

VOLUME 108 SUPPLEMENT 1994

Parasitology

Symposia of the British Society for Parasitology Volume 31

Functional molecules on the surface of protozoan parasites

EDITED BY **J. E. SMITH**

CO-ORDINATING EDITOR **L. H. CHAPPELL**

CAMBRIDGE UNIVERSITY PRESS

Subscriptions may be sent to any bookseller or subscription agent or direct to the publisher: Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU. Subscriptions in the USA, Canada and Mexico should be sent to Cambridge University Press, Journals Department, 40 West 20th Street, New York, NY 10011-4211. All orders must be accompanied by payment. The subscription price (excluding VAT) of volumes 108 and 109, 1994 is £240 (US \$460 in the USA, Canada and Mexico), payable in advance, for ten parts plus supplements; separate parts cost £22 or US \$41 each (plus postage). 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 (including ASP delivery) are available from Kinokuniya Company Ltd, P.O. Box 55, Chitose, Tokyo. Second class postage paid at New York, NY and at additional mailing offices. POSTMASTER: send address changes in USA, Canada and Mexico to *Parasitology*, Cambridge University Press, 110 Midland Avenue, Port Chester, New York, NY 10573-4930.

© Cambridge University Press 1994

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

Symposia of the British Society for Parasitology Volume 31

Functional molecules on the surface of protozoan parasites

EDITED BY
J. E. SMITH

CO-ORDINATING EDITOR
L. H. CHAPPELL



CAMBRIDGE
UNIVERSITY PRESS

Contents

<i>Preface</i>	S1	Molecular mechanisms of sequestration	S20
<i>List of contributions</i>	S3	Clinical implications of molecular studies	S22
		Recent experimental advances	S23
		Rosetting	S23
Proteins on the surface of the malaria parasite and cell invasion	S5	Ligands and antigens on the infected cell surface	S23
Summary	S5	Clinical implications of phenotypic variation	S23
Introduction	S5	Conclusions	S24
Features of surface proteins	S5	Acknowledgements	S26
Proteins stably expressed on the surface of the parasite	S5	References	S26
Proteins exported from secretory organelles	S6		
Identification of functional structures in malaria surface proteins	S6	Mutational and functional analysis of the <i>Leishmania</i> metalloproteinase GP63: similarities to matrix metalloproteinases	S29
A sulphated glycoconjugate-binding motif	S6	Summary	S29
Epidermal growth factor modules	S6	Introduction	S29
Sporozoite proteins and hepatocyte invasion	S7	Analysis of the catalytic site of <i>L. major</i> GP63	S30
The circumsporozoite protein (CSP)	S7	Activation of latent metalloproteinase activity of <i>L. major</i> rGP63	S31
Region II in CSP mediates binding to sulphated sugars	S8	Generation of <i>Leishmania</i> GP63-deficient mutants by homologous recombination	S32
CSP interacts with specific cells and this is mediated by heparan sulphate proteoglycans	S9	References	S35
Sporozoite surface protein-2/thrombospondin-related (SSP-2/TRAP) anonymous protein	S10		
Roles for CSP and SSP-2/TRAP in sporozoite invasion?	S11	Trans-sialidase, SAPA amino acid repeats and the relationship between <i>Trypanosoma cruzi</i> and the mammalian host	S37
Merozoite proteins and erythrocyte invasion	S11	Summary	S37
Proteins on the surface of the merozoite	S11	Introduction	S37
Merozoite surface protein-1 (MSP-1)	S11	Which <i>T. cruzi</i> molecules induce an antibody response in natural human infections?	S38
MSP-1 is processed on the merozoite surface	S12	Do the amino acid repeats occur in proteins that are essential for parasite survival?	S38
Antibodies to MSP-1 block invasion	S12	SAPA/TS/NA as an antigen with enzymic activity	S38
Different parasites use different receptors on the erythrocyte surface	S12	A mucin-like glycoprotein in <i>T. cruzi</i>	S39
Red cell surface receptors	S13	Amino acid repeats in SAPA/TS/NA and the core protein of a putative mucin-like glycoprotein have different functions	S40
Erythrocyte binding proteins	S13	A superfamily of <i>T. cruzi</i> surface antigens	S40
Structure of the erythrocyte binding proteins	S14	Antigens, enzymes and the host-parasite relationship: conclusions	S41
Location of the erythrocyte binding proteins	S14	Acknowledgements	S42
What is the function of the erythrocyte binding proteins?	S14	References	S42
Conclusion	S15		
References	S15	Glycosyl-phosphatidylinositol molecules of the parasite and the host	S45
		Summary	S45
Molecular mechanisms of sequestration in malaria	S19	Introduction	S45
Introduction	S19	GPI structure	S45
Biological and clinical aspects of infected cell adhesion	S19		

The molecular architecture of the kinetoplastid cell surface	S45	Proteo-HMWPG is released from amastigotes into the parasitophorous vacuole of macrophages	S68
The mammalian stages	S46	Synopsis and some speculations	S68
The insect stages	S46	Acknowledgements	S69
Inhibitors of GPI-anchor biosynthesis	S49	References	S69
Enzyme purification	S52		
Mechanistic enzymology	S52		
Future work	S52	Biochemistry and molecular genetics of <i>Leishmania</i> glucose transporters	S73
Acknowledgements	S52	Summary	S73
References	S53	Introduction	S73
		Biochemistry of glucose transport in <i>Leishmania</i>	S74
The role of lipophosphoglycan of <i>Leishmania</i> in vector biology	S55	Glucose catabolism	S74
Summary	S55	Glucose transport	S74
Introduction	S55	Glucose transport in promastigotes compared to amastigotes	S75
Metacyclogenesis in <i>Leishmania</i> promastigotes	S56	Inhibition studies and identification of a potential glucose transporter protein	S76
The lipophosphoglycan of <i>Leishmania</i> promastigotes	S56	Structure of glucose transporters in eukaryotes and prokaryotes	S76
Developmental polymorphisms of LPG	S58	Facilitated and active transporters	S76
Species-specific LPG polymorphisms and vector competence	S59	Structure of the facilitated glucose transporters	S77
References	S60	<i>Leishmania</i> genes encoding members of the glucose transporter family	S77
		Identification of the Pro-1 glucose transporter gene from <i>Leishmania enriettii</i>	S77
Characterization of phosphoglycan-containing secretory products of <i>Leishmania</i>	S63	Genomic arrangement of Pro-1 genes	S78
Summary	S63	Possible functions of different isoforms	S79
Introduction	S63	Isolation of genes for two related transporters from <i>L. donovani</i>	S80
The 'excreted factor'	S63	Genes for glucose transporter-like proteins in other trypanosomatids	S80
Lipophosphoglycan at the promastigote cell surface	S64	<i>Trypanosoma brucei</i>	S80
Characterization of components released into the promastigote culture supernatant	S64	<i>Trypanosoma cruzi</i>	S80
Lipophosphoglycan and phosphoglycan	S64	Conclusion	S81
Secreted acid phosphatase from <i>L. donovani</i> and <i>L. mexicana</i>	S66	References	S82
sAP from <i>L. mexicana</i> is a filamentous polymer	S66		
Fibrous networks	S67		