

CRUCIAL COLLABORATION

Understanding how the health of humans and animals is connected provides vital understanding of viruses. **Professor Nicola Lewis**, the new Director of the Worldwide Influenza Centre, highlights her priorities in the role.

The most surprising research results Professor Nicola Lewis has had during her career have come from studies of wild birds. “Understanding how influenza viruses spread in complex multi-host wild bird ecosystems, which birds maintain and transmit flu and permit reassortment [genetic exchange], and how influenza gene segments diffuse through populations is fascinating in terms of complexity,” she explains.

“Different species of birds that sit on the same pond together don’t get flu similarly. Different species might get different strains of flu or some will be infected, while others will not. This constantly reminds me how much we still have to understand.”

Professor Lewis, who has just been appointed new director of the Worldwide Influenza Centre (WIC) at the Francis Crick Institute, has had a “fascination with influenza” since researching the antigenic and genetic

evolution of viral pathogens in wild and domestic animals and host population ecology during her PhD in infectious diseases. This followed work as a veterinary surgeon, with a particular interest in the burden of infectious diseases in animals across different locations.

Among the research Lewis has undertaken is an analysis of avian flu outbreaks across Russia, Iraq and Kazakhstan that have also been detected in migratory waterfowl in the Netherlands. These emerging variants have posed a threat to poultry production, food security and veterinary public health. Another study investigated an infection of avian influenza in a grey seal pup rescued

in Cornwall, uncovering a rare virus mutation and suggesting the prevalence of the virus among grey seals could be underestimated.



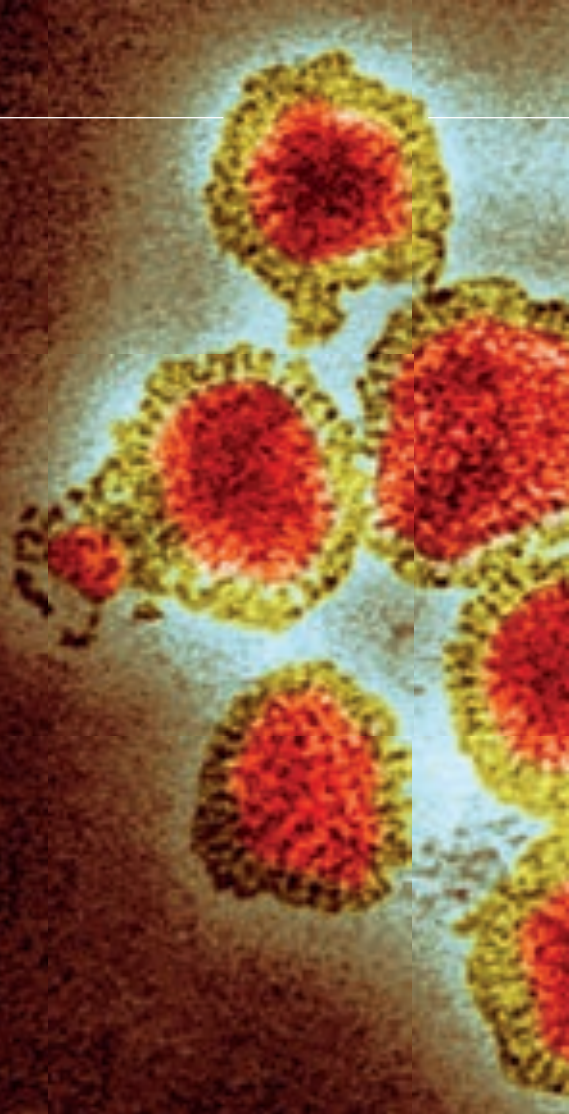
Collaboration

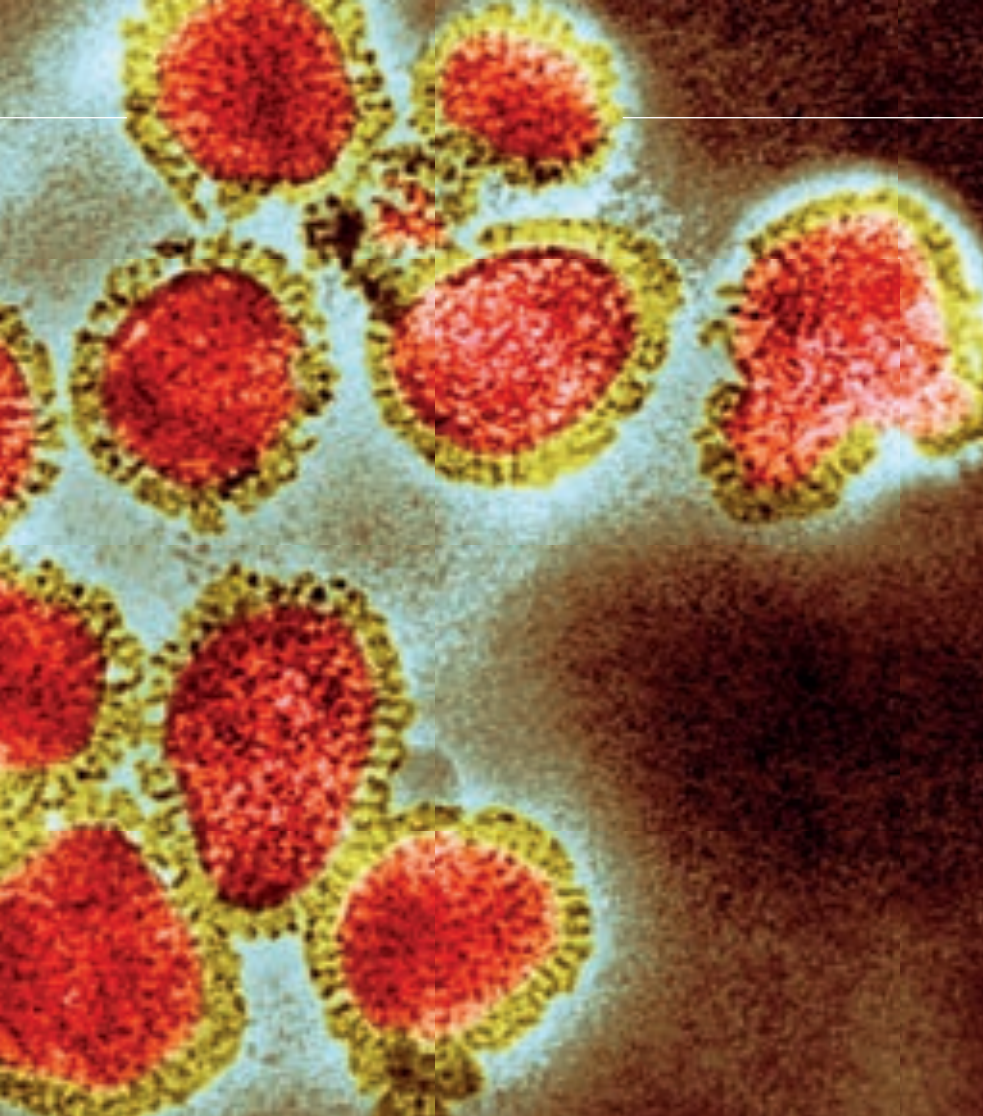
She joins the WIC from the Royal Veterinary College where she

has been Professor in One Health Evolutionary Biology, working as part of international research programmes to investigate avian and swine flu viruses to “understand their evolution and assess their zoonotic potential at the human-animal interface” – investigating the ecology and evolution of influenza viruses in animal hosts and the risks that these viruses might pose to humans.

Lewis will work with outgoing Director of the WIC, Dr John McCauley, until September, and continue her current role as Professor in One Health Evolutionary Biology at the Royal Veterinary College on a part-time basis. “As one of the world’s leading veterinary institutions, the Royal Veterinary College has key expertise in animal health and production systems,” she explains.

“Partnership with the WIC at the Crick is key to addressing ‘One Health’ evolutionary questions. This ‘One Health’ approach recognises how the health of humans and animals are connected, and we can improve health by encouraging





Links between animals and humans

Among Lewis' main priorities at the WIC will be to build on its work on human seasonal influenza viruses and to expand this further by evaluating many more of the potentially zoonotic – transmitting between animals and humans – influenza viruses in animal populations that might cause a pandemic.

Understanding these links is crucial in increasing understanding of epidemics and pandemics. “When we think about how best to tackle emerging infectious disease, and indeed trying to understand the risk of pandemic influenza, ideally we need public and animal health to work closely together, to share best practice and current information and to work collaboratively to build capacity in countries throughout the world where it might be more likely that an emerging influenza virus would arise,” Lewis says.

“Understanding the ecology and evolution of flu in animals is important in assessing what viruses are circulating and where they are circulating. By analysing these viruses, we can understand key factors that might increase the risk of spill-over infection into humans.”

The links between viruses in animals and humans are not the only goals of Professor Lewis' work, however. The potential impact of flu viruses on food production, farming and manufacturing cannot be overestimated. “It's not all about humans,” she says. “Given that flu vaccines are used in animals, by assessing current strains and trying to ensure that these are closely matched with the strains included in vaccines, we help to support food security and livelihoods and also improve animal health.”

“I am proud to have been appointed the Director of the WIC and look forward to what is the biggest challenge of my career, in serving One Health and helping to improve animal and public health into the future,” she concludes. **BMS**

disciplines and experts to collaborate.”

“I will continue to use a range of surveillance, laboratory and computational approaches in diverse hosts, including wild and domestic birds, marine mammals, pigs, horses and humans in order to understand and reduce the risk of influenza,” she adds.

Virus evolution

The WIC is a WHO “Collaborating Centre” and international reference laboratory, providing critical information on influenza surveillance, advising the WHO and its international networks on the significance of flu strains.

It's one of six centres around the world responsible for analysing influenza viruses and monitoring the flu strains that ultimately inform vaccine development. The centre examines changes in seasonal flu viruses, and analyses the properties and risks of potential pandemic strains of swine and bird flu, among others viruses.

Wild birds are particularly relevant at the moment with the latest H5 highly

PROFESSOR NICOLA LEWIS

- ✓ PhD in infectious diseases from the University of Cambridge
- ✓ Professor in One Health Evolutionary Biology at the Royal Veterinary College
- ✓ New Director of the Worldwide Influenza Centre
- ✓ Provides consultancy to the European Commission, UK Health Security Agency and the WHO, among many others.



pathogenic bird flu outbreaks. “We are seeing a paradigm shift in the way that viruses are transmitting in these populations, which hosts are being infected and the enormous increase in the geographic distribution of infected bird populations,” Lewis says.