OFFLU avian influenza virus characterisation meeting
29 – 30 March 2017
FAO Headquarters, Rome, Italy

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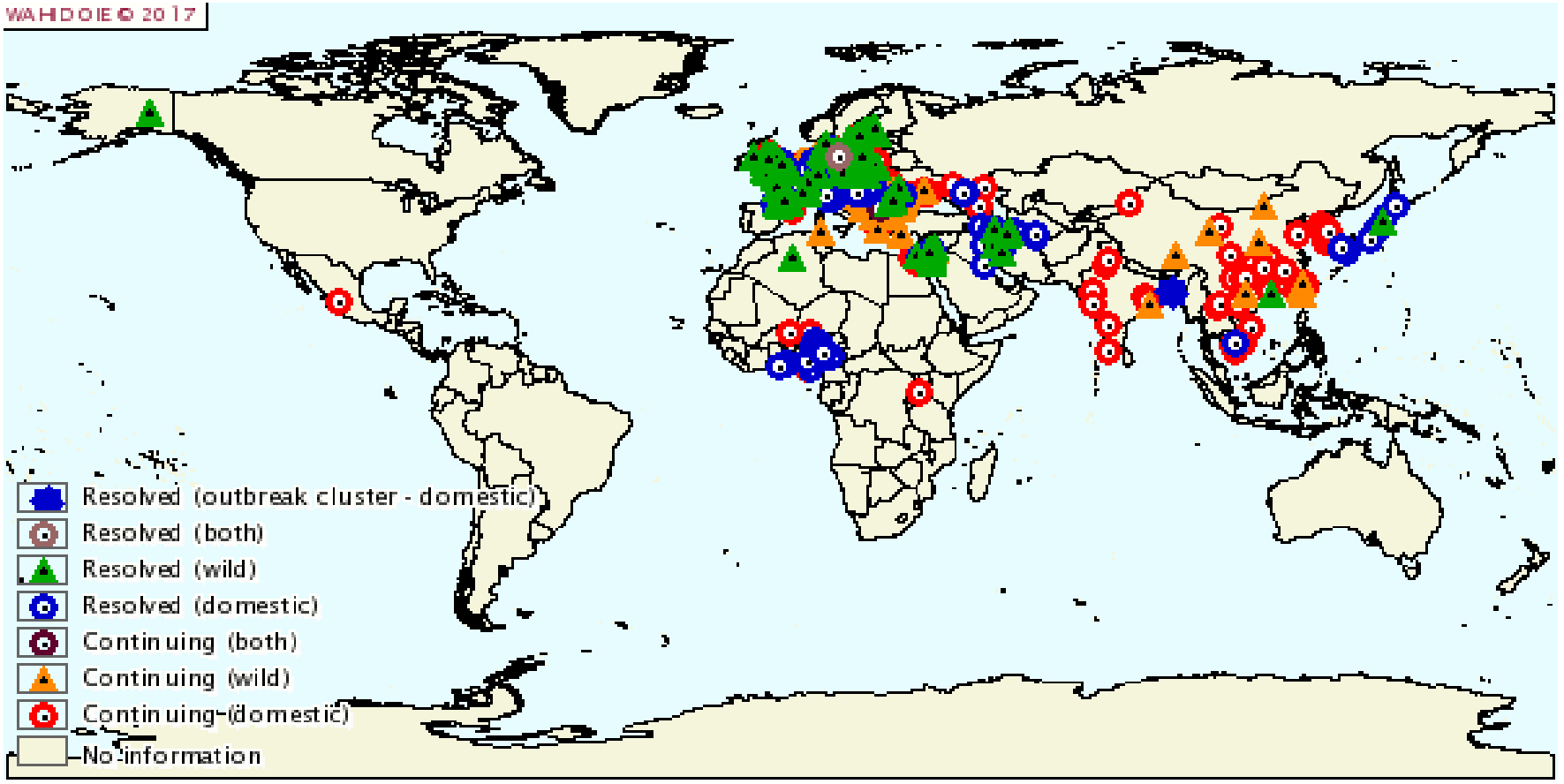
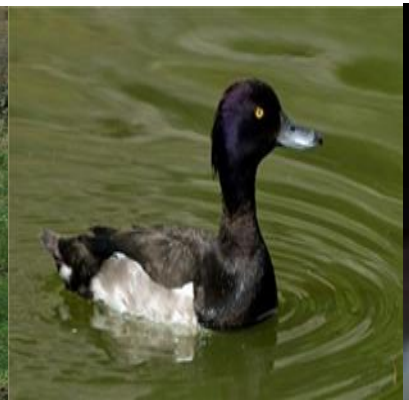
Overview of HPAI activity and virus evolution

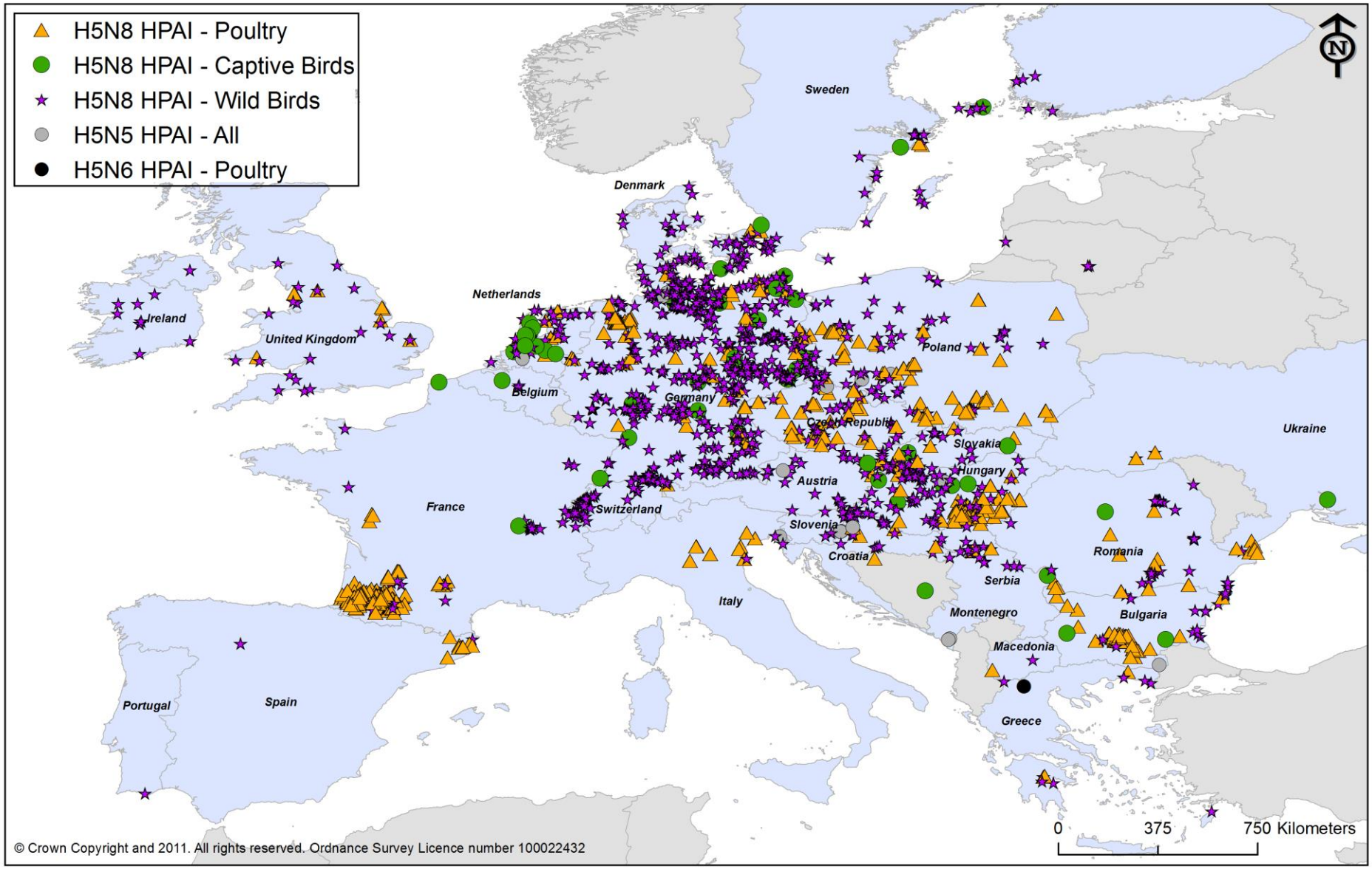
Geographical Distribution of HPAI outbreaks Nov 2016 to Feb 2017



H5N8 HPAI current situation

- To date in Europe (27/03/17) 1629 **outbreaks/events of H5N8 Highly Pathogenic Avian Influenza have been reported in poultry (1060), wild birds (1521) and captive birds (48)** from 29 European countries.
- Central Asia (Russian Federation, India, Iran), Middle East (Kuwait, Israel) and Africa (Egypt, Nigeria, Uganda)
- Further reassortment in region
  - **H5N5 HPAI in poultry & wild birds** from 7 European countries.
  - H5N6 HPAI in poultry (1) in Greece
  - H5N1 HPAI in poultry (1) in France



CREATOR:
EU Reference Laboratory
DATE: 23/03/2017

Highly Pathogenic Avian Influenza outbreaks between October 2016 and March 2017

Animal & Plant Health Agency

Total Statistics by Country

Country	Poultry	Wild Birds	Captive Birds	Grand Total
France	467	51	3	521
Hungary	234	87	5	326
Germany	80	709	15	804
Bulgaria	67	13	2	82
Poland	65	68		133
Czech Republic	37	39	1	77
Romania	34	89	2	125
Croatia	11	12		23
Italy	10	5		15
Spain	10	2		12
United Kingdom	9	22		31
Netherlands	8	47	9	64
Slovakia	8	57	3	68
Greece	5	9		14
Republic of Serbia	4	20		24
Sweden	3	30	2	35
Ukraine	3	2	1	6
Austria	2	52	1	55
Bosnia And Herzegovina	1		1	2
Denmark	1	46	1	48
FYOR Macedonia	1	1		2
Belgium		2	1	3
Finland		13	1	14
Ireland		10		10
Lithuania		4		4
Montenegro		2		2
Portugal		1		1
Slovenia		41		41
Switzerland		87		87
Grand Total	**1060**	**1521**	**48**	**2629**

Primary/Secondary cases for Poultry by Country

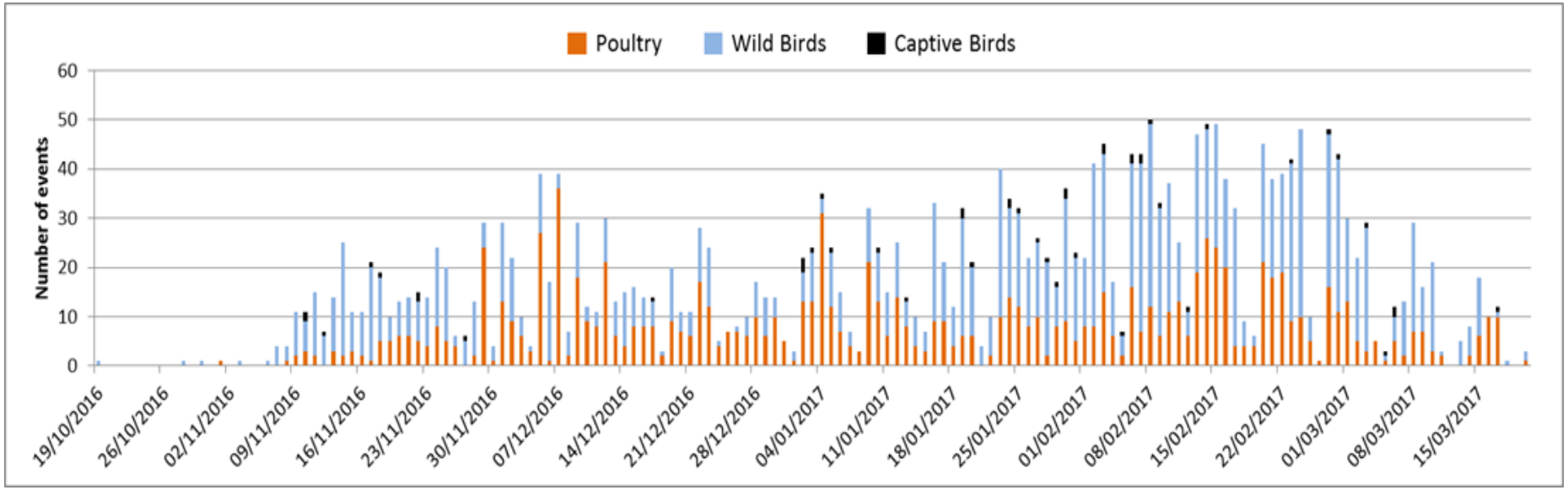
Country	Primary	Secondary	Grand Total
France	441	26	467
Germany	69	11	80
Poland	61	4	65
Hungary	46	188	234
Czech Republic	37		37
Romania	23	11	34
Bulgaria	16	51	67
Italy	9	1	10
Netherlands	8		8
Slovakia	8		8
United Kingdom	7	2	9
Croatia	5	6	11
Greece	5		5
Republic of Serbia	4		4
Sweden	3		3
Austria	2		2
Spain	2	8	10
Ukraine	2	1	3
Bosnia And Herzegovina	1		1
Denmark	1		1
FYOR Macedonia	1		1
Grand Total	**751**	**309**	**1060**

Epizootic ‘Epidemic Curve’ in Europe

Not enough evidence to suggest epidemic is truly declining at EU level (denominator data?!)

Recent numbers driven by detections in fewer countries (FR, DE, RO & PO)

Wild bird populations may show some temporal trends by species: ie migratory anatidae > endemic waterfowl> swans/raptors



New European confirmations by country in last 6 weeks

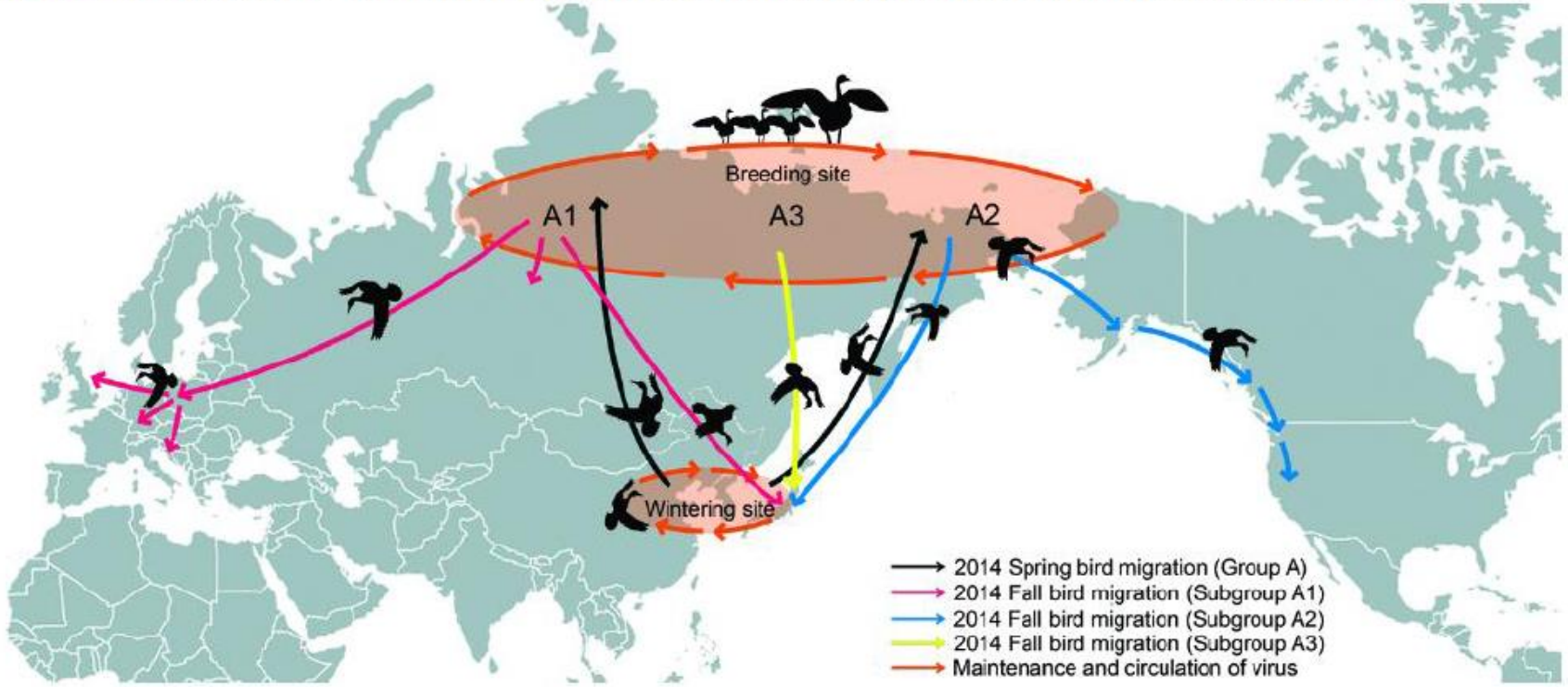
Country	Poultry	Wild Birds	Captive Birds	Grand Total
France	266	34	2	302
Germany	32	461	6	499
Poland	27	27		54
Romania	26	57	1	84
Czech Republic	17	12	1	30
Spain	10	1		11
Croatia	9	3		12
Bulgaria	7	9	1	17
Italy	6	1		7
Hungary	3	31	1	35
Greece	2	4		6
Slovakia	2	18		20
Bosnia And Herzegovina	1		1	2
Republic of Serbia	1	8		9
Ukraine	1		1	2
United Kingdom	1	4		5
Austria		31	1	32
Belgium		2		2
Denmark		7	1	8
Finland		1		1
Ireland		5		5
Lithuania		4		4
Netherlands		4	3	7
Slovenia		28		28
Sweden		14		14
Grand Total	**411**	**766**	**19**	**1196**

Epidemiological features of H5N8 HPAI in Europe

- Detections in dead wild birds (primarily waterfowl species) have preceded poultry outbreaks in many countries
- There have been multiple cases of secondary spread within domestic poultry in France, Poland, Germany, Hungary, Bulgaria and the United Kingdom.
  - Early detection without mass mortality; good early warning/intervention
- Currently eight countries have reported H5N8 in wild birds only.
- The geographic area affected has expanded and current surveillance has provided evidence for H5N8 HPAI in a greater number of wild bird species (still predominantly species associated with water bodies).
- Multiple ‘poultry hosts’ affected with generally severe spectrum of clinical presentation
  - Some similarities to H5N1 (clade 2.2.x) in 2006 onwards
- The virus carries low risk for humans (no confirmed cases globally)

Outbreaks of highly pathogenic avian influenza A(H5N8) in Europe Report Published: Nov 2016

Figure 2. Indicative transmission routes of HPAI A(H5N8) through birds migrating into Europe

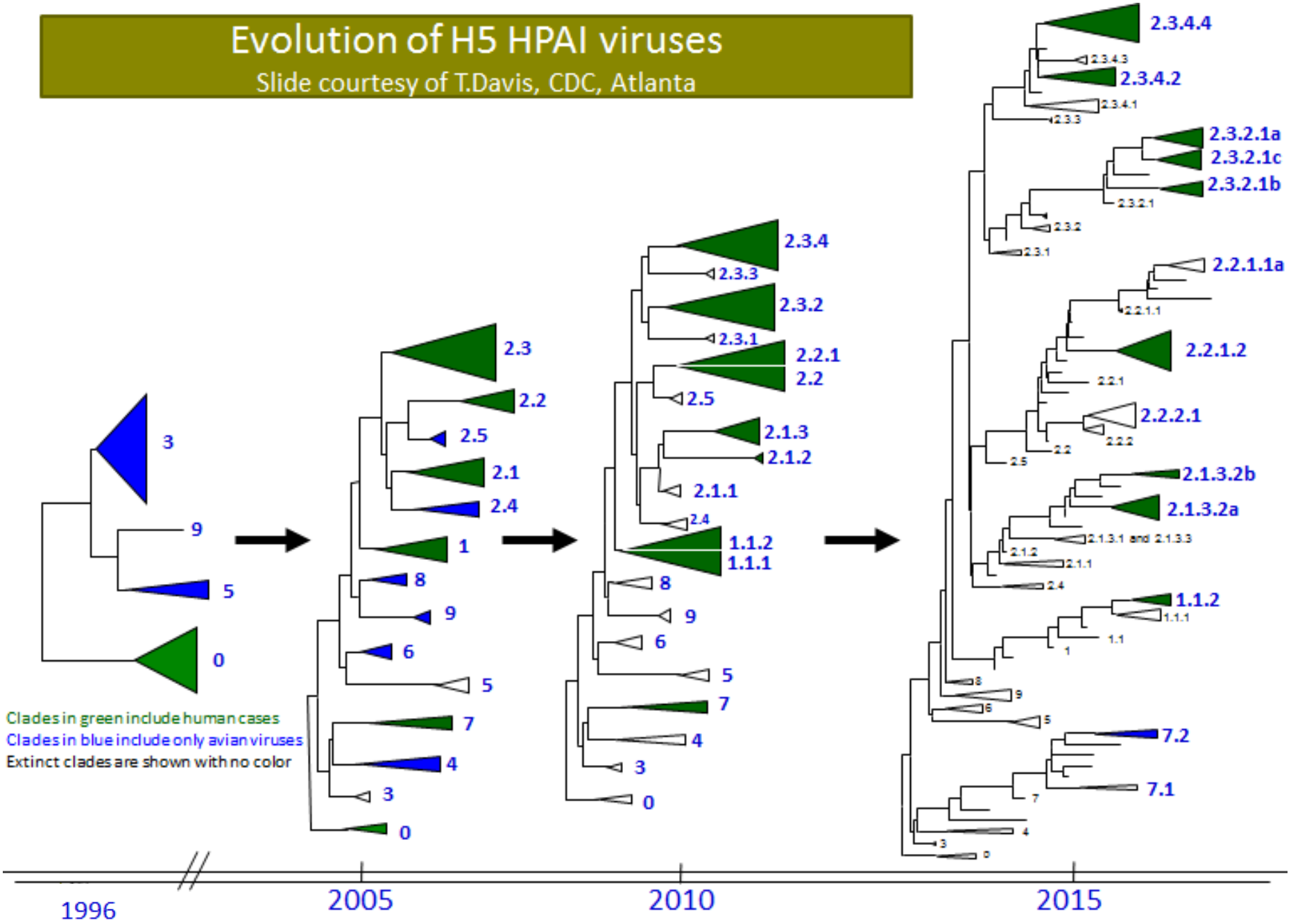


Journal of Virology, 2015, Jun;89(12):6521-4, doi 10.1128/JVI.00728-15. Reproduced with permission from the American Society for Microbiology

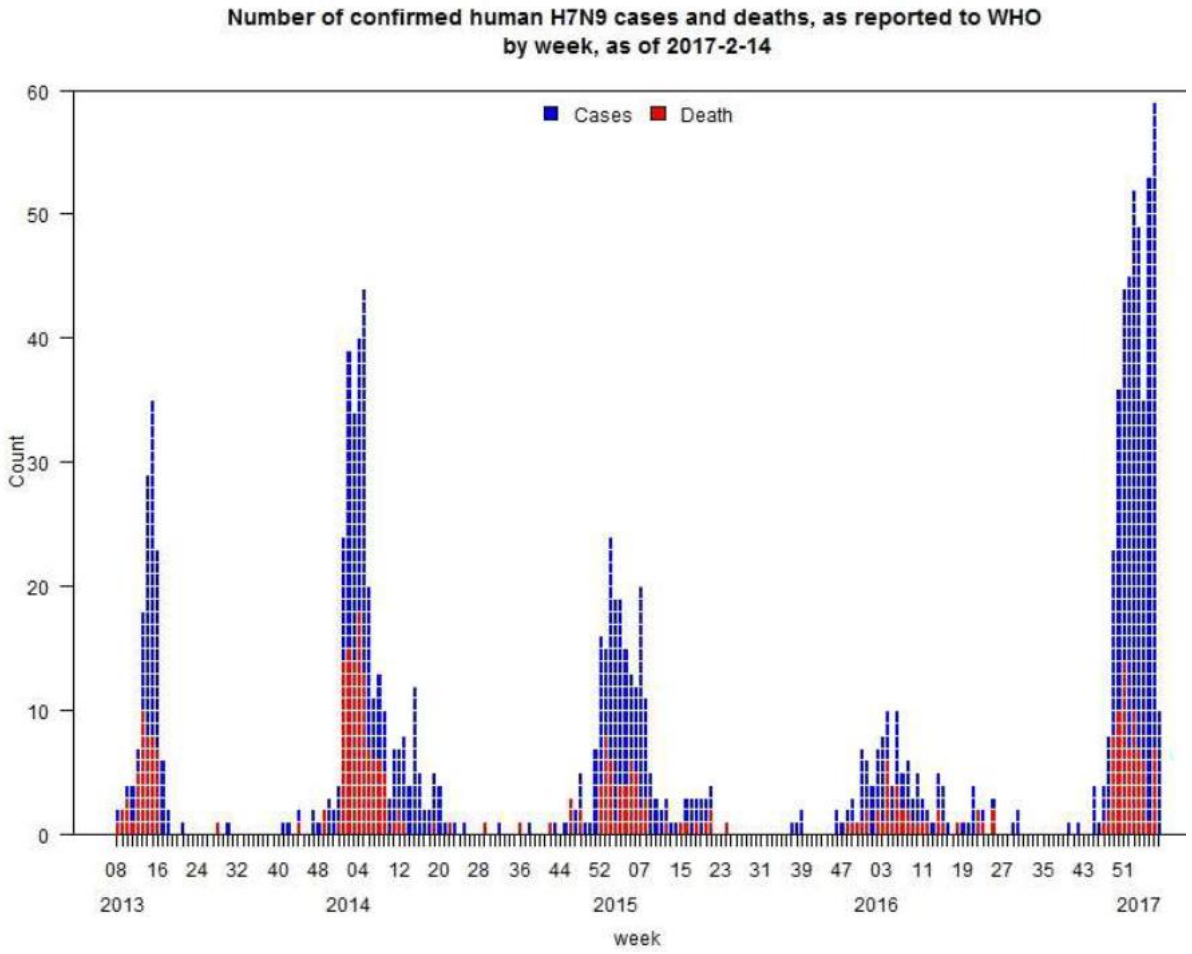
Group A: *comprises Chinese, Russian, South Korean, Japanese, European and North American A(H5N8) 2.3.4.4 viruses representing intercontinental group A;* ***Subgroup A1:*** *composed of A(H5N8) viruses from Europe and Russia from late 2014 and three viruses detected in Japan in December 2014;* ***Subgroup A2:*** *composed of A(H5N8), as well as H5 clade 2.3.4.4 North American HPAIV reassortants (A(H5N2) and A(H5N1))detected in North America starting in late 2014 and a Japanese virus, A/crane/Kagoshima/KU1/2014(H5N8), detected in November 2014;* ***Subgroup A3:*** *composed of A(H5N8) viruses isolated in Japan in December 2014 and Korea in January 2015 [28].*

Evolution of H5 HPAI viruses

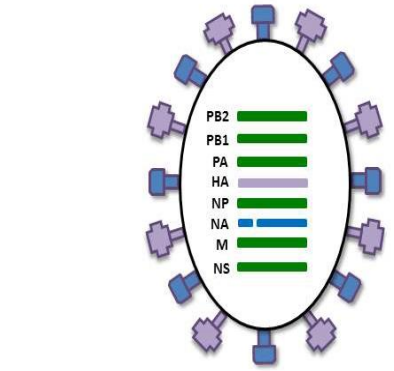
Slide courtesy of T.Davis, CDC, Atlanta



A total of 1223 laboratory-confirmed cases of human infection with avian influenza A(H7N9) virus, including 380 deaths (32% CFR) (Feb 2017)



LPAI TO HPAI event



H7 haemagglutinin - genetically related to H7Nx-like viruses detected in ducks in China, 2011

N9 neuraminidase - genetically related to HxN9-like viruses detected in ducks and wild birds in Korea and Eurasian countries, 2010-2012

Internal genes - genetically related to H9N2-lineage internal genes detected in avian influenza viruses in China, 2011-2012

Genetic data needs – OFFLU programmes

- HA will inform antigenic characterisation/ongoing evolution and drift
  - VCM type approaches with in-vitro data

- Full genome to continue to track and define genotypic variation through reassortment
  - Host range; correlates for infection kinetics/transmission
  - Zoonotic risk

Acknowledgements

- Global network submitting materials/data to APHA/OFFLU

- Flu group at APHA
- OIE
- FAO
- EU commission