Emerging and re-emerging animal viruses. Foreword.

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Foreword

Emergences of viral diseases targeting animal and/or human populations have become more frequent during the last decades. Both concern previously unknown viruses that have suddenly emerged and known viruses that have expanded geographically. The reasons for this increased frequency in occurrence are multifactorial. They combine (i) technical progress such as increased surveillance and improvement of tools for identification; (ii) human factors such as globalization, deforestation, urbanization, rural and exotic tourism, increase of exchanges between humans, animals and goods; and (iii) ecological factors such as climate change whose role remains difficult to assess and which is also impacted by human behavior. While emergences of new viruses remain rather rare in terrestrial vertebrates, they appear more frequent in invertebrates and in aquatic vertebrates which are exposed to numerous unknown viruses present in their environment (water, plants, ...).

In this special issue of *Veterinary Research*, we have selected examples of emerging and/or re-emerging animal viruses targeting various species (arthropods, fish, domestic carnivores, ruminants, horses and pigs) including novel previously unreported emergence.

This special issue begins with a comprehensive review by Domingo [1] about the mechanisms of emergence of RNA viruses. It describes the intrinsic potential of viruses for genetic change and the resulting biological complexity of their population. It shows how selection acts on this viral quasi-species to amplify specific variants able to invade new ecological niches. These variants can emerge with new phenotypic properties in the same animal species or cross the species barrier and invade another animal species. In a review of ruminant pestiviruses (family *Flaviviridae*), Peterhans et al. [8] discuss how cytopathic strains of the bovine viral diarrhoea virus (BVDV) emerged from non cytopathic strains via mutation; these cytopathic strains are frequently fatal and thus can be considered as provoking dead end hosts that prevent further transmission. Another example of the emergence of pathogenic variants of the same family is the West Nile virus (WNV) which has spread rapidly in the USA since early 2000. Murray et al. [5] describe the latest information about the epidemiology and pathogenicity of WNV.

The crossing of the species barrier is illustrated in two other reviews. Pavio et al. [6] discuss possible animal reservoirs for hepatitis E virus, other than pigs, for transmission of genotypes 3 and 4 which are pathogenic for humans. Hoelzer and Parrish [3] present an overview of parvoviruses which have emerged in domestic carnivores (dogs, cats, minks) and cause severe diseases and continuous production of new variants despite efficient vaccines. This review illustrates an example of emergence of a DNA virus.

Two other review articles focus on already well known viruses that have emerged or have a high probability of emerging in currently free regions. This is the case for bluetongue virus (BTV), serotype 8, which is a typical example of a successful recent emergence in Northern Europe from other parts of the world. MacLachlan and Guthrie [4] not only discuss the reasons for this current occurrence but also remind us that other orbiviruses, such as the African horse sickness virus (AHSV) or the epizootic hemorrhagic disease virus (EHDV), which share the same insect vectors, have the same ability to emerge in free regions or countries and constitute a real threat to animal species like horses. The same observation can be done for the bunyavirus Rift Valley fever virus (RVFV). Pépin et al. [7] describe that RVFV has the potential for successful emergence and stress the necessity of having safe and efficient vaccines in order to minimize the impact of an emergence in a free country or a re-emergence in countries regularly affected by this zoonosis.

Three articles are finally related to species like fish, shrimp or honeybees which are vital source of food for humans. Walker and Winton [10] update the global knowledge on new viruses that have emerged in fish and shrimp, and Sanchez-Paz [9] focuses on one of the most important shrimp pathogens over the last decades, the white spot syndrome virus. These two articles emphasize the important number of viruses present in sea and fresh water, which are an inexhaustible source for the emergence of new pathogen viruses in aquatic animals. The last article targets viruses of honeybees that are at the forefront of scientific and public interest due to their potential involvement in the so-called "colony collapse disorder" compared to the very positive image of honeybees as pollinators and honey producers. Genersch and Aubert [2] present a comprehensive overview on the various viruses isolated in honeybees which may devastate hives particularly when associated with other factors such as *Varroa destructor* and pesticide residues. This overview reminds us that the collapse of colonies is not due to a single virus or pesticide but rather to a complex combination of factors in which viruses of honeybees however play a significant role.

In conclusion, this special issue of *Veterinary Research* allows us to present an updated review on the mechanisms of viral emergence through important examples of animal viruses involved in recent episodes of emergences and re-emergences, including several provoking zoonoses.

The invited editors and the Editorial Team of *Veterinary Research* thank all authors who have contributed to making this special issue a significant new resource for *Veterinary Research* readers, virologists, policy-makers in animal and public health and for the scientific community in general, illustrating the concept of: « one world, one health ».

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