AMITY INSTITUTE OF VIROLOGY & IMMUNOLOGY

AMITY UNIVERSITY

AIVI eNEWSLETTER

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MESSAGE FROM THE FOUNDER PRESIDENT

I am very pleased to note that Amity Institute of Virology & Immunology (AIVI), Amity University Uttar Pradesh (AUUP), is introducing a bi-annual '**AIVI eNewsletter**' which is going to be broad-based in its contents to include, besides their activities and accomplishments, faculty and student editorial columns, important developments in virology, immunology and related areas, short communications by students and faculty, quiz, news and views, etc.

Recent years have witnessed major advances in virology and immunology following breakthroughs in techniques of molecular biology constituting as major components in all such research endeavors. Due to sustained efforts of scientists, smallpox and polio in humans and rinderpest in animals have been eradicated. There are, however, huge challenges that lie ahead related to viral, bacterial and other diseases afflicting the living beings, more specially, the humans, domesticated animals and cultivated plants which call for concerted remedial actions by our scientists. I am particularly impressed by different projects and studies being conducted by the scientists of Amity Institute of Virology & Immunology and I am eagerly looking forward to their contributions that may prove to be a boon for the mankind.

I hope that **'AIVI eNewsletter'** will form an important vehicle to link together national and international scientists leading to collaborative research and would also take in its ambit the worthy alumni of AIVI who are working in premier academic institutions and the corporate sector globally.

I wish all success to the **'AIVI eNewsletter'.**

Dr. Ashok K. Chauhan
Founder President, Ritnand Balved Education Foundation (RBEF)
(The Foundation of Amity Institutions and the Sponsoring Body of Amity Universities)
Chairman, AKC Group of Companies

MESSAGE FROM THE CHANCELLOR

It is a welcome idea that Amity Institute of Virology & Immunology (AIVI) is introducing bi-annual eNewsletter. I have closely watched the activities of this institute and am pleased to note that it has been a research driven center since its inception in 2010 which is in tune to the philosophy of Amity University Uttar Pradesh (AUUP). Identifying the need to generate more manpower in Virology and Immunology in India, AUUP embarked upon the idea of establishing a dedicated institute in these two specialized areas of Life Sciences. The AIVI since its inception five years ago, has established itself as a teaching and research-based knowledge center in Virology and Immunology with 11 ongoing research projects and 4 National/International Conferences/Workshops that the institute has organized. Guest lectures of well-known scientists in India and abroad is a regular feature of this institute. To further strengthen, itself, AIVI has introduced M.Sc. Genomics and B.Sc. (H) Life Sciences in the current session of 2016-17.

I wish AIVI eNewsletter a great success.

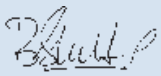
Dr. Atul Chauhan
Chancellor, Amity University
CEO, AKC Group of Companies
President, Ritnand Balved Education Foundation

MESSAGE FROM THE VICE CHANCELLOR

I have keenly watched the growth of Amity Institute of Virology and Immunology since its inception on August 16, 2010. I am quite impressed with the way this institute has grown in a short span of five years. Their programs, strength of syllabi, and type of training imparted to students has brought it on the national map. Today, AIVI's all the passed out students are working at premier institutions in India and abroad. Some of them are at Cumming School of Medicine, University of Calgary, Canada; University of Veterinary Medicine, Vienna, Austria; Indian Institute of Science, Bangalore; National Brain Research Centre, Manesar, Gurgaon; Lex IP Care, Gurgaon; Finnovation, New Delhi; Seth Research Foundation, Gurgaon, etc. In the current Academic Session, they have introduced M.Sc. Genomics and B.Sc. (H) Life Science. The institute is handling eleven research projects based on various important problems in Virology and Immunology.

I am quite confident that AIVI eNewsletter will be a useful forum for free exchange of views and promote the talents of students.

I wish all success to AIVI eNewsletter.



Prof. (Dr.) Balvinder Shukla
Professor – Entrepreneurship & Leadership
Vice Chancellor, Amity University Uttar Pradesh

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MESSAGE FROM THE PRESIDENT (HONORARY)

AMITY SCIENCE, TECHNOLOGY AND INNOVATION FOUNDATION (ASTIF) & CHAIR PROFESSOR FOR LIFE SCIENCES

It is heartening to note that Amity Institute of Virology & Immunology is introducing bi-annual AIVI eNewsletter. This institute since its inception in August 2010 has been research driven which is in tune to the vision of our Hon'ble Founder President. I hope this newsletter will become a vibrant open forum for students and faculty to showcase their talent of science and project various activities of AIVI. Virology and Immunology are two specialized disciplines of Life Sciences that have many frontiers yet to be explored. To address these problems, AIVI is focused in generating competent and committed human resource, much required in India. Viruses are predator and have existed since ages and therefore, have shaped the history and evolution of their hosts, thus enabling the smallest of living entities to exert significant force on all life forms, including themselves. Sociological and economical ramifications of certain viral infections of human, animal and plant have altered the history of many nations. Changing lifestyle and growing exposure to mutagens expose the immune system to great risks resulting in certain other types of diseases that also have sociological and economic impacts.

Knowledge of the intricacies of the immune system is critical for judiciously designing interventions in cases of infectious and autoimmune diseases. AIVI is currently handling eleven research projects on important problems in Virology and Immunology. The faculty members and research students are regularly participating in international/ national congress, conferences in India and abroad giving oral and poster presentations of their work. In a short span of five years, they have made impressive contributions with twelve research publications in journals ranging from 3.2 to 16.6 Impact Factor, sixteen presentations in international and national congress/ conference, etc., contributed four book chapters and have compiled one book. In addition, they have hosted one international congress, two national conferences and three workshops.

I hope students, alumni and faculty of AIVI will team-up and strive to make this eNewsletter quite popular and informative. I wish it a grand success.

Dr. W. Selvamurthy
Amity Science, Technology and Innovation Foundation (ASTIF),
Director General, Amity Directorate of Science & Innovation
Chancellor, Amity University Chhattisgarh and
Chair Professor for Life Sciences

FROM THE ADVISOR'S DESK

With the blessings of our most respected Hon'ble Founder President Dr. Ashok K. Chauhan, the first issue of bi-annual '**AIVI eNewsletter'** is before you. This will serve as a vehicle for free interaction of our students and faculty, encouraging their all-round talents and hobby like contributing short articles on topics in virology, immunology, genomics, proteomics, photography, composition of poem, short story writing, sketches, etc.

There are many challenges of viral and bacterial diseases like HIV, dengue, chikungunya, certain types of influenza, rotavirus, typhoid, cholera and rheumatic heart disease in human; in animals foot & mouth disease, hemorrhagic septicemia, Pest des petites ruminants (PPR), pox of cow, buffalo, sheep and goat, and clostridial disease of sheep and goat; in plants badnavirus, ilarvirus, tospovirus and begomovirus; and in aquatic animals Epizootic ulcerative syndrome (EUS) caused by the water mould *Aphanomyces invadans* in many freshwater and brackish fish species, vibriosis in fresh and marine prawn, white spot of marine prawn, nodavirus in fresh water prawn and Pacific white shrimp yellow head virus. In immunology there are gaps in neuro-immunology, ocular-Immunology, immunetoxicology, autoimmune diseases, infectious disease immunology and nutritional immunology, etc. Cancer is another important area of biomedical science where role of immune system has been well established leading to development of many successful immunotherapeutic drugs against cancer.

Faculty of AIVI all these years, have given their best in effective and quality teaching, resulting into excellent performance of students of our four passing out batches who are now in premier academic institutions and corporates in India and abroad. The faculty of AIVI is handling 11 research projects on focused topics. We regularly organize invited lectures of celebrated experts in Virology, Immunology and Genomics in India and abroad. Presentations and discussion of our faculty and students in national/international congress/conference/workshops etc. hosted by AIVI and at other places are helpful in grooming them to excel.

Amity Institute of Virology and Immunology (AIVI) since inception has been close to the heart of our Hon'ble Founder President who always blessed and supported us. Our heartfelt thanks and gratitude Sir. We are grateful to our young, dynamic and visionary Hon'ble Chancellor Dr. Atul Chauhan for his support and guidance. Our grateful thanks to Hon'ble Vice Chancellor Prof. (Dr.) Balvinder Shukla who always supported, guided and encouraged us. She listened to our problems patiently whenever we approached and gave earliest possible redressal. We sincerely thank Prof. (Dr.) W. Selvamurthy who took keen interest in the technical activities of this institute, generously giving many useful suggestions, guidance and strongly supported us in strengthening the programs of this institute.

It will be our endeavor to make AIVI eNewsletter a vibrant forum for interaction of students, faculty and interested people at large in the core areas of AIVI. We will very much welcome suggestions from any corner to improve this newsletter.

Prof. (Dr.) Narayan Rishi
Advisor, Amity Institute of Virology and Immunology

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EDITORIAL

It is a great pleasure to welcome you to the inaugural e-newsletter of Amity Institute of Virology & Immunology. The e-newsletter is an initiative of our Hon'ble Founder President to allow students, faculty and staff to forge a link with the public at large. AIVI since its inception has fast established itself in the forefront of academic excellence. The unique and futuristic master's programmes offered by the institute have been well received by academia and industry alike evidenced from our Alumni carving out a niche for itself. Virology and immunology are inter-disciplinary sciences and adding genomics was a natural progression since over the last decade or so, advances in genomics have opened new vistas in our understanding of disease and immune system apart from others. Almost every disease has a link to host gene function which therefore needs to be understood particularly if we are to provide solutions to the various auto-immune and difficult-to-treat cancers. Therefore, to add this important dimension to our research and teaching, starting the current academic session, we added a Masters' Programme in Genomics and a Bachelor's programme in Life Sciences.

This inaugural issue of the e-newsletter captures the progress of research done at AIVI since its inception in broad areas such as cancer, rheumatic heart disease, leptospirosis, influenza, Epstein-Barr virus, antibiotic resistance and plant viruses. One of the motives of the newsletter is to showcase the talents of its students, faculty and staff alike and we hope you will enjoy this compilation and invite your valuable feedback as well which will make this journey more fruitful.

PEOPLE WHO ENRICH OUR JOURNEY.....

Dr. Arvind Rai, Joint Director and Head, Division of Biochemistry and Biotechnology, National Centre of Disease Control, Delhi was always of tremendous help to us right since beginning in developing and strengthening our Medical Virology and Immunology programs in particular and general development of this institute at large. We even bothered him on holidays when he gladly visited us and gave long time. Fraternity of AIVI expresses sincere thanks to Dr. Rai and his wife Dr. Anjana Sharma who is at Dr. Rajendra Prasad Centre for Ophthalmic Sciences, AIIMS, New Delhi.

SCIENTIFIC ACHIEVEMENTS OF AIVI

RESEARCH:

We always encourage our faculty to keep themselves updated in their respective areas which help them in generating innovative ideas. The faculty is encouraged to keep in touch and have regular healthy discussions with eminent scientists in India and abroad. Eleven projects worth approx Rs. 3.25 crore have already been sanctioned. We are expecting many more to be granted further.

List of Research Projects Awarded:

- Project Title: **"Characterization of lipopolysaccharide antigens of Leptospira interrogans serovars".**
  PI: Dr. M.M. Premlatha | Co-PI: Dr. Iqbal Rajinder Kaur/Dr. R. Avasthi – UCMS
  Funding Agency: Indian Council of Medical Research (ICMR)
- Project Title: **"Functional characterization of RNA silencing suppressor encoded by a begomovirus infecting Mucuna pruriens, a medicinal plant".**
  PI: Dr. Yogesh Kumar | Funding Agency: Department of Science & Technology (DST)
- Project Title: **"Immunomodulation by Mycobacterium indicus pranii in murine model of cancer".**
  PI: Dr. Shweta Dubey | Funding Agency: Department of Science & Technology (DST)
- Project Title: **"Characterization of T cell activation and role of Follicular helper T cells in Multiple Myeloma"**
  PI: Dr. Shweta Dubey | Co-PI: Dr. Ritu Gupta, Dept. of Oncology, AIIMS, New Delhi
  Funding Agency: Indian Council of Medical Research (ICMR)
- Project Title: **"Association and polymorphism of human leukocyte antigen (HLA) class II alleles in rheumatic heart disease patients of north east India"**
  PI: Dr. Devinder Toor | Co-PI: Dr. Lokajeet Baro, Dept. of Pediatrics, AMCH, Assam
  Funding Agency: Department of Biotechnology (DBT)
- Project Title: **"Role of P2X7 in pathogenesis of Dengue"**
  PI: Dr. Devinder Toor | Co-PI: Dr. Anita Chakravarti, Dept of Microbiology, MAMC, New Delhi
  Funding Agency: Indian Council of Medical Research (ICMR)
- Project Title: **"Study of AAV mediated induced expression of hMPV specific therapeutic nucleic acids in human cells"**
  PI: Dr. Prashant Kumar | Funding Agency: Department of Science & Technology (DST)
- Project Title: **"To study the generation of virus-like-particles exhibiting co-expression of heterologous HA proteins of influenza A viruses"**
  PI: Dr. Prashant Kumar | Co-PI: Prof. V. G. Ramachandran, Dept. of Microbiology, UCMS, University of Delhi
  Funding Agency: Council of Scientific and Industrial Research (CSIR)
- Project Title: **"Elimination of onion yellow dwarf virus and garlic virus X from garlic plants through meristem tip culture coupled with thermotherapy and crytherapy and transfer of technology to micro-entrepreneurs"**
  PI: Dr. Meenakshi Arya | Funding Agency: Department of Science & Technology (DST)
- Project Title: **"Delineating the molecular mechanisms of apoptotic inhibition by EBV via targeting RON-receptor tyrosine kinase during cancer progression"**
  PI: Dr. Shuvomoy Banerjee | Funding Agency: Department of Science & Technology (DST)
- Project Title: **"Medicinal plants' three way source of anti-malarial drug discovery: Identifying and purifying curavative, prophylactic and immune booster molecules".**
  PI: Dr. Naveen K Kaushik | Funding Agency: Department of Science & Technology (DST)

INDUSTRY COLLABORATIONS

AIVI has signed a MoU with Zydus-Cadilla, Ahmedabad and Wellcome-Hilleman Laboratories, Delhi. Both Zydus-Cadilla and Wellcome-Hilleman Laboratories have a deep interest in the production of affordable vaccines for the Indian market.

PUBLICATIONS:

Our faculty has published high quality research data in research journals of high impact factor. Since 2011, there are 52 research articles in their names. The articles/book chapters/abstracts published out of the work performed at AIVI include:

BOOK:

Recent Trends in Plant Virology. Editors: Govind P. Rao, V. K. Baranwal, Bikash Mandal, **Narayan Rishi**, Studium Press LLC, USA, 2012; pages 493.

RESEARCH PUBLICATIONS:

Jha S, Siddiqui S, Waghdhare S, **Dubey S,** Krishna S, Subramanian K, Dikshit JB, Ravikiran L, Bhargava A. (2016). Identification of a novel glucokinase mutation in an Indian woman with GCK-MODY. Lancet Diabetes & Endocrinology (4) 302. (Impact factor: 16.3)

Narang J, Malhotra N, Narang S, Singhal C, Kansal R, **Chandel V,** Vastan A, Pundir CS (2016). Replacement of magnesium chloride with magnesium nano-particles in polymerase chain reaction. Protocol Exchange doi:10.1038/protex.2016.021

Arshad E, Anas A, Asok A, Jasmin C, **Pai SS,** Singh ISB, Mohandas A, Biju V (2016) Fluorescence detection of the pathogenic bacteria Vibrioharveyi in solutions and animal cells using semi-conductor quantum dots. RSC Advances (6) 15686-15693. (Impact Factor: 3.84)

Sneha KG, Anas A, Jayalakshmy KV, Jasmin C, Vipindas PV, Pai SS, Pappu S, Nair M, Muraleedharan KR, Sudheesh K, Nair S (2016) Distribution of multiple antibiotic resistant Vibrio spp across Palk Bay. Regional Studies in Marine Science (3) 242-250.

Garg H, Suri P, Gupta J, Talwar GP, **Dubey S.** (2016). Survivin: a unique target for tumor therapy. Cancer Cell International (16) 49. (Impact factor: 2.8)

Dubey S & Garg A. (2016). Releasing the brakes in Cancer. Journal of Bioanalysis & Biomedicine (8) 017-022. (Impact factor: 2.06)

Tanner WD, VanDerslice JA, **Toor D,** Benson LS, Porucznik CA, Goel RK, Atkinson RM. (2015). Development and field evaluation of a method for detecting carbapenem-resistant bacteria in drinking water. Syst Appl Microbiol. (38) 351-357. (Impact Factor 3.6)

Choudhary N, Wei G, Govindarajulu A, Roy A, Li W, Picton DD, Nakhla MK, Levy L, Brlansky RH. (2015). Detection of Citrus leprosis virus C using specific primers and TaqMan probe in one step real-time reverse-transcription polymerase chain reaction assays. J. Virological Methods (224) 105-109. (Impact Factor 1.8)

Chandel V, Rana T, Hallan V (2013). Prunus necrotic ringspot virus: incidence on stone and pome fruits and diversity analysis. Archives of Phytopathology and Plant Protection 46, 2376-2386.

Premlatha MM, Kaur IR, Avasthi R, Dey AB, Chaudhry R. (2013) A newer approach for the serodiagnosis of leptospirosis using outer membrane proteins of Leptospira interrogans serovar Tarassovi. Asian Journal of Medical Sciences. 4(2) 41-46

Deepak G, Ruchika, Ashish, **Premlatha MM,** Reetika D. (2014) Anti-bacterial properties of lemon grass (Cymbopogon flexus steud) Vats essential oils in single form and combination of honey against drug resistant bacteria. J. of Biologically active products from Nature. 4 (4) 278-28

Chauhan S, Upadhyay MK, **Rishi N,** Rishi S. (2011) Phytofabrication of silver nanoparticles using pomegranate fruit seeds. International Journal of Nanomaterials and Biostructures. 1 (2), 17-21.

BOOK CHAPTERS:

Singh RR, Pinkhasov J, Prasad P, **Dubey S** (2012). Autoantigenesis and Antigen-based Therapy and Vaccination in SLE. Dubois' Lupus Erythematosus. Chapter 19, 8th edn. Elsevier.

Singh RR, **Dubey S,** Pinkhasov J (2012). Immune tolerance defects in lupus, Dubois' Lupus Erythematosus. Chapter 21, 8th edn. Elsevier

ABSTRACT PUBLICATIONS:

Toor D, Arora PG, Sarkar S, Rastogi M, Kumar R, Sharma YP, Chakraborti A. (2015) Association of IL-6, TNF-α and mannose binding lectin gene polymorphism with north Indian rheumatic heart disease patients. 7th International Conference on Recent Advances in Cardiovascular Sciences, held at Noida, India (10th-11th March, 2015)

Pai SS, Preetha R, Jayaprakash NS, Anas A, Singh ISB (2015) Multiple anti-biotic resistant Vibrio harveyi isolated from Penaeus monodon larval rearing systems of South India. 4th National Conference of Ocean Society of India-OSICON-15, 22-24 March 2015, CSIR-National Institute of Oceanography, Goa, India

Pai SS, Kumar P, Indran SV (2014) Bacteriophages isolated for the control of pathogenic Vibrio harveyi in shrimp hatcheries. National Conference on Recent Trends in Molecular Virology-2014 from November 17-19, 2014, Centre for Interdisciplinary Research in Basic Sciences, Jamia Millia Islamia, New Delhi.

Indran SV, Kumar P, Pai SS (2014) Reverse genetics technology-applications and recent trends. National Conference on Recent Trends in Molecular Virology-2014 from November 17-19, 2014, Centre for Interdisciplinary Research in Basic Sciences, Jamia Millia Islamia, New Delhi.

SS Pai, Anas A, Singh ISB (2014) Bacteriophages isolated for the control of pathogenic Vibrio harveyi in shrimp hatcheries International Conference on Antimicrobial Research (ICAR2014), 1-3 October 2014, Madrid (Spain)

Dubey S, Singh RJ (2013) Poster: Activation induced split anergy: a mechanism for persistence of auto-immune T cells. International Congress of Immunology, Milan,.

Garg H, Talwar GP, Gupta JC, **Dubey S** (2015) Evaluation of Mycobacterium indicus pranii (MIP) Adjuvanted Recombinant Survivin as a Vaccine Candidate in Murine Model of Breast Cancer. Federation of Immunology Societies, 2015, June 30-July 3, Singapore.

Kumar P, Indran SV, Pai SS (2014) Nucleic acid based therapeutics to combat viral infections: a review. National Conference on Recent Trends in Molecular Virology-2014 from November 17-19, 2014, Centre for Interdisciplinary Research in Basic Sciences, Jamia Millia Islamia, New Delhi.

Kumar P. Application of advanced molecular techniques for monitoring microbial systems. Hands-on Training in Molecular Techniques in Biotechnology, Vallabhbhai Patel Chest Institute, University of Delhi on 23rd December, 2013.

Kumar P, Kumar B, Rajput R, Khanna M. Immunization with plasmid DNA encoding matrix epitope protects mice from influenza A virus challenge. XXI National Conference of Indian Virological Society (Virocon-2012) on "Immunobiology and Management of Viral Diseases in 21st Century"; 2012 November 8-10; IVRI Mukteshwar, Uttarakhand, India

Kumar Y, **Chandel V,** Rishi N. RNA silencing and its suppression by plant viruses. National conference on Advancement in Convergence of Technologies; Sept 8th & 9th, 2011; Amity University Haryana

Somya V, **Chandel V,** Baranwal VK, Jain RK. Production of polyclonal antibodies against Onion yellow dwarf virus using bacterial expressed coat protein gene and its application for immunodiagnosis. XX National Conference on Managing Emerging and re-emerging plant, animal, human and aquatic viral diseases: One health perspective; December 29-31, 2011.

Deepak G, Ruchika, Ashish, Tufail and **Martha Premlatha. M** (2014). Biosynthesis of silver nanoparticles using lemongrass (Cymbopogon flexuosus Steud) wats leaf extract: Phytochemical composition and anti-bacterial properties. 2nd International Conference and Exhibition on Pharmacognosy, Phytochemistry & Natural Products Beijing, China; August 25-27, 2014.

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ORATION AWARD:

Prof. Kameshwar Sahai Bhargava Oration Award in Virology was conferred upon **Prof. Narayan Rishi** at Tamil Nadu Agricultural University, Coimbatore, during (VIROCON) - 2014 on December 18, 2014 for his outstanding contributions in Virology.

Topic of Oration: The Viruses: Vedas to Virome

INTERNATIONAL CONGRESS ORGANIZED:

"Asia Pacific Congress of Virology"
organized between
17th-20th December, 2013.

International Travel Grant Award:

Dr. Shweta Dubey, International Congress of Immunology, August 22-27th, 2014, Milan, Italy. Received a travel award from American Association of Immunology and Immunology foundation, India for attending the conference.

Dr. Gaurav Gupta, Viviana Giannino, **Narayan Rishi**, Glueck Reinhard 2013. Evaluation of immune response to Measles vectored & Pichica Pastoris expressed re-combinant HPV vaccine formulations. Modern Vaccines/ Adjuvants Formulation – Impact on Future Development. 15-17 May, 2013. CHUV Lausanne, Switzerland.

Dr. Devinder Toor, XVIII Lancefield International Symposium on Streptococci and Streptococcal Diseases, Palermo, Sicily, Italy (4th–8th September 2011). Received a travel award from ICMR and organizers for attending the conference.

National Conference/Workshop/Symposium Organized:

National Symposium entitled **"Immune Mechanism in Host Pathogen Interactions: Emerging Trends"** *organized on* 27th September 2012

&

Workshop on **"Flow Cytometry and Q-PCR:** Principles and Clinical Applications" *organized on* 28th September, 2012

National Symposium entitled **"Influenza: An Omnipresent Global Health Threat"** *organized on* 11th September, 2013

&

Workshop entitled **"Molecular and Immunological Assays for Influenza"** *organized* between 12th-13th September, 2013

Workshop on **Hands-on training on cell culture techniques and cytotoxicity assays** *organized* between 14th-16th October, 2015.

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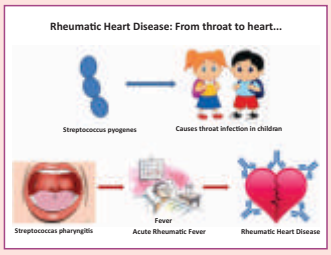
RHEUMATIC HEART DISEASE: FROM THROAT TO HEART..

We all have experienced numerous bouts of sore throat in our lifetime. In some children, however, this could be a life threatening condition as they develop a condition which leads to heart valve damage. It all begins with a throat infection by *Streptococcus pyogenes,* which leads to acute rheumatic fever in few susceptible children. These children mostly present symptoms of migratory arthritis & carditis and rarely present chorea, erythema marginatum or subcutaneous nodules. Around 60% of rheumatic fever patients develop rheumatic heart disease in which the heart valves, especially the mitral valve gets damaged. These patients have to get an injection of penicillin every month and in severe chronic cases, the patient needs to undergo valve replacement surgery. Rheumatic heart disease is a major cause of morbidity and mortality in the developing countries, including India.

The most accepted theory for development of this disease is that of molecular mimicry in which an auto-immune phenomenon is induced due to sequence similarity between Streptococcal M protein and myosin present in heart. My study with Dr. Harpreet Vohra at PGIMER, Chandigarh has shown that these patients have high titers of various inflammatory cytokines and antibodies, which play an important role in the pathogenesis of this disease. We have shown that as the disease progresses towards its chronic phase, there is a shift from Th1 to Th2 cytokine pattern leading to enhanced heart valve damage. Apart from cytokines, there are various other immunological factors that play a decisive role in development of rheumatic heart disease.

The question that when every person gets a sore throat, why only few suffer from rheumatic heart disease is intriguing. Only the susceptible individuals develop rheumatic heart disease, while rest of the population gets spared with just mild sore throat. My study with Prof. Anuradha Chakraborti at PGIMER, Chandigarh suggested that there are various HLA class II alleles that are associated with susceptibility to rheumatic heart disease in north Indian population. We also showed the presence of



various single nucleotide polymorphisms in genes of immune system components like mannose binding lectin, HLA, IL-6, TNF-α etc., which act as genetic susceptibility markers for early identification of susceptible individuals in a population.

Streptococcus pyogenes have more than 200 different strains and lots of them are associated with development of rheumatic heart disease. My surveillance studies with Prof. Rajesh Kumar and Prof. Anuradha Chakraborti at PGIMER, Chandigarh showed presence of different streptococcal strains in school going children and presence of anti-biotic resistance to common anti-biotics like tetracycline and azithromycin. There is still no vaccine available to prevent this disease which is a matter of great concern for the scientific community. Because of large number of streptococcal strains, it's very difficult to develop a single vaccine against different strains. Therefore, efforts from different scientific groups are underway to develop a vaccine using conserved region sequence of *Streptococcus pyogenes,* so that it is effective against all the strains circulating in the community. Our studies have shown that streptococcal conserved region peptides could be considered protective in impeding streptococcal infections worldwide.

There is still a lot of work to be done to understand the streptococcal biology and pathogenesis of rheumatic heart disease. Early identification of susceptible individuals, detection and prevention can help in reducing the burden of rheumatic heart disease from globe.

Dr. Devinder Toor
Assistant Professor
Amity Institute of Virology & Immunology,
Amity University,
Sec-125, Noida.

MAGIC OF SPICES

Spices have great respect in cuisine of Indian sub-continent and around. Without them, the kitchen looks empty and the food gives a feeling of Stone Age. What these spices are? Are they just meant to give good aromatic smell or to make our tongue feel good or do they make our food tasty? Or is there any science behind it which make them to be the part of our food habit? These questions are must to be addressed.

Turmeric, cumin, curry leaves, clove, ginger and fennel are among common Indian spices which are used in all kinds of household. If we look at their usage, we will found that they are not used randomly but their usages are specific to day time and weather conditions. Further, pharmacological and molecular studies revealed that oils and alkaloids produced by many of spices have anti-microbial, anti-parasitic, immune booster, antioxidants and much more properties of biological and medicinal importance.

Turmeric *(Curcuma longa)* bearing biological active ingredient curcumin, isolated from is rhizome, has attracted great interest from many among many scientists studying cancer over the last half of the century. Interestingly, curcumin provides an ideal alternative to current therapies because of its relatively safe profile, even at high doses. Other than cancer, curcumin has also proved its importance as anti-malarial, anti-fungal and immune booster. Similarly cloves' aromatic flower buds of *Syzygium aromaticum* is important as a medicinal plant that has effective anti-fungal, anti-carcinogenic, antibacterial and antiviral properties. This plant also represents one of the richest source of phenolic compounds such as eugenol, eugenol acetate and gallic acid and posses great potential for pharmaceutical, cosmetic, food and agricultural applications. These are few among long list of biological and medicinal properties of spices we use.

These medicinal properties of the same spices suggests that why they are the part of daily diet. As we know that native infections are best source of developing long lasting and sterile immune protection. Daily consumption of these spices maintain safe drug bullets always at a certain basal level in blood stream to tackle the parasite, which might help in peak season when infection definitely happen but then they will only be a native source of antigen for generating immune response and not a disease pathogen, as bullets are already present to tackle them. Recently, it has also been shown that using the whole plant in crude also helps in overcoming the danger of drug resistance of parasite resistance as nature`s combinatorial approach make parasites to take longer to evolve resistance.

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IMMUNOLOGY FOR US: VACCINES IN INDIA

Nothing is so fatal to the progress of the human mind as to suppose that our views of science are ultimate… that there are no new worlds to conquer."

Humphry Davy

We should all be very indebted to Edward Jenner for obvious reasons; he made us free from the menace of small pox. For many centuries small pox was considered a dreaded disease and it devastated mankind until Edward Jenner proposed the concept of vaccination to protect against smallpox. Edward Jenner is well known around the world for his innovative contribution to immunization and the ultimate eradication of smallpox. The vaccines developed over the first two hundred years since Jenner's lifetime have accomplished striking reductions of infection and disease wherever applied by ensuring immunity against dreadful pathogens. Later, a novel concept in vaccinology was established known as "HERD immunity". Herd is a form of indirect protection from infectious disease that occurs when a large percentage of a population has become immune to an infection, thereby providing a measure of protection for individuals who are not immune.

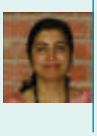
Since the healthcare system in India is still not able to cope up with burgeoning population, vaccination seems to be the best strategy to prevent disease outbreaks to save lives and enhance productivity. India has the highest number of child deaths in the world, with an estimated 1.2 million deaths in 2015 - 20 per cent of the 5.9 million global deaths. Other countries in the top five for number of deaths included: Nigeria (7,50,000), Pakistan (4,31,000), Democratic Republic of the Congo (3,05,000) and Ethiopia (1,84,000). The fourth Millennium Development Goal (MDG-4) aimed to reduce mortality — between 1990 and 2015 — among children under five by two-thirds. According to a the report published in journal Lancet , however, India does not figure in the list of 62 countries — which includes Bangladesh and Nepal — that have achieved the Millennium Development Goal to reduce the under-five mortality by two-thirds between 1990 and 2015 (25 years).

It is interesting to note that India's Universal Immunisation Programme (U.I.P.) is one of the largest in the world in terms of quantities of vaccine used, the number of beneficiaries, the number of immunisation session organised, the geographical spread and diversity of areas covered. The UIP in India targets 2.7 Crore infants and 3.0 Crore pregnant women every year and is one of the largest in the world. The national policy of Immunisation of all children during the first year of life with DPT, OPV, BCG to complete the series of primary vaccination before reaching the age of one year was adopted in 1978 with the lunching of EPI to increase the immunisation coverage in fancy to 80%. Universal Immunisation programme UIP was launched in 1985 in a phased manner. The measles vaccine was added in 1985 and in 1990 Vit A supplementation was added to the program. Recently, Mission Indradhanush launched by Government of India targets to immunize all children under the age of two years as well as pregnant women are fully immunized with seven vaccine preventable diseases. The seven diseases that are being targeted in mission indradhanush are: tuberculosis, tetanus, diphtheria, pertussis, measles, hepatitis B and polio. Though we could not achieve to Millenium Development Goal, yet whatever has been achieved in India is remarkable. There is also the introduction of new vaccines like injectable polio, rotavirus, rubella and adult Japanese encephalitis vaccine in U.I.P. With these new vaccines, India's UIP aims to provide free vaccines against 13 life threatening diseases, to 27 million children annually.

What still needs to be done now as community? Infectious disease like childhood pneumonia accounts for most childhood mortalities occurring during first year of life. The vaccines for these diseases are now available and can also be brought under the ambit of mass immunization programmes in India. Research and development should be expedited so that we can have better vaccine candidates and better modes of delivery as compared to existing ones. Additionally, newer vaccines essential to India against dreaded diseases like dengue, leishmania and malaria are under development by various investigators funded by Indian government, philanthropic agencies and public-private partenships. The vaccine manufacturing industrial set present in India matches the best in the world and most of them are WHO compliant. In fact, India is the largest exporter for cost effective vaccines to many countries in the world. The Indian vaccine industry has also taken up new challenges of manufacturing more complex and next generation vaccines like the meningococcal conjugate vaccine, pneumococcal conjugate vaccine, cholera vaccine, HPV and other combination vaccines.

While the government is doing its efforts to accelerate vaccination programmes, social awareness also needs to be created for these programmes. There are many myths associated with vaccination which prevent parents from getting their children immunized. We all should work together to dispel these myths and make people understand that having un-vaccinated children make not only the individual but the society prone to disease outbreaks. We should always try to thwart all attempts aimed at misleading the society on these aspects. Corporate social responsibility could be a big mode of spreading awareness and education about vaccination programmes.

It will be surprising to know that Jenner knew very little about immune correlates of protection that immunologists use today to account for the efficacy of most vaccines. As concepts of immunology developed, vaccinologists used these concepts to improve the existing vaccines. As it happens in science, more knowledge leads to more complexity and therefore 'even now after so many years post Jenner era, we still have a challenging task ahead to reduce the disease burden of many common diseases from this world.' Education, nutrition and vaccination could hold the key for the progress of this country.



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A SOUL PURIFYING BATH OR A DISSEMINATION OF ANTIBIOTIC RESISTANCE?

Have you imagined that your holy bath in the river Ganges or at any other pilgrim-popular water body might be contributing to the spread of anti-microbial resistance? Or worse still, you might get infected with an infectious bug that will have doctors digging deep into their prescription armory searching for a cure because the bug that you caught is resistance to all known anti-microbials. Yes, gone are the days when a dip in the river Ganges could purportedly cure skin infections. In 1896, the British doctor Earnst Hankin, working at the Government Laboratory in Agra recorded the anti-microbial properties of the waters of the Ganges and Yamuna. The size of human congregation in Pilgrim centers world-wide has only grown over the years resulting in a massive increase in the discharge of untreated human waste into the associated water bodies. To manage the waste and maintain the water quality suitable for bathing standards continually is a constant challenge to the local administration. The high human activity in pilgrim centers also dramatically increase the incidence of acute gastro-intestinal diseases there. Varanasi for example has a 66% incidence of gastro-intestinal diseases in comparison to about 15% in Kanpur. This does not mean that the waters of the Ganges at Kanpur are anyway cleaner, industrial effluents discharged from the city's leather industry pose gruesome threat to population's health. Even in the upstream state of Uttarakhand, the Ganges right from its origin is classified under category 'D' by the state's Environment Protection and Pollution Control Board (UEPPCB) effectively meaning the river is excessively polluted and therefore unfit for bathing. This case holds true for all other rivers of India.

High human waste load is a characteristic of all pilgrim centers especially during periods of increased congregation like on the auspicious days of the year or the larger Kumbh which results in a tremendous spike in coliform loads of the rivers. This substantially increases the likelihood of transfer of determinants of antibiotic resistance between bacterial strains. Forty five to eighty five percent prescriptions across the country have atleast one antibiotic prescribed reflecting a high propensity among medical practitioners to prescribe antibiotics. There is little correlation made between human waste and emergence of anti-microbial resistance, but with high levels of prescription and non-prescription use of antibiotics, a direct link with increased human waste discharge and emergence of antibiotic resistance cannot be ruled out. Studies on antimicrobial resistance in micro-organisms at pilgrim centers in India are sparse, but the few carried out thus far have recorded significantly high levels of occurrence of antibiotic-resistant bacteria. One study carried out by IITR, Lucknow and BHU, Varanasi recorded high prevalence of vancomycin resistant *Enterococcus* sp in Gangetic waters. Our study on the antibiotic resistance in bacteria off the Rameswaram coast found resistance in *Vibrio* sp. to multiple antibiotics. Increasing salinity of rivers owing to the construction of dams, barrages means this bacterium, autochthonous to the marine environment, is finding new niches further upstream from the estuaries. Definitely, more studies are the urgent need of the hour in this area which puts large tracts of populations at risk of antibiotic resistant infections. In such a grim scenario, the ritualistic bath to cleanse one's sins may prove a costly venture and god forbid, a fatal exercise.

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DOUBLE BURDEN OF DISEASE: INDIA'S NEW NEMESIS

The 21st century revolution in health and demographic transition lead to major changes in the pattern of disease. This transition resulted in a major shift in cause of death and disability from communicable disease to non-communicable diseases. India is burgeoning under the double burden of diseases. India continues to face the challenge of a range of infectious disease such as tuberculosis, malaria, filariasis, visceral leishmaniasis, leprosy, dengue, influenza, HIV infection, as well as new and childhood cluster of vaccine-preventable diseases *(Jacob et al Lancet)*.

With changing times, economic progress and epidemiological transition the trend of diseases seem to be shifting drastically. India these days is no stranger to public health terms such as obesity, diabetes, cardiovascular diseases (CVD) or meta-bolic syndrome. In fact, every year roughly 5.8 million Indians die from heart disease, stroke, cancer and diabetics according to WHO report. Statistical Rounds up to 1 in 4 Indians dying from NCD before he reaches the age of 70. To add on to this plight, India is also referred to as the diabetes capital of the world with over 40 millions diabetics. According to a 2012 WHO report, NCDs are responsible for two-thirds of the total morbidity burden and about 53% of total deaths in India. The majority of cardiovascular diseases can be attributed to major risk factors such as high cholesterol, high blood pressure, low intake of fruits and vegetables and inactive life-style.

The tendency to associate communicable disease with developing countries is engrained as it is still a major cause of mortality in India compared to developed countries. But they also demonstrate a tendency for those living in the developed world to assume lower life expectancies and preventable deaths in India are a result of diseases that could never affect them. However, this is far from reality as using country's GDP as an indicator for health is highly ineffective. The factors that enable the spread of infectious disease - poverty, unclean water, poor sanitation and weak health systems-exacerbate chronic conditions and contribute to "premature" deaths.

Disease priorities change dramatically as measurement of disease burden shifts from simple mortality indicators to indicators that incorporate disability. However, when disease burden measurement includes time lived with disability several of the neuro-psychiatric disorders also become the leading cause of disease burden.

Great attention needs to be paid to the growing needs of population in the area of mental health. Psychiatric disorders are frequently a considerable drain on health resources as a consequence of being misunderstood, misdiagnosed or improperly treated. Mental health care requires the sensitive deployment of personal who have been properly trained to give psychological support.

People living in poverty experience diseases that result from a lack of resources, while affluent individuals may suffer from diseases that result from an abundance of resources.

The researchers found that for every three percent widening in a state`s income inequality between the most affluent and the most poor, the risk for being underweight increased by 19 percent and the risk for being obese increased by 21 percent.

The above mentioned staggering numbers and statistics call for some measures that we all need to take. As scientific researchers, our bit of contributions would be by research which plays a pertinent role by providing foundation for public policy. The kind of intervention to be adopted by the government can only be derived from robust and longitudinal researched data. Therefore, the need of the hour is to support healthy research and make sure that it goes on to the policy makers for formulation of strategies and polices.

There are a few cost-effective and practical strategies which we can adopt and incorporate in our personal lives to see a world of difference both mentally and physically. Also, good habits will keep NCD risk factors under check making sure that the country's economy goes in the right direction by helping increase the standard of living instead of out of pocket expenses and catastrophic hospital expenditures.

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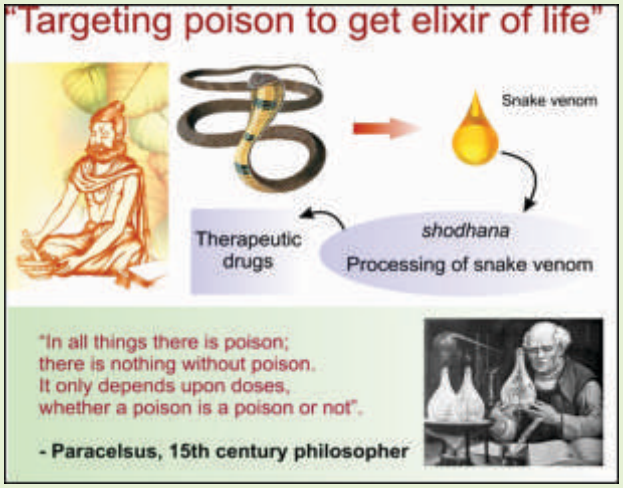
USE OF SNAKE VENOM FROM ANCIENT AYURVEDA TO MODERN MEDICINE

Snake venom is considered as extremely toxic secretion from specialized salivary glands of snakes made up of several biologically-active components, including different enzymes, polypeptides and low molecular weight compounds. As natural biological resource, snake venom could be used for potential therapeutic purposes. In ancient ayurvedic practice, use of snake venom was recommended in different pathophysiological conditions. The *visachikitsha*, the division of ayurveda which deals with the use of venoms to cure diseases through traditional ayurvedic treatment known as *suchikavoron* (venom at the needle-tip) and *shodhana* (venom detoxification) was very



successful to treat several chronic diseases including joint pain, inflammation, and arthritis.

Snake venom comprises of different neurotoxic, cardiotoxic, cytotoxic agents as well as nerve growth factor, lectins, disintrigrins, haemorrhagins and other different enzymes. Recent medical research experimentally proved that these proteins not only impose death to animals and humans, but also could be beneficial for the treatment of thrombosis, arthritis, cancer and many other diseases. The traditional use of poison as therapeutics in ayurveda was first mentioned in *Charaka Samhita* around 1000BC (3). Also, according to *Sushruta* the venom was widely used for the treatment of other toxin related symptoms in ayurvedic toxicology or *Agada Tantra*. Importantly, Sir Jagadish Chandra Bose's research work on *suchikavoron rasa* revealed the use of cobra venom as drug. Interestingly, he observed crude venom administrated plant was died while processed drug formulation did not showed any adverse effect in the experiment. Basically, cobra venom could be used after processing it with several plant products through *shodhana*. Bio-processed cobra venom was used in different pharmacological and toxicological studies. Recently, it has been proven that Indian monocellate cobra (*Naja kaouthia*) venom can be used as potent an anti-arthritis agent. With the advancement in modern cutting-edge research technologies, detail studies are required to investigate on the venom active constituents and their mechanism of actions at cellular as well as molecular levels. Exploration in the field of Indian traditional medicine against chronic diseases, cardiovascular disorders and cancer progression not only will give health benefits but also enrich our scientific knowledge to bridge ancient ayurveda to modern therapeutics in several diseases.

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UPDATE ON CITRUS LEPROSIS DISEASE

Citrus leprosis virus (CiLV) was first reported from citrus areas of Florida in early 1900s. However, the virus has disappeared since 1960s possibly due to adverse weather condition like freezing weather and high sulphur application. CiLV is a causal organism for the citrus leprosis disease in citrus plants. This virus causes the enormous loss quantitatively and qualitatively to the citrus industry mainly in South and Central America. In 2013, CiLV reported from the citrus areas of Mexico which creates a potential threat for introduction of this virus in to citrus industry of USA where mite vector is already present. Until now three types of CiLV has been reported, *Citrus leprosis virus* cytoplasmic type (CiLV-C), *Citrus leprosis virus* cytoplasmic type 2 (CiLV-C2) and *Citrus leprosis virus* nuclear type (CiLV-N). The cytoplasmic type leprosis viruses are widely distributed whereas nuclear type are only restricted in few citrus areas of Mexico and Brazil. Cytoplasmic type leprosis viruses are found in endoplasmic reticulum of cytoplasm whereas nuclear type found in nuclei of infected cells. These viruses are transmitted by same vector, false spider mite of genus *Brevipalpus*. All three viruses are non-systemic and cause only localized symptom wherever viruliferous mites feed on citrus hosts. The characteristic symptoms on infected leaves were observed as circular chlorotic or necrotic lesion from light yellow to dark brown in color and on stems as circular prominent dark brown or reddish color. On citrus fruits, dark and depressed lesions were observed on fruit skin. The premature fruits falls and unattractive fruit appearance on infected citrus trees are the major reason considered as commercial loss to the citrus industry. The annual cost of orange production is also increasing due to pesticide used to control mite vector. This virus is measured a quarantine importance due to its widespread nature and having high potential to damage citrus production. Almost all citrus species are susceptible to CiLV, however sweet oranges *(Citrus sinensis)* are highly susceptible, then mandarins *(C. reticulata Blanco)* and grape-fruits *(C. paradisi)* and lemons *(C. limon* (L.) are least susceptible.

Both CiLV-C and CiLV-C2 are closely resemble each other and in transmission electron microscopy observed a short bacilliform particles, 110-130 nm long, and 40-55 nm wide in cytoplasm of infected cells. Genome of both viruses has bipartite, positive sense, single stranded RNA with a poly tail at 3'terminal. The nucleotide sequence of RNA1 has 8729 nt and 8717 nt and RNA2 has 4975 nt and 4989 nt long of CiLV-C and CiLV-C2, respectively. The genome structures of both viruses are also found same except a hypothetical protein in CiLV-C2. RNA1 contain the two ORFs, which encode a large polyprotein and a putative coat protein. The large polyprotein has four putative domains, methyltransferase, protease, helicase and RNA-dependent RNA polymerase (RdRp) which required for virus replication. RNA2 contains four ORF which codes for four different proteins including a putative movement protein which is involved in cell-to-cell movement of virus. The function of other three proteins is not known. CiLV-C and CiLV-C2 has been classified to genus *Cilevirus*, family *rhabdoviridae*. CiLV-N was observed as short, rod-shaped particles, 120 to 130 nm long and 35 to 40 nm wide in nucleus or cytoplasm of infected cells associated with presence of viroplasm in nucleus. The genome of CiLV-N is also bipartite, but negative sense single stranded RNA with poly A tail at 3'-terminal. RNA1 is 6,268 nt long contains five ORF that encode the nucleoprotein protein (N), putative phosphoprotein (P), movement protein (MP), matrix protein (M), and glycoprotein (G). RNA2 is 5,847 nt long contains only one ORF that encode RNA-dependent RNA polymerase (RdRp). The genome structure of CiLV-N is found resembling the genome of *Orchid fleck virus* (OFV) and as such was considered to be a member of newly proposed *Dichorhavirus* genus.

Diagnosis of CiLV is mainly performed by observation of typical localized lesion symptoms on citrus plant. The type of CiLV are further confirmed by available molecular and serological laboratory detection methods such as double antibody sandwich-enzyme-linked-immunosorbent-assay (DAS-ELISA), indirect ELISA, dot-blot immunoassay, and immuno-capture-reverse transcription-polymerase chain reaction (IC-RTPCR), reverse transcription-polymerase chain reaction (RT-PCR) and real time RT-PCR. The management of CiLV is currently implemented by controlling the mite's population by spraying pesticides. The preventive measure such as removing infected branches or trees, use of windbreak to minimize vectors, remove alternate host, use clean plant source, restrict the movement of peoples can be practice to minimize the virus inoculum in citrus. Mite predator and entomopathogenic fungi can also help to control mite vector.

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THE OTHER SIDE OF PLANT VIRUS INFECTION

In the past decade, the concept of plant viruses as strictly disease-causing entities has been challenged. While the most well studied and obvious interactions between plants and viruses are related to disease, there are several examples of mutualistic relationships between plants and viruses, both indirect and direct. These mutualistic interactions have not been fully explored, and many questions remain unanswered. Metagenomic surveys have estimated that only a small fraction of virus species are known. Additionally, globalization has led to the increased movement of plant material and virus movement. As viruses move from one area to another, new potential hosts offer the possibility of new interactions, both negative and positive.

Viruses have been associated with plant disease since they were first described in 1898, but in recent years, viruses with positive impacts on the plant hosts they are associated with also have been described. Negative interactions are mostly studied as disease symptoms such as stunting or necrosis, and the vast majority of virus research has focused on the disease aspect of these interactions. Beneficial interactions involve environmental protection to the host plant, protection against other pathogens, or control of plant responses to nutritional needs. Plant viruses confer drought and cold tolerance to plants as conditional mutualists: the plant is harmed by the viruses under normal conditions, but benefited under extreme conditions. This was demonstrated for several different viruses and plant hosts. Mild strains of plant viruses protect plants from more severe isolates, a phenomenon known as cross-protection that led to the initial generation of virus-induced pathogen protection in transgenic plants. Endogenous pararetroviral elements in plants can confer resistance to exogenous viruses. The coat protein gene of a persistent virus in white clover affects the development of nodules under varying nitrogen levels, and this could be transferred to other legumes. Curvularia thermal tolerance virus is a mycovirus that infects a plant fungal endophyte, Curvularia protuberata. When both virus and fungus are present in hot springs panic grass *(Dichanthelium lanuginosum)* the holobiont is able to grow in soil temperatures up to 65 ^{0}C (Márquez et al., 2007). Many more examples of mutualistic viruses can be found in other hosts. In addition, viruses are important in population control of their hosts, and marine viruses are probably extremely important to the movement of carbon and trace elements in the microbiome of the oceans.

RNMV *(Rice necrosis mosaic virus)* inoculation improve the plant vascular system in fibre crops especially in jute. In JRO-3690, fibre layers increased by 14%. Other yield-determining characters like number of fibre wedges and fibre bundles increased significantly (22% and 52% respectively) in inoculated plants over control. Beside looking in to the pathogenic aspect of plant viruses, we still need to explore the beneficial side of these small agents (viruses). And for sure there is still much to be discovered on this topic.

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THE EVOLUTION OF HEPATITIS C VIRUS AND ITS TREATMENT

Hepatitis C is a contagious viral inflammatory liver disease that spreads through hepatitis C virus (HCV). Transmission of HCV is bloodborne and involves contact with infected blood, mostly through sharing infected needles, unsafe tattoo practices, sexual contact or perinatally from mother to child. It can lead to liver cirrhosis and sometimes liver cancer. Many of those infected may not have any symptoms for years. There is no vaccine available for Hepatitis C. Globally, an estimated 170 million people are living with HCV infection.

There was a time when people were not aware of the term hepatitis C. It was merely known as Non-A, Non-B hepatitis, which was neither Hepatitis A nor hepatitis B. The term Non-A, Non-B hepatitis kept doing the round until 1989, when the hepatitis C Virus was finally identified. Harvey Alter, while working on non-A and non-B hepatitis led to the discovery of HCV. After the discovery of HCV, it's structure and functionality was explored that led to easy and accurate diagnosis of the disease. Scientists began to understand the extent of genetic heterogeneity of HCV and also the high variability in its geographic location. Different antiviral therapies against the disease were developed.

Over the years, HCV treatment has undergone a period of rapid evolution. The treatment regimens initially involved ribavirin and pegylated interferon (peginterferon) based therapy. But these treatments had their limitations. Because of this, the focus shifted towards personalized treatment and combination therapy. Sequencing of HCV genome and understanding the viral life cycle have been the vital steps in the identification of targets for drug development. HCV protease inhibitor such as telaprevir or boceprevir have also been given in combination with peginterferon and ribavirin or with ribavirin alone. Simeprevir, a protease inhibitor is used in combination with peginterferon and ribavirin for the treatment of HCV genotype 1 infection. Simeprevir is not as efficacious with patients infected with HCV genotype 1a with an NS3 Q80K polymorphism. So it is recommended to screen for this mutation before starting the treatment regimen. Sofosbuvir, a nucleotide analogue inhibitor of the HCV NS5B polymerase enzyme has been approved for two chronic hepatitis C indications: in the combination of peginterferon and ribavirin for the treatment of genotype 1 and 4, and in the combination of ribavirin for genotype 2 and 3 infection. Oral direct-acting antivirals (DAAs) have a range of target receptors and inhibit viral proteins in the HCV genome. The use of novel DAA agents into the treatment regimen of HCV presents an opportunity to tailor treatment according to the individual patient characteristics.

The era of combination of direct antivirals has led to high rates of sustained viral response (SVR), limited toxicities, and broader applicability across patient demographics. The evolution in the therapeutic landscape of HCV reflects a triumph of medical and molecular science. Current available treatments have revolutionized the treatment options and offer an unprecedented opportunity to improve treatment of infected patients, making the prospect of highly efficacious therapy across all genotypes of hepatitis C virus.

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HOW AYURVEDA HAS CONTRIBUTED TO TREAT CANCER

India is called as the "Botanical garden of the World" as it is the largest producer of medicinal plants. Besides providing food and raw material for livelihood, these plants have natural therapeutic values against various diseases. After considerable works done on these plants now some plant products have been marketed as anti-cancer drugs, based on the traditional uses and scientific reports. It is found that due to their antioxidant property they show anti-cancer activity. In fact, the medicinal plants are easily available, cheaper and possess no toxicity as compared to the modern (allopathic) drugs. As the rate of cancer is progressing, it seems to have an urgent and effective effort for making good health of humans. So there is broad scope to have anti-cancer agents from medicinal plants through research. There are about 400 families of flowering plants having medicinal value from which about 315 are represented by India. According to the World Health Organization (WHO), about three quarters of the world's population currently use herbs and other forms of traditional medicines to treat diseases. Natural products proven to be fertile source to cure cancer, which is a major cause of death in this century. Some outstanding plant extracts like, Taxol, Camptothecin, Vincristine, Vinblastine, Colchicine, Ellipticine and Lepachol. etc. are presently used as anti-cancer agents.

As cancer is a deadly disease, the research throughout the world is going on to seek out effective treatments for cancer, including the use of plants to relieve and treat cancer patient. Various type of antica ncarios plants are Zedoary *(Curcuma zedoaria)*, Rodent Tuber *(Typhonium flagelliforme)*, Madagaskar Tuber *(Typhonium flagelliforme)*, Madagaskar Periwinkle *(Catharanthus rosens)*, Artocarpus Integer *(Selaginella corymbosa)*, Bamboo Grass *(Loathatreum Gràcies)*, Garlic (Allium sativum), Sunflower *(Helianthus annus)*, Leunca *(Solanum nigrum)*, Bamboo Rope *(Asparagus cochinchinensis)*, and others.

Many herbs like Alfalfa, Andrographis have anti-cancer properties. It has been shown that anti-cancer herbs inhibits mutations in cells that are exposed to mutation causing chemicals that can lead to cancer.

A fungus called Maitake mushroom extract is found to having excellent healing properties and can fight against breast cancer effectively.

Autumn Crocus

Species Name – *Colchicum Autumnale*

Common Names – Naked Ladies, Colchicum, and Meadow Saffron

Family – liliaceae
Compound - Colchicine
Colchicine interrupts the division of cancerous cells.

Hemp

Species Name – *Cannabis Sativa*
Common Names – Marijuana, Bhang, Ganja. Family – cannabaceae
Compound – Delta-9-Tetrahydrocannabinol Smoking marijuana helped treating the nausea that was caused by cancer chemotherapy, thereby being an aid to the cancer treatment process.

Cilantro

Species Name – *coriandrum sativum*
Common Name – Dhaniya, coriander
Family – apiaceae
Compound - beta-carotene, quercetin and rutin (antioxidants).
coriander is another potent herb that has anti-cancer properties. It is also used to remove heavy metals from body.

Basil

Species Name – *osmium basilicum*
Common Name – Tulsa, holy basil
Family – Lamiaceae
This herb has chemoproctive potential for colon cancer.
It also plays a role in reducing colon cancer.

Other then these there are more plants and herbs used to treat cancer like, garlic, ginger, turmeric, cinnamon bark, green tea, *Aloe vera, Azadirachta indica, Catharanthus roseus, Curcuma longa, Emblica officinalis etc.*

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HOW REAL IS THE ZIKA SCARE?

Virus Classification

Group	Group Iv (+ Ss RNA)
Family	Flaviviridae
Genus	*Flavivirus*
Species	*Zika*

An arbovirus (arthropod-borne) and a member of the family FLAVIVIRI-DAE, the Zika virus (named after the ZIKA FOREST in Africa where it was discovered in 1947) is being touted as THE EBOLA OF 2016. It is the causative agent for the ZIKA fever whose symptoms include fever, rash, joint pain, and bloodshot eyes in about 20% of the people who contract it, and no symptoms in the other 80%.Still the virus that produces majorly flu like symptoms has created a huge buzz in the scientific world, has become the running headline in all media and the latest thing to cause fear in people.

Zika virus though first accidentally detected in 1947 in Uganda as part of research going on for Yellow fever hasn't been something to worry about due to absence of any life threatening symptom. However this virus gained attention early this year with the increase in cases of babies being born with microcephaly in Brazil and other states of America. Another condition called Guillain-Barre Syndrome (GBS) in which the peripheral nerve system is accidentally attacked by the immune system (an autoimmune disease) causing muscle weakness is also being blamed on this virus.

But contrary to all the outbreak announcements being made on all media platforms, even from WHO, it is a little questionable why all such major agencies are allowing fear of something that has not been proven being allowed to be spread among people.

ZIKA IS NEITHER SPREAD WORLDWIDE NOR IS IT FATAL UNLIKE EBOLA

No proven study has been done to confirm that Zika virus is responsible for increasing rates of microcephaly or GBS or even if at all there is even a link between them. Out of about 4783 suspected cases of microcephaly only about 17 of them have Zika virus as a plausible cause for it, hence still only a possibility.

Microcephaly is a neuro-developmental disorder in which the newborns have unusually smaller brain size. This disorder can stem from a number of possibilities, including chromosomal abnormalities, malnutrition, any external damage to the foetus, as well as other viruses like Cytomegalovirus. Hence, it is difficult to come to any conclusion at such an early age of testing. Moreover, even the mode of transmission which was thought to be vector- borne (Aedes *aegypti and Aedes albopictus*) is facing shocking new possibilities of it being sexually transmitted or being transferred by blood transfusion.

With all the prevention protocols out against ZIKA especially for pregnant women like not travelling to Zika infected areas and wearing mosquito repellent, a high alert signal is in place. But with certain states even recommending women to hold off pregnancy till 2018 (LATIN AMERICA), it seems that the virus may have been overhyped. The virus has never earlier emerged as a life threatening disease and hasn't killed a single person yet.

But at the same time, CDC on February 10, 2016 issued an article confirming the presence of Zika virus in 4 samples. Two from newborn having microcephaly who died within 20 hrs of birth and two samples from miscarriages. Their mother's however were not tested for antibodies against Zika virus.

A lot more research has to be done and information gathered regarding the virus itself, its mode of transmission and its tropism before we come to conclusions. The development of vaccine is already underway but it would take time and a lot of financial investment along with clinical testing. Till then, taking precautions while travelling would be the best step.

The Zika virus is not something to be afraid of, but something to be concerned with.

Ms. Rashima Prem
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IMMUNE SYSTEM - THE UNIVERSE

Me:
Ma'am, why is it that
We say the immune system is our friend
We say it sometimes is a foe
It sometimes take a few weeks
The other times clear the pathogen in a go?
Professor :
Listen to me carefully..
The immune system is a magic
A universe in itself
It encompasses a diverse
group of cells.
Some soldiers stand on the boundary of our mortal bodies
The others patrol inside secreting antibodies.
Secretion, Digestion, Apoptosis-
All occur against the pathogen
After the clearance of antigen comes our system's surgeon
The self-cells that damaged in course of these battles
Are healed gradually by a series of growth factors
This face of immune system is what we call a friend
Now, lets see how it leads to the bitter end.
Within the group of immune cells hide those foes
Who kill the cells that are our own
A simple trigger initiates their activation
They become menacing and undergo proliferation
Secretion, Digestion, Apoptosis -
All occur now against our own body
The protective function now changes of the antibody
This is how my darling the immune system works
Sometimes calm and the other times berserk.
Prevent and minimize the chances of infections.

Ms. Palak Malhotra
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IIIrd Semester
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OUR BIRDS THAT LEFT THE NEST....

Rosy Dabas: Year 2011-2013 (M.Sc. Immunology)
Placement: University of Calgary, Canada
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Message:

"My teachers had discovered the 'researcher' in me"
I would like to take this opportunity to express my gratitude to each faculty at AIVI for encouraging me to work hard and for the great teachings. Without your helpfulness and directness, I would not have had pushed myself for research. I appreciate you all for being excellent educator and letting me know what I am doing wrong along with giving me ways for correcting my mistakes. It is comforting that whenever I have a question, you answer right away. Your guidance is available even now.

Taniya Mitra: Year 2011-2013 (M.Sc. Immunology)
Placement: University of Veterinary Medicine, Vienna
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Message:

"I applied for masters in immunology because I liked it and now I am doing my research in immunology because I am passionate about it. One of the most important reasons behind this interest is my master's study at AIVI, that guided me to find my career goal and each teacher helped me to build a strong base of the subject(s) and inspired/ motivated me to follow the passion".

Divya Dobrial: Year 2012-14 (M.Sc. Virology)
Placement: Working as JRF in Indian Institute of Sciences, Bangalore.
E.mail: divya.dobriyal24@gmail.com

Message:

I thank all the faculty membersof AIVI for keeping me motivated and focused towards my studies by their constant guidance and encouragement.

Noopur Singh: Year 2012-14 (M.Sc. Immunology)
Placement: Project Assistant, National Brain Research Centre, Manesar, Gurgaon
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Message:

It was a pleasure indeed to be part of AIVI for those two precious years and I am pleased to admit that those two years have been very fruitful academically and I carried a bucket full of splendid memories when I left that place. I am proud to be the part of that institution, where I met great mentors and amazing batch-mates cum friends, who were always encouraging, supportive and created a healthy competitive environment for us to keep improving and work towards being a better version of ourselves. The ethical values learned along with guidance towards enhancing research and analytical skills were of immense significance. Getting exposure by frequent lab visits to National laboratories, organizations and participation in National/International conferences, symposiums, workshops, etc. and constant guidance during dissertation were all helpful. I will remain grateful at each and every step of my career to AIVI family for that.

Ankur Nagar: (M.Sc. Immunology)
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Message:

Always grateful to AIVI faculty for training and ever ready help.

Maria Gabriel: Year 2011-2013 (M.Sc. Virology)
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Message:

Studying at AIVI was a very good experience. The faculty was exceptional and took a lot of care while teaching.

Ananya Devalapalli: Year 2012-14 (M.Sc. Virology)
Placement: Working as Assistant Manager, Seed Private Ltd. New Delhi
E.mail: dnsananya@gmail.com

Message:

Amity gave me confidence. It is because of the support of teachers and the education given by AIVI faculty that made it easier for me to confidently work in my field. Behavioral Science and Communication Skills along with the core subjects have helped me a lot as my company deals with corporates. Every institute should have these two subjects.

Priyanka Sharma: 2012-2014 (M.Sc. Immunology)
Placement: Working as JRF in Seth Research Foundation, Gurgaon
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E.mail: priyankasharma.m1@gmail.com/ priyanka272010@gmail.com

Message:

Decision of doing my M.Sc. Immunology from AIVI was correct because of its excellent faculty. Their time to time guidance and support polished my research skills and motivated all of us to pursue our career in research.

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SUCCESS STORY: TRANSFORMATION OF A STUDENT

When I reflect on my time as an M.Sc. (Immunology) student in the Amity Institute of Virology and Immunology (AIVI), one of the first things that come to my mind is 'personal'. When I joined AIVI, the institute was newly formed, few faculty members, no student (so technically, I was part of the first batch) and no laboratories. I said to myself, "this is risky, should I continue my studies here?". I took the risk and never regretted! After I joined, I realized the benefits of being in a small department. I felt that each of the teachers truly cared about helping me achieve my goals, both in their class and in starting my career. With the small number of students in the institute, I felt I was always appreciated for my efforts. The teachers took personal interest in making sure we understand the concepts of immunology and why is it important to study them. Despite being the naughtiest (as titled by Prof. Rishi), the faculty decided to make me the first ever class representative of M.Sc. (Immunology). Whether it's their trick to get me on the right path or they actually saw that I can represent the institute, the title truly boosted my confidence to perform better in class and outside.

Prior to charting out my career path, my teachers had discovered the 'researcher' in me. During my M.Sc., I had no desire of doing a Ph.D. However, destiny had some other story written for me and landed me with a career in research. And weird it may sound but now I love my job! Finding a Ph.D. position was not a cakewalk. And I realized it after sending out about 300 applications all around the world and being rejected by most of them. However, with the support of my teachers and their glowing letters of support and most importantly, a lot of patience, I was finally accepted into 4 prestigious institutions including the University of Liverpool, Imperial college of London, University of Western Ontario and University of Calgary. I was fascinated with the project offered by the University of Calgary so I decided to accept that out of all. I joined the University of Calgary which is located in Calgary, Canada in January, 2014 under the supervision of Dr. Jan Storek who is a world renowned hematologist. My Ph.D. project focuses on investigating the anti-leukemic activity of anti-thymocyte globulin (ATG, an immunosuppressive agent) in leukemic (blood cancer) patients. Through my Ph.D. project and skills gained so far, I wish to improve the outcomes of blood and bone marrow transplantation (BMT) which is the treatment of last resort for high risk leukemic patients. I have recently published my work that I did within 2 years of start of my Ph.D. in a peer-reviewed journal (Biology of Blood and Marrow Transplantation, impact factor: 4) and currently writing my second manuscript. Apart from working in lab, I am actively involved in volunteering activities such as teaching and mentoring high school as well as graduate students who helped me to gain leadership skills.

Recently, I was chosen as student representative of University of Calgary for the collaborations between University of Calgary and Ministry of Petroleum and Natural Gas (Government of India). As a member of the Canadian delegate team, I had the opportunity to meet the Hon'ble Mr. Dharmender Pradhan (Minister of Petroleum and Natural Gas, Govt. of India) and Hon'ble Dr. Harsh Vardhan (Minister of Science and Technology, Govt. of India). These small successes fuel me up to do better in life and to keep striving for the best and never settle for less. In future, I aspire to continue to do good research in field of cancer and contribute towards saving lives.

In the end, I would like to thank the AIVI faculty for being some of the few great teachers out there. I look back upon that time as so important in the development of the person that I am today. May you inspire others to achieve the greatness you have. And for my juniors I would like to say "keep your focus on the light at the end of tunnel, and think about what that accomplishment will mean to you". You just have to work hard and keep patience. Cheers!

With gratitude and best wishes,

Rosy Dabas
Ph.D. student
at the University of Calgary,
Calgary, Canada
AIVI alumni (2011-2013)

ISO CERTIFICATION FOR AMITY INSTITUTE OF VIROLOGY & IMMUNOLOGY

Amity Institute of Virology & Immunology (AIVI) is dedicated to perform best quality practices following the Quality Assurance & Enhancement (QAE) guidelines. These processes are audited regularly by internal institutional quality assurance cell (IQAC) and QAE cell of Amity University. On September 14th, 2015, auditor from *British Standards Institution* (BSI) conducted audit related to the management process and environmental care of AIVI. QAE coordinators, Dr. Devinder Toor and Dr. Nandlal Choudhary made available all the data, documents and evidences of management and environmental care process to the auditor. The auditor was satisfied with our processes and based on that recommended to award the following certificate to AIVI.

bsi Certificate of Registration: Quality Management System- ISO 9001:2008

bsi Certificate of Registration: Environmental Management System- ISO 14001:2004.

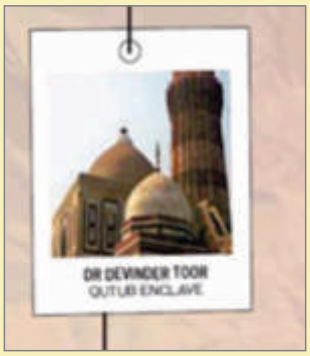
Dr. Devinder Toor &
Dr. Nandlal Choudhary
Assistant Professor and
AIVI QAE Coordinators,
Amity Institute of Virology & Immunology,
Amity Universit, Noida, Uttar Pradesh, India

PHOTOGRAPHS IN NATIONAL NEWSPAPERS

I have interest in photography and it is one of my hobby. I keep clicking photographs and submitted two of my photographs in the HT Click-o-contest of **Hindustan Times**. Both the photographs got selected and published on **13th May, 2015** and **2nd June, 2015.**

One of the selected photograph was later published along with my picture on **19th May, 2015.**

I submitted another photograph to **Times of India** for their campaign **'Lets Get Moving'** regarding the traffic problems in Delhi. My photograph got selected and published on **24th September, 2016**. The caption of the photograph stresses on the loss of family hours due to traffic jams.



Dr. Devinder Toor
Assistant Professor
Amity Institute of Virology & Immunology,
Amity University, Sec-125, Noida.

DT'S CROSSWORD CORNER

ACROSS

1. Human viral disease fully eradicated from world (8)
2. Basic structural, functional and biological unit of all known living organisms (4)
3. Molecular technique to amplify a region of DNA (3)
4. Opposite of chronic (5)
5. Instrument used for sterilization using high temperature and pressure (9)
6. Poisonous substance produced within living cells or organisms (5)
7. Hair-like appendage found on the surface of many bacteria (5)
8. Anti-body type responsible for allergy (3)
9. Membranous sac attached to an embryo, providing early nourishment (7)
10. Decrease in number of WBCs in blood (10)
11. Infectious protein agent that lacks DNA or RNA (5)
12. The energy molecule of the cell which drives many important reactions in the cell (3)
13. Coding regions of DNA (4)
14. Initial growth phase, during which cell number remains relatively constant prior to rapid growth (3)
15. Living organism in which the parasites reproduce is called..... (4)
16. Unprogrammed cell death (8)
17. Inflammation of pharynx (11)
18. Agency of United Nations that is concerned with international public health (3)
19. Any foreign substance capable of inducing an immune response (7)
21. Virus that kills bacteria (13)

DOWN

17. Fluid consisting of dead leukocytes at the site of inflammation (3)
22. Alternative forms of the same gene (7)
23. Term used when a disease occurs in greater numbers than expected in a community or region during a season (8)
24. Process of conversion of DNA to RNA (13)
25. Part of the Antigen recognized by the antibodies (7)
26. Causative organism of AIDS (3)
27. Molecular unit of heredity of a living organism present in DNA (4)
28. Since Viruses do not grow on media, therefore they are inoculated in ..... (3)
29. Most abundant anti-body isotype found in the circulation (3)

Dr. Devinder Toor
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Amity Institute of Virology & Immunology,
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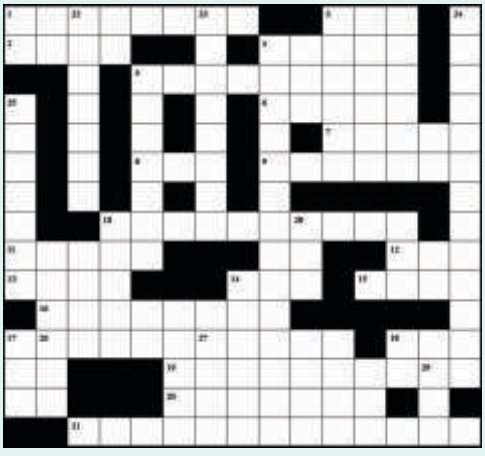
DT'S CROSSWORD CORNER



DT'S CROSSWORD CORNER (ANSWERS)

S	M	A	L	L	P	O	X			P	C	R	T
C	E	L	L			U		A	C	U	T	E	R
		L		A	U	T	O	C	L	A	v	E	A
E		E		N		B		T	O	X	I	N	N
P		L		T		R		L		P	I	L	U	S
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O			L	E	U	K	O	P	E	N	I	A		I
P	R	I	O	N				H	G			A	T	P
E	X	O	N				L	A	G		H	O	S	T
	N	E	C	R	O	S	I	S						I
P	H	A	R	Y	N	G	I	T	I	S		W	H	O
U	I				P	E	N	I	C	I	L	L	I	N
S	V				A	N	T	I	G	E	N		G	
		B	A	C	T	E	R	I	O	P	H	A	G	E

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