



THE CANADIAN ENTOMOLOGIST

VOLUME 148
NUMBER 1



FEBRUARY 2016

Published Bi-monthly by
Cambridge University Press
www.cambridge.org



ISSN 0008-347X

The Canadian Entomologist

Manuscripts. *The Canadian Entomologist* accepts manuscript submissions through the ScholarOne Manuscripts system at <http://mc.manuscriptcentral.com/tce>. For questions concerning "General Information and Instructions to Authors," please contact the Editor Kevin Floate by email at Kevin.Floate@agr.gc.ca or telephone at +1 403-317-2242.

Publishing, Subscription, and Advertising Offices. Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013-2473, U.S.A.; or Cambridge University Press, Journals Fulfillment Department, UPH, Shaftesbury Road, Cambridge CB2 8BS, UK.

The Canadian Entomologist (ISSN 0008-347X) is published bimonthly by Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013-2473; Cambridge University Press, Journals Fulfillment Department, UPH, Shaftesbury Road, Cambridge CB2 8BS, UK. Annual subscription rates for Volume 148, 2016: Institutions print and online £382/\$611; institutions online only £256/\$412; single part £73/\$117, payable in advance or on receipt of invoice; institutional check or credit card only. *The Canadian Entomologist* and all other Cambridge Journals can be found at <http://journals.cambridge.org/>

© Entomological Society of Canada 2016. All rights reserved. No part of this publication may be reproduced, in any form or by any means, electronic, photocopying, or otherwise, without permission in writing from Cambridge University Press. Policies, request forms, and contacts are available at: <http://www.cambridge.org/rights/permissions/permission.htm>

The Entomological Society of Canada grants permission to individuals to make single copies of articles for personal use. Short excerpts from articles in the journal may be reproduced for any purpose that respects the moral rights of authors, provided that the source is fully acknowledged.

Although the Entomological Society of Canada holds the copyrights to *The Canadian Entomologist*, it does not hold the copyrights to the contents of any papers published prior to 2002. Therefore, authorization to reproduce items for other than personal use, as stated above, for material published before 2002 requires the consent of the authors or their descendants. Authorization to reproduce material published since 2002 can be obtained by contacting the Chair of the Publications Committee, Tom Lowery, at Tom.Lowery@AGR.GC.CA.

www.esc-sec.ca

Entomological Society of Canada, 386 Broadway, Suite 503, Winnipeg, Manitoba, R3C 3R6 Canada

Publications Mail Registration No. 09572

Publications Mail Agreement No. 40033986

Date of issue: February 2016

Permission to copy (for users in the U.S.A.) is available from Copyright Clearance Center, <http://www.copyright.com>, email: info@copyright.com.

Periodicals postage paid at New York, NY, and additional mailing offices.

Postmaster: Send address changes in the U.S.A., Canada, and Mexico to: *The Canadian Entomologist*, Journals Dept., Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013-2473, U.S.A. Send address changes elsewhere to: *The Canadian Entomologist*, Cambridge University Press, Journals Fulfillment Department, UPH, Shaftesbury Road, Cambridge CB2 8BS, UK.

Manuscripts. *The Canadian Entomologist* accepte les soumissions de manuscrits par le système ScholarOne Manuscripts sur <http://mc.manuscriptcentral.com/tce>. Pour des questions concernant les informations générales et les instructions aux auteurs veuillez contacter le rédacteur en chef, Kevin Floate par courriel Kevin.Floate@agr.gc.ca ou téléphone +1 403-317-2242.

Bureaux de publication, abonnements et publicité . Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013-2473, É.-U. ; ou Cambridge University Press, Journals Fulfillment Department, UPH, Shaftesbury Road, Cambridge CB2 8BS, UK.

The Canadian Entomologist (ISSN 0008-347X) est publié tous les deux mois par Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013-2473 ; Cambridge University Press, Journals Fulfillment Department, UPH, Shaftesbury Road, Cambridge CB2 8BS, UK. Abonnement annuel pour le volume 148, 2016 : version papier et en ligne pour les institutions 382 £/611 \$; version en ligne seulement pour les institutions 256 £/412 \$; pièce unique 73 £/117 \$, payables à l'avance ou sur réception de la facture ; chèque institutionnel ou carte de crédit seulement. *The Canadian Entomologist* et les autres revues de Cambridge se trouvent sur <http://journals.cambridge.org/>

© La Société d'entomologie du Canada 2016. Tous droits réservés. Aucune partie de cette publication ne peut être reproduite, sous quelque forme ou par quelque moyen que ce soit, électronique, photocopie, ou autre, sans l'autorisation écrite de Cambridge University Press. Les politiques, formulaires de demande, et les contacts sont disponibles sur : <http://www.cambridge.org/rights/permissions/permission.htm>

La Société d'entomologie du Canada donne la permission à des individus de faire des copies uniques des articles pour usage personnel. De courtes sections des articles peuvent être reproduites pour tout usage qui respecte le droit moral des auteurs, en autant que la source est pleinement reconnue.

Bien que la Société d'entomologie du Canada détienne les droits d'auteur de la revue *The Canadian Entomologist*, elle ne possède pas ces droits pour tout article publié avant 2002. Par conséquent, l'autorisation pour reproduire du matériel publié avant 2002 pour toutes autres fins que personnelles, tel que cité précédemment, requière le consentement de l'auteur ou de ses descendants. Vous pouvez obtenir l'autorisation de reproduire du matériel publié depuis 2002 en contactant le président du Comité des publications, Tom Lowery, à Tom.Lowery@AGR.GC.CA.

www.esc-sec.ca

La Société d'entomologie du Canada, 386 Broadway, Suite 503, Winnipeg, Manitoba, R3C 3R6 Canada

Poste-publications enregistrement n° 09572

Convention du service poste-publication n° 40033986

Date de publication: février 2016

La permission de reproduire (pour les utilisateurs aux États-Unis) est disponible à partir du *Copyright Clearance Center*, <http://www.copyright.com>, courriel : info@copyright.com.

Port payé à New York, NY, et dans les bureaux de poste supplémentaires.

Maître de poste : Envoyer les changements d'adresse aux États-Unis, au Canada et au

Mexique à : *The Canadian Entomologist*, Journals Dept, Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013-2473, États-Unis. Envoyer tout changement d'adresse ailleurs dans le monde à : *The Canadian Entomologist*, Cambridge University Press, Journals Fulfillment Department, UPH, Shaftesbury Road, Cambridge CB2 8BS, UK.

The Canadian Entomologist

Volume 148

February 2016

Number 1

Systematics & Morphology

- J. Deng, H.-B. Li, X.-B. Wang, F. Yu, Y.-Z. Zhang, S.-A. Wu**—Molecular identification of two morphologically similar *Eulecanium* species: *E. giganteum* and *E. kuwanai* (Hemiptera: Coccidae) 1

Physiology, Biochemistry, Development, and Genetics

- M.M. Diakite, J. Wang, S. Ali, M.-Q. Wang**—Identification of chemosensory gene families in *Rhyzopertha dominica* (Coleoptera: Bostrichidae). 8

Behaviour & Ecology

- S.D. Desai, S. Kumar, R.W. Currie**—Occurrence, detection, and quantification of economically important viruses in healthy and unhealthy honey bee (Hymenoptera: Apidae) colonies in Canada 22
- J.R. Newman, D. Wagner, P. Doak**—Impact of extrafloral nectar availability and plant genotype on ant (Hymenoptera: Formicidae) visitation to quaking aspen (Salicaceae) 36
- S.J. Dergousoff, N.B. Chilton**—Ticks on small mammals at two localities in southern Saskatchewan, Canada and the detection of *Rickettsia peacockii* (Rickettsiaceae) in *Dermacentor andersoni* (Acari: Ixodidae) nymphs 43
- O. Olfert, R.M. Weiss, R.H. Elliott**—Bioclimatic approach to assessing the potential impact of climate change on wheat midge (Diptera: Cecidomyiidae) in North America 52
- C.L. Myrholm, D.W. Langor**—Assessment of the impact of symbiont Ophiostomatales (Fungi) on mountain pine beetle (Coleoptera: Curculionidae) performance on a jack pine (Pinaceae) diet using a novel *in vitro* rearing method. 68

Biodiversity & Evolution

- S.M. Hishinuma, P.L. Dallara, M.A. Yaghmour, M.M. Zerillo, C.M. Parker, T.V. Roubtsova, T.L. Nguyen, N.A. Tisserat, R.M. Bostock, M.L. Flint, S.J. Seybold**—Wingnut (Juglandaceae) as a new generic host for *Pityophthorus juglandis* (Coleoptera: Curculionidae) and the thousand cankers disease pathogen, *Geosmithia morbida* (Ascomycota: Hypocreales). 83

Insect Management

- G. Nouri-Ganbalani, M. Mardani-Talaei, M.R. Haji-Ramezani**—Age-stage, two-sex life history of the golden twin spot moth, *Chrysodeixis chalcites* (Lepidoptera: Noctuidae), on six commercial tomato cultivars under laboratory conditions 92
- P. Adhikary, U. Malik, A. Barik**—Effects of four varieties of *Lathyrus sativus* (Fabaceae) seeds on the bionomics of *Callosobruchus maculatus* (Coleoptera: Chrysomelidae). 102

A. Hernández-Juárez, L.A. Aguirre-Uribe, A. González-Ruíz, J.C. Chacón-Hernández, J. Landeros-Flores, E. Cerna-Chávez, M. Flores-Dávila, M.K. Harris —Impact of endosulfan on the predatory efficiency of larval <i>Chrysoperla carnea</i> (Neuroptera: Chrysopidae) on the eggs of <i>Heliothis virescens</i> and <i>Spodoptera frugiperda</i> (Lepidoptera: Noctuidae)	112
---	------------

Techniques - NOTE

J.G. Fidgen, M.C. Whitmore, J.J. Turgeon —Ball sampling, a novel method to detect <i>Adelges tsugae</i> (Hemiptera: Adelgidae) in hemlock (Pinaceae)	118
---	------------

Corrigendum

O. Olfert, R.M. Weiss, R.H. Elliott —Bioclimatic approach to assessing the potential impact of climate change on wheat midge (Diptera: Cecidomyiidae) in North America— CORRIGENDUM	122
---	------------

The Canadian Entomologist

Editor-in-Chief/Directeur scientifique en chef

Kevin Floate
Lethbridge, Alberta

Editorial Assistant/Adjoint à la rédaction

Andrew B.T. Smith
Ottawa, Ontario

Subject Editors/Rédacteurs thématiques

Chris Bergh
Winchester, Virginia

Dylan Parry
Syracuse, New York

David Siauxsat
Paris, France

Susan Bjornson
Halifax, Nova Scotia

Deepa Pureswaran
Ville de Québec, Québec

Derek Sikes
Fairbanks, Alaska

Christopher Buddle
Sainte-Anne-de-Bellevue, Québec

Kateryn Rochon
Winnipeg, Manitoba

Bradley Sinclair
Ottawa, Ontario

Hervé Colinet
Rennes, France

Amanda Roe
Sault Ste. Marie, Ontario

Brent Sinclair
London, Ontario

Robert Johns
Fredericton, New Brunswick

Chris Schmidt
Ottawa, Ontario

Andrew Smith
Ottawa, Ontario

Cécile Le Lann
Rennes, France

Justin Schmidt
Tucson, Arizona

Jianghua Sun
Beijing, China

Véronique Martel
Ville de Québec, Québec

Michael J. Sharkey
Lexington, Kentucky

Jon Sweeney
Fredericton, New Brunswick

Matt O'Neal
Ames, Iowa

Cory Sheffield
Regina, Saskatchewan

John Wise
East Lansing, Michigan