

# Biology Letters

volume 8  
2012

Published by

THE ROYAL SOCIETY

6–9 Carlton House Terrace, London SW1Y 5AG

ISSN 1744-9561

The six numbers in this volume can be obtained separately from the Royal Society,  
6–9 Carlton House Terrace, London SW1Y 5AG.

**Copyright**

© 2012 The Royal Society

Except as otherwise permitted under the Copyright, Designs and Patents Act, 1988, this publication may only be reproduced, stored or transmitted, in any form or by any means, with the prior permission of the publisher, or, in the case of reprographic reproduction, in accordance with the terms of a licence issued by the copyright Licensing Agency. In particular, the Society permits the making of a single photocopy of an article from the issue (under Sections 29 and 38 of this Act) for an individual for the purposes of research or private study.

The text paper used in this publication is alkaline sized with a coating which is predominantly calcium carbonate. The resultant surface pH is in excess of 7.5, which gives the maximum practical permanence.

Printed in England by Latimer Trend & Company Limited  
Typeset in India by Techset Composition Limited

## Contents

no. 1, 23 February 2012

### *Editorial*

Editorial 2012

By B. Charlesworth 1

### *Meeting reports*

Biodiversity: past, present and future

By E. M. Rubidge, A. C. Burton and S. M. Vamosi 3

Analysis and visualization of animal movement

By J. Shamoun-Baranes, E. E. van Loon, R. S. Purves, B. Speckmann,  
D. Weiskopf and C. J. Camphuysen 6

### *Animal behaviour*

Cleaner wrasse mimics inflict higher costs on their models when they are more aggressive towards signal receivers

By K. L. Cheney 10

Bees do not use nearest-neighbour rules for optimization of multi-location routes

By M. Lihoreau, L. Chittka, S. C. Le Comber and N. E. Raine 13

Learning and discrimination of cuticular hydrocarbons in a social insect

By E. van Wilgenburg, A. Felden, D.-H. Choe, R. Sulc, J. Luo, K. J. Shea,  
M. A. Elgar and N. D. Tsutsui 17

Variable individual consistency in timing and destination of winter migrating fish

By J. Brodersen, P. A. Nilsson, B. B. Chapman, C. Skov, L.-A. Hansson and C. Brönmark 21

Post-allogrooming reductions in self-directed behaviour are affected by role and status in the green woodhoopoe

By A. N. Radford 24

Behavioural flexibility and problem-solving in a tropical lizard

By M. Leal and B. J. Powell 28

Daily body temperature rhythms persist under the midnight sun but are absent during hibernation in free-living arctic ground squirrels

By C. T. Williams, B. M. Barnes and C. L. Buck 31

Perception of male–male competition influences *Drosophila* copulation behaviour even in species where females rarely remate

By A. Lizé, R. J. Doff, E. A. Smaller, Z. Lewis and G. D. D. Hurst 35

Self-agency in rhesus monkeys

By J. J. Couchman 39

Comment. On the flexibility of lizards' cognition: a comment on Leal & Powell (2011)

By M. Vasconcelos, T. Monteiro and A. Kacelnik 42

Invited reply. On the flexibility of lizards' cognition: a response to Vasconcelos *et al.*

By M. Leal and B. J. Powell 44

### *Biomechanics*

The extraordinary athletic performance of leaping gibbons

By A. J. Channon, J. R. Usherwood, R. H. Crompton, M. M. Günther and E. E. Vereecke 46

### *Community ecology*

Localized reactive badger culling increases risk of bovine tuberculosis in nearby cattle herds

By F. Vial and C. A. Donnelly 50

### *Conservation biology*

Shifting the life-history paradigm: discovery of novel habitat use by hawksbill turtles

By A. R. Gaos, R. L. Lewison, I. L. Yañez, B. P. Wallace, M. J. Liles, W. J. Nichols,  
A. Baquero, C. R. Hasbún, M. Vasquez, J. Urteaga and J. A. Seminoff 54

Dangerous dining: surface foraging of North Atlantic right whales increases risk of vessel collisions

By S. E. Parks, J. D. Warren, K. Stamieszkin, C. A. Mayo and D. Wiley 57

### *Evolutionary biology*

Pre-fledgling oxidative damage predicts recruitment in a long-lived bird

By J. C. Noguera, S.-Y. Kim and A. Velando 61

Habitat tracking, stasis and survival in Neogene large mammals

By P. Raia, F. Passaro, D. Fulgione and F. Carotenuto 64

Twinning propensity and offspring <i>in utero</i> growth covary in rural African women By I. J. Rickard, A. M. Prentice, A. J. C. Fulford and V. Lummaa	67
X- and Y-chromosome linked paternal effects on a life-history trait By U. Friberg, A. D. Stewart and W. R. Rice	71
<i>Evolutionary developmental biology</i>	
Circumventing the polydactyly ‘constraint’: the mole’s ‘thumb’ By C. Mitgutsch, M. K. Richardson, R. Jiménez, J. E. Martin, P. Kondrashov, M. A. G. de Bakker and M. R. Sánchez-Villagra	74
<i>Global change biology</i>	
Elevated carbon dioxide affects behavioural lateralization in a coral reef fish By P. Domenici, B. Allan, M. I. McCormick and P. L. Munday	78
<i>Molecular evolution</i>	
Selection on codon usage and base composition in <i>Drosophila americana</i> By S. M. de Procé, K. Zeng, A. J. Betancourt and B. Charlesworth	82
In the four-eyed fish ( <i>Anableps anableps</i> ), the regions of the retina exposed to aquatic and aerial light do not express the same set of opsin genes By G. L. Owens, D. J. Rennison, W. T. Allison and J. S. Taylor	86
<i>Neurobiology</i>	
Latitudinal variation in light levels drives human visual system size By E. Pearce and R. Dunbar	90
<i>Palaeontology</i>	
Archaeocete-like jaws in a baleen whale By E. M. G. Fitzgerald	94
A gigantic bird from the Upper Cretaceous of Central Asia By D. Naish, G. Dyke, A. Cau, F. Escuillié and P. Godefroiteller	97
<i>Pathogen biology</i>	
Incidence of adult brain cancers is higher in countries where the protozoan parasite <i>Toxoplasma gondii</i> is common By F. Thomas, K. D. Lafferty, J. Brodeur, E. Elguero, M. Gauthier-Clerc and D. Missé	101
<i>Phylogeny</i>	
MicroRNAs support a turtle + lizard clade By T. R. Lyson, E. A. Sperling, A. M. Heimberg, J. A. Gauthier, B. L. King and K. J. Peterson	104
<i>Physiology</i>	
Incubation temperature affects multiple measures of immunocompetence in young wood ducks ( <i>Aix Sponsa</i> ) By S. E. DuRant, W. A. Hopkins, D. M. Hawley and G. R. Hepp	108
<i>Special Feature</i>	
<i>Models in palaeontology</i>	
<i>Guest edited by Andre Smith and Paul Barrett</i>	
Modelling the past: new generation approaches to understanding biological patterns in the fossil record By A. B. Smith and P. M. Barrett	112
Opinion piece. On the inference of function from structure using biomechanical modelling and simulation of extinct organisms By J. R. Hutchinson	115
Models in palaeontological functional analysis By P. S. L. Anderson, J. A. Bright, P. G. Gill, C. Palmer and E. J. Rayfield	119
A refined modelling approach to assess the influence of sampling on palaeobiodiversity curves: new support for declining Cretaceous dinosaur richness By G. T. Lloyd	123
Multi-variate models are essential for understanding vertebrate diversification in deep time By R. B. J. Benson and P. D. Mannion	127

Remembrance of things past: modelling the relationship between species' abundances in living communities and death assemblages	
By T. D. Olszewski	131
Evolutionary dynamics of taxonomic structure	
By M. Foote	135
The meaning of birth and death (in macroevolutionary birth–death models)	
By T. H. G. Ezard, P. N. Pearson, T. Aze and A. Purvis	139
Modelling rate distributions using character compatibility: implications for morphological evolution among fossil invertebrates	
By P. J. Wagner	143
The evolutionary palaeoecology of species and the tragedy of the commons	
By P. D. Roopnarine and K. D. Angielczyk	147
Modelling the ecological–functional diversification of marine Metazoa on geological time scales	
By A. M. Bush and P. M. Novack-Gottshall	151
Exploring uncertainty in the calibration of the molecular clock	
By R. C. M. Warnock, Z. Yang and P. C. J. Donoghue	156
<i>Retraction</i>	
Variation in chimpanzee 'culture' is predicted by local ecology, not geography	
By J. M. Kamilar and J. L. Marshack	160
no. 2, 23 April 2012	
<i>Meeting reports</i>	
Fostering the rebirth of natural history	
By S. E. Hampton and T. A. Wheeler	161
Predicting ecosystem shifts requires new approaches that integrate the effects of climate change across entire systems	
By B. D. Russell, C. D. G. Harley, T. Wernberg, N. Mieszkowska, S. Widdicombe, J. M. Hall-Spencer and S. D. Connell	164
<i>Animal behaviour</i>	
Adaptive significance of permanent female mimicry in a bird of prey	
By A. Sternalski, F. Mougeot and V. Bretagnolle	167
Eurasian jays ( <i>Garrulus glandarius</i> ) overcome their current desires to anticipate two distinct future needs and plan for them appropriately	
By L. G. Cheke and N. S. Clayton	171
Keeping up appearances: male fiddler crabs wave faster in a crowd	
By R. N. C. Milner, M. D. Jennions and P. R. Y. Backwell	176
A simple test of vocal individual recognition in wild meerkats	
By S. W. Townsend, C. Allen and M. B. Manser	179
An airborne sex pheromone in snakes	
By R. Shine and R. T. Mason	183
Male sexual harassment alters female social behaviour towards other females	
By S. K. Darden and L. Watts	186
Scared and less noisy: glucocorticoids are associated with alarm call entropy	
By D. T. Blumstein and Y. Y. Chi	189
The transfer of motor functional strategies via action observation	
By L. Sartori, F. Xompero, G. Bucchioni and U. Castiello	193
Is the true 'wisdom of the crowd' to copy successful individuals?	
By A. J. King, L. Cheng, S. D. Starke and J. P. Myatt	197
Corvids can decide if a future exchange is worth waiting for	
By V. Dufour, C. A. F. Wascher, A. Braun, R. Miller and T. Bugnyar	201
Context-dependent tool use in New Caledonian crows	
By A. H. Taylor, G. R. Hunt and R. D. Gray	205
Masculinized female yellow-bellied marmots initiate more social interactions	
By R. Monclús, T. Cook and D. T. Blumstein	208
<i>Biomechanics</i>	
Dolphin whistles: a functional misnomer revealed by heliox breathing	
By P. T. Madsen, F. H. Jensen, D. Carder and S. Ridgway	211

*Community ecology*

- Suppression of fungal and nematode plant pathogens through arbuscular mycorrhizal fungi  
By S. D. Veresoglou and M. C. Rillig 214

*Conservation biology*

- Tracking long-distance migration to assess marine pollution impact  
By W. Montevecchi, D. Fifield, C. Burke, S. Garthe, A. Heddi, J.-F. Rail and G. Robertson 218
- How global extinctions impact regional biodiversity in mammals  
By S. Huang, T. J. Davies and J. L. Gittleman 222
- Embryonic exposure to conspecific chemicals suppresses cane toad growth and survival  
By M. R. Crossland and R. Shine 226

*Evolutionary biology*

- Defence strategies against a parasitoid wasp in *Drosophila*: fight or flight?  
By T. Lefèvre, J. C. de Roode, B. Z. Kacsoh and T. A. Schlenke 230
- Increased responsiveness in feeding behaviour of *Caenorhabditis elegans* after experimental coevolution with its microparasite *Bacillus thuringiensis*  
By R. D. Schulte, B. Hasert, C. Makus, N. K. Michiels and H. Schulenburg 234
- Father absence predicts age at sexual maturity and reproductive timing in British men  
By P. Sheppard and R. Sear 237
- A stab in the dark: chick killing by brood parasitic honeyguides  
By C. N. Spottiswoode and J. Koorevaar 241
- Reversal of height dimorphism promotes pollen and seed dispersal in a wind-pollinated dioecious plant  
By M. Pickup and S. C. H. Barrett 245
- Brain development and predation: plastic responses depend on evolutionary history  
By A. Gonda, K. Välimäki, G. Herczeg and J. Merilä 249
- Horizontally transferred fungal carotenoid genes in the two-spotted spider mite *Tetranychus urticae*  
By B. Altincicek, J. L. Kovacs and N. M. Gerardo 253
- Repeated colonization of remote islands by specialized mutualists  
By D. H. Hembry, T. Okamoto and R. G. Gillespie 258

*Global change biology*

- Opinion piece. Plasticity of preferred body temperatures as means of coping with climate change?  
By L. Gvoždík 262
- The rising cost of warming waters: effects of temperature on the cost of swimming in fishes  
By A. M. Hein and K. J. Keirsted 266
- The Northwest Passage opens for bowhead whales  
By M. P. Heide-Jørgensen, K. L. Laidre, L. T. Quakenbush and J. J. Citta 270

*Marine biology*

- Antarctic killer whales make rapid, round-trip movements to subtropical waters: evidence for physiological maintenance migrations?  
By J. W. Durban and R. L. Pitman 274
- Assessment of hypoxia-inducible factor-1 $\alpha$  mRNA expression in mantis shrimp as a biomarker of environmental hypoxia exposure  
By K. Kodama, Md. Saydur Rahman, T. Horiguchi and P. Thomas 278
- Dispersal of *Symbiodinium* by the stoplight parrotfish *Sparisoma viride*  
By C. Castro-Sanguino and J. A. Sánchez 282
- A shot in the dark: same-sex sexual behaviour in a deep-sea squid  
By H. J. T. Hoving, S. L. Bush and B. H. Robison 287

*Neurobiology*

- Vertebrate ancient opsin photopigment spectra and the avian photoperiodic response  
By W. I. L. Davies, M. Turton, S. N. Peirson, B. K. Follett, S. Halford, J. M. Garcia-Fernandez, P. J. Sharp, M. W. Hankins and R. G. Foster 291

*Palaeontology*

- Mid-Cretaceous charred fossil flowers reveal direct observation of arthropod feeding strategies  
By C. Hartkopf-Fröder, J. Rust, T. Wappler, E. M. Friis and A. Viehofen 295
- Likelihood reinstates *Archaeopteryx* as a primitive bird  
By M. S. Y. Lee and T. H. Worthy 299

*Physiology*

- Daily torpor is associated with telomere length change over winter in Djungarian hamsters  
By C. Turbill, S. Smith, C. Deimel and T. Ruf 304
- Harmonine, a defence compound from the harlequin ladybird, inhibits mycobacterial growth and demonstrates multi-stage antimalarial activity  
By C. R. Röhrich, C. J. Ngwa, J. Wiesner, H. Schmidtberg, T. Degenkolb, C. Kollwe, R. Fischer, G. Pradel and A. Vilcinskis 308
- Coping with the extremes: stress physiology varies between winter and summer in breeding opportunists  
By J. M. Cornelius, C. W. Breuner and T. P. Hahn 312

*Population ecology*

- Taylor's Law holds in experimental bacterial populations but competition does not influence the slope  
By J. Ramsayer, S. Fellous, J. E. Cohen and M. E. Hochberg 316

*Corrections*

- Experimental evidence for real-time song frequency shift in response to urban noise in a passerine bird  
By E. Bermúdez-Cuamatzin, A. A. Ríos-Chelén, D. Gil and C. M. Garcia 320

no. 3, 23 June 2012

*Meeting reports*

- Challenges in the conservation and sustainable use of genetic resources  
By M. Pautasso 321
- Challenges and perspectives for species distribution modelling in the neotropics  
By L. H. Y. Kamino, J. R. Stehmann, S. Amaral, P. De Marco Jr, T. F. Rangel, M. F. de Siqueira, R. De Giovanni and J. Hortal 324

*Animal behaviour*

- Olfactory kin recognition in a songbird  
By E. T. Krause, O. Krüger, P. Kohlmeier and B. A. Caspers 327
- Melatonin delays clutch initiation in a wild songbird  
By T. J. Greives, S. A. Kingma, G. Beltrami and M. Hau 330
- Bornean orangutans on the brink of protein bankruptcy  
By E. R. Vogel, C. D. Knott, B. E. Crowley, M. D. Blakely, M. D. Larsen and N. J. Dominy 333
- Real estate ads in Emei music frog vocalizations: female preference for calls emanating from burrows  
By J. Cui, Y. Tang and P. M. Narins 337
- Observed heterospecific clutch size can affect offspring investment decisions  
By J. T. Forsman, J.-T. Seppänen and I. L. Nykänen 341
- Only pollinator fig wasps have males that collaborate to release their females from figs of an Asian fig tree  
By N. Suleman, S. Raja and S. G. Compton 344
- Physiological implications of pair-bond status in greylag geese  
By C. A. F. Wascher, B. M. Weiß, W. Arnold and K. Kotrschal 347
- Does prey size matter? Novel observations of feeding in the leatherback turtle (*Dermochelys coriacea*) allow a test of predator-prey size relationships  
By S. Fossette, A. C. Gleiss, J. P. Casey, A. R. Lewis and G. C. Hays 351
- Invisible pair bonds detected by molecular analyses  
By T. Takahashi, H. Ochi, M. Kohda and M. Hori 355
- Human fine body hair enhances ectoparasite detection  
By I. Dean and M. T. Siva-Jothy 358
- Do females preferentially associate with males given a better start in life?  
By A. T. Kahn, J. D. Livingston and M. D. Jennions 362
- Cooperative bird differentiates between the calls of different individuals, even when vocalizations were from completely unfamiliar individuals  
By P. G. McDonald 365
- Delayed song maturation and territorial aggression in a songbird  
By A. Poesel and D. A. Nelson 369

Hotter nests produce smarter young lizards By J. J. Amiel and R. Shine	372
Eavesdropping and signal matching in visual courtship displays of spiders By D. L. Clark, J. A. Roberts and G. W. Uetz	375
Water bathing alters threat perception in starlings By B. O. Brilot and M. Bateson	379
Convergence and divergence in Diana monkey vocalizations By A. Candiotti, K. Zuberbühler and A. Lemasson	382
<i>Biomechanics</i>	
Evidence for a vertebrate catapult: elastic energy storage in the plantaris tendon during frog jumping By H. C. Astley and T. J. Roberts	386
A cockroach that jumps By M. Picker, J. F. Colville and M. Burrows	390
Iridescent colour production in hairs of blind golden moles ( <i>Chrysochloridae</i> ) By H. K. Snyder, R. Maia, L. D'Alba, A. J. Shultz, K. M. C. Rowe, K. C. Rowe and M. D. Shawkey	393
<i>Community ecology</i>	
Biodiversity hanging by a thread: the importance of fungal litter-trapping systems in tropical rainforests By J. L. Snaddon, E. C. Turner, T. M. Fayle, C. V. Khen, P. Eggleton and W. A. Foster	397
<i>Evolutionary biology</i>	
Importance of breeding season and maternal investment in studies of sex-ratio adjustment: a case study using tree swallows By R. Baeta, M. Bélisle and D. Garant	401
Ecological immunogenetics of life-history traits in a model amphibian By S. M. Barribeau, J. Villinger and B. Waldman	405
Transgenerational effects of parent and grandparent gender on offspring development in a biparental beetle species By J. E. Lock	408
A male-killing <i>Wolbachia</i> carries a feminizing factor and is associated with degradation of the sex-determining system of its host By T. N. Sugimoto and Y. Ishikawa	412
Therapeutic antimicrobial peptides may compromise natural immunity By M. G. J. L. Habets and M. A. Brockhurst	416
Cooperation among germinating spores facilitates the growth of the fungus, <i>Neurospora crassa</i> By F. Richard, N. L. Glass and A. Pringle	419
Inbreeding affects sexual signalling in males but not females of <i>Tenebrio molitor</i> By M. Pölkki, I. Krams, K. Kangassalo and M. J. Rantala	423
Susceptibility of the male fitness phenotype to spontaneous mutation By M. A. Mallet, C. M. Kimber and A. K. Chippindale	426
<i>Global change biology</i>	
The widespread collapse of an invasive species: Argentine ants ( <i>Linepithema humile</i> ) in New Zealand By M. Cooling, S. Hartley, D. A. Sim and P. J. Lester	430
<i>Marine biology</i>	
Assessment of metabolic modulation in free-living versus endosymbiotic <i>Symbiodinium</i> using synchrotron radiation-based infrared microspectroscopy By S.-E. Peng, C.-S. Chen, Y.-F. Song, H.-T. Huang, P.-L. Jiang, W.-N. U. Chen, L.-S. Fang and Y.-C. Lee	434
Prey detection in a cruising copepod By S. Kjellerup and T. Kiørboe	438
Isotopic segregation between sympatric seabird species increases with nutritional stress By C. P. Barger and A. S. Kitaysky	442
<i>Molecular evolution</i>	
Identification of two voltage-dependent anion channel-like protein sequences conserved in Kinetoplastida By N. Flinner, E. Schleiff and O. Mirus	446



*Neurobiology*

- Social status gates social attention in humans  
By M. Dalmaso, G. Pavan, L. Castelli and G. Galfano 450

*Palaeontology*

- An antiarch placoderm shows that pelvic girdles arose at the root of jawed vertebrates  
By M. Zhu, X. Yu, B. Choo, J. Wang and L. Jia 453
- A minute fossil phoretic mite recovered by phase-contrast X-ray computed tomography  
By J. A. Dunlop, S. Wirth, D. Penney, A. McNeil, R. S. Bradley,  
P. J. Withers and R. F. Preziosi 457

*Pathogen biology*

- Symbiotic bacteria on the cuticle of the leaf-cutting ant *Acromyrmex subterraneus subterraneus*  
protect workers from attack by entomopathogenic fungi  
By T. C. Mattoso, D. D. O. Moreira and R. I. Samuels 461
- Warmer temperatures reduce the vectorial capacity of malaria mosquitoes  
By K. P. Paaijmans, S. Blanford, B. H. K. Chan and M. B. Thomas 465

*Physiology*

- Wild geese do not increase flight behaviour prior to migration  
By S. J. Portugal, J. A. Green, C. R. White, M. Guillemette and P. J. Butler 469
- Snake modulates constriction in response to prey's heartbeat  
By S. M. Boback, A. E. Hall, K. J. McCann, A. W. Hayes, J. S. Forrester and C. F. Zwemer 473

*Population ecology*

- Metapopulation models for seasonally migratory animals  
By C. M. Taylor and R. J. Hall 477

no. 4, 23 August 2012

*Meeting reports*

- Ranavirus: past, present and future  
By D. Lesbarrères, A. Balseiro, J. Brunner, V. G. Chinchar, A. Duffus, J. Kerby,  
D. L. Miller, J. Robert, D. M. Schock, T. Waltzek and M. J. Gray 481
- Climate change experiments in temperate grasslands: synthesis and future directions  
By S. R. White, C. N. Carlyle, L. H. Fraser and J. F. Cahill Jr 484

*Animal behaviour*

- RNAi of the circadian clock gene *period* disrupts the circadian rhythm but not the circatidal  
rhythm in the mangrove cricket  
By H. Takekata, Y. Matsuura, S. G. Goto, A. Satoh and H. Numata 488
- Chicks, like children, spontaneously reorient by three-dimensional environmental geometry,  
not by image matching  
By S. A. Lee, E. S. Spelke and G. Vallortigara 492
- Hermit crabs perceive the extent of their virtual bodies  
By K. Sonoda, A. Asakura, M. Minoura, R. W. Elwood and Y.-P. Gunji 495
- Social learning of a communicative signal in captive chimpanzees  
By J. P. Taglialatela, L. Reamer, S. J. Schapiro and W. D. Hopkins 498
- Rollers smell the fear of nestlings  
By D. Parejo, L. Amo, J. Rodríguez and J. M. Avilés 502
- Cross-hemisphere migration of a 25 g songbird  
By F. Bairlein, D. R. Norris, R. Nagel, M. Bulte, C. C. Voigt, J. W. Fox,  
D. J. T. Hussell and H. Schmaljohann 505
- Primate communication in the pure ultrasound  
By M. A. Ramsier, A. J. Cunningham, G. L. Moritz, J. J. Finneran, C. V. Williams,  
P. S. Ong, S. L. Gursky-Doyen and N. J. Dominy 508
- Remote copulation: male adaptation to female cannibalism  
By D. Li, J. Oh, S. Kralj-Fišer and M. Kuntner 512
- It is optimal to be optimistic about survival  
By J. M. McNamara, P. C. Trimmer and A. I. Houston 516
- The directional flow of visual information transfer between pedestrians  
By A. C. Gallup, A. Chong and I. D. Couzin 520

Cryptic sociality in rattlesnakes ( <i>Crotalus horridus</i> ) detected by kinship analysis By R. W. Clark, W. S. Brown, R. Stechert and H. W. Greene	523
Antifungal activity in thrips soldiers suggests a dual role for this caste By C. Turnbull, H. Caravan, T. Chapman, D. Nipperess, S. Dennison, M. Schwarz and A. Beattie	526
Ambient noise increases missed detections in nestling birds By M. L. Leonard and A. G. Horn	530
Care for kin: within-group relatedness and allomaternal care are positively correlated and conserved throughout the mammalian phylogeny By M. Briga, I. Pen and J. Wright	533
Group size elicits specific physiological response in herbivores By P. Michelena, M.-H. Pillot, C. Henrion, S. Toulet, A. Boissy and R. Bon	537
Working against gravity: horizontal honeybee waggle runs have greater angular scatter than vertical waggle runs By M. J. Couvillon, H. L. F. Phillipps, R. Schürch and F. L. W. Ratnieks	540
Long-term familiarity promotes joining in neighbour nest defence By A. M. Grabowska-Zhang, B. C. Sheldon and C. A. Hinde	544
When it is costly to have a caring mother: food limitation erases the benefits of parental care in earwigs By J. Meunier and M. Kölliker	547
<i>Biomechanics</i>	
Cryptic asymmetry: unreliable signals mask asymmetric performance of crayfish weapons By M. J. Angilletta Jr and R. S. Wilson	551
Leading edge vortex in a slow-flying passerine By F. T. Muijres, L. C. Johansson and A. Hedenström	554
<i>Community ecology</i>	
Plant radiation history affects community assembly: evidence from the New Zealand alpine By W. G. Lee, A. J. Tanentzap and P. B. Heenan	558
Environment drives high phylogenetic turnover among oceanic bacterial communities By T. Pommier, E. J. P. Douzery and D. Mouillot	562
Winter severity predicts the timing of host shifts in the mosquito <i>Culex erraticus</i> By N. D. Burkett-Cadena, H. K. Hassan, M. D. Eubanks, E. W. Cupp and T. R. Unnasch	567
On the centrality and uniqueness of species from the network perspective By S.-M. Lai, W.-C. Liu and F. Jordán	570
Soil-mediated indirect impacts of an invasive predator on plant growth By D. A. Wardle, P. J. Bellingham, T. Fukami and K. I. Bonner	574
Niche-based mechanisms operating within extreme habitats: a case study of subterranean amphipod communities By C. Fišer, A. Blejec and P. Trontelj	578
Mind the gap: genetic distance increases with habitat gap size in Florida scrub jays By A. Coulon, J. W. Fitzpatrick, R. Bowman and I. J. Lovette	582
King penguin population on Macquarie Island recovers ancient DNA diversity after heavy exploitation in historic times By T. H. Heupink, J. van den Hoff and D. M. Lambert	586
Habitat associations of species show consistent but weak responses to climate By A. J. Suggitt, C. Stefanescu, F. Páramo, T. Oliver, B. J. Anderson, J. K. Hill, D. B. Roy, T. Brereton and C. D. Thomas	590
Low dose ionizing radiation produces too few reactive oxygen species to directly affect antioxidant concentrations in cells By J. T. Smith, N. J. Willey and J. T. Hancock	594
<i>Evolutionary biology</i>	
Opinion piece. Is more better? Polyploidy and parasite resistance By K. C. King, O. Seppälä and M. Neiman	598
An invasive species reverses the roles in a host–parasite relationship between bitterling fish and unionid mussels By M. Reichard, M. Vrtílek, K. Douda and C. Smith	601
Divergent host-plant use promotes reproductive isolation among cynipid gall wasp populations By S. P. Egan, G. R. Hood, J. L. Feder and J. R. Ott	605

Selective bird predation on the peppered moth: the last experiment of Michael Majerus By L. M. Cook, B. S. Grant, I. J. Saccheri and J. Mallet	609
Parasitoids as vectors of facultative bacterial endosymbionts in aphids By L. Gehrler and C. Vorburger	613
Trans-oceanic host dispersal explains high seabird tick diversity on Cape Verde islands By E. Gómez-Díaz, J. A. Morris-Pocock, J. González-Solís and K. D. McCoy	616
Ontogenetic niche shifts in dinosaurs influenced size, diversity and extinction in terrestrial vertebrates By D. Codron, C. Carbone, D. W. H. Müller and M. Clauss	620
Ant attendance reduces flight muscle and wing size in the aphid <i>Tuberculatus quercicola</i> By I. Yao	624
You get what you pay for: reward-specific trade-offs among direct and ant-mediated defences in plants By J. Koricheva and G. Q. Romero	628
<i>Genome biology</i>	
Reassessment of genome size in turtle and crocodile based on chromosome measurement by flow karyotyping: close similarity to chicken By F. Kasai, P. C. M. O'Brien and M. A. Ferguson-Smith	631
The long and the short of avian W chromosomes: no evidence for gradual W shortening By J. Rutkowska, M. Lagisz and S. Nakagawa	636
<i>Global change biology</i>	
Habitat stability affects dispersal and the ability to track climate change By C. Hof, M. Brändle, D. M. Dehling, M. Munguía, R. Brandl, M. B. Araújo and C. Rahbek	639
Impact of Quaternary climatic changes and interspecific competition on the demographic history of a highly mobile generalist carnivore, the coyote By S. Koblmüller, R. K. Wayne and J. A. Leonard	644
<i>Marine biology</i>	
Novel use of burrow casting as a research tool in deep-sea ecology By K. Seike, R. G. Jenkins, H. Watanabe, H. Nomaki and K. Sato	648
Functional diversity of bitter taste receptor TAS2R16 in primates By H. Imai, N. Suzuki, Y. Ishimaru, T. Sakurai, L. Yin, W. Pan, K. Abe, T. Misaka and H. Hirai	652
<i>Neurobiology</i>	
Hummingbirds have a greatly enlarged hippocampal formation By B. J. Ward, L. B. Day, S. R. Wilkening, D. R. Wylie, D. M. Saucier and A. N. Iwaniuk	657
<i>Palaeontology</i>	
Estimating maximum bite performance in <i>Tyrannosaurus rex</i> using multi-body dynamics By K. T. Bates and P. L. Falkingham	660
<i>Tikiguania</i> and the antiquity of squamate reptiles (lizards and snakes) By M. N. Hutchinson, A. Skinner and M. S. Y. Lee	665
Early evidence for complex social structure in Proboscidea from a late Miocene trackway site in the United Arab Emirates By F. Bibi, B. Kraatz, N. Craig, M. Beech, M. Schuster and A. Hill	670
Biology, not environment, drives major patterns in maximum tetrapod body size through time By R. B. Sookias, R. B. J. Benson and R. J. Butler	674
<i>Physiology</i>	
Speed, pacing strategy and aerodynamic drafting in Thoroughbred horse racing By A. J. Spence, A. S. Thurman, M. J. Maher and A. M. Wilson	678
A test of the oxidative damage hypothesis for discontinuous gas exchange in the locust <i>Locusta migratoria</i> By P. G. D. Matthews, E. P. Snelling, R. S. Seymour and C. R. White	682
<i>Population ecology</i>	
Model analysis for plant disease dynamics co-mediated by herbivory and herbivore-borne phytopathogens By T. Nakazawa, T. Yamanaka and S. Urano	685

no. 5, 23 October 2012

*Meeting reports*

- Drought-induced forest decline: causes, scope and implications  
By J. Martínez-Vilalta, F. Lloret and D. D. Breshears 689
- Using phylogenies in conservation: new perspectives  
By J. Rolland, M. W. Cadotte, J. Davies, V. Devictor, S. Lavergne, N. Mouquet, S. Pavoine, A. Rodrigues, W. Thuiller, L. Turcati, M. Winter, L. Zupan, F. Jabot and H. Morlon 692
- International Society for Wildlife Endocrinology: the future of endocrine measures for reproductive science, animal welfare and conservation biology  
By A. Ganswindt, J. L. Brown, E. W. Freeman, A. J. Kouba, L. M. Penfold, R. M. Santymire, M. M. Vick, N. Wielebnowski, E. L. Willis and M. R. Milnes 695
- Radar aeroecology: exploring the movements of aerial fauna through radio-wave remote sensing  
By P. B. Chilson, E. Bridge, W. F. Frick, J. W. Chapman and J. F. Kelly 698

*Animal behaviour*

- The structure of a bottlenose dolphin society is coupled to a unique foraging cooperation with artisanal fishermen  
By F. G. Daura-Jorge, M. Cantor, S. N. Ingram, D. Lusseau and P. C. Simões-Lopes 702
- Multiple mating in the traumatically inseminating Warehouse pirate bug, *Xylocoris flavipes*: effects on fecundity and longevity  
By A. Backhouse, S. M. Sait and T. C. Cameron 706
- Flight responses by a migratory soaring raptor to changing meteorological conditions  
By M. J. Lanzone, T. A. Miller, P. Turk, D. Brandes, C. Halverson, C. Maisonneuve, J. Tremblay, J. Cooper, K. O'Malley, R. P. Brooks and T. Katzner 710
- Biological invasions and the acoustic niche: the effect of bullfrog calls on the acoustic signals of white-banded tree frogs  
By C. Both and T. Grant 714
- Deceptive vibratory communication: pupae of a beetle exploit the freeze response of larvae to protect themselves  
By W. Kojima, Y. Ishikawa and T. Takanashi 717
- Live-bearing manta ray: how the embryo acquires oxygen without placenta and umbilical cord  
By T. Tomita, M. Toda, K. Ueda, S. Uchida and K. Nakaya 721
- Infants prefer the faces of strangers or mothers to morphed faces: an uncanny valley between social novelty and familiarity  
By Y.-T. Matsuda, Y. Okamoto, M. Ida, K. Okanoya and M. Myowa-Yamakoshi 725
- It pays to cheat: tactical deception in a cephalopod social signalling system  
By C. Brown, M. P. Garwood and J. E. Williamson 729
- Emasculation: gloves-off strategy enhances eunuch spider endurance  
By Q. Q. Lee, J. Oh, S. Kralj-Fišer, M. Kuntner and D. Li 733
- Songbirds learn songs least degraded by environmental transmission  
By S. Peters, E. P. Derryberry and S. Nowicki 736
- Effects of early visual experience on the background preference in juvenile cuttlefish *Sepia pharaonis*  
By Y.-H. Lee, H. Y. Yan and C.-C. Chiao 740
- The sound of arousal in music is context-dependent  
By D. T. Blumstein, G. A. Bryant and P. Kaye 744
- Raiders from the sky: slavemaker founding queens select for aggressive host colonies  
By T. Pamminger, A. P. Modlmeier, S. Suetter, P. S. Pennings and S. Foitzik 748
- Song in the cold is 'hot': memory of and preference for sexual signals perceived under thermal challenge  
By M. Beaulieu and K. W. Sockman 751
- The energetic cost of mating in a promiscuous cephalopod  
By A. M. Franklin, Z. E. Squires and D. Stuart-Fox 754
- Food transfers in capuchin monkeys: an experiment on partner choice  
By G. Sabbatini, A. De Bortoli Vizioli, E. Visalberghi and G. Schino 757

*Biomechanics*

- Massive, solidified bone in the wing of a volant courting bird  
By K. S. Bostwick, M. L. Riccio and J. M. Humphries 760

*Community ecology*

- Street lighting changes the composition of invertebrate communities  
By T. W. Davies, J. Bennie and K. J. Gaston 764
- Diversity–disturbance relationships: frequency and intensity interact  
By A. R. Hall, A. D. Miller, H. C. Leggett, S. H. Roxburgh, A. Buckling and K. Shea 768

*Conservation biology*

- Wildlife-friendly farming benefits rare birds, bees and plants  
By R. F. Pywell, M. S. Heard, R. B. Bradbury, S. Hinsley, M. Nowakowski,  
K. J. Walker and J. M. Bullock 772
- Table scraps: inter-trophic food provisioning by pumas  
By L. M. Elbroch and H. U. Wittmer 776
- More and more generalists: two decades of changes in the European avifauna  
By I. Le Viol, F. Jiguet, L. Brotons, S. Herrando, Å Lindström, J. W. Pearce-Higgins,  
J. Reif, C. Van Turnhout and V. Devictor 780

*Evolutionary biology*

- More than 1000 ultraconserved elements provide evidence that turtles are the sister  
group of archosaurs  
By N. G. Crawford, B. C. Faircloth, J. E. McCormack, R. T. Brumfield,  
K. Winker and T. C. Glenn 783
- Triploid plover female provides support for a role of the W chromosome in avian  
sex determination  
By C. Küpper, J. Augustin, S. Edwards, T. Székely, A. Kosztolányi,  
T. Burke and D. E. Janes 787
- The effect of resveratrol on longevity across species: a meta-analysis  
By K. L. Hector, M. Lagisz and S. Nakagawa 790
- Structured growth and genetic drift raise relatedness in the social amoeba  
*Dictyostelium discoideum*  
By N. J. Buttery, C. N. Jack, B. Adu-Oppong, K. T. Snyder, C. R. L. Thompson,  
D. C. Queller and J. E. Strassmann 794
- Evidence for an epigenetic role in inbreeding depression  
By P. Vergeer, N. (C. A. M.) Wagemaker and N. J. Ouborg 798
- Human punishment is motivated by inequity aversion, not a desire for reciprocity  
By N. J. Raihani and K. McAuliffe 802

*Global change biology*

- The effect of altered macroclimate on N-fixation by boreal feather mosses  
By M. J. Gundale, D. A. Wardle and M.-C. Nilsson 805

*Marine biology*

- Ctenophore population recruits entirely through larval reproduction in the central Baltic Sea  
By C. Jaspers, M. Haraldsson, S. Bolte, T. B. H. Reusch, U. H. Thygesen and T. Kiørboe 809
- Bottom-up regulation of a pelagic community through spatial aggregations  
By K. J. Benoit-Bird and M. A. McManus 813
- Increased oceanic microplastic debris enhances oviposition in an endemic pelagic insect  
By M. C. Goldstein, M. Rosenberg and L. Cheng 817
- North Sea ecosystem change from swimming crabs to seagulls  
By C. Luczak, G. Beaugrand, J. A. Lindley, J.-M. Dewarumez, P. J. Dubois and R. R. Kirby 821

*Molecular evolution*

- Fitness conferred by replaced amino acids declines with time  
By S. A. Naumenko, A. S. Kondrashov and G. A. Bazykin 825
- Molecular dating of human-to-bovid host jumps by *Staphylococcus aureus* reveals an association  
with the spread of domestication  
By L. A. Weinert, J. J. Welch, M. A. Suchard, P. Lemey, A. Rambaut and J. R. Fitzgerald 829

*Palaeontology*

- Testing models of dental development in the earliest bony vertebrates, *Andreolepis* and *Lophosteus*  
By J. A. Cunningham, M. Rücklin, H. Blom, H. Botella and P. C. J. Donoghue 833
- Faunal isotope records reveal trophic and nutrient dynamics in twentieth century  
Yellowstone grasslands  
By K. Fox-Dobbs, A. A. Nelson, P. L. Koch and J. A. Leonard 838

Minimum convex hull mass estimations of complete mounted skeletons By W. I. Sellers, J. Hepworth-Bell, P. L. Falkingham, K. T. Bates, C. A. Brassey, V. M. Egerton and P. L. Manning	842
Caught in the act: the first record of copulating fossil vertebrates By W. G. Joyce, N. Micklich, S. F. K. Schaal and T. M. Scheyer	846
<i>Pathogen biology</i>	
Leptin, a tool of parasites? By M. Löhmus, S. Moalem and M. Björklund	849
<i>Phylogeny</i>	
Molecular evidence for an Asian origin of monitor lizards followed by Tertiary dispersals to Africa and Australasia By N. Vidal, J. Marin, J. Sassi, F. U. Battistuzzi, S. Donnellan, A. J. Fitch, B. G. Fry, F. J. Vonk, R. C. Rodriguez de la Vega, A. Couloux and S. B. Hedges	853
<i>Physiology</i>	
Opinion piece. The ontogenetic origins of mirror neurons: evidence from ‘tool-use’ and ‘audiovisual’ mirror neurons By R. Cook	856
Gender- and stressor-specific microRNA expression in <i>Tribolium castaneum</i> By D. Freitag, E. Knorr, H. Vogel and A. Vilcinskas	860
Hot or not? Thermal reactions to social contact By A. C. Hahn, R. D. Whitehead, M. Albrecht, C. E. Lefevre and D. I. Perrett	864
Cool running: locomotor performance at low body temperature in mammals By A. D. Rojas, G. Körtner and F. Geiser	868
Parents lend a helping hand to their offspring in plant defence By D. R. Walters and L. Paterson	871
<i>Population ecology</i>	
Opinion piece. Biologically meaningful coverage indicators for eliminating malaria transmission By S. S. Kiware, N. Chitnis, G. J. Devine, S. J. Moore, S. Majambere and G. F. Killeen	874
Data from selective harvests underestimate temporal trends in quantitative traits By F. Pelletier, M. Festa-Bianchet and J. T. Jorgenson	878
Leaf morphology shift linked to climate change By G. R. Guerin, H. Wen and A. J. Lowe	882
Spatial contagion drives colonization and recruitment of frogflies on clutches of red-eyed treefrogs By M. C. Hughey, M. W. McCoy, J. R. Vonesh and K. M. Warkentin	887
<i>Population genetics</i>	
Cast adrift on an island: introduced populations experience an altered balance between selection and drift By E. M. O’Neill, K. H. Beard and M. E. Pfrender	890
Human maternal behaviour is associated with arginine vasopressin receptor 1A gene By R. Avinun, R. P. Ebstein and A. Knafo	894
no. 6, 23 December 2012	
<i>Meeting reports</i>	
Challenges in global biodiversity conservation and solutions that cross sociology, politics, economics and ecology By S. Hoban and C. Vernesi	897
Conservation physiology of marine fishes: advancing the predictive capacity of models By C. Jørgensen, M. A. Peck, F. Antognarelli, E. Azzurro, M. T. Burrows, W. W. L. Cheung, A. Cucco, R. E. Holt, K. B. Huebert, S. Marras, D. McKenzie, J. Metcalfe, A. Perez-Ruzafa, M. Sinerchia, J. F. Steffensen, L. R. Teal and P. Domenici	900
What is macroecology? By S. A. Keith, T. J. Webb, K. Böhning-Gaese, S. R. Connolly, N. K. Dulvy, F. Eigenbrod, K. E. Jones, T. Price, D. W. Redding, I. P. F. Owens and N. J. B. Isaac	904

Climate change and marine life	
By A. J. Richardson, C. J. Brown, K. Brander, J. F. Bruno, L. Buckley, M. T. Burrows, C. M. Duarte, B. S. Halpern, O. Hoegh-Guldberg, J. Holding, C. V. Kappel, W. Kiessling, P. J. Moore, M. I. O'Connor, J. M. Pandolfi, C. Parmesan, D. S. Schoeman, F. Schwing, W. J. Sydeman and E. S. Poloczanska	907
<i>Animal behaviour</i>	
Opinion piece. Pro-sociality without empathy	
By M. Vasconcelos, K. Hollis, E. Nowbahari and A. Kacelnik	910
On the evolution of noise-dependent vocal plasticity in birds	
By S. Schuster, S. A. Zollinger, J. A. Lesku and H. Brumm	913
Proximity data-loggers increase the quantity and quality of social network data	
By T. B. Ryder, B. M. Horton, M. van den Tillaart, J. De Dios Morales and I. T. Moore	917
Increased aggression during human group contests when competitive ability is more similar	
By G. Stulp, T. Kordsmeyer, A. P. Buunk and S. Verhulst	921
In the eye of the beholder: visual mate choice lateralization in a polymorphic songbird	
By J. J. Templeton, D. J. Mountjoy, S. R. Pryke and S. C. Griffith	924
Environmental variability and acoustic signals: a multi-level approach in songbirds	
By I. Medina and C. D. Francis	928
Maternal predator-exposure has lifelong consequences for offspring learning in threespined sticklebacks	
By D. P. Roche, K. E. McGhee and A. M. Bell	932
Social familiarity modulates personality trait in a cichlid fish	
By L. Galhardo, A. Vitorino and R. F. Oliveira	936
Spatial memory: are lizards really deficient?	
By L. D. LaDage, T. C. Roth, A. M. Cerjanic, B. Sinervo and V. V. Pravosudov	939
Theft in an ultimatum game: chimpanzees and bonobos are insensitive to unfairness	
By I. Kaiser, K. Jensen, J. Call and M. Tomasello	942
Learning outdoors: male lizards show flexible spatial learning under semi-natural conditions	
By D. W. A. Noble, P. Carazo and M. J. Whiting	946
Secondary eyes mediate the response to looming objects in jumping spiders ( <i>Phidippus audax</i> , Salticidae)	
By L. Spano, S. M. Long and E. M. Jakob	949
<i>Biomechanics</i>	
Testing microstructural adaptation in the earliest dental tools	
By D. Jones, A. R. Evans, E. J. Rayfield, K. K. W. Siu and P. C. J. Donoghue	952
<i>Community ecology</i>	
Northward range extension of an endemic soil decomposer with a distinct trophic position	
By C. Melody and O. Schmidt	956
Indirect commensalism promotes persistence of secondary consumer species	
By D. Sanders and F. J. F. van Veen	960
<i>Conservation biology</i>	
Causes of hatching failure in endangered birds	
By N. Hemmings, M. West and T. R. Birkhead	964
Fire creates host plant patches for monarch butterflies	
By K. A. Baum and W. V. Sharber	968
<i>Evolutionary biology</i>	
<i>Daphnia magna</i> shows reduced infection upon secondary exposure to a pathogen	
By S. J. McTaggart, P. J. Wilson and T. J. Little	972
Intralocus sexual conflict over human height	
By G. Stulp, B. Kuijper, A. P. Buunk, T. V. Pollet and S. Verhulst	976
Evidence for Permo-Triassic colonization of the deep sea by isopods	
By L. S. F. Lins, S. Y. W. Ho, G. D. F. Wilson and N. Lo	979
Facultative parthenogenesis discovered in wild vertebrates	
By W. Booth, C. F. Smith, P. H. Eskridge, S. K. Hoss, J. R. Mendelson III and G. W. Schuett	983
Endosymbiotic bacteria as a source of carotenoids in whiteflies	
By D. B. Sloan and N. A. Moran	986

Evolutionary novelty in a rat with no molars By J. A. Esselstyn, A. S. Achmadi and K. C. Rowe	990
Evolution of gliding in Southeast Asian geckos and other vertebrates is temporally congruent with dipterocarp forest development By M. P. Heinicke, E. Greenbaum, T. R. Jackman and A. M. Bauer	994
Evidence that gestation duration and lactation duration are coupled traits in primates By E. Dubman, M. Collard and A. Ø. Mooers	998
<i>Global change biology</i>	
Congruent responses to weather variability in high arctic herbivores By A. Stien, R. A. Ims, S. D. Albon, E. Fuglei, R. J. Irvine, E. Ropstad, O. Halvorsen, R. Langvatn, L. E. Loe, V. Veiberg and N. G. Yoccoz	1002
Evolution of trees and mycorrhizal fungi intensifies silicate mineral weathering By J. Quirk, D. J. Beerling, S. A. Banwart, G. Kakonyi, M. E. Romero-Gonzalez and J. R. Leake	1006
<i>Marine biology</i>	
Retention of ice-associated amphipods: possible consequences for an ice-free Arctic Ocean By J. Berge, Ø. Varpe, M. A. Moline, A. Wold, P. E. Renaud, M. Daase and S. Falk-Petersen	1012
Sediment suppresses herbivory across a coral reef depth gradient By C. H. R. Goatley and D. R. Bellwood	1016
<i>Neurobiology</i>	
Cone monochromacy and visual pigment spectral tuning in wobbegong sharks By S. M. Theiss, W. I. L. Davies, S. P. Collin, D. M. Hunt and N. S. Hart	1019
Depolymerization of actin facilitates memory formation in an insect By O. Ganeshina, J. Erdmann, S. Tiberi, M. Vorobyev and R. Menzel	1023
<i>Palaeontology</i>	
Evolution of the turtle bauplan: the topological relationship of the scapula relative to the ribcage By T. R. Lyson and W. G. Joyce	1028
Histology shows that elongated neck ribs in sauropod dinosaurs are ossified tendons By N. Klein, A. Christian and P. M. Sander	1032
<i>Pathogen biology</i>	
The consequences of climate change at an avian influenza 'hotspot' By V. L. Brown and P. Rohani	1036
Comment. The relationship between owning a cat and the risk of developing a brain cancer in a prospective study of UK women: comment on Thomas <i>et al.</i> By V. S. Benson, J. Green and V. Beral	1040
Invited reply. Cat ownership is neither a strong predictor of <i>Toxoplasma gondii</i> infection nor a risk factor for brain cancer By M. Vittecoq, K. D. Lafferty, E. Elguero, J. Brodeur, M. Gauthier-Clerc, D. Missé, B. Roche and F. Thomas	1042
<i>Phylogeny</i>	
Resolving the phylogeny of lizards and snakes (Squamata) with extensive sampling of genes and species By J. J. Wiens, C. R. Hutter, D. G. Mulcahy, B. P. Noonan, T. M. Townsend, J. W. Sites Jr and T. W. Reeder	1043
<i>Physiology</i>	
Lung collapse in the diving sea lion: hold the nitrogen and save the oxygen By B. I. McDonald and P. J. Ponganis	1047
Metabolic effects of CO <sub>2</sub> anaesthesia in <i>Drosophila melanogaster</i> By H. Colinet and D. Renault	1050
Migratory constraints on yolk precursors limit yolk androgen deposition and underlie a brood reduction strategy in rockhopper penguins By G. T. Crossin, M. Poisbleau, L. Demongin, O. Chastel, T. D. Williams, M. Eens and P. Quillfeldt	1055
Towards a general life-history model of the superorganism: predicting the survival, growth and reproduction of ant societies By J. Z. Shik, C. Hou, A. Kay, M. Kaspari and J. F. Gillooly	1059



---

Chronic stress elevates telomerase activity in rats By A. K. Beery, J. Lin, J. S. Biddle, D. D. Francis, E. H. Blackburn and E. S. Epel	1063
<i>Population ecology</i>	
Temporally varying resources amplify the importance of resource input in ecological populations By A. Hastings	1067
<i>Correction</i>	
Evolutionary dynamics of taxonomic structure By M. Foote	1070
<i>Expression of concern</i>	
Stress associated with group living in a long-lived bird By N. Selva, A. Cortés-Avizanda, G. Blanco, T. Mueller, B. Heinrich and J. A. Donázar	1071

## GUIDANCE FOR AUTHORS

### Selection criteria

The criteria for selection are scientific excellence, originality and interest across disciplines within biology. Papers are assessed by the Editorial Board for suitability before full peer-review. Their recommendations are passed to the Editor. The Editor is responsible for all editorial decisions and he makes these decisions based on the reports received from the referees and the Editorial Board.

### Publishing format

*Biology Letters* are published regularly online and in bimonthly print issues. Along with all Royal Society journals, we are committed to archiving and providing perpetual access. Although the printed version of *Biology Letters* is limited to 2500 words, there is the facility for Electronic Supplementary Material (ESM). Contents of the ESM might include details of methods, derivations of equations, large tables of data, DNA sequences and computer programs. However, the printed version must include enough detail to satisfy most non-specialist readers. Supplementary data up to 10Mb is placed on the Society's website free of charge. Larger datasets must be deposited in recognised public domain databases by the author.

### Conditions of publication

Articles must not have been published previously, nor be under consideration for publication elsewhere. The main findings of the article should not have been reported in the mass media. Like many journals *Biology Letters* employs a strict embargo policy where the reporting of a scientific article by the media is embargoed until a specific time. The Editor has final authority in all matters relating to publication.

### Categories

Papers published in *Biology Letters* will be categorised by subject, which include

- animal behaviour
- biomechanics
- community ecology
- conservation biology
- evolutionary biology
- evolutionary developmental biology
- genome biology
- global change biology
- marine biology
- molecular evolution
- neurobiology
- palaeontology
- pathogen biology
- phylogeny
- physiology
- population ecology
- population genetics

### Electronic Submission details

The Royal Society's electronic-submission and peer-review service provides *Biology Letters* authors with the facility to submit their papers online. The service allows you to upload files in a reliable and user-friendly way, using a Web-based system. When your paper is received, an immediate acknowledgement is sent that details how you can track your contribution online.

For full submission guidelines, further details about the journal and access to all journal content please visit the *Biology Letters* website at [rsbl.royalsocietypublishing.org](http://rsbl.royalsocietypublishing.org).

The Royal Society, the national academy of science of the UK and the Commonwealth, is at the cutting edge of scientific progress. We support many top young scientists, engineers and technologists, influence science policy, debate scientific issues with the public and much more. We are an independent, charitable body and derive our authoritative status from over 1400 Fellows and Foreign Members.

Our mission: to expand knowledge and further the role of science and engineering in making the world a better place.

The Royal Society's strategic priorities are to:

- invest in future scientific leaders and in innovation,
- influence policymaking with the best scientific advice,
- invigorate science and mathematics education,
- increase access to the best science internationally, and
- inspire an interest in the joy, wonder and excitement of scientific discovery.

For further information on the Society's activities, please contact the following departments on the extensions listed by dialling +44 (0)20 7839 5561, or visit the Society's Web site ([royalsociety.org](http://royalsociety.org)).

#### Research Support (UK grants and fellowships)

Research Appointments (Fellowships): 2542

Research Grants: 2223

International travel Grants: 2555

Newton International Fellowships: 2559

#### Science Policy Centre

General enquiries: 2550

#### Science Communication

General enquiries: 2573

#### Library and Information Services

Library/archive enquiries: 2606