

# **Migratory strategies in the Northern Wheatear (*Oenanthe oenanthe*)**

Von der Fakultät für Mathematik und Naturwissenschaften der Carl von Ossietzky  
Universität Oldenburg zur Erlangung des Grades und Titels eines

**Dr. rer. nat.**

angenommene Dissertation

von Herrn **IVAN MAGGINI**

geboren am 12. Juli 1979 in Locarno (Schweiz)

Angefertigt am  
Institut für Vogelforschung “Vogelwarte Helgoland”  
Wilhelmshaven

Gutachter: Prof. Dr. Franz Bairlein

Zweitgutachter: Prof. Dr. Henrik Mouritsen

Tag der Disputation: 5. August 2009

Berichte aus der Biologie

**Ivan Maggini**

**Migratory strategies in the Northern Wheatear  
(*Oenanthe oenanthe*)**

Shaker Verlag  
Aachen 2009

**Bibliographic information published by the Deutsche Nationalbibliothek**

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at <http://dnb.d-nb.de>.

Zugl.: Oldenburg, Univ., Diss., 2009

Copyright Shaker Verlag 2009

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the publishers.

Printed in Germany.

ISBN 978-3-8322-8779-5

ISSN 0945-0688

Shaker Verlag GmbH • P.O. BOX 101818 • D-52018 Aachen

Phone: 0049/2407/9596-0 • Telefax: 0049/2407/9596-9

Internet: [www.shaker.de](http://www.shaker.de) • e-mail: [info@shaker.de](mailto:info@shaker.de)

# Index

1. Synopsis .....	5
1.1 Model species: the Northern Wheatear .....	6
1.2 Structure of the project .....	8
1.3 Circannual cycles of weight and migratory activity .....	9
1.4 Orientation .....	10
1.5 Migratory connectivity .....	12
1.6 Resting metabolic rates .....	14
1.7 Conclusions .....	15
1.8 References .....	15
2. Seasonal rhythms of migratory body mass changes and nocturnal restlessness in different populations of northern wheatear <i>Oenanthe oenanthe</i> .....	20
2.1 Introduction .....	20
2.2 Methods .....	23
2.2.1 Study birds .....	23
2.2.2 Experimental setup .....	24
2.2.3 Data analysis .....	25
2.3 Results .....	26
2.3.1 Body mass .....	26
2.3.2 Nocturnal activity .....	29
2.4 Discussion .....	32
2.5 References .....	36
3. Orientation behaviour of northern wheatears, <i>Oenanthe oenanthe</i> : a common- garden experiment .....	41
3.1 Introduction .....	41
3.2 Methods .....	44
3.2.1 Study birds .....	44
3.2.2 Experimental setting .....	46
3.2.3 Data analysis .....	48
3.3 Results .....	50
3.3.1 Autumn tests .....	50

3.3.2 Spring tests .....	52
3.4 Discussion .....	53
3.5 References .....	56
4. Nitrogen and carbon stable isotopes in feathers of breeding and wintering northern wheatears, <i>Oenanthe oenanthe</i> .....	61
4.1 Introduction .....	61
4.2 Methods .....	64
4.2.1 Study birds .....	64
4.2.2 Stable isotope analysis .....	65
4.2.3 Data analysis .....	65
4.3 Results .....	66
4.4 Discussion .....	69
4.5 References .....	72
5. Metabolic response to changes in temperature in a long-distance migratory landbird: a latitudinal comparison .....	78
5.1 Introduction .....	78
5.2 Material and methods .....	80
5.3 Results .....	83
5.4 Discussion .....	86
5.5 Literature cited .....	88
6. Acknowledgements .....	93
7. Summary .....	95
8. Zusammenfassung .....	98
9. Erklärung .....	101
10. Lebenslauf .....	102