



Schistosoma mansoni extracellular vesicles and their impact on the immune system: glycosylated messengers in host-pathogen communication

Kuipers, M.E.

Citation

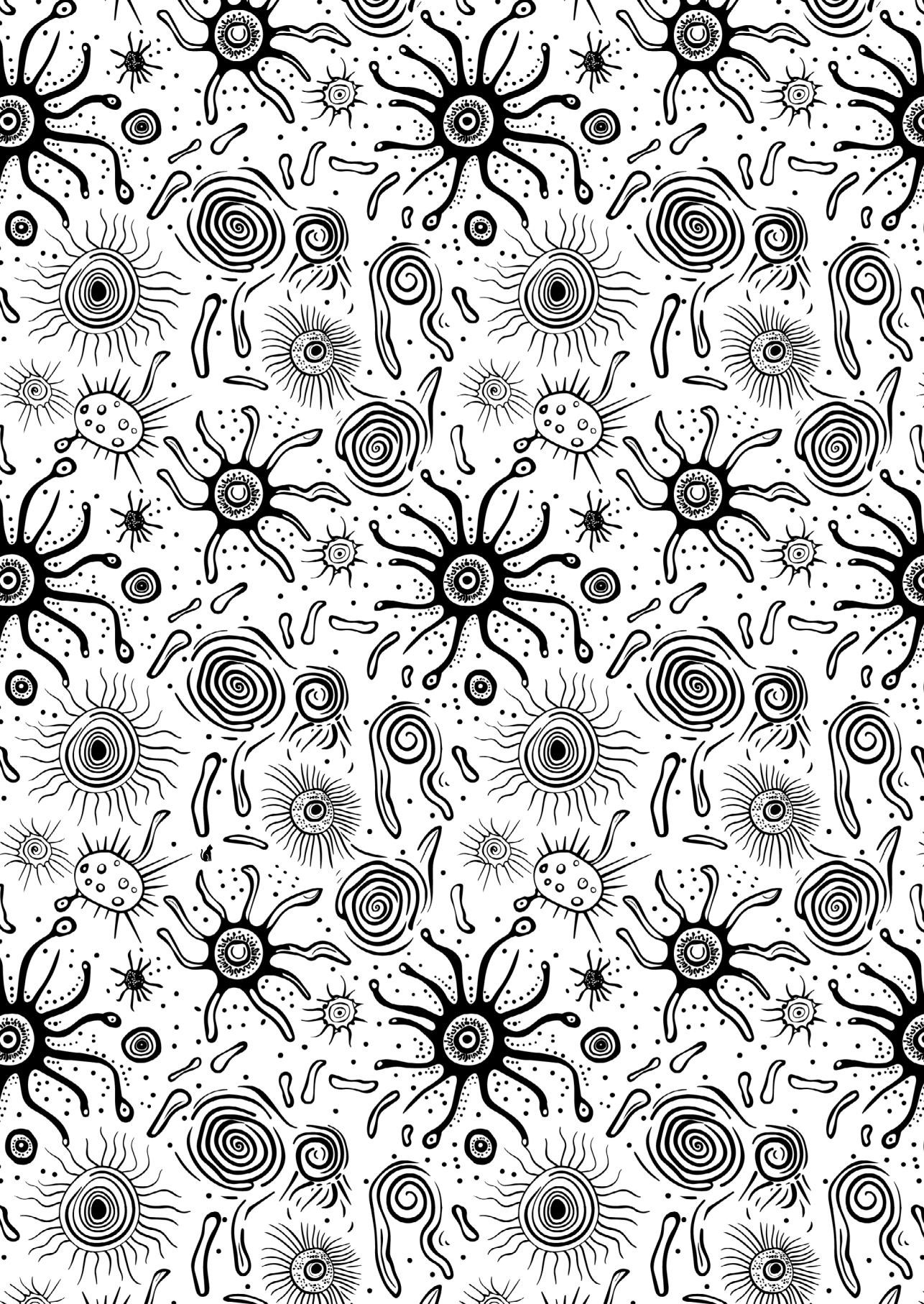
Kuipers, M. E. (2024, September 25). *Schistosoma mansoni extracellular vesicles and their impact on the immune system: glycosylated messengers in host-pathogen communication*. Retrieved from <https://hdl.handle.net/1887/4092867>

Version: Publisher's Version

[Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

License: <https://hdl.handle.net/1887/4092867>

Note: To cite this publication please use the final published version (if applicable).



***Schistosoma mansoni* Extracellular Vesicles
and their Impact on the Immune System:
Glycosylated Messengers in
Host-Pathogen Communication**

Marije E. Kuipers

ISBN: 978-94-6506-287-7
Printing: Ridderprint | www.ridderprint.nl

Cover image and chapter images were created using the Midjourney web app.
Some figures in this thesis have been made by using Servier Medical Art, provided by Servier,
licensed under a Creative Commons Attribution 3.0 unported license.

© Marije E. Kuipers 2024

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, by photocopying, recording, or otherwise, without prior written permission of the author.

The work described in this thesis was performed at the department of Parasitology (now LUCID) at the Leiden University Medical Center, Leiden, the Netherlands, and the department of Biomolecular Health Sciences at the Faculty of Veterinary Medicine at Utrecht University, Utrecht, the Netherlands. The work was supported by a grant from the Board of Directors of the Leiden University Medical Center and by the graduate program of the Dutch Research Council (NWO) (both awarded to M.E. Kuipers).

***Schistosoma mansoni* Extracellular Vesicles
and their Impact on the Immune System:
Glycosylated Messengers in
Host-Pathogen Communication**

Proefschrift

ter verkrijging van
de graad van doctor aan de Universiteit Leiden,
op gezag van rector magnificus prof.dr.ir. H. Bijl,
volgens besluit van het college voor promoties
te verdedigen op woensdag 25 september 2024

klokke 10.00 uur

door

Marije Erline Kuipers
geboren te Haarlem
in 1986

Promotoren: prof.dr. C.H. Hokke
prof.dr. H.H. Smits

Co-promotor: dr. E.N.M. Nolte-‘t Hoen (Utrecht University)

Leden promotiecommissie: prof.dr. M.J.T.H. Goumans
prof.dr. T.H.M. Ottenhoff
dr. A.G. van der Veen
prof.dr. G.J.P.H. Boons (Utrecht University)
prof.dr. K.R. Hoffmann (Aberystwyth University, UK)

voor papa

Table of contents

Chapter 1	General introduction	9
Chapter 2	Pathogen-derived extracellular vesicle-associated molecules that affect the host immune system: an overview	23
Chapter 3	Optimized protocol for the isolation of extracellular vesicles from the parasitic worm <i>Schistosoma mansoni</i> with improved purity, concentration, and yield	49
Chapter 4	Life stage-specific glycosylation of extracellular vesicles from <i>Schistosoma mansoni</i> schistosomula and adult worms drives differential interaction with C-type lectin receptors DC-SIGN and MGL	71
Chapter 5	Extracellular vesicles from <i>Schistosoma mansoni</i> adult worms stimulate IL-10 release by B cells	101
Chapter 6	DC-SIGN mediated internalisation of glycosylated extracellular vesicles from <i>Schistosoma mansoni</i> increases activation of monocyte-derived dendritic cells	129
Chapter 7	Summarizing discussion and future perspectives	163
Appendices	Popular science summary (English & Dutch)	198
	Nederlandse samenvatting voor niet-ingewijden	199
	Curriculum Vitae	208
	List of publications	210
	Dankwoord/acknowledgements	212