REPORT OF THE COUNCIL

The Council has pleasure in presenting its 159th Annual Report to the Annual General Meeting of the Society to be held on 29th September 1988 at 6.00 pm in the Society's Meeting Room at Regent's Park.

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PATRON: HER MAJESTY THE QUEEN

COUNCIL 1987–88

President: Sir William Henderson, DSc, FRCVS, FIBiol, FRSE, FRS
Treasurer: The Rt Hon Lord Peyton of Yeovil
Secretary: R M Laws, CBE, PhD, FIBiol, FRS
Sir John Ackroyd, MA
The Rt Hon Peter Archer, QC, MP
Professor R J Berry, MA, PhD, DSc, FRSE, FIBiol, FLS
The Rt Hon Lord Charteris of Amisfield, GCB, GCVO, OBE, QSO, *Vice-President*
Professor B A Cross, CBE, ScD, MRCVS, FRS, *Vice-President*
D C Evered, BSc, MD, FRCP, FIBiol
The Rt Hon Michael Heseltine, MP
Professor P A Jewell, MA, PhD
Anne L McLaren, MA, DPhil, FRS
Katharine, Viscountess Macmillan, DBE
Professor N A Mitchison, DPhil, FRS
B C Owens
J F Peake, BSc
Professor Sir Richard Southwood, MA, DSc, PhD, ARCS, FIBiol, FRS, *Vice-President*
A J Stevens, MA, BVSc, MRCVS, DipBact
†T A P Walker (Died 10 April 1988)
The Hon Sir Ronald Waterhouse, LLD
H G The Duke of Wellington, MVO, OBE, MC, *Vice-President*

HONORARY FELLOWS

Date of Election	
1977	HRH The Prince Philip, Duke of Edinburgh, KG, KT
1971	His Majesty Emperor Hirohito of Japan, KG
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
1978	Professor José Carvalho Museu Nacional, Quinta da Boa Vista, Rio de Janeiro, Brazil 20940
1975	Professor Jean Dorst Muséum National d'Histoire Naturelle, (Mammifères et Oiseaux), 55 rue de Buffon, Paris 53, France
1952	Professor Sven Otto Hörstadius Zoologiska Institutionen, Uppsala, Sweden
1984	Professor George Evelyn Hutchinson Dept of Biology, Osborn Memorial Laboratories, Yale University, P.O.B. 6666, New Haven, Connecticut, USA
1984	Professor Ernst Mayr Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA
1974	Dr Roger Tory Peterson Route 4, Box 131, Neck Road, Old Lyme, Connecticut, USA
1984	Professor Lord Zuckerman, OM, KCB, FRS University of East Anglia, Earlham Hall, Norwich

INTRODUCTION BY THE PRESIDENT

In my introduction to last year's Annual Report, I noted that it was then the seventh consecutive year in which the President had had to draw attention to the Society's pressing financial problems. It is most heartening to be able to write this year's introduction in a spirit of relief, optimism and dedication. The details of the Government's decision about its financial support for the Society, as announced on 11th May 1988, are given in the Treasurer's Report. My pleasant duty, on behalf of Council and the Fellows, is to express our warmest thanks to Lord Peyton for his success in taking, as Treasurer, the leading part in the protracted negotiations with the Department of the Environment.

I have used the words "relief, optimism and dedication". Relief is obvious and I am optimistic that the future of the Society and its many activities is now assured. To secure this future is going to involve many radical changes, each presenting a challenge to make the best use of the opportunities thus presented. I am confident that the necessary dedication required will not be lacking.

The Treasurer was the most instrumental in achieving the starting point for the future, but our thanks must also go in full measure to our predecessors, to the Society's staff in the past and in the present, all of whom have contributed to making the Zoological Society of London an institution of excellence which has to be preserved and re-equipped for further advances.

In 1984, Mr John Boyer was appointed Chief Executive Officer. During the last four years he played a key role, most successfully, within the Society and between the Society and the Department of the Environment. He had already retired from a distinguished career with the Hong Kong and Shanghai Banking Corporation. He decided on his second retirement prior to the implementation of the anticipated changes about to take place. It is a pleasure to record the Society's gratitude to him for his contribution during these difficult four years. Mr Boyer has been replaced by Mr Peter Denton, Director of Administration, on one year's secondment from the Department of the Environment.

Wm. M. Henderson

PRESIDENT

TREASURER'S REPORT

The results for 1987 were substantially better than we had expected. A surplus of nearly six hundred thousand pounds and an increase not far short of 12% in the number of visitors to the two Zoos may have owed something to favourable weather at key holiday weekends, but they were a welcome and encouraging feature of a year to which our staff contributed nobly.

The Consultants appointed jointly by the Government and the Society, reported towards the end of the year. Their paramount recommendation was that the Society should set up a wholly owned trading company – Zoo Operations Limited – and delegate to it the responsibility of managing the two Zoos. The Council understood the wisdom of this and accepted the recommendation in principle without delay. The Chairman of the Charity Commission agreed that it would be a sensible step, which would not affect the Society's charitable status. The Clerk to the Privy Council accepted in principle certain amendments to the Charter and Bylaws, subject to support for them by Fellows with the majorities required.

The Consultants also recommended that the Government should for a limited number of years give tapering revenue support to the Society and continue the matching funds arrangement, which had been in force since 1984. They recommended too that the Institute of Zoology should be separately supported from public funds. The report also dealt with the question of a new lease of the Society's premises in Regent's Park, and car parking arrangements.

The Secretary of State announced early in May his general acceptance of the Consultants' conclusions. He offered a once-for-all capital grant of ten million pounds to replace both the revenue support and the matching funds arrangement; to grant the Society a new lease of premises in Regent's Park; to include in that lease a further ten acres of land and to provide increased facilities for car parking.

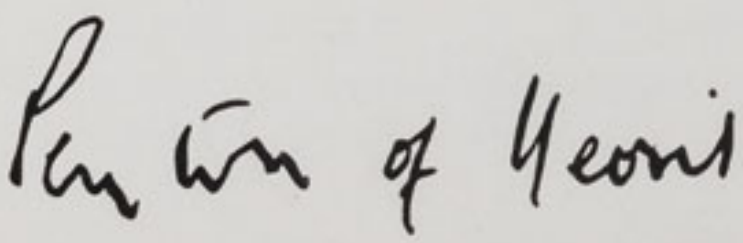
I wrote to the Secretary of State on the 11th May accepting these proposals on behalf of the Society. I would like to place on record my thanks to him and to Officials of his Department for the understanding they have shown of the Society's problems. I should also like to echo the thanks of the President to Mr John Boyer for the helpful and patient role he played in discussions with both the Department of the Environment and the Consultants, from whose examination these new possibilities have emerged.

The Fellows of the Society agreed in a postal vote in June by large majorities to the necessary changes to the Charter and Bylaws. This has made it possible to go ahead with the formation of the new company, which is expected to be in July. In accordance with the Consultants' recommendations, the Society has reached agreement in principle with Mr A Y Grant that he and his company should put together a new team to manage the Zoo. Mr Grant, who will himself be the Chief Executive, has behind him a considerable record of success at the San Diego and Philadelphia Zoos and latterly at Leeds Castle. Mr David Jones, at present Director of Zoos and Professor Tony Flint, the Director of Science, will both be members of the Board. The Secretary of the Society for the time being will be a non-executive member of the Board as will be The Rt Hon Michael Heseltine and Mr John Boyer (the former Chief Executive of the Society). I am particularly pleased that Mr David Weeks, Chairman of the Planning Committee of the Westminster City Council has also agreed to serve on the Board of the Company. I shall myself be the non-executive Chairman. Mr Peter Denton, on secondment for one year from the Department of the Environment, will be the Company Secretary. Mr Denton will also act as Director of Administration of the Society.

While these changes may seem and, indeed, are far reaching, we are, all of us, determined that the main purposes of the Society shall be upheld. Those purposes are the study of animals, the understanding of their needs and the conservation of species which are in danger of being trampled out of existence as a result of human pressures. The two Zoos are there for study, and to educate as well as to entertain.

I see these developments as affording the Society not just a few years respite, but a real opportunity to enhance its world-wide reputation, to provide better and more imaginative accommodation, both for the animals which it has in its care and those who come to see and marvel at them. Their success will depend ultimately on the support of the public and on the response to an appeal, the first the Society has ever made, which will be launched as soon as possible.

Finally, I am particularly conscious of the debt which I owe to Sir William Henderson and to members of the Council and of the Management Committee for the support which they gave me during negotiations, to which at times it seemed there would be no end.



TREASURER

SOCIETY AFFAIRS

ANNUAL GENERAL MEETING

The Annual General Meeting was held on 30 September 1987 with the President, Sir William Henderson, in the chair.

In accordance with Article 10 of the Charter and Byelaw 25, the following Fellows retired as Ordinary Members of Council: Lady Casson, Sir Arthur Drew and Sir Richard Way (Ordinary Fellows); The Earl of Cranbrook and Professor Sir Eric Denton (Scientific Fellows).

In accordance with Article 11 of the Charter and Byelaw 26, the following Fellows were elected Members of Council: Sir John Ackroyd, B C Owens and H G The Duke of Wellington (Ordinary Fellows); Professor N A Mitchison and A J Stevens (Scientific Fellows).

The President presented the following awards for contributions to zoology:

The Prince Philip Prize (awarded for an account of practical work involving some aspect of animal biology, by a pupil under 19 years of age of a school in the United Kingdom), to *Miss Heidi L Smout*, of Beaconsfield High School, for her essay 'To investigate the hypothesis that spiderlings of the genus *Zygiella* have innate tactic responses to light and gravity'.

The Thomas Henry Huxley Award (for original work submitted as a doctoral thesis) to *Dr R A Brett*, University College, London, for his thesis 'The ecology and behaviour of the naked mole-rat (*Heterocephalus glaber* Ruppell) (Rodentia: Bathyergidae)'.

The Scientific Medal (awarded to persons under 40 years of age for distinguished work in zoology) to *Dr G A Boxshall*, Department of Zoology, British Museum (Natural History), for elegant contributions to the systematics of the Copepoda and other crustaceans; to *Dr P H Harvey*, Department of Zoology, University of Oxford, for work in evolutionary biology, ranging from population genetics to evolution; and to *Dr J M V Rayner*, Department of Zoology, University of Bristol, for innovations in the study of the mechanics of animal flight.

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 *Dr Vera Fretter*, for her contributions to the understanding of the developmental biology, physiological ecology and functional morphology of the prosobranch molluscs.

OBITUARIES

The Council records with deep regret the deaths of Sir Charles Fleming, Honorary Fellow since 1978; Mr Salim Ali, Corresponding Member; Professor Adolf Portmann, Corresponding Member; Professor V V Hickman, Corresponding Member; Dr Hugh Cott, Life Scientific Fellow and former member of Council; Dr William Lane-Petter, Scientific Fellow and former Council member; Professor Alastair Worden, Scientific Fellow, Honorary Research Associate and former member of the Animal Welfare and Husbandry Committee; Professor Peter Wildy, Scientific Fellow and eminent virologist; Mr Stanley Cramp, OBE, Scientific Fellow, Chairman of the Royal Society for the Protection of Birds and Senior Editor of 'British Birds'; Dr Helene Bargmann, Scientific Fellow and formerly Zoologist, National Institute of Oceanography; The Most Hon The Marquess of Huntly, Life Fellow since 1908; Dr David W Seth-Smith, Life Fellow.

While this report was being prepared, Mr Tim Walker a current Council member, died at his home in Wiltshire. He had been suffering from cancer for some months. Mr Walker combined his considerable business talents with active participation in a number of wildlife organisations, in particular the UK Worldwide Fund for Nature (WWF) as Chairman of which he played a major part in its development and considerable success in fund-raising. Mr Walker maintained a private collection of rare hoofed stock which was managed jointly with the Society's and Marwell Zoological Trust's collection. He had been a Council member since 1985.

MEMBERSHIP

At the end of the subscription year (31 December 1987) there were 2,337 Fellows and 3,369 Associates, including 234 Student Associates.

FRIENDS OF THE ZOOS

By 31 March 1988 there were 2,300 Family Friends, 5,097 Adult Friends, 48 Student Friends and 396 Junior Friends.

STAFF

At 31 March 1988 there were 367 full-time members of staff. A list of senior members of staff is given in Appendix 2.

General

Pay increases were awarded in line with those of various outside bodies, mainly in the public sector, which have been used as

analogues under longstanding agreements. While some of these added considerably to costs it is still difficult to compete for certain categories of staff where there is a high market demand.

Changes at senior staff level included the appointment of Professor A P F Flint as Director of Science and the departure of Dr Brian Bertram, Curator of Mammals since January 1980, who left to become Director General of the Wildfowl Trust. He was succeeded by Dr J H W Gipps.

Awards

The completion of 25 years' continuous service was recognised by the presentation of gold watches or clocks to Mr C D Bates, Headkeeper, Whipsnade; Mr P Levi, Senior Keeper, London; Mr V J A Manton, Curator, Whipsnade; Mr J Robinson, Senior Keeper, London.

Retirements

Retirements (years of service in brackets) included Mr A Lee (44), Electrician; Mr A Myers (40), Print Room Supervisor; Mr V Sands (22), Senior Receptionist; Mr B Chapman (33), Senior Keeper, Lion Terraces; Mr H Ricketts (21), Part-time Recorder; Mrs J Humphrys (19), Clerk/Typist, Membership Department.

Obituaries

We regret to record the deaths of the following pensioners: Messrs G A Allen, L H Conway, W L Dulk, J Freson, W Gribble, R Heustice, A F Meakins, W P Sands, E J Smith, W Stafford, E Stimpson, F Weston; Mrs O Dyer, Mrs E Rodgie and Miss H Tompkins.

ACKNOWLEDGEMENTS

The Council is most fortunate to have the help and support of all those who give their time to serve on the advisory committees, details of which are given in Appendix 1. This immeasurably aids the work of the Society and is much appreciated.

The considerable help given by many friends and organizations and by scientists and veterinarians is gratefully acknowledged.

FINANCE AND MARKETING

FINANCE

Government grants for the year totalled £2.26 million. Of this sum, £2.10 million covered revenue support and a contribution to the consultants' fees, and £161,000 was a capital grant to match £ for £ what the Society had raised from private sources in 1986/87. Details of Government's future financial support appear on page 4 of this report and a further capital grant will be made in 1988/89 to match £ for £ what the Society raised from private sources in 1987/88, approximately £750,000.

The Society's operating deficit before other and exceptional income for the year is £1.87 million compared with the operating deficit for the previous year of £2.03 million. After deducting the Government revenue grant of £2.10 million and transferring £394,600 to the Building and Equipment Fund, which is in respect of consultancy fees, interest earned on capital funds, and £150,000 for backlog maintenance, the surplus for the year is £198,700. The balance brought forward at 31 March 1987 of £342,200 has been increased to £540,900.

The total number of visitors to both zoos is up by a pleasing 11.7% over the corresponding financial year, mainly as a result of a fine late Easter which increased attendances by 100,000. A mild winter has also resulted in increased attendances, especially in February. The increased attendances are reflected in additional income from both catering and retail and the Society continues to benefit from lower fuel costs.

DONATIONS, GRANTS AND GIFTS

Council wishes to express its thanks to all those who made contributions to the Society's general funds, again in particular to South Bedfordshire District Council who granted £25,637 by way of 50% discretionary relief of rates for the financial year. Also Dunstable Council for £2,300 generously donated.

The sum of £10,000 was received from the executors of the late Mrs D M North; £3,317 was received from the executors of the late Miss H Judd; £1,000 was received from the executors of the late Miss E G Mortin and £1,000 was received from the executors of the late Mrs E R Robinson.

Grants amounting to £600,200 were received to support the important work of the Institute of Zoology.

Gifts of various animals were kindly presented by members of the public, Government, local authorities and other establishments.

The appeal from the President to Fellows of the Society for the development of a new Bird Incubation and Rearing Unit on the North Bank raised £18,098. This splendid sum together with monies raised elsewhere, and some matching funds from the Government, means that work can now go ahead.

Incubation and rearing, particularly of rare species, is a vital part of the Bird Department's work. The new facilities will not only provide modern and controlled conditions, but will allow visitors to see some of the rearing process from incubation and hatching through to the fledging of chicks.

PUBLIC RELATIONS

London Zoo

Local, national and international media coverage kept London Zoo and the Institute of Zoology in the public eye. One major event resulted in a week of programmes transmitted 'live' on BBC TV and featuring all aspects of the Society. The Central Office of Information also filmed a detailed documentary about the Zoo and the Institute, which will be distributed throughout the world.

Items that particularly attracted attention included several animals threatened by extinction; Black Rhino, Partula Snail, Giant Earwig – all of these animals are part of international projects initiated by the Society. Births of animals were recorded; Gorilla, Tapir, White Rhino, Springhaas, Porcupine, Penguins and the Aardvark were especially popular.

Enriching the environment for animals in captivity also caught the media attention, as did the thefts of owls and of snakes which were publicized to stimulate awareness of the thoughtless trade in endangered species.

Special events for the public and Members included commercially sponsored promotions and the very popular Animal Open Houses. Celebrities gave much support for all of these and some also agreed to lend their names to animals, among them were Nigel Havers (an Arabian Oryx) and Emlyn Hughes (a Giraffe).

The 'Adopt an Animal' scheme raised a record £107,500. Christmas adopters totalled 1,000 and supported the scheme with £31,000. Valentine's Day was also popular, with over £1,000 being raised from presents. Many celebrities and commercial sponsors adopted animals.

'Zoo News' is published quarterly and is available to Members, Friends and Adopters (circulation 20,000).

Whipsnade Park
Media attention has increased steadily over the year with continued interest from the local press in events and activities at Whipsnade.

The highlight of the year was the opening of the new Discovery Centre by Sir David Attenborough. This exhibit has received excellent reviews by national as well as local papers.

The birth of a White Rhino calf on Christmas Day received extensive television and press coverage and this was followed by a special feature on the popular BBC children's programme 'Blue Peter'.

Other television programmes featuring Whipsnade animals included BBC's 'Caterpillar Trail', 'The Really Wild Show', 'Breakfast Time' and 'Zoo Week', with continued news coverage on Anglia TV News.

The Animal Adoption scheme remains popular and raised over £14,000 this financial year. Steve Cram, the famous athlete, adopted a Pygmy Hippo and 'Blue Peter' were presented with an honorary adoption of a White Rhino.

The two evening openings were enjoyable and successful.

EVENTS

The entire London Zoo was open to Friends and Members on four evenings and to the public as well on one of these occasions. Special Animal Open Houses were also held on several evenings and all, including the Open Animal Hospital, proved very popular.

Specialist weeks featured different animal sections throughout Zoo Month in July, extending to Elephant Week in August. The first champagne breakfast for Animal Adopters was a great success and fully subscribed.

Lunchtime lectures, with the Society's staff continuing to give a fascinating insight into their work, have a regular audience.

Two whole days were devoted to reptile enthusiasts and aquarists. Both events were sold out and much enjoyed.

THE DESIGN AND INFORMATION UNIT

The year started with the Unit still deeply involved in preparing the Discovery Centre at Whipsnade, ready for the opening on 20 May 1987. Many techniques were used that have seldom been employed elsewhere in the zoos. Natural materials and plants have been placed among models to give maximum effect. In the Human Animal Room, interactive devices involving graphics, mechanics and electronics introduce a new dimension to the interpretation of the animals.

The patterns and colours used in the Whipsnade Souvenir Brochure to distinguish the different geographical regions have been used on buildings and signs in the Park. The Unit has also been involved in interpretation for the Children's Zoo and the Birds of Prey exhibit.

It is only fairly recently that interpretation has come to play such a large part in the presentation of the Collections. Consequently, the Penguin Pool at London Zoo, designed by Lubetkin in 1934, had never carried information panels. When the Pool was refurbished this year, it was felt appropriate to produce graphics in keeping with the Pool's 1930s style.

Problems of a different kind were encountered with the Flamingos. Their splendid plumage demands full colour reproduction and it was necessary to use new techniques of colour-copying paintings and encapsulating graphics which should be fade resistant. Rapid deterioration of colour printing and photography when exposed to strong sunlight has necessitated restriction to the use of either black or white illustrations or original paintings in exposed areas of the zoo. Panel shapes and stands have been designed to fit in with the natural surroundings against which the Flamingos are exhibited.

During Zoo Month, several Sections were given additional interpretive panels and the most notable were those provided for the New Lion Terraces, which included information on the work of the keepers.

ZOO RESTAURANTS LIMITED

London Zoo
The catering operation at London Zoo is managed on behalf of the Society by Compass Services.

The number of functions held in the Regency Suite during the year increased to 374 compared with 303 the previous year.

Whipsnade Park
J Lyons Catering now manage the facilities at Whipsnade for the Society and during this financial year a market survey was carried out to identify customer needs. New equipment and facilities to the value of £200,000 have been installed, the cost being met by J Lyons. No fee was received during this financial year but in future the

Society will receive a commission of 7.5% of the catering turnover each year.

ZOO ENTERPRISES LIMITED

Zoo Enterprises Limited operate the Retail Departments at both London Zoo and Whipsnade Park.

At London Zoo additional outlets helped the company to achieve a turnover of almost £1.2 million. The resultant profit of £165,700 represents an increase of 3% on the previous year.

An extension of the self service area at Whipsnade enabled the company to achieve a turnover of £328,000 which resulted in a profit of £68,500, an increase of 144% over the previous financial year.

For a two week period before Christmas the Society operated a stall at the Ecology Centre in Covent Garden which generated considerable interest in both the Adoption and Membership schemes.

THE LONDON ZOO

Visitors during the year: 1,338,000.

GENERAL

Attendances last financial year totalled 1,199,000 and the welcome increase of 11% is mainly due to an exceptionally fine Easter in 1987 and a mild spring this year.

Discussions have continued with the Westminster City Council and the Department of the Environment regarding the design of the new Aquarium. This will be incorporated into a revised Master Plan which will be updated during 1988.

Requests for information and advice continue to be received from national and international sources. During the year, the Society was appointed as consultant to the Saudi Arabian National Commission for Wildlife Conservation and Development for their project at Thumamah. This is to be known as the King Khaled Wildlife Research Centre and will concentrate on research into, and captive breeding of, Arabian endemic species. Services continue to be provided to the Doha Zoological Gardens in Qatar and the Society is also assisting the Forestry Department at Delhi Zoo. In addition, help is being provided to establish a captive group of Kouprey in Laos and Kampuchea and to increase the number of captive herds of Mesopotamian Fallow Deer. Enquiries regarding the design of new zoos and parks have been received from Nigeria, Cyprus, Brunei, Brazil and Hong Kong.

'Kamili', the first baby Gorilla at London Zoo to be successfully reared by her mother.

THE COLLECTION

Mammals

The conception, birth and successful mother-rearing of a female baby Gorilla was the high point of the year for the Mammal Department. It is the first at London Zoo. The baby 'Kamili' is the firstborn to 'Zaire', who is on loan from Jersey. Despite the fact that 'Zaire' was herself handreared, she has proved to be a good mother, probably thanks to the socialization she had subsequently with other gorillas. The hope is that 'Salome', also pregnant, and helped by contact with the new baby, will turn out to be as competent a mother.

There was considerable activity among the other Great Ape species. Two Orang Utan were brought from Chester for mating, and another was sent to Dudley, all as part

Brazilian tapir 'Chico' with her mother.

of the co-operative breeding programme organized by the members of the Anthropoid Ape Advisory Panel. Another male Chimpanzee was born, and two members of this very productive group were sent to join groups at Windsor and at Southport.

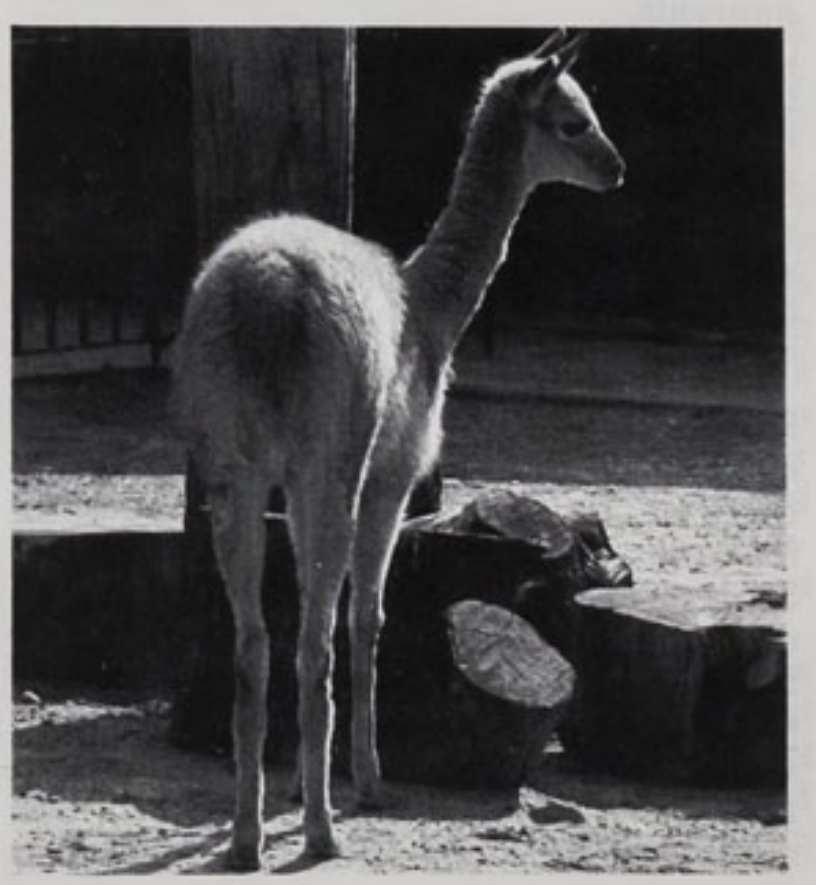
Black Rhino populations in the wild are rapidly decreasing due to illegal slaughter, and the world's captive population is not large, so breeding this species is particularly important. The Rhino paddock was divided to enable introductions to be carried out more easily, and another male and female were brought from Chester and Whipsnade respectively. The mature male Northern White Rhino 'Ben', sent to Czechoslovakia last year, was visited and reported to be thriving in the potential breeding group there. A volunteer team of apprentices from HMS Daedalus carried out an excellent resurfacing job in the Tapir paddock to create a softer substrate for the animals to walk on. The two animals have since produced a female baby, and the progress of the

The young Aardvark, born in summer 1987, and hand-reared in the Children's Zoo.

pregnancy was monitored by ultrasonic scanning. This technique was also possible with the equally tractable Aardvark, but the young one is having to be handreared.

Major modifications to the heating system on the Cotton Terraces caused some disturbance there which did not adversely affect births. Among the most significant arrivals were another female Okapi, a third male Arabian Oryx, three Roan Antelope, and a Bongo, Vicuna, and American Bison. Two Giraffes were born, and two others were sent to Chester and Whipsnade before their growth made road transport too difficult.

Movements of equids included sending the Przewalski's Horses to Woburn and the Society's remaining Common Zebra to Belfast. They were replaced from Marwell by a male and two female Hartmann's Mountain Zebras which are becoming vulnerable in the wild.



Vicuna calf 'Bonita' on the Cotton Terraces.

One of a litter of Meerkats born in The Clore Pavilion.

A number of animals were imported representing threatened species to whose conservation the Society can contribute by taking part in organized international captive breeding programmes. They included pairs of Owl-faced Monkeys from Mulhouse and Antwerp, pairs of Ocelots and Persian Leopards from Cincinnati, three Fat-tailed Dwarf Lemurs from Duke University, and six Leadbeater's Possums from Sydney and Melbourne. All these animals had to undergo a six-month rabies quarantine period on arrival.

In the Clore Pavilion there was the usual large number of births, in 43 species. The mongooses did particularly well, with summer litters by the Meerkats, Yellow Mongooses and Dwarf Mongooses.

Among other species, the most prolific individual was a female Naked Mole Rat which produced litters of 14, 14, 15, and 9, and reared almost all of them.

There were, of course, a number of disappointments to set against the successes. They included stillbirths by Orang Utan and Aardvark; the death of the Orang Utan 'Blossom' under anaesthetic and of a female Vicuna during a necessary operation for a Caesarian birth; an unexpected absence of births among the Sealions; the sterility discovered in the Sumatran Tigress; and the death after 27 years of the oldest mammal resident, the Brown Capuchin Monkey 'Nicky'.

The group of 10 young Scimitar-horned Oryx sent to Tunisia in 1985 have continued to thrive there, have been released into the wild in the Bou-Hedma National Park, and have produced their first calf; monitoring of their progress will continue at regular intervals.

The large-scale riding programme during the summer was again successful, and involved over 160,000 rides being given by Camels, Llamas, Donkeys and Ponies. The very successful 'Meet the Animals' sessions were further improved by the provision of a better public address system and by a training course for presenters and handlers.

Birds

In 1987, 143 individuals and 39 species were bred. Of particular interest was the successful handrearing of Sacred Ibis and Abdim's Storks, and useful data were obtained on diets and growth rates. The data for Abdim's Storks were especially valuable, for in recent years some chicks which had been reared by their parents showed growth abnormalities in beaks and legs. These abnormalities were at first thought likely to have been due to inbreeding as the colony had originated from a few closely related individuals. Further observations on the colony and the new data on handrearing now suggest that the growth problems were caused by nutritional deficiences. These deficiences had been brought about by the parents selecting items to feed to their chicks which did not contain sufficient vitamin and mineral supplementation. Though the supplementation was sprinkled onto the food, the parents often washed it away before feeding their young. The chicks which were handreared showed no signs of any abnormality.

Abdim's Stork chick at one month old.

Other noteworthy handrearings from artificially incubated eggs included Black-footed Penguin, Cape Barren Goose, Chiloe Wigeon, Goosander, Indian Grey Francolin, Impeyan Pheasant, Blue Eared Pheasant, Hume's Bar-tailed Pheasant, Stone Curlew and Tarictic Hornbill.

Parent-reared birds included Chilean Flamingo, Barraband Parrakeet, Rock Peplar, Princess of Wales' Parrakeet, Barn Owl, White-faced Scops Owl, Spotted Eagle Owl, Snowy Owl, Boobook Owl and Saffron Finch. For the first time in this Collection there were also successful parent-rearings by the Crowned Cranes, Western Slender-billed Cockatoo and Congo Peafowl.

A number of birds were received into the Collection mainly as a result of breeding loans or exchanges and these included Smew, Ferruginous Buzzard, Black Francolin, White Eared Pheasant, White-browed Laughing Thrush, Blue-faced Parrot Finch and Rose-coloured Starling. From Whipsnade three species of crane of conservation importance were received, the Red-crowned Crane, Wattled Crane and the White-naped Crane.

The owl collection, which is well known for its excellent breeding record, received new blood and some interesting species not seen here for many years. New partners were found for the Kenya Eagle Owl, African Spotted Eagle Owl and Short-eared Owl. In November a most impressive female Great Grey Owl was introduced to the single male.

Also in November the Society received from Helsinki Zoo six captive-bred Ural Owls, which fortunately proved to be three males and three females. They will form the basis of a cooperative breeding scheme with other collections in this country.

Another cooperative breeding and management programme has been set up by the Federation of Zoos for the extremely rare Rothschild Grackle (also called the Bali Mynah), and as part of that programme the Collection now has four potential breeding pairs. This beautiful white and crested grackle, related to the common European Starling, is found only in north-eastern Bali and is in imminent danger of extinction. In 1984 there were estimated to be less than 60 left in the wild, and captive-breeding and probably eventual reintroduction has been accepted as an essential part of an overall project to rescue this striking bird from disappearing for ever.

In April two Southern Pied Hornbills were received from Brunei. They had been rescued as fledglings from a shop and had been handreared. Their tameness prevented them from being released into the wild, where they would almost certainly have been killed. They have settled well into their new surroundings here, and have remained tame and trusting.

The Penguin Pool was officially reopened in November after its restoration and the return of the Blackfooted Penguin colony. This colony has been remarkably successful and of the 36 birds all but a few have been bred here. They include third and fourth generation individuals and grandparents who were themselves handreared.

Lord St John at the re-opening of the Penguin Pool.

A special 'Bird Week' was organized in August, and a 'Bird Evening' in June. Both events were most successful and gave visitors the chance to see some of the wide-ranging activities of the Bird Department.

In May the Curator of Birds visited western Canada on a lecture tour in which 'the role of zoos in conservation' was the main topic. In June he attended a meeting of the Congo Peafowl Trust members in Rotterdam.

Reptiles

During 1987 22 species and 322 individuals were successfully bred. Improvements in the management of the Namib Sand Gecko and the African Fat-tailed Gecko resulted in greater numbers being successfully reared.

Young Rhinoceros Iguanas, the first hatching of this species at London Zoo.

The Gila Monsters again produced fertile eggs but, due to abnormalities in the shell, these failed to hatch. Eighteen Malayan Pit Vipers were artificially hatched and hand-reared. Two female Rhinoceros Iguanas from Taronga Zoo, Sydney were gravid on arrival and each laid a clutch of eggs. Although the majority of the eggs were damaged whilst being laid, eight were successfully hatched. Most of these were eventually sent on breeding loan to other zoos.

Notable acquisitions included four Gila Monsters which will be on view in a new desert exhibit, and a consignment of reptiles from Melbourne Zoo. These included a male and two female Brown Pythons, a female and three male Carpet Pythons, a female Boa Constrictor, a pair of Tiger Snakes, a male Taipan, five Inland Bearded Dragons, three Shinglebacks, a Blue-tongued Skink and two pairs of Long-necked Terrapins.

Thieves broke into the Reptile House on two occasions early in 1988. In the first burglary 18 snakes from the breeding unit were stolen. In the second burglary 11 snakes were stolen, and these included a

number which were rare and valuable. Particularly sad and frustrating was the loss of Diamond, Blue-ringed, Brown, and Children's Pythons and two Indigo Snakes. They had been brought together into breeding groups over a number of years, and they will be difficult to replace. Months of hard work and patience by the keepers have been lost.

During the period covered by this report the Reptile Joint Management Group met at the Jersey Wildlife Preservation Trust. Reports from species coordinators were presented and cooperative management plans for a number of species were drawn up. At an earlier meeting of the Joint Management Group it was suggested that a Reptile Newsletter should be produced. Two editions have appeared to date, edited by David Risley of the Reptile Department.

A further step towards cooperation between European collections was made at a meeting in February in Monaco. Coordinators were appointed for a number of countries and their first task will be to collate information on stock and breeding for input onto a central computer bank.

Mrs Deco, a Volunteer, showing a Boa Constrictor.

Throughout the year visitors to the Reptile House have been able to enjoy, and be included in, a number of special events. 'Meet a reptile' sessions were conducted by reptile house staff, and on 106 days specialist volunteers were also in attendance. They have been able to answer numerous questions, and on 75 days were able to take out reptiles for visitors to see and handle. On each of these days there were two handling sessions each lasting over an hour. In addition, volunteers gave talks and commentaries whilst the large constrictors were feeding. There were also three 'Special Reptile Days', two in the Reptile House and one in the Meeting Rooms. Each of the days was a considerable success and much appreciated by those who came.

Aquarium and Insect House

During the past year in the Aquarium and in the Insect House, emphasis has been placed on displaying diverse examples of fish and

The Cuttlefish is a very popular exhibit in the Aquarium, and is capable of startling colour changes.

invertebrates in naturalistic settings, particularly with reference to exhibiting natural communities of animals. Although hampered by the age of both buildings, improvements to lighting, heating and water circulation have facilitated these developments.

With more pressure on aquatic and terrestrial habitats around the world, there has been an increase of interest in the conservation of endangered fish and invertebrates by captive breeding. To this end, the Society is joining forces with a number of European and North American zoos and aquaria for the captive breeding of a number of species, including the Asiatic Bony-tongue fish (*Scleropages formosus*), a selection of threatened cichlid fish from Lake Victoria (Africa), and the *Partula* land snails.

Several very successful meetings and symposia were organized in connection with the Aquarium and Insect House. These included an International Workshop on Captive Breeding of *Partula* land snails, an International Arachnid Symposium, and Aquarium Day.

BUILDING, SERVICES AND GROUNDS

Only a limited amount of new work was carried out during the year. The major project was the erection of a new barrier and gates in the Rhinoceros Paddock, to form two separate enclosures to facilitate the management and breeding of Black

Rhinoceros, and the linked new stand-off barrier formed round the enclosure. A similar barrier was also placed round the Red Panda Exhibit.

The refurbishment of the Penguin Pool, which involved substantial repairs to the reinforced concrete fabric and finishes, the replacement of the mosaic pool lining, and new metalwork elements and services, was completed in the Autumn. Both Berthold Lubetkin, the original Architect and Ove Arup, the original Structural Engineer, were present at the official opening by the Rt Hon Lord St John-Stevas on 9 November 1987. The work to this listed structure was jointly funded by Mr Peter Palumbo and English Heritage, and the Society is grateful to them for their generous support.

Further funding was allocated for backlog maintenance, covering the repair, renovation and refurbishment of various buildings and structures throughout the Zoo. Projects included the replacement of the windows and doors along the west side of the Regent Building; the refurbishment of the external faces of the Pavilion Building, following on from the earlier work in connection with the Pavilion Bar; the erection of new structures to house the new electrical switchgear; the reroofing of part of the Southern Aviary, and the refurbishment of some of the playground equipment.

The Works Department continued the ongoing maintenance and painting programmes, as well as dealing with several specialised items. These included a large new exhibition tank in the Aquarium, the fitting of new sinks in the Wellcome Building, the renewal of a large metal door in the Rhinoceros den and the replacement of the mesh over the Crane Exhibits on the north side of the Ostrich House.

The storm on the night of 16 October 1987 caused general damage throughout the Zoo, in particular to the roofs of the Giraffe House, Ostrich House, Bird House, Ape Breeding Colony, Wellcome Building and the Main Office. Most areas were repaired within a few weeks.

Two major projects were undertaken in connection with the renewal of services. All the 60 year old, and potentially dangerous low voltage electrical switchgear, has been replaced, and Emstar Ltd have completed the work in connection with the installation of new boilers. The latter work involved the removal and replacement of most of the existing heating plant, together with new heating systems in the Reptile House and part of the Cotton Terraces, and several new gas mains.

The Red Panda enclosure after the storm on October 16.

An Asbestos Audit was commissioned in connection with the continuing programme of asbestos removal. A major refurbishment of the public address system was started in 1987, improving and extending the system to cover the whole of the grounds.

The Phyllis Gorlick King Art Library has kindly allowed a series of mural panels to be displayed in the Café in the Zoo; entitled 'Monkey Suite' they were painted by Feliks Topolski in 1949, and originally hung in the dining room of his house in Regent's Park.

The October storms also caused severe damage to the trees at London Zoo, and throughout the whole of Regent's Park. The initial clearance was completed within a few days, involving the felling of over twenty trees, some dating back to 1840, and further substantial tree surgery in the case of an additional one hundred and fifty trees. A major loss was the Tree of Heaven which formed the main feature of the Red Panda Exhibit. A replanting scheme is taking place, and it is intended to continue this work over the next few years, in conjunction with the Royal Parks, and partly financed through the Countryside Commission.

A Tree Survey, covering all the specimens in the Gardens, was carried out during the Summer, the first for over 20 years.

Besides the general upkeep and maintenance of the planted areas, the Gardening Department undertook numerous new planting schemes, including the safety barriers round the Rhinoceros Paddock and the Red Panda Exhibit, and the screen planting round the new Electrical Switchgear Housings. The phased renewal of the planting forming the safety barrier round the Cotton Terraces moats continued, as well as the refurbishment of the Snowdon Aviary.

WHIPSNADE PARK

Visitors during the year: 395,000
Cars brought into the Park: 58,000

GENERAL

Attendances this financial year were given a good start by the Easter figures, which were better than the preceding two years, and indeed were higher than five out of the preceding six years' totals. Unfortunately, the remaining Bank Holiday attendances did not sustain this improvement and the advantages gained in April were gradually eroded away. Visitors are able to bring their cars into the Park, and one of the most consistent trends in the visitor analysis at Whipsnade over the last 25 years has been the increase in cars in relation to the total number of visitors. However, cars can intrude on the quality of the visit to a Park like Whipsnade and discussions are in progress at present to assess future needs for transport and weatherproof facilities.

The interest shown previously by visitors in the Park's new 'Discovery Centre' is being maintained. A number of staff from other zoological collections have commented favourably on the content and lay-out of the display and such reactions provide a useful critical test of an exhibit's quality.

Sir David Attenborough at the opening of the Discovery Centre at Whipsnade Park.

The new Giraffe House, mentioned in last year's report, is being completed for use this coming year and the third of the three ungulate buildings is now being finished so that other groups of antelopes can be housed in a more manageable way. The Society's maintenance staff are endeavouring to catch up on the maintenance work which lagged behind during the recent re-building programme. The greatest difficulty arose as a result of repairs to a broken underwater viewing window in the Dolphin exhibit which eventually led to the six inch sump pipe leading from the outside pool being accidentally pierced by a contractor's pneumatic drill.

The Society is very grateful to Windsor Safari Park and to Flamingo Land in Yorkshire who housed the Dolphins while the pool was repaired. The animals were returned to Whipsnade on 27 February 1988.

Refurbishment has continued at the Children's Zoo. It is hoped that the redecoration of the Cloisters Restaurant will not only give it a completely new look but will also encourage its increased use. The new complex includes a free-flow self-service area in the cafeteria and an improved area for banqueting and receptions.

The organization 'Men of the Trees' very generously not only donated, but also planted, 1,000 small saplings of a variety of English native broad-leaf species, which will form a new shelter-belt to the east of the railway on the Studham side of the Park. This will provide shelter for animals and also give a much more attractive backdrop against which visitors can view them.

THE COLLECTION

The Park continues to maintain its envied record of breeding successes, some of which are highlighted here. A small group of albino Bennett's wallabies have been kept at Whipsnade since the original animals were presented to Her Majesty the Queen in 1963. In the intervening years they have bred well, but with a high proportion of male offspring. During the year, it was realized that the sex ratio was improving and there are now 20 females, a sufficient number to allow the disposal of some of these very attractive animals to other collections.

Under the joint management programme between UK collections, the male Californian Sealions at Whipsnade and Chester have been exchanged to prevent inbreeding. For the same reason, the national zoo in Paris kindly donated a male Onager to join the group of females. The male Indian Rhino Calf, born at Whipsnade in August 1986, was deposited at Chester Zoo in December to make room for the expected birth of another calf later in 1988, the hope being ultimately to establish a second pair of this rare species. Christmas Day saw the birth of the 36th White Rhino at Whipsnade since the herd was started in 1970. Fortunately, this animal proved to be a female. In an effort to improve the captive breeding of Black Rhinos, a male was moved from Chester to Whipsnade in August and this animal, together with a female, was transferred to London Zoo to join another female there. The male Pygmy Hippo on loan from Bristol Zoo was returned in April, unfortunately without having produced any offspring.

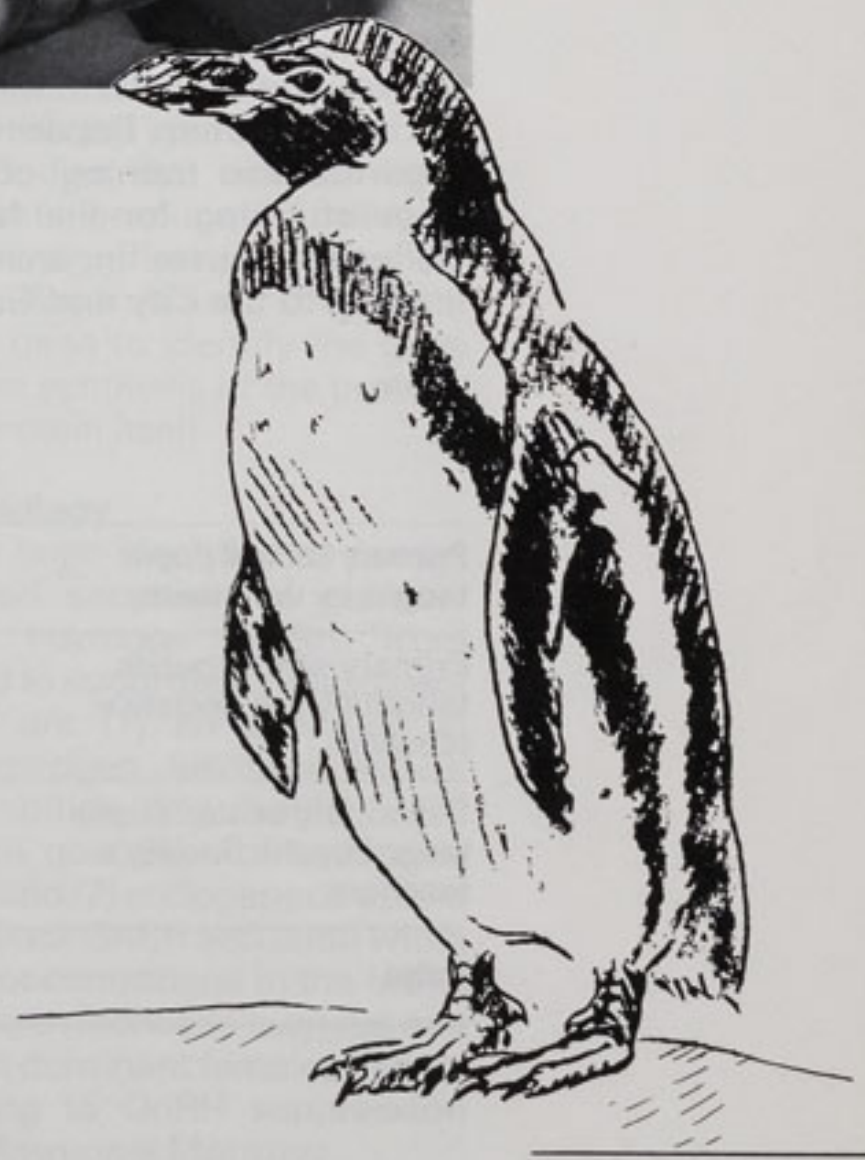
Greater Kudu were exhibited for the first time at Whipsnade. They make a spectacular show and are displayed in one of the new antelope houses next to the Roan Antelope, Nyala and Arabian Oryx. All these animals are part of the joint ownership programme with Marwell. It was gratifying to record the birth of three Common Waterbuck calves, of which two were females.

Common Waterbuck, a species usually difficult to maintain in captivity.

This is a very difficult species to maintain in captivity because of its specific nutritional needs and consequently the success is noteworthy. On the avian front, the hatching of 22 Humboldt's Penguins brings to almost 300 the total hatched at Whipsnade since the 1960s. This is the world's most endangered penguin. Most of these chicks will be destined for collections abroad to establish other breeding groups. The Scarlet Macaw pair produced two more offspring, making a total of five so far. There was continued success in the hatching of Spurthighed Tortoises; the 26 hatched this year bring the total to 56.

Scarlet Macaws bred at Whipsnade.

Humboldt's Penguin chicks hatched at Whipsnade.



EDUCATION

PROGRAMMES FOR SCHOOLS

Visits by secondary schools during the year continued to be affected by industrial action on the part of teachers, but attendances from primary schools were buoyant at both the London Zoo and Whipsnade. As a result the total number of pupils taught at both Zoos was the second highest ever, representing an increase of 5.8% on the total for 1986/87. The number of pupils taught at Whipsnade was once again a record. In order to meet this changing pattern of demand, when Mr D T J Smith, a secondary school teacher, left at the end of the Autumn Term, he was replaced by Miss C Robinson, a teacher trained to teach primary school pupils, who took up her appointment at the end of February. The numbers of school children taught during the year are set out in the accompanying table.

OTHER COURSES AND EVENTS

A Sixth Form Symposium entitled *The Natural History of Species Conservation,* organized jointly with the Fauna and Flora Preservation Society, and chaired by Mr John A Burton, was held on 25 November 1987. An appreciative audience of 234 pupils took part. Two courses for teachers were held at Whipsnade, and two open days for teachers, at which the resources available to school parties were explained and demonstrated, were held at the London Zoo. Meetings and visits were organized for the younger Friends of the Zoos.

The Education Department continued to organize the training of keepers at both Zoos studying for the National Extension College's course in animal management, leading to the City and Guilds examination. A total of 16 keepers at London and 13 at Whipsnade took part. As part of the courses visits were arranged to other zoos, so that the methods of animal husbandry in use could be compared.

Special lectures and demonstrations for students from the tertiary sector of education continued to be an important part of the Department's work. At the London Zoo students from 34 universities, polytechnics, technical colleges and other colleges in the tertiary sector took part. The total number of students involved was 1711, an increase of 15.6% on the 1986/87 figure.

VOLUNTEER ACTIVITIES

Recruitment and training of new volunteers at both Zoos was continued. At Whipsnade the number of volunteers on duty each day during the period from Easter until the end of September varied between five and 13, with an average of 9.3. At London there was an average of 10 volunteers on duty each day, an increase of two on the average for 1986. At both Zoos volunteers were able to purchase distinctive sweatshirts at low cost so as to make them readily identifiable. Activities included manning information bureaus, brass rubbing, mask making and at London the Art Cart and some talks for members of the visiting public. The London volunteers raised £1200 for the *Parrots in Peril* appeal. The Volunteers' Steering Group, under the Chairmanship of Mr J Barrington Johnson, met monthly, and continued to be an invaluable channel of communication.

	London Zoo			Whipsnade			
	Summer	Autumn	Spring	Summer	Autumn	Spring	**Total**
Primary school pupils taught by volunteers	4008	590	637	2707	0	0	**7942**
Primary school pupils taught by the Society's teachers	19645	4771	6457	8703	860	1190	**41626**
Secondary school pupils taught by the Society's teachers	6669	6590	7637	2320	447	358	**24021**
Total	**30322**	**11951**	**14731**	**13730**	**1307**	**1548**	**73589**

RESEARCH

The Institute of Zoology

The Institute represents the research function of the Zoological Society of London, including the Veterinary Hospital and the Curators' Research Units. This report gives a brief account of the activities of the various units within the four main research groups. The next Scientific Report is expected to be published in mid-1988, and from it a fuller account of the research can be obtained.

Professor A P F Flint, the new Director of Science, took up his post in September 1987; Professor J P Hearn, the previous Director of Science, who relinquished his appointment in January 1987 to become the Deputy Secretary of the Agricultural and Food Research Council, retains research links with the Institute as an Honorary Research Fellow. Dr G R Smith has been appointed Deputy Director of Science.

COMPARATIVE PHYSIOLOGY

Developmental Biology

The application of *in vitro* fertilization techniques to the Marmoset Monkey, previously shown to be highly successful, has been extended to include the removal of trophoblast cells for biopsy. This procedure, which necessitates the removal of a small number of the embryonic cells destined to become the placenta, permits the culture and genetic analysis of trophoblast cells. This enables the embryos to be sexed and, before implantation, to be examined for congenital abnormalities; these advantages are relevant to conservation and human medicine, respectively. The procedure has no detrimental effect on fetal growth. After the cells have been removed the embryos, which can be stored in liquid nitrogen before transfer to surrogate mothers, are capable of developing into normal offspring.

Trophectoderm cell culture provides a means of analyzing the effects of growth factors. Recent work has shown that the trophectoderm and developing 'inner cell mass' (the cells destined to become the embryo) engage in a 'chemical dialogue', which ensures their normal development.

One of the major endocrine products of the developing blastocyst in primates is chorionic gonadotrophin. Interaction between this hormone and the corpus luteum of the mother is necessary for the maintenance of a normal early pregnancy. Antibodies against chorionic gonadotrophin can be used to interrupt pregnancy, a finding of potential contraceptive value.

Studies on the use of surrogate hosts of heterologous species for embryo transfer continue to be successful. For example, domesticated mares have been used as surrogates for embryos of endangered species such as the Zebra and Przewalski's Horse.

Gamete Biology

Advances have been made in the methods used to analyse sperm fertility after freezing and thawing. These methods are based on the computerized analysis of motility and the ability to fertilize eggs *in vitro*. They hold great promise for studies in both endangered and domesticated species. In particular they provide a means of assessing semen preservation techniques without recourse to artificial insemination and fertility testing *in vivo*; this will greatly assist in extending the benefits of sperm preservation to species not previously studied.

In mammals, sperm acquire their fertilizing ability as they pass through the epididymis (the canal leading from the testis); by means of culture techniques in which sperm are exposed to the products of epididymal epithelial cells it has been possible to demonstrate some of the properties of the substances concerned. This work has considerable potential for the development of new contraceptive methods.

Work with monoclonal antibodies has led to the identification of components of the human sperm membrane that take part in the process by which the sperm is attracted to the egg. Antibodies that bind to these protein components produce infertility, a finding of obvious significance in the field of contraception. Recombinant DNA techniques are being used to identify the gene responsible for the synthesis of the protein, and thereby the protein itself.

Behavioural Physiology

Two factors have been identified as causes of the suppressed secretion of gonadotrophin-releasing hormone (GnRH) from the pituitary gland in subordinate Marmoset Monkeys. These are (1) an alteration in sensitivity to oestrogen feedback, which results in the inhibition of pulsatile GnRH secretion by small quantities of oestrogen in the circulation, and (2) endogenous opioid peptides, which block GnRH secretion when they reach high concentrations in the brain. There is increasing evidence to suggest that pheromones from dominant females initiate the events leading to GnRH suppression and infertility in Marmoset Monkeys.

Further work with pheromones has shown that the feeding habits of deer are profoundly affected by chemical repellents in lion dung. Exploitation of this finding is expected to reduce the severe damage inflicted on young trees by deer and the injuries that deer sustain from traditional fencing. Work is in progress to identify the chemical constituents of pheromones that control reproductive processes in Naked Mole Rats.

Physiological Ecology

In a study of the reproductive biology of Père David's Deer hinds it was shown that the breeding season began in early August and ended in mid-December, ie, it occurred three months earlier than in the Red Deer. The mean length of the oestrous cycle was 19.5 days in Père David's Deer; at the beginning of the breeding season, however, some individual animals had cycles considerably longer than this (up to 50 days). As with most wild mammals that exhibit seasonal breeding, the seasonal cycles of Red Deer are associated with fluctuations in other physiological parameters, including coat growth and appetite. Unfortunately the appetite cycle of the Red Deer is out of phase with the cycle of pasture growth. In an attempt to breed deer that are more attractive from the point of view of farming, Red Deer hinds have been inseminated with Père David's Deer semen; it is expected that this will result in offspring with a more favourable seasonal and appetite cycle.

Other aspects of seasonal breeding and photoperiod have been studied in the Bennett's Wallaby. In this species many females give birth shortly after the summer solstice, and this is the period of oestrous cyclicity. Later in the year (December) the animals become anoestrus, but continue to carry an embryo in diapause. By keeping animals in different artificial day-lengths it can be shown that the onset of the breeding season results from a reduction in day length. The effect of day length can be mimicked by treatment with melatonin; however, as in some seasonal eutherian mammals, the Bennett's Wallaby can be shown to be refractory to the influence of reduced day-length and of melatonin when exposed to these treatments in mid-summer.

Endocrinology

The Marmoset Monkey has proved to be a particularly useful model for the study of endocrine function and regulation of the ovarian follicle. Most information currently available on follicle growth has been obtained in rodents; comparable information on the Marmoset is therefore of additional interest in relation to man. Studies of the effects of two pituitary hormones (follicle stimulating, and luteinizing) on the granulosa cells of the ovarian follicle showed that the responses were influenced by the stage of follicular development and the effects of other follicular hormones, particularly androgens. Androgens either enhance or inhibit the action of follicle stimulating hormone, depending on the stage of follicular development.

Considerable advances have been made in the use of ovarian and placental hormones as indicators of pregnancy in exotic species. A microtitre plate immunoassay is being developed to demonstrate steroid hormones in the urine of Rhinoceros under field conditions.

COMPARATIVE MEDICINE

Nutritional Biochemistry

Work on the metabolic significance of essential fatty acids, particularly in brain development and growth, is carried out both in laboratory species and in the human subject. Long chain essential fatty acids occur in high concentrations in the developing brain, and concentrations are considerably higher in the human fetal circulation than in maternal blood. In fact, both dietary and placental provision of essential fatty acid were found to be related to weight and head circumference at birth. These observations suggest that essential fatty acids and nutrient deficits contribute to fetal growth retardation, and this is particularly evident in babies born to socially deprived mothers.

At the request of the World Health Organization more than 3000 human milk samples from different countries were examined for lipid and fatty acid content in order to assess the effects of steroidal contraceptives on human milk. It was found that mothers receiving oral contraceptives experienced changes in milk lipid composition; those taking levonorgestrel and ethinyl estradiol had an increase in milk lipid, whereas those treated with medroxy progesterone acetate, a long-acting injectable contraceptive, showed a significant decrease in milk lipid.

Because acute haemolytic anaemia, possibly due to vitamin E deficiency, frequently occurs in captive Black Rhinoceros, this vitamin has been assayed in serum samples obtained during the translocation of free living animals in Zimbabwe. Vitamin E concentrations were found to be significantly higher than those in captive animals.

Applied Immunology

The disease toxocariasis is caused by a worm that is frequently transmitted from dogs to children. Diagnosis in the human patient, which has in the past been difficult, can now be made easily by means of a recently devised immunosorbent assay. This test is being used to examine more than 2000 serum samples submitted to the Institute each year for diagnosis.

Microbiology

Carrion is one of the main sources for animals of the lethal neurotoxin of the botulism bacillus (*Clostridium botulinum*). Type C of the organism is notorious for producing disease in animals, including birds. Unlike type E and most other types, however, it seldom if ever does so in man, for reasons that are obscure. At comparatively high ambient temperatures type C readily produced carrion that would have been lethally toxic by ingestion, and the toxin persisted for at least a year. Lower temperatures were required by type E to produce maximally toxic carrion, but such toxicity was too low to have been lethal by mouth. Its production depended on the proteolytic enzymes in rotting flesh, but within a few weeks, all toxicity had disappeared, possibly due to the same enzyme. Fish carrion was comparatively unsuitable for the production of type C toxin.

Necrobacillosis in animals (eg 'lumpy jaw' in Wallabies) is caused mainly by *Fusobacterium necrophorum*, but infections are often mixed. Bacterial synergy may be the key to necrobacillosis. Sub-lethal doses of certain gut bacteria reduced the minimum infective dose of *F. necrophorum* ten thousand fold.

This finding is now being pursued in the context of mammalian endometritis.

Radiology and Ultrasound

A radiological survey of reptiles in the Collection showed that the severe nutritional bone disease identified in many animals 20 years ago had been eliminated. X-rays revealed calcification in the renal cortex of increasing numbers of Naked Mole Rats; this regressed after dietary vitamin supplements were substantially reduced.

Female Aardvark were monitored by ultrasound scanning to gain information on (1) the length of the breeding season, (2) the cyclic changes that occur, and (3) fetal development. Other animals scanned for ovarian activity included the Black Rhinoceros, Bongo, Gemsbok, and Red and Père David's Deer. Numerous species were also scanned for pregnancy. Snakes have been

Ultrasound scanning of a Boa Constrictor to assess reproductive status

successfully sexed and the *in vivo* development of eggs in reptiles has been observed. Ultrasound is playing an increasing role in the diagnosis of disease, particularly that of soft-tissue organs, the bladder, the heart, and the fetus.

VETERINARY SCIENCE

Clinical Studies and Pathology

More than 2000 animals were examined, treated, or given prophylactic medicines during the year, and approximately 600 animals from Regent's Park and Whipsnade were examined *post-mortem*. In addition to its diverse clinical work, the Clinical Studies unit undertakes research on disease and treatment. In particular the topics of neonatal care and sedation and immobilization continue to be given special attention.

In captivity, as in the wild habitat, the neonatal period is associated with relatively high rates of mortality, and this restricts the population growth of some species in captivity. In a survey of the incidence and major causes of neonatal mortality in selected groups of animals it was found that, among ungulates, infantile mortality was significantly higher in species that breed throughout the year than in those that calve in the warmer months. Mortality in calves born in winter could be reduced by hand-rearing.

Diagnosis and treatment of disease is often impossible in zoo animals without prior sedation and immobilization. In a detailed examination of the effects of immobilizing drugs in a number of ungulate species, various physiological parameters were monitored during the course of the induction and maintenance of anaesthesia and during recovery. It was found that in the Scimitar-horned Oryx combinations of etorphine and xylazine were most effective, but that when either drug was used alone a number of difficulties were encountered including moderate hypoxia and hyperthermia. The latter, which was associated

with a prolonged recovery time, affected animals confined at Regent's Park to a much greater extent than those kept under freer conditions at Whipsnade. A similar detailed study carried out with Black Fallow Deer demonstrated that comparable difficulties were frequently encountered in this species.

Among the commonest ailments of young birds in captivity are bone diseases, often seen as twisting or bending deformities of the limbs. Such distortions are sometimes the result of insufficient calcium or vitamin D3 in the diet, or of an unfavourable ratio of dietary calcium to phosphorus; in other instances the cause is obscure. In a study of the range of variation in long bone growth, the growth rate of the tarsometatarsus and other bones has been measured in a wide range of avian species. In the 87 species analyzed, adult tarsometatarsus length scaled with one-third power of adult weight (as does the diameter of a solid sphere with its mass), but the length also varied considerably with habitat (aerial, arboreal etc). Further work is concerned with an analysis of the number of proliferating cells in the columns of the growth plate; the frequency with which these cells divide; and the diameter, in the plane of growth, to which they grow. Preliminary studies of growth plates from Rhea and Crowned Crane suggested that the rapid growth of long bone in these species was due to very long columns of proliferating cells.

Haematology

The establishment of normal values for haematological parameters necessitates the testing of samples from healthy animals. Information on normal blood cells and their response to disease in more than 700 animal species is now available for examination by computer analysis.

The use of red cell volume distribution as a means of monitoring recovery from anaemia in mammals such as Perissodactyla and many Artiodactyla, which show little or no reticulocyte response, has been assessed. Macrocytes that persist as such in the circulation throughout their life span have been seen in Goats recovering from severe haemorrhage, and adrenolytic sedative drugs have been shown to reduce the red cell count in some mammals; in anaemic Goats sedated with xylazine this reduction was indirectly related to the initial count.

Conservation Genetics

As the breeding of rare species in captivity improves, it becomes increasingly important to study the pedigrees of individual animals. Conservation genetics, which is closely concerned with breeding programmes, includes the collection and dissemination of data, analysis of the genetics and demography of small populations, and the production of guidelines for the breeding of selected species in captivity, both in the UK and elsewhere.

As a prerequisite for population management, an inventory of mammalian and avian species in British zoos is compiled annually from stock lists produced by the members of the Federation of Zoological Gardens of Great Britain and Ireland. To provide more detailed information on individual animals, a database known as NOAH (National On-line Animal Histories) has been established. This is brought up to date monthly from a system of computerized records (ARKS; Animal Records Keeping System). So far 14 British zoos, including the Zoological Society of London, participate in the ARKS/NOAH programme.

Conventional analytical methods for assessing genetic status in endangered species are of limited value for the complex pedigrees characteristic of many small captive populations, in which in-breeding and periodic reductions in numbers are common. Computer-based methods simulate the passage of genes through pedigrees and provide a variety of statistics of direct relevance to population management. By means of these and other methods, it has been possible to assess the efficacy of various kinds of breeding programme, maximizing the genetic diversity preserved in populations of varying size and structure. Management programmes have been established for a number of species including Arabian Oryx, Rothschild's Mynah, Tiger, Gorilla, Goeldi's Monkey and Przewalski's Horse.

CONSERVATION AND WELFARE

Behavioural Enrichment

The main aims of the programme are (1) to evaluate welfare status by observing behaviour, (2) to identify the more important features of the natural environment that are missing in captivity, and (3) to evaluate quantitatively the effects of providing such features.

The most successful behavioural enrichment projects are concerned with ways of providing food in a more stimulating way. Under investigation are cricket dispensers for small carnivores, artificial termite mounds for Chimpanzees, and artificial gum

trees for Marmosets. Further possibilities include exercises such as pushing sequences of buttons and playing games which, although artificial, stimulate the use of natural abilities.

Mammals, Fish and Invertebrates
Notable breeding successes included the Arabian Oryx, Aardvark, Gaur, Gorilla, and Okapi. The year also saw the preparation of the International Giant Panda Stud Book. The Society is joining forces with European and North American zoos to breed endangered species of fish such as the Asiatic Bony-tongue and the Cichlids of Lake Victoria. It is also participating in an international programme for breeding the Moorean Partula Land Snail for reintroduction to its original habitat. A self-sustaining population of Mexican Red-kneed Bird-eating Spiders is being established.

Birds and Reptiles
Avian breeding studies have concentrated on species that rarely reproduce in captivity, and are of interest scientifically or in relation to conservation. For example, the Congo Peafowl is the subject of current research. Factors affecting the hatching of artificially incubated eggs have been studied in a number of species. There are two peaks of embryo mortality, one early in incubation and the other just before hatching. Investigations continued into the incubation and hatching requirements of reptile eggs.

Whipsnade Park
The use of Whipsnade as a research station for the Institute staff and visiting workers continued to grow.

Field Studies
Monitoring of the Black Rhinoceros on the Ol Ari Nyiro ranch in Kenya continued. Animals were identified, sexed and aged from the characteristic wrinkles on their footprints and from occasional sightings. Fresh urine was collected from the leaves of bushes and sent to the Institute for assay of the metabolites of reproductive hormones. Some animals were fitted with radiotransmitters. On capture, all animals were aged and measured, and blood samples taken for genetic studies and hormone analysis. There was much overlap between the home ranges of individual animals, and small areas of intense urine marking by rival bulls occurred within these ranges.

The group of Père David's Deer sent to Da Feng in China in 1986 were released into a 120 ha section of the Reserve, as a preliminary to giving them access to the entire 1000 ha Reserve in 1988. So far six calves have been born and five have survived, increasing the population to 44.

The Scimitar-horned Oryx introduced to the Bou Hedma National Park in Tunisia in 1985 are thriving, and the first calf has been born. Some artificial feeding is still required, but the animals increasingly use the natural vegetation.

SCIENTIFIC MEETINGS AND SYMPOSIA

The Scientific Meetings are short evening meetings held eight times a year. They offer Society Members and Friends, their guests and other visitors, the chance to hear about recent zoological research of particular interest. Speakers usually try to present their work in terms that will be clear to the non-specialist, and in addition, the June and December meetings are designed to appeal to a more general audience than those held in other months.

The Scientific Meetings in 1987–88 were again each planned around a central theme. In April 1987 this was 'Hydatid disease: a social zoonosis', and the programme included a talk by Professor J D Smyth, a recent winner of the Society's Frink Medal. In May 'Recent developments in British vertebrate palaeontology' included an account by Dr Alan Charig from the British Museum (Natural History) of the Surrey theropod dinosaur, very much in the news at the time. In June, drawings by the artist Jonathan Kingdon, who was one of the speakers, added extra interest to the meeting on 'Wildlife and conservation in Arabia'.

Another of the Society's award winners spoke in October. Dr Rob Brett won the 1986 Thomas Henry Huxley Award for his thesis on mole rats. He is now working in Kenya for the Society's Institute of Zoology, researching the black rhinoceros, and was one of the two speakers on the theme 'Rhinoceros ecology and conservation'. The November meeting, 'The fish's point of view', considered the intriguing problems of vision under water, and how fishes cope with them. In December Dr John Sparks, head of the BBC Natural History Unit, and Mr John Burton from the Unit's Sound Library, used a generous selection of film and sound recording to illustrate the difficulties, rewards and occasional zoological insights that arise in the course of making the BBC's natural history programmes. The February meeting, on the more sombre subject of 'AIDS in primates', attracted a large audience; in March, when budgets were in the news, zoological budgeting was the subject of a meeting entitled 'All for the best', in which the three eminent speakers

each considered different aspects of optimization.

The Society is most grateful to every one of the 20 speakers who contributed to the 1987–88 programme of meetings.

Thanks are also due to those who presented their work at the Symposium which was held on 8 and 9 April 1987 – 'Aspects of Decapod Crustacean Biology' – and particularly to Dr A A Fincham and Dr P S Rainbow, who organized the meeting and edited the proceedings for publication.

PUBLICATIONS

Journal of Zoology

The decision last year to combine *Series B* (formerly the irregularly published *Transactions*) with *Series A* of the *Journal of Zoology* has resulted in a more substantial publication: each monthly part of the *Journal of Zoology* now contains 192 pages (as compared with 140 ten years ago). During the year, Volumes 211 Part 4, 212, 213 and 214 Parts 1 to 3 were published, containing a total of 175 papers. These included some of the longer papers that would formerly have appeared in *Series B*, for instance the proceedings of the symposium of the Primate Society of Great Britain, 'Factors affecting fertility in primates'. The time from acceptance to publication, now down to 7–8 months, compares very favourably with that in other journals. The quality of papers remains high and the content extremely varied, covering every field of zoological enquiry. This variety of content means that it is particularly valuable for the Editor to be able to rely on the many referees whose special expertise helps her to assess the great number of papers submitted for publication. The Society warmly thanks them for their assistance.

Zoological Record

Volume 123, which covers the literature available during 1986 and 1987, was published in December 1987. From now on, a complete volume of the *Record* will be distributed each December and will index literature received in the 12 months up to July of the same year.

The contents of Volume 123 illustrate the increase in the amount of zoological literature published annually over the last 123 years. This volume gives detailed references to more than 70,000 papers extracted from over 6,000 different journals and other source documents, whereas Volume 1, which dealt with the literature for 1864, included entries for some 820 papers from 350 journals.

The computer-readable version of the *Record, ZR Online,* commenced with Volume 115 (1978 literature). It now provides access to over 600,000 items corresponding to the printed volumes since published, and is updated monthly with recently indexed references.

To aid users of both the printed and online versions of the *Record,* a reference manual, *The Zoological Record Search Guide,* has been produced. It provides information on the type of material included in the *Record* together with vocabulary terms and instructions on searching techniques.

The *Taxonomic Card Service* has also recently been introduced and provides, on laser-printed cards, taxonomic information from all sections of the *Zoological Record.* These cards contain the scientific names of animals together with bibliographical citations, geographical details and other information.

To acquaint and familiarize potential and regular users with the various services offered by the *Zoological Record,* BIOSIS gives free ZR Training Programmes around the world on a regular basis.

The help so generously given to the *Record* staff by the Director General of the Document Supply Centre, Boston Spa, and the Director of the British Museum (Natural History) is gratefully acknowledged by Council.

Symposia

Proceedings of the Society's Symposia continue to be published for us by Clarendon Press, in the series *Symposia of the Zoological Society of London.* Two volumes appeared in the year: No. 57, 'Reproductive energetics in mammals', edited by Dr A S I Loudon and Professor P A Racey, and No. 58, 'Mammal population studies', edited by Dr Stephen Harris. Sales continue at modest but steady levels.

International Zoo Yearbook

Volume 26 of the *International Zoo Yearbook* was published in the autumn of 1987. The topic for Section 1, Aquatic exhibits, offered the opportunity to include several papers on fish and invertebrate species, groups which are often neglected in zoo literature, making the volume of exceptional interest.

Section 1 of Volume 27, currently in preparation, is Conservation Science and Zoos. The papers submitted for this topic offer ample evidence of the serious commitment being made to conservation by zoos. The topics covered include repro-

duction studies, population studies, collaboration between zoos and research institutes, zoos' links with conservation in the field and reintroduction schemes, and management of rare animals in captivity, with particular reference to some of the species being managed on a national scale under the Species Survival Plan implemented by the American Association of Zoological Gardens and Aquariums. Among the interesting projects covered are the successful breeding programme for the Echidna, including details from Oklahoma Zoo on development of the young and rearing by the mother; the breeding programme for the California Condor at San Diego and Los Angeles Zoos and, under the auspices of The Zoological Society of London, the reintroduction of the Père David Deer to China.

Section 2, New developments in the zoo world, contains papers covering aspects of breeding, husbandry, hand-rearing, housing and display of a number of vertebrate species, ranging from sharks to Gerenuks. Of outstanding interest is an article from Beijing on births of the Giant panda in zoos in the People's Republic of China and elsewhere. The paper written for the *Yearbook* in Chinese was kindly translated by Professor Tan Bangjie of Beijing Zoo, a member of the *International Zoo Yearbook* Advisory Panel.

The reference section includes the lists of vertebrates bred and the census of rare species in captivity and the list of studbooks for rare or endangered species in captivity.

The editor, P J S Olney, attended the Captive Breeding Specialist Group/SSC meeting in Bristol in September and, in his capacity as International Studbook Co-ordinator, presented his annual review of the now 80 international studbooks. He also helped to organize a Studbook Keeper Workshop which followed the CBSG meeting. The workshop, which concentrated on studbook management and, in particular, on demonstrations of new computer software, was attended by over 100 people, including Pat Ellis and Benedicte Sommerfelt from the *International Zoo Yearbook*.

LIBRARY

Members of the Society and its staff continue to receive a full Library service, and the number of members of the public who apply for Reference Tickets to use the Library continues to increase.

In addition to the book on pheasants, published in 1986, two further volumes by Professor Johnsgard, illustrated with reproductions of watercolours from the Henry Jones collection in the Library, are in course of publication by Oxford University Press. In 1987 a magnificent limited edition of 60 reproductions of the waterfowl paintings of Henry Jones was published by Threshold/Harrap. The text of this edition is by Peter Olney, the Society's Curator of Birds. One other book which exploits the riches of the Society's Library is also nearing publication by the Oxford University Press. This is a book on Brian Houghton Hodgson and it is illustrated with pictures of birds and mammals from the Hodgson collection in the Library.

Another fine collection of watercolours in the Library are the bird paintings of Charles Ferguson Sharpe. They are on cardboard and date from the mid nineteenth century. Unfortunately the board has deteriorated and the paintings are in danger of being lost. In 1987 the British Library generously awarded the Library a grant of £8,500 over a period of two years for the conservation of this collection. The worst affected pictures are already being treated and work will go ahead on the others. Prints have been made from six of these pictures and the proceeds of the sale of these prints will be used to supplement the amount available for conservation work.

In spite of large increases in the price of books more are now added to the Library stock each year than ever before. Most of these additions the Library owes to the generosity of others. Among those to whom we wish to express our gratitude this year are Mr P H Maxwell, who presented a fine collection of bird books and pictures, and Mr H Biley, who bequeathed a collection of books to the Library, and also the following donors:

Mr M F Ahmed, Dr M Ataur-Rahim, Mr A W Baker, Dr E D Barlow, Sir C A Clarke, Mr A Colwell, Dr H Fox, Dr E Gentili, Dr J Gurnell, Dr K A Kermack, Mr F Laidlaw, Mr K Ryz, Dr Marques de Sousa e Holstein Beck, Dr R I C Spearman, Dr R E Stebbings, Mr J Toovey, Mr G L Wood, Biological Laboratory Imperial Household of Japan, Hawk Trust.

In addition Major Eustace Poles, formerly Chief Ranger of the Game and Tsetse Control Department of Northern Rhodesia, deposited in the Library his field journals of the period 1947 to 1950.

R.h. Laws.

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* Also members of the Institute of Zoology.

PUBLICATIONS BY SOCIETY'S STAFF AND RESEARCH WORKERS

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ANIMALS IN THE COLLECTIONS

column 1	Number of animals in the Collection at 1st January 1987.
column 2	Number of animals received in *1987* 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 in 1987.
column 4	Number of animals which died in 1987 within 30 days of birth or hatching. The figures in brackets indicate animals born or hatched during December 1986 and which died during January 1987. Stillbirths are not included.
column 5	Number of animals which died from natural causes during 1987 apart from those included in column 4.
column 6	Number of animals disposed of in 1987 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 1987 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.

LONDON ZOO

		1	2	3	4	5	6	7
MAMMALS								
Monotremata								
Tachyglossus aculeatus	Australian Echidna	1	—	—	—	—	—	1/0
Zaglossus bruijni	Bruijn's Echidna	4	—	—	—	—	—	2/2
Marsupialia								
Monodelphis domestica	Grey Short-tailed Opossum	7	—	5	—	—	—	2/5/5
Phalanger gymnotis	Grey Ground Cuscus	4	—	—	—	1	—	1/2
Gymnobelideus leadbeateri	Leadbeater's Possum	—	6	—	—	1	—	3/2
Petaurus breviceps	Sugar Glider	7	—	—	—	1	—	4/2
Dasyuroides byrnei	Byrne's Pouched Mouse	5	—	—	—	—	—	2/3
Sarcophilus harrisi	Tasmanian Devil	2	—	—	—	2	—	—
Vombatus ursinus	Common Wombat	1	—	—	—	—	—	0/1
Bettongia penicillata	Brush-tailed Bettong	7	—	1	—	1	—	4/3
Macropus rufogriseus	Red-necked Wallaby	—	6(5)	—	—	2	1(1)	2/1
Macropus parma	White-throated Wallaby	3	—	1	—	3	—	1/0
Dendrolagus goodfellowi	Goodfellow's Tree Kangaroo	1	—	—	—	—	—	0/1
Insectivora								
Erinaceus europaeus	European Hedgehog	2	1	—	—	—	—	1/0/2
Paraechinus aethiopicus	Desert Hedgehog	3	—	—	—	2	—	0/1
Chiroptera								
Pteropus giganteus	Indian Fruit Bat	15	—	2	—	—	—	4/11/2
Carollia perspicillata	Seba's Short-tailed Bat	38	—	19	11	5	—	0/0/41
Scandentia								
Tupaia glis	Common Tree Shrew	13	2	6	2	5	3	6/4/1
Tupaia tana	Large Tree Shrew	4	—	1	1	2	—	1/1
Primates								
Lemur catta	Ring-tailed Lemur	10	—	2	—	1	5	2/2/2
Lemur fulvus	Brown Lemur	10	—	3	—	—	2	2/7/2
Lemur mongoz	Mongoose Lemur	2	—	—	—	—	—	1/1
Varecia variegatus	Ruffed Lemur	7	—	—	—	—	1	3/3
Cheirogaleus medius	Fat-tailed Dwarf Lemur	1	3	2	—	—	—	2/2/2
Microcebus murinus	Grey Mouse Lemur	8	—	1	—	—	—	6/3

		1	2	3	4	5	6	7
Loris tardigradus	Slender Loris	4	—	1	1	—	—	2/2
Nycticebus coucang	Slow Loris	11	—	1	—	3	—	3/6
Galago crassicaudatus	Thick-tailed Bushbaby	1	—	—	—	—	—	1/0
Galago senegalensis	Senegal Bushbaby	4	—	4	3	1	—	2/2
Aotus trivirgatus	Douroucouli	5	—	4	1	2	—	3/3
Pithecia pithecia	White-faced Saki Monkey	8	1	1	1	1	1	3/4
Cebus appella	Brown Capuchin	9	—	—	—	2	7	—
Saimiri sciureus	Squirrel Monkey (Olive-capped form)	17	—	4	—	1	4	2/10/4
Ateles geoffroyi	Black-handed Spider Monkey	3	—	—	—	—	1	1/1
Callithrix jacchus	Common Marmoset	16	—	—	—	8	—	2/6
Cebuella pygmaea	Pygmy Marmoset	6	—	4	3	—	—	3/2/2
Saguinus oedipus	Cotton-headed Tamarin	4	2	—	—	—	4	1/1
Saguinus illigeri	Red-mantled Tamarin	9	—	6	3	1	—	5/5/1
Saguinus imperator	Emperor Tamarin	4	—	3	3	—	—	2/2
Leontopithecus rosalia	Golden Lion Tamarin	8	—	—	—	1	—	3/4
Callimico goeldii	Goeldi's Marmoset	5	—	2	—	1	1	2/1/2
Macaca nemestrina	Pig-tailed Macaque	21	—	7	2	1	1	7/15/2
Cercocebus torquatus	Sooty Mangabey	7	—	—	—	—	7	—
Mandrillus sphinx	Mandrill	8	—	3	—	—	—	6/5
Cercopithecus diana	Diana Monkey	6	—	—	—	—	—	2/4
Cercopithecus hamlyni	Owl-faced Monkey	—	2	—	—	—	—	1/1
Colobus polykomos	Western Black & White Colobus Monkey	4	—	—	—	—	—	3/1
Hylobates lar	Lar Gibbon	2	—	—	—	—	—	1/1
Pongo pygmaeus	Orang Utan	10	2	1	—	1	1	5/6
Pan troglodytes	Chimpanzee	11	—	1	—	—	2	5/5
Gorilla gorilla	Gorilla	3	—	1	—	—	—	1/3
Edentata								
Myrmecophaga tridactylus	Giant Anteater	2	—	—	—	—	—	0/2
Choloepus didactylus	Two-toed Sloth	1	—	—	—	—	—	0/1
Dasypus novemcinctus	Nine-banded Armadillo	2	—	—	—	1	—	0/1
Chaetophractus villosus	Hairy Armadillo	2	—	—	—	—	—	1/1
Rodentia								
Sciurus vulgaris	Red Squirrel	3	—	5	—	4	—	2/2
Ratufa bicolor	Malayan Giant Squirrel	2	—	—	—	—	—	1/1
Callosciurus prevosti	Prevost's Squirrel	2	—	—	—	—	—	1/1
Marmota marmota	Alpine Marmot	3	—	—	—	—	3	—
Cynomys ludovicianus	Prairie Marmot	8	—	3	—	—	4	0/2/5
Tamias sibiricus	Siberian Chipmunk	3	—	—	—	—	—	2/1
Tamias townsendi	Townsend's Chipmunk	6	—	2	—	—	—	1/1/6
Glaucomys sabrinus	Northern Flying Squirrel	9	—	—	—	1	—	3/5
Castor canadensis	American Beaver	3	—	—	—	—	1	1/1
Pedetes capensis	Springhaas	8	—	5	2	3	—	4/3/1
Sp. inc.	Deer Mouse	5	—	5	—	—	—	3/2/5
Peromyscus maniculatus	White-footed Mouse	9	—	—	—	3	—	4/0/2
Sigmodon hispidus	Cotton Rat	22	—	86	7	4	72	2/3/20
Phodopus sungorus	Dwarf Hamster	52	—	62	3	27	30	4/5/45
Cricetulus barabensis	Chinese Hamster	30	—	—	—	21	—	0/0/9
Meriones libycus	Libyan Jird	2	—	—	—	2	—	—
Meriones unguiculatus	Clawed Jird	12	—	19	3	3	4	1/2/18
Dicrostonyx torquatus	Collared Lemming	12	2	27	11	8	5	5/2/10
Clethrionomys glareolus	Bank Vole	17	—	20	—	8	—	7/5/17
Microtus orcadensis	Orkney Vole	23	—	16	3	19	1	2/2/12
Microtus agrestis	Field Vole	30	—	13	—	22	1	3/6/11
Phloeomys cumingi	Philippine Cloud Rat	2	—	—	—	2	—	—
Apodemus sylvaticus	Field Mouse	22	—	10	—	1	3	11/12/5
Micromys minutus	Harvest Mouse	55	—	150	13	37	108	1/1/45
Acomys cahirinus	Arabian Spiny Mouse	21	—	84	2	4	5	0/0/94
Acomys russatus	Golden Spiny Mouse	35	—	22	3	5	26	7/15/1
Lemniscomys barbarus	Zebra Mouse	3	—	—	—	2	—	0/1
Arvicanthis niloticus	Nile Rat	25	—	—	—	6	7	6/6
Rattus rattus	Black Rat	150	—	60	—	—	160	0/0/50
Glis glis	Fat Dormouse	3	—	—	—	1	1	0/1
Jaculus jaculus	Arabian Jerboa	10	—	2	—	5	—	3/4
Hystrix indica × H. cristata	Hybrid Indian × Crested Porcupine	2	—	—	—	—	—	1/1
Atherurus africanus	African Brush-tailed Porcupine	4	—	2	—	1	—	3/2
Kerodon rupestris	Rock Cavy	13	—	7	4	6	1	3/3/3
Dolichotis patagonum	Mara	4	—	1	—	—	—	3/2

		1	2	3	4	5	6	7
Cuniculus paca	Spotted Paca	1	—	—	—	—	—	1/0
Dasyprocta aguti	Orange-rumped Agouti	8	—	6	—	—	4	3/7
Myoprocta pratti	Green Acouchi	13	1	15	9	7	1	5/5/2
Chinchilla laniger	Chinchilla	11	—	6	1	1	1	8/6
Geocapromys brownii	Jamaican Hutia	1	—	—	—	—	—	1/0
Octodon degus	Degu	6	—	4	1	1	—	0/0/8
Proechimys guairae	Casiragua	5	—	1	—	1	—	3/1/1
Heterocephalus glaber	Naked Mole Rat	104	—	69	29	9	74	3/3/55
Carnivora								
Canis lupus	Grey Wolf	9	—	2	1	3	—	1/6
Fennecus zerda	Fennec Fox	2	—	—	—	—	—	1/1
Ailuropoda melanoleuca	Giant Panda	1	—	—	—	—	—	1/0
Ailurus fulgens	Red Panda	2	—	—	—	—	—	1/1
Potos flavus	Kinkajou	3	—	—	—	—	—	1/2
Mustela nivalis	Weasel	2	—	—	—	1	—	1/0
Mustela putorius	Polecat Ferret	15	—	—	—	—	11	2/2
Amblonyx cinerea	Oriental Small-clawed Otter	3	2	—	—	2	1	1/1
Genetta tigrina	Blotched Genet	3	—	—	—	—	—	2/1
Arctogalidia trivirgata	Small-toothed Palm Civet	3	—	—	—	1	—	0/2
Paguma larvata	Masked Palm Civet	1	—	—	—	—	—	1/0
Suricata suricatta	Suricate Meerkat	5	2	5	—	1	—	8/3
Helogale parvula	Dwarf Mongoose	8	—	10	—	—	2	8/4/4
Cynictis penicillata	Yellow Mongoose	3	—	3	3	—	—	1/2
Felis caracal	Caracal Lynx	1	1	2	—	—	—	2/2
Felis pardalis	Ocelot	—	2	—	—	—	—	1/1
Felis serval	Serval	2	—	1	—	—	—	1/2
Felis wiedi	Margay	2	1	—	—	1	1	0/1
Panthera leo	Lion	4	—	—	—	—	—	1/3
Panthera tigris	Tiger (Sumatran form)	4	—	—	—	—	—	1/3
Panthera pardus	Leopard	2	—	—	—	—	—	1/1
Panthera pardus	Leopard (Persian form)	—	2	—	—	—	—	1/1
Panthera onca	Jaguar	3	—	3	2	1	—	1/2
Acinonyx jubatus	Cheetah	2	—	—	—	—	2(2)	—
Pinnipedia								
Zalophus californianus	Californian Sealion	6	—	—	—	—	—	2/4
Tubulidentata								
Orycteropus afer	Aardvark	3	—	—	—	—	—	1/2
Proboscidea								
Elephas maximus	Asian Elephant	2	—	—	—	—	—	0/2
Hyracoidea								
Heterohyrax brucei	Bush Hyrax	7	—	1	1	3	—	1/3
Procavia capensis	Rock Hyrax	10	—	4	4	3	2	2/3
Perissodactyla								
*Hippotigris burchelli**	Common Zebra	1	—	—	—	—	1	—
*Equus zebra**	Mountain Zebra (Hartmann's form)	—	3(2)	—	—	—	—	1/2
*Equus przewalskii**	Przewalski's Horse	3	—	—	—	1	2	—
Tapirus terrestris	Brazilian Tapir	2	—	1	—	—	—	1/2
Diceros bicornis	Black Rhinoceros	1	1(1)	—	—	—	—	1/1
Artiodactyla								
Sus scrofa	Wild Boar	13	—	13	8	—	18	—
Choeropsis liberiensis	Pygmy Hippopotamus	1	—	—	—	—	—	0/1
Lama glama	Llama	5	—	—	—	—	—	5/0
Lama guanicoe	Guanaco	2	—	—	—	—	—	2/0
Lama pacos	Alpaca	1	—	—	—	—	—	1/0
Vicugna vicugna	Vicuna	5	1	1	—	1	1	3/2
Camelus bactrianus	Bactrian Camel	7	—	—	—	2	—	0/5
*Pudu pudu**	Pudu	4	—	1	—	—	—	2/3
Rangifer tarandus	Reindeer	3	2(2)	—	—	—	2(2)	1/2
Okapia johnstoni	Okapi	3	—	1	—	—	—	1/3
Giraffa camelopardalis	Giraffe	6	—	2	—	—	2(1)	3/3
*Tragelaphus eurycerus**	Bongo	5	—	1	—	—	—	3/3
*Tragelaphus strepsiceros**	Greater Kudu	5	—	2	—	1	1(1)	1/4
*Bubalus depressicornis**	Anoa	2	—	—	—	—	—	1/1
*Bos gaurus**	Gaur	4	—	1	—	—	—	3/2
Bison bison	American Bison	3	—	1	—	—	1	1/2

			1	2	3	4	5	6	7
*Hippotragus equinus**	Roan Antelope		7	—	4	1	1	2(1)	1/6
*Oryx leucoryx**	Arabian Oryx		4	1(1)	1	—	—	1(1)	2/3
*Addax nasomaculatus**	Addax		—	1	—	—	—	1	—
*Damaliscus dorcas**	Bontebok		2	—	—	—	—	—	1/1
*Damaliscus dorcas**	Blesbok		1	—	—	—	—	1(1)	—
Antilope cervicapra	Blackbuck		16	—	4	—	3	—	3/14
Ovis canadensis	Bighorn Sheep		9	—	3	—	1	—	4/7
Domestic									
	Pig:	Gloucester Old Spot	2	—	—	—	—	—	1/1
		Miniature	6	—	7	3	—	7	1/2
	Cattle:	Friesian	2	—	1	—	—	—	0/3
		Jersey	1	—	—	—	—	—	0/1
	Goat:	Common	5	—	8	—	1	6(1)	0/6
		Golden Guernsey	1	—	—	—	1	—	—
		Windsor White	—	1(1)	—	—	—	—	1/0
		Nubian	1	—	—	—	—	—	0/1
	Sheep:	Dorset Down	8	—	4	2	1	1	1/7
		Black Welsh Mountain	1	—	—	—	—	—	1/0
		Jacob's	1	—	—	—	—	—	1/0
	Rabbit		23	12	34	—	4	50	1/14
	Guineapig		16	2	28	—	7	29	5/5
	Donkey		1	1	—	—	—	1	1/0
	Pony:	Cream	4	—	—	—	—	—	2/2
		Shetland	1	2	—	—	—	—	0/3
Total Mammals:			**1403**	**65(12)**	**937**	**147**	**304**	**699(11)**	**1255**

BIRDS

Struthioniformes								
Struthio camelus	Ostrich	2	—	—	—	—	2	—
Casuariiformes								
Casuarius bennetti	Bennett's Cassowary	1	—	—	—	—	—	0/1
Casuarius unappendiculatus	One-wattled Cassowary	1	—	—	—	—	—	1/0
Dromaius novaehollandiae	Emu	2	—	—	—	—	—	1/1
Apterygiformes								
Apteryx australis mantelli	North Island Brown Kiwi	3	—	—	—	1	—	0/0/2
Tinamiformes								
Nothoprocta perdicaria	Chilean Tinamou	4	—	—	—	—	4(4)	—
Sphenisciformes								
Spheniscus demersus	Blackfooted Penguin	29	—	10	1	2	—	16/11/9
Spheniscus humboldti	Humboldt's Penguin	3	—	—	—	—	1(1)	1/1
Pelecaniformes								
Pelecanus onocrotalus	Eastern White Pelican	6	—	—	—	—	—	3/3
Pelecanus crispus	Dalmatian Pelican	2	—	—	—	1	—	1/0
Pelecanus occidentalis	Brown Pelican	5	—	—	—	—	—	0/1/4
Morus bassanus	Gannet	3	—	—	—	—	—	0/0/3
Phalacrocorax carbo	Cormorant	5	—	—	—	—	—	2/1/2
Phalacrocorax aristotelis	Shag	2	—	—	—	—	—	2/0
Ciconiiformes								
Nycticorax nycticorax	Night Heron	2	1	—	—	—	—	0/1/2
Ardeola ibis	Cattle Egret	7	—	—	—	1	—	1/4/1
Butorides striatus	Striated Heron	1	—	—	—	—	—	0/0/1
Ardea cinerea	Grey Heron	4	—	—	—	—	—	0/0/4
Ciconia abdimii	Abdim's Stork	24	—	4	1	—	—	4/4/19
Ephippiorhynchus asiaticus	Black-necked Stork	2	—	—	—	—	—	1/1
Threskiornis aethiopicus	Sacred Ibis	35	—	15	6	5	8	1/3/27
Eudocimus ruber	Scarlet Ibis	5	—	—	—	—	—	3/2
Phoenicopterus chilensis	Chilean Flamingo	42	—	4	1	3	1	7/7/27
Anseriformes								
Dendrocygna bicolor	Fulvous Whistling Duck	1	—	—	—	—	—	1/0
Dendrocygna viduata	White-faced Tree Duck	10	—	—	—	1	—	4/5

		1	2	3	4	5	6	7
Dendrocygna arborea	Cuban Tree Duck	2	—	—	—	—	—	1/1
Dendrocygna autumnalis	Red-billed Whistling Duck	1	—	—	—	1	—	—
Anser canagicus	Emperor Goose	2	—	—	—	—	1	0/1
Branta sandvicensis	Hawaiian Goose	8	—	—	—	1	2	2/3
Branta bernicla orientalis	Brent Goose	9	—	—	—	—	—	4/2/3
Cereopsis novaehollandiae	Cape Barren Goose	3	—	3	2	—	1	1/1/1
Aix sponsa	Carolina Duck	5	—	—	—	1	—	3/1
Aix galericulata	Mandarin Duck	3	—	—	—	1	—	2/0
Callonetta leucophrys	Ringed Teal	16	4	—	—	2	1	10/7
Chenonetta jubata	Maned Goose	2	—	—	—	—	—	1/1
Anas penelope	Wigeon	9	—	—	—	1	—	3/5
Anas sibilatrix	Chiloe Wigeon	10	—	6	—	2	—	7/3/4
Anas sibilatrix × *Aythya fuligula*	Hybrid Chiloe Wigeon × Tufted Duck	—	—	2	—	—	—	0/0/2
Anas strepera	Gadwall	2	—	—	—	—	—	1/1
Anas crecca	Teal	2	—	—	—	—	—	1/1
Anas flavirostris oxyptera	Sharp-winged Teal	2	—	—	—	—	—	1/1
Anas platyrhynchus laysanensis	Laysan Duck	2	—	—	—	—	—	1/1
Anas acuta	Pintail	3	—	—	—	—	—	2/1
Anas bahamensis	Bahama Pintail	1	1	—	—	—	—	1/1
Anas versicolor puna	Puna Teal	7	—	—	—	2	—	1/2/2
Anas querquedula	Garganey	4	—	—	—	1	—	2/1
Anas clypeata	Shoveler	2	—	—	—	—	—	1/1
Marmaronetta angustirostris	Marbled Teal	4	—	—	—	—	—	2/2
Netta rufina	Red-crested Pochard	3	—	—	—	—	—	1/2
Aythya valisineria	Canvasback	4	—	—	—	—	—	2/2
Aythya ferina	European Pochard	3	—	—	—	—	—	2/1
Aythya fuligula	Tufted Duck	5	—	2	—	—	—	1/4/2
Somateria mollissima	Eider Duck	17	—	—	—	1	—	8/8
Bucephala clangula	Goldeneye	2	—	—	—	1	—	0/1
Mergus albellus	Smew	—	2	—	—	—	—	1/1
Mergus merganser	Goosander	3	—	2	—	—	—	1/2/2
Oxyura jamaicensis	North American Ruddy Duck	5	—	—	—	—	1	3/1
Falconiformes								
Milvus migrans migrans	Black Kite	1	—	—	—	—	—	1/0
Haliastur indus	Brahminy Kite	1	—	—	—	—	—	1/0
Neophron percnopterus percnopterus	Egyptian Vulture	1	—	—	—	—	—	1/0
Terathopius ecaudata	Bateleur Eagle	3	—	—	—	—	—	1/1/1
Polyboroides typus	Harrier Hawk	2	—	—	—	—	—	1/1
Butastur rufipennis	Grasshopper Buzzard	1	—	—	—	—	—	0/1
Heterospizias meridionalis	Savannah Hawk	1	—	—	—	—	—	1/0
Buteo buteo	Buzzard	1	—	—	—	—	—	0/1
Buteo rufinus	Long-legged Buzzard	1	—	—	—	—	1	—
Buteo regalis	Ferruginous Buzzard	—	2	—	—	—	—	2/0
Polyborus plancus plancus	Common Caracara	2	—	—	—	—	—	2/0
Polihierax semitorquatus	African Pygmy Falcon	2	—	—	—	—	—	1/1
Galliformes								
Penelope purpurascens	Crested Guan	2	—	—	—	—	—	1/1
Crax fasciolata	Bare-faced Curassow	3	—	—	—	—	1(1)	1/1
Lophortyx californica	Californian Quail	1	—	—	—	1	—	—
Alectoris rufa	Red-legged Partridge	4	—	3	—	—	5(4)	1/1
Francolinus francolinus	Black Francolin	—	4	—	—	—	—	2/2
Francolinus pondicerianus	Indian Grey Francolin	4	—	10	3	1	6	2/2
Rollulus rouloul	Crested Wood Partridge	4	—	2	1	1	—	2/2
Bambusicola thoracica	Chinese Bamboo Partridge	2	—	—	—	—	—	1/1
Tragopan satyra	Satyr Tragopan	2	—	—	—	—	—	1/1
Pucrasia macrolopha	Koklass Pheasant	2	1	—	—	1	—	1/1
Lophophorus impeyanus	Impeyan Pheasant	2	—	3	2	—	1	1/1
Gallus sonneratii	Sonnerat's Jungle Fowl	2	—	1	—	—	1	1/1
Lophura leucomelana leucomelana	Nepal Kalij Pheasant	1	—	—	—	—	—	1/0
Lophura nycthemera	Silver Pheasant	2	—	—	—	—	2(2)	—
Lophura imperialis	Imperial Pheasant	2	—	—	—	1	—	1/0
Lophura swinhoii	Swinhoe's Pheasant	2	1	—	—	1	—	1/1
Lophura ignita ignita	Bornean Crested Fireback	2	—	—	—	—	—	1/1
Lophura diardi	Siamese Fire-back Pheasant	2	—	—	—	—	—	1/1
Crossoptilon crossoptilon	White Eared Pheasant	—	2	—	—	—	—	0/0/2
Crossoptilon auritum	Blue Eared Pheasant	2	—	1	—	—	1	1/1
Catreus wallichi	Cheer Pheasant	2	—	—	—	—	—	1/1
Syrmaticus ellioti	Elliot's Pheasant	1	—	—	—	—	—	1/0

		1	2	3	4	5	6	7
Syrmaticus humiae	Hume's Bar-tailed Pheasant	2	—	2	—	—	2	1/1
Syrmaticus mikado	Mikado Pheasant	1	1	—	—	—	—	1/1
Syrmaticus soemmerringi scintillans	Scintillating Copper Pheasant	1	—	—	—	—	—	1/0
Syrmaticus reevesi	Reeves's Pheasant	2	—	—	—	—	—	1/1
Chrysolophus pictus	Golden Pheasant	3	—	1	—	1	1	1/1
Polyplectron bicalcaratum	Peacock Pheasant	1	1	—	—	—	—	1/1
Pavo cristatus	Common Peafowl	2	—	5	—	—	5(5)	1/1
Afropavo congensis	Congo Peafowl	5	—	4	—	5	—	1/2/1
Acryllium vulturinum	Vulturine Guineafowl	5	—	—	—	1	—	3/1
Gruiformes								
Grus japonensis	Red-crowned Crane	—	2(2)	—	—	—	—	2/0
Grus vipio	White-naped Crane	—	2(2)	—	—	—	—	1/1
Grus antigone	Sarus Crane	2	—	—	—	—	—	1/1
Grus rubicunda	Brolga	1	—	—	—	—	—	0/1
Bugeranus carunculatus	Wattled Crane	—	(2)	—	—	—	—	1/1
Anthropoides virgo	Demoiselle Crane	6	—	—	—	—	—	2/4
Anthropoides paradisea	Stanley Crane	2	—	—	—	—	—	1/1
Balearica pavonina	West African Crowned Crane	2	—	—	—	—	—	1/1
Balearica regulorum	South African Crowned Crane	4	—	1	—	—	—	2/2/1
Laterallus leucopyrrhus	White-breasted Crake	2	—	—	—	—	—	1/1
Lissotis melanogaster melanogaster	Black-bellied Bustard	1	—	—	—	—	—	0/1
Charadriiformes								
Haemotopus ostralegus	Oystercatcher	5	—	—	—	1	—	2/2
Himantopus himantopus	Black-winged Stilt	1	—	—	—	—	—	0/0/1
Recurvirostra avosetta	Avocet	6	—	—	—	2	—	2/2
Burhinus oedicnemus	Stone Curlew	8	—	1	—	—	—	2/3/4
Glareola pratincola	Collared Pratincole	1	—	—	—	—	—	0/0/1
Charadrius hiaticula	Ringed Plover	1	—	—	—	—	—	0/0/1
Numenius arquata	Curlew	2	—	—	—	—	—	1/0/1
Tringa totanus	Redshank	1	—	—	—	—	—	0/0/1
Arenaria interpres	Turnstone	3	—	—	—	—	—	0/0/3
Philomachus pugnax	Ruff	2	—	—	—	—	—	0/2
Larus cirrocephalus poiocephalus	Grey-headed Gull	23	—	—	—	2	—	7/7/7
Larus novaehollandiae	Silver Gull	1	—	—	—	1	—	—
Larosterna inca	Inca Tern	4	—	—	—	—	—	1/1/2
Uria aalge	Guillemot	1	—	—	—	—	—	0/0/1
Columbiformes								
Columba guinea	Speckled Pigeon	35	—	2	1	11	1	3/3/18
Columba picazuro	Picazuro Pigeon	2	—	—	—	—	—	1/1
Streptopelia vinacea	Vinaceous Dove	2	—	—	—	—	—	1/1
Streptopelia tranquebarica humilis	Dwarf Turtle Dove	1	—	—	—	—	—	1/0
Streptopelia chinensis chinensis	Chinese Necklace Dove	3	—	—	—	—	—	0/0/3
Turtur tympanistria	Tambourine Dove	2	—	—	—	1	—	0/1
Oena capensis	Cape Dove	3	—	—	—	2	—	0/1
Phaps elegans	Brush Bronzewing	1	—	—	—	—	—	0/1
Ocyphaps lophotes	Crested Pigeon	7	—	1	—	1	—	1/1/5
Geopelia cuneata	Diamond Dove	1	—	—	—	—	—	1/0
Zenaida auriculata	Violet-eared Dove	3	—	—	—	1	—	0/2
Columbina cruziana	Gold-billed Ground Dove	1	—	—	—	—	—	1/0
Geotrygon versicolor	Mountain Witch Dove	3	—	—	—	1	—	0/0/2
Gallicolumba luzonica	Blood-breasted Pigeon	1	—	—	—	—	—	0/0/1
Ducula badia cuprea	Jerdon's Imperial Pigeon	6	—	—	—	—	—	2/2/2
Ducula bicolor	Pied Imperial Pigeon	1	—	—	—	—	—	0/0/1
Psittaciformes								
Trichoglossus euteles	Perfect Lorikeet	1	—	—	—	—	—	1/0
Calyptorhynchus funereus	Funereal Cockatoo	1	—	—	—	—	1	—
Eolophus roseicapillus	Roseate Cockatoo	2	—	—	—	—	—	1/1
Cacatua leadbeateri	Leadbeater's Cockatoo	2	—	—	—	1	—	1/0
Cacatua sanguinea sanguinea	Bare-eyed Cockatoo	1	—	—	—	—	1	—
Cacatua tenuirostris pastinator	Western Slender-billed Cockatoo	3	—	1	—	—	1	1/1/1
Nymphicus hollandicus	Cockatiel	19	—	6	—	2	8	8/6/1
Nestor notabilis	Kea	3	—	—	—	2	—	1/0
Polytelis swainsoni	Barraband Parrakeet	4	—	4	—	2	1	2/1/2
Polytelis anthopeplus	Rock Peplar	15	—	3	—	7	—	5/5/1

		1	2	3	4	5	6	7
Polytelis alexandrae	Princess of Wales' Parrakeet	3	—	1	—	—	—	1/2/1
Platycercus eximius eximius	Eastern Rosella Parrakeet	4	—	—	—	3	—	1/0
Psephotus haematonotus	Red-rumped Parrakeet	2	—	—	—	1	1	—
Neophema bourkii	Bourke's Parrakeet	1	—	—	—	—	1	—
Neophema splendida	Splendid Grass Parrakeet	1	—	—	—	—	1	—
Melopsittacus undulatus	Budgerigar	9	—	8	1	2	2	3/4/5
Psittacus erithacus	Grey Parrot	2	—	—	—	—	—	1/1
Poicephalus cryptoxanthus cryptoxanthus	Southern Brown-headed Parrot	2	—	—	—	—	2	—
Poicephalus rueppellii	Ruppell's Parrot	2	—	—	—	—	—	1/1
Loriculus vernalis	Vernal Hanging Parrot	2	—	—	—	—	—	1/1
Loriculus galgulus	Blue-crowned Hanging Parrot	1	—	—	—	—	—	1/0
Psittacula krameri krameri	African Ring-necked Parrakeet	1	—	—	—	—	1	—
Psittacula krameri manillensis	Indian Ring-necked Parrakeet	7	—	3	—	—	3	4/3
Anodorhynchus hyacinthinus	Hyacinthine Macaw	4	—	—	—	1	—	1/2
Ara ambigua	Buffon's Macaw	2	—	—	—	—	—	1/1
Ara chloroptera	Green-winged Macaw	2	—	—	—	—	—	1/1
Aratinga erythrogenys	Red-masked Conure	1	—	—	—	—	1	—
Aratinga solstitialis	Sun Conure	3	2	—	—	—	—	3/2
Cyanoliseus patagonus byroni	Greater Patagonian Conure	4	—	—	—	—	—	2/2
Pyrrhura frontalis	Red-bellied Conure	1	—	—	—	—	1	—
Brotogeris versicolurus chiriri	Canary-winged Parrakeet	2	—	—	—	1	—	0/0/1
Brotogeris pyrrhopterus	Orange-flanked Parrakeet	2	—	—	—	—	—	1/1
Amazona ochrocephala	Yellow-fronted Amazon Parrot	1	—	—	—	—	—	1/0
Amazona amazonica	Orange-winged Amazon Parrot	2	—	—	—	—	—	0/2
Cuculiformes								
Tauraco corythaix corythaix	Knysna Turaco	1	—	—	—	—	—	0/1
Tauraco erythrolophus	Red-crested Turaco	3	—	3	3	—	—	1/2
Tauraco hartlaubi	Hartlaub's Turaco	5	—	—	—	2	—	2/1
Tauraco leucotis	White-cheeked Turaco	8	—	—	—	1	—	1/2/4
Eudynamys scolopacea chinensis	Chinese Koel	1	—	—	—	—	—	0/0/1
Strigiformes								
Tyto alba	Barn Owl	3	—	5	—	—	2	1/1/2
Otus bakkamoena	Collared Scops Owl	—	2	—	—	—	—	1/1
Otus leucotis	White-faced Scops Owl	8	—	4	—	1	2	1/4/4
Bubo virginianus	Great Horned Eagle Owl	2	—	—	—	—	—	1/1
Bubo bubo bubo	European Eagle Owl	2	—	—	—	—	—	1/1
Bubo bubo turcomanus	Turkmenian Eagle Owl	2	2	—	—	—	2	1/1
Bubo capensis mackinderi	Kenya Eagle Owl	2	1	—	—	—	1	1/1
Bubo africanus africanus	Spotted Eagle Owl	3	—	2	—	—	3	1/1
Bubo africanus cinerascens	Abyssinian Spotted Eagle Owl	3	1	—	—	—	2	1/1
Bubo vosseleri	Nduk Eagle Owl	3	—	—	—	—	—	3/0
Ketupa zeylonensis	Brown Fish Owl	1	—	—	—	1	—	—
Ketupa ketupu	Javan Fish Owl	2	—	—	—	—	—	0/2
Scotopelia bouvieri	Vermiculated Fishing Owl	2	—	—	—	—	—	1/1
Pulsatrix perspicillata	Spectacled Owl	2	—	—	—	—	—	1/1
Nyctea scandiaca	Snowy Owl	2	—	1	—	—	1	1/1
Ninox novaeseelandiae	Boobook Owl	2	—	2	—	—	2	1/1
Athene noctua	Little Owl	4	—	—	—	—	2	1/1
Athene brama	Spotted Owlet	4	—	—	—	—	—	2/2
Ciccaba woodfordii	African Wood Owl	2	—	—	—	—	2	—
Strix hylophila	Rusty Barred Owl	2	—	—	—	—	1	1/0
Strix uralensis	Ural Owl	—	6	—	—	—	—	3/3
Strix nebulosa	Great Grey Owl	1	1	—	—	—	—	1/1
Asio otus	Long-eared Owl	2	—	—	—	—	—	1/1
Asio flammeus	Short-eared Owl	1	1	—	—	—	—	1/1
Coraciiformes								
Dacelo novaeguineae	Kookaburra	2	—	1	1	—	—	1/1
Momotus momota	Blue-crowned Motmot	3	—	—	—	1	—	1/1
Coracias caudata	Lilac-breasted Roller	1	—	—	—	—	—	0/0/1
Tockus alboterminatus	Crowned Hornbill	1	—	—	—	—	—	0/1
Tockus erythrorhynchus	Red-billed Hornbill	3	—	—	—	—	—	2/1
Tockus deckeni jacksoni	Jackson's Hornbill	1	—	—	—	—	—	1/0
Penelopides panini	Tarictic Hornbill	4	—	2	1	—	—	1/4

		1	2	3	4	5	6	7
Aceros undulatus	Wreathed Hornbill	1	—	—	—	—	—	0/1
Anthracoceros malayanus	Black Hornbill	1	—	—	—	—	—	0/1
Anthracoceros coronatus convexus	Southern Pied Hornbill	1	2	—	—	—	—	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	2	—	—	—	—	—	0/0/2
Tricholaema lacrymosum	Spotted-flanked Barbet	1	—	—	—	—	—	1/0
Lybius guifsobalito	Black-billed Barbet	1	—	—	—	—	—	0/1
Trachyphonus darnaudi	D'Arnaud's Barbet	1	—	—	—	—	—	0/0/1
Pteroglossus aracari	Black-necked Aracari	2	—	—	—	—	—	1/1
Pteroglossus castanotis	Chestnut-eared Aracari	1	—	—	—	—	—	0/1
Baillonius bailloni	Saffron Toucanet	1	—	—	—	—	—	0/1
Ramphastos tucanus	Red-billed Toucan	2	—	—	—	—	—	1/1
Ramphastos swainsoni	Swainson's Toucan	4	—	—	—	3	—	0/1
Ramphastos citrolaemus	Citron-throated Toucan	2	—	—	—	—	2(2)	—
Melanerpes candidus	White Woodpecker	2	1	—	—	1	—	1/1
Picoides major	Great Spotted Woodpecker	—	1	—	—	—	—	0/1
Passeriformes								
Procnias nudicollis	Naked-throated Bellbird	1	—	—	—	—	—	1/0
Motacilla alba	Pied Wagtail	1	—	—	—	—	—	0/0/1
Pycnonotus leucogenys	White-eared Bulbul	1	—	—	—	—	—	0/0/1
Pycnonotus cafer bengalensis	Red-vented Bulbul	2	—	—	—	—	—	0/0/2
Hypsipetes madagascariensis	Black Bulbul	2	—	—	—	1	—	1/0
Chloropsis aurifrons	Golden-fronted Leafbird	1	1	—	—	—	—	0/1/1
Irena puella	Fairy Bluebird	3	—	—	—	1	—	1/1
Copysychus malabaricus indicus	White-rumped Shama	1	—	—	—	1	—	—
Turdus olivaceus	African Thrush	4	—	—	—	—	—	1/1/2
Turdus pilaris	Fieldfare	1	—	—	—	1	—	—
Turdoides striatus	Jungle Babbler	1	—	—	—	1	—	—
Garrulax albogularis	White-throated Jay Thrush	1	—	—	—	—	—	0/0/1
Garrulax leucolophus	White-crested Laughing Thrush	6	—	—	—	2	—	2/2
Garrulax pectoralis	Necklaced Laughing Thrush	1	—	—	—	—	—	0/0/1
Garrulax chinensis	Black-throated Laughing Thrush	3	—	—	—	—	—	1/2
Garrulax cineraceus	Moustached Laughing Thrush	1	—	—	—	—	—	0/1
Garrulax sannio	White-browed Laughing Thrush	—	2	—	—	—	—	1/1
Leiothrix lutea	Pekin Robin	8	2	—	—	—	2	1/0/7
Malurus cyaneus	Superb Blue Wren	2	—	—	—	1	—	0/1
Malurus splendens	Splendid Fairy Wren	1	—	—	—	1	—	—
Zosterops erythropleura	Chestnut-flanked White-eye	1	—	—	—	1	—	—
Zosterops flava	Javan White-eye	1	—	—	—	—	—	0/1
Zosterops simplex	Chinese White-eye	2	—	—	—	—	—	0/0/2
Emberiza rutila	Chestnut Bunting	1	—	—	—	—	—	1/0
Sicalis flaveola	Saffron Finch	2	—	4	—	1	—	1/1/3
Volatina jacarini	Jacarini Finch	1	—	—	—	—	—	0/1
Sporophila torqueola	White-collared Seedeater	2	—	—	—	—	—	0/0/2
Sporophila luctuosa	Black & White Seedeater	2	—	—	—	—	—	1/1
Sporophila telasco	Chestnut-throated Seedeater	1	—	—	—	1	—	—
Gubernatrix cristata	Green Cardinal	1	—	—	—	—	—	0/1
Paroaria coronata	Red-crested Cardinal	2	—	—	—	—	—	1/1
Ramphocelus nigrogularis	Masked Crimson Tanager	1	—	—	—	1	—	—
Ramphocelus carbo	Silver-beaked Tanager	2	—	—	—	—	—	1/1
Ramphocelus flammigerus icteronotus	Lemon-rumped Tanager	1	—	—	—	—	—	0/1
Thraupis episcopus	Blue Grey Tanager	2	—	—	—	1	—	0/0/1
Cyanerpes cyaneus	Red-legged Honeycreeper	1	—	—	—	—	—	0/1
Cacicus melanicterus	Mexican Cacique	1	—	—	—	—	—	1/0
Molothrus bonariensis	Shiny Cowbird	2	—	—	—	—	—	2/0
Serinus leucopygius	Grey Singing Finch	—	1	—	—	1	—	—
Serinus mozambicus	Green Singing Finch	7	—	—	—	1	—	3/3
Serinus flaviventris	St. Helena Seedeater	1	—	—	—	—	—	1/0
Carduelis chloris	Greenfinch	4	—	—	—	2	—	0/0/2

		1	2	3	4	5	6	7
Carduelis carduelis	Goldfinch	1	—	—	—	—	—	0/0/1
Pytilia phoenicoptera	Red-winged Pytilia	1	—	—	—	—	—	1/0
Lagonosticta rufopicta	Bar-breasted Fire Finch	1	—	—	—	—	—	1/0
Uraeginthus bengalus	Red-cheeked Cordon Bleu	1	—	—	—	—	—	0/1
Estrilda caerulescens	Lavender Finch	1	—	—	—	1	—	—
Estrilda melpoda	Orange-cheeked Waxbill	4	—	—	—	2	—	1/0/1
Estrilda troglodytes	Red-eared Waxbill	4	—	—	—	—	—	1/2/1
Amandava amandava	Avadavat	1	—	—	—	—	—	1/0
Amandava amandava punicea	Strawberry Finch	2	—	—	—	—	—	1/1
Amandava formosa	Green Avadavat	2	—	—	—	—	—	1/1
Amandava subflava	Golden-breasted Waxbill	5	3	—	—	—	—	3/3/2
Neochima ruficauda	Star Finch	2	—	—	—	—	—	1/1
Poephila guttata	Zebra Finch	2	—	—	—	—	—	1/1
Poephila bichenovii	Bicheno's Finch	2	—	—	—	—	—	1/1
Poephila acuticauda hecki	Heck's Grass Finch	5	—	—	—	—	—	2/2/1
Erythrura trichroa	Blue-faced Parrot Finch	—	2	—	—	—	—	1/1
Lonchura malabarica cantans	African Silverbill	1	—	—	—	—	—	1/0
Lonchura striata (domesticated)	Bengalese Finch	1	—	—	—	—	—	1/0
Lonchura molucca	Moluccan Mannikin	1	—	—	—	—	—	0/0/1
Lonchura maja	White-headed Mannikin	3	—	—	—	1	—	1/0/1
Lonchura pallida	Pallid Finch	2	—	—	—	1	—	1/0
Padda oryzivora	Java Sparrow	3	—	—	—	—	—	1/1/1
Amadina fasciata	Cut-throat Finch	2	—	—	—	—	—	0/1/1
Ploceus cucullatus	Spotted-backed Weaver	1	—	—	—	—	—	1/0
Quelea quelea	Red-beaked Weaver	2	—	—	—	—	—	1/0/1
Euplectes afer	Napoleon Weaver	2	—	—	—	1	—	1/0
Vidua chalybeata	Combassou	5	—	—	—	1	—	2/2
Lamprotornis purpureus	Purple Glossy Starling	5	2	—	—	—	—	5/2
Lamprotornis chalybaeus	Green Glossy Starling	5	1	—	—	1	—	4/0/1
Spreo superbus	Superb Glossy Starling	4	5	—	—	1	2	3/3
Creatophora cinerea	Wattled Starling	6	—	—	—	—	—	4/2
Sturnus roseus	Rose-coloured Starling	—	4	—	—	—	—	3/1
Sturnus contra	Asian Pied Starling	1	—	—	—	—	—	1/0
Sturnus vulgaris	Common Starling	1	—	—	—	—	—	1/0
Leucopsar rothschildi	Rothschild's Grackle	7	6	—	—	3	1	4/5
Acridotheres cristatellus cristatellus	Chinese Crested Mynah	2	1	—	—	—	—	2/1
Gracula religiosa religiosa	Javan Hill Mynah	1	—	—	—	—	—	0/0/1
Gracula religiosa intermedia	Nepal Hill Mynah	3	2	—	—	—	—	2/1/2
Cyanocorax cyanopogon	Pileated (White-naped) Jay	1	—	—	—	—	—	0/1
Pica pica pica	Magpie	1	—	—	—	—	1	—
Pyrrhocorax graculus	Alpine Chough	1	—	—	—	1	—	—
Corvus corax corax	Raven	2	—	—	—	—	—	1/1
Corvus albicollis	White-necked Raven	2	—	—	—	—	—	1/1

Domestic

Common Duck	4	—	—	—	—	—	1/3
Silky Bantam	2	—	—	—	2	—	—
Old English Game Bantam	8	3	8	—	2	6(3)	3/4/4
Domestic Chicken	—	4	—	—	2	—	0/2
Total: Birds	**994**	**85(6)**	**143**	**24**	**133**	**110(22)**	**955**

REPTILES

Testudines

Sternotherus odoratus	Stinkpot	5	1	2	—	1	4	1/2
Kinosternon subrubrum	Eastern Mud Terrapin	1	—	—	—	—	—	0/0/1
Kinosternon scorpioides	Scorpion Mud Terrapin	2	—	—	—	—	—	1/1
Kinosternon leucostomum	White-mouthed Mud Terrapin	—	1	—	—	—	1	—
Pseudemys scripta dorbignyi	South American Ornate Terrapin	2	—	—	—	—	—	0/2
Pseudemys scripta elegans	Red-eared Terrapin	2	2	—	—	—	—	1/3
Mauremys caspica leprosa	Spanish Terrapin	1	—	—	—	—	1	—
Emys orbicularis	European Pond Tortoise	3	—	—	—	—	—	2/1
Terrapene carolina	Carolina Box Terrapin	1	—	—	—	—	—	0/1
Terrapene carolina triunguis	Three-toed Box Terrapin	2	1	—	—	1	—	1/1
Terrapene ornata	Ornate Box Terrapin	—	1	—	—	1	—	—
Kinixys homeana	Home's Hinged Tortoise	—	3	—	—	—	3	—
Testudo hermanni	Hermann's Tortoise	—	1	—	—	—	—	0/1
Geochelone gigantea gigantea	Aldabra Giant Tortoise	3	—	—	—	—	3	—
Geochelone carbonaria	Red-footed Tortoise	2	—	—	—	—	—	1/1

		1	2	3	4	5	6	7
Eretmochelys imbricata	Hawksbill Turtle	1	1	—	—	—	—	0/1/1
Chelus fimbriatus	Matamata	1	—	—	—	—	—	0/1
Chelodina longicollis	Long-necked Terrapin	2	4	—	—	—	—	2/4
Trionyx hurum	Peacock Soft-shelled Turtle	2	—	—	—	—	—	1/1
Trionyx sinensis	Chinese Soft-shelled Turtle	2	1	—	—	1	2	—
Crocodylia								
Alligator mississippiensis	American Alligator	3	—	—	—	—	—	1/2
Alligator sinensis	Chinese Alligator	3	—	—	—	—	—	1/2
Sauria								
Sp. inc.	Gecko	—	2	—	—	—	—	0/0/2
Teratoscincus scincus	Turkestan Gecko	—	2	—	—	—	—	0/0/2
Stenodactylus sthenodactylus	Elegant Gecko	—	13	—	—	1	—	0/0/12
Hemitheconyx caudicinctus	Fat-tailed Gecko	21	—	15	1	2	4	3/15/11
Chondrodactylus angulifer	Namib Sand Gecko	34	1	32	3	11	7	12/15/19
Phyllurus platurus	Leaf-tailed Gecko	3	2	—	—	3	—	1/1
Tropiocolotes steudneri	Steudner's Gecko	—	10	—	—	2	—	0/0/8
Cyrtodactylus pulchellus	Malayan Bent-toed Gecko	—	10	—	—	1	—	4/5
Ptyodactylus hasselquistii	Fan-footed Gecko	—	8	—	—	1	—	3/4
Hoplodactylus duvauceli	Duvaucel's Gecko	—	2	—	—	2	—	—
Diplodactylus ciliaris	Spiny-tailed Gecko	3	1	—	—	1	—	2/1
Gekko gecko	Tokay Gecko	1	4	1	—	1	—	1/3/1
Tarentola mauritanica	Moorish Gecko	1	—	—	—	—	—	0/0/1
Tarentola annularis	Egyptian Gecko	—	4	—	—	—	4	—
Eublepharis macularius	Leopard Ground Gecko	23	—	73	—	3	67	5/12/9
Anolis richardi	Richard's Anole	5	—	—	—	1	—	0/0/4
Anolis carolinensis	Carolina Anole	—	1	—	—	—	1	—
Laemanctus longipes deborrei	Casque-headed Lizard	1	—	—	—	—	—	0/0/1
Basiliscus vittatus	Banded Basilisk	2	—	—	—	1	1	—
Basiliscus plumifrons	Plumed Basilisk	5	—	—	—	2	1	1/1
Liolaemus multiformis	Andean Smooth-throated Lizard	8	—	—	—	3	1	1/3
Cyclura cornuta	Rhinoceros Iguana	3	3	8	—	1	3	3/2/5
Sauromalus obesus	Chuckwalla	4	—	—	—	2	—	0/2
Sp. inc.	Agama	—	1	—	—	—	1	—
Amphibolurus vitticeps	Inland Bearded Dragon	1	—	—	—	—	1	—
Physignathus lesueurii	Lesueur's Water Dragon	6	1	—	—	—	1	1/3/2
Physignathus cocincinus	Cochin China Water Dragon	3	—	—	—	—	—	1/1/1
Uromastyx hardwicki	General Hardwicke's Dabb-Lizard	6	—	—	—	1	—	0/0/5
Chamaeleo dilepis	Flap-necked Chameleon	—	9	—	—	2	—	0/1/6
Egernia striolata	Australian Tree Skink	7	—	13	—	1	6	1/1/11
Sphenomorphus quoyii	Golden Water Skink	6	1	7	—	5	6	1/1/1
Trachydosaurus rugosus	Shingleback	2	—	—	—	2	—	—
Tiliqua scincoides scincoides	Eastern Blue-tongued Skink	—	1	—	—	—	—	0/0/1
Tiliqua scincoides intermedia	Northern Blue-tongued Skink	1	—	—	—	—	—	1/0
Tiliqua nigrolutea	Blotched Blue-tongued Skink	4	—	—	—	1	1	0/0/2
Mabuya sp.	Skink	—	1	—	—	—	1	—
Mabuya brevicollis	Short-necked Skink	1	—	—	—	—	—	1/0
Mabuya quinquetaeniata	Five-lined Skink	—	5	—	—	1	4	—
Mabuya perrotetii	Orange-flanked Skink	—	1	—	—	—	1	—
Ctenotus taeniolatus	Coppertailed Skink	4	—	—	—	2	2	—
Leiolopisma telfairii	Round Island Skink	5	—	—	—	—	—	3/2
Chalcides ocellatus	Eyed Skink	4	—	13	—	1	13	1/1/1
Gerrhosaurus major	Greater Plated Lizard	5	—	—	—	2	—	2/1
Lacerta sp.	Lizard	1	2	—	—	1	1	0/0/1
Lacerta agilis	Sand Lizard	5	—	—	—	3	—	1/1
Lacerta lepida	Eyed Lizard	8	—	48	3	13	36	2/2
Lacerta vivipara	Common Lizard	6	—	—	—	1	—	2/1/2
Lacerta princeps	Zagros Lizard	1	—	—	—	1	—	—
Podarcis lilfordi	Lilford's Wall Lizard	2	—	—	—	1	—	0/1
Algyroides nigropunctatus	Corfu Lizard	2	—	—	—	—	—	1/1
Trogonophis wiegmanni	Wiegmann's Burrowing Lizard	1	—	—	—	—	—	0/0/1
Varanus griseus	Grey Monitor	—	1	—	—	—	—	0/0/1
Heloderma suspectum	Gila Monster	2	4	—	—	1	—	2/3
Ophisaurus apodus	European Glass Snake	2	1	—	—	—	1	0/0/2
Anguis fragilis	Slow-worm	3	—	—	—	1	—	0/0/2
Cordylus warreni breyeri	Breyer's Girdled Lizard	3	—	—	—	1	—	2/0
Pseudocordylus microlepidotus	Small-scaled Girdled Lizard	2	—	—	—	—	—	0/2

		1	2	3	4	5	6	7
Serpentes								
Liasis fuscus	Australian Water Python	4	—	—	—	1	—	1/2
Liasis childreni	Children's Python	8	—	10	—	3	8	2/2/3
Liasis boa	Blue-ring Python	1	1	—	—	—	—	1/1
Morelia spilotus spilotus	Diamond Python	4	1	—	—	—	—	4/1
Morelia spilotus variegata	Carpet Python	2	4	—	—	2	1	3/0
Python molurus bivittatus	Malaysian Rock Python	3	—	14	2	1	11	1/2
Python regius	Royal Python	3	3	—	—	2	2	1/1
Calabaria reinhardtii	Calabar Ground Python	2	—	—	—	2	—	—
Eunectes notaeus	Yellow Anaconda	3	—	—	—	—	—	1/2
Boa constrictor	Boa Constrictor	12	1	—	—	—	4	3/6
Eryx colubrinus	Theban Sand Boa	2	—	—	—	1	1	—
Natrix sp.	Snake	—	1	—	—	1	—	—
Natrix natrix helvetica	Grass Snake	1	1	—	—	2	—	—
Natrix tessellata	Diced Water Snake	—	1	—	—	—	1	—
Thamnophis sirtalis	Garter Snake	—	1	—	—	—	1	—
Thamnophis sirtalis parietalis	Red-sided Garter Snake	—	1	—	—	—	—	0/0/1
Boaedon fuliginosus	African House Snake	—	1	—	—	—	—	0/0/1
Drymarchon corais melanurus SS Dumeril, Bibron & Dumeril	South American Corais Snake	—	1	—	—	—	—	1/0
Drymarchon corais couperi	Eastern Indigo Snake	3	—	—	—	—	1	1/1
Elaphe guttata	Corn Snake	2	—	21	2	—	19	1/1
Elaphe obsoleta obsoleta	Black Rat Snake	2	4	6	—	—	10	1/1
Coluber najadum	Dahl's Whip Snake	1	—	—	—	—	—	1/0
Pituophis melanoleucus melanoleucus	Northern Pine Snake	3	—	3	—	—	3	2/1
Arizona elegans elegans	Kansas Glossy Snake	—	2	—	—	—	—	0/0/2
Hydrodynastes gigas	Boipevassu Snake	2	—	5	—	1	5	1/0
Coronella austriaca	Smooth Snake	1	—	—	—	—	—	1/0
Lampropeltis getulus holbrooki	Speckled King Snake	—	1	—	—	—	—	0/0/1
Lampropeltis getulus californiae	Californian King Snake	4	1	10	—	—	11	1/3
Lampropeltis triangulum sinaloae	Sinaloan Milk Snake	10	1	15	1	—	16	4/5
Lampropeltis triangulum hondurensis	Honduras King Snake	4	—	3	—	—	4	2/1
Lampropeltis triangulum annulata	Mexican Milk Snake	5	2	—	—	—	3	2/2
Lampropeltis triangulum campbelli	Pueblan King Snake	3	—	—	—	—	—	1/2
Lampropeltis pyromelana pyromelana	Arizona Mountain King Snake	6	—	2	—	1	3	2/1/1
Lampropeltis mexicana alterna	Grey-banded King Snake	10	—	3	—	—	10	1/2
Crotaphopeltis hotamboeia	White-lipped Herald Snake	—	1	—	—	—	1	—
Malpolon monspessulanus	Montpellier Snake	1	—	—	—	—	1	—
Psammophis subtaeniatus	Peter's Long-lined Snake	—	4	—	—	2	—	0/0/2
Dispholidus typus	Boomslang	1	—	—	—	—	—	1/0
Oxyuranus scutellatus scutellatus	Taipan	2	—	—	—	—	—	0/2
Notechis scutatus scutatus	Tiger Snake	2	—	—	—	2	—	—
Walterinnesia aegyptia	Innes' Cobra	3	—	—	—	—	—	1/2
Naja melanoleuca	Black & White Cobra	1	—	—	—	—	—	1/0
Naja mossambica pallida	Mozambique Spitting Cobra	2	—	—	—	—	—	1/1
Naja naja kaouthia	Indian Cobra	4	—	—	—	—	2	1/1
Dendroaspis viridis	Hallowell's Green Mamba	2	—	—	—	1	—	1/0
Dendroaspis polylepis	Black Mamba	2	—	—	—	1	—	1/0
Vipera berus	Adder	1	2	—	—	—	—	0/1/2
Vipera palaestinae	Palestine Viper	2	—	—	—	1	—	0/1
Vipera ammodytes meridionalis	Long-nosed Viper	5	—	—	—	—	2	2/1
Bitis arietans arietans	Puff Adder	2	—	—	—	1	—	0/1
Bitis gabonica rhinoceros	Gaboon Viper	2	—	—	—	—	—	0/2
Echis carinatus sochureki	Carpet Viper	8	—	—	—	1	—	1/0/6
Agkistrodon contortrix mokeson	Northern Copperhead	2	—	—	—	—	—	1/1
Calloselasma rhodostoma	Malayan Pit Viper	—	2	18	—	—	—	1/1/18
Sistrurus catenatus tergeminus	Western Massasauga	4	—	—	—	1	—	1/1/1
Crotalus durissus culminatus	Neotropical Rattlesnake	7	—	—	—	—	3	2/2
Crotalus vegrandis	Uracoan Rattlesnake	3	—	—	—	—	—	1/2
Crotalus atrox	Western Diamond-back Rattlesnake	1	—	—	—	—	—	1/0
	Total: Reptiles	**403**	**144**	**322**	**12**	**110**	**301**	**446**

AMPHIBIANS

Caudata								
Andrias japonicus	Japanese Giant Salamander	1	—	—	—	—	—	0/0/1
Triturus cristatus	Great Crested Newt	7	—	—	—	—	—	3/4

		1	2	3	4	5	6	7
Triturus marmoratus	Marbled Newt	1	—	—	—	—	—	0/0/1
Triturus vulgaris	Smooth Newt	6	—	—	—	—	6	—
Triturus helveticus	Palmate Newt	4	—	—	—	2	2	—
Triturus alpestris	Alpine Newt	2	—	—	—	—	—	0/0/2
Cynops pyrrhogaster	Japanese Newt	3	—	—	—	1	—	0/1/1
Taricha granulosa	Rough-skinned Newt	2	—	—	—	1	—	0/0/1
Pleurodeles waltl	Spanish Ribbed Newt	4	—	—	—	1	—	0/0/3
Salamandra salamandra	Fire Salamander	6	2	8	4	—	—	0/0/12
Ambystoma tigrinum	Tiger Salamander	1	—	—	—	1	—	—
Ambystoma mexicanum	Axolotl	38	—	50	45	18	—	0/0/25
Ambystoma maculatus	American Spotted Salamander	1	—	—	—	—	—	0/0/1
Anura								
Xenopus laevis	Clawed Frog	5	—	—	—	—	—	0/0/5
Xenopus tropicalis	Tropical Clawed Frog	9	—	—	—	—	—	0/0/9
Pipa pipa	Surinam Toad	2	2	—	—	1	—	1/0/2
Bombina orientalis	Oriental Toad	10	7	3	—	10	—	2/6/2
Bufo viridis	Green Toad	5	—	—	—	—	—	2/2/1
Bufo bufo	Common Toad	4	2	—	—	—	—	2/0/4
Bufo asper	Siamese Toad	1	—	—	—	1	—	—
Bufo marinus	Cane Toad	3	1	—	—	—	—	1/0/3
Bufo calamita	Natterjack Toad	—	2	—	—	—	—	2/0
Bufo terrestris	Southern Toad	—	1	—	—	—	—	0/0/1
Dendrobates auratus	Arrow Poison Frog	3	3	—	—	4	—	0/0/2
Hyla arborea	European Tree Frog	10	12	—	—	15	4	0/0/3
Hyla cinerea	Green Tree Frog	3	—	—	—	1	—	1/1
Hyla versicolor	American Grey Tree Frog	3	2	—	—	5	—	—
Hyla rubra	Daudin's Hyla	2	3	—	—	—	—	1/1/3
Hyla septentrionalis	Cuban Tree Frog	4	2	—	—	5	—	0/0/1
Rana ridibunda	Marsh Frog	6	—	—	—	1	—	0/2/3
Rana temporaria	Common Frog	10	—	—	—	1	—	3/3/3
Rana catesbeiana	American Bullfrog	4	7	—	—	4	2	0/0/5
Rana erythrea	Gold-lined Frog	2	—	—	—	1	—	0/0/1
Litoria caerulea	White's Tree Frog	4	11	—	—	11	—	1/0/3
Kaloula pulchra	Malayan Bullfrog	1	—	—	—	—	—	0/0/1
Polypedates leucomystax	Bamboo Tree Frog	2	—	—	—	2	—	—
	Total: Amphibians	**169**	**57**	**61**	**49**	**86**	**14**	**138**

WHIPSNADE PARK

MAMMALS

Marsupialia								
Macropus rufogriseus	Red-necked Wallaby	383	1(1)	343	1	53	132(5)	15/21/505
Primates								
Saimiri sciureus	Squirrel Monkey (Black-capped form)	18	—	3	—	2	5	4/7/3
Callithrix jacchus	Common Marmoset	6	—	4	2	1	—	3/1/3
Pan troglodytes	Chimpanzee	8	—	1	—	—	—	4/5
Rodentia								
Cynomys ludovicianus	Prairie Marmot	82	—	—	—	—	—	0/0/82
Dolichotis patagonum	Mara	18	—	3	—	7	—	4/4/6
Cetacea								
Tursiops truncatus	Bottle-nosed Dolphin	2	—	—	—	—	2	—
Carnivora								
Canis lupus	Grey Wolf	22	—	5	—	7	—	6/12/2
Fennecus zerda	Fennec Fox	2	—	—	—	—	—	1/1
Ursus arctos	Brown Bear	5	—	—	—	—	—	2/3
Ailurus fulgens	Red Panda	2	—	—	—	—	—	1/1
Nasua nasua	Ring-tailed Coati	8	—	9	1	—	8	1/7
Panthera leo	Lion	3	—	—	—	—	—	1/2
Panthera tigris	Tiger (Siberian form)	4	—	4	—	—	2	2/4
Panthera onca	Jaguar	5	1	—	—	1	2	1/2
Acinonyx jubatus	Cheetah	18	3(2)	3	—	2	7	5/10

		1	2	3	4	5	6	7
Pinnipedia								
Zalophus californianus	Californian Sealion	2	—	—	—	—	—	1/1
Phoca vitulina	Common Seal	1	—	—	—	—	—	1/0
Halichoerus grypus	Grey Seal	1	—	—	—	—	—	0/1
Proboscidea								
Elephas maximus	Asian Elephant	1	—	—	—	—	—	0/1
Loxodonta africana	African Elephant	2	—	—	—	—	—	1/1
Perissodactyla								
Equus zebra	Mountain Zebra (Hartmann's form)	—	2	—	—	—	2(2)	—
Equus grevyi	Grevy's Zebra	6	1	—	—	1	—	2/4
Equus hemionus	Asiatic Wild Ass (Persian form)	8	1	3	—	3	1	1/7
Equus przewalskii	Przewalski's Horse	9	1	4	2	1	3	3/5
Rhinoceros unicornis	Indian Rhinoceros	3	—	—	—	—	1	1/1
Ceratotherium simum	White Rhinoceros	9	—	1	—	—	—	2/8
Diceros bicornis	Black Rhinoceros	2	1	—	—	—	1(1)	1/1
Artiodactyla								
Phacochoerus aethiopicus	Wart Hog	1	—	—	—	—	—	1/0
Tayassu tajacu	Collared Peccary	8	—	—	—	1	—	4/3
Hippopotamus amphibius	Hippopotamus	2	—	—	—	—	—	1/1
Choeropsis liberiensis	Pygmy Hippopotamus	5	—	—	—	—	1	0/4
Lama guanicoe	Guanaco	11	—	—	—	1	1	2/7
Camelus bactrianus	Bactrian Camel	10	—	4	1	1	—	3/9
Camelus dromedarius	Arabian Camel	3	—	1	—	1	—	0/3
Muntiacus reevesi	Reeves's Muntjac	11	—	12	—	3	5	7/6/2
Dama dama	Fallow Deer	37	—	9	—	—	—	18/22/6
Axis axis	Axis Deer	28	—	16	8	2	3	12/17/2
Axis porcinus	Hog Deer	28	—	11	4	2	—	14/19
Cervus duvauceli	Barasingha	20	—	8	6	2	1	10/9
Cervus nippon	Sika Deer (Formosan form)	43	—	20	7	1	—	21/33/1
Cervus elaphus	Red Deer	24	13	—	—	—	—	1/36
Elaphurus davidianus	Pere David's Deer	36	—	9	1	2	4	7/29/2
Rangifer tarandus	Reindeer	12	2(2)	5	—	1	5(2)	3/10
Hydropotes inermis	Chinese Water Deer	114	—	111	2	18	39	0/0/166
Giraffa camelopardalis	Giraffe	3	1(1)	—	—	—	—	1/3
Tragelaphus angasi	Nyala	3	—	—	—	1	—	2/0
Tragelaphus spekei	Sitatunga	11	—	5	—	2	4	4/6
Tragelaphus strepsiceros	Greater Kudu	—	2(1)	—	—	1	—	1/0
Boselaphus tragocamelus	Nilgai	29	—	24	8	8	10	8/19
Bos grunniens	Yak	14	—	5	1	2	—	7/9
Syncerus caffer	African Buffalo	5	—	1	—	—	—	3/3
Bison bonasus	European Bison	12	—	4	—	—	5	3/8
Hippotragus equinus	Roan Antelope	5	1(1)	—	—	—	—	4/2
Kobus ellipsiprymnus	Common Waterbuck	8	1	3	1	2	—	3/6
Oryx gazella	Gemsbok	3	—	—	—	—	—	2/1
Oryx tao	Scimitar-horned Oryx	14	1	6	3	1	4	4/9
Oryx leucoryx	Arabian Oryx	3	1(1)	—	—	1	1(1)	2/0
Damaliscus dorcas	Blesbok	—	1(1)	—	—	—	—	0/1
Antilope cervicapra	Blackbuck	12	—	—	—	3	1	8/0
Gazella thomsoni	Thomson's Gazelle	9	1	5	2	4	—	4/5
Ovibos moschatus	Musk Ox	4	—	—	—	—	—	0/4
Ovis musimon	Mouflon	32	—	25	7	8	1	12/22/7
Domestic								
	Ponies	16	1	—	—	1	11	3/2
	Pygmy Donkey	2	—	—	—	—	—	1/1
	Ankole Cattle	2	—	—	—	—	1	1/0
	Windsor White Goat	15	—	6	—	—	8(1)	3/10
	Domestic Goat	—	1(1)	—	—	—	—	0/1
Total: Mammals		**1225**	**37(11)**	**673**	**57**	**147**	**271(12)**	**1460**
BIRDS								
Rheiformes								
Rhea americana	Common Rhea	5	—	—	—	1	—	2/1/1

		1	2	3	4	5	6	7
Casuariiformes								
Casuarius casuarius	Australian Cassowary	2	—	—	—	—	—	1/1
Dromaius novaehollandiae	Emu	8	—	1	—	—	1	2/2/4
Tinamiformes								
Nothoprocta perdicaria	Chilean Tinamou	—	4(4)	—	—	1	—	0/0/3
Spenisciformes								
Aptenodytes patagonica	King Penguin	13	—	—	—	1	—	4/4/4
Eudyptes crestatus	Rockhopper Penguin	8	—	—	—	—	—	5/3
Spheniscus humboldti	Humboldt's Penguin	44	1(1)	22	1	3	18	13/13/19
Ciconiiformes								
Ciconia ciconia	White Stork	9	—	—	—	1	—	3/3/2
Phoenicopterus ruber roseus	Greater Flamingo	35	—	—	—	1	—	8/17/9
Phoenicopterus ruber ruber	Rosy Flamingo	59	—	5	—	2	—	20/20/22
Anseriformes								
Cygnus atratus	Black Swan	13	—	4	—	1	—	3/9/4
Cygnus melanocoryphus	Black-necked Swan	1	—	—	—	—	—	0/1
Cygnus cygnus	Whooper Swan	3	—	—	—	—	—	1/2
Anser anser	Greylag Goose	5	—	—	—	1	—	1/1/2
Anser indicus	Bar-headed Goose	60	—	12	—	3	—	17/27/25
Anser caerulescens caerulescens	Lesser Snow Goose	12	—	—	—	—	1	2/3/6
Anser caerulescens atlanticus	Greater Snow Goose	5	—	—	—	1	1	1/0/2
Anser canagicus	Emperor Goose	17	—	—	—	1	5	4/4/3
Branta sandvicensis	Hawaiian Goose	2	—	—	—	—	—	1/1
Branta leucopsis	Barnacle Goose	44	—	5	—	3	—	8/6/32
Branta bernicla orientalis	Brent Goose	2	—	—	—	—	—	1/1
Branta ruficollis	Red-breasted Goose	23	—	—	—	1	4	12/5/1
Cereopsis novaehollandiae	Cape Barren Goose	2	—	5	—	—	—	3/4
Alopochen aegyptiacus	Egyptian Goose	12	—	4	2	3	—	2/2/7
Tadorna cana	South African Shelduck	16	—	—	—	1	2	4/5/4
Tadorna variegata	New Zealand Shelduck	4	—	—	—	—	—	3/1
Tadorna tadorna	Shelduck	10	—	—	—	—	—	5/3/2
Plectropterus gambensis	Spur-winged Goose	2	—	—	—	—	—	1/1
Aix sponsa	Carolina Duck	13	—	—	—	1	1	7/4
Aix galericulata	Mandarin Duck	14	—	—	—	—	1	5/8
Chenonetta jubata	Maned Goose	4	—	—	—	2	—	2/0
Anas penelope	Wigeon	2	—	—	—	—	—	1/1
Anas sibilatrix	Chiloe Wigeon	15	—	—	—	1	1	4/6/3
Anas falcata	Falcated Teal	4	—	—	—	—	—	2/2
Anas strepera	Gadwall	4	—	—	—	—	—	2/2
Anas crecca	Teal	3	—	—	—	—	—	1/2
Anas specularioides	Crested Duck	6	—	—	—	—	—	2/3/1
Anas acuta	Pintail	4	—	—	—	—	—	2/2
Anas bahamensis	Bahama Pintail	4	—	—	—	—	1	2/1
Anas querquedula	Garganey	6	—	—	—	1	1	2/2
Anas clypeata	Shoveler	4	—	—	—	—	—	2/2
Netta rufina	Red-crested Pochard	11	—	—	—	1	—	6/4
Aythya ferina	Pochard	4	—	—	—	1	—	2/1
Aythya fuligula	Tufted Duck	4	—	—	—	1	1	0/2
Aythya marila	Greater Scaup	7	—	—	—	1	—	2/4
Somateria mollissima	Eider Duck	10	—	—	—	—	—	3/7
Bucephala islandica	Barrow's Goldeneye	4	—	—	—	2	—	0/2
Oxyura jamaicensis jamaicensis	North American Ruddy Duck	7	—	—	—	—	2	5/0
Oxyura vittata	Argentine Ruddy Duck	3	—	—	—	—	—	3/0
Falconiformes								
Gyps africanus	African White-backed Vulture	2	—	—	—	1	—	1/0
Gyps rueppelli	Ruppell's Griffon Vulture	4	—	—	—	—	—	2/2
Torgos tracheliotus	Lappet-faced Vulture	2	—	—	—	—	—	1/1
Galliformes								
Meleagris gallopavo	North American Turkey	15	—	—	—	—	11	0/0/4
Crax fasciolata	Bare-faced Curassow	—	1(1)	—	—	—	—	0/0/1
Alectoris rufa	Red-legged Partridge	—	4(4)	—	—	—	—	0/0/4
Francolinus erckelii	Erckel's Francolin	3	—	—	—	1	—	2/0
Lophophorus impeyanus	Impeyan Pheasant	4	—	2	—	1	—	1/3/1
Gallus gallus	Red Jungle Fowl	49	—	—	—	—	—	18/31
Lophura nycthemera	Silver Pheasant	—	2(2)	—	—	—	2	—
Lophura imperialis	Imperial Pheasant	1	—	—	—	—	1	—

		1	2	3	4	5	6	7
Lophura swinhoii	Swinhoe's Pheasant	4	—	—	—	—	1	2/1
Crossoptilon mantchuricum	Brown Eared Pheasant	6	—	—	—	—	1	2/3
Crossoptilon auritum	Blue Eared Pheasant	6	—	—	—	—	4	1/1
Catreus wallichi	Cheer Pheasant	4	—	—	—	1	2	0/1
Syrmaticus mikado	Mikado Pheasant	2	—	—	—	—	—	1/1
Chrysolophus pictus	Golden Pheasant	2	—	—	—	1	—	1/0
Chrysolophus amherstiae	Lady Amherst's Pheasant	2	—	—	—	1	—	0/1
Pavo cristatus	Common Peafowl	137	5(5)	20	0—	2	22	0/0/138
Numida meleagris	Helmeted Guineafowl	15	—	—	—	4	3	0/0/8
Gruiformes								
Grus monacha	Hooded Crane	2	—	—	—	—	—	1/1
Grus canadensis	Sandhill Crane	3	—	—	—	—	—	1/2
Grus japonensis	Red-crowned Crane	7	—	2	1	—	3(2)	3/2
Grus vipio	White-naped Crane	10	—	—	—	—	6(2)	2/2
Grus rubicunda	Brolga	3	—	—	—	1	—	1/1
Bugeranus carunculatus	Wattled Crane	5	3	—	—	2	2(2)	2/2
Anthropoides virgo	Demoiselle Crane	13	—	—	—	8	—	2/3
Anthropoides paradisea	Stanley Crane	3	—	—	—	—	—	2/1
Balearica regulorum	South African Crowned Crane	15	1	—	—	4	2	4/5/1
Choriotis kori	Kori Bustard	2	—	—	—	—	—	1/1
Psittaciformes								
Pseudeos fuscata	Dusky Lory	2	—	—	—	—	—	1/1
Eolophus roseicapillus	Roseate Cockatoo	15	—	—	—	—	—	7/8
Cacatua leadbeateri	Leadbeater's Cockatoo	1	—	—	—	—	—	1/0
Cacatua sulphurea	Lesser Sulphur-crested Cockatoo	1	—	—	—	—	1	—
Cacatua galerita	Greater Sulphur-crested Cockatoo	2	—	—	—	—	—	1/1
Cacatua sanguinea	Bare-eyed Cockatoo	2	—	—	—	—	—	1/1
Alisterus scapularis	King Parrot	3	—	—	—	—	—	1/2
Platycercus eximius cecilae	Golden-mantled Rosella	2	—	—	—	—	—	1/0/1
Psittacus erithacus	Grey Parrot	2	—	—	—	—	—	1/1
Psittacula eupatria	Alexandrine Parrakeet	1	—	—	—	—	1	—
Ara macao	Scarlet Macaw	4	—	2	—	—	4	1/1
Ara chloroptera	Green-winged Macaw	2	—	—	—	—	—	1/1
Strigiformes								
Tyto alba	Barn Owl	3	2	—	—	1	—	2/1/1
Nyctea scandiaca	Snowy Owl	5	—	—	—	—	2	2/1
Athene noctus	Little Owl	2	—	—	—	—	—	0/0/2
Strix aluco sylvatica	Tawny Owl	2	—	—	—	—	—	1/1
Coraciiformes								
Dacelo novaeguineae	Laughing Kookaburra	1	—	—	—	—	—	0/1
Piciformes								
Ramphastos citreolaemus	Citron-throated Toucan	—	2(2)	—	—	—	—	0/2
Ramphastos vitellinus arieal	Ariel Toucan	1	—	—	—	—	—	1/0
Passeriformes								
Gracula religiosa	Hill Mynah	1	—	—	—	1	—	—
Domestic								
	Old English Game Bantam	—	3(3)	—	—	—	—	3/0
	Total: Birds	**922**	**28(22)**	**84**	**4**	**65**	**108(6)**	**857**

REPTILES

Testudines								
Testudo graeca	Spur-thighed Tortoise	42	11	26	—	3	41	5/14/16
Testudo hermanni	Hermann's Tortoise	16	11	3	—	2	5	7/11/5
Sauria								
Basiliscus plumifrons	Plumed Basilisk	6	—	—	—	2	—	0/0/4
Iguana iguana	Common Iguana	1	1	—	—	—	—	2/0
Agama stellio	Starred Agama	5	—	—	—	4	—	0/0/1
Eumeces schneiderii	Schneider's Skink	4	—	—	—	—	—	0/0/4
Scincus scincus	Sand Fish	6	—	—	—	—	—	0/0/6

		1	2	3	4	5	6	7
Serpentes								
Python molurus molurus	Indian Python	1	—	—	—	—	—	0/0/1
Python regius	Royal Python	—	1	—	—	—	—	0/0/1
Epicrates subflavus	Jamaican Boa	2	—	—	—	1	—	0/1
Boa constrictor	Boa Constrictor	2	—	—	—	—	1	0/0/1
Malpolon moilensis	Moila Snake	1	—	—	—	—	—	0/0/1
	Total: Reptiles	**86**	**24**	**29**	**—**	**12**	**47**	**80**

AMPHIBIANS

Anura								
Bufo marinus	Cane Toad	4	—	—	—	—	2	0/0/2
Ceratophrys cornuta	Horned Toad	2	—	—	—	1	—	0/0/1
Atelopus spp.	Harlequin Frog	—	3	—	—	—	1	0/0/2
Dendrobates auratus	Black/Green Poison Arrow Frog	—	5	—	—	1	—	0/0/4
Dendrobates pumilio	Strawberry Poison Arrow Frog	—	6	—	—	4	—	0/0/2
Agalychnis callidryas	Red-eyed Tree Frog	—	6	—	—	3	1	0/0/2
Hyla septentrionalis	Cuban Tree Frog	—	4	—	—	—	—	0/0/4
	Total: Amphibians	**6**	**24**	**—**	**—**	**9**	**4**	**17**

SUMMARY

London Zoo

	1	2	3	4	5	6	7	Number of Species (excluding domestic)
Mammals	1403	65(12)	937	147	304	699(11)	1255	142
Birds	994	85(6)	143	24	133	110(22)	955	279
Reptiles	403	144	322	12	110	301	446	101
Amphibians	169	57	61	49	86	14	138	30
Total	**2969**	**351(18)**	**1463**	**232**	**633**	**1124(33)**	**2794**	**522**

Estimated number of fishes and invertebrates in the Collection at 31 December 1987:

Fishes	Approx 2,300	240 species
Invertebrates (excluding locusts, ants and bees)	Approx 3,600	112 species

Whipsnade Park

Mammals	1225	37(11)	673	57	147	271(12)	1460	61
Birds	922	28(22)	84	4	65	108(6)	857	92
Reptiles	86	24	29	—	12	47	80	12
Amphibians	6	24	—	—	9	4	17	7
Total	**2239**	**113(33)**	**786**	**61**	**233**	**430(18)**	**2414**	**172**

Estimated number of fishes and invertebrates in the Collection at 31 December 1987:

Fishes	Approx 80	18 species
Invertebrates (excluding some common species)	Approx 55	24 species

Grand Total Zoological Society of London	**5208**	**464**	**2249**	**293**	**866**	**1554**	**5208**	**640***

* The species common to Regent's Park and Whipsnade are counted as one.

ADVISORY AND CONSULTANT SERVICES

Animal Management and Conservation

Al-Areen Wildlife Park, Bahrain: Advice on and assistance with animal management. Secondment of specialised staff.

Andean Project, London: Advice on husbandry and conservation of Andean fauna.

Corporation of London Veterinary Department and Animal Quarantine Station: Advice on identification, handling and management of reptiles.

Doha Zoo, Municipality of Doha, Qatar: Management of the national zoo for the Qatar Government.

Forest Department, Tunisia: Collaborative project on reintroduction and monitoring of Scimitar-horned Oryx.

H.M. Customs: Housing and advice on identification of reptiles.

Ministry of Forestry, People's Republic of China (with International Union for Conservation of Nature and Natural Resources/World Wildlife Fund/North of England Zoological Society/ Marwell Zoological Park/Longleat/Glasgow Zoo): Collaborative project on reintroduction of Père David's deer to the wild.

Peruvian Zoological Trust: Advice on husbandry of captive animals, and on wild status of endemic species.

Police and Local Authorities: Advice on wild animal capture techniques. Advice and assistance on identification, handling, management and capture of animals.

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

Saudi Arabia: Establishment of the King Khalid Wiidlife Research Centre on behalf of the National Commission for Wildlife Conservation and Development.

Wolong Natural Reserve Panda Research Station, People's Republic of China (with World Wildlife Fund): Advice on and assistance with the development of a management programme for the Giant Panda.

Comparative Medicine and Physiology

Agricultural and Food Research Council Research Group on Hormones and Farm Animal Reproduction, University of Nottingham School of Agriculture: Collaborative project on embryonic antiluteolysins.

American Institute of Cancer Research (with Clinical Trial Service Unit, Oxford): Collaborative project on nutrition and dietary fats of food samples from China.

Cambridge Life Sciences, Cambridge: Provision of enzyme assay reagents.

Central Middlesex Hospital (Coronary Prevention Group): Computer analysis of nutrients for food labelling.

Centre for Early Human Development, Monash University, Australia: Studies on sperm antigen.

Charing Cross & Westminster Hospital Medical School: Collaborative studies on the gonadotrophic control of primate ovarian function.

Clinical Research Centre, Harrow: Collaborative studies on iron storage disorders in birds and on the physiology of sedation and anaesthesia in ungulates.

Compass Services, London: Computer analysis of nutrients in food.

Consultants in Environmental Sciences Ltd: Laboratory examination of mud samples from Regent's Park Lake for diagnosis of botulism.

Courtauld Institute of Biochemistry, London: Analysis of urinary and faecal steroid metabolites.

Dalgety (UK) Ltd, Cambridge: Collaborative research on chemical communication in mammals.

Department of Health & Social Services: Provision of information from the Institute's WHO Collaborating Laboratory in Malaria Reference and Research for the DHSS display on UK WHO activities.

Homerton Hospital, London: Collaborative project on dietary fats and nutrition in pregnancy.

Hospital for Tropical Diseases, London: Laboratory service for testing of serum for diagnosis of *Toxocariasis*.

Institute of Hormone & Fertility Disorders, Hamburg, FDR: Collaborative studies on corpus luteum function in primates.

Institute of Obstetrics & Gynaecology, London: Collaborative study on role of oestrogens in primate folliculogenesis.

Institute of Primate Research, National Museums of Kenya: Collaborative project on reproductive physiology of primates.

Medical Research Council Reproductive Biology Unit, Edinburgh: Collaborative research on follicular development in primates.

Middlesex Hospital, London: Assistance in the treatment of patients suffering from ophidiaphobia (snake phobia); collaborative studies on sperm function. (Cobbold Laboratories): Analysis of urinary steroid metabolites.

Ministry of Agriculture, Fisheries & Food: Laboratory examinations for diagnosis of botulism.

Ministry of Defence (Directorate of Fleet Supply Duties of the Royal Navy): Advice on dietary recommendations and ration scale for HM ships and shore-bases.

North London Blood Transfusion Service: Provision of materials and advice in relation to malaria screening.

Regional Health Authorities: Advice on dietary fats and nutrition in pregnancy; laboratory

service for testing of serum for diagnosis of *Toxocariasis*.

Royal Holloway & Bedford New College: Collaborative research on non-invasive methods of physiological assessment; development of implantable electronic pump device.

St Bartholomew's Medical College: Collaborative studies on cell kinetics of bone growth in birds.

St Mary's Hospital Medical School, London: Collaborative study on chorionic gonadotrophin secretion.

St Thomas's Hospital, Department of Chemical Pathology: Computer analysis of nutrients in food.

St Vincent's Hospital, Dublin: Collaborative studies on the resistant ovary syndrome in women.

University of Adelaide, Australia (Department of Anatomy): Study on Australian rodent sperm. (Department of Genetics): Investigation of meiosis in opossum oocytes.

University of Cape Town, RSA: Collaborative project on natural suppression of reproduction in the Naked Mole Rat.

University College, London: Collaborative research on hormonal basis of maternal behaviour in primates.

University of Leeds: Collaborative studies on corpus luteum function in primates.

Wellington Fertility Clinic, Humana Hospital, London: Collaborative project on sperm and embryo physiology.

World Health Organization: The Institute of Zoology is a collaborating centre for malaria reference and research, comparative medicine and pathology of non-domestic vertebrates, reproduction and child health.

Wildfowl Trust, Slimbridge: Collaborative studies on antibiotic pharmacodynamics in zoo animals.

Training and International Liaison

British Council: Training of visiting workers in hormone assays, nutritional biochemistry and serology.

John Radcliffe Hospital, Oxford: Training of technical staff in the handling and management of venomous snakes.

University of Brasilia: Scientific exchange visits for specialist training in reproduction, behaviour and ecology of Marmoset Monkeys in the wild.

Veterinary Consultancy

Fisons plc: Ultrasonography of mammals for pregnancy or disease.

Windsor Safari Park: Ultrasonography of mammals for pregnancy or disease,

Consultant Histopathology, Pathology and Veterinary Advice: Government departments; Research institutes; Zoological collections and Veterinary practices both in the UK and abroad.

Representation on Scientific Societies, Zoological, Conservation and Research Organizations

Whether in an individual capacity or as representatives of the Society, members of staff play an active role in many organizations concerned with animal management, conservation, the publication and specialist journals, and other research activities.

Action Research on Multiple Sclerosis (ARMS): Mr P J Drury (Computer Consultant)

Agricultural and Food Research Council Institute of Animal Physiology and Genetics Research: Professor A P F Flint (Visiting Scientist)

Andean Project: Miss F M D Gulland (Veterinary Adviser)

Anthropoid Ape Advisory Panel: Dr B C R Bertram (Convenor, Scientific Committee); Dr G M Mace (Member, Scientific Committee)

Association for Animal Haematology: Mr M G Hart (Committee)

Association of British Wild Animal Keepers: Mr V J A Manton (Vice President)

Association of Veterinary Anaesthetists: Mr R A Kock (Committee Member)

Biological Council: Mr P J S Olney (Member)

British Andrology Society: Dr H D M Moore (Treasurer)

British Deer Society: Dr A S I Loudon (Chairman, Scientific Advisory Panel); Mr V J A Manton (Veterinary Adviser)

British Dietetic Association: Mrs W Doyle (Member, Community and Paediatric Dieticians' Groups)

British Journal of Experimental Pathology: Dr G R Smith (Editorial Board)

British Nutrition Foundation: Sir Cyril A Clarke (Chairman, Task Force on Sugars and Syrups)

British Ornithologists' Union: Mr P J S Olney (Vice President; Member, Meetings Committee)

British Veterinary Zoological Society: Dr J K Kirkwood (Treasurer; Meetings Secretary); Mr R A Kock (Steering Committee, International Clinical Studies Group); Mr V J A Manton (Council)

British Wildlife Rehabilitation Council: Dr J K Kirkwood (coopted to Committee)

Brooke Hospital for Animals, Cairo: Mr D M Jones (Vice Chairman)

Central Middlesex Hospital: Professor M A Crawford (Hon Secretary, Coronary Prevention Group (CPG); Member, Council of Management of ARMS/CPG Research Unit); Mrs W Doyle (Member, Nutrition Committee, CPG)

Department of the Environment: Mr D J Ball; Dr B C R Bertram; Dr J K Kirkwood; Mr R A Kock; Mr V J A Manton (Secretary of State's List of

ADVISORY AND CONSULTANT SERVICES

Inspectors under the Zoo Licensing Act 1981)

Domestic Animal Endocrinology: Professor A P F Flint (Editorial Board)

European Association for Aquatic Mammals: Mr V J A Manton (Member, Executive Council; Editor *Aquatic Mammals*)

European Association of Radiology: Professor G H du Boulay (President)

Fauna and Flora Preservation Society: Mr D M Jones (Chairman)

Florida State Museum (Program for Studies in Tropical Conservation): Dr B C R Bertram (Member, Advisory Committee)

German Research Council: Professor J P Hearn (Member, Steering Committee of Primate Research Centre, Göttingen)

Harvard Medical School: Professor J P Hearn (Member, Scientific Advisory Board of New England Primate Research Center)

Hawk Trust: Dr J K Kirkwood (Member, Scientific Subcommittee)

Horniman Museum Advisory Committee: Mr M K Boorer (Member)

International Air Transport Association: Mr V J A Manton (Member, Live Animals Board)

International Council for Bird Preservation: Dr J K Kirkwood (Member, World Working Group on Birds of Prey); Mr P J S Olney (Chairman, British Section)

International Journal of Parasitology: Dr A Voller (Editorial Board)

International Ornithological Committee (Committee of 100): Mr P J S Olney (Member)

International Primatological Society: Professor J P Hearn (President)

International Union for the Conservation of Nature and Natural Resources (Species Survival Commission): Dr B C R Bertram (Member, Cat Specialist Group); Professor J P Hearn (Member, Genome Preservation and Primate Specialist Groups); Mr D M Jones (Member, Asiatic Elephant and Captive Breeding Specialist Groups); Dr A S I Loudon (Member, Endangered Deer Specialist Group); Dr G M Mace (Member, Captive Breeding Specialist Group); Mr V J A Manton (Member, Cat and European Bison Specialist Groups); Mr P J S Olney (Member, Captive Breeding Specialist Group; Zoological Society Representative)

International Union of Directors of Zoological Gardens): Mr D M Jones (Zoological Society Representative)

Institute of Biology: Mr D M Jones (Deer Liaison Group)

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 (Editorial Board)

Journal of General Microbiology: Dr A Voller (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 Medical Microbiology: Dr G R Smith (Editorial Board)

Journal of Medical Primatology: Professor J P Hearn (Editorial Board)

Journal of Reproduction and Fertility: Dr H D M Moore; Dr P M Summers (Council of Management)

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

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

London Food Commission: Professor M A Crawford (Trustee)

Mammal Society: Dr B C R Bertram (Council Member); Dr J Gipps (Council Member)

Marwell Zoological Trust: Mr D M Jones (Trustee); Dr G M Mace (Member, Scientific and Animal Management Committee); Mr V J A Manton (Vice President – Society)

Medical Research Council: Professor G H du Boulay (Member, Cell Board); Professor A P F Flint (Member, Systems Boards' Grants Committee B)

Medicina: Dr A Voller (Editorial Board)

Metropolitan Police Firearms Unit: Miss F M D Gulland, Mr R A Kock (Veterinary Advisers)

National Federation of Zoological Gardens of Great Britain and Ireland: Mr M K Boorer (Member, Education Working Group); Mr D M Jones (Treasurer); Mr V J A Manton; Mr P J S Olney (Members, Conservation and Animal Management Committee)

National Hospital for Nervous Diseases, London: Professor G H du Boulay (Honorary Consultant; Trustee, Queen Square Development Foundation)

National Museums of Kenya: Professor J P Hearn (Member, International Scientific Advisory Board for the Institute of Primate Research)

National Trust: Mr V J A Manton (Chairman, Whipsnade Advisory Committee)

Natural Environmental Research Council: Professor J P Hearn (Member, Special Committee on Seals)

Nature Conservancy Council: Mr P J S Olney (Member, Advisory Committee for Birds)

Neuroradiology: Professor G H du Boulay (Editor-in-Chief)

Primate Society of Great Britain: Dr D H Abbott (Council; Member, Captive Care Working Party – until December 1987); Dr B C R Bertram (Member, Captive Care Working Party); Dr J K Kirkwood (Council); Professor J P Hearn (Council; Member, Primate Breeding and

Welfare Committee)

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

Radiological Research Trust: Professor G H du Boulay (Director)

Roehampton Institute of Higher Education: Dr P M Summers (Visiting Lecturer in Biology)

Royal Postgraduate Medical School, London: Professor M A Crawford (Visiting Lecturer, Department of Clinical Medicine)

Royal Society for the Prevention of Cruelty to Animals: Mr V J A Manton (Member, Wild Animals Advisory Committee)

Royal Society of Medicine: Dr G R Smith (Council Member, Section of Comparative Medicine)

Society for the Study of Fertility: Professor A P F Flint (Business Secretary); Professor J P Hearn (Committee)

XIV Symposium Neuroradiologicum 1990: Professor G H du Boulay (President)

Tropenmedizin und Parasitologie: Dr A Voller (Editorial Board)

Universities Federation for Animal Welfare (UFAW): Professor J P Hearn (Member, Primate Working Party)

University of Bristol: Dr J K Kirkwood (Visiting Lecturer, Department of Animal Husbandry)

University of London: Dr D H Abbott; Dr J K Hodges; Dr A S I Loudon; Dr H D M Moore; Dr P M Summers (Course Lecturers, Department of Zoology & Cell Biology, University College); Professor G H du Boulay (Emeritus Professor of Neuroradiology, National Hospital for Nervous Diseases); Miss F M D Gulland; Dr J K Kirkwood; Mr R A Kock (Visiting Lecturers, Department of Medicine, Royal Veterinary College); Dr C M Hawkey (Honorary Lecturer in Haematology, Royal Free Hospital School of Medicine); Professor J P Hearn (Visiting Professor in Zoology & Cell Biology, University College; Member, Board of Studies in Zoology & Botany); Dr W V Holt (Visiting Lecturer, Department of Biology, King's College); Mr D M Jones (Member, Board of Studies in Zoology & Cell Biology); Dr A S I Loudon (Visiting Lecturer, Department of Physiology, Royal Veterinary College); Dr G R Smith (Visiting Lecturer, Departments of Microbiology and Animal Production and Health, Royal Veterinary College); Dr A Voller (Reader in Immunology of Parasitic Diseases, London School of Hygiene and Tropical Medicine; Council Member, London School of Hygiene and Tropical Medicine)

University of Nottingham School of Agriculture: Professor M A Crawford (Special Professor in Applied Biochemistry and Nutrition); Professor A P F Flint (Special Professor in Molecular Biology)

University of Surrey: Dr G R Smith (Visiting Lecturer, Department of Microbiology)

Vaccine: Dr A Voller (Editorial Board)

Veterinary Deer Society: Mr R A Kock (Assistant Editor)

Veterinary Research Club: Dr G R Smith (Council)

Wellington Fertility Clinic, Humana Hospital: Dr H D M Moore (Hon Research Fellow)

Wild Mammals in Captivity: Dr B C R Bertram (Editorial Board)

Wildfowl Trust: Dr J K Kirkwood (Scientific Advisory Committee)

Wildlife Link: Mr M K Boorer (Member); Mr D M Jones (Member; Zoological Society representative)

World Health Organization: Professor A P F Flint (Member, Steering Committee of Task Force on Infertility Agents from Plants); Professor J P Hearn (Member, Research Development Committee; Adviser, Reproductive Physiology and Applied Primate Research, Special Program of Research in Human Reproduction); Dr A Voller (Member, Expert Advisory Panel on Parasitology; Member, WHO/IUIS Sub-committee on Standardization of Reagents for Enzyme Immunoassays)

World List of Scientific Periodicals: Mr R A Fish (Council)

World Wildlife Fund: Dr R A Brett (Scientific Adviser, Rhinoceros Conservation Programme, Africa); Professor J P Hearn; Dr A S I Loudon (Scientific Advisers, Conservation Research Programme, China); Mr D M Jones (Trustee and Member of Conservation Review Group, UK)

Zoo Biology: Professor J P Hearn (Editorial Board)

FINANCIAL STATEMENTS

Income and Expenditure Account for the year ended 31st March 1988

	Notes	£'000s	Year ended 31 March 1988 £'000s	Year ended 31 March 1987 £000s
Income from activities	2		6,149.3	5,351.4
Cost of activities	2		7,912.5	7,304.7
Net deficit on activities			(1,763.2)	(1,953.3)
Administrative expenses			(110.5)	(78.3)
			(1,873.7)	(2,031.6)
Other operating income	3		12.2	42.4
			(1,861.5)	(1,989.2)
Income from investments	4	63.5		56.2
Interest receivable	5	233.9		222.4
			297.4	278.6
Operating deficit for the year	6		(1,564.1)	(1,710.6)
Grant – Department of Environment	8		2,095.9	2,000.0
			531.8	289.4
Exceptional item				
Profit on sale of assets			61.5	8.9
Excess of income over expenditure			593.3	298.3
Appropriation				
Transfer to Building and Equipment Fund			(394.6)	(235.0)
			198.7	63.3
Balance brought forward			342.2	278.9
Balance carried forward			540.9	342.2

The notes on pages 57 to 64 form part of these accounts

Balance Sheet at 31st March 1988

	Notes	£'000s	1988 £'000s	1987 £000s
Fixed assets				
Tangible assets	9		1,970.5	1,732.7
Investments	10		516.7	548.8
			2,487.2	2,281.5
Current assets				
Stocks	11	149.5		137.0
Debtors	12	1,168.5		1,135.4
Cash at bank and in hand		2,438.5		1,356.5
		3,756.5		2,628.9
Creditors: amounts falling due within one year	13	(1,287.9)		(1,151.8)
Net current assets			2,468.6	1,477.1
Total assets less current liabilities			4,955.8	3,758.6
Creditors: amounts falling due after more than one year	14		(29.1)	(36.9)
			4,926.7	3,721.7
Funds and reserves				
Deferred government grant			1,195.2	1,034.3
Funds	15		824.2	642.5
Building and Equipment Fund	16		2,366.4	1,702.7
Income and Expenditure Account			540.9	342.2
			4,926.7	3,721.7

Approved by Council 8th June 1988
PEYTON
Treasurer
SIR WILLIAM HENDERSON
President

Statement of source and application of funds for the year ended 31st March 1988

	£'000s	Year ended 31 March 1988 £'000s	Year ended 31 March 1987 £000s
Source of Funds			
Grant from Department of the Environment		2,095.9	2,000.0
Deficit from operations		(1,564.1)	(1,710.6)
		531.8	289.4
Items not involving the movement of Funds			
Composition Fund – transfer	(2.2)		(0.8)
Depreciation	189.4		131.8
Transfer from Building and Equipment Fund	(88.5)		(120.9)
		98.7	10.1
Total generated by operations		630.5	299.5
Funds from other sources			
Sale proceeds of assets	62.2		8.9
Net decrease in investments	32.1		—
Surplus on sale of Scientific Fund investments (note 15)	177.7		45.8
Funds income	6.2		14.7
Grants for purchase of fixed assets			
Department of the Environment	160.9		34.3
Other	357.6		15.0
		796.7	118.7
		1,427.2	418.2
Application of Funds			
Net increase in investments	—		41.6
Purchase of tangible fixed assets	427.9		444.1
		427.9	485.7
		999.3	(67.5)
Movement in working capital			
Increase in stocks		12.5	12.4
Increase/(decrease) in debtors		33.1	(202.1)
(Decrease)/increase in creditors		(128.3)	218.3
		(82.7)	28.6
Movement in net liquid funds			
Increase/(decrease) in bank balances and deposit		1,082.0	(96.1)
		999.3	(67.5)

Report of the Auditors

TO THE COUNCIL OF THE ZOOLOGICAL SOCIETY OF LONDON

We have audited the financial statements on pages 54 to 64 in accordance with approved auditing standards.

In our opinion the financial statements, which have been prepared under the historical cost convention, give a true and fair view of the state of affairs at 31st March 1988 and of the excess of income over expenditure and source and application of funds for the year ended on that date.

ARTHUR YOUNG *Chartered Accountants*
8th June 1988

Notes to the Financial Statements

1. ACCOUNTING POLICIES

(a) *Changes in Accounting Policies*
The Society changed its accounting policy for fixed assets and depreciation to that stated below from January 1984. Freehold land and buildings acquired prior to December 1983 are fully depreciated; other buildings, plant, vehicles and fittings and furnishings were written off in the year of purchase.

(b) *Basis of Financial Statements*
The Society receives from the Department of the Environment a revenue grant of £2 million a year commencing in the Government's financial year to 31st March 1985 subject to review in the year ended 31st March 1988 and additional contributions towards repayment of the Society's overdraft and capital expenditure within the same period. The Department of the Environment has recently announced the establishment of an endowment of £10 million plus on going grants to support the Institute of Zoology. The financial statements have accordingly been prepared on a going concern basis and under the historical cost convention.

(c) *Consolidation*
The financial statements do not consolidate the results and the assets and liabilities of the Society's wholly owned subsidiaries, Zoo Restaurants Limited and Zoo Enterprises Limited.
Concession fees, covenanted profits and losses of these companies are included in catering and retail services income, Note 2(f).

(d) *Fixed Assets and Depreciation*
Fixed assets acquired by purchase or gift during the year are shown at cost or valuation depreciated on a straight line basis at rates appropriate to write off the cost over their expected useful lives. Freehold and leasehold buildings are depreciated over a range of 15 to 40 years; plant and equipment 5 to 10 years and motor vehicles 5 years.

(e) *Building and Equipment Fund*
The fund comprises grants received and appropriations from income and expenditure account, which are released back to revenue over the expected useful life of the relevant asset by equal annual amounts.

(f) *Grants*
Government grants received of a revenue nature are credited to the income and expenditure account for the year in which they are received. Grants for capital expenditure are credited to a deferred government grant account and are released to revenue over the expected useful life of the relevant asset by equal annual amounts.

(g) *Stocks*
Stocks are stated at the lower of direct cost and net realisable value with the following exceptions: no value is placed on the animals, farm and garden stocks and the library; stocks of scientific publications are included at nominal valuation.

(h) *Special Funds*
Special funds of the Society which have conditions attached to their use are not included in the balance sheet. Details of these are set out in note 18.

(i) *Pension Scheme Arrangements*
The pension scheme of the Society is maintained as a separate trust fund. Payments made to the fund and charged in these financial statements are based on actuarial advice. The fund is actuarially valued every three years.

(j) *Leasing Commitments*
Assets obtained under finance leases are capitalised in the balance sheet and are depreciated over their useful lives. The interest element of the rental obligations is charged to profit and loss account over the period of the lease and represents a constant proportion of the balance of capital repayments outstanding.

2. INCOME AND EXPENDITURE ON ACTIVITIES IS ATTRIBUTABLE AS FOLLOWS:

	Notes	Income £'000s	Expenditure £'000s	1988 Surplus/ (Deficit) £'000s	1987 Surplus/ (Deficit) £'000s
Specific activities					
Zoological Gardens					
London Zoo	2(a)	3,909.2	4,171.3	(262.1)	(387.8)
Whipsnade Park	2(a)	1,096.8	1,614.0	(517.2)	(690.1)
Education	2(b)	110.5	177.0	(66.5)	(65.8)
Library	2(c)	1.0	91.2	(90.2)	(75.5)
Publications	2(d)	268.8	277.7	(8.9)	4.5
Institute of Zoology	2(e)	652.0	1,561.7	(909.7)	(821.0)
		6,038.3	7,892.9	(1,854.6)	(2,035.7)
General activities					
Members subscriptions and fees		118.4	19.6	98.8	103.9
Transfer: Composition fees	15	2.2	—	2.2	0.8
Donations		37.0	—	37.0	19.0
Less: Investment income (Institute of Zoology)	15	(46.6)	—	(46.6)	(41.3)
		6,149.3	7,912.5		
Net deficit on activities				(1,763.2)	(1,953.3)

2 (a) Zoological Gardens

	Notes	London Zoo 1988 £'000s	London Zoo 1987 £'000s	Whipsnade Park 1988 £'000s	Whipsnade Park 1987 £'000s
Income					
Admission of visitors		3,254.1	2,770.9	789.5	670.6
Admission of cars		—	—	100.9	87.5
Catering and retail services	2 (f)	494.4	449.4	101.8	44.3
Miscellaneous income		73.2	60.4	74.4	77.8
Friends of the Zoos		87.5	98.5	30.2	—
		3,909.2	3,379.2	1,096.8	880.2
Expenditure					
Staff costs		2,004.3	1,847.0	832.1	763.0
Administration costs		381.5	317.7	196.9	149.6
Provisions		268.2	246.1	157.8	172.3
Less: Income from animal adoption scheme		(107.5)	(87.2)	(14.3)	(12.5)
Backlog maintenance		319.8	324.2	72.6	182.1
Minor works		79.1	56.1	13.3	8.2
Works materials		103.0	100.2	54.5	43.5
Gardening and forestry		30.5	9.8	0.8	5.0
Equipment and supplies		71.0	78.0	41.2	16.1
Miscellaneous direct expenses		54.6	52.7	39.9	36.8
Rates and insurances		79.4	65.2	11.8	14.8
Fuel, light, water and transport		446.3	413.5	95.8	108.2
Advertising and promotion		282.3	197.4	74.6	124.7
Graphics and information		95.2	79.0	21.1	10.8
Friends of Zoos		10.5	28.1	2.8	—
Depreciation		115.0	88.2	37.4	17.3
Transfer from Building and Equipment Fund		(61.9)	(49.0)	(24.3)	(69.6)
		4,171.3	3,767.0	1,614.0	1,570.3
Deficit		(262.1)	(387.8)	(517.2)	(690.1)

(b) Education

Income					
Education visits		90.1	76.6	20.4	16.2
Expenditure					
Staff costs		117.9	111.4	15.4	13.5
Administration costs		24.6	19.2	3.2	2.5
Printing		—	—	0.6	—
Equipment and supplies		1.3	0.8	1.6	2.2
Sundry		8.9	6.7	3.5	2.3
		152.7	138.1	24.3	20.5
Deficit		(62.6)	(61.5)	(3.9)	(4.3)

(c) Library

	1988 £'000s	1987 £'000s
Income	1.0	0.4
Expenditure		
Staff costs	56.2	49.9
Administration costs	11.5	8.6
Equipment and supplies	23.5	17.4
	91.2	75.9
Deficit	(90.2)	(75.5)

(d) Publications

	Journal of Zoology Symposia	International Zoo Year Book	Zoological Record and Nomenclator	1988 Total	1987 Total
	£'000s	£'000s	£'000s	£'000s	£'000s
Income					
Sales	205.3	59.9	3.6	268.8	314.0
Expenditure					
Staff costs	64.5	37.1	18.2	119.8	107.9
Administration costs	13.2	7.6	3.7	24.5	18.7
Paper and printing	103.8	18.4	—	122.2	169.1
Sundry	5.6	5.1	—	10.7	13.3
Depreciation	—	0.5	—	0.5	0.5
	187.1	68.7	21.9	277.7	309.5
Surplus/(deficit)	18.2	(8.8)	(18.3)	(8.9)	4.5

(e) Institute of Zoology

	Veterinary Science £'000s	Wellcome Laboratories £'000s	Nuffield Laboratories £'000s	1988 Total £'000s	1987 Total £'000s
Income					
Fees	5.2	—	—	5.2	6.0
Scientific Fund – investment income	—	46.6	—	46.6	41.3
Grants					
Specific project	4.8	331.0	264.4	600.2	548.0
	10.0	377.6	264.4	652.0	595.3
Expenditure					
Staff costs	242.4	374.5	482.5	1,099.4	1,007.2
Administration costs	50.2	17.2	66.2	133.6	108.6
Equipment and supplies	38.7	107.3	127.1	273.1	241.0
Miscellaneous direct expenses	6.7	11.4	7.1	25.2	24.5
Sundry	6.1	7.1	6.5	19.7	26.1
Depreciation	—	13.0	—	13.0	11.2
Transfer from Building and Equipment Fund	—	(2.3)	—	(2.3)	(2.3)
	344.1	528.2	689.4	1,561.7	1,416.3
Deficit	(334.1)	(150.6)	(425.0)	(909.7)	(821.0)

(f) Catering and Retail Services
Included under this heading are concession fees and covenanted profits from Zoo Restaurants Ltd and its subsidiary company Zoo Enterprises Ltd as follows:

	1988			1987		
	London Zoo	Whipsnade Park	Total	London Zoo	Whipsnade Park	Total
	£'000s	£'000s	£'000s	£'000s	£'000s	£'000s
Zoo Restaurants Ltd	167.5	—	167.5	73.8	12.3	86.1
Zoo Enterprises Ltd	293.1	101.8	394.9	262.8	54.7	317.5
	460.6	101.8	562.4	336.6	67.0	403.6
Add: release of provision on Zoo Restaurants Ltd	33.8	—	33.8	112.8	(22.7)	90.1
	494.4	101.8	596.2	449.4	44.3	493.7
Sales for the period amounted to						
Zoo Restaurants Ltd						
– Own operations			—			308.2
– Concession operations			1,832.3			1,639.9
Zoo Enterprises Ltd			1,534.0			1,241.9

3. OTHER OPERATING INCOME

	1988 £'000s	1987 £'000s
Income from consultancies	12.2	42.4

No provision has been made for taxation on consultancy income received from abroad, the Society does not believe there to be a liability to overseas taxation.

4. INCOME FROM INVESTMENTS

Listed investments	63.5	56.2

5. INTEREST RECEIVABLE

Bank deposits	211.6	189.7
Zoo Restaurants Ltd and Zoo Enterprises Ltd	22.3	32.7
	233.9	222.4

6. OPERATING DEFICIT

After charging		
Auditors' remuneration	8.1	8.0
Depreciation	189.4	131.8
Consultancy fee	95.9	—

	1988 £'000s	1987 £'000s
7. STAFF COSTS		
Wages and salaries	3,907.7	3,559.1
Employers National Insurance contributions	369.9	338.2
Other pension costs	342.7	325.4
	4,620.3	4,222.7
The average weekly number of employees during the period was made up as follows:		
Zoological Gardens – London Zoo	189	194
Whipsnade Park	99	97
Education	10	10
Library	4	4
Publications	10	10
Institute of Zoology	72	73
Administration	29	27
	413	415
8. DEPARTMENT OF THE ENVIRONMENT		
Revenue grants were received as follows:		
During 12 months to 31st March 1988	2,095.9	2,000.0

Capital grants received in the 12 months to 31st March 1988 amounted to £160.9 (1987 – £34.3).

9. TANGIBLE FIXED ASSETS

	Freehold land and buildings £'000s	Short leasehold buildings £'000s	Plant and equipment £'000s	Motor vehicles £'000s	Leased plant £'000s	Total £'000s
Cost						
At 31st March 1987	545.1	869.1	492.3	183.3	54.3	2,144.1
Additions during the year	67.3	261.9	76.0	22.7	—	427.9
Disposals	—	—	—	(1.0)	—	(1.0)
At 31st March 1988	612.4	1,131.0	568.3	205.0	54.3	2,571.0
Depreciation						
At 31st March 1987	94.4	104.4	96.7	112.0	3.9	411.4
Charge for the year	23.9	64.3	72.1	25.5	3.6	189.4
Disposals	—	—	—	(0.3)	—	(0.3)
At 31st March 1988	118.3	168.7	168.8	137.2	7.5	600.5
Net book value						
At 31st March 1988	494.1	962.3	399.5	67.8	46.8	1,970.5
At 31st March 1987	450.7	764.7	395.6	71.3	50.4	1,732.7

	1988 £'000s	1987 £'000s
10. INVESTMENTS		
Investments at cost		
Quoted investments	516.7	548.8
Market valuation at 31st March 1988	955.8	1,324.6
These investments are attributed to		
Scientific Fund	942.1	1,304.9
Fantham Bequest	13.7	19.7
	955.8	1,324.6
11. STOCKS		
Raw materials and consumables	148.5	136.0
Finished goods and goods for resale	1.0	1.0
	149.5	137.0
12. DEBTORS		
Amounts due from Zoo Restaurants Ltd and Zoo Enterprises Ltd	353.0	374.3
Other debtors	445.4	396.6
Prepayments and accrued income	370.1	364.5
	1,168.5	1,135.4
13. CREDITORS: amounts falling due within one year		
VAT, PAYE and National Insurance contributions	147.9	—
Other creditors	599.5	463.7
Accruals and deferred income	540.5	688.1
	1,287.9	1,151.8
14. CREDITORS: amounts due after more than one year		
Finance lease obligations	29.1	36.9

15. FUNDS

	Heer Bequest £'000s	Fantham Bequest £'000s	Scientific Fund £'000s	Composition Fund £'000s	Staff Benevolent Fund £'000s	Total £'000s
Balance at 31st March 1987	0.1	8.4	601.4	29.5	3.1	642.5
Investment income	—	0.7	46.6	—	0.4	47.7
Additional capital	—	—	1.6	3.5	—	5.1
Surplus on sale of investments	—	—	177.7	—	—	177.7
Transfer to Income and Expenditure Account	—	—	—	(2.2)	—	(2.2)
Transfer to Institute of Zoology	—	—	(46.6)	—	—	(46.6)
Balance at 31st March 1988	0.1	9.1	780.7	30.8	3.5	824.2

16. BUILDING AND EQUIPMENT FUND

	£'000s
Balance at 31st March 1987	1,702.7
Grants received during the year for the purchase of fixed assets	357.6
Transfer from Income and Expenditure Account	394.6
	2,454.9
Less: Transfer to Income and Expenditure Account	88.5
Balance at 31st March 1988	2,366.4

17. PENSION FUND

At the last triennial valuation at 30th June 1984, the Pension Fund showed a surplus of assets over liabilities and was solvent in terms of benefits to be provided on winding up. The Society made a contribution of £235,611 to the Pension Fund during the year. A valuation as at 30th June 1987 is being finalised.

18. SPECIAL FUNDS

(a) De Arroyave Fund

The capital of the fund is held by the Official Custodian for Charities. The net income was £16,821.

(b) Davis Fund

The capital of the fund is held in trust by the Society but is not included on the balance sheet. The income from the fund was £57.

19. CAPITAL COMMITMENTS

	1988 £'000s	1987 £'000s
Expenditure contracted	32.0	—
Authorised but not yet contracted	39.5	—

20. FINANCE LEASE OBLIGATIONS

Net amount payable		
Next year	7.8	7.8
In the second to fifth years	29.1	31.1
Thereafter	—	5.8
	36.9	44.7

21. STATUS OF THE SOCIETY

The Society is incorporated by Royal Charter and is a registered charity, No. 208728. It is exempt from United Kingdom taxation.

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