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Institution: **Indian Institute of Technology, Guwahati**

Date of Birth: **January 05, 1980**

Gender (M/F/T): **M**

Category Gen/SC/ST/OBC: **Gen**

Whether differently-abled: **No**

### Research Interests:

1. Molecular interaction of host-pathogen-vector of infectious diseases.
2. Gene expression analysis of Spirochete, *Leptospira interrogans* and *Borrelia burgdorferi*.
3. Development of vaccine against an outer membrane protein of *Leptospira interrogans* and *Borrelia burgdorferi*.
4. Vector-borne diseases of Zoonotic importance.

### Academics:

#### Education

- Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, College of Veterinary Sciences, Uttaranchal, India, **B.V.Sc. & A.H.** (1999-2004).
- Indian Veterinary Research Institute, Izatnagar, Bareilly, India, Veterinary Public Health **M.V.Sc.** (2004- 2006).
- University of Maryland, College Park, USA, Molecular Microbiology and immunology **PhD.** (2006-2010).

#### Professional Experience

- University of Maryland, College Park, USA, **Postdoctoral fellow** (Nov 2010- Dec 2010).
- Johns Hopkins School of Medicine, Baltimore, USA, Division of Rheumatology, **Postdoctoral fellow** (Jan 2011- May 2012).
- **Assistant Professor**, Department of Biosciences and Bioengineering, IIT Guwahati (June 2012- Jan 2017).

## Achievements and Fellowships

- **2010** Avrum Gudelsky Veterinary Graduate Student Award for exemplary graduate research in Veterinary Medicine, College Park, Maryland, USA.
- **2006** Graduate Research Assistantship, University of Maryland, College Park, USA.
- **2004** Junior Research Fellowship (JRF) of Indian Council of Agriculture Research, New Delhi, India.
- **2001** GBPUA&T merit scholarship during UG program, Pantnagar, India.
- **1999** National Talent Scholarship (NTS) of Indian Council of Agriculture Research, New Delhi, India.

## Professional affiliations

1. Member of Indian Association of Veterinary Public Health Specialists (IAVPHS).
2. Member of Indian Society for Veterinary Medicine (ISVM).
3. Member of American Society for Microbiology (ASM).
4. Registered Veterinary Practitioner, Veterinary Council of India (VCI), New Delhi.
5. Registered Veterinary Practitioner, Bihar Veterinary Council, Patna, India.
6. Member of the Indian Science Congress Association, Kolkata, India.
7. Member of Society for Biosafety, Bhopal, India

## Publications:

1. Dhara A, Hussain MS, Kanaujia SP, **Kumar M** "[Acyldepsipeptide activated ClpP1P2 macromolecule of \*Leptospira\*, an ideal Achilles' heel to hamper the cell survival and deregulate ClpP proteolytic activity](#)", Research in Microbiology, DOI.10.1016/j.resmic.2021.103797, Vol., , P.P - , (2021)
2. Harshini SP, Ghosh KK, Kumari RR, Kumar P, **Kumar M** "[Evaluation of sporozoite and macroschizont antigen \(Spm2\) of \*Theileria annulata\* for its diagnostic potential](#)", Ticks and Tick-borne Diseases, DOI.https://doi.org/10.1016/j.ttbdis.2021.101691, Vol.12, 4, P.P - , (2021)
3. Prakash A, **Kumar M** "[Characterizing the transcripts of \*Leptospira\* CRISPR I-B array and its processing with endoribonuclease LinCas6](#)", International Journal of Biological Macromolecules, DOI.10.1016/j.ijbiomac.2021.04.066, Vol.182, , P.P 785-795 , (2021)
4. Dixit B, Anand V, Hussain MS, **Kumar M** "[The CRISPR-associated Cas4 protein from \*Leptospira interrogans\* demonstrate versatile nuclease activity](#)", Current Research in Microbial Sciences, DOI.https://doi.org/10.1016/j.crmicr.2021.100040, Vol.2, 100040, P.P - , (2021)
5. Hota S, Hussain MS, **Kumar M** "[ErpY-like lipoprotein of \*Leptospira\* outsmart host complement regulation by acquiring complement regulators, activating alternate pathway, and intervening membrane attack complex](#)", bioRxiv, DOI.https://doi.org/10.1101/2021.05.27.446086 , Vol., , P.P - , (2021)

6. Kumar P, Kumar P, Roy RK, Kumari RR, Kumar A, Sarma K, Sharma P, **Kumar M** "Mixed Infection of Tick-borne Haemo-parasites in Water Buffalo and Associated Pathological Responses and Treatment", Indian Journal Of Animal Research, DOI.10.18805/IJAR.B-4450 , Vol., , P.P 1-9 , (2021)
7. Kumar P, Kumari RR, Kumar A, Raman RK, Chandran PC, **Kumar M** "Status of Subclinical Mastitis in Crossbred Cattle of Peri-urban Unorganized Herd of Middle Indo-gangetic Plains.", Indian Journal of Animal Research, DOI.10.18805/IJAR.B-4241, Vol., , P.P - , (2020)
8. Choudhury M, Dhara A and **Kumar M** "Trigger factor in association with the ClpP1P2 heterocomplex of *Leptospira* promotes protease/peptidase activity", ACS Omega, DOI.10.1021/acsomega.0c05057, Vol., , P.P - , (2020)
9. Saha G, Chiranjivi AK, Khamar BM, Prerna K, **Kumar M** and Dubey VK " BLIMP-1 Mediated Downregulation of TAK1 and p53 Molecules Is Crucial in the Pathogenesis of Kala-Azar. ", Front. Cell. Infect. Microbiol., DOI.10.3389/fcimb.2020.594431, Vol.10, 594431, P.P - , (2020)
10. Ghosh KK , Prakash A , Dhara A , Hussain MS , Shrivastav P , Kumar P , Balamurugan V, **Kumar M** "Role of Supramolecule ErpY-Like Lipoprotein of *Leptospira* in Thrombin-Catalyzed Fibrin Clot Inhibition and Binding to Complement Factors H and I, and Its Diagnostic Potential", Infection and Immunity , DOI., Vol.87, 12, P.P e00536-19-e00536-19 , (2019)
11. Saha G, Khamar B, Kumari P, **Kumar M**, Dubey V. "BLIMP-1 plays important role in the regulation of macrophage pyroptosis for the growth and multiplication of *Leishmania donovani*", ACS Infectious Diseases , DOI.https://doi.org/10.1021/acsinfecdis.9b00186, Vol.5, 12, P.P 2087-2095 , (2019)
12. Kumari RK, Kumar R, Kumar P, **Kumar M**. "Emergence and variations in disease ecology of tick-borne bovine theileriosis in East India", International Journal of Livestock Research, DOI.http://dx.doi.org/10.5455/ijlr.20190920061236, Vol.9, 11, P.P 12-25 , (2019)
13. Dhara A, Hussain MS, Datta D, **Kumar M** "Insights to the assembly of functionally active leptospiral ClpP1P2 protease complex along with its ATPase chaperone ClpX", ACS omega, DOI., Vol.4, , P.P 12880-12895 , (2019)
14. Ghosh KK, Prakash A, Shrivastav P, Balamurugan V, **Kumar M** "Evaluation of a novel outer membrane surface-exposed protein, LIC13341 of *Leptospira*, as an adhesin and serodiagnostic candidate marker for leptospirosis", Microbiology, DOI., Vol.164, 8, P.P 1023-1037 , (2018)
15. Ghosh KK, Prakash A, Balamurugan V, **Kumar M**. "Catecholamine modulated novel surface-exposed adhesin LIC20035 of *Leptospira* binds host extracellular matrix components and is recognized by host during infection. ", Applied and environmental microbiology, DOI., Vol.84, 6, P.P e02360-e02317 , (2018)

16. Kumar P, Barari SK, Tripathi MK, Kumari RR, **Kumar M** "Foot and Mouth Disease: An Economically Devastating Disease of the livestock.", Journal of Veterinary Sciences, DOI., Vol.4, 1, P.P - , (2018)
17. Kumar P, Dey A, Kumar A, Ray PK, Chandran PC, Kumari RK, **Kumar M** "The effects of PPR on the reproductive health of Black Bengal goats and the possible role played by oxidative stress.", Tropical Animal Health and Production, DOI., Vol., doi: 10.1007/s11250-018-1578-7, P.P - , (2018)
18. Singh P, Verma D, Backstedt BT, Kaur S, **Kumar M**, Smith AA, Sharma K, Yang X, Azevedo JF, Gomes-Solecki M, Buyuktanir O, Pal U. "*Borrelia burgdorferi* BBI39 paralogs are targets of protective immunity inducing microbicidal responses and reducing pathogen persistence either in hosts or in the vector.", The Journal of Infectious Diseases, DOI., Vol. Jan 31. doi:10.1093/infdis/jix036., , P.P - , (2017)
19. Dixit B, Ghosh KK, Fernandes G, Kumar P, Gogoi P, **Kumar M** "Dual nuclease activity of a Cas2 protein in CRISPR-Cas subtype I-B of *Leptospira interrogans*", FEBS Letters, DOI., Vol.590, 7, P.P 1002-1016 , (2016)
20. Kumar P, Pandian S J, Kumari RR, **Kumar M**. "Package and practices for Livestock Farmers: Under supervision of a Veterinarian. ", Poulvet; Online journal [http://poulvet.com/dairy/articles/livestock\\_farmers.php](http://poulvet.com/dairy/articles/livestock_farmers.php) , DOI., Vol., , P.P - , (2016)
21. Kumar P, Pandian SJ, Sinha BS, Kumari RK, **Kumar M**. "Calf Diarrhoea: Devastating disease of bovine during first three months after birth.", <http://www.krishisewa.com/articles/livestock/705-calf-diarrhoea.html>, DOI., Vol., , P.P - , (2016)
22. Kumar P, Roy RK, **Kumar M**, Kumari RK, Kumar A. "PPR control in Goat: A guide for animal health service providers. ", <http://www.vethelplineindia.co.in/ppr-control-in-goat-a-guide-for-animal-health-service-providers/>, DOI., Vol., , P.P - , (2015)
23. Kumar P, Kumari RR, **Kumar M**, Kumar S, Chakrabarti A. "Current practices and research updated on Diabetes mellitus in Canine", Veterinary World, DOI., Vol.7, 11, P.P 952-959 , (2014)
24. Ouyang Z, Narasimhan S, Neelakanta G, **Kumar M**, Pal U, Fikrig E, Norgard M V. "Activation of the RpoN-RpoS regulatory pathway during the enzootic life cycle of *Borrelia burgdorferi*", BMC Microbiology , DOI., Vol.44, 12, P.P doi:10.118- , (2012)
25. **Kumar M**, Kaur S, Kariu T, Yang X, Bossis I, Anderson JF, Pal U. "*Borrelia burgdorferi* BBA52 is a potential target for transmission blocking Lyme disease vaccines", Vaccine, DOI., Vol.29, 48, P.P 9012-9019 , (2011)

26. Xiao S\*, **Kumar M\***, Yang X, Akkoyunlu M, Collins P L, Samal S K, Pal U. "[An efficient avian host-restricted viral vector for antigen-specific host immunization against Lyme disease pathogens](#)", Vaccine, DOI., Vol.29, 32, P.P 5294-5303 , (2011)
27. **Kumar M**, Bhilegaonkar KN, Agarwal RK. "[Prevalence and characterization of rotavirus from faecal samples of children and animals](#)", Indian Journal of Animal Sciences, DOI., Vol.81, 10, P.P 993-999 , (2011)
28. Kumari RR, **Kumar M**, Kumar P. "[An Integrated Approach to Control Toxocara vitulorum: A Major Cause of Buffalo Calf Mortality.](#) ", Livestock International, DOI., Vol.15, 2, P.P 8-9 , (2011)
29. **Kumar M**, Yang X, Coleman AS, Pal U. "[BBA52 facilitates Borrelia burgdorferi transmission from feeding ticks to murine hosts](#)", The Journal of Infectious Diseases, DOI., Vol.201, 7, P.P 1084-1095 , (2010)
30. Zhang X, Yang X, **Kumar M**, Pal U. "[BB0323 function is essential for Borrelia burgdorferi virulence and persistence through tick-rodent transmission cycle](#)", The Journal of Infectious Diseases, DOI., Vol.200, 8, P.P 1318-1330 , (2009)
31. Promnares K, **Kumar M**, Shroder D Y, Zhang X, Anderson J F, Pal U "[Borrelia burgdorferi small lipoprotein Lp6.6 is a member of multiple protein complexes in the outer membrane and facilitates pathogen transmission from ticks to mice](#)", Mol Microbiol, DOI., Vol.74, 1, P.P 112-125 , (2009)
32. Ouyang Z, **Kumar M**, Kariu T, Haq S, Goldberg M, Pal U, Norgard M V. "[BosR \(BB0647\) governs virulence expression in Borrelia burgdorferi](#)", Mol Microbiol, DOI., Vol.74, 6, P.P 1331-1343 , (2009)
33. Kumari RR, Kumar P, **Kumar M** "[Nutritional Deficiency Diseases of Newborn Farm Animals and There Management.](#)", Intas Polivet, DOI., Vol.10, 2, P.P - , (2009)
34. Pal U, Dai J, Li X, Neelakanta G, Luo P, **Kumar M**, Wang P, Yang X, Anderson J F, Fikrig E. "[A differential role for BB0365 in the persistence of Borrelia burgdorferi in mice and ticks](#)", The Journal of Infectious Diseases, DOI., Vol.197, 1, P.P 148-155 , (2008)
35. Coleman AS, Yang X, **Kumar M**, Zhang X, Promnares K, Shroder D, Kenedy MR, Anderson JF, Akins DR, Pal U "[Borrelia burgdorferi complement regulator-acquiring surface protein 2 does not contribute to complement resistance or host infectivity](#)", PLoS ONE, DOI., Vol.3, (8):3010e, P.P - , (2008)
36. Kumar P, Challa J, Dimri U & **Kumar M**. "[Role of Micro-nutrients in dermatological disorders of dog.](#)", Intas Polivet., DOI., Vol.8, 2, P.P 465-471 , (2007)
37. **Kumar M**, Bhilagaonkar KN, Kumar P. "[Epidemiology of Japanese Encephalitis in the Indian Scenario](#)", Intas Polivet, DOI., Vol.7, (II), P.P 312-319 , (2006)

38. Kumar P, **Kumar M**, Mudgal V, Mishra S K. "[Awareness for nutritional management in Pet animals](#)", Pet India, DOI., Vol.11, 6, P.P 48-50 , (2005)
39. Kushwaha R B, Shankar U, Kumar P, **Kumar M**. "[Pyometra in canines: an appraisal](#)", Poulvet .Online in [www.poulvet.com/articles/ pyometra\\_article.](http://www.poulvet.com/articles/pyometra_article) , DOI., Vol., , P.P - , (2005)
40. Kumar P, **Kumar M**, Prasanna S B, Singh S K. "[First Aid assistance for companion animal during an emergency](#)", Pet India, DOI., Vol.10, 12, P.P 15-17 , (2004)

#### **Books and chapters:**

1. Book Chapter: CRISPR/Cas system and stem cell editing: Prospects and Possibilities in the Veterinary Science. Book: Stem Cells in Veterinary Science. Publisher: Springer Verlag, Singapore. Publication Date: 04/10/2021, ISBN-13:9789811634635

#### **Conferences and Presentations:**

1. **Kumar M**, Bhilegaonkar, KN; Kumar P & Sharma, MC. "[Public health awareness among livestock farmers for sustaining economy.](#) ", National Seminar on Micro Enterprise Promotion in rural India, Experience, Prospects & Strategies, IVRI, Izatnagar, India.(2005)
2. **Kumar M**; Bhilegaonkar KN; Agarwal RK. "[Prevalence and rapid detection of \*Salmonella\* and \*E. coli\* in diarrhoeal cases of children and calves and piglets.](#)", International symposium on "Food Safety, Quality Assurance & Global Trade: Concerns and Strategies" on the occasion of Annual conference of Indian Association of Veterinary Public health Specialists, GBPUA&T, Pantnagar, Uttarakhand, India. (2008)
3. **Kumar M**; Bhilegaonkar KN; Agarwal RK & Kumar P. "[RT-PCR for detection of rotavirus from faecal samples of children and animals.](#) ", Annual conference of Indian Association of Veterinary Microbiologists, Immunologists & Specialists in Infectious Diseases and national Symposium on Newer concepts and strategies for Disease Diagnostics & Immunoprophylactics for enhancing Livestock health & production., IVRI, Izatnagar, India. (2008)
4. Kumar P, Sharma MC, **Kumar M** and Swarup D. "[Oxidative stress and genotoxicity in relation to micro-mineral deficiency in cattle of Bihar districts.](#)", Pp 183, Proceedings of the International Summit on "Advancing Veterinary Medical care: Challenges and Strategies" and 27th ISVM convention Satellite Seminar on Veterinary Internal Medicine" 19-21 Feb 2009.
5. Soloski M J, **Kumar M**, Wu G, Ji H, Kortte K, Crowder L, Aucott J. "[Immune Profiling of Early Lyme Disease.](#)", ID Week, 17-21 Oct 2012 San Diego, California, USA.(2012)
6. Kung F, **Kumar M**, Promnares K, Yang X, Pal U "[Role of bbd18 in \*Borrelia burgdorferi\* Biology and Infectivity.](#) ", Graduate Research Interaction Day (GRID). College Park, Maryland, USA.(2014)

7. Dixit B, **Kumar M** "A novel Cas2 Protein of CRISPR/Cas system in *Leptospira interrogans* displaying dual nuclease activity.", 9th Scientific meeting of International Leptospirosis society, 7-10 Oct 2015 Semarang, Indonesia. (2015)
8. Ghosh KK, **Kumar M** "Characterization of hypothesized outer membrane protein of *Leptospira interrogans Copenhageni*.", 8th Indo Global Summit and Expo on Vaccines, Therapeutics & healthcare, November 02-04, 2015 HICC, Hyderabad, India. (Best Paper Award). (2015)
9. Dixit B, **Kumar M** "Characterization of one of core Cas protein of CRISPR-Cas Subtype I-B in *Leptospira interrogans Copenhageni* strain Fiocruz L1-130.", Innovative Research in Biotechnology, Biomedical Sciences, Bioinformatics and Stem Cell application in JNU, New Delhi. (Best poster award). (2016)
10. Dixit B, **Kumar M** "Characterization of Cas1 protein of CRISPR Cas subtype I-B *Leptospira interrogans Copenhageni* strain Fiocruz L1-130.", Global Symposium on "Animal Health: Newer Technologies and their Applications" in Veterinary College Khanapara. (2016)
11. Prakash A, **Kumar M**. "Cloning and expression of novel Lon Protease of *Leptospira interrogans Copenhageni* Strain Fiocruz L1-130.", Global Symposium on "Animal Health: Newer Technologies and their Applications" in Veterinary College Khanapara. (2016)
12. Ghosh KK, **Kumar M**. "In vitro expression analysis of selected outer membrane proteins of *Leptospira interrogans Copenhageni* strain Fiocruz L1-130 for diagnostics and vaccination.", Global Symposium on "Animal Health: Newer Technologies and their Applications" in Veterinary College Khanapara. (2016)
13. Prakash A, **Kumar M** "Characterization of a novel Cas5 protein of CRISPR-Cas type I-B in pathogenic *Leptospira interrogans*.", 57th Annual Conference of Association of Microbiologists of India and International symposium on "Microbes and Biosphere" in Gauhati University, Assam. (2016)
14. Ghosh KK, **Kumar M**. "Modulation of gene expression of *Leptospira interrogans* exposed to catecholamines and its role in host immune evasion.", 57th Annual Conference of Association of Microbiologists of India and International symposium on "Microbes and Biosphere" in Gauhati University, Assam. (2016)
15. Basumatary B, **Kumar M**. "Investigation of biochemical characteristics of a core Cas protein in CRISPR-Cas subtype-IC in *Leptospira interrogans* serovar *Copenhageni* strain Fiocruz L1-130. ", 57th Annual Conference of Association of Microbiologists of India and International symposium on "Microbes and Biosphere" in Gauhati University, Assam. (2016)
16. Dhara A, **Kumar M**. "Cloning, expression and purification of Caseinolytic proteases of pathogenic *Leptospira interrogans Copenhageni* strain Fiocruz L1-130. ", 57th Annual Conference of Association of Microbiologists of India and International symposium on "Microbes and Biosphere" in Gauhati University, Assam. (2016)

17. **Kumar M** "Immunogenic Lipoprotein LP46 of *Leptospira interrogans* interacts with host extracellular matrix components. Opportunities and Challenges of Translational Research in the Frontier Areas of Animal Biotechnology", OUAT National seminar, Bhubaneswar. (2017)
18. **Kumar M** "Analysis of Differential Expression of Outer Membrane Proteins of pathogenic *Leptospira* in response to catecholamine: a host stress factor.", ICAR-NIVEDI meeting, Bengaluru. (2017)
19. Ghosh KK, **Kumar M**. "Catecholamines as chemical messengers for host-*Leptospira* interaction.", Research conclave'18. (2018)
20. Prakash A, Ghosh KK, **Kumar M** "Characterization of *Leptospira* putative lipoprotein LIC11966 and its serological diagnostic application in diverse hosts including humans", National Conference VIBCON-2018 in Nagaland on "Innovative Biotechnological Approaches for Improving Animal Health and Productivity". (2018)
21. Prakash A, **Kumar M** "Identification and characterization of essential elements involved in CRISPR expression and maturation in pathogenic *Leptospira interrogans*", International Conference on Recent Research in Biomedical Engineering, Cancer Biology, Stem Cells, Bioinformatics and Applied Biotechnology (BECBAB-2018) in JNU, New Delhi. (2018)
22. Harshini SP, Kumar P, **Kumar M** "Cloning and expression of sporozoite and macroschizont (spm2) protein from genomic DNA of *Theileria annulata* isolated from the cattle blood sample.", National Conference VIBCON-2018 in Nagaland on "Innovative Biotechnological Approaches for Improving Animal Health and Productivity". (2018)
23. Dhara A, **Kumar M** "Two isoforms of Caseinolytic proteases (ClpPs) of *Leptospira interrogans* are essential for functional activity", World Congress on Infectious Diseases & Antibiotics – 2018, Bangalore.(2018)
24. **Kumar M** "*Leptospira* putative lipoprotein LIC11966 is a fibrinogen binding protein of diagnostic importance.", VIBCON 2018. (2018)
25. Saha G, Khamar B.M, **Kumar M**, Dubey VK "Unraveling the role of BLIMP-1 induction during *Leishmania donovani* infection as a novel escape mechanism", 17th International Conference of Immunology, Oct 19-23, 2019 Beijing China. Vol.49, S3, P.P 1174-1175 , (2019)
26. Prakash A and **Kumar M** "Potential application of supramolecule ErpY-Like lipoprotein of *Leptospira* as an anticoagulant, complement regulation, and leptospirosis diagnostic kit development", Global Bio-India 2019. (2019)
27. Hussain MS, **Kumar M** "Biochemical characterization of CRISPR-Cas Cascade complex subunit protein-Cas7 in *Leptospira interrogans* Copenhageni Strain Fiocruz L1- 130", Research conclave' 19 at IITG. (2019)
28. Hussain MS, **Kumar M** "*Leptospira* Cas8b protein: a genetic fusion of large and small subunit of CRISPR-Cas type I-B Cascade complex", Emerging Areas in Biosciences and Biomedical Technologies-2 (eBBT-2). (2020)



29. Choudhu M, **Kumar M** "The novel role of trigger factor in stimulating caseinolytic serine protease activity of *Leptospira*", Emerging Areas in Biosciences and Biomedical Technologies-2. (2020)

30. Anand V and **Kumar M** "Biochemical characterization of a core Cas protein of CRISPR-Cas subtype-IC in *Leptospira interrogans* serovar Copenhageni strain Fiocruz L1-130", Challenges and Threats of Microbes to Animals and Humans. (2020)

### Sponsored projects and funding:

Title	Sponsoring agency	Sponsored Amount	From	To
Role of Trigger factor in caseinolytic protease system of <i>Leptospira</i>	SERB, DST	5624000	31-12-20	30-12-23
Repurposing endogenous CRISPR-Cas type_I machinery for efficient markerless genome editing tool in <i>Leptospira interrogans</i>	DBT	2375000	31-08-20	28-02-22
Injectable bioresorbable silk hydrogel system for localized breast cancer therapy and post lumpectomy reconstruction	DST-SERB	4691240	27-03-20	26-03-23
Biochemical Characterization of boar seminal gel and its application for biostimulation in Pigs	NECBH, IIT Guwahati	1179900	29-04-19	29-08-21
Generation of DNA vaccine with a mutated capsid gene of Porcine Circovirus type 2 and evaluation of its immunopotential	NECBH, IIT Guwahati	488750	29-04-19	29-08-21
Development of minimally invasive novel injectable hydrogel and nano-carrier-hybrid system for localized targetted cancer therapy	DHR	4722356	15-10-18	14-10-21
Elucidating the role of Cas6, Cas7, and Cas8 in spirochetes CRISPR adaptive immunity against alien genetic elements	DBT	6875000	28-06-18	26-12-21
Characterization of predicted novel extracellular proteins of pathogenic <i>Leptospira interrogans</i>	ICMR	3796000	09-08-17	08-08-20
Study on Casenolytic proteases of <i>Leptospira interrogans</i> , a promising target for treating bacterial infection	SERB, DST	7000000	27-09-16	26-03-20
Unit of excellence in Molecular and Biochemical Parasitology: Investigation on evolutionary pressure for unique redox metabolism of <i>Leishmania</i> parasite	DBT	10555000	15-12-15	14-12-18
Deciphering the role and architecture of CRISPR/Cas defense system in <i>Leptospira</i>	DBT	5070000	04-10-	04-04-

<i>interrogans</i>			13	17
Modulation of gene expression in <i>Leptospira interrogans</i> exposed to human catecholamine hormone	SERB, DST	2350000	08-08-13	07-08-16
Purification and characterization of recombinant outer membrane proteins of <i>Leptospira interrogans</i> for vaccine and diagnostics	ICMR	1000000	28-03-13	27-03-16
Purification and characterization of putative outer membrane protein of <i>Leptospira interrogans</i>	IIT Guwahati	500000	01-03-13	19-05-15
<b>Total</b>	<b>Rs 5,62,27246.00</b>			

### PhD/ MTech/ MSc Supervision

No of PhD Thesis Guided			No of M.Tech Thesis Guided	
Completed	Submitted	Ongoing	Completed	Ongoing
4	0	5	6	2