

Cambridge University Press

978-0-521-54407-8 - Colyer's Variations and Diseases of the Teeth of Animals

Edited by A. E. W. Miles and Caroline Grigson

Frontmatter

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**Colyer's Variations and Diseases of the Teeth of
Animals**

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REVISED EDITION BY

A. E. W. MILES

Honorary Curator

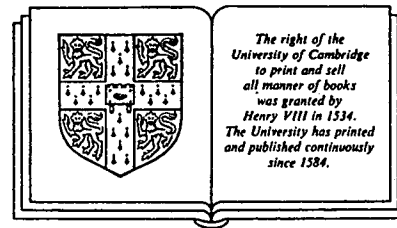
*Odontological Museum of the Royal College of
Surgeons of England*

AND

CAROLINE GRIGSON

Osman Hill Curator

*Odontological Museum of the Royal College of
Surgeons of England*



CAMBRIDGE UNIVERSITY PRESS

CAMBRIDGE

NEW YORK PORT CHESTER

MELBOURNE SYDNEY

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PUBLISHED BY THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE
The Pitt Building, Trumpington Street, Cambridge, United Kingdom

CAMBRIDGE UNIVERSITY PRESS

The Edinburgh Building, Cambridge CB2 2RU, UK

40 West 20th Street, New York NY 10011-4211, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

Ruiz de Alarcón 13, 28014 Madrid, Spain

Dock House, The Waterfront, Cape Town 8001, South Africa

<http://www.cambridge.org>

First edition copyright N. Colyer 1936

Revised edition © Cambridge University Press 1990

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First edition published by John Bale, Sons & Danielsson Ltd 1936

This revised edition first published by Cambridge University Press 1990

First paperback edition 2003

A catalogue record for this book is available from the British Library

Library of Congress Cataloguing in Publication data

Colyer, James Frank, 1866-1954.

[Variations and diseases of the teeth of animals]

Colyer's Variations and diseases of the teeth of animals. - Rev.

ed. / by A. E. W. Miles and Caroline Grigson.

p. cm.

Bibliography: p.

I. Veterinary dentistry. I. Miles, A. E. W. II. Grigson,

Caroline. III. Title.

SF867. C65 1990

636.089'76-dc 19 87-3532 CIP

ISBN 0 521 25273 3 hardback

ISBN 0 521 54407 6 paperback

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SIR FRANK COLYER, K.B.E., LL.D., F.R.C.S., F.D.S.R.C.S. 1866 – 1954

This portrait, which hangs in the Odontological Museum of the Royal College of Surgeons of England, was presented to Sir Frank by his friends on the occasion of his 80th birthday, 25 September 1946. Painted by Clarence White.

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Preface to the revised edition

Sir Frank Colyer (1866–1954) was a man who, during an exceptionally long working life, accomplished a great deal. Following his appointment to the consultant staff at the Royal Dental Hospital and School in London, he engaged in the scientific activities of the time and in the associated controversies. He quickly gained a reputation as an educator and, in 1893 when he was 27 years of age, he collaborated with Morton Smale, his senior at the Royal Dental Hospital, in producing a book, *Diseases and Injuries of the Teeth*. This book became the standard undergraduate textbook in British dental schools until the 1950s, being carried through a total of nine editions, at first by Colyer single-handed, who for the third edition (1910) changed its title to *Dental Surgery and Pathology*, and then, in 1931 (sixth edition), began a collaboration with Evelyn Sprawson to produce the subsequent editions.

Colyer served as Dean of the Royal Dental Hospital from 1904 to 1909. During the first World War, he was one of the pioneers who, mainly through their experience in the treatment of jaw fractures, collaborated with the growing nucleus of plastic surgeons in the repair of wounds of the head and face. It was for this work that he was knighted in 1920.

The Museum of the Odontological Society of Great Britain began its life in 1859. In 1900, when Colyer was appointed Honorary Curator in succession to W. C. Storer Bennett, who had died suddenly, the Odontological Society and the Royal Dental Hospital, whose premises it shared and with which it had been closely associated for many years, were seeking new premises to suit their expanding activities; a few months later the Museum was moved temporarily to

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the Royal College of Surgeons. Then, about 18 months after that, in 1902, it was rehoused with the Society and Hospital in Hanover Square. Negotiations were under way during the whole of this period to amalgamate various medical societies, including the Odontological Society, and this was finally achieved in 1907 with the formation of the Royal Society of Medicine. However, in 1909, when the new building at Wimpole Street was ready for this Society to move into, the Museum was transferred formally to the Royal College of Surgeons, on extended loan, to be housed as an integral part of its museum system (Colyer, 1943a; Miles and White, 1959; Miles, 1972). The collection was thus united with many specimens already possessed by the College, including for many years (until 1963), the odontological specimens of the Hunterian Collection.

Sir Frank's curatorship of the Odontological Museum to which he devoted so much of his time lasted for 54 years; the time he spent at the Museum increased when he retired from his other appointments and from his private practice. Over this long period, the collection grew at a pace much greater than hitherto largely through Sir Frank's personal efforts. He was indefatigable in seeking out material, establishing contacts and acquiring specimens by persuasion or purchase, using the small annual grant, of we believe £75 (Colyer, 1943a), derived ultimately from the Royal Society of Medicine and quite often his own money. The early part of his curatorship overlapped with the period when hunters were collecting, and it now seems to us ravaging, the wild species in Africa and in other parts of the world. Sir Frank had close contact with the grass roots of that situation and later with the game wardens who came into existence when policies of conservation of the wild began to take over. Many of the specimens referred to in this book came into the Museum by these routes. One of the special interests of Sir Frank was injury of elephant tusks from which he realized there was much to be learned about the response of developing dental tissues to injury. In the days of the British Empire, the discovery of elephants with double or misshapen tusks was commonly the subject of notes or letters in *The Times* or the *Illustrated London News*. Such a note would be sure to generate a letter from Sir Frank, often leading to the acquisition of another specimen.

In 1947 the size of the Odontological Museum collection was much increased when Sir Frank donated to it his own private collection of 2600 animal skulls. The Odontological Collection as it exists today is thus a memorial to him (Miles, 1972).

In 1936, Sir Frank Colyer produced the first edition of this book which turned out to be yet another

memorial to his efforts. The book was based mainly on material in the College supplemented by specimens in museums all over the world that Colyer saw on many journeys made predominantly for that purpose. He gave further interesting information about how the book came into existence in the Preface, which is reproduced here unchanged apart from the omission of a short paragraph explaining certain abbreviations for teeth that he used. As we have used a slightly different system, the retention of this paragraph could have led to confusion.

Judging from the many times it has been and still is cited today, the book came to be widely known and used and it would seem that it is available to most centres over the world. However, it is clear that, almost since it first appeared, it became quite rare because in 1940 the publisher's stocks were destroyed during an air raid. Thus, it seemed to us that consideration should be given either to a facsimile edition or to one supplemented by a record of literature since 1936. However, with the support of Cambridge University Press, we came to the conclusion that it would be better to produce a new edition in which, where new knowledge had made total revision necessary, that should be undertaken. Nevertheless it has been our intention to preserve the main framework of Sir Frank's original and, of course, nearly all the original figures, though with the addition of many others associated with the advances in knowledge over the past 50 years or so.

Sir Frank was noted for his integrity and forthright attitudes and was universally respected. His youthful exuberance, which remained with him into advanced age, made him well-liked, though on occasion, for example, if his beloved museum was in any way threatened, he could reveal unsuspected fierceness. One of us (AEWM) was privileged to be associated with him in his care of the Collection over the last eight years of his Curatorship and thus to acquire a deep affection and respect for him; and furthermore to learn from him the value of observation with the naked eye, mainly of specimens from which the soft parts had been lost, leaving the teeth and bone for better viewing.

We both have a high regard for the value of the specimens that are preserved in museums, which are to a large extent a heritage of past years, and which it is hoped will be preserved for ever. Collections of this sort will never again be gathered, for one thing many of the species so represented are either lost for ever or are endangered, so that deliberate collection from the wild must be strictly forbidden. We are sure that, even if these collections are preserved, no-one will ever attempt *de novo* such encyclopaedic descriptive work as Sir Frank produced in 1936. We certainly could not

have contemplated such an undertaking without the foundation stone of all the illustrations and data Sir Frank had accumulated.

We are glad to say again that almost all the Odontological Museum specimens that Sir Frank referred to are still in existence, partly because of his foresight in packing them up in the first year of the last war, and partly because at that time the Collection was housed in the basement and survived the severe damage that the Royal College of Surgeons suffered in 1941. Unfortunately that is not true of all the specimens in the Hunterian Museum of the College and some we have had to record in the text as no longer in existence.

It is appropriate here to pay tribute to the Wellcome Trust which, in 1973, came to the aid of the Odontological Museum with a generous financial grant at a very critical period.

We have done our best to discover whether specimens in other collections that are referred to are still housed where they were, and as far as possible this is indicated in the text; on the whole we were relieved to find that so much material still survives.

The main substance of this new edition consists of Colyer's text rearranged taxonomically. The reference numbers and locations of all the specimens referred to in museums all over the world have been checked as far as possible. Thus the basis of each of the chapters consists of records of specimens that Colyer saw or, in some instances, gathered from the literature. Most of the Tables represent analyses based on Colyer's own observations. We have added a great deal of material from the post-1936 literature but it has been impossible to incorporate all of these additions into the Tables because in many cases subsequent workers have examined at least some of the same specimens as Colyer. The individual instances of variation in the first two sections that we have added from the literature can be distinguished from those described by Colyer by the reference added to each.

We have added a General Introduction (Chapter 1) which contains a great deal of conceptual material which was not available in Colyer's time but needs to be taken account of in thinking of the significance and underlying causes of much of the more factual material that follows. The overall structure of the original has been retained but division of the book into several sections that was present in the original has now been formalized into four Sections. As a result of some re-ordering within the first two Sections, there are now 25 Chapters instead of 23.

Sound arguments occurred to us in favour of some larger reorganization of the material stemming from

consideration of advances of knowledge and differences of view that now pertain from those of 1936. However, the only one we have made is to place the chapter, *Overgrowth of Teeth*, which it is evident is a disorder of eruption, into the Section, *Abnormalities of Tooth Eruption*. *Odontomes*, now regarded as predominantly disturbances of tooth development, might have been integrated into the first part of the book. However, we decided not to do so in order to preserve as much as possible of the structure and substance of the original.

Three of the Sections, *Variations in Number, Size and Shape*, *Variations in Position*, and *Abnormalities of Eruption*, are also now introduced by material that we considered more appropriate to place there than in the General Introduction.

We are sure that few would expect us to have attempted to cover systematically the literature of palaeozoology for examples of disorders of dentition. It is only because Sir Frank included a few examples and we happened upon a few others that we mention the matter.

However it is necessary to say that, although the title of the book might lead readers to expect non-mammalian animals to be dealt with, Sir Frank not surprisingly restricted his attention to mammals. We have not attempted systematically to remedy this and indeed a superficial search of the literature revealed a scarcity of references to disorders of dentition in fishes, amphibia and reptiles. This does not necessarily indicate that such disorders are rare, because the difficulties are very great in detecting variations of numbers, shape and position and disorders of eruption in the multiple-generation dentitions composed of large numbers of teeth of simple form, sometimes spread over areas rather than in the rows that are characteristic of mammalian vertebrates; especially as, in non-mammalian vertebrates, even when the teeth are arranged in rows, the number of teeth in each row tends to increase with age by additions to the posterior ends of the rows. Non-mammals are of too much interest and importance to ignore and the observations or the examples we found have been added in places that seemed appropriate.

Because we know, from the innumerable references to it that occur in a diverse range of literature, that Colyer (1936) was, and is, consulted by workers in a wide range of disciplines, probably much wider than Sir Frank himself envisaged, in writing the introductory material, we have tried to predict the needs of a readership of similar width that will include zoologists and veterinarians as well as those trained in human dentistry whose general or research interests

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lead them beyond the study of man. We have had a mind to the needs of researchers into human dental disease who may be seeking an animal model for experiments designed to throw light on dental or oral disease. Some readers therefore will be already familiar with what the introductory material attempts to explain and may find it over-simplified but others we hope will find it adequately helpful.

In general, the text has had to assume some familiarity with tooth structure and the processes of tooth development, and with comparative dental anatomy. For those needing refreshment in those areas, we recommend *Dental Anatomy and Embryology* edited by J. W. Osborn (1981a). *Recent Mammals of the World* by S. Anderson and J. K. Jones (1967) contains good descriptions of dentitions and dental formulae of the genera. We have also found it necessary to consult some of the older works such as the most recent edition of C. S. Tomes *A Manual of Dental Anatomy, Human and Comparative* prepared by H. W. M. Tims and C. B. Henry (1923) and *The Microscopic and General Anatomy of the Teeth* by J. H. Mummery (1924).

The taxonomic nomenclature used in the First Edition has been updated by reference to *A World List of Mammalian Species* by G. B. Corbet and J. E. Hill (1986), *The Mammals* by D. Morris (1965) and *The Field Guide to the Large Mammals of Africa* by J. Dorst and P. Dandelot (1972). *The Catalogues of the Primates in the British Museum (Natural History)* by P. H. Napier (1976, 1981, 1985) were relied upon for the Primates.

We have tried to ascertain the present whereabouts of all the specimens mentioned in the First Edition, as well as others found in the literature. Almost every one has a unique number beginning with the abbreviated name of the Museum or Institution where it is housed. A list of abbreviations used in the text and the names and addresses of the museums and institutions is given below. The abbreviations are those used by the institutions concerned.

A.E.L.	Anatomisch-Embryologisch Laboratorium, Academisch Medisch Centrum, Meibergdreef 15, Amsterdam, Netherlands.
AGL	Ian Clunies Ross Animal Research Laboratory, Blacktown, New South Wales, Australia.

AHS	A. H. Schultz Collection, Anthropologisches Institut und Museum der Universität Zürich-Irchel, Winterthurerstrasse, Zürich, Switzerland.
AIMUZ	Collection of the Anthropologisches Institut und Museum der Universität Zürich-Irchel, address as above.
AMNH	American Museum of Natural History, Central Park West at 79th Street, New York, U.S.A.
B.I.	Biological Institute, Siberian Centre of the U.S.S.R. Academy of Sciences.
BMNH	Mammal Section, British Museum of Natural History, Cromwell Road, London.
Cambridge	University Museum of Zoology, Downing Street, Cambridge.
FMNH	Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, Chicago, Illinois, U.S.A.
Göteborg Naturhistoriska Museet	Natural History Museum of Gothenburg, Slottsskogen, Gothenburg, Sweden.
HZM	Harrison Zoological Museum, Sevenoaks, Kent.
J	Modern mammal collection, Queensland Museum, Brisbane, Queensland, Australia.
KMMA	Koninklijk Museum voor Midden-Afrika, Tervuren, Belgium.
KU	Museum of Natural History of the University of Kansas, U.S.A.
MCZ	Museum of Comparative Zoology, Agassiz Museum, Harvard University, Cambridge, Mass., U.S.A.

MHNG	Muséum d'Histoire naturelle, Casa postale 284, Route de Malagnou, Geneva, Switzerland.	TM	Transvaal Museum, Pretoria, South Africa.
ML	Musée Guimet d'Histoire naturelle, 28 Bd. des Belges, Lyon, France.	USNM	National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.
MNHN	Muséum National d'Histoire naturelle, 55 Rue de Buffon, Paris, France.	WAM	Modern mammal collection, Western Australian Museum, Perth, Western Australia.
MPEG	Museu Paraneso Emilio Goeldi, Av. Magalhaes 376, Belem, Brazil.	ZI	Institute of Zoology, U.S.S.R. Academy of Sciences.
MRI	Mammal Research Institute, Bialowieza, Poland.	ZM	Zoological Museum, Lomonosov University, Moscow, U.S.S.R.
MVZUC	University of California Museum of Vertebrate Zoology, Berkeley, California, U.S.A.	ZMA	Zoologisch Museum, Universiteit van Amsterdam, Plantage Middenlaan 53, Amsterdam, Netherlands.
NMBE	Naturhistorisches Museum, Bernastrasse 15, CH-3005 Bern, Switzerland.	ZMB	Zoologisches Museum, Museum für Naturkunde der Humboldt-Universität zu Berlin, Invalidenstr. 43, 1040 Berlin, D.D.R.
NMW	Naturhistorisches Museum Wien, Burgring 7, Vienna, Austria.	ZMUC	Zoologisk Museum, Universitetsparken 15, Copenhagen, Denmark.
NRM	Section for Vertebrate Zoology, Naturhistoriska Riksmuseet, Stockholm, Sweden.	Zool. Coll., Oxford Univ. Mus.	The Zoological Collections, University Museum, Parks Road, Oxford.
P-C. Mus.	The Powell-Cotton Museum, Quex Park, Birchington, Kent.	Zoo. Soc. Coll.	Disbanded collection of the Zoological Society of London, Regents Park, London NW1.
RCS Odonto. Mus.	Odontological Museum, Royal College of Surgeons of England, 35–43 Lincoln's Inn Fields, London WC2.		
RCS Osteo. Series RCSP	Osteological Series, Pathological Series, Hunterian Museum, Royal College of Surgeons of England, 35–43 Lincoln's Inn Fields, London WC2.		
RMNH	Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands.		
Rothschild Museum	Lord Rothschild's Museum, Tring. Collection incorporated in British Museum (Natural History).		
Schultz Collection	See AHS above.		

The specimens that have been destroyed or lost since Colyer examined them are listed in the text as 'formerly' in the relevant collection.

Acknowledgements

We are very grateful to members of staff of many museums and institutions who have answered tedious questions on the age, sex, status and catalogue numbers of specimens in their care. They are too numerous to mention individually, but special thanks go to Miss Elizabeth Allen (Hunterian Museum, Royal College of Surgeons of England); Dr Renate Angerman (Museum für Naturkunde, Humboldt-Universität, Berlin); Professor J. Anthony (Muséum d'Histoire

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naturelle, Paris); Drs A. J. de Haas (Anatomisch-Embryologisch Laboratorium); Dr K. A. Joysey (University Museum of Zoology, Cambridge); members of the Mammal Section of the Natural History Museum. Dr Juliet Clutton-Brock, Daphne Hill, Martin Sheldrick and Paula Jenkins; Rita Larje (Naturhistoriska Riksmuseet, Stockholm); and Ms Suely A. Marques (Museu Paranaense Emilio Goeldi, Belem, Brazil). Those who have helped us with general problems of dental anatomy and disease, as well as taxonomy, include J. E. Hill (Natural History Museum), Dr P. J. H. van Bree (Zoologisch Museum, Amsterdam), Dr R. G. Every (Christchurch Hospital, New Zealand), Dr J. A. Sofaer, Dr A. G. S. Lumsden and Dr Grace Suckling (New Zealand Medical Research Council).

As our main task has been to gather information and then to distil it into a small compass, it will be appreciated that we have had to lean on the resources of many libraries. The staff of the following libraries have been particularly helpful: Royal College of Surgeons (Michelle Lelliott and Matthew Derrick), British Library – Science Reference Library (Aldwych Reading Room), British Dental Association, Royal College of Veterinary Surgeons, the Zoology and

General Libraries of the British Museum (Natural History), Institute of Archaeology, Zoological Society of London (Susan Bevis and Paul Jeorrett) and the Royal Society of Medicine.

We pay tribute to the largely unsung compilers of the *Zoological Record*, *Index Veterinarius* and *Veterinary Bulletin*, without whose diligent labours it would have been virtually impossible to tap systematically the advances of knowledge published over the past 50 years.

We thank Mrs Lilian Rubin and Caroline Osbourne who bore the brunt of typing the script, Annette Serrant for much general assistance, Dr W. Tschernesky for his translation of some Russian texts and John E. Linder for help with many German ones.

Above all, we gratefully appreciate the generosity of the Anatomical Society of Great Britain in making a grant towards the costs of production which helped and encouraged us to undertake the task.

We have enjoyed continuous help and support from Cambridge University Press during the period of gestation of the book.

A.E.W.M.
C.G.

June 1990

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Preface to the Original Edition

During the autumn of 1930 I delivered for the Dental Board of the United Kingdom a course of four lectures on 'Abnormal Conditions of the Teeth of Animals in their Relationship to Similar Conditions in Man'. These lectures were published in book form [Colyer, 1931]. In this volume I have given a fuller account of the subjects dealt with in those lectures, more especially the one on 'Positional Variations of the Teeth' and have added chapters on 'Variations of the Teeth in Number and Shape', 'Abnormal Eruption and Growth of Teeth' and on those interesting abnormalities usually classed as 'Odontomes'. I trust that the facts recorded may be of some value to those interested in Comparative Dental Pathology.

I wish to record my thanks to the authorities of the Natural History Section of the British Museum for the facilities afforded me to examine the extensive collection of mammals' skulls and for permission to photograph several of the specimens. I am also indebted to Major Powell-Cotton for placing at my disposal, for the purposes of study, the valuable collection of Apes and Monkeys in his museum at Quex Park and to Lord Rothschild for allowing me to examine his collection at Tring Park.

During my visits to museums in Europe and America I was invariably received and assisted in the most friendly spirit by those in charge of the collections, and I wish to place on record my gratitude to Professor Dr Einar Lönnberg and Count Nils Gyldenstolpe of the Natural History Museum of Sweden; Professor Dr Nils Holmgren of the Högskola, Stockholm; Professor Hellman of Lund University; Dr Nic. Peters of the Zoological Museum of Hamburg; Dr H. Schoutenden of the Congo Museum, Belgium; Dr

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F. Voss of the Natural History Museum, Berlin; Professor Dr H. Boschma of the Natural History Museum, Leiden; Professor R. Anthony of the Natural History Museum, Paris; Dr A. Hrdlička and Mr G. S. Miller of the United States National Museum, Washington; Mr T. D. Carter of the American Museum of Natural History, New York; Mr Stephen C. Simms of the Field Museum, Chicago; Dr Magnus Degerbøl of the Natural History Museum, Copenhagen; Professor Dr A. M. Ribero of the National Museum, Rio Janeiro.

I desire to express my most sincere thanks to Mr Martin A. C. Hinton, F.R.S., of the British Museum, for the ready help at all times accorded to me; my thanks are also due to Mr R. I. Pocock, F.R.S., for many valuable suggestions, more especially in connexion with the difficult question of classification; to Dr W. L. H. Duckworth of Cambridge University for his unfailing kindness. I also wish to record the help I have received from Dr J. W. Woerderman, Dr Th. E. de Jonge-Cohen, Captain Guy Dollman, Dr G. C. A. Junge, Dr G. M. Vevers, Dr Karl Jordan, F.R.S., Dr E. Schwarz, Mr C. Forster Cooper, F.R.S. and Professor D. Axel Palmgren.

My thanks are also due to Mr R. W. Hayman for the ready and useful assistance he has always given to me during my visits to the British Museum; Mr

S. A. Sewell for his valuable help in connexion with the illustrations, and to Mr E. J. Manly for the trouble he has taken in photographing many of the specimens figured in the text.

I am deeply indebted to Mrs L. Lindsay for many valuable suggestions and for her great kindness in reading through the manuscript and the proof sheets.

I am indebted for the loan of blocks to the Council of the Royal Society of Medicine; the Publishing Committee of the British Dental Association; the Dental Board of the United Kingdom; the Dental Manufacturing Co.; the Amalgamated Dental Manufacturing Co.; the S.S. White Dental Manufacturing Co. for Figs. 846 to 848 [21.2 and 21.3] which are taken from the *Dental Cosmos*; Messrs Macmillan and Co. for permission to reproduce Figs. 67 and 68 [3.59 and 3.63] from Bateson's Material for the Study of Variation; *The Field Newspaper* for Figs. 738 and 739 [6.45 and 6.46]; Messrs Cassell and Co. for Figs. 1006 and 1007 [25.35 and 25.34]; and to the Bombay Natural History Society.

Lastly I must express my gratitude to Mr A. E. Bale for the great trouble he has taken with the production of the book.

J. F. COLYER.