Editorial

This issue contains an article on lampreys, eel-like, naked animals without any trace of dermal bone, a single median nostril and a circular mouth with a complex toothed tongue. About 40 species live in freshwater or marine habitats and feed by rasping away the flesh of other fishes. Today we recognise that the lampreys are the smooth-skinned, modern survivors of the jawless vertebrates (agnathans) which arose some 550 million years ago, following the great evolutionary explosion in the Cambrian which produced the major groups of animals and plants. Nevertheless, the oldest, undeniably vertebrate remains do not appear until the Ordovician, in sedimentary deposits between 460–360 million years old, when a group of animals known collectively as the ostracoderms (shell skins) were found throughout the world and provide the best evidence for the appearance of the early vertebrates.

Fossil ostracoderm: *Thyestes egertoni* (Lankester), Head shield, width 2cm. Lower Devonian, Downtonian, Ledbury, Herefordshire. BM(NH) P.6112.

So far, more than 600 ostracoderm species have been described. Cladistic studies (Forey & Janvier, *Nature* 361, Jan 1993) have shown that these ostracoderms are more closely related to modern jawed vertebrates than they are to lampreys and are more derived than either lampreys or hagfishes, suggesting that both these groups were primitively naked and that both the dermal skeleton and a calcified endoskeleton appeared in the ancestors of gnathostomes, after the lampreys and hagfishes diverged. They also show that lampreys are more closely related to gnathostomes than are the hagfishes, which are the most primitive vertebrates known. Thus, those features of hagfishes which were previously considered degenerate are more parsimoniously interpreted as primitively simple. These include the lensless eye, the heart lacking nervous regulation and the simple hypophysis and ear. Other characters such as the absence of a lateral-line system, electroreceptors, a cerebellum and an inability to regulate internal ionic concentrations, are considered primitive absences. Thus the authors conclude that while the hagfishes are the most primitive of craniate animals, some features of modern hagfishes and lampreys, such as a median nasohypophyseal

opening, prenasal sinus, pouch-like gills and their complex tongue, must have been present in the common ancestor of all known vertebrates but have become modified or lost in gnathostomes. Finally, they conclude that the fossil jawless fish *Jamoytius* appears to be a close relative of modern lampreys.

BRIAN GARDINER

REFERENCE

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Society News

At the Anniversary Meeting there was a surprise item, the nomination and election by acclaim of Baroness Young of Old Scone to Honorary Membership. The Society's Bye-Laws make provision for four such Members, in addition to members of the Royal Houses of Japan, Sweden and the UK. This is the first time that anyone can remember the Honorary Membership being bestowed – the last was in 1812 – but, as the Treasurer said in moving the nomination, "the conservation of the UK's fascinating and fragile ecosystems and species has over the last ten years had a champion whose administrative skills have ensured the talents and skills of her staff have been focused to deliver conservation gains at all levels." In the last decade she has been Chief Executive of the RSPB, Chairman of English Nature and is now the Chief Executive of the Environment Agency. We are delighted to have her with us.

At the same Anniversary Meeting, Mrs. Jean Bowden gave a brief address as the President unveiled a portrait of the Reverend John Lightfoot, the history of which is given below. Needless to say, the Society is most appreciative of the generosity of Jim Lightfoot for the donation of the portrait of his ancestor.

"The Reverend John Lightfoot was to have been a Founder Member of the Linnean Society, but he died a few days before the first meeting, which was held on 26th February 1788.

He is best known for his *Flora Scotica*, published in 1777. He had a vast knowledge of the British flora, and other branches of natural history, such as conchology – interests which he shared with his employer – he was Chaplain and Librarian to the Dowager Duchess of Portland. She encouraged him to accompany Thomas Pennant on his tour of the Highlands and Islands of Scotland in 1772 – the year before Dr Johnson's more famous tour of the Hebrides. He accompanied Joseph Banks on a tour of Wales in 1773. He also toured East Anglia, Cornwall and Kent collecting plants and making notes on their habitats. Apart from his work for the Duchess, he was Rector of a parish at Uxbridge in Middlesex, and when his duties allowed – they didn't seem to be very onerous – he botanised there too. His herbarium, which was bought by King George III for his wife Queen Charlotte, finally came to rest in the Herbarium at Kew, apart from some algae which are at the British Museum.

He was elected a Fellow of the Royal Society in 1781.

The only likeness I had been able to find of Lightfoot was a silhouette, drawn by William Curtis, pasted into a copy of the second edition of the *Flora Scotica* in the Kew Library. In

1998 I received a letter from Lightfoot's great-great-great-grandson, Jim Lightfoot, who lives in Australia. Apparently he had been idly "surfing the Net" one day, and thought he would look at the Kew website, as he knew that his ancestor had been a botanist. There he found my book in the list of Kew publications, obtained a copy, and discovered that I hadn't been able to find any portrait. He told me that he had recently inherited a portrait of John Lightfoot from his father, and that, as the frame was in bad condition, it had been removed from it and rolled up, and it was now in his mother's attic in Worcester.

We arranged to meet at the National Portrait Gallery when he was next over here, and showed it to the experts there – who, I have to say, were not very interested in it. As he is the last of the male Lightfoots, Jim wanted it to go where it would be appreciated. I suggested that the Linnean Society would probably like to have a portrait of "the one who got away"! The Society was pleased to accept it, and generously paid for it to be restored and re-framed.

Although Jim Lightfoot is unable to be here this evening, I'm very pleased to say that his sister Helen and her husband John Graham are here – Helen is John Lightfoot's great-great-great-grandaughter, descended from his younger son William."

Professor John Cairns FMLS received the 2001 Ruth Patrick Award of the American Society of Limnology and Oceanography. The citation notes Professor Cairn's "pioneering work in comprehensive ecosystem research and his outstanding applications of aquatic science in ecosystem recovery and restoration". The citation also quotes Ruth Patrick: "The development of scientific knowledge and how to apply these findings to the problems of our World is not enough, for it is the public's understanding of these findings that causes them to develop methodologies that make use without abuse possible".

In *The Linnean* for July last year, we chronicled the Society's abrupt departure from the affiliated Societies of the Institute of Biology because the Council of the Society felt that the academic development of biology in universities was not a model which was in the interests of systematic biology. Since then, the biological community has been involved in discussions which would take biologists into a federation within which whole organism biology, systematics and natural history would have a role to play. Our President has been asked to serve on the Working Group which is acting as midwife to the federation, and the Society has been asked to act as a focus for these areas of biology. The Society has been in touch with some 28 societies with a prime interest in whole organism biology, systematics and natural history, and two meetings have taken place in the Society's rooms. As a direct result of the comments made, the Society's President has sent the document below to Rt Hon Michael Meacher, Environment Minister and to Prof. David King, Government Chief Scientific Adviser:

A possible solution to the plight of systematic biology and the study of whole organisms....

The plight

1. Ten years ago, a House of Lords Select Committee on Science and Technology chaired by the late Lord Dainton published a report highlighting the parlous state of research in systematic biology. It noted that ". . . as an academic subject in the

institutes of higher education it has been widely displaced by the newer areas of biological science, and the increasing average age of systematists in the faculties is such as to render them almost an endangered species in themselves". After commenting that the subject "... was of central importance not only to evolutionary theory but also provides an essential framework to most other branches of applied biological science . . .", it stated that ". . . the research itself, the curation of the collections and its position at universities is now placed at a risk which the nation can ill afford . . .". The Select Committee then made a series of modest financial and other recommendations which it hoped "... will give systematic biology research a much needed stimulus, after which we expect the subject to take its place with other branches of science".

2. The government's response to the Report was largely ineffective and suggested few new initiatives beyond those already agreed, such as the limited NERC proposals. It is not surprising that today, a decade later, the plight of systematic biology research has worsened with the situation now extending into the biology of most kinds of whole organisms. Still fewer people are employed in whole organism research, their ages have increased further, and less natural history is taught in schools. Even though concern for the loss of biodiversity has escalated considerably over the past decade, the fact continues to be ignored that field identification of species is fundamental to measuring biodiversity loss. Little or no attention is paid to the research in systematic biology which is urgently needed for some vulnerable and important groups. This is despite the fact that modern systematic biologists employ molecular techniques wherever they are relevant.

3. The reasons for the continuing deterioration are various.

(a) It is the openly stated policy of Research Councils to fund only 'hypothesis-driven' research. This policy excludes from their support any kind of urgently needed alpha taxonomy (the recognition and description of species, as distinct from beta taxonomy – the arranging of species in classifications which reflect evolutionary relationships). This is even if the conduct of alpha taxonomy is in some aspects little different from the sequencing of genomes.

(b) Partly for this reason and partly because taxonomic journals have low 'impact factors', systematic biology is poorly rated in the Research Assessment Exercise – even though the average life of a publication in this field is far longer than for those in 'modern' subjects, with the best remaining in use for very many years. Since university departments are under considerable pressure to appoint only those whose research will be highly rated in the RAE, anyone whose work involves alpha taxonomy becomes completely excluded. Similar pressures militate against the appointment of those whose research involves the more descriptive aspects of studies in the field.

(c) Over the last decade, universities have come under increasing financial pressures from the 25% – 30% rise in student numbers accompanied by marked declines in funding per student – so leaving them with virtually no resources to fund research other than that highly rated in the RAE.

(d) Contrary to a key recommendation in the 'Dainton' report, core funding for research and curation in the major systematics institutions has continued to decline relative to all other major areas of biology, and they have had the additional (and quite understandable) pressure to allocate proportionately more of their resources towards activities which attract the public.

(e) Teaching of natural history in schools above the primary level has sharply declined. A similar situation exists in universities, where training in systematics and in the use of identification keys is largely non-existent, and students' understanding of whole organisms can be so limited that terms used in keys are often not understood.

(f) There is no single body – neither charity, government agency nor research council – with responsibility for the oversight of the state of systematic biology research, the formulation of any kind of national policy for it, and ensuring that the available resources are allocated in the most rational and effective way. The much healthier state of affairs in the USA results from the existence of a Systematics and Evolutionary Biology Committee of the National Science Foundation, which oversees a well-funded and dedicated programme, with initiatives such as their special competition, Partnerships for Enhancing Expertise in Taxonomy (PEET). Although a UK Systematics Forum was established some years ago, it is simply a voluntary organisation with no formal relationship to any other bodies and no role in the oversight of allocation of resources. It has hence had very limited effect beyond the preparation of a strategy document, *The Web of Life.*

4. Two examples will illustrate the present plight in the UK. Disney (2000) established that a research proposal to examine mitochondrial DNA data to resolve a sibling species/polymorphism problem would be regarded as eminently suitable for funding by a particular research council, but that the monographic revision of the group of insects which revealed this problem in the first place would be regarded as unsuitable. Second, Wilson (2000) noted that the cover of an issue of *Nature* which reported the landmark sequencing of the bacterium *Xylella fastidiosa* portrayed its insect vector – but without any indication within the journal of its identity beyond that it was some kind of xylem-feeding leafhopper. In fact, the very few entomologists in the world capable of recognising it concluded it was probably an undescribed species of a subfamily known to contain important vectors of crop diseases. The control of such diseases would be impossible without knowledge of the biology of potential vectors – once they have been identified by taxonomists.

A possible solution

5. Simply making plaintive requests for more money will not solve problems in today's world.

6. The starting point is that almost everybody agrees the importance and necessity of good, well-planned and efficiently conducted research in systematic biology. However, national requirements extend well beyond this. Good identification manuals are still needed for many groups of organisms. National distribution maps are important in considering conservation issues, yet few are available other than for birds, flowering plants and mammals. As biodiversity loss becomes more and more

prominent as a political concern, it is especially important that schoolchildren receive competent instruction in its practical and local aspects. While taxonomic collections are satisfactorily curated in the major systematic institutions, there is no co-ordinated national scientific policy for the many small collections held in university departments and regional museums (where local authorities rarely see research as a priority).

The role of the Learned Societies

7. The Learned Societies concerned with systematics, the study of whole organisms and their natural history are a valuable resource. Because of the serious decline in the number of professional taxonomists, many such societies rely heavily on amateurs. For example, the British Lichen Society with *ca.* 600 members has prepared national distribution maps of all UK species (all on disc, 30% published with some on CD-ROM) entirely by its own efforts. There are almost as many lichen species in Britain as there are of flowering plants, yet there are now only two professional lichenologists (both over 50) in any UK university, and very few in museums – and even though lichens are the most sensitive indicators of atmospheric pollution of any group of organisms. While amateurs are invaluable in such projects, many lack detailed or indeed any knowledge of biology, so it is important that academics trained in whole organism biology are trained and supported.
8. Many learned societies own and operate journals where important new observations are published. The surplus income from these journals is allocated in a variety of ways to promote a society's interests – such as grants to help small research projects, preparation of technical illustrations and assistance to students. A number of the larger societies have educational programmes for schoolchildren and the general public, and offer particular help to amateur beginners in their topic.
9. No doubt the overall contribution of these societies to improving the condition of systematics and natural history nationally could be improved by more effective networking and coordination. It is to be hoped that such improvement will be achieved under the auspices of the Biosciences Federation whose establishment is being explored by a working group under the auspices of the Institute of Biology and representatives of some major bioscience disciplines.

The need for a national systematics body

10. A particular problem confronting those interested in systematics and natural history is the absence of any kind of national body with whom they can interact to ensure that scarce human and other resources are used in the most effective way.
11. Such a body, if established, would not only act in an advisory/linking capacity for the research councils, considering biodiversity from the genome to community level and facilitating research initiatives where appropriate. It could offer guidance on school and university curricula in systematics and natural history, and provide a focus for any relevant assistance which could be provided by bodies such as environmental charities, learned societies, museums, botanic gardens and zoos. It could assess those areas where the need for good identification manuals are most

urgently needed, and be provided with resources to ensure these needs were met. Its remit might also include offering advice to relevant institutions and universities in the light of any international environmental obligations concerning biodiversity to which government is committed.

12. Most importantly of all, it could provide informed advice on the state of systematics, natural history and the study of whole organisms in the UK. No such body presently exists.

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WILSON, M R. 2000. Loss of taxonomists is a threat to pest control. *Nature*, 407, 559.

....into Parliament he must go.

The Dimitrov family have been with us for 11 years. In that time, a family of political refugees has brought up two daughters, now graduates, and has produced one son, now six years old. Ekaterina Dimitrova has published on the beautiful illuminated religious books held in the British Museum; Dimitar (Mishu) has edited a Bulgarian literary journal. They have been a focus for emigré Bulgarians in the UK and are aligned with the monarchist interest in Bulgaria. When King Simeon of the Bulgarians decided, a few weeks before the event, to set up a party to contest the Bulgarian general election on 17th June, Mishu allowed his name to go forward and was duly elected a Member of Parliament in Bulgaria. For us it is a sad wrench – the family have been such a very positive help to all of us in the Society's rooms, serving the Society with charismatic distinction in so many ways. We have been fortunate to enjoy their loyalty and support which will surely be appreciated in their new home. Whilst we may be sad to see them go, we must surely rejoice that they can return to a land from which they had formerly felt themselves excluded. For them, new-found roles in a country they have only very recently been able to visit again are fraught with excitement and uncertainty. May they continue to live in interesting times!

The translation from the Society's resident staff to Member of Parliament is, as far as we can discover, a unique event. But another of the Society's previous residents, Prof. Gordon McG. Reid is now the Director of Chester Zoo. Prior to the Council Room being moved to the 2nd floor, a flat there had been traditionally occupied by the Librarian; the flat was converted in 1929. There was at one stage a lift in the neighbouring stairwell which leads to two flats on the 4th floor. The lift also served the upper floors of the Linnean Society and was last used in 1948. It was dismantled only a few years ago and all traces of the accesses to the Society have been expunged.

Please note: The Programme Card for 2001–2002 carried a more than excusable number of errors. Please alter the details of meetings in January 2002 on your card according to the programme on the back cover of this issue which is correct.
Our Editorial Secretary and Vice-President is Professor DF Cutler and the BES observer on Council is Dr. JH Crothers (1992). Sincere apologies for these lapses.

Looking further at our Programme Card, one meeting – *Sitona* spp. distribution and effects on the plant – relates to an insect which lives on the nitrogen-fixing nodules of legumes and the talk will be about the distribution of the insect, both here and in New Zealand, where it is an introduced pest, and its effects on plants including the impact of both above and below ground herbivory. As our colleagues at the Royal Society of Chemistry have noted[1], in the 1960s nitrogen fixation was exciting stuff, but after 40 years with the fundamental chemistry still a mystery, scientists have moved on to other things. Yet in these high energy cost days the chemical process (the high pressure, high temperature Haber process) is unprofitable and is being largely discontinued, doubtless to the delight of generations of schoolchildren who have struggled with the thermodynamics and kinetics of this exemplary reaction. What schoolchildren do not learn is that legumes and other nitrogen fixers carry out the task of activating nitrogen – the principal difficulty in its fixation – at normal temperatures and pressures. Life is full of surprises. In the world of nitrogen fixation it used to be a *sine qua non* that the process required the absolute exclusion of oxygen, and cyanobacteria, azotobacter and rhizobia appear to go to great lengths to achieve this. Yet *Streptomyces thermoautropicus,* which grows well at 60°C fixes atmospheric nitrogen in the presence of oxygen. Watch this space!

A notable event takes place on 26th November 2001 – the unveiling of a plaque in the Royal Academy marking the place where, in 1858, the Darwin-Wallace paper was read by Dr. George Busk. In those times the Society shared with the Royal and Chemical Societies a small office and meeting room on the first floor of old Burlington House, which became the home of the Royal Academy in 1867. Latterly, the area had become a lavatory and a staircase, but has now been restored down to the original décor as the Reynolds Room. After the unveiling, Prof. Richard Dawkins FRS will give an address.

Next year's Conversazione will be in Liverpool in September 2002. From July – September 2002, the Liverpool Museum is organising an exhibition commemorating the 13th Lord Derby who, as Lord Stanley, was the Society's second President (1828–34). It was this Earl of Derby who hired one Edward Lear ALS as tutor to his children (see Picture Quiz). The restored Museum will be opened by HM The Queen in August. We will also commemorate in September the late Sir Cyril Clarke Hon FLS FRS, with a lecture by Dr. Laurence Cook Hon FLS on Clarke's non-medical genetic work, much of which was published in the Society's journals. Sir Cyril, who is chiefly remembered for solving foetal incompatibility problems in *rh+* mothers, was one of a number of eminent biologists in Liverpool in the latter half of the last century, most of whom are no longer with us.

The International Oak Society will be holding its fourth triennial conference in the historic city of Winchester, from the 12th to the 15th of September 2003. This will be the first such conference to be held outside the United States and over 100 delegates are expected to attend from Europe, Asia and the Americas. The conference secretary is Ron Holley: *23crescent@supanet.com* tel. +44 (0)2392 585972.

JOHN MARSDEN

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1 *Chemistry in Britain,* May 2001 pp23, 24

Picture Quiz

James de Carle Sowerby

The July Quiz (**17**(3);13) featured James de Carle Sowerby (1787–1871) naturalist and artist, the eldest son of James Sowerby a descendant of an old border family. He was born at Stoke Newington on 5 June 1787. His mother was a de Carle, a French family that had settled in Norwich.

In 1793 Sir James Edward Smith persuaded his life-long friend James Sowerby to become a member of the Linnean Society. It was later said by James Gilmour that the two most valuable gifts Smith bequeathed to posterity were the Linnean Society and Sowerby's *English Botany*! This, however, underestimates the enormous contributions made to natural history by not just James, founder of the scientific race of his name, but also by his sons and grandsons, particularly James de Carle.

The foundation of this scientific heritage began when James acquired from Francis Seaforth (one time Governor of Barbados) a huge collection of British birds, while James Brodie gave him a series of skulls including that of a stranded whale. These collections eventually formed the basis of the Sowerby Museum which was augmented by a huge Natural History Library. The museum became a family institution in which were deposited not only all the specimens collected by the family, but also hundreds more sent by correspondents, mainly amateurs, from all over the UK. Here were also deposited the specimens from which the drawings had been made for *English Botany*; *Mineral Conchology of Great Britain 1812–1846,* 8 vols., and many other books. In later years the family even employed paid collectors.

The Museum (in Mead Place) contained, in addition, a huge printing press in which the family (father and sons) etched the copper plates and then printed and hand coloured the resultant prints. Then, when the text was returned from the printer the entire family would assemble, stitch and dispatch each issue to the subscribers. They were assisted in the latter two chores by several paid assistants. Garry's *Notes of the Drawings for Sowerby's English Botany* (1903–4), not only gives a bibliographic description of the various editions but also explains how the copper plates were later transferred to stone for the *Nature* and other re-issues and how they were eventually sold, together with the copyright.

Initially, James de Carle was educated at home but, later, his father sent him to study under Humphry Davy where he was joined by Michael Faraday. Together they assiduously applied themselves to the pursuit of chemistry. This training eventually allowed James de Carle, at an early age, to propose (independently of Berzalius) a

classification of minerals according to their chemical composition. Eventually these analyses were incorporated into the production of the two mineralogical works begun by his father (*British Mineralogy* and its companion work *Exotic Mineralogy,* published in monthly parts). These ideas were not only innovative but also far ahead of their time.

Following the death of their father in 1822, James de Carle and his brother Charles Edward took over the running of the family business. They continued with the production of *Exotic Mineralogy*, *British Mineralogy*, *English Botany*, *Mineral Conchology of Great Britain 1812–1846*, *Genera of Recent and Fossil Shells*, James de Carle doing almost all of the engravings and colouring. Thus, not only did James de Carle continue the production of works begun by his father, with which he had already been helping him for several years, but now he was producing his own! At this point he became a prolific illustrator, mainly of the works of other scientists. Churlishly, some considered his botanical illustrations not equal to those of his father but in my estimation the sheer variety of his works, from palaeontology to turtles, to angiosperms, puts him in a class of his own.

James de Carle's earliest illustrations were made for Dawson Turner's *Muscologiae Hiboricae Spicilegium* (1804). He later did the illustrations for *Flora Graeca Sibthorpiana* (1806–1840), *Loudon's Encyclopaedia of Plants* (1829), Halstead's *Little Botanist* (1835) and the first six plates of Sultard Blomford's *Palaeontology of Viti* (1865). There is little doubt that his best artwork is demonstrated in the plates of tortoises and turtles that he and Edward Lear executed for Bell's *Monograph of the Testudinata* (1836–42). This work hit a hiccup owing to trouble with the publisher, so that it was not until 1872 that the entire set of sixty plates was issued, thanks to J.E. Gray, in a work entitled *Tortoises, Terrapins and Turtles, Drawn from Life.*

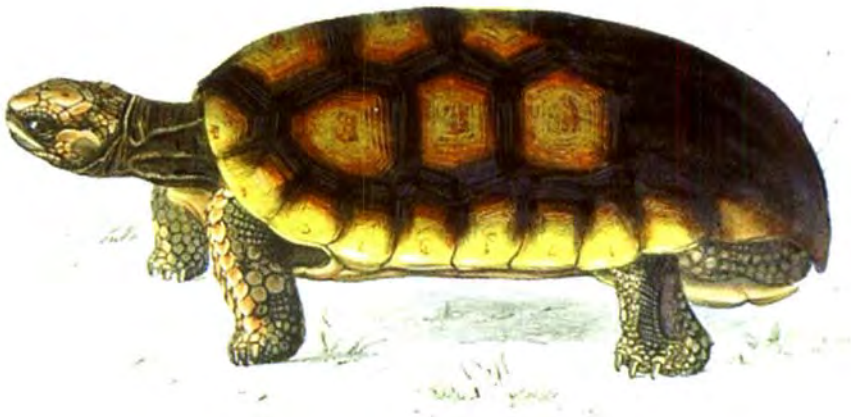
In February 1823 James de Carle was elected a Fellow of the Linnean Society. From the very outset he played an active role in the formation and running of the Zoological Club, where he first came into contact with Sir Stamford Raffles, who was elected FLS in February 1825. That same year saw the publication of the *Zoological Journal*, an independent publication conducted by Bell, Children, James de Carle and G.B. Sowerby, all Linnean Fellows and members of the Club. Just two volumes were published, 1825–26, for which James de Carle supplied all the plates (now in the NHM) and some of the text. Although Raffles attended some of the Zoological Club meetings he soon realised there was a real need to study living animals; in effect, a separate society was needed. This point of view he first expressed in a letter dated 9 March 1825 to his cousin the Reverend Thomas Raffles. He suggested that there was a need for:

> "a society for the introduction of living animals, bearing the same relation to Zoology as a Science that the Horticultural Society does to Botany."

Following a visit by Raffles to the Museum at Mead Place, and conversations with James de Carle and his brother, the objects of the new Zoological Society were broadened to include: (1) The formation of a collection of living animals; (2) a Museum of preserved animals with a collection of comparative anatomy; and (3) a library connected with the subject.

In 1838 James de Carle joined with his cousin Phillip Barnes in founding the Royal Botanic Society and Gardens in Regents Park. He was its first Secretary and resided in

A tortoise illustrated by Edward Lear



A tortoise illustrated by Sowerby

Regent's Park for over 30 years. During this period the Society became renowned for its floricultural and fashionable displays. However, elsewhere he modelled the gardens on the Chelsea Physic Garden, with courses of lectures in botany for students from the London medical schools and the newly formed Pharmaceutical Society. More importantly, he arranged for a regular supply of botanical specimens to these institutions. In 1846 he was appointed Curator and Librarian to the Geological Society, a post from which he was eventually obliged to resign owing to his increasing commitment to the Botanic Garden.

Other than the books mentioned above he published several zoological papers on such subjects as snails, long-eared bats and *Nymphaea* and palaeontological papers on coal shale fossils and fossil Mollusca.

James de Carle married Mary Ann Edwards in September 1813 and moved to Camden Town (5 Camden Terrace). They had a large family comprising two daughters and four sons. The eldest daughter married the engraver, Charles Wallis.

A year before his death James de Carle retired from his office as Secretary to the Botanical Society and was succeeded by his second son, Mr William Sowerby. He died on 26 August 1871, aged eighty four.

Darwin and the Sowerby brothers

In November 1831, Henslow, in a letter to Darwin, comments that he has just received the plates of Lowe's paper in which were included plates 5 and 6 by George Brattingham Sowerby. Subsequently, George described Darwin's specimens of fossil shells in the appendices to both *Volcanic Islands* (1844) and *South America* (1846).

In 1845 Darwin visited the Sowerby Museum (Mead Place) to show both Charles and James de Carle his shells and to consult Charles on the identifications and descriptions. As a consequence, he paid Charles £4.10s for his subsequent engravings of the Tertiary shells. On 31 March 1846 Darwin wrote to Charles asking him if he would illustrate some of his shells from the Cordillera. Accordingly, George illustrated the 60 species he himself described, as well as the 11 secondary fossil shells described by Edward Forbes. Nevertheless, Darwin had trouble with Sowerby varieties. Writing to R. Fitch on 28 January he pointed out that *Pollicipes maximus* and *P. sulcatus* of Sowerby were mere varieties, while later he concluded that *Pollicipes maximus* was in reality *Scapellium maximum var vulcatum* and that *P. medius* was synonymous with *S. maximum*!

Despite this, Darwin not only got George to draw the figures for three of the four *Cirripedia* volumes but also employed him to translate his descriptions into Latin (Darwin's account book shows seven guineas for these translations). This and the corresponding volume of the British fossil forms are Darwin's only contribution to formal taxonomy which, according to Freeman, are still held in high regard. When it came to the *Fossil Cirripedia* 1851, despite the fact that James de Carle had apparently confused *Pollicipes unguis* with *P. levis*, Darwin employed him to make the plates rather than his brother. Furthermore, Darwin used several of James de Carle's engravings from Sowerby and Sowerby (e.g. *S. quadratum*) while he gives specimen records as coming from the collections of James de Carle Sowerby.

BRIAN GARDINER

Clue: He effected the removal of window tax and, like Darwin's, the painting of his portrait was paid for by Fellows' subscriptions.

Correspondence

Sterkfontein Research Unit,
Wits Medical School

20.5.2001

Dear Professor Gardiner

I think I must be one of the few surviving persons who attended the inhumation of the ashes of Sir Arthur Keith at Down House in January 1955. When I last visited Down House I was amazed to learn that the curator did not know anything about the fact that Keith was buried in the grounds of Down House and that the position was not in any way marked. I tried hard to locate the spot but could not be sure. If the curator herself knew nothing about this, I am wondering whether there is any record at all – say, by an annotation in *The Linnean* for that time, or in Sir Arthur's obituary in the Royal Society volume for that year – or even in *The Times*.

It occurred to me that, while my memory still functions tolerably, and while I still have access to my diary of that period, I should perhaps write a short item for *The*

Linnean to put this episode on record, where it would be most appreciated. Would you think this a good idea?[1]

Yours sincerely
PHILLIP V. TOBIAS

University of Washington,
Seattle

25.5.2001

Dear Brian

The April *Linnean* (just received) Picture Quiz is of Samuel Stevens[2], with whom Wallace seems to have had an unusually mutualistic relationship (according to John Brock's accounts in "Just Before the Origin"). The following advertisement, for a collection made by Wallace and H.W. Bates, appeared in the *Annals and Magazine of Natural History* in 1850.... (see also opposite page, Ed.)

TO NATURALISTS &c. SAMUEL STEVENS, Natural History Agent, No. 24 Bloomsbury Street, Bedford Square, begs to announce that he has recently received from South America Two beautiful Consignments of INSECTS of all orders in very fine condition, collected in the province of Paraa, containing numbers of very rare and some new species, also a few LAND and FRESHWATER SHELLS, and some BIRD SKINS and several small parcels of Insects, &c., from New Zealand, New Holland, India, and the Cape, all of which are for Sale by Private Contract.

Sincerely
ALAN J. KOHN

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briagar@aol.com

25.05.2001

Dear Dr Marsden

I'm writing a study of the adventures and misadventures, both scientific and military, of the late Col. Richard Meinertzhagen. Dr Pamela Rasmussen of the Smithsonian mentioned to me that she'd seen an article about a gift Meinertzhagen made to the Linnean Society of "Charles Darwin's pipe" – a gift evidently bestowed with a good deal of fanfare, and which turns out to have been manufactured sometime in the 1920s. Darwin must have had a bit of trouble smoking it, just as I have had a bit of trouble swallowing some of Meinertzhagen's claims like the one about his close friendship with Darwin who by my rough calculations seems to have died when Meinertzhagen was three and a half years old.

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1 Yes please. Editor.
2 There were three correct answers to the last picture quiz. The stag beetle seemed to be a good clue!

JOURNEY TO EXPLORE THE NATURAL HISTORY OF SOUTH AMERICA.

To the Editors of the Annals of Natural History.

GENTLEMEN, 24 Bloomsbury Street, Jan. 19, 1850.

In the January Number of your valuable Magazine for 1849, you were good enough to insert extracts from a letter I had received from Messrs. Wallace and Bates, two gentlemen who are investigating the Natural History of the Amazon River and its tributaries in South America, and who consign their collections to me for sale. I now send you extracts from a letter just received from Mr Wallace, dated Sautarem, Sept. 12, 1849, which, if you think sufficiently interesting, you may perhaps feel inclined to insert : –

"I have got thus far up the river, and take the opportunity of sending you a few lines. To come here, though such a short distance, took me a month. I am now waiting here to get to Montalegre, but the difficulties of getting men even for a few days are very great. Here the country is very sandy and dry, with a scrubby, shrubby vegetation ; there are however some patches of forest, and in these, Lepidoptera are rather abundant; there are several lovely Erycinidae new to me, and many common insects, such as Heliconia Melpomone and Agraulis Dido, abundant, which we hardly ever saw at Parà : Coleoptera I am sorry to find as scarce as ever. I hope however to do better at Montalegre, as the hills there are near a thousand feet high, and must I should think produce some. I wish to know what is thought of Cuyaba in the province of Matto Grosso as a locality; it is at the head of the Tapajoz and Paraguay River ; there is a communication from here, salt being taken up. I could also from Rio Nigro get up the Madeira to Matto Grosso city, or up some branches into Bolivia. Is Bolivia at all known? I see in the Museum Catalogue only five or six Eycyinidae from it, from Mr Bridges' collections. I see there is a branch of the Andes in it the highest in America, and its capital cities appear higher ground than even Bogota or Quito. Either of the localities can be I think quite easily reached as the Andes up the Amazon ; at all events I should like to know if the ground is open and likely to be good, for some future time, if not just at present. I shall I think get up the Rio Nigro towards the sources of the Orinooko, but I am rather fearful that all N. Brazil is rather poor in Coleoptera.

"September 14th. – I believe I shall now start for Montalegre tomorrow, having a canoe lent me; I have however found so many new species of Lepidoptera, that I shall probably stay here a month on my return before going to Rio Negro, unless indeed I find Montalegre so very good as to induce me to spend until December there. I do not think that you need send me anything until I write again. Pray write whenever you can, and give me all the information you may be able to obtain, as to what things are wanted in any class or order and as to localities.

"The Tapajoz here is clear water with a sandy beach, and the bathing is luxurious; we bathe here in the middle of the day, when dripping with perspiration, and you can have no idea of the excessive luxury of it; the water is so warm that then is the healthiest time. Oranges are about fourpence a bushel here, and are far the best fruit; large pineapples twopence to fourpence, but we seldom eat them. The more I see of the country, the more I want to, and I can see no end of the species of butterflies when the whole country is well explored. Remember me to all friends."

I am, Gentlemen, your obedient Servant,
SAMUEL STEVENS

From *Ann. Mag. Nat. Hist.* 1850.

I've been unable to track down the article Pam Rasmussen mentioned. Assuming I'm not altogether garbling what she said, I wonder if you can enlighten me about the details of the gift of the pipe and the discovery of its, ah, questionable provenance?[1]

Thanks very much for your attention. I look forward to hearing from you.

Most cordially

BRIAN GARFIELD

From the Archives

In August 1738 Linnaeus visited Falun and became formally betrothed to Sara Lisa Moraea. The next month, following his future father-in-law's advice he set up in practice as a physician in Stockholm. Initially ridiculed because of his botanical interests, few patients were prepared to trust themselves to him. "There was nobody who would put even a servant under my care. I was obliged to live in virtuous poverty."

Things were so bad that by the winter of 1738 he was more or less forced to go and search for patients and was reduced to scouring the more seedy parts of the city, especially around the docks. His luck changed when he seemingly cured a young rake of gonorrhoea (more probably non-specific urethritis) and then several of his friends with chest pains which had been preventing them drinking at table. Soon he had "the greater part of the young men of Stockholm" in his care. By March of the following year (1739) his reputation for the treatment of diseases such as smallpox and the ague (malaria) had grown so dramatically that he was treating some "forty to sixty patients almost every day".

At this point a stroke of good fortune brought Linnaeus to the attention of the Court. Following a consultation by a Senator's wife, with a bad cough, for which Linnaeus had prescribed gum tragacanth lozenges to good effect, the lady recommended him to the Queen. This enabled Count Carl Tessin (Speaker of the House of Nobles) to use his influence and have Linnaeus appointed Physician to the Admiralty (1739).

Meanwhile, Linnaeus applied for the job as lecturer on assaying and mineralogy at the College of Mines, Daunemora, relinquished by his old friend Mårten Triewald. Following his appointment he gave a few lectures on botany. Triewald and Linnaeus eventually established an Academy of Science in Stockholm for which Linnaeus was the first President.

In June 1739 he returned to Falun and was married. Despite receiving a handsome income from his postion as Physician to the Admiralty, he realized that there was a great deal of money to be earned in the treatment of venereal diseases, particularly the Great Pox. Accordingly he wrote for advice to François Boissier de Sauvages de la Croix at Montpellier with whom he had been in correspondence since 1737. Sauvages replied 15 March 1740 (see below) generously giving him details of a practical treatment and the recognized remedy (mercury ointment). Whether or not Linnaeus was ever able to practice Sauvages's advice is doubtful since, in March 1740 Rudbeck died and was

1 Copy of *The Linnean* sent. Ed.

succeeded by Rosén. Finally, following intrigues of the worst academic kind, Linnaeus was appointed Professor of Medicine in place of Roberg in 1741.

> "By God's grace I am now released from the wretched drudgery of a medical practitioner in Stockholm. I have obtained the postion I have coveted for so long: the King has appointed me Professor of Medicine and Botany at Uppsala University."

The letter from François Boissier de La Croix de Sauvages to Linnaeus

Montpellier, 15 March 1740 n.s.

Illustrissimo viro D[omino] D[octori] Carolo Linnaeo Academiae
Naturae curiosor[um] socio, Stockolmensis praesidi
Classeos navalis Suecicae medico primario &c
De Sauvages proffessor med[icinae] Monsp[elensis] S[alutem]

Litteras tuas, Suavissime Linnaee, osculo delibatas, eo majore cum voluptate perlegi, quo minus erant expectatae, magisque desideratae.Verebar ne qua de causa D[omi]no de Jussieu nondum respondisti, mihi pariter responsum denegares; quantum voluppe mihi sit te blandam cum amabili conjuge in patria quietem et sanitatem consecutum esse, vix effari queo, voluppe etiam est quod tam feliciter scientias naturales promovere pergas, quod aliqualem debitissimae tuis meritis mercedis partem reportes, ut qui famae celebritate ditissimus es, aliis quam philosophicis divitiis potiaris, omnibus certe dignissimus. Singula quae scripsisti mihi avidis excepi oculis, quorsum tanta inter nos distantia tuis inventis me frui denegat. Jubes itaque, Amice colendissime, ut typis iterum classes meas morborum committam; committentur, nihil enim satius et melius facturum me puto quam tanti viri consiliis obtemperare. Laborem improbum in me suscipio te hortatore et autore, illud opus jam tibi devoveo, tibi dicatum volo, sed quanto accuratius utiliusque foret, si species, quas experiundo aut legendo noveris, mihi communicares, ordinem vero ex tuis canonibus corrigam, utcumque oblatrent invidi et malevoli, qui nova nomina, novam methodum a juniore sibi obtrudi aegerrime ferunt, addam theoriam Geometriae principiis innixam et praxim Hippocraticam. Jam pathologiam latine scriptam edidi, in qua te, summe vir, ut mereris praedico; ut methodi in naturalibus historiis principem, nomino. Mittam cum aliis a te quaesitis, si se dederit opportunitas. Quidni in epistolae plicae tuae Linnaeae semina aliquot misisti? Mitte precor! Quod domina nobilis illa summis digitis patitur Herpeti miliari mihi videtur affine, pertinax affectus diaeta lactea, aquis chalibeatis, balneis, ni fallor, oppugnandus intermixtis jusculis cancror[um] fluviat[ilium] cum plantis antiscorbuticis, post praemissa generalia.

Gonorhaea Siphilitica. Consideranda 1° in inflammatione. 2° in suppuratione.

1°. Quamdiu est ardor urinae, dolor, tumor, sit diaeta tenuis et refrigerans. Utatur aeger lacticiniis, ptisanis emulsionatis, emollientibus ex nimphaeae radic[ibus], florib[us] malvae viol[arum], semin[ibus] lini, frigidis majorib[us] &c. Foveatur pars lacte decoctis similibus: abstineat a calidis, diureticis acribus, vino, motu, (coitu *crossed out*)&c. Praescripta diaeta mittatur sanguis semel, bis, imo, si chordata sit aut sit testium phlegmone et febris, pluries. Vespere narcotica in emulsione hauriat. Sic pergat usque quo fluxus blandus, subalbidus, parcus evadat, nec aliud moliendum aut nimis festinandum.

2°. Sedata phlogosi, temperata fluxus acrimonia, tum ulceris detersione laboret medicus: quocirca lac pro omni cibo, aut simile quid aeger sumat et quovis mane ante lactis haustum, guttas 10. XV, vel XX balsami de copahu, vel de canada vel alterius, in syrupi haustu deglutiat. Per X vel XV dies usque quo guttulae puris albae et paucae stillent. Interea ad virus siphilitici cautelam unguento mercuriali ex axungiae partib[us] II. Et mercurii therebinthina extincti part[e] I fiat litus in perinaeo, scroto &c. Sero in lecto calide. Per VI–Xve dies e dragma una aut 3ii unguenti et si ulcus possit attingi ellychnium candellulae cereae unguento hoc onustum in

uretrham (sic) saepius immittatur. His peractis intra mensis circiter spatium vulgo cessat Gonorhaea, si vero perseveret, tunc ad astringentia tuto confugimus ut infunde instar theae manip[ulos] semis[icco]s equiseti ramosi in aq[ua] ciathis 2 vel 3bus, adde balsami copahivi gutt[as] XX; bibat mane. Iteretur per septimanam semel in die, sumantur opiatae ex karabe, ex oculis cancror[um], corall[is] aliisque adstringentibus. Fiant etiam injectiones in urethram ex infuso Equiseti, rosar[um] rubrar[um] &c. Aquas chalibeatas aeger bibat et sic sanabitur, sed quandoque stilla fluxus albidi pertinacissima superest, quae naturae committenda, sponte enim evanescit. Si Siphilidis totius curam desideres, jube: exequar.

Pluries de te hic colloqui contigit cum Magnolio meo collega, qui te multum veneratur, tum cum D[omi]no Le Momiez Parisiensi, qui jussu regis huc plantas lecturus, cum astronomis venerat; et qui te virum adorandum nuncupat. Tibi gratulor quod D[ominus] Jussieu Horti regii Paris[iensis] plantas in tuum ordinem nuper redegerit, qui tamen ordinem Turnefortii semper assumserat, illum inde pluris facio, quod veritati obsequatur; facinus certe egregium mihi illud videtur; ille senex, tu juvenis, ambo botanici: oh quantum distant a medicis lividis, invidis, botanici candidi. Si umquam classes morborum Tuo Marte adornare in lucem edere volueris, pergratum mihi facies; tanti laboris oneri sustinendo nescio utrum par animus meus fuerit utcumque cupiam. Livor aut iniquitas collegarum meorum me terret et deterret. Luci duobus abhinc annis commisi meam febrium theoriam Stalhianam; ne mireris: Naturam seu Animam esse machinae nostrae potentiam, motricem calculo possum evincere mechanico. Plures asseclas feci sed multo plures antagonistas. Scripsi Amstelodamum D[omino] Cliffort et rogavi, qui Horti Cliffortiani mihi vel prece vel pretio copiam faceret. Responsum expecto.

Quo pacto quaeso aqua argillacea febres protrahis, quid hoc significat? An illas producis, an vero sanas? Non bene legi. Accepi Systema tuum naturae, et Genera plantarum, stupui ad tam pulchra, tam utilia inventa. Illa omnia hic iam venum eunt et a nostris botanicis avidissime accipiuntur, ego e Batavia advehi curavi. Pro illis quibus me cohonestas elogiis gratias millenas refero, id vero benevolentiae tuae adscribo, laudes profundis, qui omni laudis genere cumulatissimus es.

Inscribas quaeso tuas epistolas gallice A Monsieur Mr de Sauvages proffesseur en medecine. À Montpellier. Latine possent disperdi, quod summe dolerem.

Vale vir omni laude major, mihique aeternum charissime et colendissime et me amare perge.

Monspelii 15 Martii 1740, statim ab acceptis tuis.

In this letter La Croix de Sauvages thanks Linnaeus for his unexpected letter. He is happy to know that Linnaeus now enjoys a happy family life with his wife, and that his scientific work is successful. In his letter Linnaeus had entreated Sauvages to publish a second edition of *Classes morborum.* Sauvages promises to do this and will dedicate it to Linnaeus. He will also adjust it systematically in accordance with Linnaeus's canons and include *Theoria Geometriae* and *Praxis Hippocratica.* Sauvages has now published his *Pathologia*, in which he hails Linnaeus as the leading expert in the methodology of natural history. These works will be dispatched to Linnaeus as soon as possible.

Sauvages asks Linnaeus to send seeds from his own plant *Linnaea borealis.* In a previous letter Linnaeus described the symptoms of a female patient and asked for a diagnosis. Sauvages believes that this woman is suffering from *Herpes miliaris* and prescribes a cure. In the same letter Linnaeus asked for advice on how to treat gonorrhoea, which is wide spread in Stockholm. Sauvages prescribes the following cure:

"One night with Venus and a lifetime with Mercury".
Victoria and Albert Museum.

+"Gonorhoea Siphilitica should be considered as to
1. Inflammation.
2. Suppuration.

1. As long as urination is accompanied by a painful, burning sensation and a tumescence is discernible, the diet should be light and cooling. The patient should keep to milk products and decocts from barley, softening substances[1] from the roots of *Nymphaea*, flowers of mallows and violets, seeds of flax, major cooling methods etc. The part in question (= the penis) should be fomented with decocts of wheat in milk. The patient should abstain from all products that are hot, acid, diuretics, wine, etc. During the period of this prescribed diet the patient should let blood once or twice, or even more, if the part in question is tied, or if the patient has a burning pain in his testicles and a fever. At night he should drink narcotics in an emulsion. The treatment continues in this way until a smooth, whitish moderate fluid is emitted. No other measures should be taken, nor should one try to rush the process.

2. When the burning pain (inflamation) has receded, and the flow is moderate, then the doctor should turn his attention to the cleansing of the ulcer. Therefore the patient should consume milk, or something similar, instead of all food, and every morning, before drinking the milk, he should swallow 10, 15 or 20 drops of Canada balsam and balsam of copaiba in a syrup. Do this for 10–15 days, until only a few small white drops of pus are

1 Probably poultices

emitted. At the same time, as a precaution against the syphilitic virus, rub the perineum, scrotum, etc. of the patient with an unguent made of two parts of fat (of swine) and one part of mercury "extinguished" in turpentine at night in bed and hot. Use 1–2 drachmas of this unguent for 6–10 days and if the ulcer can be touched, the wick of a small wax candle prepared with this unguent should be repeatedly inserted into the urethra.

Thanks to this treatment the gonorrhoea normally yields within a month. However, if it continues, then we have recourse to astringents. Pour, as when you make tea, 2 or 3 *ciathi* of water on a handful of half-dry *Equisetum ramosum*. Add 20 drops of balsam of copaiba to be drunk in the morning. This is repeated for a week. Once a day the patient should have opiates of crabs from the eyes of crayfish, corals and other astringents. You should also inject into the urethra extracts of *Equisetum*, red roses, etc. The patient should drink *aqua chalibeata* (viz water in which a red hot iron has been dipped), and in this way he will recover. Sometimes, however, a whitish dripping flow will persist for a long time. Let it run its course and it will disappear spontaneously. If you want a complete cure of syphilis, ask and I shall obey."

Sauvages often discusses Linnaeus with his friends Pierre Magnol and Pierre Charles Le Monnier, who both think highly of him. Bernard de Jussieu, director of Jardin du Roi in Paris, has forsaken the botanical system of Joseph Pitton de Tournefort and adopted Linnaeus's new classification system. Sauvages congratulates Linnaeus on this victory. He also finds the adaptability and openmindedness thus demonstrated by Jussieu quite extraordinary in such an old man.

Sauvages would be very grateful, if Linnaeus would assume the task of editing *Classes morborum*. He doubts he will be able to do it himself. Sauvages complains of the envy and injustice he suffers from his colleagues. Two years ago Sauvages published *Theoria febrium Stahliana*, which garnered him many followers but even more enemies. Sauvages has written to George Clifford and asked for access to his garden but has still not received an answer.

Sauvages wants to know what Linnaeus means by "protracting fevers" using clayey water. Does he mean that he arouses fevers or does he cure them?

Sauvages has received *Systema naturae* and *Genera plantarum,* which have filled him with admiration. All Linnaeus's works are now for sale and are studied avidly by all botanists. He thanks Linnaeus for honouring him in these works with such flattering words. Sauvages asks Linnaeus to write the address in French to ensure a safe delivery of the letters.

The above letter was translated by Johnny Strand. Ed.

In October 1741 Linnaeus and his family moved to Uppsala where he remained for the rest of his life.

Lampreys, the food of Kings

Lampreys are the most primitive vertebrates and the sister group of the gnathostomes or jawed vertebrates. There are some 40 species of lamprey and like hagfishes (the sister group of lampreys + gnathostomes) they have a bipolar distribution. However, only four species belong to the southern hemisphere (*Geotria australis, G. mordax, G. praecox, Mordacia lapieidia*). Lampreys are eel-like, naked animals without trace of bone, paired fins or jaws and with a circular mouth and sucker, a rasping tongue, single median nostril and seven gill slits. They share with all other vertebrates well developed, cartilaginous, neural and haemal arches (i.e. the rudiments of a true backbone), radial muscles in the fins which allow their voluntary flexing, a lateral line with neuromast organs, large eyes with associated eye muscles and cartilage made up of chondrotin-6 sulphate. All lampreys breed in fresh water and pass a major part of their life cycle in a freshwater larval state, called the ammocoete, as filter feeders.

Lampreys fall into three groups according to how they behave after metamorphosis. The first and by far the largest group are anadromous, ectoparasitic bloodsuckers who return to the sea after breeding in fresh water. This group includes *Petromyzon marinus,* which grows up to three feet long and *Lampetra fluviatilis,* which reaches one foot six inches. At the end of larval life (five years in the case of *L. fluviatilis*) they move downstream towards the sea or estuary, where they feed voraciously on such fish as salmon, and grow rapidly.

Their mouth appears to produce a vacuum while the pointed, keratinous teeth act in a circular motion rasping the skin away and making a neat, characteristic hole. Gunther records salmon taken from the Rhine as far up as Bonn with lampreys fixed to them boring into their flesh. The lampreys appear to stay in shallow waters during their sojourn in the seas around Europe and thrive on the continental shelf. During their time at sea they are seldom captured, except around the coast of North America in shad nets used in estuarine conditions. Some however, do stray and there are records of them being taken at 86 fathoms on the Grand Banks, and at 200–300 fathoms on the Nova Scotia Banks (*P. marinus*). Eventually, after a period of from one to three years, the lampreys return to the rivers on their spawning migration. In the past, fish stocks near river mouths, such as herring and migratory salmon, suffered greatly but today it is mainly the eel stocks which are preyed upon. Death follows shortly after spawning.

The second group contains the non- parasitic or brook lampreys, which are widely distributed and constitute a little over half of all the known species. Although these forms develop the necessary mechanisms for a parasitic mode of life during metamorphosis, they are never used. Instead the intestine atrophies and the fore-gut lumen never develops. Consequently, despite taking a further 6–9 months to mature, they remain as dwarf forms, somewhat smaller than the fully grown ammocoete and after spawning they die. The widespread occurrence and distribution of the brook lamprey strongly suggests that these dwarf, non-parasitic forms have evolved from the corresponding parasitic ancestral species. This concept of "paired species" has now been extended to almost all the known non-parasitic lampreys which are presumed to have represtatives in many lamprey genera with the exception of *Petromyzon*, *Caspiomyzon* and *Geotria*.

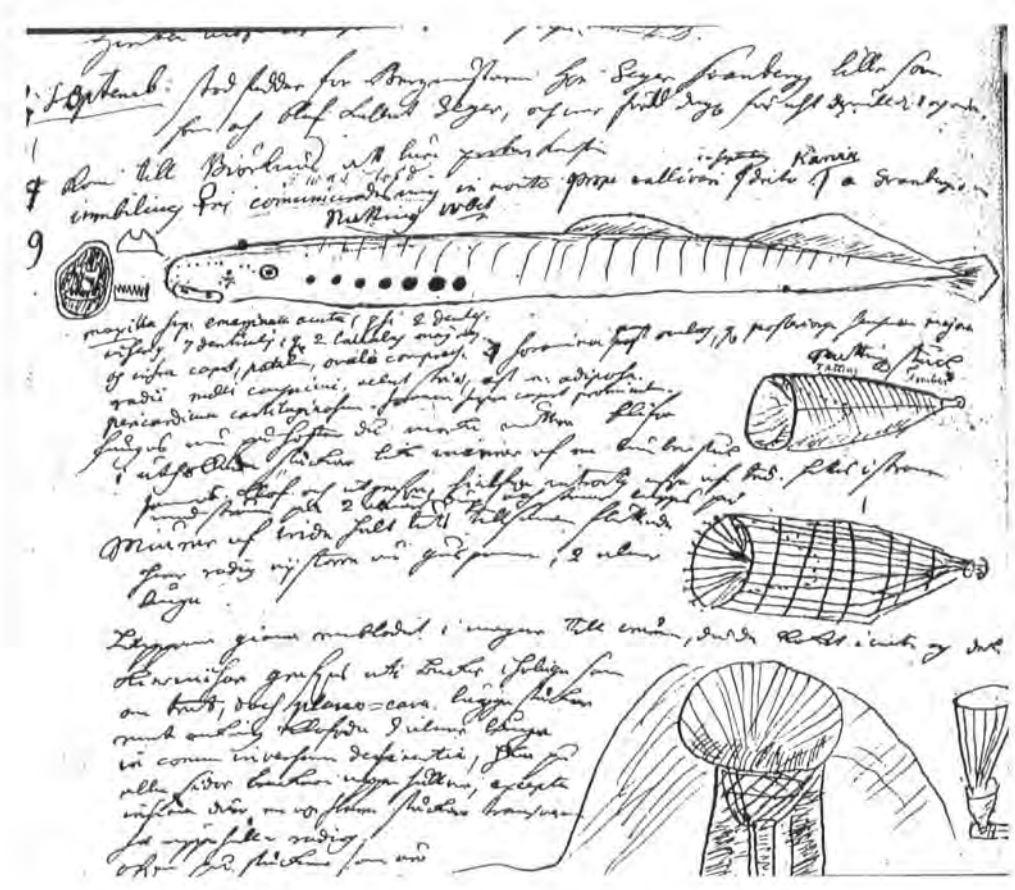
Painting by Peter Forey

The third group is parasitic and lives entirely in fresh water, feeding and breeding in various rivers. Three of the group are members of the genus *Ichthyomyzon*, one species of which occurs in the Hudson Bay drainage to the Mississippi Basin, another is found from western Manitoba, Iowa, and Wisconsin to Alabama and a third is found only in the Ohio drainage system. In Mexico there is an entirely different species belonging to the genus *Tetrapleurodon* (*T. spadiceus*, the Mexican river lamprey). The Old World can boast but one species: *Eudontomyzon danfordi* from the Danube Basin and some tributaries of the Baltic and Black Seas.

Generally these fluviatile species are smaller than their typical anadromous brothers and sisters, and this is also the case with the landlocked form of *Petromyzon marinus* which occurs throughout the Great Lakes and some of the smaller lakes in New York State. This dwarf race has undoubtedly been derived from the much larger andromous sea lamprey, probably during glacial times. Additional dwarf, landlocked forms include *Lampetra fluviatilis* (in the Western Mediterranean), *L.* (*Entosphenus*) *tridentata* (in Oregon) and *L. japonica* (the Arctic lamprey found in Alaska, the North West Territories, Slave River and Hay River). Varieties of *L. japonica* are also found in the Japan Sea, Korea, the western Arctic from the White Sea to the Ob Basin, Siberia and Norway.

Both *Petromyzon marinus* and *Lampetra fluviatilis* were first described by Linnaeus in 1735 from Artedi's types. It was on his Lapland journey of 1732 that Linnaeus first realised the importance of the Natting (*Lampetra fluviatilis*) to the indigenous population, who considered them a great delicacy devising ingenious traps for their capture.

The name 'lamprey' is derived from the Greek for 'lick' and 'stone'. As Linnaeus observed, the lamprey maintains its position in the river by adhering to stones by sucking. It was not just the Lapps who considered the lamprey a delicacy; as long ago as



Page from Linnaeus' Lapland notebook.

AD40 a single *P. marinus* would sell for as much as ten pieces of gold in Rome. The Romans made ponds for them, trapping them as they ascended the rivers, to spawn. Augustus' friend, Vedius Pollin, supposing that lampreys fed on human flesh were more delicate, ordered that his slaves, when accused of the slightest fault, be thrown into these ponds!

Until recent decades, most European rivers contained both *P. marinus* and *L. fluviatilis*. The river most celebrated for its lampreys was the Severn. William Camden, writing in his *Britannia* (1856), noted:

> "The Severn feeds such a number of river lampreys that nature seems to have made a pond for them in that place, such as the Romans anciently invented at the height of their luxury".

The pond referred to consists of the large meander or horse-shoe bend in the river, three miles below Gloucester, from where the Severn bore is best observed (Stone bench). Today there is a small hamlet just below nearby Minsterworth called Priding which takes its name from Peid or Pride, the Old English name for lamprey. Moreover, fishermen on this part of the Severn had to pay dues called Peid gravel (i.e. rent) to the Rodley estate, the ancient domain of the King since early Plantagenet days. In 1216

Priding, Minsterworth and Elmore had lamprey fishing weirs installed by Henry III. Said to be unique, they consisted of a rectangular, mud and brushwood plateau, or crib, six yards wide and four yards long, built to within a few inches of the surface. There, upon each crib, was set a row of wicker baskets or weels (still used to this day to catch eels). These baskets, made of woven osiers, are some four yards long with a wide mouth of fourteen inches, slightly bellied at the centre and tapering to a small opening downstream. Inside each trap there are two constricted throats or chales. Linnaeus (1732) described the similar lamprey traps made of willow twigs and resembling wicker baskets used by the Lapps, which, in their faster running waters, were kept down by stones and their mouths turned to meet the current.

Returning to the Plantagenets; as every English schoolboy once knew, Henry I died of a surfeit of lampreys. He was in the thirty fifth year of his reign when he died on 1 December 1135 in Elbeuf, Normandy. Where Henry's proclivity for eating lampreys was fostered is uncertain[1] but there is no doubt that Henry II got his from Gloucestershire. Henry II kept his mistress, Jane Clifford in the village of Frampton, a stone's throw from Priding.

Henry III so enjoyed his lamprey pie that he started a tradition of having pies baked for him by the Corporation of Gloucester and sent to him wherever he happened to be. There are records of lampreys being sent to Westminster in "bread and jelly" by the Sheriff of Gloucester to Henry III:

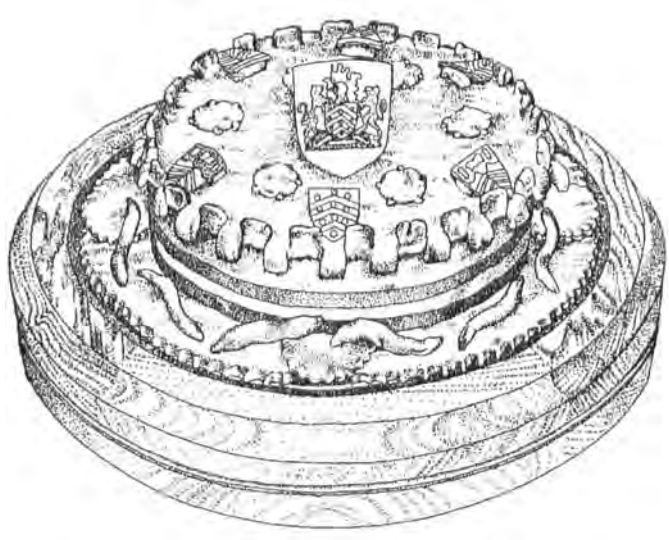
> "Since after lamprey all fish seem insipid to both King and Queen"
> (Close Rolls 1234–1237).[2]

Lamprey pies were baked in Westgate Street, Gloucester (until the 20th Century) using potted or stewed lampreys which were covered with a large raised crust. Sometimes, according to season, the river lamprey (*L. fluviatilis*) was potted with the larger species (*P. marinus*) because the former was reckoned to have a milder flavour. The Corporation of Gloucester was not the only body to send lamprey pie to the Royal Family. Richard Hempsted, the last prior of Llanthony Secunda, foreseeing the closure of his monastery and looking to his future, sent a present of baked lampreys to Henry VIII shortly before the Dissolution (1530). The custom of sending lamprey pies to the king and other dignitaries continued down to Victorian times. Thus, in the twelve months ending March 1823 it cost the Corporation of Gloucester £12-17 s for lamprey pies sent to the king.

Sadly, this tradition more or less ended in 1835 when, under the Municipal Corporation Act, the old Corporation ceased to exist.The custom was, however, briefly revived for Queen Victoria's Diamond Jubilee in 1897 when the City of Gloucester sent

1 The lampreys which caused the death of Henry I came from Lyons-la-Floret. His castle has gone but the market where they were purchased remains with its rue d'Enfor. However, back in Britain, he had already sired an illegitimate son, Robert of Gloucester.

2 Henry III maintained his own fishing weirs at Alney, Garne, Minsterworth, Rodley and Deany, and in November 1240 ordered the Sheriff of Gloucester: "To take good care of the King's lamprey weirs in the Severn and to prepare them well if the need be". Some evidence of the cost of lampreys are also to be found in the Rolls. Thus, during Lent 1242 Henry received 188 lampreys which cost £12-7-3d, while six lampreys cost Edward III £6-7-2d.



The 1977 Jubilee pie.

her a lamprey pie weighing 20lbs, its oval crust embellished with truffles and crayfish. A golden crown and sceptre decorated the top, while four gold lions sat round the base. The City of Gloucester having once embarked down this road of preparing a lamprey pie to present to the sovereign on a special occasion felt it had no option but to thus honour Queen Elizabeth's Silver Jubilee of 1977. Twelve *P. marinus* (average length twenty inches) came courtesy of the Severn River Authority, while the pie was baked by the Home Economics Department of Gloucestershire College of Education. The finished pie weighed 12lbs and was decorated with both City and College crests interspersed with Tudor roses, and the plinth with small pastry lampreys and shells. Whether or not the City of Gloucester will ever bake another remains to be seen!

P. marinus was always considered a great delicacy in London where it could be found on the slabs of the principal fish merchants throughout the eighteenth and nineteenth centuries.[1] In that same period, *P. marinus* occurred in enormous numbers in the mouths of the major French and Italian rivers and was often grilled, moderately salted and barrelled up for sale with the addition of vinegar and spices. In Germany they were cooked and potted in earthenware jars in much the same way as pilchards are potted in Cornwall. In the 1890s pickled lampreys were imported from Holland for the German inhabitants of Soho. During this same period lampreys were exceedingly plentiful in parts of New England. At Hadley Falls on the Connecticut River, in 1840, a single catch of 3,800 individuals is recorded. Despite the popularity of *P. marinus* and the fact that its close relative *L. fluviatilis* has a milder taste, the latter was taken from the Thames throughout most of the nineteenth Century and sold as bait to the Dutch, for their long line, cod and turbot fisheries. Yarrel reported that the Thames supplied up to one million lampreys in 1850 but that by 1876 the number had fallen to around forty

1 Lampreys can be stored alive in large urn-shaped baskets called hard weels, the mouths of which are stopped with a wooden plug. A tethering rope is thrown around the neck of the basket and the whole sunk in the river.

thousand which fetched up to £38.10s a thousand. Earlier, in 1298, Thames lampreys were twelve a penny but the larger sea lampreys were four shillings each before mid-Lent and two shillings each thereafter.[1]

With the industrialisation of Europe and North America have come changes in land usage, including drainage and the use of fertilisers etc. This has meant that the clear spawning streams, required for the development of ammocoete larvae are often no more. Consequently, the lamprey populations have fallen steadily. Thus, although lampreys were still being sold in the fish markets of New Jersey in the middle of the nineteenth century, today they are merely a memory throughout New England. Ironically, while populations of the sea lamprey of both Europe and North America have been steadily declining, that of the Great Lakes has been flourishing. The sea lamprey only started becoming abundant in Lake Ontario at the turn of the last century. Niagara Falls, between Lakes Erie and Ontario, constituted a natural barrier until the Welland ship canal was constructed in 1829. The first lampreys were reported in Lakes Huron and Michigan in 1936 and in Lake Superior ten years later in 1946. Presumably the rapids and ship locks had deterred them passing through earlier! In all the Great Lakes except Ontario the lampreys are land locked (see earlier) and no longer anadromous.This has resulted in a rapid build up of lamprey populations at the expense of the trout, white fish and burbot fisheries. Unlike the English, the Americans have no taste for lampreys and consequently, there is a dearth of fish on Fridays. Although the authorities have resorted to lampricides, I am reliably informed that the lamprey population is again expanding.

As a child brought up in Gloucestershire, the Spring tides and Severn bore provided our family with the region's greatest delicacies: small lampreys six to eight inches long which were on their way downstream, and elvers (young eels) which were coming up. The lampreys were stewed till tender in elderberry wine while the elvers were fried in bacon fat to which a little flour was added. Unlike the Plantagenets and Tudors I preferred the elvers; clearly I was not destined to be a king. Instead I have spent a lifetime working on actinopterygians, the group to which the eel belongs.

* * *

This article formed the basis of my 1995 Presidential Address.The practice of giving a Presidential Address at the Anniversary Meeting was introduced in 1854 by Thomas Bell, Professor of Zoology at King's College, London and, with two exceptions, they were delivered every year up until the second World War. Since then it has been more customary for the President to give a single address at the end of his three years in office. These Addresses were for the most part printed in our *Proceedings*. Always mindful of copy for *The Linnean*, I decided to give three Presidential Addresses – this being the first. The last Presidential Address to be published in full was by Professor Prance entitled "Alfred Russell Wallace", *The Linnean* **15**(1) 1999: 18–35.

BRIAN GARDINER

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1 The only fish market that I know which still sells lampreys is in Helsinki – where they are smoked like eels.

Appendix

Classical French Recipe : Matelotte de Lamproie

(à la Bordelaise if with red wine, à la Nantaise if with white)

For 4 persons, you need:

- 3–4 large sea lampreys (*Petromyzon marinus*)
- two onions, finely sliced
- two cloves of garlic
- a bunch of mixed herbs (thyme, 2 bay leaves, parsley)
- olive oil
- flour
- salt, pepper
- one bottle of red Bordeaux or of Muscadet

1. Eviscerate the lampreys and cut them into 5cm long sections (including the heads), but *don't remove the skin*, since the mucus is very important for the taste and the consistency of the sauce. The heads may not be eaten, but add taste to the sauce.
2. Put three tablespoons of oil in a large stewpan; add the onions and fry until slightly browned.
3. Reduce heat, add the pieces of lamprey, and stir for 30 seconds. Add the bunch of mixed herbs and garlic, stir again. At this stage, you may optionally, add a small glass of brandy and put it on fire – "flambé". Then pour in half a bottle of red/white wine. Season generously.
4. Cover the pan, and let it simmer for 10–15 mins (depending on the size of the lampreys).
5. Remove the pieces of lamprey and put them aside.
6. Add two tablespoons of flour, stir, and let the sauce simmer on a low flame for 20 mins, until it thickens. Stir often, so that it does not burn on the bottom (it would be catastrophic!). You may add 1/2 a glass of wine at the end.
7. Return the lamprey to the pan for a further 10–15mins, to warm through.
8. Serve accompanied with boiled potatoes. A more refined way is to serve the chunks of lamprey alone, surrounded by a "bush" of crayfish, and put the sauce in a sauceboat. Be sure to sieve the sauce carefully to remove the lamprey's teeth, which are very sharp. Serve preferably with a dry white wine (Bordeaux or Muscadet), but it is quite good also with a cool red Champigny (Saumur) wine.

Note: If there is something left after the dinner, put the lamprey chunks in a plate with some sauce over them and put them in the refrigerator. They will gelify (thanks to the proteins in the mucus, the notochord, and the head skeleton) and can be eaten cold.Then, some days later, when you come back from lamprey or eel fishing late in the evening, take a large piece of bread, rub it with a clove of garlic, and put two large slices of cold lamprey on it. Eat it with a large glass of cool Muscadet... marvelous!

The same recipe can be used for eels, river loach, catfish (*Silurus glanis*) or anglerfish (*Lophius pescatorius*). However, you will not have the special taste of freshwater fish that "river people" prefer and that "sea people" hate!

Bon appetit

PHILIPPE JANVIER

Who was W. Goodall?

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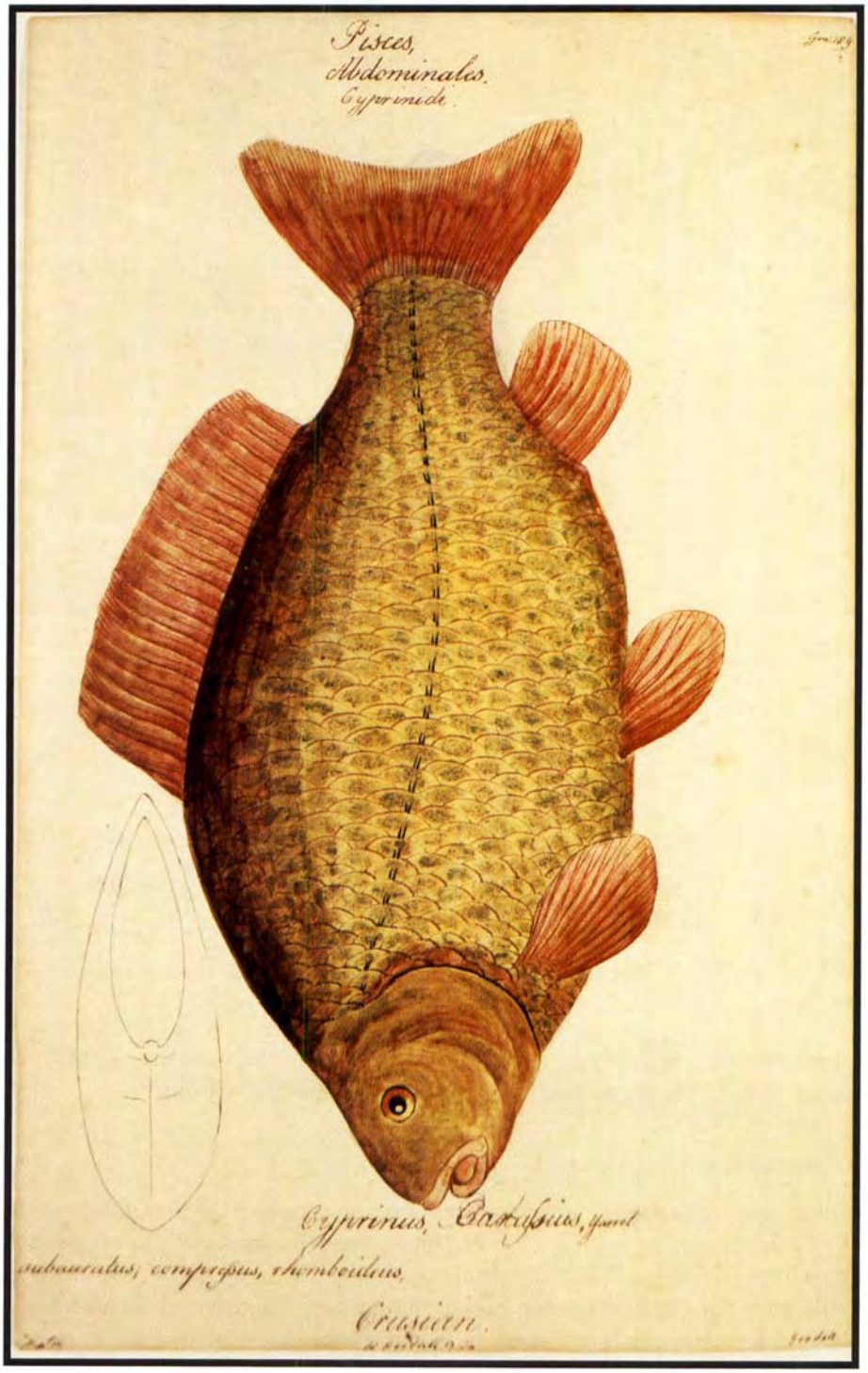
Introduction

Manhattan was an exciting place to explore in the late 1950s when I (ML) was studying at the Rockefeller Institute, later Rockefeller University. During a walk downtown to Bloomingdales I came upon an antiquarian bookshop called Weyhe's, easily identified by its neat black and white chequerboard trim. The shop was full of old books and prints and at the back were some dusty black boxes. These contained not prints, but beautiful original watercolours of a wide variety of animals. The accuracy of the presentation, the unusual nature of many of the subjects, the detail and the brilliant colouring, made them instantly appealing to a biologist. I asked the owner about them, fearing that they might be too expensive for someone who had only recently ceased to be a student. "Oh yes, those are the Goodalls" she said. "The interior decorators like them. They are 25 cents each, except for the big brightly coloured ones which are $3.50."

Over the next few weeks I used up my spending money and came to own more than 200, representing all kinds of natural history objects, from microorganisms and fossils to worms, shells, crabs, insects, fish, even whales. A few prints were also boxed among the paintings, some of which I recognized as Donovan's from the 1790s .[38] The remarkable thing about these prints was that they were identical or very similar to the paintings filed with them. The boxes seemed to attract little attention in the shop, which still had some of the paintings when my wife (JVC) and I went back 20 years later. Weyhe's is no longer opposite Bloomingdales but is now on West 57th Street. In a recent letter, the owner, Ms G.W. Dennis, felt that the artist must have been a woman, since someone who produced so much work must have had almost no other demands on their time.[1]

All the paintings followed the same format (Figs 1–4). The paper measured 13×7 3/4 inches, some being watermarked with the year. The subject was in the centre of the portrait page except for long animals which were reproduced landscape. There were sometimes subsidiary drawings such as life stages, caterpillars and pupae or enlarged mouthparts. Microorganisms were often grouped together on the same page. The classification was at the top, such as Insecta, Aptera, Podopthalmata, for a crayfish (Fig. 4). The Linnaean classification lay below the picture, sometimes followed by a Latin description and the English name. The bottom left hand corner occasionally gave a locality such as "Antilles" for a limpet (Fig. 3), or "England" for a small tortoiseshell butterfly (Fig. 9). The right-hand side often contained the name of some well-known eighteenth or early nineteenth century textbook of natural history: Donovan, Leach, Ruppel, Shaw, Sowerby, Swainson, Savigny, or occasionally, Goodall. Some had references to "Zoo. Trans.", or "Bot. M." There was sometimes a brief notation in the top right hand corner, probably part of a cataloging system. The signature "W.



Figures 1–4. The Natural History Paintings of W. Goodall. The subjects range from microorganisms to whales, fossils to plants. They excel in colour, clarity and attention to detail. All are signed at the bottom on paper measuring about 13x8", some with watermarks from 1794–1830. Figure 1. A carp with fresh, natural colouring, almost certainly from life. "Dinton" appears both as the locality on the left and with Goodall's name.

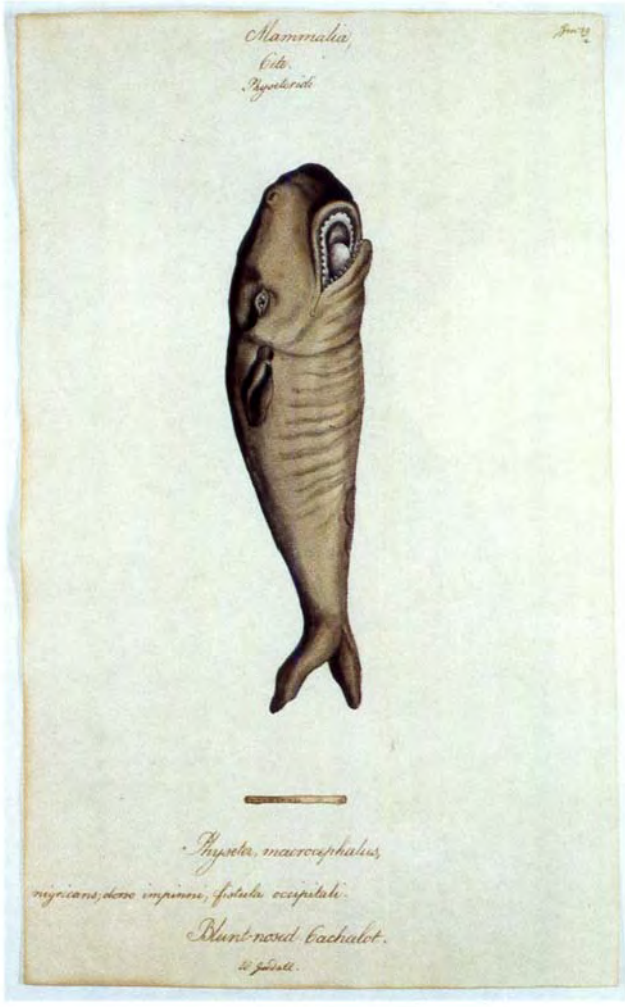


Figure 2. A sperm whale, with scale but no reference. An almost identical whale appears in Shaw.[49]

Goodall" appeared at the bottom. All the writing was in the same careful script as the signature. Who was this painter who signed his name "W. Goodall"?

The Goodall family of painters

Although reproductions of the paintings began to appear in the literature, the identity of W. Goodall was a mystery. For example, the *Architectural Digest* describes a designer's use of a beautiful lily painting, saying "This example, the work of W. Goodall, of whom little is known except that he was English and active after 1800, possesses a fragile and subtle coloration."[2] Some were bolder in their attributions. A set of six bird paintings illustrated in 1974 was sold as "paintings by Walter Goodall, 1830–1889."[3] In 1981 the Fitzwilliam Museum in Cambridge had an exhibition of flower paintings which included some with the signature W. Goodall, part of a bequest in 1973 of 112 paintings from Henry Broughton, second Lord Fairhaven.[4] The

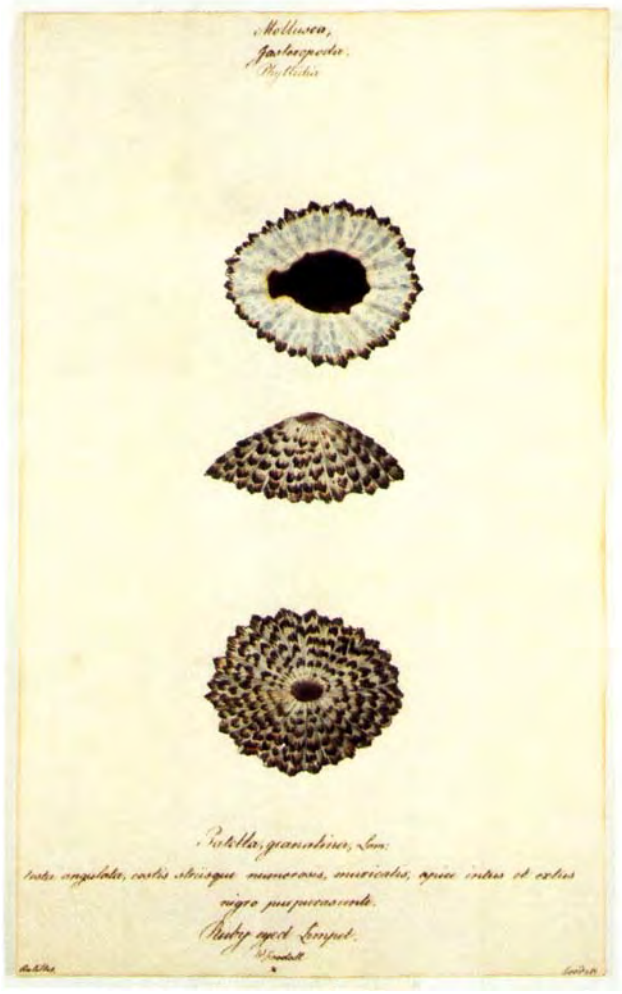


Figure 3. Ruby-eyed Limpet, Goodall as the reference, suggesting that it was painted from a shell in his or his brother's collection.

Fitzwilliam paintings of flowers were identical in format to those of animals in our collection. The Fitzwilliam Museum also attributed them to Walter Goodall.[5] The Goodalls were a family of artists. Edward Goodall (1795–1870), line engraver, had three sons and a daughter who were all widely exhibited painters. Walter, the youngest son, specialized in watercolour landscapes and scenes of people from all walks of life, many of which survive in collections.[6–8]

Walter Goodall (1830–1889) is unlikely to have painted the "W. Goodalls" because: (1) In spite of there being hundreds or even thousands of W. Goodall paintings (a life's work, even for a very active painter), there is no reference to Walter having painted anything but watercolour landscapes and scenes with people. (2) The natural history paintings are stylistically unlike Walter's work illustrated in copies of eight of his paintings held by the Witt Library of the Courtauld Institute. (3) Conversely, although "W. Goodall" was skilled in representing natural history objects, he could not paint landscapes. When he tried to portray the background around his objects the result was

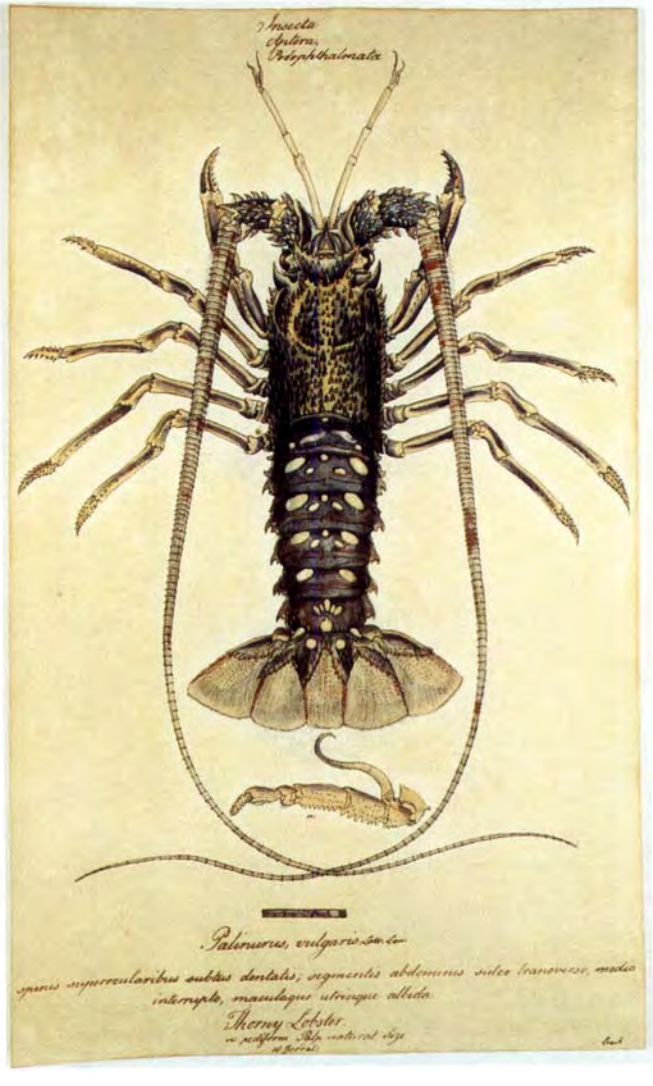


Figure 4. Thorny Lobster, Leach as the reference, watermarked 1811.

amateurish.[3] (4) The watermarks are dated 1794 to 1830, before Walter was born. Although a family of painters could have accumulated a stash of old paper, one might have expected some of the W. Goodalls to have later, contemporary watermarks, if Walter had in fact painted them. (5) "W. Goodall" had a deep grasp of the Natural History of his time. His paintings often showed minute anatomical details of eyes, mouthparts, appendages, profiles and life histories. He wrote and could presumably speak Latin. He knew about classification, but that classification is from an archaic period before 1830. For him, the Crustacea were "Insecta, Aptera". If he were an illustrator working later than the middle of the nineteenth century he would not have used a grouping changed by Latreille in 1810.[9,10] We conclude that Walter Goodall did not paint the "W. Goodalls", but if he didn't, who did?

The first clue to paintership

The first clue came from a painting of a mollusc from the Galapagos, titled "*Chiton Goodallii*", Brod., Goodall's Chiton. Who was the Goodall who had a chiton named after him? Was he the painter? The chiton, the type specimen of which still exists,[11] was named after the Rev. Dr Joseph Goodall (1760–1840).[12–14] Joseph Goodall was educated at Eton[15] and Kings College, Cambridge,[16] and became the 29th Provost of Eton (1809–1840). Much is known about him. He was intensely conservative in all respects, continuing up to the very end of his life to wear the costume of an ecclesiastical dignitary of the 18th century, the barber bringing a newly dressed wig to

Figure 5. Dr. Joseph Goodall, Provost, and Dr. Keate, Headmaster of Eton, 1828. From the silhouette by Augustus Edouart, reproduced from Lyte[17]. His elder brother William may have looked, or at least dressed, like this man of the times.

the Provost's lodge every morning (Fig. 5).[17] His mild discipline earned him the love of his students but the displeasure of King William IV. The Provost overheard him telling Keate, the headmaster "When Goodall goes I'll make you him". Joseph turned to the King with one of his most gracious bows, saying, "Sire, I could never think of going before your Majesty". He didn't, outliving the King by three years.[17,18]

More important for our search, Joseph Goodall was a well-known collector and natural historian. Besides *Chiton goodalli*, his name appears in the genus *Goodallia* Turton, 1822, synonymous with *Voluta*, small cowry-like snails from Europe, and a near relative, *Goodalliopsis orbignyi*, an Eocene fossil. *Azeca goodalli*, Ferrusac, was named in his honour.[19] His collection of drawings was one of the largest in the country.[20] In 1819, for example, he bought 3,275 conchological drawings that Charles Wodarch had been commissioned to make by Napoleon before his deposition.[21] William Swainson, whose name appears as a marginal reference in some of the

paintings, was a founder of Science at the British Museum, and a friend of Joseph.[22] Joseph Goodall came from the right time-period and had the right interests – describing, naming and collecting – to have painted the Goodalls, but he had the wrong first name. However, he had an elder brother called William.[23]

Like Joseph, William Goodall (1757–1844) went to Eton[15] and Cambridge (Christ's College, 1775–80).[24] He was ordained at Lincoln in 1781, became a curate in Berkhampstead, Hertfordshire, and Rector of Marsham, Norfolk (1787–1844).[16]

Marsham seemed a likely place to find a country clergyman interested in Natural History, because of the Marsham Record.[25] Robert Marsham, F.R.S. of Marsham, Norfolk, a contemporary and correspondent of Gilbert White, began a phenological record in 1736, noting the dates of the first indications of spring for 20 species of plants and animals. The record was carried on through five generations of the family until 1947, becoming the longest known list of phenological events. In an attempt to find a signature to match the W. Goodall on the paintings, we visited Goodall's parish church of All Saints in Marsham and confirmed that William was indeed Rector from 1787 to his death in 1844. However, throughout his rectorship, the clergy officiating at birth, death and marriage ceremonies were all curates.[26] There were signatures of the previous Rector, Nathaniel Ponder, some visiting Rectors and numerous curates, but there were no signatures of William Goodall. He was an absentee Rector, his position a sinecure. This explains the cryptic comment in the Christ's College register that he was not buried at Marsham.[24] William Goodall must surely have liked the idea of being rector in a community interested in Natural History, so what kept him away from Marsham, and was he indeed the painter of our pictures?

William Goodall of Dinton

The second clue came from noticing the "Dinton" that occurred in very small script below the signature in only two of the more than 200 paintings (Figs. 1,9). In five paintings, "Dinton" was given as the locality of subjects that could have been drawn from life (Carp, Marsh Limnaea, Muddy Limnaea, Ovate Limnaea, Ear Snail – painted extended from its shell). These "Dintons" linked W. Goodall the painter to William Goodall the Rector, for Dinton is named as the seat of William Goodall in the Cambridge biographical register.[16]

On 15 April 1788, Joseph Goodall officiated at the marriage of his brother to Rebecca (1767–1853),[27] the daughter of Sir John Van Hattem (1725–1787),[28–30] magistrate and Lord of the Manor at Dinton Hall, Dinton, Buckinghamshire.[15,16] Sir John died in December, 1787, only months before his daughter's marriage. There is no record of him marrying, but he left most of his estate to his daughter, Rebecca Van Hattem.[28] In his will he refers to her as " ...lately called Rebecca Dorsett, now at boarding school....". Dorsett is a common local name, so Rebecca may have been adopted and/or a love child.[18,31] William presumably met Rebecca in Berkhampstead St Peter, Hertfordshire, where he was a curate in his late 20's and she was a 19 year old girl at the boarding school run by Miss Emilia Smith. Rebecca and William's son was born on 5 May 1788 and christened William Goodall Van Hattem on 2 June, but he died in August.[31,32] William moved to Dinton Hall on 25 October, 1788,[33] where Joseph often visited them, changing horses at Aylesbury on his ride from Eton.[29] Life with a new

Figure 6. Signatures of William Goodall, Curate of Berkhampstead St Peter, Hertfordshire resemble those of W. Goodall of Dinton, artist. The five signatures on the left are from the parish registers and are in an expansive cursive script [34]. Those on the right are a selection of the neat, almost printed signatures, from the paintings named in the right hand column. To make comparisons easier they have been reproduced similar in size. In spite of the differences in writing style, there are general similarities between both columns of signatures, slope of the script, shape of the W, G and oo, flourish on the d. The bottom pair are almost identical.

wife as Lord of the Manor at Dinton Hall was much more attractive than looking after a dreary Norfolk parish. William and Rebecca went on to have a long life together with fifteen more children, most of whom survived childhood.

William's signatures in the birth and death registers match those on the paintings (Fig. 6). [34] So do later signatures on letters to the Rev. Thomas Brooke Clarke, Vicar of Ss Peter & Paul, Dinton in 1825 (Fig. 7).[35] The Goodall line carried on at Dinton into the 20th century. His son James Joseph Goodall (1800–1886), inherited his uncle Joseph's "vast accumulation" of fossils and shells,[18] and 50 volumes of watercolour drawings of birds, animals, butterflies and plants from his father. James Joseph's son Liebert Edward Goodall (1842–1918) was also a naturalist and collector from childhood. He gave up his career in the army to manage the estate when his elder brother, William Alexander Goodall (1839–1876) died without marrying. Liebert's widow, Philadelphia Bruce Lee, died in 1920 and the estate passed to their adopted son, Lt. Col. Malcolm Goodall. With the break up of the estate, 50 volumes of Natural History Art came on the market at auctions in 1921 and 1926.[18] Ms. Dennis, the proprietor of Weyhe's Gallery, says that their paintings came from England some years before World War II.[1] A portrait of Sir John Van Hattem,[30] now in the Fitzwilliam museum, was put up for sale In 1926, but withdrawn before being finally sold not long before the death of the last of the line, Lt. Col. Malcolm Goodall,1888–1974.

Figure 7. Signatures of William Goodall, Lord of the Manor at Dinton Hall resemble those of W. Goodall, artist, Dinton. The signatures on the left are on letters from William Goodall, Dinton, to the Rev. Thomas Brooke Clarke, Vicar of Ss Peter & Paul, Dinton in 1825.[35] Those on the right are a selection from the paintings named in the right hand column. The "Dintons" on the right are with the name Goodall in Fig. 1, and given as localities in paintings of the "Marsh Limnaea",[2] "Muddy Limnaea", "Ovate Limnaea"[2] and the "Ear Snail". In the originals the William Goodall signatures are larger (28–35mm) than the W. Goodall ones (12–14mm) as are the "Dintons", (15–18mm cf 9–12mm). To make comparisons easier they have been reproduced similar in size. Although the Goodall signature, and Dinton written in the letters, are in a rambling cursive script, there is a general resemblance to the tiny precise lettering of the pictures (similar slope, shape of W, d, some Gs). The last pair of "Goodalls" are almost identical.

The nature of the Goodall paintings, are they the originals used by engravers?

The Natural History Museum, in London received a bequest of 191 Goodall paintings from a Mrs Ann Hull Grundy who had bought them at auction many years earlier.[36] She supposed that they were the originals for pictures in Donovan's *British Insects*, an attribution treated with some skepticism by the Entomology Library, for there is a note on the Goodall folder "Original watercolour copies from various works on British Entomology".[37] In the original Weyhe's boxes we had found prints together with paintings that suggested that there might be a relationship between them. Were the prints taken from Goodall's originals, or was Goodall copying the prints for his amusement, as so many Victorian young ladies were wont to do?

We first established that similarities between paintings and prints could only be interpreted as a relationship in their genesis. We looked for arrangements and inessential details that would be expected to be randomly different. Such features showed a connection between the paintings and the prints in Donovan (Figs. 8–10).[38] The painting of the "Purple High Flyer Butterfly" (now more commonly known as the purple emperor) resembles the print except that the position of the pupa is reversed and the painting includes a depiction of the underside in addition (Fig. 8). The stem, leaves and unnaturally twisted proboscis (inset) might be expected to be at random, but their

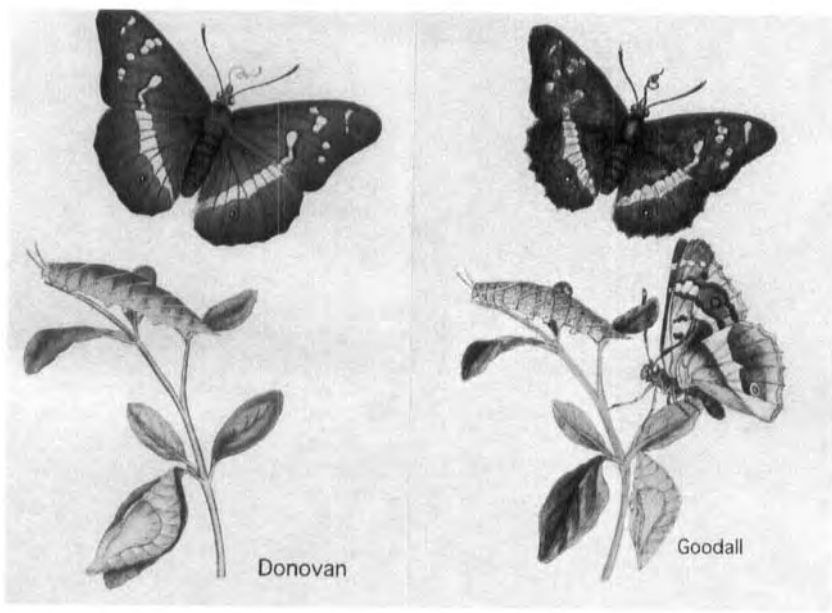


Figure 8. The painting of the "Purple Emperor Butterfly" (Plate XXXVII, 37, p. 3) resembles the print except that the painting includes a depiction of the underside and the position of the pupa is reversed. Although the arrangements of the stem, leaves and spiral proboscis (inset) might be expected to be random, they are identical.

arrangement is almost identical. The painting of the "Small Tortoise-shell Butterfly" resembles the print except for the position of the caterpillar. The Hop leaves, which might be expected to be variable, are identical (Fig. 9). Amoebae are by their nature constantly varying in shape, but the painting of *Proteus diffluens* has expanded and contracted animals with exactly the outline of those in the print, although they differ in their positions on the page (Fig. 10). There is a scale in the painting that is absent in the print (Goodall often put in scales that are absent in the corresponding prints). The detailed similarities allow us to conclude that there is a relation between prints and paintings, but they do not tell us which was the source material. We therefore looked for differences between the paintings and the prints, such as the insertion or correction of errors, that might suggest which came first.

Some errors in the prints have been corrected in the paintings (Fig. 11). In the forelegs of *Squilla Mantis* the engraver, ("R.P.Nodder *sculptit*", perhaps a son of F.P. Nodder) has made a mistake in the pattern of the cuticle on the raptorial forelegs.[39] The pattern is asymmetrical as though the original drawing was reconstructed using two legs from the same side. The pattern is correctly depicted in the painting. If the engraver was using Goodall's picture as his original he made an error in copying, although it seems unlikely that an experienced engraver would make such an elementary mistake. Conversely, a knowledgeable naturalist copying the print might be expected to notice and correct the mistake. Similarly, he might add a scale, feeling that it would make the figure easier to understand. In a painting of "*Gymnotus Electricus*" (not shown) Goodall omits three spots indicating openings of the lateral line that are present in an F.P. Nodder print (published by F.P. Nodder & Co., Feb. 1st, 1798). An engraver would be unlikely to make up such a detail, but a copier might not notice the deficiency.

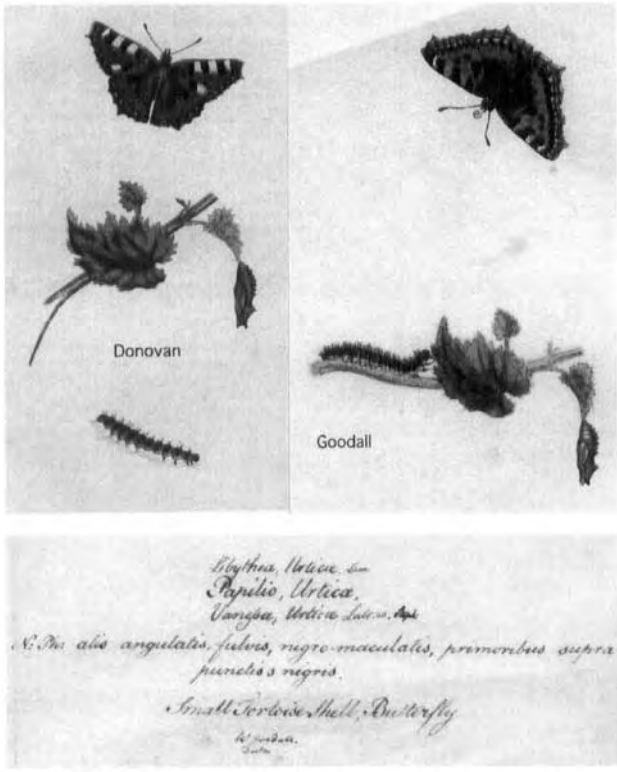


Figure 9. The painting of the "Small Tortoise-shell Butterfly" (Plate LV, 55, p. 49) resembles the print except for the position of the caterpillar. The hop leaves, which might be expected to be variable, are identical. The heading to the painting has "Dinton" written below the signature.

Occasionally, both matched prints and paintings perpetuated gross errors. For example, two tapeworms, *Taenia vulgaris*, (not shown) were joined to create one long organism tapering at both ends. The mistake probably came when the original artist was given two worms preserved in the same bottle and presumed they were a single specimen broken into two. Did Goodall make this mistake and pass it on to the engraver, or did he perpetuate the engraver's error? Interpretations of the differences between prints and paintings are not as helpful in determining the source material as one might have hoped, but in general they favour the idea that Goodall was copying the prints and adding details of his own.

One print is a mirror image of the painting. The painting of the spiral shell of a gastropod is the mirror image of the print (Fig. 12). Nearly all gastropods are dextrally coiled with the mouth of the tube facing obliquely to the right, like a wood screw, as in the painting.[40] The shell in the print has a sinistral coil. To achieve the correct representation of a shell, an engraver must make a mirror image copy of the original on his plate. The engraver (R.N.) has failed to appreciate that coiling has a handedness and has engraved the snail image directly on the plate, converting a dextral engraving into a sinistral print. Goodall either corrected the error if he was copying, or he drew from life.

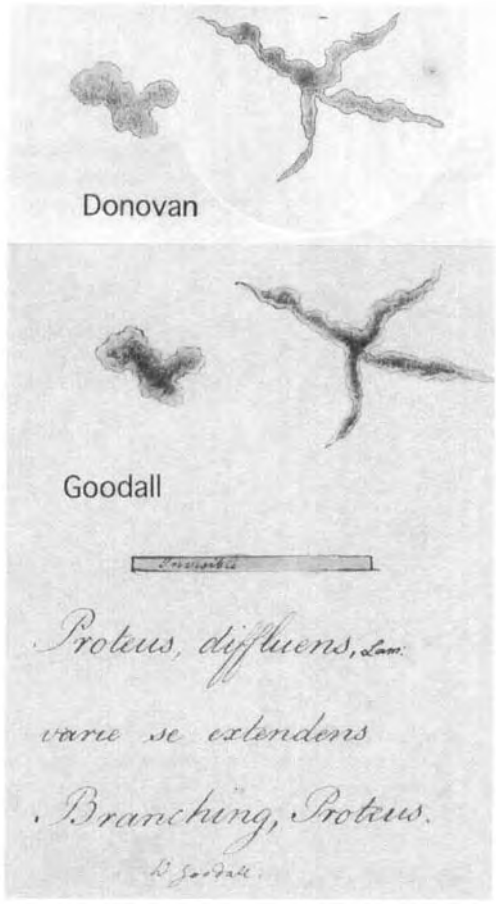


Figure 10. Amoebae are by their nature constantly varying in shape, but the painting of *Proteus diffluens* (Plate XLVII, 47,l, p. 27) describes expanded and contracted animals with exactly the outline of those in the print but with different positions on the page. The scale in the painting is omitted in the print (as it is in several others).

William may have been preparing to help Joseph, who was critical of Swainson's illustrations, offering to help him make corrections.[41]

Conclusive proof that at least some of the paintings are copies came by matching three paintings on paper having watermark dates with prints from a book with a known publication date (Fig. 13). The Goodall paintings of "*Trichoda Lynceus*" and "*Trichoda Bomba*" share the same sheet, "*Vorticella Polymorpha*" is on another sheet. Both sheets are watermarked 1797. These three microorganisms are identical to figures in Donovan. Donovan's book is marked MDCCXCIII.[38] Unless the book repeats the date of publication for an earlier volume we have to conclude that the book came first. The short time difference suggests that Goodall may have acquired books specially to satisfy his need to copy from them.

In our collection of paintings, 102 were on watermark-dated paper. Mrs Ann Datta, Librarian at the Natural History Museum, matched 75 of these with prints in dated publications. Six prints were published before the watermarks on the paper of matching

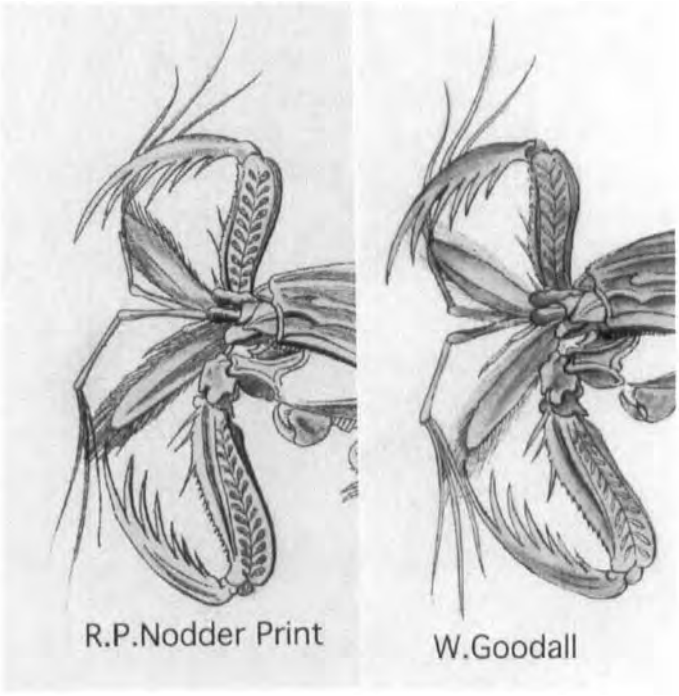


Figure 11. Errors in prints are correct in the paintings. In the raptorial forelegs of *Squilla Mantis*, the engraver has made an error in the cuticle pattern caused by the insertion of muscles.[39] The pattern is asymmetrical as though the original drawing was reconstructed using two legs from the same side. The pattern is correctly depicted in the painting.

paintings (Table 1). These paintings could therefore not have been created before the prints and were presumably copied from them. If William used old paper, he could also have copied the prints published after the watermarks on the corresponding paintings.

Table 1. Some prints matched with Goodall's paintings were published before the watermarks on the paper he used. These paintings could therefore not have been painted before the prints and were presumably copied from them. Matching by Mrs Ann Datta, the Zoology Librarian, NHM.

Topic	Print reference and date	Painting watermark
Scorpio afer	Shaw and Nodder, April 1, 1792 Naturalists Miscellany, Vol 3, Plate 100	1794
Vermiculum oblongum	George Montagu, 1803 Testacea Brittanica, Vol 2. Plate 14, Fig. 9.	1804
Limnaea glutinosa, Limnaea aurucularia	George Montagu, 1803 Testacea Brittanica, Vol 2. Pl. 16 Figs. 2 & 5.	1804
Voluta hyalina Voluta bidentata	George Montagu, 1803 Testacea Brittanica, Vol 2. Pl. 30	1811
Vermetus inopertus	E. Rüppell, 1828–1830. Atlas zu der Reise im nördlichen Afrika	1830
Parmophorus australis	E. Rüppell, 1828–1830. Atlas zu der Reise im nördlichen Afrika	1830

Why was William such a prolific painter?

Fifty volumes of paintings were listed in his estate. He lived at Dinton for 56 years, giving him time to accumulate roughly a volume a year. If each volume contained 112 paintings (the number in the Fitzwilliam Museum volume) he would have had to paint about two a week, a leisurely life's work, a delightful hobby for a dedicated naturalist who loved to paint. But was there a purpose to his activity?

William had no access to live whales or the larvae of foreign butterflies, so that he must have copied many of his paintings from printed works. This does not mean that he copied all of them. Some are probably original or partly original. Many paintings suggest observations on live or newly caught organisms. For example, Fig. 9 has a life-like caterpillar in a different position from that in the print, while Fig. 8 has the underside of the Purple High Flyer butterfly added. Fig. 1 has the natural colouring of a live carp, perhaps from the fish ponds at Dinton Hall. Some local snails have their tentacles extended (not shown). Lepidoptera in the South Kensington collection have many localities from the home counties.[37] Even paintings known to have been copied contain corrections or some new element to improve the presentation. For example, Donovan's *Vorticella viride* is grey, but William has painted it green to match the description (Fig. 13).

William lived in a more leisurely age when the only way to create a visual archive was to paint, much as we might now collect photographs. His pursuit of images probably satisfied his inclinations to paint, to collect and to study natural history combined in the one activity. He was following in the footsteps of Sir Hans Sloane (1660–1753) but on a smaller scale, for Sloane's collection of manuscripts alone took nearly 4,000 pages to catalogue. He thus created his personal museum, a good part of which was a paper museum.[42]

William could have been planning to use some of the illustrations for a work on British shells. Joseph, in a letter to William dated November 10th, 1822, says "Not one stroke of work have I done to my British shells since the end of March".[23] Was this a reference to sorting his collection, or to the arrangement needed for an illustrated book? In the *Limnaea* shells with a Dinton locality reference, William refers to Goodall where he usually inserted well-known textbook authors. Is this a reference to his brother's collection, his own, or to a future publishing enterprise?

What manner of man was William Goodall?

William was a naturalist, a descriptive morphologist, a cataloguer, and a prolific painter of industry and skill. But he achieved much more than this. He kept up and illustrated the "Dinton Album", an historical record of the estate begun by Sir John Van Hattem.[33,43] In William's time the Dinton estate of arable land, grass and ponds extended for about 1,000 acres up to the river Thame. He had a large collection of guns. His game book from 1825–1830 tells us something about his activities as lord of this estate.[44] A season's bag was 150 to 250 head with ten brace of partridges in a day as the largest bag. He shot hares, rabbits, snipe, pheasants, moorhens, jack snipe, water rail, quail, various ducks, as well as herons (sometimes eaten), ravens and magpies.[44] He shot twice a week, killing enough game to satisfy the needs of his household.

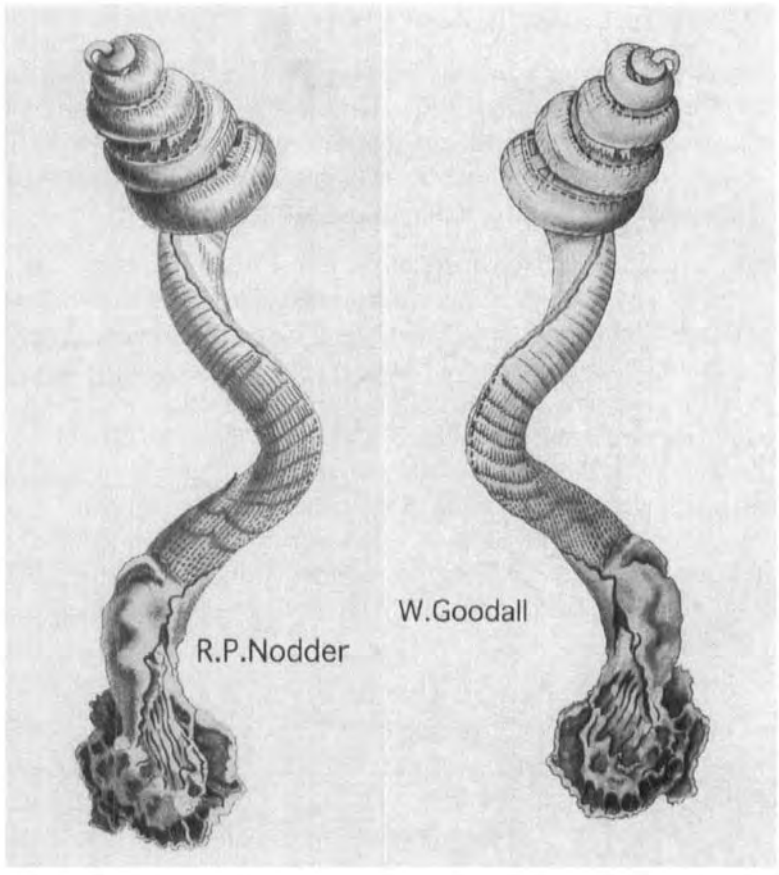


Figure 12. The painting of the spiral shell of a Gastropod, *Siliquaria*. Syn. *Tenegodus*, family Siliquaridae (in Goodall's classification it is a Serpulid worm, "Vermes, Testacea. Sedentes, *Siliquaria anguina*, Lam. Chain-sided Serpula", watermarked 1801, reference Shaw), is an exact mirror image of the print engraved by R.P. Nodder in J. Shaw & R.P. Nodder, *Naturalists miscellany*, Vol. 14, Plate 571, 1790–1813. The sinistral helix in the print is an error of engraving.[40] Goodall's dextral spiral is correct in its orientation.

Dinton Hall was a large, part Jacobean house, with a long and famous history going back to the Saxons.[45] Three generations of Van Hattem's lived there before William became a magistrate.[43] The Hall gave William a lofty status, much higher and with more freedom than he would have had as Rector of Marsham. William lived as a young curate in the racy years described by Henry Fielding (1707–1754) in *Tom Jones* (1749). Fielding, like William, was educated at Eton. It should be noted that William married Rebecca in April 1788, only three weeks before their first son was born.[32] However, society changed dramatically during William's lifetime, with Victorian prudery replacing Georgian indiscretion. The mausoleum erected in the Dinton churchyard after William's death does not mention the 1788 birth at Berkhampstead, but only the second William, born and died in 1791.[46] Was William a "white knight" rescuing a (wealthy) maiden in distress, or did he forget his dashing early years as he grew more conservative, concealing an act that changed from a minor indiscretion to a misdeed as the century progressed?

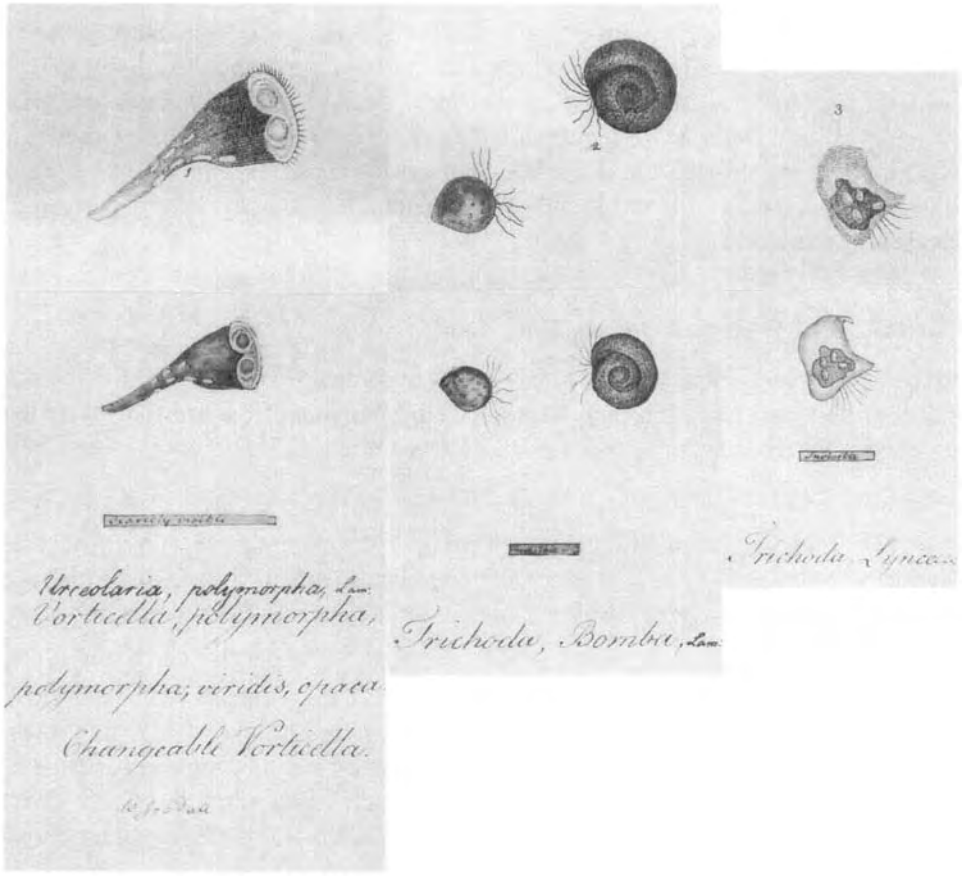


Figure 13. Paintings identical to Donovan prints have watermarks after the book publication date, suggesting that Goodall copied the Donovan. Three microorganisms figured in Donovan[38] have been correlated with Goodall paintings on paper having watermarks. "*Trichoda Lynceus*" (Plate XL, 41. 3; p. 12), "*Trichoda Bomba*" (Plate XLVII, 47 ; p 27) and "*Vorticella Polymorpha*" (Plate XL, 41, 1; p 11), are all identical to the Goodall paintings. The two *Trichoda* share the same sheet, *Vorticella* is on another sheet. Both are watermarked 1797. Donovan's book is dated MDCCXCIII, four years earlier.

William Goodall lived only a generation before Charles Darwin (1809–1882), who was from a similar social class and also educated at Christ's College, Cambridge. Like Darwin, Goodall had the free time to develop a prodigious knowledge as a naturalist. He kept records of localities and distributions. He painted protozoa and probably owned a microscope. He was a morphologist, drawing the mouthparts of crustacea and insects in the meticulous detail used by systematists. He handled fossils and must have had some thoughts on their relation to living forms. Goodall and Darwin were both good with a gun, ardent naturalists, observers, cataloguers and collectors, but the two came to differ fundamentally in their beliefs. Paley (1743–1805) and Cambridge, followed by a rich country living, kept Goodall a traditional clergyman, recording the beauty of nature in order to confirm the existence of God. Paley had proposed an answer to questions about the way that animals seem to be perfectly designed for survival in their particular ways of life.[47] He argued that sensible animal design was evidence for

an intelligent designer, that is, God. These ideas initially appealed to Darwin, but his *Beagle* experience made him invert the logic, life influencing design. Darwin used his data on sensible animal design as a scientist to confirm hypotheses. In a letter to Henry Fawcett he wrote "...all observation must be for or against some view if it is to be of any service".[48] While Darwin was incubating ideas for the *Origin of Species*, Goodall was brooding over the unsuitability of a late hour for evensong and the risk it posed that "indecencies and acts of prostitution" would be perpetrated by his Dinton parishioners released into the darkening churchyard.[35]

A brief Life of William Goodall, 1757–1844

Birth: 22 February, baptized 5 March, 1757 at St James's Westminster. Firstborn son of Joseph Goodall and Ann, née Lupton, of the parish of St Martins in the Fields, Middlesex, where they were married on 24 December, 1755.

Schooling: 1767–1775, King's School, Eton, under Dr Davies.

University: Matriculated Michaelmas Term, 1775. Admitted to Christ's College, Cambridge, 30 October as a Pensioner under Dr Shepherd and Messrs Paley and Parkinson. 1776: Scholar of Christ's College on the Durham Foundation. 1780, B.A. 1785, M.A.

Occupation: Ordained Priest at Lincoln, March, 1781. Later that year, licensed as a curate to Berkhamstead, Hertfordshire. His earliest paintings may date from this time. Some paintings in the Fitzwilliam Museum collection are of common garden plants like Southernwood and local flowers such as Broad Leaved Orchids. These give the locality as Berkhamstead. They are marked with an asterisk, his shorthand notation for "painted from life"

13 April, 1787: Rector of All Saints Church, Marsham, near Aylsham in Norfolk until his death in 1844. The position was a sinecure. He was an absentee Rector. Parish work was performed by a succession of curates, notably James Bingle from 1802–1832, followed by William Jewell and Henry Evans.

Family: December,1787: death of Sir John Van Hattem, Lord of the Manor at Dinton Hall Buckinghamshire. Sir John's daughter Rebecca Van Hattem (1767–1853), called Rebecca Dorsett when she was at boarding school in Berkhamstead, became sole heiress to the estate.

William married Rebecca Van Hattem on 15 April, 1788 making him Lord of the Manor at Dinton Hall and a Justice of the Peace (Magistrate) for Bucks. Their first son, William, was born 5th May, but did not survive infancy. They went on to have 15 more children. On several occasions William notes how he "had many years of wedded happiness". Income from the estate and his sinecure rectorship gave him the time to collect, paint and procreate. His work formed a collection of wildlife paintings probably numbering several thousand.

William died at Dinton Hall on 19 March,1844. He is buried in the Churchyard of SS Peter and Paul adjacent to the Hall. His son, James Joseph Goodall (1800–1886), erected a Mausoleum engraved with much of the family history, sadly defaced by time.

Acknowledgements

Scott and Margaret Henderson started us off on this journey by finding many of the early clues. Eric Classey, that giant store of all things entomological, led us to the Natural History Museum, where we were greatly helped by the Entomology Librarians, Ms Julie Harvey and Ms Pam Gilbert and especially by Mrs Ann Datta, the Zoology Librarian. We are indebted to Ms. P. Hatfield, Archivist of Eton College for our first major find, the letter from Joseph to his older brother William; we are grateful to Eton College for permission to quote from that letter. My friend from Cambridge days, Dr. David Dewhirst, found William in the Christ's College records for us. Professor Dave Scott told us about the Marsham record. Dr. David Scrase, Keeper at the Fitzwilliam Museum, gave us one of our most exciting moments when he produced the painting of William's father-in-law, Sir John Van Hattem.[30] Ms Sally Mason, the Bucks. Archivist, found letters from William when he was Lord of the Manor and Ms Serena Williams, the Hertfordshire Archivist helped with William's signatures when he was a curate. Stella and David Young were most gracious in introducing us to Dintonians and were our inspiration for learning about Dinton. Our great friend, Professor David S. Smith, gave invaluable help with the gift of an original Donovan volume. Timothy Locke and Ian Craig helped with some of the photography. Lastly, we are greatly indebted to the local historian Alan J. Dell, for enthusiastically introducing us to his extensive earlier work on Dinton Hall and the Goodalls.

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Library

The departure of Mishu from the Library is mentioned elsewhere. Although there will be a new appointment later in the year, there will be an interim period when there will be only one person in the Library. Advance warning of your requirements will help avoid delays and disappointments.

As this goes to press, the summer student helpers are finishing off the massive clearing and sorting exercise which has been going on for the past 6 weeks. This year we had Axel Anfält and Erin Strand from Sweden, Gabrielle Bayon from Paris, a succession of Spanish girls from Madrid (Esther Tolmos, Iria Casals and Blanca Golmayo), Rebecca Frater, Rebecca Lock and Nicola Morris from London, Bettina Furley from Heidelberg, Nikola Chavdarov and Yana Kambitova from Bulgaria and Erika from Rome from mid-July to late August. As the book hoist motor burnt out at the beginning of July they have had to hand carry box after box of conservation publications (received from Richard Fitter) from the East Basement up to the Reading Room for sorting. The Piccadilly side store was repainted in the early summer so dust from that exercise had to be removed first before shifting everything around to make way for the "new" intake. General cleaning and housekeeping tasks will finish off the last few days: the Library carpet will get its annual clean, horrifying all concerned with the extracted grime!

Most of the material we received from Richard Fitter has now been sorted. The journals have been assimilated with our previous holdings, adding to our rich records of UK Natural History Societies as well as worldwide wildlife conservation: over 200 new journal titles have been added. The conservation "monographs" have joined boxes of similar material received from Prof. G.Ll. Lucas and will be catalogued more gradually. They remain in temporary storage in the Gallery but some order has been achieved. Boxes of more ephemeral material such as trail guides and conservation leaflets will remain low priority for the moment. Clearance of an old boiler room will give us an accessible new store for conservation archives once it has been redecorated. This will house the Council for Nature archives and the combined IUCN/WWF records from R. Fitter, G.Ll. Lucas and Max Nicholson, as well as a growing number of archives of past Fellows.

Donations

The following presents to the Library were received from May to the end of August 2001. A number of smaller catalogues, journals and more ephemeral items have not been separately listed due to space limitations.

Prof. M. Akam	Benson, C.W., *Type specimens of bird skins in the University Museum of Zoology, Cambridge, UK,* edited by K.A. Joysey, 221 pp., illustr. some col., Tring, British Ornithologists' Club Occasional Publications No. 4, 1999.
Dr S.I. Ali	Ali, S.I. & Qaiser, M. eds., *Flora of Pakistan, No 202 Iridaceae.* 35 pp., illustr. some col., Karachi & St Louis, 2001.
	Ali, S.I. & Qaiser, M. eds., *Flora of Pakistan, No 203 Salicaceae.* 60 pp., illustr., map, Karachi & St Louis, 2001.
Brooklyn Botanic Gdn.	Jones, Patricia, guest ed., *Japanese inspired gardens,* 111 pp., col. illustr., map, New York, Brooklyn Botanic Garden, 2001 (Handbook No. 166).
	Appell, Scott D. ed., *The potted garden, new plans and new approaches for container gardening,* 111 pp., col. illustr., New York, Brooklyn Botanic Gdn, 2001 (Handbk. No. 168).
Julia Bruce	Brown, Janet, *The pursuit of paradise, a social history of gardens & gardening.* 377 pp., illustr. some col., London Harper Collins, 1999.
Prof. A.K. Campbell	Campbell, A.K. & Matthews, Stephanie B., *Lactose intolerance and the MATHS syndrome*...31 pp., figs, Cardiff, Welston Press, 2001.
M. Campbell-Culver	Campbell-Culver, Maggie, *The origin of plant: the people, and plants that have shaped Britain's Garden History since the year 1000.* 260 pp., illustr. some col., London, Headline, 2001.
J.D. Chapman	Chapman, J.D. & Chapman, H.M., *The forests of Taraba & Adamawa States, Nigeria, an ecological account and plant species check list.* 145pp. (+ 75) Illustr., maps, Christchurch NZ., for WWF & DFID, by Univ. Canterbury, 2001.
Chatto & Windus pubs.	Raby, Peter, *Alfred Russel Wallace, a life.* 340 pp. ilustr., London, Chatto & Windus, 2001.
Dr C.J. Clegg	Clegg, C.J., *Genetics and evolution.* 91 pp., illustr., London, J. Murray, 1999.
	Clegg, C.J., *Introduction to advanced biology,* 518 pp., col. illustr., London, J. Murray, 2000.
Fuller, Errol	Fuller, Errol, *Extinct birds.* 398 pp. illustr. some col., Oxford, Oxford University Press, 2000.
Galton Institute	Peel, Robert A. & Timson, J. eds., *A century of Mendelism,* (Proceedings of a conference), 80 pp., London, Galton Institute, 2001.

Geneva Conservatoire & Jardin Botanique	Spichinger, Richard & Ramella, Lorenzo, *Flora del Paraguay, No. 33 Polygonaceae* by A.M. Cialdella & J. Brandbyge, 106 pp., illustr., maps, Geneva, Cons. & Jard. Bot., 2001.
	Flora del Paraguay, No. 34. Caprifoliaceae, by R. Bolli, 13 pp., illustr., map, Geneva, Cons. & Jard. Bot., 2001.
W.H. Hardie	Hardie, Nell, *Border memories and wildflowers of the Scottish borders.* 81 pp., col. illustr., Glasgow, William Hardie Ltd., 1992.
Hunt Inst., Pittsburgh	Pittsburgh, Carniegie-Mellon University, Hunt Institute, *Enduring perfection, paintings by Damodar Lal Gurjar.* Catalogue of an exhibition curated by James J. White & Lugene B. Bravo. 44 pp., col. illlustr., Pittsburgh, Hunt Institute, 2001.
Prof. B.E. Jonsell	Jonsell, Bengt, Editor in chief, *Flora Nordica, Volume 2, Chenopodiaceae to Fumariaceae,* 430 pp., illustr., maps, Stockholm, The Bergius Foundation and Royal Swedish Academy of Sciences, 2001. ISBN 91 7190 037 3.
Prof. S.L. Jury	*Flora Europaea on CD-ROM,* 1 CD-ROM, Cambridge, Cambridge University Press, 2001.
Kew, Royal Bot. Gardens	Halliday, Pat, *The illustrated rhododendron...* 268 pp., col. illustr., Kew, Royal Botanic Gardens, 2001.
	Prendergast, Hew D.V., Jaeschke, Helena and Rumball, Naomi, *A lacquer legacy at Kew in the Japanese collection of John J. Quin.* 100 pp., col. illustr., Kew, Royal Botanic Gardens, 2001.
	Sprent, Janet, *Nodulation in legumes,* 146 pp., illustr. some col., Kew, Royal Botanic Gardens, 2001.
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