



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



Influenza Vírus

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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**

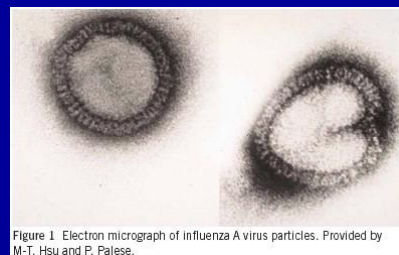
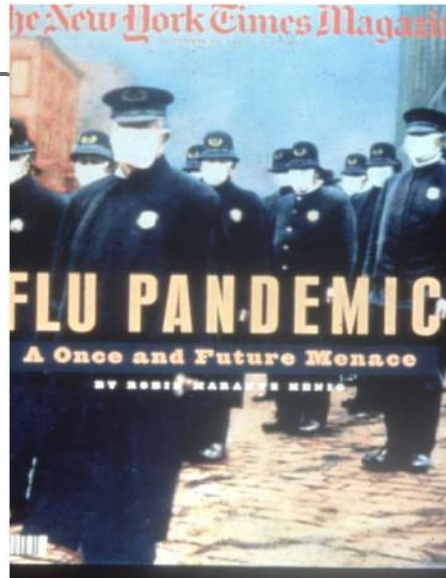


Figure 1. Electron micrograph of influenza A virus particles. Provided by M.-T. Hsu and P. Palese.



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

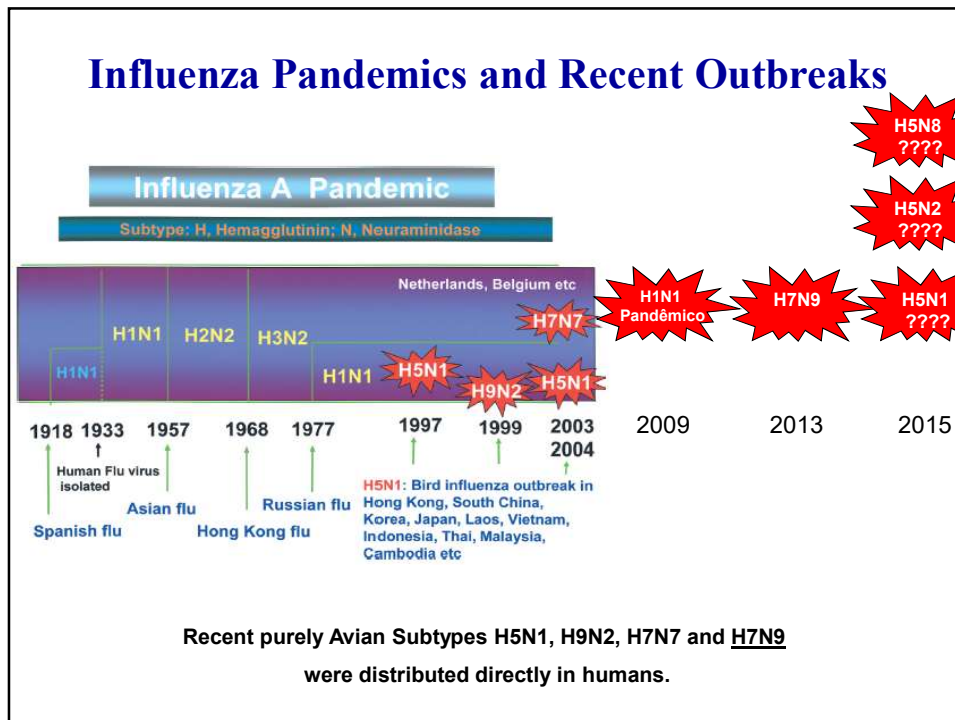
Influenza Pandêmica 1918



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 - Estrutura antigênica

Antígenos tipo-específicos

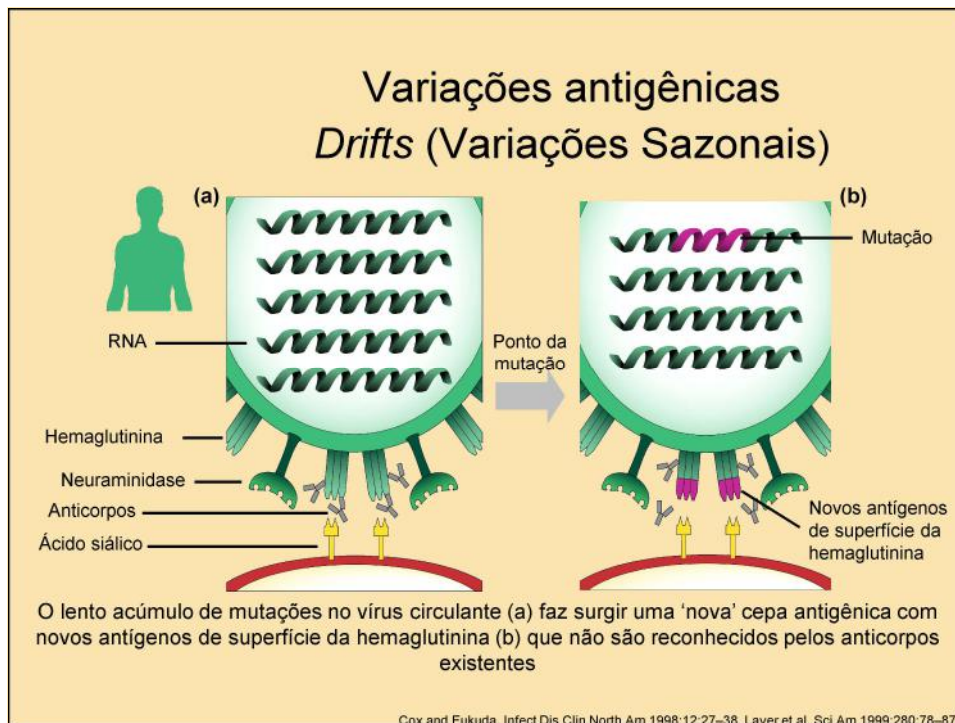
- NP - nucleoproteína
- M - matriz
- Classificam os vírus em tipos:
 - A, B e C

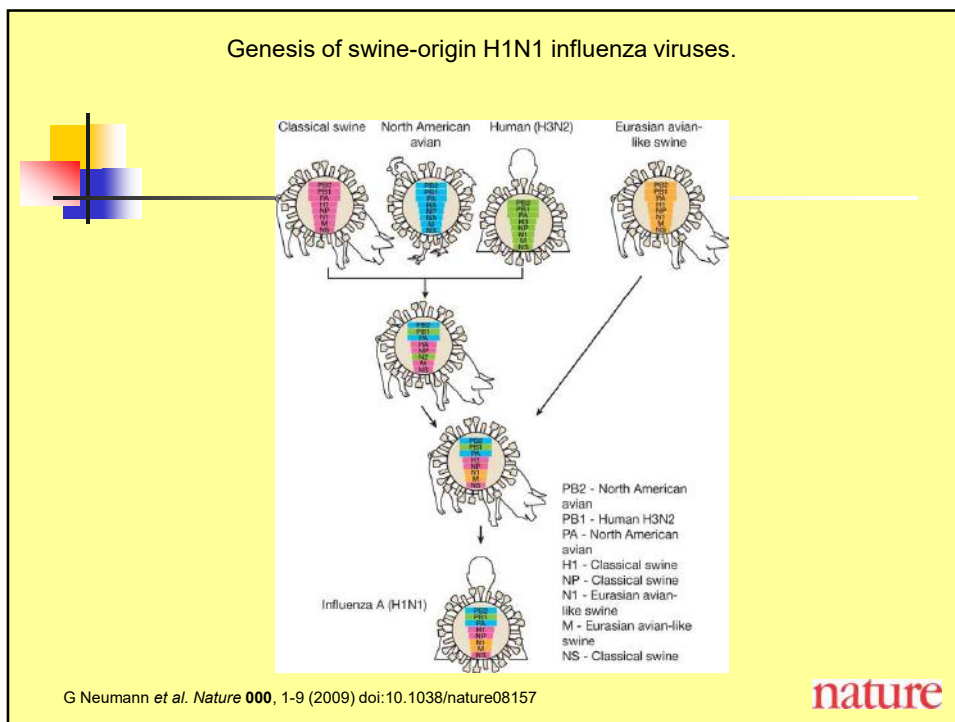
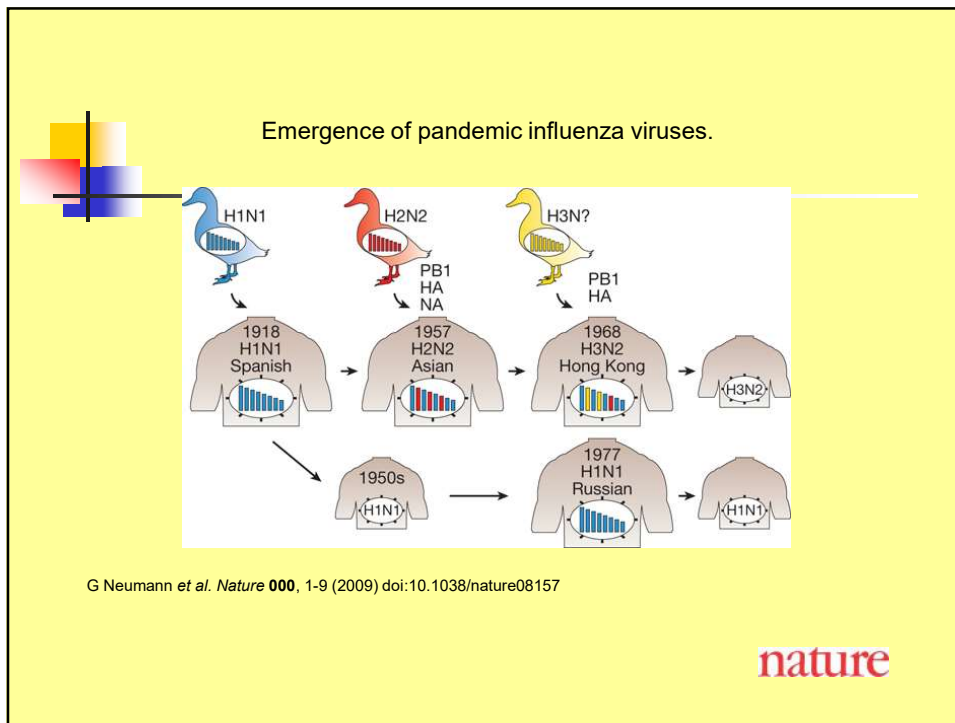
Antígenos sub-tipo específicos

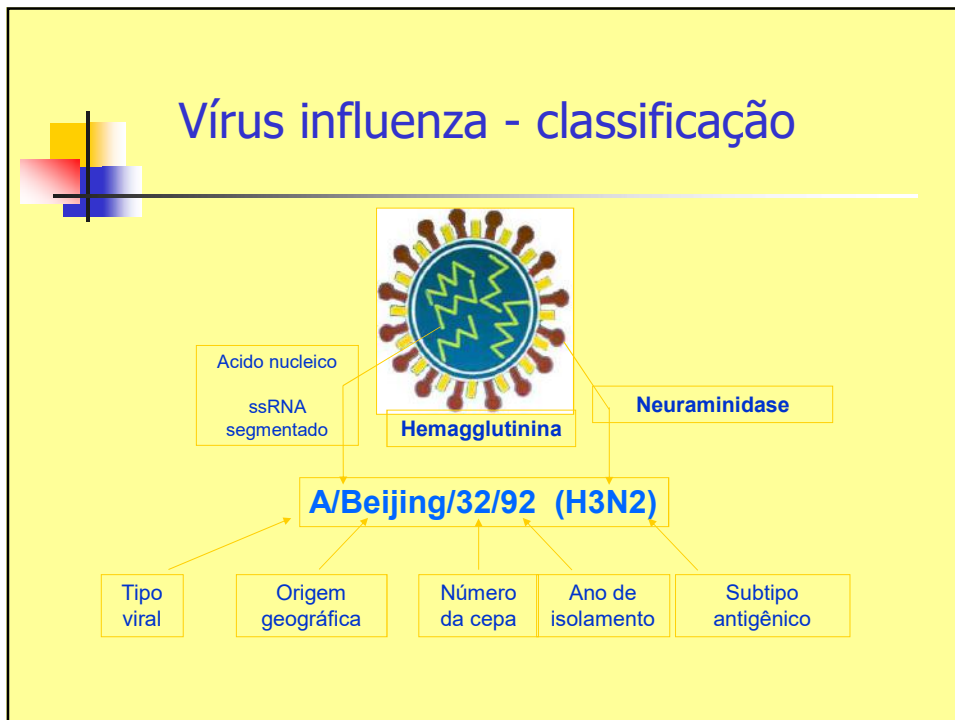
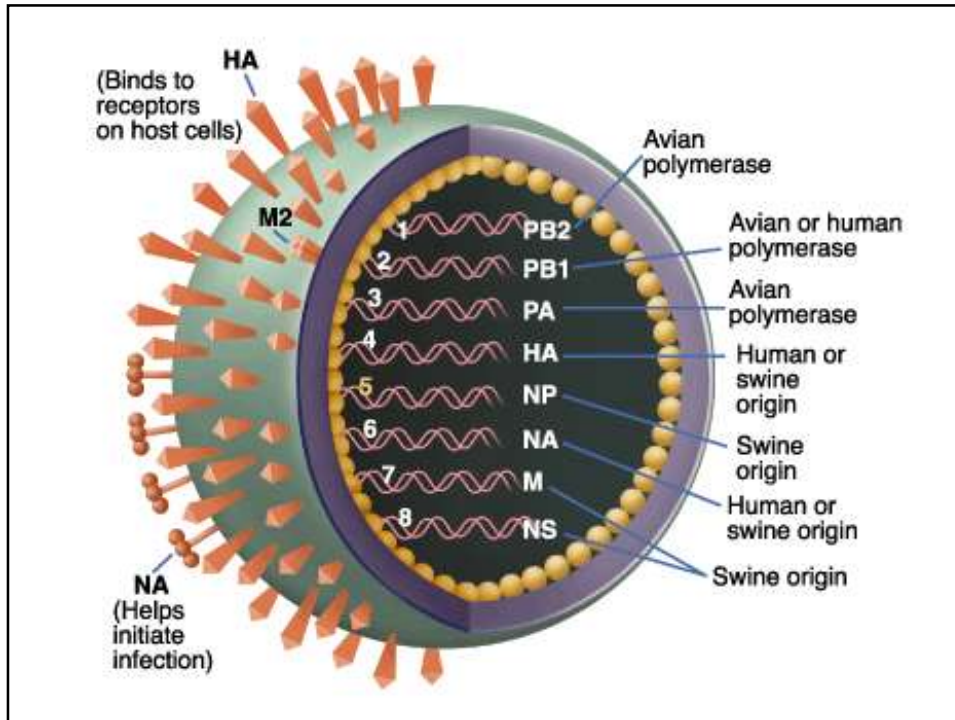
H - hemaglutinina
N - neuraminidase

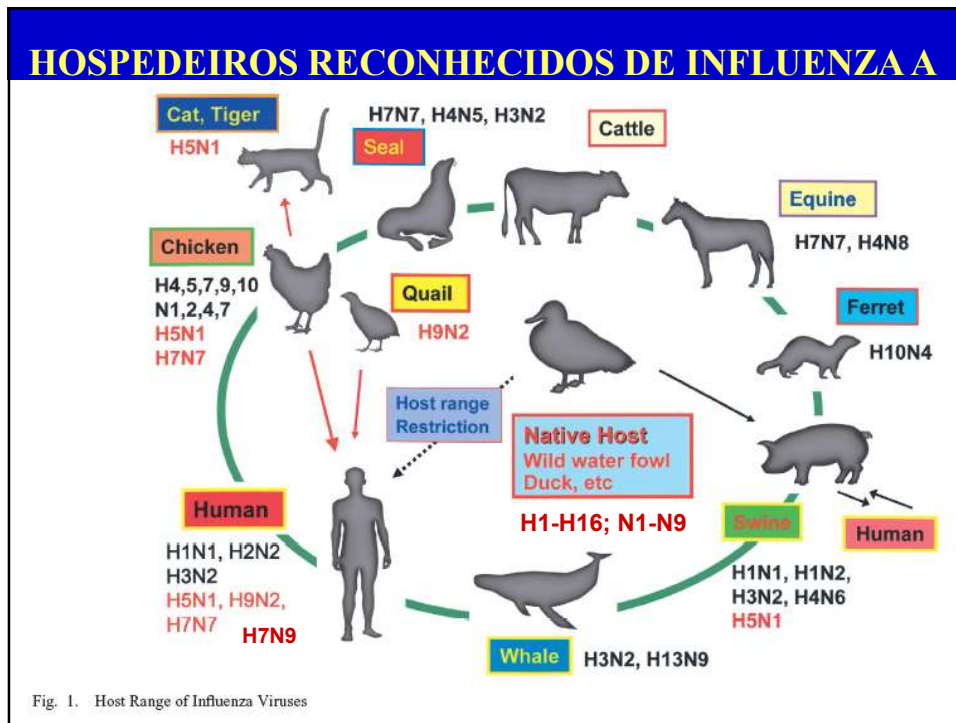
Classificam os vírus em tipos sorológicos
H1N1, H2N2, H3N3

Russell Kightley Media rkm.com.au



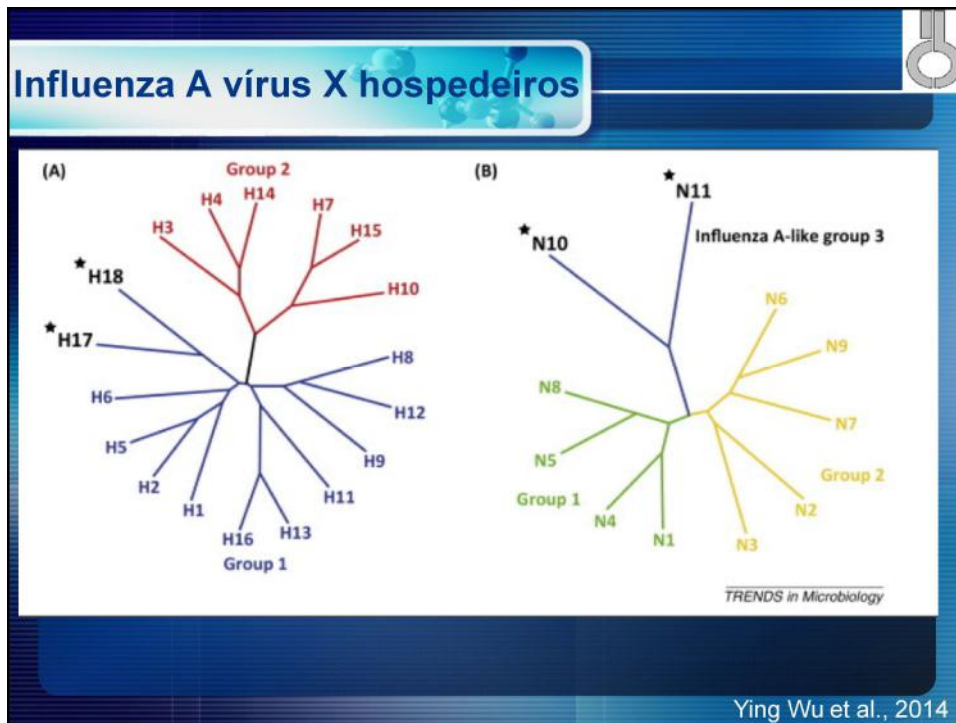






Influenza A vírus X hospedeiros

H1	Human	Swine	Wild water fowl	Human
H2	Human	Swine	Wild water fowl	Human
H3	Human	Swine	Wild water fowl	Human
H4		Swine	Wild water fowl	Human
H5	Human	Swine	Wild water fowl	Human
H6		Swine	Wild water fowl	Human
H7	Human	Swine	Wild water fowl	Human
H8		Swine	Wild water fowl	Human
H9	Human	Swine	Wild water fowl	Human
H10				Human
H11				Human
H12				Human
H13				Human
H14				Human
H15				Human
H16				Human
H17			Bats	Human
H18			Bats	Human



Time Line Of Outbreaks in United Estates

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

oie 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				
	Species	Susceptible	Cases	Deaths	Destroyed
Affected animals	Birds	114000			114000
Affected population	A commercial chicken and duck operation.				

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

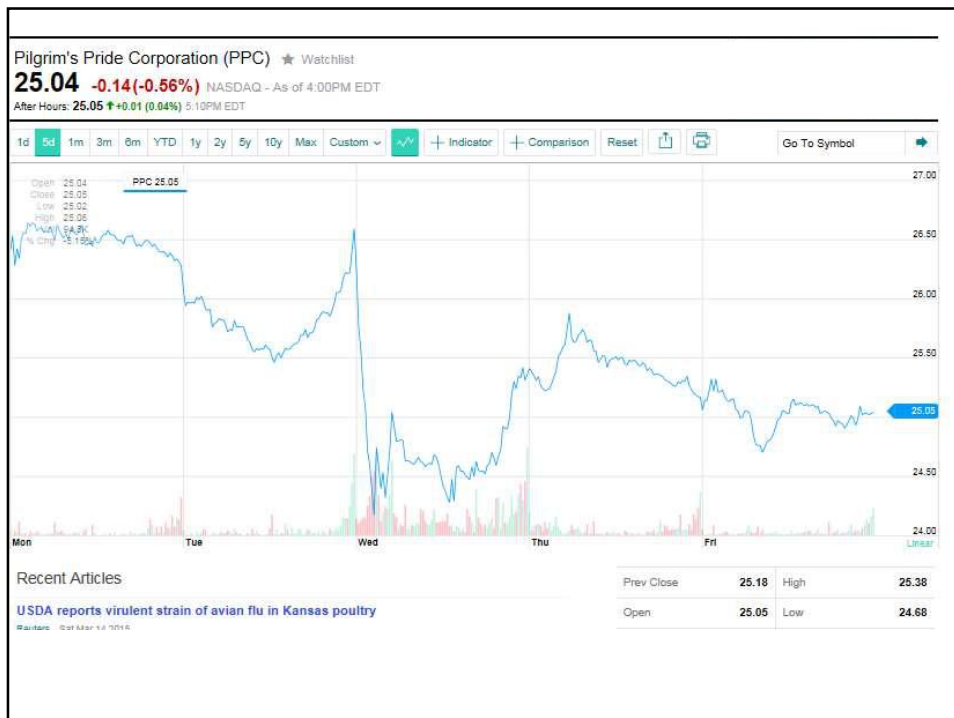
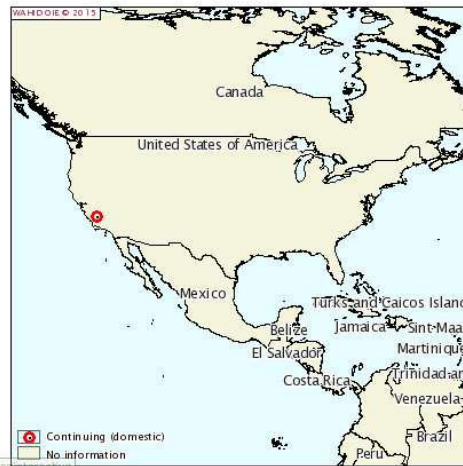
Related reports

- [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

USGS
 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

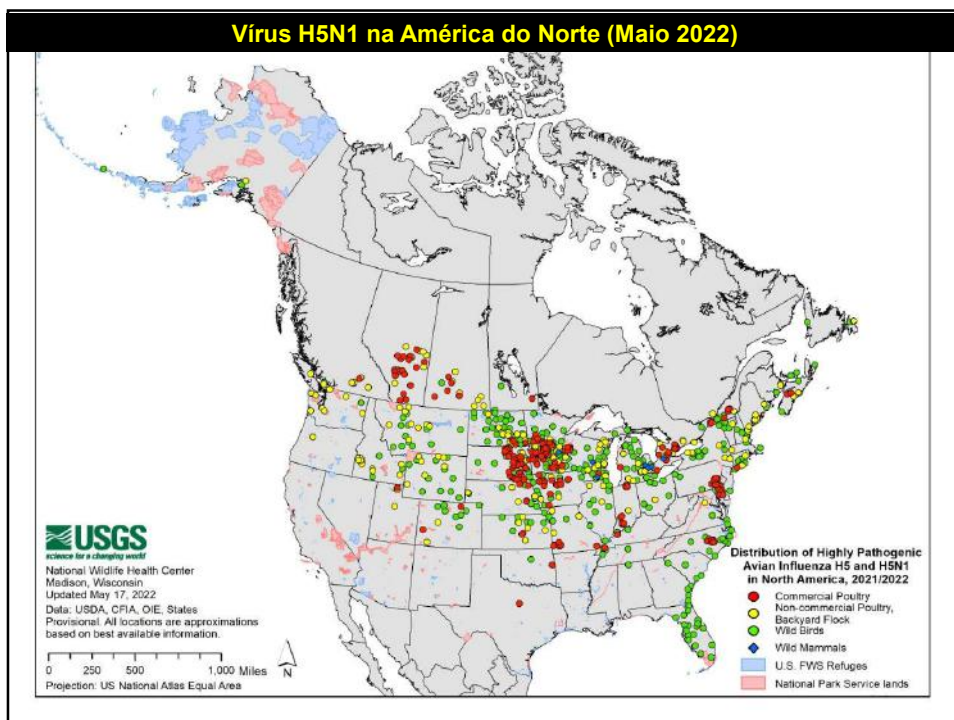
More Information

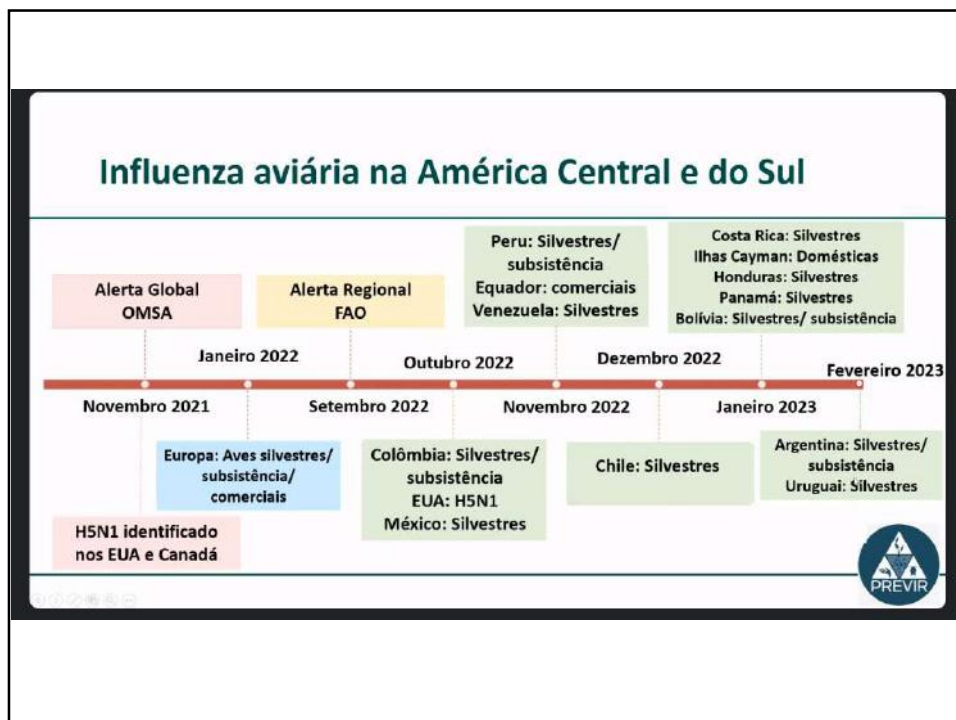
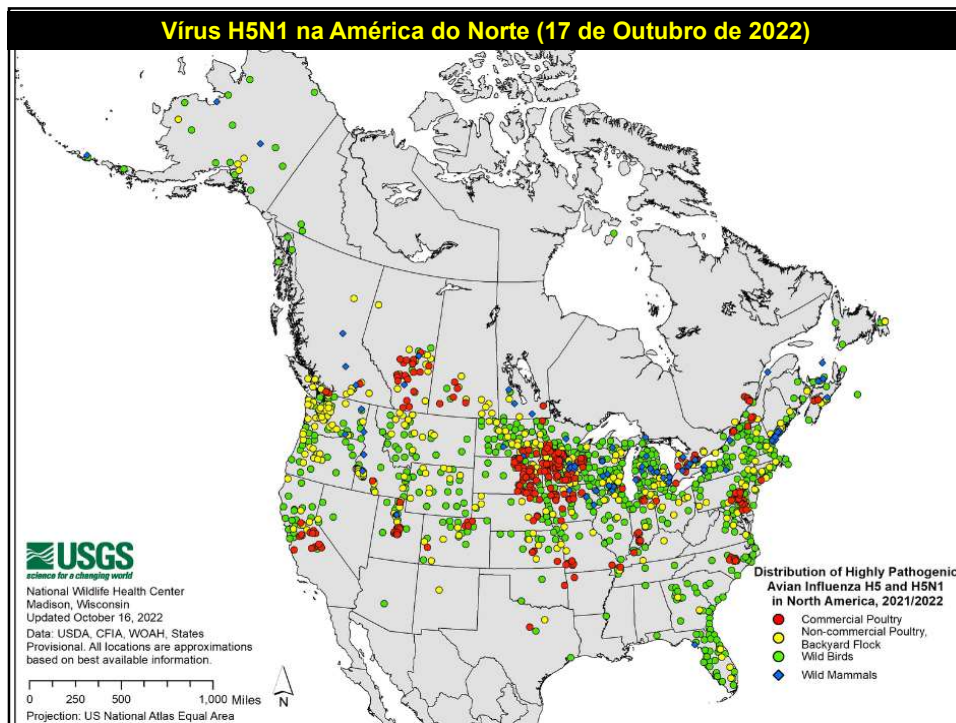
Highly pathogenic avian influenza (HPAI) H5 infections have been reported in U.S. domestic poultry (backyard and commercial flocks), captive wild birds, and wild birds. HPAI H5 detections began in December 2014 and have continued to date in 2015. USDA is reporting H5 bird flu virus detections in 20 U.S.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

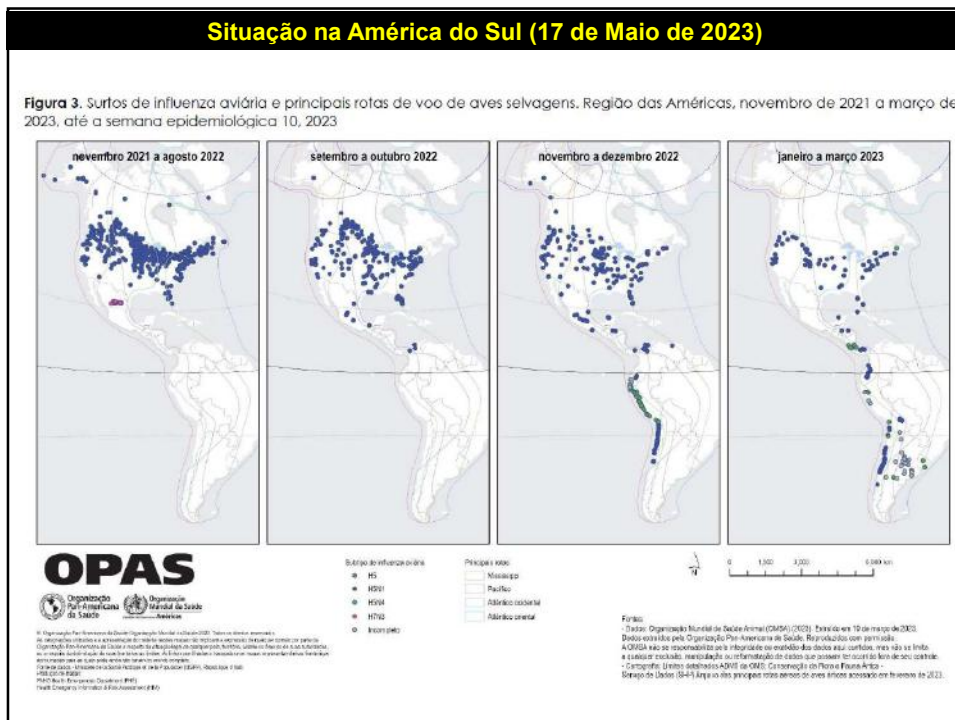
No human infections with these viruses have been detected at this time, however similar viruses have infected people in other countries and caused serious illness and death in some cases.

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 (17 de Maio de 2023)



OPAS

Organização Pan-Americana de Saúde
Organización Panamericana de la Salud
Organisation of American States
Organizzazione Panamericana di Sanità
Organisation of American States
Organización Panamericana de la Salud

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Brasil registra três casos de gripe aviária no Espírito Santo

Ministério da Agricultura foca na "catação do abate", mas garante que não há risco para alimentação humana

BRASIL REGISTRA DOIS CASOS DE GRIPE AVIÁRIA NO ES



Foto: Divisão de Comunicação e Relações Institucionais - SCS - Claudio Maciel

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

FOCOS DE INFLUENZA AVIÁRIA NAS AMÉRICAS

Atualizado em 22 mai 2023
Fontes: Ministério da Agricultura e Pecuária, Organização Mundial da Saúde Animal e Senecop (Paraguai)

Os países destacados em **vermelho** já registraram focos de gripe aviária em **frangos de corte e/ou galinhas poedeiras**.

Já os países destacados em **amarelo** registram focos de gripe aviária em **aves silvestres e/ou aves de subsistência** (criadas em quintal).

As informações são dos relatórios do Sistema Mundial de Informação de Saúde Animal da Organização Mundial para Saúde Animal (WAHIS) e do Ministério da Agricultura e Pecuária (Mapa) no caso do Brasil.



Embrapa

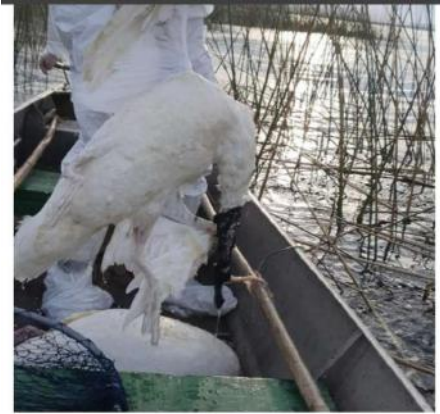
Os primeiros casos **no Brasil** foram anunciados em 15 de maio, em duas aves marinhas da espécie **trinta-réis-de-bando**, em Marataizes e Vitória, no litoral do Espírito Santo.

No fim do dia, foi confirmada a presença do vírus em uma terceira ave migratória, da espécie **atobá-pardo**, que já se encontrava no Instituto de Pesquisa e Reabilitação de Animais Marinhos (Ipram) de Cariacica-ES.

A presença do vírus nas aves marinhas **não afeta a condição** do Brasil como **país livre de Influenza Aviária de Alta Patogenicidade** e o comércio internacional deve ser mantido.

embrapa.br/saúdes-e-aves/ia

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.

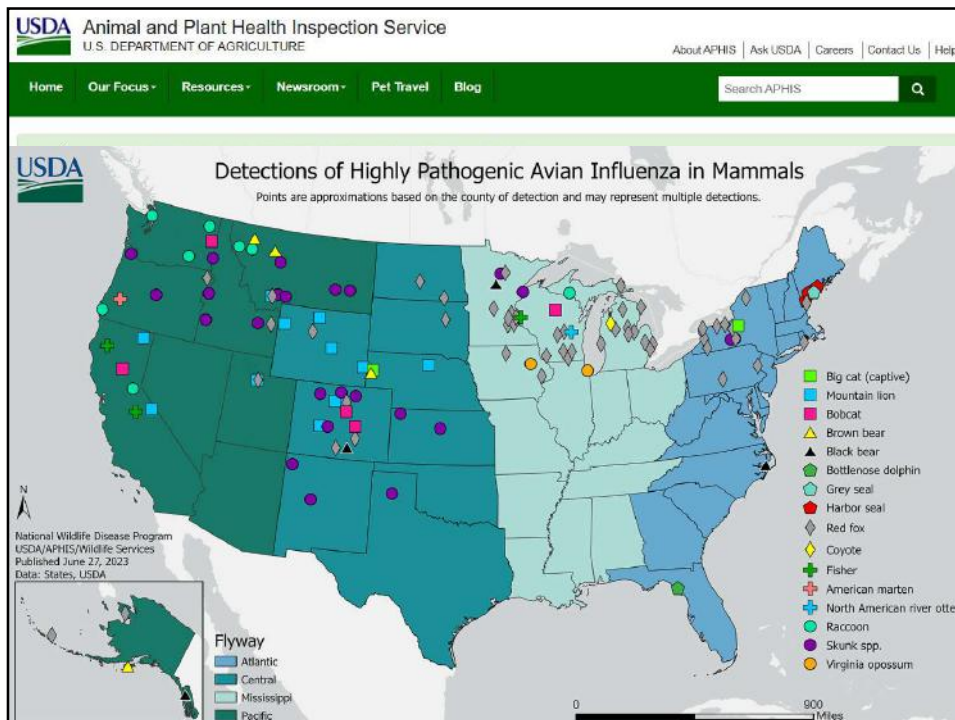
Adagri confirma notificação de gripe aviária em avoantes nos municípios de Tamboril e Monsenhor Tabosa



marufoles



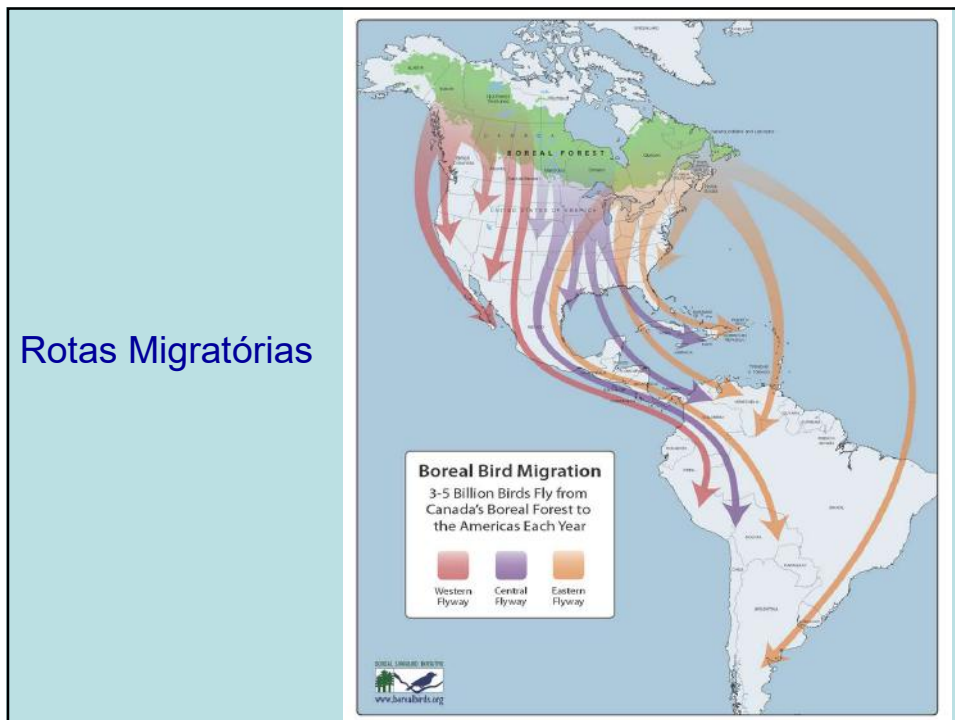
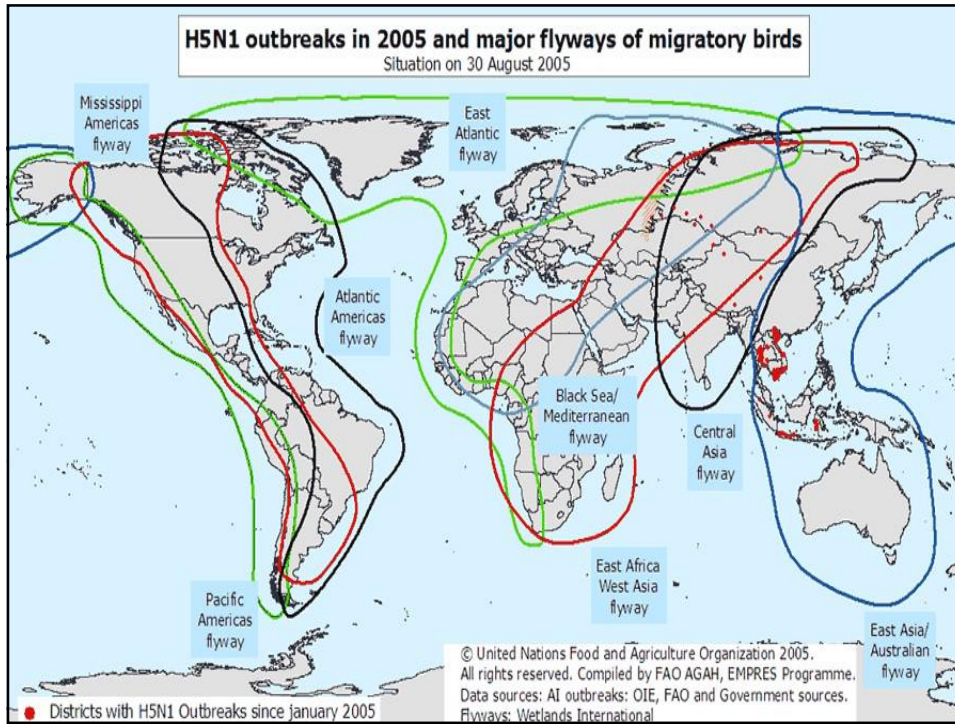
A Agência de Defesa Agropecuária do Estado do Ceará (Adagri) recebeu uma notificação preocupante na quinta-feira (25). Segundo informações confirmadas por Amorim Sobrinho, em entrevista ao CETV, foram



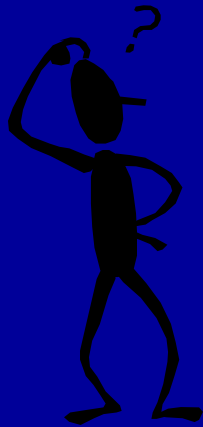


E no Brasil?





Será que este contato existe?



Expedição 2005

Humaitá-Manaus

Ilha de Mosqueiro

Vigia de Nazaré

Monte Negro-Roraima

Die 5 REGIONER

- Norte
- Nordeste
- 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



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







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)

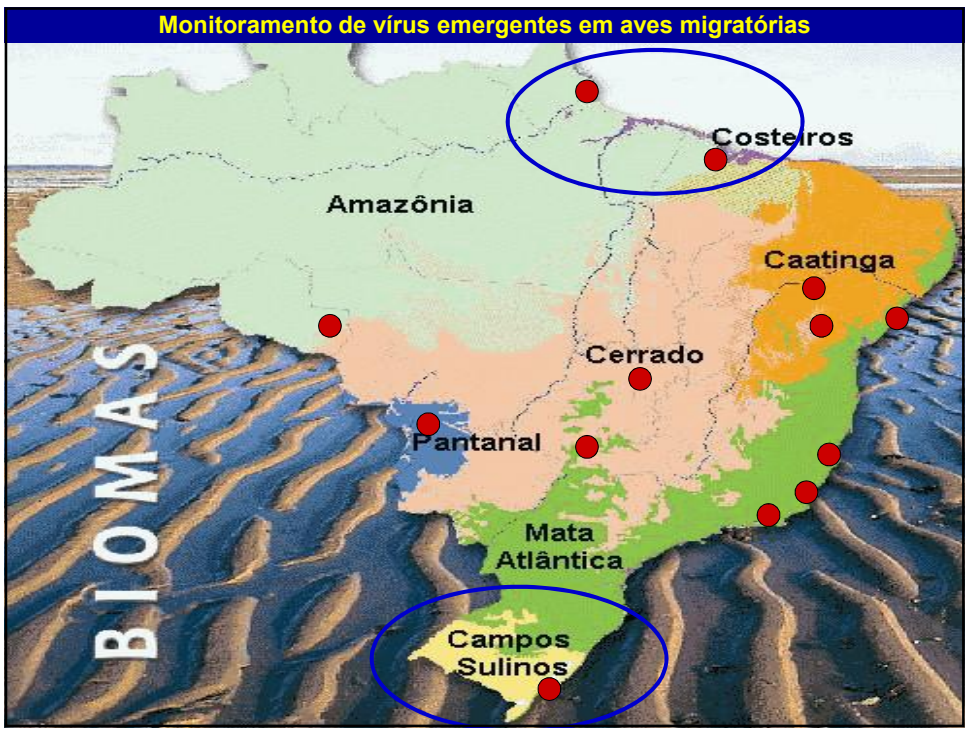


Parque Nacional da Lagoa do Peixe- RS Dezembro 2011



Parque Nacional da Lagoa do Peixe- RS Dezembro de 2011







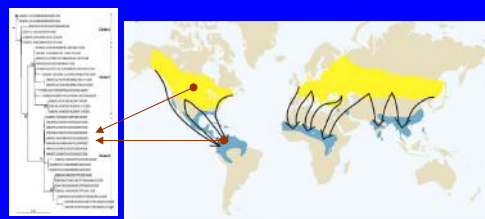




RESULTADOS PARCIAIS- Ilha de Canelas

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



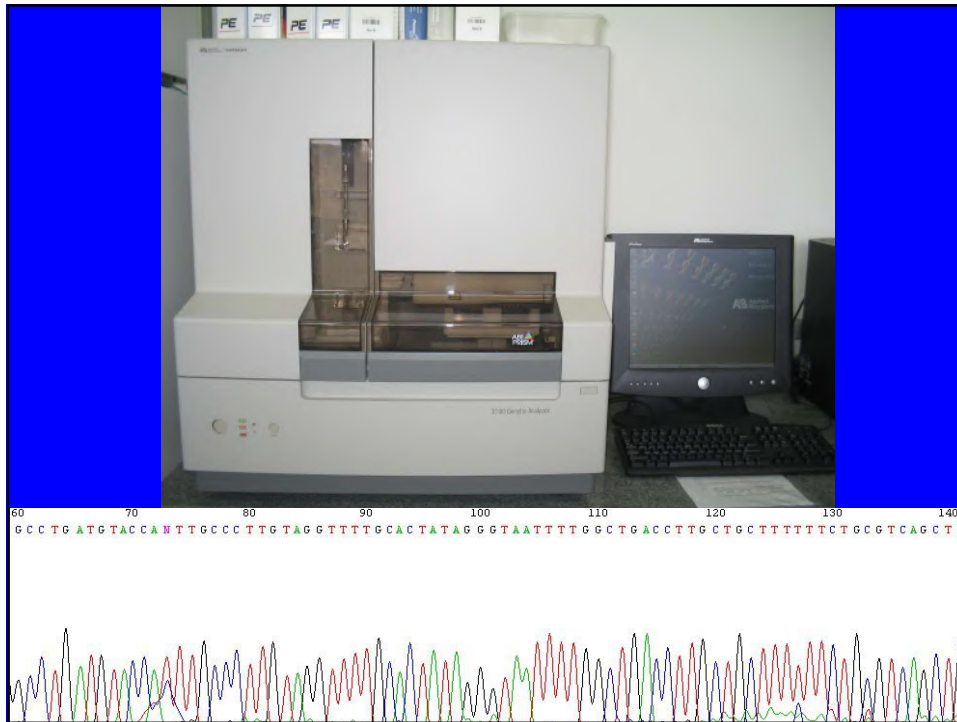
BSL3+ Laboratory



OVOS EMBRIONADOS



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



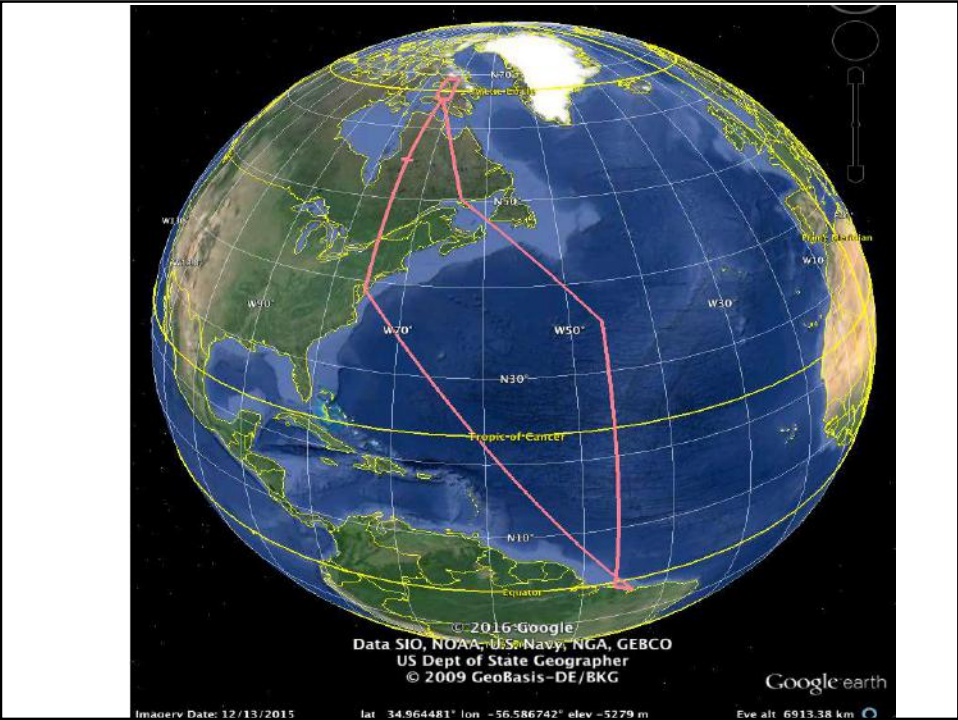
OPEN ACCESS Freely available online PLOS ONE

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

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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

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ORIGINAL ARTICLE WILEY

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

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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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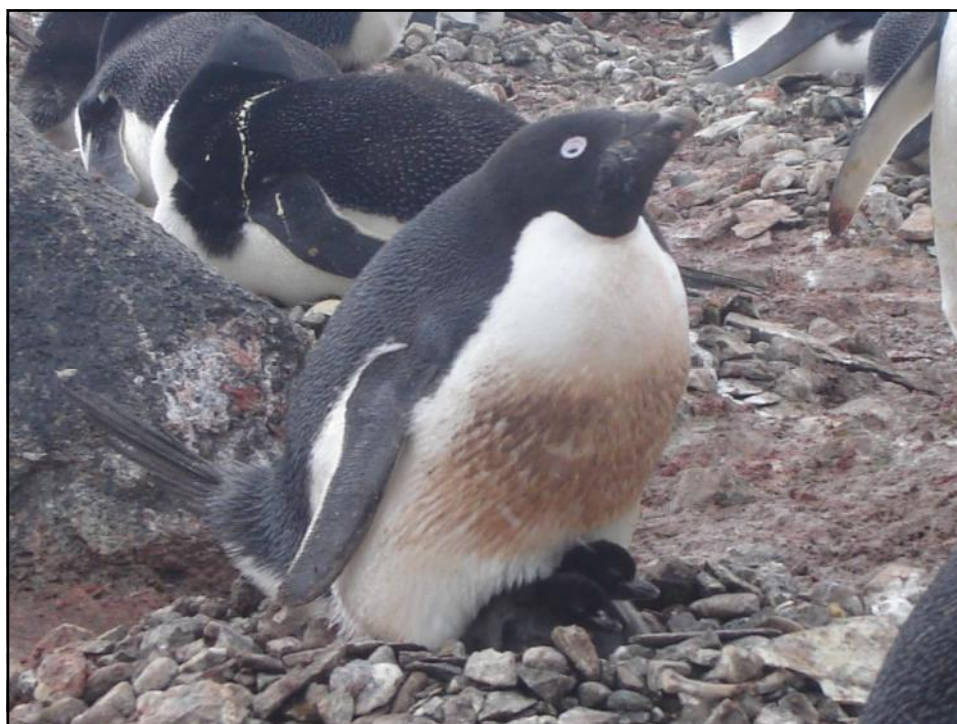
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ORIGINAL PAPER

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

