

Intercontinental Spread of Eurasian Highly Pathogenic Avian Influenza A(H5N1) to Senegal

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In January 2021, Senegal reported the emergence of highly pathogenic avian influenza virus A(H5N1), which was detected on a poultry farm in Thies, Senegal, and in great white pelicans in the Djoudj National Bird Sanctuary. We report evidence of new transcontinental spread of H5N1 from Europe toward Africa.

On December 23, 2020, a single poultry farm composed of 4 barns of laying hens having a total of 102,000 birds in Pout, Thies Region, Senegal, reported increased deaths (mortality rate 58%) to animal health authorities. The clinical signs observed in the affected poultry were edema of the cervical region, cyanosis, congestion of the crests and barbs, and a state of general prostration. Organs and cloacal and oropharyngeal swab specimens collected from dead and sick birds were analyzed at the National Veterinary Laboratory for Livestock and Research (LNERV; Dakar, Senegal),

where highly pathogenic avian influenza (HPAI) A (H5N1) virus was confirmed on January 7, 2021.

Later that month, 750 great white pelicans (*Pelecanus onocrotalus*) (740 juveniles and 10 adults) were found dead by rangers in the Djoudj National Bird Sanctuary, a UNESCO World Heritage site, which is a wetland near the Senegal–Mauritania border. The sanctuary welcomes thousands of Palearctic and Afrotropical migratory birds every year as a refuge, feeding site, and breeding site. On January 15, 2021, the monthly count of birds at Djoudj enacted by the Ministry of Environment documented 8,887 pelicans, for an estimated mortality rate of 8.4% in January 2021. After identifying H5N1 in the dead birds, LNERV analyzed amino acid sequences deduced at the hemagglutinin cleavage site (PLREKRRKR×GLF) on samples from poultry and pelicans, which classified the strain as an HPAI.

Since the emergence of the HPAI H5Nx viruses of the goose/Guangdong (gs/Gd) lineage in 1996, the transcontinental spread of the virus to Africa has been described at least 3 times (1). According to available data, no incursions have involved Senegal before. This unprecedented geographic spread raises questions about the mechanisms of emergence and dissemination of HPAI H5N1 in this country. To determine the origin and transmission pathways of the virus, we analyzed the complete genome of 4 HPAI H5N1 viruses collected in Senegal from domestic and wild birds, studying their spatial diffusion dynamics.

The Study

A total of 8 clinical samples were submitted to the World Organisation for Animal Health Reference

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Laboratory and to the Food and Agriculture Organization of the United Nations Reference Center for Avian Influenza and Newcastle Disease at the Istituto Zooprofilattico Sperimentale delle Venezie (Legnaro, Padova, Italy) for confirmatory diagnosis and genetic characterization of the identified viruses. HPAI H5N1 was identified in all submitted samples by molecular analysis, confirming the results from LNERV. Because of the low viral load, whole-genome sequences were successfully generated from only 4 of 8 samples (Table) collected from poultry and wild birds, as previously described (1).

The phylogenetic analysis of the hemagglutinin gene revealed that the 4 HPAI H5N1 viruses from Senegal belong to clade 2.3.4.4b and cluster not only together but also with the HPAI H5N1 viruses that have been circulating in Europe since October 2020 (99.8%–99.9% nucleotide similarity) (Appendix Figure 1, <https://wwwnc.cdc.gov/EID/article/28/1/21-1401-App1.pdf>) (2,3). In particular, the HPAI H5N1 viruses from Senegal cluster together in the phylogenetic trees of all 8 gene segments and are closely related to HPAI H5N1 viruses identified in the Netherlands, United Kingdom, and Italy during October–December 2020 (98.8%–100% nucleotide similarity) (Appendix Figures 1–8). These findings suggest virus introduction in the country was likely caused by wild birds' migration routes from Europe.

To reconstruct the spatial spread and estimate time of virus introduction into Senegal, we performed a phylogeographic analysis of the hemagglutinin gene in BEAST version 1.10.4 (4). We defined 5 discrete geographic regions: Central Asia, Northern Europe, Eastern Europe, Southern Europe, and Senegal. The mean time to the most recent common ancestor of the HPAI H5N1 viruses from Senegal was estimated to be November 2020 (95% HPD interval October–December 2020). The genetic spatial analysis indicated that the virus had spread from Southern Europe to Senegal, which suggests that West Africa likely acted as the ecologic sink of the HPAI H5N1 viruses circulating in Europe (Figure; Appendix Figure

9). Because availability of viral sequences from different countries could affect phylogeographic analyses, having a large number of sequences available is vital to obtain accurate and reliable results.

Conclusions

These evolutionary and spatial investigations indicate that the H5N1 outbreaks in Senegal did not emerge from local evolution of H5N1 viruses in Africa. These new viruses seem to have been introduced in fall 2020 from Eurasia through migratory birds flying southwest for winter. The estimated time to the most recent common ancestor (October–December 2020) and the long branches that separate the Senegal viruses from progenitors in Europe suggest an undetected virus circulating in the area, likely in wild birds.

The Djoudj National Bird Sanctuary, located in the Senegal River delta along the East Atlantic Flyway, is a sanctuary for large breeding waterbirds, including great white pelicans. H5N1 caused the death of hundreds of pelicans there. Before the emergence of the HPAI H5Nx viruses of the Gs/GD lineage, infection with avian influenza virus of pelicans was rarely reported (5). The incursion of the Gs/GD lineage has resulted in numerous fatal infections in this species. On the basis of data from the avian influenza passive surveillance system implemented in Europe during 2005–2017, an HPAI detection rate of 9.5% has been estimated in great white pelicans (6). This species is highly gregarious, behavior that could have promoted the spread of HPAI in these birds in Senegal. Unfortunately, surveillance of wild and domestic birds near where the H5N1-infected pelicans were identified did not shed light on the species responsible for introducing the virus. The wetlands of Senegal are inhabited by millions of aquatic bird species, including Garganey (*Anas querquedula*), Northern pintail (*Anas acuta*), Northern shoveler (*Spatula clypeata*), Eurasian teal (*Anas crecca*), Eurasian wigeon (*Mareca penelope*), Common pochard (*Aythya farina*), and Tufted duck (*Aythya fuligula*), many of which have had a role in the spread of Gs/GD-lineage H5

Table. HPAI H5N1 viruses identified from chicken and pelican samples, Senegal, 2020–2021*

Sample type	Virus name	Species	Location	Latitude and longitude	Collection date	GISAID accession no.
Cloacal swab	A/chicken/Senegal/21VIR1084–3/2021	Chicken	Thies region	14.781388, 17.042222	2020 Dec 23	EPI1866442–9
Cloacal swab	A/chicken/Senegal/21VIR1084–4/2021	Chicken	Thies region	14.781388, 17.042222	2020 Dec 23	EPI1866450–7
Cloacal swab	A/chicken/Senegal/21VIR1084–5/2021	Chicken	Thies region	14.781388, 17.042222	2020 Dec 23	EPI1866458–65
Oropharyngeal swab	A/great-white_pelican/Senegal/21–67_21VIR1084–8/2021	Great white pelican	Djoudj National Bird Sanctuary	16.352169, 16.277897	2021 Jan 23	EPI1866466–73

*Sequences were submitted to GISAID's EpiFlu database (<https://www.gisaid.org>). HPAI, highly pathogenic avian influenza.

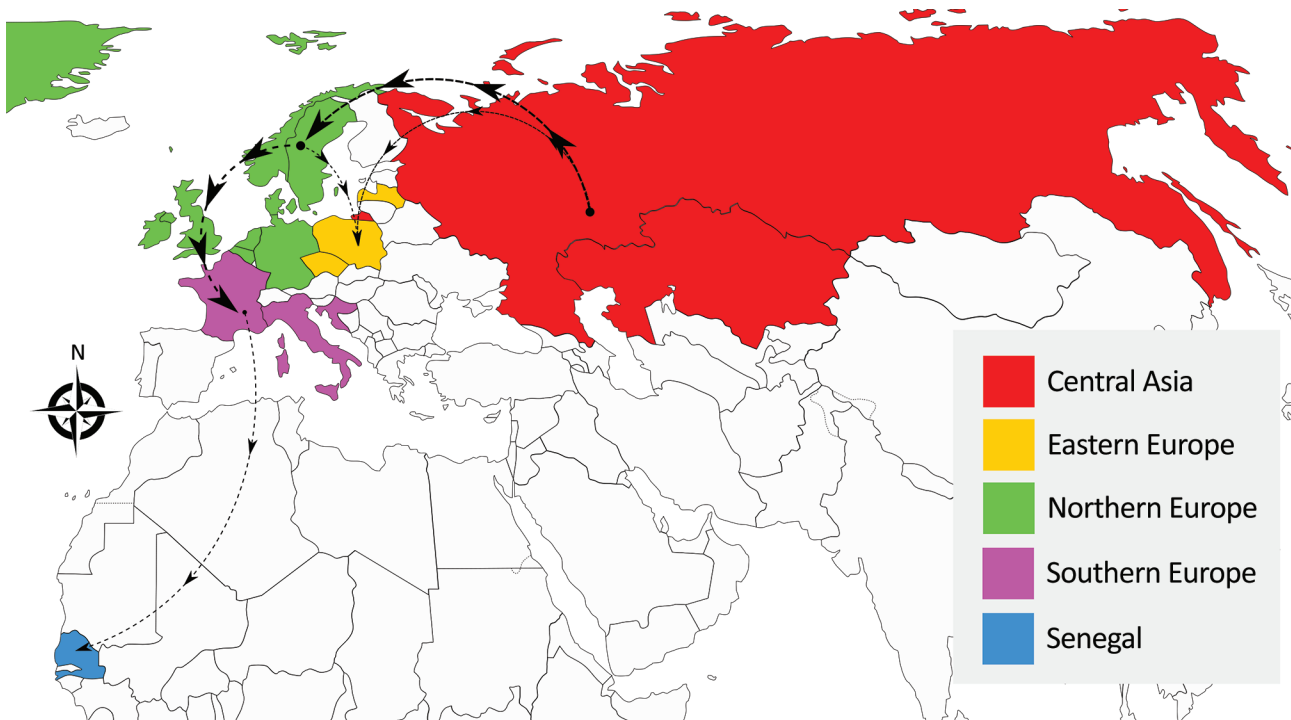


Figure. Origin and spread of the highly pathogenic avian influenza H5N1 virus. Five discrete geographic regions, namely Central Asia, Northern Europe, Eastern Europe, Southern Europe, and Senegal, are defined and marked with different colors. The routes of migration supported by a Bayes factor >10 are displayed in the map as thin dashed lines; thicker dashed lines indicate Bayes factor >20 .

viruses (7,8). This bird population has been hardly affected by the 2020–2021 epidemic in Europe, during which HPAI H5 virus infections were reported in apparently healthy birds (2). Therefore, even considering that most of the great white pelicans residing in the Djoudj National Bird Sanctuary are deemed to be sedentary (9), species other than pelicans might have been involved in introducing and spreading H5N1 within Senegal or to neighboring countries reporting HPAI H5N1, including Niger, Nigeria, Mauritania, and Mali.

Recent reports of H5N1 in Senegal, Mauritania, and Mali indicate an unprecedented westward spread of the virus in Africa (10). However, the lack of genetic information on the viruses detected in these countries makes it difficult to reconstruct the exact number of virus introductions and dynamics of virus dissemination, and both poultry trade and wild bird movements remain valid candidate pathways. Moreover, after the outbreaks of HPAI in poultry, 2 states in Nigeria reported 7 suspected human cases of avian influenza H5N1, 4 in Kano and 3 in Plateau. These cases confirm the importance of One Health joint activities by public human and animal health sectors to contain and monitor virus spread and the emergence of novel viruses of major concern (11).

There is still much to learn about the ecology of these viruses in the wild bird population; detection of the 2.3.4.4b clade in Senegal demonstrates that predicting the dissemination trajectories of these viruses is difficult. No system yet exists that can prevent the virus from following wild bird movements. Efforts are needed to regulate poultry movements and develop risk-based surveillance in wild birds in Africa to detect newly introduced and circulating viruses, reduce the likely spread to poultry, and limit the risk for exposure of humans to infected birds.

Acknowledgments

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Animal Diseases Senegal for funding the field investigation. Finally, we thank the authors and the originating and submitting laboratories of the sequences from the GISAID EpiFlu Database on which this research is partly based (Appendix Table).

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This article is in memory of our beloved colleague Matteo Griggio, a lively behavioral ecologist strongly committed to nature conservation, who prematurely passed away on May 14, 2020.

About the Author

Dr. Lo is a microbiologist and head of the Laboratory of Bacteriology and Avian Pathology at the National Laboratory of Livestock and Veterinary Research at Institut Sénégalais de Recherches Agricoles, Dakar-Hann, Senegal. Her research interests include epidemiologic surveillance of cross-border diseases such as avian influenza and serologic and molecular epidemiology, gene flow, and the One Health approach.

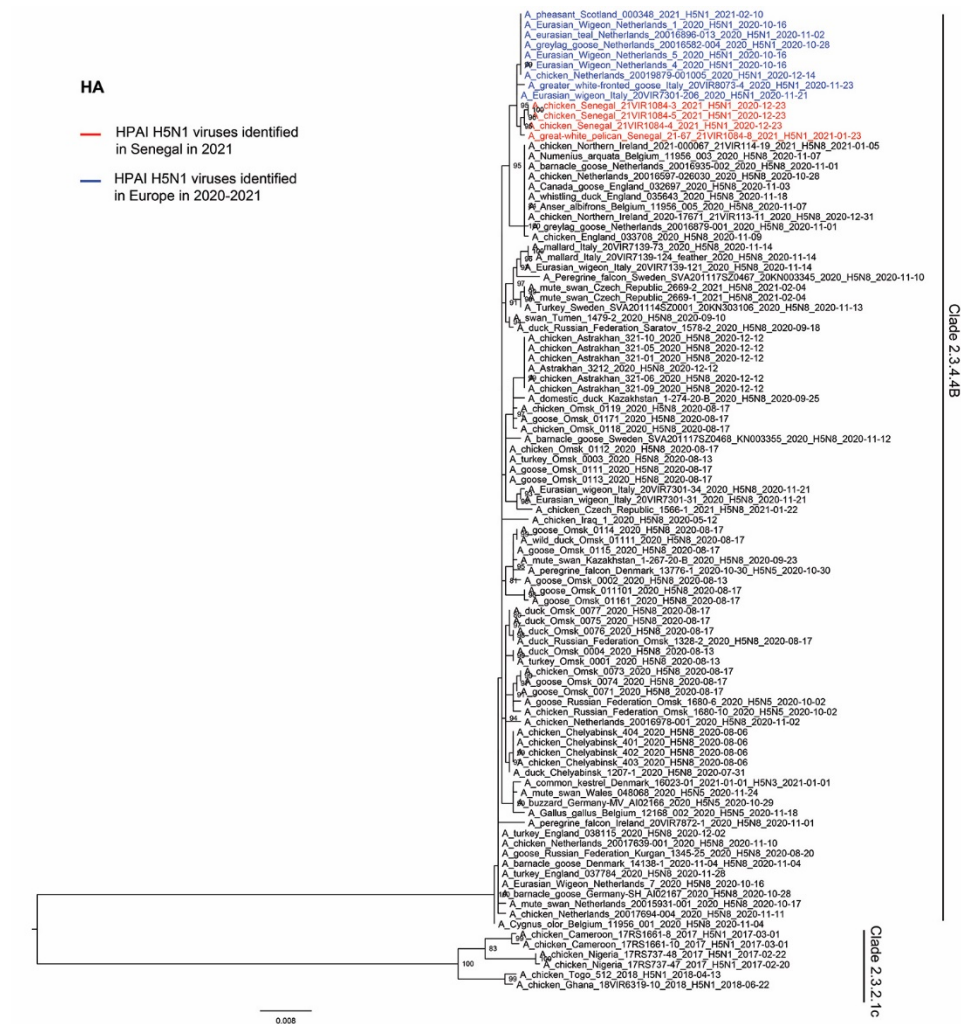
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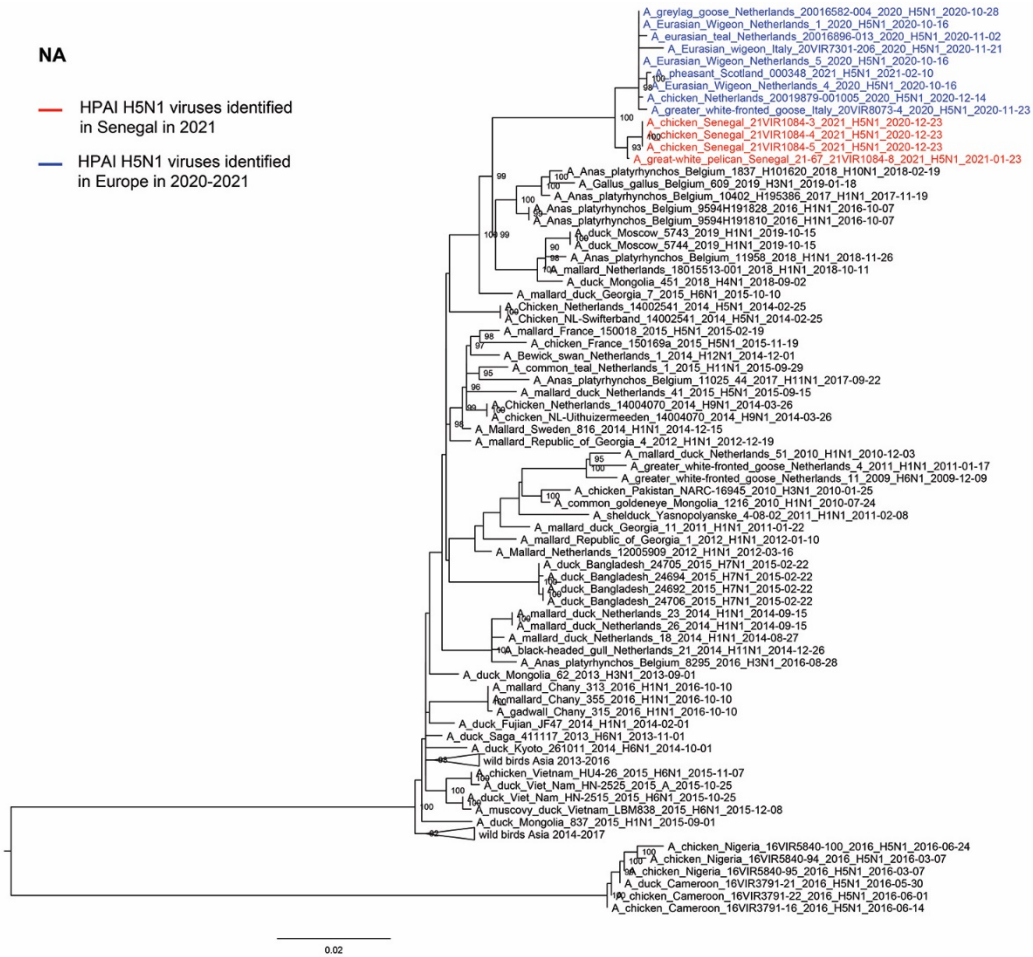
Appendix



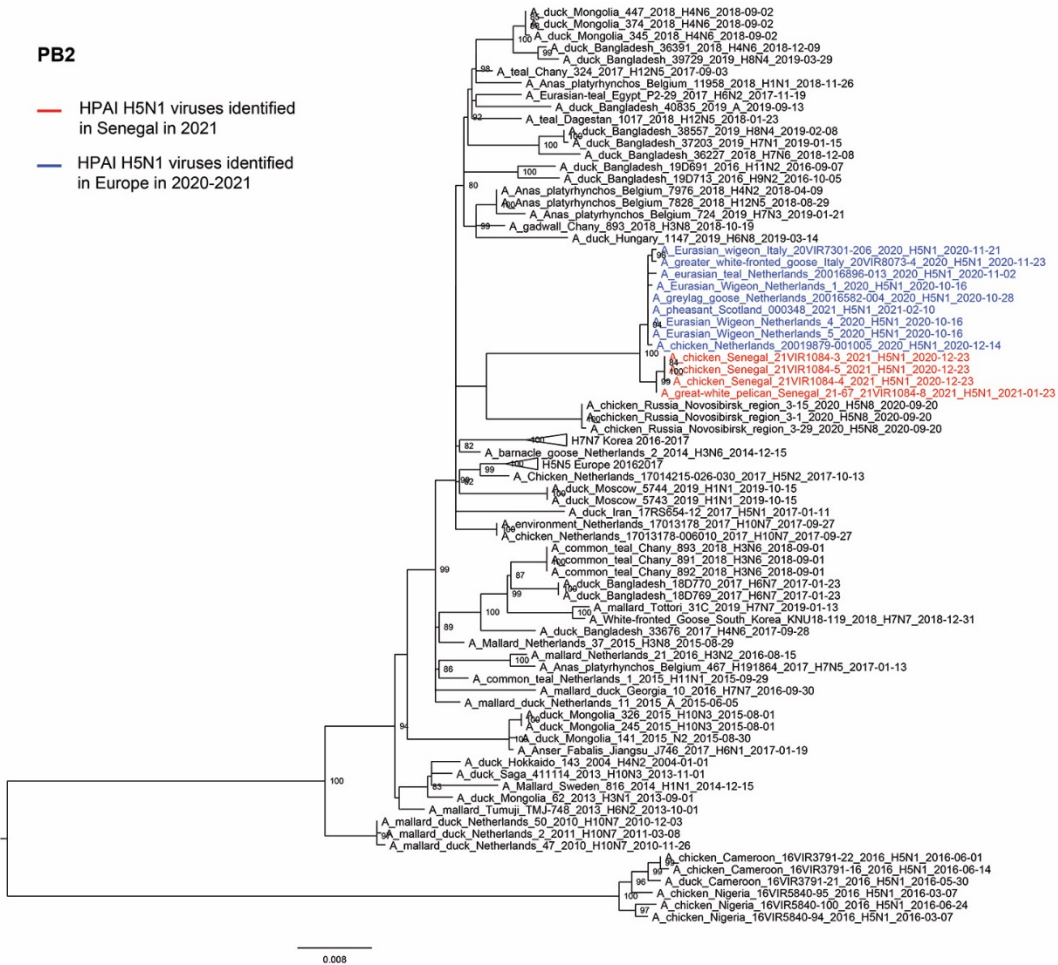
Appendix Figure 1. Maximum likelihood phylogenetic tree of the hemagglutinin (HA) gene (clade 2.3.4.4b) obtained by using IQTREE version 1.6.6. The HPAI H5N1 viruses from Senegal are marked in red; the HPAI H5N1 viruses from Europe are marked in blue. Ultrafast bootstrap supports >80 are indicated next to the nodes. HPAI, highly pathogenic avian influenza.

NA

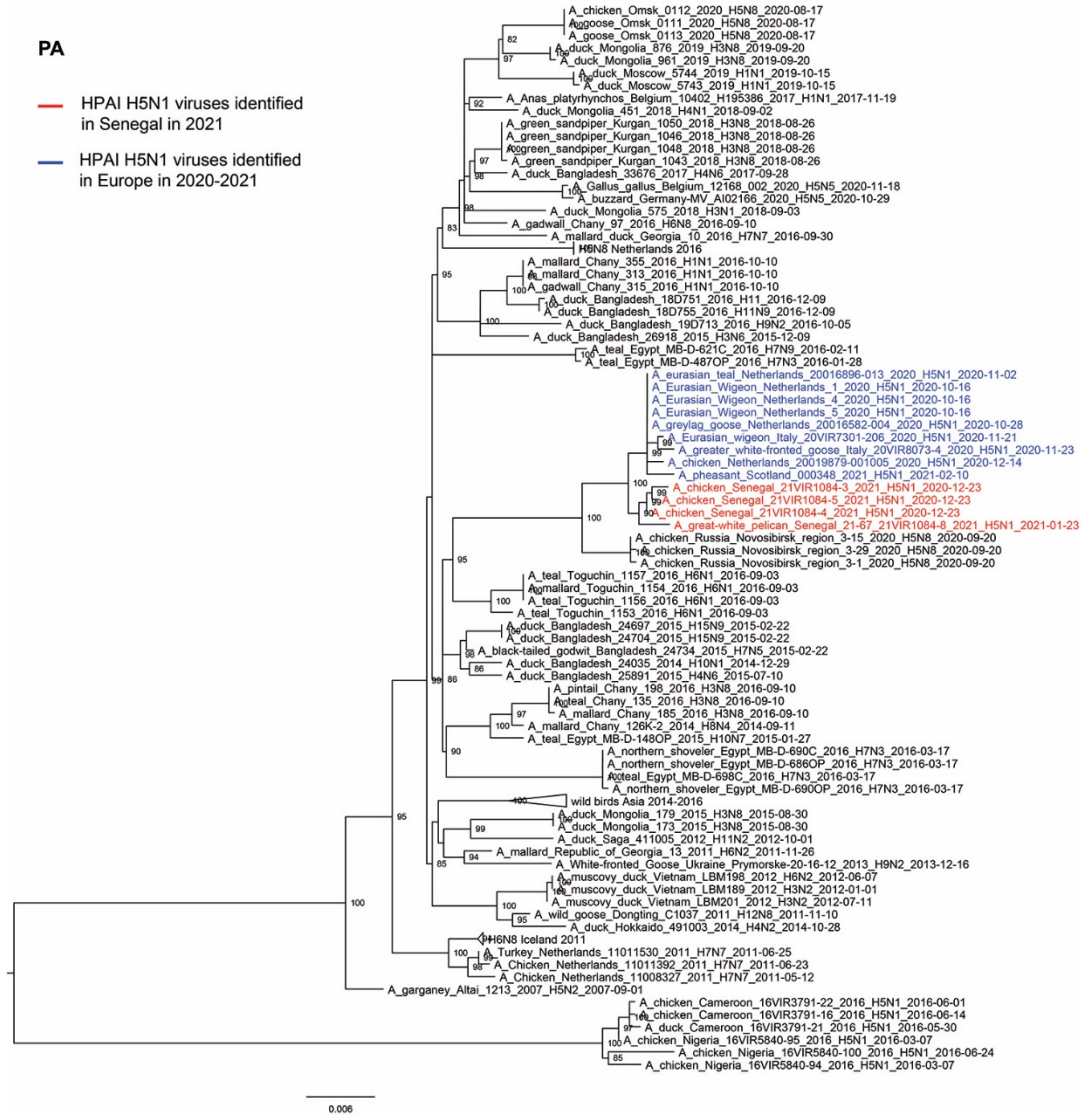
- HPAI H5N1 viruses identified in Senegal in 2021
- HPAI H5N1 viruses identified in Europe in 2020-2021



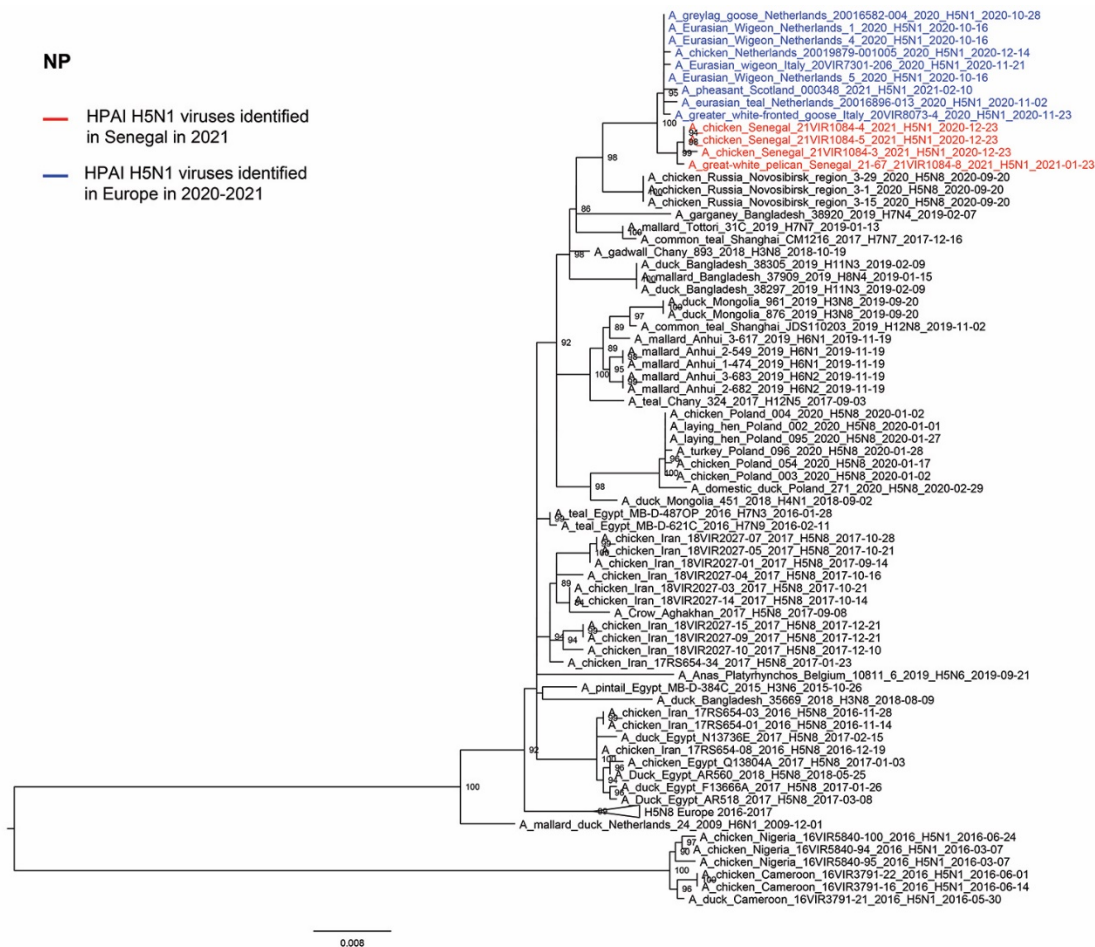
Appendix Figure 2. Maximum likelihood phylogenetic tree of the neuraminidase (NA) gene obtained by using IQTREE version 1.6.6. The HPAI H5N1 viruses from Senegal are marked in red; the HPAI H5N1 viruses from Europe are marked in blue. Ultrafast bootstrap supports >80 are indicated next to the nodes. HPAI, highly pathogenic avian influenza.



Appendix Figure 3. Maximum likelihood phylogenetic tree of the polymerase basic 2 (PB2) gene obtained by using IQTREE version 1.6.6. The HPAI H5N1 viruses from Senegal are marked in red; the HPAI H5N1 viruses from Europe are marked in blue. Ultrafast bootstrap supports >80 are indicated next to the nodes. HPAI, highly pathogenic avian influenza.



Appendix Figure 5. Maximum likelihood phylogenetic tree of the polymerase acidic (PA) gene obtained by using IQTREE version 1.6.6. The HPAI H5N1 viruses from Senegal are marked in red; the HPAI H5N1 viruses from Europe are marked in blue. Ultrafast bootstrap supports >80 are indicated next to the nodes. HPAI, highly pathogenic avian influenza.

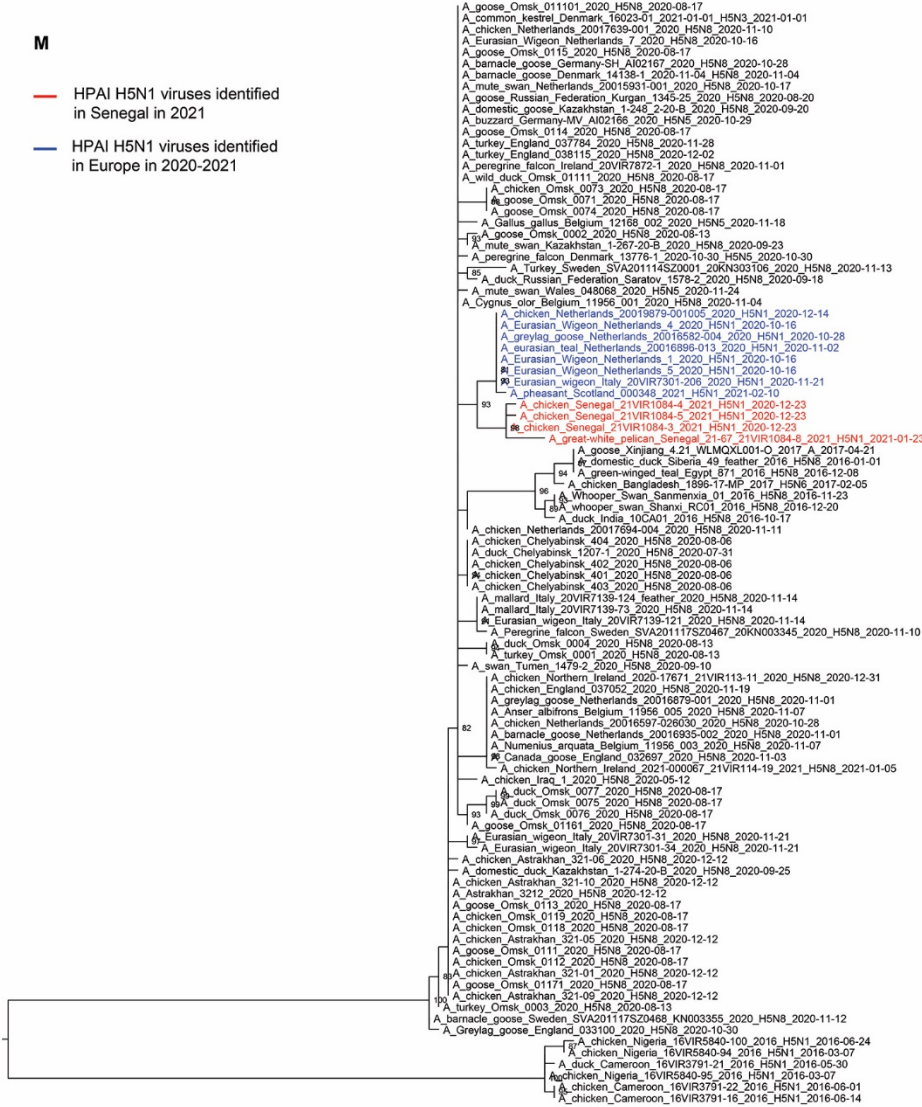


Appendix Figure 6. Maximum likelihood phylogenetic tree of the nucleoprotein (NP) gene obtained by using IQTREE version 1.6.6. The HPAI H5N1 viruses from Senegal are marked in red; the HPAI H5N1 viruses from Europe are marked in blue. Ultrafast bootstrap supports >80 are indicated next to the nodes. HPAI, highly pathogenic avian influenza.

M

— HPAI H5N1 viruses identified in Senegal in 2021

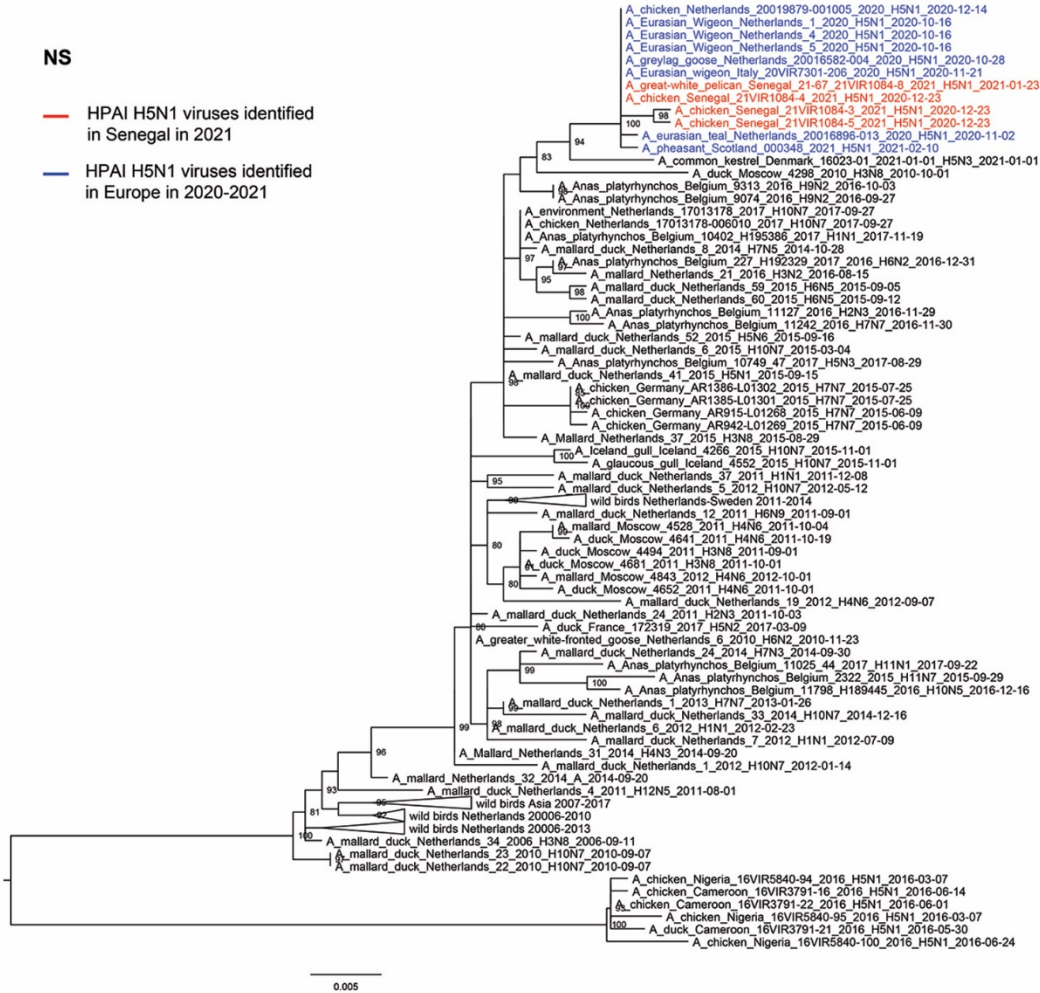
— HPAI H5N1 viruses identified in Europe in 2020-2021



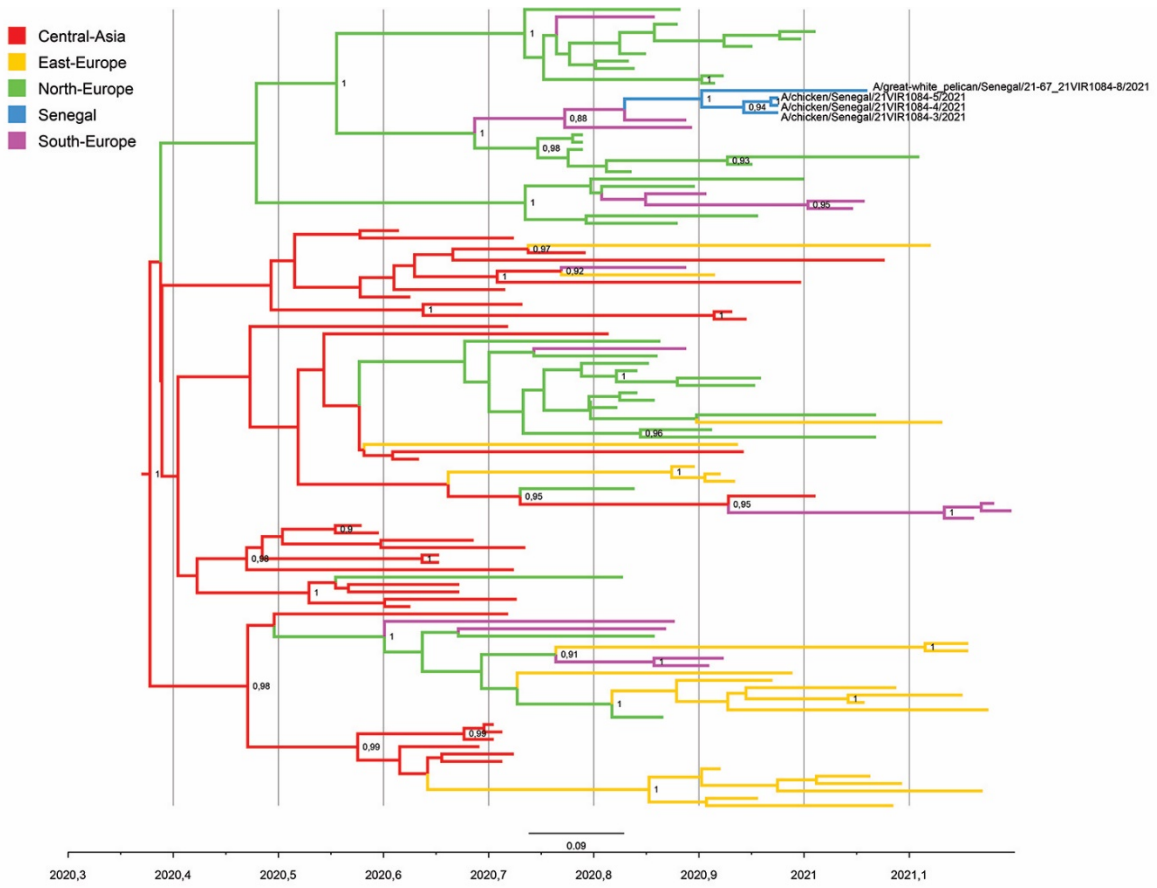
Appendix Figure 7. Maximum likelihood phylogenetic tree of the matrix (M) gene obtained by using IQTREE version 1.6.6. The HPAI H5N1 viruses from Senegal are marked in red; the HPAI H5N1 viruses from Europe are marked in blue. Ultrafast bootstrap supports >80 are indicated next to the nodes. HPAI, highly pathogenic avian influenza.

NS

- HPAI H5N1 viruses identified in Senegal in 2021
- HPAI H5N1 viruses identified in Europe in 2020-2021



Appendix Figure 8. Maximum likelihood phylogenetic tree of the non-structural (NS) gene obtained by using IQTREE version 1.6.6. The HPAI H5N1 viruses from Senegal are marked in red; the HPAI H5N1 viruses from Europe are marked in blue. Ultrafast bootstrap supports >80 are indicated next to the nodes. HPAI, highly pathogenic avian influenza.



Appendix Table. Acknowledgment table of the authors and the originating and submitting laboratories of the sequences from the GISAID EpiFlu Database on which this research is partly based

Segment ID	Country	Collection date	Isolate-ID	Isolate name	Originating Laboratory	Submitting Laboratory	Authors
EPI1813749	Denmark	2020 Oct 30	EPI_ISL_644737	A/peregrine_falcon/Denmark/13776-1/2020-10-30	Statens Serum Institut	Statens Serum Institut	Charlotte Hjulsager
EPI1814727	Sweden	2020 Nov 10	EPI_ISL_668456	A/Peregrine_falcon/Sweden/SVA201117SZ0467/20KN003345/2020	National Veterinary Institute, SVA	National Veterinary Institute	
EPI1847780	Denmark	2021 Jan 1	EPI_ISL_1063993	A/common_kestrel/Denmark/16023-01/2021-01-01	Statens Serum Institut	Statens Serum Institut	Charlotte Hjulsager, Jesper Schak Krog
EPI1843642	Italy	2020 Nov 23	EPI_ISL_956412	A/greater_white-fronted_goose/Italy/20VIR8073-4/2020	Istituto Zooprofilattico Sperimentale delle Venezie, EU/OIE/Reference Laboratory and FAO Reference Centre for AI and ND	Istituto Zooprofilattico Sperimentale Delle Venezie	B. Zecchin, A. Fusaro, A. Milani, A. Schivo, A. Salviato, A. Pastori, G. Zamperin, I. Monne, C. Terregino
EPI1811671	Russian Federation	2020 Oct 2	EPI_ISL_626648	A/goose/Russian_Federation/Omsk/1680-6/2020	Federal Centre for Animal Health (ARRIAH)	Animal and Plant Health Agency (APHA)	
EPI1814684	Russian Federation	2020 Sep 10	EPI_ISL_661178	A/swan/Tumen/1479-2/2020	Federal Centre for Animal Health (ARRIAH) OIE Regional Reference Laboratory	Federal Centre for Animal Health (ARRIAH)	N. Zinyakov, P. Akshalova, P. Zhestkov, A. Kozlov, A. Andriyasov, E. Ovchinnikova, Z. Nikonova, V. Sosipatorova, L. Scherbakova, D. Andreychuk, I. Chvala Elliot Whittard
EPI1811584	Kazakhstan	2020 Sep 23	EPI_ISL_614401	A/mute_swan/Kazakhstan/1-267-20-B/2020	National Veterinary Reference Center	Animal and Plant Health Agency (APHA)	
EPI1813730	Belgium	2020 Nov 4	EPI_ISL_644735	A/Cygnus_olor/Belgium/11956_001/2020	Sciensano - Animal Infectious Diseases	Sciensano, Department of Animal Infectious Diseases	Steven Van Borm, Elisabeth Mathijs, Thierry van den Berg, Bénédicte Lambrecht, Mieke Steensels
EPI1815183	United Kingdom	2020 Nov 24	EPI_ISL_683999	A/mute_swan/Wales/048068/2020	Animal and Plant Health Agency (APHA)	Animal and Plant Health Agency (APHA)	
EPI1806859	Netherlands	2020 Oct 17	EPI_ISL_591075	A/mute_swan/Netherlands/20015931-001/2020	Wageningen Bioveterinary Research	Wageningen Bioveterinary Research	Nancy Beerens, Frank Harders, Sylvia Verschuren-Pritz, Marit Roose, Evelien Germeraad, Marc Engelsma, Alex Bossers, Rene Heutink
EPI1837949	United Kingdom	2020 Dec 2	EPI_ISL_710505	A/turkey/England/038115/2020	Animal and Plant Health Agency (APHA)	Animal and Plant Health Agency (APHA)	
EPI1837933	United Kingdom	2020 Nov 28	EPI_ISL_710504	A/turkey/England/037784/2020	Animal and Plant Health Agency (APHA)	Animal and Plant Health Agency (APHA)	
EPI1846961	Russian Federation	2020 Dec 12	EPI_ISL_1038924	A/Astrakhan/3212/2020	Center of Hygiene and Epidemiology in Astrakhan Region	State Research Center of Virology and Biotechnology (VECTOR)	O. Pyankova, I. Susloparov, V. Marchenko, A. Ryzhikov

Segment ID	Country	Collection date	Isolate-ID	Isolate name	Originating Laboratory	Submitting Laboratory	Authors
EPI1807267	Netherlands	2020 Oct 16	EPI_ISL_603136	A/Eurasian_Wigeon/Netherlands/7/2020	Erasmus Medical Center	Erasmus Medical Center	
EPI1807259	Netherlands	2020 Oct 16	EPI_ISL_603135	A/Eurasian_Wigeon/Netherlands/5/2020	Erasmus Medical Center	Erasmus Medical Center	
EPI1807251	Netherlands	2020 Oct 16	EPI_ISL_603134	A/Eurasian_Wigeon/Netherlands/4/2020	Erasmus Medical Center	Erasmus Medical Center	
EPI1807243	Netherlands	2020 Oct 16	EPI_ISL_603133	A/Eurasian_Wigeon/Netherlands/1/2020	Erasmus Medical Center	Erasmus Medical Center	
EPI1846305	United Kingdom	2021 Jan 5	EPI_ISL_996003	A/chicken/Northern_Ireland/2021-000067_21VIR114-19/2021	AFBI - Agri-Food & Bioscience Institute	Istituto Zooprofilattico Sperimentale Delle Venezie	M.J. McMenamy, V. Harkin, K. Lemon, B. Zecchin, A. Fusaro, A. Schivo, A. Salviato, A. Pastori, I. Monne, C. Terregino
EPI1846297	United Kingdom	2020 Dec 31	EPI_ISL_995172	A/chicken/Northern_Ireland/2020-17671_21VIR113-11/2020	AFBI - Agri-Food & Bioscience Institute	Istituto Zooprofilattico Sperimentale Delle Venezie	M.J. McMenamy, V. Harkin, K. Lemon, B. Zecchin, A. Fusaro, A. Schivo, A. Salviato, A. Pastori, I. Monne, C. Terregino
EPI1811657	Russian Federation	2020 Oct 2	EPI_ISL_626647	A/chicken/Russian_Federation/Omsk/1680-10/2020	Federal Centre for Animal Health (ARRIAH)	Animal and Plant Health Agency (APHA)	
EPI1811628	Iraq	2020 May 12	EPI_ISL_623074	A/chicken/Iraq/1/2020	Central Veterinary Labs	Animal and Plant Health Agency (APHA)	
EPI1838673	Netherlands	2020 Dec 14	EPI_ISL_711055	A/chicken/Netherlands/20019879-001005/2020	Wageningen Bioveterinary Research	Wageningen Bioveterinary Research	Nancy Beerens, Frank Harders, Sylvia Verschuren-Pritz, Marit Roose, Evelien Germeraad, Marc Engelsma, Alex Bossers, Rene Heutink
EPI1813085	Netherlands	2020 Nov 11	EPI_ISL_641395	A/chicken/Netherlands/20017694-004/2020	Wageningen Bioveterinary Research	Wageningen Bioveterinary Research	Nancy Beerens, Frank Harders, Sylvia Verschuren-Pritz, Marit Roose, Evelien Germeraad, Marc Engelsma, Alex Bossers, Rene Heutink
EPI1813077	Netherlands	2020 Nov 10	EPI_ISL_641394	A/chicken/Netherlands/20017639-001/2020	Wageningen Bioveterinary Research	Wageningen Bioveterinary Research	Nancy Beerens, Frank Harders, Sylvia Verschuren-Pritz, Marit Roose, Evelien Germeraad, Marc Engelsma, Alex Bossers, Rene Heutink
EPI1812965	Netherlands	2020 Nov 2	EPI_ISL_641377	A/chicken/Netherlands/20016978-001/2020	Wageningen Bioveterinary Research	Wageningen Bioveterinary Research	Nancy Beerens, Frank Harders, Sylvia Verschuren-Pritz, Marit Roose, Evelien Germeraad, Marc Engelsma, Alex Bossers, Rene Heutink

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<u>EPI1812533</u>	Russian Federation	2020 Jul 31	<u>EPI_ISL_637098</u>	A/duck/Chelyabinsk/1207-1/2020	Federal Centre for Animal Health (ARRIAH) OIE Regional Reference Laboratory	Federal Centre for Animal Health (ARRIAH)	N. Zinyakov, P. Akshalova, P. Zhestkov, A. Kozlov, A. Andriyasov, E. Ovchinnikova, Z. Nikonova, V. Sosipatorova, L. Scherbakova, D. Andreychuk, I. Chvala
<u>EPI1837899</u>	United Kingdom	2020 Nov 18	<u>EPI_ISL_710512</u>	A/whistling_duck/England/035643/2020	Animal and Plant Health Agency (APHA)	Animal and Plant Health Agency (APHA)	
<u>EPI1811696</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_626650</u>	A/duck/Russian_Federation/Omsk/1328-2/2020	Federal Centre for Animal Health (ARRIAH)	Animal and Plant Health Agency (APHA)	
<u>EPI1811611</u>	Kazakhstan	2020 Sep 25	<u>EPI_ISL_615072</u>	A/domestic_duck/Kazakhstan/1-274-20-B/2020	National Veterinary Reference Center	Animal and Plant Health Agency (APHA)	
<u>EPI1813249</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644138</u>	A/wild_duck/Omsk/01111/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasilii Marchenko, Alexander Ryzhikov
<u>EPI1811564</u>	Germany	2020 Oct 29	<u>EPI_ISL_614399</u>	A/buzzard/Germany-MV/AI02166/2020	Landesamt für Landwirtschaft, Lebensmittelsicherheit und Fischerei (LALLF)	Friedrich-Loeffler-Institut	
<u>EPI1837941</u>	United Kingdom	2020 Nov 3	<u>EPI_ISL_710506</u>	A/Canada_goose/England/032697/2020	Animal and Plant Health Agency (APHA)	Animal and Plant Health Agency (APHA)	
<u>EPI1841769</u>	Ireland	2020 Nov 1	<u>EPI_ISL_813979</u>	A/peregrine_falcon/Ireland/20VIR7872-1/2020	Central Veterinary Research Laboratory	Istituto Zooprofilattico Sperimentale Delle Venezie	O. Flynn, E. Connaghan, C. Byrne, L. Garza Cuartero, R. O'Neill, B. Zecchin, A. Fusaro, A. Pastori, A. Salviato, A. Schivo, I. Monne, C. Terregino
<u>EPI1815373</u>	Italy	2020 Nov 21	<u>EPI_ISL_683752</u>	A/Eurasian_wigeon/Italy/20VIR7301-34/2020	Istituto Zooprofilattico Sperimentale delle Venezie, EU/OIE/Reference Laboratory and FAO Reference Centre for AI and ND	Istituto Zooprofilattico Sperimentale Delle Venezie	
<u>EPI1815381</u>	Italy	2020 Nov 21	<u>EPI_ISL_683751</u>	A/Eurasian_wigeon/Italy/20VIR7301-31/2020	Istituto Zooprofilattico Sperimentale delle Venezie, EU/OIE/Reference Laboratory and FAO Reference Centre for AI and ND	Istituto Zooprofilattico Sperimentale Delle Venezie	

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<u>EPI1815150</u>	Italy	2020 Nov 14	<u>EPI_ISL_683593</u>	A/Eurasian_wigeon/Italy/20VI R7139-121/2020	Istituto Zooprofilattico Sperimentale delle Venezie, EU/OIE/Reference Laboratory and FAO Reference Centre for AI and ND	Istituto Zooprofilattico Sperimentale Delle Venezie	B. Zecchin, A. Fusaro, A. Pastori, A. Milani, A. Salviato, A. Schivo, I. Monne, C. Terregino
<u>EPI1815142</u>	Italy	2020 Nov 21	<u>EPI_ISL_683592</u>	A/Eurasian_wigeon/Italy/20VI R7301-206/2020	Istituto Zooprofilattico Sperimentale delle Venezie, EU/OIE/Reference Laboratory and FAO Reference Centre for AI and ND	Istituto Zooprofilattico Sperimentale Delle Venezie	B. Zecchin, A. Fusaro, A. Pastori, A. Milani, A. Salviato, A. Schivo, I. Monne, C. Terregino
<u>EPI1815159</u>	Italy	2020 Nov 14	<u>EPI_ISL_683594</u>	A/mallard/Italy/20VIR7139-124_feather/2020	Istituto Zooprofilattico Sperimentale delle Venezie, EU/OIE/Reference Laboratory and FAO Reference Centre for AI and ND	Istituto Zooprofilattico Sperimentale Delle Venezie	B. Zecchin, A. Fusaro, A. Pastori, A. Milani, A. Salviato, A. Schivo, I. Monne, C. Terregino
<u>EPI1814606</u>	Italy	2020 Nov 14	<u>EPI_ISL_654958</u>	A/mallard/Italy/20VIR7139-73/2020	Istituto Zooprofilattico Sperimentale delle Venezie, EU/OIE/Reference Laboratory and FAO Reference Centre for AI and ND	Istituto Zooprofilattico Sperimentale Delle Venezie	B. Zecchin, A. Fusaro, A. Pastori, A. Milani, A. Salviato, A. Schivo, I. Monne, C. Terregino
<u>EPI1814694</u>	Belgium	2020 Nov 7	<u>EPI_ISL_664102</u>	A/Numenius_arquata/Belgium /11956_003/2020	Sciensano - Animal Infectious Diseases	Sciensano, Department of Animal Infectious Diseases	Steven Van Borm, Elisabeth Mathijs, Frank Vandenbussche, Thierry van den Berg, Bénédicte Lambrecht, Mieke Steensels
<u>EPI1812399</u>	Netherlands	2020 Nov 1	<u>EPI_ISL_632318</u>	A/greylag_goose/Netherlands /20016879-001/2020	Wageningen Bioveterinary Research	Wageningen Bioveterinary Research	Nancy Beerens, Frank Harders, Sylvia Verschuren-Pritz, Marit Roose, Evelien Germeraad, Marc Engelsma, Alex Bossers, Rene Heutink
<u>EPI1812367</u>	Netherlands	2020 Oct 28	<u>EPI_ISL_632314</u>	A/greylag_goose/Netherlands /20016582-004/2020	Wageningen Bioveterinary Research	Wageningen Bioveterinary Research	Nancy Beerens, Frank Harders, Sylvia Verschuren-Pritz, Marit Roose, Evelien Germeraad, Marc Engelsma, Alex Bossers, Rene Heutink
<u>EPI1813753</u>	Denmark	2020 Nov 4	<u>EPI_ISL_644824</u>	A/barnacle_goose/Denmark/1 4138-1/2020-11-04	Statens Serum Institut	Statens Serum Institut	Charlotte, Hjulsager

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<u>EPI1811572</u>	Germany	2020 Oct 28	<u>EPI_ISL_614400</u>	A/barnacle_goose/Germany-SH/AI02167/2020	Landeslabor Schleswig-Holstein	Friedrich-Loeffler-Institut	
<u>EPI1812391</u>	Netherlands	2020 Nov 1	<u>EPI_ISL_632317</u>	A/barnacle_goose/Netherlands/20016935-002/2020	Wageningen Bioveterinary Research	Wageningen Bioveterinary Research	Nancy Beerens, Frank Harders, Sylvia Verschuren-Pritz, Marit Roose, Evelien Germeraad, Marc Engelsma, Alex Bossers, Rene Heutink
<u>EPI1814735</u>	Sweden	2020 Nov 12	<u>EPI_ISL_668457</u>	A/barnacle_goose/Sweden/VA201117SZ0468/KN003355/2020	National Veterinary Institute, SVA	National Veterinary Institute	
<u>EPI1814627</u>	Belgium	2020 Nov 18	<u>EPI_ISL_660264</u>	A/Gallus_gallus/Belgium/12168_002/2020	Sciensano - Animal Infectious Diseases	Sciensano, Department of Animal Infectious Diseases	Steven Van Borm, Elisabeth Mathijs, Frank Vandebussche, Thierry van den Berg, Bénédicte Lambrecht, Mieke Steensels
<u>EPI1844083</u>	Czech Republic	2021 Jan 22	<u>EPI_ISL_977513</u>	A/chicken/Czech_Republic/1566-1/2021	State Veterinary Institute Prague	State Veterinary Institute Prague	A. Nagy, L. Cernikova, M. Stara
<u>EPI1847025</u>	Russian Federation	2020 Dec 12	<u>EPI_ISL_1039240</u>	A/chicken/Astrakhan/321-10/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1847017</u>	Russian Federation	2020 Dec 12	<u>EPI_ISL_1039239</u>	A/chicken/Astrakhan/321-10/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1847009</u>	Russian Federation	2020 Dec 12	<u>EPI_ISL_1039238</u>	A/chicken/Astrakhan/321-09/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1847001</u>	Russian Federation	2020 Dec 12	<u>EPI_ISL_1039236</u>	A/chicken/Astrakhan/321-06/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov

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<u>EPI1846993</u>	Russian Federation	2020 Dec 12	<u>EPI_ISL_1039235</u>	A/chicken/Astrakhan/321-05/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1846985</u>	Russian Federation	2020 Dec 12	<u>EPI_ISL_1039234</u>	A/chicken/Astrakhan/321-05/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	
<u>EPI1846977</u>	Russian Federation	2020 Dec 12	<u>EPI_ISL_1039232</u>	A/chicken/Astrakhan/321-01/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	
<u>EPI1846969</u>	Russian Federation	2020 Dec 12	<u>EPI_ISL_1039231</u>	A/chicken/Astrakhan/321-01/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	
<u>EPI1813433</u>	Russian Federation	2020 Aug 6	<u>EPI_ISL_644161</u>	A/chicken/Chelyabinsk/404/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813425</u>	Russian Federation	2020 Aug 6	<u>EPI_ISL_644160</u>	A/chicken/Chelyabinsk/403/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813409</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644158</u>	A/chicken/Omsk/0073/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813385</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644155</u>	A/chicken/Omsk/0119/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov

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<u>EPI1813377</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644154</u>	A/chicken/Omsk/0118/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813345</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644150</u>	A/chicken/Omsk/0112/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813329</u>	Russian Federation	2020 Aug 6	<u>EPI_ISL_644148</u>	A/chicken/Chelyabinsk/404/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813321</u>	Russian Federation	2020 Aug 6	<u>EPI_ISL_644147</u>	A/chicken/Chelyabinsk/403/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813313</u>	Russian Federation	2020 Aug 6	<u>EPI_ISL_644146</u>	A/chicken/Chelyabinsk/402/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813305</u>	Russian Federation	2020 Aug 6	<u>EPI_ISL_644145</u>	A/chicken/Chelyabinsk/401/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813265</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644140</u>	A/chicken/Omsk/0073/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy

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<u>EPI1813225</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644135</u>	A/chicken/Omsk/0119/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Marchenko, Alexander Ryzhikov Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813217</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644134</u>	A/chicken/Omsk/0118/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813153</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644126</u>	A/chicken/Omsk/0112/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1837917</u>	United Kingdom	2020 Nov 9	<u>EPI_ISL_710509</u>	A/chicken/England/033708/20	Animal and Plant Health Agency (APHA) Wageningen	Animal and Plant Health Agency (APHA)	Nancy Beerens, Frank Harders, Sylvia Verschuren-Pritz, Marit Roose, Evelien Germeraad, Marc Engelsma, Alex Bossers, Rene Heutink
<u>EPI1807231</u>	Netherlands	2020 Oct 28	<u>EPI_ISL_603132</u>	A/chicken/Netherlands/20016597-026030/2020	Biovetinary Research	Wageningen Biovetinary Research	
<u>EPI1813393</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644156</u>	A/goose/Omsk/011101/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813361</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644152</u>	A/goose/Omsk/01161/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813353</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644151</u>	A/goose/Omsk/0114/2020	State Research Center of Virology and	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey

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					Biotechnology (VECTOR)		Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813273</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644141</u>	A/goose/Omsk/0074/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813257</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644139</u>	A/goose/Omsk/0071/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813233</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644136</u>	A/goose/Omsk/011101/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813201</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644132</u>	A/goose/Omsk/01171/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813185</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644130</u>	A/goose/Omsk/01161/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813177</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644129</u>	A/goose/Omsk/0115/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov

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<u>EPI1813169</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644128</u>	A/goose/Omsk/0114/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813161</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644127</u>	A/goose/Omsk/0113/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813145</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644125</u>	A/goose/Omsk/0111/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813121</u>	Russian Federation	2020 Aug 13	<u>EPI_ISL_644122</u>	A/goose/Omsk/0002/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1814675</u>	Belgium	2020 Nov 7	<u>EPI_ISL_661313</u>	A/Anser_albifrons/Belgium/11956_005/2020	Sciensano - Animal Infectious Diseases	Sciensano, Department of Animal Infectious Diseases	Steven Van Borm, Elisabeth Mathijs, Frank Vandenbussche, Thierry van den Berg, Bénédicte Lambrecht, Mieke Steensels
<u>EPI1813417</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644159</u>	A/duck/Omsk/0076/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813337</u>	Russian Federation	2020 Aug 13	<u>EPI_ISL_644149</u>	A/duck/Omsk/0004/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov

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<u>EPI1813297</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644144</u>	A/duck/Omsk/0077/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813289</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644143</u>	A/duck/Omsk/0076/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813281</u>	Russian Federation	2020 Aug 17	<u>EPI_ISL_644142</u>	A/duck/Omsk/0075/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813137</u>	Russian Federation	2020 Aug 13	<u>EPI_ISL_644124</u>	A/duck/Omsk/0004/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1812375</u>	Netherlands	2020 Nov 2	<u>EPI_ISL_632315</u>	A/eurasian_teal/Netherlands/20016896-013/2020	Wageningen Bioveterinary Research	Wageningen Bioveterinary Research	Nancy Beerens, Frank Harders, Sylvia Verschuren-Pritz, Marit Roose, Evelien Germeaad, Marc Engelsma, Alex Bossers, Rene Heutink
<u>EPI1813129</u>	Russian Federation	2020 Aug 13	<u>EPI_ISL_644123</u>	A/turkey/Omsk/0003/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov
<u>EPI1813113</u>	Russian Federation	2020 Aug 13	<u>EPI_ISL_644121</u>	A/turkey/Omsk/0001/2020	State Research Center of Virology and Biotechnology (VECTOR)	State Research Center of Virology and Biotechnology (VECTOR)	Natalia Goncharova, Ivan Susloparov, Natalia Kolosova, Alexey Danilenko, Juliya Bulanovich, Vasiliy Marchenko, Alexander Ryzhikov

Segment ID	Country	Collection date	Isolate-ID	Isolate name	Originating Laboratory	Submitting Laboratory	Authors
<u>EPI1813830</u>	Sweden	2020 Nov 13	<u>EPI_ISL_647969</u>	A/Turkey/Sweden/SVA20111 4SZ0001/20KN303106/2020	National Veterinary Institute, SVA	National Veterinary Institute	

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