

# Chemical Senses



## In this issue:

A New Labeled Hedonic Scale

Prenatal Flavor Exposure Affects Flavour  
Recognition and Behavior of Piglets

Intraoral or Postingestive Detection in P2X2/P2X3  
Purinergic Receptor Null Mice

In association with  
Association for Chemoreception Sciences  
European Chemoreception Research Organization  
Japanese Association for the Study of Taste and Smell

[www.chemse.oxfordjournals.org](http://www.chemse.oxfordjournals.org)



OXFORD JOURNALS  
OXFORD UNIVERSITY PRESS

# Chemical Senses

## Editor-in-Chief

W. Meyerhof, *Department Molecular Genetics, German Institute of Human Nutrition, Potsdam-Rehbruecke Arthur-Scheunert-Allee 114-116, 14558 Nuthetal, Germany*

E-mail: [meyerhof@dife.de](mailto:meyerhof@dife.de)

## Executive editors

K. Abe, *Department of Applied Biological Chemistry, Graduate School of Agricultural and Life Sciences, The University of Tokyo, 1-1-1 Yayoi, Bunkyo-ku, Tokyo 113-8657, Japan*

P. Breslin, *Monell Chemical Senses Center, 3500 Market Street, Philadelphia, PA 19104, USA; Department of Nutritional Sciences, Rutgers University, 96 Lipman Drive, New Brunswick, NJ 08901-2882, USA*

A. Carleton, *Departement of Neuroscience, Centre Medical Universitaire, University of Geneva, 1 rue Michel Servet, 1211 Geneve 4, Geneva, Switzerland*

B. Keverne, *Sub-Dept. of Animal Behaviour, Cambridge University, High Street, Madingley, Cambridge, CB3 8AA, UK*

T. McClintock, *Department of Physiology, University of Kentucky, 800 Rose Street, Lexington, Kentucky, 40535-0298, USA*

Y. Ninomiya, *Section of Oral Neuroscience, Graduate School of Dental Sciences, Kyushu University, 3-1-1 Maidashi, Higashi-ku, Fukuoka 812-8582, Japan*

A. Spector, *B334 PDB, Department of Psychology, Florida State University, Tallahassee, FL 32306-4301, USA*

R.A. Steinbrecht, *Max-Planck-Institut für Verhaltensphysiologie, D-82319 Seewiesen, Germany*

K. Touhara, *Department of Integrated Biosciences, Rm201 The University of Tokyo, Chiba 277-8562, Japan*

S. Travers, *Section of Oral Biology, The Ohio State University, 305 W. 12<sup>th</sup> Avenue, Columbus, OH 43201, USA*

## Editorial board

S. Anton, *Versailles, France*

L.M. Bartoshuk, *New Haven, CT, USA*

I. Boeckhoff, *Stuttgart, Germany*

P.A. Brennan, *Cambridge, UK*

A. Cunningham, *Sydney, Australia*

D. Drayna, *Rockville, MD, USA*

R. Gervais, *Bron, France*

J.I. Glendinning, *New York, NY, USA*

B. Green, *New Haven, CT, USA*

Th. Hummel, *Dresden, Germany*

R. Margolskee, *New York, NY, USA*

H. Mustaparta, *Trondheim, Norway*

H. Nishijo, *Toyama, Japan*

P. Pelosi, *Pisa, Italy*

R. Reed, *Baltimore, MD, USA*

D. Restrepo, *Denver, CO, USA*

S.D. Roper, *Miami, FL, USA*

H.N.J. Schifferstein, *Delft, The Netherlands*

E. Städler, *Wädenswil, Switzerland*

M. Stopfer, *Bethesda, MD, USA*

T. Tanimura, *Fukuoka, Japan*

B. Trask, *Seattle, WA, USA*

S. Van Toller, *Warwick, UK*

L. Vosshall, *New York, NY, USA*

M. Wachowiak, *Boston, MA, USA*

Y. Yoshihara, *Wako, Japan*

## Production editor

Carys Wyn Jones, *Oxford Journals*

EBRO AChemS JASTS

OXFORD JOURNALS

Published nine times per year by Oxford Journals, in association with the European Chemoreception Research Organization, the Association for Chemoreception Sciences and the Japanese Association for the Study of Taste and Smell

**Cover image:** Piglet performing the gate preference test. Piglets were exposed to anise through their foster mothers' diets during gestation or lactation or both or not at all. At the age of 6–7 days they were separated from their mothers but could return to them by passing through one of two gates marked by the familiar anise or by an unfamiliar mint flavour. For details see Prenatal flavour exposure affects flavour recognition and stress-related behaviour of piglets, Oostindjer et al., *Chemical Senses* 2009 34 (9):775–787; doi:10.1093/chemse/bjp063.

---

# Subscriptions

---

A subscription to *Chemical Senses* comprises nine issues. All prices include postage, and for subscribers outside the UK delivery is by Standard Air.

## Annual subscription rate (Volume 34, 9 issues, 2009):

### *Institutional*

Print edition and site-wide online access: £682/\$1364/€1023

Print edition only: £648/\$1296/€972

Site-wide online access only: £587/\$1174/€881

### *Personal*

Print edition and individual online access: £262/\$524/€393

Please note: UK£ rate applies to UK and Rest of World, except US and Canada (\$) and Europe (€).

There may be other subscription rates available; for a complete listing please visit [www.chemse.oxfordjournals.org/subinfo/](http://www.chemse.oxfordjournals.org/subinfo/).

Full pre-payment in the correct currency is required for all orders. Payment should be in US dollars for orders being delivered to the USA or Canada; Euros for orders being delivered within Europe (excluding the UK); GBP sterling for orders being delivered elsewhere (i.e. not being delivered to USA, Canada, or Europe). All orders should be accompanied by full payment and sent to your nearest Oxford Journals office. Subscriptions are accepted for complete volumes only. Orders are regarded as firm, and payments are not refundable. Our prices include Standard Air as postage outside of the UK. Claims must be notified within four months of despatch/order date (whichever is later). Subscriptions in the EEC may be subject to European VAT. If registered, please supply details to avoid unnecessary charges. For subscriptions that include online versions, a proportion of the subscription price may be subject to UK VAT. Subscribers in Canada, please add GST to the prices quoted. Personal rate subscriptions are only available if payment is made by personal cheque or credit card, delivery is to a private address, and is for personal use only.

The current year and two previous years' issues are available online at [www.periodicals.com/oxford.html](http://www.periodicals.com/oxford.html) or from Oxford University Press. Previous volumes can be obtained from the Periodicals Service Company, 11 Main Street, Germantown, NY 12526, USA. Email: [psc@periodicals.com](mailto:psc@periodicals.com). Tel: +1 (518) 537 4700. Fax: +1 (518) 537 5899.

**For further information, please contact:** Journals Customer Service Department, Oxford University Press, Great Clarendon Street, Oxford OX2 6DP, UK. Email: [jnls.cust.serv@oxfordjournals.org](mailto:jnls.cust.serv@oxfordjournals.org). Tel (and answerphone outside normal working hours): +44 (0)1865 353907. Fax: +44 (0)1865 353485. **In the US, please contact:** Journals Customer Service Department, Oxford University Press, 2001 Evans Road, Cary, NC 27513, USA. Email: [jnorders@oxfordjournals.org](mailto:jnorders@oxfordjournals.org). Tel (and answerphone outside normal working hours): 800 852 7323 (toll-free in USA/Canada). Fax: 919 677 1714. **In Japan, please contact:** Journals Customer Services, Oxford University Press, 4-5-10-8F Shiba, Minato-ku, Tokyo, 108-8386, Japan. Email: [custserv.jp@oxfordjournals.org](mailto:custserv.jp@oxfordjournals.org). Tel: (81) 3 5444 5858; Fax: (81) 3 3454 2929.

**Methods of payment.** (i) Check (payable to Oxford University Press, to Oxford University Press, Cashiers Office, Great Clarendon Street, Oxford OX2 6DP, UK) in GB£ Sterling (drawn on a UK bank), US\$ Dollars (drawn on a US bank), or EU€ Euros. (ii) Bank transfer to Barclays Bank Plc, Oxford Group Office, Oxford (bank sort code 20-65-18) (UK), overseas only Swift code BARC GB 22 (GB£ Sterling to account no. 70299332, IBAN GB89BARC20651870299332; US\$ Dollars to account no. 66014600, IBAN GB27BARC20651866014600; EU€ Euros to account no.

78923655, IBAN GB16BARC 20651878923655). (iii) Credit card (MasterCard, Visa, Switch or American Express).

*Chemical Senses* (ISSN 0379-864X) is published nine times a year in January, February, March, May, June, July, September, October and November, by Oxford University Press, Oxford, UK. *Chemical Senses* is distributed by Mercury International, 365 Blair Road, Avenel, New Jersey 07001, USA. Periodicals postage paid at Rahway, New Jersey, USA and additional entry points.

US POSTMASTER: send address changes to *Chemical Senses*, c/o Mercury International, 365 Blair Road, Avenel, New Jersey 07001, USA.

## Oxford Journals Environmental and Ethical Policies

Oxford Journals is committed to working with the global community to bring the highest quality research to the widest possible audience. Oxford Journals will protect the environment by implementing environmentally friendly policies and practices wherever possible. Please see [www.oxfordjournals.org/ethicalpolicies.html](http://www.oxfordjournals.org/ethicalpolicies.html) for further information on Oxford Journals' environmental and ethical policies.

## Digital Object Identifiers

For information about DOIs and to resolve them, please visit [www.doi.org](http://www.doi.org).

## Permissions

For information on how to request permissions to reproduce articles/information from this journal, please visit [www.oxfordjournals.org/jnls/permissions](http://www.oxfordjournals.org/jnls/permissions).

## Advertising

Advertising, inserts, and artwork enquiries should be addressed to Advertising and Special Sales, Oxford Journals, Oxford University Press, Great Clarendon Street, Oxford, OX2 6DP, UK. Tel: +44 (0)1865 354767; Fax: +44 (0)1865 353774; E-mail: [jnlsadvertising@oxfordjournals.org](mailto:jnlsadvertising@oxfordjournals.org).

**Disclaimer.** The opinions expressed in *Chemical Senses* are those of the authors and contributors and do not necessarily reflect those of the European Chemoreception Organization, the Association for Chemoreception Sciences, the Japanese Association for the Study of Taste and Smell, the editors, the editorial board, Oxford University Press or the organization to which the authors are affiliated.

© 2009 Oxford University Press.

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 prior written permission of the Publishers or a licence permitting restricted copying issued in the UK by the Copyright Licensing Agency Ltd, 90 Tottenham Court Road, London W1P 9HE, or in the USA by the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

Typeset by TnQ Books and Journals Pvt. Ltd., Chennai, India.

Printed by C.O.S. Printers, Singapore, on acid free paper.