VOL. 97 NO. 2 MARCH 2017

Journal of the Marine Biological Association of the United Kingdom

https://doi.org/10.1017/S0025315417000145



ISSN: 0025-3154

IMBA JOURNAL OF THE MARINE BIOLOGICAL ASSOCIATION OF THE UNITED KINGDOM

EDITOR IN CHIEF: PROFESSOR M.C. THORNDYKE Royal Swedish Academy of Sciences, University of Gothenburg, Sweden.

EDITORIAL BOARD

M. COCK, Station Biologique de Roscoff, France C. HAUTON, University of Southampton, UK N. DE VOOGD, Naturalis Biodiversity Center, The Netherlands D. M. PATERSON, University of St Andrews, UK P. G. H. EVANS, Sea Watch Foundation, UK D. POWER, University of the Algarve, Portugal M. FROST, Marine Biological Association of the United Kingdom, UK H. SOLO-GABRIELE, University of Miami, Florida, USA A. GLOVER, Natural History Museum, London, UK

ASSOCIATE EDITORS

P. ANDERWALD, University College Cork, Ireland F. MCGOWAN, Open University, UK; Hanze University, Netherlands M. ARVEDLUND, University of Copenhagen, Denmark D.A. MCHUGH, Colgate University, USA J.A. BAEZA, Smithsonian Marine Station, USA T. MOENS, University of Ghent, Belgium C.N. BIANCHI, University of Genova, Italy L.F. MØLLER, Technical University of Denmark, Denmark J. CARTES, Institut de Ciències del Mar de Barcelona, Spain P.D.R. MØLLER, Natural History Museum of Denmark B.K.K. CHAN, Research Centre for Biodiversity Academia Sinica, Taiwan B. OKAMURA, Natural History Museum, London, UK M. COCK, Algal Genetics Group, France P.J. PALSBØLL, University of Groningen, The Netherlands M.J. COSTELLO, Leigh Marine Laboratory, NI, New Zealand N.D. POPE, Marine Biological Association of the United Kingdom, UK M. CUNLIFFE, Marine Biological Association of the United Kingdom, UK A. PULSFORD, Wharf Arts Centre, UK J. ELLIS, Centre for Environment, Fisheries & Aquaculture Science (Cefas), UK N. QUEIROZ, CIBIO, Vairão, Portugal M.R. ELPHICK, Queen Mary University of London, UK J.A. RAVEN, FRS, University of Dundee, UK G. FAUVILLE, Sven Lovén Centre for Marine Sciences, Sweden M.M. RIVADENEIRA, Universidad Católica del Norte, Chile K. FLYNN, University of Swansea, UK J.M. RUIZ, Universidade da Coruña, Spain N. HICKS, Scottish Association for Marine Science J.G. HIDDINK, Bangor University, UK M. RUSSELL, Villanova University, PA, USA M.Y. HU, University of Kiel, Germany D. JOLLIVET, Roscoff Marine Laboratory, France M. STUMPP, Helmholtz Centre for Ocean Research Kiel, Germany D. THIELTGES, NIOZ Royal Netherlands Institute for Sea Research; W.J. LANGSTON, Marine Biological Association of the United Kingdom, UK Utrecht University, Netherlands V. LAPTIKHOVSKY, Falklands Department of Fisheries, Falkland Islands P. THOR, Norwegian Polar Institute, Norway J. LI, University of Maryland, USA O. S. WANGENSTEEN, University of Salford, UK M. LOUIS, University of St Andrews, UK B. WIGHAM, Newcastle University, UK F. MALTAGLIATI, University of Pisa, Italy N. WHITELEY, School of Biological Sciences, Bangor, UK

Address all correspondence to: Journal of the Marine Biological Association, The Laboratory, Citadel Hill, Plymouth, PL1 2PB, UK. (Tel: +44 (0) 1752 426493; e-mail: journal2@MBA.ac.uk)

EDITORIAL POLICY

The Journal of the Marine Biological Association UK (JMBA) is an international journal, publishing original research and reviews on all aspects of marine biology, to support the aims of the MBA. The topics of present interest for JMBA are:

- Marine ecology, behaviour and fisheries;Biodiversity and population studies of marine ecosystems, especially potential impacts of global warming, ocean acidification and climate change on ecosystem resilience;
- · Physiology, biochemistry, genetics and molecular biology of marine organisms, including microbiology, particularly related to the integrative ecophysiology of marine organisms;
- Taxonomic syntheses, including molecular phylogenies;
 Morphology, life history and developmental biology of marine organisms, especially model systems;
- Chemical and physical oceanography, as directly relevant to marine biology; Marine environmental health, and in particular its relationship to human health and well-being.

In addition to papers describing original research, the journal will also publish short reviews and original viewpoints on topics of current marine biological interest. Papers describing work involving experimental procedures on living animals will

be published only if they comply with the legal requirements of the UK Home Office. In the case of species not covered by the current law, papers will be published only if it is judged that the experiments have been conducted in a humane manner and adequate precautions taken to minimize stress.

Authors may like to know that papers published in the *JMBA* are covered by the following abstracting or indexing services: Animal Breeding Abstracts, ASFA, Biological Abstracts, Biological and Agricultural Index, Chemical Abstracts, Current Advances in Ecological Sciences, Current Contents, Current Titles in Oceanography, FISHLIT, Geological Abstracts, GeoRef, Helminthological Abstracts, Lead Abstracts, Nutrition Abstracts, Oceanic Abstracts, Selected Water Resources Abstracts, Zincscan.

SUBSCRIPTIONS

SUBSCRIPTIONS The *JMBA-Journal of the Marine Biological Association of the United Kingdom* (print ISSN 0025-3154; electronic ISSN 1469-7769) is published eightfold in February, March, May, June, August, September, November and December. The 2017 subscription price (excluding VAT) of a volume, which includes print only is £1355 (US \$2170 in USA, Canada and Mexico), print and online access, is £1535 (US \$2456 in USA, Canada and Mexico). The online-only price available to institutional subscribers is £1163 (US \$1859 USA). in USA, Canada and Mexico).

Orders, which must be accompanied by payment, may be sent to a bookseller, subscription agent or direct to the publisher: Cambridge University Press, Journals Fulfillment Department, UPH, Shaftesbury Road, Cambridge CB2 8BS, UK, or in the USA, Canada and Mexico, to Cambridge University Press, 1 Liberty Plaza, Floor 20,

New York, NY 10006, USA. EU subscribers (outside the UK) who are not registered for VAT should add VAT at their country's rate. VAT registered subscribers should provide their VAT registration number. Japanese prices for institutions are available from: Kinokuniya Company Ltd, PO Box 55, Chitose, Tokyo 156, Japan.

Periodical postage paid at New York, NY, and at additional mailing offices. Postmaster: send address changes in USA, Canada and Mexico to Journal of the Marine Biological Association, Cambridge University Press, 100 Brook Hill Drive, West Nyack, New York 10994-2133, USA.

Claims for missing issues should be made immediately on receipt of the subsequent issue

COPYRIGHT/PHOTOCOPYING

The journal is registered with the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 09123, USA. Organizations in the USA which are also registered with CCC may therefore photocopy material (beyond the limits permitted by sections 107 and 108 of US copyright law) subject to payment to CCC of the per-copy fee of \$16.00. This consent does not extend to multiple copying for promotional or commercial purposes. Code 0025-3154/2016.

ISI Tear Sheet Service, 3501 Market Street, Philadelphia, PA 19104, USA, is authorized to supply single photocopies of separate articles for private use only. Organizations authorized by the UK Copyright Licensing Agency may also photocopy material subject to the usual conditions. For all other use, permission should be sought from Cambridge or the American branch of Cambridge University Press. Microfilm copies of back numbers are available from University Microfilms International, 300 North Zeeb Road, MI 48106-1346, USA.

No part of this publication may otherwise be reproduced, stored or distributed by any means without permission in writing from Cambridge University Press, acting for the copyright holder.

Cover image: MultiNet deployment for zooplankton sampling on RV Maria S. Merian. © Bernd Christiansen

©2017 Marine Biological Association of the United Kingdom (Registered Charity no. 1155893)

Information on the JMBA

ELECTRONIC ACCESS

JMBA: Journal of the Marine Biological Association of the United Kingdom is one of the titles included in the Cambridge Journals Online service which can be found at: http://cambridge.org/MBI Further information on this and on other Press titles can be found at http://journals.cambridge.org/ or http://www.cambridge.org/