Editorial

One of the historical articles in this issue of *The Linnean* concludes that the Society has in its possession Robert Brown's microscope. Brown (1773–1858), possibly the greatest of all British botanists, is most universally known for his description of the phenomenon we call Brownian movement; what perhaps is less widely appreciated is the effect his death had on the history of our Society.

Robert Brown died in June 1858 and the June meeting of the Linnean Society for that year was adjourned at the request of the President, Dr Thomas Bell, as a token of respect to Brown's memory. The scientific papers which were to have been read were deferred to a subsequent meeting. Most importantly for science, this adjournment coincided with Charles Darwin's receipt of the famous letter from Alfred Wallace on 18th June 1858.

A special meeting for the Linnean was subsequently called for 1st July 1858 to elect a council member for the next session to replace Robert Brown. In the meanwhile Darwin had consulted Sir Charles Lyell and J. D. Hooker as to his course of action regarding Wallace's manuscript. Hooker, whose paper had already been deferred from the June Linnean meeting, agreed that it should be further deferred and that in its place he and Lyell should communicate Darwin and Wallace's paper

"On the Tendency of Species to form varieties, and on the perpetuation of varieties and species by natural means of selection . . ."

The communication was accordingly read by the Secretary of the Society as was the custom in those days and there was no discussion. Subsequently, in his Presidential address for the year covering this historic communication, Dr Thomas Bell remarked "It has not, indeed, been marked by any of those striking discoveries which at once revolutionize so to speak, the department of Science on which they bear, it is only at remote intervals that we can reasonably expect any sudden and brilliant innovation which shall produce a marked and permanent impress on the character of any branch of knowledge, or confer a lasting and important service on mankind".

In a previous issue we noted that this Society was fortunate to possess Wallace's journal and notebooks. Our library also contains a considerable collection of drawings, manuscripts and letters of 18th and 19th century naturalists. These include John Ellis's manuscripts, Richard Pulteney's papers, Edward Davall's journal, William Swainson's correspondence and the papers of A. and W. S. Macleay. The library, which specializes in taxonomic works and biological publications of historical interest, is open to Fellows and Associates and most books can be borrowed by those resident in the U.K.

SOCIETY NEWS

Important Notices

Annual Contributions

The amendments to the Bye-Laws as proposed in the last issue (*The Linnean* 1(3): 1) were balloted for and duly passed on 6 December 1984. (See the Treasurer's Report in this issue for reference.) These contributions will be implemented for new Fellows and Associates on their election on or after 14 February and for present Fellows and Associates before 24 May 1985. Those with Direct Debit Mandates will have the figures automatically adjusted on the due dates, see the President's letter of 14 December 1984; those with standing Bankers Orders are asked to ensure that these are now amended. Fellows who require invoices and who have not already let the office know are requested to do so without delay.

ICSEB III

The Society is one of the sponsors of the International Congress for Systematic and Evolutionary Biology being held in Brighton, 4–10 July 1985. It is also involved in the running of two of the Symposia: *The Evolution of Marine Meiofauna,* coordinator Dr H. M. Platt, F.L.S. and *Random and Directed Events in Evolution,* Dr S. Jones, F.L.S.

Full details of the complete programme may be obtained by writing to Prof. Barry Cox, c/o I.C.S.E.B. Congress Office, 130 Queen's Road, Brighton, East Sussex BN1 3WE.

Expedition

The Society has agreed to join forces with the Royal Geographical Society in an expedition to Australia in 1988. To ensure that long-term planning gets off to a good start a subcommittee has been formed, with members of our Bicentenary Committee providing the Linnean input. The Committee wishes to hear from anyone who is interested in helping with the initial organization, and in due course with particular projects probably in the arid zones of the north of Australia. Correspondence to Burlington House.

Specialist Group—Computer Applications in Biology

This group is being formed to act as a forum for the informal exchange of technical information, views, experiences and future plans associated with the use of computers in the biological field. The intention is to embrace a very broad spectrum of applications including crop biology, systematics, ecology, genetics, developmental biology and physiology, and to appeal to a range of interests from those of the staff of a large team with a main frame computer to the home enthusiast with a micro.

The group will be open to anyone interested, regardless of whether they are Fellows of the Society. Any meetings or newsletters will of course be free to members of the Society but costs will be recovered by a small charge to others.

The inaugural meeting will be at 16.00 hours on Thursday, 31 January 1985.

Regional Meetings

The 1985/86 programme will include a meeting at Malham Tarn, and another meeting is provisionally planned for the West Midlands the following year. The Programmes Committee is now planning scientific meetings up to three years ahead and welcomes suggestions from Fellows for venues and topics, especially for 1986 and 1987.

Notes

Format

We have now incorporated all the Proceedings for the previous year in this issue; Nos. 5 and 6 will therefore contain only news, programme affairs and historical articles. This pattern will continue in the future—with the Proceedings appearing as a single package in the Christmas issue.

Fellows who wish to keep complete issues of Proceedings should note that they will need to retain Volume *1*, Nos. 1, 2 and 3 as each contains a part of the 1982/83 Proceedings.

Errata

On 31 January 1985 Mr Paul Hulton will be talking to us on James Bruce. We apologize for turning the 'l' in his name into a 't'. We also apologize for the misspelling of Professor B. C. Clarke ('Clowke') on the Council list on the first page of *The Linnean 1*(3). Also in the same issue, on page 4 in the list of new Fellows it should of course be 'Prof. William A. Weber' (not Web), while on page 28 of Volume 1, No 2 it should read Seaward, M.R.D. (not Seward).

Anniversaries

With our bicentenary only 4 years away we are now becoming increasingly aware of important milestones in the histories of other societies. Fellows are asked to let us know in very good time of any events, especially those occurring abroad, which they feel should not go unmarked by the Society and of which we, in the office, may be unaware. During the course of 1984 we sent congratulatory messages to:

The Asiatic Society, Calcutta—200 years on 11 January 1984;

Bootham School, York, Natural History Society—150 years on 23 February 1984;

La Société Mycologique de France—100 years on 24 September 1984.

The Social Scene

In spite of gloomy prognostications the Willi Hennig meeting proved to be so popular that the reception filled the Library to capacity. Piccadilly was in danger of running short of wine and the office of blank Forms of Recommendation.

The reception held in honour of Irene Manton was very much enjoyed by all who attended and many who were unable to do so were sad to miss it. In addition to a book of collated congratulatory letters and good wishes, which included a poem in Mongolian, gifts included red roses, a fossil and a cheque for

over £1600. She would like very much for us to record her most sincere thanks, and says that the enormous sum collected administered a shock so great that mental paralysis set in, which is in a sense still operating!

Deadlines

The deadlines for copy for the next two issues are 14 January 1985 and 31 May 1985.

Library

Fellows and others wanting to use the Manuscript collections are reminded that, as many of these are housed in rooms used for meetings, it is not always possible to make them available at short notice. Please telephone beforehand so that we can make sure that what you want is available when you want it, rather than waste your time on a fruitless visit.

Conversazione—3 May 1985

We would like to encourage members of the Society to use the Conversazione as an opportunity to display material which they think might be of interest both to the Fellowship and to the Society's guests. Posters as well as working equipment and displays will be most welcome. Please contact the Executive Secretary. Details of the Conversazione will be included in the next issue.

Funds

The *Appleyard Fund* was established in 1968 with a capital sum of £4,200 from the estate of Percy Appleyard, F.L.S. An annual income of approximately £200 is available from which grants are made towards the expenses of research projects in the fields of botany or zoology by Fellows and Associates of the Society who are not in full-time employment as biologists.

The *Bonhote Fund* was established in 1975 with a capital sum received from the estate of the late John Lewis James Bonhote, F.L.S. An annual income of approximately £400 is available from which grants are made to British-born subjects towards the cost of projects related to furthering the knowledge of heredity.

The above funds are administered by a Committee appointed by Council. Applications, on forms available from the Executive Secretary, must be made not later than 31 March each year.

From the Archives, J. Proc. Lin. Soc. (1861)

> The following Account of the Habits of a Species of Australian Ant is extracted from a letter from Sydney, New South Wales, written by Mrs. LEWIS HUTTON, and communicated through ROBERT PATTERSON, Esq., by the SECRETARY.
>
> [Read April 5th, 1860.]
>
> "ONE very hot and cloudless day, when not a breath of air stirred the leaves, my eldest boy (four years old), coming up from the beach fatigued and hot, threw himself on a grassy mound near where I was sitting, and remained quietly enjoying the rest and

anticipating the pleasure he would have in showing to his sister the pretty shells and corals he had found. I was startled by a sudden scream, such as one only gives when in terrible pain; a snake was my first thought, and in horror I went to the child, but was at once reassured on seeing him covered by 'Soldier Ants,' on whose nest he had unwittingly lain down. Some of the insects still clung on with their forceps and stung my poor boy, who roared with pain at every fresh attack, whilst I killed them as fast as I could, assisted by the nurse. At length all were removed, about twenty being left dead on the ground. Going to see the little fellow bathed with something to ease the pain, I was absent about half an hour, and then returned to the same place, when I saw a large number of the Ants surrounding the dead ones. Being fond of natural history and having read much concerning the instinct of Ants, I determined to watch them closely now. At least four ran off very quickly, and I followed them until I saw them enter a hillock containing an Ants' nest which we had, in vain, tried to get rid of on account of the annoyance caused by their close vicinity to our sitting tent. They remained here about five minutes, when a number more came out two by two, and proceeded slowly to the place where their dead companions lay. Here they seemed to wait for something; and presently we saw coming from the other side near the creek a number surpassing those I had followed, and halting in the same place. Then two Ants took up one of the dead ones and marched off, followed by two others as mourners, then two others entered the procession with a second dead Ant, succeeded, in the same way, by another pair, and so on until all the dead were taken up, a number of, I should think, 200 bringing up the rear.

"Following the train, I found that the two empty-handed followers relieved their fellows in advance, the latter falling behind in the place of those who relieved them, and thus continuing to alternate from time to time. They had now gone a considerable distance towards the sea-side when they stopped at a sandy hillock, where those who marched in the rear of the procession commenced operations by making holes, but I soon observed that only about half the number took part in this employment. When a sufficient number of graves had been dug, the dead bodies were laid in them, and I found that those Ants which had hitherto stood idle were deputed to cover them in. About six would not stir from their places, and on these the others fell and killed them, whereupon they made a single large pit at a distance from the other graves, into which all the six were put and duly covered up. The Ants then all paired off and marched back to the scene of slaughter, where they remained together for a few minutes, when each company left for their own habitation.

"The observation of this curious proceeding gave me great pleasure; and I had frequent opportunities afterwards of seeing the insects act much in the same way. If one of the 'workers,' however (who are much smaller than the rest), were killed, it was buried where it fell, and no friends attended the funeral."

Portrait of Linnaeus

This portrait, now in the Ferens Art Gallery, Hull, was acquired from Hymers College Hull in 1984, being previously probably from Hull Botanic Garden. The polar star cross and *Linnaea borealis* on the table by the book suggest that it is a hitherto unrecorded 'portrait' of Linnaeus. It bears no resemblance to any known portrait and may be a 'fantasy' portrait of what the unknown artist may have thought Linnaeus should have looked like.

Personalities

Dr Humphrey Greenwood

Congratulations to Humphrey Greenwood, P.-P.L.S., on being elected a foreign member of the Royal Swedish Academy of Sciences. The Royal Swedish Academy of Sciences was founded in 1739 with Carl Linnaeus one of the founding members.

Few British scientists have received this distinction. Those who have include Sir Bernard Lovell, Sir Alan Hodgkin and Professor Sir Ernst Gombrich. But at present Dr Greenwood is the only British zoologist to be so honoured. He is particularly known for his work on the cichlid fishes of East Africa, and for his research into the classification of bony fishes.

Mr Gavin D. R. Bridson, F.L.S.

Our congratulations also to Gavin Bridson on the confirmation of his position as Bibliographer and Senior Research Scholar at the Hunt Institute, Pittsburgh. Gavin was our Librarian and Archivist from 1969 to 1983 and before that a librarian in the Department of Zoology at the British Museum (Natural

Gavin in the Linnean strongroom.

History). He is the author of a historical directory of some 700 British 18th and 19th century graphic-arts printing firms and their productions.

Tailpiece

Some may remember that last summer in London was long and hot—but there were compensations for a few who came to Piccadilly.

One lunchtime on a particularly sunny day John, the gatekeeper, was assailed by a girl who said that she was so hot that she just had to take her clothes off. When told she really could not do that in his office (think of what the neighbours might say!) she went into the archway and proceeded to undress, blocking the departure of a couple in a yellow mini and to the evident delight of an old gentleman on the pavement who, when asked by the naked girl if she looked all right replied, 'Yes, thank you very much'! On being told by John that she couldn't stay around like that she put on her mackintosh, stuffed everything else in a plastic bag and left in the direction of the Ritz . . .! Later on, the President of the Royal Academy, Sir Hugh Casson, driving his mini back in to the courtyard asked if John had enjoyed the cabaret.

Do come and use your Rooms—you never know what might be going on.

Meetings

31 January 1985 at 18.15. Refreshments at 19.30.

General Interest Lecture: ***James Bruce's 'Abyssinian' Plants and Animals: Art, Science or Fable?*** This is a three part lecture by Mr F. N. Hepper, F.L.S. (The Herbarium, Royal Botanic Gardens, Kew), Dr I. B. Friis, F.L.S. (Instutute of Systematic Botany, University of Copenhagen) and Mr Paul Hulton (formerly Keeper of Prints and Drawings, British Museum).

James Bruce's extraordinary travels to the source of the Blue Nile resulted in a wealth of splendid illustrations, mainly by Luigi Balugani who died at Gondar in 1771. Contemporaries thought Bruce's stories to be fables and the natural history illustrations were overlooked for some 200 years, but present studies are shedding new light on both the expedition and its participants (see *The Linnean* *1*(3): 4).

In spite of Dr Friis' request, the refreshments will not include raw beef, tef bread, or bonza beer.

14 February 1985 at 10.00. Joint meeting with the British Ecological Society on ***Orkney and its Biological Future.***

Society business will be conducted at 14.00 before the start of the afternoon session. The agenda will be:

1. Admission of Fellows
2. Announcement of Council's nominations for Medals and Awards 1985
3. Ballot for the election of Fellows, Associates and Student Associates.

This is the second annual meeting run jointly with the British Ecological Society and the three sessions will be chaired by The President; Professor L. R. Taylor, President of the British Ecological Society; and Mr J. Wallace, M.P. for Orkney.

10.00. Professor R. J. Berry, F.R.S.E., F.L.S.—*Introduction: reason(s) for conservation*

Abstract

The reasons and urgency for conservation are different in the U.K. than in many developing countries. The NCC Strategy Document *Nature Conservation in Great Britain* defines the purpose of biological conservation here as "primarily cultural . . . used in the broadest sense as referring to the whole mental life of a nation". The meaning of the concept will be explored.

10.15. Dr J. H. Dickson, F.L.S. (Department of Botany, Glasgow University)—*The land of Orkney: its biological past*

Abstract

The analyses of microscopic and macroscopic fossils will be used to discuss the development of the biota of Orkney from late-glacial times to the present. Particular emphases will be placed on the spread and decline of woodland and also of heaths and mires.

10.40. Professor A. C. Renfrew, F.B.A. (Department of Archaeology, Cambridge University)—*The land of Orkney: its human history*

Abstract

The human occupation of Orkney began with the arrival of the first famers probably after 4000 BC: there is no good evidence yet for earlier occupation by hunter–gatherer groups. The islands are exceptional for the fine preservation of settlement sites and monuments of stone of the neolithic period, and recent findings on these will be reviewed. The archaeological remains of the so-called bronze age are less obvious, but with the iron age the picture is well defined by the numerous brochs. Evidence is now coming to light for the succeeding 'Pictish' period. With the arrival of the Norseman the islands at last began to

enter the light of history. Until this century they preserved farming practices and other customs with their roots deep in the prehistoric past.

11.20. Coffee.

11.45. Professor G. M. Dunnet, F.R.S.E. (Department of Zoology, Aberdeen University)—*The natural history of Orkney: introduction*

Abstract

The Orkneys were probably linked to Scotland by a landbridge until after the last ice age so that this largely green archipelago has a much richer variety of wildlife than Shetland. The island group is a submerged plateau with high features of cliffs and hills mainly in the west and sheltered low lying often sandy islands in the east. Vegetation is rich but not as specialized as some in Shetland, with only tiny remnants of natural woodland. Seabirds and birds of prey abound; seals are abundant and terrestrial mammals are of unusual interest. The marine fauna and flora are well known. Orkney benefits from the work of many local and visiting naturalists.

12.20. Mr E. R. Meek (RSPB, Stenness, Orkney)—*The natural history of Orkney: the birds*

Abstract

Orkney is perhaps unique in the British Isles in the way it supports several important populations of birds, dependent on very different habitats, within such a relatively small area: enormous colonies of sea-birds on the cliffs and maritime heaths; heather moorlands with unrivalled concentrations of birds of prey and other species such as red-throated divers and curlews; marshlands holding high densities of breeding waders and ducks.

A decade ago the major threat to Orkney's birds was seen as being the imminent development of the oil industry. Fortunately, the impact of oil appears to have been small, although the possibility of a major accident remains. Sea-bird populations, however, are likely to be affected if overfishing for industrial usage increases in Orkney waters. Inland, the major threat today is certainly the destruction of habitat, particularly moorland and marsh, as a result of agricultural developments and it is this which has led to the current 'conflict' between conservationists and the farming community.

13.00. Lunch.

14.00. Linnean Society business—see above.

14.15. Miss E. R. Bullard, MBE (St Ola, Orkney)—*The natural history of Orkney: the vegetation*

Abstract

Present day vegetation in Orkney is, with few exceptions, anthropogenic. Some areas which have had considerable disturbance in the past, e.g. old peat cuttings, attempts at drainage, etc., show good powers of regeneration and now include some of the best fens.

Regeneration, however, is severely restricted by the effects of past management, which may have brought about changes in soil structure, or the dominance of a very few species, in many cases combined with a complete lack of seed parent material from which regeneration could take place, especially in the smaller islands.

Vegetation in risk categories includes the 'dales' (lush valleys in the moorlands), most wetlands, maritime heath (including *Primula scotica* sites)—all being influenced by farming practices—and residual scrub, at risk from fires.

14.50. Emeritus Prof. J. R. Raeburn, CBE, F.R.S.E. (Formerly Principal, North of Scotland College of Agriculture; Head of Department of Agriculture, University of Aberdeen)—*Orkney agriculture*

Abstract

Agriculture can, for our purposes, most usefully be considered as the result of decisions taken by farm families, traders, government departments and other decision-makers. Some historical changes in the decision-making environment in Orkney and their consequences: land tenure, knowledge, demands for income, price relationships, challenges.

Questions from farmers as managers: what are the attributes of conservation activities and constraints; what would be the consequences of incorporating the more appropriate of them in farm plans; how would benefits and costs, including risk and uncertainty bearing, be shared as between farm and firms and other bodies or individuals?

The fundamental social issue: how to secure those conservation activities and constraints for which there are now effective social demands, without undermining the fundamental freedom-to-manage of farm firms and the social benefits therefrom.

15.25. Mr E. F. Scott (Orkney Islands Councillor, Firth, Orkney)—*Land use in Orkney*

Abstract

Agriculture is the basic industry of the people of Orkney and has been for thousands of years. The countryside is lived in by an egalitarian community of farmers who look after the land in a close relationship with it, and which is keenly observant of nature, and very interested in it. Orkney farmers have traditionally welcomed naturalists and given them uninterrupted access to their land.

The rich variety of bird life, for instance, is due not only to the rich feeding on the farm land, but also to the fact that farmers have been positively keen to leave areas of wet land or overgrown patches, where wild creatures can find shelter. Also, the farmers have allowed predators to survive, in contrast to naturalists (who shot rare birds last century) and egg collectors.

The activities of conservationists in recent years have been such that farmers, fearing restrictions on their land, are now reclaiming as much moorland as they can as quickly as possible. Thus the conservation lobby in Orkney is causing the destruction of what they say they are trying to preserve.

16.00. Tea.

16.30. Mr P. Reynolds (NCC, Evie, Orkney)—*Conservation in Orkney*

Abstract

A description of the major habitats of nature conservation importance in Orkney and their significance in a national context. The lecture will include an appraisal of nature conservation problems, and the structure and organization of conservation within the Orkney Islands.

17.05. Mr T. Eggeling (Planning Department, Orkney Islands Council)—*Conflicting pressures on Orkney*

Abstract

Although the main settlements in Orkney have continued to expand, urban encroachment upon agricultural land has produced little conflict. Manufacturing industry is poorly represented but agriculture and particularly the production of beef cattle remains the mainstay of the local Orkney economy. Partly as a result of the concentration of effort on agriculture, the development potential of Orkney's natural landscape and abundant wildlife has been neglected and remains to be realized. Unfortunately almost all recent agricultural changes and developments in Orkney have, to some extent, been unfavourable either to landscape or wildlife or to both. This conflict between modern agricultural developments and effective nature conservation is potentially the most immediate threat to Orkney's biological future.

17.40. General Discussion.

14 March 1985 at 16.45. Tea will be served at 16.15 and refreshments on conclusion.

1. Admission of Fellows.
2. First reading of Certificates of Recommendation for election of Foreign Members and Fellows *honoris causa.*
3. Election of Auditors for the Treasurer's Accounts for the year ended 31 December 1984.
4. Short Papers Communications: *Succession: insect-plant relationships.* The reading of the papers on this subject was postponed due to the illness of the organizer. The abstracts are as in *The Linnean 1*(2), p. 5.

21 March 1985 at 14.00.

This will be an informal discussion meeting on *Computer Applications in Biology,* being the inaugural meeting of the Specialist Group (p. 2). Projects to be covered include:

A compendium of taxonomic databases, Dr F. A. Bisby, F.L.S. (c/o The Linnean Society).

Micro Club—for users of microcomputers to exchange experiences and even software, Dr Charles Stirton (Royal Botanic Gardens, Kew).

Newsletter—for the group to correspond about purpose-made biological software as in ecological modelling, developmental simulation, sequence analysis etcetera, Dr Richard White (Southampton University).

Anyone interested is asked to complete the enclosed questionnaire and return it to Dr Stirton, or to contact Dr Bisby.

27–29 March 1985. Symposium: ***Pollen and Spores: Form and Function.***

This international symposium, being organized jointly with the Systematics Association, will be held in the Rooms and in the British Museum (Natural History). The meeting will discuss all aspects of function in fossil and extant pollen grains and vascular plant spores from their early development until their germination. Some 30 speakers from 10 countries have agreed to participate. The programme, with full details, may be obtained from the Executive Secretary.

1–3 April 1985. Symposium: ***Systematic and Taxonomic Approaches in Palaeobotany.***

This symposium has been arranged to follow the above joint meeting and will be preceded, on 31 March, by a 1 day field trip to the Tertiary of Sheppey. The symposium is being organized jointly with the Systematics Association and will be held at Goldsmiths' College. Further details may be obtained by writing to Dr B. A. Thomas, F.L.S., Life Sciences Department, Goldsmiths' College, Rachel McMillan Building, Creek Road, London SE8.

The microscope of Robert Brown

Standing amongst the Society's relics in the glass-topped display case in the entrance lobby at Burlington House is a mahogany box bearing in its lid a brass bush. This unprepossessing object contains one of the more important microscopes in the history of botanical microscopy. It belonged to Robert Brown, after whom 'Brownian movement' was named, and who was responsible for the naming of the nucleus, the discovery of cytoplasmic streaming in the giant staminal hairs of *Tradescantia virginiana,* and for many important observations on the mechanisms of plant fertilization. However, it is remarkable that the microscope is with us today; during Brown's life it seems to have been discarded and neglected, and for more than 40 years it was outside the Society's care and control. Even after it was returned, its significance appears to have been widely misunderstood.

The microscope's origin

There is an engraved manufacturer's identification around the microscope stage which provides, not only the origin, but also some indication of the date of this microscope. The words are:

BANKS 441 STRAND LONDON.

This is the mark of an instrument maker, Robert Banks*, who has been known as a manufacturer of barometers etc., but who—as a microscope producer—is almost unknown. He appears in N. Goodison's *English Barometers* 1680–1860 (Cassell: London, 1969) in the following passage:

> BANKS, Robert, fl. 1796–1834
> (1) 440–441 Strand, London.
> (2) 119 New Bond Street., London 1820–34.
> Opt. to the Prince of Wales, later George IV: in partnership with a son from 1820 (Bancks & Son). Barometers survive signed 'Banks 440–1 Strand'.
>
> BANKS & SON fl. 1820–34
> 119 New Bond St, London.
> 'Instrument Makers and Opticians to His Majesty'.
> Partnership of Robert Bancks and a son.

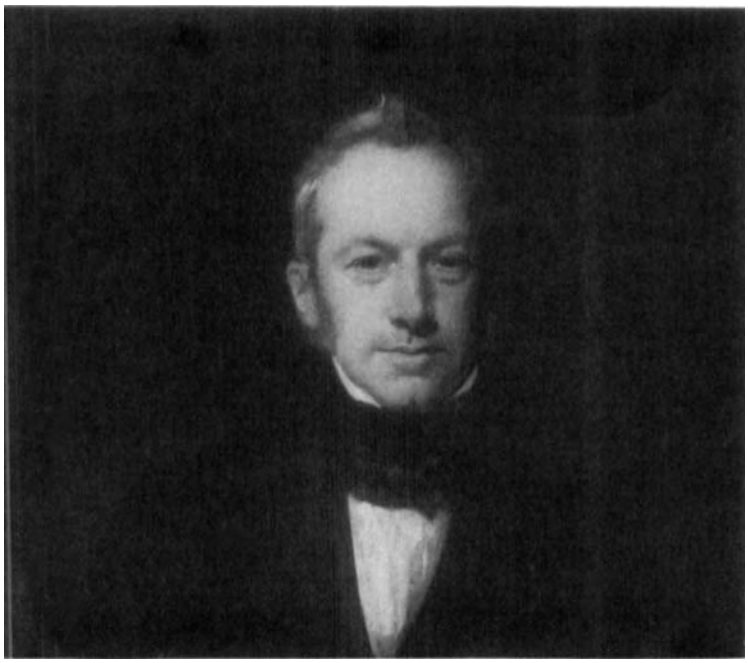
Banks designed and produced microscopes for such luminaries as Darwin, Bentham and Hooker, and his bar-limb construction and the fine-focusing adjustment he perfected were highly influential. In the works on microscopy, however, Banks is rarely referred to. *The History of the Microscope* by R. S. Clay and T. H. Court published by Charles Griffin in 1932 notes him in the list of instrument makers, but in the text he appears in a passing reference: 'Early in the 19th century several makers, amongst others Jones, Tuther, Banks and Bate, made "aquatic" microscopes with a rack adjustment'.

The fact than Banks moved from the Strand address in 1820 allows us to infer that the microscope itself was produced before then. The term "aquatic" microscope did not imply that such instruments were to be used only for pond life, incidentally. The term arose since many of the early mass-produced simple microscopes (such as the Wilson Screw-barrel) were designed to accommodate ivory or bone sliders, in which the specimens were sandwiched between discs or talc or mica. The growth of interest in the study of pond life in the 18th century led to the design of an instrument with an open stage, on which a watch-glass or a slide with living pond-life could be observed. This was the origin of the "aquatic" microscope, though in later years the same instrument was designated a "botanical" microscope instead, as studies in that field continued to expand.

Brown's early years

Robert Brown was born in Montrose, Scotland, on 21 September 1773 into a strongly religious family. His father was a Scottish Episcopalian clergyman. The young Brown (whose life has been documented by our former president, Professor William Stearn) was educated at Marischal College, Aberdeen, and later studied medicine at the University of Edinburgh before joining the Fifeshire Regiment of Fencibles at the age of 21, as surgeon's mate, and moving with his Regiment to Ireland. During a visit to London in October 1798 he was introduced to Sir Joseph Banks at Soho Square and it was through him that Brown was appointed naturalist to the Flinders expedition which sailed in the *Investigator* in July 1801. Robert Brown returned to England, after a troublesome voyage across the Far East and Australasia in 1805 with 4000 collected species

*Spellings as 'Banks' and 'Bancks' survive; for consistency the former is used here.



of plant and animal life. By January 1810 he had described more than half of these, including 1700 new species and 140 new genera. It was in this year that Banks appointed Brown to succeed Jonas Dryander as librarian and curator at Soho Square, and this was the phase of Brown's career when he began to have time to extend his studies into diligent microscopy. During the 1820s Brown purchased a more elaborate microscope from Banks (i.e. Banks the instrument maker—he and Sir Joseph Banks were unrelated). This featured a fine adjustment mechanism and represented a fine example of microscope construction in the pre-achromatic era. The wear on this microscope shows clearly that it sustained much use during its life, indeed the surfaces of some of the short focus length doublet lenses are scratched and worn, where they have grounded against a specimen under examination. This microscope bears a silver plate on the box, identifying it as being used by Brown in his researches at Soho Square, and on the stage is engraved the following annotation:

BANKS, LONDON, INSTRUMENT MAKER TO HIS MAJESTY

This puts it later than 1820, the year of accession. A third microscope associated with Brown is a tiny pocket microscope now in the collections of the University Museum of Utrecht. It is a fine precision microscope made by Dollond of London, and although it has been identified as the microscope "of Robert Brown" inspection of the handwritten list of accessions at the University shows that the original entry describes it: *folgens Robert Brown,* i.e. after Robert Brown, an important distinction. Other lenses which Brown used were presented to the botanist de Candolle, and they exist to this day. It may be, then, that we have a

relatively complete record of Brown's microscopical instruments: Brown's earlier microscope, in our own collection; his later microscope by Banks, which is in the Herbarium at the Royal Botanic Gardens, Kew; a microscope of the kind he used in Utrecht; and some hand-lenses still owned by the descendants of de Candolle.

Which microscope did Brown use?

Robert Brown's microscopes are of a kind customarily designated 'low-power dissecting microscopes' though they prove to generate images of extraordinarily high quality when used correctly.

Of the three high-power microscopes at Burlington House, Kew and Utrecht, it is the Utrecht instrument that might at first sight seem to be the most appropriate for high-power use, simply because it contained the lens of the shortest focal length. This lens was measured to have a magnification of ×480, though it was apparently lost some years ago.

Brown refers to this microscope in his work, but mentions that the high-power lens of the Dollond microscope was too powerful for normal use. He did use it to observe "several minute points", but he goes on to write, "To give greater consistency to my statements, and to bring the subject as much as possible within general observation, I continued to employ throughout the whole of the enquiry the same lens with which it was commenced". The Utrecht microscope—or its counterpart—was not used for Brown's research on the nucleus and the other related investigations of that time.

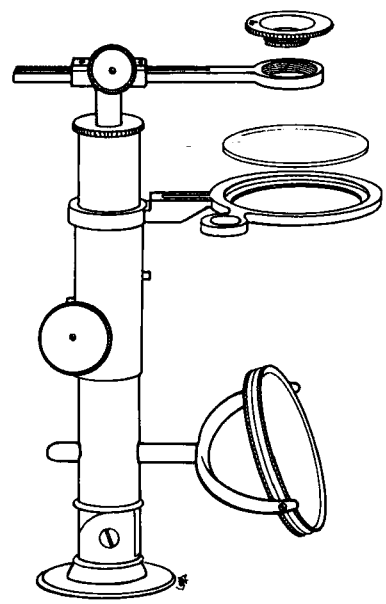


Figure 2. Robert Brown's microscope in schematic form, showing rack and pinion mechanisms controlling focus and lens-arm movement. Note the single lens held in a brass mount; the circular glass stage plate; an eccentric mount for stage forceps; and the substage mirror. The entire instrument mounts on the top of the case containing it, and the main pillar can be reclined through the fulcrum at the base. The instrument shown has a main pillar 100 mm in length.

The choice between the two Banks microscopes in our own collection and at Kew is also resolved within Brown's writings. He states that his work was done using an instrument made by Banks "in the Strand". Since we know that Banks left the Strand address in 1820 and this is the address engraved on the Linnean Society microscope, we can be confident that it is this instrument which was responsible for Brown's epoch-making observations.

The microscope described

Brown's microscope is housed in a 22 × 115 × 42 mm case, and in use it is screwed into the lid-mounted brass boss. The interior of the case is fitted with a mahogany tray measuring 185 × 91.5 × 17 mm which lifts out before the box is closed and the microscope fitted to the lid. This tray holds the central brass pillar of the microscope, a 100 mm long cylinder 45 mm in diameter, onto which fit the lens bracket at the top and—via a dovetailed holder on a moveable collar—a circular stage with provision for stage forceps for bulky objects such as flowers or insects (these useful devices were provided on microscopes until the early years of the present century).

Beneath the stage fits a 43 mm diameter concave mirror with a focal length of 100 mm. Focusing is through two mechanisms: a cork bush inside the upper extremity of the main pillar allows the lens bracket arm to be slid up and down, whilst a rack and pinion device raises and lowers the stage itself. A range of lenses was found with the instrument, each mounted in a brass mount which fitted the custom-build inner tray. Two of these were low-power "macro" lenses magnifying ×6 and ×8; two were medium-power lenses ×32.5 and ×25; there is one higher power lens of ×75 and a high-power lens magnifying ×170. A detailed description of the instrument has been published in *Microscopy 34:* 406–418 (1982) together with some examples of the images that the ×170 lens can generate.

The fate of the instrument

As Professor Stearn has pointed out, Brown published little work after 1828, and his momentous work on the reproduction of the orchids—which appeared in 1831—dates from several years earlier. It may well be that his microscope was neglected from that time until Brown died in June 1858; the silver plate on the Kew instrument leads us to assume that any work he did in later years would have involved that instrument, rather than the one in our own Society's collections. Certainly it is clear that at the time of his death, the Linnean Society microscope was in poor condition, for there is in the Library archives a letter from Brown's assistant, John J. Bennett, which describes Brown's relics as in "so dirty a condition" and sent "without any attempt at cleaning". Other writers of the time—including Bentham, whose letters are also part of our archive collections— wrote of Brown's disorganized and confused domestic surroundings in his later years, for it is clear he was not as efficient as a domestic manager as he had always been as a taxonomist and microscopist.

This letter accompanied Brown's microscope and some other family documents (they have since disappeared) when it was sent by Bennett—in his capacity as Brown's executor—to their mutual friend Thomas Bell, the noted

zoologist and dentist who was at the time the President of our Society (see Editorial). Bell died in 1880, and following his death his personal effects were put on sale. The microscope was purchased as a curio, and so left the care of the Society and its officers. It remained out of the Society for more than 40 years, when it was returned by Miss Ida M. Silver with a note attesting that her father had bought it "at the Sale of Mr Bell of Selbourne's effects".

The Society was celebrating the centenary of the naming of the nucleus a few years after that time, yet the microscope was left out of the celebrations. It was concluded that, although it agreed with the description Brown had left behind, it was just a "common simple microscope" and, it seems, hardly worthy of further interest. The neglect during Brown's lifetime, compounded by over 40 years of neglect or even misuse in private hands meant that by the time the instrument was photographed for the first time in the mid 1970s (by one of the Society's fellows, Mr W. A. S. Burnett) it was in a sorry state. Not only was the brasswork pitted and blackened but the stage had been forced apart from its focusing collar, its securing bracket had been bent downwards and later distorted through an ill-advised attempt to straighten it by applying pressure to the whole assembly. The dovetail bracket was splayed out, the cap at the top of the pillar was unscrewed and damaged, and teeth had been stripped from the main focusing pinion. The velvet lining of the lid had been torn, the pad itself had been replaced the wrong way round, and there were many other signs of damage. The cork focusing system—which was found to be surprisingly effective in use—had been removed, and one of the milled caps of the microscope was lying in the inner case where a lens should be.

Since then the microscope has been carefully restored to working condition. No attempt has been made to remove the essential signs of its use by Brown—thus the darkened area of the brasswork adjacent to the rack and pinion control knob where Brown's finger rubbed in using the instrument is well preserved—but the bent portions have been carefully trued up against a wooden block and the lenses have been cleaned. Brown's microscope is once again in a condition similar to that in which Brown may have last used it. With care and good fortune it will remain as an important part of our collections, and as a tangible reminder of the early days of high-power botanical microscopy.

BRIAN J. FORD

The other Smith herbarium

History

Liverpool Botanic Garden possessed, from its foundation, a significant herbarium. Founded in 1802 by William Roscoe (who is best known in the botanical world for his monograph *Monandrian Plants of the order Scitamineae*) the Botanic Garden had purchased the residue of Johann Reinhold Forster's herbarium following Forster's death in Halle in 1798. The Liverpool Botanic Garden herbarium later acquired a large number of duplicates from the collections of Sir J. E. Smith, the subject of this article. Subsequently, in 1909, the herbarium passed to the City Museum, now Merseyside County Museums. As the existence of this material has not been widely publicized (other than by an entry in *Index Herbariarum*), the completion of a project to catalogue the

Smith material at Liverpool seems a suitable occasion to call attention to this historic collection.

Roscoe and Smith were good friends. Roscoe announced, at the inauguration of the Botanic Garden, that Dr J. E. Smith had consented to deliver 'Public Instructions' in Liverpool on the science of Botany. It must have been during a visit to Liverpool that Smith offered Roscoe a set of duplicate herbarium specimens, since there is no direct reference to the offer in the surviving Smith/Roscoe correspondence. The precise date of the transfer is not known, however, it was evidently completed by late 1808 as the Committee of the Liverpool Botanic Garden notified their acceptance of the herbarium material in a letter from Roscoe to Smith dated 21 November 1808. A manuscript list of the plants sent to Liverpool (ref. no. 36) exists in the Linnean Society library.

Composition

The material sent to Liverpool consists of specimens which closely resemble those in the main Smith herbarium at Burlington House. In method of mounting they are identical, however, there is less information annotated on the Liverpool specimens (all writing being in Smith's own hand), the usual data consisting of scientific name and locality. Generally the name of the collector is not given; where Smith has given the collector's name, it often proves to be the same as that of the author of the name. Where Smith himself is author of the scientific name, the place of publication is usually cited. In most cases the Liverpool specimen can be matched exactly with the specimen in the main Smith herbarium. Where two or more specimens at Burlington House share the data found on the Liverpool specimen, it has been necessary to extract the catalogue numbers from Spencer-Savage's manuscript catalogue of the Linnean Society's Smith herbarium from both or all possible counterparts of the Liverpool specimen. In those few cases where no counterpart could be found at Burlington House, it is possible that Smith placed a different name (e.g. a taxonomic synonym) on the Liverpool specimen. However, there seems to be a residue of unmatchable specimens at Liverpool which must be regarded as unicates.

Taxonomic scope

The Smith material at Liverpool covers the same range as that of the main herbarium in London; nearly every group of flowering and non-flowering plant is represented, including bryophytes and lichens. There are, however, very few fungi at Liverpool, and the marine algae are also very sparsely represented.

State of the catalogue

Over the last 3 years a catalogue of the 'other' Smith herbarium has been prepared, largely with the help of a scheme sponsored by the Manpower Services Commission. A total of 2779 specimens have now been catalogued, forming about 25% of the surviving material from the Liverpool Botanic Garden herbarium. All explicit and inferred data have been recorded on A5 cards designed to a format based on the Museum Documentation Association (M.D.A.) system. The introduction of the Spencer-Savage catalogue, including details of collections and collectors represented, applies equally to the Liverpool material, and it has not been thought necessary to invent a new cataloguing

system. Instead, data from the Spencer-Savage catalogue have largely been copied verbatim, with regard to content, but in M.D.A. format. There already exists a catalogue of the Liverpool Botanic Garden herbarium as a whole, with the result that each Smith specimen bears a penicilled number on the top left-hand corner of the sheet. This number forms a unique reference to the sheet. As there is sometimes more than one gathering per sheet, each gathering has been catalogued separately. In some cases this has led to the separation of the sheet in to two halves, each being filed in a separate part of the Museum's herbarium (e.g. British and Foreign).

State of identifications

The Smith herbarium at Liverpool has been largely ignored by systematic botanists. Less than 1% of the sheets have been redetermined by specialists; the remainder have merely been curated according to *Index Kewensis* and Clapham, Tutin and Warburg's *Flora of the British Isles*. To complete the cataloguing project, comments sheets filed at The Linnean Society have been scrutinized, and where a specimen has been cited as holotype at Burlington House its counterpart at Liverpool has been treated as an isotype and placed in a special folder. Following completion of the catalogue, a number of additional types were recognised at Liverpool, and these were treated similarly. The total number of types at Liverpool currently stands at 325. Smith sent a very small number of Linnaean specimens to Liverpool, marked 'ex herb. Linn.' These too include type specimens.

Future availability

The whole of the Liverpool Smith herbarium has recently been microfilmed at Kew, and Cibachrome prints have been made of the type specimens. I hope that this will minimize the need to loan the specimens abroad, since a photograph serves to answer most enquiries adequately. The Cibachrome prints will be filed in the Kew herbarium; the microfilms are mounted on aperture cards to the kept at Liverpool, but suitable for sending through the post. The main importance of the Liverpool material from J. E. Smith's herbarium lies in the opportunity it offers for studying the range of variation exhibited by duplicate material in an excellent state of preservation.

Thanks are due to Barbara Greenwood, Angus Gunn and Yvonne Iles for their help in preparing parts of the catalogue, and to the Manpower Services Commission for financial support. Costs of microfilming the Smith herbarium were defrayed with the help of the North-West Museum and Art Gallery Service.

JOHN EDMONDSON
Keeper of Botany,
Merseyside County Museums

Wallace's Notebooks (continued)

Plan to obviate the necessity for quoting any synonyms for the future

For this purpose it is necessary that a complete and authorized catalogue should be published in all branches of Natural History (in groups of moderate

extent) giving all the synonyms under which each species has ever been described and figured since the establishment of the binomial nomenclature, with full references; at the same time determining by ~~the law of priority alone~~ authority, the true and standard specific name to be henceforward used by all naturalists without quotation of synonyms. In order that every naturalist may use this Synonymical Cat. it must be prepared and corrected by Committee of Naturalists in every country of Europe, the true synonyms being finally determined by comparisons of the original specimens in all doubtful cases and the location of these specimens indicated, and it should be published in the very cheapest possible form so that its expense may not be burdensome.

This catalogue being published, uniformity and simplicity of nomenclature will reign among Naturalists. In all Catalogues, Lists, Synopses etc. and in all exchanges of specimens and communications among naturalists one specific name only need be used,—every one being supposed to have a copy of the Catalogue in the department he studies—and all collections to be named by it. The expense of all future catalogues and systematic works will thus be much diminished, a great portion of their space being now occupied by references to the synonyms. Uniformity in the naming of collections will be introduced and thus a fertile source of error and perplexity censored, and all those numerous "aliases" which are a disgrace to Nat. History will be kept out of sight and only referred to for purposes of study.

Feb. 1857

RECORD OF THE PROCEEDINGS OF THE LINNEAN SOCIETY OF LONDON FOR THE SESSION 1983–84

Contents

1. General Meetings

22 June 1983. Professor R. J. Berry, President, in the Chair.

Professor Eviatar Nevo (Institute of Evolution, University of Haifa), who was passing through London on his return to Israel, read his paper on *The evolutionary significance of genetic diversity in plants and animals: ecological, demographic and life history correlates.*

Abstract

To investigate the importance of adaptation in affecting inherited variation, 815 species scored for an average of 23 allozyme loci were given a 'biotic profile', determined by seven ecological, five demographic and nine life-history variables. It was found that genetic diversity varied non-randomly among taxa and among groups described by the biotic variables; diversity was partly predictable by a combination of three or four variables, with ecological factors the most important. This showed that natural selection is clearly implicated in species differentiation.

20 October 1983. Professor R. J. Berry, President, in the Chair.

Professor F. T. Last (Institute of Terrestrial Ecology, Bush Estate, Nr Penicuik, Midlothian)—*The growth of trees—the interplay of natural and man-made factors*

Abstract

While foresters do not like to be reminded of the fact, it is none the less true that our trees are equivalent, on the evolutionary scale of crop plants, to einkorn wheat. What, then, are the prospects for the future? How can the variation within outbreeding trees be utilized for man-made planting in temperate and tropical environments, recognizing that frost sensitivity/tolerance is a major concern in the former and that the early prediction of form, as determined by branch production and retention, is a matter of concern in all locations.

While the choice of planting-stock is of the essence, growth thereafter is influenced by a diverse array of biotic and abiotic factors. Three of these were examined (1) the concept of succession as it affects the choice of fungi that may be used to establish sheathing mycorrhizas that mediate nutrient uptake, (2) the effects of mixtures of atmospheric pollutants, and (3) the damage done by deer. Each of these aspects called into question some of the generally accepted 'truths' in what was a personal selection from the many rapidly developing areas of tree biology.

17 November 1983. Professor R. J. Berry, President, in the Chair.

Co-evolution, Resistance and Nematodes

Dr A. R. Stone, F.L.S. (Nematology Department, Rothamsted Experimental Station)—*Co-evolution and resistance—the implications.*

Abstract

Some agriculturally important plant-parasitic nematodes appear to be products of an intimate co-evolutionary process with their hosts, while others appear far less highly adapted. Therefore many aspects of the biology of such nematodes, including host resistance and its utilization must be considered.

Dr R. Cook (Welsh Plant Breeding Station, Aberystwyth)—*Breeding for resistance: the problem posed by nematode variation.*

Abstract

Nematode resistance breeding most easily exploits strongly expressed resistances under simple genetic control. These are easily identified in screening

and can be rapidly incorporated into agronomically improved cultivars. The emergence of virulence in nematode populations is a potential threat to this approach. Four examples illustrating the factors affecting the extent of the threat to plant breeding programmes were described, the cereal cyst-nematode, *Heterodera avenae,* the root-knot nematode, *Meloidogyne naasi,* and two nematodes of white clover, *Heterodera trifolii* and *Ditylenchus dipsaci.*

Dr S. J. Turner (Nematology Laboratory, Department of Agriculture, Northern Ireland) and Dr A. R. Stone—*Selection of potato cyst-nematodes with virulence against resistance.*

Abstract

The co-evolutionary process which has produced plants resistant to cyst nematodes and pathotypes (races) of the nematodes able to overcome the resistance is believed to have produced gene-for-gene interactions. The resistance of *Solanum vernei* to potato cyst-nematodes *Globodera rostochiensis* and *G. pallida* was described and the implications for plant breeding strategies discussed.

Mr W. M. Robertson and Dr B. S. Griffiths—(Scottish Crops Research Institute, Invergowrie, Dundee)—*Histochemical changes induced in plant cells by virus vector nematodes.*

Abstract

Feeding by the virus-vector nematode *Xiphinema diversicaudatum* induces more rapid increases in RNA and protein but not nuclear DNA in root-tips of strawberry, *Fragaria vesca,* than those of a poorer host, ryegrass, *Lolium perenne.* These changes were described in relation to host-plant status and compared with those induced in ryegrass by *Longidorus elongatus.* The relationship between nematode, virus and host plant was also discussed.

Miss S. L. Rice (Department of Plant Biology, University of Birmingham and Nematology Department, Rothamsted Experimental Station)—*Cellular changes involved in resistance to potato cyst nematodes.*

Abstract

Cellular changes in roots to potato cyst-nematodes differ. The response of a susceptible host plant to nematode invasion involves formation of a multinucleate syncytium and apparently different mechanisms of resistance to potato cyst-nematodes have evolved. Where there is a hypersensitive response occurring within 24 h of invasion which does not itself limit nematode development there may be the basis for a novel, rapid test for resistance.

8 December 1983. Professor R. J. Berry, President, in the Chair.

Professor R. Dahlgren, F.L.S. (University of Copenhagen)—*Attempts towards a phylogenetic classification of flowering plants.*

Abstract

Examples of constellations of orders, based on distribution of a considerable number of character states, were shown for the monocotyledons. Some unconventional aspects on relationships of liliiflorean families were given. Some realignments among dicotyledonous complexes were also proposed, based to a great extent on embryological and phytochemical characters. Information on isolated plant orders is now being used for cladistic analyses and in the future

such analyses will probably be extensively used as the bases for angiosperm classification up to the highest levels. To date this has not been possible.

As *The Linnean* now carries the details of much of the Society's programme, especially those of Scientific Meetings, the Proceedings will cross refer and only contain detail where the programme has significantly changed. The President will have taken the Chair unless otherwise stated.

19 January 1984

Revisiting the marine fauna of Aristotle, see *The Linnean 1*(1): 5.

16 February 1984

The future ecology of the Norfolk Broadlands—an assessment of the potential for restoration of the Broadland ecosystem. This was a joint meeting with the British Ecological Society, see *The Linnean 1*(1): 6–8.

15 March 1984

Due to illness Dr A. W. Crompton was unable to be present. Two papers were read:

Dr B. G. Gardiner, (Queen Elizabeth College)— *The classification of the Amphibia.*
Abstract

Four pairs of arcualia were primitively present in each segment of gnathostomes. The individual vertebral ossifications of early temnospondyls are most economically interpreted as the endochondral ossifications of these cartilaginous arcualia. Centra have formed independently on at least two occasions within the tetrapods: once in Amphibia and once in amniotes, and arcualia play little or no part in the formation of true centra in any living form. The so called pleuro- and intercentra of the temnospondyls cannot be homologized with the centra of either lissamphibians or amniotes. The Nectridia are considered to be the sister group of the Lissamphibia and the Aistopoda the sister group of these two. The anthracosaurs, seymourians and microsaurs are regarded as amniotes. There is no evidence for resegmentation in the vertebral column.

Professor K. A. Kermack, F.L.S. (University College London)—*The ear in mammal-like reptiles and early mammals.*
Abstract

In mammals a chain of three bones: malleus, incus and stapes connects the tympanic membrane to the fenestra ovalis of the inner ear. In all other living tetrapods possessing a tympanic membrane the stapes connects the latter either directly or by a cartilaginous extrastapes; the chain of three bones is never present. The origin of the two additional bones (malleus and incus) in the mammalian middle ear was determined as the reptilian articular and quadrate by Reichart, well over a hundred years ago, but the exact location of the tympanic membrane in the mammal-like reptiles remained an unsolved problem. Broom, later supported by Parrington, suggested that the tympanum was located immediately posterior to the quadrate and that the stapes contacted it as in living reptiles. This hypothesis not only gives rise to great difficulties in

explaining the evolution of the mammalian auditory ossicles, but is hopeless acoustically, due to the necessarily tiny size of a tympanum in this position. This paper confirmed the suggestion of Allin that the tympanum in the mammal-like reptiles was located in the lower jaw, and showed that this makes sense from the point of view of both evolution and acoustics.

29 March 1984. Due to illness the meeting on *Succession: insect plant relationships* was postponed and was replaced by a short papers meeting on *Hybrid zones.*

Dr N. Barton (Department of Genetics and Biometry, University College London)—*A hybrid zone between the toads Bombina bombina and B. variegata.*
Abstract

The fire-bellied toad *Bombina bombina* meets the yellow-bellied toad *B. variegata* in a narrow zone of hybridization in southern Poland. A genetic analysis, based on extensive data from J. Szymura, shows that the zone is most likely maintained by hybrid unfitness and gives estimates of the strength of selection, the number of genes involved and the barrier to gene flow between the two forms.

Mr R. A. Nichols (School of Biological Sciences, University of East Anglia)—*Patterns in alpine habitat and grasshopper populations.*
Abstract

The alpine grasshopper, *Podisma pedestris,* has two chromosomal races which meet in a hybrid zone in the Alpes Maritimes. It does not appear to follow an ecotone. Patterns of *Podisma* density are closely related to the distribution of perennial plants, and hence may be consistent enough to determine the location of the hybrid zone.

Mr L. R. Noble (Department of Genetics and Biometry, University College London)—*The ecology of selfing and outcrossing in two species of slug.*
Abstract

Recent evidence suggests that selfing, once thought to be a character of plants, is widespread in some groups of higher animals.

The ecology of selfing and out-crossing illustrated by *Arion ater ater* and *Arion ater rufus* and the consequences of uniparental reproduction for speciation and hybrid zone formation were discussed.

12 April 1984. Professor E. A. Bell, Vice-President, in the Chair.
Diversity in the Tropical Rain Forests (see *The Linnean 1*(2): 6. Dr C. Pannell's paper *Diversity in Aglaia* was read by Dr. F. Smith.

2. Symposium and Conversazione

The Biology of Pteridophytes

12–16 September 1983.

This was an international symposium held jointly with the Royal Society of

Edinburgh and the British Pteridological Society at the University and Royal Botanic Garden, Edinburgh. It was to be the first time that important aspects of the Biology of the Pteridophyta would be discussed at an international level and had the aim of complementing rather than repeating the taxonomic and phytogenetic theme of the symposium on *The phylogeny and classification of the ferns* held in April 1972 (see Proceedings, *Biological Journal of The Linnean Society 4:* 335 and *Botanical Journal of The Linnean Society 67* (Supplement 1)). The meeting therefore included those aspects of research which help to understand further the biological activities and processes of pteridophytes and the ways in which such processes are implicated in the interrelationships between the plants and their natural environment. It was unique in bringing together both laboratory and field workers with a wide variety of approaches to the living pteridophyte plant, and researchers in other areas of botany whose investigations impinge on problems of biology in ferns and fern-allies. The week's meeting was attended by over 120 participants from 24 countries, and 18 attended the associated field meeting organized by A. C. Jermy and K. P. Kavenagh. Nearly 60 papers were presented and there were a further 40 contributions in poster form. Themes included cytology, genetics, physiology and biochemistry of pteridophytes, cellular aspects of development, germination, cell-division and reproduction, environmental and biotic interactions, the biology of economic ferns, the ecology of hybridization and speciation, and adaptive strategies of pteridophytes in the field.

The Proceedings of the Symposium, edited by A. F. Dyer and C. N. Page, will be published by the Royal Society of Edinburgh early in 1985.

Conversazione

3 May 1984. The President and Mrs Berry received guests in the Library.

There were 12 exhibits, eight on the general theme of Technology in Biology. The latter included: Scanning electron micrographs of an Indian millipede, Professor R. Bellairs and A. Boyde; Conserving plant genes *in vitro,* Dr L. Withers; The measurement of protozoan cell volume using a Coulter counter, Dr D. Roberts; Energy flow in arboreal ephiphytic communities, Dr B. Turner; Teleost tumours caused by intra-cellular protozoa, Professor E. Canning, Mr Page and Mrs Billam; Genetic manipulations with plant protoplasts, Professor E. C. Cocking and Dr M. R. Davey. Other exhibits, which both enhanced and decorated the rooms included Distribution and bionomics of *Amblypelta* (Insecta, Coreidae), Mr R. A. Lever, F.L.S; Colour in foliage, paintings by Mr L. Greenwood, F.L.S; and Identification of plant fragments, Dr D. F. Cutler, F.L.S., Dr P. Rudall, F.L.S. and Mr P. Gasson. Equipment and some of the original sketches (all five volumes of which are now in the Society's possession) of the late Rev. W. Keble Martin were also displayed. A film of Indian millipedes and 'A journey through a palm' was shown during the evening.

3. Anniversary Meeting

24 May 1984. Professor R. J. Berry, President, in the Chair.

Elections

After extracts of the relevant Bye-Laws had been read, the President appointed Drs D. C. Fielding and B. Hopkins and Mr G. R. Speed as Scrutineers and declared the Ballots open. The results of the Ballots were:

New Members of Council:	replacing:
Dr F. A. Bisby	Dr D. F. Cutler
Professor M. F. Claridge	Dr C. J. Humphries
Dr J. M. Edmonds	Mr N. D. Purchon
Dr D. A. S. Smith	Dr A. R. Stone
Dr P. F. Yeo	Dr J. G. Vaughan

Officers:

President:	Professor R. J. Berry, F.R.S.E.
Treasurer:	Mr C. M. Hutt
Secretaries:	Dr D. M. Kermack (Zoology)
	Dr C. Patterson (Editorial)
	Dr F. A. Bisby (Botany)

Foreign Members:

Professor Abraham Fahn, F.L.S., Israel
Dr Peter Hamilton Raven, F.L.S., United States of America

Fellows and Associates as in *The Linnean, 1*(3): 4.

The President appointed as Vice-Presidents:

Professor E. A. Bell
Professor W. G. Chaloner, F.R.S.
Professor B. C. Clarke, F.R.S.
Professor Sir Richard Southwood, F.R.S.

Presentation of Medals and Awards

The President read the citations and presented the Linnean Medals, the Trail-Crisp Award, the H. H. Bloomer Award, and the Bicentenary Medal.

Linnean Medal for Botany

Professor John Gregory Hawkes, F.L.S.

Jack Hawkes was a student in the Botany School, Cambridge, where he gained all his academic qualifications: B.A. In 1937, Ph.D. in 1941, and Sc.D. in 1957. His life's work has been centred at Birmingham University where he was a professor for 20 years, and in South America, where he was a frequent migrant and occasional resident.

Potatoes have been the staple diet of Jack Hawkes' life: over 45 years of study have resulted in about 80 publications on potatoes, ranging from treatments of practical agronomic problems, through the taxonomic niceties of *Solanum* to etherial historical and sociological considerations. He is justly famous

throughout the world as the top potato taxonomist: he has had few rivals and no equals.

The romance of plant exploration first came to him as a young man in Latin America and continued throughout his life, never waning but rather expanding to include Indonesia and other lands. In all his travels, which have covered most of the world, he has been an explorer, noting all interesting things, and always collecting plants for botanical colleagues at Kew and elsewhere. In particular his exceptional collection of non-potato species of *Solanum* and other genera of the Solanaceae are the basis of the unique Birmingham University Solanaceae collection.

His first potato collecting expedition to South America formed the basis for his Ph.D. His subsequent research on potatoes at the Commonwealth Bureau of Plant Breeding and Genetics and at the Agricultural Research Council Potato Genetics Station led to his secondment for 3 years to establish the Ministry of Agriculture Potato Research Station in Colombia.

He brought his potatoes with him when he moved to Birmingham University 30 years ago. Frequently he returned to Latin America to renew acquaintance with plants, places and people, and to explore and discover new localities and new species. His studies, and those of his students, have recognized and described many new species of potatoes, have elucidated the complex evolutionary history of the potato, *Solanum tuberosum,* and of many wild species and natural hybrids. They have formed the basis for taxonomic revisions of all wild and cultivated species culminating in meticulous publications such as *The Potatoes of Argentina, Brazil, Paraguay and Uruguay—a Biosystematic Study.*

Whilst specializing in the potato *Solanum,* Jack Hawkes also found time to tackle the rest of the Solanaceae. He treated most of this family for *Flora Europaea,* he started up the Solanaceae Newsletter and he organized the first Solanaceae Symposium, jointly editing the resultant volume.

He has always had his mind open to new developments and has had the happy knack of exploring new fields at the right time. In 1955 he persuaded an immunologist to work with potato juice: their publication heralded the modern approach to phytoserology, and subsequently he edited the landmark publication on Chemotaxonomy and Serotaxonomy.

Also, around 1955 he was deeply involved with his local natural history society in the new *County Flora of Warwickshire.* With typical foresight he grasped the opportunity of processing the data by new-fangled computers, and the book published in 1971 led the world field, not only as a modern regional flora, but also as a computer-mapped publication.

There is normally a gulf between orthodox taxonomists concerned with natural wild plants, and plant breeders concerned with highly domesticated and therefore un-natural, crop plants. Jack is remarkable in being at heart both orthodox taxonomist and plant breeder, his concern with wild and cultivated species making him aware of all intermediate conditions of both man and plant. His biosystematic studies of wild, semi-cultivated and less or more domesticated species of potato forced him to contemplate the origins and nature of the processes of agriculture and domestication. Breeding experiments involving diverse taxa gave awareness of the various barriers to species formation amongst them, and how these barriers were broken down by human environmental interference. This led to the knowledge of the means of deliberately introducing

into commercial potatoes useful genes from their wild relatives.

His early encounters with potato domestication in South America led naturally to consideration of domestication of many other crop plants in other parts of the world. His collection of wild and weedy potatoes made him acutely aware of the great potential of wild relatives of crop plants to plant breeders, a heritage which was fast being lost due to modern agricultural methods.

The need for conservation of germplasm of crop plants is now well known, and is an area of intense activity. Much of this is due to Jack Hawkes' pioneer activities. He was one of the early prophets and in 1969 started the unique Birmingham M.Sc. course in Conservation and Utilization of Plant Genetic Resources. This has trained over 150 scientists who are now active in almost every country in the world. This field, of profound practical importance and basic to the survival of mankind, illuminates another of the many facets of Jack Hawkes.

In all things and with all people he shows remarkable sympathy. Some students in South East Asia were amazed that this eminent European professor would talk with them on equal terms, and even more so when he walked with them barefoot in the rice fields.

Linnean Medal for Zoology

Professor John Stodart Kennedy, F.R.S.

John Kennedy has for many years been recognized as a leading figure in the field of animal and, more especially, insect behaviour. Working mainly with four insect groups of great economic importance, namely locusts, mosquitoes, aphids and moths, his penetrating experimental analyses have proved to be fundamental to our understanding of behaviour patterns and of great practical value to the applied entomologist.

After graduating from University College, London, his research career began in 1934 at Birmingham University in association with the late D. L. Gunn. As part of his Ph.D. project he had the opportunity to visit an outbreak centre of the Desert Locust in the Sudan and there examined the behaviour of marching hopper bands, characterizing in detail the behaviour associated with aggregation and with the initial stages of phase transformation. Returning to the London School of Hygiene and Tropical Medicine as Avebury Student, he completed a prescient study of the visual responses of mosquitoes in flight showing that sources of airborne odour were found by positive movement induced by the insect's optomotor responses. For this investigation he devised a novel wind tunnel with a projected moving patterned floor—an arrangement later developed in his moth work.

During the war years John Kennedy was engaged in applied research on mosquitoes and locusts. As research officer in the Middle East Anti-Locust Unit he became closely involved in the first aerial spraying campaign against roosting adult swarms. Many difficulties were encountered. Some were logistic, for example, assembling the equipment and the lumbering Avro Anson trainers in the right place and at the right time. Swarms were difficult to locate and in the end reliance had to be placed on the rustling noises they made! Moreover, the insecticide did not stick easily to the dry cuticles.This problem was later sorted

out by John and his colleagues at Porton Down. Spraying of swarms in flight could then be recommended as feasible.

In 1946 he joined V. B. Wigglesworth's Agricultural Research Council Unit of Insect Physiology in Cambridge, embarking on a comprehensive programme of research on aphid behaviour. This centred round host plant finding and selection and on flight behaviour in general, but included many excursions into other aspects of aphid physiology. Unexpectedly, aphids proved to be unable to distinguish host plants from a distance. They had to alight, probe and reject the unsuitable; final acceptance depending not only on botanical differences but also on the state of maturity of the foliage. This emphasized the need for a better knowledge of the composition of the phloem sap and led to the development of an aphid stylet-cutting technique suitable for collecting samples of pure sap for microanalysis—a method later used by plant physiologists. In contrast, he also found that aphids could themselves modify the plant to their own advantage. For example, the nutritional status of the plant was sometimes improved by aphid-induced leaf galls or virus infections.

For analysing aphid behaviour in flight a vertical flight chamber or 'air treadmill' was built in which the changing rate of climb could be measured as an index of 'flight excitability'. Evidence for central nervous co-ordination of successive activities in an intact insect brought the whole complex behaviour pattern firmly within the domain of physiology.

In 1967 John moved to Imperial College, as the senior member of another ARC sponsored Insect Physiology Group, receiving the conferred title of Professor of Animal Behaviour in the University of London. There he became increasingly intrigued by the behavioural aspects of pheromone research, particularly the mechanism by which male *Lymantria* and tortrix moths locate distant sources of female pheromone, establishing that the odour source was not found by chemotactic 'aerial trail-following', testing his theories out of doors. During the last few summers a casual observer passing the Silwood Meteorological Tower would have noted a number of persons in motley garb apparently chasing a train of soap bubbles wafted by the wind!

No citation would be complete without mentioning his other interests, as shown in his many reviews and essays, invariably packed tightly with argument and personal research experience. Insect migration and the interpretation of animal behaviour have been two recurrent themes. His comments some years ago on the ethological concepts then in vogue were very influential. But it is also clear that physiologists with a too simplistic view of behaviour must also beware!

John Kennedy's friends and colleagues, past and present, congratulate him warmly on his award and wish him a happy and profitable semi-retirement in his new environment at Oxford.

The Trail-Crisp Award

Professor Karl Fredga

Karl Fredga, Professor of Genetics in the University of Uppsala, is a mammalian cytogeneticist with an international reputation. He has added greatly to the knowledge and understanding of the exceptional sex chromosome systems that occur in many genera of mammals. Most notable is his work on species of the genus *Herpestes,* mongooses, and on *Myopus schisticolor,* wood

lemming, a species in which fertile females that bear daughters only are frequent in nature. With colleagues he has shown that these females have chromosomes that resemble closely those of a normal male, with a single (though modified) X chromosome and a normal Y chromosome. He has nevertheless provided a full and satisafctory explanation of this bizarre phenomenon in cytogenetic terms.

Dr Fredga has also made major contributions to the definition of the karyotypic differences that occur commonly both within populations and between closely related forms. The demonstration that the Linnaean species *Sorex araneus,* common shrew, is a complex of cryptic species and semi-species owes much to his work.

Much of Dr Fredga's success can be attributed to his outstanding skill as a microscopist. This is exhibited in the consistently high quality of his preparations and in the photomicrography which is an inescapable requirement for the illustration of karyotypes. His pictures of mammalian chromosomes are at the same time among the most beautiful and the most informative that have been published. He is a most worthy recipient of the Trail-Crisp Award.

On receipt of his award Professor Fredga replied, thanking the Society for this honour and wishing in return to present a token of esteem on behalf of the University of Uppsala. This took the form of one of a specially commissioned set of medals and a video film of Linnaeus' garden which had been recorded with an English sound track.

The President accepted these gifts on behalf of the Society.

The H. H. Bloomer Award

Richard Laurence Edward Ford

Richard Ford was born in 1913 and educated at Hurstpierpoint College, Sussex.

From 1934 he was Assistant to D. S. Wilkinson at the Commonwealth Institute of Entomology, working on finding and breeding from a series of known hosts the braconid parasites of Lepidoptera, chiefly the genus *Apanteles.* After Wilkinson's death in 1939 the work was continued by Dr G. E. C. Nixon at the British Museum (Natural History). Ford's skill in field work and in breeding long series was noted by both authors. There are some 50 type specimens of new species which carry Ford's name on their data.

In recognition of Ford's work the Trustees of the British Museum conferred on him the title of Honorary Associate of the Department of Entomology in 1939.

From 1939 until his retirement he ran the natural history firm of Watkins and Doncaster. On one occasion he heard a colleague had been banned from exporting glass tubes to Turkey as the Turks were protecting their own glass trade. Showing not a little resource Richard saw this as no problem. He merely bought up a collection of beetles of a collector who had died and transmitted the glass with one specimen in each tube.

His spare time was devoted to palaeontology, specializing in the fossil Mammalia of the Isle of Wight. When he began, only 16 species of fossil

mammals were listed: there are now 150. Forty-five of these he obtained from the Oligocene of the Hamstead Beds, on which he has concentrated. Named after him are two new species of rodent and two conifers.

Richard Ford has written several small books on Natural History, mainly for A. and C. Black and Frederick Warne. His last book *Studying Insects* is now a standard text on this subject. He has also published many papers in the *Proceedings of the Isle of Wight Natural History and Archaeological Society,* of which he is Vice-President, and has collaborated with leading palaeontologists in papers on his discoveries. Recently, these included an early Cretaceous crocodile, and Eocene glass lizards, amphibians and snakes.

His life was and still is centred around fossils. Robin, his son, tells us that holidays had to be in some fossil-bearing area like Charmouth or the Isle of Wight where they would spend hours hacking at pieces of rock or trailing through the grey mud of the Hamstead Beds searching for black lumps which might turn out to be fossil teeth. Any good find was rewarded by an addition to the pocket money.

There was a billiard table in their house in Bexley but this was soon covered as the remains of a large fossil mammal from Sussex took over. This became an adult three-dimensional jigsaw of trying to piece the bones together. Billiards were never played again.

When he retired to the Isle of Wight to be nearer the fossil beds, the house had to have a fossil room especially built. Many hours are spent looking for the minute mammal teeth under a microscope. He has not much time for gardening, but plenty for the shed at the bottom of the garden. It is the sieving shed where many kilos of clay are washed, sorted and baked. The garden would look better without it since of course it is built with timber from the beach.

For his contributions to palaeontology, most notably to the Palaeogene mammal fauna of the Isle of Wight, Richard Ford is a worthy recipient for the H. H. Bloomer Award.

The Bicentenary Medal

Peter Roland Crane

Peter Crane graduated from Reading University in 1975, remaining there to work for a Ph.D. in Professor Heywood's department. His research was on the early Tertiary angiosperm leaves and fruits preserved as compression fossils in the Isle of Wight, and, nearer at hand, in the Reading Beds. In this latter study he was following no less a pioneer than J. D. Hooker whose palaeobotanical work included a paper on the fossil leaves in the Reading Beds in 1854. Crane made extensive, carefully documented collections, made cuticle preparations from the leaves, and sought by all available means to link leaves and reproductive structures.

Crane stayed on at Reading, as an assistant lecturer, until 1981. This gave the Organizing Committee of the first International Palaeobotanical Conference, held in Reading in 1980, the opportunity of persuading him to be Secretary of the conference. He assumed responsibility with enormous commitment, a quiet efficiency, and characteristic modesty.

In 1981 Crane worked for a short period with Professor Dilcher in

Bloomington, Indiana, on American early angiosperms. Then, in 1982, he was appointed to the department of Geology in the Field Museum of Natural History, Chicago, the post that he now holds. Significantly, he was subsequently granted an adjunct position in Evolutionary Biology on the Faculty of the University of Chicago. While many will regret having lost—perhaps only temporarily—so promising a young British palaeobotanist, we also have a certain pride in a British product having broached such a competitive market across the Atlantic.

Crane's work has extended through a broad range of fossil material—leaves, cuticles, petrified roots, fruits, seeds and pollen. He has used scanning electron microscopy without being seduced by it, and cladistic analysis without making cladistics an end in itself. But above all he has handled his plant fossils as parts of a whole organism, reassembling those parts when the evidence has justified it. In this way he has elucidated the early evolution of several angiosperm families, notably the Betulaceae and Juglandaceae.

Another worker in the United States, G. Ledyard Stebbins, wrote in the year that Crane entered Reading, "the fossil record of angiosperms can be more misleading than enlightening as a means of interpreting the major trends of their evolution". Early in his career, Peter Crane has cast doubt on this somewhat negative proposition. We hope he may go on to demolish it.

Treasurer's Report

1983 was a good financial year for the Society. It can be seen from the balance sheet that we made a profit of £5,500 and were able to transfer £30,000 to contingency for repairs and improvements. This was achieved by a combination of skill and good fortune—skill by our publisher, Academic Press, skill by our stockbrokers and Finance Committee, skill by Sue Darell-Brown who keeps a consistently watchful eye on Society Funds, and the good fortune of a 60% increase in the value of equities and, to us if not to the Government, the weakness of sterling against the U.S. dollar.

The other side of our financial fence, as it will apply to 1984, shows a less happy picture. Contributions in 1983 totalled £36,000. We returned to Fellows, free of charge, without profit to Society or our publisher, journals which, with postage, cost us £30,000. So far so good; we managed on income without drawing on capital.

In 1984, however, we are publishing, and hope to continue publishing, an extra volume of the Biological Journal. In consequence, our return to Fellows, based on 1983 prices will, in 1984, be approximately 105% of the contributions received. This was a matter of great concern to the Finance Committee who, after careful consideration, recommended to Council that contributions could no longer remain at their present level. Council agreed with the principle and the suggestions, as also did Fellows present at the Annual General Meeting. The increased annual contributions, if finally accepted, will therefore in May 1985 be as follows:

Fellows (no journal . .	£25	Associates (no journal) . .	£12.50
Fellows (one journal) . .	£30	Associates (one journal) .	£15
Fellows (two journals) . .	£35	Associates (two journals) .	£20

No increase was recommended for student associates. They will continue to

pay £2.50 per annum. Those Fellows who have already paid composition fees will not of course be affected.

The relationship between the Society and our paying guests, the British Ecological Society and the Society for Experimental Biology, continues to be excellent. In the day-to-day problems that inevitably occur, each endeavours to help the other. What more can one ask?

Finally, as Treasurer, I must say how grateful we must be to Council, Officers and Finance Committee who, until virtually the last moment, have for so long helped to keep contributions from Fellows unchanged.

Report of Council

During 1983 and 1984 the Society has seen the implementation of plans reported a year ago for the assimilation into the Rooms of the Mammal Society and the Society for Experimental Biology—on 1st October and 10th January respectively.

Meetings and Symposia

The British Ecological Society is now well integrated into the affairs of Burlington House and we ran a very successful 1 day joint symposium on the *Future Ecology of the Norfolk Broadlands* in February. We plan a similar meeting on the Orkney Isles for next spring, and intend to make these joint meetings a regular feature of our two Societies' programmes. Indeed, looking towards the Bicentenary, only 4 years away now, joint meetings with other Societies also will become a feature of the programme.

We have recently been most unfortunate. Very sadly we had to postpone the symposium on *The genetics of host and parasite populations* for a year due to the illness and then untimely death of the main organizer, Dr Chris Wright. In addition we had to change two of our regular Thursday meetings at very short notice, also due to illness.

We were, however, extremely fortunate that we were able to call on Professor Kenneth Kermack and Dr Brian Gardiner, at only 24 hours notice, to speak on 15th March; and Dr Nick Barton and Messrs Nicholls and Noble to read papers a fortnight later. (For abstracts see p. 23.) We thank them for their praiseworthy efforts, and also all the other speakers who read communications throughout the year.

The sixth formers were treated this year to a 1 day symposium which we ran in conjunction with the British Ecological Society and the Field Studies Council on *Tomorrow's Ecologists*. We plan to arrange more young people's symposia in the future. All the sixth form lectures were well subscribed and for only one was the Meeting Room not full—a combination of snow and half term. Mr Nigel Purchon is to be thanked for the enthusiasm he puts into the task of producing such a high quality programme year after year.

The only meeting held outside London during this session was a very successful 8 day event in Edinburgh on the *Biology of Pteridophytes* in conjunction with the Royal Society of Edinburgh, the British Pteridological Society, and the International Association of Pteridologists (see p. 24).

This year an innovation has been the running of two weekend practical workshops for teachers, at Kew, planned by Mr Adam Cade of the ILEA and run by Dr Peter Brandham, Mr Tom Reynolds, and their staffs. They were so

popular and so oversubscribed that our problem is how to fit in more people in the future.

Publications

During the year *The Linnean* was launched at your request and Issue Number 3 should appear in the late summer. Council is concerned that the first issues were late for a whole variety of reasons, some too difficult to deal with—one being a reported broken axle on the delivery lorry!

Council would value comments, criticisms, suggestions, and contributions so that *The Linnean* will become both useful to the Fellowship and a credit to the Society. We would all want to express our sincere thanks to Dr Brian Gardiner for the work he has put in to making *The Linnean* an instant success.

The Meetings Card will still be produced but the latest information of the programme will always be on the back cover of *The Linnean*, or called to your attention by Society Notes inside.

We are pleased to report that sales of all three journals have held remarkably steady in view of the cutback in library spending in virtually every country in the world. Both the *Zoological* and *Biological Journals* now appear monthly. Our thanks are due to the three journal editors who devote much of their time to this vital aspect of the Society's affairs: and we should not forget the band of referees who do so much to ensure the maintenance of the necessarily high standard of scholarship.

The series of *Synopses of the British Fauna* in which we co-operate with the Estuarine & Brackish Water Association has been through a difficult, dare we say, murky year. At a General Meeting last year the Zoological Secretary reported on our troubles with Cambridge University Press with HRH The Duke of Edinburgh, the Chancellor of the University, in the front row. Even a subsequent letter from the Palace had little effect and we had no option but to terminate our contract with C.U.P. However, after much hard and often abortive work an excellent agreement with E. J. Brill of Leiden and London was negotiated. The financial terms were much the same but, thankfully, no commitment to hard backed editions. Our most sincere thanks are due to Dr Doris Kermack for her prolonged efforts to see the series right and, we sincerely hope, into good and sympathetic hands.

Publications have exercised Council for much of the year as they are of course important and tangible indicators of the Society's stature. We look forward to *The Linnean* settling down, and *The Synopses* starting to come off the press with the regularity we had come to expect in the past.

Library

Library activity continues to increase. Most of the books in the main cases have now been labelled by our most willing team of four young Manpower Services Commission helpers; all the portraits have been catalogued by Mrs Margot Walker; and the Ladies of Kent, Dr Ethel Barrow and Mr D. Cull continue to help with the conservation and cataloguing of pictures, papers and books.

Staff

During the course of the year Miss Eve Hickey has joined the office staff and

Mrs Shirley Theobald has taken up residence, with her family, as the Housekeeper. We are most pleased with the way they and Mrs Jacqueline Elliott, the part-time Secretary of the Society for Experimental Biology, have settled in. Our thanks are due to all the staff, paid and voluntary, including the Executive Secretary, Miss Sue Darell-Brown, and Misses Gina Douglas and Linda Glavin in the Library, all of whom cope with an ever increasing workload.

The Rooms

With our increasing activities we need extra space and, after some frustrating negotiations, it is most likely that by this time next year we shall have some additional rooms in the North East corner of the Courtyard.

The Membership

The Society continues to expand modestly, by some 40, but sadly we had to report the death of an Honorary Member last September, ex-King Leopold III of the Belgians, and also of three Foreign Members and Professor Michael White in Australia, a Fellow *honoris causa* who had received a Linnean Medal only last year.

To end on a happier note; nearer home we congratulate one of our Vice-Presidents, Sir Richard Southwood, on his Knighthood, Mr F. J. Bingley on his MBE, Dr J. R. Krebs, last year's Bicentenary Medallist, for his election as a Fellow of the Royal Society, and Dr P. H. Greenwood upon his election as a Foreign Member by the Swedish Academy of Sciences.

The Linnean now records the names of new members on their election. Below are the annual statistics and names not yet recorded:

see *The Linnean*		Fellows	Associates	Student Associates
17 November 1983	*1* (2):4	25	7	
16 February 1984	*1* (2):4	27	—	
12 April 1984	*1* (3):4	21	3	
24 May 1984	*1* (3):4	25	1	
		98	11	nil

20 Fellows have withdrawn

29 Fellows and one Associate were removed for non-payment of their Annual Contributions but six Fellows were reinstated following payment of sums overdue

5 Fellows were re-admitted

The deaths of 25 Members have been reported

Geoffrey Howard Banbury, B.Sc., M.I.Biol. Born: 20 October 1920. Died: 30 November 1983. Elected: 20 November 1952.

Professor Elso Sterrenberg Barghoorn, A.B., A.M., Ph.D. Died: 27 January 1984. Elected: 19 June 1969.

Thomas Theodore Barnard, M.C., M.A., Ph.D. Born: 31 August 1898. Died: 10 August 1983. Elected: 24 May 1947.

Mrs Mary Barnes. Born: 17 August 1901. Died: 7 November 1983. Elected: 17 November 1977.

Professor Dr. Sergei Bukasov. Born: 1891. Died 17 July 1983. Elected: F.M.L.S. 1965. Member of the V. I. Lenin Academy of Agricultural Sciences in Moscow. Member of the Mexican Academy of Sciences.

Professor David Raitt Robertson Burt, B.Sc. Born: 19 June 1899. Died: 8 May 1983. Elected: 1 December 1927.

Herbert James Campbell, B.Sc., Ph.D. Born: 18 November 1925. Died: 18 July 1983. Elected: 18 November 1982.

Morley Benjamin Crane, F.R.S., V.M.H. Died: 17 September 1983. Elected Associate: 7 January 1926; Fellow *honoris causa:* 15 March 1973.

Major-General Lionel Hugh Knightley Finch, C.B., O.B.E., D.S.O. Bar. Died 1981 aged 94. Elected: 26 November 1936.

Frank William Hankins. Born: 8 September 1897. Death reported in May 1984. Elected: 20 November 1975.

Professor Sydney Cross Harland, D.Sc., F.R.S. Death reported early 1984. Elected: 3 March 1921.

King Leopold III, former King of the Belgians. Born: 3 November 1901. Died: 25 September 1983.

Dr Dick Hille Ris Lambers. Died: April 1984 aged 74. Elected F.M.L.S. 1981.

Bertram Maurice Hobby, M.A., D.Phil. Born: 23 October 1905. Died: 19 July 1983. Elected: 29 April 1948.

Fred Howarth, B.Sc. Born 1894. Died: 14 April 1983. Elected: 15 April 1926.

David McCall, B.Sc., Ph.D. Death reported 1983. Elected: 12 May 1932.

George H. McCourt, M.Sc., M.I.Biol. Born: 5 December 1922. Died: 2 March 1983. Elected: 15 March 1973.

Arthur Peter Hoblyn Oliver, F.Z.S. Born: 10 November 1918. Died: 6 April 1984. Elected: 19 October 1972.

Clara Agnes Pratt, M.A., Ph.D., D.I.C. Died: 30 July 1983. Elected: 22 January 1925.

Michael Curtis Rawlence. Died: 11 April 1983. Elected: 11 March 1943.

Professor Dr Erik Andersson Stensiö. Died 11 January 1984. Elected: F.M.L.S. 1937.

Lt Col. William Percival Cosnahan Tenison, D.S.O. Death reported September 1983. Elected: 5 March 1942.

Michael James Denham White, F.R.S., Fellow *honoris causa.* Died: 16 December 1983. Elected: 24 May 1979.

John Teast Waterhouse, B.Sc., M.Sc. Died 1 April 1983. Elected: 18 January 1973.

Christopher Amyas Wright, B.Sc., A.R.C.S., D.I.C., Ph.D. Born: September 1928. Death reported 1983. Elected: 19 January 1967.

Presidential Address

The President gave an address on *Ethics in Biology and for Biologists*

Abstract

Ethics (defined as 'moral duty or obligation, based on assessment of value or

worth') are no longer an esoteric and optional hobby for scientists; increasingly we may have to justify or defend the worth or relevance of our research, despite usually having had little training or expertise in such activity. Indeed the normal (and proper) background of scientists lies in identifying and isolating particular problems, rather than considering their wider implications.

It is well, therefore, to recognize the three main groups of ethical problems likely to be faced by biologists. These are environmental (we are *both* a part of nature *and* apart from nature, not simply one or the other as is commonly assumed in environmental debates); the care and treatment of animals (the fashionable defence of 'animal rights' as a necessary antidote to the alleged sin of speciesism is a form of reductionism; it is also worth noting that creationism, with its understandable concern for human dignity, is a form of speciesism); and biomedical problems, particularly those concerned with reproductive manipulation (where discussion tends to identify 'life' with genetic continuity, whereas human personhood is something entirely different, involving at least organizational competence and individuation wrought by embryological thresholds).

A good biologist is not merely an intelligent and/or successful reductionist (as he or she must operationally be in research); but someone capable also of a sensible holism in science. Although 25 years ago C. P. Snow was right to draw attention to the divide between the science and arts cultures, it is at least as important to acknowledge and deplore the tunnel vision of many scientists.

A fuller version of this Address was published in the *Biologist* (the Journal of the Institute of Biology) in November 1984. Copies may be obtained from the Executive Secretary.

Benefactions

During the course of the year the Society has received the following donations in excess of £20.00:

Mrs D. Brittan	£ 25
F. R. Goodenough	£ 200
Dr D. Knight	£ 336
Estate of Mrs Maxwell-Knight	£ 186
Estate of Dr J. Ramsbottom	£9,000

4. Balance sheet and accounts

The Linnean Society of London

Balance Sheet
31st December 1983

31st December 1982 £	ASSETS	£	£
	Investments (as per schedule)		
121,637	(Market Value 31st December 1983: £234,727)		142,480
15,227	**Sundry Debtors**		47,725
	Share of Stock held on Joint Publishing Account		
3,706	(at valuation)		178
16,673	**Deposit and Current Account balances**		18,926
157,243			209,309
	Less: Current Liabilities		
15,014	Contributions received for future years	15,249	
10.483	Provision for repairs and improvements (Note 1)	37,111	
4,106	Sundry creditors and provisions	4,939	
29,603			57,299
127,640			152,010
	Trust Funds		
	Investments (as per schedule)		
67,223	(Market value 31st December 1983: £102,418)	67,748	
17,346	Deposit and Current Account balances	29,372	
84,569			97,120
£212,209			£249,130
	Represented by:—		
	General Funds		
111,366	General Fund (Note 2)	136,595	
16,274	Publications Fund (Note 3)	15,415	
127,640			152,010
	Trust Funds		
84,569	Balance of Funds		97,120
£212,209			£249,130

C. M. Hutt Treasurer
F. H. Brightman
D. A. Goode
A. R. Stone
E. B. Worthington
} Audit Committee

Income and Expenditure Account for the year ended 31st December 1983

1982 £		£
	INCOME	
34,947	Annual contributions received	36,134
781	Income tax recoverable on covenanted contributions (year to 5th April 1983)	957
14,560	Dividends and interest	15,799
361	Publications—sales of back issues	3,194
1,168	Donations received	248
5,651	Use of rooms	6,860
1,591	Miscellaneous receipts	9,705
9,803	Publications (Note 6)	32,865
£68,862		£105,762
	EXPENDITURE	
33,880	Salaries and National Insurance	42,942
4,839	Electricity and gas	5,078
2,733	General rates (£7,238 less grant £3,780)	3,458
1,462	Repairs, renewals and insurance	3,390
4,720	Printing, stationery, postage and telephone	4,527
1,495	Audit fee	1,552
2,810	Miscellaneous	5,221
2,214	Books and periodicals	2,949
976	Binding, repairs and cleaning books	385
985	Cost of cataloguing	729
56,114		70,231
8,000	Transfer to provision for repairs and improvements	30,000
£64,114		£100,231
£4,748	Excess of Income over Expenditure for the year	£5,531

Report of the Auditors to the Fellows of The Linnean Society of London

We have obtained all the information and explanations which were necessary for the purpose of our audit. We have examined the General Balance Sheet and Income and Expenditure Account and the Accounts of the Trust and Reserve Funds with the books and vouchers of the Society and certify them to be in accordance therewith.

4 London Wall Buildings
London EC2M 5NT
3rd April 1984

FRASER KEEN
(Chartered Accountants)

NOTES TO ACCOUNTS—31st DECEMBER, 1983

Balance Sheet

		£	£
Note 1.	**Provision for Repairs and Improvements**		
	Balance at 1st January 1983	10,483	
	Transfer from Income and Expenditure Account	30,000	
		40,483	
	Expenditure during year	3,372	
	Balance at 31st December 1983	£37,111	
Note 2.	**General Fund**		
	Balance at 1st January 1983	111,366	
	Composition fees received during the year	225	
	Gain on changes of investments during the year	10,473	
	Ramsbottom, Linnean Library Bequest	9,000	
		131,064	
	Add: Excess of income over expenditure for the year	5,531	
			£136,595
Note 3.	**Publications Fund**		
	Balance at 1st January 1983	16,274	
	Transfer from Joint Publishing Account (less due to other Societies £238)	3,466	
	Less: Stock	(377)	
		19,363	
	Less: Transfer to Income and Expenditure Account	3,948	
			£15,415

Note 4. The value of the Library, furniture and stock of unsold Journals is not included in this Balance Sheet.

Note 5. Annual contributions in arrear at 31st December 1983 amounted to £1,499 (31st December 1982: £1,853, 88% of which was paid in 1983).

Income and expenditure account

Note 6.

1982 £	£		£	£
		Publications		
32,019		Half share of surplus on 1983 Joint Publishing Account—Journals	58,101	
4,069		Transfer from Publications Fund	3,948	
349		Cambridge University Press	351	
36,437				62,400
		Less:		
	26,069	Contributions to Joint Publishing Account and distribution cost for Journals—Fellows	28,860	
	565	Editorial expenses	675	
26,634				29,535
£9,803		Surplus transferred to Income and Expenditure Account		£32,865

Joint Publishing Account with Academic Press Inc. (London) Ltd.
Income and Expenditure Account for the Publishing year ended 31st December 1983

1982 £		£	£
	Sales—		
163,963	Journal (including Linnean Society contributions)		225,273
24,135	Books		15,034
£188,098			£240,307
1,670	Stock at 1st January 1983	7,413	
	Less: Cost of Synopses acquired by Society and transferred to Publications (Note 6)	755	
—			6,658
	Production costs—		
99,925	Journal		109,071
17,897	Books		1,326
119,492			117,055
7,413	*Less:* Stock at 31st December 1983		357
£112,079			£116,698
	Gross Profit for year—		
38,009	Academic Press		61,804
	Linnean Society—		
32,019	Journals	58,101	
5,991	Books: Publications Fund	3,704	
38,010			61,805
£76,019			£123,609

Special Account (Trust and Reserve Funds) for the year ended 31st December 1983

	INCOME			EXPENDITURE				
	Deposit and current account balances at 1st January, 1983	Dividends interest and income tax recovered	Royalties or other receipts	Grants, awards transfers and sundry expenses	Purchase of investments	Administration contribution	Deposit and current account balances at 31st December, 1983	Investments at book value
	£	£	£	£	£	£	£	£
P. Appleyard Bequest	1,437	1,244	—	300	49	116	2,216	7,774
The H. H. Bloomer Award Trust	256	241	—	106	10	23	358	1,078
Bonhote Fund	1,196	809	—	400	41	81	1,483	5,628
Goodenough Fund	74	127	200(b)	25	—	9	367	873
Hooker Lecture Fund	152	160	—	—	—	14	298	983
Minchin Fellowship Fund	—	26	—	26(a)	—	—	—	120
Denis Stanfield Memorial Fund	393	145	—	250	4	14	270	1,103
Trail–Crisp Award Fund	85	70	—	—	—	6	149	336
Westwood Fund	80	100	—	—	6	8	166	676
Jane Jackson Bequest	—	1,349	—	1,349(a)	—	—	—	4,088
Flora Europaea Fund	13,048	4,536	8,078(c)	2,332	188	414	22,728	36,181
Omer–Cooper Fund	625	1,033	—	—	226	95	1,337	8,908
	£17,346	£9,840	£8,278	£4,788	£524	£780	£29,372	£67,748

NOTES:
(a) Income transferred to General Income Account
(b) Donation
(c) Royalties

Schedule of Investments on 31st December 1983

Nominal		General Account	Book Value £
£9,000.00		Treasury 12% Stock 1986	8,688
£3,600.00		Treasury 13% Stock 1990	3,624
£7,000.00		Treasury 12½% Stock 1993	6,465
£10,000.00		Treasury 9% Stock 1994	7,272
5,000	Shares	Allied Lyons plc 25p Ordinary Shares	4,696
£1,972.00		Barclays Bank plc Ordinary Stock	2,326
6,400	Shares	B.A.T. Industries plc Ordinary Shares	5,968
9,375	Shares	B.O.C. Group plc 25p Ordinary Shares	5,703
8,000	Shares	Boots Co. plc 25p Ordinary Shares	10,475
12,000	Shares	Cadbury Schweppes plc 25p Ordinary Shares	9,240
3,000	Shares	Distillers Co. plc 50p Ordinary Shares	5,419
2,500	Shares	Glaxo Holdings plc 50p Ordinary Shares	3,386
		Land Securities plc	
£3,320.00		10% Convertible Unsecured Loan Stock 1990/95	4,868
		Land Securities plc	
157	Shares	New Ordinary £1 Shares	—
393	Shares	£1 Ordinary Shares	828
5,250	Shares	Northern Foods plc 25p Ordinary Shares	3,880
1,478	Units	Royal Insurance plc 25p Stock Units	3,235
£11,000.00		Scottish Mortgage & Trust plc 8–14% Stepped Deb.	11,083
		Shell Transport & Trading Co. plc	
2,000	Shares	25p Ordinary Shares	5,368
10,730	Units	The Equities Investment Fund for Charities	16,711
5,000	Shares	Racal Electronics plc 25p Ordinary Shares	12,468
			131,703
		National Savings Bank—Investment Account	10,777
			£142,480

(Market Value 31st December 1983 £234,727)

Nominal		Trust Funds	Book Value £
	Units	The Equities Investment Fund for Charities:	
4,042	„	Omer–Cooper Fund	6,593
6,496	„	Jane Jackson Bequest	4,088
5,891	„	Appleyard Bequest	7,267
1,180	„	Bloomer Award Fund	971
626	„	Goodenough Fund	873
843	„	Hooker Lecture Fund	983
126	„	Minchin Fund	120
715	„	Stanfield Memorial Fund	1,062
371	„	Trail–Crisp Award Fund	336
494	„	Westwood Fund	613
7,467	„	*Flora Europaea* Fund	11,851
1,786	„	Bonhote Fund	2,143
		Treasury 9% Stock 1994	
£9,300.00		*Flora Europaea* Fund	7,398
		Treasury 9% Stock 1994	
£4,165.58		Bonhote Fund	3,063
		6½% Funding Stock 1985/1987	
£19,014.18		*Flora Europaea* Fund	15,000
			62,361
		National Savings Bank—Investment Account	5,387
			67,748

(Market Value 31st December 1983 £102,418)

OBITUARIES

Erik Stensiö (1891–1984)

When former head of the Section for Palaeozoology of the Swedish Museum of Natural History, Emeritus Professor Erik Stensiö died recently at the age of 92, Sweden lost one of its foremost scientists and the international palaeontological community one of its leading figures.

He was born in the county of Småland, in Stensjöby, a community which later in life he had the pleasure of seeing transformed into a cultural preserve, a transformation in which he himself played an integral role.

After university studies in medicine and zoology, his attention was focused on the Triassic fishes of Spitsbergen. During these studies he came to realize that an understanding of the often complicated structures of fossil fish could only be understood through comparisons with living animals. These insights he brought to his doctoral thesis (1921), which in a single bound placed him among the world's leading palaeozoologists.

After a few years in Uppsala, in 1923 he was appointed Professor and Head of the Section of Palaeozoology of the Swedish Museum of Natural History, a position he held until his official retirement in 1959. Under his leadership, the methods of preparation and illustration were greatly improved, particularly through advanced grinding techniques and detailed art-work.

His own work was chiefly dedicated to the agnathans and placoderms of the Silurian and Devonian, and our current knowledge of these groups of fishes is to a large extent due to his work. The year 1927, when his monograph on the Cephalaspids of Spitsbergen was published, has by many been considered to mark the birth of modern palaeozoology. For the first time modern techniques were utilized to their maximum extent. Stensiö could describe through serial grindings, wax models and comparisons with recent organisms the internal anatomy of the fossil forms in astonishing detail and demonstrate their relationship with modern lampreys.

The Section of Palaeozoology became, during Stensiö's time, an international centre, a Mecca of palaeozoology, and the 'Stockholm school' became a byword in the field. He was an inspiring and generous teacher, and many leading palaeoichthyologists must acknowledge their debt to Stensiö.

Erik Stensiö was an honorary member of numerous scientific academies and societies the world over, among them the Linnean Society of London, whose gold medal he received in 1957.

We, his colleagues at the Swedish Museum of Natural History, and his friends in many countries will cherish our memories of his enthusiasm, friendship and generosity, to which I would add my thanks for a friendship lasting more than 50 years.

ERIK JARVIK

Erik Stensiö was by a clear 10 years our most senior Foreign Member. Besides the Linnean gold medal he was awarded our Darwin Wallace medal, the Wollaston medal of the Geological Society, the Daniel Elliott Giraud medal and the gold medal of the Belgian Geological Society. He received honorary doctorates from Paris, Copenhagen, Oslo and Tübingen and was a foreign

member of the Royal Society, the Royal Society of Edinburgh, the New York Academy of Sciences and the U.S.S.R. Academy of Sciences.

EDITOR

Sergei M. Bukasov (1891–1983)

Sergei Bukasov, academician and professor, F.M.L.S. since 1965, died on 17th July 1983, aged 92. He graduated from Leningrad (then Petersburg) University in 1913 and in 1918 joined the Bureau of Applied Botany (now the All-Union Vavilov Institute of Plant Industry) where he spent much of his working life.

In 1925–26 he led a botanical expedition to Mexico, Guatemala and Colombia and returned with some 500 samples of cultivated plants.

Sergei Bukasov worked mainly on the genus *Solanum* and discovered 19 new species of the cultivated potato. His works on potato systematics and hybridization are widely known. He was a prodigious worker and produced more than 300 publications. His decorations include the Order of the Hero of Socialist Labour, two Orders of Lenin and an Order of the Red Banner of Labour.

Academician K. Z. BUDIN
Professors A. Ya. KAMERAS &
V. S. LEKHNOVICH

LIBRARY

The new Manpower Services Commission team has continued cleaning and labelling the book stock and those Fellows with loan items not yet labelled will be asked to return them during the coming months. Loans can be renewed after a short interval, but we must ensure that all Reading Room stock is labelled before any subject rearrangement takes place.

A paperback reissue of *The compleat naturalist: a life of Linnaeus*, by Wilfrid Blunt with the assistance of W. T. Stearn, has been received from the publishers, Collins. The reappearance of this in print is particularly welcomed by the Society as in the past we have searched high and low for second-hand copies, often at a much higher price than might be expected. The paperback edition is priced at £6.95 and is substantially the same as the 1971 hardback edition. For those Fellows who regret not buying the original edition before it disappeared, now is the chance to acquire a copy.

Donations

We are most grateful to the following for donations:

The author	Cheers, G., 1983. *Carnivorous Plants:* pp. 95. Diamond Creek.
The author	Cloudsley-Thompson, J. L., 1980. *Tooth and Claw: Defensive Strategies in the Animal Kingdom*: pp. 252. London.

The author	Court, Doreen, 1981. *Succulent Flora of Southern Africa*: pp. 224. Cape Town.
The editors	*Flora del Paraguay*, Vol. 1, 1983. Published by the Conservatoire et Jardin Botanique, Geneva and the Missouri Botanical Garden.
The author	Gray, Dulcie, 1978. *Butterflies on my Mind, their Life and Conservation in Britain Today:* pp. 123, Brighton.
A. Grenfell	Bailey, D., 1977. *List of the Flowering Plants and Ferns of the Seychelles, with their Vernacular Names:* pp. 46. Seychelles.
A. E. Gunther	*The autobiography of William Carmichael M'Intosh*, transcribed by A. E. Gunther, 2 vols typescript, together with associated papers, 1973.
The author	Hirohito, Emperor of Japan, 1984. *A new hydroid* Hydractinia bayeri *n.sp. (family Hydractiniidae) from the Bay of Panama:* pp. 8, Tokyo.
Dr T. R. H. Hall	Benčat, F., 1982. *Atlas of the Distribution of Exotic Woody Plants in Slovakia and Zoning of their Cultivation:* pp. 359, text & pp. 451. Atlas, Bratislava.
O. Hedberg	Tanzania, Electricity Supply Co., 1976. *Ecological Studies of the Mtera Basin. Greater Ruaha Power Project:* pp. 173, Stockholm.
The author	Matthews, K., 1983. *Flora of the Tamilnadu Carnatic* Vol. 3, parts I and II. Tiruchirapalli.
T. Riley	Salt, J., 1889. *List of Plants Collected . . . in the Neighbourhood of Sheffield:* Sheffield.
The author	Ruhberg, Hilke, 1983. *Die Peripatopsidae (Onychophora): Systematik, Ökologie, Chorologie und phylogenetische Aspekte:* pp. 295, (Thesis).
D. B. Starr-Glass	Avigad, Brakha, 1977. *Flowers of Jerusalem:* 24 pl. Tel-Aviv.
D. B. Starr-Glass	Avigad, Brakha, 1981. *Wild Flowers of Israel, the Carmel:* 25 pl. Jerusalem.
D. B. Starr-Glass	Avigad, Brakha, 1966. *Wild Flowers of Israel, Galilee flowers:* 30 pl. Haifa.
The authors	Stearn, W. T. & Davis, P. H., 1984. *Peonies of Greece:* pp. 126. Kifissia.
The author	Thompson, T. E., 1976. *Nudibranchs:* pp. 96, Hong Kong.
The author	Weber, W. A. (Ed.), 1976. *Theodore Cockerell, Letters from West Cliff, Colorado 1887–1889:* pp. 222. Boulder.
The author	Weber, W. A., 1976. *Rocky Mountain Flora, a Field Guide . . .:* pp. 479, Boulder.

Accessions

Accessions to the Library during the period April to September 1984 include the following items:

Anderson, O. R., 1983. *Radiolaria:* pp. 355. New York.

Baker, R. R., 1984. *Bird Navigation: the Solution of a Mystery?:* pp. 256. London.

Bliss, D. E. (Ed.), 1983. *Biology of Crustacea, Vol. 7, Behaviour and Ecology:* pp. 338. New York.

British Museum (Natural History), 1983. *Seaweeds of the British Isles, Vol. I Part 2A Cryptonemiales (sensu stricto), Palmariales, Rhodymeniales,* by Linda M. Irvine: pp. 113. London.

British Museum (Natural History), 1983. *Blue Butterflies of the Lycaenopsis Group* by J. N. Eliot & A. Kawazoé: pp. 309. London.

Caljon, A., 1983. *Brackish-water Phytoplankton of the Flemish Lowland:* pp. 272. The Hague.

Casas, J. F. & Jimenes, A. C., 1982. *Plantas Silvestres de la Peninsula Iberica (Rupicolas):* pp. 432. Madrid.

Conrad, M., 1983. *Adaptability: the Significance of Variability from Molecule to Ecosystem:* pp. 383. New York.

Cooper, E. L., 1983. *Fishes of Pennsylvania and the Northeastern United States:* pp. 243. Pennsylvania.

Davies, P., Davies, J. & Huxley, A., 1983. *Wild Orchids of Britain and Europe:* pp. 256. London.

Dumont, J. J., Moghraby, A. I. & Desougi, L. A., 1984. *Limnology and Marine Biology in the Sudan:* pp. 363. The Hague.

Fitter, R. & Fitter, A. 1984. *Collins Guide to the Grasses, Sedges, Rushes and Ferns of Britain and Northern Europe:* pp. 256. London.

Gilbert, P. & Hamilton, C. J., 1983. *Entomology, a Guide to Information Sources:* pp. 237. London.

Grassé, P. P., 1984. *Termitologia, Vol. II:* pp. 613. Paris.

Hegi, G., 1981. *Illustrierte Flora von Mitteleuropa, Bd. III:* pp. 504. Berlin.

Hindak, F., 1975. *Klúč na urcovanie výtrusných rastlin. I. diel Riasy:* pp. 397. Bratislava.

Iran, Islamic Republic, [1984]. *Flora of Iran, Vol. 3* by A. Ghahreman: 125 pl. [Tehran].

Jones, D., 1983. *The Country Life Guide to Spiders of Britain and Northern Europe:* pp. 320. Feltham.

Kermack, D. M. & Kermack K. A., 1984. *The Evolution of Mammalian Characters:* pp. 149. London.

Kuehne R. A. & Barbour, R. W., 1983. *The American Darters:* pp. 177. Lexington.

Mahunka, S. (Ed.) [Budapest, Termezettudomany Museum], 1983. *The Fauna of the Hortobagy Natural Park,* Vol. 2: pp. 489. Budapest.

McDonald, J. G., 1981. *North American Bison, their Classification and Evolution:* pp. 316. Berkeley.

Mech, L. D., 1983. *Handbook of Animal Radio-tracking:* pp. 107. Minneapolis.

Mloszewski, M. J., 1983. *The Behaviour and Ecology of the African Buffalo:* pp. 256. Cambridge.

Nitecki, M. H., 1983. *Coevolution: Proceedings of the Fifth . . . Systematics Symposium, May 1982:* pp. 392. Chicago.

Ovington, J. D., 1983. *Temperate Broad-leaved Evergreen Forests. Ecosystems of the World,* Vol. 10: pp. 241. Amsterdam.

[PEKING, Academia Sinica] 35 books on the flora and fauna of China.

Richens, R. H., 1983. *Elm:* pp. 347. Cambridge.

Satchell, J. E. (ed.), 1983. *Earthworm Ecology from Darwin to Vermiculture:* pp. 495. London.

Swingland, I. R. & Greenwood, P. J., 1983. *The Ecology of Animal Movement:* pp. 311. Oxford.
Teas, H. J., 1983. *Biology and Ecology of Mangroves:* pp. 188. The Hague.
Trewavas, E., British Museum (Natural History), 1983. *Tilapine Fishes of the genera Sarcotherodon, Oreochromis and Danakilia:* pp. 583.
Wiggins, M. J. & Graham, G. G., Nature Conservancy Council, 1981. *Guide to the Identification of some Difficult Plant Groups:* pp. 145. Banbury.
Worthington, E. B., 1983. *The Ecological Century: a Personal Appraisal:* pp. 206. Oxford.
