

Cambridge University Press  
978-0-521-10366-4 - Vertebrate Blood Cells  
Edited by A. F. Rowley and N. A. Ratcliffe  
Frontmatter  
[More information](#)

---

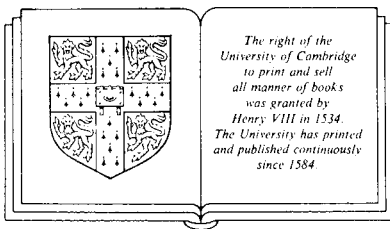
## Vertebrate blood cells

Cambridge University Press  
978-0-521-10366-4 - Vertebrate Blood Cells  
Edited by A. F. Rowley and N. A. Ratcliffe  
Frontmatter  
[More information](#)

# Vertebrate blood cells

EDITED BY

A.F. Rowley & N.A. Ratcliffe  
*Biomedical and Physiological Research Group,  
School of Biological Sciences, University College of Swansea*



**CAMBRIDGE UNIVERSITY PRESS**  
Cambridge  
New York New Rochelle  
Melbourne Sydney

Cambridge University Press  
978-0-521-10366-4 - Vertebrate Blood Cells  
Edited by A. F. Rowley and N. A. Ratcliffe  
Frontmatter  
[More information](#)

---

CAMBRIDGE UNIVERSITY PRESS  
Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo, Delhi

Cambridge University Press  
The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by Cambridge University Press, New York

[www.cambridge.org](http://www.cambridge.org)  
Information on this title: [www.cambridge.org/9780521103664](http://www.cambridge.org/9780521103664)

© Cambridge University Press 1988

This publication is in copyright. Subject to statutory exception  
and to the provisions of relevant collective licensing agreements,  
no reproduction of any part may take place without the written  
permission of Cambridge University Press.

First published 1988  
This digitally printed version 2009

*A catalogue record for this publication is available from the British Library*

ISBN 978-0-521-26032-9 hardback  
ISBN 978-0-521-10366-4 paperback

# Contents

<i>Preface</i>	vii
<b>1 Comparative aspects and possible phylogenetic affinities of vertebrate and invertebrate blood cells</b> N.A. Ratcliffe & D.A. Millar	1
<b>2 Fish</b> A.F. Rowley, T.C. Hunt, M. Page & G. Mainwaring	19
<b>3 Amphibians</b> R.J. Turner	129
<b>4 Reptiles</b> J. Sypek & M. Borysenko	211
<b>5 Birds</b> F. Dieterlen-Lièvre	257
<b>6 Mammals</b> R.T. Parmley	337
<i>Taxonomic Index</i>	425
<i>Subject Index</i>	430

Cambridge University Press

978-0-521-10366-4 - Vertebrate Blood Cells

Edited by A. F. Rowley and N. A. Ratcliffe

Frontmatter

[More information](#)

## Contributors

- BORYSENKO, M. PhD, Associate Professor, Department of Anatomy and Cellular Biology, Tufts University School of Medicine, Boston, MA 02111, USA
- DIETERLEN-LIEVRE, F. PhD, Directeur de Recherche au CNRS, Institut d'Embryologie, 49 av de la Belle Gabrielle, 94130 Nogent-Sur-Marne, France
- HUNT, T.C. PhD, Biomedical and Physiological Research Group, School of Biological Sciences, University College of Swansea, Singleton Park, Swansea SA2 8PP, UK
- MAINWARING, G. PhD, Biomedical and Physiological Research Group, School of Biological Sciences, University College of Swansea, Singleton Park, Swansea SA2 8PP, UK
- MILLAR, D.A. M.Sc., Senior Research Assistant, Biomedical and Physiological Research Group, School of Biological Sciences, University College of Swansea, Singleton Park, Swansea SA2 8PP, UK
- PAGE, M. PhD, Postdoctoral Research Fellow, Department of Anatomy and Embryology, University College, Gower Street, London, UK
- PARMLEY, R.T. MD, Associate Professor/Division Chief, Department of Pediatrics, The University of Texas, Health Center at San Antonio, 7703 Floyd Curl Drive, San Antonio, Texas 78284, USA
- RATCLIFFE, N.A. PhD, DSc, Professor and Leader of the Biomedical & Physiology Research Group, School of Biological Sciences, University College of Swansea, Singleton Park, Swansea SA2 8PP, UK
- ROWLEY, A.F. PhD, Lecturer in Immunology, Biomedical and Physiological Research Group, School of Biological Sciences, University College of Swansea, Singleton Park, Swansea SA2 8PP, UK
- SYPEK, J.P. PhD, Assistant Professor, Division of Geographic Medicine & Infectious Diseases, Tufts University – New England Medical Center Hospitals, Boston, MA 02111, USA
- TURNER, R.J. PhD, Lecturer in Immunobiology, Department of Zoology, The University College of Wales, Penglais, Aberystwyth, SY23 3DA, Wales, UK

## Preface

Over two decades have elapsed since the publication of *Comparative Haematology* by Warren Andrew (Grune & Stratton, 1965) in which the haematology of all major animal groups was elegantly reviewed. Since then, there have been several volumes dealing with invertebrate haematology such as *Invertebrate Blood Cells* Volumes I & II (N.A. Ratcliffe & A.F. Rowley, 1981), *The Reticuloendothelial System: A Comprehensive Treatise* Volume III, *Phylogeny & Ontogeny* (N. Cohen & M.M. Sigel, Plenum Press, 1982) and *Blood Cells of Marine Invertebrates* (W.D. Cohen, Alan R. Liss, 1985) but no collected review of vertebrate haematology has appeared. Tremendous advances, however, have been made in vertebrate haematology and immunology since *Comparative Haematology* was published in 1965 and the present volume attempts to bring much of the more recent literature together in a comprehensive form.

The book is divided into six chapters. The first, reviews the possible stages in the evolution of the blood cells typical of all vertebrate classes and compares and contrasts some aspects of invertebrate and vertebrate haematology. Subsequent chapters cover the different vertebrate classes in depth. Each chapter, although written by different authors, has a uniform approach covering fundamental topics such as the structure of the circulatory and lymphatic systems, and blood cell ontogeny, structure and functions. The chapters are copiously illustrated with light and electron micrographs of different blood cell types. The book should find a wide scientific audience including immunologists, clinical and veterinary haematologists, and evolutionary and developmental biologists. The main aim of *Vertebrate Blood Cells* is to stimulate research into comparative haematology in which so much still remains to be discovered.

AFR  
NAR