

Cambridge University Press

978-0-521-15257-0 - Animal Camouflage: Mechanisms and Function

Edited by Martin Stevens and Sami Merilaita

Frontmatter

[More information](#)

Animal Camouflage

Mechanisms and Function

In the last decade, research on the previously dormant field of camouflage has advanced rapidly, with numerous studies challenging traditional concepts, investigating previously untested theories and incorporating a greater appreciation of the visual and cognitive systems of the observer.

Using studies of both real animals and artificial systems, this book synthesises the current state of play in camouflage research and understanding. It introduces the different types of camouflage and how they work, including background matching, disruptive coloration and obliterative shading. It also demonstrates the methodologies used to study them and discusses how camouflage relates to other subjects, particularly with regard to what it can tell us about visual perception.

The mixture of primary research and reviews shows students and researchers where the field currently stands and where exciting and important problems remain to be solved, illustrating how the study of camouflage is likely to progress in the future.

Martin Stevens is a BBSRC David Phillips Fellow based in the Department of Zoology, University of Cambridge. His research focuses on sensory ecology and behaviour and has covered bird colour vision, computational models of colour and spatial vision, anti-predator markings, brood parasitism and cuckoos and sexual signals and vision in primates.

Sami Merilaita is an Academy of Finland Research Fellow in the Department of Biosciences, Åbo Akademi University, Finland. His research focuses on questions related to the evolution and function of animal coloration, especially with regard to prey concealment. He has also studied anti-predator signalling, factors influencing maintenance of colour polymorphism and sexual selection.

Cambridge University Press

978-0-521-15257-0 - Animal Camouflage: Mechanisms and Function

Edited by Martin Stevens and Sami Merilaita

Frontmatter

[More information](#)

Animal Camouflage

Mechanisms and Function

Edited by

MARTIN STEVENS

University of Cambridge

SAMI MERILAITA

Åbo Akademi University, Finland



CAMBRIDGE
UNIVERSITY PRESS

Cambridge University Press

978-0-521-15257-0 - Animal Camouflage: Mechanisms and Function

Edited by Martin Stevens and Sami Merilaita

Frontmatter

[More information](#)

CAMBRIDGE UNIVERSITY PRESS

Cambridge, New York, Melbourne, Madrid, Cape Town,
Singapore, São Paulo, Delhi, Tokyo, Mexico City

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

Information on this title: www.cambridge.org/9780521199117

© Cambridge University Press 2011

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 2011

Printed in the United Kingdom at the University Press, Cambridge

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

Library of Congress Cataloguing in Publication data

Animal camouflage : mechanisms and function / edited by Martin Stevens, Sami Merilaita.
p. cm.

Includes bibliographical references and index.

ISBN 978-0-521-19911-7 – ISBN 978-0-521-15257-0 (pbk.)

I. Camouflage (Biology) I. Stevens, Martin, Dr. II. Merilaita, Sami. III. Title.

QL759.A55 2011

591.47'2 – dc22 2011006853

ISBN 978-0-521-19911-7 Hardback

ISBN 978-0-521-15257-0 Paperback

Additional resources for this publication at

www.cambridge.org/9780521199117

Cambridge University Press has no responsibility for the persistence or
accuracy of URLs for external or third-party internet websites referred to
in this publication, and does not guarantee that any content on such
websites is, or will remain, accurate or appropriate.

Cambridge University Press

978-0-521-15257-0 - Animal Camouflage: Mechanisms and Function

Edited by Martin Stevens and Sami Merilaita

Frontmatter

[More information](#)

**This book was originally published as an issue of the
Philosophical Transactions of the Royal Society, Series B, Biological Sciences
(Volume 364, Issue 1526) but has been modified and updated.**

Cambridge University Press

978-0-521-15257-0 - Animal Camouflage: Mechanisms and Function

Edited by Martin Stevens and Sami Merilaita

Frontmatter

[More information](#)

Contents

	<i>List of contributors</i>	<i>page ix</i>
1	Animal camouflage: Function and mechanisms Martin Stevens and Sami Merilaita	1
2	Crypsis through background matching Sami Merilaita and Martin Stevens	17
3	The concealment of body parts through coincident disruptive coloration Innes C. Cuthill and Aron Székely	34
4	The history, theory and evidence for a cryptic function of countershading Hannah M. Rowland	53
5	Camouflage-breaking mathematical operators and countershading Ariel Tankus and Yehezkel Yeshurun	73
6	Nature's artistry: Abbott H. Thayer's assertions about camouflage in art, war and nature Roy R. Behrens	87
7	Camouflage behaviour and body orientation on backgrounds containing directional patterns Richard J. Webster, Alison Callahan, Jean-Guy J. Godin and Thomas N. Sherratt	101
8	Camouflage and visual perception Tom Troscianko, Christopher P. Benton, P. George Lovell, David J. Tolhurst and Zygmunt Pizlo	118
9	Rapid adaptive camouflage in cephalopods Roger T. Hanlon, Chuan-Chin C. Chiao, Lydia M. Mäthger, Kendra C. Buresch, Alexandra Barbosa, Justine J. Allen, Liese Siemann and Charles Chubb	145

Cambridge University Press

978-0-521-15257-0 - Animal Camouflage: Mechanisms and Function

Edited by Martin Stevens and Sami Merilaita

Frontmatter

[More information](#)**Contents** vii

10	What can camouflage tell us about non-human visual perception? A case study of multiple cue use in cuttlefish (<i>Sepia</i> spp.) Sarah Zylinski and Daniel Osorio	164
11	Camouflage in marine fish Justin Marshall and Sönke Johnsen	186
12	Camouflage in decorator crabs: Integrating ecological, behavioural and evolutionary approaches Kristin M. Hultgren and John J. Stachowicz	212
13	Camouflage in colour-changing animals: Trade-offs and constraints Devi Stuart-Fox and Adnan Moussalli	237
14	The multiple disguises of spiders Marc Théry, Teresita C. Insausti, Jérémy Defrize and Jérôme Casas	254
15	Effects of animal camouflage on the evolution of live backgrounds Kevin R. Abbott and Reuven Dukas	275
16	The functions of black-and-white coloration in mammals: Review and synthesis Tim Caro	298
17	Evidence for camouflage involving senses other than vision Graeme D. Ruxton	330
	<i>Index</i>	351

The colour plates will be found between pages 52 and 53.

Cambridge University Press

978-0-521-15257-0 - Animal Camouflage: Mechanisms and Function

Edited by Martin Stevens and Sami Merilaita

Frontmatter

[More information](#)

Contributors

Kevin R. Abbott

Department of Biology, Carleton University, Ottawa, Ontario, Canada

Justine J. Allen

Marine Biological Laboratory, Woods Hole, MA, USA and Department of Neuroscience, Brown University, Providence, RI, USA

Alexandra Barbosa

Marine Biological Laboratory, Woods Hole, MA, USA and Institute of Biomedical Sciences Abel Salazar, University of Porto, Portugal

Roy R. Behrens

Department of Art, University of Northern Iowa, Cedar Falls, IA, USA

Christopher P. Benton

Department of Experimental Psychology, University of Bristol, UK

Kendra C. Buresch

Marine Biological Laboratory, Woods Hole, MA, USA

Alison Callahan

Department of Biology, Carleton University, Ottawa, Ontario, Canada

Tim Caro

Department of Wildlife, Fish and Conservation Biology and Center for Population Biology, University of California at Davis, CA, USA

Jérôme Casas

Centre National de la Recherche Scientifique, Université de Tours, France

Chuan-Chin C. Chiao

Marine Biological Laboratory, Woods Hole, MA, USA and Department of Life Science, National Tsing Hua University, Hsinchu, Taiwan

Cambridge University Press

978-0-521-15257-0 - Animal Camouflage: Mechanisms and Function

Edited by Martin Stevens and Sami Merilaita

Frontmatter

[More information](#)

x

List of contributors

Charles Chubb

Department of Cognitive Sciences and Institute for Mathematical Behavioral Sciences,
University of California at Irvine, CA, USA

Innes C. Cuthill

Centre for Behavioural Biology, University of Bristol, UK

Jérémy Defrize

Centre National de la Recherche Scientifique, Université de Tours, France

Reuven Dukas

Department of Psychology, Neuroscience and Behaviour, McMaster University,
Hamilton, Ontario, Canada

Jean-Guy J. Godin

Department of Biology, Carleton University, Ottawa, Ontario, Canada

Roger T. Hanlon

Marine Biological Laboratory, Woods Hole, MA, USA

Kristin M. Hultgren

National Museum of Natural History, Smithsonian Institution, Washington DC, USA

Teresita C. Insausti

Centre National de la Recherche Scientifique, Université de Tours, France

Sönke Johnsen

Biology Department, Duke University, Durham, NC, USA

P. George Lovell

School of Psychology, University of St Andrews, UK

Justin Marshall

Queensland Brain Institute, The University of Queensland, Brisbane, Australia

Lydia M. Mäthger

Marine Biological Laboratory, Woods Hole, MA, USA

Sami Merilaita

Department of Biosciences, Åbo Akademi University, Turku, Finland

Adnan Moussalli

Sciences Department, Museum Victoria, Melbourne, Australia

Daniel Osorio

School of Life Sciences, University of Sussex, Brighton, UK

Zygmunt Pizlo

Department of Psychological Sciences, Purdue University, West Lafayette, IN, USA

Hannah M. Rowland

School of Biological Sciences, The University of Liverpool, UK

Graeme D. Ruxton

Division of Ecology and Evolutionary Biology, University of Glasgow, UK

Thomas N. Sherratt

Department of Biology, Carleton University, Ottawa, Ontario, Canada

Liese Siemann

Marine Biological Laboratory, Woods Hole, MA, USA

John J. Stachowicz

Department of Evolution and Ecology, University of California at Davis, CA, USA

Martin Stevens

Department of Zoology, University of Cambridge, UK

Devi Stuart-Fox

Department of Zoology, University of Melbourne, Australia

Aron Székely

Department of Sociology, University of Oxford, UK

Ariel Tankus

Department of Computer Science, Tel-Aviv University, Israel

Marc Théry

Centre National de la Recherche Scientifique, Muséum National d'Histoire Naturelle, Brunoy, France

David J. Tolhurst

Department of Physiology, Development and Neuroscience, University of Cambridge, UK

Tom Troscianko

Department of Experimental Psychology, University of Bristol, UK

Cambridge University Press

978-0-521-15257-0 - Animal Camouflage: Mechanisms and Function

Edited by Martin Stevens and Sami Merilaita

Frontmatter

[More information](#)

xii

List of contributors

Richard J. Webster

Department of Biology, Carleton University, Ottawa, Ontario, Canada

Yehezkel Yeshurun

Department of Computer Science, Tel-Aviv University, Israel

Sarah Zylinski

School of Life Sciences, University of Sussex, Brighton, UK