



UvA-DARE (Digital Academic Repository)

Molecular diagnostics and epidemiology of *Treponema pallidum*

Zondag, H.C.A.

Publication date
2023

[Link to publication](#)

Citation for published version (APA):

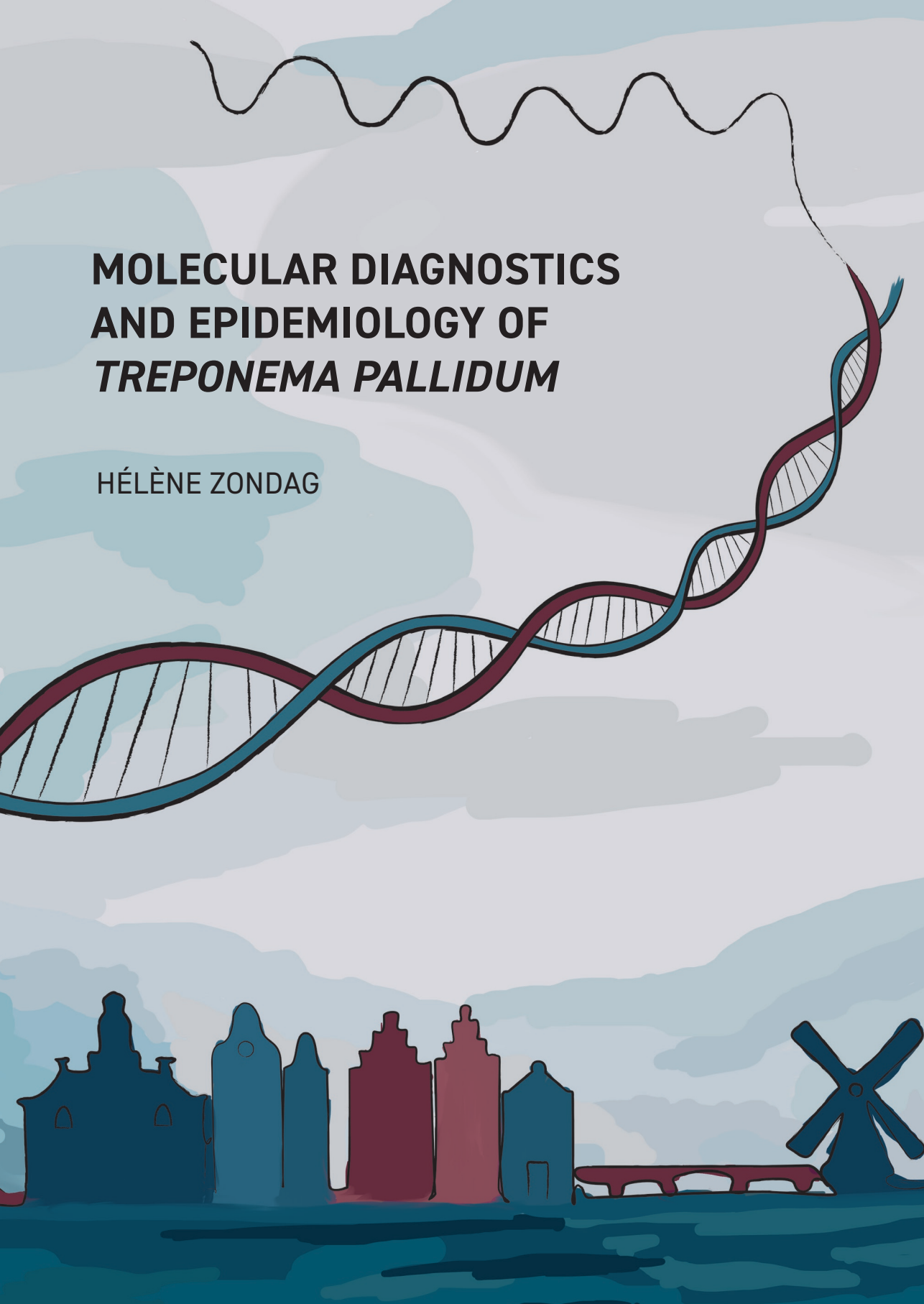
Zondag, H. C. A. (2023). *Molecular diagnostics and epidemiology of Treponema pallidum*. [Thesis, fully internal, Universiteit van Amsterdam].

General rights

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <https://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.



MOLECULAR DIAGNOSTICS AND EPIDEMIOLOGY OF *TREPONEMA PALLIDUM*

HÉLÈNE ZONDAG

**MOLECULAR DIAGNOSTICS AND EPIDEMIOLOGY
OF *TREPONEMA PALLIDUM***

Hélène Zondag

Molecular Diagnostics and Epidemiology of *Treponema pallidum*

PhD thesis, University of Amsterdam, the Netherlands

ISBN 978-94-6469-3393

© Hélène Zondag 2023

All rights reserved. No part of this thesis may be reproduced, stored or transmitted in any form or by any means without the prior permission of the author or, when applicable, of the publishers of the scientific papers.

Cover art by: Bregje Jaspers | ProefschriftOntwerp.nl

Layout and design by: Bregje Jaspers | ProefschriftOntwerp.nl

Printed by: ProefschriftMaken | www.proefschriftmaken.nl

Financial support for printing this thesis was kindly provided by the Public Health Service of Amsterdam and the Amsterdam UMC.

Molecular Diagnostics and Epidemiology
of *Treponema pallidum*

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad van doctor
aan de Universiteit van Amsterdam
op gezag van de Rector Magnificus
prof. dr. ir. P.P.C.C. Verbeek
ten overstaan van een door het College voor Promoties ingestelde commissie,
in het openbaar te verdedigen in de Aula der Universiteit
op donderdag 13 juli 2023, te 11.00 uur

door H el ene Clotilde Adriana Zondag
geboren te Darmstadt

Promotiecommissie

Promotor:	prof. dr. H.J.C. de Vries	AMC-UvA
Copromotores:	dr. S.M. Bruisten dr. A.P. van Dam	GGD Amsterdam AMC-UvA
Overige leden:	prof. dr. D. Šmajš dr. L. van Alphen prof. dr. M. van der Valk prof. dr. D. Pajkrt prof. dr. J.W.R. Hovius dr. R. van Houdt	Masaryk University, Brno Maastricht UMC AMC-UvA AMC-UvA AMC-UvA VU Medisch Centrum

Faculteit der Geneeskunde

TABLE OF CONTENT

Chapter 1	General Introduction	7
PART I	MOLECULAR DIAGNOSTICS	27
Chapter 2	Detection of <i>Treponema pallidum</i> DNA During Early Syphilis Stages in Peripheral Blood, Oropharynx, Ano-Rectum and Urine as a Proxy for Transmissibility	29
Chapter 3	Timely diagnosis of incubating syphilis infections using <i>Treponema pallidum</i> Transcription Mediated Amplification assay	55
PART II	MOLECULAR EPIDEMIOLOGY	69
Chapter 4	Molecular diversity of <i>Treponema pallidum</i> subspecies <i>pallidum</i> isolates in Amsterdam, the Netherlands	71
Chapter 5	<i>Treponema pallidum</i> subspecies <i>pallidum</i> inpatient homogeneity at various body locations in men with infectious syphilis	81
Chapter 6	<i>Treponema pallidum</i> strains among women and men who have sex with women in Amsterdam, the Netherlands and Antwerp, Belgium between 2014 – 2020	101
Chapter 7	No bejel among Surinamese, Antillean and Dutch syphilis diagnosed patients in Amsterdam between 2006 – 2018 evidenced by multi-locus sequence typing of <i>Treponema pallidum</i> isolates	111
Chapter 8	Increased clonality among <i>Neisseria gonorrhoeae</i> isolates during the COVID-19 pandemic in Amsterdam, the Netherlands	131
Chapter 9	General Discussion	153
Appendix	Summary	173
	Nederlandse samenvatting	179
	About the author	185
	List of publications	187
	List of contributing authors	189
	Author's contributions	193
	Portfolio	197
	Dankwoord	201