



**Dedicated To**

*My Beloved Parents,*

*My Sister,*

*and*

*My Ever- supporting Husband.*



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## DECLARATION

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I hereby declare that the thesis "*Leishmania donovani* promastigote Lipophosphoglycan interaction with macrophage Toll-like receptor 4 modulates parasite internalization and macrophage dysfunction" submitted to the School of Sciences, Tezpur University in requirement of partial fulfillment for the award of the degree of Doctor of Philosophy in Molecular Biology and Biotechnology has been carried out by me at Department of Molecular Biology and Biotechnology, Tezpur University, Assam, India, under the supervision of Dr. Suman Dasgupta. The work is original and has not been submitted in part or full in any other University or Institute for any degree, diploma, associateship, fellowship or any other similar title or recognition.

Date: 14/3/24

Place: Tezpur

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(Sayani Mazumder)

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### CERTIFICATE OF SUPERVISOR

This is to certify that the thesis entitled "*Leishmania donovani* promastigote Lipophosphoglycan interaction with macrophage Toll-like receptor 4 modulates parasite internalization and macrophage dysfunction" submitted to the School of Sciences, Tezpur University in requirement of partial fulfilment for the award of the degree of Doctor of Philosophy in Molecular Biology and Biotechnology is a record of research work carried out by **Ms. Sayani Mazumder** under my supervision and guidance.

All help received by her from various sources have been duly acknowledged.

No part of this thesis has been submitted elsewhere for award of any other degree.

(Signature of supervisor)

Date: 14.03.24

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### ACKNOWLEDGEMENTS

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**Place:** Tezpur

**Date:** 14/3/24

*Sayani Mazumdar*  
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## LIST OF TABLES

<b>CHAPTER I:</b>	
Table 1.1. Clinical forms of different <i>Leishmania</i> species and their geographical distribution.	<b>1</b>
<b>CHAPTER III:</b>	
Table 3.1. List of primers and oligos used in this study	<b>49-50</b>
Table 3.2. List of primers used for mutation of LRRs in this study	<b>60-61</b>

## LIST OF ABBREVIATIONS

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<b>Abbreviations</b>	<b>Full forms</b>
~	Around
μ	Micron
μg	Microgram
μl	Microlitre
μM	Micromolar
μm	Micrometer
nm	Nanometer
ASO	Anti-sense oligo
ATCC	American Type Culture Collection
AHSG	Alpha 2- Heremans Schmid glycoprotein
BSA	Bovine serum Albumin
BW	Body weight
C/EBP	Caatenhancer binding protein Clu
CD-14	Sterof differentiation-14
CHAPS	3-[(3-cholamidopropyl) imethylammonio]-1-propanesulfonate
DMEM	Dulbecco's Modified Eagle Medium
DAPI	4',6-diamidino-2-phenylindole
DCFDA	Dichlorodihydrofluorescein diacetate
ERK	Extracellular signal-regulated kinase
EtBr	Ethidium bromide
Ex	Excitation

## LIST OF ABBREVIATIONS

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Em	Emission
FBS	Fetal Bovine Serum
Fet-A	Fetuin-A
FITC	Fluorescein isothiocyanate
G	Relative centrifugal force
GFP	Green fluorescent protein
GAPDH	Glyceraldehyde3-phosphatedehydrogenase
h	Hour(s)
HEK-293	Human embryonic kidney 293 cells
IFN $\gamma$	Interferon-gamma
IgG	Immunoglobulin G
IL-4	Interleukin-4
IL-6	Interleukin-6
IL-1 $\beta$	Interleukin- beta
IL-10	Interleukin -10
i.p.	intraperitoneal
i.v.	intravenous
IMPA	Imidazo[1,2- $\alpha$ ] pyridine
ITC	Isothermal titration calorimetry
kDa	Kilodalton
LDU	Leishman-Donovan unit
LPG	Lipophosphoglycan
LPS	Lipopolysccharide
LRR	Leucine rich repeats



## LIST OF ABBREVIATIONS

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M	Molar
mM	Millimolar
MAPKs	Mitogen-activated protein kinases
MCP-1	Monocyte chemoattractant protein-1
MCSF	Macrophage colony stimulating factor
MD-2	Myeloid Differentiation factor-2
mg	Milligram
min	Minute(s)
ml	Millilitre
MTT	3-(4,5-Dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide
M $\phi$	Macrophage
MyD88	Myeloid differentiation primary response-88
NO	Nitric oxide
NF- $\kappa$ B	Nuclear factor kappa-light-chain-enhancer of activated B cells
nM	Nanomolar
OxLDL	Oxidized low density lipoprotein
°C	Degree centigrade
PBMC	Peripheral blood mononuclear cells
PBS	Phosphate-Buffered Saline
PI	Propidium iodide
PFA	Paraformaldehyde
PM	Promastigote
PMA	Phorbol 12-myristate 13-acetate

## LIST OF ABBREVIATIONS

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PVDF	Polyvinylidene difluoride
ROS	Reactive oxygen species
Rpm	Revolution per minute
RPMI-1640	Rosewell Park Memorial Institute 1640 Medium
RT-PCR	Reverse transcriptase polymerase chain reaction
SDS-PAGE	Sodium dodecyl sulphate - polyacrylamide gel electrophoresis
Sec	Second(s)
siRNA	Small interfering RNA
Th1	T helper type 1
Th2	T helper type 2
TLR	Toll like receptor
TNF $\alpha$	Tumor necrosis factor- $\alpha$
YFP	Yellow fluorescent protein
VL	Visceral leishmaniasis