *Beagle* landed at Rio de Janeiro and stayed there until 5 July. Darwin's Brazilian lichen collections [the specimens seen in BM have a

printed label “from J.S. Henslow” to which Henslow has added in pencil “Rio Jan. May 1832” and a collection number] include the following taxa: *Coenogonium*, *Diploschistes*, *Pseudocyphellaria aurora* (Galloway 1993b), *Ramalina usnea* [Henslow No. 493] and *Teloschistes flavicans* [Henslow No. 486].

3. *Uruguay*: On 28 July 1832, Darwin wrote in his Diary of a visit to Monte Video, “...Landed early in the morning on the Mount. This little hill is about 450 feet high & being by far the most elevated land in the country gives the name Monte Video. – The view from the summit is one of the most uninteresting I ever beheld. – Not a tree or a house or trace of cultivation give cheerfulness to the scene...yet there is a charm in the unconfined feeling of walking over the boundless turf plain...” (Keynes 1988: 85-86).

From Monte Video Darwin collected two lichens. Both were later described by the Irish lichenologist, Thomas Taylor (1847 – see also Sayre 1982, 1987) as *Parmelia fistulata* Taylor and *Usnea densirostra* Taylor, and are well-known taxa in the Uruguyan lichen mycobiota (Osorio 1972, 1992, 2009). *Parmelia fistulata* has had a somewhat complicated nomenclatural life, subsequently being transferred to the genera *Everniastrum* and *Concamerella* before being recently assigned to *Parmotrema* (Blanco *et al.* 2005: 157). *Usnea densirostra*, a saxicolous lichen, is the only species of *Usnea* to have a common name in Uruguay (Osorio 1982), being known there as “Yerba de la Piedra” (Stone Grass, or Herb of the Rock). In 1987 for the Sesquicentenary of the National Museum of Natural History in Montevideo, the Government of Uruguay issued the first postage stamp commemorating a lichen, none other than *Usnea densirostra*, the Yerba de la Piedra first collected by Darwin 155 years before. The same species is also used as a monitor of heavy metal pollution in semi-arid environments in Argentina (Bernasconi *et al.* 2000), something Darwin would never have dreamed of!

4. *Tierra del Fuego*: The *Beagle* anchored in Good Success bay off the coast of Tierra del Fuego on 16 December 1832 and left for the Falkland Islands on 26 February 1833 (Burkhardt & Smith 1985: 540). It was here, among the channels and islands of the uttermost south of South America that lichens made their biggest impact on Darwin since they are often conspicuous elements of both the coastal and alpine vegetation. Darwin would also have been conscious of the fact that Tierra del Fuego had seen a succession of botanists for at least 60 years preceding him, from Commerson through Banks and Solander to the Forsters, Sparrman, Anderson and Menzies (Moore 1983) – it was not at all “terra ingonita” even for lichens. But it was undoubtedly stimulating, dangerous and exciting country to be exploring. In his Diary, writing of the dense Fuegian coastal forest Darwin noted “...Their curved & bent trunks are coated with lichens, as their roots are with moss...” (Keynes 1988: 126), and further, “...The appearance of these forests brought to my mind the artificial woods at Mount Edgecombe: the greenness of the bushes & the twisted forms of the trees, covered with Lichens, in both places are caused by strong prevalent winds & great dampness of climate...” (Porter 1987: 166).

All of Darwin’s lichen collections so far seen, are labelled from “South part of Tierra del Fuego 1833. C. Darwin”. His collections comprise the following: *Cladia aggregata*, *Pseudocyphellaria berberina* [Henslow Nos 472 pr.p., 473, 474 pr.p.], *P.*

freycinetii [Henslow No. 472 pr.p., 474 pr.p.] (Galloway 1992a) from the forest, and *Usnea aurantiaco-atra* from rocks. This last lichen (Fig. 2), is characteristic of exposed rocks above treeline in southern South America (Walker 1985), where it often forms extensive swards. It was vividly described from the Falklands and southern South America by Joseph Hooker (1847: 520-521) whose perceptive comments are still well worth reading, and it was undoubtedly the lichen that Darwin referred to in his Diary entry for 20 December 1832, when he wrote: "...I was very anxious to ascend some of the mountains in order to collect the Alpine plants & insects. – The one which I partly ascended yesterday was the nearest, & Capt. FitzRoy thinks it is certainly the one which M^r Banks ascended, although it cost him the lives of two of his men & very nearly that of D^r Solander... I had imagined the higher I got, the more easy the ascent would be, the case however was reversed...I hailed with joy the rocks covered with Lichens & soon was at the very summit. – The view was very fine, especially of Staten Land [where Menzies had made a rich collection of lichens in 1787 (Galloway & Groves 1987; Galloway 1995b)] & the neighbouring hills; Good Success Bay with the little Beagle were close beneath me..." (Keynes 1988: 126).

5. *Falkland Islands*: The *Beagle* visited the Falkland Islands twice, in 1833 from 1 March until 6 April, and again in 1834 from 10 March until 8 April (Darwin 1845; Godley 1965; Keynes 1979, 1988; Burkhardt & Smith 1985). Darwin described the country in his Journal as "...An undulating land, with a desolate and wretched aspect, is everywhere covered by a peaty soil and wiry grass, of one monotonous brown colour..." (Darwin 1845), and in his Diary for 3 March "...Took a long walk; this side of the Island is very dreary... The whole landscape from the uniformity of the brown color, has an air of extreme desolation..." (Keynes 1988: 145). From a stay on the



Fig. 2. Darwin's 1833 collection of *Usnea aurantiaco-atra* from Tierra del Fuego (BM)

islands of 66 days, Darwin collected only two lichens, both from Berkeley Sound [the labels give as locality data “Berkley [sic] Sound, Falkland Island, March 1833, C. Darwin”], *Pseudocyphellaria crocata* [Henslow No. 498], growing in grassland, and *Ramalina terebrata* from coastal rocks.

6. *Punta Tres Montes and the Chonos Archipelago*: In a letter to his sister Catherine, from Valparaiso on 8 November 1834, Darwin wrote “...Hurra! Hurra! It is fixed the *Beagle* shall not go one mile South of Cape Tres Montes (about 200 miles South of Chiloe) & from that point to Valparaiso will be finished in about 5 months. We shall examine the Chonos archipelago, entirely unknown, & the curious sea behind Chiloe. For me it is glorious; Cape Tres Montes is the most Southern point where there is much geological interest, as there the modern beds end...” (Barlow 1945: 110; Keynes 1979: 243; Burkhardt & Smith (1985: 418). From an anchorage close to Punta Tres Montes on the western tip of the Taitao Peninsula at latitude 47°S, Darwin wrote in his Diary “...the land in all these islands is next thing to impassable; the coast is rugged & so very uneven that it is one never ceasing climb to attempt to pass that way; as for the woods, I have said enough about them; I shall never forget or forgive them; my face, hands, shin-bones all bear witness what maltreatment I have received in simply trying to penetrate into their forbidden recesses...” (Keynes 1988: 274). Here he collected *Stereocaulon ramulosum* [Henslow No. 471 – recorded by Hooker (1847: 529)]. This was the first lichen collection from this remote part of southern Chile, and it was to be another 156 years before lichens were collected from this area when, in 1990, Raleigh International investigated the Taitao Peninsula and Laguna San Rafael and a specific regional lichen collection was made (Galloway 1992b).

From anchorages further north among the islands of the Chonos Archipelago Darwin collected the following lichens: *Leifidium tenerum* [Henslow No. 485 – recorded as *Sphaerophoron tenerum* by Hooker (1847: 530)], *Menegazzia magellanica* [Henslow No. 477 – recorded as *Parmelia diatrypa* by Hooker (1847: 533)], *Pseudocyphellaria divulsa* (Fig. 1) [Henslow No. 476 – (this collection is the type of *Sticta divulsa* (Taylor 1847; Galloway 1991a: 236; 1992a: 97-98; 2008: 443. Recorded as *Sticta billardieri* by Hooker (1847: 527)], *P. flavicans*, *P. nitida* and *Usnea chilensis* [recorded as *U. florida* by Hooker (1847: 522)]. From what he called Midship Bay, Darwin noted, “...Here Cryptogamic flora reached its perfection... All the Cryptogamio were gathered in 5 minutes and within a space of 210 yards square. A most wonderful profusion...” (Porter 1987: 179).

7. *Iquique*: On 12 July 1835, the *Beagle* anchored at the then Peruvian port of Iquique, Darwin noting in his Diary “...The coast was here formed by a great steep wall of rock about 2000 feet high; the town containing about a thousand inhabitants, stands on a little plain of loose sand at the foot of this barrier. The whole is utterly desolate... At this season of the year, a heavy bank of clouds parallel to the ocean seldom rises above the wall of coast rocks. – The aspect of the place was most gloomy...” (Keynes 1988: 344). The following day Darwin wrote “... On the coast mountains at about 2000 ft elevation, the bare sand was strewed over with an unattached greenish Lichen, in form like those which grow on old stumps: this in a few spots was sufficiently abundant to tinge the sand when seen from a little distance, of a yellowish color. I also saw another minute species of Lichen on the old bones. And where the first kind was

lying, there were in the clefts of the rocks a *few* Cacti. These are supported by the dense clouds which generally rest on the land at this height... This is the first true desert I have ever seen; the effect on me was not impressive..." (Keynes 1988: 345-346).

Darwin's unknown soil lichen is most likely *Vermalicina tigrina* (Spjut 1995, 1996), described by Gerhard Follmann as *Ramalina tigrina* (Follmann 1966), 131 years after its initial discovery, although no specimen of it has been found attributable to Darwin. His observations on the relationships of cloud, cacti and lichens, are the first I know of, of the "camanchaca" (the South American vernacular name for the cold coastal fog that sweeps in from the Pacific to drape the coastal ranges and their "cactus forests") and its influence on lichen distribution in these fascinating fog-oases that are characteristic of the north of Chile and found also in Peru, Baja California and Namibia. Although in recent years, the characteristic North Chilean coastal lichen mycobiota has been in alarming decline (Follmann 1995), Darwin's "lichen oasis" was rediscovered by Gerhard Follmann in the early 1990s when a few SW-facing clefts of the outer ridges of the coastal cordillera between 800 and 900 m, revealed large mats of soil lichens developed between sparse skeletons of the columnar cactus *Eulychnia iquiquensis*. Here, Darwin's greenish lichen, *V. tigrina*, associates with *Heterodermia leucomela*, *Ramalina celastri*, *R. cochlearis*, *R. peruviana*, *R. pilulifera*, *Roccellina suffruticosa* and *Xanthomendoza mendozae* (Follmann 1994).

8. *Peru*: The *Beagle* anchored at Callao on 19 July 1835 and Darwin stayed in Lima for 6 weeks (Burkhardt & Smith 1985: 541), during which time he visited the island of San Lorenzo. In a letter to Joseph Hooker on 16 April 1845 he wrote "...The enclosed little lichens, came from near the summit of most barren isl^d of San Lorenzo off Lima: what on earth made me think them worth collecting I know not – please throw them away..." (Burkhardt & Smith 1987: 177). To this Hooker replied on 28 April 1845 "...The St Lorenzo Lichen I can make nothing of but have sent it to D^r Taylor, with no hopes however: as I could not find fructification. You notice somewhere a *blown-about-Lichen* on the Andes, at Quillota is it? – it is an *Usnea* perhaps the Antarctic *U. melaxantha* but the specimens are very imperfect..." (Burkhardt & Smith 1987: 183). This refers to the lichen *Ramalina tigrina*, that Darwin had found on sand above Iquique (see above).

9. *Galapagos Islands*: The *Beagle* stayed at the Galapagos Islands from 15 September until 20 October 1835 (Burkhardt & Smith 1985: 541). In his Journal Darwin noted "...The tortoises which live on those islands where there is no water... feed chiefly on the succulent cactus. ...and likewise a pale green filamentous lichen (*Usnea plicata*), that hangs in tresses from the boughs of trees..." (Darwin 1845). Joseph Hooker lists three lichens from the Galapagos all collected by Darwin viz. *Usnea plicata* [= *U. articulata*], *Borreria leucomelos* [= *Heterodermia leucomela*] and *Sticta aurata* [= *Pseudocyphellaria aurata*] (Hooker 1851).

Darwin's place in South American lichenology

The great South American traveller and observer, Alexander Humboldt (1769-1859), makes a fascinating comparison of Darwin with George Forster as a gifted observer of nature as shown in the following extract from *Cosmos*, "...I have here attempted to indicate the direction in which the power possessed by the observer of representing what he has seen, the animating influence of the descriptive element, and

the multiplication and enlargement of views opened to us on the vast theatre of natural forces, may all serve as means of encouraging the scientific study of nature, and enlarging its domain. The writer who in our German literature, according to my opinion, has most vigorously and successfully opened this path, is my celebrated teacher and friend, George Forster. Through him began a new era of scientific voyages, the aim of which was to arrive at a knowledge of the comparative history and geography of different countries. Gifted with delicate aesthetic feelings, and retaining a vivid impression of the picture with which Tahiti and the other then happy islands of the Pacific had filled his imagination, as in recent times that of Charles Darwin, George Forster was the first to depict in pleasing colours the changing stages of vegetation, the relations of climate and of articles of food in their influence on the civilisation of mankind, according to differences of original descent and habitation. All that can give truth, individuality, and distinctiveness to the delineation of exotic nature is united in his works..." (Humboldt 1849: 436-437).

Darwin has an established place in the annals of South American lichenology both for his collections, and for the observations that he made upon some of these, from Brazil, Uruguay, Tierra del Fuego and the west coast of Chile from the Taitao Peninsula to the Atacama Desert. It is the Chilean mycobiota especially to which Darwin's collections are foundational (Galloway 1993a). Indeed, Darwin's lichen collections from the Chonos Archipelago, Chiloe and from the Atacama are amongst the first from these regions and were not repeated until the 1960s and 1970s with the work of the lichenologists Gerhard Follmann in the north, and Henry Imshaug in the south.

He was, however, not the first 19th century collector of Chilean lichens. The Italian physician and traveller, Carlo Guiseppa Bertero collected lichens in 1827 from Chile and from Juan Fernández in 1830, while the enterprising Devonshire sail-maker, naturalist, explorer and merchant Hugh Cuming who had settled in Valparaíso in 1819, collected lichens on a trip to Chiloé in 1827, among them the type of *Sticta nitida* (Taylor 1847), a distinctive Valdivian lichen epiphyte now known as *Pseudocyphellaria nitida* (Galloway 1992a). Nevertheless, Darwin's South American lichen discoveries are important in the history of South American lichenology in that they form a bridge between the earliest collectors in the region; Handisyd in the 17th century (Moore 1983; Galloway 1985, 1991a, 1998b, 2008); and Commerson (Galloway 1985, 1992a, 1998b, 2008), Banks and Solander (Galloway 2008), George Forster (Galloway & James 1977, Galloway 1985, 1991a, 1992a, 1998b, 2008) and Archibald Menzies (Galloway & Groves 1987; Galloway 1995b) in the 18th century, and the period of intense interest and collection that came 20 years after Darwin's visit, with the work of Joseph Hooker, Claudio Gay, Willibald Lechler and others. Moreover, Darwin was generations ahead of his time in his observations on biodiversity of cryptogams, made in his journal, diary and notebooks (Darwin 1845; Keynes 1979, 1988, 2000; Porter 1980, 1982, 1985, 1987), a point that should be stressed.

Darwin's lichen collections were of vital importance to Joseph Hooker in his studies on the southern zone, and he used several Darwin specimens as illustrations for the second part of his *Flora Antarctica* (Hooker 1847). One such, is the glorious coloured engraving of *Pseudocyphellaria freycinetii* made by Walter Hood Fitch from Darwin's collection from Tierra del Fuego (Fig. 3). As a small digression, the pattern plate used

for this illustration I found in the reprint storeroom of Wheldon & Wesley in the early 1980s in one of the outbuildings of Lytton Lodge. The late Howard Kirke Swann gave me the key to the barn where the reprints were housed and told me “to have a fossick”. Beside finding a number of very useful lichen reprints, I came across several brown paper parcels, one of which was untied and had a coloured engraving, which I recognised, projecting from it. On further examination, these proved to be the original “pattern plates” for J.D. Hooker’s *The Botany of the Antarctic Voyage*. When I told Howard about these, he told me that they were undoubtedly part of the bankrupt stock of Lovell Reeve that had come into their possession when their business was established. I suggested that the then Botany Department Librarian, Judith Diment, should look at the plates with a view to purchasing them for the British Museum (Natural History)



Fig. 3. W.H. Fitch’s hand-coloured engraving (pattern plate) of Darwin’s 1833 collection of *Pseudocyphellaria freycinetii* from Tierra del Fuego (original in BM, Botany Department Library)

and so, one memorable autumn afternoon, Judith and I went through the parcels and discovered the complete collection of pattern plates, which Howard offered to the Museum at a very favourable price. As far as the lichen plates go, many of them have marginal annotations by both Joseph Hooker and Churchill Babington the author of the lichen sections of *Flora Novae Zelandiae* and *Flora Tasmaniae* (Galloway 1991b), as directions to the colourists for getting just the required shading or colour for a particular lichen. The pattern plates are now boxed and held in the Botany Library of the Natural History Museum.

The mycologist Miles Joseph Berkeley (1803-1889) who had earlier studied Darwin's fungi (Berkeley 1842), wrote of Darwin "...a writer whom I have no hesitation, so far as my own judgement goes, in considering as by far the greatest observer of our age..." (Berkeley 1869). Darwin's natural successor as an observer of southern South American cryptogams and their habitats was Carl Skottsberg (1880-1963) who followed Darwin 70 years later (Moore 1983; Marticorena & Rodríguez 1995; Tibell 1999).

Interestingly, and by way of conclusion, one of Darwin's schoolboy friends in 1817 at Mr Case's primary day school in Shrewsbury, William Allport Leighton (1805-1889), also a Botany student at Cambridge under Henslow, later became the leading British lichenologist of his day, publishing a *Flora of Shropshire* in 1841, which he dedicated to Henslow, and later his magisterial *Lichen Flora of Great Britain* (Leighton 1871) which ran to three editions. Leighton appears early in Darwin's autobiography in the following remembrance "...One little event during this year [1817] has fixed itself very firmly in my mind, and I hope that it has done so from my conscience having been afterwards sorely troubled by it; it is curious as showing that apparently I was interested at this early age in the variability of plants! I told another little boy (I believe it was Leighton, who afterwards became a well-known Lichenologist and botanist) that I could produce variously coloured Polyanthuses and Primroses by watering them with certain coloured fluids, which was of course a monstrous fable, and had never been tried by me. I may here also confess that as a little boy I was much given to inventing deliberate falsehoods, and this was always done for the sake of causing excitement..." (Barlow 1958: 23).

References

- ACHARIUS, E. (1799) ["1798"]. *Lichenographiae Suecicae Prodromus*. Lincopiae, D.G. Björn.
- ACHARIUS, E. (1803). *Methodus qua omnes detectos Lichenes...* Stockholmiae, F.D.D. Ulrich.
- ACHARIUS, E. (1810). *Lichenographia Universalis...* Gottingae, I.F. Dankwerts.
- ACHARIUS, E. (1814). *Synopsis methodica lichenum...* Lundae, Svanborg et Soc.
- BARLOW, N. Ed. (1945). *Charles Darwin and the voyage of the Beagle, unpublished letters and notebooks*. London, Pilot Press Ltd.
- BARLOW, N. Ed. (1958). *The Autobiography of Charles Darwin 1809-1882, with original omissions restored. Edited with Appendix and Notes*. London, Collins.
- BARLOW, N. (1967). *Darwin and Henslow. The growth of an idea*. London, John Murray.
- BERKELEY, M.J. (1842). Notice of some fungi collected by C. Darwin, Esq., in South America and the islands of the Pacific. *Annals and Magazine of Natural History* 9: 443-448.

- BERKELEY, M.J. (1869). Address as President of Section on Biology. *Report of the 38th Meeting of the British Association for the Advancement of Science*. Norwich. Pp. 83-87.
- BERNASCONI, E.S., DE VITO, I.E., MARTÍNEZ, L.D. and RABA, J. (2000). Lichen *Usnea densirostra* como bioindicador de metales pesados. Determinación por ICP-AES ascoplado con nebulizador ultrasónico. *Ars Pharmaceutica* **41** (3): 249-257.
- BLANCO, O., CRESPO, A., DIVAKAR, P.K., ELIX, J.A. and LUMBSCHE, H.T. (2005). Molecular phylogeny of parmotreoid lichens (Ascomycota, Parmeliaceae). *Mycologia* **97**: 150-159.
- BORY DE SAINT-VINCENT, J.B.G.M. (1822-1831) [Ed.]. *Dictionnaire classique d'histoire naturelle*, 17 vols. Paris, Rey et Gravier; Baudoïn Frères.
- BROWNE, J. (1995). *Charles Darwin, Vol. 1: Voyaging*. London, Jonathan Cape.
- BURKHARDT, F. and SMITH, S. Eds (1985). *The correspondence of Charles Darwin Vol. 1. 1821-1836*. Cambridge, Cambridge University Press.
- BURKHARDT, F. and SMITH, S. Eds (1986) *The correspondence of Charles Darwin Vol. 2. 1837-1843*. Cambridge, Cambridge University Press.
- BURKHARDT, F. and SMITH, S. Eds (1987). *The correspondence of Charles Darwin Vol. 3. 1844-1846*. Cambridge, Cambridge University Press.
- DARWIN, C. (1845). *Journal of Researches into the Natural History and Geology of the Countries visited during the Voyage of H.M.S. Beagle round the World under the Command of Capt. FitzRoy, R.N.* 2nd ed. London, John Murray.
- DELISE, D.F. (1825a). Histoire des Lichens: Genre *Sticta*. *Mémoires de la Société Linnéenne du Calvados [Normandie]* **2**: 1-167.
- DELISE, D.F. (1825b). Dernière addition au genre *Sticta*. *Mémoires de la Société Linnéenne du Calvados [Normandie]* **2**: 598-600.
- ESCHWEILER, F.G. (1824). *Systema Lichenum*. Nuremberg, J.L. Schrag.
- FÉE, A.L.A. (1824-1837). *Essai sur les cryptogames des écorces exotiques...* 2 vols. Paris, Firmin Didot père et fils.
- FÉE, A.L.A. (1826). Lichens. *Dictionnaire Classique d'Histoire Naturelle* **9** [IO-MACIS]: 360-369.
- FOLLMANN, G. (1966). Eine neue Ramalina-Art aus der Ceruchis-Gruppe. *Willdenowia* **4**: 225-233.
- FOLLMANN, G. (1994). Darwin's "lichen oasis" above Iquique, Atacama Desert rediscovered. *International Lichenological Newsletter* **27**: 23-25.
- FOLLMANN, G. (1995). On the impoverishment of the lichen flora and the retrogression of the lichen vegetation on coastal central and northern Chile during the last decades. *Cryptogamic Botany* **5**: 224-231.
- FORSTER, J.G.A. (1787). Fasciculus plantarum magellanicarum. *Novi Commentarii Societatis Regiae Scientiarum Gottingensis* **9**: 13-45.
- FRIES, E. (1821). *Systema mycologicum...* Vol. 1, Lund, ex Officina Berlingiana.
- GALLOWAY, D.J. (1981a). Erik Acharius, Olof Swartz and the evolution of generic concepts in lichenology. In: A. Wheeler & J.H. Price (Eds), *History in the service of systematics. Society for the Bibliography of Natural History Special Publication* **1**: 119-127.
- GALLOWAY, D.J. (1981b). The lichen collections of Georg Forster. In: *The Resolution Journal of Captain Cook*. Guildford, Genesis Press. Pp. 804-806.
- GALLOWAY, D.J. (1985). Lichenology in the South Pacific, 1790-1840. In: A. Wheeler & J.H. Price (Eds), *From Linnaeus to Darwin: Commentaries on the history of Biology and*

- Geology. Society for the History of Natural History Special Publication 3*: 205-214.
- GALLOWAY, D.J. (1988). Erik Acharius and his influence on English lichenology. *Bulletin of the British Museum (Natural History) Botany* **18** (2): 149-194.
- GALLOWAY, D.J. (1991a). Phytogeography of Southern Hemisphere lichens. In: P.L. Nimis & T.J. Crovello (Eds), *Quantitative Approaches to Phytogeography*. Dordrecht, Kluwer. Pp. 233-262.
- GALLOWAY, D.J. (1991b). Churchill Babington MA, DD, FLS (1821-1899), theologian, archaeologist, rector: a forgotten Victorian lichenologist. *British Lichen Society Bulletin* **69**: 1-7.
- GALLOWAY, D.J. (1992a). Studies in *Pseudocyphellaria* (lichens) III. The South American species. *Bibliotheca Lichenologica* **46**: 1-275.
- GALLOWAY, D.J. (1992b). Lichens of Laguna San Rafael, Parque Nacional 'Laguna San Rafael', southern Chile: indicators of environmental change. *Global Ecology and Biogeography Letters* **2**: 37-45.
- GALLOWAY, D.J. (1993a). Darwin y la liquenología chilena [Darwin and Chilean lichenology]. Abstracts of International Symposium "Darwin y la Beagle en Chile" evolucion hoy". Universidad de Chile, Vicerectoría Académica y Estudiantil, 29-30 Septiembre – 1 Octubre, Santiago, Chile. P. 32.
- GALLOWAY, D.J. (1993b). Nomenclatural notes on *Pseudocyphellaria* V: Some Brazilian taxa. *Tropical Bryology* **7**: 87-92.
- GALLOWAY, D.J. (1995a). Studies on the lichen genus *Sticta* (Schreber) Ach.: III. Notes on species described by Bory de St-Vincent, William Hooker, and Delise, between 1804 and 1825. *Nova Hedwigia* **61** (1-2): 147-188.
- GALLOWAY, D.J. (1995b). The extra-European lichen collections of Archibald Menzies MD, FLS (1754-1842). *Edinburgh Journal of Botany* **52** (2): 95-139.
- GALLOWAY, D.J. (1998a). Contributions to a history of New Zealand lichenology. 1. Cook's botanists. *Australasian Lichenology* **43**: 20-26.
- GALLOWAY, D.J. (1998b). The lichens of Chile: present knowledge and future prospects. In: M.P. Marcelli & M.R.D. Seaward (Eds), *Lichenology in Latin America: history, current knowledge and applications*. São Paulo, CETESB. Pp. 87-100.
- GALLOWAY, D.J. (2008). Godley Review. Austral lichenology: 1690-2008. *New Zealand Journal of Botany*, **46**: 433-521.
- GALLOWAY, D.J. and GROVES, E.W. (1987). Archibald Menzies MD, FLS (1754-1842), aspects of his life, travels and collections. *Archives of Natural History* **14**: 3-43.
- GALLOWAY, D.J. and JAMES, P.W. (1977). *Pseudocyphellaria berberina* (G.Forster) D.Gall. & P.James: notes on its discovery and synonymy. *Lichenologist* **9**: 95-105.
- GALLOWAY, D.J. and JAMES, P.W. (1986). Species of *Pseudocyphellaria* Vainio (Lichenes), recorded in Delise's "Histoire des Lichens: Genre *Sticta*. *Nova Hedwigia* **42** (2-4): 423-490.
- GAUDICHAUD-BEAUPRÉ, C. (1827). Botanique. In: L. Freycinet (Ed.) *Voyage autour du monde, entrepris par ordre du Roi...sur les corvettes de S.M. l'Uranie et la Physicienne, pendant les années 1817, 1818, 1819 et 1820*. Paris, Pillet-ainé.
- GODLEY, E.J. (1965). Botany of the Southern Zone. Exploration to 1843. *Tuatara* **13** (3): 140-181.
- HAWKSWORTH, D.L. and SEAWARD, M.R.D. (1977). *Lichenology in the British Isles 1568-1975. An historical and bibliographical survey*. London, Richmond Publishing Co. Ltd.

- HOOKER, J.D. (1847). Lichenes. In: J.D. Hooker (Ed.) *The Botany of the Antarctic Voyage of H.M. Discovery Ships Erebus and Terror, in the years 1839-1843, under the command of Sir James Clark Ross. I. Flora Antarctica. Part II. Botany of Fuegia, the Falklands, Kereguelen's Land etc.* London, Lovell Reeve. Pp. 519-542.
- HOOKER, J.D. (1851). An enumeration of the plants of the Galapagos Archipelago; with descriptions of those which are new. *Transactions of the Linnean Society* **20**: 163-233.
- HOOKER, J.D. and TAYLOR, T. (1844). LICHENES ANTARCTICI; being characters and brief descriptions of the new LICHENS discovered in the southern circumpolar regions, Van Diemen's Land and New Zealand, during the Voyage of H.M. Discovery Ships *Erebus and Terror. London Journal of Botany* **3**: 634-658.
- HOOKER, W.J. (1829). *Sticta macrophylla*; *Sticta humboldtii*. *Botanical Miscellany* **1**: 17-18.
- HOOKER, W.J. (1829-1866). *Supplement to the English Botany*, vols 1-5. London, J.D.C. & C.E. Sowerby; J.W. Salter.
- HUMBOLDT, A. von (1849). *Cosmos: A sketch of a Physical Description of the Universe* [transl. By E.C. Otté], Vol. II. London, Henry G. Bohn.
- JACQUIN, N.J. (1781). *Miscellanea Austriaca ad Botanicam, Chemiam et Historiam Naturalem spectantia*. Vol. 2. Vindobonae, ex Officina Krausiana.
- KÄRNEFELT, I. and FRÖDÉN, P. (2007). Erik Acharius – the last of the Linnean pupils. *Svenska Linnésällskapets Årsbok* **2007**: 105-131.
- KEYNES, R.D. Ed. (1979). *The Beagle Record. Selections from the original pictorial records and written accounts of the voyage of H.M.S. Beagle*. Cambridge, Cambridge University Press.
- KEYNES, R.D. Ed. (1988). *Charles Darwin's Beagle Diary*. Cambridge, Cambridge University Press.
- KEYNES, R.D. Ed. (2000). *Charles Darwin's Zoology Notes and Specimen Lists*. Cambridge, Cambridge University Press.
- KEYNES, R.D. (2002). *Fossils, Finches and Fuegians. Charles Darwin's adventures and discoveries on the Beagle, 1832-1836*. London, Harper Collins.
- KUNTH, C.S. (1822). *Synopsis plantarum quas in itinere ad plagam aequinoctialem orbis novi, collegerunt Al. de Humboldt at Am. Bonpland*. Vol. **1**: 26-29 [account of *Sticta* by W.J. Hooker]. Parisiis, F.G. Levrault.
- LAUNDON, J.R. (2005). The publication and typification of Sir James Edward Smith's lichens in English Botany. *Botanical Journal of the Linnean Society* **147**: 483-499.
- LAUNDON, J.R. and WATERFIELD, A. (2007). William Borrer's lichens in the Supplement to the English Botany 1829-1866. *Botanical Journal of the Linnean Society* **154**: 381-392.
- LEIGHTON, W.A. (1871). *The lichen-flora of Great Britain, Ireland and the Channel Islands*. Shrewsbury, privately printed.
- MANN, G.E. (2006). [Obit.] David L. Yudilevich 1930-2006. *Physiology News*, **64**: 49-49.
- MARTICORENA, C. and RODRÍGUEZ, R. (1995). *Flora de Chile*. Vol. I. Pteridophyta – Gymnospermae. Concepción, Universidad de Concepción.
- MOORE, D.M. (1983). *Flora of Tierra del Fuego*. Oswestry, Anthony Nelson.
- OSORIO, H.S. (1972). Contribution to the lichen flora of Uruguay. VII. A preliminary catalogue. *Comunicaciones Botánicas del Museo de Historia Natural de Montevideo* **4** (56): 1-46.
- OSORIO, H.S. (1982). Contribution to the lichen flora of Uruguay XVII. The scientific

- name of the “Yerba de la Pietra”. *Phytologia* **52** (4): 217-220.
- OSORIO, H.S. (1992). Contribucion a la flora liquenica del Uruguay. XXV. Liqueenes publicados entre 1972 a 1991. *Anales del Museo Nacional de Historia Natural de Montevideo ser. 2*, **8**: 43-70.
- OSORIO, H.S. (2009). Contribution to the lichen flora of Uruguay XLIII. New or additional records. *Comunicaciones Botánicas del Museo Nacional de Historia Natural y Antropología* **6** (136): 1-8.
- PORTER, D.M. (1980). Charles Darwin’s plant collections from the voyage of the *Beagle*. *Journal of the Society for the Bibliography of Natural History* **9** (4): 515-525.
- PORTER, D.M. (1982). Charles Darwin’s notes on plants of the *Beagle* voyage. *Taxon* **31** (3): 503-506.
- PORTER, D.M. (1985). The *Beagle* collector and his collections. In: D. Kohn (Ed.), *The Darwinian Heritage*. Princeton, Princeton University Press/ Nova Pacifica. Pp. 973-1019.
- PORTER, D.M. (1987). Darwin’s notes on *Beagle* plants. *Bulletin of the British Museum (Natural History) Historical Series* **14** (2): 145-233.
- SAYRE, G. (1983). A Thomas Taylor bibliography. *Journal of Bryology* **12**: 461-470.
- SAYRE, G. (1987). Biographical sketch of Thomas Taylor. *Journal of Bryology* **14**: 415-427.
- SEAWARD, M.D. (2002). Great discoveries in bryology and lichenology. William Borrer (1781-1862), Father of British Lichenology. *Bryologist* **105** (1): 70-77.
- SMITH, J.E. (1807). *Introduction to Physiological and Systematical Botany* (1807). London, F. Ongman, Hurst, Rees, Orme & J. White. [this work went to 5 editions, with ed. 5 published in 1825].
- SMITH, J.E. and SOWERBY, J. (1790-1814). *English Botany*, 36 vols. London, Sowerby.
- SPUJT, R.W. (1995). *Vermilacina* (Ramalinaceae, Lecanorales), a new genus of lichens. In: F.J.A. Daniels, M. Schulz & J. Peine (Eds), *Flechten Follmann*. Cologne, Geobotanical and Phytotaxonomical Study Group, Botanical Institute, University of Cologne. Pp. 337-351.
- SPJUT, R.W. (1996). *Niebla* and *Vermilacina* (Ramalinaceae) from California and Baja California. *SIDA. Botanical Miscellany* **14**: 1-209.
- TAYLOR, T. (1847). New lichens, principally from the herbarium of Sir William J. Hooker. *London Journal of Botany* **6**: 148-197.
- TIBELL, L. (1999). Swedish lichen collectors abroad. *Symbolae Botanicae Upsalienses* **32** (2): 61-1-2.
- TURNER, D. and BORRER, W. (1839). *Specimen of a Lichenographia Britannica*. Yarmouth, Turner. [An historical introduction by D.L. Hawksworth & M.R.D. Seaward was published in a Richmond Publishing Co edition of 1978].
- WALKER, F.J. (1985). The lichen genus *Usnea* subgenus *Neuropogon*. *Bulletin of the British Museum (Natural History) Botany* **13**: 1-130.
- WALLROTH, K.F.W. (1824). *Flora cryptogamica Germaniae*, 2 vols. Nuremberg, J.L. Schrag.
- WALTERS, S.M. & STOW, E.A. (2001). *Darwin’s Mentor. John Stevens Henslow, 1797-1861*. Cambridge, Cambridge University Press.
- WHITE, F.J. and JAMES, P.W. (1988). Studies on the genus *Nephroma* II. The southern temperate species. *Lichenologist* **20** (2): 103-166.
- YUDILEVICH, D.L. & CASTRO, LE-FORT, E. (1995). *Darwin en Chile (1832-1835), viaje de un naturalista alrededor del mundo*. Santiago, Editorial Universitaria.

Obituaries

Leaford Patrick FLS (1934-2009)

Member of Council of the Linnean Society of London 1999-2003

It is with great sadness that we report the death of biologist and museum curator Leaford Patrick on Friday 6th February 2009. Pre-deceased in December 2008 by his devoted wife Jeanne, Leaford is survived by his beloved daughters Anne and Kay, grandchildren Joe, Marcus, Jed and Cleo, niece Sonia and older sister Norma.

Leaford was born on 4th October 1934 in Kingston, Jamaica, to George and Adeline Patrick. Precociously concerned to explore the world of science and culture, Leaford aged seven often visited the Institute of Jamaica in Kingston to use the library and admire the museum collections. His pleasant, bright and enquiring nature captured the attention of Deputy Director Mr. Ron Bengey and Assistant Director Mr. Verity, both of whom became academic mentors. Leaford boldly questioned his first biology teacher, Father Arthur Hennessy of St George's College, over perceived biological issues relating to the virgin birth of Jesus, thus beginning what was to become a life-long personal debate over 'science versus faith'.

Family funds to advance Leaford's education remained scarce and, while a teenager, he found work as a fisherman, developing a wide interest in marine life. Despite demands of work, he maintained his close association with the Institute; gladly stepping in to voluntarily assist Conservator and Picture Restorer Ann Clapp in combating devastation to the collections resulting from hurricane 'Charlie' in 1951. This inspired ambitions for a career in museums involving artefact and specimen preservation. An early leaning towards botany was evident, with visits to botanical gardens including Castelton, Chinchona Plantation and Hope Garden. A Botany Department was established at the Institute under George Proctor and Leaford eagerly assisted in its development and in expeditionary fieldwork, where he had a passion for the study of indigenous grasses. This led to the production of a work on *The Grasses of Jamaica* and Leaford became a Member of the Geological Society of Jamaica in 1953.

In 1956 Leaford travelled to Britain to pursue his thirst for knowledge, where he gained a post in the University of Oxford's Zoology Department as a trainee Technical Assistant. Leaford worked for the Linacre Professor, Sir Alister Hardy FRS (1896-1985) and other eminent Oxford zoologists including entomologist Dr Edmund Brisco Ford FRS (1901-1988) and Dr Arthur J. Cain FRS (1921-1999). The relationship with Hardy prospered, re-kindling Leaford's interest in the sea, fish and fisheries which was Hardy's specialism. Leaford remained in Oxford for two years, returning in 1958 to work in the Institute of Jamaica under Director Bernard Lewis and becoming progressively more interested in zoology. Between 1961 and 1962 he visited the University of Georgia where he studied ichthyology. In 1962 he returned to Oxford, where he worked in the University's Museum of Zoology, curated by Arthur Cain. There he prepared exhibits on Darwinian evolution and gained the Technical Certificate of the Museums Association.

Leaford was recruited by the Horniman Museum & Gardens in 1963, eventually becoming Deputy Keeper of Natural History. He remained here until his retirement in



Leaford Patrick c. 2001.

1999. Leaford spent many years curating the collections and preparing, installing new natural history exhibits, utilising his great breadth of skills acquired in geology, palaeontology, botany, zoology, physical anthropology and educational interpretation. I first met Leaford when I joined the Horniman Museum in 1985. We became close colleagues and personal friends, collaborating on curious and interesting projects including the refurbishment and redisplay of the famous Horniman Walrus. This was created in Victorian times without full knowledge of the appearance of the live animal, resulting in a comically over-stuffed but much-loved taxidermy mount! We worked together on many temporary public exhibitions such as *Leeches to Lasers* – a bio-medical display run in

conjunction with King's College Medical School. Much to the excitement and amusement of local schoolchildren, this featured an animated gin-swilling Victorian nurse and living leeches (*Hirudo medicinalis*).

Leaford and I steadily catalogued and helped conserve the large specimen collections in 'Dreadnought', a vast Greenwich storehouse. It pleased us that we managed to rescue significant collections that had been 'at risk' and incorporate these in the Horniman Collections. We also worked in partnership with the Greater London Ecology Unit, London Wildlife Trust and the Manpower Services Commission to establish a large Horniman-based team of university graduates to survey wild animals,



Leaford Patrick c 1961 with the staff of the Zoology Department, University of Oxford.

plants and natural habitats south of the Thames. From this survey, we identified areas of ‘social *cum* environmental deprivation’ and acted to protect the scientifically important Sydenham Hill Wood from building development. In 1990 we collaborated on our last project: *Living Waters – an Aquarium for the Future*, the first in the world to be dedicated entirely to issues in aquatic conservation. This was a complete re-working of the original Horniman Museum Aquarium & Vivarium established under the *aegis* of Victorian naturalist and marine biologist Philip Henry Gosse FRS (1810-1888), who actually invented the word ‘aquarium’ and founded the first ever public aquarium at Regents Park Zoo, 1854.

Leaford met his future wife Jeanne Pruce in 1962, while he was volunteering at the Camberwell Association with Robin Guthrie who convened a Board on Race Relations. Jeanne was Secretary to the Association and looked after the welfare of overseas students and visitors. Leaford was a handsome, well-dressed, polite young man and on meeting Jeanne there was instant mutual attraction. Jeanne’s father was Labour Party Councillor Ernest Pruce, a distinguished political figure in south London. Leaford told me that he proposed marriage to Jeanne on a visit to her family house. She was keen to accept but he would have to first seek the approval of her father, who was at that moment in the garden chopping wood with a large axe. Inter-racial marriages were at that time uncommon and Leaford was naturally apprehensive in approaching Ernest, not quite knowing what to expect. Plucking up courage he said “Sir, I would like to ask for your daughter’s hand in marriage ... and, of course, help you chop wood.” Ernest looked at him closely, handed him the axe and then, with a beaming smile, enquired if they had set a date. The couple married in April 1965 and, before the wedding, Leaford formally converted to Roman Catholicism but continued his lifetime struggle in balancing religious and scientific convictions, particularly in relation to Darwinian evolution.

Always hugely public spirited and generous with his time, Leaford gave voluntary service to many boards from 1970 onwards, to which roles he brought a calm dignity and natural gravitas, which earned respect. These notably included The Inner London Executive Council, The South East Thames Regional Health Authority, The Lambeth Southwark and Lewisham Area Health Authority and Family Planning Clinic, The Camberwell Health Authority Community Board and Trust and the Family Health Service Authority. He was elected as an Associate Member of King’s College Hospital Healthcare (1991-1992) and as a Mental Health Act Manager for West Lambeth Healthcare (1995-1999). He served alongside Dr Keith Maybury VPLS and Professor Brian Gardiner PPLS as a Member of Council of the North of England Zoological Society (2000-2001). Following his longstanding contributions to natural history, he was elected as a Fellow of the Linnean Society of London on 6th February 1997 and as a Council Member 1999-2003.

Leaford was a keen artist and his paintings demonstrate a certain genius, charm and spirituality. Particular favourites of mine are his endearing rendition of a ‘White Horse’ and, above all, his ‘Brotherly Love’, which shows the two of us under the famous portrait of Charles Darwin in the Linnean Society’s Lecture Room.

GORDON MCGREGOR REID PPLS

Margaret Elizabeth Varley FLS (1918-2009)

An appreciation of the life of Peggy Varley (née Brown)

Decades ago a visiting American zoologist wanted to photograph 'Dr ME Brown' reputed to have tutored 70% of the UK Professors of Zoology earlier in their careers, either at Cambridge, London or Oxford Universities. Expecting to find an elderly man, he was very surprised to be introduced to the ever-smiling Peggy Brown. Peggy Brown, as she was then known, was born in India in 1918, where safaris on elephants with her father, a District Officer in the Indian Civil Service, sparked her interest in wildlife. From six years old she was sent to live in England where, from Malvern Girls College, in 1937 with a scholarship to Girton College Cambridge, she went to the Zoology Department to study Natural Sciences under Dr Sidnie M. Manton FRS, who became a lifelong friend and fellow enthusiast for breeding cats. Her professor, James Grey, had an experimental approach to solving biological problems and Peggy's PhD on the growth of brown trout – an early study on how fish behaviour affects growth – led her to a lifelong interest in fish physiology and behaviour and established her reputation in these fields.

Several junior teaching jobs in Cambridge enabled her to complete her PhD. During that period, in 1941, when the Freshwater Biological Association was exploring ways in which the yield of edible fish from freshwater sources could be used to augment wartime food supplies, Barton Worthington engaged Peggy to carry out tank experiments on eels at the FBA laboratory in Wray Castle on Lake Windermere. In 1942 I was appointed to continue this work, and thus began a lifetime friendship and travels to study fishes with Peggy. In 1950-51 she spent her sabbatical year working at the East African Fisheries Research Organization, living with me in Jinja, Uganda. Here she



Peggy Varley with a tray of haplochromines aboard the RV Ethelwyn Trewavas on Lake Malawi in 1991.

researched growth rates of Lake Victoria's haplochromine cichlid fishes, and also advised on the trout stocked in the highland streams of Kenya and Uganda. En route to the Kenya coast to look at tilapia ponds and marine fishes we climbed Mount Kilimanjaro. Years later we continued our cichlid studies on Lake Malawi (1991) and in Brazil (1995) when attending the International Limnological Congress.

In 1951 Peggy moved to Kings College London as Lecturer in Vertebrate Zoology until her marriage in 1955 to entomologist Professor George Varley prompted a move to Oxford. Here she was welcomed as Demonstrator in the Zoology and Comparative Anatomy Department at the University from 1959 to 1964 and in 1962 joined the teaching staff at St Hilda's College, becoming a supernumerary Fellow in 1963. In Oxford the Varleys lived in an ionic house designed by former professor of zoology Walter Garstang, later the home of Alastair Hardy. This remained Peggy's base, with many visitors, until she died at home in July 2009 aged 90.

Peggy's research into tilapia as a food fish continued during the 1960s. Her busy life, in addition to teaching zoology and producing a daughter and son, included editing the two volume treatise *The Physiology of Fishes*. She also wrote books on *The Trout* with Winifred Frost of the Freshwater Biological Association (Collins New Naturalist, 1967) and another on *British Freshwater Fishes* and, in collaboration with Manton, a widely used dissection manual. As an authority on fish growth and culture she was an active consultant to the Salmon and Trout Association, which brought a stream of fishes for autopsy to their home. She also assisted George Varley with his entomological work until he died in 1983.

In 1969 Peggy was appointed Senior Lecturer, then Reader in Biology, at the newly formed Open University, Milton Keynes. This OU team designed the pioneer courses for the 'university of the air' and their television programmes on ecology and other aspects of biology, with excellent accompanying texts, showed Peggy's communicating skills to a whole new audience of students. A wider public also appreciated the TV programmes – for example a memorable one on Sidnie Manton's genetic work to produce the new 'colour point' breed of cats, enlivened by kittens scampering all over the studio. The job involved presenting TV programmes at Alexandra Palace in North London and frequent travel to Milton Keynes, where she trained many new recruits in the art of writing OU courses. An example of her work with the OU's dispersed and very disparate students was the study of melanism in peppered moths developed for the first science foundation course in 1971. Discoveries by students were of sufficient importance to merit publication in the US journal *Science* (1986).

Peggy was a long time member of the Linnean Society, a very active Chairman of the Berks, Bucks & Oxon Wildlife Trust (BBOWT), a member of the Natural Environment Research Council, The Freshwater Biological Association and many other bodies. Her greatest legacy was from her excellent teaching skills and with her happy disposition she greatly enriched the lives of a wide circle of friends and colleagues.

RO LOWE-M^cCONNELL FLS

Christopher John Humphries (1947-2009)

With Chris Humphries' death on 31st July 2009, systematics in general, and the Linnean Society in particular, has lost one of its most influential personalities. As demonstrated at his funeral, his passing has been mourned, and he is greatly missed.

Christopher John Humphries was born in Derby on 29th April 1947. He attended grammar school in Etwall, but left at 16 to work at Bass's brewery. Encouraged by their chief scientist, he studied at Derby Technical College and then University of Kingston-upon-Hull, graduating in 1969 with BSc Honours in Botany. He studied for his Ph.D, awarded in 1973 for "A taxonomic study of the genus *Argyranthemum*", with Vernon Heywood at Reading. In 1969 Chris met Marilyn Shephard, and they married in 1971. They had two children, Ben, now an architect, and Marie, a photographer.

In 1972 Chris joined the British Museum (Natural History) as an assistant curator in the Botany Department. He remained with the NHM London throughout his career, receiving several promotions, and retiring in 2007 after eleven years as a Merit Researcher. Before that he had been Head Curator of the European Herbarium, Head of the General Herbarium, and Division Head for Flowering Plants Research.

Chris's early research concentrated on Asteraceae and their distribution in Macaronesia, and a fascination with the North Atlantic islands remained to the last. However, his interests in empirical botany widened considerably, including popular works and field guides but, most significantly, he became enthralled by the flora of the southern hemisphere – notably *Nothofagus* and the eucalypts. This key element in his research *œuvre* was triggered by his involvement in the great "Banks' Florilegium" project, completed in 1989 and comprising 100 sets of 738 plates, each individually coloured, published by Alecto Historical Editions. The idea emerged from an informal conversation between Chris and his friend Nigel Frith (of Alecto) over a decade earlier - and Chris was involved in developing the texts, as well as checking the colour fidelity of all the plates.

Chris held leading positions with the Systematics Association, the Willi Hennig Society, and the Flora & Fauna Preservation Society. For the Linnean Society, Chris was Member of Council (1981-1984), Botanical Secretary (1990-1999), and Vice



President (1996-1997). He helped organise meetings sponsored by the Society and the Systematics Association, including several presented at Burlington House, the NHM, and at Kew. An associate editor for *BJLS* (1981-1983), he was founder and editor of *Cladistics*, and served on the editorial boards of *Australian Systematic Botany*, *Journal of Biogeography*, *Oryx* and *Journal of Comparative Biology*. His teaching at Reading's Department of Plant Sciences was recognised by appointment as Visiting Professor. Abroad he taught short courses at Melbourne, Copenhagen and Cape Town. However, his most important contribution to teaching came through his key role in the Systematics Association sponsored course *Cladistics: Theory and Practice*, which ran for several years in the 1990s, and was then absorbed into the Imperial College/NHM course *Advanced Methods in Taxonomy and Biodiversity*, which continues to this day.

From a scientific perspective his most important contributions were to developing the theory of cladistics, and applying it, for example, to conservation (which took him and eight other scientists to the Wissenschaftskolleg in Berlin, 1994-95), developmental biology ("Ontogeny and Systematics", 1988), and most importantly of all, to biogeography (the second edition of "Cladistic Biogeography", with Lynne Parenti, is a standard work). His numerous honours included the Bicentenary Medal of the Linnean Society (1980; for promising biologists under 40), Honorary Fellowship of the Willi Hennig Society (1998), Honorary Research Fellow of the American Association for the Advancement of Science; Senior Research Fellow University of Melbourne, and the Linnean Medal for Botany, awarded by the Society in 2001. He will be recognised by a festschrift, "Beyond Cladistics", and a more extensive appreciation in *Cladistics*, to appear in 2010.

Chris Humphries was remarkable not just for the quality and quantity of his published research, but for his connection with the wider systematics community through his involvement with societies, students and personal contacts - amateurs, historians, artists, conservationists and, above all, other researchers interested in the theory and practice of systematics. But to those who knew him well, Chris was much more than just an outstanding academic. His interests in food, art, modern literature, and above all music, made him huge fun to be with. As the Irish might say, *he was good crack*. As a result, he is not only missed for his intellectual ability, but also his great warmth as a human being.

R.I. VANE-WRIGHT FLS

221st Anniversary Meeting of the Linnean Society

held at
Burlington House, Piccadilly, London W1J 0BF
at 4.00 pm on Thursday 21st May 2009

1. **The President** took the Chair and welcomed 56 Fellows and their guests to the meeting.

Apologies were received from:

Professor William Chaloner	Professor Michael Claridge
Mr Alastair Driver	Dr Jennifer Edmonds
Dr I Keith Ferguson	Mr Jeremy Franks
Mrs Katerina Heldring-Morris	Dr Pamela Le Couteur
Dr Ro Lowe-McConnell	Dr Sylvia Phillips
Dr Brian Rosen	Ms Elaine Shaughnessy
Dr Frederick Skinner	Mr Wim Snoeijer
Professor Jean-Jacques Symoens	Ms Diane Tough
Professor Dick Vane-Wright	Mr Peter Wilberforce

2. **Admission of Fellows.** The following signed the Obligation in the Roll and Charter Book and were admitted Fellows:

Jennifer Arthur	Patricia Eckel
Michael Engel	Felix Forest
Allan Hart	Colin Hindmarch
Jan Kresten Nielsen	John Thompson
Paolo Viscardi	

3. The **Minutes of the Meetings held on 16th April 2009 and 30th April 2009** were accepted and signed.

4. **The Executive Secretary** read for the third time the **Certificate of Recommendation** for the election of a Fellow *honoris causa*, Ms Gina Douglas.

The citation is reproduced below:

Gina Douglas's outstanding knowledge of all the collections held by the Society has ensured that many research workers, both Fellows and visitors have been helped to produce greatly improved research papers or books by her timely support as the many acknowledgements in these works attest!

Her constant and strong support of all the Society's activities has greatly helped to make the Society the dynamic and forward-looking structure it is today. Based on the strength of its collections and the knowledge which has been made public through the CARLS programme and the Society's website, Gina's voice can be discerned, promoting and explaining what treasures there are, what yet there is to do and how they can be used to help with the modern challenges we face.

For outstanding service to the Society and the study of Natural History for over 26

years as Librarian and Acting Executive Secretary, we the undersigned propose Ms Gina Douglas as a Fellow *honoris causa*.

Gren Lucas, David Cutler, Vaughan Southgate

5. Appointment of Scrutineers. The following were appointed as scrutineers;

Dr Alan Brafield, Dr Mary Morris and Professor David Pye.

6. Ballots. As a result of the ballots:

- a. The following were elected to Council: Dr N Keith Maybury (Z), Mr Terence Preston (Z), Dr Sylvia Phillips (B), Dr Mark Watson (B) Dr David Williams (B). Professor Patricia Willmer (Z).

Details of these new Council members can be found in *The Linnean Society of London Anniversary Meeting 2009 Council Agenda and Council Nominations*, circulated with *The Linnean* in January 2009. , These nominations, all made by the Council, were for Fellows to replace Professor David Cutler (B), Dr Joe Cain (Z), Dr Shahina Ghazanfar (B), Mr Alastair Land (Z), Dr George McGavin (Z), Professor Mark Seaward (B) The President thanked outgoing Council members for their services to the Society.

- b. The following was elected a Fellow *honoris causa*: Ms Gina Douglas.

c. The Officers elected were: President **Dr Vaughan Southgate**, Treasurer, **Professor Gren Lucas OBE**; Editorial Secretary, **Dr John Edmondson**; Botanical Secretary, **Dr Sandy Knapp**; Collections Secretary, **Mrs Susan Gove** and Zoological Secretary, **Dr Malcolm Scoble**.

- d. The Fellows were elected as on the accompanying list.

7. Citations and Presentations of Medals and Awards:

- a. The President presented the **2009 Linnean Medal for Botany** to Professor Peter Ashton FLS, formerly Charles Bullard Research Professor of Forestry and Director of the Arnold Arboretum at Harvard University, and *the Editorial Secretary, Dr John Edmondson* read the citation:

“Professor Peter Ashton is internationally renowned for his research on the flora of tropical Asian forests. His six books and numerous papers on this subject, including a major monographic work of the family Dipterocarpaceae, based on extensive field studies and containing many major timber trees, have helped not only in increasing the understanding of the ecology and population biology of lowland tropical rainforests but in addressing applied conservation issues, particularly relating to these lowland forests in Malaysia and Borneo.

Following his undergraduate study at the University of Cambridge, he was appointed Forest Botanist to the Brunei Government; he retained this position whilst undertaking postgraduate study. He completed his doctorate in 1962, the same year in which he was appointed as Forest Botanist to the Sarawak Government. Following four years in this post, in 1966 he took up an appointment as a Lecturer at the University of Aberdeen and was promoted to Senior Lecturer in 1972. In 1978, he moved to the United States of America to take up the prestigious appointment of Director of the Arnold Arboretum and Arnold Professor of Botany at Harvard University, becoming Charles Bullard Professor of Forestry in 1991. He is currently Charles Bullard Professor of Forestry Emeritus, a Faculty Fellow in the Centre for International Development in the Kennedy

School of Government at Harvard University and a Research Associate at the Royal Botanic Gardens, Kew.

Alongside these academic roles, Professor Ashton's expertise has led to his appointment as a consultant to a wide range of national and international committees. He has been President of the International Association of Botanical Gardens, a governor of the U.S. Nature Conservancy, and recently completed a five-year term as a consultant in biodiversity to a Forest Research Institute Malaysia/ITTO/UNDP (World Bank-GEF) research project on Biodiversity conservation in productive rain forests. He is currently a consultant to the Highstead Foundation, to the TROPENBOS Foundation for Tropical Forestry in the Netherlands, a regional advisor (Asia) to the Centre for Tropical Forest Sciences of the Smithsonian Tropical Research Institute and a member of the Trees Advisory Group of the Species Survival Commission of IUCN. His current research projects include the preparation of a field guide to trees in the Brunei region of Borneo, contributing to the world checklist of Myrtaceae and he is providing editorial assistance for the Tree Flora of Sabah and Sarawak.

For his seminal contributions to ecology, particularly relating to tropical lowland forestry Professor Ashton has received the Award for Environmental Achievement of the U.S. Environmental Protection Agency and the Sultan Qaboos Prize for Environmental Conservation of UNESCO. There is no doubt that he is a most deserving recipient of the prestigious award to be presented to him today - the Linnean Medal for Botany in 2009".

Professor Ashton responded by thanking the Society for the award of the medal. He highlighted his work with scientists in developing countries with a small scientific base and expressed the hope that their ideas and situations would be given adequate consideration, when international biological objectives were being developed.

- b. The President presented the **2009 Linnean Medal for Zoology** to Professor Michael Akam, Director of the University Museum of Zoology at the University of Cambridge and the *Zoological Secretary, Dr Vaughan Southgate* read the citation:

"Professor Michael Akam is currently Director of the University Museum of Zoology at the University of Cambridge. Described by colleagues as "a reference figure in the evo-devo field" and an "exceptional developmental biologist", Professor Akam was one of the pioneers of evolutionary developmental biology and continues to be an exemplary leader in this field.

Professor Akam completed a BA in Natural Sciences at King's College, Cambridge in 1974 and a DPhil in Genetics at Magdalen College, Oxford in 1978. He was a College Lecturer in Zoology at Magdalen College, Oxford during 1978 before moving to an 8-year appointment as a Research Fellow at King's College, Cambridge; during this period he also held a Fellowship in the Department of Biochemistry at Stanford University from 1979-1981. He was a Founder member of the Wellcome/CRC Institute of Cancer and Developmental Biology at Cambridge, now the Wellcome Trust and Cancer Research UK Gurden Institute, and was elected a Fellow of the Royal Society in 2000.

Much of his research has concerned the role of the 'Hox' family of developmental regulatory genes which control the basic layout of the body in most animals including man; his early research in the 1980s is considered to be groundbreaking and formed the foundation of work which still continues over 20 years later. In the early 1990's Professor Akam recognized the potential application of detailed comparative developmental biology to understanding natural diversity, and so his "evo-devo" work, particularly relating to

insects began. He has developed his work on Hox genes, and in particular how their regulation and expression leads to the range of different segment morphologies in *Drosophila* to address how changes in the role of these genes may be related to the pattern of segment diversity in other insects, in crustaceans and in myriapods. Professor Akam and his group have described not only developmental differences between species, but abstract general rules about evolution and development and his laboratory continues to generate critical data to push evo-devo forward and tackle difficult questions. Their work involves the use of a range of genetic and embryological techniques, including transgenesis, the analysis of cell lineage and descriptive molecular embryology. DNA sequences and genomic organisation play an increasingly important role, providing the phylogenetic framework against which to test hypotheses of evolutionary mechanisms.

In recognition of his exceptional contribution to the field of zoology and to evolutionary biology, we are delighted to present the 2009 Linnean Medal for Zoology to Professor Michael Akam”.

Professor Akam expressed his thanks to the Society for the medal which he considered a tribute to the renaissance of evolutionary-developmental biology. He commented that it was his biology teacher who had inspired him to pursue a career in biology and paid tribute to biology teachers who inspire the next generation of biologists.

c. The President presented the **2009 H H Bloomer** Award to Mr Markku Häkkinen. The citation, was composed and read by the *Editorial Secretary, Dr John Edmondson*:

“Mr Markku Anton Häkkinen is a remarkable self-taught botanist and natural historian. Mr Häkkinen’s interest in natural history and botany was stimulated by the travel opportunities offered to him in his “first” career as a sea captain – he gained his master’s certificate in 1976. His main research interest is in the study of wild bananas, the genus *Musa*. His work on this genus is based on field observations from China and South East Asia, and on the herbarium material, and literature from across the world. This has resulted in 55 publications, with more currently in press. His excellent photographic work aids the identification and description of many new species within this confusing taxonomic group.

Although he has no formal taxonomic training, Mr Häkkinen is now considered to be one of the world’s leading authorities on the taxonomy of *Musa*. He is currently a visiting researcher at the Natural History Museum, University of Helsinki, a visiting scholar at the Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences and, through the Biodiversity Taxonomic Advisory Group, a *Musa* specialist adviser for many institutions all over the world. Mr Häkkinen is a member of the International Association for Plant Taxonomy and an Emeritus Member of the Botanical Society of America.

Bananas are one of the world’s most important dessert fruits. They are threatened by many diseases, and new genes need to be identified to facilitate the breeding of “disease-free” crops. Wild banana populations are themselves, however, under threat of extinction in many areas, due to mass land-clearance. Through his research, Mr Häkkinen has sought to emphasise the importance of the study and conservation of wild *Musa* species to the wider public, through newspaper, radio and television coverage in West and East Malaysia, China and Finland. He has personally collected many ex-situ collections from Borneo, China and Malaysia, and has donated his wild *Musa* collection of 50 taxa to the ITC Gene Bank in Louvain, Belgium for the benefit of the international community.

Most recently, his research collaboration with molecular systematists has taken his taxonomic insights to a higher level, which will enable him to further develop and test his ideas and hypotheses.

Mr Häkkinen's standing within the scientific community is recognised by the support he receives from research organisations in Finland and many other countries. We are delighted to acknowledge his significant achievements today by awarding him the H.H. Bloomer Award of the Linnean Society of London".

On receiving his medal, Mr Häkkinen thanked the Society for the honour of receiving this award which had come as a surprise to him. He commented that the award recognised his work with the Musaceae family and his hope that his work would continue to draw attention to the need to conserve wild populations of the genus *Musa*.

d. The President presented the **2009 Bicentenary Medal** to Professor Michael Engel. The citation was read by the *Zoological Secretary, Dr Vaughan Southgate* as follows:

"Professor Michael Engel is Professor of Ecology and Evolutionary Biology and Senior Curator at the Natural History Museum, University of Kansas. From his initial interest in Apoidea (bees), Professor Engel has extended his work to other insect families, giving him a diverse knowledge which he applies to the broad issues of insect distribution, speciation and evolutionary divergence.

Born in 1971, Professor Engel pursued his undergraduate studies at the University of Kansas, receiving a BS in Cellular Biology and a BS in Chemistry in 1993. He then undertook postgraduate studies in entomology at Cornell University and was awarded his doctorate in 1998. He then took up a post as a Research Scientist at the American Museum of Natural History before returning to his alma mater, the University of Kansas in 2000 as Assistant Professor in the College of Liberal Arts and Sciences and Assistant Curator at University's Natural History Museum. Following promotion to Associate Professor and Associate Curator in 2005, he was appointed to his current roles (Professor and Senior Curator) in 2008.

A daring and original thinker, Professor Engel has a mastery of a number of different groups of insects. Many researchers become specialists on fossil or living taxa; Professor Engel is an authority on both. His research has led to the discovery of many new species and new diagnostic characters, a seminal contribution to our knowledge of the biodiversity of insects and their evolution. In recent years, much of his work has focused on determining the phylogeny and evolutionary history of the Isoptera (termites), a particularly difficult group of insects; work for which he received the prestigious Guggenheim Award.

An accomplished entomologist, with an international reputation, his entomological and paleontological research has taken him to numerous countries, and earned him a number of awards, most recently the Charles Schuchert Award from The Paleontological Society of America, presented to a person under 40 whose work reflect excellence and promise in the science of paleontology. His research has also resulted in a phenomenal publication record. He has published more than 275 scientific papers and monographs, and co-authored two major books, all before reaching the age of 40!

Described by a colleague as "far and away the pre-eminent entomologist of his generation, with a great potential for future achievements", we are delighted to present the Bicentenary Medal for 2009 to Professor Michael Engel".

Professor Engel thanked the Society for the honour of receiving the Bicentenary Medal, commenting that he was very fortunate to study the astonishing diversity of insects. He thanked his mentors, colleagues, students and family for their encouragement and support.

- e. The President presented the **2009 Irene Manton Prize** to Dr Chris Yesson. The citation was prepared and read by the *Collections Secretary, Mrs Susan Gove*, as follows:

“The winner of this year’s Irene Manton Prize is Dr Chris Yesson.

A former management consultant, Chris gave up a successful business career in order to retrain as a biologist. He began retraining by spending six months doing voluntary field work in Vietnamese forests, then went on to obtain an MSc degree in Advanced Methods in Taxonomy and Biodiversity at Imperial College and the Natural History Museum.

Chris conducted his doctoral research under the supervision of Dr Alastair Culham at the University of Reading, submitting his thesis entitled “Investigating Plant Diversity in Mediterranean Climates”; by the time of the viva, three papers had already been published in international journals, and one had been awarded a prize at the BioMed-Central Biology awards. Chris integrated ecological niche models and phylogenetic reconstruction to investigate the impact of historic climate change on the evolutionary history of plants from Mediterranean climates. His studies focussed on *Cyclamen* (Myrsinaceae) and *Drosera* (Droseraceae), and he found that climatic niches are heritable and most lineages have probably persisted for millions of years in their present locations. However, many of these species may be at threat from the predicted future climate change.

Competition for the Irene Manton Prize is always stiff and this year was no exception. The members of the assessment committee were so impressed with Chris’s thesis I would like to quote from their reviews. “The candidate displays mastery of a range of skills well beyond what might be expected from a person just beginning their research career. There is sufficient work here for 2 PhDs!” Reading many excellent PhD theses is a humbling task, and each one seems excellent – Chris’s however, was truly impressive – “I have no doubt that this is THE ONE from my perspective in terms of the general importance of its findings, the breadth of the community to which it will appeal and the publications already out or in the works. It is also the one that I imagine I’ll go back to for a closer read (or at least the papers arising).”

After finishing his PhD Chris worked on a Darwin-funded project to produce DNA barcodes for Mexican cacti and we are delighted to hear that from June he will start working at the Zoological Society of London for the EU-funded Coralfish project, where he will apply his skills to the problem of deep-sea coral distribution, which are at least partly plants! When provided with a choice of art work from which to select his prize, Chris chose a very appropriate drawing of *Banksia nutans*, or Nodding Banksia, a small shrub from South Western Australia, a key warm mediterranean climate region featured Chris’s thesis. Chris, we are delighted to award you the Irene Manton Prize for 2009”.

- f. The President presented the **2009 Jill Smythies Award for published botanical art** to Dr Halina Bednarek-Ochyra. *The Collections Secretary, Mrs Susan Gove* read the citation which she had prepared as follows:

“The winner of this year’s Jill Smythies Award is Dr Halina Bednarek-Ochyra.

Dr Halina Bednarek-Ochyra is an Assistant Professor in the Institute of Botany of the Polish Academy of Sciences. An accomplished botanist, her main research interests are

the taxonomy and phytogeography of bryophytes and she counts 158 research papers and 12 monographs and books amongst her publications.

Halina received her MSc in Botany from the Jagiellonian University in 1984 and continued her studies as a postgraduate student in the Institute of Botany of the Polish Academy of Sciences where she has worked since 1987. In 1995 she gained her PhD; her doctoral thesis was based on a taxonomic revision of the moss genus *Racomitrium* in Poland. She was appointed Curator of Bryophytes in 1993 and served as editorial assistant for the *Fragmenta Floristica et Geobotanica* from 1991-1996. Since 1997 she has been co-editor of *Atlas of the geographical distribution of mosses in Poland*. Her major scientific achievements include a monograph of the genus *Racomitrium* in Poland, published in 1996 in which she proposed the first detailed infrageneric classification of this genus and a world conspectus of its species, and co-authorship of the *Liverwort Flora of Antarctica* published in 2000. She is currently working on a monographic study of the genus *Bucklandiella*, in the extra-Holarctic and on *The Liverwort Flora of the Prince Edward Islands in the Subantarctic*.

The Jill Smythies Award however, recognises Halina's exceptional talent, as a botanical illustrator, in particular the illustrations within *The Illustrated Moss Flora of Antarctica*, published by Cambridge University Press in November 2008. The first modern Flora of mosses of this continent in the Southern Hemisphere, this publication is greatly enhanced by the full page of detailed clear line drawings including the habit, stem cross-sections, leaves and leaf structures which accompany each taxon. Members of the judging panel described her work as "Outstanding. Although many of the other artists works were considered by the panel of the highest standard, the consistent high quality, accuracy and sheer number of plates produced over the years, made the difficult choice a unanimous one". You will have the opportunity to view some of this work in an exhibition, which she has kindly mounted in the Society's library for this occasion.

In recognition, therefore, of her significant achievements to botanical illustration, we are delighted to present The Jill Smythies Award for 2009 to Dr Halina Bednarek-Ochyra".

Dr Bednarek-Ochyra expressed her gratitude to the Society and thanked her nominee and collaborators for their support. She presented the Society with an illustration of *Aloina brevirostris* (Hook & Grev.) Kindb, which the President accepted on behalf of the Society.

8. The Treasurer presented the Accounts for 2008. These are to be found in the 2008 Annual Report.

a. The Treasurer summarised the Society's financial accounts as presented in the Annual Report previously circulated to all Fellows. He drew attention to the dramatic drop in the Society's Asset value as a result of the stock markets' severe down turn during the year. Despite this situation the Society's Council agreed that all the main projects and the refurbishment programme budgeted for action during the year should continue to completion.

He remarked it was pleasing to report that the income received during the year was above budget due in the main to the increased revenue from the joint Journal publishing programme with Wiley/Blackwell. It was even more pleasing that through the tight control by the staff and officers the expenditure budget had been held below budget for the day-to-day activities of the Society, thus leaving a surplus of £61,087 at the end of the year.

Project costs totalled £180,278 and Refurbishment costs covering the Library and Offices totalled £390,599 with a contribution from the Nora McMillan Fund this was reduced to £275,285 to be found from general funds.

The final Balance Sheet showed that the Society's Assets at the end of the year after paying for the Projects and Refurbishment work along with the major reduction in investment losses of £741,214 were £1,596,934, compared with £2,819,553 in 2007.

The Treasurer drew attention to the problems that the Society had during the year with the fraudulent activities being perpetrated to their Lloyds Bank accounts which had caused considerable time wasting and worry for the Society's Financial Controller. He warmly thanked Priya for all his hard work and perseverance on behalf of the Society. He also drew attention to the success Victoria had in exceeding her target for the use of the Society's rooms despite all the building work. Finally he thanked all the staff for their commitment and hard work during a difficult but very successful year! He then asked if there were any questions or further information he could provide. None were forthcoming.

b. Dr N Keith Maybury read a statement prepared by Dr Sara Churchfield, a member of the Audit Review Committee who was unable to attend due to illness. "In accordance with Bye-Law 12.6, I confirm that I attended the Audit Review Committee of the Linnean Society on 12 March 2009 at which the Accounts for 2008 were presented. After a thorough review of the written statement of accounts, together with accompanying notes and opportunities for discussion with other members of the Review Committee (including the Treasurer and a representative of the official Auditors), I am satisfied that the Accounts give a true and fair view of the Society's finances as at 31 December 2008. I therefore move that they be accepted at the Annual Meeting on 21 May." This was carried unanimously on a show of hands.

c. The Treasurer moved that the firm of Knox Cropper, of 16 New Bridge Street, EC4V 6AX, be appointed as auditors in accordance with Bye-Law 12.5, which was accepted unanimously. He then proposed a change in the banking arrangements to Barclays Bank, Wembley and Park Royal Branch. Both motions were carried unanimously with a show of hands.

9.

a. The President gave his address on "Fragmentary Evidence". In this address he discussed how plant anatomy helps people who suspect their houses have been damaged by tree roots, detectives looking for forensic evidence in murder cases, archaeologists with puzzling plant remains, often of wood or charcoal, antique dealers who want to check authenticity of furniture, food manufacturers with strange foreign material in their products, pharmaceutical companies who need to be sure that the dried herbs they are buying are not adulterated, and those concerned with suspected poisoning by plants.

b. On behalf of the Fellows the President was thanked for his talk. Dr Pat Morris moved that the President's address be published and circulated and the motion was passed.

c. Professor David Cutler then handed over the Presidency to **Dr Vaughan Southgate**

who thanked the outgoing President for his leadership throughout a very busy three years in the Society's history which had included the Tercentenary Celebrations. Dr Southgate named his Vice Presidents for the coming year as Dr Mike Fay, Dr Keith Maybury, Dr Sandra Knapp and Dr Malcolm Scoble.

10. Any other valid business.

There being no other valid business, the President declared the meeting closed, noting the dates of forthcoming meetings. The next Anniversary Meeting will be on **Thursday 20 May 2010 at 4pm.**

RUTH TEMPLE
Executive Secretary

Free Taxonomy and Biodiversity lectures

'What's in a Name? Taxonomy and Biodiversity': Saving our Experts from Extinction

**The Linnean Society of London /
Ecology and Conservation Studies Society
Joint Lecture Series in conjunction with Birkbeck Institute of
Environment, University of London**

This series of lectures focuses on the importance of being able to define and identify the natural world with examples of the need and uses of giving species a name, and organising them into systems of classification.

The introductory overview will review uncertainty in the numbers of species on Earth and their extinction rates, and survey how resulting problems can be addressed for effective conservation action. Following lectures will highlight the importance of taxonomy to fungi, forensics, invertebrates, and control of illegal use of endangered species. In the final session a panel of experts will review how the next generation of naturalists can be inspired and discuss how to encourage more people to enter the field of taxonomy, where there is a critical shortage.

Join the debate. All welcome. Free admission but booking is essential.

The venue on 16 October is the John Snow Lecture Theatre, London School of Hygiene and Tropical Medicine, Keppell Street, **WC1E 7HT**. For all other dates the venue is Room B04, Birkbeck University of London, 43 Gordon Square, WC1H 0PD.

Email: environmentevents@FLL.bbk.ac.uk for booking details, (or telephone 020 631 6473)

All lectures are from 6.30 to 8.30 pm on the following Fridays. Doors open at 6.00pm Programme overleaf.

- **16 October** 'Taxonomy, Systematics and Conservation Biology'
Professor Lord Robert May of Oxford, past President of the Royal Society
- **23 October** 'Out of Sight, Out of Mind: our lives depend on the hidden kingdom – Fungi'
Professor Lynne Boddy, President of the British Mycological Society
- **30 October** 'Control of Illegal Use of Endangered Species and Incorrectly Identified Species'
Professor Monique Simmonds, Jodrell Laboratory, Royal Botanic Gardens, Kew
- **6 November** 'Botany, palynology, and mycology: powerful weapons in the forensic armoury'
Patricia Wiltshire, Forensic Ecologist
- **13 November** 'Taxonomy, Natural History and the Digital World'
Dr Malcolm J. Scoble, Keeper of Entomology, Natural History Museum
- **20 November** Panel Presentation and Discussion: 'Inspiring New Naturalists and Taxonomists'
Working with Children: Gail Bromley, Education Development Manager, RBG, Kew
Higher Education: David Streeter, Reader in Ecology, University of Sussex
Professional Taxonomy: Dr Mike Fay, Head of Genetics, Jodrell Laboratory, RBG, Kew

Full details of speakers and their lectures can be accessed at
<http://www.bbk.ac.uk/environment/news/lectures>

The Burlington House Lecture

The New World of Galileo

Monday 26 October 2009

A free lecture for the general public.

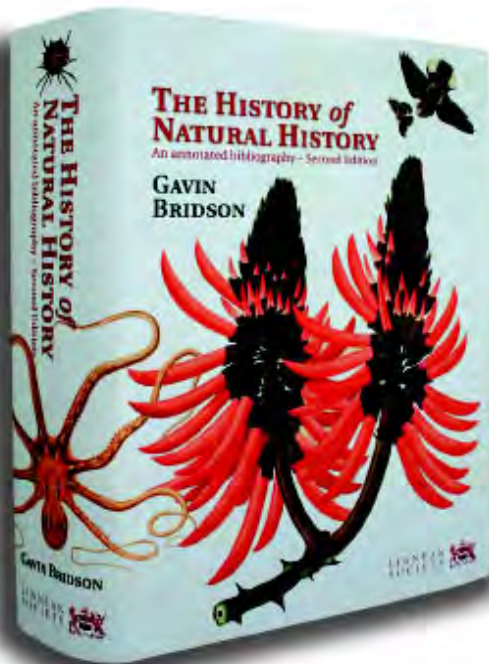
In this richly illustrated lecture Professor William Shea, the holder of the Galileo Chair of the History of Science at the University of Padua, at which Galileo himself taught for 18 years, will explain his astronomical discoveries and explain why Galileo saw what he saw. "Seeing is believing but not everyone has the same visual experience and we all tend to see what we expect to find!"

- **Time:** 6pm
- **Venue:** The Geological Society of London (Piccadilly entrance)
- **Speaker:** Professor William R Shea (University of Padua)
- **Admission:** Admission is free but by ticket only, available from Alys Hilbourne at the Geological Society. Tel: 020 7432 0981 or email alys.hilbourne@geolsoc.org.uk

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The
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The Linnean Society

Programme

2009

15 th Oct	Thurs 6 pm	A GENERAL NATURALIST IN MODERN TIMES Martin Jacoby FLS	Evening Meeting and Book Sale
26 th Oct	Mon 6 pm	The Burlington House Lecture – at the Geological Society THE NEW WORLD OF GALILEO Professor William R. Shea, Univ. Padua	(page 68 for details)
28 th Oct	Wed	Palaeobotany Specialist Group	Day Meeting**
29 th Oct	Thurs	Palynology Specialist Group	Day Meeting **
5 th Nov*	Thurs 6 pm	THE POETRY OF SCIENCE Kelley Swaine	Evening Meeting
10 th Nov	Tues 6 pm	CHARLES DARWIN, LIVE AT THE LINNEAN! Richard Milner FLS	(p10 for more info.) .Evening Meeting**
17 th Nov	Tues	THE GALAPAGOS ARCHIPELAGO: A LIVING LABORATORY † Sarah Darwin FLS and Sandra Knapp FLS	Day Meeting **
19 th Nov	Thurs 4 pm	LINNEAN SOCIETY DEBATE † Andrew Sheppy FLS and Sandra Knapp FLS	Afternoon and Evening Meeting **
2 nd Dec	Wed 6 pm	FOUNDERS DAY: NATURAL HISTORY COLLECTIONS AS MODELS OF DIVERSITY Sandra Knapp FLS	Evening Meeting
4 th Dec	Fri 6 PM	THE DARWIN LECTURE: SCIENCE AND MEDICINE Steve Jones	Lecture at the Royal Society of Medicine**
10 th Dec	Thurs 6 pm	EMBRYONIC STEM CELLS Sir Martin Evans	Evening Meeting
2010			
21 st Jan*	Thurs 6 pm	RESTORING BRITISH BIODIVERSITY: NATIVE MAMMAL REINTRODUCTIONS AND THE SCOTTISH BEAVER TRIAL Tony King FLS	Evening Meeting
18 th Feb	Thurs 6 pm	THOMAS BLAKISTON'S LINE: A VICTORIAN EARLY CONTRIBUTION TO BIOGEOGRAPHY Andrew Davis	Evening Meeting

* Election of new Fellows † organiser(s) ** Registration required

Unless stated otherwise, all meetings are held in the Society's Rooms. Evening meetings start at 6.00pm with tea available in the library from 5.30. For further details please contact the Society office or consult the website (address inside the front cover).

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