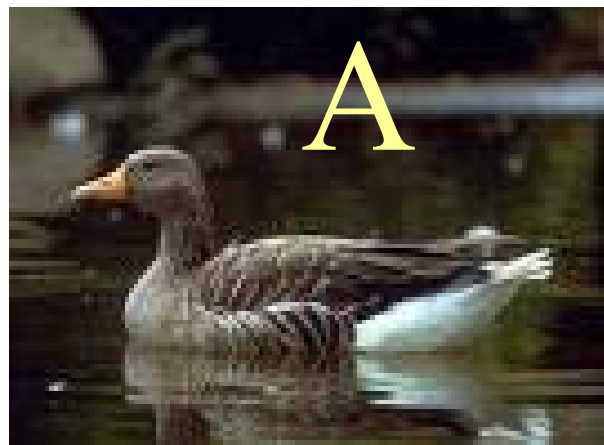
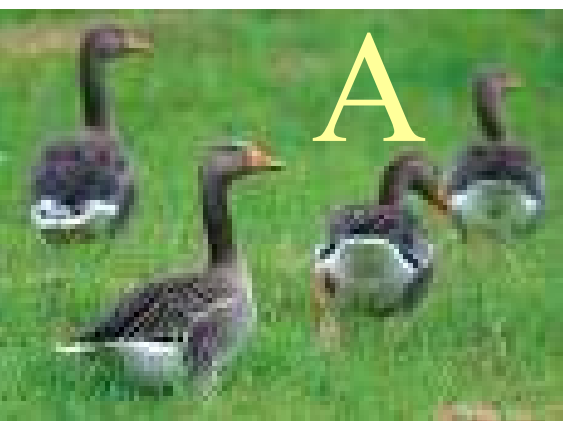
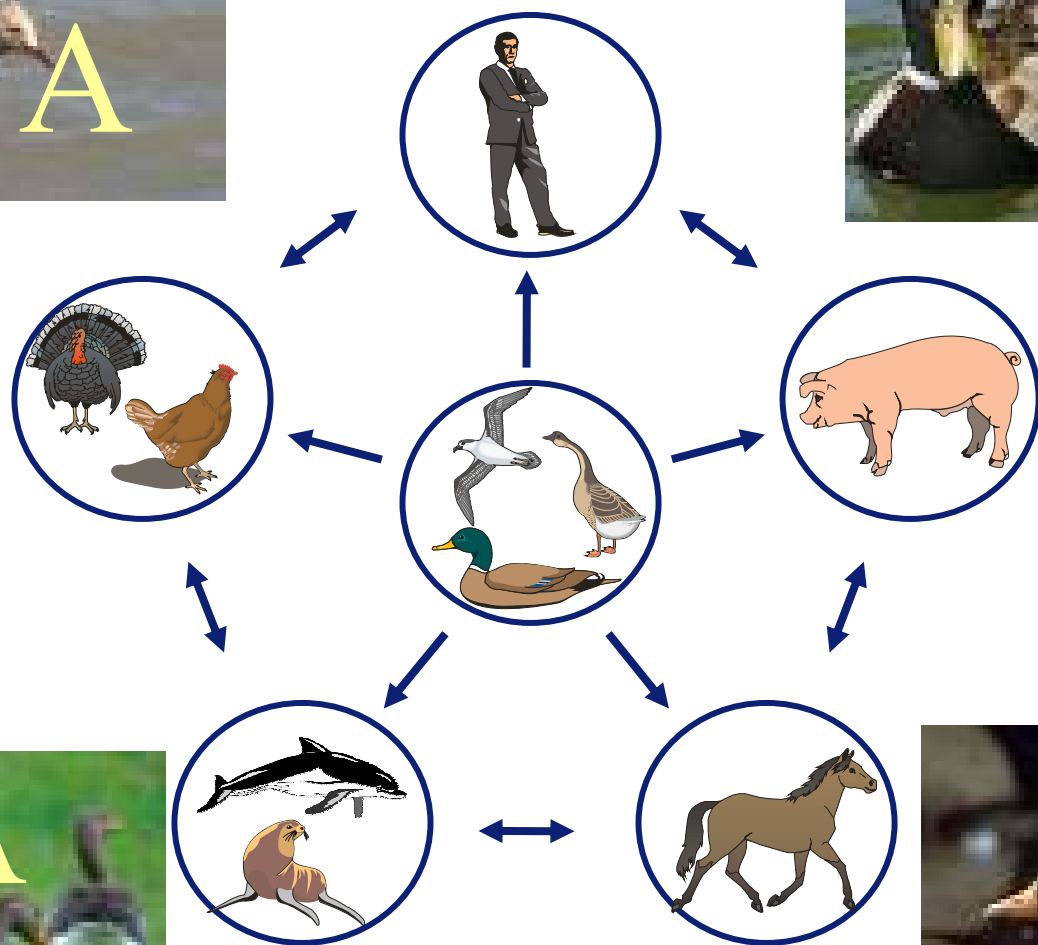
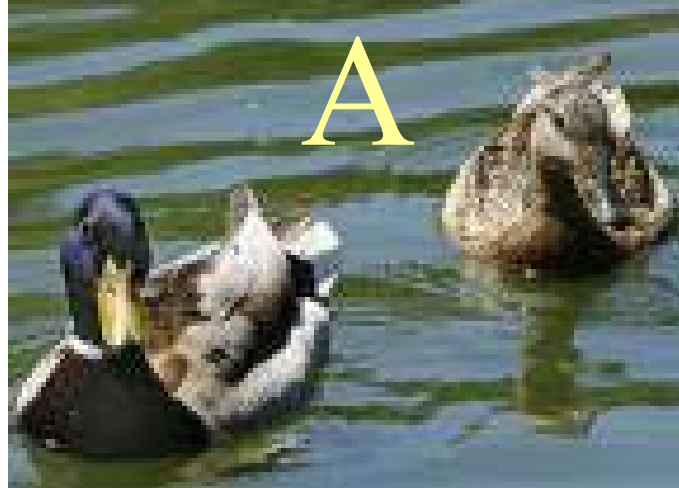


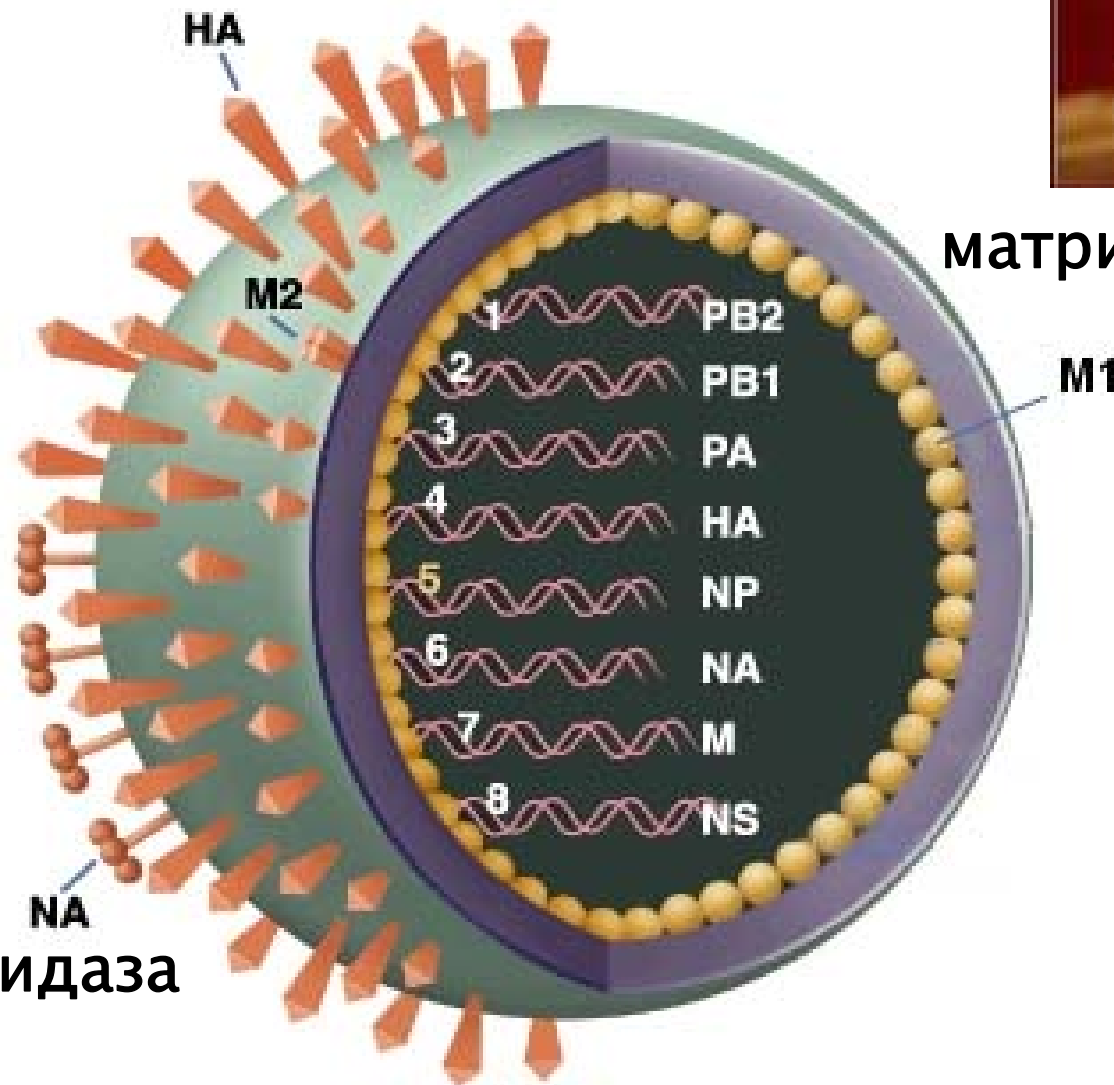
Вирусная футурология или грипп как предчувствие

Каверин Николай Вениаминович
академик РАМН , профессор НИИ
вирусологии им. Д.И. Ивановского



гемагглютинин

100 нм



нейраминидаза

0



матриксный белок

SMITH, W.; ANDREWES, C. H. AND LAIDLAW, P. P.
A Virus Obtained from Influenza Patients
The Lancet. 1933, v.2, p.66.

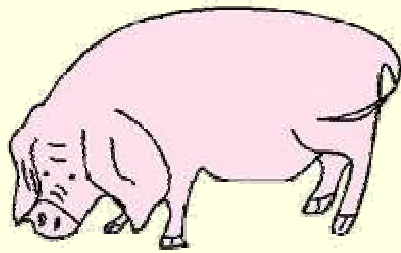
Пандемии гриппа А

Год	Подтип	Погибло ($\times 10^6$)
1889	H2N?	6
1898	H3N8	0,5
1918	H1N1	40
1957	H2N2	4
1968	H3N2	2
1977	H1N1	?

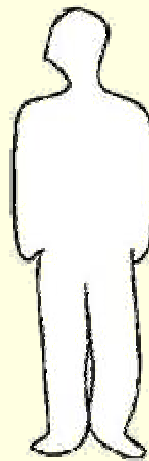


Распределение подтипов гемагглютина у человека, животных и птиц

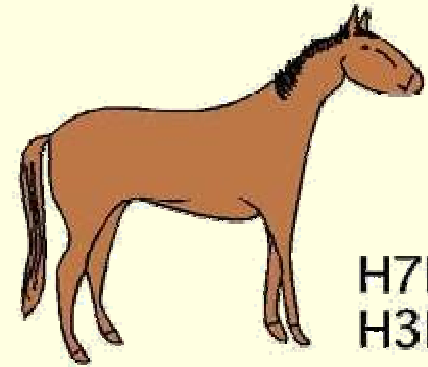
H1				H9	()	()	
H2				H10			
H3		 		H11			
H4		() ()		H12			
H5	()			H13		()	
H6				H14			
H7		() 		H15			
H8				H16			



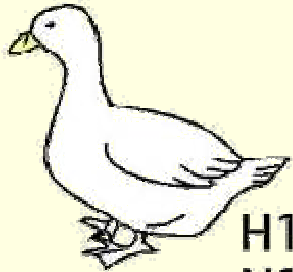
H1N1
H3N2
(H1N2)



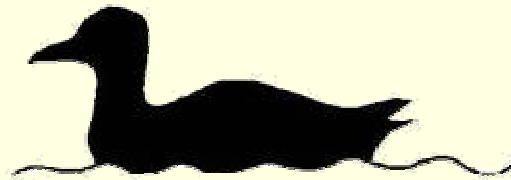
H1N1
H2N2
H3N2
(H2N8)
(H3N8)



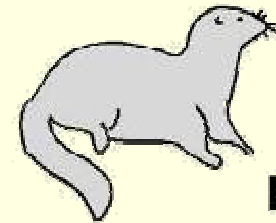
H7N7
H3N8



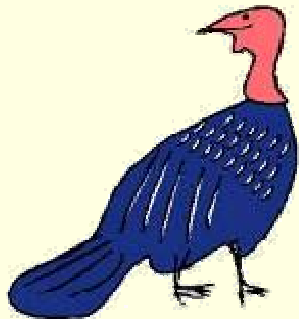
H1-12
N1-9



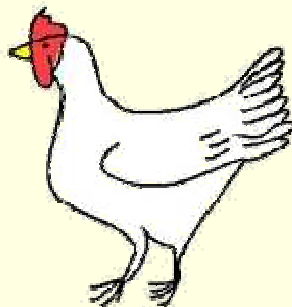
H1-16
N1-9



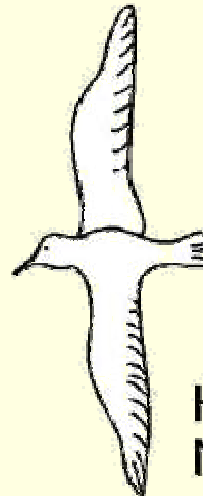
H10N4



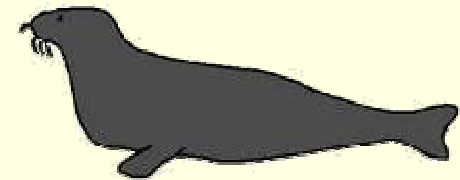
H1-10
N1-9



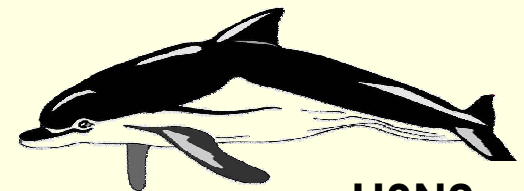
H4, 5, 7, 9, 10
N1, 2, 4, 7



H1-7, 9-16
N1-9



H7N7
H4N5
H3N3



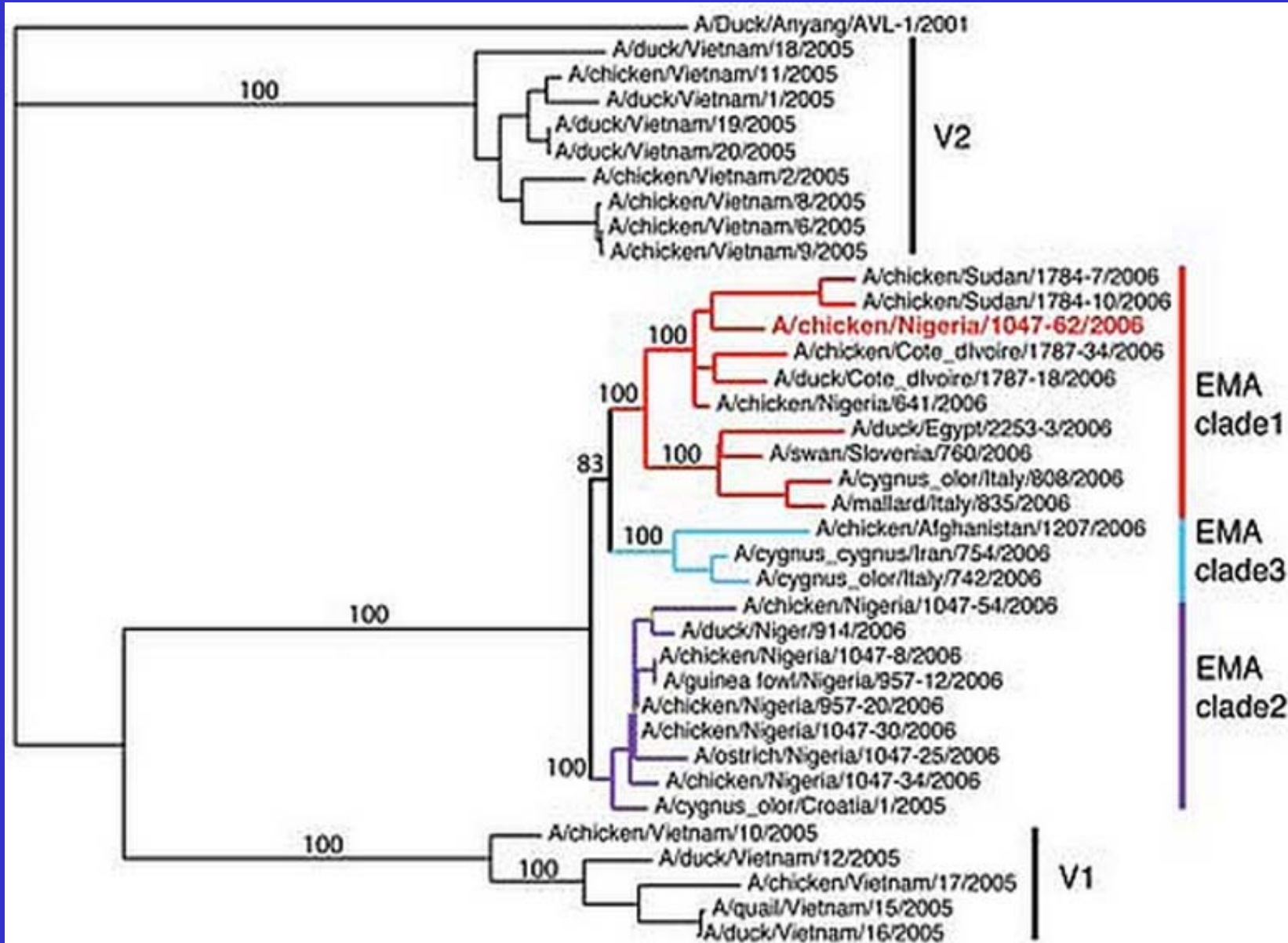
H3N2
H13N9

Подтипы вирусов гриппа А в России

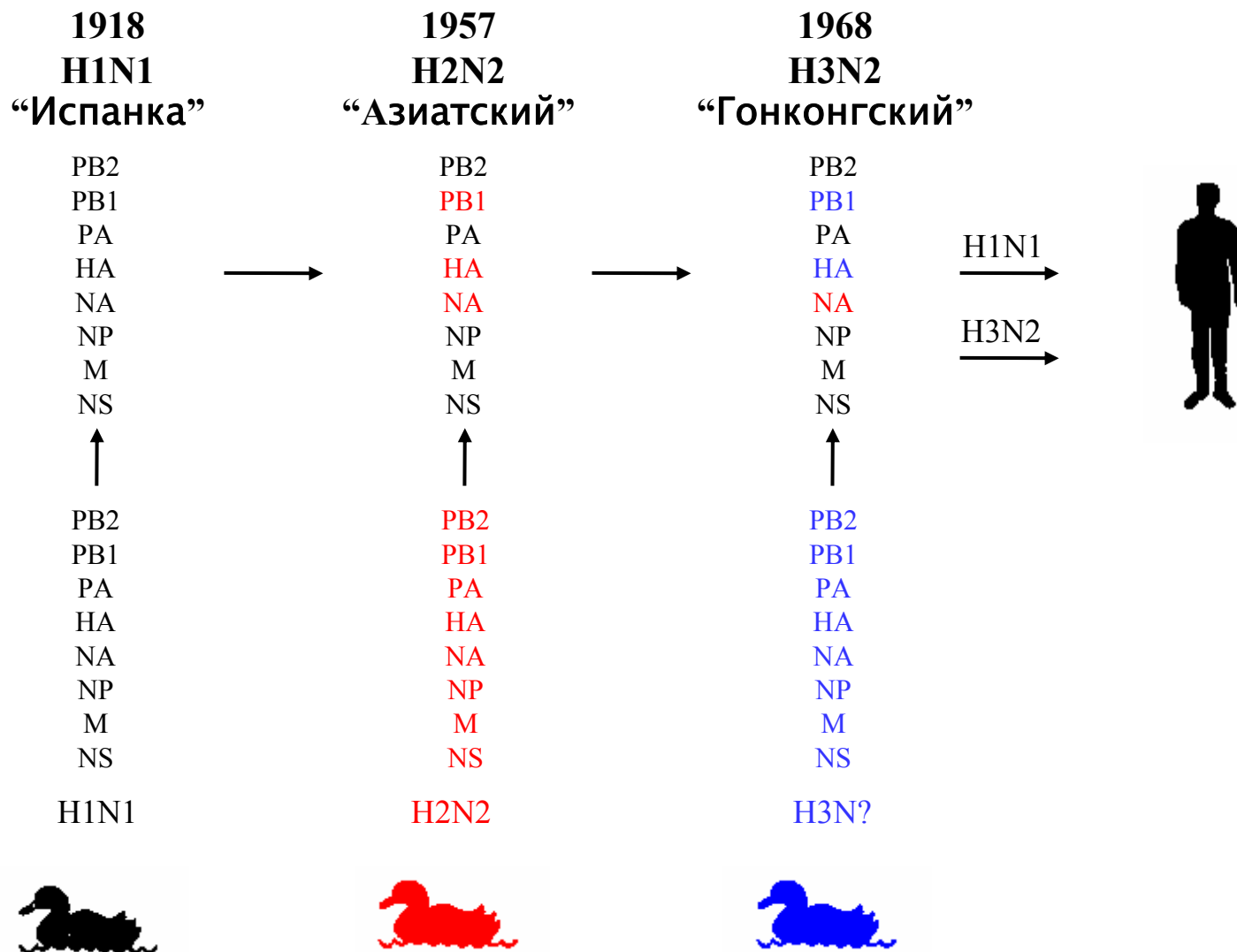


	10	20	30	40	50	60	70
A/chicken/Shandong/2/02							
A/Chicken/Shanghai/1/02	MEVSLITIL	LVVTASNADK	ICIGYQSTNS	TETVDTLTEN	NVPVTHAKEL	LHTEHNGMLC	ATNLGHPLIL
A/chicken/Hong Kong/WF2/99	MEVSLITIL	LVVTASNADK	ICIGYQSTNS	TETVDTLTEN	NVPVTHAKEL	LHTEHNGMLC	ATNLGHPLIL
A/duck/Hong Kong/644/79	METIALI--L	LVVTASNADK	ICIGYQSTNS	TETVDTLIET	NVPVTHAKEL	LHTEHNGMLC	ATNLGHPLIL
A/duck/Hong Kong/552/79	METTALIAIL	LMVTTASNADK	ICIGYQSTNS	TETVDTLIEN	NVPVTHAKEL	LHTEHNGMLC	ATNLGHPLIL
A/duck/Hong Kong/610/79	METTALIAIL	LMVTTASNADK	ICIGYQSTNS	TETVDTLIEN	NVPVTHAKEL	LHTEHNGMLC	ATNLGHPLIL
A/duck/Hong Kong/366/78	METIALIAIL	LVVTASNADK	ICIGYQSTNS	TETVDTLIET	NVPVTHAKEL	LHTEHNGMLC	ATNLGHPLIL
A/duck/Hong Kong/448/78	METIALITIL	LVVTASNADK	ICIGYQSTNS	TETVDTLIET	NVPVTHAKEL	LHTEHNGMLC	ATNLGHPLIL
A/duck/Hong Kong/702/1979	METKALIAIL	LMVTTASNADK	ICIGYQSTNS	TETVDTLTEN	NVPVTHAKEL	LHTEHNGMLC	ATNLGHPLIL
A/duck/Hong Kong/147/77	METIALIAIL	LMVTTASNADK	ICIGYQSTNS	TETVDTLTEN	NVPVTHAKEL	LHTEHNGMLC	ATNLGHPLIL
A/guinea fowl/Hong Kong/WF10/9	METISLITIL	LVVTASNADK	ICIGHQSTNS	TETVDTLTET	NVPVTHAKEL	LHTEHNGMLC	ATSLGHPLIL
A/quail/Hong Kong/A28945/88	MEALALITIL	LVVTASNADK	ICIGYQSTNS	TETVDTLMES	NVPVTHAKEL	LHTEHNGMLC	ATNLGHPLIL
A/swine/Hong Kong/9/98-MA	MEASLITIL	LVVTASNADK	ICIGYQSTNS	TETVDTLTET	NVPVTHAKEL	LHTEHNGMLC	ATNLGHPLIL

	80	90	100	110	120	130	140
A/chicken/Shandong/2/02							
A/Chicken/Shanghai/1/02	DTCTIEGLIY	GNPSCNLLL	GREWSYIVER	PSAVNGLCYP	GNVENLEELR	SIFSSASSFQ	RIQIFPDTIW
A/chicken/Hong Kong/WF2/99	DTCTIEGLIY	GNPSCDLLG	GREWSYIVER	PSAVNGLCYP	GNVENLEELR	SIFSSASSYQ	RIQIFPDTIW
A/duck/Hong Kong/644/79	DTCTIEGLVY	GNPSCDLLG	GKEWSYIVER	SSAVNGMCYP	GNVENLEELR	SFFSSANSYQ	RIQIFPDTIW
A/duck/Hong Kong/552/79	DTCTIEGLVY	GNPSCDLLG	GKEWSYIVER	SSAVNGMCYP	GNVENLEELR	SFFSSANSYR	RIQIFPDTIW
A/duck/Hong Kong/610/79	DTCTIEGLVY	GNPSCDLLG	GKEWSYIVER	SSAVNGMCYP	GNVENLEELR	SFFSSANSYR	RIQIFPDTIW
A/duck/Hong Kong/366/78	DTCTIEGLVY	GNPSCDLLG	GKEWSYIVER	SSAVNGMCYP	GNVENLEELR	SFFSYANSYQ	RIQIFPDTIW
A/duck/Hong Kong/448/78	DTCTIEGLVY	GNPSCDLLG	GKEWSYIVER	SSAVNGMCYP	GNVENLEELR	SFFSSANSYQ	RIQIFPDTIW
A/duck/Hong Kong/702/1979	DTCTIEGLVY	GNPSCDLLG	GKEWSYIVER	SSAVNGMCYP	GNVENLEELR	SFFSSANSYR	RIQIFPDTIW
A/duck/Hong Kong/147/77	DTCTIEGLVY	GNPSCDLLG	GKEWSYIVER	SSAVNGMCYP	GNVENLEELR	SFFSSANSYR	RIQIFPDTIW
A/guinea fowl/Hong Kong/WF10/9	DTCTIEGLVY	GNPSCDLLL	GREWSYIVER	SSAVNGTCYP	GNVENLEELR	TIFSSASSYQ	RIQIFPDTIW
A/quail/Hong Kong/A28945/88	DTCTIEGLIY	GNPSCDLLG	GKEWSYIVER	SSAVNGMCYP	GNVENLEELR	SFFSSANSYQ	RVQIFPDTIW
A/swine/Hong Kong/9/98-MA	DTCTIEGLIY	GNPSCDLLG	GREWSYIVER	PSAVNGMCYP	GNVENLEELR	SIFSSASSYQ	RIQIFPDTIW



Эволюция вируса гриппа А человека в XX столетии



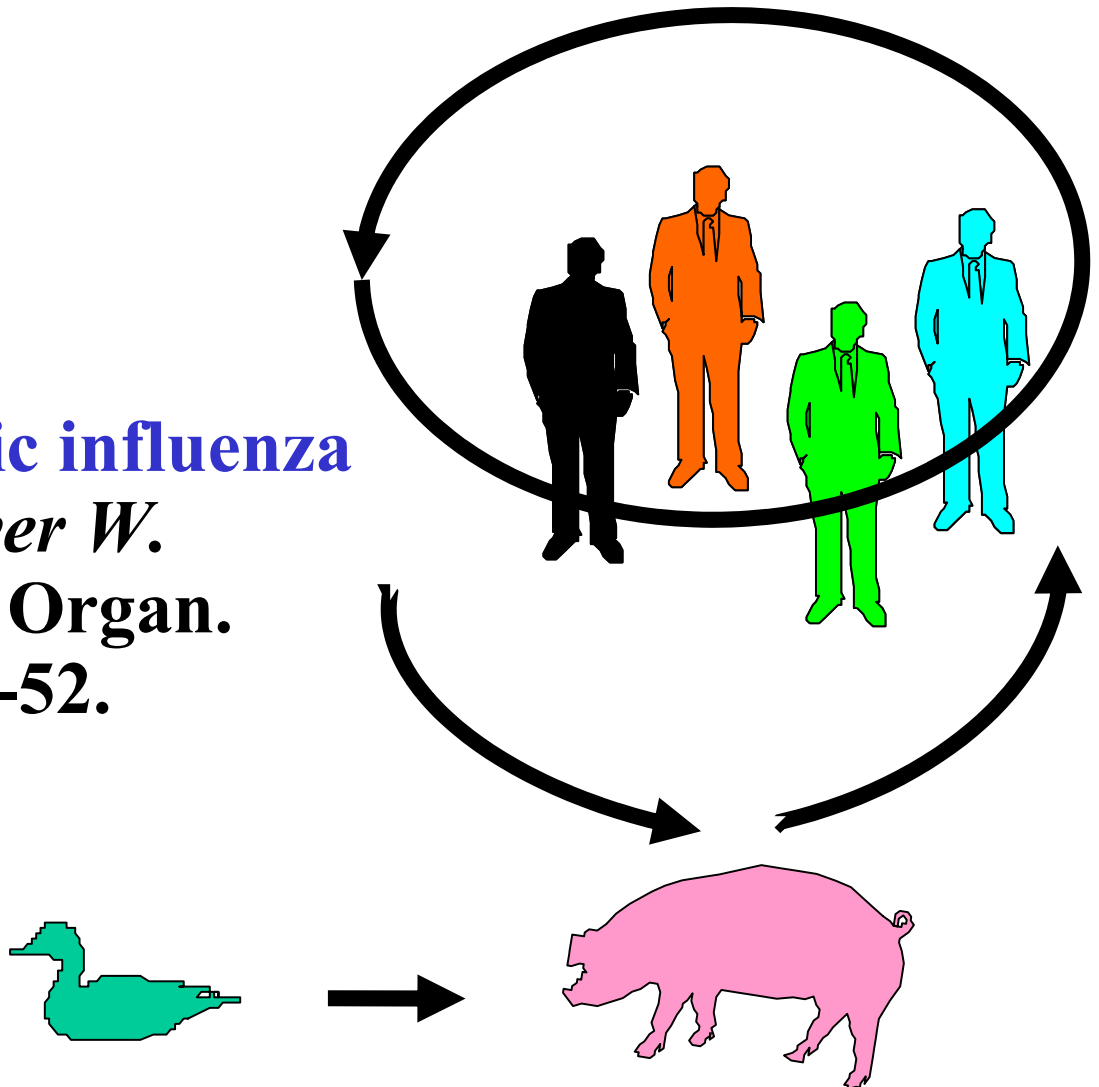
Свиньи как «смешивающий сосуд» при реассортации

The origin of pandemic influenza

Webster RG, Laver W.

Bull World Health Organ.

1972;47(4):449-52.



Реассортационная теория Вебстера и Лэйвера



Robert Webster

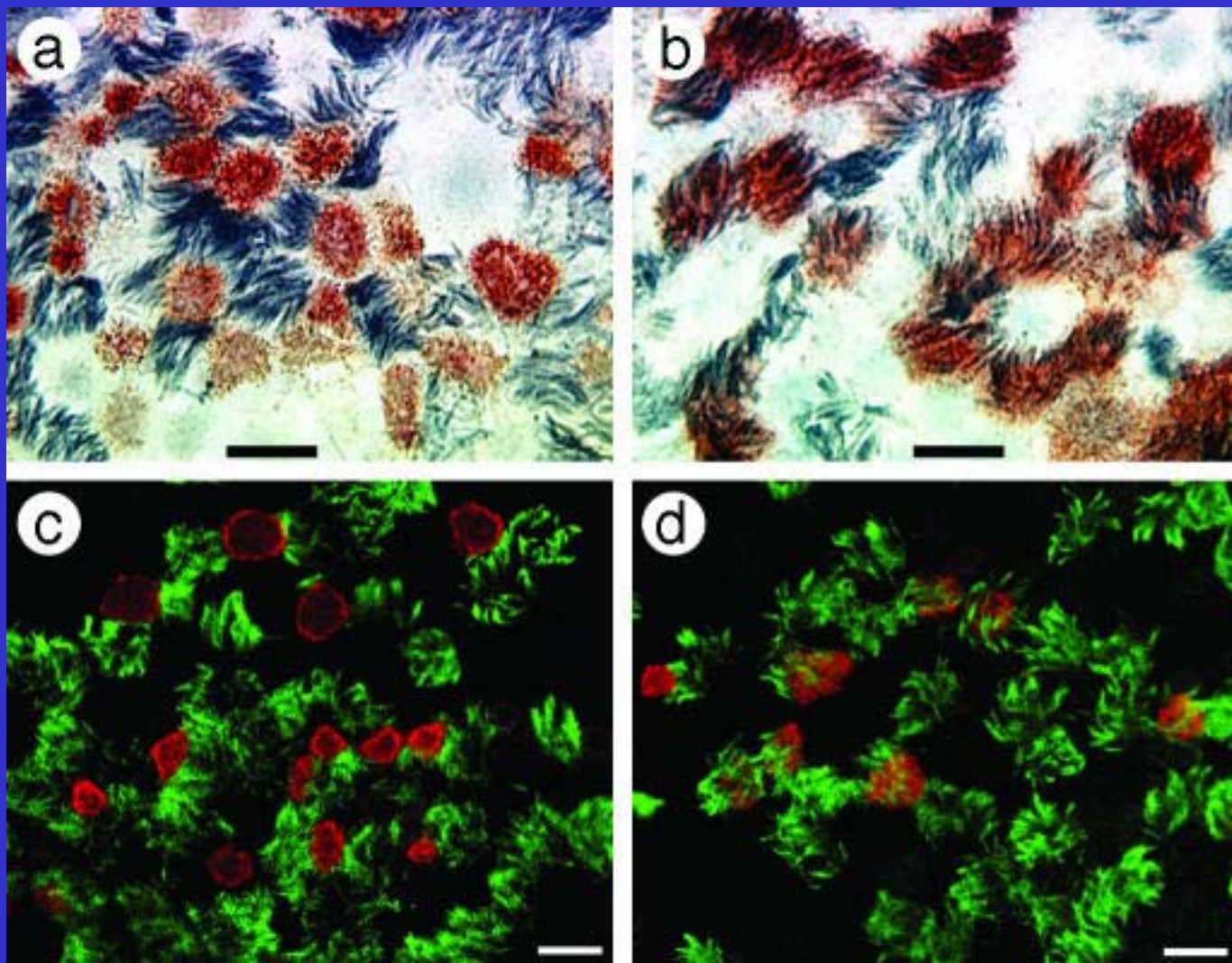


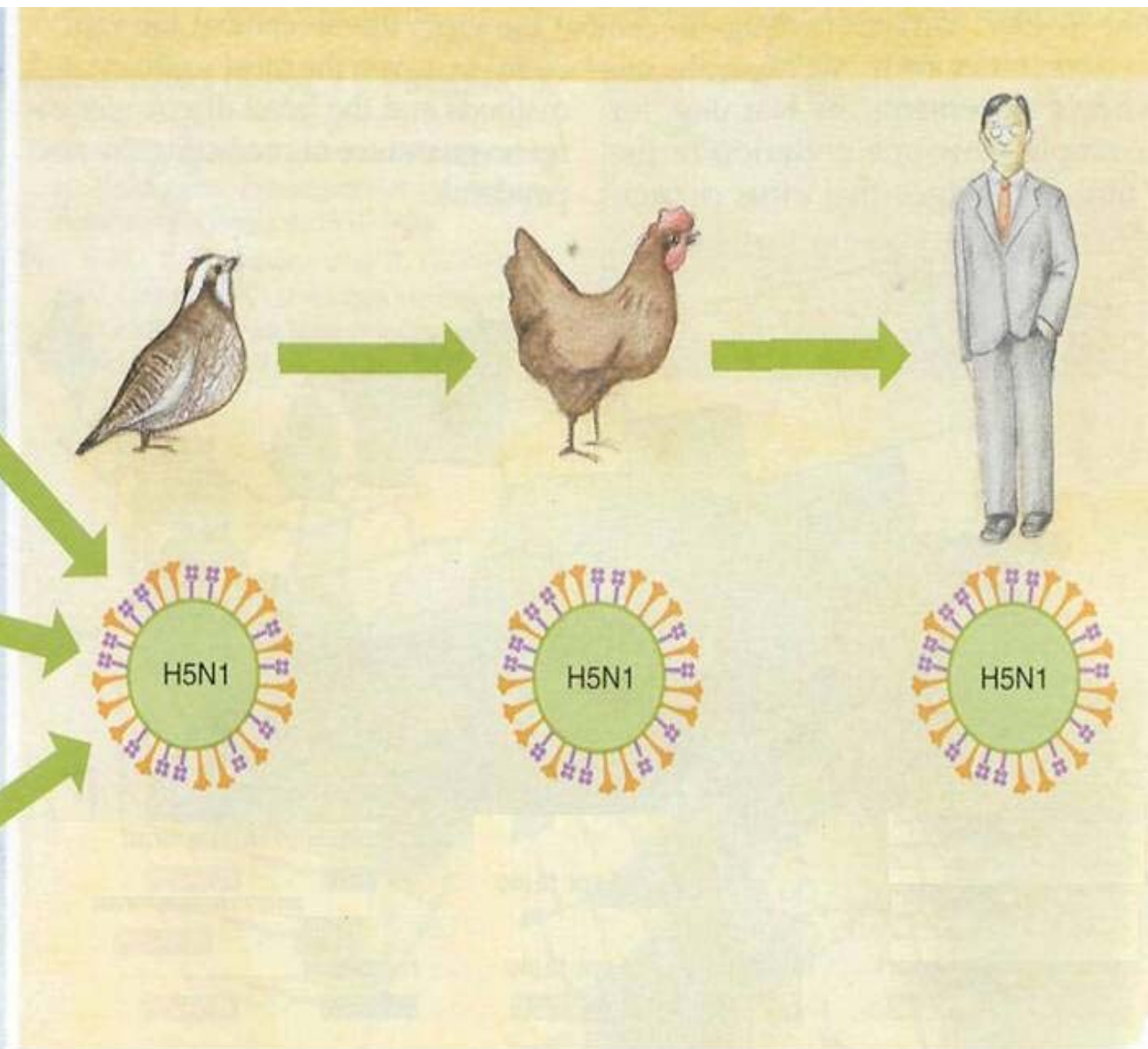
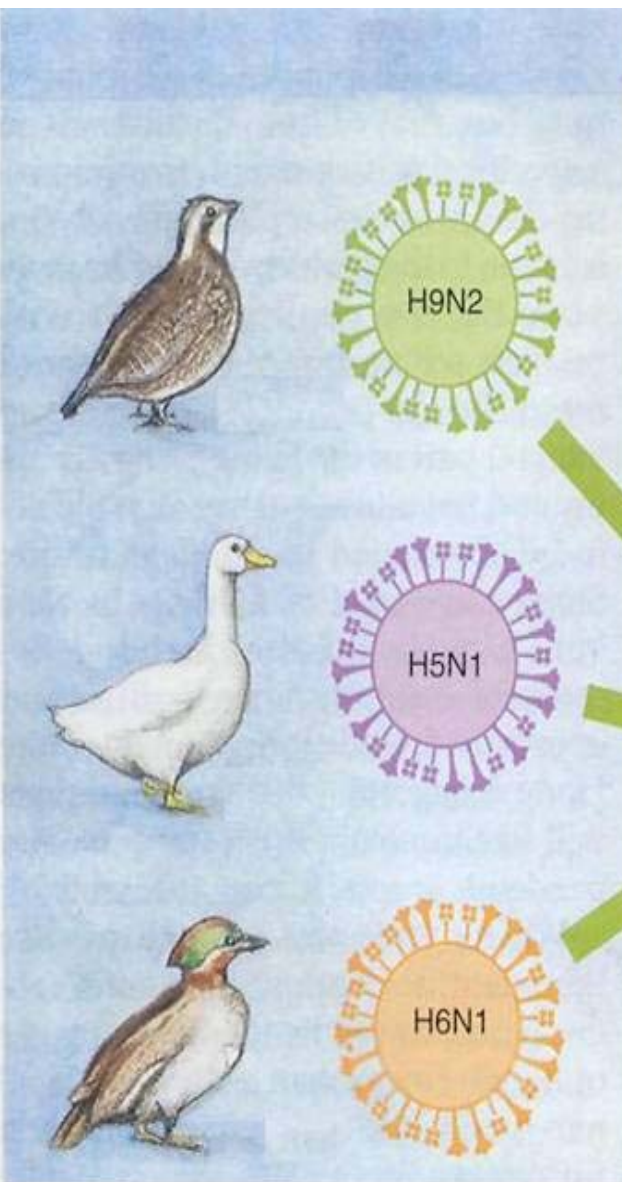
Graeme Laver

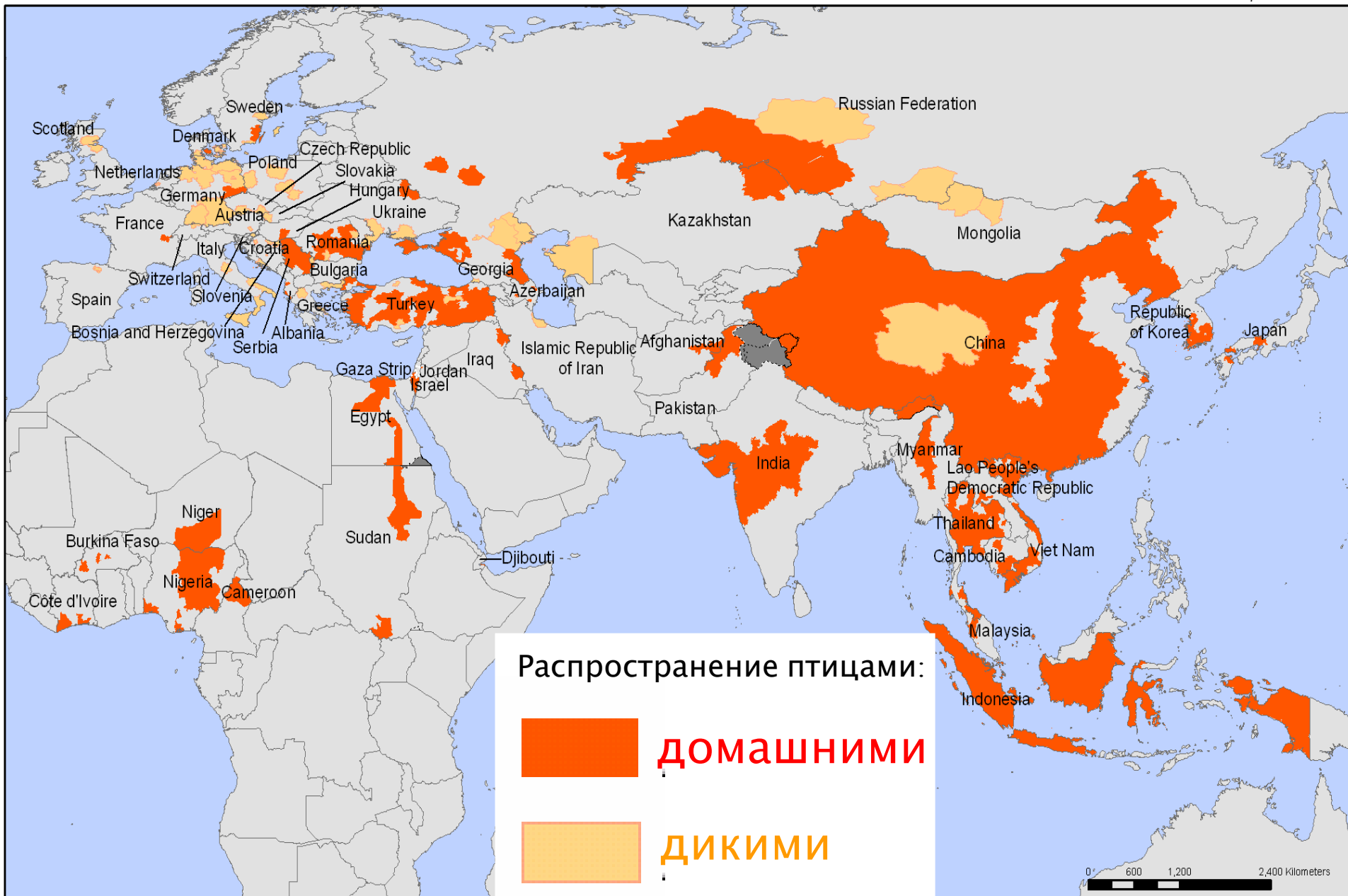




Рецепторы «птичьего» и «человеческого» типа в клетках носоглотки человека







Vietnam's losing battle with bird flu

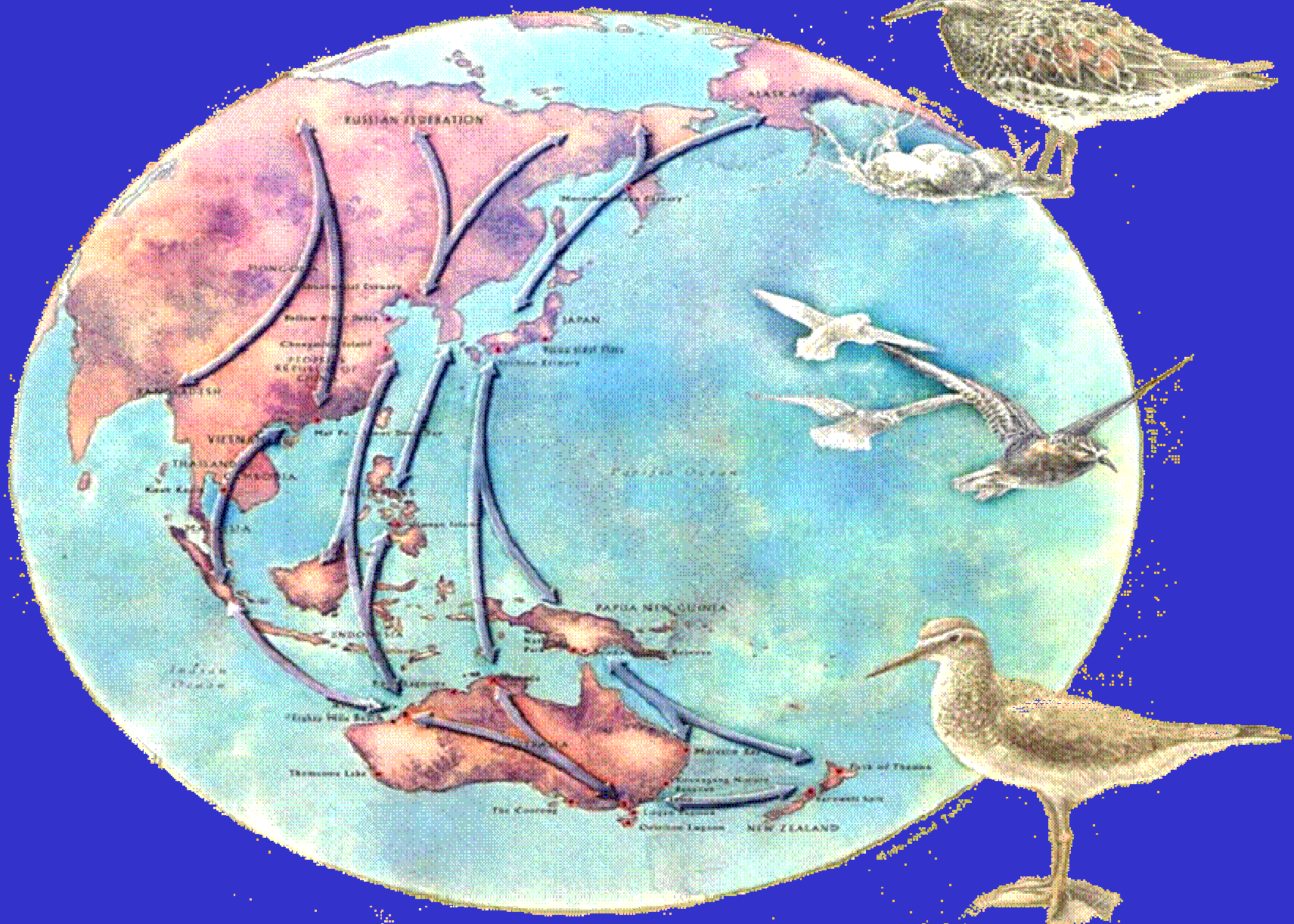


Hein T.T. et al. // New Eng. J. Med. – 2004.

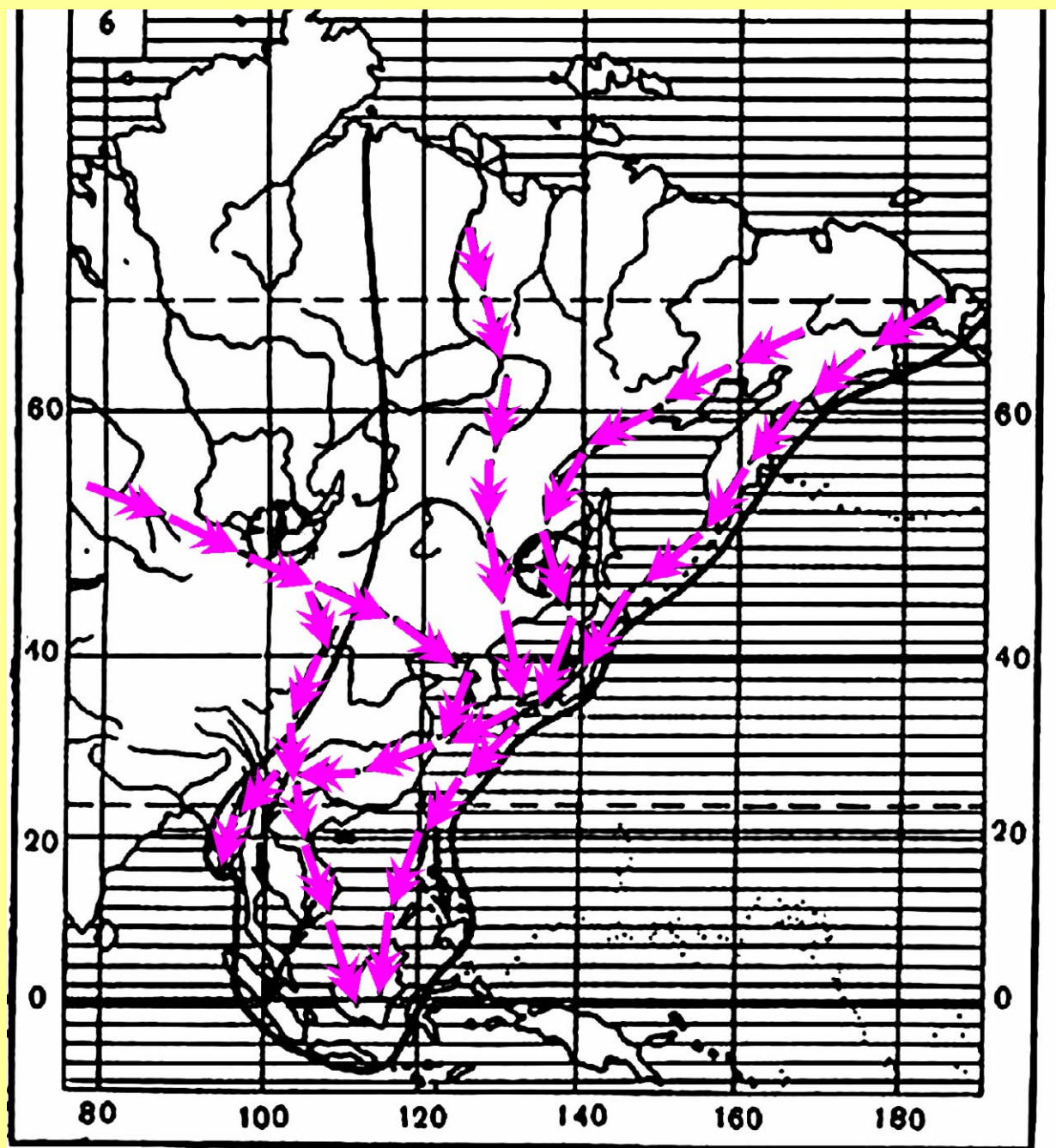
10 случаев среди детей (средний возраст 13.7 года):

Лимфопения (10/10); диарея (7/10); летальный исход (7/10).

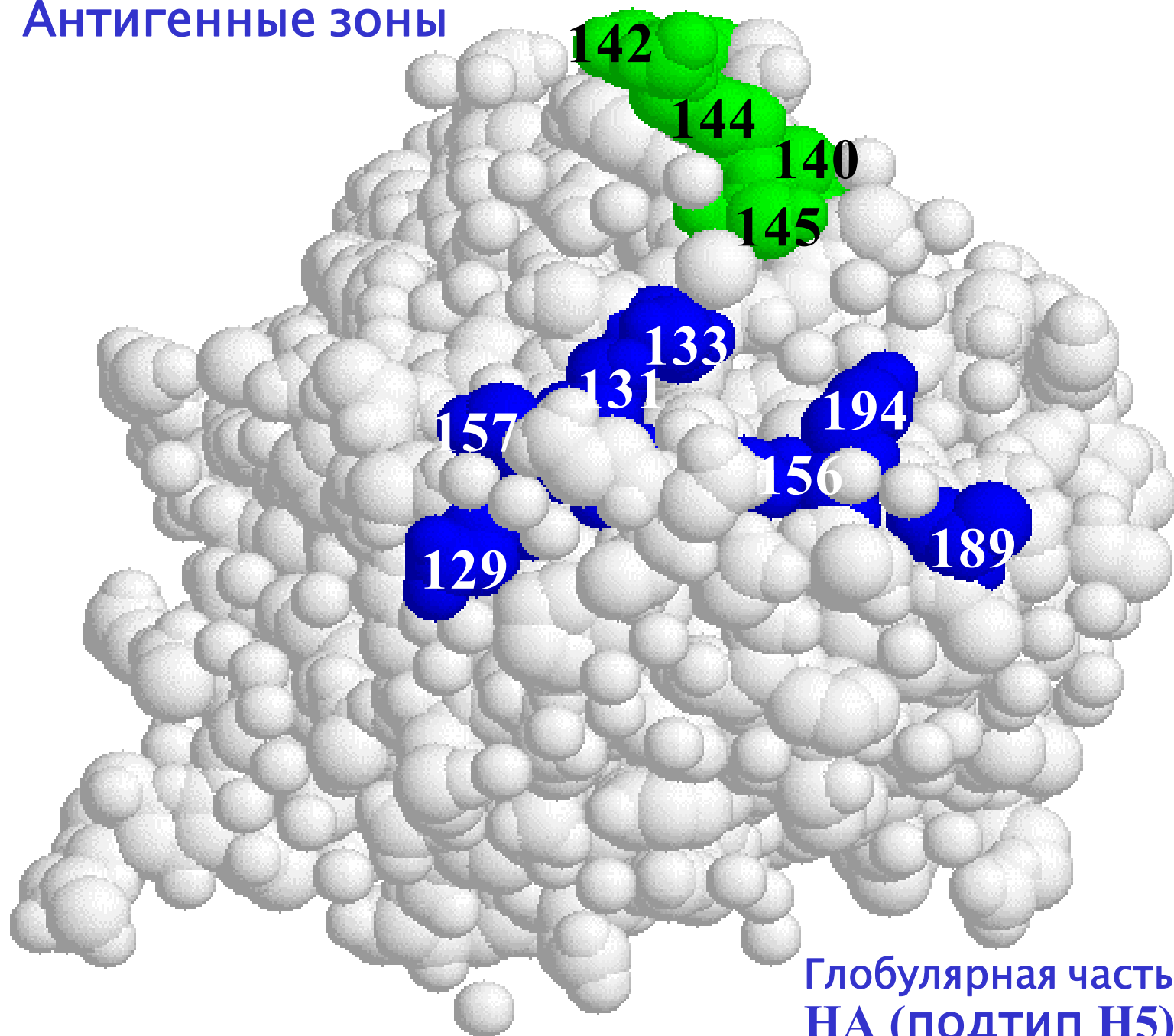
Миграционные пути в восточной Азии



МИГРАЦИОННЫЕ ПУТИ ПЕРЕЛЕТНЫХ ПТИЦ



Антигенные зоны



В ожидании пандемии ...





НЕ БОЛЕЙТЕ
(не только гриппом)
В НОВОМ ГОДУ!