

# Parasitology

## EDITORS

F. E. G. COX *and* C. ARME

## EDITORIAL ASSISTANT

M. ELISABETH PAINTER Ph.D.

## ADVISORY BOARD

L. G. GOODWIN, F.R.S. (Chairman)

R. M. ANDERSON, F.R.S.

J. R. BAKER

D. C. BARKER

J. BARRETT

D. A. P. BUNDY

E. U. CANNING

L. H. CHAPPELL\*

D. W. T. CROMPTON

D. I. GIBSON

D. W. HALTON

R. E. HOWELLS

C. R. KENNEDY

M. W. KENNEDY

D. L. LEE

D. J. McLAREN

D. P. McMANUS

D. H. MOLYNEUX

P. W. PAPPAS

D. ROLLINSON

M. E. SCOTT

A. SHER

V. R. SOUTHGATE\*

R. C. TINSLEY

K. VICKERMAN, F.R.S.

D. WAKELIN

P. J. WHITFIELD

R. A. WILSON

M. E. J. WOOLHOUSE

\* Representing the British Society for Parasitology.



**CAMBRIDGE**  
**UNIVERSITY PRESS**

Published by the Press Syndicate of the University of Cambridge  
The Pitt Building, Trumpington Street, Cambridge CB2 1RP  
40 West 20th Street, New York, NY 10011-4211, USA  
10 Stamford Road, Oakleigh, Melbourne 3166, Australia

© Cambridge University Press, 1995

Printed in Great Britain by the  
University Press Cambridge

# CONTENTS

## PART 1 JANUARY 1995

ALBUQUERQUE, C. M. R. and HAM, P. J. Concomitant malaria ( <i>Plasmodium gallinaceum</i> ) and filaria ( <i>Brugia pahangi</i> ) infections in <i>Aedes aegypti</i> : effect on parasite development	1
GLYNN, J. R. and BRADLEY, D. J. Inoculum size, incubation period and severity of malaria. Analysis of data from malaria therapy records	7
DUJARDIN, J. C., DUJARDIN, J. P., TIBAYRENC, M., TIMPERMAN, G., DE DONCKER, S., JACQUET, D., AREVALO, J., LLANOS-CUENTAS, A., GUERRA, H., BERMUDEZ, H., HAMERS, R. and LE RAY, D. Karyotype plasticity in Neotropical <i>Leishmania</i> : an index for measuring genomic distance among <i>L. (V.) peruviana</i> and <i>L. (V.) braziliensis</i> populations	21
WEBSTER, J. P., LLOYD, G. and MACDONALD, D. W. Q fever ( <i>Coxiella burnetii</i> ) reservoir in wild brown rat ( <i>Rattus norvegicus</i> ) populations in the UK	31
TER KUILE, B. H. and MÜLLER, M. Maltose utilization by extracellular hydrolysis followed by glucose transport in <i>Trichomonas vaginalis</i>	37
TCHUEM TCHUENTE, L. A., SOUTHGATE, V. R., IMBERT-ESTABLET, D. and JOURDANE, J. Change of mate and mating competition between males of <i>Schistosoma intercalatum</i> and <i>S. mansoni</i>	45
ELLIS, J. T. and MORRISON, D. A. <i>Schistosoma mansoni</i> : patterns of codon usage and bias	53
JAZIN, E. E., BONTEMPI, E. J., SANCHEZ, D. O., ÅSLUND, L., HENRIKSSON, J., FRASCH, A. C. C. and PETTERSSON, U. <i>Trypanosoma cruzi</i> exoantigen is a member of a 160 kDa gene family	61
ROBINSON, K., BELLABY, T. and WAKELIN, D. Immune response profiles in vaccinated and non-vaccinated high- and low-responder mice during infection with the intestinal nematode <i>Trichinella spiralis</i>	71
VEIT, P., BILGER, B., SCHAD, V., SCHÄFER, J., FRANK, W. and LUCIUS, R. Influence of environmental factors on the infectivity of <i>Echinococcus multilocularis</i> eggs	79
SMART, D., JOHNSTON, C. F., MAULE, A. G., HALTON, D. W., HRCKOVÁ, G., SHAW, C. and BUCHANAN, K. D. Localization of <i>Diploptera punctata</i> allatostatin-like immunoreactivity in helminths: an immunocytochemical study	87
LINDO, J. F., ROBINSON, R. D., TERRY, S. I., VOGEL, P., GAM, A. A., NEVA, F. A. and BUNDY, D. A. P. Age-prevalence and household clustering of <i>Strongyloides stercoralis</i> infection in Jamaica	97
LEVAR, M., MIRSKY, A. F., SCHANTZ, P. M., CASTRO, S. and CRUZ, M. E. Parasitic infection in malnourished school children: effects on behaviour and EEG	103
ERRATUM	113

## PART 2 FEBRUARY 1995

GRAVENOR, M. B., MCLEAN, A. R. and KWIATKOWSKI, D. The regulation of malaria parasitaemia: parameter estimates for a population model	115
SIMS, T. A. and HAY, J. Host-parasite relationship between congenital <i>Toxoplasma</i> infection and mouse brain: role of small vessels	123
AWAD-EL-KARIEM, F. M., ROBINSON, H. A., DYSON, D. A., EVANS, D., WRIGHT, S., FOX, M. T. and McDONALD, V. Differentiation between human and animal strains of <i>Cryptosporidium parvum</i> using isoenzyme typing	129
HAAS, W., KÖRNER, M., HUTTERER, E., WEGNER, M. and HABERL, B. Finding and recognition of the snail intermediate hosts by 3 species of echinostome cercariae	133

BROWNLEE, D. J. A., FAIRWEATHER, I., JOHNSTON, C. F., THORNDYKE, M. C. and SKUCE, P. J. Immunocytochemical demonstration of a SALMFamide-like neuropeptide in the nervous system of adult and larval stages of the human blood fluke, <i>Schistosoma mansoni</i>	143
GIANNINI, A. L. M., CARIDE, E. C., MARTIN BRAGA, V. M. and RUMJANEK, F. D. F-10 nuclear binding proteins of <i>Schistosoma mansoni</i> : structural and functional features	155
IWAMURA, Y., YONEKAWA, H. and IRIE, Y. Detection of host DNA sequences including the H-2 locus of the major histocompatibility complex in schistosomes	163
KIM, E., DAY, T. A., BENNETT, J. L. and PAX, R. A. Cloning and functional expression of a <i>Shaker</i> -related voltage-gated potassium channel gene from <i>Schistosoma mansoni</i> (Trematoda: Digenea)	171
STEVENS, J. R. and TIBAYRENC, M. Detection of linkage disequilibrium in <i>Trypanosoma brucei</i> isolated from tsetse flies and characterized by RAPD analysis and isoenzymes	181
DUBINSKÝ, P., HAVASIOVÁ-REITEROVÁ, K., PEŤKO, B., HOVORKA, I. and TOMASÖVICÖVÁ, O. Role of small mammals in the epidemiology of toxocarasis	187
CLAYTON, D. H. and TOMPKINS, D. M. Comparative effects of mites and lice on the reproductive success of rock doves ( <i>Columba livia</i> )	195
LEWIS, E. E., GREWAL, P. S. and GAUGLER, R. Hierarchical order of host cues in parasite foraging strategies	207
ANDERSON, T. J. C. <i>Ascaris</i> infections in humans from North America: molecular evidence for cross-infection	215
ANDERSON, T. J. C., ROMERO-ABAL, M. E. and JAENIKE, J. Mitochondrial DNA and <i>Ascaris</i> microepidemiology: the composition of parasite populations from individual hosts, families and villages	221
PAPPAS, P. W. and DURKA, G. M. Partial characterization of the carbohydrates of the eggs (oncospheres) of the tapeworm, <i>Hymenolepis diminuta</i>	231

### PART 3 APRIL 1995

BRITTO, C., CARDOSO, M. A., MONTEIRO VANNI, C. M., HASSLOCHER-MORENO, A., XAVIER, S. S., OELEMANN, W., SANTORO, A., PIRMEZ, C., MOREL, C. M. and WINCKER, P. Polymerase chain reaction detection of <i>Trypanosoma cruzi</i> in human blood samples as a tool for diagnosis and treatment evaluation	241
IMBODEN, M., MÜLLER, N., HEMPHILL, A., MATTIOLI, R. and SEEBECK, T. Repetitive proteins from the flagellar cytoskeleton of African trypanosomes are diagnostically useful antigens	249
MCDONALD, V., MCCROSSAN, M. V. and PETRY, F. Localization of parasite antigens in <i>Cryptosporidium parvum</i> -infected epithelial cells using monoclonal antibodies	259
QIAO, Z., MILES, M. A. and WILSON, S. M. Detection of parasites of the <i>Leishmania donovani</i> -complex by a polymerase chain reaction-solution hybridization enzyme-linked immunoassay (PCR-SHELA)	269
HARTSKEERL, R. A., VAN GOOL, T., SCHUITEMA, A. R. J., DIDIER, E. S. and TERPSTRA, W. J. Genetic and immunological characterization of the microsporidian <i>Septata intestinalis</i> Cali, Kotler and Orenstein, 1993: reclassification to <i>Encephalitozoon intestinalis</i>	277
RANDOLPH, S. E. Quantifying parameters in the transmission of <i>Babesia microti</i> by the tick <i>Ixodes trianguliceps</i> amongst voles ( <i>Clethrionomys glareolus</i> )	287
BAYLIS, M. and MBWABI, A. L. Feeding behaviour of tsetse flies ( <i>Glossina pallidipes</i> Austen) on <i>Trypanosoma</i> -infected oxen in Kenya	297
FULFORD, A. J. C., BUTTERWORTH, A. E., OUMA, J. H. and STURROCK, R. F. A statistical approach to schistosome population dynamics and estimation of the life-span of <i>Schistosoma mansoni</i> in man	307
BOWLES, J., BLAIR, D. and MCMANUS, D. P. A molecular phylogeny of the genus <i>Echinococcus</i>	317

LEHMANN, T., CUPP, S. M. and CUPP, W. E. Chemical guidance of <i>Onchocerca lienalis</i> microfilariae to the thorax of <i>Simulium vittatum</i>	329
ERIKSSON, K. S., MAULE, A. G., HALTON, D. W., PANULA, P. A. J. and SHAW, C. GABA in the nervous system of parasitic flatworms	339
RAMDATH, D. D., SIMEON, D. T., WONG, M. S. and GRANTHAM-McGREGOR, S. M. Iron status of schoolchildren with varying intensities of <i>Trichuris trichiura</i> infection	347
PANG, F.-Y., MASON, J., HOLDEN-DYE, L., FRANKS, C. J., WILLIAMS, R. G. and WALKER, R. J. The effects of the nematode peptide, KHEYLRFamide (AF2), on the somatic musculature of the parasitic nematode <i>Ascaris suum</i>	353
ERRATA	363

#### PART 4 MAY 1995

BOGERS, J. J. P. M., NIBBELING, H. A. M., KUMAR SINGH, S., DEELDER, A. M. and VAN MARCK, E. A. E. Ultrastructural immunolocalization of two circulating egg antigens in miracidia of <i>Schistosoma mansoni</i>	365
MARKS, N. J., HALTON, D. W., MAULE, A. G., BRENNAN, G. P., SHAW, C., SOUTHGATE, V. R. and JOHNSTON, C. F. Comparative analyses of the neuropeptide F (NPF)- and FMRFamide-related peptide (FaRP)-immunoreactivities in <i>Fasciola hepatica</i> and <i>Schistosoma</i> spp.	371
ZHONG, C., SKELLY, P. J., LEAFFER, D., COHN, R. G., CAULFIELD, J. P. and SHOEMAKER, C. B. Immunolocalization of a <i>Schistosoma mansoni</i> facilitated diffusion glucose transporter to the basal, but not the apical, membranes of the surface syncytium	383
PASTERNAK, A. F., HUNTINGFORD, F. A. and CROMPTON, D. W. T. Changes in metabolism and behaviour of the freshwater copepod <i>Cyclops strenuus abyssorum</i> infected with <i>Diphyllbothrium</i> spp.	395
BANDI, C., LA ROSA, G., BARDIN, M. G., DAMIANI, G., COMINCINI, S., TASCIOTTI, L. and POZIO, E. Random amplified polymorphic DNA fingerprints of the eight taxa of <i>Trichinella</i> and their comparison with allozyme analysis	401
BASÁÑEZ, M. G., REMME, J. H. F., ALLEY, E. S., BAIN, O., SHELLEY, A. J., MEDLEY, G. F. and ANDERSON, R. M. Density-dependent processes in the transmission of human onchocerciasis: relationship between the numbers of microfilariae ingested and successful larval development in the simuliid vector	409
RILEY, M. W. and UGLEM, G. L. <i>Proterometra macrostoma</i> (Digenea: Azygiidae): variations in cercarial morphology and physiology	429
DALE, V. M. E. and MARTIN, R. J. Oxantel-activated single channel currents in the muscle membrane of <i>Ascaris suum</i>	437
HOLDEN-DYE, L., FRANKS, C. J., WILLIAMS, R. G. and WALKER, R. J. The effect of the nematode peptides SDPNFLRFamide (PF1) and SADPNFLRFamide (PF2) on synaptic transmission in the parasitic nematode <i>Ascaris suum</i>	449
SIMEON, D. T., GRANTHAM-McGREGOR, S. M. and WONG, M. S. <i>Trichuris trichiura</i> infection and cognition in children: results of a randomized clinical trial	457
YOUNG, C. J., MCKEAND, J. B. and KNOX, D. P. Proteinases released <i>in vitro</i> by the parasitic stages of <i>Teladorsagia circumcincta</i> , an ovine abomasal nematode	465
DELAHAY, R. J., SPEAKMAN, J. R. and MOSS, R. The energetic consequences of parasitism: effects of a developing infection of <i>Trichostrongylus tenuis</i> (Nematoda) on red grouse ( <i>Lagopus lagopus scoticus</i> ) energy balance, body weight and condition	473
JACQUIET, P., HUMBERT, J. F., COMES, A. M., CABARET, J., THIAM, A. and CHEIKH, D. Ecological, morphological and genetic characterization of sympatric <i>Haemonchus</i> spp. parasites of domestic ruminants in Mauritania	483
ROBERTS, M. G. and HEESTERBEEK, J. A. P. The dynamics of nematode infections of farmed ruminants	493

PART 5 JUNE 1995

- IQBAL, J., SIDDIQUE, A. B., AHLBORG, N., PERLMANN, P. and BERZINS, K. Cytoadherence-related homologous motifs in *Plasmodium falciparum* antigen Pf155/RESA and erythrocyte band 3 protein 503
- LAINSON, R. *Progarnia archosauriae* nov. gen., nov. sp. (Haemosporina: Garniidae), a blood parasite of *Caiman crocodilus crocodilus* (Archosauria: Crocodilia), and comments on the evolution of reptilian and avian haemosporines 513
- ELLIS, J. T., LUTON, K., BAVERSTOCK, P. R., WHITWORTH, G., TENTER, A. M. and JOHNSON, A. M. Phylogenetic relationships between *Toxoplasma* and *Sarcocystis* deduced from a comparison of 18S rDNA sequences 521
- MAGNAVAL, J.-F. Comparative efficacy of diethylcarbamazine and mebendazole for the treatment of human toxocariasis 529
- HOLLAND, C. V., O'LORCAIN, P., TAYLOR, M. R. H. and KELLY, A. Sero-epidemiology of toxocariasis in school children 535
- TOMLINSON, S., VANDEKERCKHOVE, F., FREVERT, U. and NUSSENZWEIG, V. The induction of *Trypanosoma cruzi* trypomastigote to amastigote transformation by low pH 547
- BROWN, A., BURLEIGH, J. M., BILLETT, E. E. and PRITCHARD, D. I. An initial characterization of the proteolytic enzymes secreted by the adult stage of the human hookworm *Necator americanus* 555
- WEBB, T. J. and HURD, H. *Hymenolepis diminuta*-induced fecundity reduction may be caused by changes in hormone binding to *Tenebrio molitor* ovaries 565
- STEAR, M. J., BAIRDEN, K., DUNCAN, J. L., GETTINBY, G., MCKELLAR, Q. A., MURRAY, M. and WALLACE, D. S. The distribution of faecal nematode egg counts in Scottish Blackface lambs following natural, predominantly *Ostertagia circumcincta* infection 573
- LEWIS, E. E., SELVAN, S., CAMPBELL, J. F. and GAUGLER, R. Changes in foraging behaviour during the infective stage of entomopathogenic nematodes 583
- KAVALIERS, M. and COLWELL, D. D. Reduced spatial learning in mice infected with the nematode, *Heligmosomoides polygyrus* 591
- SHI, H. N., SCOTT, M. E., KOSKI, K. G., BOULAY, M. and STEVENSON, M. M. Energy restriction and severe zinc deficiency influence growth, survival and reproduction of *Heligmosomoides polygyrus* (Nematoda) during primary and challenge infections in mice 599
- DENNIS, R. D., BAUMEISTER, S., SMUDA, C., LOCHNIT, C., WAIDER, T. and GEYER, E. Initiation of chemical studies on the immunoreactive glycolipids of adult *Ascaris suum* 611
- BASCAL, Z. A., MONTGOMERY, A., HOLDEN-DYE, L., WILLIAMS, R. G. and WALKER, R. J. Histochemical mapping of NADPH diaphorase in the nervous system of the parasitic nematode *Ascaris suum* 625

## Parasitology

**Back volumes.** Vols. 1–71: Inquiries should be addressed to Wm. Dawson & Sons Ltd, Cannon House, Folkestone, Kent. Vols. 72 onwards: quotations for parts still in print may be obtained from Cambridge or the American Branch of Cambridge University Press.

**Copying.** This journal is registered with the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. Organizations in the USA who are also registered with C.C.C. may therefore copy material (beyond the limits permitted by sections 107 and 108 of US copyright law) subject to payment to C.C.C. of the per-copy fee of \$11.00. This consent does not extend to multiple copying for promotional or commercial purposes. Code 0031–1820/95 \$11.00 + .10.

Organizations authorized by the Copyright Licensing Agency may also copy material subject to the usual conditions.

**ISI Tear Sheet Service.** 3051 Market Street, Philadelphia, Pennsylvania 19104, USA, is authorized to supply single copies of separate articles for private use only.

**For all other use,** permission should be sought from Cambridge or the American Branch of Cambridge University Press.

**Claims** for missing issues can only be considered if made immediately after receipt of the subsequent issue.

**Advertising.** Details of advertising in *Parasitology* may be obtained from the publisher.

© Cambridge University Press 1995

The Pitt Building, Trumpington Street, Cambridge CB2 1RP  
40 West 20th Street, New York, NY 10011–4211, USA  
10 Stamford Road, Oakleigh, Melbourne 3166, Australia

*Printed in Great Britain by the University Press, Cambridge*

# Parasitology

## CONTENTS

	PAGE
Iqbal, J., Siddique, A. B., Ahlborg, N., Perlmann, P. and Berzins, K. Cytoadherence-related homologous motifs in <i>Plasmodium falciparum</i> antigen Pf155/RESA and erythrocyte band 3 protein	503
Lainson, R. <i>Progarnia archosauriae</i> nov. gen., nov. sp. (Haemosporina: Garniidae), a blood parasite of <i>Caiman crocodilus crocodilus</i> (Archosauria: Crocodylia), and comments on the evolution of reptilian and avian haemosporines	513
Ellis, J. T., Luton, K., Baverstock, P. R., Whitworth, G., Tenter, A. M. and Johnson, A. M. Phylogenetic relationships between <i>Toxoplasma</i> and <i>Sarcocystis</i> deduced from a comparison of 18S rDNA sequences	521
Magnaval, J.-F. Comparative efficacy of diethylcarbamazine and mebendazole for the treatment of human toxocariasis	529
Holland, C. V., O'Lorcain, P., Taylor, M. R. H. and Kelly, A. Sero-epidemiology of toxocariasis in school children	535
Tomlinson, S., Vandekerckhove, F., Frevert, U. and Nussenzweig, V. The induction of <i>Trypanosoma cruzi</i> trypomastigote to amastigote transformation by low pH	547
Brown, A., Burleigh, J. M., Billett, E. E. and Pritchard, D. I. An initial characterization of the proteolytic enzymes secreted by the adult stage of the human hookworm <i>Necator americanus</i>	555
Webb, T. J. and Hurd, H. <i>Hymenolepis diminuta</i> -induced fecundity reduction may be caused by changes in hormone binding to <i>Tenebrio molitor</i> ovaries	565
Stear, M. J., Bairden, K., Duncan, J. L., Gettinby, G., McKellar, O. A., Murray, M. and Wallace, D. S. The distribution of faecal nematode egg counts in Scottish Blackface lambs following natural, predominantly <i>Ostertagia circumcincta</i> infection	573
Lewis, E. E., Selvan, S., Campbell, J. F. and Gaugler, R. Changes in foraging behaviour during the infective stage of entomopathogenic nematodes	583
Kavaliers, M. and Colwell, D. D. Reduced spatial learning in mice infected with the nematode, <i>Heligmosomoides polygyrus</i>	591
Shi, H. N., Scott, M. E., Koski, K. G., Boulay, M. and Stevenson, M. M. Energy restriction and severe zinc deficiency influence growth, survival and reproduction of <i>Heligmosomoides polygyrus</i> (Nematoda) during primary and challenge infections in mice	599
Dennis, R. D., Baumeister, S., Smuda, C., Lochnit, C., Waider, T. and Geyer, E. Initiation of chemical studies on the immunoreactive glycolipids of adult <i>Ascaris suum</i>	611
Bascal, Z. A., Montgomery, A., Holden-Dye, L., Williams, R. G. and Walker, R. J. Histochemical mapping of NADPH diaphorase in the nervous system of the parasitic nematode <i>Ascaris suum</i>	625

