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**The evolution of highly pathogenic avian influenza in recent years in the new geographical regions of the world and in new species**

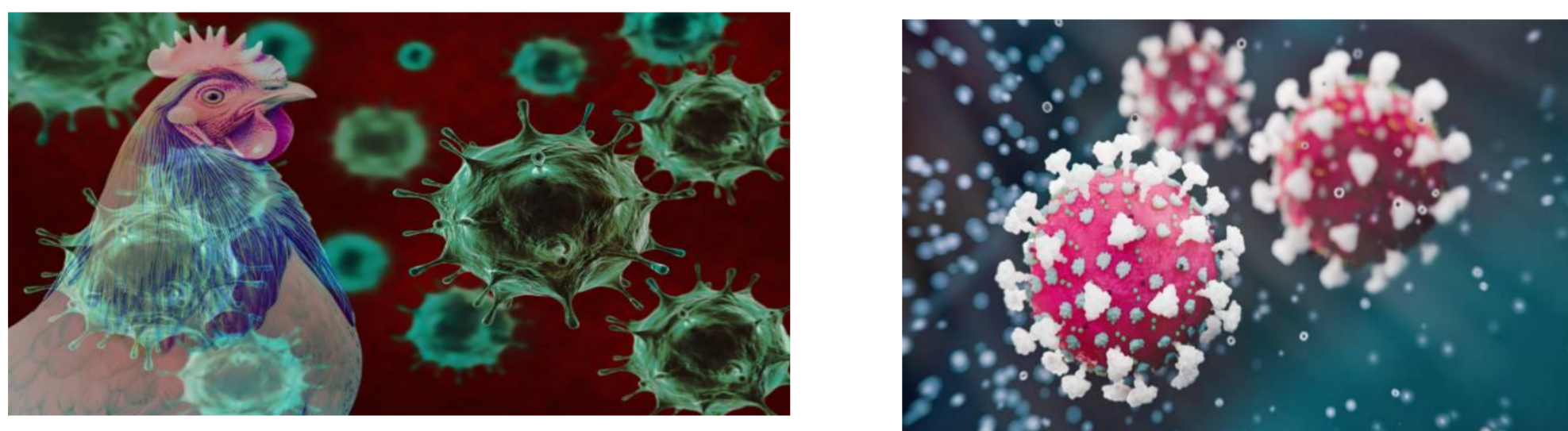
**Daniela Moț<sup>1</sup>, Emil Tîrziu<sup>2</sup>, Liliana Olariu-Jurca<sup>1</sup>**

<sup>1</sup>University of Life Sciences "King Michael I", Faculty of Animal Sciences and Biotechnologies, 300645 Timișoara, 119 Aradului Way, Romania  
<sup>2</sup>University of Life Sciences "King Michael I", Faculty of Veterinary Medicine, 300645 Timișoara, 119 Aradului Way, Romania

**Abstract:**

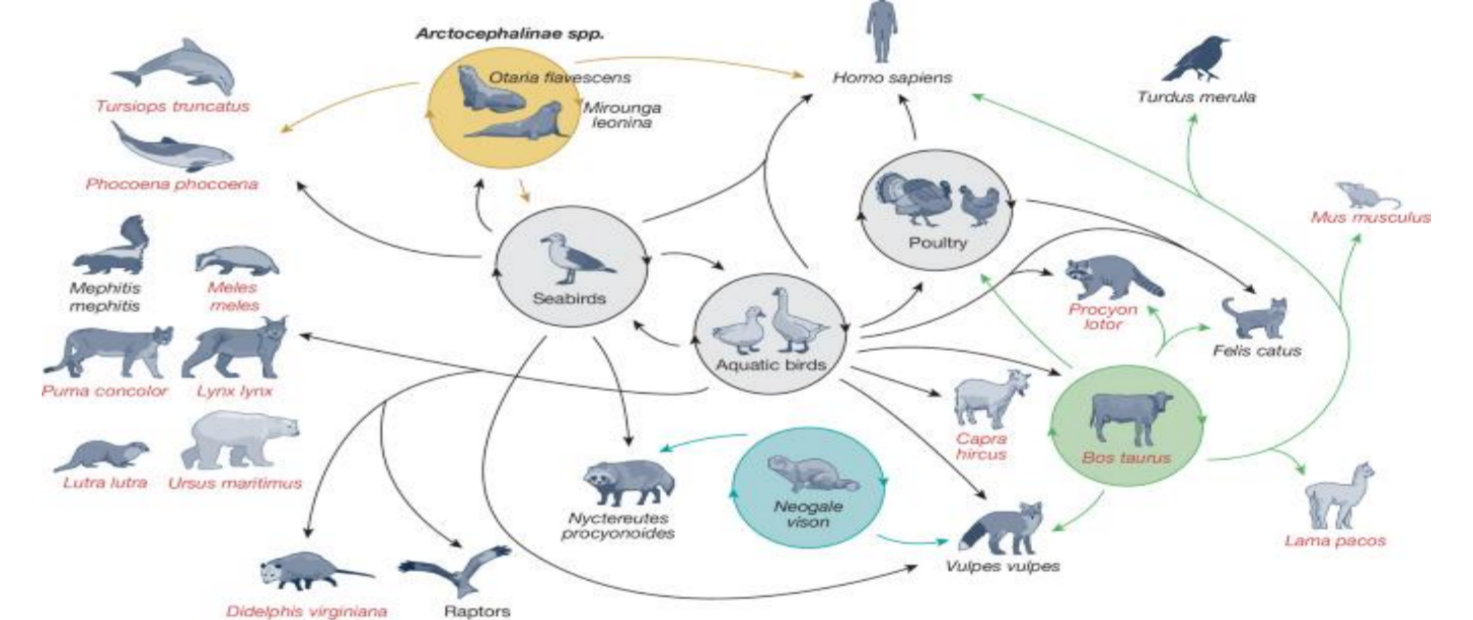
Highly pathogenic avian influenza H5N1 dominated the global epidemiological picture between 2004-2006. The carriers of the flu are migratory birds, the virus being located in the intestines of birds. The H5N1 subtype is extremely contagious for birds. It does not normally affect humans, but since 1997 there have been cases of transmission of the virus to humans, most of whom have had direct contact with infected birds or surfaces contaminated with H5N1. The H5N1 virus was first isolated in 1996 on a goose farm in the Guangdong region of China, and since 1997 this type of infection has been reported in humans. Highly pathogenic avian influenza H5N1, also known as "bird flu", has led to the death of hundreds of millions of birds globally in recent years. Its spread to humans and other mammal species, including cattle and pigs in the United States. Between 2023 and early 2025, the world experienced a sustained and unprecedented panzootic evolution of highly pathogenic avian influenza (HPAI) H5N1 (clade 2.3.4.4b). This period was marked by the spread of the virus to new geographic regions—including Antarctica and South America—a significant increase in infections among mammals and sporadic cases in humans, which raised concerns among health officials.

The causative agent of avian influenza belongs to the Orthomyxoviridae family, genus Influenza virus type A. The family has three genera, marked A, B and C, but only the genus "A" is recognized as a pathogen for birds.



The pathogenicity of avian influenza virus strains varies extremely widely and cannot be estimated solely on the basis of the recognized host or the identification of the antigenic subtype of the strain in question. There are differences in pathogenicity between strains of avian influenza virus that are expressed differently depending on the same host: the differences in pathogenicity are correlated with the antigenic structure, respectively with the hemagglutinin and neuraminidase, birds being recognized as having highly pathogenic (HPAI) strains belonging to the H5 and H7 serotypes. There are numerous strains of avian influenza (AI) virus, which are usually classified into two groups according to the severity of the disease they cause in domestic birds: low pathogenic (LPAI) strains, which usually cause discrete clinical manifestations in domestic birds or none at all, and highly pathogenic (HPAI) strains, which can cause severe clinical signs and a high mortality rate in domestic birds. Several studies have investigated the pathogenicity of H5N8 strains (also identified in the outbreak in Romania, 2020) for different mammalian species, mammalian cell cultures and laboratory mammals (ferret, mouse), to assess possible mutations associated with the risk of acquiring interspecific transmission properties between mammals of the newly generated strains.

Between 2020 and 2025, highly pathogenic avian influenza (HPAI), particularly H5N1, spread to multiple species beyond birds, causing significant impacts on wildlife and livestock globally. This outbreak affected a wide range of animals, including domestic animals such as cats and farm animals such as cows, as well as wild animals such as seals, dolphins, and various carnivores. Avian influenza usually affects birds, but other animals (mammals such as cows, alpacas, mice, cats) can be infected with avian influenza viruses, including pigs, mink, seals, wild boars, foxes and cats.



**Conclusions**

Transmission to humans of avian influenza viruses (AI) detected in wild birds or poultry has not been observed recently in Europe; however, zoonotic transmission of AI viruses cannot be completely excluded in general when these viruses are present in birds. No evidence of human-to-human transmission was documented during the reporting period. The risk of infection with avian influenza A(H5) viruses of clade 2.3.4.4b currently circulating in Europe remains low for the general public in the European Union/European Economic Area (EU/EEA). The risk of infection remains low to moderate for people occupationally or otherwise exposed to infected animals or contaminated environments.

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Bird flu is a respiratory disease that infects more than 100 species of wild birds, and it is rare for these strains to infect humans. However, there are increasingly reports of bird flu in other mammals, such as tigers, polar bears, elephants, seals, mink, and pet dogs and cats.

