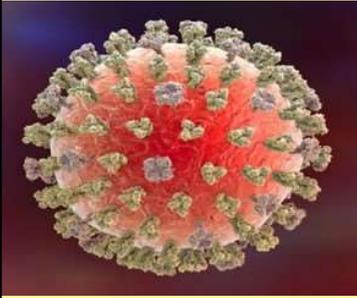




Disciplina 0420136 – Integrado de Microbiologia, Imunologia e Parasitologia (MIP)



Influenza Vírus

Prof. Dr. Jansen de Araujo
Departamento de Microbiologia Laboratório
BSL3 de Virologia Clínica e Molecular
Universidade de São Paulo
ICB-II/USP



Segundo o CDC (Center for Diseases Control and Prevention):

- ✓ Doenças emergentes são aquelas doenças infecciosas cuja incidência aumentou nas duas últimas décadas ou tendem a aumentar no futuro.
- ✓ Identificação de novos agentes etiológicos, anteriormente desconhecidos.



**WHO statistical data: Viruses represent 66%
of human infectious diseases!**



Zoonoses virais

Conceito

✓ “Doenças ou infecções que se transmitem naturalmente, entre os animais vertebrados e o homem, ou vice-versa”

✓ “Zoonoses são doenças contagiosas que se disseminam entre animais e seres humanos. São causadas por bactérias, vírus, parasitas e fungos, carreadas pelos animais vertebrados e insetos. Exep.: Coronavirus, SARS, MERS, *Antraz*, *Dengue*, *Febre hemorrágica por Ebola*, *infecção por E. coli*, *Doença de Lyme*, *Malária*, *Peste*, *Febre maculosa*, *Salmonelose*, e *Febre do Nilo Ocidental causada por vírus*.”

Como são transmitidos?



Transmissão

- Transmissão:
 - contato direto pessoa à pessoa
 - Aerossóis e mãos
 - contato indireto: - via aérea
 - via fómites - objetos
 - por água





INFLUENZA A

**Vírus RNA da família
ORTHOMYXOVIRIDAE**

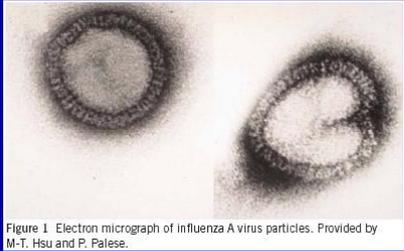
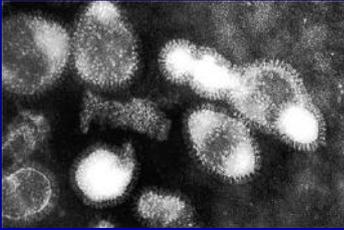
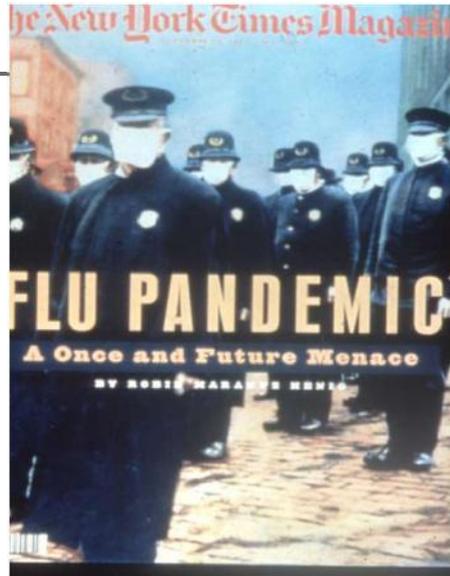


Figure 1. Electron micrograph of influenza A virus particles. Provided by M.-T. Hsu and P. Palese.

- Infecção em várias espécies
- pleiomórficos
- Envelopados
- RNAss-, segmentado (8 segmentos)

Influenza Pandêmica 1918

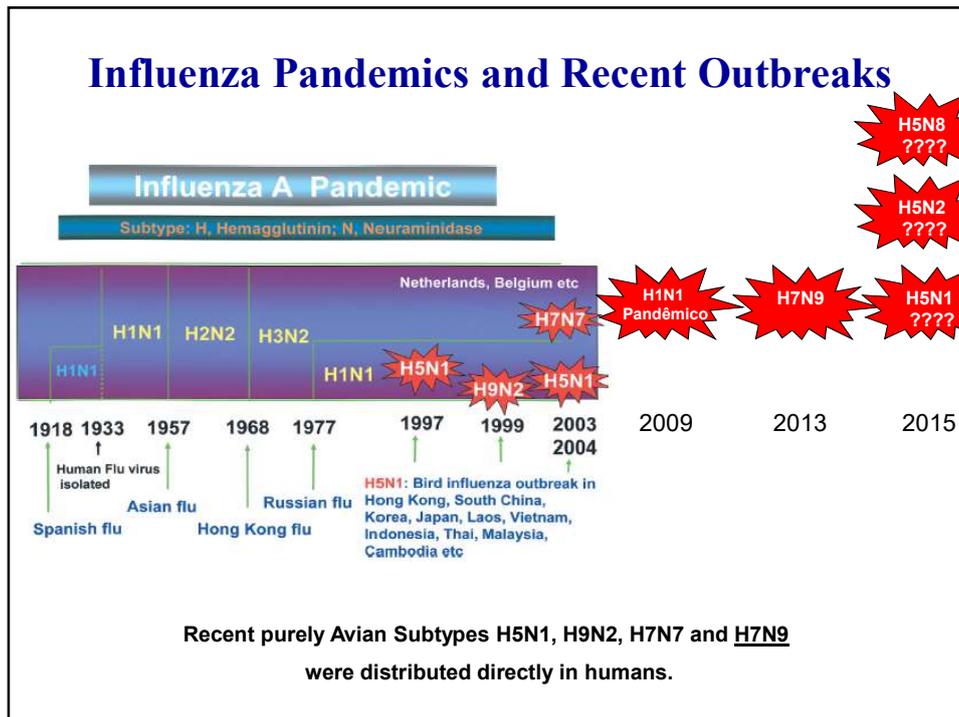


EPIDEMIA- Gripe Espanhola- 1918



Vítimas da Influenza internadas no hospital das forças armadas dos EUA, em Aix-les-Bains na França, em 1918. Ao todo estima-se que a gripe tenha matado 40 milhões de pessoas no mundo, das quais mais de 35 mil no Brasil

Influenza Pandemics and Recent Outbreaks



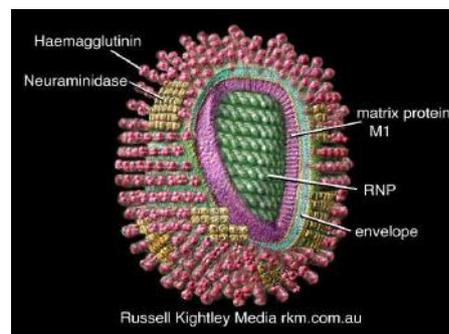
Influenza - Estrutura antigênica

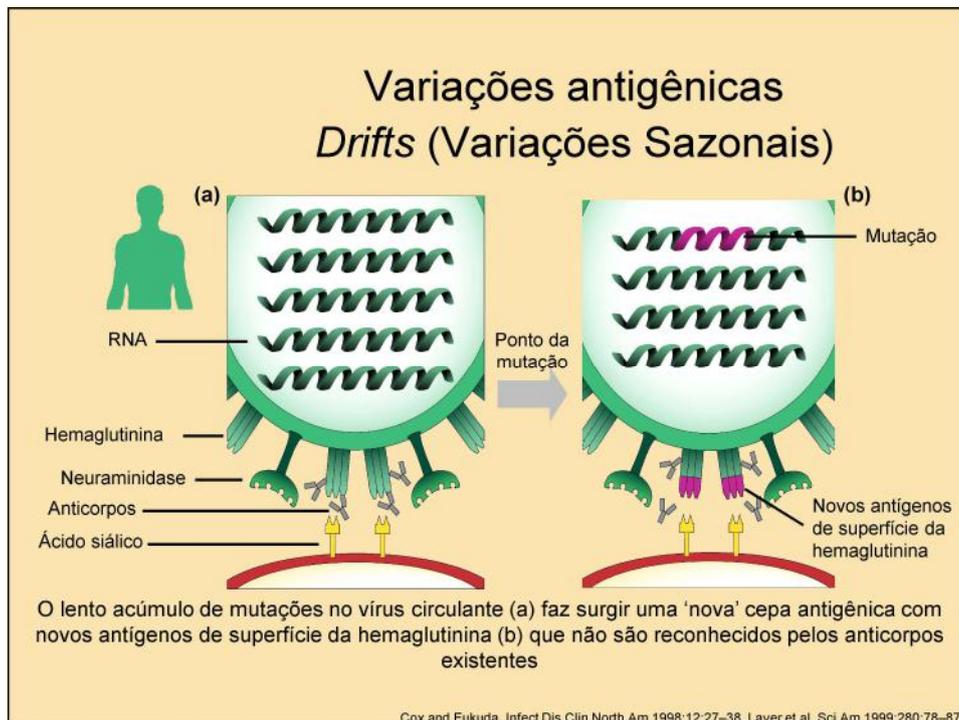
Antígenos tipo-específicos

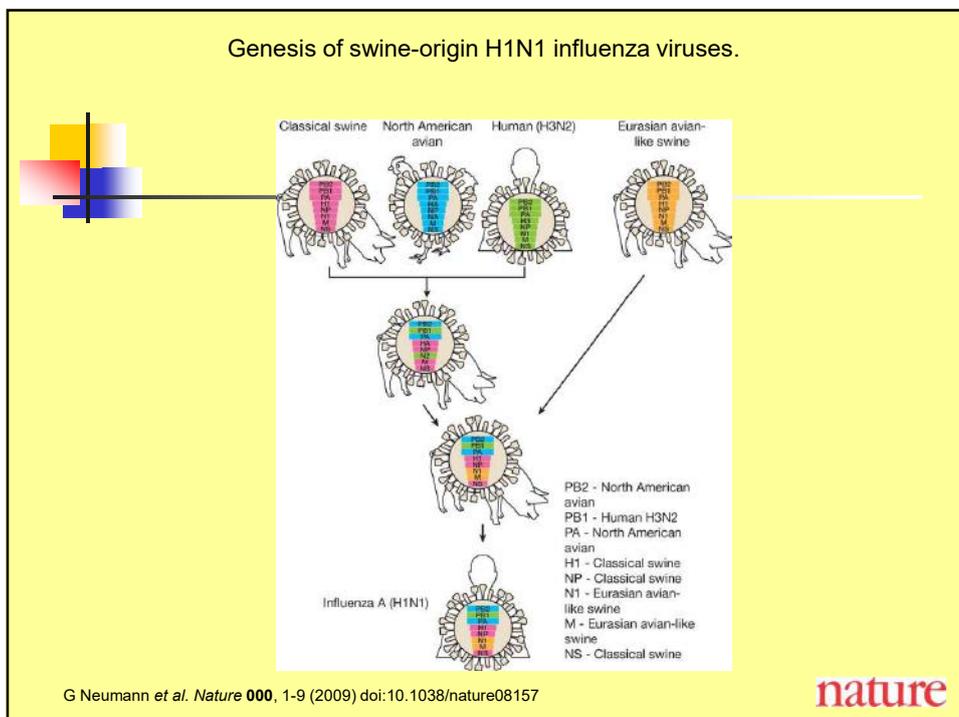
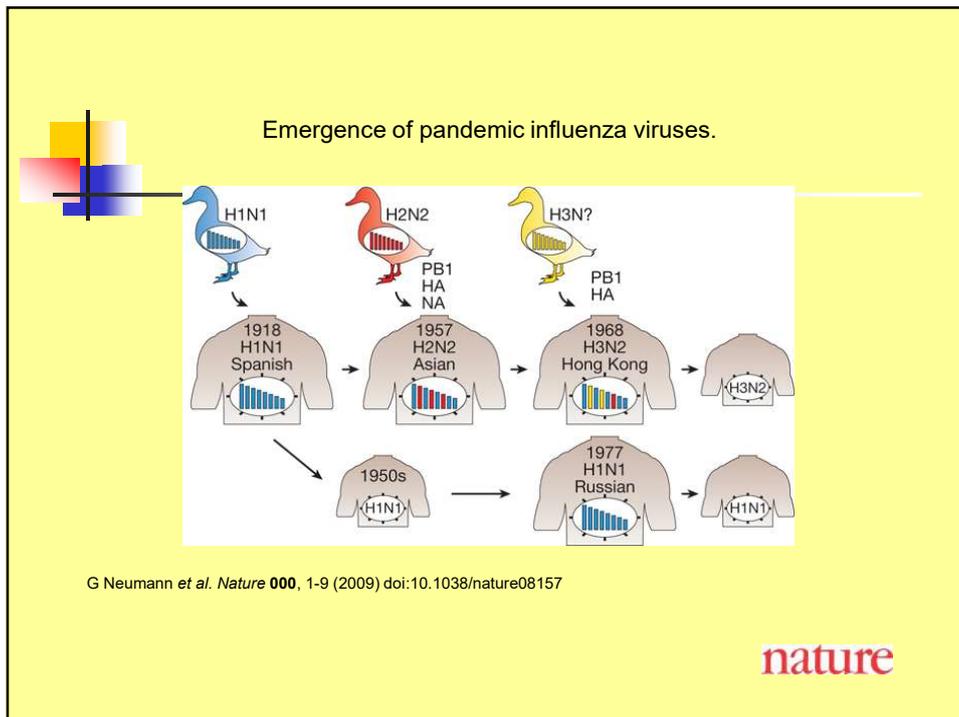
- NP - nucleoproteína
- M - matriz
- Classificam os vírus em tipos:
 - A, B e C

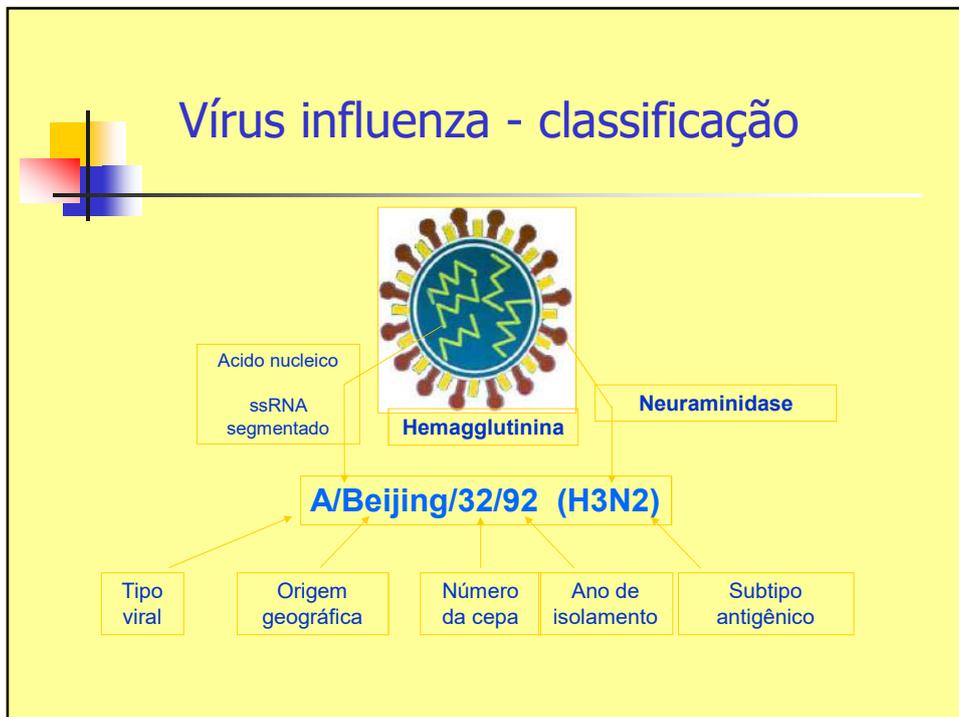
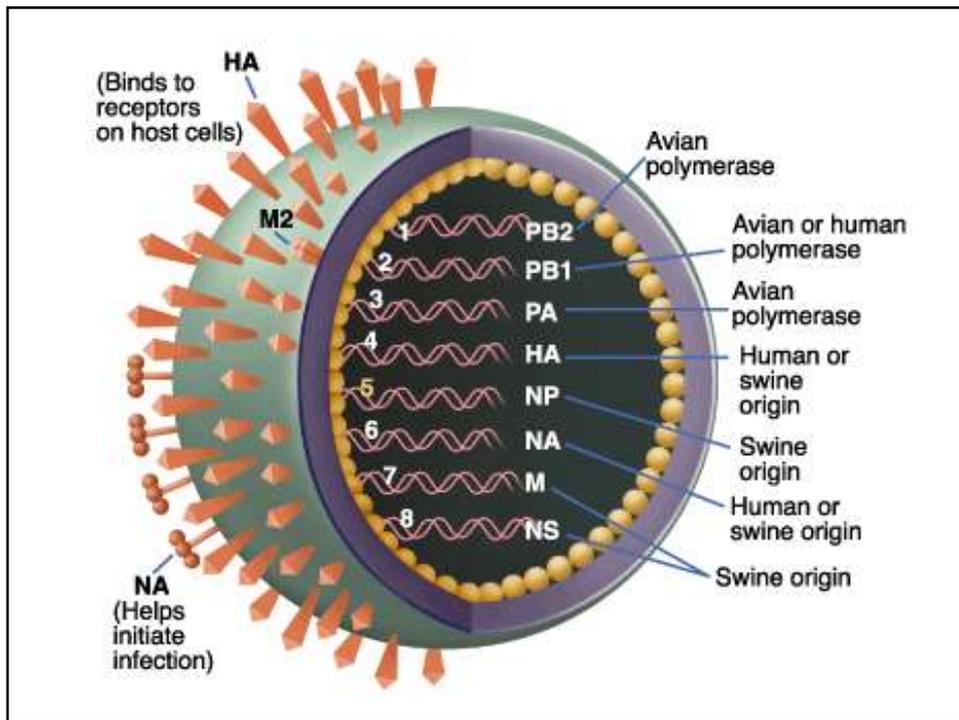
Antígenos sub-tipo específicos

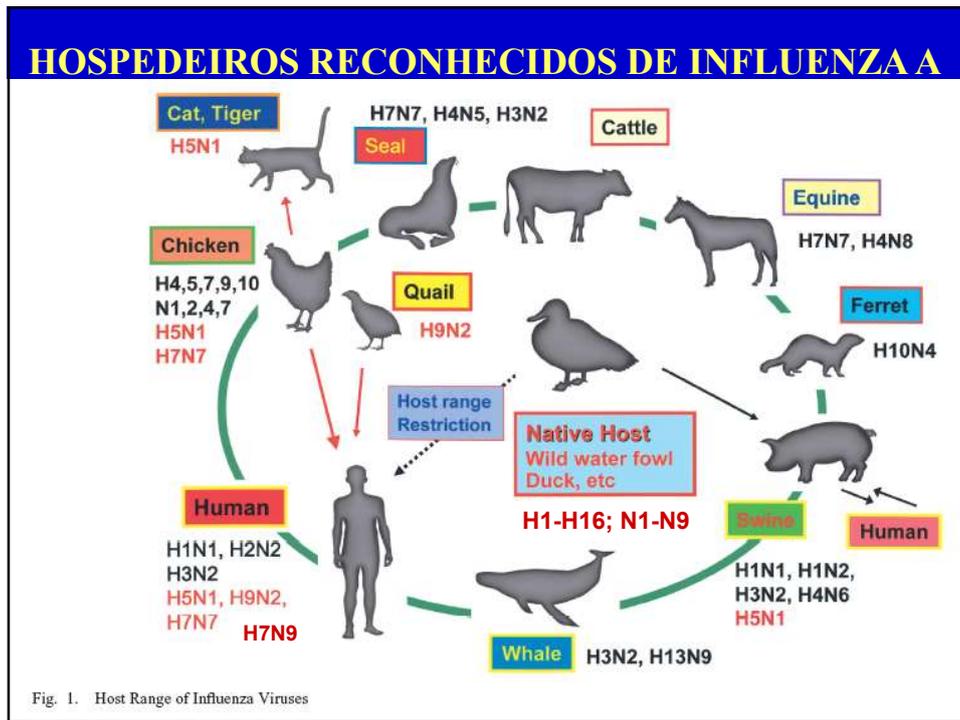
- H - hemaglutinina
- N - neuraminidase
- Classificam os vírus em tipos sorológicos
- H1N1, H2N2, H3N3





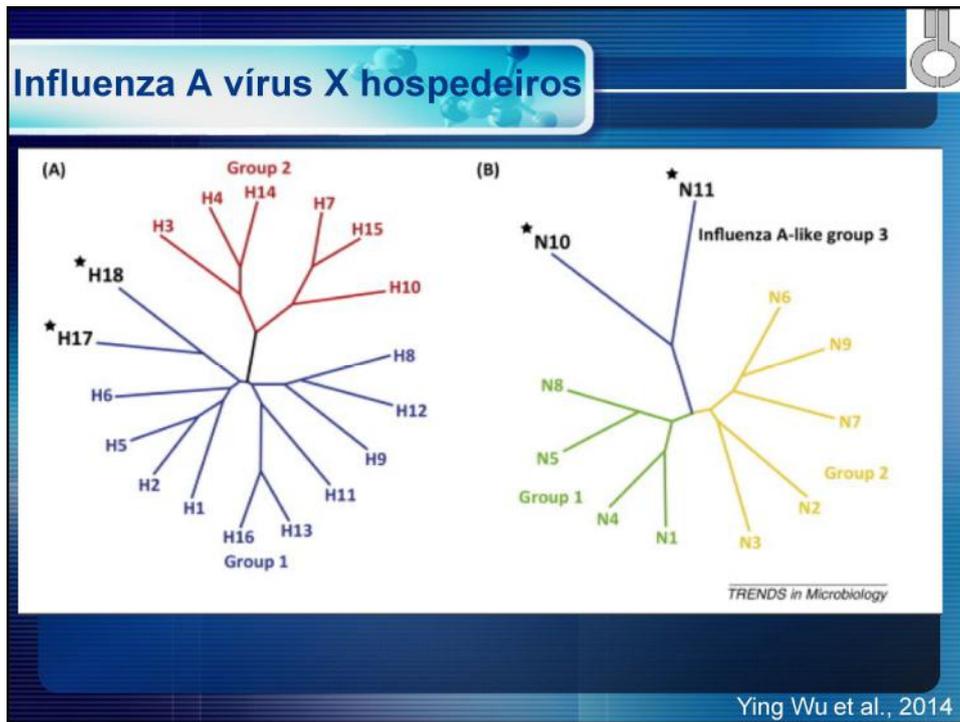






Influenza A vírus X hospedeiros

Virus	Human	Swine	Equine	Wild Waterfowl	Bats
H1	👤	🐷		🦆	
H2	👤	🐷		🦆	
H3	👤	🐷	🐎	🦆	
H4		🐷		🦆	
H5	👤	🐷		🦆	
H6		🐷		🦆	
H7	👤	🐷	🐎	🦆	
H8		🐷		🦆	
H9	👤	🐷		🦆	
H10				🦆	
H11				🦆	
H12				🦆	
H13				🦆	
H14				🦆	
H15				🦆	
H16				🦆	
H17					🦇
H18					🦇



Time Line Of Outbreaks in United States

Date of start of the event	10/12/2014
Date of confirmation of the event	14/12/2014
Report date	13/02/2015
Date submitted to OIE	13/02/2015
Reason for notification	Reoccurrence of a listed disease
Date of previous occurrence	2004
Manifestation of disease	Clinical disease
Causal agent	Highly pathogenic avian influenza
Serotype	H5N8
Nature of diagnosis	Laboratory (advanced)
This event pertains to	a defined zone within the country
Related reports	Immediate notification (16/12/2014) Follow-up report No. 1 (19/12/2014) Follow-up report No. 2 (29/12/2014) Follow-up report No. 3 (07/01/2015) Follow-up report No. 4 (22/01/2015) Follow-up report No. 5 (25/01/2015) Follow-up report No. 6 (03/02/2015) Follow-up report No. 7 (13/02/2015) Follow-up report No. 8 (25/02/2015) Follow-up report No. 9 (05/03/2015) Follow-up report No. 10 (20/03/2015) Follow-up report No. 11 (31/03/2015) Follow-up report No. 12 (22/04/2015)

These H5N8 and H5N2 detections involve only wild birds

Time Line Of Outbreaks in United States

Map of outbreak locations



Time Line Of Outbreaks in United States



Highly pathogenic avian influenza,
United States of America

Outbreak 1	Kings County, Kings, CALIFORNIA				
Date of start of the outbreak	02/02/2015				
Outbreak status	Continuing (or date resolved not provided)				
Epidemiological unit	Farm				
Affected animals	Species	Susceptible	Cases	Deaths	Destroyed
	Birds	114000			114000
Affected population	A commercial chicken and duck operation.				

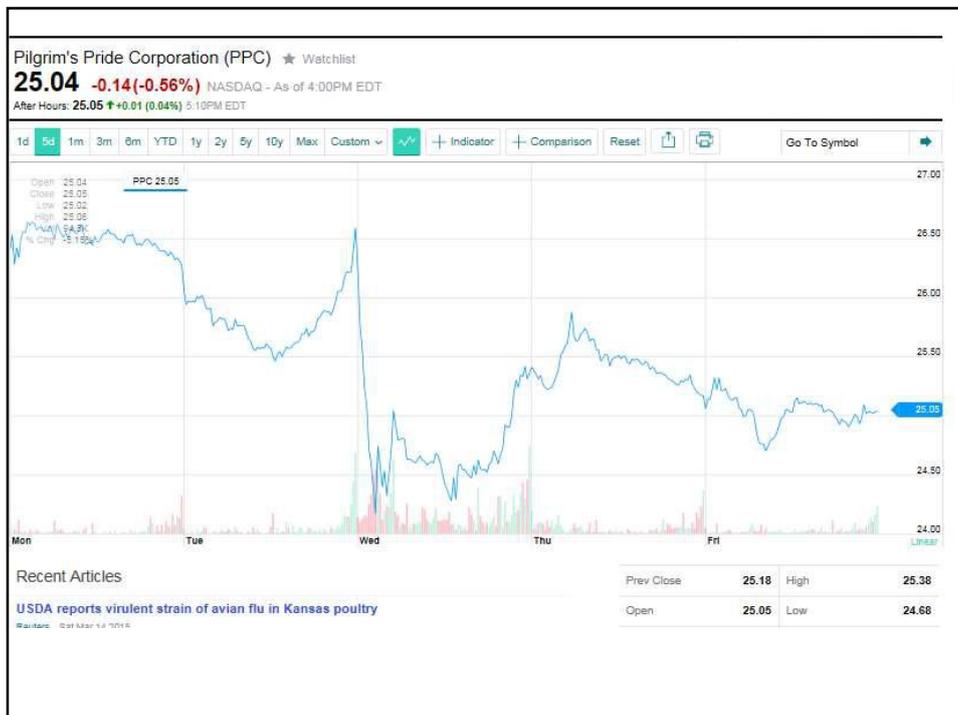
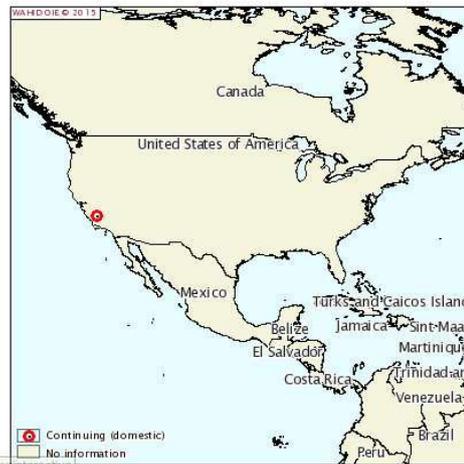
Summary of outbreaks	Total outbreaks: 1				
Total animals affected	Species	Susceptible	Cases	Deaths	Destroyed
	Birds	114000	**		114000

- Related reports**
- [Follow-up report No. 5 \(25/01/2015\)](#)
 - [Follow-up report No. 6 \(03/02/2015\)](#)
 - [Follow-up report No. 7 \(13/02/2015\)](#)
 - [Follow-up report No. 8 \(25/02/2015\)](#)
 - [Follow-up report No. 9 \(05/03/2015\)](#)
 - [Follow-up report No. 10 \(20/03/2015\)](#)
 - [Follow-up report No. 11 \(31/03/2015\)](#)
 - [Follow-up report No. 12 \(22/04/2015\)](#)

These H5N8 and H5N2 detections involve poultry

Time Line Of Outbreaks in United States

Map of outbreak locations



United States
Department of
Agriculture

science for a changing world

NATIONAL FLYWAY COUNCIL
Pacific est. 1952 - Central est. 1948 - Mississippi est. 1952 - Atlantic est. 1952

Last Updated: 05/14/2015

WILD BIRD HIGHLY PATHOGENIC AVIAN INFLUENZA CASES IN THE UNITED STATES ^a							
Case #	COLLECTION DATE	SPECIES	COUNTY	STATE	SUBTYPE*	CONFIRMATION DATE	COLLECTING AGENCY
1	12-08-2014	Northern Pintail	Whatcom	WA	EA/AM H5N2	12-15-2014	Washington State DFW
2	12-08-2014	Mallard	Whatcom	WA	EA/AM H5N2	12-24-2014	Washington State DFW
3	12-16-2014	American Wigeon	Whatcom	WA	EA H5N8	12-24-2014	Washington State DFW
4	12-20-2014	Mallard	Lane	OR	EA/AM H5N2	01-12-2015	USDA-APHIS
5	12-22-2014	Mallard	Bingham	ID	EA H5N8	03-18-2015	USDA-APHIS
6	12-22-2014	Mallard	Bingham	ID	EA H5N8	03-18-2015	USDA-APHIS
7	12-23-2014	Northern Pintail	Clark	WA	EA/AM H5N2	01-16-2015	USGS-NWHC
8	12-23-2014	Mallard	Whatcom	WA	EA/AM H5N2	02-02-2015	Washington State DFW
9	12-24-2014	Mallard	Columbia	OR	EA/AM H5N2	01-16-2015	USGS-NWHC
10	12-24-2014	Mallard	Columbia	OR	EA H5N8	02-23-2015	USGS-NWHC
11	12-28-2014	Gadwall	Butte	CA	EA H5N8	01-01-2015	USDA-APHIS
12	12-29-2014	American Green-winged Teal	Whatcom	WA	EA/AM H5N1	01-16-2015	USGS-NWHC
13	12-30-2014	Cooper's Hawk	Whatcom	WA	EA/AM H5N2	01-26-2015	Washington State DFW

WILD BIRD HIGHLY PATHOGENIC AVIAN INFLUENZA CASES IN THE UNITED STATES ^a cont'd							
Case #	COLLECTION DATE	SPECIES	COUNTY	STATE	SUBTYPE*	CONFIRMATION DATE	COLLECTING AGENCY
67	03-10-2015	Ring-necked Duck	McCracken	KY	EA/AM H5N2	04-24-2015	Kentucky DFWR
68	03-13-2015	Canada Goose	Lyon	KS	EA/AM H5N2	03-27-2015	Kansas DWP
69	03-16-2015	Lesser Snow Goose	Nodaway	MO	EA H5 ^c	03-24-2015	USDA-APHIS
70	03-16-2015	Canada Goose	Laramie	WY	EA/AM H5N2	03-25-2015	Wyoming GFD
71	04-13-2015	Snowy Owl	Oconto	WI	EA/AM H5N2	05-06-2015	Wisconsin DNR
72	04-14-2015	Cooper's Hawk	Yellow Medicine	MN	EA/AM H5N2	04-29-2015	Minnesota DNR

Update on Avian Influenza Findings

Poultry Findings Confirmed by USDA's National Veterinary Services Laboratories

201

Detections Reported

44,671,073

Birds Affected

19/12/14

First Detection Reported

29/05/15

Last Detection Reported

State	County	Flyway	Flock type	Species	Avian influenza subtype*	Confirmation date	Flock size
Minnesota	Renville	Mississippi	Commercial	Turkey	EA/AM-H5N2	29/05/2015	29,300
Minnesota	Meeker	Mississippi	Commercial	Turkey	EA/AM-H5N2	29/05/2015	4,900
Iowa	Hamilton	Mississippi	Commercial	Turkeys	EA/AM-H5N2	29/05/2015	17,000
Minnesota	Brown	Mississippi	Commercial	Turkey	EA/AM-H5N2	29/05/2015	7,300
Iowa	Wright	Mississippi	Commercial	Chickens	EA/AM-H5N2	28/05/2015	991,500
Minnesota	Renville	Mississippi	Commercial	Turkeys	EA/AM-H5N2	28/05/2015	48,900
Minnesota	Kandiyohi	Mississippi	Commercial	Turkeys	EA/AM-H5N2	28/05/2015	pending

CDC Centers for Disease Control and Prevention
CDC 24/7: Saving Lives. Protecting People™

SEARCH

CDC A-Z INDEX ▾

Influenza (Flu)

Avian Influenza

H5 Viruses in the United States

Language: English ▾

Risk to Human Health

- No human infections with U.S. H5 viruses have occurred
- Similar viruses have infected humans in other countries
- People in contact with known infected or possibly infected birds should take precautions to protect against infection

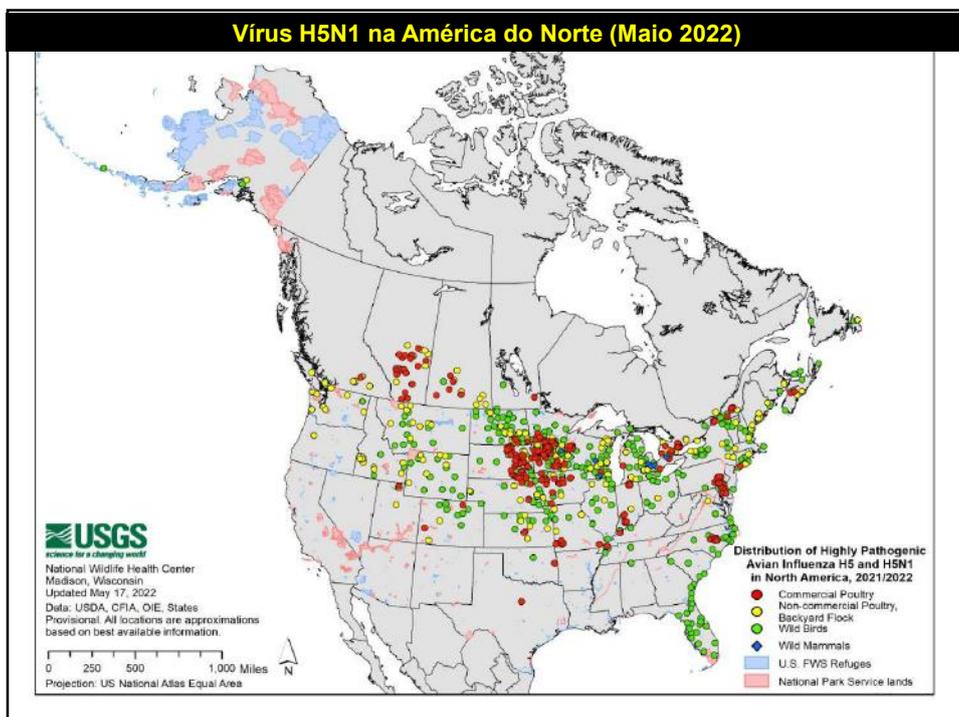
More Information

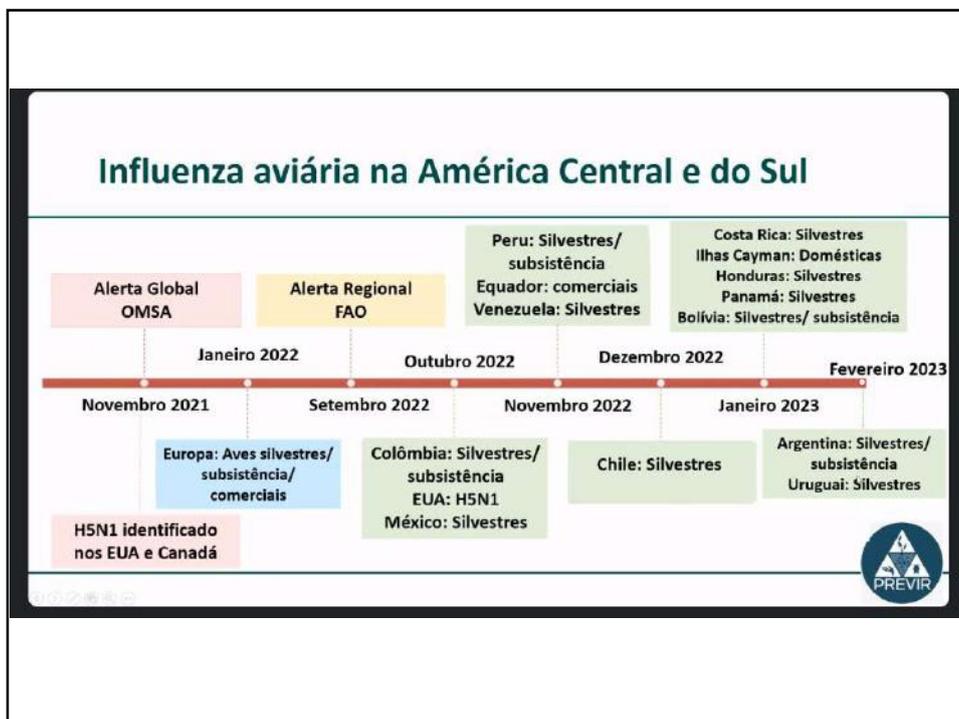
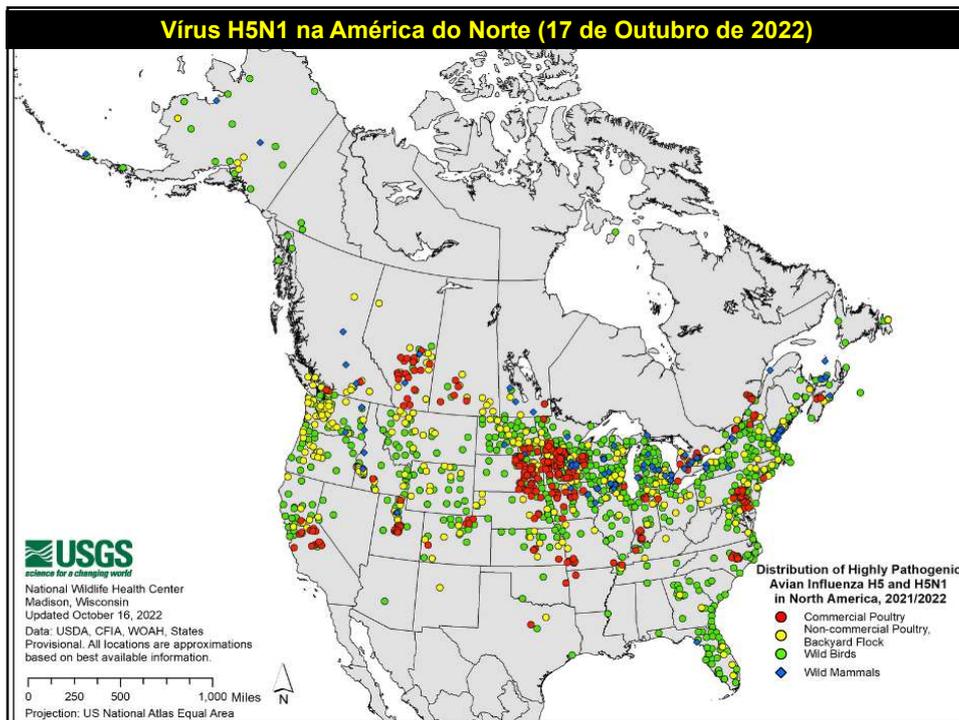
Highly pathogenic avian influenza (HPAI) H5 infections have been reported in U.S. domestic poultry (backyard and commercial flocks), captive wild birds, and wild birds. HPAI H5 detections began in December 2014 and have continued to date in 2015. USDA is reporting H5 bird flu virus detections in 20 U.S. states (15 states with outbreaks in domestic poultry or captive birds and 5 states with H5 detections in wild birds only).

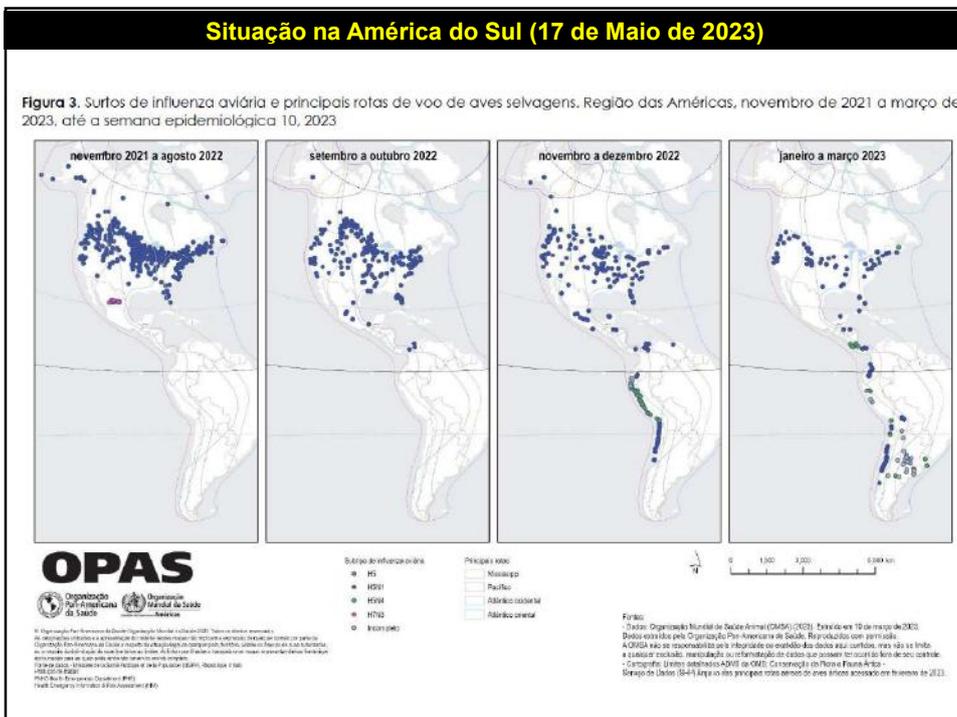
No human infections with these viruses have been detected at this time, however similar viruses have infected people in other countries and caused serious illness and death in some cases.

Human infections with other avian influenza viruses have occurred after close and prolonged contact with infected birds or the excretions/secretions of infected birds (e.g., droppings, oral fluids).

While the health risk posed to the general public by these domestic HPAI outbreaks is low at this







Situação na América do Sul (28 de Maio de 2023)



Animais foram encontrados por equipe da Estação
ESEC TAIM / Divulgação

A mortandade foi constatada em cisnes do pescoço negro. Conforme Weber, a situação é considerada incomum.

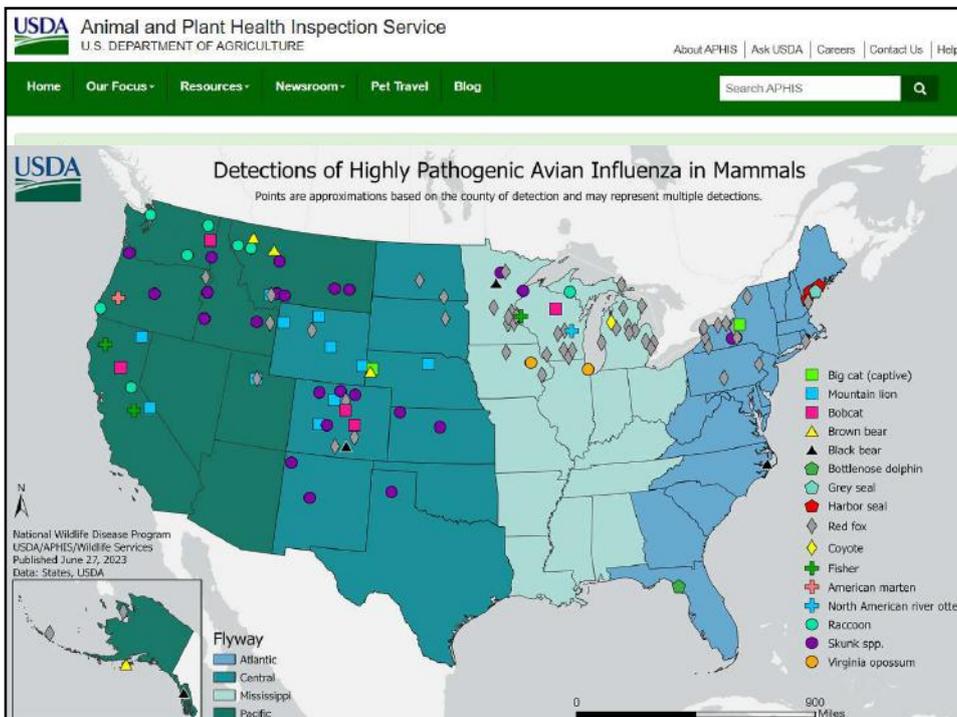
Adagri confirma notificação de gripe aviária em avoantes nos municípios de Tamboril e Monsenhor Tabosa



marufoles



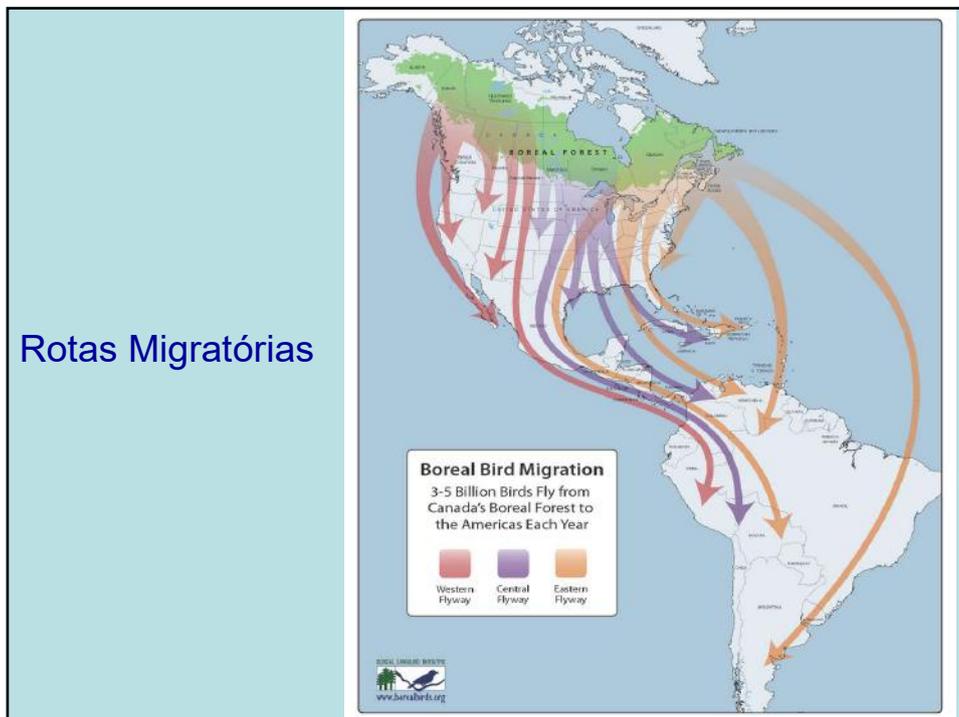
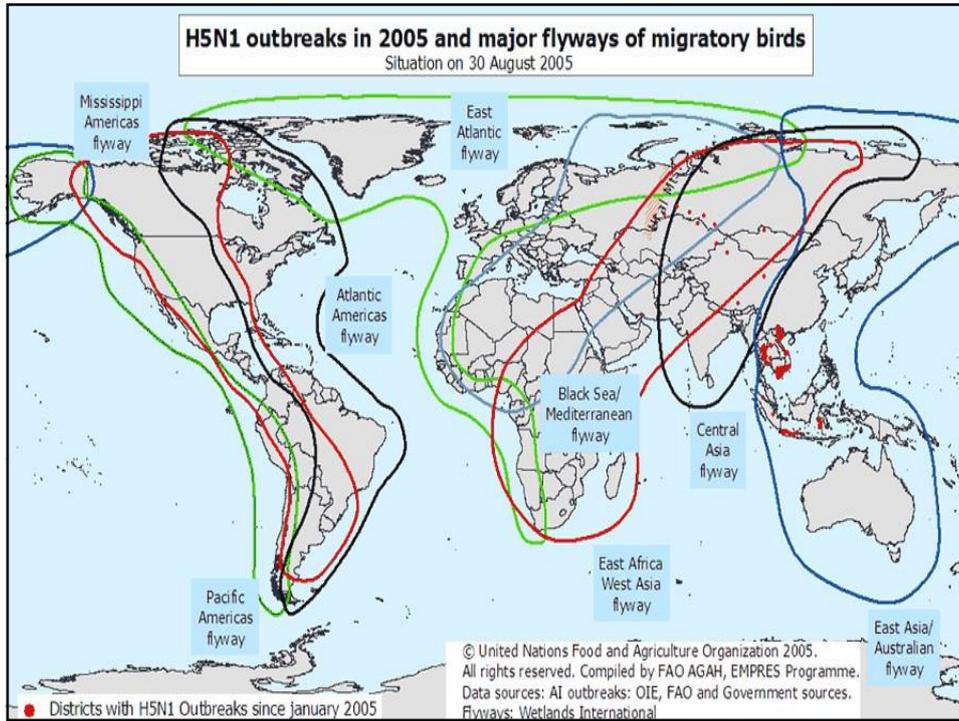
A Agência de Defesa Agropecuária do Estado do Ceará (Adagri) recebeu uma notificação preocupante na quinta-feira (25). Segundo informações confirmadas por Amorim Sobrinho, em entrevista ao CETV, foram





E no Brasil?





Será que este contato existe?



Expedição 2005

Humaitá-Manaus

Ilha de Mosqueiro

Vigia de Nazaré

Monte Negro-Roraima

Die 5 REGIONER

- Norte
- Nordeste
- Centro-Oeste
- Sudeste
- Sul

Rede de Diversidade Genética de Vírus VGDNI





Biosafety Standards



Reunião em família





Expedição Marajó 2006





Expedição Marajó 2006



WHO- Indonésia 02/11/2011- Surto de H5N1



OMS, acess 02/11/2011







**Expedições
Breves / Ilha de Canelas (PARÁ)**

Breves (Marajó)

Ilhas e Ajuruteua

ADEPARA/ MAPA/USP/UFRPE

The complex block contains a central map of Brazil with the state of Pará highlighted in yellow. A red circle on the map indicates the location of Ilha de Canelas. To the left of the map is a satellite image of Breves (Marajó) with a red arrow pointing to it. To the right is a satellite image of Ilhas e Ajuruteua with a red arrow pointing to it. The text 'ADEPARA/ MAPA/USP/UFRPE' is at the bottom.



Expedição Outubro de 2006



Expedição Abril de 2007





Ilha de Itamaracá- (Pernambuco 2008- 2009)



➤ **Coroa do avião- PE**



Grupo do Prof. Severino Mendes (UFRPE)

August- 2008- Coroa do Avião- Pernambuco



The collage consists of four photographs. The top-left photo shows a sunset over a beach with several masts visible in the distance. The top-right photo shows a howler monkey sitting on a tree branch. The bottom-left photo shows a large colony of birds on a beach with waves crashing. The bottom-right photo shows a bird being held in blue gloves.





Parque Nacional da Lagoa do Peixe- Rio Grande do Sul- 2009



Dados Biométricos e Identificação- CEMAVE e equipe da Prof. Virginia Petry

Espécies migratórias principais

Alimentação e estação do ano



Novembro- 2009 Parque Nacional da Lagoa do Peixe- Rio Grande do Sul- ICMBio



Parque Nacional da Lagoa do Peixe- RS (Abril -2010)

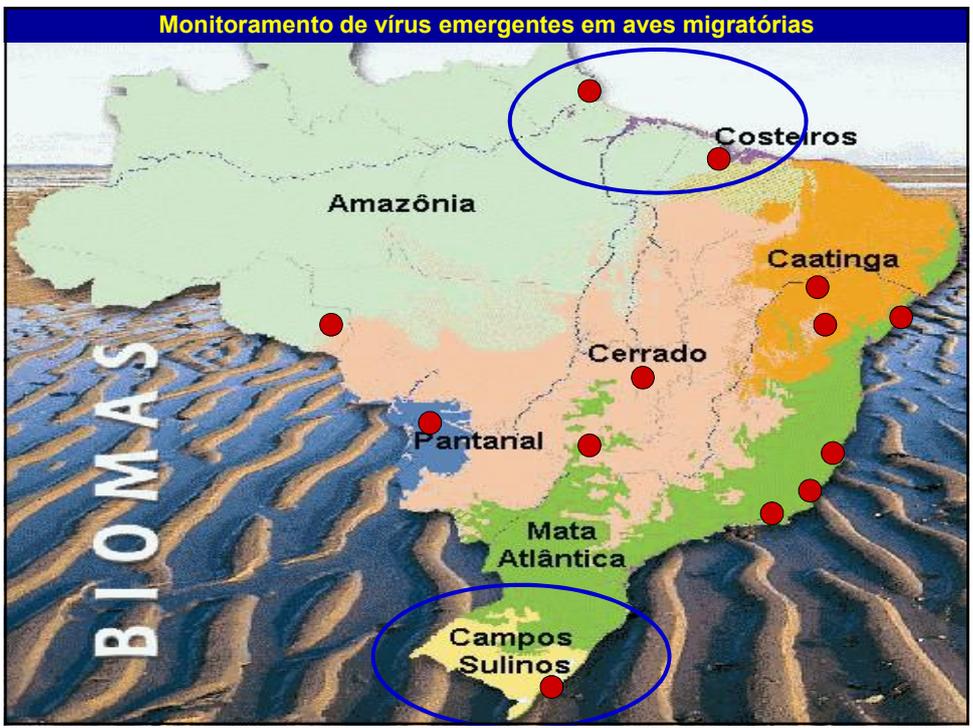


Parque Nacional da Lagoa do Peixe- RS Dezembro 2011



Parque Nacional da Lagoa do Peixe- RS Dezembro de 2011







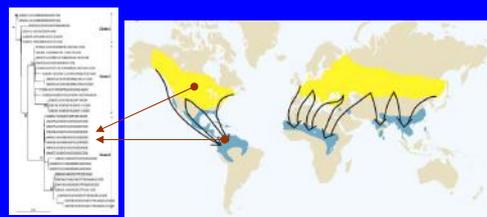




RESULTADOS PARCIAIS- Ilha de Canelas

Family	Popular name	Species	N° of positive/N° of tested	%
Scolopacidae	Maçarico-rasteiro	<i>Calidris pusilla</i>	0/5	0
Scolopacidae	Maçarico-pintado	<i>Actitis macularius</i>	0/31	0
Scolopacidae	Vira-pedras	<i>Arenaria interpres</i>	4/22	18
Scolopacidae	Maçarico-branco	<i>Calidris alba</i>	0/2	0
Scolopacidae	Maçarico-de-perna-amarela	<i>Tringa melanoleuca</i>	0/1	0
Scolopacidae	Maçarico-de-costa-branca	<i>Limnodromus griseus</i>	0/9	0
Laridae	Trinta-réis-do-bico-preto	<i>Sterna nilotica</i>	0/1	0
Thraupidae	Figuinha-do-mangue	<i>Conirostrum bicolor</i>	0/9	0
Total			4/80	5

- Potencial de dispersão do vírus através dos continentes pelo movimento das aves infectadas
- Confirmado por análise filogenéticas entre os vírus isolados em aves selvagens



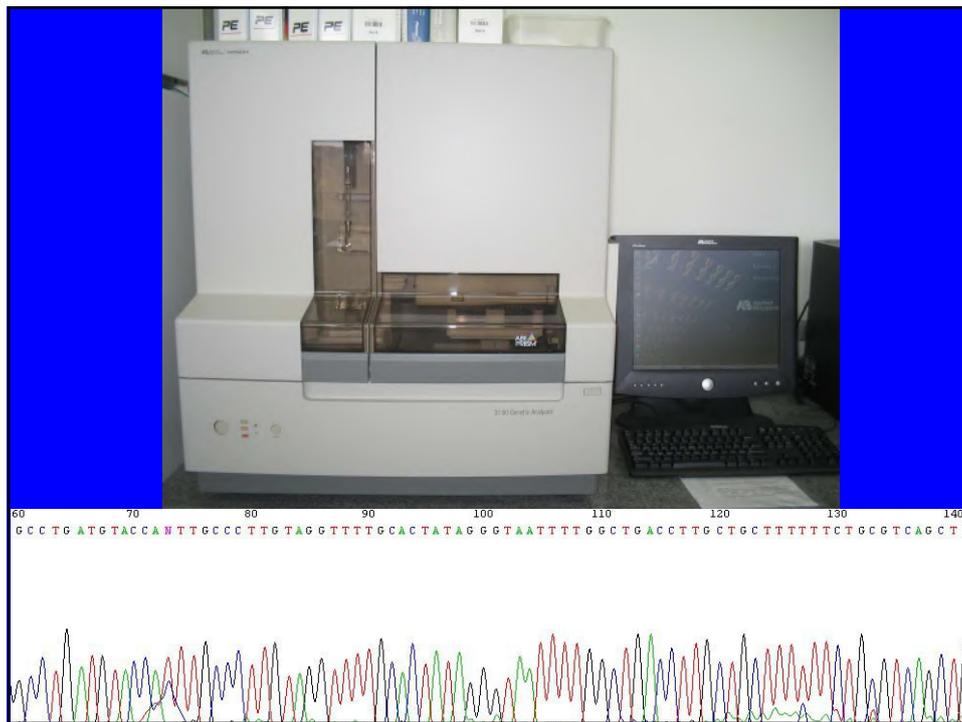
BSL3+ Laboratory



OVOS EMBRIONADOS



Department of Infectious Diseases, St. Jude Children's Research Hospital, Memphis, TN, USA.



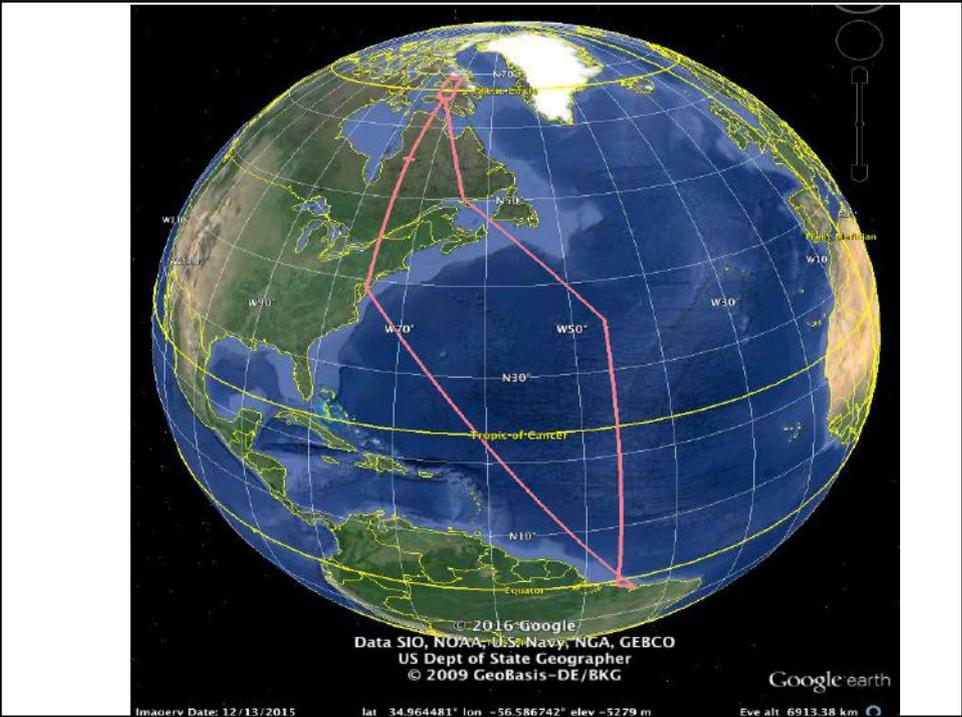
OPEN ACCESS Freely available online PLOS ONE

Avian Influenza Virus (H11N9) in Migratory Shorebirds Wintering in the Amazon Region, Brazil

Jansen de Araujo^{1*}, Severino M. de Azevedo Júnior², Nicolas Gaidet³, Renata F. Hurtado¹, David Walker⁴, Luciano M. Thomazelli¹, Tatiana Ometto¹, Marina M. M. Seixas¹, Roberta Rodrigues², Daniele B. Galindo⁵, Adriana C. S. da Silva⁶, Arlinéa M. M. Rodrigues⁵, Leonardo L. Bomfim⁵, Marcelo A. Mota⁶, Maria E. Larrazábal⁷, Joaquim O. Branco⁸, Patrícia Serafini⁹, Isaac S. Neto⁹, John Franks⁴, Richard J. Webby⁴, Robert G. Webster⁴, Edison L. Durigon¹

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Abstract
Aquatic birds are the main sites for water birds the possibility of the trans-Hemispheres. In total, 5





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Revista Brasileira de Ciência Avícola

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<http://dx.doi.org/10.1590/1806-9061-2015-0111>

Investigation of Influenza A, West Nile and Newcastle Disease Viruses in Birds from the Pantanal Wetlands of Mato Grosso, Brazil

■ **Author(s)**

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Barbosa CM¹
Ramos DG⁵
Melo ALT¹
Pinho JB¹
Durigon EL¹
Aguíar DM¹

ABSTRACT

The Pantanal is the world's largest wetland biome with a seasonal flood pulse that attracts a great diversity of birds, many of which are migratory. Birds can be natural reservoirs *Influenza A*, *West Nile* and *Newcastle Disease* viruses. However, the occurrence of carriers for these viruses in the Pantanal was not verified yet. The present study evaluated the occurrence of natural infection by Influenza A, WN and ND virus of birds in the municipality of Poconé, a subregion of the Pantanal in the state of Mato Grosso, Brazil. A total of 76 birds belonging to 11 orders and 20 families were captured using mist

Accepted: 18 October 2017
DOI: 10.1111/irv.12519

ORIGINAL ARTICLE

Migratory birds in southern Brazil are a source of multiple avian influenza virus subtypes

Jansen Araujo¹ | Maria Virginia Petry² | Thomas Fabrizio³ | David Walker³ | Tatiana Ometto¹ | Luciano M. Thomazelli¹ | Angelo L. Scherer² | Patricia P. Serafini⁴ | Isaac S. Neto⁴ | Scott Krauss³ | Robert G. Webster³ | Richard J. Webby³ | Edison L. Durigon¹

WILEY

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Funding information
Fundação de Amparo à Pesquisa do Estado de São Paulo, Grant/Sponsor Number: 13021/7; US National Institute of Allergy and Infectious Disease Centers of Excellence for Influenza Research and Surveillance (CIERS) and by

Background: There is insufficient knowledge about the relation of avian influenza virus (AIV) to migratory birds in South America. Accordingly, we studied samples obtained over a 4-year period (2009-2012) from wild birds at a major wintering site in southern Brazil.

Methods: We obtained 1212 oropharyngeal/cloacal samples from wild birds at Lagoa do Peixe National Park and screened them for influenza A virus by RT-PCR amplification of the matrix gene. Virus isolates were subjected to genomic sequencing and antigenic characterization.

Results: Forty-eight samples of 1212 (3.96%) contained detectable influenza virus RNA. Partial viral sequences were obtained from 12 of these samples, showing the presence of H2N2 (1), H6Nx (1), H6N1 (8), H9N2 (1), and H12N5 (1) viruses. As H6 viruses predominated, we generated complete genomes from all 9 H6 viruses. Phylogenetic analyses showed that they were most similar to viruses of South American lineage. The H6N1 viruses caused no disease signs in infected ferrets and, despite genetic differences, were antigenically similar to North American isolates.

Conclusions: Lagoa do Peixe National Park is a source of multiple AIV subtypes, with the levels of influenza virus in birds being highest at the end of their wintering period in this region. H6N1 viruses were the predominant subtype identified. These viruses

Tubes	Sample ID	Ct	Scientific name	Date	Location	HA	Flu detect	HI	Subtype
1	PNLP 233	38	<i>Calidris fuscicollis</i>	25/03/2010	Lagoa do Peixe	-	-	-	-
2	PNLP 304	37	<i>Sterna hirundo</i>	27/03/2010	Lagoa do Peixe	-	-	-	H6N1
3	PNLP 315	35	<i>Calidris canutus</i>	27/03/2010	Lagoa do Peixe	+	+	640	H12N5
4	PNLP 319	35	<i>C. canutus</i>	27/03/2010	Lagoa do Peixe	-	-	-	-
5	PNLP-320	37	<i>C. canutus</i>	27/03/2010	Lagoa do Peixe	-	-	-	-
6	PNLP-325	36	<i>C. fuscicollis</i>	27/03/2010	Lagoa do Peixe	-	-	-	-
7	PNLP-346	37	<i>C. fuscicollis</i>	27/03/2010	Lagoa do Peixe	-	-	-	-
8	PNLP-395	39	<i>C. fuscicollis</i>	29/03/2010	Lagoa do Peixe	-	-	-	-
9	RS 738	36	<i>Larus dominicanus</i>	20/12/2010	Lagoa do Peixe	-	-	-	-
10	RS 787	38	<i>C. canutus</i>	04/04/2011	Lagoa do Peixe	-	-	-	H9N2
11	RS 1147	28	<i>C. fuscicollis</i>	17/04/2012	Lagoa do Peixe	-	-	-	H6N1
12	RS 1148	36	<i>Choradrius semipalmatus</i>	17/04/2012	Lagoa do Peixe	-	-	-	-
13	RS 1149	25	<i>C. fuscicollis</i>	17/04/2012	Lagoa do Peixe	+	+	160	H6N1
14	RS 1150	34	<i>C. fuscicollis</i>	17/04/2012	Lagoa do Peixe	-	-	-	-
15	RS 1151	30	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	+	+	640	H6N1
16	RS 1152	39	<i>C. semipalmatus</i>	18/04/2012	Lagoa do Peixe	-	-	-	-
17	RS 1153	38	<i>C. semipalmatus</i>	18/04/2012	Lagoa do Peixe	-	-	-	-
18	RS 1154	29	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	-	-	-	H6N1
19	RS 1155	32	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	-	-	-	-
20	RS 1156	34	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	-	-	-	-
21	RS 1158	31	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	-	-	-	-
22	RS 1167	32	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	+	-	-	H6N1
23	RS 1169	33	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	-	-	-	H6N1
24	RS 1170	38	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	-	-	-	-
25	RS 1177	23	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	+	-	-	H6N1
26	RS 1179	39	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	-	-	-	-
27	RS 1183	38	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	-	-	-	-
28	RS 1188	32	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	-	-	-	-
29	RS 1189	38	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	-	-	-	-
30	RS 1190	39	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	-	-	-	-
31	RS 1193	30	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	-	-	-	H2N2
32	RS 1196	30	<i>C. fuscicollis</i>	18/04/2012	Lagoa do Peixe	-	-	-	H6N1



Adaptation of Pandemic H2N2 Influenza A Viruses in Humans

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The 1957 A/H2N2 influenza virus caused an estimated 2 million fatalities during the pandemic. Since viruses of the H2 subtype continue to infect avian species and pigs, the threat of reintroduction into humans remains. To determine factors involved in the zoonotic origin of the 1957 pandemic, we performed analyses on genetic sequences of 175 newly sequenced human and avian H2N2 virus isolates and all publicly available influenza virus genomes.

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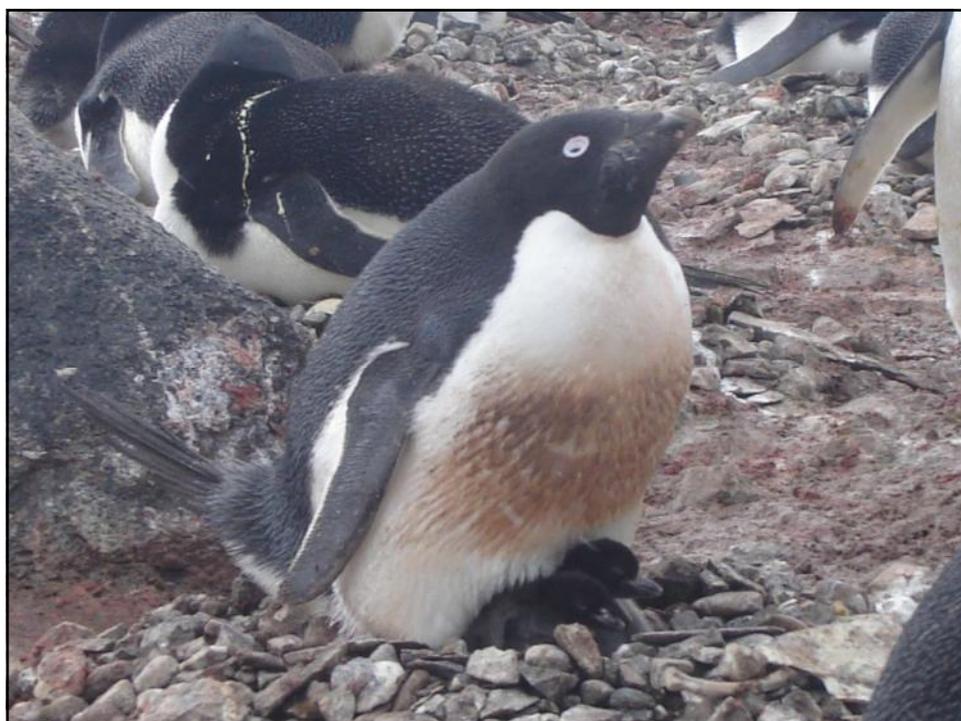
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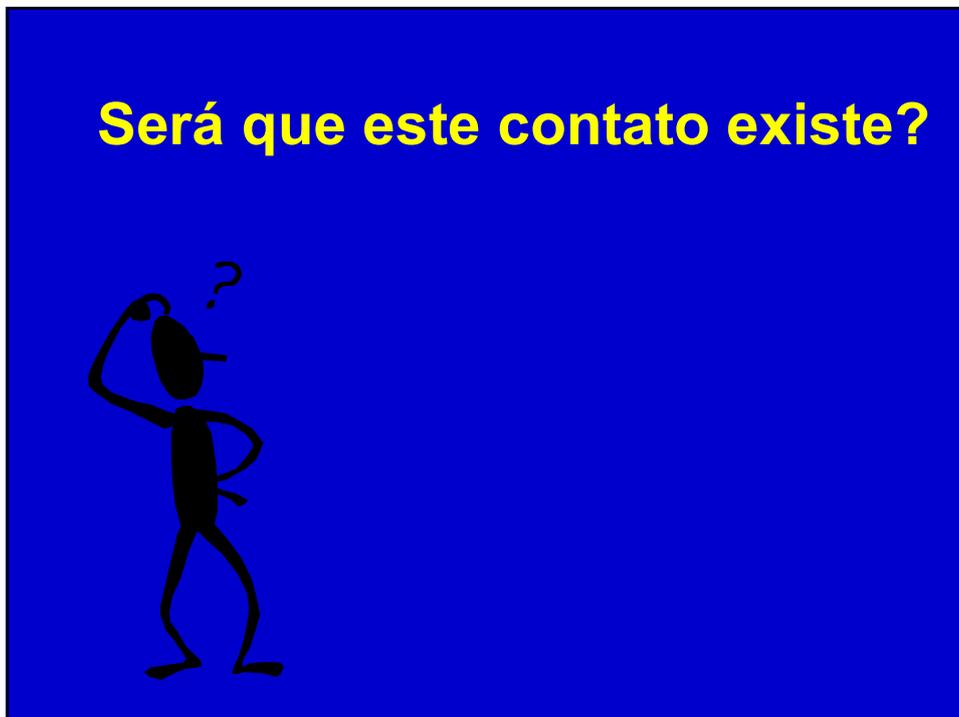
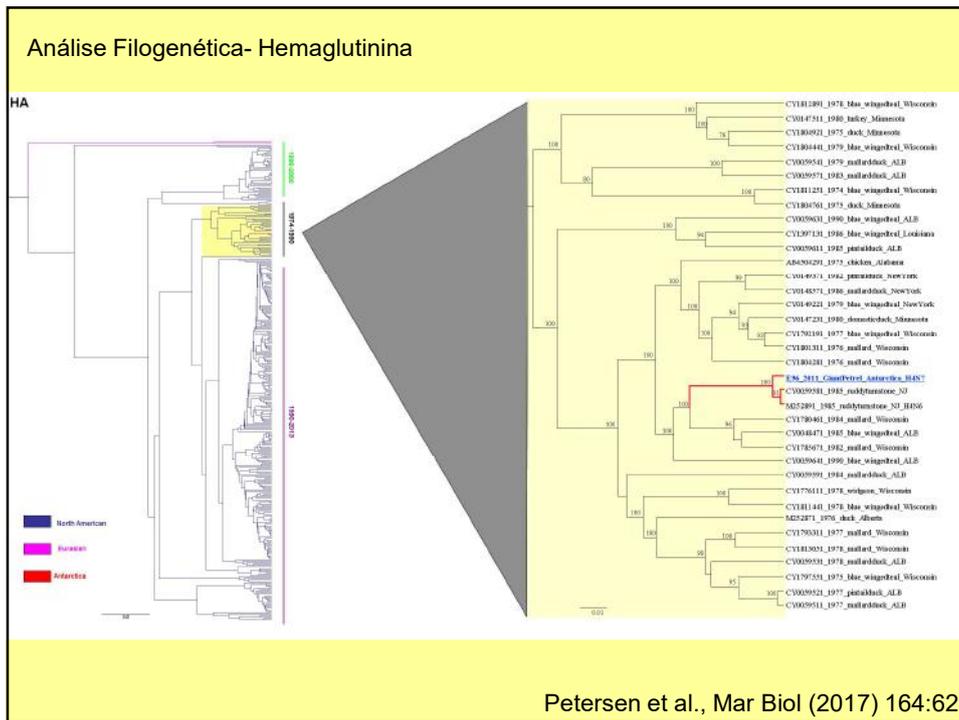
First detection of avian influenza virus (H4N7) in Giant Petrel monitored by geolocators in the Antarctic region

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Abstract This study presents the results of the virologic analysis and year-round movements of a Southern Giant Petrel that tested positive for avian influenza virus. Data were collected in two areas of Antarctica, where 299 Southern Giant Petrel adults and chicks were sampled. One star-

summer/spring and migrated to northern areas near South America and the Falkland Islands during the non-breeding season. Our results point out the first evidence of avian influenza virus H4N7 in Giant Petrels. Furthermore, the genetic similarity of the sequenced virus provides evidence



Parque Nacional de Jacupiranga- 2008



Sul da Bahia, Reserva Indigena- 2010





