Dedicated to my beloved parents,

Shri Binay Kumar Mishra (Papa)

Late Shrawan Kumar Pandey (Father-in-law)

and

Smt. Pushpa Mishra (Maa)

Smt. Durga Pandey (Mother-in-law)

for their blessings, endless support and encouragement

DECLARATION BY THE CANDIDATE

I hereby declare that the thesis **"To study the snake venom nerve growth factor-derived custom peptides for their application in preventing Parkinson's disease"** being submitted to Department of Molecular Biology and Biotechnology, Tezpur University, Tezpur, Assam in partial fulfillment for the award of the degree of Doctor of Philosophy in Molecular Biology and Biotechnology, has previously not formed the basis for the award of any degree, diploma, associateship, fellowship or any other similar title or recognition. Due to the unavailability of proper facilities at Tezpur University, the following experiments/sample analyses were carried out at other institutes:

1. LC-MS/MS analysis of samples was performed at the Centre for Cellular and Molecular Platforms (C-CAMP) and Biokart, Bangalore, India. Transcriptomics and miRNA sequencing were performed at Biokart, Bangalore, India.
2. Confocal microscopic studies, Flow cytometry studies, and many other techniques were used at SAIC IASST, Guwahati 781035, India.
3. *In vitro* and *in vivo* experiments were performed at an animal experiment facility, IASST, Guwahati 781035, India.

Date:

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Department of Molecular Biology and Biotechnology

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CERTIFICATE OF SUPERVISOR

This is to certify that the thesis entitled "**To study the snake venom nerve growth factor-derived custom peptides for their application in preventing Parkinson's disease**" 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 is a record of research work carried out by Ms. Dev Madhubala under my supervision and guidance. All help received by her from various sources has been duly acknowledged. No part of this thesis has been submitted elsewhere for award of any other degree.

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Place: Tezpur

Date:

(Dev Madhubala)

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ABBREVIATIONS

Abbreviation	Full form
AD	Alzheimer’s Disease
ANOVA	One-Way Analysis of Variance
ATCC	American Type Culture Collection
ATP	Adenosine Triphosphate
BBB	Blood-Brain Barrier
BDNF	Brain-Derived Neurotrophic Factor
CD	Circular Dichroism
CID	Collision-Induced Dissociation
DAPI	4′,6-Diamidino-2-Phenylindole
DMEM	Dulbecco's Modified Eagle Medium
DMSO	Dimethyl Sulfoxide
FBS	Fetal Bovine Serum
FITC	Fluorescein Isothiocyanate
HD	Huntington’s Disease
HNP	Heptadeca-Neuropeptide
L6	Rat Myoblast or Myogenic Cells
LDH	Lactate Dehydrogenase
MAPK	Mitogen-Activated Protein Kinase
MDA-MB-231	Human Breast Adenocarcinoma Cells
MCF-7	Michigan Cancer Foundation-7
EMEM	Eagle's Minimum Essential Medium
ADP	Adenosine Diphosphate
AMP	Adenosine Monophosphate
ATP	Adenosine Triphosphate
CCCP	Carbonyl Cyanide M-Chlorophenylhydrazone
CGC	*Caenorhabditis* Genetics Center
CTAB	Cetyltrimethylammonium Bromide
DBP	Disulfide Bridge Peptide
DCF	2',7’-Dichlorodihydrofluorescein
DTT	Dithiothreitol
DPPH	2,2-Diphenyl-1-Picrylhydrazyl

Abbreviation	Full Form
FPLC	Fast Protein Liquid Chromatography
HCL	Hydrochloride
H_2DCFDA	2',7'-Dichlorofluorescein-Diacetate
HEPES	4-(2-Hydroxyethyl)-1-Piperazineethanesulfonic Acid
LC_{50}	Median Lethal Concentration
LC/ES-MS	Liquid Chromatography-Electronspray Tandem Mass
LC-MS/MS	Spectrometry
LPP	Liquid Chromatography-Tandem Mass Spectrometry
LD_{50}	Median Lethal Dose
MALDI-TOF-	Matrix-Assisted Laser Desorption/Ionization -Time Of Flight - Mass Spectrometry
NCBI	National Center For Biotechnology Information
NGM	Nematode Growth Media
MMGBSA	Molecular Mechanics/Generalized Born Surface Area
MMP	Mitochondrial Membrane Potential
MTT	3-(4,5-Dimethylthiazol-2-Yl)-2,5-Diphenyltetrazolium Bromide
NCBS	National Centre For Cell Science
NDs	Neurodegenerative Disorders
NGF	Nerve Growth Factor
P^{75}NTR	P75 Neurotrophin Receptor
PC-12	Adrenal Pheochromocytoma Cell Line
PD	Parkinson's Disease
PDB	Protein Data Bank
PI	Propidium Iodide
PI3K	Phosphatidylinositol 3-Kinase Stimulation Of Protein Kinase B Signaling Pathways
PPI	Protein-Protein Interaction
PPP	Platelet-Poor Plasma
PRP	Platelet-Rich Plasma
PT	Paraquat
qRT-PCR	Quantitative Reverse Transcription-Polymerase Chain Reaction

Abbreviation	Full Form
RESPA	Reversible Reference System Propagator Algorithms
RMSD	Root Mean Square Deviation
ROS	Reactive Oxygen Species
RT	Rotenone
SD	Standard Deviation
SV-NGF	Snake Venom Nerve Growth Factor
TIP3P	Three-Points Water Model
TNP	Trideca-Neuropeptide
TrkA	Tropomyosin Receptor Kinase A Receptor
UHPLC-MS/MS	Ultra-Performance Liquid Chromatography-Tandem Mass Spectrometer
PBS	Phosphate buffered saline
PPP	Platelet poor plasma
PRP	Platelet rich plasma
Q-RT PCR	Quantitative reverse transcription polymerase chain reaction
Q-TOF	Quadrapole time of flight
RCSB	Research collaborator for structural bioinformatics
RNA	Ribonuclic acid
ROS	Reactive oxygen species
RP-HPLC	Reversed-phase high-performance liquid chromatography
RP-UHPLC	Reversed-phase ultra-high-performance liquid chromatography
SGOT	Serum glutamic oxaloacetic transaminase
SGPT	Serum glutamic pyruvic transaminase
TBS	Tris-buffered saline
TCA	Trichloroacetic acid
TEMED	Tetramethylethylenediamine
TFA	Trifluoroacetic acid
WHO	World health organization
CNS	Central Nervous System
ALS	Amyotrophic Lateral Sclerosis
DALYs	Disability-Adjusted Life Years
Aβ	Amyloid-B

Abbreviation	Full Form
DAMP	Danger-Associated Molecular Pattern
IP3	Inositol 1,4,5-Triphosphate
PLCγ	Phospholipase Cγ
JNK	C-Jun N-Terminal Kinase
YFP	Yellow Fluorescence Protein
miRNA	MicroRNAs
NTFs	Neurotrophic Factors
6-OHDA	6-Hydroxydopamine
MPP+	1-Methyl-4-Phenylpyridinium Iodide