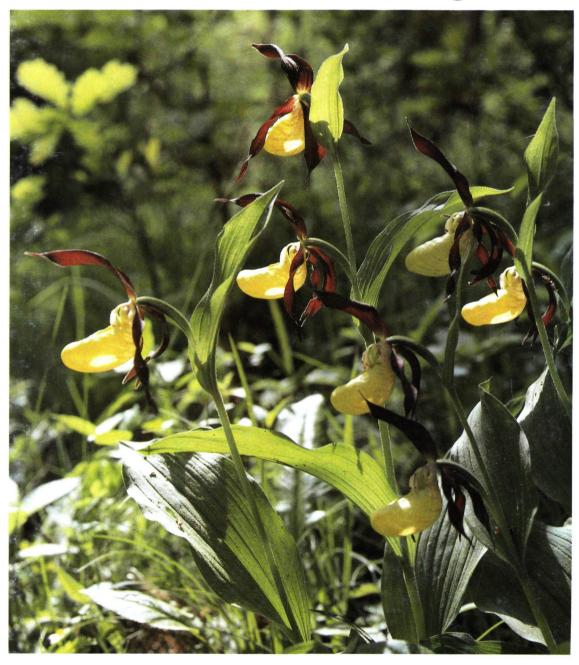
Volume XVIII

Fauna & Flora Preservation Society





# Fauna & Flora Preservation Society

Founded 1903
Patron HER MAJESTY THE QUEEN



Sir Peter Scott CBE DSC

Vice Presidents

Dr E.A.O. Asibey (Ghana)
David Attenborough CBE (UK)
Professor A.G. Bannikov (USSR)
Dr David Bellamy (UK)
Dr Felipe Benavides OBE (Peru)
Lt Col C.L. Boyle OBE (UK)
Dr Harold J. Coolidge (USA)
Mervyn Cowie CBE ED (Kenya)
Lord Craigton, P.C. CBE
Dr Kai Curry-Lindahl (Sweden)
Lt Col J.P. Grant of Rothiemurchus,
MBE

Major lan R. Grimwood OBE (Kenya) Dr Lee M. Talbot (USA) T.A.P. Walker

Chairman Richard Fitter

Vice Chairman David M. Jones MRCVS

Hon. Treasurer Edward Hoare FAAI

Membership

Oryx is free to members. Details, see tear sheet

Colour separation donated by Masterlith Ltd of Mitcham in Surrey.

Council

Dr Keith Banister
Dr David Chivers
Mrs Maisie Fitter
Dr C. Humphries
Brian Jackman
Clive Jermy
Stuart Johnstone
Jonathan Kingdon
G.Ll. Lucas OBE
Dr David

Macdonald Jeremy Mallinson Professor

N.W. Moore
Fergus O'Gorman
John Sparks
Dr R.E. Stebbings
Sir Peter Watkin
Williams
The Hon. Vincent
Weir
Edward Wright

Exec. Secretary John A. Burton

Editor of Oryx Dr Jacqui Morris Fauna and Flora Preservation Society

US Directors
Dr Gerard A. Bertrand
John Perry
John Walsh
Phoebe Wray

UK Directors John A. Burton Richard Fitter Dr Alison Jolly

Hon. Director
Dr Harold J. Coolidge

**Editorial Board** 

Dr Jacqui Morris (Chairman) Dr David Chivers Mrs Maisie Fitter Dr C. Humphries Brian Jackman Dr David MacDonald Fergus O'Gorman John Sparks Edward Wright

Design Adviser to Oryx Keith Whitehead Manuscripts are invited for consideration for publication and should be sent to the Editor from whom guidelines for authors are also available.

ISSN 0030-6053

The opinions expressed by authors do not necessarily reflect the policy of ffPS.

**Address** 

c/o Zoological Society of London, Regent's Park London NW1 4RY Tel: 01-586 0872

Registered Charity No. 250358

Cover: Lady's slipper Cypripedium calceolus, one of Europe's best known orchids, has been picked and uprooted for its beauty since early times and has become extinct in many places. In Britain it is now known at only one site in Yorkshire. These flowers were photographed in Germany (Hans Reinhard/Bruce Coleman Ltd).

Colour cover donated by Edward Wright Ltd.
We gratefully acknowledge the support received for the publication of *Oryx* from Consolidated Goldfields PLC.

#### **Subscriptions**

The journal is published quarterly (January, April, July, October) and the subscription price for 1984 for non-members is £19·50 (UK), £23·50 (overseas), and \$45 (USA and Canada) post free.

The journal is published for the Fauna & Flora Preservation Society by Blackwell Scientific Publications Ltd. All matters relating to subscriptions, back numbers and offprints should be sent to Blackwell Scientific Publications Ltd, PO Box 88, Oxford, England.

Advertising

Enquiries should be sent to the Advertisement Manager, Blackwell Scientific Publications LTd, Osney Mead, Oxford OX2 0EL, England (telephone 0865 240201).

© 1984 Fauna & Flora Preservation Society.

#### USA

Authorization to photocopy items for internal or personal use, or the internal or personal use of

specific clients, is granted by the Fauna & Flora Preservation Society for libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of \$02.00 per copy is paid directly to CCC, 21 Congress Street, Salem, MA 01970, U.S.A. Special requests should be addressed to the Editor. 0030–6053/84 \$02.00.

Current issues for North and South America, the Indian Sub-Continent, Australasia and the Far East are sent by air to regional distribution points from where they are forwarded to subscribers by surface mail. Any back numbers are normally despatched by surface to all regions, except North America and India, where they are sent by air freight.

US Mailing Agent: Expediters of the Printed Word Ltd, 515 Madison Avenue, Suite 1217, New York, NY 10022, second class postage paid at New York, N.Y.

Postmaster: send address corrections to *Oryx*, c/o Expediters of the Printed Word Ltd., 515 Madison Avenue, New York, NY 10022 (US Mailing Agent).



## **Application for Membership**

#### The Fauna and Flora Preservation Society

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

| Please enrol me as a member of the society from(date).  Name (BLOCK LETTERS) Please state Mr/Mrs/Miss or title  |
|---|
| Address   |
| l enclose £<br>being my subscription as a Life/Benefactor/Ordinary Member/Student/Family.   |
| Minimum subscriptions.  Ordinary member £15, US \$30; family £20, US \$40; benefactor £35, US \$70; student £7, U \$14. (Please add £1 for other convertible currency)  UK Members: It greatly benefits the society if you sign a deed of covenant (UK taxpayer only) |
| US Members: ffPS Inc is registered as a tax-deductible charity.   |
| Life membership: £1000, US \$2000   |
| The use of a Banker's order saves time, expense and reminders.  |
| (to be sent to the Fauna and Flora Preservation Society)  Name (Block Letters)  |
| Bank  |
| Address of Bank   |
| *Please pay for the credit of: Fauna and Flora Preservation Society, Account No. 3089914:<br>Barclays Bank Ltd, Camden Town Branch (20-17-53), London NW1 my subscription of  |
| £; and the same amour oneach year until further notice.   |
| *Please pay for the credit of ffPS (Inc), Account No. 12-0844-6, Union National Bank, Mai<br>Street, Ayer MA 01432 USA my subscription of   |
| \$; and the same amour oneach year until further notice.  |
| Signed: *delete as appropriate  |

## **BIOLOGICAL CONSERVATION**

#### An International Journal

#### EDITOR Dr Eric Duffey

Monks Wood Experimental Station, Institute of Terrestial Ecology, Abbots Ripton, UK

Biological Conservation has as its main purpose the widest dissemination of original papers dealing with the preservation of wildlife and the conservation or wise use of biological and allied natural resources. It is concerned with plants and animals and their habitats in a changing and increasingly man-dominated biosphere – in fresh and salt waters as well as on land and in the atmosphere. While its main basis is ecological the journal aims at fostering other relevant aspects of biological conservation and hopes thereby to encourage more research and publication of work which contributes to our knowledge and understanding of wildlife communities and their value to mankind. Biological Conservation publishes analytical studies which make contributions to our understanding of conservation as well as reports of discoveries or important original information.

The journal's coverage of the discipline of conservation ecology is relevant to universities and

The journal's coverage of the discipline of conservation ecology is relevant to universities and research institutes while the emphasis on the practical application of the research results is important to all land managers, from those dealing with landscape design problems to those whose concern is nature reserve management.

**ABSTRACTED/INDEXED IN:** Current Contents, Biological Abstracts, Geo Abstracts, Biological and Agricultural Index, Environmental Periodicals Bibliography.

#### **EDITORIAL BOARD**

**Professor F. Bourlière,** Faculté de Médecine, 45 rue Saints-Pères, Paris, France.

**Dr G. Budowski,** Tropical Research and Training Center, Costa Rica.

Professor A. Carr, University of Florida, USA. Dr J.C. de M. Carvalho, Museu Nacional. Rio de

Janeiro, Brazil.

**Dr Avv Fabio Cassola, WWF** Vice-President (Italian Appeal), Rome, Italy.

Dr M.E. Coe, University of Oxford, UK.

**Professor J.B. Cragg**, University of Calgary, Alberta, Canada.

**Professor H. Crusz**, University of Peradeniya, Sri Lanka.

**Professor W.H. Drury,** College of the Atlantic, Maine, USA.

**Professor W. Erz,** Bundesforschungsanstalt für Naturschutz und Landschaftsökolgie, West Germany.

**Dr John A. Gibb,** Department of Scientific and Industrial Research, New Zealand.

**Dr F.B. Goldsmith,** University College, London, UK

Professor Lennart Hansson, Swedish University of Agricultural Sciences, Uppsala, Sweden.

**Dr L. Hoffmann,** Station Biologique de la Tour du Valat. France.

**Dr Osamu Ikenouye,** Marine Parks Center of Japan, Tokyo, Japan.

Professor D.J. Kuenen, Leiden, The Netherlands. Professor K. Mellanby, Monks Wood Experimental Station, UK

Professor Th. Monod, Laboratoire d'Ichtyologie Générale et Appliquée, Paris, France.

**Dr B. Nievergelt,** Zoologisches Institut der Universitat, Zurich, Switzerland.

**Professor J.D. Ovington,** Australian National Parks and Wildlife Service, Canberra City, Australia.

**Dr J.F.V. Phillips,** University of Natal, Pietermaritzburg, South Africa.

Sir Peter Scott, The New Grounds, Slimbridge, Gloucester, UK

Mr L.S. Shaposhnikov, Ministry of Agriculture of the USSR, USSR.

**Dr L. M. Talbot**, International Union for Conservation of Nature and Natural Resources, Gland, Switzerland. **Professor Manuel G. de Viedma,** Universidad Politecnica de Madrid, Spain.

Professor A. de Vos, Auckland, New Zealand. Professor Dr V. Westhoff, Catholic University, Nijmegan, The Netherlands.

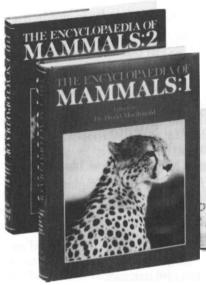
#### SUBSCRIPTION INFORMATION (ISSN: 0006-3207)

4 issues per volume, 3 volumes a year (volume approx. 1152 pages). Subscription price for 1984 (Volumes 28, 29 and 30); UK, £140.00; Overseas, £173.00. All prices include postage and packing. Subscriptions for delivery to USA, Canada, Japan and Australia are air-speeded at no extra charge.

Send for a FREE SPECIMEN COPY to the publishers:

ELSEVIER APPLIED SCIENCE PUBLISHERS LTD Ripple Road, Barking, Essex, England.

# A complete reference work in two magnificent volumes 'Brilliantly executed and beautifully illustrated' Desmond Morris



# THE ENCYCLOPAEDIA OF MAMMALS

Edited by Dr David Macdonald In two cloth-bound volumes at £25.00 each



Volume 1 Publication: June 1984

Volume 2 Publication: October 1984

Here in a superb two-volume set is a definitive reference work for anyone seriously interested in mammals.

- ★ 750 full-colour photographs, 72 specially-commissioned colour illustrations
- ★ 200 expert contributors
- ★ Each article written and signed by a specialist
- ★ Reports on the latest research
- ★ Summary panels on each species for easy reference

Volume 1 covers carnivores, seamammals and primates. The second volume covers herbivores, insectivores, bats and marsupials. Together, these books embrace every living species of mammal, providing information on the latest and most exciting discoveries and theories.

As a beautifully illustrated and truly absorbing reference work *The Encyclopaedia of Mammals* has no rivals.

#### GEORGE ALLEN & UNWIN

Editor Dr David Macdonald is an internationally respected authority in mammal biology and natural history, with many scientific publications to his name. For this major publication he heads a list of authors that includes many world-famous names, making a team of the highest quality.

#### ORDER YOUR COPIES HERE!

THE ENCYCLOPAEDIA OF MAMMALS in two volumes will be available from all good bookshops. In case of difficuly, simply complete this form and return it with your payment to the address below. Please add a token delivery charge of £0.75 per order within the UK, £1.50 per order for overseas delivery.

Please supply:

- ☐ THE ENCYCLOPAEDIA OF MAMMALS Volume 1 @ £25.00
- ☐ THE ENCYCLOPAEDIA OF MAMMALS Volume II @ £25.00

(which I understand will be supplied on publication in October 1984)

Credit eard customers may also order by telephone. Call Hemel Hempstead (V442) 56089 for 24 hour service.

Return to: Sales Dept., George Allen & Unwin (Publishers) Ltd., PO Box 18, Park Lane, Hemel Hempstead, Herts HP2 4TE, England.

EM84



# **QUESTERS**The world through nature tours.

Travel with a purpose.

Search out plants and animals, birds and flowers. Explore rain forests, mountains and tundra, seashores, lakes and swamps. With Questers you have ample time to photograph, absorb, reflect. Your guide is a naturalist, tour parties are small, accommodations first-class.

Our current Directory of Worldwide Nature Tours describes tours to: *In the Americas*—Okefenokee, Alaska, Hawaii, Canadian Rockies, Churchill, Mexico, Amazon, Patagonia, Galapagos, Peru. *In Asia*—Nepal, Bhutan, Sri Lanka, Japan. *In Australasia*—New Zealand, Australia, Papua New Guinea. *In Africa*—Madagascar, Mauritius, Kenya. *In Europe*—Iceland, Greece, Ireland, Switzerland, Scotland.

Learn and discover with Questers. Write or call today for your free copy of the Directory of Worldwide Nature Tours.



Worldwide Nature Tours Dept. OR, 257 Park Avenue South New York, NY 10010 • (212) 673-3120

## **CATALOGUE**

Over 250 new books in medicine and the natural sciences are described in our latest catalogues. Copies are available free on request from:

Publicity Department, Blackwell Scientific Publications Ltd, Osney Mead, Oxford OX2 0EL, England

Please send me ..... copies of your new

Medical Catalogue

Natural Sciences Catalogue

(delete as applicable)

| N  | Ĭá | <b>a</b> 1 | n | 10 | 2 |   |   |   |  | • |  |   | • |  |  |  |  | • |  |   |  |  |  |   |   |  |
|----|----|------------|---|----|---|---|---|---|--|---|--|---|---|--|--|--|--|---|--|---|--|--|--|---|---|--|
|    |    |            |   |    |   |   |   |   |  |   |  |   |   |  |  |  |  |   |  |   |  |  |  |   |   |  |
| A  | .( | d          | d | r  | e | S | s | • |  |   |  |   |   |  |  |  |  |   |  |   |  |  |  |   |   |  |
|    |    |            |   |    |   |   | • |   |  |   |  |   |   |  |  |  |  | • |  | • |  |  |  |   | • |  |
| ٠. |    |            |   |    |   |   |   |   |  |   |  |   |   |  |  |  |  |   |  |   |  |  |  |   |   |  |
|    |    |            |   |    |   |   |   |   |  |   |  | • |   |  |  |  |  |   |  | • |  |  |  | • |   |  |

### Blackwell Scientific Publications

Oxford London Edinburgh Boston Melbourne