

CENTRE FOR CELLULAR AND MOLECULAR BIOLOGY  
(Council of Scientific & Industrial Research)  
Habsiguda, Hyderabad 500 007

NOTIFICATION NO.5/2009

**Ph.D.Programme**

Director, Centre for Cellular and Molecular Biology, invites applications from candidates who are bonafide Indian citizens and having consistently good academic record. Candidates should have strong motivation to pursue research in modern biology leading to a Ph.D degree. The projects offered for Ph.D would be in the broad areas of (i) Biotechnology and Biomedicine (ii) Genetics and Evolution (iii) Cell Biology and Development (iv) Molecular Biology (v) Biochemistry and Biophysics (vi) Bioinformatics and Theoretical Biology. For details, see our Website : [www.ccmb.res.in](http://www.ccmb.res.in).

**Candidates who satisfy the following criteria only need apply:**

1. Should have an M.Sc. degree in any area of biological/physical/chemical sciences including mathematics and qualified in the CSIR-UGC (NET) examination for Junior Research Fellowship. The Fellowship Certificate should be valid as on the date of joining. Candidates qualified only for Lecturership in CSIR-UGC (NET) examination need not apply.
2. Candidates qualified in ICMR-JRF examination under Life Sciences may apply. Admission will be subject to their qualifying in the CCMB written test/interview and award of Fellowship by ICMR.
3. Candidates qualified in DBT-JRF examination can also apply.
4. Engineering (B.E. & B.Tech.) or B.Pharm graduates with Biotechnology as a subject of study and have qualified in GATE examination with a minimum of 85 percentile may also apply for award of Research Fellowship subject to their qualifying in the written test/interview and award of fellowship by CSIR. The GATE certificate should be valid as on the date of joining.
5. Students with **non-life sciences background** (having master degree in Mathematics/Statistics/Physics/Chemistry and B.Tech in Computer Sciences or other Engineering discipline) are specifically encouraged to apply, if they have high desire and motivation in doing interdisciplinary research in Life Sciences.
6. Students with MBBS with first division may also apply. Selected candidates should also qualify/obtain the Senior Research Fellowship conducted by the Human Resource Development Group, Council of Scientific & Industrial Research, New Delhi, to pursue PhD in CCMB.
7. Upper age limit is 28 years as on **4.12.2009** which is relaxable by 5 years for SC/ST/OBC/Women/Physically Handicapped candidates.

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**Applications :** Candidates who satisfy the above criteria may submit their typed applications on plain paper with the following details:

(Please superscribe "Application for the Ph.D. programme" on the application form as well as the envelope) 1) Full name of the candidate (in BLOCK LETTERS); 2) Correspondence and Permanent address with Telephone number and email address; 3) Date of birth and age in years; 4) Nationality; 5) State whether belongs to SC/ST/OBC/Physically Handicapped/General (in case of SC/ST/OBC/PH, please enclose attested copy of the certificate); 6) Date and year of passing CSIR-UGC (NET) examination with Roll No., CSIR/UGC Scheme and subject; validity period and whether the fellowship is activated and if so, please furnish the particulars; 7) Date and year of passing GATE/ICMR-JRF/ DBT-JRF examination with Regn. No., percentile and subject; validity period; 8) Educational qualifications commencing from 10<sup>th</sup> class, Intermediate, B.Sc/B.V.Sc. and M.Sc/M.V.Sc/BE/B.Tech. with name of the University, year of passing, Class/Division, percentage of marks, subjects (underline the main), etc.

The filled in applications affixed with a signed recent passport size photograph and attested copies of certificates of date of birth, educational qualifications, etc. should reach the Controller of Administration, Centre for Cellular and Molecular Biology, Habsiguda, Hyderabad 500 007, Andhra Pradesh, by **4.12.2009**.

**Written Test and Interview :** All the applications will be screened and candidates found suitable will be called for written test on 22.1.2010 at CCMB, Hyderabad. Candidates qualified in the written test will have to appear for interview on 23<sup>rd</sup> & 24<sup>th</sup> January, 2010. Candidates selected in the interview will have to stay for discussions on 25.1.2010 with Scientists at CCMB regarding allotment of projects for the Ph.D. programme. Traveling Allowance is not payable by CCMB and candidates have to make their own arrangements for stay, etc. at Hyderabad.

Candidates who have qualified in CSIR-UGC NET Fellowship or ICMR-JRF or DBT-JRF can also walk in on the day of the written test (22<sup>nd</sup> January, 2010) at 7.30 AM in CCMB along with proof of their qualification for the respective fellowship. They are requested to send an email intimating the same to COA, CCMB at [coa@ccmb.res.in](mailto:coa@ccmb.res.in).

Mere fulfilling of the minimum requirements stipulated in the notification would not automatically entitle a person for selection. The decision of the Centre in this regard shall be final. Canvassing in any form and/or bringing in any influence, political or otherwise, will be treated as a disqualification.

Controller of Administration

This Notification is also available at : [www.ccmb.res.in](http://www.ccmb.res.in)

## Details of Research areas at CCMB

### **I. Biochemistry and Biophysics**

#### **Membrane active molecules and intracellular transport of proteins**

- Host-defense peptides
- Peptide super-structures
- Modulation of peptide-membrane interactions by covalently linked fatty acids
- Role of fatty acid acylation in targeting of proteins to membranes, and modulating fusion events and translocation across membranes

#### **Membrane and Membrane receptor biology**

- Membrane organization, dynamics and function
- Organization, dynamics and function of the Serotonin<sub>1A</sub> receptor

#### **Chaperones and Protein folding**

- Molecular chaperones
- Protein folding, aggregation and diseases

#### **Protein structure and conformations**

- Calcium-binding proteins
- Corneal crystallins

#### **NMR spectroscopy**

- Exploring cerebral metabolism during normal aging, and in Alzheimer's disease in mice *in vivo*
- Structural and mechanistic details of RDE-4 in RNA interference pathway of *C. elegans*
- Role of R2D2 in enhancing sequence-specific mRNA degradation in *Drosophila* RNAi pathway

#### **Structural biology**

- Exploring the structural basis of amino acid recognition in Class II tRNA synthetases
- Exploring the structural basis for thermostability of *Bacillus subtilis* lipase
- Structure-function studies on polyketide synthases and fatty acid synthases from *Mycobacterium tuberculosis*
- Structure-function analysis of virulence factors of *Xanthomonas oryzae* pv. *oryzae*, the bacterial leaf blight pathogen of rice
- Structural and functional studies on calcium-binding proteins

#### **Computational biology and bioinformatics**

- Modelling spatiotemporal organisation in biological systems
- Modelling biochemical pathways
- Spatiotemporal dynamics in epidemiology
  
- PSSARD: Protein Sequence-Structure Analysis Relational Database
- Protein Structure Analysis: Analysis of Intra-Chain Disulphide bridged Peptides (ICDBP) in proteins of known three-dimensional structure
  
- Identification of SNPs and SNP haplotypes
- De novo gene finding

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## II. Biotechnology and Biomedicine

### **DNA Finger printing and conservation of endangered species**

- Genetic studies of natural populations of *Panthera tigris* by non-invasive methods
  - Conservation of endangered animals
  - Reprogramming of undifferentiated male germ cells and application
  - Detection of fatal malarial infections in the Indian White-backed vultures (*Gyps bengalensis*)
  - Phylogenetic studies in primates
  - Phylogenetic studies in Indian deer species
  - Wildlife forensics
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- Identification of DNA markers associated with disease and pest resistance in Mulberry (*Morus spp.*)
  - DNA profiling for ascertaining genetic diversity and construction of framework molecular linkage map of mulberry
  - Conservation genetics of the olive ridley sea turtle (*Lepidochelys olivacea*)
  - Molecular characterization of Indian wolf populations
  - Identification of a new tree frog species from the Central Western Ghats of India using molecular techniques
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- Biodiversity analysis of buffalo germplasm using DNA markers

### **Transgenics and aquaculture**

- Transgenic fish production
- Genetic interrelationships among fish populations
- DNA vaccine against diseases

### **Tumour biology**

- Search for new molecules involved in the *wnt* pathway and colon cancer and development of murine cancer models
- Study of differential gene expression patterns in cancers using microarray technology
- Study of tumour suppressor RASSF1A in human breast cancer

### **Infectious diseases**

- Molecular parasitology: studies on *Leishmania donovani*
- Molecular determinants of *Plasmodium falciparum* pathogenesis
- Virulence genes and growth regulators of *Mycobacterium tuberculosis*
- Investigation of Chikungunya outbreak in Southern India
- Study on HIV-1 induced neuroinflammation

### **Neurobehavioural Disorders**

- Epigenetic mechanisms underlying neuropsychiatric disorders using rodent models
- Epigenetic regulation of embryonic and adult neural stem cells

### **Cataract and other diseases**

- Vascular endothelial growth factor expression and signaling in the lens
- *Ex vivo* expansion of corneal stem cells in treating ocular surface disorders caused by limbal stem cells deficiencies
- Ultrastructural studies of ocular pathologies
- Amyloid formation in Type II Diabetes

### **Proteomics**

- Cancer proteomics
- Proteomics of mouse embryonic stem cells

#### **Nanobiotechnology**

- Nanomaterials and nanodevices: Application in cell differentiation and diseases

#### **Applied processes and products**

- Protein engineering by directed evolution
- Triglyceride sensor
- Lipid- and peptide-based gene delivery strategies

### **III. Cell Biology and Development**

#### **Muscle cell development**

- Molecular biology of skeletal muscle growth and regeneration
- Adhesion-dependent signaling in growth and differentiation of muscle cells
- Isolation and analysis of skeletal muscle-derived stem cells

#### **Drosophila developmental biology**

- Organogenesis in *Drosophila*

#### **Chromatin structure and function**

- Genome, chromatin and regulation of genetic information
- Comparative genomics of non-coding DNA

#### **Cell and tissue engineering**

- Role of integrins and membrane lipids in regulation of cell motility on the extracellular matrix
- Study of bone marrow stem cells from rats and mice and human fetal liver for their use in hepatic regenerative medicine
- Evaluation of new ceramic-based biomaterials for their use as osteogenic implants and substrates
  
- Derivation of stem cells of various sources and their expansion *ex vivo*

#### **Reproductive biology**

- Tyrosine phosphorylated dihydrolipoamide dehydrogenase in Hamster spermatozoa for oocyte activation and fertilization
- Role of nitric oxide in sperm capacitation
- Studies on hamster CAP1 protein
- Candidate gene polymorphisms in south Indian women with Endometriosis

#### **Hormone-regulated expression of genes and proteins**

- Expression, properties and function of tissue-specifically expressed salivary and lacrimal gland secretory proteins

#### **Plant developmental biology**

- Control of meiosis in plants
- Analysis of the *DYAD* and *DUET* genes in *Arabidopsis*
- Role of the *ATME-12* gene family in *Arabidopsis*

#### **IV. Genetics and Evolution**

##### **Molecular basis of sex determination and evolution of sex chromosomes**

- Molecular basis of sex reversals
- Genetic causes of male infertility
- Molecular basis of temperature-dependent sex-determination in Indian mugger, *Crocodylus palustris*
- Characterization of sex- and species-specific heterochromatic DNA transcript(s) expressed during spermatogenesis
- Isolation of the factors involved in nuclear reprogramming in snake oocytes and functional characterization of WDR13 protein

##### **Microbial/Fungal Genetics**

- Repeat-induced point mutation (RIP) and meiotic silencing in *Neurospora*
- Cell division in bacteria

##### **Extremophiles and mechanism of adaptation**

- Transcription and regulation of gene expression at low temperature
- Role of RNA-degrading machinery in cold adaptation
- RecBCD complex and its importance during growth at low temperature
- Essential genes for growth at low temperature
- Low temperature protein expression system
- Microbial biodiversity of Antarctica, Himalayan glaciers, Indian Ocean and molecular basis of adaptation to low temperature

#### **V. Genomics**

##### **Genome diversity and analysis of human genetic disorder**

- Human genome diversity
- Genetic analysis of pancreatic disorders in Indian population
- Genetic analysis of Type 2 Diabetes mellitus in Indian population
- Molecular diagnosis, carrier detection, genetic counselling and prenatal diagnosis for genetic disorders
- Molecular basis of mitochondrial disorders
- Genetics of ovarian development and cycling disorders
- Chromosome defects and human genetic diseases
- Genetic basis of polycystic ovaries
- Genomics and functional proteomics in recurrent early pregnancy loss

##### **Functional genomics using transgenic and gene knockout mice**

- Functional analysis of Argonaute genes in mouse
- Functional analysis of mouse Wdr13 gene

## **VI. Molecular Biology**

### **Nuclear organization**

- Functional role of nuclear lamins

### **Signal transduction**

- Signal transduction by protein tyrosine phosphatases
- Molecular mechanism of pathogenesis of Glaucoma caused by mutations in optineurin gene
- Mechanism of induction of apoptosis by tumor suppressor P53 and anti-cancer drugs
- Signal transduction by Hck tyrosine kinase: identification of substrates and physiological consequences of their interactions
- Role of a guanine nucleotide exchange factor, C3G in actin reorganization and filopodia formation

### **Gene silencing**

- Mechanism of transgene silencing
- Gene-silencing in heterochromatin formation and chromatin dynamics
- A molecular link between non-coding RNA, dosage compensation and RNAi
- RNA-based epigenetic inheritance
- Viral Resistance genes for antiviral drug development
- Hybrid interference: A device for modulating chromatin organization

### **Eukaryotic transcription mechanisms**

- Role of nucleosomes and chromatin structure in transcription
- Mechanisms of initiation of transcription by RNA polymerase II

### **Host-guest interactions in plants**

- Genetics of plant-pathogen interactions