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## **VIROdesk** **Newsletter**

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### **DIRECTOR'S MESSAGE**

We have reached the last lap of 2021 after yet another very eventful year. In the second year of the pandemic, the whole globe perceived a ray of light with the development of vaccines and the start of the vaccination drive. Our lives have started moving ahead trying to meet the terms of normalcy.

Amidst this, we are glad to bring forth the last issue of the NIV-Newsletter VIROdesk for 2021 which features the pioneering studies on Medical Entomology at our institute right from its inception till date. The journey has been a fascinating one with pioneering activities which led to the establishment of the Medical Entomology & Zoology Group at the ICMR-NIV, Pune. This issue features a thematic article on seven decades of research and the enormous contributions in understanding the natural cycle of arboviruses including ecological factors. The mighty Himalayan survey undertaken during the early 1960s from Rajasthan to Arunachal Pradesh generated huge data on blood-sucking arthropods and vertebrate reservoir hosts of arboviruses, the comprehensive investigations of the Japanese encephalitis virus outbreak and investigations of the Kyasanur Forest Disease. Identification of the etiological agent using virological techniques improved the understanding of virus transmission and helped in the management of vector-borne diseases in the country, subsequently.

The department is also credited for the establishment of the first mosquito cell line in the world providing a key tool for isolation of arboviruses, especially dengue and subsequently several cell lines from medically important mosquitoes and ticks. Imparting trainings for the whole country on vector collection, taxonomical studies of vector species and virus isolation were part of our pursuits. The expertise of the department was not restricted to medical entomology, but also spanned other areas of field biology, viz., studies on rodent-borne to bat-borne viruses. Keeping with the advances of molecular biology, metagenomics analyses of viromes of *Aedes aegypti* mosquitoes across the country have also been initiated.

An interview with Mr. Ravindra Soman, a Senior Entomologist of ICMR-NIV, who bridged the VRC and NIV eras provides us glimpses of the work culture, at VRC under the expert guidance of eminent American scientists from the Rockefeller Foundation, as well as stalwarts of India. A brief review article on zoonotic vector-borne diseases included in this edition is noteworthy especially when the world is experiencing a surge in zoonoses. We are also glad to announce the launch of ArVirInd, a database on arboviruses and their vectors, created by us. Additionally, we have the 'student's corner', literary contributions from NIV staff, awards and honors received by NIV staff and several events. The year ended with the news of the sad demise of Dr. KM Pavri, the first woman Director of NIV on 27<sup>th</sup> December 2021. A hardcore serologist, her contributions in the development of diagnostics for KFD, JE, dengue, chikungunya, hepatitis and AIDS are unparalleled.

I hope this issue of the newsletter meets your expectations. We welcome your feedback to improve the quality of future editions.

Signing off from 2021, wishing you happy reading and a very Happy New Year!

**Priya Abraham**

Jai Hind!

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## Medical Entomology at ICMR-NIV, Pune: A journey of seven decades

Dr. MD Gokhale (Scientist D) & Dr. AB Sudeep (Scientist E)

In response to the global surveillance of arboviruses, "Virus Research Centre" was established under the aegis of the ICMR and the Rockefeller Foundation, USA at Pune, Maharashtra in 1952. Since the mandate was identification of arthropod vectors and arboviruses across the country, the Medical Entomology and Zoology department was created to run the flagship program. A few enthusiastic Indian scientists under the guidance of international experts paved the way for arbovirus research in the country. The initial studies addressed the role of hematophagous arthropods in the transmission of viruses during outbreaks and inter-epidemic periods. Later, the mandate was extended to ecological studies to understand the natural cycle of arboviruses and virus-vector interaction studies to substantiate the vector potential of the arthropods. Over the last seven decades, the group has made phenomenal contributions towards the understanding of major arboviruses of the country viz., Kyasanur Forest Disease virus (KFDV), Japanese encephalitis virus (JEV), West Nile virus (WNV), Chandipura virus (CHPV), Crimean Congo Hemorrhagic Fever virus (CCHFV), dengue virus (DENV), chikungunya virus (CHIKV), etc.

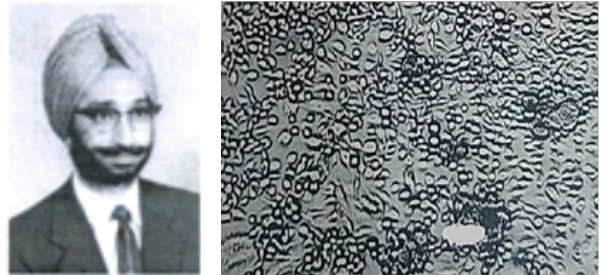
▶ The first entomological activity of the group was initiated as vector biology support during a mystery outbreak at Jamshedpur in 1954. Extensive mosquito collections were made from the affected areas to isolate the etiological agent. These studies led to the establishment of systematic workflows for investigation of arboviral disease outbreaks.

▶ Another major contribution of the Group was in the field biology studies on KFDV. This tick-borne virus that causes fatal infection in monkeys and occasionally in humans was first reported in Shimoga, Karnataka in 1957. Extensive field studies revealed the involvement of 16 species of ticks in KFDV transmission. The virus is maintained in nature among small forest mammals such as rats, mice, squirrels, insectivorous and frugivorous bats, shrews and birds. The comprehensive studies unearthed valuable information about the virus, i.e., maintenance in nature, transmission and other ecological factors. Colonies of important KFD vector ticks were maintained and their vector potential as well as transovarial transmission (TOT) were demonstrated experimentally.

▶ The Group also undertook extensive studies to understand the natural cycle of JEV that caused large-scale outbreaks in different parts of India since 1955. Field studies revealed 19 vector mosquito species responsible for the virus transmission, as well as the reservoir and amplifying hosts instrumental for maintenance and dispersal of the virus. In-depth studies, i.e., vector seasonality and disease

occurrence, endophilic behavior of *Culex tritaeniorhynchus*, the universal vector of JEV, virus isolation from wild caught mosquitoes and sentinel hosts, etc. have been carried out in Vellore, Kolar, Mysuru, Gorakhpur, Bellary and Warangal. The demonstration of the absence of viremia in cattle is a classic piece of research work by the group.

▶ One of the seminal work the department has made was the establishment of cell lines from hematophagous arthropods that eased studies on virus isolation and virus vector interaction. In 1967, the world's first mosquito cell line was established by Dr. KRP Singh of the department from *Aedes albopictus* and *Aedes aegypti* mosquitoes.



Dr. KRP Singh and the ATC-15 cell line developed by him

Dr. Singh's ATC-15 cell line developed from *Aedes albopictus* mosquitoes garnered worldwide acceptability among researchers due to its broad spectrum susceptibility to arboviruses. The cell line supported the replication of more than 50 arboviruses. A clonal population of the cell line, C6/36, developed by Dr. Akira Igarashi in 1978 has generated tremendous interest among virologists and is the most widely used cell line for dengue virus studies worldwide. Subsequently, several cell lines from important vector mosquitoes, viz., *Culex tritaeniorhynchus*, *Cx. bitaeniorhynchus*, *Aedes vittatus*, *Ae. novalbopictus*, *Ae. krombeini*, etc. were developed. The department also established cell lines from three tick species to study tick-borne viruses. Eight novel lepidopteran cell lines were developed from economically important agricultural pests for production of bio-pesticides and recombinant proteins.

▶ The Hematophagous Arthropod Survey in the Himalayan Region spanning from Kashmir to the erstwhile NEFA (Arunachal Pradesh) was a mammoth task undertaken by the department. The study generated huge data on blood-sucking arthropods along with vertebrate reservoir hosts of arboviruses, viz., birds, mammals, and reptiles. During the survey, several new species of arthropods [mosquito (1), sand flies (2), lice (14), fleas (2), bugs (3), ticks (18) and mites (64)] and mammals [rodent (1), bird (1)] were described. Using the procedures of taxidermy many of these specimens have been preserved in a museum by the group for academic and research purposes. NIV museum has 52 species of rodents, 342 species of birds, 22 species of bats and a huge collection of arthropods [mosquitoes (203 spp.), ticks (52 spp.), fleas (35 spp.), mites (50 spp.) and sandflies (15 spp.)].

▶ Chandipura virus, an encephalitic virus that causes high mortality in children was first isolated in India in 1965. The department contributed in identifying the vectors involved in the maintenance and transmission of the virus by isolation from *Phlebotomus* and *Sergentomyia* sand flies, and by subsequent experimental studies on their vector potential.

▶ As part of dengue studies, the group carried out extensive surveys of *Aedes aegypti* across the country. The study was structured for villages, towns/cities separately with an aim of in-depth analysis of *Aedes aegypti* prevalence at different breeding habitats. The impact of ecological changes due to urbanization and transport on the vector abundance and distribution was also documented. Studies were also conducted to understand the distribution of *Aedes aegypti* along the western coast of India from Kanyakumari to the Kutch.

▶ During the CCHFV outbreak in Gujarat in 2011, the group supported in the collection and identification of ticks.

▶ The group has also contributed in experimental studies on vector potential of *Aedes aegypti* for Zika virus.

▶ Enormous data has been generated on the vector competence of different mosquitoes to JEV, DENV, CHIKV, CHPV, WNV, etc. The Group also demonstrated the potential of different mosquitoes in maintaining the viruses during inter-epidemic periods by revealing transovarial and venereal transmissions.

▶ Mosquito inoculation technique (MIT) for virus propagation in mosquitoes was a novel technology adapted by the department. MIT is routinely being used by the Group for screening and isolation of DENV, CHIKV and JEV from field samples.

▶ Using molecular tools, the group demonstrated CHIKV binding receptors on the midgut membrane fractions of *Aedes aegypti*, elucidated the biochemical response to insecticide resistance and studied the immune responsive genes during parasitic and viral infections.

▶ Recently, the Group has initiated metagenomics studies on virome of *Aedes* mosquitoes from different parts of the country. Pilot studies on mosquitoes collected from Pune revealed the presence of reads corresponding to several human pathogenic arboviruses as well as insect-specific viruses.

▶ The Group has also recently ventured into the study of bat-borne high pathogenic viruses and contributed to the investigations on several outbreaks of Nipah virus disease in Kerala. The group also participated in a countrywide survey of the Nipah virus in fruit bats (*Pteropus*).

Over the period of the past 7 decades, the Group has laid a solid foundation in classical and molecular entomology. The Group gratefully acknowledges the contributions of all the erstwhile colleagues in this successful journey.



Mosquito collection from breeding habitats



Tick collection from field by flag dragging method

## Vector-borne zoonotic diseases and their challenges

Dr. R. Balasubramanian (Scientist D, ICMR-NIV Kerala Unit)

Vector-borne diseases (VBD) have shown a progressive surge in recent years and pose a major challenge to the public health. Approximately, 1500 species of infectious organisms are known to be pathogenic to humans, of which 61% are classified as zoonotic. Most of the VBDs exist in a complex zoonotic cycle involving a variety of vertebrate animals and are transmitted to humans by hematophagous arthropods, viz., mosquitoes, ticks, sand flies, mites, etc. The ecology and epidemiology of VBDs are mainly influenced by the adaptability of the pathogen, the vector, the host and climate. Human activities viz., deforestation, changes in agricultural practices, alterations in water management, unplanned infrastructure development, etc. have contributed considerably for the emergence or reemergence of several vector-borne viruses.

During the last few decades, India experienced several VBD outbreaks with high morbidity and mortality. Though the incidence of malaria, filariasis and leishmaniasis has been brought down substantially, arboviral infections i.e., Japanese encephalitis, dengue, Zika, chikungunya, West Nile, Kyasanur Forest Disease, Crimean Congo Hemorrhagic Fever, etc. have surged phenomenally causing large scale outbreaks. This article is limited to the zoonotic vector-borne viruses of public health importance in India.

KFD virus, a tick-borne hemorrhagic virus, was first reported in 1955 from Shimoga district of Karnataka during an outbreak involving humans with fatalities. Human infections are preceded by monkey deaths as monkeys amplify the virus and die due to hemorrhage. Ticks belonging to *Haemaphysalis* group are the main vectors for the virus, which is maintained in nature by ticks, rodents, birds, and small mammals. The virus remained restricted to Karnataka for decades, but lately has shown geographic expansion to Kerala, Tamil Nadu and Maharashtra exposing the naïve populations. Similarly, the CCHF virus has also become endemic to Gujarat and Rajasthan since its first detection in Gujarat in 2011. The virus is maintained in domestic animals, viz., sheep, goats, cattle, etc. and is transmitted to humans through ticks.

Japanese encephalitis virus, a mosquito borne flavivirus is an important zoonotic virus that causes large scale encephalitic outbreaks in children with 10-20% mortality. It was first reported from North Arcot district in Tamil Nadu in 1955 and spread to other parts of the country causing large scale outbreaks in Karnataka, West Bengal, Assam, Uttar Pradesh and Bihar. The virus has been isolated from 19 species of mosquitoes and is maintained in ardeid birds (herons, egrets) and mosquitoes. Domestic pigs serve as the amplifying host for the virus.

West Nile virus is another important zoonotic virus in India. It is maintained in nature by a plethora of vertebrates and vectored by more than 30 species of mosquitoes. In India WNV infection is self limiting, but a small percentage of people develop neurotropic infection causing deaths as seen in Assam (2003) and Kerala (2011).

In addition to the above, a number of viruses of zoonotic origin vectored by arthropods have shown their potential to cause human infections. Ganjam virus, which is a variant of the Nairobi sheep disease virus, causes large scale outbreaks in sheep and goats in India. The virus was isolated from a boy with febrile illness in Tamil Nadu. Ingwavuma virus, a mosquito-borne arbovirus reported initially from Africa has been found circulating in India. Though the virus is maintained in nature in a pig-mosquito-bird cycle, human infection has been confirmed by virus isolation and detection of neutralizing antibodies. ICMR-NIV has also isolated a large number of viruses from arthropods and animals, viz., Thimiri virus, Bhanja virus, etc. with human pathogenic potential. Though no major outbreak involving humans has been reported yet, the potential of these viruses to replicate in different species of mosquitoes and vertebrates including humans pose a threat to public health should there be a change in their genomes. Further studies will help in the preparedness by developing diagnostics and potential therapies against these viruses.

### Identification of Phasi Charoen-Like Virus, a novel insect specific virus in *Aedes aegypti* mosquitoes in Karnataka

*Dr. Ashok M (Scientist-B, ICMR-NIV, Bengaluru Unit)*

Arthropod-borne viruses remain a major threat to public health, causing hundreds of thousands of human infections and deaths worldwide every year. Advances in molecular biology techniques such as whole genome sequencing have been yielding greater insights into their epidemiology. Such studies, occasionally, have also revealed the circulation of a range of insect-specific viruses in mosquito populations, with unknown impact on human and animal health.

During the investigations of a chikungunya outbreak in Mantapa Village, Bengaluru District,

Karnataka in June 2019, an insect-specific flavivirus was detected in *Aedes aegypti* mosquitoes. Whole genome sequencing revealed the presence of Phasi Charoen-like virus (PCLV), an RNA virus of genus Phasivirus within the Family *Phenuiviridae*. This virus has been reported in field-caught *Aedes aegypti* mosquitoes in several countries (Americas, Asia and Australia) earlier, but has not been reported from India so far. On subsequent screening, PCLV was detected in 26 *Aedes aegypti* pools collected from 6 districts of Karnataka. Phylogenetic analyses of the sequences revealed similarity of 97.1-98.3% with PCLV sequences from Thailand. Dual infection of PCLV with dengue and/or chikungunya viruses was also detected in five mosquito pools.

Despite their widespread circulation in mosquitoes, PCLV is not known to cause infection in humans. However, its impact on the replication and transmission of disease-causing arboviruses within mosquitoes is currently unknown, calling for detailed studies.

### An interview with Shri. Ravindrakumar S Soman

*(Former Deputy Director, Medical Entomology & Zoology Group, ICMR-NIV, Pune)*

#### 1. Kindly tell us about your entry at the Virus Research Centre (VRC).

After my post graduation in Zoology from the Pune University and a short stint as a lecturer at Govindram Seksaria College in Belgaum, I joined VRC as a Research Assistant in the Entomology Group in 1968. One of the major areas of research at VRC during those days was field and laboratory studies of KFD and its vectors, which I started learning. The Director, Dr. T. Ramachandra Rao assigned me to work on mosquito taxonomy and ecology at the VRC Field Station, Christian Medical College, Vellore. I was assigned to Dr. Rachel Reuben, an eminent entomologist par excellence.



#### 2. How were your initial years and the work environment at the field stations? Can you summarize some of the focus areas in your research career and major achievements?

During those formative years of my career, I worked extensively on the ecological aspects of dengue vectors as well as to understand the natural cycle of Japanese encephalitis virus. I was fascinated with dengue and JE vector ecology. I was also associated with dengue fever outbreak investigations and *Aedes aegypti* survey in the East and West coast of peninsular India. As the Officer in-charge of the newly established virology unit at Bangalore, I worked to understand the correlation of seasonal prevalence of *Aedes aegypti* and dengue virus incidence in humans, diurnal biting

and feeding rhythms, ovipositional preferences and virus isolation.

I worked on JE vectors in the Nagarjuna Sagar dam catchment areas and districts of West Bengal, Assam and Arunachal Pradesh. Establishment of a field station at Gorakhpur for the studies on JE was another milestone in my career. We have done extensive laboratory transmission studies and serosurveys to implicate the role of birds and vectors in JEV ecology. We have also demonstrated JEV growth kinetics in different vectors and trans-ovarial transmission. I was also involved in the surveys of haematophagous arthropods conducted by NIV in Andaman and Nicobar Islands in connection with the Andaman Hemorrhagic Fever.

### 3. How would you place the role of good mentorship in entomological science and research?

As mentioned earlier, being a Research Assistant to Dr. Reuben was the best thing to happen in my research career. She guided me to learn the natural cycle of arboviruses with a combination of field observations and laboratory perspectives. This helped me in gaining a keen understanding of the nuances of arboviruses. In addition, I had the opportunity to work with scientists Dr. T. Ramchandra Rao, Dr. KRP Singh, Dr. Vijay Dhanda, Dr. HR Bhat and many more who were the pillars of arbovirology in India. Those were very exciting times and I can still feel that enthusiasm when we identified a novel *Aedes* species viz., *Aedes (Diceromyia) ramachandrai* from India.

### 4. What would be your message to the future generation of researchers and students of Medical Entomology and Zoology?

I would suggest them that one should develop a passion for this discipline and keep abreast with the latest developments in technology to address the unanswered questions related to the recent surge of arboviral infections.

### 5. Are you associated with science post retirement?

I have been associated with 'Lokvidnyan Sanghatana' over three decades for popularization of science among the masses through Vidnyan Yatras and exhibitions in towns and villages and publication of Lokvidnyan Calendar.

[Interviewed by Dr. MD Gokhale (Scientist D, ICMR-NIV, Pune)]

## ArVirInd, a new database for Arboviruses and Vectors by ICMR-NIV

An online database of curated antigenic proteins from arbo-viruses isolated from India and other countries of the Indian subcontinent namely Bhutan, Bangladesh, Nepal, Sri Lanka, Maldives and Pakistan has been developed in 2020 by a team of scientists at the ICMR-NIV, Pune. This knowledge-base, named ArVirInd, is a quick reference of papers on arboviruses and vectors,

published by NIV Pune from 1957 to 2019 and can be accessed at <http://arvirind.co.in/>.

[With inputs from Dr. Pratip Shil, Scientist D, Dr. Nitin Atre, Research Associate & Dr. K Alagarasu, Scientist D, ICMR-NIV, Pune]

## Scientific Desk

1. Kant R, Dwivedi G, Zaman K, Sahay RR, Sapkal G, Kaushal H, Nyayanit DA, Yadav PD, Deshpande G, Singh R, Chaowdhary S, Gupta N, Kumar S, Abraham P, Panda S, Bhargava B. Immunogenicity and safety of a heterologous prime-boost COVID-19 vaccine schedule: ChAdOx1 vaccine Covishield followed by BBV152 Covaxin. *J Travel Med.* 2021 Oct 15: taab166. doi: 10.1093/jtm/taab166. Epub ahead of print.

(**Summary:** The evidence for the effectiveness of heterologous priming of the COVID-19 vaccine is very limited. Here, we studied eighteen participants who received a heterologous vaccination regimen of AstraZeneca's ChAdOx1-nCov-19 followed by inactivated whole virion BBV152. Heterologous group participant doesn't report any adverse event following immunization and demonstrated high humoral and neutralizing antibody response.)

2. Sapkal GN, Yadav PD, Sahay RR, Deshpande G, Gupta N, Nyayanit DA, Patil DY, Shete AM, Kumar S, Abraham P, Panda S, Bhargava B. Neutralization of Delta variant with sera of Covishield vaccinees and COVID-19-recovered vaccinated individuals. *J Travel Med.* 2021 Oct 11;28(7):taab119. doi: 10.1093/jtm/taab119.

(**Summary:** This study compared the neutralizing antibody responses against B.1 (D614G) and Delta variants of SARS-CoV-2 in the sera of 116 individuals who received Covishield vaccine. This included (i) 31 individuals who received a single dose of the vaccine, (ii) 31 who received 2 doses, (iii) 19 who recovered from COVID-19 acquired after the 1st dose, (iv) 20 who recovered from COVID-19 acquired after 2 doses and (v) 20 breakthrough cases of COVID-19. Sera of categories (i) and (ii) showed 4.5-fold and 3.2-fold reduction in neutralizing antibody (NAb) titres against the Delta variant, compared to B.1. Subjects who had two vaccine doses showed higher NAb titres (against both variants) than those who received only one dose. Higher titres of IgG antibodies targeted against RBD and N protein were noted in categories (iii) to (v). Sera of cases with breakthrough COVID-19 and recovered patients who had received one or two doses of vaccine showed higher protection against the Delta variant, compared to individuals who received either one or two doses of the vaccine. Long-term follow-up of participants could help to understand the impact of natural infection and vaccination on long-term protection offered by Covishield. Immune escape mutants also need to be tracked among the breakthrough cases.

## Obituary

Dr. Khorshed M. Pavri, the first woman director of the National Institute of Virology (NIV) and a great human being breathed her last on 27<sup>th</sup> December 2021. She retains an exalted position in the field of virology both in India and abroad. Her dedicated service, strong sense of work and research ethics, exemplary



**Dr. Khorshed M. Pavri  
(1927-2021)**

research contributions, mentorship of students and visionary leadership will serve as an inspiration to the budding as well as seasoned virologists.

Dr. Pavri completed her Ph.D. in Microbiology in 1953 and proceeded to the USA on Fulbright Smith Mundt Fellowship for further studies in Virology. She started her career in NIV, Pune with studies on Kyasanur Forest Disease virus, that caused havoc in the Shimoga district of Karnataka. She was instrumental in the isolation of the virus from different bat species, ticks, small forest mammals thereby shedding light on its natural cycle. She played a crucial role in identifying the etiological agent during a hemorrhagic fever outbreak with more than 200 deaths reported from Kolkata in 1963. This was the first isolation of chikungunya virus in India. She also played active role in the investigations of Japanese encephalitis virus in Tamil Nadu and Karnataka; West Nile virus in Karnataka and dengue virus in Rajasthan. Several novel viruses i.e., Balagodu, Kaisodi, Wanowrie, Palyam, Kasba, etc., were isolated by Dr. Pavri.

During her tenure as the director of NIV (1978-88), her attention was drawn to the hepatitis virus infections and she contributed to the understanding of transmission of Hepatitis A, B, and E viruses. Her efforts resulted in the screening of blood and blood products in blood banks at the national level. She also played an important role in supporting the vaccine trials for these viruses. Another contribution was the identification of enteric viruses that caused fatal gastroenteritis among children and initiation of routine screening to identify the etiological agents. Her attention and tireless efforts led to the development of diagnostics against HIV detection at NIV, Pune that helped to detect the first cases among prostitutes in Tamil Nadu and Pune in 1986. Post retirement, she worked as a Project Director of the Centre for AIDS Research and Control and published a bulletin "CARC Calling".

Dr. Pavri mentored many post graduate and doctoral students in the field of virology. Dr Pavri had initiated the 'Diploma in Medical Virology' course at NIV, which has matured into a full-fledged Master's degree course in Virology affiliated to the Savitribai Phule Pune University in Pune. She served on many national and international committees including those of the World

Health Organization (WHO). She was a member of the Scientific Committee to the Cabinet and also of the World AIDS Foundation. ICMR-NIV family fondly remembers Dr. Pavri. May her soul rest in peace.

We deeply mourn the sad demise of Mr. Vijay M. Ayachit on 12<sup>th</sup> November, 2021. Mr. Ayachit retired from ICMR-NIV as a Senior Technical Officer in 2019, after serving the Institute for 39 years. He initially joined the Immunology Group (presently, the Encephalitis Group), and later in the Diagnostic Virology Group. He



**Vijay M. Ayachit  
(1959-2021)**

had expertise in serological methods, virus isolation, cell culture and animal experimentation. His significant contributions have been in the development of the first indigenous Japanese encephalitis vaccine (JENVAC), in collaboration with Bharat Biotech International Limited. He was a soft-spoken and gentle person and a caring colleague for all the staff and students he associated with, and will be fondly remembered by the NIV family. We join his family in their mourning, and pray that his soul rests in eternal peace.

## Personal Anecdote

**"Life Lessons Learnt from the COVID-19 Pandemic"**

*Mrs. Triparna D. Majumdar  
(Technical Officer, BSL-4 Group ICMR-NIV, Pune)*

We are nearing the completion of the second year since the deadly COVID-19 pandemic struck the world. The first SARS-CoV-2 positive case reported from India was in January 2020. The situation turned grimmer, with a 21-day nationwide lockdown being declared on 24<sup>th</sup> March, 2020. This lockdown got extended for another 14 days and eventually for months to follow; and quite unknowingly we transitioned into the New Year 2021. Just as we had got accustomed to the 'New Normal' in our daily lives, the whole country had the deadly second wave in March-April 2021, caused by the highly infectious Delta variant. Shortage of ICU beds in hospitals, empty oxygen cylinders, thousands of people losing their near and dear ones, exhausted doctors; the virus had reached our very doorstep. Soon the whole country turned into a pyre of dead bodies. Many at-risk people, who had luckily evaded the virus during the first wave, sadly succumbed to it in the second wave. However, standing at this juncture of the pandemic and looking back at these two years, we all had some life lessons.

**Dedication and Diligence Never Fails** - At ICMR-NIV, Pune we worked round-the-clock under tight schedules and deadlines. Being part of many important studies, I got the opportunity to know the SARS-CoV-2 virus up-close, and would have never witnessed it, if not for this

pandemic. However, my key learning was that, even small roles that we get to play eventually count in big ways if done with honesty and diligence.

**'New Normal'** – Globally the pandemic instilled in us hand washing and sanitization practices, social distancing and compulsory use of masks. The added benefit was the decrease in the cases of common cold, flu, etc. apart from keeping ourselves safe from the deadly SARS-CoV-2.

**Where there is a will, there is a way** - With the onset of the lockdown measures, our lives came to a sudden halt – no means of public transport, no domestic help and with limited amenities, we were left with no choice than to take charge of everything ourselves, from online grocery shopping to daily chores. Time has now moulded us to meet any challenges and realized that where there's a will, there surely is a way.

**From Real to Virtual** - Lockdown enforced workplaces, schools and colleges to shut down. The concept of 'Work from Home' was introduced – wherein people worked from the comfort of their homes, and worldwide communication was possible avoiding the hassle of travelling. Children learnt the use of computers and today are more tech-savvy than many adults.

**Family values re-visited** - The wrath of the pandemic was such that thousands lost their dear ones to the virus - rich and poor alike; no social gatherings or religious festivities, restrictions even for funerals - the very root of man being a social animal was shaken. Family values, need for friends and well-wishers around was felt more than ever.

**Being compassionate** - The heart-wrenching scenes of thousands of migrant workers walking across states to reach their homes, carrying their belongings; elderly people, pregnant women and children walking without food and water - sent a chill down our spine. We realized that there is nothing above humanity.

**Prepared for times ahead** – The untiring efforts by the Ministry of Health and Family Welfare, Government of India led to the start of the nationwide vaccination drive from 16<sup>th</sup> January, 2021, which was a silver lining to the dark looming cloud of the SARS-CoV-2 pandemic. Today, with majority of the Indian population being vaccinated, the severity of infection seems to be diminished. But the pandemic is not over yet. And we will not surrender to the virus.

## Students' Corner



*(Contributed by Ms. Vaishnavi Giri, MSc Virology Student, 2020-22 batch)*

## Events at ICMR-NIV

1. The **Vigilance Awareness Week** was observed from 26<sup>th</sup> October to 1<sup>st</sup> November, 2021. All staff members read a pledge on 26<sup>th</sup> October, 2021, across both the campuses. A link for online pledge was also made available on the institute's website. An online lecture on the topic by Dr. Prashant Dhakephalkar, Director, Agarkar Research Institute was also held as part of the observation. An Essay Competition was also held on 31<sup>st</sup> October, 2021, for the staff.
2. A special drive on **Swachhata Abhiyan** was conducted during October 2021, and cleaning activities were carried out in all Groups and both the Campuses.



3. A half-day **Workshop on Adult Basic Life Support** was organized in the institute in collaboration with the Department of Anesthesiology, MIMER Medical College and Dr. BSTR Hospital, Talegaon on 4<sup>th</sup> December, 2021. A total of 22 participants attended the training.

## Awards

### Dr. Pragya Yadav

(Scientist E & Group Leader, Maximum Containment Facility), received the following prestigious awards:

**National Academy of Medical Sciences Amritsar Award** for Best Orator and **Dr. Vinod Kumar Bhargava Award** for her work on "Immunogenicity and protective efficacy of inactivated SARS-CoV-2 vaccine candidate, BBV152 in rhesus macaques" at Banaras Hindu University on 28<sup>th</sup> November, 2021.

**Sharda Shakti Vishesh Samman Puraskar** for being a Women Warrior in the COVID-19 pandemic from the Sharda Shakti, Maharashtra Unit, on 4<sup>th</sup> December, 2021.

**Award of Honour to The COVID-19 Frontline Warrior** by the National Academy of Sciences, India at the 91<sup>st</sup> Annual Session and Symposium on Interface between Biological and Physical sciences on 4<sup>th</sup> December, 2021.



### PhD awarded

**Mrs. Nitali Tadkalkar** was awarded a PhD degree in Biotechnology by Savitribai Phule Pune University for her thesis titled 'Investigating the role of Dengue Virus non-structural protein-1 on endothelial cell ultrastructure and junctional physiology' completed under the guidance of Dr. Atanu Basu, Scientist G, ICMR-NIV, Pune.



### University Toppers in MSc Virology Examination of Savitribai Phule Pune University



**Mr. Avirup Sanyal**  
(2018-20 Batch)



**Mr. Abhranil Gangopadhaya**  
(2019-21 Batch)

### Dr. AB Sudeep

(Scientist E, Medical Entomology & Zoology) received the prestigious SOMA Young Scientist Award during the 14<sup>th</sup> International Conference on Medical Arthropodology on 27<sup>th</sup> November, 2021.



### Dr. MD Gokhale

(Scientist D, Medical Entomology & Zoology) received the prestigious Anantha Krishna Award during the 14<sup>th</sup> International Conference on Medical Arthropodology on 27<sup>th</sup> November, 2021.



### Dr. Mallika Lavania

(Scientist D, Group Leader, Enteric Viruses) received the ICMR-JALMA Trust Orator Award for 2020, in December 2021.



### Best MSc Virology Thesis Award



**Ms. Anjali Shrivastava (2019-21 Batch)** won the Best Thesis Award for her MSc Virology dissertation (completed under the guidance of Dr. Vandana Saxena, Scientist D, ICMR-NARI, Pune).





## Outbreak investigation

- ▶ The Bacteriology and Enteric Virus Groups investigated an outbreak of cholera in Village Top, PHC Shirol in Kolhapur, Maharashtra during October 2021. A total of 108 cases occurred in a population of 2299 in 508 households, with a peak of 43 cases on the 28<sup>th</sup> of October (attack rate 4.69%).
- ▶ Investigations in coordination with the local rapid response team revealed leakage in water supply pipelines (located close to shallow drainage areas) from a public well as the incriminating factor.
- ▶ *Vibrio cholerae* O1 Ogawa was detected in 8 out of 20 stool samples. Additionally, norovirus was detected in two and sapovirus in one samples, respectively. Results were communicated to the stakeholders.
- ▶ All patients were managed symptomatically, and there was no mortality. Public health measures were suggested to the local Gram Panchayat Sarpanch and Gram Sevaks of the village, including provision of alternate arrangements for drinking water, chlorination of well, repair of damaged supply pipelines, and provision of chlorine solution to households.
- ▶ The last case was reported on 1<sup>st</sup> November, and the outbreak was declared to be over on 11<sup>th</sup> November, 2021.

## ICMR-NIV in News

### Dr Khorshed M Pavri, NIV's first woman director, dies at 94

EXPRESS NEWS SERVICE  
PUNE, DECEMBER 28

DR KHORSHED M Pavri, former Director of the National Institute of Virology (NIV), Pune, died at the age of 94 in Mumbai on Monday.

She was NIV's first woman director (1978-88), and steered the institute to great heights, an official statement issued by ICMR NIV said.

Born in 1927, she was a viro-



Dr Khorshed M Pavri

logist par excellence and her core areas of interest included viruses that cause hepatic and enteric infections. She made significant contributions to the understanding of the transmission of Hepatitis A, B, and E viruses and the identification of enteric viruses that caused fatal gastroen-

teritis among children. She contributed to the foundation of modern clinical and epidemiological research on arboviruses in the country. She was also an authority on several virology diagnostic techniques.

Dr Pavri served on many national and international committees including those of the World Health Organisation (WHO). She was a member of the Scientific Committee to the Cabinet and also of the World AIDS Foundation.

With PTI inputs

### Small ICMR study finds vaccine mixing safe, offers better immunity

ANURADHA MASCARENHAS  
PUNE, OCTOBER 16

A LIMITED study conducted by the Indian Council of Medical Research (ICMR) among 18 participants has found that a combination of Covishield and Covaxin shots is safe and, in fact, offers better immunogenicity than two doses of the same vaccine.

The researchers, however, have made it clear that the evidence is very limited and called for multi-centre randomised clinical trials to conclusively prove the findings.

"The reactivity profile of the participants of the heterologous group demonstrated that mixing of the two vaccines derived from different platforms is safe," said the study, conducted

by ICMR- Regional Medical Research Centre and ICMR-National Institute of Virology. It has been accepted for publication in the International Journal of Travel Medicine.

This study comes months after several people in Uttar Pradesh received Covishield as the first dose followed by inadvertent administration of Covaxin as the second dose.

Dr Rajni Kant, director of ICMR's Regional Medical Research Centre, Gorakhpur, and lead author, told *The Indian Express* that this was a small study involving 18 participants.

They received a vaccination regimen of Covishield followed by Covaxin. The participants did not report any adverse event following immunization and demonstrated high antibody response.

## ICMR-NIV isolates Omicron strain, to check jab efficacy

Umesh.Isalkar@timesgroup.com

**Pune:** Scientists at the Pune-based Indian Council of Medical Research-National Institute of Virology (ICMR-NIV) have successfully isolated the Omicron strain of the novel coronavirus at the high-end bio-safety laboratory in Pashan. The step is critical in assessing the efficacy of vaccine as well as natural infection-induced antibodies in thwarting severe disease.

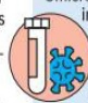
"The Omicron variant of the virus, with all its signature changes (mutations), has been isolated. This is a milestone achievement that will further facilitate vaccine efficacy studies. In the next two weeks, we

### NEXT STEP IN CURBING THE DISEASE

▶ Scientists at ICMR-NIV have isolated the Omicron strain in the lab in ample amounts using animal cells

▶ Now, they will draw neutralizing antibodies from the serum or blood of Covid recovered patients/vaccinated humans

▶ The lab-cultured (grown) Omicron strain will be used in the neutralization study by subjecting the strain to antibodies drawn from the recovered patients/vaccinated participants and examining how they react with each other



will be able to effectively gauge vaccine efficacy of Covishield and Covaxin against the new variant," an ICMR official told TOI on Wednesday.

The exercise will also find an answer to another critical question: Will the new variant

outsmart existing antibodies in those who have had Covid from old strains? "Virus isolation is a significant achievement and the first step forward to know this. Now, we can take up a neutralization study to assess the efficacy of Covaxin-

and Covishield-induced antibodies and natural infection-induced antibodies against the Omicron lab-grown strain," the official said.

A neutralization study is the best way to assess vaccine efficacy and chances of reinfection. Through this, the scientists will also be in a position to compare the level of neutralizing ability of the vaccine-induced antibodies and natural infection-induced antibodies against the older strains (like delta) and the new Omicron variant. "And beyond cell culture experiments, the protective ability of vaccine-induced as well as natural infection-induced antibodies can also be studied now in animal models

against Omicron," said another virologist.

Infection by any strain of SARS-CoV-2 kicks off an immune response against the entire virus, and not just against certain parts such as its 'spikes'. This is why many experts believe mutations are unlikely to significantly affect the protective shield.

There are 1,273 amino acids on the SARS-CoV-2's spike protein that triggers the immune response. The new Omicron variant has 32 amino acid changes or mutations in the S protein. So, the assumption that vaccines will offer some protection against the new strain sounds logical, experts have said.

## World's first rapid test kit to detect silicosis developed at Mumbai lab

TIMES NEWS NETWORK

**Mumbai:** For the first time in the world, scientists working in a public laboratory in the city have come up with a rapid test to ascertain if a person has silicosis, a progressive lung disease caused by exposure to silica.

The kit - which detects levels of serum CC16 in blood - is the result of a collaboration between the Mumbai team of the National Institute of Viro-

logy (NIV) and the National Institute for Occupational Health. "India has a high burden of silicosis with an estimate of 1.25 crore patients at the moment," said Dr Shyam Sundar Nandi from the Mumbai laboratory, who is one of the scientists who developed the test.

The invention, called a point of care test, is similar to a pregnancy test kit and detects levels of serum CC16 in a drop of blood. "Based on the con-

centration of the serum, we can diagnose the patient with severe, mild disease or is likely to develop it in the near future," said Dr Nandi. When the value of serum CC16 is between 6 and 9 ng/ml, it is indicative of early silicosis. The research work has been accepted in the medical journal, *Nature Scientific Reports*.

"Every day eight crore people are exposed to silica in India alone," said the scientist. Silicosis is usually diagnosed

at an advanced stage when nothing much can be done to prolong the person's life.

Most silicosis patients develop tuberculosis. "India wants to eliminate TB by 2025, but this is not possible if we cannot control silico tuberculosis and silicosis," Dr Nandi said. The Indian government plans to make it mandatory for industries involving silica dust exposure to conduct CC16 rapid test twice every year for its staff.



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