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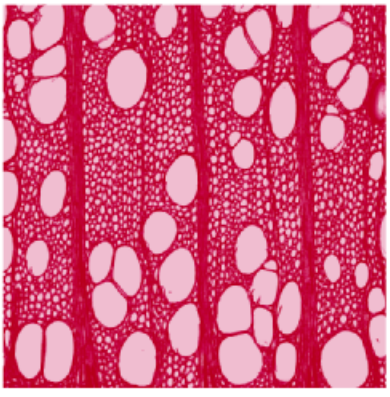
The Linnean



NEWSLETTER AND PROCEEDINGS OF THE LINNEAN SOCIETY OF LONDON

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A living forum for biology

THE LINNEAN SOCIETY OF LONDON

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THE LINNEAN

Newsletter and Proceedings
of the Linnean Society of London

Edited by Brian G Gardiner

Editorial

This issue contains two papers. The first is an account of John Hunter, the late eighteenth century surgeon who was honorary surgeon to George III and who is generally regarded as the founder of scientific surgery. Among his patients were Benjamin Franklin and Adam Smith. This paper by Wendy Moore was the subject of our evening meeting on the 19th January 2006 in which she emphasised Hunter's visionary work in natural history and, in particular, evolutionary theory which, she pointed out, anticipated Darwin's work by more than sixty years. Her book *The Knife Man: Blood, Body-snatching and the Birth of Modern Surgery*, was published in paperback in April 2006 (see page 20 for details of this book).

There is a second, much shorter, paper concerning a manuscript page from Darwin's *Origin of Species* which examines the role of transitional grades in evolution.

Finally, in this issue we include an obituary of one of our Fellows who died last June, Alwyne Wheeler. Alwyne was not only the foremost authority on British fishes and a curator at the Natural History Museum, but he was also a prominent member of our Society, where he curated the Linnean fish collection. He published in our Journal catalogues of the material both in London (1985) and those at the University of Uppsala (1991). Furthermore, together with Fernholme, he published an account of the collection in the Swedish Museum of Natural History (1983). He will be sadly missed.

BRIAN GARDINER

Society News

The slightly quieter summer period has provided us with a good opportunity to move ahead on several fronts. Elaine Shaughnessy has been very busy on development activities and by the time you receive this she will have reported to Fellows at the Conversazione focusing on our plans to improve access both to our premises and our collections. Elaine has also been working hard to redesign our website which will be launched at the Conversazione. If you have not looked at *www.linnean.org* recently do please do so – it now contains a lot more information in a much more accessible form, but there is always room for improvement so we shall welcome your comments and feedback.

The Tercentenary Programme. Among other things the website provides plenty of information on our Tercentenary plans. These are now largely in place and there are a lot of exciting activities and events. We shall launch the programme at a special Christmas event on 7th December when there will be presentations and poster boards on our plans for the Tercentenary. We shall be inviting a number of distinguished guests so numbers may have to be limited – if you are planning to come do let us know in good time.

Building and Refurbishment Work. As reported in the previous *Linnean*, the emphasis has now shifted from the Courtyard to our own premises. There has been a lot of hard work on our Meeting Room over the summer and we hope that you will be

impressed by the results of the refurbishment. We have also started work on the new suite of rooms on the third floor and the Conversazione will be an opportunity for Fellows to see this area – if they do not mind climbing 96 stairs! As you will all know one of the key targets for our fundraising is to get the money for a lift.

By the time that you read this we hope that work will have started on installing a new air management system and re-decorating the library. That will be another major project and may not be completed until after Christmas so once again we ask for your understanding if we are not able to offer you a full library service whilst the work is going on.

In the Courtyard itself we are now settling down to a new regime where the landlord plays a more active role and we work more closely with our Courtyard colleagues. We hope that Burlington House will be seen as more of a cultural centre where the sciences and arts come together. On 18th September there will be an event both to promote this idea and to celebrate the completion of the refurbishment, with Sir David Attenborough and Lord Sainsbury as the lead speakers.

Staff. Lisa Thiruvalam has been very much part of the Society for the last few years, both in a part-time and full-time capacity, but she has now decided to get further training. We are very sorry to see her go, and wish her all the best. Her successor is Sharon Smith, who recently completed a Zoology degree at the University of Leeds and we welcome her to the team.

Evening Meetings. Unusually we continued our meetings programme right through the summer this year. As our contribution to National Insect Week in June, Quentin Wheeler gave a most stimulating overview of the current state of entomology. Following that we celebrated the careers of two outstanding woman biologists. In July there was a talk by Roger Pullin to celebrate the launch of Ro Lowe-McConnell's autobiography *The Tilapia Trail*, and in August there was a conference *Plants, People and Evolution* in honour of Dr Barbara Pickersgill, attended by over a hundred people. We shall continue to have a lively programme in the autumn (see back cover) and we can now confirm that the Brogdale lecture will be given by Edward Wilson from Worcester College Oxford who will speak on *Edward Bunyard,* who was not only an outstanding pomologist and plantsman in the early 20th century, but also a prominent Fellow of the Linnean Society.

Awards and Prizes. Most Fellows will know something about our various awards and prizes. It is important that they go to worthy recipients. At present we are inviting applications for the **Dennis Stanfield Awards** for botanical research in tropical African plants, and nominations for the **Irene Manton Prize** for the best Ph D thesis in botany/ plant science over the last year, and for the **Jill Smythies Award** for published botanical drawings. If you know of anyone you would like to nominate do please let me know.

Lastly I should mention that we are participating in a Charity Commission review exercise. We pride ourselves on being well-run but this will be a useful opportunity to learn more about current approaches to charity management.

ADRIAN THOMAS

The Botanical Research Fund

The Botanical Research Fund is a small trust fund which makes modest grants to individuals to support botanical investigations of all types and, more generally, to assist their advancement in the botanical field. Grants are available to amateurs, professionals and students of British and Irish nationality. Where appropriate, grants may be awarded to applicants in successive years to a maximum of three.

The next deadline for applications is January 31st, 2007.

Further details may be obtained from Mark Carine, Hon. Secretary, The Botanical Research Fund, c/o Department of Botany, The Natural History Museum, Cromwell Road, London SW7 5BD. E-mail: m.carine@nhm.ac.uk

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Reflections on a decade of small grants:

Subjective advice to prospective applicants for Systematics Research Fund grants

The Systematics Association Small Grants scheme – more recently amalgamated with most of the Linnean Society's previous grant schemes to form the Systematics Research Fund (SRF) – has made 11 rounds of annual awards since its widely welcomed reappearance in the autumn of 1995. In early years, annual awards totalling *ca* £6,000 were typically made by the Association to 8–10 of the 30–35 applicants, who were dominantly from the European Union, while more substantial sums were made available by the Linnean Society, primarily to UK applicants. This year, the Linnean Society and Systematics Association together made awards totalling £29,300 to 29 of the 84 applicants, who represent a truly international constituency. Thus, allowing for inflation, the scheme has triumphantly trebled in both size and geographical reach, though the percentage of successful applicants has steadfastly remained one quarter to one third.

Another consistent factor across the years has been the bell-curve defined by the aggregate scores awarded by panel members to the proposals. This represents a large number of Good proposals sandwiched between much smaller numbers of proposals rated Excellent or Poor. The Poor tail was never large, and happily has decreased through time. However, based on our respective experiences as SRF coordinators (Bateman 1995–7, Hollingsworth 1998–2000, Littlewood 2001–5, Hawkins 2006>) and frequently as assessors, it is our perception that the Excellent category has not shown significant expansion relative to the Good. The following (admittedly subjective) advice is offered primarily in an attempt to achieve that outcome.

Recognise the likely benefits of following the rules. SRF has been organised with the expressed intentions of maximising simplicity and minimising the time invested in the scheme by both applicants and assessors (even so, this year's applications took each of the six assessors two full days to score). Confining an application to a single side of A4 paper means exactly that; it does not somehow implicitly excuse images, or bibliographies, or budgets, or supporting letters solicited by the applicant; these supplements consume unnecessary time and paper. Also, the December 31st deadline for applications is real; it does not carry a ten-day error bar.

Optimise your use of the single side of A4. Much of the skill of formulating a one-page proposal lies in a combination of prioritising the content and optimising the logic and structure of the text. Waste neither words nor space, yet don't be afraid to use paragraph headings; after all, this is a short proposal, not an abstract. And illustrations are rarely included by applicants, despite the fact that well-chosen images (small, of course!) can substitute for a significant number of words.

Include a budget. Budgets are still omitted from a substantial minority of proposals, and many of those that are presented are inadequate. Estimates that are clearly over-inflated are laudably rare. Nonetheless, applicants should realise that a scheme that by definition distributes funds in small measures is unlikely to be impressed by the inclusion of budget lines labelled "miscellaneous", "contingency" and even "overhead"!

Avoid appearing greedy. Requests approximating the maximum allowable sum of £1500 will not be funded to that level unless they are accompanied by a particularly strong justification. There is a good reason for preferring applications in the £500–1000 range; the more modest the requirements of individual applications, the larger the proportion of the assembled applications that we can fund.

Explain why you have approached us rather than another funding body. Relatively few applicants tell us why their primary funding body (including their current employer) is unable or unwilling to fund the fieldwork, or collection visit, or laboratory analyses, or item of equipment, or temporary assistant, that they are proposing. Often, assessors will assume that the applicant has ready access to such funding or materials when in fact that person does not.

Predict the ultimate outputs. The majority of applications fail to specify any explicit outputs, and those that do usually simply state that the SRF will be acknowledged in any resulting peer-reviewed publications. For most projects, it is feasible to predict in advance which journals or publishers are most likely to receive written outputs. Similarly, tell us if web-based outputs, such as interactive keys or educational packages, are envisaged.

Partition large projects into fundable portions. Although they are fundamentally altruistic, the bodies who invest in the Systematics Research Fund are nonetheless seeking an element of *quid pro quo* from recipients. Wholly amalgamating the SRF contribution into a broader project that is being funded from multiple sources is unlikely to achieve this goal. Specifying at least an element of the project that is particular to the SRF, and will be acknowledged accordingly in ensuing outputs, always encourages assessors. Indeed, why not consider emphasising this element of the overall project in your proposal, rather than giving equal space to every element of the larger project?

Look forward more than backward. Many applicants expend the bulk of their side of A4 in describing the taxonomic history of their chosen group and/or geographical region, often supported by an extensive bibliography. That precious space is better used to describe the details of the approaches to be taken in the proposed research, and to show us that you understand the main strengths and weaknesses of each.

Stand out from the crowd. Remember that almost all applicants to SRF are proposing to study, with commitment and enthusiasm, a particular taxonomic group in a specified geographical area using a limited range of specified approaches. Most

applicants aim to generate a taxonomic revision and/or reconstruct a phylogeny, thereby by definition filling gaps in our existing knowledge. Hence, none of these features will, in itself, distinguish your proposal from the others.

Consider the broader impact of your outputs. All too often, biologically fascinating groups are under-sold by their advocates, particularly where their study implicitly offers clear benefits to one or more user constituencies. And by user constituencies we mean other academic biologists studying evolution, development and related aspects of molecular biology, as well as more applied disciplines such as conservation, agriculture, medicine or education. In this competitive age, it is essential that you demonstrate the broader relevance of your proposed research.

Keep your feet on the ground. Lastly, please remember that a modest but achievable project is more likely to be funded than an all-singing, all-dancing proposal that would more appropriately receive larger scale funding from a research council. We are seeking to achieve substantial advances from small investments, and there are many ways of achieving that goal. For an established professional, a small amount of pump-priming sequence data can successfully deliver the aforementioned large research council grant. For an "amateur" researcher, a specially designed net can trap sufficient tropical bats to populate a raft of papers. For a postgraduate student, a well-targeted field trip can bring revolutionary insights into the biology of their study organisms. And for a retired researcher, a digitiser-laptop package can greatly increase the efficiency and affordability of a self-funded collections visit.

In the meantime, those of us involved in administering the Fund will renew our efforts to seek additional sources of cash, in the hope that we can continue to fund a substantial percentage of the applications submitted to this increasingly popular scheme. Naturally, we are anxious to be in a position to fund your Excellent proposal once we receive it.

RICHARD BATEMAN, PETE HOLLINGSWORTH,
TIM LITTLEWOOD AND JULIE HAWKINS

Library

This year the threat of imminent redecoration of the library Reading Room and building work elsewhere have meant some changes to our summer programme of student work. As a result we have been concentrating on "clearing the surfaces" so as to be ready for redecoration when the time comes. We have been able to do some re-shelving of journals and Lynda has overseen a major cleaning and rearrangement of the books in the first few bays of the Reading Room. This has got rid of the dust resulting from last summer's work on the windows and stonework, given us space for recent accessions and brought better order to the general biology collection, especially in books on wildlife conservation and palaeontology, where changed shelf-marks had increased numbers of items to be accommodated.

The student team included the usual international mixture with Sabrina and Adrian from Alicante in Spain, Emeline, Nathan and Olivia from the International School at Ferney Voltaire, Thomas from Holland and the UK provided Alison, Christine, George,

Katie Vernon, Kate Conway and Olive.

Meanwhile, our volunteers Alan Brafield, Enid Slatter and John St Quinton have finished checking and re-boxing many of the manuscripts. These were in temporary storage and are now relocated to a more accessible place. The benefits of this exercise include removal of rusty paperclips and staples, acidic wrappers and boxes and their replacement by more suitable materials. As a bonus, the new location listing will also serve as the first step towards an electronic catalogue of manuscripts as well as having information on content, size and conservation needs. The volunteers have moved on to the "domestic archives" which are also in a temporary location.

The summer months have seen an influx of donations, both for the forthcoming book sale on the evening 12 October, and more specifically for the Library. We are happy to acknowledge receipt of all the items listed below which will be added to the Library stock. Space limits mean that some will be listed in the next issue. Please note that donations are not necessarily catalogued as received, as Library staff may be undertaking other tasks, so the books may not be immediately available for loan.

The book sale is happy to take any books on any subjects and it has been suggested that we should also accept surplus audio tapes and DVD's. These will be given away to good homes, with a donation to the Society funds. Please bring any book sale material in before the day of the event as we need to sort material first.

GINA DOUGLAS

Donations – May to mid-August 2006
(The name of the donor is given in bold.)

Dr Paul Barrett: Barrett, Paul & Evans, Susan E. (eds.) *Ninth International Symposium on Mesozoic Terrestrial Ecosystems and Biota, Manchester 2006.* 187 pp., London: Natural History Museum, 2006. ISBN 0-565-09215-4.

Brooklyn Botanic Garden: Rogers, R. (ed.) *Crazy about cacti and succulents.* 119 pp. illustr., New York: Brooklyn Botanic Garden, 2006. (Handbook No. 184). ISBN 1-889538-72-8.

Janet Browne: Burkhardt, R.W. *Patterns of behaviour.* 636 pp. Chicago: University of Chicago Press, 2005. ISBN 0-226-08090-0.

M. Campbell-Culver: Campbell-Culver M. *A passion for trees: the legacy of John Evelyn.* 282 pp. illustr., London: Eden Project Books, 2006. ISBN 1-903-91947-9.

Eric J. Clement: Clement, Eric J., Smith, D.P.T. & Thirlwell, I.R. *Illustrations of alien plants of the British Isles.* 466 pp. London: BSBI, 2005. ISBN 0-901158-32-1.

Prof. J.L.Cloudsley Thompson: Krupp, Friedhelm (ed.in chief) *Fauna of Arabia* (multiple volumes: see on-line catalogue for details of holdings). Basle: Karger Libri for Senkenbergishe Naturforschende Gesellschaft and King Abdulaziz City for Science and Technology, Riyadh.

Dr Anthea Gentry: Rainger, R. *An agenda for antiquity.* 360 pp. Tuscaloosa: University of Alabama Press, 1991. ISBN 0-8173-06360X.

The Hakluyt Society: Rivière, Peter (ed.) *The Guiana travels of Robert Schomburgk 1835-1844.* (Series III, Vol. 16) 406 pp. illustr., map, London: Hakluyt Society, 2006. ISBN 0-904130-86-7.

Dr B.P.Horton: Horton, B.P. & Edwards, R.J. *Quantifying Holocene sea-level change using intertidal foraminifera.* 97 pp., Virginia: Cushman Foundation for Foraminiferal Research, 2006. (Special publication No 40).

Prof. H.F.Linskens: Linskens, H.F. & Jackson, J.F. (eds) *Plant volatile analysis.* (Modern methods of Plant Analysis, Vol. 19). 266 pp., figs., Berlin: Springer Verlag, 1997. ISBN 3-540-61589-X.

Linskens, H.F. & Jackson, J.F. (eds)*Analysis of Plant waste materials.* (Modern methods of Plant Analysis, Vol. 20). 214 pp., figs., Berlin: Springer Verlag, 1999. ISBN 3-540-64669-8.

Dr Sandra Knapp: Knapp, Sandra & Press, Bob, *The gilded canopy: botanical ceiling panels of the Natural History Museum.*168 pp. col. illustr., London: Natural History Museum, 2005. ISBN 0-565-09198-0.

Prof. A.M.Lucas: Home, R.W. et al. (eds.) *Regardfully yours: selected correspondence of Ferdinand von Mueller, Vol. 3: 1876-1896.* 909 pp. Bern: Peter Lang, 2006. ISBN 3-906757-10-2.

Dr Jan Mees & Vlaams Instituut voor de Zee (Flanders Marine Institute): De Clerck, O., Bolton, J.J., Anderson, R.J., Coppejans**,** E**.** *Guide to the seaweeds of KwaZulu-Natal.* (Scripta Botanica Belgica, 33). National Botanic Garden of Belgium (NBGB): 294 pp. ill., Meise, Belgium, 2005. ISBN 90-72619-64-1.

Vanden Berghe, E., Brown, M., Costello, M.J., Heip, C.H.R., Levitus, S., Pissierssens, P**.** (eds.). *Proceedings 'The Colour of Ocean Data'*: *international symposium on oceanographic data and information management with special attention to biological data. Brussels, Belgium, November 25-27, 2002.* (VLIZ Special Publication, 16). 308 pp., UNESCO/IOC/VLIZ: Paris, 2004.

Herrier, J.-L., Mees, J., Salman, A., Seys, J., Van Nieuwenhuyse, H., Dobbelaere, I., (eds.). *Proceedings 'Dunes and Estuaries 2005'*: *International Conference on nature restoration practices in European coastal habitats. Koksijde, Belgium 19-23 September 2005.* (VLIZ Special Publication, 19). 685 pp. Oostende: Vlaams Instituut voor de Zee (VLIZ), 2005.

Dr Jordan Goodman: Robinson, Micahel F. *The coldest crucible, Arctic exploration and American culture.* 206 pp., illustr., Chicago: Univ. of Chicago Press, 2006. ISBN 0-226-72184-1.

Grande Giardini Italini: Cottini, P. (ed.) *Linneo* (Conference proceedings, Capri 2006)

Rizzotti, Tullia *Capri blooming, botanical walks*. 127 pp., col. illustr., Milan: Mondadori, 2003. ISBN 880374-1789-6.

Institute of Mechanical Engineers & Linnean Society of London: Harkness, N., Greated, C., Cutler, D & Collins, M. (eds.) *Colour and design in the natural and man-made worlds.* (Special issue of *Optics and Laser Technology* Vol. 38 (4-6) 2006) pp. 203-485, ilustr. some col., Amsterdam: Elsevier, 2006.

Drs Mary and Pat Morris: Montmollin, B. de & Strahm, Wendy *The top 50 Mediterranean island plants.* 110 pp., Gland: IUCN, 2005. ISBN 2-8317-0832-X.

Prof. Claus Nielsen: Nielsen, Claus *Animal evolution, interrelationships of the living phyla.* 2nd ed., reprinted. 563 pp. illustr., Oxford: OUP, 2006. ISBN 0-19-850682-1.

R.M. Payne: Payne, R.M. *The flora of walls of West Norfolk.* 30 pp., King's Lynn, Privately printed, 1998.

Payne, R.M., *The flora of Ely.* 30 pp., King's Lynn: Privately printed, 2002.

Nancy Pick: Pick, Nancy *Curious footprints: Professor Hitchcock's dinosaur tracks and other natural history treasures at Amherst College.* 121 pp. illustr., Amherst MA: Amherst College Press, 2006. ISBN 0-943184-09-6.

Real Jardín Botánico, Madrid: Castroviejo, Santiago & Ibáñez, Alicia (eds.) *Estudios sombre la biodiversidad de la region de Bahía Honda (Veraguas, Panamá)/ Studies on the Biodiversity of the Bahiá Honda region (Veraguas, Panama).* 835 pp. col. illustr., maps, Madrid: CSIC, Inst. de España & Real Academia de Ciencias, 2005. ISBN 84-00-08405-5.

Palao, Mercedes, Soler, Emilio & Opatrný, Josep (eds.) *El Paraíso ilustrado, Malaspina y Haenke en el Nuevo Mundo siglos XVII-XIX.* 231 pp. col. illustr., Madrid: Lunwerg, 2006. ISBN 84-9785-258-3.

Real Jardín Botánico, *Real Jardín Botánico 1755-2005, 250 años protegiendo la flora del Reino de España*. CD-ROM.

Royal Botanic Gardens, Kew: César, Edgley A., Juchum, Fabricio S. & Lewis, Gwilym P. *Lista preliminar da familia Leguminosae na região nordeste do Brasil / Preliminary list of the Leguminosae in Northeastern Brazil.* (Portuguese/ English text), 209 pp., map, Kew: Royal Botanic Gardens, 2006. ISBN 1-84246-142-7.

Ghazanfar, Shahina A. & Beentje, Henk J. (eds.) *Taxonomy and ecology of African plants, their conservation and sustainable use.* (17th AETFAT Conference, Addis Ababa, Ethiopia). 179 pp. illustr., map, Kew: Royal Botanic Gardens, 2006. ISBN 1-84246-115-X.

Jansen-Jacobs, M.J. (ed.) *Flora of the Guianas,* Series A: Phanerogams, Fasc. 23, 156 Acantaceae & 159 Mendonciaceae. 188 pp. map, Kew: Royal Botanic Gardens, 2006. ISBN 1-84246-313-1.

Johns, R.J. (& others) *A guide to the alpine and subalpine flora of Mount Jaya.* 653 pp. illustr. some col., map, Kew: Royal Botanic Gardens, 2006. ISBN 1-84246-057-9.

McGough, H. Noel (& others) *CITES and Slipper Orchids: an introduction…*(Text in English/French/Spanish + CD-ROM) 56 pp., illustr., Kew: Royal Botanic Gardens, 2006. ISBN 1-84246-128-1.

Smith, Matthew J. (& others) *CITES Orchid Checklist Vol. 4.* 184 pp. + CD-ROM, Kew: Royal Botanic Gardens, 2006. ISBN 1-84246-122-2.

John Tennent: Tennent, John *A checklist of the butterflies of Melanesia, Micronesia, Polynesia and some adjacent areas.* 209 pp., (*Zootaxa* 1178) Auckland:, Magnolia Press, 2006. ISBN 1-877407-71-2.

Dr C. Violani: Sindaco, R. et al. (eds.) *Atlante degli anfibi e dei rettili d'Italia/ Atlas of Italian amphibians and reptiles.* 789 pp. illustr., Firenze: Ed. Polistampe, 2006. ISBN 88-8304-941-1.

E. Weaver: Griffiths, O. & Florens, V. *Non-marine molluscs of the Mascarene islands.*185 pp. illustr. some col., maps, Mauritius: Bioculture Press, 2006. ISBN 99949-22-05-X.

Dr Joan Webb: Webb, Joan, *George Caley: nineteenth century naturalist, a biography.* 188 pp., illustr. Chipping Norton (NSW): Surrey Beatty & Sons, 1995. ISBN 0-949324-62-0.

Prof. Volker Wissemann: *Haussknechtia: Mitteilungen der Thüringischen Botanischen Gesellschaft.* Hft.9 2003.

Harlan, Volker *Wert und Grenzen des Typus in der botanischen Morphologie* (Symposium). 262 pp. illustr., Nümbrecht: Martina-Galunder Verlag, 2005. ISBN 3-89909-052-7.

Mollenhauser, Dieter (ed.) *Gregor Kraus: ein Botaniker aus dem Spessart und seine Pflanzen.* 52 pp. illustr., Bad Orb in Spessart: Verlag Orbensien, 2005. ISBN 3-927176-20-6.

Kögel, Andrea (ed.) *100 Jahre Rosarium Sangerhausen Jubiläumsband.* 144 pp., col. illustr., Sangerhausen: Rosenstadt Sangerhausen, 2003.

Verein Deutscher Rosenfreunde *Rosenjahrbuch* for years 2000-2005, Baden-Baden.

Zündorf, Hans-Joachim (and others) *Flora von Thüringen: die wildwachsenden Farne- och Blütenpflanzen Thüringens.* 764 pp., illustr., maps, Jena: Weissdorn Verlag, 2006. ISBN 3-936055-09-2.

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In April and July 2002, *The Linnean* carried a number of articles about public attitudes to biological evolution, particularly in the USA. Members may be interested to learn that a new survey of attitudes to evolution in over 30 countries[1] shows that in the USA one third of the adult population believe that evolution is "absolutely false"; taken with doubters, the figure rises to 45%, 5% greater than 20 years ago. In the UK, most European countries and Japan, disbelievers constitute between 7% and 15% of the adult population. The USA finds itself almost at the bottom of a league table of 33 European countries and Japan; only Turkey has more disbelievers than the USA. The authors of the study note that in the USA "The broad public acceptance of the benefits of science and technology in the second half of the 20th century allowed science to develop a nonpartisan identification that largely protected it from overt partisanship. That era appears to have closed."

[1] Miller JD Scott EC & Okamoto S. 2006. Public Acceptance of Evolution. ***Science*** 313: 765-766.

Picture Quiz

Michael Foster (sometimes referred to as Forster) 1836–1907

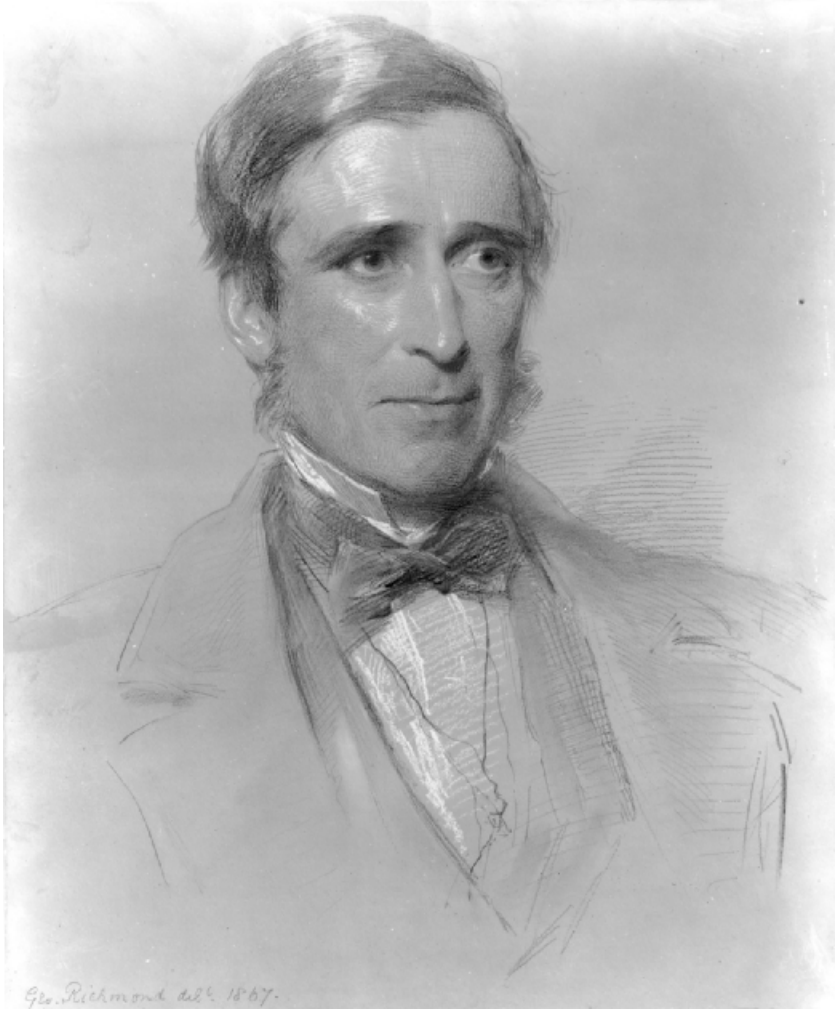
Professor Sir Michael Foster, K.C.B., MD, was born at Huntingdon on 8th March 1836. His initial education was at Huntingdon Grammar School and later, from 1849-1852, at University College School and then at University College London where he gained a BA in classics. Following a further period of study he was awarded his MD in 1859 after having won gold medals in anatomy and physiology.

During the next two years he completed his training in Paris (according to the DNB "the traditional route for those who aspired to the upper ranks of the British Medical Profession."). During this period he completed his first paper "On the effects produced by freezing on the physiological properties of muscle" (*Proc. Roy. Soc.*, 1859-60.) In 1867 he was invited to join the anatomy department back at University College, first as Teacher in Practical Physiology and then, in 1869, as Professor of the same subject. That same year he was appointed Fullerian Professor of Physiology at the Royal Institution, where he succeeded Thomas Henry Huxley, having previously served, together with Ray Lankaster, as one of Huxley's demonstrators in elementary biology at South Kensington.

Clue: Organised the opposition to the anti-vivisectionists.

Foster's intimate friendship with Huxley had a marked influence on his career. First he became the Biological Secretary of the Royal Society in succession to Huxley and then, at Huxley's instigation, he left London and came to Cambridge as Praelector in Physiology at Trinity College in 1883. Meanwhile, in 1876 he founded the Physiological Society and in 1878 he founded the *Journal of Physiology* which he edited until 1894. However, Foster's fame apparently rested on the creation of the Cambridge School of Physiology in which his principle of teaching involved much practical work. He held "that a student must see and do things for himself in order to gain a real and lasting hold of any scientific subject."

Initially Foster's research was mainly concerned with the problem of the heart beat and whether or not it was neurogenic or myogenic (he favoured the latter). Apparently his students eventually dominated heart research in both Britain and the States, while the obvious success of his research school was mainly down to "its charismatic and inspiring leader who developed a coherent and compelling programme of research." (DNB) One of Foster's most important contributions to physiology was his *Text-book of Physiology* – a classic of which the first edition appeared in 1876 and there were many editions until, growing as the subject grew, it necessarily split into several volumes, going through six editions and part of a seventh; translated into several European languages. His graphic literary style is said to have given distinction to the work in which several chapters rise to a high level of eloquence. One of the last



Clue: Catalogued the pathological specimens in the College of Surgeons Museum.
(By kind permission of the National Portrait Gallery.)

of Foster's contributions to physiology was his organising of opposition to the anti-vivisection campaign which culminated in the Cruelty to Animals Act of 1876.

Other notable contributions include his help in the establishment of both the National Physical Laboratory and the Meteorological Office. He also took a considerable part in starting the International Congress of Geology, the International Catalogue of Scientific Papers and the International Association of Academies. He also sat on a myriad of commissions and inquiries such as the Royal Commission on "Vaccination", on that of the Disposal of Sewage, on the Tuberculosis Commission and "the Reorganisation of the University of London". Perhaps more importantly he was chairman of the Treasury Departmental Committee on "Botanical Works and Collections at the British Museum and at Kew" 1999–1901. He was elected a Fellow of The Linnean Society on January 16th 1865. His recommendation reads "aquaintence with the science of Physiology being desirous of becoming a Fellow of the Linnean

Society." The form was signed by Thomas Henry Huxley, George Busk, George Bentham and Wm. Stephen Mitchell.

In 1900 Forster was elected MP for the University of London, a liberal who, when Gladstone introduced his Home Rule Bill, joined the Liberal Unionists and supported the Conservative government. Unable eventually to support the government on their Education Bill he crossed the floor of the House and joined the Liberal opposition. In 1906 he failed to be re-elected and the following year died on the 29th January 1907. He was buried in the Huntingdon cemetery.

The above account has been taken from Foster's obituary notice in our *Proceedings*, augmented by extracts from the New DNB, both of which are gratefully acknowledged.

BRIAN GARDINER

Postscript

This street corner scene was photographed by a colleague in 1957 and sent to me as a Christmas card! At that time I was a research student in palaeontology. I have

included it here because it portrays the couplet "It is more important to know the Rock of Ages than the age of rocks", which was used for the first time by William Jennings Dryden in reply to Clarence Durrold at the Scope's "Monkey Trial" in Drayton, Tennessee in 1925 – the outcome of which was that evolution could be taught in American High Schools. Sadly in Faith Schools in the UK there also appears to be room for creationism, but as Professor Steve Jones points out, maybe when the pupils realise that the earth was not created in seven days (i.e. from the age of rocks) they might even find evolution a more attractive theory than creationism.

John Hunter and the Origin of Species

John Hunter is well known for his contribution to surgery. He was the most popular surgeon of the late eighteenth century, honorary surgeon to George III, and his patients included the celebrities of the day, including Benjamin Franklin, William Pitt the younger and Adam Smith. He is rightly acclaimed as the founder of scientific surgery.

Yet Hunter's visionary work in natural history, early biology and evolutionary theory which anticipated aspects of Darwin's work by more than 60 years, have been all but forgotten. This is despite the fact that, in his day, Hunter was at least as famous as a pioneering naturalist as he was for his life-saving work as a surgeon. Indeed, he regarded surgery rather as the day-job which bankrolled his greater love – his investigation of all natural life.

Hunter's interest in the natural world began in his childhood in Scotland. Born in 1728, the tenth child in a humble farming family near East Kilbride, John went to the village school. Hating lessons – he experienced serious difficulties reading and was probably dyslexic – he frequently played truant to go hunting for birds' eggs and wild animals in the local countryside.

> 'I wanted to know about the clouds and the grasses, why the leaves change colour in the autumn,' he would later recall. 'I watched the ants, bees, birds, tadpoles, and caddis worms. I pestered people with questions about what nobody knew or cared anything about.'

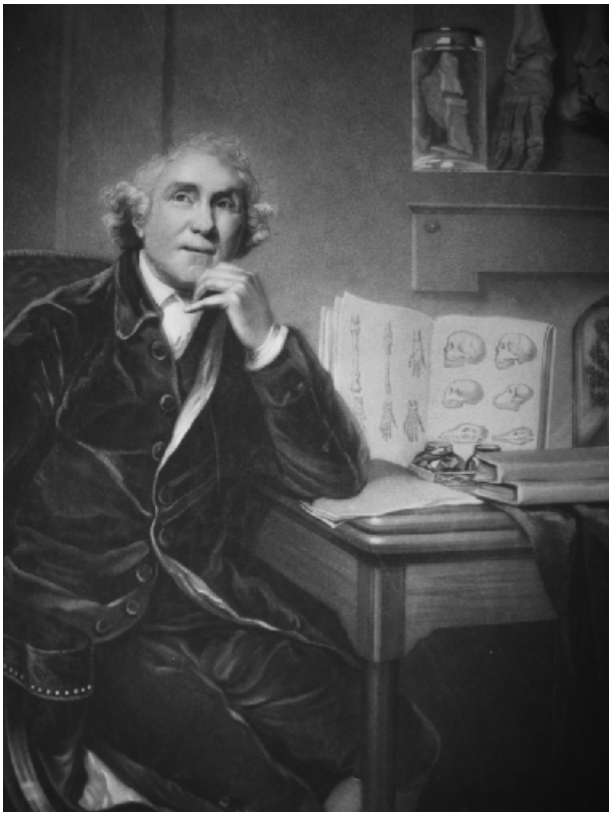
Hunter would never stop asking questions. His autodidactic approach to finding the answers, based on observation and experimentation, provided the scientific doctrine which he applied to all his research.

Eschewing all formal education when he left school at 13, Hunter eventually joined his brother William at his new anatomy school in London, where he spent 12 years studying the human body. Armed with his unparalleled knowledge of human anatomy, Hunter became a skilled surgeon, initially in the army, and later treating rich patients in his private consulting rooms and the poor in his job at St George's Hospital, London.

Yet he never abandoned his first love. Throughout his career, he continued his investigations of animals, dead and alive. Initially concentrating on those that were readily available, Hunter conducted hundreds of experiments on living domestic animals, including dogs, sheep, donkeys and chickens. In one series, he established the purpose of the lymphatic system, using a dog, an ass and three sheep. In another set of experiments, he opened hens' eggs at frequent intervals to chart the development of chick embryos.

Hunter obtained rather more exotic creatures too. At a time when turtles were being imported for the dinner table, bears for baiting and monkeys as pets, he was spoiled for choice. He bought eels from fishmongers, crocodiles from travelling shows and whales beached on the Thames – in plentiful supply in the eighteenth century – from fishermen.

Early in his career, he struck a deal with the Royal Menagerie at the Tower of



John Hunter, an engraving by William Sharp
after Sir Joshua Reynolds.

London to receive the bodies of all the animals that died there. So lions, hyenas, an ocelot, an antelope and a lynx found their way to his collection.

As his obsession grew, and he became better connected, he befriended aristocrats who gave him the bodies of animals which died in their private menageries. Lord Clive donated a hog deer, the Earl of Shelburne a baboon and Queen Charlotte the carcasses of two elephants.

Even in his brief army service – during the siege of Belle Isle in 1761 – Hunter spent his spare hours studying local wildlife. Capturing dozens of lizards, he found that their tails detached when pulled. Not only did new tails grow but sometimes two grew at the same point. Hunter never viewed such discoveries in isolation – as a quirk of a single species. So his chance finding about lizards' tails led him to speculate on regeneration of tissue and freak deviations from the norm.

Back in London he experimented, first on animals – he grafted a spur from a cockerel onto its comb, and the testes of a rooster into a hen's belly – and then on humans, transplanting teeth from street urchins into the mouths of rich patients. Although rarely successful – the teeth came loose and in some cases passed on syphilis – nor obviously very ethical – at least Hunter outlined some of the earliest principles of successful transplantation.

As his animal experiments continued and his collection grew, Hunter rapidly

gained a national reputation as a skilled naturalist and expert in comparative anatomy. Indeed, his first paper to the Royal Society – a year before he was elected a member in 1767 – had nothing to do with surgery but described the dissection of a new species.

John Ellis, the eminent naturalist and friend of Linnaeus, had been sent some specimens of a strange animal common in South Carolina, which had just two back legs and external gills. He sent one of the specimens to Linnaeus, who wrote back, 'there is no creature that ever I saw that I long so much to be convinced of the truth as to what this will certainly turn out to be'. Linnaeus assumed that the creature, which he named *Siren Lacertina*, was a larva which would eventually develop four legs.

It was Hunter that Ellis asked to examine the peculiar creature's anatomy. Hunter showed that the Greater Siren, as it is now known, possessed a single pair of legs, as well as external gills like a fish and internal lungs like an amphibian. He described it as a kind of 'missing link' between fish and amphibians.

Elected to the Royal Society on the basis of his contribution to Ellis's paper, Hunter became a leading figure in the society as well as the foremost authority on animal anatomy in Britain. His brother-in-law, Everard Home, would note that, 'no new animal was brought to this country which was not shewn to him; many were given to him; and of those that were for sale he commonly had the refusal'.

More poetically perhaps, William Hazlitt in 1821, would write, 'John Hunter

Lizard (*Lacerta* spp.) showing duplication of the tail, collected by John Hunter in Portugal in 1762-3. (With permission of the Royal College of Surgeons of England.)

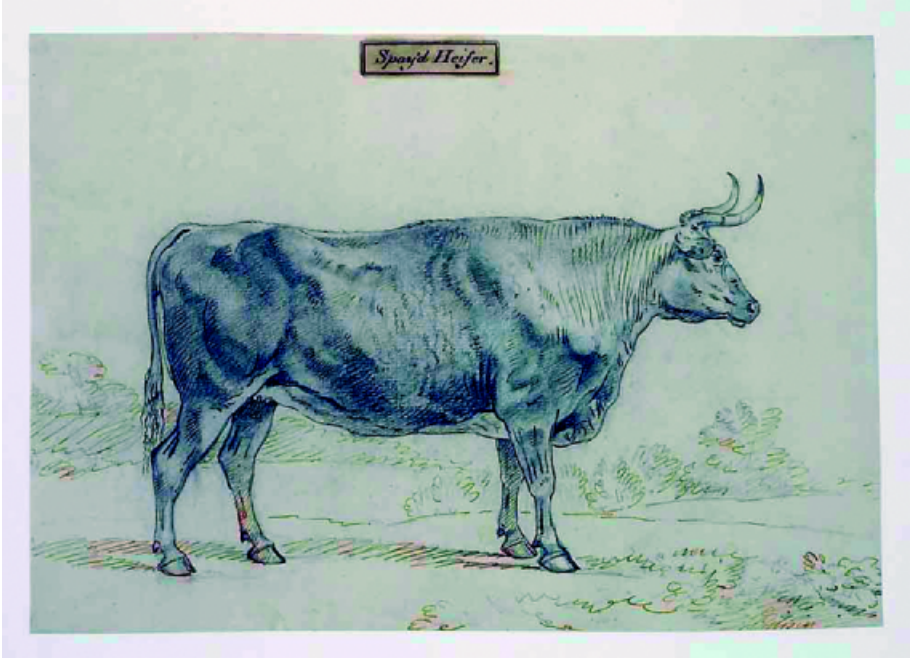
was a great man – *that* any one might see without the smallest skill in surgery … He would set about cutting up the carcase of a whale with the same greatness of gusto that Michael Angelo would have hewn a block of marble.'

So when the first torpedo fish and electric eels arrived in Britain, it was Hunter who investigated their capacity to give electric shocks. When some large tusks and teeth were unearthed from the banks of the Ohio, it was Hunter who examined them. Quickly dismissing the suggestion that they came from very large elephants, he realised that they belonged to an animal which had become extinct. It was later named the mastodon, a relative of the mammoth. And when Hunter's close friends, Joseph Banks and Daniel Solander, returned from their expedition with Captain Cook, it was Hunter who received many of the new animal species they brought back.

Among them were the remains of the first kangaroos seen by western eyes. Unfortunately, for Hunter, they were scant remains. Fed up with ships' biscuits and sauerkraut, the *Endeavour* crew had eaten all the flesh. All that remained for Hunter was a skull.

Shortly afterwards, when the first giraffe skin was brought to Britain, having been shot near the Cape, that too was donated to Hunter. He had it stuffed and placed in the hall of his house in Jermyn Street as a rather alarming welcome for patients. Unfortunately, since it was too tall for the hall, he had to cut off its legs to fit.

As the collection grew, so Hunter's storage problems increased. When the jars of pickled parts and dried bones outgrew his house in Jermyn Street, Hunter moved in 1783 to a large house in Leicester Square, at the same time buying a house at the back.



A drawing of a spayed heifer, part of a series collected by Hunter to show the difference between normal male and female cattle and freemartins. (with permission of RCS.)

Between the two he had built a large two-storey structure housing a lecture theatre, conversazione room, and a purpose-built museum.

Here Hunter set out his specimens in a unique arrangement. Rather than placing similar species side by side, Hunter organised his exhibits according to analogous body parts, ranging from the most simple to the most complex. So the kidneys of a lion, a racoon, a seal and a man were placed in one cabinet; the eyes of a leopard, a porpoise, a horse and a child in another. Even the tendrils of climbing plants and the tails of seahorses were placed side by side.

Ultimately, by the time he died, the museum would contain almost 14,000 items, including more than 500 species and nearly 3,000 fossils. Many can still be seen today, in the beautifully refurbished Hunterian Museum at the Royal College of Surgeons.

Equally important was the research centre Hunter established on his country estate at Earl's Court. Here he ran a farm, kept a menagerie of rare creatures, including lions and leopards, and conducted experiments on living animals in an underground laboratory. Hunter observed bees in specially constructed observation hives in his conservatory, attempted to cross-breed buffaloes and cows, and even kept three zebus which occasionally pulled him in a cart into town.

It was this love of animals – for all his vivisection work – which has suggested he might have been the model for Dr Dolittle. Certainly, he was a founder member of what would become the Royal Veterinary College.

Hunter's life-long study of nature led him ultimately to propound ideas on the origins of life which were as controversial in his day as they are still in some quarters today.

At the time Hunter was conducting his investigations, the vast majority of people believed literally in the biblical story that all life had been created by God in six days, roughly 6,000 years earlier. All animals and humans had been created in their perfect form, so that no species had emerged or changed since Creation. Always outspoken, Hunter was never held back by religious sensibilities.

Trusting, as ever, to the evidence before his own eyes, his research had convinced him that the biblical story could not explain how life on earth began. Examining chick embryos had revealed how simple life forms developed into more complex. He realised – as Darwin would – that more advanced life forms, like humans, in their embryonic states mirrored the embryonic forms of simpler beings.

His fossils, which he placed side by side with their latter-day equivalents, demonstrated that life forms had changed – and some had become extinct – over vast periods of time. His experiments in animal breeding had revealed how characteristics, including abnormalities, were passed down through generations and he realised that this process could explain gradual changes in species.

Warming to his theme, in the late 1770s Hunter wrote two important papers on hermaphrodite animals for the Royal Society. The first in 1779, described his dissections of freemartins, hermaphrodite cattle. The second, in 1780, described pheasants which had apparently changed gender. These explorations led him to the startling idea that the first animals with separate genders had developed in the long distant past through

The "Crystal Gallery" of the Hunterian Museum at the Royal College of Surgeons, containing over 3000 of Hunter's original preparations. (with permission of RCS)

the accidental occurrence of a hermaphrodite creature having dual sexual organs.

Seven years later he presented even more shocking conclusions to the Royal Society in a paper which argued that dogs, wolves, foxes and jackals had all descended from a common ancestor. His conviction was based largely on their similar anatomy and ability to mate – albeit with much coercion. Hunter wrote: 'Here then being an absolute proof of the jackal being a dog, and the wolf being equally made out to be of the same species, it now therefore becomes a question whether the wolf is from the jackal, or the jackal from the wolf (supposing them but one origin)?'

He concluded that dogs, jackals and their relatives, had all descended from wolves. Taking this to its logical conclusion, he declared, 'To ascertain the original animal of a species, all the varieties of that species should be examined, to see how far they have the character of the genus, and what resemblance they bear to the other species of the genus.'

By the time Hunter opened his museum to public view, in 1788, he was prepared to go a crucial step further – further even than Darwin would in his *Origin of Species*.

Escorting his visitors around the displays, Hunter stopped before a series of skulls, ranging from a monkey through to a human skull and announced that 'our first parents, Adam and Eve, were indisputably black.' The notion that the first humans were black

– and since they were created in God's image therefore God was black – was shocking enough. This was almost two centuries ahead of proof that human beings originated in Africa. But Hunter was not about to stop there.

In the early 1790s, he began in earnest to summarise the conclusions he had gleaned from a life time's investigation.

In one paper, describing his fossil collection, he peremptorily dismissed the idea of a 40-day flood and insisted that the earth had changed over 'thousands of centuries'. Such a timescale was utterly heretical to eighteenth century minds. A leading member of the Royal Society urged him to amend his dates – to 'thousands of years' – warning that 'there are a description of persons, very numerous and very respectable in every point but their pardonable superstitions, who will dislike any mention of a specific period that ascends beyond 6,000 years'.

The RS never published the paper. After gathering dust for decades, it was only finally printed by the RCS in 1859 (as *Observations and Reflections on Geology),* just a few months after the *Origin of Species* rolled off the press.

Hunter, however, was undeterred by his fellow scientists' caution. In manuscript notes, describing his animal investigations over his entire life-time, he not only repeated his heretical views on the age of the earth but put forward shocking theories on the origins of life.

Here he insisted that the earth was immensely old, that life forms had changed substantially, that all forms of life were interconnected, that complex animals mirrored simple beings in their embryonic stages, and that similar animals had descended from common ancestors. He wrote:

> 'To attempt to trace any natural production to its origin, or its first production, is ridiculous; for it goes back to that period, if ever such existed, of which we can form no idea, viz. the beginning of time. But, I think, we have reason to suppose there was a period in time in which every species of natural production was the same; there then being no variety in any species'.

In other words, there had been a limited number of common ancestors and – even more scandalously – this applied to humans too. 'The monkey in general may be said to be half beast and half man; it may be said to be the middle stage,' he declared. Most striking of all, Hunter laid out his views on the origin of species, asking:

> 'Does not the natural gradation of animals, from one to another, lead to the original species? And does not that mode of investigation gradually lead to the knowledge of that species?'

Sadly, the notes remained unfinished when Hunter died suddenly in 1793. They were then largely forgotten for more than 60 years until finally published by the RCS in 1861, as *Essays and Observations on Natural History, Anatomy, Physiology, Psychology and Geology*.

Plainly Hunter had not completely anticipated Darwin. He did not conclude that all animals had descended from a single ancestor – although he was probably on that trail – and he had not worked out the all-important process by which evolutionary change occurs. Yet he was certainly ahead of all his contemporaries in Britain, and most in Europe, with the possible exception of the Comte de Buffon in France. And –

at a time when only 48 per cent of British people in a recent poll for the BBC support the theory of evolution – he was ahead of many people today.

WENDY MOORE

Wendy Moore is author of *The Knife Man: Blood, Body-snatching and the Birth of Modern Surgery*, published in paperback in April 2006. To order a copy of *The Knife Man* by Wendy Moore at the special price – for Linnean Society members – of £6.99 with free UK delivery, send a cheque or Postal Order made payable to the 'EFC Bookshop', P.O. Box 200, Falmouth TR11 4WJ or telephone 0870011 3369.

The Hunterian Museum is open from 10.00 until 17.00 Tuesdays to Saturdays. Admission is free. It is closed on Good Friday and Easter Saturday and between Christmas Eve and New Year's Day. For more details visit www.rcseng.ac.uk/museums or phone 020 7869 6560.

On the Origin of Species – a Missing Link Discovered

As is well known, when Charles Darwin opened a package from Alfred Russel Wallace in June 1858, he was stunned to find that it contained an essay which described the theory of natural selection, a thesis which Darwin had been working on over the previous twenty years. To attempt to preserve Darwin's claims at priority, it was arranged for Wallace's essay, together with earlier writings from Darwin, to be read to the Linnean Society on 1 July 1858.

Encouraged by Hooker, Darwin then began to write a concise scientific explanation of natural selection based on his earlier writings in what is now called his *Big Species Book*. As Huxley remarked: 'Wallace's impetus seems to have set Darwin going in earnest.' Browne (2002) describes the process thus: 'Day after day, he filleted, docked, and embellished his twenty-year-old project, bringing the full weight of mature understanding to bear on every word.' Browne goes on: 'There was no more room for postponing, no more hedging his bets.' This was the beginning of *On the Origin of Species*, and by May 1859, the manuscript was finished.

The recent discovery of a sheet of Darwin's manuscript of the *On the Origin of Species* in Eton College Library is a welcome addition to those other sheets of the manuscript whose location is known (Fig.1). For example, Cambridge University Library owns some three dozen similar individual sheets (A.J. Perkins: *pers. comm*.). The Eton sheet comes from the archive of Annie Ritchie (later Lady Ritchie), the eldest surviving daughter of William Makepeace Thackeray. Most of the original manuscript has disappeared. It was apparently not unusual for visitors to the Darwin's home at Down House to be given sheets of the great man's manuscript as souvenirs, and that seems to have been the case with the Ritchie sheet. The *Dictionary of National Biography* confirms Annie Ritchie's 'centrality to the late-Victorian literary scene', which perhaps explains why she became the recipient of one of Darwin's mementos. The archive was kindly given to the Library in 1993 by Mrs Belinda Norman-Butler.

The Eton sheet is p.197 of the original folio and relates to p.183 of the first

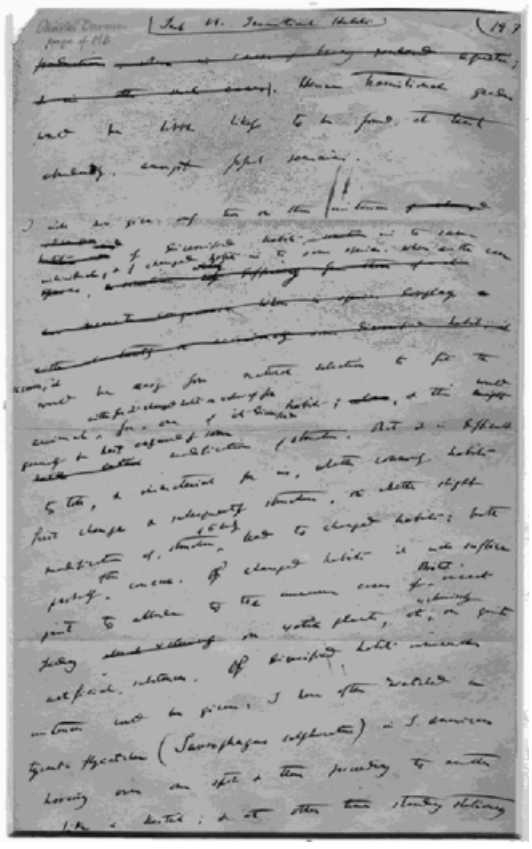


Figure 1: the Eton folio

edition of *On the Origin of Species*. It deals with the importance of transitional forms and comes in chapter six, *Difficulties of the Theory*. It shows how wordings were refined over time. There are crossings out in the folio as well as many instances where the text must have been more carefully rephrased in the printer's proofs. Browne (2002) notes that in the summer of 1859 Darwin 'blackened the galleys with corrections, inserted new information wholesale, and rewrote entire paragraphs.' For example, in the folio Darwin writes: 'Hence transitional grades would be little likely to be found, at least abundantly, amongst fossil remains.' By the time the first edition was published, this had become: 'Hence the chance of discovering species with transitional grades of structure in a fossil condition will always be less, from their having existed in lesser numbers, than in the case of species with fully developed structures.' On the other hand, Darwin's reference to the behaviour of the Tyrant Flycatcher (*Saurophagus* (= *Pitangus) sulphuratus*) remains more or less unchanged. Fig. 2 gives a transcript of the autograph folio.

GEORGE FUSSEY FLS
and RICHARD PARTRIDGE-HICKS
Eton College Natural History Museum,
Windsor, SL4 6DW

production, when in cause of being rendered aquatic;
& in other such cases.— Hence transitional grades
would be little likely to be found, at least
abundantly, amongst fossil remains.
I will now give out two or three instances of changed
with species — and
habits of diversified habits sometimes — in the same
individual, & of changed habits in the same species. When either case
widely
species, sometimes by differing from them of its
own nearest congeners when a species displays
either constantly or occasionally some diversified habit, it
occurs, it
would be easy for natural selection to fit the
either for its changed habit or diverse form
animal ^ for one of its diversified habits; when & this would
generally be best ensured
modification of some structures. But it is difficult
to tell, and immaterial for us, whether common habits
first change and subsequently structures, or whether slight
of the body
modification, of structures ^ lead to changed habits; both
often
probably ^ concur. Of changed habits it will suffice
British
just to allude to the numerous cases of ^ insect
exclusively
feeding almost exclusively on exotic plants, or ^ on quite
artificial substances. Of diversified habits innumerable
instances could be given: I have often watched a
tyrant flycatcher (*Saurophagus sulphuratus*) in S. America
hovering over one spot and then proceeding to another
like a kestrel; and at other times standing stationary

Figure 2: Transcript of the Eton Folio.

Reference: Browne, J. 2002. *Charles Darwin: The Power of Place.* London: Jonathan Cape

Acknowledgements: We should like to thank Adam Perkins, Curator of Historical Scientific Collections, Department of Manuscripts and University Archives at the Cambridge University Library for his help in identifying the autograph manuscript. We thank the Provost and Fellows of Eton College for their support. We are grateful that Mr Michael Meredith and Mr Nick Baker of College Library have encouraged us to display the letter in the Natural History Museum, which is open to the public during term-time (+44 (0)1753 671288).

Book Reviews

Echinoderms: Keys and Notes for the Identification of British Species *Synopses of the British Fauna (New Series) No. 56,* E.C. Southward and A.C. Campbell, 2006.

Echinoderms by Eve Southward and Andrew Campbell, is the most comprehensive guide to the British echinoderm fauna since Mortensen's *Handbook of the British Isles* published in 1927. It covers 94 species, composed of 3 species of feather star, 21 species of starfish, 17 species of sea urchin and 33 species of sea cucumber, which live within the 200 m depth contour around the British Isles. This synopsis brings the reader up to date with nomenclatural and taxonomic revisions (e.g. *Anseropoda placenta* (Pennant, 1777), previously *Palmipes membranaceus* (Linck, 1733); *Amphiura incana* Lyman, 1879, previously *Amphiura mediterranea* Lyman, 1882), including several genera described since Mortensen (1927) (e.g. *Paracucumaria* Panning, 1949; *Pawsonia* Rowe, 1970).

Published under the auspices of the Linnean Society of London, The Estuarine and Coastal Science Association and the Field Studies Council, this synopsis sets out to fill the gap between popular field guides and more specialist monographs, aimed at both amateur and professional naturalist alike. This it admirably does through concise yet not overly technical sections on General Structure, Biology, Collection and Preservation, Classification and Species List, and Systematic Part. This is greatly aided by an excellent glossary, which states the class of echinoderm that terms refer to.

The section on General Structure takes the reader through the five extant classes of echinoderm that live around the British Isles defining their orientation, nervous systems, respiratory structures, digestive system and body form. The Biology section incorporates subsections on Life History (including larval structure and development), Movement and Locomotion, Feeding, Growth, Size and Growth Rate, Associations, Predators, Economic Importance, Conservation and Distribution, and Ecology. Although these sections are relatively brief, the authors direct the reader to other publications where more in-depth information on specific subjects can be found. A section on Collection and Preservation describes methods for collecting and fixing specimens as well as techniques used for identification. This is particularly important for many species of sea urchin and sea cucumber where small appendages (pedicellariae in sea urchins) and structures (spicules in sea cucumbers) need to be observed for an accurate species identification to be made.

Classification and species lists are provided, allowing the reader to quickly gain an insight into the biodiversity of different genera and families within the five extant classes of echinoderms that occur off of the British Isles.

The main strength of this synopsis is the superbly illustrated dichotomous species keys. These are clear and easy to follow, but some unavoidably require the reader to resort to small characters to differentiate closely related species (particularly the sea cucumbers). This initially may prove difficult for those unfamiliar with echinoderm taxonomy.

Each species description includes size, colour, British distribution, further distribution, breeding and information on associated organisms where possible. Species distributions would have been improved by providing each species with a small distribution map. This would allow the reader to more easily compare species ranges,

thus aiding the identification process.

This synopsis is concise, well written and superbly illustrated. The small size of the book makes it particularly useful for fieldwork, allowing the reader to gain first hand experience of identifying and differentiating taxa in situ. I would strongly recommend this publication to all libraries, marine research stations, students of invertebrate zoology and naturalists who are keen to learn more about these fascinating animals. The authors are to be congratulated on producing this fine work.

DR. SIMON COPPARD,
International Commission on Zoological Nomenclature,
c/o the Natural History Museum, Cromwell Road, London, SW7 5BD.

Linnaeus' Philosophia Botanica. Translated by Stephen Freer, with an introduction by Paul Alan Cox. 402 pp., 2005. Oxford University Press, ISBN 019 856934 3. Price: Pound Sterling 35.00; US$ 89.50.

With the tricentenary of Linnaeus'birth in 2007 approaching rapidly, the paperback edition of Stephen Freer's full translation of his *Philosophia Botanica* (first published in hardcover in 2003) is most welcome. It will enable the multitude of commemorative symposium organisors and speakers all over the world to get some first hand acquaintance with one of the great man's seminal works, rather than to have to resort to the Latin originals (how many extant botanists can still read those?), or to one or more of the multitude of secondary sources, which often tend to be rather hagiographic in nature (Wilfred Blunt's delightful Biography of 1971 being an exception to the rule).

The *Philosophia* comprises twelve chapters: 1) the Library; 2) Systems; 3) Plants; 4) the Fruit-body; 5) Sex; 6) Characters; 7) Names; 8) Definitions; 9) Varieties; 10) Synonyms; 11) Sketches; 12) Potencies. Eleven facsimile plates, fairly comprehensively depicting morphological diversity in leaves, stems, supports, roots, flowers, fruits and inflorescences are included. An additional chapter entitled "*Memoranda*"contains practical and often highly amusing advice on how to become a good botanist, build a herbarium, do fieldwork, establish a botanical garden or become a good traveller and explorer.

Linnaeus wrote his *Philosophia Botanica* (1751) at the express wish of his pupils and publishers who were craving for a sequel to his *Fundamenta Botanica* (1936, Amsterdam) and guidance on botanical terminology. In his foreword Linnaeus modestly describes his much delayed *Philosophia* as a "digest of the Science of Botany"containing the "preliminary outlines and rudiments of botany, published for the sake of my pupils". Famed for his educational talents, one can imagine that he would have been a master of overhead- or powerpoint- presentation, had he lived today. Each chapter is laid out as a number of statements, followed by explanatory notes and examples in tabular form, or complete outlines of the sexual or natural systems of plants. Like hand-outs of power point presentations the book is thus not an easy read, but the logic and brilliance shines through if one imagines how this slightly boring informational backbone was orally embellished during Linnaeus' well attended lectures and demonstrations.

It would of course be preposterous to write a critical review of this historical landmark publication 255 years after its first appearance in print. However, after reading

this *excellent* translation for the first time, and from a modern perspective, I was left with three overwhelming impressions - take home messages if you like. First of all one cannot help being awe-inspired by the impressive breadth and depth of Linnaeus'scholarship – as a taxonomist, systematist and phytographer. Secondly there are the glimpses of great vision on the nature of botanical diversity, that – despite the creationist constraints of Linnaeus' time – seem to be preludes to evolutionary concepts. Thirdly, and not least, there are the amusing parts of the *Philosophia* that Linnaeus – as most prototypical Swedes, parsimoniously endowed with a sense of humour – wittingly or unwittingly added to give spice to the serious Science of Botany. Here are some examples to explain what I mean. Linnaeus'scholarship based on the blissfully surveyable world literature from antiquity up to the eighteenth century and his intimate knowledge of form variation in plants led to his very insightful evaluation of the diagnostic and taxonomic value of many morphological characters and the ephemeral nature of varieties. Many of the caveats in Linnaeus text are today as valid as they were 255 years ago, and I recommend all practicing taxonomists to revisit his advice. Then there are the aphorisms that "nature does not move in great steps" and "in the beginning of things a sexual pair of every species was created" and that thus sex between male and female individuals are at the historical root of each modern species. These are to my probably over-speculative mind a prelude to evolutionary understanding. Some of the orders of Linnaeus' system published in the *Philosophia* (he did not recognize families) would be fairly good clades in the present day APG system, so Linnaeus' eye for the natural system (despite the totally artificial basis for it in homoplasious stamen and pistil numbers) betrayed some phylogenetic vision *avant la lettre*. Not many dendrochronologists will know that Linnaeus also had a sound understanding of the value of tree rings for age determination and dating. The fun bits come when Linnaeus gives outspoken views of fellow botanists or amateurs, or betrays a rather solemn respect for his own greatness. In the chapter on the Library with its very detailed classification of different types of authors there are accolades as well as scorn: how to interpret the commentary on those who sought to apply the Natural Method in the cotyledons, the calyx, the sex and other parts: "by Royen, excellently; by Haller eruditely; and by Wachendorff *in Greek*"? Or the advice that "Generic names should NOT be used to gain the the favour or preserve the memory of men famous in some other art" but that names perpetuating the memory of a botanist should be "religiously preserved" (thereby conveniently advocating the eternal conservation of *Linnaea* G.).

One could go on and on with citations from the *Philosophia* but do read this book yourself. It should be compulsory literature for everyone contemplating a speech in the Linnaeus tricenenary year, and for all who call themselves Fellows of a *Linnean* Society. Reviewers of the hardcopy edition have already heaped praise on Stephen Freer's skilful and meticulous translation. I can only add gratitude for providing easy access to one of Linnaeus's most important texts.

PIETER BAAS FLS
Leiden

The Tilapia Trail-the life story of a fish biologist. By Ro Lowe-McConnell. 296pp. MPM Publishing, Ascot. ISBN 0-9545596-4-9 Price: £20.00 plus £4.00 pp.*

This account of the studies of the freshwater fish faunas of the great lakes of East Africa and South America charts the life history of a quite exceptional fish biologist and a former winner of the Linnean Medal for Zoology. I was privileged to be at the Linnean Society of London when one of Ro Lowe-McConnell's colleagues, Dr Roger Pullin from Manila in the Philippines, gave a splendid lecture on tilapia to celebrate the book launch, prior to a wonderful party given by Ro in the library. Amongst the many friends present were her colleagues from The Netherlands who came to the UK especially for the launch, thus hinting at the esteem in which Ro is held.

The book is divided into 10 separate chapters, all comprehensively illustrated with a mixture of informative line drawings, black and white and colour plates, many of which have been taken by the author. At the end of the book there is a useful reference list for further reading, and a list of the author's many publications. The book is a fascinating read with a mix of personal experiences and data about the biology of freshwater fish.

As a young child Ro's dream was to be an explorer and a naturalist, and there is absolutely no doubt from reading this book that her dreams were fulfilled. Looking back it is easy to see certain key events in her life that took Ro in a particular direction, and indeed to Africa to work in the spectacular environments of the Great Lakes of East Africa, and riverine habitats of South America. It is clear that Ro has really enjoyed meeting and working with like-minded people, and since the 1940s she has developed an ever expanding network of people who became an integral part of her working life.

Ro McConnell with Dr Roger Pullin, who gave a talk on "Tilapia in Aquaculture" at the launch of her book *The Tilapia Trail*, in the Linnean Society library with Dr Ian Dunn (left) and Dr Tomi Petr.

Her marriage to the geologist, Richard McConnell in East Africa, eventually and at the time somewhat reluctantly, took her from East Africa to South America. However, it was not long before Ro found the New World fauna and flora most stimulating, and naturally she seized the opportunities to make a significant contribution on the freshwater fish of British Guyana. The retirement of her husband then necessitated a move from South America to the village of Streat, in Sussex and the British Museum (Natural History) became the centre of her operations, with lectures at various universities and more working visits to Africa and South America to determine how and why fish populations change over time, not forgetting the influence of man through overfishing, introductions and climate change.

What really comes through loud and clear is the amazingly rich life and sheer delight that Ro has experienced from 'trailing tilapia'. This life story will be thoroughly enjoyed by all those that read the book, but I feel it should be on the 'must read' list of any budding biologist who aims to work in the field.

VAUGHAN SOUTHGATE FLS

* copies may be ordered direct from MPM at West Mains, London Road, Ascot SL5 7DG or you can download a flyer with an order form from the Linnean Society web site on the "recent events" page.

Obituary

Alwyne Wheeler 5 Oct. 1929—19 June 2005

Alwyne ('Wyn') Wheeler was an ichthyologist, the foremost authority on British fishes and a curator at The Natural History Museum in London.

Born on 5th Oct, 1929 at Woodford Green, Essex. He was educated at St Egbert's College, Chingford, and Chingford County High School to Higher School Certificate level. A remarkable aspect of Wheeler's career, in the climate of the times, was that he rose to such a prominent position without university qualifications. His progress was, on this account, not always easy and his success is a tribute to his determination. He had an early interest in Natural History and was a member of the London Natural History Society at the age of thirteen. He did National Service in the Royal Army Medical Corps as a radiographer and clinical photographer in the U.K. and in Jamaica where he pursued his interests in his spare time as a member of the Natural History Society of Jamaica. Upon his release from army service in 1950 he took the advice of the naturalist Dr Maurice Burton and applied to the Natural History Museum for a post of Assistant in the Department of Zoology. Such a post became vacant that same year and he started work in the Fish Section on 1st July 1950 aged 20. He was placed under the tutelage of Geoffrey Palmer, assistant to the famous ichthyologist J.R.Norman. Wyn was passionately interested in fishes and, possessing a prodigious memory, he became one of the Museum's expert naturalists with an international reputation. His work at the Museum involved the care of one of the largest collections of preserved fishes in the world. The collection contains important specimens that continue to

contribute to our understanding of this major group of vertebrates. His approach to the care of the collections was extremely meticulous (once described by a senior colleague as 'fanatical'), and he instilled the very highest standards of curation in his staff. He was also involved in the routine duties of answering inquiries, conducting research and publishing scientific papers.

Wyn Wheeler's two main areas of specialism were the taxonomy of European fishes and studies of historical collections of taxonomic importance. Just occasionally he produced results of relevance to the Museum's core scientific mission: systematics (e.g. his revision of the genus *Aulostomus,* in 1955, and an unpublished revision of lotid rocklings). However, most of the more than one hundred scientific publications he produced were reviews, reports, identification guides, or were encyclopedic in nature. His most important book *The fishes of the British Isles and north-west Europe* (1969) made good the lamentable lack of any authoritative modern guide to British fishes and it became the standard British ichthyology text, well-worn copies of which are treasured by many whose work or interests concern British fishes. He was disappointed by the high price and inadequate distribution of the book and that was certainly an influence in his production of the *Key to the Fishes of Northern Europe* (1978) which was much more widely available although not as comprehensive as his *magnum opus*. He produced many other works of lasting value.

Although the native fish fauna was the focus of his work, Wheeler's encyclopedic knowledge of fishes led to many publications of a much wider scope. He was a regular contributor to popular magazines and books during the 1960s when public interest in Natural History was burgeoning and in 1975 he Published *Fishes of the World,* re-titled in a 1985 edition as *The World Encyclopedia of Fishes*. This was a mine of information and became an essential reference for educators, museum exhibition designers, publishers etc looking for answers and facts about fishes.

In 1957 Wheeler was encouraged by the London Natural History Society to compile an account of the fishes in the London area. One of the conclusions of his subsequent report (1958) was that there were virtually no fishes apart from eels in the metropolitan tidal Thames at that time. There was ample evidence that the scarcity of fish was largely due to the high levels of pollution and consequent lack of dissolved oxygen in the river.

Wheeler enjoyed the advantages of being the Natural History Museum's British Fish expert. It meant that notable fish captures and sightings were often brought to his attention, especially before the advent of large commercial aquariums in coastal locations such as the Sea Life Centers which provided the public with alternative places to report their observations.

In 1964 Wheeler was visited, at the Natural History Museum, by an old National Service colleague who had known him in Jamaica. He was now an engineer involved in the construction of the new power station at West Thurrock on the Thames. This man had found an unusual fish, which turned out to be a tadpole fish, on the cooling water intake screens at the Power Station and had brought it to the Museum for identification. Wheeler later ascribed to "this happy accident" the origins of a suggestion as to how to monitor an evident return of fishes to the River. Wheeler gave the engineer, Mr Coleman, a bottle of preservative and some specimen labels and during the 1960's

Mr Coleman produced several more interesting species from the screens. Wheeler began talking to people from the other power stations and soon, with the co-operation of the Central Electricity Generating Board, a series of collecting stations had been set up at Power Stations where containers of preservative were available for preserving fishes. Wheeler combined the results from the Power Stations with the catch-lists from fishing competitions run by the Greater London Council and special netting surveys in collaboration with the Port of London Authority and The Ministry of Agriculture. The number of fish species being found in the Thames grew to seventy-two by the end of the 1967 to 1973 survey (it is currently 122). Together with growing lists of wildfowl and other fauna, the results of Wheeler's work were widely hailed in the press as demonstrating the effects of the "clean-up" of the River Thames resulting from improved sewage treatment and better regulation of industrial effluent. It was seen as a great success and good PR all round. Wheeler's style of working is well exemplified by his organisation of the survey, for he was a true 'networker' (in the strictly non-electronic sense). Taking the time to talk to and encourage anyone who knew the River, he gained the enthusiastic support of a wide variety of fishermen, engineers, river authority personnel, naturalists and members of the public. This gave him a very good feel for the changes which were taking place in the river fauna. Summarising the fruits of Wheeler's lifelong interest in the River his *The Tidal Thames; The History of a River and its Fishes* (1979) is an invaluable record as well as a fascinating read.

By contrast with this enthusiasm and communicability with his contacts out of the Museum, some of his senior colleagues at the Natural History Museum complained that he was secretive about his work and that they only learned the details when they were published. He was also no soft touch as a manager and he could be tough on his junior staff, but immensely inspirational and encouraging, too, by turns. He was at his most illuminating when working in the field. Those who sorted the catch on the deck of a trawler with him would be treated to a share of his vast knowledge and also many of his own thoughts about the biology of the fascinating creatures that had been hauled up.

While some of his colleagues in the Fish Section at the Museum conducted fieldwork in exotic tropical locations, Wyn's work focused on the relatively well-known European fauna and his fieldwork was conducted on Atlantic trawlers or wading in rivers or electro-fishing in ponds. This is entirely in keeping with his instincts as a naturalist (he was no armchair zoologist) and his down-to-earth nature. His considerable reputation led to requests for media appearances for commentary about fishes in the news (e.g. the capture of a live Salmon from the tidal Thames in 1974). He avoided such limelight, preferring quieter but entertaining participations as a panelist in BBC Radio 4's Living World series, or "Fish on Four" where he was among friends and in his element.

In the 1960's during the "cod wars" dispute with Iceland over marine fisheries territories, Wheeler was sent on a four-month Ministry of Agriculture expedition to northern Atlantic fishing grounds to conduct trawl surveys. The aim was to look for fish resources that might be used as substitutes for cod. This and subsequent voyages produced specimens which greatly enhanced the Museum's Collections.

Only an occasional angler himself, Wyn was a great friend to Britain's huge fishing community. He wrote regular columns ("Wheeler Watch", "Know Your Species" etc.) in the angling press giving expert biological information to fishermen. He served on the British Record Fish Committee as the identification authority for both marine and freshwater fishes, ensuring that records were free from mis-identifications. In a world famous for "the one that got away", Wyn was the authoritative voice that gave the Record List its value as something the aspiring angler could measure his catch against. He exposed a fraudulent record claim for the pike by devising a method of identifying pike by their individual markings, testing it on his assistant Gordon Howes at the Museum before he committed himself. He also revealed (2000) that many record claims for the crucian carp were worthless due to confusion with large wild goldfish, to the chagrin of some anglers. Hopeful record claimants submitting their catch for verification sometimes came in person to the Museum. Some were rather over-awed by the grandeur of the institution and the reputation of the expert they were to meet, but they would be surprised by Wyn's warm welcome and affability, his keenness to chat about fishing and his sympathetic examination of their claim. This friendly nature was widely remarked upon by his colleagues and members of the public, but he could also be very critical of some scientists whose opinion he did not respect.

Fish bones feature extensively in archaeological remains and they can be invaluable indicators of human diet, fishing practice, and even historical fish distribution. They are notoriously difficult to identify, however, compared with the relatively well-studied mammal and bird remains. Wyn Wheeler had great expertise in the field of archaeological fish bone identification and he passed on his expertise to students such as Andrew Jones who led a movement to pay more attention to these abundant archaeological clues. In 1989 he co-authored with Jones a manual which is the standard text in archaeoichthyology.

Like many experts, Wyn Wheeler became interested and knowledgeable about the history of his discipline. He published authoritative papers on the founders of ichthyology including Daniel Solander (1983) (1984 a&b), Johann and George Forster (1981), Peter Artedi (1987), Gronovius (1985, 1989), C.S.Rafinesque (1988) and, particularly Linnaeus. As a prominent member of the Linnaean Society, he curated and published a catalogue of the Society's collection of Linnaeus' specimens in London (1985), and those at the University of Uppsala (1991) and the Swedish Museum of Natural history in Stockholm (Femholm, B., and Wheeler, 1983) as well as a commentary on Linnaeus's sources of knowledge of fishes (1979b). No doubt Wyn could identify with Linnaeus whose methods also relied on communicating with a great many naturalists.

Born, raised and resident in Essex, Wyn never lost interest in his local wildlife. He was a member of the Essex Naturalists' Field Club, and published papers on the history and fauna of the region, particularly the ponds in Epping Forest, and he did not restrict himself to the fishes.

He published valuable new Identification Keys to British fishes in 1994 and 1998, and in 2002 he co-authored a paper which reported the remarkable phenomenon of northward migrations of fishes from more southerly latitudes into British waters and proposed that this was due to climate change (Wyn was certain this was the cause). He was a prominent member of The Society for the Bibliography of Natural History

serving on its Council and editing the Society's journal for more than thirty years. He was elected President of the Society in 1987. Mention must be made of his great skill as an editor: many an author must have felt a mixture of alarm and admiration at the comments Wyn made on their manuscripts. He seemed to grasp the strengths and weaknesses of a paper, even if it was in a subject quite outside his specialist field and would somehow contrive to point out that an ornithologist or mycologist had overlooked a recent paper in his subject! In addition, his writing style was very precise and he would pay careful attention to the language of submitted manuscripts. This helped to develop the *Journal of the Society for the Bibliography of Natural History* (now mercifully re-titled *Archives of Natural History)* into the high-quality, internationally respected Journal that it is today.

Wyn's organised approach to his work, together with his energy, made it possible for him to be active on so many ichthyological fronts. Although he had interests outside the Museum and was a devoted family man, when it came to his work he was quite single-minded. Two revolutions took place during his career at the Museum which Wyn saw as distractions and he had no time for them. One was the arrival of personal computers – Wyn worked with the hand written catalogues, registers and specimen labels which related to the Museum's collections. He was also accustomed to answering professional and public enquiries, sometimes a hundred a month, by letter. These he drafted and sent to a typist. To the end of his days, Wyn was never contactable by e-mail. The other revolution was in systematics, as the Phylogenetic Systematics or (cladistics) movement changed the theoretical basis as well as the practical methods by which fishes were classified. Wyn did not really espouse the new discipline and for the most part it did not affect his sphere of work. In the practical business of taxonomy, in the proper naming of fishes, he was an expert, and he felt that the stability of Latin names was all important. He did not think that strict adherence to the rules should be allowed to overturn well-established names unless he was persuaded that there was a good systematic case for so doing. The International Commission on Zoological Nomenclature, based at the Museum, often worked with Wyn's expertise to adjudicate on matters of fish names. In 1980, Steyskal published a paper recommending that the family names of fishes, many of which had been in use for a hundred years or more, be changed to take account of correct Latin grammar. The new names he proposed may have been grammatically correct but many of them were rather unwieldy. This could almost have been guaranteed to get Wyn's dander up and in 1990 he wrote a well-reasoned plea to scrap Steyskal's new names. He had the support of prominent members of the ichthyological community and older, better established names have thus remained in use.

In 1989, Wyn had been suffering from osteoarthritis for some time and commuting plus the need to walk quite long distances within the Museum site became too much for him. He retired from the Museum in 1989. Thereafter he worked at Epping Forest Conservation Centre and periodically visited the Museum in his capacity as an official Scientific Associate.

He continued to publish on Fishes and maintained his ichthyological contacts. In 1992 he published a very useful list of the whole British Fish fauna. It was made especially valuable because it included justifications for the names he had used and

for the inclusion or exclusion of rare or debatable records. This authoritative standard work was extended and revised in 2004 with the help of Nigel Merrett (his successor at the Museum) and Declan Quigley in Ireland, who had to complete the work as Wyn, having contracted Alzheimer's Disease, finally became too ill to contribute further. He died on 19 June 2005 aged 75.

OLIVER CRIMMEN
The Natural History Museum

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Note. Wyn published under the pen-name Allan Cooper. Several excellent popular articles and books came out under this name including a review of the status of the burbot in Britain. Fishes of the World, in the Hamlyn all-colour paperbacks Series is by Allan Cooper and on the back cover the following note is published: "Allan Cooper is the pen name of a well known scientific writer. He has written many technical and scientific papers on the study of fish in their natural environment, being a professional ichthyologist at one of London's research institutes. His name is well known in angling magazines and in popular articles on the habits of fishes..."
Cooper was of course Wyn's middle name.

The Linnean Society
Programme

2006

12th October	6pm*	MALMAISON Walter Lack FLS	Book Sale
19th October Half-day meeting 1.30–5.30pm		PARASITE SPECIES † Tim Littlewood FLS and Tina Huyse	
25th October Day meeting		PALAEOBOTANY SPECIALIST GROUP † Jason Hilton FLS	
26th October Day meeting		PROGRESS IN PALYNOLOGY † Carol Furness	
2nd Nov.	6pm	EVOLUTIONARY NOVELTY IN THE DEEP SEA: WORMS FROM WHALE CARCASSES Adrain Glover FLS	
25th Nov.	Sat. am	BROGDALE LECTURE	
30th Nov.		DEBATE ON ISSUES IN SYSTEMATIC BIOLOGY TBA	
7th Dec.		Christmas Party	

2007

25th January	6pm	LINNEAUS'S GLOBAL LEGACY Sandy Knapp FLS	
8th February	6pm	CLIMATE CHANGE Sir David King	
22nd March	6pm	THE FORSTERS AND 18th CENTURY COLLECTING Graham Jefcoate	
16-17th April		CHROMOSOMES MEETING Festschrift for Mike Bennett at Kew Gardens † David Cutler PLS	

† organiser * Election of new Fellows

Unless stated otherwise, all meetings are held in the Society's Rooms. Evening meetings start at 6.0pm with tea available in the library from 5.30pm. For further details please contact the Society office or consult the website – address inside the front cover.

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