

ZSL 99

The Zoological Society of London Annual Report



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Front cover: Aye-Aye: two aye-ayes came from Jersey Zoo to London Zoo in August 1999; they are part of the international co-operative breeding programme.

Photo: David Haring, Oxford Scientific Films

Above: ZSL staff worked on a large number of conservation and research projects throughout the world in 1999. Many other collaborations are in development.

ZSL MISSION

To promote the worldwide conservation of animals and their habitats by presenting outstanding living collections, breeding threatened species, increasing public awareness through information and education, conducting relevant research and undertaking action in the field.

The ZSL pursues this mission by:

- 1** keeping and presenting animals at London Zoo and Whipsnade Wild Animal Park in accordance with best practice;
- 2** giving priority to species that are threatened in the wild;
- 3** increasing public understanding of animals and their welfare and of the issues involved in their conservation;
- 4** maintaining an outstanding education and information programme, particularly for schoolchildren and families;
- 5** undertaking field conservation programmes, both in Britain and abroad;
- 6** developing its role as a leading centre for research and conservation biology and animal welfare;
- 7** fulfilling its role as a learned society and force for zoology and animal conservation through publications, scientific meetings, lectures, the award of prizes for outstanding achievement and the promotion of conservation policy.

PRESIDENT'S INTRODUCTION



front cover



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As this report shows, the Zoological Society of London has had another good year. Its high point was the visit by our Patron, Her Majesty The Queen, accompanied by our past-President, HRH The Duke of Edinburgh, to open our Millennium Conservation Centre with its *Web of Life* exhibition. But there were many other memorable occasions and events, as these pages show.

Such things do not 'just happen'. They are the culmination of a vast amount of teamwork, extending over years rather than months. In introducing this Report, I would like to pay particular tribute to a key member of our team, Professor R. McNeill Alexander, who stepped down at the end of 1999 after seven years as Secretary, and several years before that as a Council member and Vice President.

Neill Alexander took over as Secretary when the Society was shaken, demoralised and losing money. In partnership with my predecessor as President, Field Marshal Sir John Chapple, and with the support of dedicated staff at all levels, he led a revival which now sees our finances restored, our facilities enhanced and our services to conservation and to science gaining wide recognition. Our popularity with the public is demonstrated by the fact that over a million people visited London Zoo last year and nearly half a million came to Whipsnade. And those who watched the BBC 1 documentary *Zoo* cannot fail to have been impressed by the professional skill and personal commitment of our keepers and veterinary staff at both sites.

We owe Neill Alexander an immense debt of gratitude. That he was the right man for a demanding job at the right time was evident. But his service to the Society took a great deal of his time and energy, and I was delighted when Professor Paul Harvey, a distinguished evolutionary biologist, agreed to take over at the start of the current year.

Neill Alexander once wrote a book on *The Dynamics of Dinosaurs and other Extinct Giants*. Paul Harvey has written one on *The Comparative Method in Evolutionary Biology*. Far be it for me to suggest that these titles have any symbolic relevance to the ZSL in their respective periods. But I am confident that under the guidance of our new Secretary and the leadership of our new Director General, Dr Michael Dixon, who took up his post early in January 2000, the Society is well fitted not only to survive but to flourish in an increasingly demanding evolutionary context.

A handwritten signature in black ink, which appears to read 'Martin Holdgate'.

Sir Martin Holdgate
President



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Council Members

President

Sir Martin Holdgate, CB, MA, PhD, DSc (h.c.), CBIol, FIBiol

Treasurer

Harry Wilkinson, OBE, MA, FCA

Secretary

Professor R McNeill Alexander, PhD, DSc, CBIol, FIBiol, FRS (to 31 December 1999)

Sheila Anderson, BSc[†]

John Barrington-Johnson^{*}

Brian Bertram, MA, PhD, CBIol, FIBiol^{*}

Jonathan Boyce, DM, MA, MSc, MRCP, FFPHM^{*}

Michael Brambell, MA, VetMB, PhD, DVSc, MRCVS[†]

Professor Bryan Clarke, DPhil, FRS, *Vice President* (to April 1999)

Peter Davies (Member designate resigned 16 June 1999)

John Edwards, MA, FLS[†]

Roger Ewbank, OBE, MVSc, MRCVS, FIBiol

Tony Fincham, BSc, PhD^{*}

Professor Mike Hassell, DSc, FRS

Martin Jiggins, FRICS, FSVA, FRSA

Nancy Lane, OBE, DPhil, ScD, CBIol, FIBiol, *Vice President*

Ken Livingstone, MP^{*}

Christopher Marler[†]

Sophie McCormick, MA, PhD, CBIol, FIBiol

Derrick Moore, FCA (resigned 18 February 1999)

Professor Paul Racey, MA, PhD, DSc, FRSE, CBIol, FIBiol (co-opted 2 November 1999)

Professor Jeremy Rayner, BA, MA, PhD (co-opted 8 June 1999)

Neville Reyner, Bsc, MBA, CEng FIEE, FIMgt (co-opted 2 November 1999)

Martin Rowson, MA

Ken Sims, *Vice President*

Ted Smith, BSc, CBIol, FIBiol

Peter Stevens, BSc, MIBiol^{*}

Jane Thornback, BSc, MSc

Professor Roger Wheeler, OBE, CBIol, FIBiol, FRSA, FRSGS, FRZSS, FRSE[†]

(co-opted 28 September 1999)

Robert Wingate

[†] To 8 June 1999

^{*} From 8 June 1999

REVIEW OF THE YEAR



1999 was another highly successful year for The Zoological Society of London. This report illustrates some of the vital conservation work carried out by ZSL staff throughout the world, and highlights the major developments at London Zoo and Whipsnade, which together attracted 1.5 million visitors.

A major theme running through the report is the building, fitting out and opening of our Millennium Conservation Centre, housing the exhibition, *Web of Life*. This is appropriate because, although situated within London Zoo, it was planned and developed as a Society-wide development. The opening of this stunning exhibit by our patron, HM The Queen, accompanied by HRH The Duke of Edinburgh, himself a former President of ZSL, was the culmination of several years' planning and hard work from all areas of the Society. A vital contribution to our education mission, *Web of Life* helps visitors to understand the issues of biodiversity and its conservation, using living exhibits, graphics, interactive displays, videos and computer games. We were delighted to learn that Dr Jo Gipps, who led the project team, was awarded the OBE in the Millennium Honours List for his contribution to the project.

At Whipsnade, the new penguin exhibit was opened to visitors, showing the birds in their large enclosure against a magnificent backdrop of the surrounding countryside. At both sites, the less

glamorous but vital work of maintaining and improving facilities such as roads, paths, water supplies and perimeter fencing continued, helping further to redress the legacy of under-investment in the basic infrastructure of the sites over many years.

Visitor numbers were again high, with 1,017,000 paying visitors coming to London Zoo, and 437,000 to Whipsnade. This gives us an enormous audience to engage with the conservation message, and it is encouraging that many of these visitors go on to join the membership schemes, thus contributing to the future development of ZSL.

We were proud to receive the Investors in People Award at Whipsnade, a recognition of the systems put in place to develop our staff.

1999 was a potentially difficult year, as we had no Director General in post. We are immensely grateful to Dr Michael Brambell who, as Assistant Secretary, chaired the Directorate throughout the year, and to our Directors who shouldered extra responsibilities in order to ensure



Above: The black and white ruffed lemur reintroduction project in Madagascar: a lemur leaps across the canopy in Betampona Reserve.
Photo: Adam Britt

Left: H.M. The Queen performs the opening ceremony at the Millennium Conservation Centre.
Photo: Brian Aldrich

Opposite: Leaf cutter ant in *Web of Life*.

that things ran smoothly during this busy time. Dr Michael Dixon was appointed as Director General, to take up his post in January 2000, and we look forward to the continuing development of ZSL under his leadership.

During the year, Professor Morris Gosling, our Director of Science, left to take up a Chair at the University of Newcastle. During his five years with us, he led the Institute of Zoology through a period in which it redefined its role, focusing its efforts more sharply on the science that underpins conservation. Alexandra Dixon, Director of Field Conservation and Consultancy, announced her departure towards the end of the year. Over her 14 years with ZSL, she used her talents to excellent effect in the development of our field conservation programme. We thank them both for their work with ZSL, and wish them well in their future careers.

Two television series made a major contribution to raising awareness and informing viewers about the work of good zoos. A 13-part series, *Whipsnade*, featured the work of the Park and was broadcast in the Anglia, HTV and

Meridian TV regions as well as on the Discovery Channel. London Zoo, Whipsnade and the Institute of Zoology's Veterinary Department featured in a 14-part documentary, *Zoo*, shown in prime viewing time on BBC 1. An ongoing theme was the development and opening of *Web of Life*. ZSL also featured in a great number of broadcast and print media items; this publicity keeps ZSL and its work in the public eye, but the work and disruption to routine involved in ensuring the success of major media projects should not be underestimated.

Another important window on ZSL was opened with the launch of our website, with generous support from the Mitsubishi Corporation Fund for Europe and Africa. This is to be found at www.zsl.org, and is well worth a visit; of course, development of the site continues.

We have been fortunate in attracting further funding and gifts-in-kind from many businesses. We are very grateful for this support, and value the association this builds up between these organisations and the work of ZSL.



Mitsubishi Corporation

An ongoing challenge during the year was the need to identify an alternative routing for the core grant we receive from the Higher Education Funding Council for England (HEFCE) for the work of the Institute. Discussions have been held with a number of universities, and arrangements with a new partner will be finalised during 2000. This has unfortunately delayed our appointment of a new Director of Science.

Our work overseas continues to develop. The map on the inside cover of this Annual Report gives an indication of the number of countries in which our main projects and collaborations are located; the combination of the Institute, our field staff and the two zoos, enables us to offer an unparalleled range of skills and facilities in furtherance of conservation. Amongst these, our work at the King Khalid Wildlife Research Centre in the Kingdom of Saudi Arabia continues, and this partnership with the National Commission for Wildlife Conservation and Development is about to enter its 13th year. The Chitwan programme in Nepal is now well established, with the setting up of clinics which provide a much-appreciated veterinary service for

local people. Project Seahorse, based in the Philippines, is a high-profile collaboration with McGill University in Canada, and continues to develop, having started in 1996.

Closer to home, we finally signed a lease for the Regent's Park site, after several years of complex negotiations. This is for the maximum 60 years permitted under the law, and enables us to plan ahead with some certainty.



Above: Entrance to the Millennium Conservation Centre. Photo: Brian Aldrich

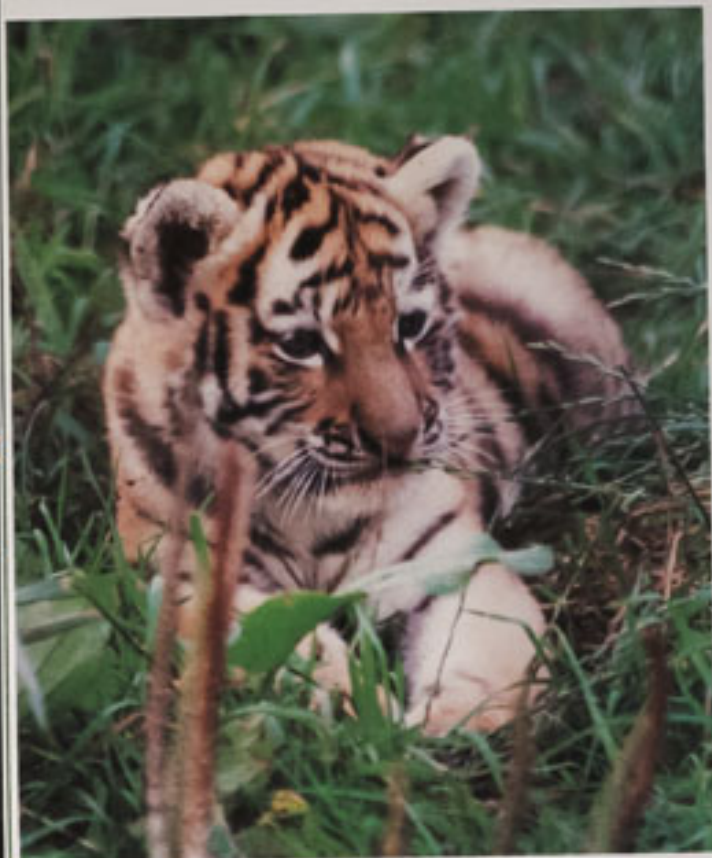
Above from top: *Web of Life* fundraising dinner: Head keeper Dave Clarke introduces Lady Thatcher to a Mexican red-kneed spider, and Ken Livingstone gets to grips with a giant African land snail.

Photos: Brian Aldrich

ZSL's Web site is sponsored by the Mitsubishi Corporation Fund for Europe and Africa.

Below: Sunrise at the special ibex reserve at Howtah Bany Tamim, Kingdom of Saudi Arabia. Composite Photo: Jo Gipps





This report demonstrates the enormous wealth of experience and expertise within ZSL. It also highlights the enthusiasm and dedication of all our staff to the achievement of our mission, and we would wish to take this opportunity of thanking them, members of Council and committees, and our many volunteers for their contribution to this very successful year.

This is my last report as Secretary of our Society, as my resignation took effect on the last day of 1999. I had been in office for seven years, which I felt was enough both for me and for the Society. I had asked Council some time previously to seek a successor for me, and when it emerged that Professor Paul Harvey was willing to take over, I was glad to stand down. It was for me a great privilege to serve the ZSL as Secretary, and I am very glad that I accepted the office when it was offered to me. However, it required a great deal of my time and energy, which I am pleased now to be free to devote to research and writing.

Professor R McNeill Alexander
Secretary

Above from top: Amur tiger cub and white rhino with calf at Whipsnade.
Photos: Simon Hodge

ZSL recognises outstanding achievements in the field of zoological research and conservation through its annual presentation of awards and prizes. Council has announced the following awards for contributions to zoology for 1999:

Honorary Fellowship

to Professor Sir Robert May, FRS, Chief Scientific Advisor to the Government. His academic distinction and his commitment to the wider issues of conservation and biodiversity distinguish him as an outstanding scientific spokesman.

The ZSL Frink Medal for British Zoologists

(for significant and original contributions by professional zoologists to the development of zoology in its wider implications) to Professor Linda Partridge, FRS, of University College London in recognition of her contribution to evolutionary biology.

The Scientific Medal

(awarded to zoologists 40 years of age and under, in recognition of scientific merit) to Dr Russell Foster of Imperial College, for his research in vertebrate physiology; to Dr Tim Guilford of the University of Oxford, for his research in animal behaviour; and to Professor Andrew Read of the University of Edinburgh, for his research in the evolutionary ecology of parasites.

The ZSL Marsh Award for Conservation Biology

(for contributions of fundamental science and its application to the conservation of animal species and habitat) to Dr John Croxall of the British Antarctic Survey, for his contribution to avian conservation.

The Stamford Raffles Award

(for distinguished contribution to zoology, open to amateur zoologists or to a professional zoologist in recognition of contributions which are outside the scope of his or her professional activities and principal specialisation) to Max Nicholson, for his life-long contribution to conservation.

The Thomas Henry Huxley Award

(for original work submitted as a doctoral thesis) to Dr Frank Clarke, of the Institute of Zoology, for his thesis *Determinants of reproductive status and mate choice in captive colonies of the naked mole-rat, Heterocephalus glaber*.

The Prince Philip Prize

(open for competition to pupils, under 19 years of age, of schools or other places of education in the United Kingdom, the Channel Islands or the Isle of Man, on the basis of an account of practical work involving some aspect of animal biology) to Thomas Berry of Newport Free Grammar School, for his essay *An investigation into the variation of adhesive force and rhythmicity in the topshell Monodonta lineata*.

The Silver Medal

to Dr Michael Brambell for his major contribution to the work of ZSL.

The ZSL Marsh Award for Conservation Biology, The Thomas Henry Huxley Award and The Prince Philip Prize are sponsored by The Marsh Christian Trust.



Above from top:
The Stamford Raffles Award.

The 1998 prize winners, who received their awards at the 1999 AGM.

CONSERVATION & SCIENCE



ZSL's unique strength is that work on animal conservation is underpinned by an active programme of strategic research. Practical conservation work at our two zoos and in the wild is supported by a world-class institute of conservation biology. We aim not only to be effective conservationists but also to achieve the level of understanding that is essential if the daunting problems of animal conservation are to be addressed. We can only cover here a selection of the wide range of projects in which ZSL staff have been involved during the year.

Project Seahorse, the international seahorse conservation project run between the Zoological Society of London and McGill University, continues to go from strength to strength. Work began under the five-year £0.5 million National Lottery Charities Board grant which funds two project areas: in a small fishing community in north Bohol (Philippines), a habitat and fisheries research project has been initiated to develop models for improved fisheries management. Meanwhile, the team at the Institute of Oceanography in Nha Trang, Vietnam, is developing seahorse aquaculture techniques. The aim is to transfer these skills to the Philippines to set up small scale, low technology seahorse aquaculture as an alternative livelihood to seahorse fishing.

21st Century Tiger widened its activities, supported once again by Esso UK plc, which funds a part-time administrator at ZSL. This support has enabled the production of literature encouraging new donations from other companies and individuals. 1999 saw a wide variety of fruitful partnerships with companies including the National Geographic Channel and BA Holidays. Funding went towards radio equipment for anti-poaching patrols in the Russian Far East, uniforms and jeeps in India and staff for anti-poaching teams in Sumatra.

A captive breeding and pilot reintroduction programme for the highly endangered Egyptian Tortoise was launched at The Zaranik Protected Area in North Sinai in 1998; this is the first project of its kind in Egypt. Careful progress monitoring of the project and

welfare of the ten animals released into the wild is co-ordinated by Esther Wenman of London Zoo's reptile house, Dr Gian Lorenzo D'Alterio and Sherif Baha El Din, Scientific Advisor to the Egyptian Environmental Affairs Agency (EEAA). Comparative screening of blood and faecal analysis is being conducted to establish a clinical data base for the species, which is otherwise unknown. Other components to the project, known as the CARE initiative, include the completion of five large enclosures, into which the remaining confiscated animals have been relocated to live in semi natural conditions. Education and community development programmes have also been initiated, generating support and funding for the conservation of the species.

In Australia, many species have become extinct since European settlement. Many more are currently in danger of extinction, and the Australian wildlife authorities consider the development of methods for freezing sperm and eggs a priority. Marsupials are among the prime candidates for attention because some of the remaining populations are small and highly vulnerable to catastrophes, such as fire, disease and loss of genetic diversity.



Above: Rangers of St Katherine's Protectorate, Sinai, carrying out a gazelle and ibex survey. ZSL is playing a major role in the establishment of the Protectorate. Photo: Tim Wacher

Opposite: Rainforest in the Leuser ecosystem in Sumatra, where ZSL has been working since 1996. Photo: Kathryn Monk

The survival of marsupial spermatozoa after freezing is poor. In collaboration with the Animal Gene Storage Resource Centre of Australia and the University of Queensland, we are investigating why marsupial sperm are damaged by freezing in order to improve the success of these techniques. Cryomicroscopy was used for the first time to study kangaroo and wallaby spermatozoa at Western Plains Zoo, Dubbo, NSW. Kangaroo spermatozoa survive the freeze-thaw process itself but do not survive subsequent rewarming. Further work with the University of Queensland showed that membrane damage occurs at around 25°C because of the high glycerol concentrations required to keep sperm alive during freezing. A fluorescent stain was developed for koala sperm and sudden damage to sperm membranes was observed during warming.



Another challenge is the handling of wild animals in captivity. Three giraffe were recently anaesthetised at Whipsnade Wild Animal Park in order to trim the feet of two adults and treat an umbilical abscess in a 4 month-old male calf. In the past, giraffe have been anaesthetised with combinations of drugs including etorphine and sedatives, but dangerous side effects can occur. In addition, physical injury to a giraffe is always a concern. A safer combination of medetomidine and ketamine was chosen for the animals at Whipsnade, and anaesthetists from the Department of Clinical Veterinary Medicine, University of Cambridge, joined us to assist and monitor the cases. The medetomidine/ketamine combination shows great

promise, and the procedures used showed the importance of good planning and teamwork involving the veterinary unit, keeping staff and outside experts who volunteered their time and interest.

As well as its research interests, the Veterinary Science unit is responsible for the health of the animals in ZSL's collections. A major concern is the protection of animals in London Zoo and Whipsnade from infectious diseases brought in by new arrivals. Whenever possible, incoming animals are quarantined in one of the two veterinary hospitals, and, when this is not possible, isolation and testing is carried out in a suitable enclosure. Particular attention is paid to assessing the health of animals of unknown (and hence possibly dubious) source accepted by ZSL, for example those seized by Customs and Excise. The potential dangers of acquiring animals from Customs is well illustrated by two seizures dealt with in 1999: Savu pythons and Dun's pythons in a consignment of 36 reptiles were found to have Inclusion Body Disease, possibly caused by a retrovirus, and some of these cases were diagnosed by kidney biopsy. The pythons of these two species in the consignment were euthanased or died. In the second case, a large number of rare parrots were found to have Proventricular Dilatation Syndrome, or the agent of this disease, diagnosed by crop biopsy. Many of these reptiles and parrots required quarantine for over a year because of the difficulty of testing for new infectious agents and the serious nature of the diseases identified.

Non-invasive methods to determine when female rhinoceroses are most fertile were originally developed using urine samples; these have been modified for use with faecal samples, resulting in the extensive collection of information on the reproductive biology of wild black rhinoceros in Save Valley Conservancy, Zimbabwe. Dr Julie Garnier and her team of trackers have used techniques for locating individually identified animals, without the use of radio-collars, based on the unique characteristics of their footprints.



Above: Llamas: genetic analysis has revealed the link between wild vicuña and guanaco populations and domestic alpaca and llama. Photo: Helen Stanley

Above left: Giraffe at Whipsnade: improved methods of anaesthesia have been developed for their treatment.



By collecting samples two or three times per week from the same individual, a reproductive profile can be established, pregnancy diagnosed and environmental factors, such as seasonal weather patterns, which may influence reproduction can be studied. Long-term monitoring of the wild population provides vital information for the wildlife managers responsible for the well-being of this critically endangered species.

In zoos, captive white rhinoceros are usually maintained in herds, often in large paddocks, making the collection and identification of samples more complicated. Nevertheless, keeping staff at several zoos in the UK collected samples for analysis by a student on our Wild Animal Health course. Characteristic changes in hormone concentrations were identified in five of the females studied, while differences in the profiles of two females lead us to suspect that they may be in the early stages of pregnancy.

The final year of the South American camelid project funded by the Darwin Initiative for the Protection of Species was very successful. In a collaboration between the Institute of Zoology, Cardiff University, San Marcos University and The National Council for South American

Camelids (CONACS) (Peru), diagnostic genetic markers were identified for the wild vicuña *Vicugna vicugna* and guanaco *Lama guanicoe* and used to show that these species are ancestral to the domesticated alpaca *Lama pacos* and llama *Lama glama*, respectively. A national alpaca register may now be established in Peru to screen for purity to aid future breeding and export programmes. Analysis of genetic variation within and between vicuña populations in Peru revealed the existence of four demographically distinct subpopulations and CONACS' management programmes are being revised to ensure the survival of these genetically distinct groups.

Cheetahs, like all the large cats, are endangered and their numbers continue to decline. However, protected areas do not provide a sanctuary for this species as they also harbour high densities of lions and hyaenas, which take kills from cheetahs and kill cheetah cubs. Most cheetahs currently live outside protected areas. In the 25 years since it began, the Serengeti Cheetah Project has revealed a phenomenal impact of lions and hyaenas on cheetah populations. On the Serengeti plains only one in 20 cheetah cubs survives to independence, largely because of lion predation. Simulation modelling shows that if lion density remains high,

Above: Jao Island, the site of the Lottery-funded seahorse project in the Philippines.
Photo: Alice Courage

a cheetah population has a low chance of survival if isolated. Fortunately, the Serengeti plains population is not yet isolated, and the identification of source populations which may supplement numbers is crucial for future cheetah conservation. In 1999, field work began to compare the success of cheetahs and their predators inside the protection of the park with those living in Maasai lands outside of it. Transect counts show that there are sufficient prey in Maasai land to support a substantial number of cheetahs, whilst call-in playbacks, where the sound of hyaenas at a kill is played to attract scavengers, are being used to monitor lions and hyaenas. The results so far suggest that Maasai lands show strong potential as habitats for large carnivores and unusually high levels of human-wildlife coexistence.

Many female mammals attract mates through signals based on sight and smell which advertise how close they are to ovulation. The role of vocal signals is less clear. In collaboration with the University of Sussex and the Gibraltar Ornithological and Natural History Society, we studied the famous 'Rock apes', or Barbary macaques, to investigate this question. The copulation call (a loud call given during or immediately after mating) was recorded throughout the oestrous cycle and acoustic analyses indicated that these calls do indeed provide males with information about female reproductive state: as the sexual swelling (the visual signal of ovulation) increased in size, the calls became longer and were also of a higher frequency. This is the first experimental evidence that the calls of female mammals contain

information on their reproductive state which males can use to increase their chances of fathering infants. Acoustic analysis may be a useful tool for the non-invasive monitoring of female reproductive state, and particularly for helping to manage the reproduction of endangered species with no visual signal of ovulation.

Since the 1960s, the IUCN has provided information on the animal and plant species that conservationists believe to be at the highest risk of global extinction. Nowadays, there are important implications for species that are listed and so the methods used to compile the list are important and sometimes controversial. In 1994, new quantitative criteria were adopted by IUCN and these have now been applied by several hundred assessors to over 20,000 species. It is not surprising that there have been some disputes about species listed and concerns raised about the criteria, and in 1996 IUCN set up a group to review the criteria and report on their effectiveness. We have participated throughout the review which started with correspondence among users and compilers of the list, and ended with a series of six international workshops at which invited experts addressed the major areas of concern. Two of these concerns are also topics of central interest to conservationists, and addressing these concerns has led to some new perspectives.

Conservationists generally pay most attention to small but stable populations and less attention to more widespread populations that are declining rapidly. Depending on the cause, these populations may continue to decline to extinction unless something reverses the trend. The new IUCN criteria became controversial when some commercially harvested marine fish were included as a result of their recent declines. This was unacceptable to fisheries' managers, although many other species, such as the African elephant, also qualify for threatened status on this same basis. Conservation biologists and natural



Left: Studies of genetic variations between wolf populations in Europe and the near East have shown that each should be considered as a distinct unit for conservation purposes. This research is a collaboration between ZSL and the Istituto Nazionale per Fauna Selvatica in Italy. Photo: Michael Lyster

resource managers use different decision rules to manage populations. For example, while conservation biologists generally try to minimise the risk of extinction, fisheries' managers try to maximise yield. In addition there are fundamental differences in attitudes to risk between the two groups. Exploring this dispute has led to new understandings between the two disciplines and a better flow of ideas that should, in the long run, benefit both.

The British Isles are home to 108 native breeds of domestic ungulate, several of ancient origin, for example, the Soay sheep and White Park and Highland cattle breeds. The development of breeds, as we understand them today, really began during the eighteenth century. In the early twentieth century, changes in farming practices led to some replacement of native breeds with continental improved types, such as Holstein-Friesian dairy cattle, and at least 26 British livestock breeds have since become extinct. ZSL was one of the first organisations to be involved in rare breed conservation and in 1966 groups of endangered breeds were established at Whipsnade.

Our involvement in the conservation of British rare breeds continues today through a project funded by MAFF in which we are studying the genetic diversity of common and rare breeds of cattle and sheep. In general, British breeds have lower levels of genetic variation and higher distinctiveness than those found in mainland Europe. Although rare breeds tend to have lower genetic variability than common breeds, they are distinct, particularly the primitive sheep breeds which have a long history of isolation. Our results will be vital to help conserve the 16 cattle and 28 sheep breeds which are still included on the Rare Breeds Survival Trust list of priority and minority breeds.

The Mauritius kestrel *Falco punctatus* was the rarest bird in the world in 1974 (with a single known wild breeding pair) as a result of habitat destruction during the last 200 years and pesticide poisoning.

An intensive conservation programme has now restored the species to over 250 wild pairs. The genetic consequences of the emergence of the species from such an extreme population bottleneck have been investigated in collaboration with the Mauritius Wildlife Foundation and the Durrell Wildlife Conservation Trust. Museum specimens (40-170 years old) representing the pre-bottleneck population on Mauritius were compared with the restored population and with similar data for widespread kestrel populations on the African continent. We have shown that pre-bottleneck genetic diversity on Mauritius was remarkably high and comparable to that in the continental kestrels. A combination of genetic and field studies has enabled us therefore to reinterpret the recovery of the Mauritius kestrel. The flagship status of these birds and the unexpected resilience shown by the rapid recovery of the population will be important in promoting the conservation priority of other critically endangered island species.

Collaborations between Field Conservation & Consultancy and the Institute of Zoology included the Guassa Biodiversity Project in the Central Highlands, Ethiopia, where one of our population ecologists advised field staff on the implementation of biodiversity surveys, population studies and data analysis and helped to define the recommendations for future management of the project site.

The collaboration between the genetics laboratories at King Khalid Wildlife Research Centre (KKWRC), which is managed by ZSL, and the Institute of Zoology on the application of genetics to practical conservation problems in Saudi Arabia has continued and expanded. Gazelle taxonomy and population genetics continues to be the main focus but during the last year we have begun an investigation of the genetic distinctiveness of the Arabian leopard subspecies *Panthera pardus nimr*.

There is growing concern that many animals threatened with extinction might be 'living dead': doomed to disappear as



Above: Fregate Island beetle: this critically endangered species, along with other threatened Seychelles invertebrates, is being bred in the Web of Life.
Photo: Rod Williams

a result of habitat destruction in historical times (regardless of ongoing habitat loss), unless active conservation steps are taken. To investigate whether any African primates might be at risk from extinction lags, ZSL scientists have calibrated ancestral forest cover in African countries with the number of primate species they contain. By incorporating data on historical deforestation, they used this relationship to estimate the number of populations that might now be at risk. It appears that several African countries do indeed contain 'living dead' primates. It is hoped that this research, which pinpoints those countries with species at greatest risk, will help to avert their extinction by identifying where conservation action is most urgently needed.

Differences in species richness among bird families were investigated in a collaborative study with researchers

at the Universities of Oxford and Queensland, Australia. High species diversity was strongly associated with pronounced plumage dichromatism, generalist feeding habits, good dispersal capabilities and large, fragmented geographic ranges. Together with earlier work which showed that differences in extinction risk are associated with variation in body size and life history, the data suggest that different factors appear to determine the rates of extinction and speciation.

Understanding the interaction between animals and their food supply is essential if we are to predict the effects which environmental or management changes may have. Several species of geese which breed in the Arctic are traditionally important grazers on British coastal habitats, often occurring in large flocks and depleting vegetation. We studied Brent geese which are now found in



Left: Barbary macaque, subject of a study into the role of female vocal signalling in providing information about their reproductive state.
Photo: Stuart Semple

large numbers in south-east England. They feed on intertidal mudflats and salt marshes in preference to inland grassland whenever possible and the availability and quality of these habitats determines when the geese switch their attention to farmland, where they can cause substantial crop damage. Coastal marsh has not been significantly modified by man, supports a wide range of highly specialised fauna and flora, and therefore has a high conservation value in its own right. Data on goose foraging were collected, allowing us to develop a simple model. This successfully predicted the date on which the geese had abandoned a green algal bed in previous years and the model can now be used to explore the effects of a range of environmental conditions on the geese. On salt marshes, however, the situation is more complex but our results showed that grazing by geese improves their own habitat for subsequent years and increases the diversity of habitat structure.

The harbour porpoise is the only cetacean species prioritised on the UK Biodiversity Action Plan and is in decline in the southern North Sea and English Channel. Factors proposed to explain this decline include entanglement in fishing nets, changes in food supply and pollution. Since 1990, with funding from the Department of the Environment, Transport and the Regions (DETR), and WWF-UK, we have been investigating



the threats to porpoises, as well as dolphins and whales, in the waters around England and Wales. Post-mortem investigations have established the cause of death and disease status of stranded animals; the harbour porpoise and common dolphin were stranded most frequently and entanglement in fishing gear was the most common cause of death in both species. Among porpoises, infectious diseases (pneumonias and generalised bacterial infections) were another common cause of mortality. Further investigations revealed that PCB and mercury concentrations were significantly higher in these individuals when compared to healthy porpoises that were accidentally trapped in fishing nets. The results support the hypothesis that industrial pollutants impair immune function in marine top predators.



Above: At work on the cheetah project in the Serengeti.
Photo: Sarah Durant

Left: Protected area of natural habitat used for a trial release of *Partula* snails in French Polynesia.
Photo: Trevor Coote

EDUCATION & INFORMATION

Biodiversity and its conservation

The five kingdoms



Education, in its broadest possible sense, is a key feature of ZSL's mission: looking up at a giraffe for the first time; touching a giant snail; reading an information panel or trying out an interactive display; hearing keepers talk about their work; attending a scientific lecture or reading one of our journals; using a teacher's resource pack or being trained in wild animal health, all come under this broad definition of education.

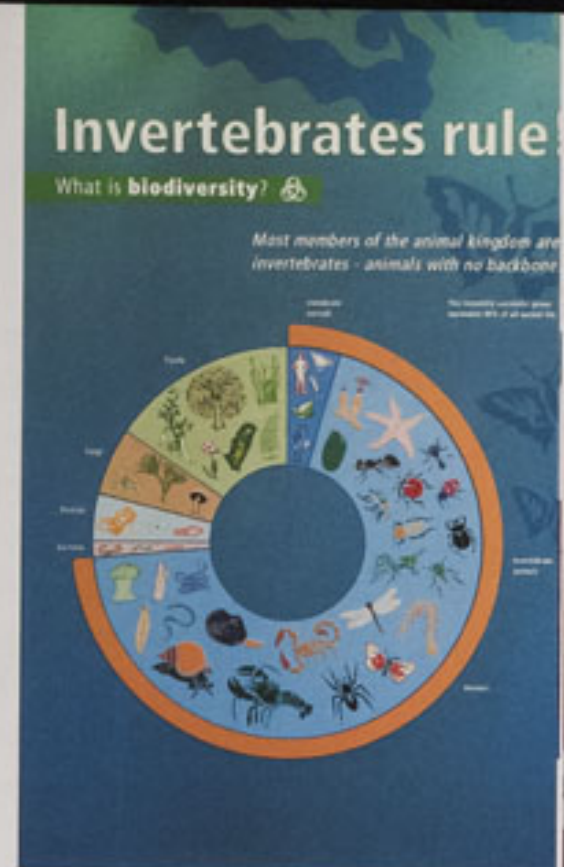
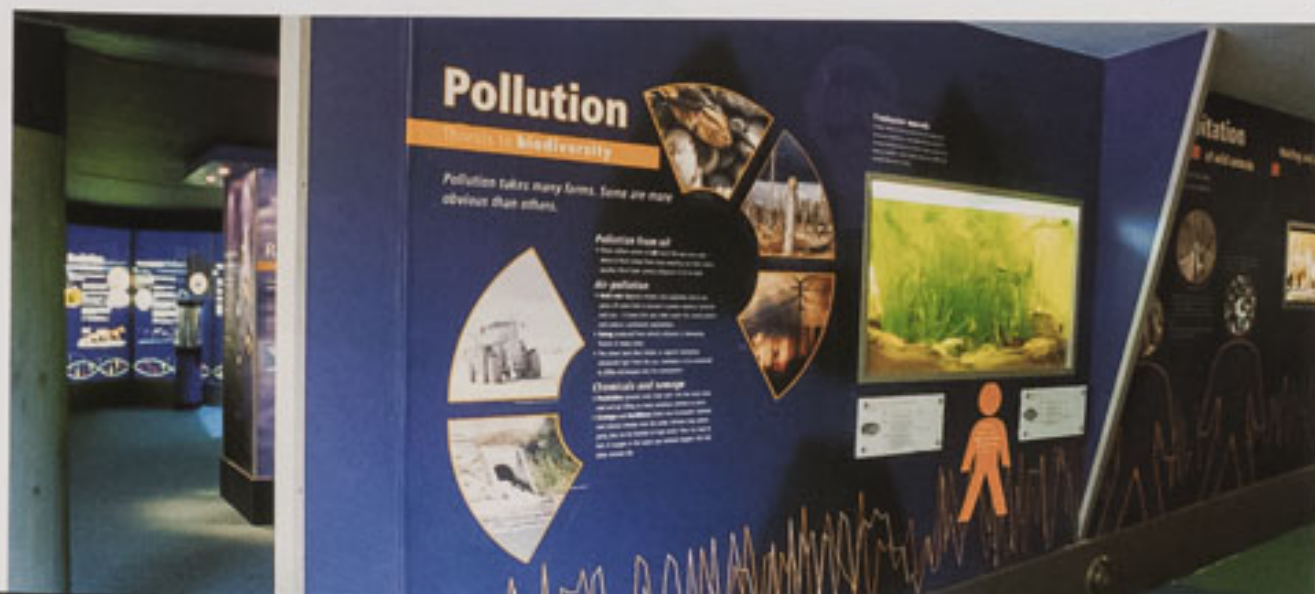
Spring saw the culmination of ZSL's most innovative conservation education project to date, when *Web of Life* opened its doors to visitors in April. This unique exhibition uses live animals to illustrate a strong message about biodiversity and its conservation. It explores the nature of genetic, species and ecosystem diversity, the threats to wildlife and habitats, and the features of good conservation. Staff from all parts of ZSL worked on developing and producing the exhibition, with education staff researching and writing the exhibition panels, selecting video footage and designing briefs for interactive displays. These include a demonstration of natural selection in peppered moths and an animated computer graphic to explain how habitat fragmentation causes loss of genetic diversity in golden lion tamarins. A key feature of the section on the role of good zoos was the design of an interactive computer game to help visitors understand how breeding programmes work.

Over 60 live animal exhibits illustrate different aspects of the story; for example, a tank of cichlid fish illustrates adaptive radiation, while the Mexican red-kneed spider provides an example of animals threatened by the pet trade. In response to visitors' interest in what goes on

'behind the scenes', several breeding rooms have been opened up like a doll's house, enabling visitors to see keepers at work caring for animals or inputting data on breeding programmes. Since 98% of animal species are invertebrate, the live displays reflect this, and staff from the old invertebrate house were closely involved in the design of exhibits and off-show support facilities. The mezzanine level of the building contains further breeding rooms for the work of the Invertebrate Conservation Unit.

The exhibition is designed to appeal to a wide age-range of visitors, from families with children to students and adults wishing to further their understanding of biodiversity and conservation issues. The needs of disabled visitors and children were a high priority when considering access and visibility of exhibits, hence the ramped flooring and low level tanks. A souvenir guide was written to complement the exhibition.

At Whipsnade, we have re-designed the species information panels. In addition to being far more attractive, they are much easier to read and have a longer lifespan. Fading due to weather is a major problem at both zoos and results in the need to renew information panels



Above and left: Colourful graphics, interactives and videos provide a wealth of information on biodiversity and its conservation. Here, a micrarium allows visitors to see some of the world's smallest organisms.
Photo: Brian Aldrich

Opposite: Visitors meet a hissing cockroach in *Web of Life*.
Photo: Brian Aldrich

at least once a year; a new method of production at Whipsnade – heat pressing on to metal – should drastically reduce this problem, providing an increased life expectancy of up to five years. The popular animal-shaped boards in the Park have been incorporated in the new graphics for the penguins, where they carry *Did you know?* facts. We have found that visitors who would not normally read a large graphics board enjoy this form of presentation and are reading more than one panel. As a result, information is reaching a wider audience.

We have also developed a new series of interpretation panels at London to explain the work of the scientists in the Institute of Zoology. For example, panels on monitoring fertility in elephants and rhinos and on conservation measures to protect Komodo dragons are displayed near related species.

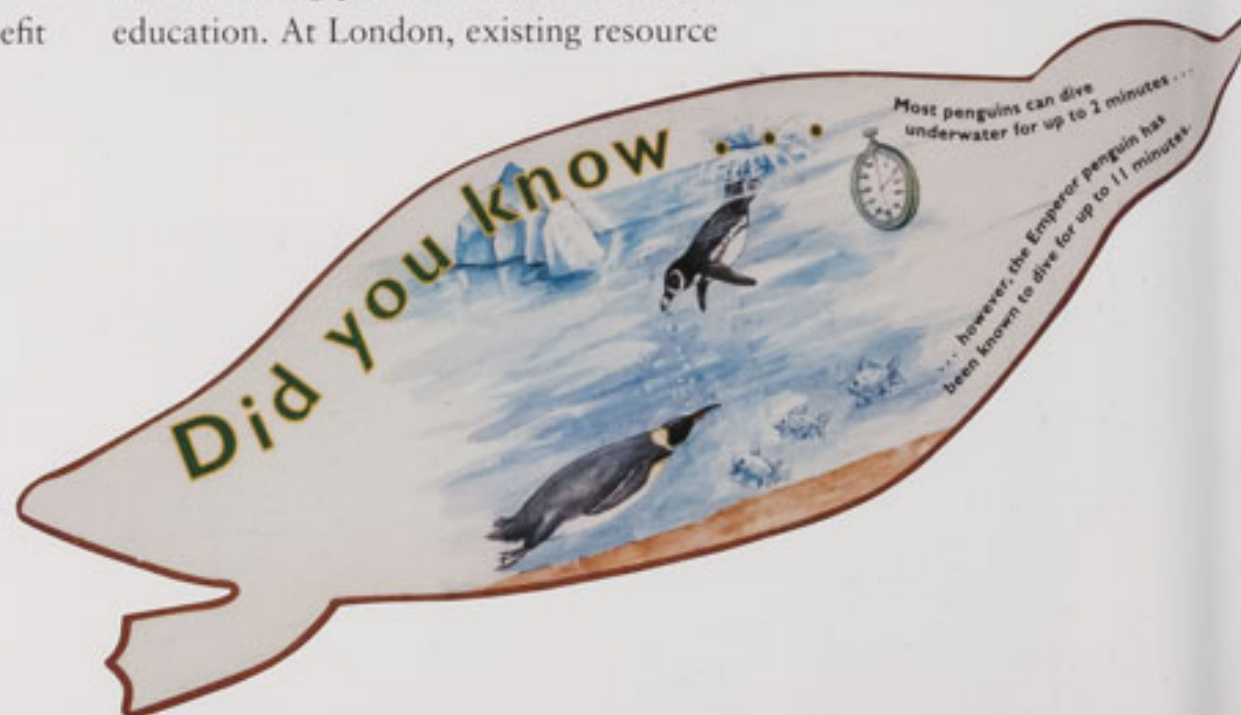
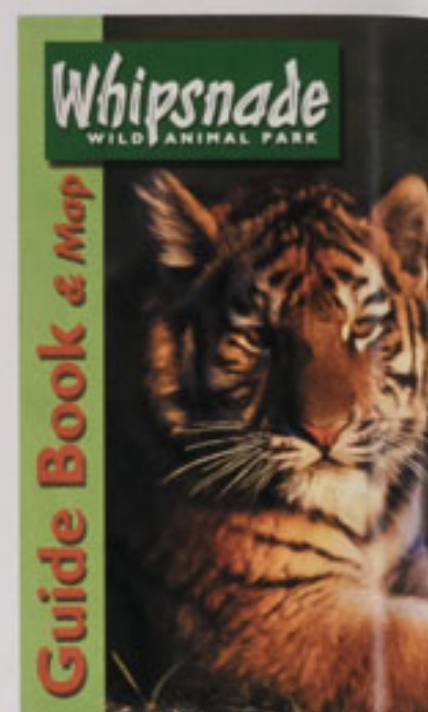
Interactive interpretation provides visitors with additional stimulation for learning. *The Survival Game* at Whipsnade has been reworked and refurbished and is now a very popular part of many children's visit to the Park. The old *Dash About, Think About* trail has been revamped under the new name, *Animalympics*, with funding from the Richard, Tim and Luke Harris Memorial Fund. A new addition to the trail has been to the chimps area where a rope walk frame is used to give children the opportunity to consider how chimps move through trees.

The Whipsnade map has been revamped using animal illustrations as well as species names. This has the added benefit

of ease of reference, especially for children, as well as making it simpler for visitors to find their way around.

An extension of the education work at London has been to bring visitors closer to animals and provide opportunities for asking questions; London Zoo Volunteers have been trained in a new activity, roving, which involves wandering around *Web of Life* armed with a giant snail or jungle nymph and interacting with visitors. As more volunteers are recruited, we plan to extend this popular activity to other areas of the Zoo, offering visitors a chance to meet someone 'in the know', and find out more about the daily life of a zoo. Since the opening of the Activity Den – a new building beneath the rhea paddock opposite *Web of Life* – demand for craft activities has increased and volunteers report a welcome rise in income. Brass-rubbing and badge-making are still popular and the extra space allows for new craft activities to be developed.

For the fourth year running, the number of school children visiting both zoos has increased; Whipsnade's figure for children on organised education visits was 29,000, and London attracted 54,000. The majority of Whipsnade's school visits are from primary schools in Bedfordshire and Hertfordshire, while London's key market comprises the London boroughs of Camden and Barnet and, interestingly, Hertfordshire. At Whipsnade, we have developed teachers' resource packs for the pre-school market, which previously had not been catered for. These have proved very popular and are providing a useful starting point for under 5's science education. At London, existing resource



Above: New editions of the zoo guidebooks from London and Whipsnade.

Right: Colourful penguin-shaped graphics boards provide fascinating facts about the penguins at Whipsnade.

material was updated and work started on new packs for Key Stages 2 to 4 and A-level, linked to studies in biodiversity and *Web of Life*.

Four trainee keepers at Whipsnade and six at London passed the City & Guilds examination in Zoo Animal Management. Four keepers at London gained distinction in their project and practical assessments, while one at Whipsnade gained a distinction in the written exam. This is the culmination of two years study, practical assessment and an individual project on a subject of their choice, and forms part of the basic training for all ZSL's keepers.

The Junior Friends of Whipsnade Saturday Club has continued to grow in popularity with 60 or more children attending regularly; activities included a day as a keeper, a trip to London Zoo and an African experience. At London, junior members of Lifewatch were offered an elephant encounter and poetry activity, safaris in *Web of Life*, a chance to *Muck-In, Muck-Out* in the hoofed animal section and a Hallowe'en party.

In the Institute of Zoology, four students submitted PhD theses, three of whom subsequently received their doctorates in 1999 and one in 2000. Jos Milner studied the natural selection of heritable morphological traits, such as body weight and dentition, in the soay sheep

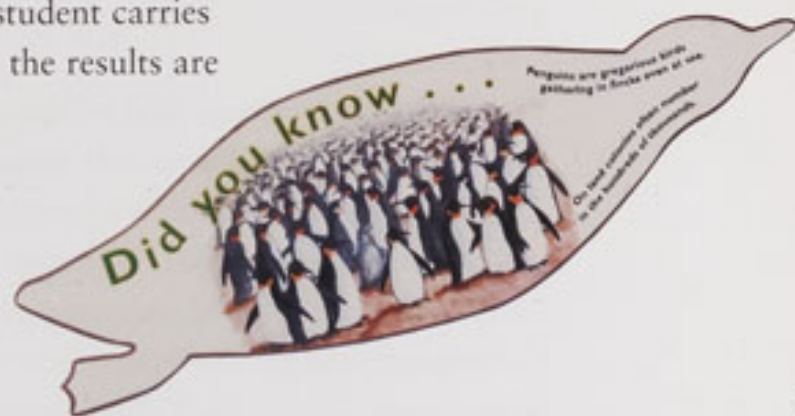
on St Kilda, in order to determine their importance in over-winter survival. Frank Clarke investigated the hormonal, behavioural and genetic correlates of dominance and breeding status in captive colonies of the naked mole-rat *Heterocephalus glaber*, a co-operatively breeding and eusocial rodent. Trevor Coote studied the genetics and conservation of Polynesian tree snails (*Partulidae*). A number of genetic markers were isolated to monitor captive populations; field research included surveys and a trial release of snails into a protected area of natural habitat in their native French Polynesia. Steve Casey studied the evolutionary relationships and taxonomy of *Hippocampus* spp and the population genetics of *H. comes* in the Philippines, in order to enhance conservation and management efforts. Part of this research was included in *Seahorses: an identification guide to the world's species and their conservation* which was published by Project Seahorse.

The Master of Science Course in Wild Animal Health continues to attract a great deal of interest from veterinarians. Over 180 inquiries and 80 applications were received for the 1998/99 course and 15 vets subsequently enrolled. For the first time, the course included a field trip to enable participants to work in teams, solve problems and develop their interpersonal skills. Each student carries out a research project and the results are



Above: A part of the Millennium project at Regent's Park includes a craft centre for children.

Photo: Brian Aldrich



published. Graduates from the course go on to work in zoos, national parks, universities and other institutes, working on both captive and free-living wild animals. In recent years a number of new job opportunities have arisen and it is a measure of the success of the course that these posts are often filled by our MSc graduates.

Facilitating the communication of data and ideas between professional zoologists, researchers and the general public is an essential part of ZSL's work. We hold four series of meetings, which are open to the public as well as to members and staff.

Tuesday Talks are aimed at a general audience. The nine talks held during the year covered a wide range of topics, including *What's become of the Scottish wildcat?*, *Kew Gardens: science and pleasure from the world's plants* and *Conserving great bustards in Saratov*.

The eight *Scientific Meetings* included diverse subjects, such as *Pollution and infertility*, *Global climate change and birds* and *Extinction lags and species conservation*. At each meeting three speakers presented important research on different aspects of the subject. *Conservation in Africa* and *Maintaining biodiversity through genetic resource management* were particularly well attended.

The *Research Seminars* held by the Institute of Zoology comprised talks by invited speakers on subjects relevant to our research, for example, Dr Allen Moore, University of Manchester, on *Constraints and the evolutionary maintenance of sex*, Dr Carlos Garza, University of California, on *Population genetics of the northern elephant seal*, Dr Tom Brooks, Conservation International, Washington, on *How long is the time-lag between deforestation and bird extinctions* and Dr Dave Coltman, University of Edinburgh, on *Parasite-mediated selection against inbred Soay sheep*.

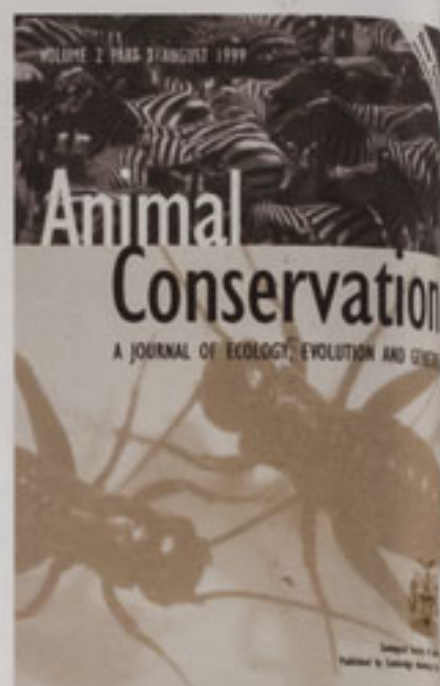
The 1999 Sir Stamford Raffles lecture, *The BSE crisis and the emerging epidemic of new variant Creutzfeldt Jacob disease*,

was given by Professor Roy Anderson FRS, Linacre Professor of Zoology and Director of the Wellcome Trust Centre for the Epidemiology of Infectious Disease, University of Oxford. The event was again sponsored by the Singapore Tourism Board and Singapore Airlines; we are most grateful for their continuing support of this important event.

The *Journal of Zoology*, a pre-eminent international journal dedicated to academic zoology, continues to attract contributions from top researchers. During the year 154 original, refereed articles were published in the 12 monthly parts of Volumes 247-250.

ZSL's quarterly journal, *Animal Conservation*, specialises in the rapid publication of rigorous empirical or theoretical studies relating to species and population biology, particularly on new ideas from evolutionary biology and ecology that contribute to the scientific basis of conservation biology. The second volume, published in 1999, contained 60 articles.

Over 180 people attended the international ZSL Symposium on *Conservation of Exploited Species* that was held in the Meeting Rooms on 10-11 December 1999. This was the fourth in the annual series of conservation-based symposia sponsored by ZSL, and the Wildlife Conservation Society, New York, also provided financial support allowing 21 of the best speakers to be invited from UK (10), North America (9) and Australia (2). Researchers presented an overview of the impact of exploitation on a range of taxa and discussed practical ways to apply this information to conservation. Many excellent papers were presented but the development of practical approaches to the conservation of exploited species is still littered with difficult scientific and social problems. Selected contributions will be published in our *Conservation Biology* series, and these should contribute towards getting those problems tackled and solved.



Above from top: *Animal Conservation* and *Journal of Zoology*, ZSL's two scientific journals.

Singapore Airlines and Singapore Tourism Board provide valuable support for the annual Sir Stamford Raffles lectures.

Cambridge University Press publishes two series of books in association with the Society, and ZSL's Scientific Books section is responsible for the overall management of these book-production projects. Our aim is to produce timely books which reflect the research interests of the Society and provide an important contribution to a particular field.

The *Conservation Biology* series includes internationally significant advances in the science that underpins conservation biology. Titles are based either on symposia held at ZSL or on other topics which meet these aims. The first book in the Series, *Conservation in a Changing World*, edited by Georgina Mace, Andrew Balmford and Josh Ginsburg, included the research of Institute staff. In 1999 a comprehensive and scientific account of the problems and possible solutions of tiger conservation, *Riding the Tiger*, edited by John Seidensticker, Sarah Christie and Peter Jackson, was published.

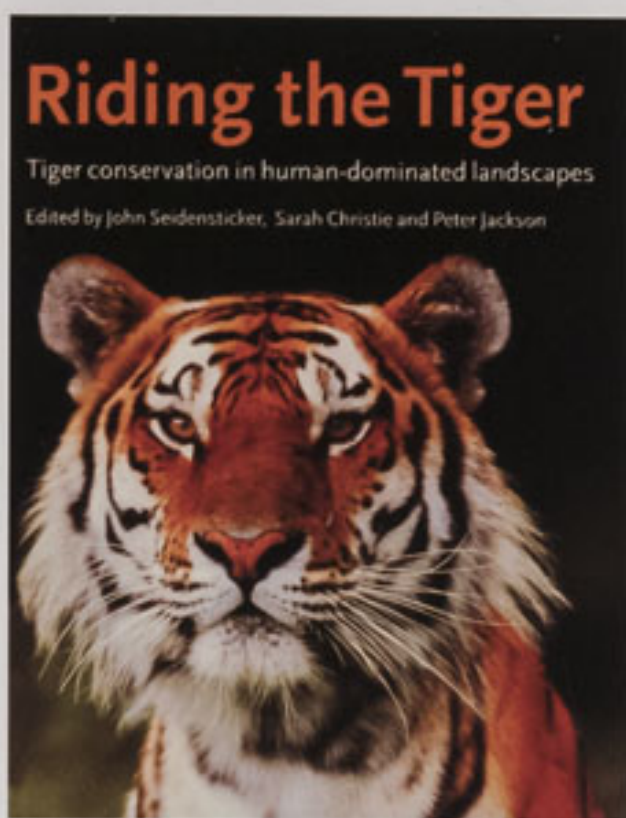
Books in the *Symposia of The Zoological Society of London* series cover topics such as population biology, behaviour, ecology and evolutionary biology.

Mammalian social learning: comparative and ecological perspectives, edited by Hilary Box and Kathleen Gibson, was published in 1999. The book includes information on a wide variety of species, and social learning in humans is compared with that in other mammals.

The primary publication from ZSL Scientific Books is the *International Zoo Yearbook*, edited by Peter Olney and Fiona Fisker and first published in 1960. Volume 37 was edited during 1999 and includes a comprehensive special section on Psittacines.

Volume 135 of *Zoological Record* was published jointly with BIOSIS and distributed in print, online and CD-ROM formats, as well as on the Web. Over 1.3 million records are now available on disc. *Zoological Record* is the most notable publication in its field, containing citations from over 4,500 serials and other sources. Authoritative indexing allows rapid access to relevant citations.

Discussions between ZSL and BIOSIS have focused on ways to make the database even more accessible and widely known. The continued generous support of various institutions, principally the British Library Document Supply Centre at Boston Spa and the Natural History Museum, London, in providing access to material for indexing is gratefully acknowledged.



Above, left to right: *Riding the Tiger*, a volume in ZSL's *Conservation Biology Series*, and *Mammalian Social Learning (Symposia series)* were both published in 1999.

ZSL IN THE NEWS



bird-eating spider appeared in *The Times*, *The Daily Mail*, *The Guardian* and *The Ham and High*. The story reached over 20 regional papers and featured in *Hello!*

Coverage of the official opening was achieved in *The Times*, *The Sun* and *Metro* with *London Tonight* featuring the event on the evening news. Press releases were also sent out to the local press of London Zoo's Children's Committee members with their quotes about meeting the Queen; they were also interviewed on radio.

A once-in-a-lifetime opportunity arrived in the form of the Eclipse. Journalists from *The Times*, *The Evening Standard* and several news agencies donned their special glasses and headed to London Zoo, to report the animals' reactions to this event (essentially, none!).

1999 also saw several high profile births. The successful hand-rearing of a pygmy hippo calf at Whipsnade resulted in footage shown by *Anglia TV*, *Newsround*, *Look East* and *RDF TV*. *The Daily Telegraph T2 section*, *The Evening Standard*, *The Express*, *Daily Star*, *Independent* and *The Times* featured articles, *The Mirror* produced a comprehensive colour picture story, and there was also extensive local and regional coverage.

Whipsnade's Amur tiger cubs featured in the *The Mirror*, *The Times*, *The Telegraph T2 Section* and *OK Magazine*, and the West African crocodiles appeared in *The Independent* and regional press.

The birth of the world's first captive-bred striped possum at London Zoo also caught the imagination of the press. The story was featured in national and regional papers, and on Teletext.

On the 20 January, the DETR launched their Tiger Mission, to crack down on illegal trade in tiger parts. The Rt Hon. Michael Meacher, Environment Minister and The Rt Hon. Derek Fatchett, Foreign Office Minister, took part in a photocall with a London Zoo tiger and held a press conference. Pictures were

featured in the *Independent* and *The Times*, and ZSL's Alexandra Dixon and Sarah Christie were featured on live link ups with *ITN*, *SKY News*, *BBC News 24*, *BBC Newsroom South East*. Radio coverage included interviews on Radio 4's *Today Programme*, *LBC* and *Radio 1*.

The official opening of Whipsnade's new penguin exhibit was attended by the *Daily Star*, *The Dunstable Gazette*, *PA*, *Anglia news*, *BBC Look East*. Articles appeared in *The Times Meg@* and *Animals and You*.

Whipsnade was also featured in a live broadcast by Carlton TV's *London Tonight*. The half-hour programme was a combination of live links and pre-recorded interviews with staff. Subjects included the role of a modern zoo, a day in the life of a zoo vet, breeding programmes, live links with the elephants and sealions, and an item about the lemur re-introduction project in Madagascar.

Adopt-an-Animal week, held in October half term, started with the C4 fashion programme *She's gotta have it*, featuring adoptions as a 'must have purchase'. The week's events, including a workshop by chimp choreographer, Peter Elliott, and the building of a four-foot high Yoplait Wildlife yoghurt pot elephant by visiting children at London Zoo, were covered by local as well as listings press.

Andy Hallsworth and Rob Goodchild took some of the London Zoo's *Animals in Action* animals into the studio of *Heart FM* for a lively early morning appearance with the breakfast crew. To highlight the adoption scheme, MPs were invited to adopt an animal for a colleague (flattering or otherwise!) and The Rt Hon. Dr Mo Mowlam's choice of a two-toed sloth for the Cabinet Office resulted in a front page story in *The Times* and articles in *The Express*, *Mail*, *Daily Star*, *The Sun*, and the *Independent on Sunday*.

Zoo keepers look after baby who lost her mum

JUST like any other three-week-old baby she demands constant bathing and feeding - but this little girl needs more looking after than most.

For this rare baby pygmy hippopotamus - the latest addition to Whipsnade Zoo - has no mum.

Tragically her mother Valenta died during a complicated emergency Caesarian before Christmas.

Since her birth, senior keeper Cliff Tuck has been surrogate mum - caring for the six-named orphan and experiencing some of the trials of parenthood.

First there are the twice-daily baths and then there is her voracious appetite for milk - which at one stage she needed seven times a day.

Now Cliff, 43, has cut her down to four feeds a day but the baby is still demanding breakfast at 5.30am and a supper-time nightcap.

Swim

Keepers hope to have a name for her soon when fund-raisers decide what to call her.

And although she may look cute, bath times can be difficult.

Hippoes are so slippery as soap because a protective liquid exuding from their skin makes them almost impossible to hold onto.

But she's happy in the water and can swim like a seal already.

"She's a wonderful girl," said father-of-two Cliff. "An absolute joy to look after. Everybody at Whipsnade has fallen for her."

Pink-nosed and brown in colour she's about the size of a Labrador pup but weighs 7.5 kilos, about twice as much.

When she's fully grown, the hippo will be roughly the size of a Shetland pony. The new baby at

Whipsnade, Belsie, is one of the last of her species in the world.

There are only a dozen of them in this country. Their natural habitat is the rainforests of Liberia, West Africa, but they adapt well to Britain.

Officials hope their new ally join a breeding programme aimed at saving the pygmy hippo from extinction.

In a few months the baby will join the others at Whipsnade's hippo house. There she will meet her father for the first time - an enormous 10-year-old called Nao.

And there's another family surprise in store.

She has a half-sister through Nao who is two weeks older than her.

Keepers hope they will become playmates.

Whipsnade spokeswoman Miranda Kennerly said: "Everybody here has fallen in love with the little hippo."

"She's so cute everyone has been round to see her even though she's still in our animal hospital."

"These lovely creatures are so rare, it makes her all the more special."

"Hopefully one day she will have children and keep the species going."

"This little girl is a huge hit. She certainly made Christmas and New Year very interesting."



SPLASH OUT: Keeper Cliff puts baby hippo in the bath

Above: Hand-rearing a pygmy hippo at Whipsnade was widely covered by the media.

Courtesy: *The Mirror*

FUNDRAISING

The major fundraising activity in the first part of this year was focused on the *Web of Life Appeal*, concluding a campaign begun in 1998. This unique building is part-funded by the Millennium Commission. Amongst the major contributors this year were the Mitsubishi Corporation Fund for Europe and Africa, Thames Water, the John S Cohen Foundation and the Trusthouse, Ibbetson and D'Oyly Carte Charitable Trusts.

The *Animal Partners* corporate adoption scheme, now in its second year, has gained in strength, generating financial sponsorship and gifts in kind totalling over £145,000, an increase of 37% over 1998. This scheme enables sponsors to choose from a variety of benefits to match their objectives and is related to the value of their contribution.

Once again the Mitsubishi Corporation Fund headed the list by donating £70,000 over three years to support the development of a new *Web of Life* website. Abbey National generously sponsored a new ramp for special needs access to the Mappin Terraces. Cash donations were received from Andersen Consulting, British Gas, Kodak, Land Rover, Merck, Sharpe and Dohme, the Nationwide Building Society and Suzuki, amongst others.

At Whipsnade, the Penguin Pool Appeal reached its target, and the Lion Appeal for £80,000 was launched. By the end of the year, nearly half this sum had been raised.

One of our more unusual sponsorships was a donation of shares from DLJ Direct (part of the French financial services group AXA) towards the financing of the Serengeti Research Project. These were purchased on ZSL's behalf in front of a city audience, to mark the introduction of their UK Internet dealing service.

Another new animal sponsorship came from Long Mountain, the South African wine company, in support of London Zoo's giraffes. This link appeared in a new sales campaign appearing on London's buses.

Gifts in kind also increased, and we are very grateful for the continuation of British Salt's donation of salt for the sealion pool at Whipsnade and Twinings' herbal infusions for our gorillas. New sources included food mixers from Robot Coupe, shelving from Spur, scales from Avery Berkel and furniture from Merlin Interiors and Ikea.

In May, we were honoured to host a fundraising dinner at which our principal speakers were Lady Thatcher and Ken Livingstone MP, the first time apparently that they have ever shared a platform together! Both spoke movingly about their childhood associations with London Zoo and the importance of supporting it as a vital part of Britain's heritage.

Singapore Tourism Board and Singapore Airlines continued their sponsorship of the annual Stamford Raffles Lecture, for which we offer them our continuing thanks. We are most grateful to all the corporations, trusts and other donors who have supported ZSL's vital conservation work in any way over the past year.



LONG MOUNTAIN



Abbey National

Charitable Trust Limited

LONDON ELECTRICITY



Above from top: A section of the sponsors' board in *Web of Life*.

A journey from Whipsnade Wild Animal Park to Emmen Zoo in Holland for Bill, the common hippo (weighing 1.5 tonnes), was made possible thanks to the assistance of Boss Forklift trucks.

Some of the many household names that supported ZSL's work during the year.

LZ

LONDON ZOO

Earth summit

Conservation worldwide

In June 1992 over 20,000 people from around the world gathered in Rio de Janeiro, Brazil, for the biggest ever world environmental conference.

What happened at the summit?

• The summit produced the Rio Declaration on Environment and Development, which set out 26 principles to guide global development.

• It led to the adoption of the Convention on Biological Diversity, which aims to protect the world's plants, animals and ecosystems.

28

"If people were not so impressed by size alone, they would consider an **ant** more wonderful than a rhino."

What is **biodiversity**?

These amazing creatures have a big effect on the world.



The five kingdoms

What is **biodiversity**?

Bacteria

• Bacteria are the most abundant organisms on Earth.

• They are found in almost every environment.

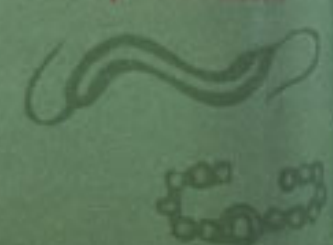
• Some bacteria can live in extreme conditions, such as hot springs and deep-sea vents.

• Bacteria play a vital role in the recycling of nutrients.

• Some bacteria are used in food production, such as cheese and yoghurt.

• Bacteria are also used in biotechnology to produce drugs and other products.

4,000 species known



1999 was a hugely important year in the process of the renaissance of London Zoo. The opening of the *Web of Life* Exhibition in the Zoological Society of London's Millennium Conservation Centre was a major milestone, representing the largest new development on the Regent's Park site for many years.

The activities of all London Zoo departments were devoted to getting this new exhibition up and running in time for our 1999 season; the Animal Management Department spent many hours getting the exhibitions ready, the Visitor Information and Education Department prepared the words and pictures for the graphics, the Visitor Services Department opened a new shop associated with the new building, the Site and Services Department, as well as contributing significant amounts of time to the development of the exhibition itself, also put a lot of effort into preparing the adjoining areas, and the Events Department organised all the events leading up to, and including, the opening. Other parts of ZSL, particularly the Institute of Zoology and Field Conservation, contributed material and information for the exhibition and the Public Relations Office generated a great deal of media interest.

A combination of a themed story (that of Biodiversity, the threats facing it, and the steps being taken to preserve it around the world), with many animals exhibits, interactive devices, and extensive graphics, make it, we believe, unique in the zoo world, and one of the best new exhibits in any zoo in the world in 1999.

As well as *Web of Life* activities, the staff of the Millennium Conservation Centre were involved in a further Field Cricket release, and the Reptile House continued to be involved in field work on the Egyptian Tortoise. A pair of Aye-Ayes from Madagascar were introduced to the collection in the Grade 1 listed former Gorilla House

by Lubetkin, and we have hopes of breeding success. Research into the environment for seahorses has led to a significant increase in breeding these increasingly threatened fish, and the arrival of a female Okapi, as part of the European Breeding Programme (EEP), will, we hope, enable us to breed these beautiful animals.

We introduced a new recommended route for our visitors which enables them (a) never to get lost and (b) to see everything; it has proved very popular and we will improve it in 2000.

A number of events through the year added variety to life at the zoo. We were host to a major open-air exhibition of the sculpture of Guy Taplin, we held the now-annual fun days organised by The Variety Club and The Metropolitan Police for deprived London children, and again hosted two weeks of Junior Citizen activities aimed at teaching young children life skills.

In the summer we collaborated with The Open Air Theatre in the production of fifteen performances of a children's play, *The Last Fattybottypus in the World*. This was highly successful and almost completely booked out.

All of this activity led to a rise in visitor numbers over the previous year, but not quite so high as we had hoped; however the combination of tight cost control and a higher spend per head contributed to a reasonably successful year financially.



Opposite and above: Leaf cutter ants: one of the most popular exhibits in *Web of Life*.

Photos: James Morris, Ian Meyrick, Brian Aldrich

WWAP

WHIPNADE WILD ANIMAL PARK



1999 was a good year for Whipsnade, with a number of important breeding successes, an excellent financial performance, and an increase in numbers; on the staff side, we were honoured to be recognised as an Investor in People.

Whipsnade generated a surplus for the seventh successive year, with strong contributions from non-day-visitor activities such as The Cloisters functions business which hosted major conferences and events for Norwich Union, Ernst & Young, Thomas Cook, Britannia Airways and many others.

Further links have been developed across the Hertfordshire and Bedfordshire Business Communities and there is now strong representation of our interests on a number of local and regional bodies.

In addition to achieving the Investors in People award, we introduced a number of in-house training seminars ranging from Presentation Skills to Resource Management and once again Customer Care seminars for all staff highlighted the importance we place on service to our customers.

Great effort has been put into the presentation of the park, maintaining and improving the high standards already in place, and building work in 1999 focused on the park's infrastructure with further renovation of our road and water systems and some essential modifications to operational aspects. Plans were drawn up for the bull elephant facility to be built in 2000.



A large number of births included a white rhino calf, caribbean flamingos, two very playful Siberian tiger cubs, and yet more dwarf crocodiles which this time were reintroduced to the parents and made a wonderful display in the Discovery Centre.

The new penguin exhibit was officially opened by Pam St Clement (who plays Pat Evans in Eastenders) at an extremely well-attended event, which generated substantial publicity. Pam also continued her ongoing relationship with WWAP by once more fronting the Anglia TV *Whipsnade* programme for its second series to be broadcast in 2000, and giving interviews to *My Weekly*, *Atlantic 252* and *Teletex*.

The Lion Appeal has also been a roaring success, with almost half the target of £80K raised by the end of 1999; the Midsummer Ball, attended by large numbers of business leaders and civic dignitaries, made a profit of around £5,000.

The winter operation policy was repeated, with visitors being offered a 'Winter Membership' valid until the end of February. This provides excellent value for money and approximately 48% of winter visitors converted to full membership.

Overall, 1999 was a highly successful year, with Whipsnade well positioned to move forward into 2000.



Above: Giraffe and calf.

Left: Przewalski's horse foals born at Whipsnade during the year.

Photo: Simon Hodge

Opposite: Part of the new penguin exhibit at Whipsnade.

Photo: Ian Meyrick

FCC

FIELD CONSERVATION & CONSULTANCY



Field Conservation and Consultancy, often working with staff from other parts of ZSL, runs a number of very successful projects in various parts of the world. An update on the progress of these initiatives indicates the diverse nature of the work which ZSL carries out in the field.

In Madagascar, we are monitoring the Black and White Ruffed Lemurs that were released into the Betampona reserve. Two major landmarks were the successful reproduction by captive-bred animals and the successful integration of an individual into a wild group.

At Lake Mburo National Park, Uganda, we have been assessing the benefits of revising wildlife conservation policy to enable the controlled integration of regionally adapted cattle into the management of protected areas. In Ethiopia, the final stage of the field work and writing up for the Guassa Biodiversity Project culminated in the publication of the Final Report and recommendations for the continued conservation of the project site. An international workshop in Ethiopia was held with all stakeholders and consensus was reached as to the way forward in a multi-disciplinary programme.

The Leuser Development Programme in northern Sumatra has continued, with support for the development of a new conservation area. Most of the field surveys are now being carried out in North Sumatra province, where there are good sites for developing research work on primates, sun bears and elephants in particular.

In Nepal, progress with the Chitwan Wildlife and Domestic Veterinary Programme has been considerable with three clinics fully functional and a fourth scheduled for 2000. The service is popular with local people for whom livestock is a major economic asset. Several wildlife captures and immobilisations were undertaken

as part of the management programme and to deal with problem animals.

The gazelle captive breeding program at the King Khalid Wildlife Research Centre continues, although a planned release of Mountain Gazelles in the Rub al Khali was postponed when prolonged drought left conditions unsuitable. Fieldwork has included the annual aerial census of Farasan Island gazelles. On the mainland, tracks and signs of as yet unidentified gazelles have been found beside the Gulf of Aqaba. The genetics laboratory team have added a forensic capacity to their ongoing research on gazelles and carnivores, successfully proving that samples of shed hair from an otherwise unseen gazelle, were unequivocally from an Idmi. In Sinai, our work at the St Katherine's Protectorate becomes increasingly established. Our role was further enhanced when a six week training course, specifically designed for St Katherine's Protectorate Rangers, was held at the KKWRC.

Dr Richard Kock continues work with the Pan-African Rinderpest Campaign (PARC) to help rid Africa of the morbillivirus. Rinderpest has devastated ruminant populations, wild and domestic, in Africa since the beginning of the 20th century and remains a threat which is of major economic importance. Focus on rinderpest in wild animals within PARC, however, only started recently and he is presently working on mapping out the final pockets of disease in the East African region. He has helped to train wildlife experts in Ethiopia, Uganda, Kenya and Tanzania and has developed a wildlife epidemio-surveillance network in Africa.



Above from top: Gelada baboon grazing on the Guassa grass amongst Lobelia, Ethiopia.
Photo: Karen Laurensen

African Wildlife Veterinary project: Dr T Mlenguya being trained to use a dart gun from a helicopter.
Photo: Richard Kock

Ankole cows in Lake Mburo National Park, Uganda.
Photo: Stuart Williams

Madagascar: discussing and explaining the project work with the village elders.
Photo: Adam Britt

Opposite: Black and white ruffed lemur released into the Betampona Reserve, Madagascar.
Photo: Adam Britt

IOZ

INSTITUTE OF ZOOLOGY



The reorganisation of research under the four themes introduced in 1998 – Evolutionary Ecology, Population Ecology, Conservation Biology and Management and the Origins and Maintenance of Biodiversity – was consolidated during the year.

However, this has also been a time of change for the Institute. Morris Gosling, Director of Science, left to take up a Chair at the University of Newcastle, and Dr Mike Bruford, who played a pivotal role in establishing conservation genetics as a successful discipline with the Institute, left to take up a Readership in Cardiff. Partly because of the need to change the arrangements with a partner university for the receipt of our £1.6 million HEFCE core grant, these two key posts have been held open. Dr Bill Holt was appointed Acting Director of Science.

The HEFCE core funding, provided to ZSL in recognition of its special role in national and international conservation, gives an opportunity for further external fund raising. This year we obtained a £70,000 grant from the WWF-UK to investigate the potentially harmful effects of environmental endocrine disrupting chemicals on marine mammals, the harbour porpoise in particular. This grant was enabled through preliminary reproductive assessments of harbour porpoise reproduction carried out in the context of a major project on marine mammals, funded by the DETR. This project, notably now in its tenth year, has resulted in a considerably increased understanding of causes of mortality among these species.

Other projects carried out within the Institute are also long-term in nature and constantly need supporting funds. A generous contribution of nearly £16,000 was received from National Geographic to support the Serengeti cheetah project, which adds to the £106,000 received from other sources over the previous three years.

A project to study extinction dynamics experimentally, using mosquitoes as model organisms, was funded by the Leverhulme Trust (£23,000). This work involves parallel studies in the laboratory and in the field. It is relatively straightforward to engineer different environmental conditions and different degrees in genetic relatedness, to study the interactions between population fitness and the environment.

As a result of the HEFCE audit, carried out towards the end of 1998, we have been working to implement a series of recommendations to develop and improve some of the management activities with the Institute.

We are looking towards the future in the knowledge that our research strengths will shortly be supported by closer association with a major higher education institution. Moreover, our science programme will be boosted by the appointment of new senior staff, including a Director of Science.

Further details of the Institute's work appear in ZSL's Scientific Report, *Science for Conservation 1999*.



Above: ZSL publishes a report of the work of the Institute of Zoology, *Science for Conservation*, each year.

Opposite: The Serengeti cheetah project is one of a number of long-term projects carried out within the Institute.

Photo: Sarah Durant

F & L

FELLOWSHIP & LIBRARY



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Our Library continues to maintain its pre-eminence as the largest collection of books and periodicals on the subjects of zoology and animal conservation in private ownership in the world, but despite its private nature it is one of the most readily accessible. Much of the material is available to Fellows of ZSL to borrow. The major event of 1999 was the repair of the roof, making the Library brighter and leak-free.

The project saw the reading room shrouded with dust sheets and filled with scaffolding and a low wooden ceiling. A temporary roof was built over the top to ensure rainwater did not get in. There was some inevitable disruption to services, but we remained open for most of this essential roof work in which all the glass panels in the roof were replaced.

We continued to lend books to Fellows, provide reference use of the Library to members of the public, give introductory tours to new staff, students and Library users, and answer enquiries, both zoological and historical. Our tours for special groups included a themed evening on *Images of Birds*, with special emphasis on our pictures of rare and extinct species.

The Library's watercolours and books illustrated by Edward Lear were filmed by the Channel 4's *Collector's Lot*, with the Librarian being interviewed by Nicholas Parsons.

An 1831 volume of the Daily Occurrences and a letter to ZSL from the Duke of Wellington were borrowed by the Royal Armouries for an exhibition held at the Tower of London about the Royal Menagerie; some of the animals came to the Zoological Gardens when the Tower Menagerie was finally closed.

The team of Library volunteers carried out surface cleaning of the nineteenth century letter collection. The letters have been transferred to archival quality envelopes and boxes, and are kept in the air-conditioned archive store. Correspondents include the Duke of

Bedford, Charles Darwin, Lord Kitchener, Sir Charles Lyell, and Barnum.

As always, we are extremely grateful to our volunteers for all their hard work throughout the year; and to all those who have donated books and archival items.

The wonders of modern technology have had a positive impact on Fellowship. ZSL's new website has created a greater awareness of the Fellowship, resulting in numerous new Fellows joining by simply completing and downloading the application form and posting it off. E-mail has also meant that any queries can be answered quickly, which has proved especially useful for those who live overseas.

Fellows enjoyed an open evening at Whipsnade in the late Summer with the Friends of WWAP. Many also attended the various open evenings at London Zoo and the popular series of Meetings, which are run to coincide with the academic year.

1999 saw the last editions of the *Fellows' Newsletter*, which now joins forces with *Lifewatch* magazine. Any specific issues which are directly related to Fellowship matters, such as ballot results, will be included as an insert in this publication or mailed separately.



Above from top: John Gould (1804-1881), author and publisher of some of the most magnificent illustrative works on birds ever to have been created.

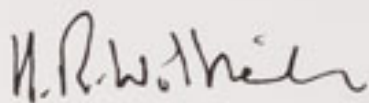
The library roof shrouded in scaffolding in early 1999.

Opposite: A selection of illustrations from publications by Gould which are held in the ZSL library.

TREASURER'S STATEMENT

1. The attached summarised accounts show the overall results of ZSL for the year to December 31, 1999. The Society achieved a consolidated surplus of £1.6 million for the year (1998 – restated surplus £0.9 million) and increased its total funds to £19.8 million, a most satisfactory performance overall.
2. The summarised accounts generally follow the format adopted for the previous year, and the main statement, the consolidated statement of financial activities, is taken from the statutory accounts which must follow the requirements of charity financial reporting. Developments in financial reporting have once again required a restatement of our opening funds and our results, increasing our total funds at the beginning of 1999 by a further £1.0 million. Additional information is given on the operating divisions based on internal management accounts which do not follow the exact format of the statutory accounts.
3. ZSL remains dependent on the two zoos for the success of its operating results. Both London Zoo and Whipsnade recorded an increase in visitor numbers, London by 2% to 1,017,469, Whipsnade by 8% to 437,276. The increase was due partly to the excellent weather during August and September, coupled with the beneficial publicity from the two TV series, *Whipsnade* and *Zoo*, culminating in the programme showing the Royal Visit to Regent's Park. Whipsnade's numbers were particularly strong throughout the year, and the results reflected increased contributions both from admissions and other activities. Field Conservation and Consultancy (FCC) increased its activities, but, as with the Institute of Zoology, its funds are effectively ring-fenced and cannot generate surpluses for the general use of the Society. The surplus in the Institute resulted partially from lower overheads due to unfilled senior posts.
4. The results of the year were also positively affected by further unrealised gains in investment values (£236,000), the receipt of two major legacies and savings due to the absence of a Director General and associated support staff.
5. In the early part of the year ZSL completed the Millennium Conservation Centre, which has cost a total of £4.5 million, and billed the Millennium Commission for the remainder of its 50% share of the basic costs. This constituted a major part of our capital expenditure for the year. The remainder related mainly to essential refurbishment, including the library roof at Regent's Park. The amount due from the Millennium Commission was received in March 2000, following signing of the lease for the Regent's Park site, and the amount constituted a large part of our balance sheet debtors at December 31, 1999.
6. ZSL's results for 1999 show the fifth successive annual surplus, and the largest annual surplus of the five. Completion of the Millennium Conservation Centre and receipt of the funding from the Millennium Commission now enables us to review our medium term financial planning with the aim of developing a programme for upgrading the two zoo sites and setting aside an appropriate amount for permanent investment. In addition our case for reducing VAT payments is proceeding satisfactorily, albeit slowly.

We remain as always grateful to members and donors for their continuing support.



Harry Wilkinson, FCA
Treasurer

SUMMARISED ACCOUNTS FOR 1999

Consolidated Statement of Financial Activities for the year ended 31 December 1999

	Year to 31.12.99 £000	Restated Year to 31.12.98 £000
Incoming Resources		
Zoo Operating Income:		
Visitor Admissions	8,762	7,665
Catering and Shops (Net)	2,686	2,464
Other Zoo Income	965	894
	<u>12,413</u>	<u>11,023</u>
Government and other Grants	2,432	2,381
Sales and Fees	1,162	1,015
Subscriptions	151	159
Donations and other Income	1,087	1,043
Interest and Investment Income	391	522
	<u>17,636</u>	<u>16,143</u>
Resources Expended		
Direct Charitable Expenditure:		
Zoo Operating Costs	11,629	10,883
Science and Research	3,157	3,017
Conservation and Consultancy	885	801
	<u>15,671</u>	<u>14,701</u>
Fundraising and Publicity	228	253
Management and Administration	441	510
	<u>16,340</u>	<u>15,464</u>
Operating Surplus for the year	<u>1,296</u>	<u>679</u>
Gains on Investments	268	263
Surplus for the year	<u>1,564</u>	<u>942</u>
Total funds balance brought forward, as previously reported	17,239	16,817
Prior year adjustment	994	474
Total Funds balance brought forward, as restated	<u>18,233</u>	<u>17,291</u>
Total Funds balance carried forward, as restated	<u>19,797</u>	<u>18,233</u>

Summarised Cash Flow Statement for the year ended 31 December 1999

	Year to 31.12.99 £000	Restated Year to 31.12.98 £000
Surplus for the year	1,564	942
Add Depreciation	1,270	1,105
	<u>2,834</u>	<u>2,047</u>
Less Purchase of Fixed Assets (Net of Disposals)	(1,940)	(3,236)
	<u>894</u>	<u>(1,189)</u>
Changes in other Assets and Liabilities	32	25
Net Cash Inflow/(Outflow)	<u>926</u>	<u>(1,164)</u>

Analysis of Surplus by Division for the year ended 31 December 1999

	Year to 31.12.99 £000	Restated Year to 31.12.98 £000
Divisions:		
Zoological Gardens:		
London Zoo	849	618
Whipsnade Park	702	285
	<u>1,551</u>	<u>903</u>
Scientific:		
Institute of Zoology	45	3
Field Conservation and Consultancy	(51)	(135)
Learned Society	(121)	137
	<u>(127)</u>	<u>5</u>
Surplus on Funds not included above	<u>672</u>	<u>521</u>
Less: Fundraising and Publicity	(228)	(253)
Management and Administration	(441)	(510)
	<u>(669)</u>	<u>(763)</u>
Surplus for the year before change of accounting policy	<u>1,427</u>	<u>666</u>
Change of accounting policy adjustment	137	276
Surplus for the year	<u>1,564</u>	<u>942</u>

Consolidated Balance Sheet at 31 December 1999

	31.12.99 £000	Restated 31.12.98 £000
Fixed Assets		
Tangible Assets	12,788	11,934
Investments	2,744	2,556
	<u>15,532</u>	<u>14,490</u>
Current Assets		
Stock	444	423
Debtors	2,986	2,608
Cash at Bank and in Hand	6,445	5,519
	<u>9,875</u>	<u>8,550</u>
Creditors: Amounts falling due within one year	(4,915)	(4,256)
Net Current Assets	<u>4,960</u>	<u>4,294</u>
Deferred Liabilities:		
Amounts falling due after more than one year	(695)	(551)
	<u>4,265</u>	<u>3,743</u>
Net Assets	<u>19,797</u>	<u>18,233</u>
Funds		
Unrestricted – General	13,608	12,770
– Designated	2,205	1,939
Restricted – Endowments	758	704
– Other	3,226	2,820
Total Funds	<u>19,797</u>	<u>18,233</u>

During the year, further to developments in accounting practice, it has been determined that certain incoming resources (grants, donations and similar income) should be fully recognised in the year they become receivable and not be accounted for as deferred income except where certain pre-conditions have not been met. Accordingly, the opening balances of Accruals and Deferred Income, and Deferred Capital Grants, have decreased and Funds increased by the same amount reflecting this change in accounting policy. These changes have an impact on the previously reported surplus for 1998, increasing it by £276,000 and on the surplus for 1999, increasing it by £137,000.

The Scientific Fund (£2,116,000) has been reclassified from Unrestricted Funds to Restricted Funds, following legal advice provided in the year.

The summarised accounts are based on the Society's full annual accounts. These summarised accounts may not contain sufficient information to allow for a full understanding of the financial affairs of the Society. For further information, the full Society's accounts, and Ernst & Young's audit report on them which is unqualified, should be consulted. A full set of the Society's accounts is obtainable on request from the Director of Finance.

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The Zoological Society of London

(registered charity no. 208728)

Regent's Park, London, NW1 4RY

Whipsnade Wild Animal Park, Dunstable, Bedfordshire, LU6 2LF

Directors

Director General **Dr Michael Dixon** (from January 2000)

Director, Field Conservation & Consultancy **Alexandra Dixon** (until January 2000)

Director of Finance **Norman Reed**

Acting Director of Science, Institute of Zoology **Dr Bill Holt**

Director, London Zoo **Dr Jo Gipps**

Director of Personnel **Ian Meyrick**

Director, Whipsnade Wild Animal Park **Stuart Earley**

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Fellowship Services **020 7449 6261**

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Fundraising Office **020 7449 6264**

Institute of Zoology **020 7449 6601**

Library **020 7449 6293**

London Zoo **020 7449 6501**

Whipsnade Wild Animal Park **01582 872171**

Website www.zsl.org

Full information on organisation, committee membership, staffing, and animals in the collection is contained in Part 2 of this report.

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Back cover: Rockhopper
penguin at Whipsnade.

Photo: Peter Thrusell

