THE ZOOLOGICAL SOCIETY OF LONDON

ANNUAL REPORT 1993–1994

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This Report covers the period from 1 April 1993 to 31 March 1994.

Published by

The Zoological Society of London,
Regent's Park, London NW1 4RY

Telephone:
National: 071-722 3333
International: +44 71 722 3333
Fax: 071 586 5743

Whipsnade Wild Animal Park
Dunstable, Beds LU6 2LF

Telephone:
National: 0582 872171
International: +44 1 0582 872171
Fax: 0582 872649

THE ZOOLOGICAL SOCIETY OF LONDON

MISSION STATEMENT

To promote the worldwide conservation of animal species and their habitats by stimulating public awareness a concern through the presentation of living collections, by breeding endangered species, by relevant research and direct action in the field.

MISSION AIMS

1. To foster public awareness of the variety and diversity of the living world through imaginative exhibits featuring live animals in appropri environments.
2. To maintain and breed species with a high conservation and education value and to link this to a comprehensive programme of learn for all age groups, but particularly for children of school age.
3. To increase our understanding of the biology of rare animal species, concentrating on veterinary research, reproduction, genetics, ethol and ecology.
4. To initiate and run practical conservation programmes chosen in accordance with accepted international criteria for effective and h priority conservation.
5. To promote the understanding of conservation issues and their relationship to the development of the world's poorest countries an promote the application of sound scientific principles to wildlife management.
6. To ensure that the highest standards of husbandry and welfare are employed wherever we care for animals and that techniques to furt improve the husbandry of these species are studied and communicated to others.
7. To co-operate with other responsible societies and organisations promoting conservation on a worldwide basis.
8. To disseminate new knowledge in Zoology and field conservation through publications, symposia, scientific meetings and maintenanc the library.
9. To make awards of prizes and medals for distinguished work in Zoology and Conservation.

ABOUT THE SOCIETY

The Society was founded in 1826 by Sir Stamford Raffles, Sir Humphry Davy and other eminent naturalists. The Society is a cha incorporated by Royal Charter, granted in 1829. A new Charter was issued in 1963.

The Society was formed as a scientific society and this remains its prime purpose. It now comprises five divisions which act togethe furtherance of the aims set out in the Mission Statement.

London Zoo (opened 1828) and **Whipsnade Wild Animal Park** (opened 1931) co-operate in the management and exhibition of the Socie animal collections. They are amongst the world's leading wildlife visitor attractions and enjoy an enviable reputation in the breedin endangered species.

The Education Departments at London Zoo and Whipsnade are instrumental in the provision of knowledge to the visitor. There is extensive programme for schools and many other courses and events are arranged at both locations.

The Institute of Zoology was formed in 1977 to link the Wellcome Institute of Comparative Physiology, the Nuffield Institute of Compara Medicine (both founded by the Society during the 1960's) and the Veterinary Hospitals at London Zoo and Whipsnade Park. A wide rang research is undertaken by the Institute, much of it in close co-operation with the Zoos. It encompasses work on ecology, genetics, reproduc biology, wildlife disease and veterinary medicine, all of which is directed towards the conservation of rare and threatened species and highest standards of animal care.

The Conservation and Consultancy Division was created in 1992 and builds on a variety of overseas field work and zoo design work initi some 15 years ago. Activity is concentrated in Africa and the Middle East. The work encompasses direct support for threatened species s as elephant and rhino, training of nationals, secondment of skilled staff and management of multidisciplinary projects in conservation rese and related field operations.

The Learned Society, as the core division, is responsible for encouraging the spread of knowledge by arranging discussion meetings publishing the results of zoological research and by maintaining a library.

Scientific Meetings, at which the results of new research are communicated and discussed, are held on eight occasions during the y Symposia on special subjects of international interest are also arranged and generally occupy two days of contributions and discussions.

The Society's publications include:

The *Journal of Zoology*, which publishes original research in all fields of zoology, from international contributors. The wide variety of contents provides a broad view of trends and developments in the subject.

The *Symposia* series of books, each of which contains the papers presented at a Symposium and thus covers a particular topic in depth

The *International Zoo Yearbook*, a work of reference as well as an authoritative record of developments in the zoo world.

The *Zoological Record*, a comprehensive annual bibliography of zoological literature with subject and systematic indexes. The *Recor* published in conjunction with BIOSIS, Philadelphia. Produced continuously since 1864, it is an unrivalled source of information zoological research world-wide.

The Library was established soon after the Society's foundation and is now one of the major zoological libraries in the world. It provid full library service to members of the Society and to its staff. It also houses a unique archive.

ILLUSTRATIONS

Cover: 'Cheetah (*Felis jubata*)'. Watercolour by Joseph Wolf, October 1852. Illustration chosen to mark Whipsnade's outstanding success in breeding of Cheetahs.

Photographs: Michael Lyster, Peter Denton and Ken Taylor.

EDITORIAL: Peter H. Denton and Marcia A. Edwards

REPORT OF THE COUNCIL

The Council has pleasure in presenting its 165th Annual Report to the Annual General Meeting of the Society to be held on 28 September 1994 at 3.00 pm in the Society's Meeting Room at Regent's Park.

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PATRON: HER MAJESTY THE QUEEN

COUNCIL 1993–94

President: Field Marshal Sir John Chapple, GCB, CBE, MA
Treasurer: P J Wrangham
Secretary: Professor R McNeill Alexander, PhD, DSc, FIBiol, FRS
J Barrington-Johnson
Dr B C R Bertram, MA, PhD, FIBiol
Dr M R Brambell, VetMB, PhD
Dr S Cobb, BA, DPhil
G J Cutting
Professor A S D Farmer, PhD, CBiol, FIBiol, FLS, MIPM, ARPS
Professor T R Halliday, MA, DPhil
J M Knowles, OBE
Dame Anne McLaren, BA, DPhil, FRS, *Vice President*
M A Moore
Professor M Peaker, DSc, PhD, FIBiol, FLS, FRSE, *Vice President*
M Rowson, MA
The Hon Peregrine Simon, QC, FLS
Miss J Thornback, MSc
Professor R C Tinsley, PhD
C H Tudge, MA
D Tunnicliffe, CBE, BSc, FINSTT
I Webb, BSc(Econ), MBA
Councillor D P Weeks, BA (*Nominated Member*)

HONORARY FELLOWS

DATE OF ELECTION

1977 HRH The Prince Philip, Duke of Edinburgh, KG, KT
1991 HM The Emperor Akihito of Japan
1952 Professor Sven Otto Hörstadius Zoologiska Institutionen, Uppsala, Sweden
1974 Dr Roger Tory Peterson Route 4, Box 131, Neck Road, Old Lyme, Connecticut, USA
1975 Professor Jean Anthony Muséum National d'Histoire Naturelle, 55 rue de Buffon, Paris 53, France
1975 Professor L D Brongersma Rijksmuseum van Natuurlijke Historie, Leiden, Holland
1975 Professor Jean Dorst Muséum National d'Histoire Naturelle (Mammifères et Oiseaux), 55 rue de Buffon, Paris 53, France
1978 Professor José C M Carvalho Museu Nacional, Quinta da Boa Vista, Rio de Janeiro, Brazil 20940
1984 Professor Ernst Mayr Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA
1988 Professor Dr Milton Thiago de Mello Instituto de Ciencias Biologicas, Universidad de Brasilia, Brasilia, Brazil DF70.910
1990 Professor Knut Schmidt-Nielsen Department of Zoology, Duke University, Durham, North Carolina, USA
1990 Professor John Z Young Emeritus Professor of Anatomy, University College London, Gower Street, London WC1
1992 Professor Edward O Wilson Museum of Comparative Zoology, Harvard University, 26 Oxford Street, Cambridge, Massachusetts, USA

MESSAGE FROM THE PRESIDENT
FIELD MARSHAL SIR JOHN CHAPPLE

he Society has come through the last Financial Year in much better shape than many could possibly have predicted a ouple of years ago. Both our major operating divisions, London Zoo and Whipsnade Wild Animal Park, have broken ven on their operating budgets for the first time for many, many years. The other divisions have also come in on or near neir targets.

What all this means is that the Society has learnt to live within its means with tight financial controls and a cost onsciousness which now applies to all areas of activity, and all levels of the Society's business.

This satisfactory situation has been reached at some cost and occasionally it has been a bruising process. There has een at times a lively debate and a few harsh things said and done. Also, we must acknowledge that the situation is only atisfactory, not yet comfortable. We have little in reserve as yet and we must achieve some surpluses to help us rebuild nd renew. I sum it all up as having come through Survival and started Revival. We are not yet into 'Thrival'.

I make no apology for opening on the financial side of our Society. It is vital that we get this right. The many people ho have worked so hard to achieve these results deserve our gratitude and thanks.

To me, however, this is not the most notable achievement of the Society over the last couple of years. What I consider be most worthy of note, is the return of a sense of purpose and a confidence in the value of the work of all our ivisions. A great deal of work has been done by Council, by the Boards and by the senior executives to reinforce our lission, sharpen our objectives, consider how to increase membership, continue the work on a new Charter and yelaws, re-negotiate the lease for Regent's Park, start out on the revival plans for London and Whipsnade, select Rhino onservation as the first of what I hope will be a new series of flagship projects and look hard at the projection of our ublic image and publicity.

Much of this will be reported more fully at the Annual General Meeting. This report covers many areas of activity, rgely unsung but immensely important. I draw your attention to the scientific work of the Society undertaken in the nstitute; to the Consultancy work; and to the excellent publications produced by the Society. We are fortunate to have ich dedicated and capable people working for us and with us.

A year ago I left to take up a new appointment in Gibraltar. I have been able to get back for most of the Council eetings but I was finding it more difficult to devote sufficient time in between to helping the Society. I handed over as resident on 1 June 1994 to Sir Martin Holdgate and I can only say that the Society is very fortunate to have acquired distinguished a person as your new President.

I would like to thank all members of staff for their help and support. They have neither lost faith nor faltered in their ork. Also my thanks go to the many Volunteers who work so tirelessly for us. The executives have been professional, obust and committed. Finally, to all those Council members with whom I have served for the last two and a half years, give my special thanks for all the time they have so selflessly devoted to further the cause of our great Society.

John Chapple

RESIDENT

A NOTE BY THE INCOMING PRESIDENT
SIR MARTIN HOLDGATE

I feel deeply honoured by being chosen by the Council to succeed Sir John Chapple as President. It is fitting that my fi action is to pay tribute to his leadership, which has brought the Society out of deep crisis, and set us on the path fr survival through revival to "thrival" (to use his words).

The thriving future that we seek must be built on our strengths. We are unique in linking, in one body, an o standing professional Society, a major information base, a research Institute that is working at the leading edge zoological and conservation science, and two collections that not only give the public the face-to-face contact with l animals that makes a film look like just so much celluloid but also demonstrate how good zoos contribute to world-wi conservation.

For the past six years I have been the Director General of the world's largest and oldest Union of governmental a non-governmental bodies working for the conservation of nature and the sustainable use of natural resources. I ha seen how important captive breeding can be in saving components of the Earth's biological diversity. I am sure that Zoological Society of London will make a major contribution to that crucial task. As President, I commit myself helping to build a thriving Society with an increasing reputation for such work.

Sir Martin Holdgate
INCOMING PRESIDENT

Presidential greeting: the outgoing President, Field Marshal Sir John Chapple, congratulates his successor, Sir Martin Holdgate, 25 May 1994.

REVIEW OF THE YEAR

A period of consolidation followed the ast two turbulent years. Membership of Council stabilised and the strict financial nonitoring regime introduced the pre- ious year ensured that expenditure did ot exceed income.

The President was appointed Governor f Gibraltar in April. Whilst he managed o attend most meetings of Council, he et it be known in November that he vould stand down when a suitable eplacement had been found. A selection ommittee comprising the Secretary, reasurer and the Vice-presidents then onsidered the nominations to replace ir John received from members of ouncil. They decided unanimously to ecommend to Council that Sir Martin oldgate be elected to the Presidency. ouncil, meeting on 9 March, concurred nd the new President assumed his esponsibilities on 1 June 1994.

There was much discussion in Council nd amongst executives over the Society dopting a unified membership scheme, ncorporating the present Fellowship, ssociates, Lifewatch members of ondon Zoo and the Friends of Whipsnade. Total membership of these odies stands at 20,000. Many feel that y promoting the Society through the ublication of a conservation-orientated agazine and mounting throughout ll divisions of the Society a vigorous ecruitment drive, a total membership rget of 100,000 would be achievable. iscussion was continuing at the year- nd on converting the interest shown the general public in the Society's ork into a more tangible relationship. ouncil resolved to promote Rhino con- rvation as a flagship project featuring e contributions from all five divisions.

With the improvement in the Society's nancial fortunes, Council decided to ok at several key issues including the sirability of there being a Chief xecutive of the Society. The mission atement and the extent to which e devolved operating divisions should anage their own accounts and person- l resources were also reviewed. A vised mission statement, adopted by ouncil on 20 April 1994, appears at e beginning of the annual report.

The draft Charter and Byelaws were fined during the year. Messrs Hempsons ere selected through competitive tender- g to represent and advise the Society the various processes leading to option by the Privy Council of the new Constitution. The Hon Peregrine Simon QC, Chairman of the Constitution working party, made a short presentation to the Annual General Meeting indicating the major changes in the revised draft. Discussion with the Privy Council continues. It is hoped to have the new Charter and Byelaws in place by December 1994.

For the first time, a formal election was held to select Fellows to serve on Council, replacing the five members who had retired by rotation. There were 15 candidates; seven Scientific Fellows and eight Ordinary Fellows. Thirty per cent of Fellows voted. The process was repeated for 1994 with nominations being invited via the members' newsletter.

COUNCIL AND BOARDS

Council met on 12 occasions with average attendance amongst members achieving a commendable 78%. Attendance of individual members of Council was as follows: Sir John Chapple 10 out of a possible 12; Professor R McNeill Alexander 12/12; Mr Peter Wrangham 10/12; Mr J Barrington-Johnson 5/5; Dr Brian Bertram 5/5; Mr John Knowles 5/5; Miss Jane Thornback 5/5; Professor Richard Tinsley 3/5; Dr Michael Brambell 9/12; Dr Stephen Cobb 11/12; Mr Geoffrey Cutting 12/12; Mr John Edwards 6/7; Professor Anthony Farmer 9/12; Professor Tim Halliday 9/12; Professor Arthur Lucas 1/7; Dr Anne McLaren 6/12; Professor Mike Hassell 1/7; Mr Michael Moore 7/12; Professor Malcolm Peaker 9/12; Mr Martin Rowson 11/12; Hon Peregrine Simon 9/12; Mr Nigel Sitwell 6/7; Mr Colin Tudge 10/12; Mr Denis Tunnicliffe 5/12; Mr Anthony Smith 5/7; Mr Ian Webb 12/12 and Councillor David Weeks 5/12.

A Learned Society Board was established to manage the affairs of the Membership Department, the Publications and International Zoo Yearbook Departments, the Library and the responsibilities of the Clerk to the Council. The Secretary took the Chair for the first meeting and then handed over to Professor Richard Tinsley. Unfortunately, owing to accepting a post at Bristol University, Professor Tinsley had to resign as chairman, being replaced by Mr John Edwards. Financial matters dominated the early deliberations of the

His Excellency Khaled Al-Dawaisan, Kuwaiti Ambassador, with the President and a group of children. His Excellency accepted the Society's Gold Medal on behalf of His Highness the Emir of Kuwait. The medal was presented in recognition of the gift of £1 million.

Ann Sylph, Librarian, and Peter Denton, Clerk to the Council, at the statue in Westminster Abbey to one of the Society's founders Sir Stamford Raffles. The garland was made from flowers grown in the Zoological Gardens.

Board with priority being given to increasing income through a series of marketing initiatives featuring the Society's archive.

Professor Peaker was replaced in July as Chairman of the London Zoo Board. The Treasurer assumed the Chair in a temporary capacity. Council undertook a review in January of the non-executive governance of London Zoo. The sub-committee, comprising the Secretary, Mr Barrington-Johnson and Dr Michael Brambell recommended *inter alia* that the two longest serving members of the Board, Mr John Edwards and Mr Martin Rowson, be asked to stand down. Council, however, took the view that Mr Rowson should remain a member. The review of the London Zoo governance had been occasioned by a resolution of the London Zoo Board in December calling on Council to dismiss the Director. However, after considering the issues carefully, Council decided not to affirm the resolution and accordingly confirmed Dr Gipps in post. Membership of the Board otherwise was unchanged.

THE MEMBERSHIP

At the end of the subscription year (31 December 1993) there were 2,099 Fellows and 1,840 Associates, including 67 Student Associates.

Obituaries

Among those Fellows of whose deaths Council heard with deep regret were Mr David H Fleay, MBE, Corresponding Member; The Earl of Bessborough, Ordinary Fellow and former Vice-President; Sir Arthur Drew, Ordinary Fellow and former member of Council; Dr Ethelwynn Trewavas, Scientific Fellow and President of the British Cichlid Association; Mr George Cansdale, the former Superintendent of London Zoo; Dame Elisabeth Frink, Life Fellow, who sculpted several pieces for the Society's awards.

Sir Michael Sobell, whose generous gift enabled the Michael Sobell Pavilion for Apes and Monkeys to be built, died in August 1993.

During the preparation of this report, Council also received with sadness news of the death of Professor Sir Barry Cross, CBE, FRS. Sir Barry, the distinguished physiologist who was Secretary of the Society from 1988 to 1992, died on 4 April 1994 after a short illness.

Members' Newsletter

Five editions of the newsletter were published, it now being received by Associates as well as Fellows. Mrs Roberta Davies assumed the duties of Honorary Editor. The newsletter contained on average eight pages of text including a lively correspondence column, a comprehensive diary of Society events, feature articles on fieldwork with which the Society is associated and aspects on the historical legacy of the Society contributed by Fellows.

ANNUAL GENERAL MEETING

The Annual General Meeting was held on 22 September 1993 with the President, Field Marshal Sir John Chapple, in the chair.

In accordance with Article 10 of the Charter and Byelaw 25, the following Fellows retired as Ordinary Members of the Council: Mr J C Edwards and Mr N D W Sitwell (Ordinary Fellows), Professor M Hassell, Professor A Lees and Mr A J F Smith (Scientific Fellows).

In accordance with Article 11 of the Charter and Byelaw 26, Professor R McNeill Alexander was elected Secretary, Mr P Wrangham was elected as Treasurer and the following Fellows were elected as Ordinary Members of Council: Mr J M Knowles and Mr Barrington-Johnson (Ordinary Fellows), Dr B Bertram, Miss J Thornback and Mr R C Tinsley (Scientific Fellows). The following Fellows appointed, in accordance with Article 12 of the Charter and Byelaw 26, to fill the casual vacancies created at the end of 1992, were confirmed in office: Mr G J Cutting, Mr M Rowson, The Hon Peregrine Simon, Mr D Tunnicliffe and Mr I W Wallace (Ordinary Fellows); Dr M R Bramble, Dr S Cobb, Professor A S D Farnes and Dame Anne McLaren (Scientific Fellows).

The President presented the awards that had been made in 1992 for contributions to zoology. Cheques generously donated by the Marsh Christian Trust in connection with the Society's Marsh Award for Conservation Biology and the Thomas Henry Huxley Award were presented to the winners of the awards by Mr Brian P Marsh.

Awards and Honours

Council announced the following awards made in 1993 for contributions to zoology:

The Scientific Medal (awarded to zoologists 40 years of age and under, in recognition of scientific merit) to *Dr H C Godfray*, of Imperial College, for contributions to population biology at the interfaces between ecology, evolution and behaviour.

The Zoological Society of London Frink Medal for British Zoologists (for significant and original contributions by professional zoologists to the development of zoology in its wider implications) to *Professor R M Anderson*, of the University of Oxford, for his contributions to the fundamental theory of epidemiology and its application to the dynamics of disease transmission.

The Zoological Society of London Marsh Award for Conservation Biology (for contributions of fundamental science and its application to the conservation of animal species and habitat) to *Dr Georgina M Mace*, of the Institute of Zoology, for building links between fundamental ecology and its practical applications in conservation.

The Silver Medal (for contributions to the understanding and appreciation of zoology, including such activities as public education in natural history and wildlife conservation) to *Mr Jonathan Kingdon*, for contributing by both art and science to the public understanding and appreciation of zoology.

The Stamford Raffles Award (awarded to an amateur zoologist for distinguished contributions to zoology) to *Dr W R P Bourne*, for contributions to the study of seabirds at sea.

The Thomas Henry Huxley Award (for original work submitted as a doctoral thesis) to *Dr J S Field*, of the University of Ulster, for his thesis 'Studies on *Diplostomum* spp. affecting rainbow trout (*Oncorhynchus mykiss*) at Movanagher Fish Farm and development of control strategies'.

The Prince Philip Prize (open for competition to pupils under 19 years of age, of schools or other places of education in the United Kingdom, the Channel Isles or the Isle of Man, on the basis of an account of practical work involving some aspect of animal biology) to *Rodger Toner & Donal Keane*, of the Abbey Christian Brothers Grammar School, Newry, Co Down, for their essay 'Assessment of female quality by male *Gammarus*'.

In April 1993, Council resolved to present the Society's Gold Medal to His Highness the Emir of Kuwait, in recognition of his contribution to keeping London Zoo open, through the generous donation of £1 million in 1992 as a gift from the children of Kuwait to the children of Great Britain. At London Zoo on 7 July 1993, His Excellency Khaled Al-Duwaisan, Ambassador for the State of Kuwait, accepted the medal from the President and was shown the Society's plans for development.

Amendments to the Regulations

The Resolution to increase the subscriptions for Fellows and to consolidate categories of payment from 1 January 1994 was agreed at the Annual General Meeting of the Society held on 22 September 1993.

The consequential amendments to the Regulations, which were passed by Council, are given in Appendix 6.

PERSONNEL

At 31 March 1994 there were 340 full time, permanent staff employed by the Society. Together with seasonal staff and people employed overseas by the Conservation and Consultancy Division, this takes the total to over 450 at some points of the year.

Mr David Jones left the Society in March after 25 years' service on appointment as the Director of the North Carolina Zoological Park. He joined the Society as the junior vet based at Whipsnade and subsequently became Senior Veterinary Officer at London Zoo, Director of Zoos and General Director. He had latterly been the Director of the Conservation and Consultancy Division. Miss Alexandra Dixon currently fills the post as Acting Director. Professor Morris Gosling joined the Society in January 1994, as Director of Science, a post which had been occupied in an acting capacity for most of the year by Dr Geoffrey Smith. Mrs Carol Boroughs left the Society in December and was replaced as Head of Personnel by Mr Ian Meyrick, formerly a Personnel and Training Manager at Hampshire County Council. As the year closed it became known that Mr Lester Corp had tendered his resignation as Director of Finance on his being appointed to a similar position at the Royal Albert Hall.

Other senior appointments included Mr Simon Tonge, as Senior Curator, and Mrs Valerie Pakenham-Keady, as Development Manager at London Zoo.

The dedication and hard work of the staff has been a major factor in achieving the greatly improved position in which the Society now finds itself. The projects planned for the next decade will prove an exciting challenge as the Society works to sustain growth and development well into the future.

Awards

The following six candidates successfully passed the City & Guilds Certificate in Zoo Animal Management: Mr J Boyd, Ms Sarah Carter, Ms C Connor, Ms V Silverton, Ms Esther Wenman, Ms Carol Wilson.

Departures and Retirements

Mrs Ann Maskell, Telephonist (15); Mr Richard Raft, Support Services Manager, Whipsnade (24); Mr David Jones, Director Conservation & Consultancy Division (25); Mrs Pam Passfield, Telephonist (26). Figures in brackets denote number of years' service.

Obituaries

We regret to record the deaths of the following pensioners: Mr J J Hazel; Mrs R Owens; Mr G R F Evans; Mrs H Goodman; Mr C Hersey.

ACKNOWLEDGEMENTS

The work of those Fellows who serve on the advisory committees and boards and the continued support and help received from many organisations and individuals are vital to the success of the Society.

To all those too numerous to mention here, Council extends its deep appreciation.

SCIENTIFIC ACTIVITIES

RESEARCH

THE INSTITUTE OF ZOOLOGY

Professor L M Gosling joined the Society as Director of Science in January 1994. Dr G R Smith was Acting Director in the first part of the year, following the departure of the previous Director, Professor A P F Flint, in February 1993. Professor Gosling will continue his research in olfactory communication and develop its application to conservation problems, especially those of behavioural incompatibility in captive breeding programmes.

There is a growing consensus that the research programme of the Institute of Zoology should reflect the conservation mission of the Society. While there have always been conservation implications in the work of the Institute, the change in this respect has accelerated in parallel with the explicit recognition that conservation is at the heart of the work of a modern zoo. The adoption of this mission has produced a vigorous sense of purpose throughout all Divisions of the Society.

The Institute is in a good position to capitalise on these developments having taken the major steps of establishing new research groups in Conservation Genetics and Ecology. Both of these Groups now have active research programmes complementing those of Reproductive Biology, Veterinary Science and Comparative Medicine, and have had considerable success in attracting grant income. The aim now is to continue to focus the Institute's work programme in the science underpinning conservation biology. At an organisational level this will mean a more balanced Group structure to promote a multidisciplinary research programme addressing the key conservation problems of maintaining biodiversity, managing and restoring rare populations of wild animals, and maintaining and breeding endangered species in captivity. The balance of the Institute's research will continue to fall mainly within a strategic framework, addressing important areas of theory within each field but bearing in mind the need for short or long term applications.

The Institute continues to develop active links with colleges of the University of London and with other Universities. In addition to involvement in collaborative research our staff contribute to a wide range of teaching programmes. The programme of postgraduate training goes from strength to strength with twenty students enrolled for PhDs. We plan to supplement this programme with a new MSc course in Wild Animal Health which will be offered jointly by the Institute and the Royal Veterinary College in 1994.

ECOLOGY

Now in its third year, the Group has been able to consolidate its general aims (stated in last year's Report) into four main research themes as a result of new external funding, which includes four grants from the Natural Environmental Research Council, one from the EC and one from the Royal Society.

First, the evolution of breeding systems in a range of invertebrates and vertebrates is being investigated. This is an important question in behavioural ecology because it deals with how natural selection and ecology jointly determine behaviour. Current studies of the costs and benefits of communal breeding in both leptothoracine ants in the laboratory and in the Banded mongoose in Uganda will provide insight into how ecological constraints affect the allocation of reproductive effort and influence dispersal. This knowledge is not only important for testing kin selection theory but also directly relevant to the conservation and management of many species in fragmented habitats.

Second, the ecological and genetical factors influencing the life histories of animals in natural populations are being studied. Investigating the process of natural selection in Red deer and Soay sheep in the Hebrides improves our understanding of the maintenance of genetic diversity and population stability. These single species studies are potentially important in conservation management because of the insight they give into adaptation to fluctuating environments.

Third, although it is often convenient to study a single species, interspecific competition may have an important influence on population dynamics and population persistence. In East Africa we are investigating the demise of the Cheetah as a result of competition with lions and hyaenas, which not only steal their prey, but also kill their young. Also under investigation is the possibility that competition from domestic livestock for food and water resources is responsible for the decline of the already endangered Grevy's zebra. In both these threatened species populations can persist only in protected areas and the work of the Group is relevant to the design and management of national reserves and parks.

Fourth, attempts are being made to (a) identify critically important sites for conserving biological diversity *in situ*, develop better predictions of the risk of extinction of species, based on some conservation population theory, and (c) establish priorities for species conservation. These *situ*, in zoological gardens and wild parks. For example, the consequences of different methods for choosing where protected areas should be sited are being investigated. The most obvious aim is to try to include as many species as possible in the protected area network.

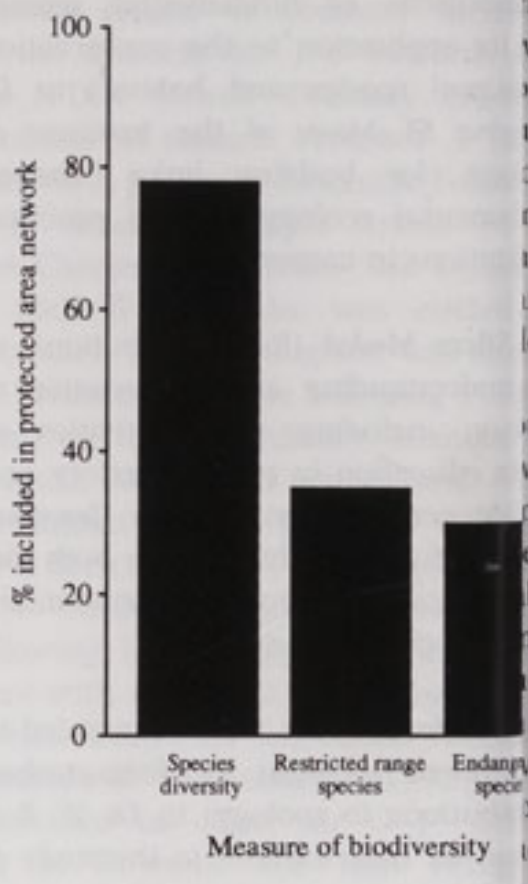


Figure 1. This figure shows the consequences of selecting protected areas for African antelopes by maximising the number of species in the protected area network. Although the network successfully encompasses almost 80% of the total species diversity, only a minority of species with restricted ranges, and only 30% of species classified as globally endangered are included. Strategies for designing protected area networks need to consider multiple aims, and are the basis of some continuing research in the Ecology Group.

However, as Figure 1 shows for African antelopes living south of the Sahara, such a strategy does not necessarily achieve what is intended: in this instance only a minority of threatened species (30%), or of species with a very restricted distribution (35%), is protected, when sites are chosen to maximise species numbers.

CONSERVATION GENETICS

This Group applies advanced molecular genetic techniques to practical questions on conservation and basic problems in population genetics and systematics.

The last Simien jackal populations, found in the Ethiopian highlands, number no more than 500 animals. Analysis of blood by DNA sequencing techniques showed that the close relatives of the Simien jackal were not the three other species of African jackal, but rather Grey wolves and Coyotes. This suggested that Simien jackals could interbreed with the domestic dog, a close evolutionary cousin of the Grey wolf. Some Simien jackals have unusual pelage and conformation. Such animals, unlike normal Simien jackals, were found to have dog-specific genetic markers. This provided the evidence needed to prove that Simien jackals are threatened by hybridisation with domestic dogs.

In an experiment with the tropical butterfly, *Bicyclus anynana*, populations were founded with either 1, 3 or 10 mated pairs and allowed to breed for several generations, thus mimicking the abnormal circumstances ('bottlenecks') imposed by population contractions. The heritability of wing pattern characters, a critical measure of adaptive potential, was lower for the populations that experienced the more severe bottlenecks, but remained unchanged in the population derived from 10 pairs. The experiment also showed that, although fertility and viability were drastically reduced in the first few generations by the more severe bottlenecks, some populations recovered through natural selection of the most fecund individuals. This work suggests that reintroductions should never be based on less than 10 pairs; and that in captive breeding programmes it may be important to select breeding animals by some measure of fitness, rather than by pedigree alone.

Partula snails were reduced from about 75 species to only 23 by the introduction of a predatory snail into their habitat. Many of the remaining species and subspecies are being bred as distinct lines at the Zoo and University of Nottingham. This immense effort may be unnecessary if many strains are genetically very similar. Genetic techniques are now being used to determine the genetic units that need to be bred independently.

Newly funded research includes a collaborative study of genetic differences between species of Madagascan butterflies (genus *Henotsia*) and genetical studies of British bats, Sea trout, South American camelids, British breeds of cattle and sheep, and East African bushbabies.

REPRODUCTIVE BIOLOGY

The effect of seasonal environmental changes on reproduction was studied in deer, wallabies and rodent models. In deer, seasonal photoperiodic change influences reproductive hormones, sexual behaviour and the timing of puberty. This has important implications for breeding in captivity, because attempts to induce oestrous behaviour and mating in exotic species frequently fail. The biological action of prolactin was examined, together with the hormonal regulation of seasonally produced secondary sexual characteristics.

The skewing in sex ratio that occurs in wild Red deer is correlated with social status. Possibly social rank influences ovarian development and steroid hormone secretion and hence the birth sex ratio. In pregnant ruminants, the developing conceptus produces chemical signals that influence the mother's hormonal state. Current work emphasises the importance of uterine hormone receptors and their effects on uterine hormones. The oxytocin receptor (OTR) holds the key to the establishment of pregnancy, its activity in the uterus being controlled by embryonic interferon.

In deer, techniques have been developed for synchronising oestrous cycles and inducing ovulation. Current studies on oocyte collection from superovulated females will be invaluable in future breeding management of rare captive ungulates.

A single gene defect (*tau* gene) alters the timing of the daily biological clock in hamsters. This is proving useful in studies of the mechanism by which animals regulate annual breeding cycles.

In the Naked mole-rat, social suppression results in the blocking of ovulation and impairment of spermatogenesis. Current results indicate that social interactions, rather than pheromones, regulate reproduction.

Measurement of urinary and faecal steroid metabolites of ovarian steroids continued to be used as a non-invasive method of monitoring fertility in captive and free-living wild animals, including rhinos and elephants.

A human gene, the homologue of which was identified as being expressed early in rat spermatogenesis, was sequenced and shown to code for a transcription factor. Its precise role in testicular function has yet to be established. The serine-protease inhibitor molecule implicated in mammalian sperm-egg binding was located in a precise region of the spermatozoon, suggesting a role in regulating the acrosome reaction.

Cryomicroscopy and fluorescence microscopy are being used routinely to measure the damage to spermatozoa caused by cryopreservation; and computer-assisted sperm motility assessment is of value in relating sperm quality to fertility. These techniques are of major relevance to the preservation of genetic material from endangered species.

Unfertilised marmoset oocytes were stimulated to divide by ethanol exposure or electrical stimulation. Ethanol-activated embryos developed to 16 cells *in vitro* but electrically activated embryos to only four cells. Pronuclear transfer was performed by micromanipulation of one-cell marmoset embryos. After such transfer, control embryos (both parental genomes restored) develop to eight cells *in vitro*. It was possible to create uniparental marmoset embryos, which developed to at least six cells *in vitro*. This work is important because it indicates the relative role of genes of paternal and maternal origin in controlling early embryonic development.

COMPARATIVE MEDICINE

Applied immunology

The programme on the development and application of immuno-diagnostic tests for infectious diseases, largely funded by the Overseas Development Administration, was extended during

the year and included a field visit to Sri Lanka. A collaborative research programme on novel methods of malaria diagnosis was established in Kandy. In addition, lectures and workshops were held on the application of new diagnostic methods to toxocariasis (a helminth disease of Man and dogs), hepatitis, and plant viral diseases. With collaborators in Australia, a new research project was initiated on the development of a 'dipstick' test, based on monoclonal antibody, for malaria screening.

During the year visiting workers included colleagues from Burma, Malaysia, China, Kenya and the USA.

Microbiology

In a collaborative study, 50 human and animal strains of *Fusobacterium necrophorum*, the causative organism of necrobacillosis, were classified into four types by the pathogenicity tests described in earlier Reports. The same strains, which bear coded designations, are being examined by specialised chemical and molecular techniques in five other laboratories.

Most cases of human botulism are caused by the toxins of *Clostridium botulinum* types A, B and E. Types C and D are notorious for producing botulism in animals but, for reasons hitherto unknown, rarely do so in Man. Carrion is the major source of toxin for animals and, in a series of experiments, types C and D differed from types A, B and E in producing much greater toxicity in rotting carcasses.

Pseudotuberculosis, caused by *Yersinia pseudotuberculosis*, affects many animal species, especially rodents and birds. It is well known in zoos and a vaccine capable of being administered orally in food would be of value. Several strains of low virulence, given orally to mice, protected against subsequent oral challenge with fully virulent strains; occasionally, however, they themselves gave rise to disease. A strain isolated from the intestinal contents of a normal Mara showed greater promise, causing no more than a mild abortive infection when given by mouth.

VETERINARY SCIENCE

Diseases of captive wild animals

Many conservation programmes necessitate the maintenance of animals in captivity for periods varying from a few days (e.g., during translocation) to a year or more (e.g., for breeding). The veterinary care of the Society's animals at Regent's Park and Whipsnade provides the opportunity for gaining knowledge of diseases, medicine and husbandry techniques that are crucial for the success of such conservation programmes.

Vigilance for spongiform encephalopathy led to the diagnosis of a further case, this time in a Cheetah from Whipsnade. The possible source of this 'infection' is being investigated. The many other activities included close monitoring of the health status of the Great bustards at Whipsnade, the diagnosis of incomplete separation of the trachea and oesophagus (possibly an inbreeding effect) in Asiatic lion cubs that died at birth, and the successful treatment of severe forelimb stiffness in the Asian elephant, 'Anna', at Whipsnade.

Diseases of free-living wild animals

It is important to determine the causes of unusual large-scale mortality incidents in free-living wild animals. Such incidents may be 'natural' phenomena, but if 'man-made' there may be ways of preventing further cases. Determining the cause of death often requires painstaking and detailed examinations. Such examinations of carcasses of Common dolphins (*Delphinus delphis*) stranded, in unprecedented numbers, in South West England in the early months of 1992 revealed that the majority died as a result of entanglement in fishing nets. Investigations into the causes of death in this species, Harbour porpoises and other marine mammals are continuing. The possibility of a viral aetiology in widespread mortality incidents in Common frogs in South East England is being investigated.

Training in wildlife health

Veterinarians from a variety of countries saw practice and studied aspects of wild animal diseases and care at Regent's Park and Whipsnade. Plans for a Master's course in Wild Animal Health to be jointly run by the Institute of Zoology and the Royal Veterinary College were developed and approved by the University of London Board. It is hoped that the first of these courses will begin in October 1994.

SCIENTIFIC MEETINGS, SYMPOSIA AND SEMINARS

Attendance at the Scientific Meeti
held at 5 pm on the second Tuesda
the month during academic te
fluctuated during the period of
Report. No doubt this to some ex
reflects the 'popularity' of the subje
the meeting. However, numbers ge
ally increased from autumn 1993.
hoped that this trend may be a resp
to the higher profile given t
meetings through the now reg
Members' Newsletter as well as thro
Lifewatch, and that it will conti
Meetings were held on 'New approa
to plant-parasitic nematode con
(marking the 150th anniversary
Rothamsted Experimental Station)
May 1993, and 'Conservation ecolog
the dormouse *Muscardinus avellana*
in June. The autumn meetings
'New dimensions in primate s
behaviour' in October, 'Planning
designing for birds in London'
November, and 'Slugs and sea s
how to succeed without a shell
December. In February 1994 som
the current research on cephalo
was reported in 'Living with the jet
and 'Lake Baikal' was the topic
March 1994.

Efforts have been made to foster
social potential of the Scientific Mee
so that there is more opportunity
members to meet and talk to each o
on these occasions. The Library
have offered tea and coffee before
meeting, with a display of sur
Library stock for sale. The Regenc
Raffles Bar has been open to
audience when the meeting ends.

A new series of meetings
introduced in October, open to
public as well as to members, under
general title of 'Tuesday Talks'. It
hoped that these talks, aimed at a
general audience and starting later
7 pm—than the Scientific Meeti
would appeal to a wider spectrum
members and associates and we
interest non-members in the Soci
activities. Ken Livingstone, MP, op
the series, speaking on conserv
issues in 'Tales from the Riverb
Subsequent meetings drew on
expertise of the Society's staff
members, with talks from Paul Pe
Kelly, John Edwards, Doug Richard
Colin Tudge and Alexandra D

Attendances suggest that the series meets a demand and should continue to grow in prestige and popularity.

Much of the success has been due to the Society members who have volunteered their help with organisation. They are warmly thanked. The Society is also extremely grateful to all the speakers and chairmen who have contributed so much to the year's Scientific Meetings and Tuesday Talks.

A Symposium was held in November 1993, jointly with the Mammal Society, on 'Recent Advances in Bat Biology'. Over 200 people attended the two-day meeting with its impressive list of speakers invited from all over the world. Thanks are due to the organiser, Professor Paul Racey, and to the Mammal Society who have originated and supported so many successful symposia in association with the Zoological Society.

The Institute of Zoology's programme of short scientific Seminars on Tuesday afternoons continued, eight or nine seminars being held during each academic term for Institute of Zoology staff and invited guests. The Institute is grateful to all contributors to this seminar series.

PUBLICATIONS

Journal of Zoology

The *Journal* continues to maintain its reputation for the highest standards of science and quality of production. Readers remarked upon 'the excellent wide range of papers from all over the world' and enjoyed 'the unpredictable diversity of topics in *Journal of Zoology*'. The 12 parts published during the year—Volume 229 part 4 to Volume 232 part 3—contained 166 papers, presenting research at the forefront of every branch of zoology—the essential basic information upon which conservation work must be founded. The *Journal* maintains and improves upon its position in the top 25% of journals listed under 'Zoology' in the Science Citation Index. Some readers would rate it higher still: 'The *Journal of Zoology* is perfect'.

Symposia

Two volumes in the series *Symposia of the Zoological Society of London* were published during the year by Oxford University Press. No. 65, *Mammals as Predators*, edited by Dr Nigel Dunstone and Dr Martyn Gorman, contained the proceedings of the symposium held jointly with the Mammal Society in November 1991. No. 66, the proceedings of a symposium held in April 1992, was *Marine Mammals: Advances in Behavioural and Population Biology*, edited by Dr Ian Boyd.

Zoological Record

Volume 129 (1992/1993 literature) was published in December. The volume, which comprises 27 separately issued sections, contains details of 66,180 published items which were located by searching 6,751 different serial titles and nearly 1,600 books. About 9,000 of these items refer to more than one animal group and are therefore indexed in several sections to give a total of approximately 75,000 citations for the entire volume. Indexing for Volume 130 (1993/1994 literature) began at the end of June and is currently ahead of schedule.

The most significant event during 1993 was the introduction of the new production system at the start of indexing for Volume 130. It is much more sophisticated than the preceding system and includes a number of automated features which will allow more accurate and economical preparation. As part of the new system a new file, TITAN (The Index To Taxonomic Names), was created to hold the data needed for automatic classification.

The moves towards greater compatibility between the *Record* and other BIOSIS products necessitated changes to the format of the *Record*, but the components of the original *Zoological Record* production system, developed by BIOSIS of Philadelphia, could not deal with the revised format without extensive modification. The resources to achieve this were not available in Philadelphia and consequently it was agreed that responsibility for these further production stages would be transferred to BIOSIS UK in York. This agreement included production of PostScript tapes for the print product and tapes to go to Dialog/USDA and to Silver Platter for the OnLine and CDROM products respectively.

BIOSIS UK staff continued to work as part of the development team for *ZR (Zoological Record) on CDROM*, with particular emphasis on the thesaurus and on conversion of the original data, leading up to the product launch in December. Initial impressions are that this is likely to be a very successful addition to the tools available to librarians and information workers.

1993 brought a number of new responsibilities for the User Services Department. The BIOSIS European Help Desk and the remaining responsibility for all BIOSIS training within the UK were transferred from Vital Information and BIOSIS UK also took over the role, previously carried out by Thompson Henry, of supporting the other European Training Representatives by holding and supplying training materials.

A Long Service Awards ceremony was held in December, when the President of BIOSIS, John Anderson, presented certificates and gifts to twelve staff with a total of 175 years' service to BIOSIS and the Zoological Society in the preparation of *Zoological Record*.

BIOSIS UK continue to collaborate with the International Commission on Zoological Nomenclature (ICZN), under the auspices of the International Union of Biological Sciences (IUBS), and the Zoological Society of London, to develop a *List of Generic Names in Zoology* based on the published volumes of Neave's *Nomenclator Zoologicus* and brought up to date with information from *Zoological Record*. The database now covers all generic and subgeneric names from 1758 to 1993 and will be available for a variety of purposes.

The ICZN have circulated a discussion draft of a Fourth Edition of the *International Code of Zoological Nomenclature*, to obtain comments before formal adoption in 1996. This draft includes clauses which require that all names published after 1995 must be recorded as such in *Zoological Record* for their availability to be recognised. If adopted, this can only enhance the position which the *Record* holds amongst zoologists worldwide.

Some 600 serials—about 10% of those active—are now being received directly from publishers and we are grateful to those who continue to assist in this way.

The Director General at the British Library Document Supply Centre and the Director of the Natural History Museum are thanked for support given to the staff of the *Zoological Record*.

International Zoo Yearbook

Volume 32 of the *International Zoo Yearbook* was published at the end of 1993 with the special theme of 'Ungulates' in Section 1. Twenty-four papers, from around the world, are included in this section and cover subjects as diverse as the reintroduction of Mountain gazelle *Gazella gazella* in Saudi Arabia, the status of captive Himalayan Forest musk deer *Moschus c. chrysogaster* in India and, from the Czech Republic, the maintenance and breeding of the Northern White rhinoceros *Ceratotherium simum cottoni* at Dvur Kralove Zoo. The 14 papers in 'New developments in the zoo world' as always offer a wide range of species from a behavioural study of the Jewel wasp to two papers on the Asian elephant. Volume 32 also contains the biennial list of Zoos and Aquaria of the world, as well as the annual data on breeding of vertebrates in zoos for 1991, the census of rare animals in captivity at 1 January 1992 and the annual list of international studbooks.

The special topic for Section 1 of Volume 33, currently in preparation, is 'Aquatic birds'. The 23 papers accepted for Section 1 include reports on penguins, storks, ibis, spoonbills, flamingos, waterfowl, stilts and alcids. Fourteen papers have been accepted for the section 'New developments in the zoo world'.

The reference section includes the list of vertebrates bred in 1992, the census of rare species in captivity at 1 January 1993, and the summary of international studbooks and world registers.

The senior editor, P J S Olney, continues his work, under the auspices of the Captive Breeding Specialist Group (CBSG), as co-ordinator of the now over 140 international studbooks and registers.

LIBRARY

Library use has continued to increase throughout the year with 5,000 visitors to the Library and 3,000 telephone and written enquiries. A book ordering service for Fellows was launched and five 'Behind the scenes Library tours' were organised. These tours gave Fellows and Associates the opportunity to see some of the more unusual and beautiful items in the collection as well as allowing them to visit parts of the Library which are not normally accessible.

A reciprocal agreement has been arranged between the Society and the Royal Entomological Society, which allows Fellows and Associates access to their library of approximately 10,000 books and 250 current journals on all aspects of entomology.

'National Library Week' was held in November 1993 and the Library participated by organising a 'Zoological Quiz' for members and 'Animal Question Time' for members of the public. Twenty-five people entered the quiz although many more attempted to answer the challenging questions devised by Ordinary Fellow Dr Maurice Sobell. Jonathan Wright, a newly elected Fellow and a London Zoo volunteer, won the quiz and was presented with a copy of 'Nature in Danger' kindly donated by the publishers, Guinness Publishing. During the week a small selection of zoo memorabilia was displayed in the Library Reading Room.

A number of commercial ventures earning royalties for the Library have been initiated including limited edition framed reproductions from the Henry Jones collection of watercolours.

A selection of six Christmas cards and blank greetings cards depicting Victorian views of London Zoo were commissioned and sold by the Library and also by the London Zoo Shop.

The 'Library Endowment Fund' attracted seven donations totalling £9,000 but, at £308,000, the fund is still a long way from the target of £1 million.

The Library has only a small budget for book acquisitions and so relies heavily on the generosity of those who donate books, contribute to the Library funds or spend time assisting Library staff. Donors this year include: Professor R McNeill Alexander, Mr A W Baker, Dr E Barlow, Professor B Benedict, Mrs Ing Bennell, Mr P A W Bennett, Professor R J Berry, Dr B C R Bertram, Dr G Bertram, Mr D R Bird, Mr J F Burton, Dr P H Denton, Dr A F Dixson, Mr J Edwards, Professor J S Fairley, Mrs Godsall Bottriell, Dr R A Griffiths, Mr E M Groves, Mr R and Mrs K Hawkins, Mr P Hayward, Lady Head, Mr Koor Mr Koya, Professor J R Krebs, Mr Latter, Dr R M Laws, Ms A R Lee, G M Mace, Members of Lloyd's Lloyd's Brokers, Dr P A Morris, Profes B Morton, Mr P J Olney, Mr C Rawlins, Mr D Richardson, Miss Schofield OBE, Mrs M V Scrase-Dicki Dr K P Shuker, Mr A Smith, Dr Sobell, Mr T A Stanley, Mr C H Tud Miss F J Turtle, Professor Van Tienhov Mr J S Veasey, Mr G D Wandrag, Mis Waterfield, Dr E C Zimmerman.

BIOSIS UK Limited, Blackw Scientific Publications, Embassy of State of Kuwait, Federation of Zoolog Gardens of Great Britain and Irela Guinness Publishing, London Natu History Society and Marshall Editi have also donated publications to Society's Library.

LONDON ZOO

Visitors during the year: 865,848

wen January 1993, the Business Plan Librafor London Zoo was launched. This document details the proposed physical Furchanges to be made to the Zoo over g £9the next 10 years, and the financial a leconsequences and requirements of those changes, but remains a working docubudgnent subject to annual review and remodification.

se w

brar The **Animal Management Department** Libraas undergone a period of consolidation rofesand the first evidence of the 'new ker.lirection' is becoming apparent. Breedrs Hng programmes for endangered species rofesare progressing well, and more new G exhibits have been commissioned. There ton.has been increased involvement with Mr International conservation programmes Mrs and examples include: financial support s. Mor Game Guards in Kerinci Seblat wkinNational Park, Sumatra; assistance Kofor Indonesian and Indian zoos in Mr Establishing structured captive breeding Lee.rogrammes for Sumatran tiger and 's Asiatic lion respectively; field surveys of rofesndangered invertebrates in St Helena; C and a field survey of small mammals in ss Saudi Arabia.

Dicki Only two species were added to the Dr Mammal Collection during the year: Tud'ygmy tree shrew and a pair of Black nhoemurs; the latter being part of the InterMisational Breeding Programme for the pecies, the male from Hamerton Wildlife entre and the female from St Louis Zoo, ackUSA. Both female Asiatic lions produced of two litters. In each first litter, a single olog cub was taken for hand-rearing, but in Irela her second litter 'Ruchi' successfully Natueared two out of her three cubs. A male Editicub from 'Chandani's' second litter was to hand-reared to the age of four months nd then successfully integrated into Ruchi's' litter; it is believed that this is he first occasion on which a handeared cub has been cross-fostered into a trange litter. Initially, introductions were made between the three cubs. After about three weeks 'Ruchi' was llowed access to the trio. The only arly problem was extreme aggression om the tiny hand-reared cub 'Bruno' owards 'Ruchi'. Other notable mammal irths include Slow loris, three Fat-tailed warf lemurs, two Goeldi's monkeys, wl-faced monkey, Hanuman langur, himpanzee, 14 species of rodents, orilla, Pudu, and Arabian Oryx.

A Sumatran tiger female, 'Mira', as received on breeding loan from Bremerhaven Zoo in May. Matings were observed but at the end of the year 'Mira' was not thought to be pregnant. Generous sponsorship for the whole Sumatran tiger programme was received from Esso.

'Thi', the Asian elephant on breeding loan at Chester Zoo, gave birth in September but immediately attacked the female calf which sustained fatal injuries. Another elephant, 'Mya', spent three weeks at Chester Zoo in May/June and was mated by their bull 'Chang'. Unfortunately, no pregnancy resulted but improved understanding of the timing of reproductive cycles in these elephants provides valuable information for further attempts.

An endangered species programme was expanded in September when a trio of Anoa was imported from Leipzig Zoo in Germany. Another calf was born and successfully hand-reared. At the year end, eight animals were held and a pair scheduled to be transferred to Marwell Zoo. The male Panda, 'Bao Bao', returned to Berlin after an unsuccessful attempt to pair him with 'Ming Ming'; artificial insemination was tried later in the year but still no pregnancy resulted.

Despite hormone monitoring which indicated that the female Okapi was not cycling properly, she became pregnant and carried the calf to term. Unfortunately, possibly because of her age, she experienced difficulties in labour and both she and the calf failed to survive a caesarean operation.

The Children's Zoo operated throughout the summer but by the year end it had been closed and the stock dispersed to other collections. This was to allow work to commence on the new Children's Zoo.

The aviaries on the North Bank have been adapted to house nectarivorous birds. Four species of lories and lorikeets were added to the Collection and the Fairy and Red-flanked lorikeets successfully reproduced. Also during the year five species of Fruit doves were acquired; none of them is particularly rare, but it was felt prudent to expand husbandry experience with this group as there are a number of Indo/Malayan species whose numbers are declining in the wild. Other interesting hatchings during the year included Black-footed penguin, Sacred ibis, Harrier hawk, Cheer pheasant, Mikado pheasant, Stone curlew, Slender-billed conure, Livingstone's turaco, White-faced Scops owl, Boobook owl, Burrowing owl, Kookaburra, and Asian pied starling.

Work has continued on the upgrading of the exhibits in the Reptile House. In addition, renovation of some empty off-exhibit areas has started, to make them available for future conservation programmes. In September, five Taipan eggs hatched; we believe this to be a first UK breeding (one of very few

A regular feature of London Zoo in the pre-Christmas period is the Nativity Play involving visiting children and real animals.

anywhere) of this highly toxic snake. Three juveniles have been sent to the Liverpool School of Tropical Medicine and two retained in the Collection here.

Notable invertebrate breeding successes during 1993 included the production of a second generation of the British field cricket which was used to found a third colony in West Sussex. Surveys have confirmed that the two 1992 colonies have both become established. A second generation was produced of the New Zealand Weta cricket. The numbers of all 16 *Partula* species increased over the year, and colonies were transferred to Berlin Zoo and Braunschweig University as part of the international breeding programme. A very successful *Partula* release trial was conducted at Kew Gardens. An English Nature grant enabled the construction of an external rearing unit for the over-wintering and rearing of species such as the Wart-biter and Field crickets.

Other notable projects included a unique treatment course for people suffering from arachnophobia (fear of spiders). Treatment success results have been dramatic. With support from the Whitley Trust, development has continued on the colony management database, CERCI, allowing the detailed management of breeding programmes for colony species. A second and very productive field trip to St Helena was mounted with the support of Pest Control News. Zoo staff participated in a major Captive Breeding Specialist Group workshop, and subsequent publication, with Royal Botanic Gardens at Kew, on the flora and invertebrate fauna of St Helena.

In the Aquarium, installation of the heating system for the new Tropical Marine section was completed. Further difficulties with the new space heating have yet to be fully resolved. A CERCI species list for fish and aquatic invertebrates has now been introduced in the Aquarium. A new display for Characin fish and a tidal rockpool were constructed. A study of Sea horse husbandry methods proved successful, resulting in longevity of, in some cases, 27 months.

This year the **Education Department** paid particular attention to the development of visitor education, the development of the new Children's Zoo and the production of a new map and guide book. Major changes have been made to the service offered to secondary schools, bringing it in line with the National Curriculum. School attendances, of 43,000 children, showed a slight increase on last year. Of continuing importance has been the need to redesign teachers' resource material and observation sheets so as to coincide with the current Collection. New and revised talks at secondary level include Evolution, Conservatio and Classification (at three levels). F Primary schools, work has concentrat on writing resource packs for teache to be used in conjunction with cla work; these include 'Growth' and 'O bodies' for Key Stage 1. Teachers' Op Days were held in April and Octob Education Officers attended the Briti Zoo Educators' conference at Arundel November.

The first phase of the basic labelli programme has been completed; the a was to make sure that every spec was labelled, providing information distribution, habitat, behaviour, cons vation status and breeding programm The use of occasional questions enco ages visitors to find out more by looki at the animal, rather than just readi the label. Over 180 basic labels ha now been written. 'Conservation Action' panels describing major bre ing programmes at London Zoo greater detail and incorporating inf mation on the involvement of oth divisions of the Society, where releva have also been provided. A large pos summarising these projects has be erected in several sites around the Zo

The new guide book explains wh is involved in captive breeding a gives greater prominence than before the Society's conservation work a activities behind the scenes, as well the conventional information on t animals.

There has been a considera increase in bookings from stude studying the leisure industry or mark ing; the special talk illustrating t history, structure, funding and devel ing role of the Society has been w well received.

A recruitment campaign in t Autumn resulted in 50 new volunte bringing the total to 150. The post Volunteer Co-ordinator was establish and she undertook the training volunteers in the history and cons vation work of the Zoo. Volunteers a learn basic biology, visitor care, ca handling and 'Touch Trolley' skills. Volunteer common room in t Lifewatch Centre was opened.

It was recognised that the 1993/94 y would be problematic for the **Mark ing Department** at London Zoo. T Business Plan had been launched there was no new capital project

Two historical tours of the gardens were conducted by Mr Clinton Keeling. Here he is seen at the Northern end of the West Tunnel with a group of Fellows.

Asiatic lion cub 'Lavinia' at three weeks old. One of a litter born to 'Ruchi'.

Children from St Nicholas Special School in Purley, Surrey, visited London Zoo in March. Here they are seen admiring 'Sam', a Blue and Gold macaw.

Juvenile Hanuman langur bred at London Zoo.

Taipan snakes. Five young were successfully reared.

market; the belief that the Zoo was about to close, or was indeed closed, had also to be overcome.

Under the banner of 'Conservation in Action', the new communications campaign was launched, the objectives being: to tell people that London Zoo will remain open, to convince them that the Zoo is a conservation organisation and that it is a great place to visit and support.

The advertising campaign featured keepers and their animals and heralded the 'Conservation in Action' slogan. Bus-sides, posters, radio, press, and Underground posters were all utilised but the major impact was achieved through the TV adverts. A television advert featuring Paul Pearce-Kelly, Keeper-in-Charge of the Invertebrate House, and 'Belinda', the Mexican Red-kneed bird-eating spider was also screened in cinemas during showings of the film 'Jurassic Park'.

Zoo attendances in the first half of the year were disappointing, not helped by particularly bad weather over the Easter period. By the end of June, visitor numbers were 13% below budget, but then, due to the advertising campaign and the approach of summer, things began to improve. August and September saw a large influx of visitors —during these two months, 66,000 more people than were expected came to the Zoo, which, together with a good January, enabled budgeted visitor numbers for 1993/94 to be exceeded. In August 1993, research was undertaken to measure the success of the advertising campaign, with reassuring results. The Lifewatch Friends of London Zoo Membership Scheme generated great interest and over 14,000 members joined. The Animal Adoption Scheme as usual gained support from many companies, among them Esso UK, Britvic, Virgin Atlantic, Taylor Nelson, Dudley Stationery, The Children's Channel, London Media and The Department of the Environment (in connection with an energy conservation initiative).

Joint promotional activity with companies was developed during 1993 and included Roberto Neckwear, Weetabix and Weetos.

A strong proactive approach in press and public relations proved beneficial. Particular sectors were targeted, including women's press and environmental journalists, the objective being to replace the concept of 'crisis' at London Zoo with the idea of 'stability', 'conservation', and 'success'. The 'bright future' of the Zoo and its Business Plan received media attention throughout the year; Dr Gipps and other members of staff were interviewed many times by television, radio and the press.

In June, a Children's Committee was established to assist the Zoo with issues relating to children. Selecting members from the 200 names received proved a difficult task. The Committee commented on the 1994/95 advertising campaign, undertook a survey into what children think of Zoos and conservation, and received considerable coverage on Children's TV, and in the press.

A variety of animal and conservation stories were covered widely: the arrival of 'Mira' the female Sumatran tiger as a mate for 'Martin' provided an opportunity for a discussion about stud books and international co-operation; the birth of five Asiatic lion cubs highlighted captive breeding; *Partula* snails and the expedition to search for the Giant earwig caught the imagination of environmental journalists, as did 'Ming Ming's' possible pregnancy; in October, the death of television star 'Belinda', a Mexican Red-kneed bird-eating spider, hit the headlines. Supporters of the Zoo also received much coverage: the Emir of Kuwait received the Society's Gold Medal in July and Dr Paul gave £1 million to build the new Children's Zoo.

The daily programme coordinated by the **Events Department** continued. The Animal Encounters which take place around the grounds increasingly reflect the Zoo's conservation emphasis, through talks on Giant pandas, Asiatic lions, the Arabian oryx, and the possible fate of the Giant earwig. 'Animals in Action' further developed its popular approach to animal matters with demonstrations of natural behaviour by participants as varied as stick insects and Caracals. Two Blue and Gold macaws were obtained during the year, along with a European Eagle owl, two Black kites and a Kookaburra. Special versions of 'Animals in Action', modified to suit class projects, continued to be offered for pre-booked school groups. Members of the Events Team made a number of PR appearances with animals, most notably in Carlton TV's station identification slots between programmes. Twice-weekly Birds of Prey shows through the summer of 1993, by an outside team, proved highly popular. A series of workshops initiating people into animal behaviour by observation and imitation, conducted by actor Peter Elliott and drama coach Vanessa Ewan, attracted national, then international media interest, though rather few paying customers. Other major occasions during the year included the now annual Variety Club and Metropolitan Police Fundays, and the Christmas promotion.

The **Projects Department** was formed in the early part of 1993. A great deal of time has been spent in discussing development proposals with local amenity groups and the planning authorities. These extensive negotiations proved beneficial and planning permission was granted for the Hyacinthine Macaw Aviary and the new Children's Zoo. This sensitive dialogue continues.

Other capital projects being developed include the Aquarium refurbishment (Grade II Listed Building), the Madagascar Centre (the old Lubetkin Gorilla House, a Grade I Listed Building), the Bird House, a new penguin exhibit in the Waders' Aviary, the Invertebrate Centre, and Barclay Court.

Smaller tasks have included the new Pudu exhibit, enlargement of the enclosures for the Event animals, the new Giraffe feeders (Listed Building consent being required), refurbishment work on the Reptile House, and remedial work on the Grade I listed Penguin Pool.

The **Visitor Operations Department** continues to be responsible for Admission, Security and Health and Safety. Electronic tills were installed at the Main Entrance, and a new access control system was introduced for the Main Office, to enable more effective monitoring and control of all persons entering the building. On the Health and Safety front, manual handling assessments, in accordance with the Manual Handling Regulations, commenced in February. Risk assessments have continued throughout the year, in conjunction with Heads of Departments and the committee set up to evaluate risks and propose control measures.

Kookaburra (above) and African harrier hawk (right); two species bred during the year.

Senior Civil Servants visited the Zoo to discuss th new lease. They were interrupted by 'Tyto', the fo year-old Barn owl, and Keeper Andy Hallsworth.

n October 1993, the **General Services Department** took over responsibility for grounds from the Visitor Operations Department. This consolidates the aim of having all grounds service divisions in a single department.

A new, pedestrian-operated, litter collection machine was delivered and a Kubota tractor was bought to replace the last remaining Bradshaw Electric vehicle.

The Maintenance Section has refurbished and upgraded the lavatories in the Regent Building, and provided a new unisex lavatory for the disabled; this work is the first step in a programme to improve all public lavatories.

Work on a new Children's Playground, the Golden lion tamarin enclosure, the upgrading of the Amphitheatre, and refurbishment of the Keepers' Lodge, has been carried out by Zoo staff. These projects have all been completed on time and within budget.

The sunken bed, a water garden with Japanese influence, was designed and built by the Gardens Section in April to enhance the Sobell Pavilions. Circulation fans have also been installed in the greenhouses, to improve heat distribution. Standing out space in the nursery has been increased by levelling and resurfacing.

The **Retail Department** has had a very successful year, achieving high profit margins and with net contributions exceeding budgeted figures by around 5%. Stock levels were kept low, with stock turning over six times per annum on average; staffing levels were also kept to a minimum, as was operating expenditure. Administration and stock control is now computerised, thereby producing more timely and accurate information. The Main Gift Shop is the Retail Department's chief outlet; it produced average sales of 90p per head, accounting for around 60% of retail turnover. The layout was changed early in the year, the better to reflect the popularity of goods. A larger book section was introduced, expanding the range of publications on offer, particularly those aimed at the adult market. The Main Gate Kiosk accounted for 20% of total turnover, half attributable to guidebook sales. The Discovery Shop produced around 20% of turnover.

Contributions from retail concessions increased by 20% with the introduction of a badge-making concession, a children's roundabout and a foreign exchange kiosk; face painting remained as popular as ever.

On completion of the catering contract with Compass at the end of September, the opportunity was taken to separate the day visitor and banqueting functions. **De Blank Restaurants** have held the day-visitor catering contract since October. The introduction of a 'specials' menu has improved service as customers become aware of what is on offer and so spend less time choosing. Refurbishment work has been carried out on the various food outlets in the grounds, and prices are very keenly set to encourage repeat custom. Customer-care training for all day visitor catering staff has been introduced.

Letheby & Christopher Limited took over the Banqueting contract also in October. Their first Christmas with London Zoo was extremely busy with much new business having been generated from a mailshot to 5,000 potential customers. Sales increased in the children's market with the implementation of the London Zoo Hospitality children's party package. A joint marketing thrust with the Zoo's Marketing Department is expected to increase substantially banqueting turnover in 1994.

WHIPSNADE WILD ANIMAL PARK

Visitors during the year: 401,181
Cars brought into the Park: 43,606

Financial matters

Whipsnade made an operating surplus for the first time in a quarter of a century. Visitor numbers were some 2% below budget and 1.9% down on the previous year. However, the revenue budget was achieved through a series of special initiatives. Whipsnade remains weather sensitive and a rainy Easter highlighted the vulnerability of TV advertising. Consequently, the decision was taken to drop TV advertising and build a more sustained marketing campaign through press advertisements and feature articles. This strategy proved successful. Whilst there was a 14% drop in visitor numbers over the key 20 days of the year, there was an overall shortfall of only 2%.

The management of the Park was restructured and continues to evolve with a reduction of four management positions.

Prices were held at 1992 rates. Considerable thought went into creating a more effective pricing strategy to reflect the changed perception of the Park in summer and winter. Consequently, as a trial, winter admission prices will be 50% lower. The loss of gate revenue should be offset by increased numbers and through increased sales in the catering outlets and the shop.

The Friends of Whipsnade and the season ticket scheme were introduced for the start of the season. A membership database separate from that at London was developed, every effort being made in the first year to target local people. Income from the scheme exceeded expectation and was 40% over budget. Several successful events for members were held and a Saturday club started for the young Friends of Whipsnade.

The Collection

Another very good year for penguin births culminated in the third King penguin hatching of the year in October, which is the latest this species has ever hatched at Whipsnade. The penguins are being featured in the current fund-raising programme to allow for expansion and improvement in the facilities of the existing pond. After a week with his mother, 'Ernie', the Reticulated giraffe, had to be hand-reared. This proved successful and he was later returned to the main herd. 'Ernie' was so named in recognition of the support given by the local dairy, who provided all the milk during the hand-rearing period. After 43 years at Whipsnade, 'Henry' the common Hippo died. He sired 26 calves and it is believed he was the longest lived mammal ever in the Society's care. The first birth of 1994 was a female Pygmy hippo, which was very welcome after some concern that the females were not conceiving. The Indian rhino, 'Roopa', gave birth to an apparently healthy female calf but within 36 hours the calf died from an infection which had developed *in utero*. Luckily, the mother appeared not to have been affected and will hopefully continue to breed.

Another new species in the Park was the Barberry carpet moth. They arrived in the form of pupae ready to emerge in the spring. The species is one of only a very few moths for which a captive breeding programme has been established. The programme is managed jointly by the Joint Nature Conservation Council and the Federation of Zoos and this type of programme complements the designation of the chalk downland within the Park as a Site of Special Scientific Interest.

Staff from Whipsnade are participating in several of the newly formed Taxon Advisory Groups. Whipsnade holds the Chair for the UK Rhino TAG and Co-chair for the Crane TAG. In addition, staff participate in the Tapir, Hippo, Terrestrial Invertebrate, Rep and Bird of Prey TAG's.

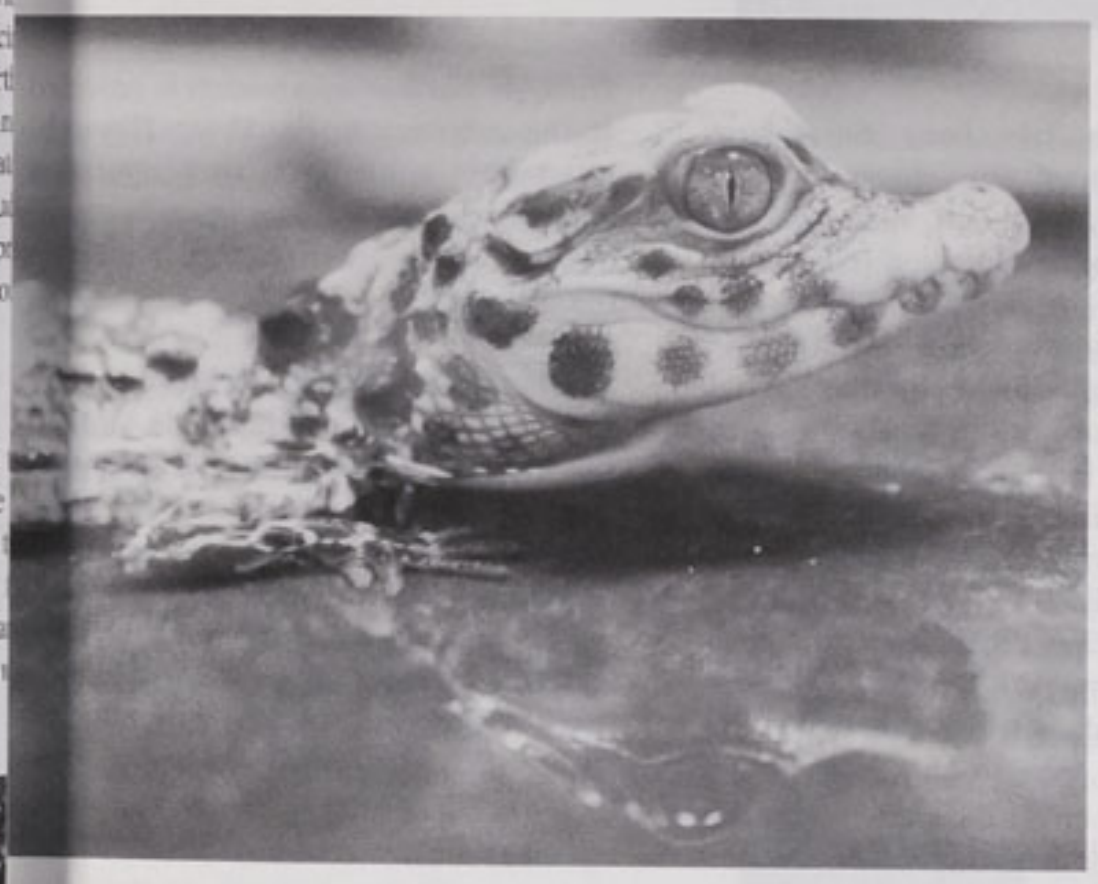
The new Black rhino house completed in September and in Octo two young Black rhinos joined collection. The Dwarf crocodiles p duced four successful hatchings fro clutch of 21 eggs laid in May. This the first recorded occasion that species had been bred successfully in UK. Their new home, a much lar enclosure with underwater view and a nursery pond, was compl although the plants that form part the eco-system will take time to mat Butterflies will be introduced into exhibit. A large extension has been b to the Cheetah enclosure, providing the process a kopje on which they sun themselves. A viewing platform the visitors has also been provi which will allow viewing free of fenc a photographer's paradise. Furt development in this area is plann funded through the 'Cheetahwat project. Promotions in 1993 inclu the launch of the 'Cheetahwatch' p by Miss Rula Lenska at Cedar Ho Galleries.

Overseas activities

The joint training programme with Department of Game and Wildlife Ghana had a successful year with training courses being run by Curator for local zoo staff in Gha Sponsorship for the programme

Robbie Hutton with Keepers from Accra and Kumasi Zoos, at a training course run as p of the joint programme with the Department of Game and Wildlife in Ghana.

'Ben' and 'Nigna', the Common hippos on loan from Chessington, produced a male calf, pictured here with mother 'Nigna'.



West African Dwarf crocodile hatched at Whipsnade: first successful breeding in the UK.

Grevy zebra: another birth of this rare species. 'Moa' and her latest offspring, 'Moss'.

Corporal David Joseph came to collect the Windsor white goat 'Taffy', mascot of the Roya Regiment of Wales. The herd is kept at Whipsnade by permission of the Queen.

obtained from Mr Rod Hall of British Airways Assisting Nature Conservation, who also provided support for several other overseas projects. The Great bustard programme continued with Park staff visiting Russia again in order to study further some of the establishments in the Saratov region where Great bustard chicks are being reared. Dr Anatoly Khrustov from Saratov spent ten days at Whipsnade to coincide with an international bustard conference hosted by Whipsnade with representatives from Hungary, Russia, Spain and the United Kingdom. The Great Bustard Trust held its Annual General Meeting at the Park in December.

Education

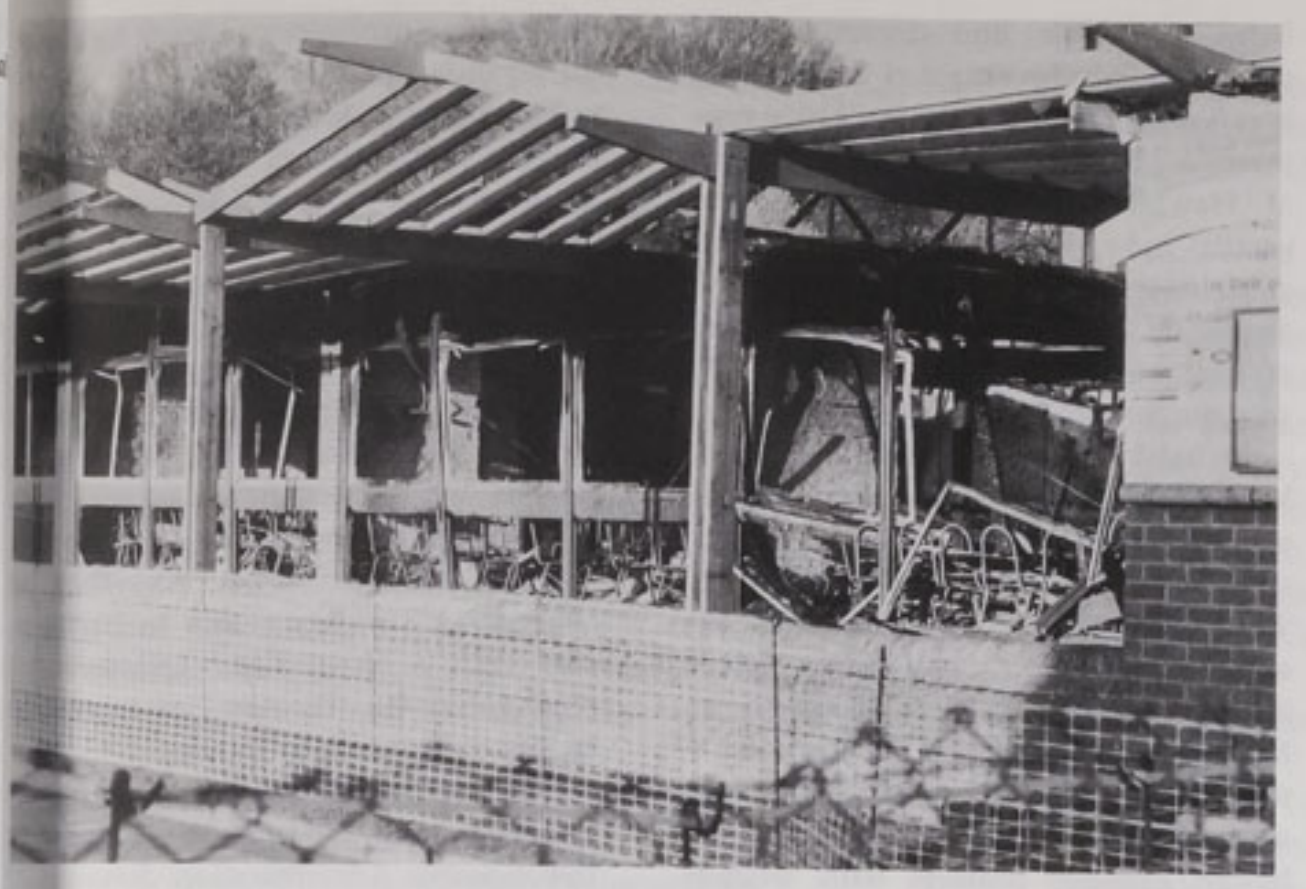
The emphasis has been on taking education out of the classroom and into the Park. Margaret Williams, the Whipsnade Senior Education Officer, has now focused on how to inform and motivate all visitors and not just the 15% or so who make up the official education groups.

A standard format for labelling all the animal exhibits was adopted after input from all Departments, Whipsnade Board and Council. Each exhibit now contains key information and statistics. All visitors entering the Park by car now receive a leaflet which identifies the species to be seen in the Asian Drive Through. Further information is provid at the entrance to the Drive Throug Interactive equipment was upgrad and developed to give visitors mo effective information on the animals the collection.

Marketing and Public Relations

Frances Sutton, the Whipsnade Mark ing Manager, led the team that orga ised the very successful 'Christm Wonderland'. Part of the success of th event was due to the introduction of pre-booking system which accounted f 4,000 bookings. The now tradition 'Steam Weekend', Easter Egg Hunt a Teddy '93, the Whipsnade sponsor

Gold Crest Dairies sponsored the Gold Top milk for our hand reared Reticulated giraffe, pictured here with Gary, Whipsnade's regular milkman. The giraffe was subsequently named 'Ernie Goldcrest'.



Fire damage to the Function Suite and Education Centre.

walk and the WWF sponsored walk, all consolidated their position as features of the events calendar. Planned for 1994 is a Mediaeval Fayre and a Countryside day in the autumn organised jointly with the South Bedfordshire County Council and the Dunstable Town Council.

Messrs Jane Howard PR were appointed during the year to represent the Park. Blue Peter filmed the newly hatched Dwarf crocodiles in the Discovery Centre—one of the rare times that animal stories have been filmed outside the Blue Peter studio. Many stories appeared on Anglia TV with occasional coverage on Carlton and GMTV. Radio coverage was extensive with Chiltern, Hot FM and BBC radio all running animal stories from the Park. The 'Vets in the Wild' TV series, shown on Channel 4, focused on the Veterinary Training Course at Whipsnade. Further TV coverage was obtained from Chris Packham's Wild Shots for BBC TV.

Great emphasis has been placed on developing an affiliation between the Park and the inhabitants of Dunstable, Luton, Leighton Buzzard and Hemel Hempstead. Business links have been forged with such companies as Tesco, Sainsbury and B & Q. Mr Roger Smith, a prominent local businessman, joined the Whipsnade Management Board.

A seminar was held for the casual and seasonal staff and helped increase the high level of visitor satisfaction. Further customer care seminars are to be held in 1994 for permanent as well as seasonal staff.

The fire

On the evening of Sunday, 5 December, fire destroyed the restaurant and education buildings. It is believed that the fire had started through an electrical fault. Although the damage was extensive, there was no personal injury, nor was any animal lost. Whilst every effort was made to minimise the impact of the fire, there is no doubt that the lack of catering facilities had an effect on visitor derived revenue. Dealing with the aftermath of the fire and the associated insurance claim put yet a further burden on the already hard-pressed senior managers but their commitment was exemplary.

A bigger and better function suite will be built on the site of the old restaurant. The main day visitor catering will be concentrated in a larger facility on the site of the existing Café on the Lake. This will have the advantage of providing visitors with vistas over the Asian Drive Through, Lake Daedalus, Tiger Falls and beyond to the new Black rhino exhibit. To avoid having a building site in the middle of the Park during peak season, work will commence on this facility in September.

Park infrastructure

First drafts are being prepared of a ten year plan for the Park, covering the animal collection, Park development, organisational structure, new exhibits, backlog maintenance, graphics, education, commercial opportunities and strategic marketing.

Traffic was re-routed round the Park in an anti-clockwise direction. The old route had taken visitors behind the restaurant, by the works yard and past the main car parks before they had seen animals other than the elephants. The new route presents the cheetahs, bears, elephants and chimps as the entrée to Whipsnade. In addition, the routing directs cars to the main car parks where visitors can then leave their vehicles and visit the core area. Maintenance has included the extensive resurfacing of roads and paths, including the Asian Drive Through. Toilet facilities throughout the Park have been upgraded. Many of the houses have been painted and additional hard standing provided for the animals. The main gates were refurbished and the reception area in the main offices redesigned. The main gift shops were completely altered and upgraded, improving customer flow. A new shop was established in the Discovery Centre and the Information kiosks re-sited.

Health and Safety and Risk Assessment

A committee was established to meet the statutory requirement to analyse risks to staff and visitors. Over 120 jobs have been assessed and a continuous review process has been implemented. Owing to the importance of Health, Safety and related matters, the frequency of meetings of the appropriate committees was increased to bi-monthly.

CONSERVATION AND CONSULTANCY DIVISION

David Jones, who began the conservation and consultancy work 15 years ago and who has been director of the Division for the last two years, has left to take up the post of director of the North Carolina Zoological Park. His place is taken by Alexandra Dixon, who has been the Society's Conservation Officer for many years.

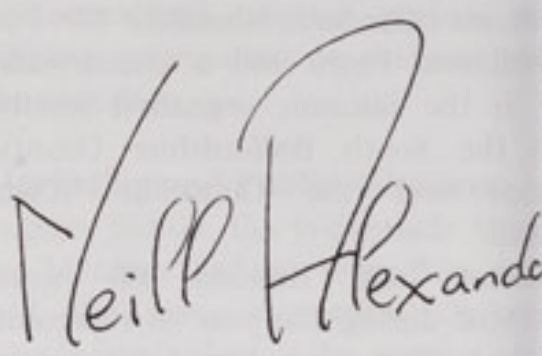
Dr Douglas Williamson left the Society in August, due to ill health, and a new director, Dr Jacques Flamand, has been appointed to the King Khalid Wildlife Research Centre in Saudi Arabia. Dr Flamand was, until recently, the senior veterinarian to the Natal Parks Board and has had previous experience in Saudi running the sister research station at Taif. Mr Patrick Campbell also joined the project, charged principally with developing an appropriate management plan for the gazelles at Qassim. An internal scientific review of the Centre's activities took place in the autumn in collaboration with Drs Steve Albon and Georgina Mace. Priority areas of research and development were identified and the Centre will concentrate largely on gazelle genetics and taxonomy, the further reintroduction of these species into suitable areas in the Kingdom and field work on the remaining wild populations. Although bovine tuberculosis has now been eradicated from the Centre, the situation with regard to this disease will continue to be carefully monitored. Elsewhere, the relationship between wildlife and domestic stock diseases will be investigated as very little is known about these interactions in Saudi Arabia. The reintroduction project at Hawtah where 71 Idmi (*Gazella gazella*) have been released and second generation wild-born fawns are now appearing, will continue and further projects for Idmi and Rheem (*G. subguturosa*) are being developed.

Richard Kock, seconded to the Kenya Wildlife Service as head of the Veterinary Unit, now has six young Kenyan veterinary graduates under training. The objective here is to be able to create a well-equipped and well-trained veterinary unit staffed by Kenyans who have the ability and confidence to cope with the huge variety of responsibilities laid upon them. As Kenya's human populations expand, conflicts with wildlife inevitably increase and it is often the Veterinary Unit which is expected to deal with the problem. As a result, Dr Kock has spent a great deal of time on community relations, problem animal control, disease investigation (rabies is rampant in Kenya) as well as the more predictable rhino and elephant darting operations.

Elsewhere in Africa, amongst other things, the Society continues to co-sponsor the secondment of a senior mechanic to the Zimbabwe Wild Life (sic) Department, channelled £15,000 to the Save the Rhino Trust in Namibia for the purchase of a vehicle, equipment and support of poaching patrol, and undertook a preliminary survey to as the Uganda National Parks.

The year has seen an increase in t Division's consultancy work, with upturn in new projects being conside around the world. The Division currently involved in the detailed pl ning of a zoo at Madinah in Sa Arabia, has been advising on a n nocturnal exhibit for the Natio Museum in Sharjah and assisting w design work for new aviaries Singapore's Jurong Park. It has begun a major project providing concept and outline design in partn ship with a Hong Kong architectu partnership for the new major rep facility at Taipei Zoo, Taiwan.

The Division would like to thank sponsors, most especially the Overs Development Administration, Suzuki Cars and Land Rover for their inva able support.



Professor R McNeill Alexander
SECRETARY

LEGACIES TO THE SOCIETY

The Zoological Society of London is a registered charity (Number: 208728) and all gifts to it are completely exempt from capital gains tax and capital transfer tax.

Please consider leaving the Society a legacy in your will. The Society's many educational and conservation activities depend on the generosity of its friends and benefactors. Its world famous collection of animals and the Institute of Zoology also need financial support. Unless income can be constantly increased, there is certain to be a reduction in what the Society can achieve. A legacy would be a very real help.

Further advice on legacies and how the Society may benefit can be obtained from The Secretary, Zoological Society of London, Regent's Park, London NW1 4RY.

COMMITTEES AND BOARDS 1993–1994

Animal Welfare Committee

Terms of Reference: To advise Council on matters relating to animal welfare in the Collections, at both London Zoo and Whipsnade Park, at the Institute of Zoology and in the work of the Conservation and Consultancy Division.

Professor D M Broom, BVMS, MRCVS
R Ewbank, OBE, MVSc, CBiol, FIBiol
Professor T R Halliday, DPhil
A J Higgins, BVetMed, MSc, PhD, MRCVS
I F Keymer, PhD, FRCVS, FRCPath, FIBiol
A Lindley, MA, DPhil
Professor A R Peters, DVetMed, BA, PhD, FRCVS
D G Pritchard, BVetMed, BSc, MPH, MRCVS
W Plowright, CMG, DVSc, FRCVS, FRS
A J Stevens, BVSc, MRCVS, DipBact, *Chairman*
I R Swingland, BSc, PhD
Secretary: J Kirkwood, BVSc, PhD, MRCVS

Awards Committee

Terms of Reference: The Council presents awards for contributions to zoology: The Stamford Raffles Award, The Scientific Medal, The Thomas Henry Huxley Award, The Silver Medal, The Zoological Society of London Frink Medal for British Zoologists, the ZSL Marsh Award for Conservation Biology and the Prince Philip Prize. The Committee advises Council on all matters relating to these awards.

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Professor P P G Bateson, PhD, ScD, FRS
Professor M P Hassell, DPhil, DSc, FRS
Sir Barry Cross, CBE, MA, PhD, ScD, FIBiol, FRS
Professor K Simkiss, PhD, DSc, FIBiol
Professor P Racey, BSc, FRSE, FIBiol
Mrs Margaret Varley, PhD
Professor J E Webb, DSc, PhD, *Chairman*
Professor L Wolpert, CBE, DIC, PhD, FRS
Secretary: Marcia A Edwards, PhD, FLS

Conservation & Consultancy Board

Terms of Reference: To supervise the affairs of the Conservation and Consultancy Division, on behalf of Council. To maintain a watching brief on conservation policy for the Society in relation to its Mission Statement. To advise all other divisions of the Society on matters relating to conservation.

Barzdo
S Cobb, DPhil
Professor A S D Farmer, PhD, CBiol, FIBiol, FLS, MIFM, ARPS
Professor T R Halliday, DPhil, *Chairman*
D Macdonald, DPhil
Ex officio: A J Stevens, BVSc, MRCVS, DipBact
Secretary: D M Jones, BSc, BVetMed, MRCVS
Miss A Dixon, BA, MSc

Education Committee

Terms of Reference: To advise Council on all matters relating to the Society's educational activities.

Barrington-Johnson
S Cutting
F Everiss, MBE, MSc, FIBiol
I Hattingh, BSc
Professor A Lucas, BEd, PhD, FIBiol, *Chairman*
S T Pollock, MSc(Hons)
Secretary: Miss Claire Robinson, BEd (Hons)

Publications Committee

Terms of Reference: To advise Council on matters concerning the publication of zoological research; to serve as an editorial board for the Journal of Zoology; to make recommendations on Library policy.

Professor R J Berry, PhD, DSc, FRSE, FIBiol, FLS, *Chairman*
W N Bonner, BSc, FIBiol, FLS
G A Boxshall, PhD, FRS
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J P Croxall, PhD
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J Gurnell, PhD
P Herring, PhD
Marion Nixon, PhD
P S Rainbow, MA, PhD
Professor R C Tinsley, PhD
Secretary: Marcia A Edwards, PhD, FLS

International Zoo Yearbook Editorial Board

Terms of Reference: To advise on the content and production of the Yearbook.

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Professor Janet Kear, PhD
I F Keymer, PhD, FRCVS, FRCPath, CIBiol, FIBiol
J M Knowles, OBE
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Georgina Mace, DPhil
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Professor R J Wheater, OBE, CBiol, FIBiol, FRSE
Secretary: P J S Olney, BSc, DipEd, CIBiol, FIBiol, FLS

Institute of Zoology Committee

Terms of Reference: To advise the Society and the University of London under the terms of the Agreement between them; to consider, and make recommendations on all matters relating to the Institute of Zoology.

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Professor B G Gardiner, PhD, DSc
Professor S Jones, PhD
Professor L E Lanyon, BVSc, PhD, MRCVS, *Chairman*
Professor K Simkiss, PhD, DSc, FIBiol
Professor G A T Targett, PhD, DSc

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University of London
Vice Chancellor
Principal
Chairman of Convocation

Zoological Society of London
President
Secretary
Treasurer
Director of Science
Secretary: E W Thompson, PhD, DSc

London Zoo Board

Terms of Reference: To advise Council on all matters relating to the operation of London Zoo covering animal management, visitor operations, preparation of draft budgets, operational target setting and monitoring, staffing, marketing, capital and development projects.

W J Boyce, DM, MA, MSc, MRCP, FFPHM (from 7 July 1993)
M R Brambell, VetMB, PhD, MRCVS, *Chairman* (member from 7 July 1993, Chairman from 3 February 1994)
J C Edwards, MA (to 3 February 1994)
J H W Gipps, PhD
Professor M P Hassell, MA, DPhil, DSc, FRS (to 7 July 1993)
Professor M Peaker, DSc, PhD, FIBiol, FLS, FRSE (Chairman to 7 July 1993)
M G Rowson, MA (from 9 June 1993)
D L Sussman (from 7 July 1993)
C H Tudge, MA (to 3 February 1994)
D Tunnicliffe, CBE (from 7 July 1993)
P J Wrangham (Acting Chairman from 7 July 1993 to 3 February 1994)
Secretary: P H Denton, MBIM, AInst TA

Whipsnade Wild Animal Park Board

Terms of Reference: To advise Council on all matters relating to the operation of Whipsnade Wild Animal Park covering animal management, visitor operations, preparation of draft budgets, operational target setting and monitoring, staffing, marketing, capital and development projects.

S D Earley
Professor T R Halliday, DPhil
J M Knowles, OBE, *Chairman*
Professor A Lucas, BSc, BEd, PhD, FIBiol (until 27 October 1993)
C J S Marler
N S E Martin, FBIM, FIIM
R Smith (from 24 November 1993)
I Webb, BSc(Econ), MBA
Secretary: P H Denton, MBIM, AInst TA

Learned Society Board

Terms of Reference: To be accountable to Council for, and supervise all matters relating to, the policy on finance of the Learned Society comprising the Fellowship, the Library, the general secretariat and, working closely with its own committee, the Publications Department: to monitor adherence to the Society's objects: to initiate income generating measures through exploitation of the Society's archive and by other means.

B C R Bertram, MA, PhD
G A Boxshall, PhD, FRS
J C Edwards, MA, *Chairman*
M A Moore
Professor R C Tinsley, PhD
M D Ward
Miss Amanda Waterfield (to 12 November 1993)
Secretary: P H Denton, MBIM, AInst TA

STAFF AND VOLUNTEERS

STAFF

THE ZOOLOGICAL SOCIETY OF LONDON

Director of Science: L M Gosling, PhD, FIBiol (from 4.1.94)
Acting Director of Science: G R Smith (from 27.2.93 to 3.1.94)
Deputy Director of Science: G R Smith, PhD, MRCVS, DVSM, DipBact
Assistant Director of Science (Publications & General): Marcia A Edwards, PhD, FLS

Library

Librarian: E Ann Sylph, BSc, MSc, M.I.Inf.Sc
Information Officer: P Humphreys, BSc, MSc, PGC (until 13.9.93)
Library Assistant: Kate Ferguson, BA, DipEd, DipLib

Publications

International Zoo Yearbook
Editor: P J S Olney, BSc, DipEd, CIBiol, FIBiol, FLS
Assistant Editors: Pat Ellis; Fiona Fisken, BSc
Clerk/Typist: M G Barrett
Journal of Zoology, Symposia, Nomenclator Zoologicus, Zoological Record
Editor: Marcia A Edwards, PhD, FLS
Assistant Editors: Angela J Stroud, BSc; Unity M M McDonnell, MA
Secretary: Patricia Manly

Fellowship

Fellowship Officer: Patsy Conway

Institute of Zoology

(Note: The Institute is a grant-aided Institute of the University of London)
Director: L M Gosling, PhD, FIBiol (from 4.1.94)
Office Manager/PA to Director of Science: Linda Forbes, BSc
Deputy Director: G R Smith, PhD, MRCVS, DVSM, DipBact
Honorary Research Fellows: A J E Cave, MD, DSc, FRCS, FLS; Sir Cyril A Clarke, KBE, MD, FRCP, FRS
Honorary Overseas Research Fellows: R M Eley, PhD; J Samour Hasbun, DVM, PhD; C R Thouless, BA, PhD
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Laboratory Superintendent (Nuffield): P G Cottingham, BTec(CED), MIScT
Laboratory Superintendent (Wellcome & Hospital): G F Nevill, HND
Chief Technician (Animals): M J Llovet, FIAT
Senior Technician (Animals) Whipsnade: A G Hartley, BAgriSc
Animal Technicians: Judy Bidgood, AIAT; Mandy Gordon, IIAT; Caroline Layram, OND, Whipsnade; T D Noble, AIAT; J Rozowski; D R Stula
Senior Workshop Technician: W G Ray, AIScT
Senior Photographic Technician: T R Dennett
General Laboratory Aides: Jean Hutchins; Breda Farrell

REPRODUCTIVE BIOLOGY

Research Fellows: A S I Loudon, PhD (*Head of Group*); W V Holt, PhD; Helen J Shaw, PhD (until 31.3.94); Georgina E Webley, PhD; Anne Stirland, PhD
Research Associates: D R E Abayasekara, PhD (to 31.3.94); C G Faulkes, PhD; H N Jabbour, PhD; Alison Moore, PhD; Marie R Rodway, PhD (to 10.1.94)
Postgraduate Research Students: P A Adoyo, MSc; Clare Holt, BSc; Vivienne S Marshall, BAgriSc; Cheryl Niemuller-Hare, BSc; Alison M Paterson, MSc; Stella A Pelengaris, BSc; Tessa Smith, BSc; D G Thomas, BSc; P Riley, BSc; R Lucas, BSc; D Bainbridge; L Clark, BSc; Sarah Ford, BSc
Senior Technicians: D Cheesman, BTEC, HNC; Daphne I Green, HNC, AIScT
Technicians: Sheila C Boddy, BSc; Yasmin N Mohammad, MSc; R D North, BSc; Helen P O'Brien, BSc; Mary-Jo Searle, BSc; S Francis, BSc

CONSERVATION GENETICS

Research Fellows: R K Wayne, PhD (*Head of Group*); M W Bruford, PhD (*Acting Head of Group* 1.10.93–7.2.94 and from 7.3.94 onwards); Helen F Stanley, PhD
Research Associates: Elizabeth M Barratt, PhD; M S Roy, PhD; Heather Hall, PhD
Postgraduate Research Students: Sarah Beer, BSc; D Lees, BSc; I J Saccheri, BSc
Technicians: Susan A Haines, BSc; W E R Rebholz, MSc (to Dec '93); T Robson, HND (to 14.1.94); S P Casey, BSc; Tamsin Burland, BSc (until 18.3.94); Miranda Kadwell, BSc; Sian Colley, BSc; T Coote, BSc; Harriet Green, BSc; Emma Taylor, BSc (from 21.3.94)

ECOLOGY

Research Fellows: S D Albon, PhD (*Head of Group*); J R Ginsberg, PhD
NERC Research Fellow: I P F Owens, PhD
Pew Foundation Research Fellow: Georgina M Mace, DPhil
Research Associates: A F G O D Bourke, PhD; Sarah M Durant, PhD; A Balmford, PhD; Rosie Woodroffe, PhD
Postgraduate Research Students: Sarah L Gascoyne, BSc, VetMB, MRCVS; S Williams, BSc; Melanie Kershaw, BA; Manuela Fonseca, MSc; Isabelle Porteous, Drp.Vet.Med.; G Chan, BSc; Daniella de Luca; T Jones, BSc
Technician: Jill G Pilkington, BSc; Angela Alexander (*P/T*)

COMPARATIVE MEDICINE

Zuckerman Research Fellow: G R Smith, PhD, MRCVS, DVSM, DipBact (*Head of Group*)
Honorary Research Fellow: A Voller, PhD, DSc
Research Associate: D E Bidwell, PhD
Technicians: Elisabeth A Thornton, BSc; Tracy Hughes, BSc
Postgraduate Research Student: Nelly Ortiz Rodriguez, DVM, MSc

VETERINARY SCIENCE

Zuckerman Research Fellow—Senior Veterinary Officer: J K Kirkwood, BVSc, PhD, MRCVS (*Head of Group*)
Research Fellows: P M Bennett, PhD
Honorary Research Fellows: G H Du Boulay, CBE, MB, BSM, FRCP, DMRD, FRCP; P Kertesz, BDS, LCS, RDS
Pathologist: A A Cunningham, BVMS, MRCVS
Veterinary Officer (London): A W Sainsbury, BVMS, MRCVS; Sue Thornton, BVetMed, MRCVS
Veterinarian: Paul Jepson, BVMS, MRCVS
Veterinary House Surgeon (Whipsnade Wild Animal Park): E Flach, MA, VetMD, MSc, MRCVS
Senior Veterinary Nurse: A K Fitzgerald, VN
Technicians: Tracey Howard, TecII (to 4.4.94); S Macgregor, HTec

Veterinary Nurses: Christine Dean, VN; Meryl D Lang, VN; Gillian Bennett, VN
Administrative Assistant (P/T): Charlotte Iskjaer-Ackley

Administration
Clerk to Council: P H Denton, MBIM, AInstTA
Secretary to the Officers: Mrs C A Chapman

Personnel
Head of Personnel: Mrs C Boroughs, MIPM (to 19.11.93)
Head of Personnel: I Meyrick, BA, FIPM (from 31.1.94)
Senior Personnel Officer: Ms H R L Catling, BA, GradIPM (to 24.12.93); Ms P Harris, GradIPM (from 21.1.94)
Secretary: Mrs M D Latty, GradIPM
Pensions Administrator: T P Carey
Medical Referee: K H Lewis, MA, BM, BCh

Finance
Director of Finance: L D Corp, BSc(Econ), MBIM, FCA
Secretary: Mrs S Morgan
Financial Accountant: Miss J F Jupp
Management Accountants: C J Biggie; J M Wright
Cash Book Keeper: Miss L Archer-Morgan
Chief Cashier: D P Lack
Cashiers: L Oxley; J A Piggott; P A Gibbs
Payments Supervisor: Mrs R S Rodrigues
Wages Clerk: Miss J Owen

CONSERVATION AND CONSULTANCY DIVISION
Director: D M Jones, BSc, BVetMed, MRCVS, FIBiol (to 31.3.94)
Secretary: Mrs I Finch
Conservation Officer: Miss A Dixon, BA, MSc (Acting Director from 1.4.94)

Overseas Staff
P Campbell; Dr J Flamand; W Flavell; K Dunham, BSc, MPhil; R Brett, MA, PhD (to 31.3.94); C Kichenside; R Kock, MRCVS; T J Wacher, PhD

LONDON ZOO
Director: J H W Gipps, PhD
Secretary to the Director: Lucy Eadie (to 16.3.94); Fiona Jamieson (from 21.3.94)

Animal Management Division
Senior Curator: S Tonge, BSc
Assistant to Curator: Miss S K Christie, BSc
Conservation Programmes Co-ordinator: Miss E M Chaplin
Zoo Manager: W A B James
Assistant Curator of Mammals: D M Richardson
Assistant Curator of Lower Vertebrates: D J Risley
Keepers In Charge: M E Carman; B J Harman; G S Asher; Miss T Webb; B Harris; P Pearce-Kelly; Mrs L Walker; F W Smith
Senior Keepers: M S Clark; Miss A James; J B Robson; F Wheeler; R E Charter; P R Harrington; M A Hennessy; J Nicklin; D E Robinson; M J Tiley; D Clarke; T W March; S J Matchett; P A Spanner; J H Pullen
Qualified Keepers: M Fagg; Mrs L DaVolls; Miss J W Ossowski; S Mannell; R Dodd; J Buchan; A J Ferguson; A James; M S Fitzpatrick; D McGinnie; C E Wickenden
Trainee Keepers: Mrs D Platt (to 24.12.93); Miss S Carter; P Kybett; Miss M C Lamb; J Leng (to 15.7.93); J W Stevens; Miss C L Wilson; Miss C J Connor; Miss E L Wenman; Miss V Silverton; Miss A M McKenna; Miss T Lee; J Boyd; K Lloyd; C Walker; S Whitelock; Ms M Welsh

Marketing
Marketing Manager: Miss S Ament
Sales Executive: J Hosking
Secretary: Miss J Ratcliffe
Press Officer: Miss G Dobson (to 8.10.93); Miss M Hahn (from 6.12.93)
Membership Executive: Miss G Guarnieri
Lifewatch Adoptions Administrator: Mrs H Pond (to 5.1.94)
Sponsorship and Promotions Executive: Mrs J Rattue
Marketing Administrator: Miss T Butler

Development
Development Manager: Mrs V Pakenham-Keady (from 3.3.94)
Secretary: Miss L Friend

Education Department
Senior Education Officer: Miss C Robinson, BEd
Education Officers: Miss J Chamberlain, BSc; Miss S Bain, BSc
Education Officer (Special Needs): Mrs L Sales, BA, MA
Interpretation Officer: Miss C Kelly
Volunteer Co-ordinator: Ms M Gerlis, BSc
Bookings Co-ordinator: Mrs V Timperley (to 1.10.93); Miss P Inglis (from 22.11.93)

Projects Department
Acting Projects Manager: B D Edwards
Contracts Co-ordinator: M J Swallow
Secretary (P/T): Miss C Boscawen

General Services Department
General Services Manager: G Roden
Maintenance Supervisor: P Davies
Secretary: Mrs D Price
Building Craftsmen: P D Bell; A Connolly; M Foster; J C Frou T Sheehan; D Brain; S Roberts; W F Manly
Electricians: C G Rolfe; R Fitzgerald; P Smith
Handyman/Labourer: J Baker
Gardens Supervisor: Miss J C Smith
Chargehands: Miss V Kiss; M Morrice (to 27.10.93); Mrs Y Morris
Gardeners: B M Clougherty (to 28.1.94); D Burke; R J Lynch Miss M Malka; P Flynn (from 21.2.94); Miss F Williamso (from 28.2.94)
Purchasing & Transport Chargehand: R J Pearce
Drivers/Stores Assistants: R E Harrison; R Ashmore
Stores Assistant: A W James
Supplies Buyer: C P Major
Signmaker/Print & Stationery Buyer: A Taylor
Grounds Supervisor: P Walker-Croft
Groundstaff Chargehand: J Turner
Drivers: G A Houlder; O Tiwari
Groundsperson/Sweeper: A W Ransome; J Breen
Toilet Attendants: Mrs B Ampong; Miss B M Lee
Driver: A Mackinnon (to 3.10.93); A Martin (from 19.2.94

Retail Department
Retail Manager: Mrs Y Ubels
Assistant Retail Manager: Mrs J Powell
Office Administrator: Mrs B A Kinsella
Supervisors: G Constantine; Mrs Y Nicholas
Warehouse Supervisor: R Bruce
Sales Assistants: Miss P M Delius; Miss D A Houlder

Visitor Operations Department
Visitor Operations Manager: B Nutkins
Secretary: Miss S A O'Neill
Admissions Officer: R McLaughlin
Assistant Admissions Officer: Mrs S Cole
Senior Gatekeeper: C Ramdass
Gatekeeper: K Ganatra (to 5.9.93); Miss J Sheridan (from 4.10.93); Mrs G Gray-Smith (from 1.11.93)
Security Gatekeepers: P K Brown; P A J Gabriel; S Sturgeon; Ms V Rickards
Events Co-ordinator: R Tomlinson
Senior Presenter: A Hallsworth
Ticket Collector P/T: J W Richards
First Aid Attendant: Miss G A Reay
Weekend First Aid Attendant: Miss C Wheeler
Receptionists: D Hitchcock; Miss T A Butler (to 11.3.94); Mrs B Ordish (from 14.3.94)
Telephonists: Mrs P Passfield (to 2.3.94); Mrs B Ambrose; Mrs B Ordish (to 11.3.94); S Shokaufan (from 10.3.94)
Gatekeeper/Cashier: Miss M Katzer (to 25.7.93); Miss R MacDonald (to 30.8 93); Miss J Simmons; Miss A Agbesanmi; C Bowles (from 6.3.94)
Car Park Attendant: A Aremu

WHIPSNADE WILD ANIMAL PARK
Chief Executive: S D Earley
Financial Controller: R Bodnarec
Senior Secretary: Miss L Hughes
Cashiers/Wages Clerks: Mrs J Lee; Ms S Smith
Accounts Clerk: Mrs C Davies
Assistant Accounts Clerk: Mrs M Jenkins
Receptionist/Clerk: Mrs M Hull

Support Services Department
Projects Manager: A Coates, BA (Hons), DipArch
Support Services Manager: R Raft (to 30.7.93)
Support Services Chargehand: M Shillingford
Deputy Support Services Chargehand: G Guild
Stores Co-ordinator: A Latham
Building Craftsmen: D Law; J Whinnett; J C Harrold; M Guild
Supprt Services Staff: J E Baisbrown; J Bradley
Horticultural Officer: A Southern

Visitor Operations Department
Visitor Operations Manager: L Killorn (to 30.6.93)
Head Gatekeeper: Mrs P Clark
Senior Gatekeeper: H Jackson
Cleaners: Miss S Shury (to 28.1.94); Ms J Raft (to 28.1.94)

Retail
Retail Controller: Mrs M White
Supervisor: Miss M Matthews

Railway
Railway Manager: F Crawley (to 31.3.94)
Engineer: I Gordon

Animal Management
Curator: N B D Lindsay, BSc, CBiol, MIBiol
Assistant to Curator: Mrs G Richards
Animal Manager's General Secretary: Mrs A Slocombe (to 25.7.93)
Regional Co-ordinators: A R White; V Curzon; R Hutton
Animal Activities Co-ordinator: L J Radford
Animal Activities Deputy Co-ordinator: G Frost
Senior Activities Staff: A Reeve
Animal Activities Staff: Miss J Pardoe, BSc; P Williams
Deputy Co-ordinators: C Bates; R G Wingate; C Tack
Senior Keepers: A E Morris; Miss M Spittel; K Taylor; M Lear; R M Catchpole; J E Baines; J C Chapman; T Moxey; Mrs J Lear; Mrs C Day; Miss J Crabtree (to 18.3.93); M Best; M Brett
Qualified Keepers: Miss L Waterhouse; F Smith
Trainee Keepers: D Fisher; N Rogers (to 17.4.93); N Williams (to 28.10.93); S Copeland (to 31.8.93); Miss J Power; C White (from 1.11.93); M Clarke (from 1.12.93); Miss H Laing, BSc (from 6.12.93); P Curzon (from 20.3.94)

Catering Department
Catering Manager: J Thornicroft
Hospitality Manager: Miss L Tiarks (to 30.5.93)
Deputy Hospitality Manager: Mrs S Dempsey
Catering Supervisor: Miss M Keating (to 22.4.93)
Senior Chef: P Sheridan
Hospitality Supervisor: Mrs B McCarthy
General Catering Assistants: Miss Z Fitzpatrick; Mrs M Grizzell

Marketing Department
Marketing Manager: Miss C Robinson (to 14.6.93)
Development Manager: Miss F Sutton
Marketing Assistant: Miss C Boys
Adoptions Administrator: Miss S Winter

Education Department
Senior Education Officer: Miss M L Williams, BSc, PGCE
Education Officer: Miss F O'Neill (to 3.3.93)
Volunteer Co-ordinator: G Lucas

VOLUNTEERS

London Zoo

Zina Abdul-Nour; Kryia Al Yawer; Laurie Allen; Don Alvarez; Rajan Amin; Margaret Armstrong; David Ashby; Fran Audric; John Ayrey

John Balkman; Norma Barnet; Gary Bartlet; Margaret Baukham; Pam Beanlands; Alison Binns; Nilgun Bishop; Denise Blackwell; Jakki Blag; Sally Brough; Andrew Brown; Emily Brown; Simon Brown; Elaine Brumstead

Johanna Carse; Debbie Catt; David Chan; Amanda Church; John Clifford; Sid Cocks; Andrew Colman; John Collins;

Dorothy Copeland; Jackie Cottrell; Richard Creighton; Daphne Cross; Isabel Cruickshank; Geoff Cutting; Ann Curtis

Gladys Davies; Gavin Davy; Kathleen Dixon; Don Driver; Joan Eggmore; Mary Elgin; Neil Faith; Felix Fifer; Jill Fleming; Elizabeth Formoy

Valery Golding; Barbara Gordon; Janet Gates; Celia Gaya; Trish Gibson; Angela Gillham; Nevil Gorthy; Mary Godwin; Elizabeth Grabow; Dorothy Gyngell

Sheila Haes; Ron Hart; Matthew Hartley; Tony Hazeldine; Pat Healy; Lisa Hodgekinson; Joyce Hunter-Lieberman; David Hutchinson

June Ingram; Sheila Jackson; Linda Janiszewski; Barrie Johnson; Cyril Johnson; Iris Johnson; Edward Jones; Bev Jordan

Geoffrey Kenton; Eric King; Wyn Knowles; Kam Kumar; Ruby Langrell; Margaret Lawrence; Jon Lee; Belinda Line; Joy Long; Darren Lowings; Gary Lowings

Flavia Malim; Karina Matsuda; Jane Mcintyre; Rebecca Meirs; Lee Mitchel; Barbara Moir; Tes Morely; Linda Morrison; George Mumford; Jackie Mutton; Karen Nolan; Patricia Novelli; Alison Noyes; Mandy Odwell

Prafulla Patel; Sally Penfold; Grace Pirie; Jonathon Pollard; Dilvia Del Prato; Marta Pytel; Sean Rapples; Dorothy Reed; Majda Rida; Ian Robinson; Marilyn Roseman; Duncan Rowlatt; Kerstin Rucht

Nicola Stratzullo; Diane Shearing; Jean Sherman; Siva Sivaganeshan; Valery Skinner; Jo Smith; Maurice Sobell; Ruth Sober; Margaret Stafford; Paul Svensson

Maggie Tighe; Michael Tigwell; John Thompson; Georgia Todeschini; Brenda Tonks; M Tracey; Mrs Wailes; Amanda Waterfield; Jenny Watts; Diana Way; Delene Welch; Marion Winter; Tracey Wombwell; David Wooderson; Jonathon Wright

Whipsnade Wild Animal Park

Karen Adams; Jean Anderson; Michael Atkins

Heather Bardner; Kirsty Bevan; Tina Boundy; Jill Broad; Leile Brown; Carol Butler

Louise Carter; Kathleen Chapman; Anne Clark-Jones; Sidney Cocks; Maureen Cook; Ronald Cowan; Marion Cowan

Catherine Dyer; Kathleen Eames; Kenneth Eames; Arthur Ellis Pamela Erwood; Patricia Faulkner; Tracy French; Mary Frost; Denis Garner; Erica Godman; Nevil Gorthy; Robert Green; Jim Griffin

Norman Hancock; Brian Herring; Pauline Hodgson; Pete Huggins; Geraldine Irving; Dorothy Isaacs; Austin Janes; Gordon Jewry-Phillips; Jeff Knowles

Dorothy Lawson; Jennifer Lewis; Malcolm Mackenzie; Terence Manson; Eileen March; Miriam Martin; Betty McHugh; Patricia Mitchell

Lyn Paynter; Derrick Pendar; Lucy Pendar; Audrey Perrott; Ilid Putnam; Enid Ranson; Christopher Richardson; Elizabeth Richmond; Suzannah Rush

Rebecca Sandifer; Raye Sawyer; Peter Scrivener; Kenneth Sharpe; Christine Sharpe; Cheryl Sharpe; Walter Smith; Mary Snoxall; Doreen Spencer; Tony Stevens; Marion Strapp; Paul Susman

Hans van der Grinten; Arthur Waring; Elizabeth Webb; Naomi White; Patricia Wickens; Jennifer Wynn

PUBLICATIONS BY THE SOCIETY'S STAFF AND RESEARCH WORKERS

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Brown, D, Alexander, D E, Marrs, R W & Albon, S (1993). Structural accounting of the variance of demographic change. *J Anim Ecol* **62**: 490–502.

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mobility in reproductively active and socially suppressed males of two eusocial African mole-rats, the naked mole-rat (*Heterocephalus glaber*) and the Damaraland mole-rat (*Cryptomys damarensis*). *J Reprod Fert* **100:** 411–416.

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Gillespie, S H, Dinning, W J, Voller, A, & Crowcroft, N S (1993). The spectrum of ocular toxocariasis. *Eye* **7:** 414–418.

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Ginsberg, J R & Clode, D (1993). Hunting. *Animal Behaviour* (Ed) T Halliday, Weldon Russel, Sydney.

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Hearn, J P, Seshagiri, P B & Webley G E (1993) Chorionic gonadotrophin and the regulation of embryo implantation in primates. *Latin Amer Assoc for Research in Human Reprod. Proc XIII Congress*, Buenos Aires.

Hearn, J P, Seshagiri, P B & Webley, G E (1993). The physiology of implantation in primates. In: *In-Vitro Fertilization & Embryo Transfer in Primates*, pp. 158–168 (Ed) Wolf, D P, Stouffer, R L & Brenner, R M. Serono Symposium USA, Springer-Verlag, New York.

Hearn, J P & Webley, G E (1993). Early embryo development and implantation in the marmoset monkey, *Callithrix jacchus*. In: *Reproductive medicine and conservation. A Primatologia No Brasil* **4:** 215–225.

Hearn, J P & Webley, G E (1993). The regulation of chorionic gonadotrophin during embryo-maternal attachment and implantation in primates. *Serono Symp* **91:** 37–47.

Hearn, J P & Webley, G E (1993). The rescue of the corpus luteum. *Latin Amer Assoc for Research in Human Reprod. Proc XIII Congress*, Buenos Aires.

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ANIMALS IN THE COLLECTIONS

column 1 Number of animals in the Collection at 1st January 1993.

column 2 Number of animals received in 1993 by presentation, exchange, purchase, or transfer between the Society's two Collections. The figures in brackets indicate animals which have been so transferred.

column 3 Number of animals born or hatched during 1993.

column 4 Number of animals which died in 1993 within 30 days of birth or hatching. The figures in brackets indicate animals born or hatched during December 1992 which died during January 1993.
Stillbirths are not included.

column 5 Number of animals which died from natural causes during 1993 apart from those included in column 4.

column 6 Number of animals disposed of in 1993 by presentation, exchange, deposit, sale, or transfer between the Society's two Collections, as well as culled animals and those killed by vermin or vandals.
The figures in brackets indicate animals which have been transferred between the two Collections.

column 7 Number of animals in the Collection at 31st December 1993 showing sexes where these are known.
e.g. 1/3/1 indicates 1 male, 3 female, 1 sex unknown.

Key

G Genus new to the Collection
S Species new to the Collection
SS Sub-species new to the Collection

*Species subject to the Agreement with the Marwell Preservation Trust on joint ownership and management

**Free-ranging animals at Whipsnade censused once a year

IUCN Threatened species categories (*1994 IUCN Red List of Threatened Animals*. Compiled by World Conservation Monitoring Centre, Cambridge, UK)

E Endangered
Ex Extinct *in situ*
I Indeterminate
K Insufficiently known
R Rare
V Vulnerable

LONDON ZOO		1	2	3	4	5	6	7
MAMMALS								
Monotremata								
Tachyglossus aculeatus	Australian Echidna	2	—	—	—	1	—	1/0
Zaglossus bruijni (E)	Bruijn's Echidna	3	—	—	—	—	—	1/2
Marsupialia								
Phalanger gymnotis	Grey Ground Cuscus	4	1	—	—	1	—	2/2
Gymnobelideus leadbeateri (E)	Leadbeater's Possum	9	—	—	—	1	3	2/3
Petaurus breviceps	Sugar Glider	4	6	—	—	2	—	5/3
Dasyuroides byrnei (E)	Byrne's Pouched Mouse	2	—	—	—	—	—	1/1
Potorous tridactylus	Long-nosed Potoroo	4	—	1	—	—	—	2/3
Macropus rufogriseus frutica	Red-necked Wallaby	4	—	1	—	—	1	1/3
Insectivora								
Erinaceus europaeus	European Hedgehog	2	1	—	—	—	2	0/0/1
Suncus murinus	Grey Musk Shrew	—	1	—	—	—	—	0/0/1
Chiroptera								
Pteropus rodricensis (E)	Rodriguez Fruit Bat	18	—	7	3	—	—	12/10
Carollia perspicillata	Seba's Short-tailed Bat	111	—	122	7	7	12	0/0/207
Scandentia								
Tupaia minor	Pygmy Tree Shrew	—	2	—	—	—	—	1/1
Tupaia tana	Large Tree Shrew	1	2	2	1	1	—	1/1/1
Primates								
Eulemur macaco macaco (V)	Black Lemur	—	2	—	—	—	—	1/1
Eulemur fulvus mayottensis (V)	Mayotte Lemur	3	—	2	1	1	—	0/3
Varecia variegatus variegatus (E)	Ruffed Lemur	1	—	—	—	—	—	0/1

		1	2	3	4	5	6	7
Varecia variegatus rubra (E)	Ruffed Lemur	2	1	—	—	—	—	1/2
Cheirogaleus medius	Fat-tailed Dwarf Lemur	5	—	3	—	—	—	4/4
Microcebus murinus	Grey Mouse Lemur	4	—	—	—	—	—	3/1
Loris tardigradus	Slender Loris	4	—	1	1	—	—	3/1
Nycticebus coucang	Slow Loris	3	—	1	—	—	1	1/2
Nycticebus pygmaeus (V)	Pygmy Slow Loris	2	1	—	—	—	—	2/1
Galago senegalensis	Senegal Bushbaby	2	—	—	—	—	—	1/1
Aotus trivirgatus boliviensis	Douroucouli	2	—	—	—	—	—	1/1
Pithecia pithecia	White-faced Saki Monkey	4	2	1	—	—	1	3/3
Ateles paniscus paniscus (V)	Red-faced Black Spider Monkey	2	—	1	—	—	—	1/2
Callithrix argentata argentata	Silvery Marmoset	2	—	2	—	—	—	1/1/2
Cebuella pygmaea	Pygmy Marmoset	6	—	3	2	1	—	3/2/1
Saguinus oedipus (E)	Cotton-headed Tamarin	4	—	—	—	—	—	3/1
Saguinus imperator	Emperor Tamarin	2	—	—	—	—	—	1/1
Leontopithecus rosalia (E)	Golden Lion Tamarin	9	1	—	—	—	2	3/5
Leontopithecus chrysomelas (E)	Golden-headed Lion Tamarin	2	—	—	—	—	—	2/0
Callimico goeldii (R)	Goeldi's Monkey	10	—	2	—	—	4	2/5/1
Macaca nigra (I)	Sulawesi Crested Macaque	7	—	1	—	—	—	3/5
Cercopithecus diana diana (V)	Diana Monkey	3	—	—	—	—	1	1/1
Cercopithecus hamlyni (V)	Owl-faced Monkey	3	—	1	—	—	—	2/2
Colobus polykomos polykomos	Western Black & White Colobus Monkey	2	—	—	—	—	—	1/1
Presbytis entellus thersites	Hanuman Langur	4	1	1	—	—	1	2/3
Hylobates lar	Lar Gibbon	3	—	1	—	—	—	2/2
Pan troglodytes (V)	Chimpanzee	11	—	2	—	—	—	4/9
Gorilla gorilla gorilla (V)	Western Lowland Gorilla	5	—	—	—	—	2	1/2
Xenarthra (Edentata)								
Choloepus didactylus	Two-toed Sloth	2	—	—	—	—	—	1/1
Chaetophractus villosus	Hairy Armadillo	2	—	—	—	2	—	—
Rodentia								
Callosciurus prevostii	Prevost's Squirrel	2	2	4	—	1	2	3/2
Tamias townsendi	Townsend's Chipmunk	4	—	—	—	1	—	2/1
Tamias sibiricus	Siberian Chipmunk	10	—	4	—	1	8	3/2
Peromyscus polionotus	Oldfield Mouse	3	—	—	—	1	—	0/0/2
Phodopus sungorus	Dwarf Hamster	13	—	52	8	7	31	11/8
Cricetulus barabensis	Chinese Hamster	16	—	21	—	22	—	7/7/1
Gerbillus perpallidus	Pallid Gerbil	32	—	11	5	5	—	0/0/33
Meriones unguiculatus	Clawed Jird	1	—	—	—	1	—	—
Alticola strelzowi	Mountain Vole	2	—	—	—	2	—	—
Apodemus sylvaticus	Field Mouse	24	—	49	18	14	—	21/20
Micromys minutus	Harvest Mouse	2	4	—	—	2	—	1/3
Acomys russatus	Golden Spiny Mouse (Black form)	30	—	11	2	11	12	3/13
Rattus rattus	Black Rat	58	—	213	64	5	181	0/0/21
Rattus norvegicus	Brown Rat	98	6	220	32	2	268	7/0/15
Dryomis nitedula	Forest Dormouse	9	—	5	—	1	—	11/2
Muscardinus avellanarius	Common Dormouse	6	5	4	4	2	3	3/3
Hystrix africaeaustralis	Cape Crested Porcupine	2	—	—	—	—	—	1/1
Atherurus africanus	African Brush-tailed Porcupine	7	2	1	—	—	3	3/4
Dasyprocta aguti	Orange-rumped Agouti	20	—	8	2	7	—	9/10
Myoprocta pratti	Green Acouchi	5	1	—	—	—	1	3/2
Chinchilla laniger	Chinchilla	5	—	3	—	—	4	3/1
Octodon degus	Degu	7	—	—	—	5	—	1/1
Carnivora								
Canis lupus (V)	Grey Wolf	3	—	—	—	—	—	1/2
Fennecus zerda (K)	Fennec Fox	2	1	—	—	—	—	1/2
Ailuropoda melanoleuca (E)	Giant Panda	2	—	—	—	—	1	0/1
Ictonyx striatus	Zorilla	4	—	2	—	—	2	1/3
Martes martes	Pine Marten	2	—	—	—	1	—	1/0
Amblonyx cinerea (K)	Oriental Small-clawed Otter	2	—	—	—	—	—	1/1
Genetta tigrina	Blotched Genet	2	—	—	—	—	—	1/1
Arctictis binturong	Binturong	2	—	—	—	—	—	1/1
Suricata suricatta	Suricate Meerkat	2	—	—	—	—	—	1/1
Helogale parvula	Dwarf Mongoose	10	—	—	—	—	—	2/2/6
Mungos mungo	Banded Mongoose	2	—	—	—	—	—	1/1

		1	2	3	4	5	6	7
Cynictis penicillata	Yellow Mongoose	14	—	2	—	7	4	4/1
Felis caracal	Caracal Lynx	1	—	—	—	—	—	0/1
Felis pardalis	Ocelot	4	—	—	—	—	—	3/1
Panthera leo persica (E)	Asiatic Lion	4	—	9	4	—	—	6/3
Panthera tigris (E)	Tiger	2	—	—	—	—	2	—
Panthera tigris sumatrae (E)	Sumatran Tiger	1	1	—	—	—	—	1/1
Panthera pardus saxicolor (I)	Persian Leopard	2	—	—	—	—	—	1/1
Neofelis nebulosa nebulosa (V)	Clouded Leopard	2	—	—	—	—	—	1/1
Pinnipedia								
Arctocephalus australis	South American Fur Seal	2	2	—	—	2	1	0/1
Proboscidea								
Elephas maximus (E)	Asian Elephant	3	1	—	—	—	1	0/3
Perissodactyla								
*Equus burchelli antiquorum**	Chapman's Zebra	2	—	—	—	—	—	1/1
Diceros bicornis (E)	Black Rhinoceros	2	—	—	—	—	—	1/1
Artiodactyla								
*Lama glama**	Llama	2	—	—	—	—	—	2/0
*Camelus bactrianus**	Bactrian Camel	3	1(1)	—	—	—	—	0/4
*Pudu pudu** (K)	Pudu	3	—	1	—	—	1	2/1
Rangifer tarandus	Reindeer	3	—	—	—	—	—	0/3
Okapia johnstoni	Okapi	2	—	—	—	1	—	1/0
*Giraffa camelopardalis**	Giraffe	7	—	—	—	—	3	1/3
*Tragelaphus strepsiceros**	Greater Kudu	4	—	2	—	—	—	3/3
*Bubalus depressicornis** (E)	Anoa	4	3	1	—	—	—	3/5
*Oryx leucoryx** (E)	Arabian Oryx	7	1	3	—	1	4	2/4
Gazella gazella arabica (V)	Arabian Gazelle	3	2	—	—	1	1	3/0
Domestic								
	Cattle	2	—	—	—	—	2	—
	Goat	4	—	—	—	2	2	—
	Sheep	5	—	—	—	—	5	—
	Rabbit	18	—	8	1	3	11	6/5
	Guinea pig	12	—	6	—	2	5	1/10
	Donkey	2	2	—	—	—	4	—
	Pony	6	—	—	—	1	5	—
	Pig	—	4	23	4	—	23	—
Total: Mammals		790	59(1)	818	159	128	620	760
BIRDS								
Sphenisciformes								
Spheniscus demersus (K)	Blackfooted (Jackass) Penguin	40	—	11	1	3	2	12/14/19
Spheniscus humboldti	Humboldt's Penguin	1	—	—	—	—	1(1)	—
Pelecaniformes								
Pelecanus onocrotalus	Eastern White Pelican	5	—	—	—	1	—	0/0/4
Pelecanus occidentalis	Brown Pelican	2	—	—	—	1	—	0/0/1
Morus bassanus	Gannet	3	—	—	—	—	—	1/0/2
Phalacrocorax carbo	Cormorant	1	—	—	—	1	—	—
Ciconiiformes								
Nycticorax nycticorax	Night Heron	3	—	—	—	—	—	0/1/2
Ardeola ibis	Cattle Egret	12	—	—	—	2	—	1/2/7
Ardea cinerea	Grey Heron	2	—	—	—	—	—	0/0/2
Ciconia abdimii	Abdim's Stork	10	—	—	—	2	—	0/0/8
Leptoptilos crumeniferus	Marabou Stork	2	—	—	—	—	—	0/2
Threskiornis aethiopicus	Sacred Ibis	27	—	10	—	8	—	0/1/28
Eudocimus ruber	Scarlet Ibis	8	—	—	—	3	—	3/2
Plegadis ridgwayi	Puna Ibis	—	6	—	—	—	—	3/3
Platalea alba	African Spoonbill	4	—	—	—	1	—	0/0/3
Phoenicopterus chilensis	Chilean Flamingo	41	—	—	—	—	—	17/24

		1	2	3	4	5	6	7
Anseriformes								
Dendrocygna bicolor	Fulvous Whistling Duck	2	—	—	—	1	—	0/0/1
Dendrocygna viduata	White-faced Tree Duck	5	—	—	—	—	—	0/1/4
Branta bernicla orientalis	Brent Goose	3	—	—	—	—	—	2/1
Aix sponsa	Carolina Duck	7	—	1	1	1	—	2/4
Callonetta leucophrys	Ringed Teal	10	—	—	—	2	—	5/3
Anas sparsa	Black Duck	—	2	—	—	—	—	1/1
Anas penelope	Wigeon	16	—	4	1	—	—	11/8
Anas americana	American Wigeon	1	—	—	—	1	—	—
Anas sibilatrix	Chiloe Wigeon	7	—	—	—	2	—	1/1/3
Anas sibilatrix × *Aythya fuligula*	Chiloe Wigeon × Tufted Duck	3	—	—	—	2	—	1/0
Anas strepera	Gadwall	1	—	—	—	—	—	0/1
Anas capensis	Cape Teal	2	—	—	—	—	—	1/1
Anas acuta	Pintail	9	—	8	1	2	—	10/4
Anas bahamensis	Bahama Pintail	3	—	1	—	—	—	1/1/2
Anas versicolor puna	Puna Teal	4	—	5	5	—	—	2/2
Ana punctata	Hottentot Teal	1	—	—	—	—	—	1/0
Anas querquedula	Garganey	9	—	—	—	1	—	6/2
Anas clypeata	Shoveler	1	—	—	—	—	—	1/0
Netta rufina	Red-crested Pochard	5	—	10	5	4	—	2/2/2
Aythya valisineria	Canvasback	4	—	—	—	1	—	1/2
Aythya ferina	European Pochard	4	—	—	—	—	—	2/2
Aythya fuligula	Tufted Duck	4	—	—	—	1	—	1/2
Somateria mollissima	Eider Duck	12	—	2	2	3	—	3/6
Bucephala clangula	Goldeneye	1	—	—	—	—	—	0/1
Mergus albellus	Smew	2	—	—	—	—	—	1/1
Mergus merganser	Goosander	4	—	—	—	1	—	0/3
Oxyura jamaicensis jamaicensis	North American Ruddy Duck	4	—	—	—	3	—	0/1
Falconiformes								
Milvus migrans	Black Kite	—	2	—	—	—	—	1/1
Milvus migrans migrans	Black Kite	1	—	—	—	—	—	1/0
Haliaeetus vocifer	African Sea Eagle	—	2	—	—	—	—	1/1
Torous tracheliotus	Lappet-faced Vulture	2	—	—	—	—	—	1/1
Terathopius ecaudatus	Bateleur Eagle	1	2	—	—	1	—	1/1
Polyboroides typus	Harrier Hawk	3	—	1	—	—	—	1/1/2
Polihierax semitorquatus	African Pygmy Falcon	1	—	—	—	—	—	1/0
Galliformes								
Penelope purpurascens purpurascens	Crested Guan	3	1	—	—	—	—	2/2
Crax fasciolata	Bare-faced Curassow	2	—	—	—	—	—	1/1
Francolinus pondicerianus	Indian Grey Francolin	1	—	—	—	—	—	1/0
Tragopan satyra	Satyr Tragopan	2	—	—	—	—	—	1/1
Tragopan temminckii	Temminck's Tragopan	2	—	4	—	—	—	2/4
Lophophorus impeyanus	Impeyan Pheasant	6	—	3	2	—	1	3/3
Lophura edwardsi (V)	Edward's Pheasant	4	—	—	—	—	—	2/2
Crossoptilon crossoptilon (V)	White Eared Pheasant	1	—	—	—	—	—	0/1
Catreus wallichi (E)	Cheer Pheasant	2	—	7	6	—	—	2/1
Syrmaticus humiae (R)	Hume's Bar-tailed Pheasant	4	—	—	—	—	4	—
Syrmaticus mikado (V)	Mikado Pheasant	5	—	4	1	—	3	3/2
Pavo cristatus	Common Peafowl	3	—	5	3	—	3(3)	1/1
Afropavo congensis (K)	Congo Peafowl	2	—	—	—	1	—	0/1
Acryllium vulturinum	Vulturine Guineafowl	9	—	1	1	2	—	3/4
Gruiformes								
Grus japonensis (V)	Red-crowned Crane	3	—	—	—	—	1	1/1
Grus vipio (V)	White-naped Crane	1	—	—	—	—	—	1/0
Anthropoides virgo	Demoiselle Crane	3	—	—	—	—	1	1/1
Charadriiformes								
Burhinus oedicnemus	Stone Curlew	2	—	3	2	—	1	1/1
Numenius arquata	Curlew	1	—	—	—	—	—	0/0/1
Tringa totanus	Redshank	1	—	—	—	—	—	0/1
Philomachus pugnax	Ruff	1	—	—	—	—	1	—
Larus cirrocephalus poiocephalus	Grey-headed Gull	25	—	1	—	2	8	0/0/16
Larosterna inca	Inca Tern	5	—	—	—	1	—	1/3
Uria aalge	Guillemot (Murre)	2	—	—	—	—	—	0/0/2

		1	2	3	4	5	6	7
Columbiformes								
Pterocles alchata	Pintailed Sandgrouse	1	—	—	—	—	1	—
Columba guinea	Speckled Pigeon	27	—	6	—	7	—	1/1/24
Ducula aenea	Green Imperial Pigeon	—	2	—	—	—	—	1/1
Ducula bicolor	Pied Imperial Pigeon	2	—	—	—	1	—	0/1
Ptilinopus cinctus	Black-backed Fruit Dove	—	3	—	—	—	—	3/0
Ptilinopus jambu	Jambu Fruit Dove	—	4	—	—	—	—	1/3
Ptilinopus magnificus	Magnificent Fruit Dove/ Wompoo	—	4	—	—	—	—	1/0/3
Ptilinopus melanospila	Black-naped Fruit Dove	—	4	—	—	—	—	2/2
Ptilinopus superbus	Superb Fruit Dove	—	3	—	—	2	—	1/0
Psittaciformes								
Charmosyna placentis	Red-flanked Lorikeet	—	2	4	—	1	1	1/1/2
Charmosyna pulchella rothschildi	Fairy Lorikeet	3	—	6	2	1	2	1/1/2
Charmosyna rubronotata	Red-spotted Lorikeet	—	3	—	—	1	—	1/1
Eos cyanogenia (R)	Black-winged Lory	—	2	—	—	—	—	1/1
Eos reticulata (R)	Blue-streaked Lory	—	5	—	—	—	1	3/1
Cacatua alba (E)	White-crested Cockatoo	2	—	—	—	—	—	1/1
Cacatua moluccensis (E)	Salmon-crested Cockatoo	—	3	—	—	—	—	2/1
Cacatua tenuirostris pastinator	Western Slender-billed Cockatoo	2	—	—	—	—	—	1/1
Nestor notabilis	Kea	1	—	—	—	—	—	1/0
Polytelis alexandrae (K)	Princess of Wales' Parrakeet	3	—	—	—	1	—	1/1
Poicephalus robustus	Cape Parrot	2	—	—	—	—	—	1/1
Anodorhynchus hyacinthinus (V/R)	Hyacinth Macaw	5	—	—	—	—	—	3/2
Ara ararauna	Blue & Yellow Macaw	—	2	—	—	—	—	0/2
Aratinga solstitialis	Sun Conure	—	3	—	—	—	—	0/0/3
Enicognathus ferrugineus	Austral Conure	2	—	—	—	—	—	1/1
Enicognathus leptorhynchus	Slender-billed Conure	4	—	1	—	—	—	2/1/2
Loriculus galgulus	Blue-crowned Hanging Parrot	—	3	—	—	1	—	0/2
Myiopsitta monachus	Quaker (Monk) Parrakeet	23	—	3	—	5	—	0/0/21
Amazona ochrocephala	Yellow-crowned Amazon	1	—	—	—	—	1	—
Cuculiformes								
Musophaga violacea	Violet Plantain-Eater	—	1	—	—	—	—	0/1
Tauraco persa livingstonii	Livingstone's Turaco	2	—	5	2	—	—	1/1/3
Tauraco erythrolophus	Red-crested Turaco	2	—	—	—	—	—	1/1
Tauraco hartlaubi	Hartlaub's Turaco	2	—	—	—	—	—	0/2
Tauraco leucotis	White-cheeked Turaco	9	—	3	3	1	1	3/2/2
Strigiformes								
Tyto alba	Barn Owl	3	1(1)	—	—	—	2	2/0
Otus bakkamoena	Collared Scops Owl	2	—	—	—	—	—	1/1
Otus leucotis	White-faced Scops Owl	5	5(5)	8	—	—	2	7/9
Bubo bubo	Eurasian Eagle Owl	—	1	—	—	—	—	1/0
Bubo capensis mackinderi	Kenyan Eagle Owl	1	—	—	—	—	1	—
Bubo vosseleri	Nduk Eagle Owl	1	—	—	—	—	—	1/0
Pulsatrix perspicillata	Spectacled Owl	2	—	—	—	—	—	1/1
Nyctea scandiaca	Snowy Owl	2	—	—	—	1	—	0/1
Ninox novaeseelandiae	Boobook Owl	5	1	3	—	—	6	1/2
Athene brama	Spotted Owlet	2	—	—	—	1	—	0/1
Speotyto cunicularia	Burrowing Owl	6	1	5	1	2	6	2/1
Strix hylophila	Rusty-Barred Owl	2	—	—	—	1	—	0/1
Strix uralensis	Ural Owl	4	2	—	—	1	2	2/1
Strix nebulosa	Great Grey Owl	1	1	—	—	—	—	1/1
Apodiformes								
Amazilia lactea	Sapphire-spangled Emerald Hummingbird	—	5	—	—	5	—	—
Anthracothorax nigricollis	Black-throated Mango	—	2	—	—	2	—	—
Colibri delphinae	Brown Violet-ear	—	1	—	—	1	—	—
Florisuga mellivora	White-necked Jacobin	—	1	—	—	1	—	—
Trogoniformes								
Pharomachrus auriceps	Golden-headed Quetzal	—	1	—	—	—	—	0/1

		1	2	3	4	5	6	7
Coraciiformes								
Dacelo novaeguineae	Kookaburra	3	—	2	1	—	1	1/1/1
Coracias caudata	Lilac-breasted Roller	2	1	—	—	—	1	1/1
Tockus erythrorhynchus	Red-billed Hornbill	1	2	—	—	1	—	1/1
Penelopides panini	Tarictic Hornbill	1	—	—	—	—	—	1/0
Anthracoceros coronatus convexus	Southern Pied Hornbill	3	—	—	—	—	—	1/2
Bycanistes subcylindricus	Black and White Casqued Hornbill	2	—	—	—	—	—	1/1
Buceros bicornis	Great Indian Hornbill	1	—	—	—	—	—	0/1
Buceros hydrocorax	Rufous Hornbill	2	—	—	—	—	—	1/1
Piciformes								
Psilopogon pyrolophus	Fire-tufted Barbet	1	1	—	—	1	—	1/0
Lybius dubius	Bearded Barbet	2	—	—	—	1	—	1/0
Pteroglossus aracari	Black-necked Aracari	2	19	—	—	2	14	4/1
Pteroglossus castanotis	Chestnut-eared Aracari	1	—	—	—	—	—	0/1
Baillonius bailloni	Saffron Toucanet	2	—	—	—	—	—	1/1
Melanerpes candidus	White Woodpecker	1	—	—	—	—	—	0/1
Passeriformes								
Psarisomus dalhousiae	Long-tailed Broadbill	—	4	—	—	—	—	3/0/1
Procnias nudicollis	Naked-throated Bellbird	1	—	—	—	—	—	1/0
Pycnonotus jocosus	Red-whiskered Bulbul	2	—	—	—	—	—	1/1
Irena puella	Fairy Bluebird	2	1	—	—	1	—	1/1
Garrulax leucolophus	White-crested Laughing Thrush	2	—	—	—	1	—	0/1
Garrulax pectoralis	Necklaced Laughing Thrush	1	—	—	—	1	—	—
Garrulax chinensis	Black-throated Laughing Thrush	2	—	—	—	—	—	1/1
Garrulax sannio	White-browed Laughing Thrush	1	1	—	—	—	—	1/1
Leiothrix argentauris	Silver-eared Mesia	2	—	—	—	—	—	1/1
Leiothrix lutea	Pekin Robin (Red-billed Leiothrix)	1	—	—	—	—	—	0/0/1
Zosterops sp.	White-eye	2	—	—	—	—	—	0/0/2
Paroaria coronata	Red-crested Cardinal	2	—	—	—	—	—	1/1
Ramphocelus carbo	Silver-beaked Tanager	—	2	—	—	—	—	1/1
Tangara icterocephala	Silver-throated Tanager	—	2	—	—	—	—	1/1
Gnorimopsar chopi	Chopi Grackle	1	—	—	—	1	—	—
Poephila acuticauda hecki	Heck's Grass Finch	2	—	—	—	2	—	—
Erythrura trichroa	Blue-faced Parrot Finch	1	—	—	—	1	—	—
Quelea quelea	Red-beaked Weaver (Quelea)	2	—	—	—	—	—	1/1
Foudia flavicans (E)	Rodriguez Fody	4	—	—	—	—	—	2/2
Lamprotornis iris	Emerald Glossy Starling	2	—	—	—	—	—	1/1
Spreo superbus	Superb Glossy Starling	5	—	3	2	1	—	1/2/2
Creatophora cinerea	Wattled Starling	2	—	—	—	1	—	0/1
Sturnus roseus	Rose-coloured Starling	2	—	—	—	—	—	1/1
Sturnus contra	Asian Pied Starling	3	—	1	—	1	—	1/1/1
Leucopsar rothschildi (E)	Rothschild's Mynah	4	—	—	—	—	1	2/1
Ampeliceps coronatus	Golden-crested Mynah	2	—	—	—	—	—	1/1
Gracula religiosa intermedia	Nepal Hill Mynah	2	—	—	—	—	—	1/1
Cyanocorax chrysops	Plush-crested Jay	1	—	—	—	1	—	—
Domestic								
	Duck	3	—	—	—	—	—	0/3
	Chicken	5	—	—	—	—	—	0/5
	Total: Birds	595	114(6)	131	42	104	71(4)	623

REPTILES

Testudines								
Sternotherus odoratus	Stinkpot	1	—	—	—	—	—	1/0
Kinosternon subrubrum	Eastern Mud Terrapin	1	—	—	—	—	—	1/0
Kinosternon scorpioides	Scorpion Mud Terrapin	2	—	—	—	—	—	1/1
Pseudemys scripta dorbignyi	South American Ornate Terrapin	1	—	—	—	—	—	0/1
Pseudemys scripta elegans	Red-eared Terrapin	6	—	—	—	—	—	3/3
Terrapene carolina triunguis	Three-toed Box Terrapin	1	—	—	—	—	—	1/0
Testudo graeca	Spur-thighed Tortoise	5	5	—	—	—	—	3/7

		1	2	3	4	5	6	7
Testudo hermanni (V)	Hermann's Tortoise	—	1	—	—	—	—	1/0
Testudo kleinmanni (V)	Egyptian Tortoise	—	4	—	—	1	1	2/0
Malacochersus tornieri (K)	Pancake Tortoise	1	—	—	—	—	—	1/0
Geochelone carbonaria	Red-footed Tortoise	1	—	—	—	—	1	—
Eretmochelys imbricata (E)	Hawksbill Turtle	3	—	—	—	—	—	2/1
Chelus fimbriatus	Matamata	5	—	—	—	—	—	0/0/5
Chelodina longicollis	Long-necked Terrapin	5	—	—	—	—	—	2/3
Trionyx hurum	Peacock Soft-shelled Turtle	2	—	—	—	—	—	1/1
Crocodylia								
Crocodylus niloticus	Nile Crocodile	3	—	—	—	—	1	1/1
Alligator sinensis (E)	Chinese Alligator	5	—	—	—	—	—	1/2/2
Sauria								
Teratoscincus scincus	Frog-eyed Sand Gecko	1	—	—	—	—	—	1/0
Hemitheconyx caudicinctus	African Fat-tailed Gecko	4	—	—	—	—	4	—
Chondrodactylus angulifer	Namib Sand Gecko	3	—	—	—	1	—	1/1
Gekko gecko	Tokay Gecko	1	—	—	—	—	—	0/1
Phelsuma lineata pusilla	Lined Day Gecko	17	—	—	—	—	—	0/0/17
Phelsuma standingi (I)	Standing's Day Gecko	6	—	—	—	1	—	2/2/1
Coleonyx variegatus	Western Banded Gecko	3	—	—	—	1	—	1/1
Eublepharis macularius	Leopard Ground Gecko	4	—	—	—	—	—	2/2
Anolis equestris	Knight Anole	—	1	—	—	—	—	1/0
Laemanctus longipes deborrei	Casque-headed Lizard	1	—	—	—	—	1	—
Basiliscus plumifrons	Plumed Basilisk	3	—	6	—	5	—	1/0/3
Cyclura cornuta cornuta (I)	Rhinoceros Iguana	4	—	—	—	—	—	3/1
Pogona vitticeps	Inland Bearded Dragon	7	3	—	—	3	4	1/0/2
Egernia striolata	Australian Tree Skink	2	—	—	—	1	—	0/1
Corucia zebrata	Prehensile-tailed Skink	5	2	—	—	1	—	1/1/4
Trachydosaurus rugosus	Shingleback	3	—	—	—	—	—	1/2
Tiliqua scincoides scincoides	Eastern Blue-tongued Skink	3	—	—	—	—	—	1/2
Tiliqua scincoides intermedia	Northern Blue-tongued Skink	2	—	—	—	—	—	1/1
Mabuya quinquetaeniata	Five-lined Skink	1	—	—	—	—	1	—
Eumeces schneiderii	Schneider's Skink	3	—	—	—	—	—	0/0/3
Chalcides ocellatus	Eyed Skink	3	—	—	—	1	—	0/0/2
Gerrhosaurus major	Greater Plated Lizard	3	—	—	—	—	—	2/1
Lacerta lepida	Eyed Lizard	2	—	—	—	—	2	—
Trogonophis wiegmanni	Wiegmann's Burrowing Lizard	1	—	—	—	—	—	0/0/1
Varanus exanthematicus exanthematicus	Bosc's Monitor	3	6	—	—	3	—	0/0/6
Heloderma suspectum suspectum (V)	Reticulated Gila Monster	8	—	—	—	—	—	3/3/2
Anguis fragilis	Slow-worm	2	—	—	—	—	—	0/0/2
Cordylus giganteus	Sungazer	6	—	—	—	1	—	0/0/5
Serpentes								
Liasis boa	Bismark Ringed Python	3	1	—	—	1	—	3/0
Liasis childreni	Children's Python	—	1	—	—	—	1	—
Morelia spilotus spilotus	Diamond Python	1	—	—	—	—	—	1/0
Python molurus bivittatus (V)	Burmese Rock Python	3	1	14	—	—	15	1/1/1
Python regius	Royal Python	6	1	—	—	—	2	2/2/1
Boa constrictor	Boa Constrictor	5	3	—	—	1	—	2/3/2
Candoia aspera	Fierce Papuan Boa	—	3	—	—	2	—	0/0/1
Natrix natrix	Grass Snake	1	—	—	—	—	—	1/0
Drymarchon corais couperi (V)	Eastern Indigo Snake	1	—	—	—	—	—	1/0
Elaphe longissima	Aesculapian Snake	—	2	—	—	—	—	2/0
Elaphe radiata	Radiated Rat Snake	1	—	—	—	—	—	1/0
Pituophis melanoleucus melanoleucus	Northern Pine Snake	2	—	3	—	—	2	1/1/1
Hydrodynastes gigas	Boipevassu Snake	4	—	12	1	—	13	1/1
Coronella austriaca	Smooth Snake	1	—	—	—	—	—	1/0
Lampropeltis getulus floridana	Florida King Snake	1	3	—	—	—	3	1/0
Lampropeltis getulus splendida	Desert King Snake	—	3	—	—	—	3	—
Lampropeltis getulus californiae	Californian King Snake	2	—	—	—	1	—	1/0
Lampropeltis triangulum sinaloae	Sinaloan Milk Snake	3	2	1	—	1	—	2/2/1
Lamprophis fuliginosus	African House Snake	—	10	—	—	1	7	0/0/2
Psammophis subtaeniatus	Peter's Long-lined Snake	1	—	—	—	—	—	1/0
Pseudaspis cana	Mole Snake	—	1	—	—	—	—	0/0/1

		1	2	3	4	5	6	7
Dispholidus typus	Boomslang	1	—	—	—	—	1	—
Oxyuranus scutellatus	Taipan	4	—	5	—	1	3	1/2/2
Notechis scutatus	Tiger Snake	2	—	—	—	—	—	1/1
Naja pallida	Red Spitting Cobra	2	—	—	—	—	—	1/1
Naja kaouthia	Monocellate Cobra	1	—	—	—	—	—	1/0
Dendroaspis angusticeps	Common Green Mamba	2	—	—	—	—	—	1/1
Dendroaspis polylepis	Black Mamba	—	1	—	—	1	—	—
Vipera berus	Adder	1	—	—	—	—	—	0/1
Vipera ammodytes ammodytes	Western Long-nosed Viper	3	—	—	—	1	—	1/1
Vipera russelli siamensis	Russell's Viper	1	—	—	—	—	—	1/0
Bitis arietans	Puff Adder	2	—	—	—	—	—	1/1
Bitis gabonica gabonica	Gaboon Viper	2	—	—	—	1	—	0/1
Echis carinatus sochureki	Saw-scaled Viper	8	—	8	—	1	10	1/1/3
Echis carinatus ocellatus	West African Saw-scaled Viper	2	—	—	—	—	—	1/1
Echis carinatus leakeyi	East African Saw-scaled Viper	3	—	—	—	—	—	1/2
Agkistrordon piscivorus	Cottonmouth Moccasin	1	—	—	—	—	—	1/0
Agkistrordon contortrix contortrix	Southern Copperhead	—	3	—	—	—	—	0/0/3
Calloselasma rhodostoma	Malayan Pit Viper	9	—	12	—	—	—	1/2/18
Trimeresurus purpureomaculatus	Mangrove Pit Viper	1	—	—	—	—	—	0/0/1
Bothrops atrox	Fer-de-Lance	1	—	—	—	—	—	0/1
Bothrops moojeni	Moojen's Fer-de-Lance	1	—	—	—	—	—	0/0/1
Sistrurus catenatus tergeminus	Western Massasauga	1	—	—	—	1	—	—
Crotalus durissus culminatus	North Western Neotropical Rattlesnake	2	—	—	—	1	—	1/0
Crotalus scutulatus	Mojave Rattlesnake	2	—	—	—	—	—	1/1
Crotalus viridis helleri	South Pacific Rattlesnake	—	2	—	—	—	—	1/1
Crotalus mitchelli	Speckled Rattlesnake	1	—	—	—	—	—	1/0
Crotalus cerastes	Sidewinder	1	—	—	—	—	—	0/0/1
Total: Reptiles		**232**	**59**	**61**	**1**	**33**	**75**	**243**

AMPHIBIANS

Caudata

Ambystoma maculatum	American Spotted Salamander	1	—	—	—	—	1	—
Ambystoma mexicanum (R)	Axolotl	8	—	—	—	3	—	0/0/5
Pleurodeles waltl	Spanish Ribbed Newt	8	—	—	—	1	—	0/0/7
Salamandra salamandra	Fire Salamander	10	12	—	—	—	10	0/0/12
Taricha torosa	Rough-skinned Newt	2	—	—	—	—	—	0/0/2
Triturus vulgaris	Smooth Newt	4	—	—	—	1	—	0/0/3
Pachytriton sp.	Dog-faced Newt	11	—	—	—	1	—	0/0/10

Anura

Bombina orientalis	Oriental Fire-bellied Toad	20	—	—	—	1	—	0/0/19
Bufo rubropunctatus	Red-spotted Toad	7	—	—	—	1	—	0/0/6
Bufo viridis	Green Toad	3	10	—	—	1	2	0/0/10
Colostethus trinitatus	Stream Frog	45	—	—	—	—	—	0/0/45
Dendrobates truncatus	Poison Arrow Frog	1	—	—	—	1	—	—
Hyla cinerea	American Green Tree Frog	1	—	—	—	—	1	—
Kassina senegalensis	Running Frog	2	—	—	—	2	—	—
Hymenochirus sp.	Dwarf Surinam Toad	7	—	—	—	—	—	0/0/7
Pipa pipa	Surinam Toad	2	—	—	—	—	—	0/0/2
Mantella pulchra	Mantella	10	—	—	—	—	—	0/0/10
Rana catesbeiana	American Bullfrog	3	—	—	—	1	—	0/0/2
Rana pipiens	Leopard Frog	1	—	—	—	—	—	0/0/1
Rana ridibunda	Marsh Frog	3	—	—	—	1	—	0/0/2
Rana temporaria	Common Frog	1	—	—	—	—	—	0/0/1
Xenopus laevis	Clawed Frog	6	—	—	—	—	6	—
Xenopus tropicalis	Clawed Frog	5	—	—	—	—	2	0/0/3
Total: Amphibians		**161**	**22**	**—**	**—**	**14**	**22**	**147**

FISHES

Details of the fishes in the Collection have not been included in previous Annual Reports. On this occasion, the numbers given represent fishes held at the end of 1993.
†=approximate number

CHONDRICHTHYES		
Lamniformes		
Carcharhinus melanopterus	Black-tip Reef Shark	4
Triakis semifasciata	Leopard Shark	2
Scyliorhinus canicula	Spotted Dogfish	4
Rajiformes		
Potamotrygon sp.	Freshwater Stingray	3
Raja clavata	Thornback Ray	10
Raja microocellata	Small-eyed Ray	3
Raja montagui	Spotted Ray	1
OSTEICHTHYES		
Ceratodiformes		
Neoceratodus forsteri	Australian Lungfish	1
Lepidosireniformes		
Protopterus aethiopicus	Heckles African Lungfish	1
Polypteriformes		
Polypterus bichir	Polypterus	2
Polypterus delhezi	Polypterus	1
Polypterus palmas	Polypterus	1
Polypterus retropinnis	Polypterus	3
Polypterus senegalensus	Polypterus	1
Polypterus weeksi	Polypterus	1
Acipenseriformes		
Acipenser ruthenus	Sterlet	7
Scaphirhynchus platyorynchus	Shovelnose Sturgeon	2
Polyodon spathula (V)	Paddlefish	1
Lepisosteiformes		
Lepisosteus platostomus	Shortnose Gar	3
Amiiformes		
Amia calva	Bowfin	4
Osteoglossiformes		
Gnathonemus ibis	Elephant Nose Fish	1
Marcusenius angolensis	Round-nose Elephant Fish	1
Notopterus chitala	Clown Knife Fish	5
Pantodon buchholzi	Butterfly Fish	1
Anguilliformes		
Anguilla anguilla	Common Eel	3
Conger conger	Conger Eel	1
Cypriniformes		
Acanthophthalmus myersi	Slimy Coolie	13
Botia hymenophysa	Tiger Botia	5
Botia lohachata	Pakistani Loach	4
Botia macracantha	Clown Loach	9
Botia modesta	Red-finned Botia	5
Botia sidthimunki	Chain Loach	12
Botia striata	Striped Botia	4
Lepidocephalus thermalis	Spotted Loach	13
Acheilognathus micropterus	Asian Bitterling	8
Barbus arulius	Arulius Barb	18
Barbus barbus	Barbel	4
Barbus fasciatus	Striped Barb	1
Barbus nigrofasciatus	Ruby Barb	23
Barbus 'odessa'	Odessa Barb	7
Barbus oligolepis	Checker Barb	20†
Barbus sachsi	Golden Barb	7
Barbus schwanenfeldi	Tinsel Barb	3
Barbus tetrazona	Tiger Barb	2
Barbus titteva	Cherry Barb	18
Carassius auratus	Goldfish	20†
Ctenopharyngodon idella	Grass Carp	6
Cyprinus carpio	Carp (incl. Common Carp, Mirror Carp, and Koi)	114†
Epalzeorhyncus siamensis	Flying Fox	6
Gobio gobio	Gudgeon	6
Hypophthalmichthys molitrix	Silver Carp	8
Labeo bicolor	Red-tailed Black Shark	1
Leuciscus cephalus	Chub	4
Leuciscus idus	Ide or Orfe	8
Nemacheilus barbatulus	Stone Loach	2
Notropis sp.	American Shiner	9
Notropis lutrensis	Red Shiner	40†
Osteochilus vittatus	Bony-lipped Barb	2
Phoxinus phoxinus	Minnow	5
Rasbora elegans	Elegant Rasbora	33
Rhodeus amarus	Common Bitterling	4
Rutilus rutilus	Roach	10
Scardinius erythrophthalmus	Rudd	40†
Tinca tinca	Tench	3
Characiformes		
Leporinus fasciatus	Black-banded Leporinus	1
Alestes longipinnis	African Long-finned Tetra	3
Hemigrammus caudovittatus	Buenos Aires Tetra	42†
Hyphessobrycon herbertaxelrodi	Black Neon Tetra	20
Hyphessobrycon rubrostigma	Bleeding Heart Tetra	6
Hyphessobrycon serpae	Serpae Tetra	12
Metynnis argenteus	Silver Dollar	10
Micralestes interruptus	Congo Tetra	5
Myleus rubripinnis	Red Hook Pacu	8
Paracheirodon axelrodi	Cardinal Tetra	10
Pristella riddlei	X-ray Fish	21
Serrasalmus nattereri	Piranha	157†
Triporthes angulatus	Narrow Hatchetfish	8
Siluriformes		
Bunocephalus coracoideus	Banjo Catfish	1
Pelteobagrus brashnikowi	Amur Dragon Catfish	12
Corydoras aeneus	Bronze Catfish	5
Corydoras elegans	Elegant Corydoras	5
Corydoras haraldschultzi	Corydoras	4
Corydoras melanistius	Black Dorsal Catfish	2
Corydoras nattereri	Blue Catfish	6
Corydoras paleatus	Peppered Catfish	8
Corydoras panda	Panda Cats	1
Corydoras trilineatus	Leopard Corydoras	1
Corydoras undulatus	Wavy Catfish	12
Hoplosternum littorale	Hoplosternum	2
Heteropneustes fossilis	Stinging Catfish	2
Ictalurus nebulosus	American Bullhead	1
Ictalurus punctatus	Channel Catfish	6

Ancistrus sp.	Bristle-nosed Catfish	1
Hypostomus punctatus	Suckermouth Catfish	6
Peckoltia sp.	Emperor Zebra Plec	1
Pterygoplichthys gibbiceps	Pleco	3
Malapterus electricus	Electric Catfish	1
Synodontis angelicus	African Spotted Catfish	1
Synodontis clarias	Red-tailed Synodontis	1
Synodontis multipunctatus	Spotted Synodontis	4
Synodontis sp.	Synodontis	4
Kryptopterus bicirrhis	Glass Catfish	8
Silurus glanis	Wels Catfish	3
Gymnotiformes		
Electrophorus electricus	Electric Eel	1
Salmoniformes		
Esox lucius	Pike	2
Gadiformes		
Gadus merlangus	Whiting	1
Cyprinodontiformes		
Aphyosemion loennbergi	Loenberg's Killi	3
Ameca spendens (E)	Butterfly Goodeid	77†
Xenotoca eiseni	Red-tailed Goodeid	70†
Poecilia nigrofasciata	Black-barred Limia	36†
Poecilia reticulatus	Guppy	500†
Xiphophorus couchianus (E)	Monterrey Platyfish	35†
Atheriniformes		
Bedotia geayi (K)	Madagascan Rainbow	6
Glossolepis incisus	Metallic Rainbow	2
Melanotaenia boesemani (V)	Boeseman's Rainbowfish	9
Melanotaenia splendida fluviatalis	Crimson-spotted Rainbow	2
Melanotaenia trifasciatus	Rainbowfish	6
Gasterosteiformes		
Gasterosteus aculeatus	Three-spined Stickleback	3
Syngnathiformes		
Hippocampus erectus	Lined Seahorse	1
Hippocampus spinoissimus	Prickly Seahorse	8
Nerophis ophidion	Worm Pipefish	10†
Syngnathus acus	Great Pipefish	1
Scorpaeniformes		
Myoxocephalus scorpius	Father Lasher	1
Pterois volitans	Lionfish/Dragonfish	2
Perciformes		
Naso lituratus	Lipstick Tang	2
Paracanthurus hepatus	Regal Tang	13
Ctenopoma kingsleyi	Kingsley's Climbing Perch	7
Apogon nematopterus	Pyjama Cardinal	2
Belontia signata (R)	Combtail	33†
Betta splendens	Siamese Fighting Fish	2
Macropodus opercularis	Paradise Fish	4
Trichogaster leeri	Pearl Gourami	3
Trichogaster pectoralis	Snake Skin Gourami	3
Trichogaster trichogaster trichopterus	Three-spot Gourami	9
Blennius gattorugine	Tompot Blenny	32†
Blennius pholis	Blenny, Shanny	6
Synchiropus picturatus	Psychedelic Mandarin	1

		1	2	3	4	5	6	7
Lepomis gibbosus	Pumpkinseed							
Lepomis gulosus	Warmouth Bass							
Lepomis macrochirus	Bluegill Sunfish							
Lepomis megalotis	Long-eared Sunfish							
Cichlasoma nigrofasciatum	Convict Cichlid							
Chromidotilapia guentheri	Guenther's Mouthbrooder							
Haplochromis ishmaeli (I)	Lake Victoria Cichlid							5
Julidochromis marlieri	Julie Cichlid							
Julidochromis ornatus	Ornate Julie							
Julidochromis regani	Striped Julie							
Labeotropheus fuelleborni	Red-top Cichlid							1
Neolamprologus brichardi	Lyretail Lamprologus							4
Neolamprologus leleupi	Golden Lamprologus							
Melanochromis sp.	Mbuna							
Melanochromis auratus	Golden Cichlid							1
Melanochromis chipokee	Chipokee Mbuna							
Melanochromis johanni	Johanni Mbuna							
Nannacara anomola	Dwarf Cichlid							
Oreochromis mossambicus	Mozambique Mouthbrooder							
Pseudotropheus aurora	Aurora Cichlid							
Pseudotropheus elongatus	Slender Mbuna							
Pseudotropheus livingstonii	Livingston's Mbuna							
Pseudotropheus lombardoi	Kennyi Mbuna							
Pseudotropheus tropheops	Tropheops Mbuna							5
Pseudotropheus zebra	Zebra Mbuna							4
Pterophyllum scalare	Angel Fish							2
Symphysodon aequifasciata	Green Discus							
Telmatochromis vittatus	Tanganyikan Goby Cichlid							
Oxycirrhites typus	Long-nosed Hawkfish							
Neocirrhitus armatus	Scarlet Hawkfish							
Periopthalmus sp.	Mudskipper							
Ptereleotris evides	Torpedo Goby							
Labroides dimidiatus	Cleaner Wrasse							
Labrus bergylta	Ballen Wrasse							
Datnoides quadfasciatus	Many-barred Tiger							
Monodactylus argenteus	Silver Fish							
Mugil labrosus	Thick-lipped Grey Mullet							3
Etheostoma spp.	Darter							
Etheostoma caeruleum	Rainbow Darter							
Perca fluviatilis	Perch							
Centropyge acanthops	Cherub Angel							
Centropyge loriculus	Flame Angel							
Pomacanthus paru	French Angelfish							
Amphiprion ocellaris	Clownfish							
Dascyllus aruanus	White-tailed Humbug							
Dascyllus melanurus	Black-tailed Humbug							
Selenotica multifasciata	Green Scat							
Cephalopholis argus	Peacock-eyed Bass							
Cephalopholis mincatus	Red Grouper							
Cromileptis altivelis	Pantherfish							
Dicentrarchus labrax	Sea Bass							2
Sparus auratus	Gilthead Bream							3
Toxotes jaculator	Archerfish							
Pleuronectiformes								
Psetta maxima	Turbot							
Scophthalmus rhombus	Brill							
Pleuronectes platessa	Plaice							5
Tetradontiformes								
Balistes carolinensis	Grey Triggerfish							1

Total Fishes: approx. 194 species; approx. 2390 specimens

		1	2	3	4	5	6	7/8
INVERTEBRATA								
(Invertebrates in the aquarium are not listed)								
Key to columns								
1. Arrivals. **2.** Births/Hatchings. **3.** Deaths. **4.** Departures. **5.** Number of Young/Eggs at end of year. nr=Not recorded na=Not applicable. **6.** Number at end of year of Adult Male/Adult Female/Adult Unknown or No Gender. **7.** Count Unit: I=Adult numbers represent exact number of individuals. Young and Eggs may be estimated. A=All numbers are approximate. C=Numbers represent exact number of colonies. **8.** Population Status: M=Maintaining. B=Breeding. D=Declining. N=Newly acquired species.								
CNIDARIA								
Scyphozia								
Aurelia aurita	Moon Jellyfish	214	—	14	—	200/nr	0/0/0	A/D
ANNELIDA								
Hirudinea								
Hirudo medicinalis (I)	Medicinal Leech	4	—	5	—	0/0	0/0/10	I/M
MOLLUSCA								
Gastropoda								
Trochomorpha sp. 1	Raiatean Trochomorph Snail	—	nr	2	—	5/nr	0/0/10	A/B
Trochomorpha sp. 2	Raiatean Trochomorph Snail	—	nr	3	—	12/nr	0/0/12	A/B
Trochomorpha sp. 3	Huahine Trochomorph Snail	—	nr	—	—	0/nr	0/0/1	A/M
Partula arguta (E)	Polynesian Tree Snail	—	—	5	—	0/na	0/0/0	I/D
Partula dentifera (E)	Polynesian Tree Snail	—	23	23	—	18/na	0/0/19	I/B
Partula faba (E)	Polynesian Tree Snail	—	260	250	—	112/na	0/0/111	I/B
Partula garretti (Ex)	Polynesian Tree Snail	—	49	70	—	3/na	0/0/8	I/D
Partula hebe (E)	Polynesian Tree Snail	—	128	87	—	27/na	0/0/56	I/B
Partula labrusca (E)	Polynesian Tree Snail	—	16	12	—	112/na	0/0/111	I/B
Partula mirabilis × taeniata	Polynesian Tree Snail	—	38	7	—	27/na	0/0/14	I/B
Partula mooreana (Ex)	Polynesian Tree Snail	—	89	75	—	23/na	0/0/39	I/B
Partula nodosa (Ex)	Polynesian Tree Snail	543	251	420	—	193/na	0/0/179	I/D
Partula rosea (E)	Polynesian Tree Snail	—	6	6	—	4/na	0/0/5	I/B
Partula suturalis strigosa (Ex)	Polynesian Tree Snail	—	748	672	—	120/na	0/0/122	I/B
Partula suturalis vexillum (Ex)	Polynesian Tree Snail	—	772	650	—	213/na	0/0/215	I/B
Partula taeniata nucleola (Ex)	Polynesian Tree Snail	—	3	5	—	0/na	0/0/2	I/D
Partula taeniata elongata (Ex)	Polynesian Tree Snail	168	28	47	120	11/na	0/0/18	I/D
Partula taeniata ssp. unknown (Ex)	Polynesian Tree Snail	—	3	1	—	2/na	0/0/2	I/B
Partula tohiveana (Ex)	Polynesian Tree Snail	—	315	346	—	105/na	0/0/128	I/B
Partula turgida (Ex)	Polynesian Tree Snail	—	418	176	—	197/na	0/0/68	I/B
Partula varia (E)	Polynesian Tree Snail	—	240	246	—	25/na	0/0/86	I/B
Samoana attenuata (E)	Polynesian Tree Snail	—	3	6	—	0/na	0/0/0	I/D
Achatina achatina	Giant Land Snail	—	—	4	—	0/nr	0/0/0	A/D
Achatina fulica	Giant Land Snail	—	nr	nr	—	30/nr	0/0/10	A/B
Archachatina marginata	West African Giant Land Snail	—	—	2	—	15/nr	0/0/4	A/B
CRUSTACEA								
Malacostraca								
Birgus latro (R)	Robber Crab	—	—	—	—	0/nr	0/1/0	I/M
Coenobita clypeatus	Land Hermit Crab	—	—	2	3	0/nr	0/0/1	I/M
ARACHNIDA								
Araneae								
Nephila sp.	Giant Orb Spider	—	—	30	—	0/0	0/0/0	I/D
Euathlus smithii (K)	Red-kneed Bird-eating Spider	24	—	4	40	194/0	1/15/0	I/B
Euathlus sp.	Flame-kneed Bird-eating Spider	1	—	—	—	0/0	0/1/0	I/M
Argyrodes	St Helena Golden Sail Spider	2	—	1	—	0/0	0/1/0	I/M
Avicularia avicularia	Pink-toed Bird-eating Spider	—	—	1	—	0/0	0/1/0	I/M
Avicularia metallica	Surinam Bird-eating Spider	—	—	—	—	1/0	0/0/0	I/M
Euathlus emilia	Red-legged Bird-eating Spider	—	—	—	—	0/0	0/1/0	I/M
Euathlus vagans	Red-rumped Bird-eating Spider	1	20	19	—	2/0	0/1/0	I/M
Lasiodora parahybana	Brazilian Bird-eating Spider	—	—	—	—	0/0	0/2/0	I/M
Poecilotheria formosa	Salem Ornamental Black and White	—	—	1	—	1/0	0/0/0	I/M
Poecilotheria subfusca	Sri Lankan Ornamental Spider	—	—	1	—	0/0	0/0/0	I/D
Latrodectus hasselti	North American Black Widow Spider	3	—	4	—	0/0	0/1/0	I/M
Scorpiones								
Androctonus crassicauda	Fat-tailed Scorpion	—	—	1	—	0/na	0/1/0	I/M
Buthus occitanus	Yellow Scorpion	—	—	4	—	0/na	0/0/0	I/M

		1	2	3	4	5	6	7
Heterometrus spinifer	Asian Jungle Scorpion	—	—	2	—	0/na	0/0/3	I/N
Pandinus imperator	Imperial Scorpion	31	—	8	—	6/na	0/0/35	I/B
MYRIAPODA								
Chilopoda								
Scolopendra horridus	Giant Centipede	3	—	—	—	3/0	0/0/0	I/N
Diplopoda								
Graphidostrepus sp.	Giant Millipede	10	nr	—	—	10/nr	0/0/3	A/N
Epibolus sp.	Giant Millipede	20	nr	—	—	10/nr	0/0/10	A/N
Epibolus pulchripes	Mombassan Train Millipede	20	nr	3	—	30/nr	8/9/0	A/B
INSECTA								
Orthoptera								
Vetralla quadrata	Sri Lankan Leafhopper Bush Cricket	—	—	5	—	15/0	0/0/5	A/N
Locusta migratoria	Migratory Locust	—	nr	nr	100	300/nr	50/50/0	A/B
Gryllus bimaculatus	African Field Cricket	200	nr	nr	—	400/nr	50/50/0	A/B
Gryllus campestris (E)	British Field Cricket	6	300	270	145	33/nr	0/0/0	I/B
Pholeogryllus geertsi	Cave Cricket	—	nr	nr	—	200/nr	25/25/0	A/B
Hemideina crassidens	Wellington Tree Weta	—	68	37	—	214/nr	0/0/0	I/B
Decticus verrucivorus (E)	British Wart-biter Cricket	—	230	230	—	0/2770	0/0/0	I/N
Tettigonia sp.	Tropical Bush Cricket	—	—	12	—	0/nr	0/0/0	A/D
Schistocerca gregaria	Desert Locust	—	nr	nr	—	50/nr	10/10/0	A/D
Blattodea								
Gromphadorhina portentosa	Malagasy Hissing Cockroach	24	nr	nr	—	22/na	17/17/0	I/B
Periplaneta americana	American Cockroach	—	nr	nr	—	500/nr	250/250/0	A/B
Periplaneta australasiae	Australian Cockroach	—	nr	nr	—	50/nr	26/24/0	A/B
Mantodea								
Hymenopus coronatus	Malaysian Orchid Mantis	—	—	2	—	0/0	0/0/0	I/D
Sphodromantis sp.	African Praying Mantis	9	100	106	2	2/0	0/1/10	A/B
Phasmatodea								
Acrophylla wuelfingi	Queensland Titan Stick Insect	—	nr	nr	—	400/750	4/4/0	A/B
Eurycantha calcarata	Indonesian Spiny Stick Insect	—	nr	nr	—	120/200	0/1/0	A/B
Extatosoma tiaratum	Macleay's Spectre Stick Insect	—	nr	nr	—	270/500	10/20/0	A/B
Heteropteryx dilatata	Malaysian Jungle Nymph	—	nr	nr	—	100/200	0/0/0	A/B
Phyllium bioculatum	Leaf Insect	—	nr	nr	—	30/30	0/0/0	A/N
Coleoptera								
Chrysocarabus olympiae (E)	Olimpia's Ground Beetle	—	—	3	—	0/0	5/2/0	I/D
Eudicella gralli	Jade Headed Buffalo Beetle	—	nr	nr	50	0/nr	0/0/0	A/B
Scarabaeus semipunctatus	African Dung Beetle	—	nr	4	—	0/nr	0/0/2	A/N
Canthon sp.	American Dung Beetle	10	nr	—	—	0/nr	0/0/10	A/N
Blaps sp.	Desert Beetle	18	—	—	—	0/nr	0/0/20	A/N
Diptera								
Drosophila melanogaster	Fruit Fly	—	nr	nr	—	0/nr	0/0/1000	A/B
Lepidoptera								
Bombyx mori	Silkworm	100	nr	nr	—	0/600	0/0/0	A/B
Heliconius melpomene	Postman Butterfly	10	nr	nr	—	15/40	10/10/0	A/B
Actias luna	American Moon Moth	20	nr	nr	—	20/nr	0/0/0	A/N
Hymenoptera								
Ampulex compressa	Jewel Wasp	—	42	49	—	0/0	0/0/0	I/D
Apis mellifera	Honeybee	3	—	1	—	0/nr	0/0/3	C/M
Atta cephalotes	Leaf-cutting Ant	—	—	1	—	2/nr	0/0/1	C/M
Formica rufa (V)	Red Wood Ant	—	—	—	—	0/nr	0/0/1	C/M
Hemiptera								
Platymerus biguttata	Assassin Bug	—	nr	nr	—	30/nr	0/0/5	A/B

Total Invertebrata: 80 species; 3,275 specimens; 5 colonies

WHIPSNADE WILD ANIMAL PARK

MAMMALS

		1	2	3	4	5	6	7
Marsupialia								
Macropus rufogriseus frutica	Red-necked Wallaby**	546	—	—	—	—	—	490
Primates								
Varecia variegatus variegatus (V)	Ruffed Lemur	1	—	—	—	—	1	—
Saimiri sciureus	Squirrel Monkey (Black-capped form)	17	—	4	—	—	—	5/10/6
Leontopithecus rosalia rosalia (E)	Golden Lion Tamarin	3	—	—	—	—	1	1/1
Pan troglodytes (V)	Chimpanzee	9	—	2	2	—	—	6/3
Rodentia								
Cynomys ludovicianus	Prairie Marmot**	250	—	—	—	—	—	234
Dolichotis patagonum	Mara**	75	—	—	—	—	—	130
Chinchilla laniger	Chinchilla	2	—	—	—	—	—	0/2
Carnivora								
Canis lupus (V)	Grey Wolf	16	—	5	—	2	—	4/9/6
Ursus arctos	Brown Bear	5	—	2	—	—	1	3/3
Ailurus fulgens (V)	Red Panda	2	—	—	—	—	—	1/1
Nasua nasua	Ring-tailed Coati	5	—	—	—	1	4	—
Suricata suricatta	Meerkat	1	—	—	—	—	1	—
Helogale parvula	Dwarf Mongoose	8	—	—	—	—	—	4/4
Panthera leo	Lion	2	—	—	—	—	—	1/1
Panthera tigris altaica (E)	Siberian Tiger	3	—	1	1	—	—	1/2
Acinonyx jubatus (V)	Cheetah	15	—	—	3	—	4	5/3
Pinnipedia								
Zalophus californianus	Californian Sealion	3	—	—	—	—	—	1/2
Phoca vitulina	Common Seal	1	—	—	—	—	—	1/0
Halichoerus grypus	Grey Seal	1	—	—	—	—	—	0/1
Proboscidea								
Elephas maximus (E)	Asian Elephant	3	—	—	—	—	—	0/3
Perissodactyla								
*Equus burchelli antiquorum**	Common Zebra (Chapman's form)	1	—	—	—	—	—	1/0
*Equus grevyi** (E)	Grevy's Zebra	8	—	1	—	—	1	2/6
*Equus hemionus** (V)	Asiatic Wild Ass (Persian form)	10	—	5	2	3	—	2/8
*Equus przewalskii** (Ex?)	Przewalski's Horse	15	—	4	—	1	4	4/10
Rhinoceros unicornis (E)	Asian One-horned Rhinoceros	3	—	1	1	—	—	2/1
Cerototherium simum (V)	White Rhinoceros	9	—	—	—	—	—	4/5
Diceros bicornis michaeli (E)	Black Rhinoceros	—	2	—	—	—	—	1/1
Artiodactyla								
Hippopotamus amphibius	Hippopotamus	4	—	1	—	1	—	1/3
Choeropsis liberiensis	Pygmy Hippopotamus	3	—	—	—	—	—	1/2
*Lama glama**	Llama	2	—	—	—	—	—	2/0
Camelus bactrianus	Bactrian Camel	15	1	5	—	2	7(1)	3/9
Muntiacus reevesi	Reeves's Muntjac**	12	—	—	—	—	—	20
Dama dama	Fallow Deer	17	—	5	—	4	—	4/5/9
*Axis axis**	Axis Deer	48	—	19	13	2	2	16/28/6
*Axis porcinus**	Hog Deer	37	—	17	4	2	—	22/19/7
*Cervus duvauceli** (E)	Barasingha	27	—	6	2	2	—	12/16/1
*Cervus nippon**	Sika Deer (Formosan form)	45	—	8	1	1	1	12/28/10
Cervus elaphus	Red Deer	92	—	24	2	1	4	32/75/2
*Elaphurus davidianus** (E)	Père David's Deer	63	—	23	5	1	—	14/38/28
Rangifer tarandus	Reindeer	6	—	—	—	1	1	0/4
Hydropotes inermis (V)	Chinese Water Deer**	358	—	—	—	—	—	320
*Giraffa camelopardalis**	Giraffe	1	—	—	—	—	—	1/0
*Giraffa camelopardalis reticulata**	Giraffe (Reticulated)	4	—	2	1	—	—	3/2
*Tragelaphus angasi**	Nyala	10	—	3	—	2	1	2/8
*Tragelaphus spekei**	Sitatunga	13	—	2	—	1	8	2/4
*Tragelaphus euryceros**	Bongo	5	—	—	—	—	—	2/3

		1	2	3	4	5	6	7
*Boselaphus tragocamelus**	Nilgai	27	—	26	12	7	—	2/28/4
*Bos gaurus** (V)	Gaur	6	—	—	—	—	4	1/1
Bos grunniens	Yak	12	—	5	1	1	—	3/6/6
*Syncerus caffer**	African Buffalo (Dwarf Forest form)	6	—	2	—	—	1	2/5
Bison bison	American Bison	2	—	—	—	—	—	1/1
Bison bonasus (V)	European Bison	7	—	3	1	1	1	2/5
*Hippotragus equinus**	Roan Antelope	12	—	1	1	3	—	4/5
*Kobus ellipsiprymnus**	Common Waterbuck	5	—	—	—	—	—	1/4
Kobus megaceros (V)	Nile Lechwe	4	—	1	—	—	—	3/2
*Oryx gazella**	Gemsbok	6	—	1	1	—	—	1/5
*Oryx dammah** (E)	Scimitar-horned Oryx	20	—	6	—	2	—	4/20
*Oryx leucoryx** (E)	Arabian Oryx	2	1	—	—	1	2	—
*Damaliscus dorcas**	Bontebok	3	—	—	—	—	—	0/3
*Antilope cervicapra** (V)	Blackbuck	22	—	7	4	3	—	3/11/8
*Gazella thomsonii**	Thomson's Gazelle	6	—	2	2	3	1	1/1
Ovibos moschatus	Musk Ox	3	—	—	—	—	—	1/2
Ovis musimon	Mouflon	1	—	—	—	—	—	0/1
Ovis canadensis	Bighorn Sheep	7	1	1	—	4	—	2/3
Domestic								
	Shire Horse	1	—	—	—	—	—	1/0
	Cream Pony	2	—	—	—	—	—	1/1
	Welsh Pony (Cream form)	1	—	—	—	—	—	1/0
	Saddleback × Oxford Saddleback Pig	1	—	—	—	1	—	—
	Oxford Sandy & Black Pig	1	—	—	—	—	—	0/1
	Belted Galloway Cattle	1	—	—	—	—	—	1/0
	Red Poll Cattle	3	—	—	—	—	—	0/3
	Manx Loghtan Sheep	2	—	—	—	1	—	1/0
	Lincoln Longwool Sheep	1	—	2	—	—	—	0/3
	Wensleydale Sheep	1	—	2	1	—	—	0/1/1
	Hampshire Sheep	13	—	7	3	1	—	4/10/2
	Windsor White Goat	20	—	12	1	7	5	11/8
Total: Mammals		**1974**	**5**	**218**	**64**	**62**	**55(1)**	**1969**
BIRDS								
Casuariiformes								
Casuarius casuarius	Australian Cassowary	2	—	—	—	—	2	—
Dromaius novaehollandiae	Emu	7	—	—	—	—	—	3/3/1
Sphenisciformes								
Aptenodytes patagonica	King Penguin	13	—	3	1	—	1	3/4/7
Eudyptes crestatus	Rockhopper Penguin	11	—	2	—	—	—	4/2/7
Spheniscus humboldti	Humboldt's Penguin	52	1(1)	27	4	5	20	6/9/36
Ciconiiformes								
Ciconia ciconia	White Stork	13	—	3	1	3	2	1/2/7
Eudocimus ruber	Scarlet Ibis	9	1	12	10	—	—	0/0/12
Phoenicopterus ruber ruber	Rosy Flamingo	58	—	—	—	1	7	2/48
Anseriformes								
Cygnus atratus	Black Swan	4	—	—	—	—	—	2/0/2
Cygnus melanocoryphus	Black-necked Swan	1	—	—	—	—	—	0/1
Cygnus cygnus	Whooper Swan	5	—	—	—	—	—	1/1/3
Coscoroba coscoroba	Coscoroba Swan	2	—	—	—	1	—	1/0
Anser indicus	Bar-headed Goose	49	—	4	—	3	1	11/11/27
Anser canagicus	Emperor Goose	4	—	—	—	—	—	2/1/1
Branta leucopsis	Barnacle Goose	9	—	2	—	—	—	4/0/7
Branta bernicla orientalis	Brent Goose	1	—	—	—	1	—	—
Branta ruficollis (K)	Red-breasted Goose	6	—	—	—	2	—	3/1
Alopochen aegyptiacus	Egyptian Goose	8	—	—	—	—	—	1/1/6
Tadorna cana	South African Shelduck	7	—	—	—	—	—	2/2/3
Tadorna tadorna	Shelduck	6	—	—	—	—	—	4/2
Aix sponsa	Carolina Duck	1	—	—	—	—	—	0/1

		1	2	3	4	5	6	7
Anas penelope	Wigeon	2	—	—	—	2	—	—
Anas sibilatrix	Chiloe Wigeon	1	—	—	—	—	—	1/0
Anas strepera	Gadwall	1	—	—	—	—	—	0/1
Anas crecca	Teal	1	—	—	—	1	—	—
Anas acuta	Pintail	1	—	—	—	1	—	—
Anas clypeata	Shoveler	3	—	—	—	3	—	—
Netta rufina	Red-crested Pochard	5	—	—	—	5	—	—
Aythya fuligula	Tufted Duck	2	—	—	—	2	—	—
Aythya marila	Greater Scaup	1	—	—	—	1	—	—
Somateria mollissima	Eider Duck	17	—	3	—	—	—	4/8/8
Falconiformes								
Haliaeetus leucocephalus (R)	Bald Eagle	1	—	—	—	—	—	0/1
Gyps africanus	African White-backed Vulture	1	—	—	—	—	—	1/0
Gyps rueppellii	Ruppell's Griffon Vulture	4	—	—	—	1	—	1/2
Accipiter nisus	Eurasian Sparrowhawk	—	1	—	—	—	—	0/1
Parabuteo unicinctus	Harris' Hawk	1	1	—	—	—	—	1/1
Falco biarmicus	Lanner Falcon	4	—	—	—	—	—	3/1
Falco cherrug	Saker Falcon	1	—	—	—	—	—	1/0
Galliformes								
Gallus gallus	Red Jungle Fowl**	21	—	—	—	—	—	25
Crossoptilon crossoptilon (V)	White Eared Pheasant	2	—	—	—	1	—	1/0
Pavo cristatus	Common Peafowl**	120	(3)	—	—	—	—	150
Gruiformes								
Grus monacha (V)	Hooded Crane	1	—	—	—	1	—	—
Grus japonensis (V)	Red-crowned Crane	4	—	—	—	1	—	1/2
Grus vipio (V)	White-naped Crane	5	—	1	—	—	—	2/2/2
Grus antigone	Sarus Crane	1	—	—	—	—	1	—
Grus rubicunda	Brolga	3	—	—	—	—	—	1/1/1
Bugeranus carunculatus (K)	Wattled Crane	4	—	—	—	1	—	1/2
Anthropoides virgo	Demoiselle Crane	1	—	—	—	—	1	—
Anthropoides paradisea	Stanley Crane	4	—	6	3	1	—	2/2/2
Balearica regulorum	South African Crowned Crane	5	—	—	—	2	—	2/1
Cariama cristata	Red-legged Seriema	2	—	—	—	—	1	1/0
Otis tarda tarda (R)	Great Bustard	5	—	—	—	—	—	3/2
Charadriiformes								
Haematopus ostralegus	Oystercatcher	6	—	—	—	—	—	0/0/6
Burhinus bistriatus	Double-striped Thick-knee	2	—	—	—	—	—	1/1
Psittaciformes								
Ara ararauna	Blue/Gold Macaw	1	1	—	—	—	1	1/0
Ara macao	Scarlet Macaw	2	—	—	—	—	—	1/0/1
Cyanoliseus patagonus	Patagonian Conure	3	—	—	—	—	2	1/0
Myiopsitta monachus	Quaker Parrakeet	4	5	—	—	—	—	1/1/2
Psittacula eupatria	Alexandrine Parrakeet	2	—	—	—	—	—	1/0/1
Strigiformes								
Tyto alba	Barn Owl	4	—	—	—	1	1(1)	1/1
Otus leucotis	White-faced Scops Owl	7	—	2	—	2	6(5)	0/1
Bubo bubo bengalensis	Bengal Eagle Owl	1	—	—	—	—	—	0/1
Nyctea scandiaca	Snowy Owl	2	—	4	1	1	—	1/2/1
Strix aluco sylvatica	Tawny Owl	2	—	—	—	—	—	1/1
Coraciiformes								
Dacelo novaeguineae	Laughing Kookaburra	1	—	—	—	—	—	0/1
Piciformes								
Ramphastos vitellinus citreolaemus	Citron-throated Toucan	2	—	—	—	—	—	0/2
Passeriformes								
Carpodacus mexicanus	Mexican Rose Finch	6	—	—	—	—	—	0/0/6
Total: Birds		**538**	**5(4)**	**69**	**20**	**44**	**46(6)**	**536**

		1	2	3	4	5	6	7
REPTILES								
Testudines								
Testudo hermanni (V)	Hermann's Tortoise	10	—	—	—	—	1	2/7
Testudo kleinmanni (V)	Kleinman's Tortoise	4	1	—	—	—	—	3/1
Geochelone denticulata	Yellow-footed Tortoise	3	—	—	—	—	—	1/2
Chelus fimbriatus	Matamata Turtle	—	2	—	—	—	—	1/1
Crocodylia								
Osteolaemus tetraspis	West African Dwarf Crocodile	2	—	4	—	—	—	1/1/4
Sauria								
Phelsuma madagascariensis	Day Gecko	—	5	—	—	—	—	0/0/5
Eublepharis macularius	Leopard Ground Gecko	4	—	—	—	—	—	1/3
Basiliscus plumifrons	Plumed Basilisk	4	2	—	—	—	4	1/1
Iguana iguana	Common Iguana	4	—	—	—	—	—	3/1
Eumeces schneiderii	Schneider's Skink	1	—	—	—	—	—	0/0/1
Scincus scincus	Sand Fish	2	—	—	—	—	—	0/0/2
Uromastyx aegypticus	Egyptian Dabb Lizard	3	—	—	—	1	—	0/0/2
Anolis carolinensis	Carolina Anolis Lizard	2	—	—	—	—	—	0/0/2
Anolis sagrei	Anolis Lizard	1	—	—	—	—	—	0/0/1
Ameiva sp.	Ameiva	1	—	—	—	—	—	0/0/1
Varanus exanthematicus	Bosc's Monitor	4	—	—	—	1	—	3/0
Serpentes								
Python molurus bivitatus (V)	Burmese Python	6	—	—	—	—	1	1/2/2
Corallus enydris cooki	Cook's Tree Boa	3	—	—	—	—	—	1/2
Cerastes cerastes	Horned Cerastes Viper	4	—	—	—	—	—	1/3
Echis carinatus sochureki	Saw-scaled Viper	9	—	—	—	2	—	0/0/7
	Total: Reptiles	**67**	**9**	**4**	**—**	**4**	**6**	**70**
AMPHIBIANS								
Anura								
Bufo marinus	Cane Toad	1	—	—	—	1	—	—
Ceratophrys cornuta	Horned Toad	2	—	—	—	—	2	—
Dendrobates auratus	Black/Green Poison Arrow Frog	15	—	—	—	4	—	0/0/11
Dendrobates truncatus	Yellow/Black Poison Arrow Tree Frog	2	—	—	—	—	—	0/0/2
Rhacophorus dennysi	Giant Asian Tree Frog	1	—	—	—	—	1	—
Ceratophrys ornata	Wide-mouthed Frog	1	—	—	—	—	—	0/0/1
	Total: Amphibians	**22**	**—**	**—**	**—**	**5**	**3**	**14**

SUMMARY

London Zoo

	1	2	3	4	5	6	7	Number of Species (excluding domestic)
Mammals	790	59(1)	818	159	128	620	760	94
Birds	595	114(6)	131	42	104	71(4)	623	150
Reptiles	232	59	61	1	33	75	243	78
Amphibians	161	22	—	—	14	22	147	18
Total	**1778**	**254(7)**	**1010**	**202**	**279**	**788(4)**	**1773**	**340**

Estimated number of fishes and invertebrates in the Collection at 31 December 1993:

Fishes	Approx 2,390	194 species
Invertebrates (excluding some common species)	Approx 3,275 (+5 colonies)	80 species

Whipsnade Wild Animal Park

	1	2	3	4	5	6	7	Number of Species (excluding domestic)
Mammals	1974	5	218	64	62	55(1)	1969	60
Birds	538	5(4)	69	20	44	46(6)	536	55
Reptiles	67	9	4	—	4	6	70	20
Amphibians	22	—	—	—	5	3	14	3
Total	**2601**	**19(4)**	**291**	**84**	**115**	**110(7)**	**2589**	**138**

Estimated number of fishes and invertebrates in the Collection at 31 December 1993:

Fishes	Approx 126	21 species
Invertebrates (excluding some common species)	Approx 28 (+2 colonies)	11 species

Grand Total Zoological Society of London	4379	273	1301	286	394	898	4362	439*

*The species common to London Zoo and Whipsnade Wild Animal Park are counted as one

COLLABORATION WITH SCIENTIFIC SOCIETIES, ZOOLOGICAL, CONSERVATION AND RESEARCH ORGANISATIONS

AFRC Institute of Animal Physiology and Genetics Research, Roslin: Epidemiology of tropical theileriosis in Morocco.

AFRC & MRC Neuropathogenesis Unit, Edinburgh: Spongiform encephalopathies of captive wild animals.

Animal Diseases Research Association, Moredun Research Institute: Collaborative study on toxoplasmosis in wallabies and wild animals: Diseases of Red deer.

Associacion Amigos del Coto de Donana: Sociality and genetic distinctiveness of the Iberian wolf.

Birdlife International: Identification of priorities for *in situ* conservation and assessment of patterns of tropical deforestation: Collaborative study of South American seed eaters.

Blood Transfusion Service: Malaria diagnosis.

British Airways Assisting Nature Conservation: Collaboration on conservation of Great bustard.

CABI, International Institute of Parasitology: Parasites of zoo animals.

Cell Labs, Brookvale, Australia: Malaria detection.

Central Science Laboratory, Berks: Mass mortalities of the Common frog.

Central Veterinary Laboratory, Surrey: Marine mammal serology; Spongiform encephalopathies of captive wild animals: Puffinosis in Manx shearwaters; Mass mortalities of the Common frog.

Chataburi Hospital, Thailand: Infectious disease diagnosis in blood banks.

Clinical Research Centre, Middlesex: Collaborative research on the evolutionary biology of alanine glyoxylate aminotransferase.

Dar Al-Handasah, Egypt: Designs for Madinah Zoo, Saudi Arabia.

Dept of Health, Yangon, Myanmar: Disease screening tests.

Dundee Institute of Technology (Department of Mathematics and Computer Sciences): Collaborative study on alternative methods of home range analysis in animals.

English Nature: Health and welfare of Red squirrels in the Species Recovery Programme; Management of site of specialised scientific interest (SSSI) at Whipsnade; (Training branch) advice on handling of venomous snakes.

Faith Foundation: Technical advice in Tanzania.

Forestry Commission Research Division: Conserving the Red squirrel in East Anglia; Health and welfare of animals involved in the reintroduction programme.

Frankfurt Zoological Society: Radio tracking Cheetah.

Herpetofauna Consultants International: Mass mortalities of the Common frog.

Hospital for Tropical Diseases: Malaria research.

HM Customs: Housing and advice on identification of reptiles.

Indian Wildlife Institute: Indian grey wolf population genetics.

INRA, France: Collaborative study of Brown trout.

INSERM, Paris: Collaborative study on the molecular biology of hormone receptors with Prof Paul Kelly.

Institute of Animal Physiology and Genetics, Babraham, Cambridge: Collaborative studies on boar spermatozoa.

Institute of Anti-parasitic Diseases, Sichuan, China: Infectious disease screening.

Institute for Medical Research, Kuala Lumpur, Malaysia: Diagnostic methods.

Institute of Terrestrial Ecology, Banchory: Intraspecific variation in Atlantic puffin; Collaborative research on the genetics of domesticated camelid breeds; Parasites of European otters (*Lutra lutra*).

Institute of Virology & Environmental Microbiology, Oxfo Puffinosis in Manx shearwaters.

International Endocrine Services: Monitoring, with Europe zoos, endocrine cycles of exotic species, particularly capti elephants.

IUCN — The World Conservation Union (Species Surviv Commission): Criteria for categories of threat to species.

James Gardner 3d Concepts Ltd: Advice on Sharjah Noctur House and Jurong Bird Park, Singapore; Children's Discove Centre.

Jersey Wildlife Preservation: Study on Pink pigeons.

John Radcliffe Hospital, Oxford (Nuffield Department of Clini Medicine): Advice on housing and management of venomou snakes.

Joint Nature Conservation Committee: Health assessment a medicine of Red kites imported for reintroduction.

Kenya Wildlife Service: Secondment of Dr R Kock as seni veterinarian and Dr R A Brett as National Rhino Co-ordinato

Kimron Veterinary Institute, Beit Dagan, Israel: Studies o mosquitoes.

King's College (KQC), London: Collaborative study on mouse complex gene/protein TCP11; (*Department of Anatomy a Human Biology*): Collaborative project on neuroendocri aspects of reproductive suppression in Naked mole-ra (*Department of Biological Sciences*): Welfare of captive parro Collaborative studies in enzymes and hormones.

Kingston University, Surrey: Protozoal infections of reptiles a invertebrates.

Limnological Institute, Irkutsk: Intraspecific variation in Baikal sea

London School of Hygiene & Tropical Medicine: Diagnost methods; Collaborative studies in epidemiology of rabies i Africa; Sexual selection of sandflies.

Macaulay Land Use Research Institute, Aberdeen: Forage quali and plant-herbivore cycles in Soay sheep; Collaborative stud into the reproductive biology and control of puberty i Scottish Red deer; (*Shotts*): Collaborative research on th genetics of domesticated camelid breeds.

Madagascar Fauna Group: Advice on veterinary aspects of lemur in Madagascar.

MAFF Central Veterinary Laboratory, Weybridge: Collaborati studies on spongiform encephalopathies in zoo animal marine mammal serology.

MAFF Fisheries Laboratory, Burnham-on-Crouch: Collaborati studies on organochlorine and heavy metal levels in marin mammals/cetaceans and seals.

MAFF Veterinary Investigation Service: Collaborative studies o diseases of marine mammals and salmonella infections i birds.

Malta Medical School, Valetta: Leishmania screening in dogs an people.

Mammal Research Institute, Poland: Eastern European wol population genetics.

Marwell Zoological Park, Hants: Research Projects on captiv breeding and AI.

Ministry of Agriculture, Food and Fisheries: Collaborative studie on the development of reproductive technologies in alternativ agricultural species; Studies of reproductive technology in deer

Moshi Hospital, Tanzania: Malaria research.

MRC Unit of Experimental Embryology and Teratology, St George's Hospital Medical School, Tooting: Collaborative studies o mouse sperm freezing and embryo transfer.

Munich Wildlife Society: European wolf project.

National Avian Research Centre, United Arab Emirates: Collaborative studies of Bustard management & nutrition: Collaborative project on molecular phylogeny of Bustards.

National Commission for Wildlife Conservation and Development, Saudi Arabia: Management of King Khalid Wildlife Research Centre.

National Institute of Health, Islamabad, Pakistan: Surveillance of human and canine leishmaniasis.

National Malaria Research Programme, South Africa: Malaria screening.

National Parks Department, Uganda: Advice on future sustainability of the parks.

National Parks and Wildlife Management Department, Zimbabwe: Joint funding with Rhino Rescue of seconded mechanic.

Natural History Museum, London: Collaborative studies on life history/parasitology of cetaceans and cetacean strandings, parasites and parasitic infections of captive and free-living wild animals.

Nature Conservation Bureau Ltd, Newbury: Management and veterinary care of Bustards; Collaborative project on molecular phylogeny of Bustards.

North London Blood Transfusion Centre: Malaria diagnosis.

Norwegian Institute for Nature Research: Climate, plant phenology and ungulate population dynamics.

National Marine Mammal Laboratory, Seattle: Natal fidelity in Northern fur seal.

Open University: Collaborative studies on Peafowl.

Oval Partnership, Hong Kong: Designs for Taipei Zoo.

Oxford Polytechnic, UCSD: Study of Bushbabies.

Queen Mary and Westfield College (Department of Biological Sciences): Health and welfare of red squirrels involved in the reintroduction programme.

Queen's University, Belfast (School of Biology & Biochemistry): Study of Brown trout.

Reading University: Huchen, projects in the Mekong Delta; *(Department of Microbiology)*: Studies of spongiform encephalopathy in zoo ungulates.

Royal Free Hospital, London: Toxocara diagnosis; Comparative anatomy of the appendix; Inflammatory bowel disease of primates.

Royal Holloway and Bedford New College (Department of Biology): Health and welfare of rehabilitated and released hedgehogs; Health of dormice involved in a species recovery programme; Mortality of the common dormouse; Diseases of the European hedgehog.

Royal Society for the Protection of Birds: Health assessment of Red kites imported for reintroduction; Advice on avian diseases; Investigation of wild bird mortality incidents.

Royal Veterinary College, London: Clinical investigations into ocular disease and orthopaedic disorders of zoo animals; Collaborative studies on the sexual development of marsupials.

RSPCA Wildlife Hospital, Norfolk/MAFF Veterinary Investigation Centre, Polwhele/Dyfed Wildlife Trust/SAC Veterinary Investigation Centre, Inverness/University of Cork (Zoology Dept)/ University of Liverpool (Dept of Pathology): Collaborative studies on the pathology of cetaceans and seals; Collaborative studies on diseases of marine mammals.

St Mary's Hospital, London: Retrovirus infections of primates; Retroviral infections of wild animals; Papillomatosis of captive wild animals.

San Francisco State University, California, USA: Study of Cameroon birds.

Saratov Regional Authority, Russia: Joint programme for conservation of Great bustard.

Save the Rhino Trust Fund, Namibia: Funding for anti-poaching vehicles.

Scottish Agricultural College: Collaborative studies on marine mammal diseases.

Scottish National Heritage: Management of Red deer on Rhum, Scotland.

Seal Rehabilitation and Research Centre, Pieterburen/Hellenic Society for the Study for the Protection of Monk Seal, Athens/WWF, Greece/Parc Nationale de Port, Crus/University of Barcelona, Spain: Study of Mediterranean monk seal.

Sea Mammal Research Unit, Cambridge: Collaborative studies on diseases of cetaceans; Collaborative studies on gene flow in geographically structured seal populations, on the life history of the Harbour porpoise and on organochlorines and heavy metal levels in cetaceans and seals.

Sense and Vision Electronic Systems Ltd, Sheffield/JSR Heathbred Ltd, Thorpe Willoughby, Yorks: Collaborative development of computerised sperm mobility assessment system; Studies on boar spermatozoa.

Serengeti Wildlife Research Institute: Collaborative studies of importance of competition refuges for Cheetah population persistence; Rabies transmission from domestic dogs to wildlife.

Shanks & McEwan (Southern) Ltd: Collaborative botulism research.

Southern General Hospital, Glasgow: Radionuclides in seals and porpoise.

State Institute for Public Health and Environment, Bilthoven/ State University of Utrecht/Veterinary Research Laboratories, Stormont: Collaborative studies on virus diseases in cetaceans and seals.

Statens Bakteriologiska Laboratorium, Stockholm, Sweden: Serological diagnosis in Somalia.

Stockholm University (Division of Population Genetics): Brown trout.

Tanzanian National Parks: Campaign to reduce tourist harassment of Cheetahs.

Thrigby Hall Wildlife Centre, Norfolk: Research projects on captive breeding and artificial insemination.

University of Aberdeen: Collaborative research on Lyme borreliosis in Red deer; *(Department of Zoology):* Collaborative study of genetics of bat populations.

University of Bath (Biological Sciences): Kin selection in ants.

University of Birmingham: Collaborative research on the evolutionary physiology of Tamm-Horsefall protein.

University of Bradford (Department of Biomedical Sciences): Collaborative studies on the endocrine control of hair growth in seasonal mammals; *(Department of Zoology):* Genetics of bat populations and Greater horseshoe bat social structure.

University of California, Davis (Department of Wildlife and Fisheries Biology): Demography of Cheetahs in the Serengeti; *(Berkeley):* Collaborative study of hyenas.

University of Cambridge (Department of Genetics): Genotype, environment and genotype environment interactions in food-limited ungulates; *(Department of Zoology):* Population dynamics of Red deer; Natural selection and aerodynamics in birds; Collaborative study on the role of parasites in the population dynamics of Soay sheep on St Kilda; Collaborative study on Patagonian cavy.

University of Cape Town (Department of Zoology): Collaborative studies on the reproductive physiology and molecular genetics of African mole-rats.

University of Chicago, Illinois, USA: Collaborative study of baboons.

University College, London (Department of Biology): Competition between wild and domestic herbivores; Kin selection in mongooses; Phenotypic plasticity in breeding behaviour in Red deer; Relationships of wild and domestic horses; Collaborative studies on chemical pathology and reproductive biology; *(Department of Genetics and Biometry):* Patterns of species richness; Split-set ratio theory in ants.

University of East London: Protozoal infections of reptiles and invertebrates.

University of Edinburgh: Collaborative study of Red deer; *(Institute of Cell, Animal & Population Biology):* Natural selection on foraging efficiency in Soay sheep.

University of Leicester: Study of chickens/Pink pigeons.

University of Lisbon, Portugal: Lizards; *(Department of Zoology & Anthropology):* Population genetics of the Iberian wolf.

University of Liverpool: Collaborative studies on diseases of marine mammals.

University of London, Imperial College (Silwood Park): Plant-herbivore cycles in Soay sheep; Gallwasps.

University of Manchester: Collaborative research with the medical information group, Department of Computer Science, on the development of novel techniques for investigating geographical and temporary patterns in disease.

University of Nottingham (Department of Physiology and Environmental Science): Mechanisms of sex ratio determination in Red deer; Embryonic signal studies in sheep and cows.

University of Oslo (Zoological Museum), Norway: Parasites and the population regulation of Reindeer on Spitzbergen.

University of Oxford (Department of Zoology): Collaborative study on mortality in Harbour porpoise populations: Puffinosis in Manx shearwaters.

University of Peradineya, Sri Lanka: Research on human and veterinary disease diagnosis.

University of Rome, Italy: Population genetics of Italian wolves.

University of San Marcos, Peru: Collaborative study of domestication in South American camelids.

University of Southampton (Department of Biology): Collaborative study on the parasitological examination of formalin-fixed cetacean tissues.

University of Stockholm, Sweden: Collaborative study on trout genetics.

University of Utrecht, Holland: Collaborative studies on virus diseases of marine mammals.

University of Virginia, Charlottesville, USA (Department of Biology): Collaborative studies on biological clocks.

University of Wisconsin, Madison, USA: Collaborative study of song sparrows.

University of Würtzburg (Theodor-Boveri-Institut): Genetics and evolution of *Leptothorax* ants.

US Fish and Wildlife: North American grey wolf population genetics; *(Mexican Wolf Rehabilitation Programme):* Mexican wolf genetics.

Veterinary Research Laboratories, Stormont: Collaborative studies on diseases of marine mammals.

WHO Centre for Echinococcosis/Hydatidoses: Collaborative project on the prevalence of *Echinococcus granulosus* in Uruguay.

WHO Collaborative Centre for the Control of Antivenoms, Liverpool School of Tropical Medicine (The Alistair Reid Snake Venom Research Unit): Advice on housing and management of venomous snakes.

Wildlife Conservation Research Unit, Oxford: Sociality of European badgers (*Meles meles*); Reproductive success in wild Brown rats.

Representation on Scientific Societies, Zoological, Conservation and Research Organisations

American Association of Zoological Parks and Aquaria: Dr J R Ginsberg (Member, Canid, Hyaena & Aardwolf Taxon Advisory Group; Member, Equid Taxon Advisory Group).

Animal Behaviour: Dr A F G Bourke (Consulting Editor).

Animal Welfare: Dr M A Edwards (Advisory Editor).

Anthropoid Ape Advisory Panel: Dr J K Kirkwood (Member, Scientific Committee).

Bibliography of Reproduction: Dr H Shaw; Dr A Loudon (Board of Management).

Biodiversity Foundation for Africa (Bulawayo Museum, Zimbabwe): Dr J R Ginsberg (Board Member).

British Andrology Society: Dr W V Holt (Secretary).

British Ecological Society: Dr S D Albon (Publications Committee).

British Veterinary Zoological Society: Dr J K Kirkwood (President Elect); Mr A A Cunningham (Council Member).

British Wildlife Rehabilitation Council: Dr J K Kirkwood (Treasurer).

Department of the Environment: Dr J K Kirkwood (Part 1 of Secretary of State's List of Inspectors under the Zoo Licensing Act); Miss A M Dixon (Member of Bio-Diversity Advisory Group); Mr D M Jones (Secretary of State's List of Inspectors under Zoo Licensing Act 1981).

European Cetacean Society: Mr T Kuiken (Member, Pathology Working Group).

European Wildlife Disease Association: Mr T Kuiken (Secretary).

Fauna & Flora Preservation Society: Mr D M Jones (Chair).

Federation of Zoological Gardens of Great Britain and Ireland, Joint Management of Species Group Committee: G S Asher (Member, UK Bovid Taxon Advisory Group (TAG); Dr P M Bennett (Member, Terrestrial Invertebrate TAG); J Buchan (Member, UK Felid TAG); M E Carman (Member, UK Primate TAG; EEP Primate TAG); Miss S K Christie (Corresponding member, JMSC; UK Primate TAG); UK Felid TAG; UK Bovid TAG; EEP Felid TAG; EEP Marsupial TAG; EEP Bovid TAG; EEP Primate TAG); A A Cunningham (Member, Penguin TAG); Mrs L DaVolls (Member, UK Primate TAG); Miss A M Dixon (Member, Rhino TAG); M S Fitzpatrick (Member, UK Small Carnivore TAG); Dr J H W Gipps (Member, JMSC; UK Primate TAG; EEP Primate TAG); P R Harrington (Member, UK Touraco TAG); N B D Lindsay (Chair, UK Rhino TAG); J H Pullen (Member, UK Primate TAG); D M Richardson (Member, UK Felid TAG; EEP Felid TAG; EEP Hornbill TAG); D J Risley (UK Reptile TAG); F W Smith (Member, Penguin TAG); M J Tiley (Member, UK Parrot TAG); F Wheeler (Member, UK Small Carnivore TAG).

Foundation for Research, Science and Technology, New Zealand: Dr A Loudon (Member of the International Advisory Panel).

Government of Brunei (Batang Duri Zoo): Mr D Richardson (Adviser on Zoo Management).

Hwange Conservation Trust, Zimbabwe: Dr J R Ginsberg (Trustee).

Institute of Fisheries Management: Dr H Hall (Member).

Ghana Game & Wildlife Department: Mr N B D Lindsay (Adviser to Zoo Committee).

International Recovery and Management Committee for the Golden-headed Lion Tamarin: Dr G M Mace (Member).

International Society of Andrology: Dr W V Holt (Member, Executive Council Sub-committee on the International Status of Andrology).

IUCN—World Conservation Union (Species Survival Commission): Dr P M Bennett (Member, Captive Breeding Specialist Group, Reintroduction Specialist Group); Mr A A Cunningham (Member, Captive Breeding Specialist, Invertebrate Group; Pathology Working Group, Declining Amphibians Task Force); Miss A M Dixon (Member, Captive Breeding Antelope, Parrot and Reintroduction Specialist Groups); Dr E J Flach (Member); Dr J R B Flamand (Veterinary Group); Dr J R Ginsberg (Deputy Chairman, Canid Specialist Group; Member, Captive Breeding, Equid, Reintroduction Specialist Groups); Mr D M Jones (Member, Asian Elephant, Captive Breeding Specialist Groups); Dr J K Kirkwood (Member, Veterinary Group); Mr N B D Lindsay (Member, Reintroduction, Insectivore Specialist Groups); Dr G M Mace (Member, Captive Breeding, Pheasant, Reintroduction Specialist Groups).

Jersey Wildlife Preservation Trust: Dr G M Mace (Member, Scientific Advisory Committee).

Joint RSPCA/UFAW/FRAME/BVA Workshops on Refinement: Mr A W Sainsbury (Member, Housing Rabbits Group).

Journal of Animal Ecology: Dr S D Albon (Editor).

Journal of Clinical Laboratory Analysis: Dr A Voller (Editorial Board).

Journal of Clinical Pathology: Dr A Voller (Editorial Board).

Journal of Comparative Pathology: Dr G R Smith (Chief Editor).

Journal of Endocrinology: Dr A Loudon (Editorial Board).

Journal of General Virology: Dr A Voller (Editorial Board).

Journal of Immunoassay: Dr A Voller (Editorial Board).

Journal of Immunological Methods: Dr A Voller (Editorial Board).

Journal of Virological Methods: Dr A Voller (Editorial Board).

Linnean Society of London: Dr M A Edwards (Editorial and Programme Committees).

MAFF, Fisheries Department: Mr P D Jepson (Member, Bycatch Working Group).

Marwell Preservation Trust: Dr G M Mace (Member, Scientific and Animal Management Committees); Mr D M Jones (Trustee).

Medicina: Dr A Voller (Editorial Board).

National Avian Research Center, United Arab Emirates: Dr J K Kirkwood (Scientific Panel).

National Federation of Zoological Gardens of Great Britain & Ireland: Miss A M Dixon, Mr N B D Lindsay (Members, Conservation and Animal Management Committee); Miss A M Dixon (Council Representative for Fauna & Flora Preservation Society).

National Marine Mammal Research Steering Group: Dr J K Kirkwood, Mr T Kuiken (Members), Mr P D Jepson (Member, Bycatch Working Group).

Natural Environment Research Council (Special Committee on Seals): Dr S D Albon (Member).

Norwegian Institute for Nature Research: Dr S D Albon (Scientific adviser to the Director).

Open University: Dr S D Albon (External examiner—Ecology Course unit).

Oryx: Dr J R Ginsberg (Editorial Board).

Primate Society of Great Britain: Mr A W Sainsbury (Member, Council; Captive Care Working Party).

Programme for Appropriate Technology in Health (PATH): Dr A Voller (Technical Advisory Group).

Royal College of Veterinary Surgeons: Dr J K Kirkwood (Member of Zoo and Wildlife Board).

St Helena Group: Mr P Pearce-Kelly (Chair).

Scientific Steering Committee for The French Save the Monk Seal Programme: Dr H Stanley (Member, Technical Working Group).

Scottish Strandings Liaison Group: Mr T Kuiken (Member).

Society for Endocrinology: Dr G Webley and Dr D R E Abayasekara (Members).

Society for the Study of Fertility in Great Britain: Dr G Webley and Dr D R E Abayasekara (Members).

Sumatran Tiger PHVA and Captive Breeding Workshop, Indonesia: Miss S Christie; Mr D Richardson.

The Biochemical Society: Dr D R E Abayasekara (Member).

Tropenmedizin und Parasitologie: Dr A Voller (Editorial Board).

Tropical Biology Association: Dr A Balmford (Adviser to Course Committee).

UK Dependent Territories, Conservation Forum: Miss A M Dixon, Mr P Pearce-Kelly (Members).

UK Pig Reproduction Research Liaison Group: Dr W V Holt (Member).

Universities Federation for Animal Welfare: Dr M A Edwards (Council Member).

University of Bristol: Dr J K Kirkwood (Visiting Lecturer, Departments of Medicine and Animal Husbandry).

University of Glasgow: Mr A A Cunningham (Visiting Lecturer, Department of Veterinary Pathology).

University of Kent, Canterbury: Dr J K Kirkwood (Visiting Lecturer, Durrell Institute of Conservation and Ecology); Dr G M Mace (External Examiner—MSc in Conservation Biology).

University of London: Dr J K Kirkwood (Royal Veterinary College); Dr G Webley (Honorary Lecturer, Department of Physiology, University College, London); Dr A Moore (Honorary Lecturer, Physiology Department, King's College, London); Dr S D Albon, Dr A Balmford, Dr A F G Bourke, Dr J R Ginsberg, Dr G M Mace, Dr R Abayasekara, Dr B Brinklow, Dr C Faulkes, Dr W V Holt, Dr H Jabbour, Dr A Moore and Dr G Webley (Course Lecturers and Honorary Research Fellows, Department of Biology, University College, London); Dr B Brinklow, Dr C Faulkes, Dr H Jabbour (Course Lecturer in an Inter-Collegiate course on Reproductive Biology, King's College, London); A A Cunningham (Visiting Lecturer, Department of Pathology, Royal Veterinary College); Dr W V Holt (Honorary Lecturer, King's College, London); Dr J K Kirkwood (Board of Studies, Royal Veterinary College, Subject Panel in Veterinary Medicine); Dr A Loudon (Course Co-ordinator and Honorary Research Professor, Department of Biology, University College, London); Dr G R Smith (Visiting Lecturer, Department of Pathology, Royal Veterinary College); Dr A Voller (Reader in Immunology of Parasitic Diseases, London School of Hygiene and Tropical Medicine); Dr S D Albon, Dr A F G Bourke (Course Lecturers) and Dr I P F Owens (Course Lecturer & Research Fellow, Department of Genetics and Biometry); Mr D M Jones (Member, Board of Studies in Biology).

University of Manchester: Dr P M Bennett (Honorary Research Fellow, Department of Computer Science).

University of Nottingham: Dr A Loudon (Visiting Lecturer, Sutton Bonington).

University of Wisconsin, USA: Dr G Webley (International Affiliate Scientist, Wisconsin Regional Primate Research Center).

University of Zimbabwe: Dr G R Smith (External Examiner in Veterinary Microbiology and Immunology).

Vaccine: Dr A Voller (Editorial Board).

Veterinary Invertebrate Society: Mr A A Cunningham (Secretary).

Wildlife and Countryside Link: Miss A M Dixon (Member, ZSL representative; Vice Chair, Conventions Group).

Wildlife Disease Association, European section: Mr T Kuiken (Secretary).

World Association of Wildlife Veterinarians: Mr A W Sainsbury (Secretary).

World Health Organisation: Dr A Voller (Member, Expert Advisory Panel on Parasitology; Member, WHO/IUIS Sub-committee on Standardization of Reagents for Enzyme Immunoassays).

World Parrot Trust: Dr P M Bennett (Board of Management).

World Pheasant Association: Dr G M Mace (Member, Scientific Advisory and Conservation Committee).

World Society for the Protection of Animals: Mr A W Sainsbury (Member, Scientific Advisory Panel).

World Wide Fund for Nature: Mr D M Jones (Trustee and Chair, Conservation Committee).

Zebra Foundation for Veterinary Zoological Education: Dr J E Kirkwood (Director and Trustee).

AMENDMENTS TO THE REGULATIONS

The following amended Regulations, effective from 1 January 1994, were made by Council pursuant to the power granted in Article 8 of the Charter:

ENTRANCE FEES AND SUBSCRIPTIONS

7 To be deleted.

8 £30 out of the annual subscription of £95 shall be remitted in the case of a Fellow who does not wish to receive the *Journal of Zoology*.

10 When an Associate is elected on or after 1st October in any year, his subscription for that year shall be remitted.

11 When a Fellow is elected on or after 1st October in any year, his subscription for that year shall, unless he wishes to receive the *Journal of Zoology*, be remitted.

12 **Overseas List**

(i) To be deleted.

(ii) To be deleted.

(iii) A Fellow who is resident outside the British Isles at the time of his election shall be registered on the Overseas List. If he does not wish to receive the *Journal of Zoology*, £60 out of the annual subscription of £95 shall be remitted.

(iv) A Fellow who takes up residence outside the British Isles after election or intends at any time to reside outside the British Isles for a period of more than twelve months shall be transferred to the Overseas List. If he does not wish to receive the *Journal of Zoology* during his residence abroad, £60 out of the annual subscription of £95 shall be remitted, except in respect of the year in which he leaves the British Isles.

13 **Life Fellows**

The following life composition fees shall be payable by any Fellow who wishes to compound his future subscriptions:

Age group	18–29	30–39	40–49	50–59	60 years and over
	£1205	£1100	£965	£800	£410

Any Fellow on the Overseas List may compound his future subscriptions by a single payment bearing the same proportion to the full composition fee for his age group as his annual subscription bears to the full annual subscription, provided that the balance of the full composition fee for his age group shall be payable if and when he becomes resident in the British Isles.

Publications

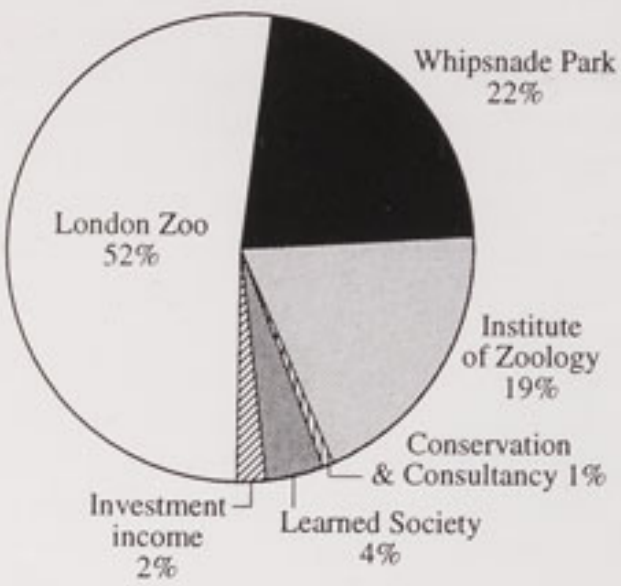
26 To be deleted.

TREASURER'S REPORT

1. The strategy of prudent financial management has continued throughout the year in order to maintain the financial viability of the Society without receipt of general revenue grants from the Government.
2. The Society as a whole achieved a surplus of £169,000 in the year, compared to the smaller surplus of £32,000 in 1992/93.
3. The 1993/94 Accounts show a small drop in total income (including income from investments and interest) to £14,678,000 from £14,716,000 the previous year. However, expenditure was reduced by £175,000 from 1992/93 levels to a total of £14,509,000 for the year. In the Balance Sheet the 'Total Funds' stand at £9,981,000, down from £10,148,000 in the previous year. This reflects a reduction in fixed assets through the annual depreciation charge. £5,170,000 of the 'Total Funds' are represented by fixed assets purchased over a number of years and depreciated in line with normal accounting policies. £1,098,000 has been invested in a portfolio of shares mainly held by the Scientific Fund. Working capital amounted to £3,713,000.
4. Capital expenditure of £635,000 was undertaken during the year. The major projects undertaken were the Hyacinthine Macaw aviary, now opened, and the new Children's Zoo, both at London Zoo. Backlog maintenance resulting from underinvestment in earlier years remains a major problem. Plans have been formulated to recover the position in future years, both by redevelopment of existing exhibits and by an increased maintenance programme.
5. The total number of visitors to both Zoos was down by 7% over the previous financial year, a reduction of 92,345 visitors in total. Of this decline, London Zoo accounted for 83,807 and Whipsnade 8,538; however, we must bear in mind that in 1992/93 a surge of visitors to London Zoo had been experienced upon the announcement of impending closure. London Zoo Lifewatch Membership, The Friends of Whipsnade Scheme and the Animal Adoption Scheme have grown substantially during the year.
6. The Society has continued to look towards revival with capital investment in new exhibits; however, there is still much more to be done.

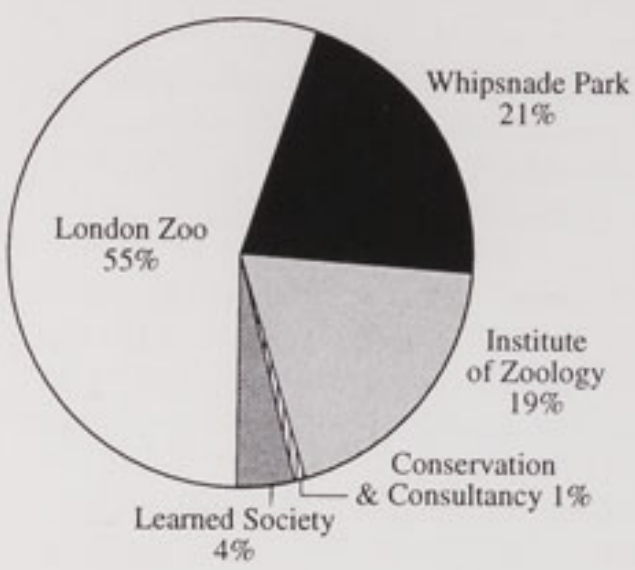
   Attendance figures in the first quarter of this financial year at London and Whipsnade are lower than budget and measures will be taken to reduce expenditure in line with the revenue shortfall, unless there is a dramatic upturn. The attraction of a higher number of visitors remains a crucial objective of the Society in what are still uncertain economic times.

INCOME ANALYSIS 93/94



Total £14.68 million

EXPENDITURE ANALYSIS 93/94



Total £14.51 million

PETER WRANGHAM
Treasurer

SUMMARISED ACCOUNTS FOR 1994

Consolidated Revenue Account for the year ended 31 March 1994

	1994 Surplus/ (*Deficit*)	1993 Surplus/ (*Deficit*)
	£'000	£'000
Income	14,337	14,231
Expenditure	14,509	14,684
Operating deficit for the year	(172)	(453)
Income from investments	82	187
Interest receivable	259	298
	341	485
Surplus for the year	169	32
Exceptional items		
Grants for purchasing fixed assets:		
Emir of Kuwait	—	1,000
Other	218	165
	218	1,165
Surplus/(deficit) on sale of assets	141	(7)
Restructuring credit	—	62
	528	1,252
Extraordinary item		
Curtailment credit	—	1,254
Excess of income over expenditure	528	2,506

Revenue Account by Division for the year ended 31 March 1994

	1994 Surplus/ (*Deficit*)	1993 Surplus/ (*Deficit*)
	£'000	£'000
Divisions		
Zoological Gardens		
London Zoo	(86)	352
Whipsnade Park	97	(124)
Scientific		
Institute of Zoology	232	(155)
Conservation and Consultancy	(27)	(16)
Publications	5	14
Library	(107)	(100)
Learned Society	42	36
ZSL Development Trust	50	(223)
Other Designated Funds	126	(34)
	332	(250)
Grants for purchasing fixed assets	196	1,502
Curtailment credit	—	1,254
Excess of income over expenditure	528	2,506

Total Net Assets
as at 31 March 1994

	1994	1993
	£'000	£'000
Tangible assets	5,170	3,462
Investments	1,098	977
	6,268	6,439
Total current assets	6,005	5,713
Current liabilities	(2,292)	(2,004)
Total net assets	9,981	10,148
Represented by		
Development Fund	5,816	4,790
ZSL Development Trust	528	478
Other Designated Funds	1,197	1,071
Endowment Fund	1,827	3,313
General Fund	613	496
Total Funds	9,981	10,148

The summarised accounts set out above are extracted from the Society's full annual accounts. While the auditors' opinion on those accounts is unqualified, their report contains an explanatory paragraph dealing with the fundamental uncertainty concerning the level of financial resources available to the Society to continue its usual operations. A full set of the Society's accounts is obtainable on request from the Clerk to the Council.

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The Zoological Society of London

Annual Report 1994-1995