International Program
Department of Biomedical Sciences and Pathobiology, VMRCVM

Preamble:
The Virginia-Maryland Regional College of Veterinary Medicine (VMRCVM), VirginiaTech and The Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), Chennai, India joined hands to build capacity to understand viral diseases and promote animal biotechnological applications as part of the Indo-U.S. Agricultural Knowledge Initiative, funded by the USDA to Drs. Nammalwar Sriranagnathan and Elankumaran Subbiah, faulty at the department of biomedical sciences and pathobiology. This landmark project is the only animal health initiative funded by the USDA under US-India Agricultural knowledge initiative. As a spin-off from this funded project, Virginia Tech signed a memorandum of understanding (MoU) with TANUVAS, Chennai in April 2007.

This has paved the way for a very productive collaboration since 2007 on several fronts including veterinary education, research and extension. Several international workshops, conferences and seminars were organized in various disciplines including animal biotechnology, emerging diseases of animals, stem cell and regenerative medicine in medical, dental and veterinary specialties, international veterinary clinical case presentation seminars for students. The faculty from the two institutions actively collaborate and publish jointly in key animal health issues. The coordinators for this international program are: Dr. Elankumaran Subbiah, and Dr. Nammalwar Sriranganathan.

Collaborative Programs:
I. Veterinary Education:

Summer clinical externships in veterinary medicine:
Exchange of veterinary medicine students from both institutions commenced from spring/summer 2008 and has evolved into a 6-week two-credit course in “International Clinical Veterinary Medicine”. Three batches of VMRCVM students (20 in total) underwent summer externships at TANUVAS from 2008 to 2010. Similarly, four batches of Indian DVM students (20 in total) were trained in clinical veterinary medicine at VMRCVM, Blacksburg and Maryland campuses since 2008. This program is in its fourth year and six DVM students will be in TANUVAS from July 1-August 20, 2011 and Five Indian DVM students will be training in Blacksburg from September 12, 2011 for a period of 5-weeks. Dr. Elankumaran Subbiah and Dr. Nammalwar Sriranganathan coordinate this program.

Dual PhD Program:
A dual PhD program in biomedical and veterinary sciences will be offered from Spring 2012 for prospective graduate students from both institutions. This proposed landmark program will offer graduate education and research to students from VMRCVM and TANUVAS to obtain tow doctoral degrees in biomedical sciences with involvement of faculty from both institutions.
II. Research:

Faculty Exchange:

There is an active exchange of faculty from both institutions since the inception of the MoU.

- Vice-Chancellor of TANUVAS Dr. N. Balaraman visited VMRCVM in April 2007 and signed the MoU.

- Associate Deans of VMRCVM Dr. Roger Avery and Dr. Siba K. Samal and faculty from both campuses of VMRCVM including Drs. Nammalwar Sriranganathan, Elankumaran Subbiah, Ansar Ahmed, Ruby Paramas Dhas Nathaniel Tablante, Daniel Perez, Bettye Walters, Utpal Pal and Ioannis Bossis visited TANUVAS in 2007. Dr. Isis Mullarky, Department of Dairy Science, VirginiaTech also visited TANUVAS to discuss collaborative projects in Dairy Microbiology.

- Dr. Manoharan from the department of biotechnology, TANUVAS underwent a short-term training at the Center for molecular medicine and infectious diseases, DBSP for 4-weeks in 2008.

- Dr. John Dooley, Vice President for Outreach and International Affairs, and Dr. S. K. De Datta, Associate Vice President for International Affairs and Director, International Research, Education and Development visited TANUVAS in 2008 to discuss collaborative activities and possibilities of including TANUVAS in VT-India center.

- Vice-Chancellor of TANUVAS Dr. Palanimuthu Thangaraju visited VMRCVM in 2008 to develop collaborative programs and delivered an invited lecture on “Microsatellite analysis in animal breeding” at the department of biomedical sciences and pathobiology. He also met with the President and Provost of Virginia Tech to discuss future collaborative ventures.

- Dr. Jonathan Abbott, VMRCVM visited TANUVAS in July 2009 and conducted wet labs for TANUVAS faculty in veterinary cardiology.

- Dr. Ansar Ahmed, Professor and department head, DBSP and Dr. Siba K. Samal, Associate Dean, VMRCVM, Maryland Campus visited TANUVAS in 2009 to discuss various collaborative programs and to develop a jointly taught course at TANUVAS.

- Dr. Muralimanohar, Professor of Pathology and Director, Center for Animal Health Studies, TANUVAS was teaching and performing research at DBSP, VNRCVM under an American Society for Microbiology International Visiting Professorship in 2009 for a period of 3-months.

- Dr. Willard Eyestone and Dr. Jennifer Barrett visited TANUVAS to discuss veterinary regenerative medicine with TANUVAS faculty and to initiate collaborative
research programs. A second visit of Dr. Eyestone and members of the “Center for Veterinary Regenerative Medicine, VMRCVM” is planned for July 2011.

- Dr. Gerhardt Schurig and Dr. Nammalwar Sriranganathan visited TANUVAS in 2010 to initiate a research project on targeted delivery of nanomedicine for intracellular bacteria.

- Dr. Elankumaran Subbiah, DBSP, VMRCVM and Dr. Roop Mahajan, Director, Institute of Critical Technology and Applied Science, VirginiaTech, were invited by the Ministry of Science, Department of Biotechnology, Government of India to provide technical consultancy for a potential “Translational Research Sources National Center for Veterinary Vaccines and Diagnostics” in collaboration with Virginia Tech.

### Research Collaborations

- Dr. Elankumaran Subbiah, DBSP and Faculty from TANUVAS have initiated several research projects in veterinary virology and immunology. Some of the on-going collaborative research projects include:
  - Molecular characterization of Newcastle disease virus pathotypes in India
  - Development of novel vaccines for animal diseases
  - Development of novel and rapid diagnostics for animal diseases
  - Toll-like receptors in indigenous species of animals in India and Dr. Subbiah serves as a technical consultant to a Government of India sponsored project on Toll-like receptors in health and disease awarded to TANUVAS.
  - Some of the joint publications from these collaborative programs are listed below.

- Dr. Nammalwar Sriranganathan and a group of researchers from the Targeted delivery of nanomedicine team of VirginiaTech including Dr. Gerhardt Schurig, Dr. Elankumaran Subbiah, DBSP and Dr. Judy Riffle from the department of chemistry, VT are currently performing a research study at TANUVAS on targeted delivery of drugs to intracellular bacteria such as *Brucella* spp., and *Mycobacterium paratuberculosis*.

- Dr. Ronald Tyler, pathology resident and graduate student of Dr. N. Sriranganathan is presently performing a part of his doctoral research on Johne’s disease at TANUVAS under an Indo-US Science Research fellowship for 4 months.

### Scientific Research Conferences/Seminars/Symposia/Workshops

**2007:**

Dr. Roger Avery, Associate Dean, Research and Graduate studies, VMRCVM, VirginiaTech, and 250 delegates from across the world attended the inaugural session of a three-day International workshop to identify areas for research and development and faculty improvement, build capacity in veterinary training, and promote animal
biotechnological applications. Virginia Tech faculty including Drs. Nammalwar Sriranganathan, Elankumaran Subbiah, Ansar Ahmed, Ruby Paramadhas and faculty from the College Park campus of the VMRCVM including Dr. Siba Samal, Associate Dean, Nathaniel Tablante, Daniel Perez, Bettye Walters, Utpal Pal and Ioannis Bossis participated in the workshop.

Technical sessions were conducted on emerging and trans-boundary viral diseases, viral genome studies, molecular epidemiology, poultry health and production, the development of diagnostics and vaccines and embryo biotechnology such as in-vitro fertilization and stem cell research.

2008:
VT-TANUVAS jointly sponsored International conference on emerging infectious diseases and animal biotechnology, TANUVAS, Chennai, India. Dr. Siba K. Samal inaugurated the conference and Dr. N. Sriranganathan, Dr. Ansar Ahmed, Dr. Elankumaran Subbiah delivered invited lectures.

VT-TANUVAS jointly sponsored International case presentation conference for veterinary students, TANUVAS, India. Dr. Elankumaarn Subbiah and Dr. Nammalwar Sriranganthan served as panel members of judging committee for the conference.

2009:
VT-TANUVAS jointly sponsored International case presentation conference for veterinary students, TANUVAS, India. Dr. Siba K. Samal, Dr. Nammalwar Sriranganthan and Dr. Jonathan Abbott attended the conference.

VT-TANUVAS jointly sponsored International conference on Veterinary Internal Medicine, TANUVAS, India. Dr. Elankumaran Subbiah served as the member of the organizing committee. Dr. Nammalwar Sriranagnathan attended the conference.

2010:
VT-TANUVAS and NCRM, Japan jointly sponsored International Seminar on Frontiers of stem cell and biotechnology in human and veterinary medicine, Chennai, India, 2010. Dr. Elankumaran Subbiah delivered a keynote address, Dr. Willard Eyestone and Dr. Jennifer Barrett, VMRCVM delivered invited research presentations.

2011:
VT-TANUVAS and NCRM, Japan jointly sponsored Second International Seminar on Frontiers of stem cell and biotechnology in human and veterinary medicine, Chennai, India, July 2011. Several faculty from VMRCVM and collaborators from Wake Forest Institute of Regenerative Medicine will be participating.
Peer-reviewed joint research publications.


III. Outreach:

Efforts are underway in collaboration with ICTAS, VT and TANUVAS, Chennai to develop a “Sustainable village” in Tamil Nadu, India incorporating energy harvest (solar and wind), efficient use of water resources and novel concepts in veterinary and public health. Dr. Elankumaran Subbiah, Dr. Nammalwar Sriranganathan, DBSP are working with Dr. Roop Mahajan, Director, ICTAS, VT to make this happen.