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Metric: 1.3.3

Programme: M.Sc. Genetics

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List of Students

Number of MSc students who have undertaken research projects in the department

Year	S.No	Names	Gender	Roll No	Numbers
2018	1	Arushi Shukla	F	61371	11
	2	Ayush Kumar	M	61372	
	3	Bharti	F	61373	
	4	Himani Singh	F	61374	
	5	Prerna Aggarwal	F	61375	
	6	Priyakshi Gogoi	F	61376	
	7	Roopam Sharma	F	61377	
	8	Sabita Yadav	F	61378	
	9	Sonu Yadav	F	61379	
	10	Srashti Jyoti Agrawal	F	61380	
	11	Vikram Sen	M	61381	
2019	1	Bm Minhajuddin	M	61571	14
	2	Deepali Mishra	F	61572	
	3	Hungharla Hungyo	F	61573	
	4	Neelesh Prashant	M	61574	
	5	Priya	F	61575	
	6	Rohit Kachhwaha	M	61576	
	7	Sayeed Qadir Danishiar	M	61577	
	8	Shikha Gautam	F	61578	
	9	Shruti Khanna	F	61579	
	10	Simran Choudhary	F	61580	
	11	Vagisha Kulshreshtha	F	61581	
	12	Vaishali Kataria	F	61582	
	13	Zoha Sadaqat	F	61583	
	14	Yogita	F	61382	
2020	1	ANKITA MADDHESHIYA	F	61771	8
	2	AYUSH GOEL	M	61772	
	3	BHAWNA	F	61773	
	4	HIMANSHI GANGWAR	F	61774	
	5	RASHI ANAND	F	61776	
	6	RASHMI SHARMA	F	61777	
	7	SHREESH PRATAP SAMRAT	M	61778	
	8	SUKRIT MAHAJAN	M	61779	
2021	1	AMIT KUMAR BHATT	M	61971	12
	2	ANUPAM CHAWLA	M	61972	
	3	DEEPTI THAPLIYAL	F	61973	
	4	KHANGEMBAM NONGTHANGLEIMA DEVI	F	61974	
	5	MOHD AAQUIB	M	61975	
	6	NGATHINGWON KASAR	F	61976	
	7	OSHEEN TANEJA	F	61977	
	8	PRIYA KHADGAWAT	F	61978	
	9	SHABNAM	F	61979	
	10	SHIVANI GAHLOT	F	61980	

	11	SIDAK MINOCHA	M	61981	
	12	YOGEETA GUPTA .	F	61983	
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	2	DEEPTI ROY	F	20/1258	
	3	KARTIKEYA	M	20/1261	
	4	MANASVI CHOPRA	F	20/1257	
	5	NEELAM	F	20/1254	
	6	NEERU YADAV	F	20/1252	
	7	PARUL KUMAR	M	20/1253	
	8	PRAGATI VIRMANI	F	20/1260	
	9	PREETI SINGH	F	20/1262	
	10	SHURUTI SOOD	F	20/1251	
	11	SUMITA RANI	F	20/1255	
	12	VANDANA	F	20/1259	
	13	VARSHA	F	20/1263	
	14	YATHARTHA KUMAR	M	19/1258	

Total Number : 59

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Annexure-II

Sample Project Reports

Artificial miRNA Technology and Its Applications in Developing Stress Tolerant Crop Plants

Dissertation (Review) submitted to the Department of Genetics, University of Delhi, South Campus for the partial fulfilment of the degree of M. Sc. in Genetics

Alisha Srivastava

Department of Genetics
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New Delhi 110021

(May 2022)

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CERTIFICATE

This is to certify that **Ms. Alisha Srivastava** has worked on the dissertation (Review) entitled **"Artificial miRNA technology and its applications in developing stress tolerant crop plants"** under my guidance. This dissertation being submitted to the Department of Genetics, University of Delhi, South Campus for the partial fulfilment of the degree of **M. Sc. in Genetics**. All the sources of information used in this review have been duly acknowledged. This dissertation has not been submitted to any other University for the award of any other degree.

Date: May 4, 2022

Prof. M. V. Rajam
Guide

Date: May 4, 2022

Signature of the HoD

Abbreviations

amiRNA	-	Artificial micro RNA
DCL-1	-	Dicer like 1
EXPO1	-	Exportin-1
HEN-1	-	Hua enhancer
HIGS	-	Host-induced gene silencing
HYL-1	-	Hyponastic leaves
miRNA	-	Micro RNA
PTGS	-	Post-transcriptional gene silencing
RdRP	-	RNA-dependent RNA polymerase
RISC	-	RNA induced silencing complex
RNAi	-	RNA interference
ROS	-	Reactive oxygen species
SDN	-	Small RNA degrading nucleases
siRNA	-	Small interfering RNA
sRNAs	-	Small RNAs

Trafficking of Small Regulatory RNAs Between the Host Plants and Their Pathogens

DISSERTATION (REVIEW) SUBMITTED TO THE DEPARTMENT OF GENETICS,

UNIVERSITY OF DELHI IN PARTIAL FULFILMENT FOR THE DEGREE OF

Master of Science
in
Genetics

Shuruti Sood

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(May 2022)

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Prof. M. V. RAJAM
(Guide)

Head of the Department

Abbreviations

AGO	-	Argonaute proteins
CMV	-	Cucumber mosaic virus
DCL	-	DICER like protein
dsRNA	-	Double-stranded RNA
EVs	-	Extracellular vesicles
EXPO	-	Exocyst Positive Organelle
GUS	-	β-Glucuronidase
HEN1	-	Hua Enhancer 1
HIGS	-	Host-induced gene silencing
hpRNA	-	Hairpin RNA
HYL1	-	Hyponastic leaves 1
miRNA	-	MicroRNA
natsiRNA	-	Natural antisense short interfering RNA
nt	-	Nucleotide(s)
pre-miRNA	-	Precursor miRNA
pri-miRNA	-	primary miRNA
PTGS	-	Post-transcriptional gene silencing
RISC	-	RNA-induced silencing complex
RNAi	-	RNA interference
SE	-	Serrate proteins
SIGS	-	Spray-induced gene silencing
siRNA	-	Small interfering RNA
sRNAs	-	small RNAs
TET	-	Tetraspanin
TGS	-	Transcriptional Gene Silencing
TRV	-	Tobacco rattle virus
VSRS	-	Viral suppressors of RNA silencing

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Abstract

Various non-coding RNAs have been known to play a regulatory role in cellular pathways. The structure and biogenesis of small RNAs (sRNAs) define their mode of action. Although plant-pathogen interactions are mediated by different types of sRNAs, the roles of the sRNAs are still to be explored. Plants express sRNAs for a number of processes such as defense, immune response and growth. On the contrary, pathogens or pests also take support of sRNA to suppress plant immune response. The movement of these sRNAs between plants and pathogens is a critical step in the process of cross-kingdom communication. Both pathogens and plants have developed ways of delivering the sRNAs across kingdoms, in a safe and efficient manner. This review majorly focuses on sRNA trafficking and cross-talk between distinct organisms and the ways of delivery of these sRNAs.

The Convoluted Role of FOXO in Polyglutamine disorders: A review

Dissertation submitted in partial fulfilments
of the requirements for the Degree of
MASTER OF SCIENCES
in
GENETICS

By
DEEPTI ROY

Under the supervision
of
DR SURAJIT SARKAR

Department of Genetics
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Abstract

Polyglutamine diseases are a family of neurodegenerative conditions which arise from CAG triplet repeat expansion in a specific gene. This mutated gene produces a pathogenic protein containing a critically expanded glutamine tract. These diseases impact every 10 out of 1,00,000 people, so developing novel, effective therapeutics is vital. Previously, SIRT1 has been a prime target for drugs, but new research has emphasized the potential role of FOXO in neuroprotection, especially in neurological disorders. The Forkhead Box O (FoxO) transcription factor family is a crucial player in an evolutionarily conserved pathway downstream of insulin and insulin-like growth factor receptors. They are also well-known for their ability to coordinate upstream stress signals (like increased oxidative stress in the cell and reduced glucose levels) to activate fate-determination processes like survival or apoptosis. Owing to the potential FOXO presents, this article explores the role of FOXO in polyglutamine disorders its potential as a therapeutic target.

Keywords: Polyglutamine disorders, FOXO, neurodegenerative diseases, *drosophila* melanogaster, insulin pathway

Functional Ramifications of *Drosophila* Toll Pathway beyond Immunity and Development

Dissertation (Review) submitted to the

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(2022)

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Abbreviations

4E-BP - eIF4E binding protein

AD - Alzheimer's disease

ALS - Amyotrophic Lateral Sclerosis

AMP - Anti-microbial peptides

APOE4 - Apolipoprotein E

A-T - Ataxia-Telangiectasia

ATM - Ataxia telangiectasia mutated gene

Aβ42 - Amyloid β-protein 42

Bcl-2 - B-cell lymphoma 2

CHMP2B - Charged multivesicular body protein 2b

CNS - Central nervous system

DD - Death domains

Dif - Dorsal- related immunity factor

dsRNA - Double stranded ribonucleic acid

FoxO - Forkhead Box O

FTD - Frontotemporal dementia

GNBP1 - Gram-negative binding protein 1

GNBP3 - Gram-negative binding protein 3

Gprk2 - G protein-coupled receptor kinase

GSK3 - Glycogen synthase kinase 3

Hid - Head involution defective

IFN- γ - Interferon γ

IL-18 - Interleukin 18

IL-1β - Interleukin 1 beta

IL-6 - Interleukin 6

IMD - Immune deficiency

JAK-STAT	-	Janus kinase/signal transducers and activators of transcription
JNK	-	c-Jun N-terminal kinase
lncRNA-CR33942	-	long non-coding ribonucleic acid CR33942
mHtt	-	Mutant huntingtin protein
miRNA	-	Micro-ribonucleic acid
ModSP	-	Modular serine protease
mRNA	-	Messenger ribonucleic acid
NF-kB	-	Nuclear factor-kB
NFTs	-	Neurofibrillary tangles
NLP-29	-	Neuropeptide-like protein-29
PAMPs	-	Pathogen-associated molecular pattern molecules
PD	-	Parkinson's disease
PGRP-SA	-	Peptidoglycan recognition protein SA
PGRP-SD	-	Peptidoglycan recognition protein SD
PRRs	-	Pattern recognition receptors
PSH	-	Persephone
RIPK1	-	Receptor-interacting protein kinase 1
RNAi	-	RNA (ribonucleic acid) interference
ROS	-	Reactive oxygen species
Ser129	-	Serine 129
SPE	-	Spätzle processing enzyme
TGF-	-	Transforming growth factor β
TLR	-	Toll like receptor
TNF-α	-	Tumor necrosis factor-α
TOR	-	Target of rapamycin
UTR	-	Untranslated Region
XBP1	-	X-Box Binding Protein 1

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ABSTRACT

Neurodegenerative diseases that are characterized by progressive loss of neurons and synaptic junctions are increasingly affecting the health of the society at large. For decades, the brain and immune response were studied exclusively as the central nervous system was thought to be an immune privileged region. Growing evidences have now linked hyperactivation of the immune response to various neurodegenerative diseases. However, the molecular pathway(s) that bridges these two events is yet to be explored. To study the same, one can exploit the functional homology between humans and *Drosophila* in both neurodegeneration and immune response. Recent studies have reported the involvement of Toll pathway in mediating neurodegeneration but the conduit of events are still enigmatic. Finding the conventional and non-conventional channels that connect the Toll pathway with neurodegeneration would help to develop better therapeutic interventions. In the present review, we have summarized the role of the Toll pathway in various *Drosophila* models of neurodegeneration; non-conventional interactions of the Toll pathway in different physiological conditions. Lastly, I have proposed a conciliatory pathway that links the Toll pathway to neurodegeneration.

Keywords: Neurodegeneration, *Drosophila*, Innate immunity, Toll pathway

DISSERTATION REPORT

On

Drug screening and standardization of effective drug concentration against poly(Q) toxicity in *Drosophila* poly(Q) models.

By

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Date:

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Genotype-Phenotype association of seed Glucosinolate trait in *Brassica juncea*

DISSERTATION REPORT

Submitted to University of Delhi
for the partial fulfilment of

MASTER OF SCIENCE
IN GENETICS

2018-2020

SUBMITTED BY

HIMANSHI GANGWAR

Under the guidance of

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Declaration

I, **Himanshi Gangwar**, hereby declare that my dissertation entitled "**Genotype-Phenotype association of seed Glucosinolate trait in *Brassica juncea***" is the bonafide record of the original research work carried out by me under the supervision and guidance of **Prof. Akshay K. Pradhan**. It has not been submitted earlier elsewhere for the award of any degree, diploma, or fellowship.

I certify that all sources of information and data are fully acknowledged in the dissertation Report.

Date: May 29, 2020

Himanshi Gangwar

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[TO INVESTIGATE THE ACTIVITY OF TP53 GENE UNDER STRESS]

DISSERTATION PROJECT REPORT SUBMITTED TO THE UNIVERSITY OF DELHI IN PARTIAL FULFILLMENT FOR THE DEGREE OF

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In
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(Supervisor)

Head of the Department

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PROJECT WORK

ON

CLONING OF THE DNA BINDING DOMAIN 0F P53 IN His tag PROTEIN EXPRESSION VECTOR, pET28a(+)

DISSERTATION

submitted to

Department of Genetics,
University of Delhi South Campus

BY

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Supervisor

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Expression profiling of Ayurveda Prakriti-specific Susceptibility Genes in Rheumatoid Arthritis - A Pilot Study

DISSERTATION PROJECT REPORT SUBMITTED TO THE UNIVERSITY OF DELHI IN PARTIAL FULFILLMENT FOR THE DEGREE OF

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(Supervisor)

Head of the Department

LIST OF COMMONLY USED ABBREVIATIONS

1. bp - Base pairs
2. Ct - Cycle Threshold
3. GWAS - Genome Wide Association Study
4. MCT - Micro Centrifuge Tube
5. NTC - No Transcription Control
6. NFW - Nuclease Free Water
7. PCR - Polymerase Chain Reaction
8. RT-PCR - Real-Time Polymerase Chain Reaction
9. RA - Rheumatoid arthritis
10. RPM - Rotations/revolutions per minute
11. RT - Room Temperature
12. SD - Standard Deviation

NOTATIONS

1. ^{O}C – Degree Celsius
2. sec – Second
3. min - Minute
4. kDa – Kilo Dalton
5. mL – Milli Litre
6. µL – Micro Litre
7. mg - Milligram
8. ng - Nanogram

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Overexpression and purification of Mtg3p truncates, containing either deletion of mitochondrial targeting sequence (MTS) or both MTS and C-terminus, from *Escherichia coli*.

Dissertation project report

Submitted to Department of Genetics
University of Delhi South Campus
University of Delhi South campus New Delhi-110021, India
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Submitted by:
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Dr. Kaustuv Datta
Supervisor

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5. Material and methods

Abbreviations

Abbreviations	Full forms
a.a.	Amino acid
Amp	Ampicllin
$CaCl_2$	Calcium Chloride
cpGTPase	Circularly permuted GTPase
dNTP	Deoxyribonuclotide
DMSO	Dimethylsulfoxide

EtBr	Ethilidium bromide
Kan	Kanamycin
LB	Lysis Broth
$MgCl_2$	Magnesium Chloride
mtLSU	Mitochondrial ribosomal Large Subunit
mtSSU	Mitochondrial ribosomal Small Subunit
O/N	Overnight
RT	Room temperature
SDS	Sodium dodecyl sulfate
Tet	Tetracycline
w/o	Without
wrt	With respect to
Zn^{2+}	Zinc

1. INTRODUCTION

1.1 Ribosomes

It is known that mitochondrial ribosomes or mitoribosomes have bacterial origin, but they have substantial divergence from their ancestors and are prominently distinct from their cytosolic counterparts (Amunts et al, 2014).

Mitoribosomes are made up of nuclear encoded proteins and mitochondrial encoded rRNAs. The ordered assembly of the functional structure in the matrix involves an intricate play between synthesis of mitochondrial encoded rRNA and expression and import of cytoplasmic factors. This process, as of yet, remains elusive. A myriad of factors such as rRNA modifying enzymes, RNA helicases, GTPases and chaperones are seen to be involved in this process, but the functional details at many points. (Kressler et al.,2010 ; De Silva et al.,2015).

GTPases represent the major class of players essential for the ribosomal assembly in bacterial and the mitochondria as well. The ribosome assembly GTPases function either by acting as sensors of the GTP/GDP ratio (thus, coupling energy status of the cell to ribosomal assembly) or drive the assembly by channeling the energy released from GTP hydrolysis. They may act via binding to the RNA and/or the ribosomal protein. (Britton, 2009; Karbstein, 2007).

Developing a Yeast One Hybrid (Y1H) assay for studying interaction between transcription factors from plant and their putative *cis*-elements

Dissertation project report submitted to

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Cloning of Membrane Glycoprotein CD133 gene in *E. coli* DH5α from non-small cell lung carcinoma cell line A549

Submitted By

Sukrit Mahajan

TO THE UNIVERSITY OF DELHI

FOR PARTIAL FULFILMENT OF THE DEGREE

MASTER OF SCIENCE

IN

GENETICS

Under the Supervision of

Dr. Tapasya Srivastava

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DECLARATION BY THE STUDENT

I hereby declare that the thesis 'Cloning of Membrane Glycoprotein CD133 gene in *E. coli* DH5α from non-small cell lung carcinoma cell line A549' is an original work carried out by me, under the guidance of Dr. Tapasya Srivastava, Assistant Professor, Department of Genetics, University of Delhi and has not been submitted to University of Delhi or any other university, for the award of any degree.

Date: 31.5.2020

Place: New Delhi Sukrit Mahajan

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LIST OF ABBREVIATIONS

1.	ABC	ATP Binding Cassette
2.	CD	Cluster of Differentiation
3.	CSC	Cancer Stem Cell
4.	DEPC	Diethyl pyro carbonate
5.	DMEM	Dulbecco's Modified Eagle Medium
6.	DMSO	Dimethyl sulfoxide
7.	dNTP	deoxyribonucleoside triphosphate
8.	EtBr	Ethidium bromide
9.	FBS	Fetal Bovine Serum
10.	FLIP	Flice Like Inhibitory Protein
11.	GBSC	Glioblastoma Stem Cell
12.	HDAC	Histone deacetylase
13.	HEK	Human Embryonic Kidney
14.	LB Agar	Luria Bertani Agar
15.	PBS	Phosphate Buffer Saline
16.	PCR	Polymerase Chain Reaction
17.	PI3K	Phosphoinositide 3-kinase
18.	TGF	Transforming growth factor
19.	TNF	Tumour necrotic factor
20.	NSCLC	Non-Small Cell Lung Cancer
21.	OCT4	Octamer Binding Transcription Factor 3/4 (OCT4)
22.	SOX2	SRY-box containing gene 2

To study the role of accessory factors in mitochondrial function in *Saccharomyces cerevisiae*

Dissertation project report

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Certificate

This is to certify that Priya Khadgawat has carried out her dissertation project entitled "**To govern the role of accessory factors in mitochondrial function in *Saccharomyces cerevisiae***" towards the partial fulfillment of Degree of Masters of Science in Genetics from University of Delhi under my guidance and supervision. The content of this thesis is original and has not been submitted in full or in part in this University or elsewhere for award of any degree or diploma.

Dr. Kaustuv Datta
Supervisor

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Mitochondrial translation and regulation
MRX8
G-Domain
Mitochondrial Ribosomes
MTG3
IRC3

II. Objectives:

1) To observe the growth phenotype of wild type and knock-out MRX8.
2) To perform a mating assay with ΔMRX8 strain to obtain it's mating type.
3) To determine the primary consequence of GKSAAA mutant on mrx8p by analyzing protein stability.
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5) To perform mitochondrial isolation from different MTG3 strains:
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- Mitochondrial isolation from MTG3 Truncate strains.

6) Mitochondrial Isolation and quantification of IRC3 strains.
7) To create stable clones in a suitable expression system for MTG3 truncates

III. Experimental Design

IV. Result and Discussions:

1) To observe the growth phenotype of wild type and knock-out MRX8.
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6) Mitochondrial Isolation and quantification of IRC3 strains.
7) To create stable clones in a suitable expression system for MTG3 truncate

V. Material and methods

Abbreviations:

Abbreviations	Full forms
a.a	Amino acid
Amp	Ampicllin
$CaCl_2$	Calcium Chloride
cpGTPase	Circularly permuted GTPase
DMSO	Dimethylsulfoxide
EtBr	Ethilidium bromide
Kan	Kanamycin
LB	Luria-Bertani
$MgCl_2$	Magnesium Chloride
d.d.H_2O	Double Distilled Water
YPG	Yeast, Peptone, and Glycerol
YPD	Yeast, Peptone, and Dextrose
rpm	rotations per minute
O/N	Overnight
RT	Room temperature
SDS	Sodium dodecyl sulfate
PAGE	Polyacrylamide Gel Electrophoresis
Tet	Tetracycline
H_2O_2	Hydrogen Peroxide
Ab	Antibody
Zn^{2+}	Zinc

Development of transgenic tomato for early blight disease by targeting *Alternaria solani* specific genes *CHS* and *Hog1* (HOG pathway MAP Kinase) using artificial-miRNA (amiRNA) bicistronic construct

DISSERTATION PROJECT REPORT SUBMITTED TO THE UNIVERSITY OF DELHI IN PARTIAL FULFILLMENT FOR THE DEGREE OF

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In

Genetics

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Certificate

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Prof. M. V. RAJAM
(Supervisor)

Head of the Department

LIST OF COMMONLY USED ABBREVIATIONS

1. LBA - Luria Broth Agar
2. LB - Luria Broth
3. GTE - Glucose Tris EDTA
4. rpm - Rotations per minute
5. mins – Minutes
6. MCT - Micro Centrifuge Tube
7. RT- Room Temperature
8. RE – Restriction Enzyme
9. FD- Fast Digest
10. amiRNA – artificial micro RNA
11. dNTP- Deoxyribonucleotide triphosphate
12. bp - Base pairs
13. PDA- Potato Dextrose Agar
14. PCA – Potato Carrot Agar

NOTATIONS

1. ^{O}C – Degree Celsius
2. sec – Second
3. min - Minute
4. kDa – Kilo Dalton
5. mL – Milli Litre
6. µL – Micro Litre
7. mg - Milligram
8. ng - Nanogram

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