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## Recent Advances in Animal Virology

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Yashpal Singh Malik • Raj Kumar Singh  
Mahendra Pal Yadav  
Editors

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 Springer

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ISBN 978-981-13-9072-2

ISBN 978-981-13-9073-9 (eBook)

<https://doi.org/10.1007/978-981-13-9073-9>

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The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

*The book is dedicated to all the eminent virologists who own not only inventiveness and creativity but also astonishing compassion. Their resourceful contribution helped in accomplishing this mammoth compilation involving important aspects on animal viral pathogens/diseases.*

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## Preface

A number of new infectious diseases in animals, humans, and plants have emerged in the last few decades in various parts of the globe. In other instances, diseases which were confined to certain regions of the world have now spread to new areas or new hosts. Amongst the various emerging infectious/contagious diseases, viral diseases/infections, including zoonoses, are on top of the list. In the absence of the safe and inexpensive antiviral drugs, the control and management of viral diseases is a challenging job requiring expertise in vaccine development, vaccinology, besides capacity building for detection and differentiation of the pathogen; development of rapid, sensitive, and cost-effective pen-side diagnostic tests/kits and regional and peripheral diagnostic laboratories; clinical and serosurveillance of the disease in the susceptible and in-contact animal populations; planning and implementation of appropriate strategies for control, prevention, and immunoprophylaxis; and border control for transboundary diseases, quarantine facilities, vector control, and restriction on the movement of animals from the affected areas, besides other relevant general health control measures, such as disposal of carcasses, zoo-sanitary measures, and management practices.

The book covers important viruses/viral diseases in animals of various chapters authored by eminent scientists and research scholars. The chapters deal both with single- and double stranded DNA viruses, including African swine fever virus, adenovirus, papillomavirus and polyomavirus, poxviruses (buffalo pox, camel pox, swine pox, fowl pox), porcine circoviruses, chicken anaemia virus, canine parvoviruses, bovine and equine herpesviruses, Marek's disease virus, and laryngotracheitis virus. The book provides an overview of evolving RNA viruses covering single- and double-stranded and segmented genome viruses including porcine coronaviruses, avian reovirus, avian pneumoviruses (APV) I (NDV), APV 2–15, bovine viral diarrhoea virus, avian infectious bronchitis virus, and infectious bursal disease virus to name a few.

Each chapter comprises of an introduction, emphasizing on the history, importance of the virus/disease, and recent scientific advancements in the area; virus structure/genome organization, types/variants, etc.; epidemiology of disease and risk factors; transmission, immunopathobiology, and diagnostics – conventional and modern; and prevention and control – vaccines, antivirals, and other measures.

The book also includes basic virology chapters on epidemiological perspective on managing viral epidemics in animals; virus-mediated cancers in animals;

antivirals, past, present, and future; and bioinformatics applications in animal virus research for updating the knowledge of the readers.

We believe that owing to the broader animal virology coverage with high-quality contributions, the present book will represent an excellent source of information for the readers. The chapters published could be useful for veterinary professionals, clinicians, public health experts, researchers, students/scholars, animal producers, faculty, and students having interest in virology, viral diseases, viral immunity and pathogenesis, epidemiology of viral diseases, viral zoonoses and management of viral diseases and epidemics, pharmaceutical industry, and biomedicine experts and pave the way towards designing and adapting effective and safer therapeutics from clinics to the laboratory for countering important animal viral diseases.

We, the editors, would like to express our gratitude to all the contributors for their support and hard work to make this book compilation a reality. We also extend special thanks to all the peer reviewers whose able expertise and rigorous reviewing of the manuscripts submitted in this book helped the authors to further improve their manuscript to reach publication stages. The guest editors are also grateful to the Springer Nature Publisher for accepting this book proposal. We extend our special thanks to Dr. Bhavik Sawhney, Associate Editor, Biomedicine, Springer Nature, for providing all the editorial help and high cooperation while processing the manuscripts for its successful publishing.

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## About World Society for Virology

World Society for Virology (WSV) is a nonprofit organization, 501c3-ID No. 001303257, that was established in 2017 with the main mission to strengthen virology research to viral diseases of humans, animals, and plants.

The main objectives of WSV includes but not limited to:

1. Gather the virologists worldwide in the main society that does not require a fee for its membership (a great obstacle for many virologists in many countries) and provide help to all whenever possible.
2. Build up a network of scientific collaborations among virologists worldwide.
3. Build international bridges for virology laboratories worldwide.
4. Help virologists worldwide to advance their careers and obtain awards.
5. Provide educational resources free of charge and freely available to all members.
6. Help and facilitate getting scholarships and vacancies for virologists worldwide.
7. Build up databases of virologists based on their field of specialization for remote assistance and guide in case of the existence of any disease outbreak.

For the details visit [www.ws-virology.org](http://www.ws-virology.org)

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## About the Indian Virological Society

1. The Indian Virological Society (IVS), a member of the International Union of Microbiological Society (IUMS), was established in December 1984 at Hisar, Haryana, with the objective to promote research & development in the field of virology. It provides a platform for those associated with the characterization and management of viruses affecting the animal, human, fish, insect, plant, and other living organisms. The society also organizes national and international conferences, trainings, seminars, workshops, invited lectures, academia-industry meet, etc. The society also recognizes the outstanding contributions of the individual members by electing them as Fellows of the society and conferring lifetime achievement awards, Springer Nature-IVS Best Publication Award and Young Scientist awards. IVS publishes an internationally reputed journal *VirusDisease* in collaboration with Springer Nature. The society also publishes a biannual Newsletter Virus Research News. The objective of the newsletter is to provide information on the latest developments in virology, news about IVS activities, and other connected events. At present, society has 500 active members.

Izatnagar, Uttar Pradesh, India

Yashpal Singh Malik  
Raj Kumar Singh  
Mahendra Pal Yadav

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**Raj Kumar Singh** is Director and Vice-Chancellor of the ICAR-Indian Veterinary Research Institute, Izatnagar. He is a respected Scientist, specializing in veterinary microbiology, biotechnology, molecular epidemiology, diagnostics, and vaccinology. He has served as Head, Division of Virology; station-in-charge at the IVRI, Mukteswar Campus, Uttarakhand; and later Director, NRC on Equines and VTCC, Hisar. He has filed 10 national patents, 2 of which have been granted, and has developed more than 8 live attenuated vaccines and 26 diagnostic tests and kits. He has authored 2 books and 23 book chapters and published over 234 scientific research papers, 52 reviews, 15 lead papers, and 24 guest editorials/compendium chapters. He has received several prestigious awards, including ICAR Rafi Ahmed Kidwai Award and Team Research Award, DBT Tata Innovation Fellowship Award, Agriculture Research Leadership Award, and FAO Fellowship for training at the University of California, Davis, USA. He is President of ISVIB and has distinguished fellowships and life memberships of prestigious professional societies.

**Mahendra Pal Yadav** is Former Director, ICAR-Indian Veterinary Research Institute, Izatnagar, and Vice-Chancellor, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut. Dr Yadav is amongst the most respected scientists working in the field of virology. His major research contributions include the development of indigenous vaccines against equine influenza, infectious laryngotracheitis, and colisepticaemia in poultry, isolation and characterization of animal

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