

A retrospective summary of APMV cases in Europe (2006 – 2015)

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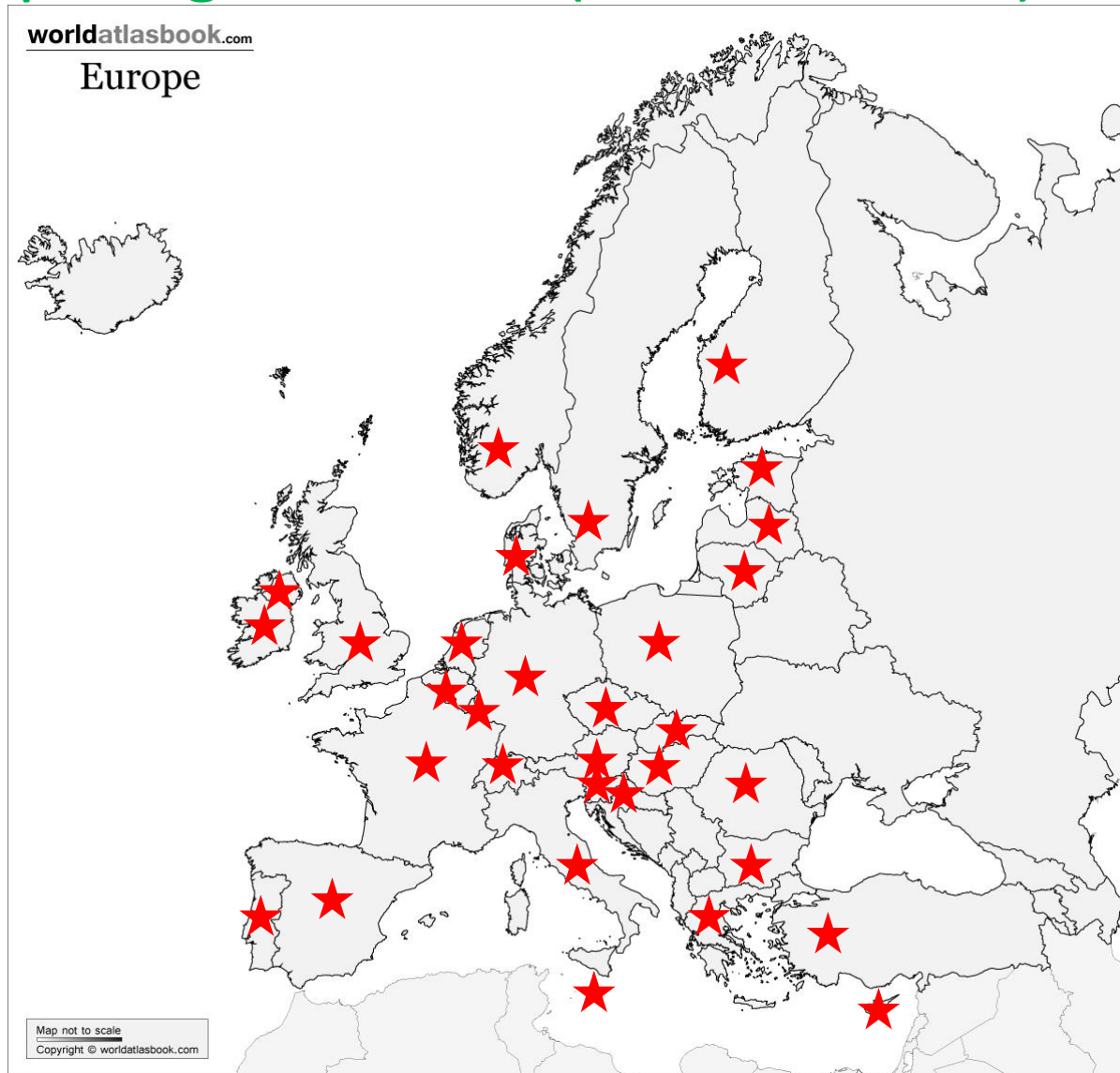
Animal and Plant Health Agency (APHA)

Introduction

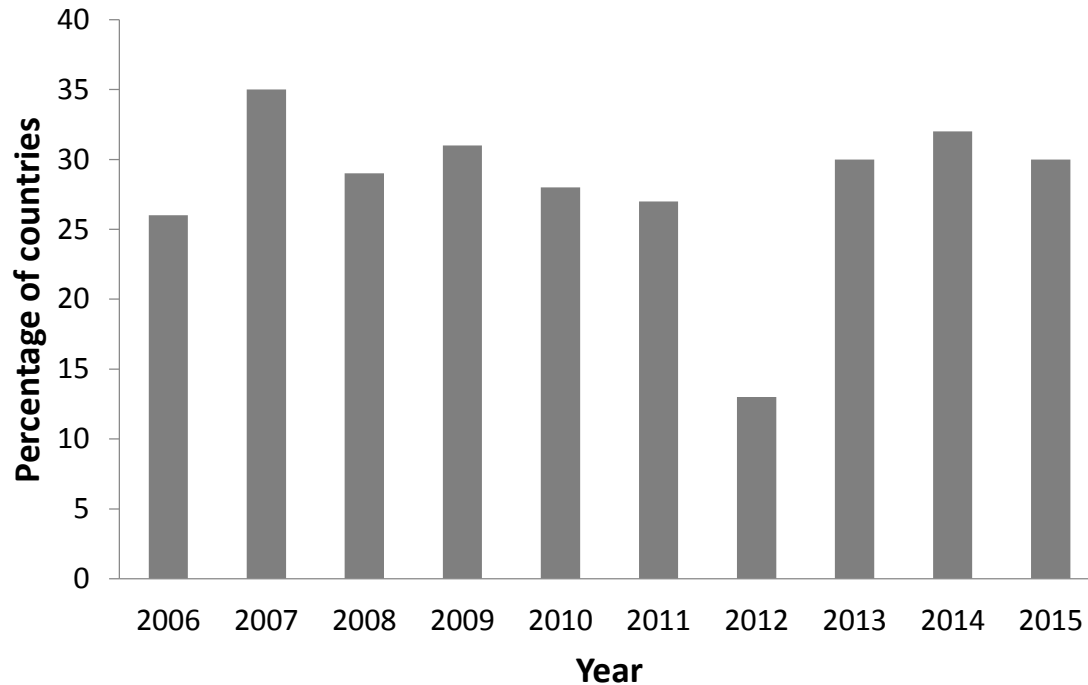


- A 10-year retrospective summary of avian paramyxovirus (APMV) detections in Europe, between 2006 and 2015
 - Velogenic APMV-1
 - PPMV-1
 - Other APMV
- Collation of data provided within the “Member State (and Third Countries) Reports” - submitted to the EURL (APHA) between 2006 and 2015
- Data reflects information from member states AND third countries (eg. Turkey)
- Caveats
 1. This interpretation reflects ONLY the data provided in the questionnaire responses
 2. Ducks (including Mallard) – all interpreted as ‘wild’ unless explicitly defined as poultry/meat in the questionnaires
 3. ‘Unclassified’ viruses – genotype not identified at time of questionnaire submission

Participating countries (2006 to 2015)



Countries with no APMV detected or isolated

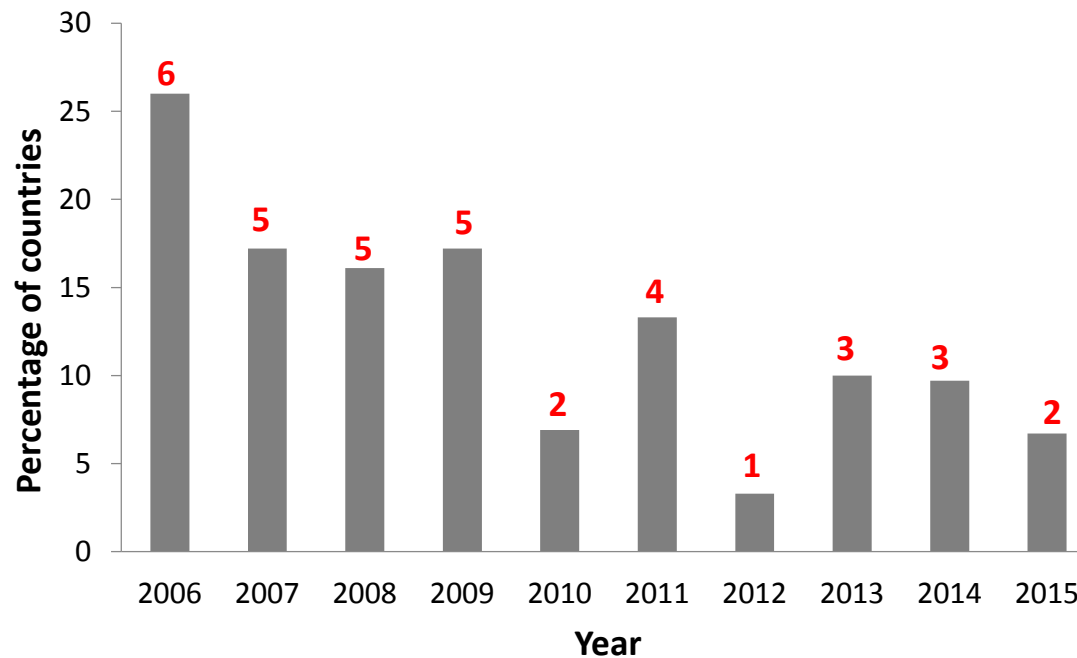




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Velogenic APMV-1

Percentage of countries reporting ND outbreaks

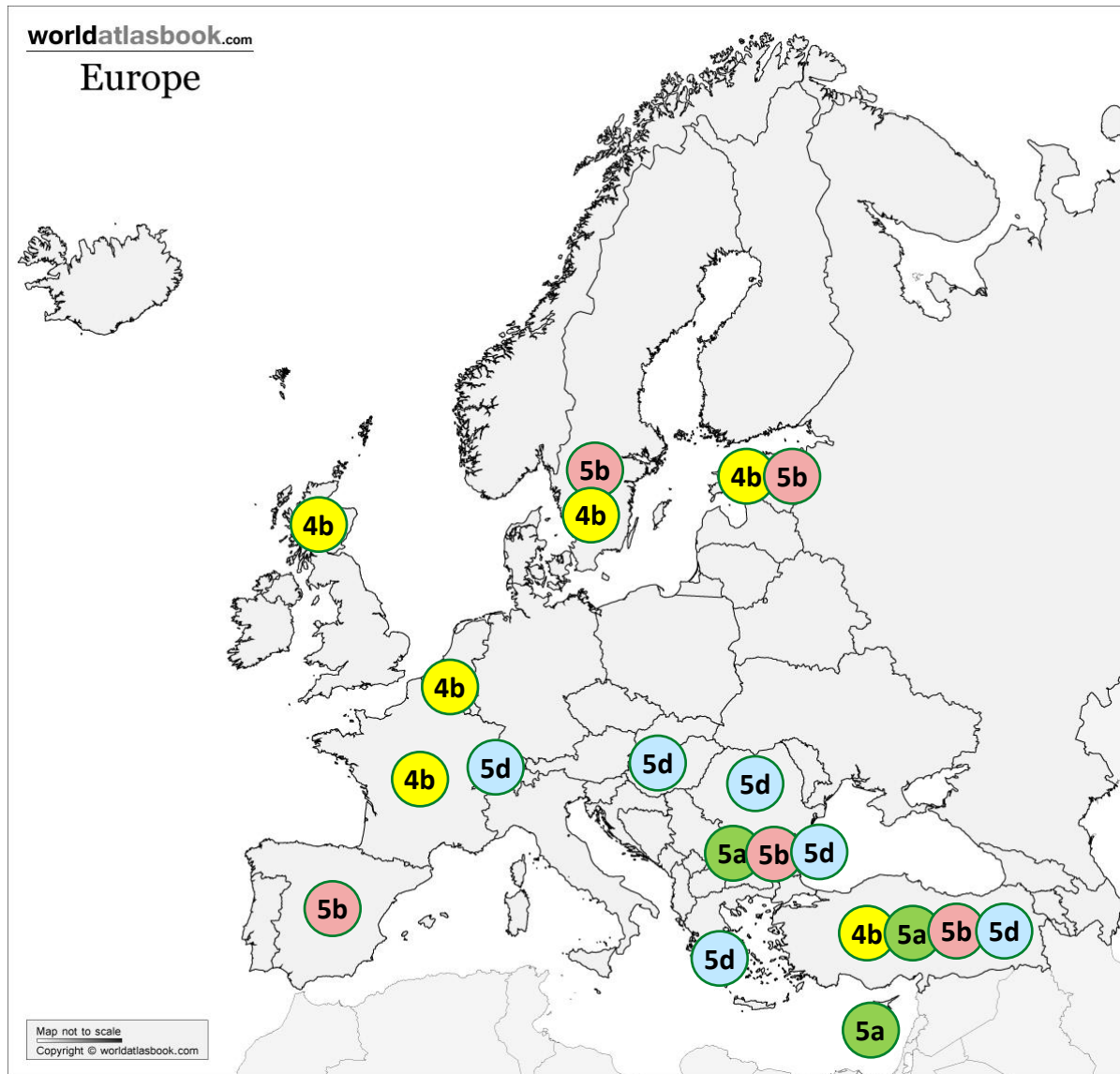


Countries with ND outbreaks

Year	Belgium	Bulgaria	Cyprus	Estonia	France	Greece	Hungary	Portugal	Romania	Spain	Sweden	Switzerland	Turkey	UK
														
2006														
2007														
2008														
2009														
2010														
2011														
2012														
2013														
2014														
2015														
Total	1	5	1	2	3	1	1	2	6	1	5	1	6	1



Velogenic APMV-1 - domestic poultry/captive birds



Defined as having a virulent F0 cleavage site sequence

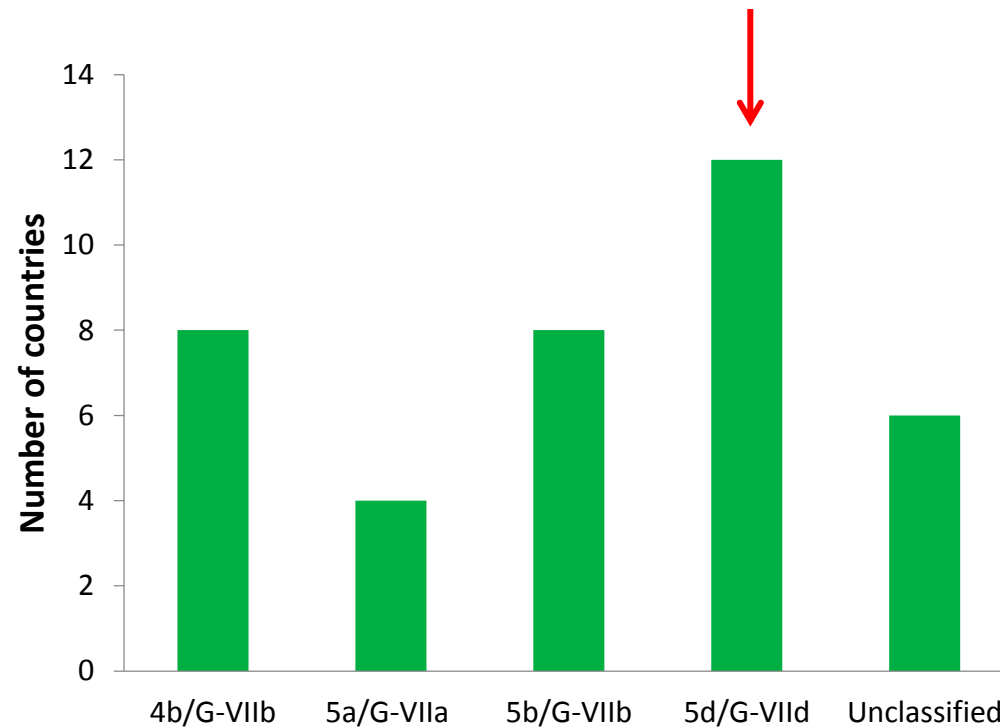
Velogenic APMV-1 - domestic poultry/captive birds

Year	Lin 4b (G VIb)	Lin 5a (G VIIa)	Lin 5b (G VIIb)	Lin 5d (G VIId)	Unclassified
2006	Chicken (Belgium) Meat pigeon (France) Partridge (UK)		Chicken (Sweden)	Chicken (Bulgaria, Hungary) Turkey (Bulgaria)	
2007	Chicken (Estonia)			Chicken & turkey (Bulgaria) Chicken (Greece)	Chicken (Portugal, Romania)
2008			Chicken (Bulgaria, Sweden)		Chicken (Portugal, Romania, Turkey) Parrot (Romania)
2009			Pheasant (Spain) Turkey (Turkey) Chicken (Sweden)	Chicken (Bulgaria, Romania) Parrot (Romania)	
2010	Meat/breeder pigeon (France)				Chicken, turkey & gamebirds (Turkey)
2011	Chicken (Sweden)		Turkey (Estonia)	Chicken (Switzerland, Turkey)	
2012				Chicken (Romania)	
2013	Chicken (Turkey)	Chicken (Bulgaria, Cyprus, Turkey)		Chicken (Turkey)	
2014		Chicken (Turkey)	Chicken (Sweden)	Chicken (Romania)	
2015	Meat pigeon (France) – Lin 4a (G VIa)			Chicken (Romania)	

Defined as having a virulent F0 cleavage site sequence;

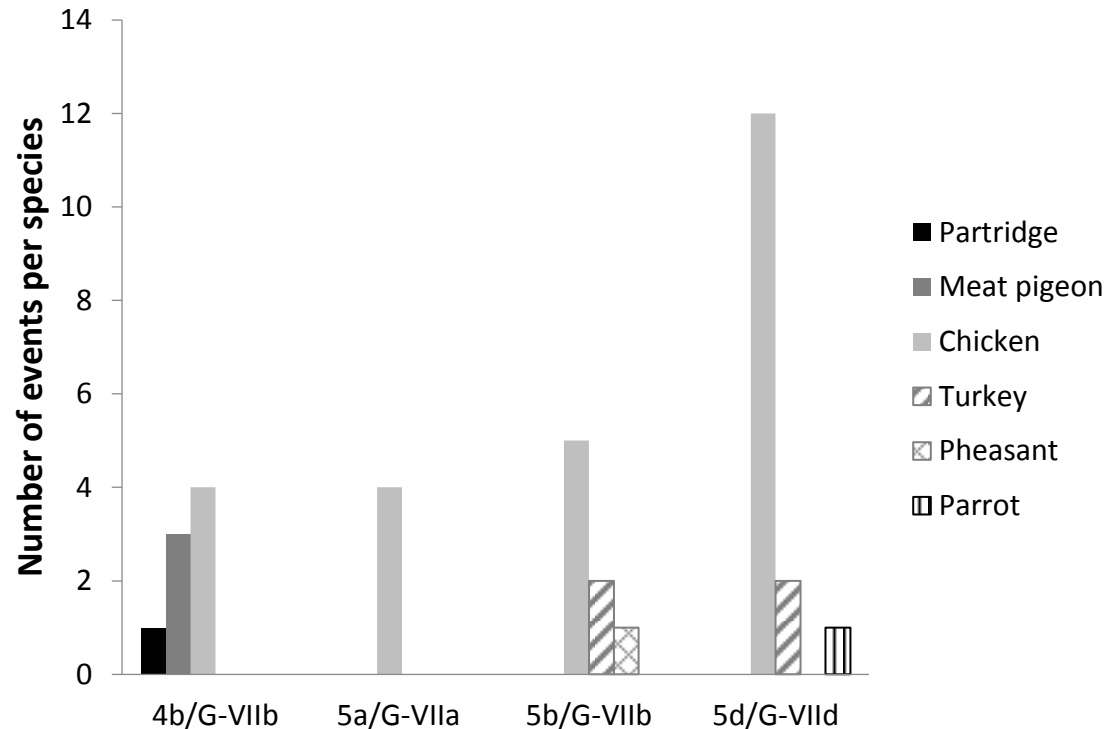
Unclassified = lineage not determined at time of questionnaire submission

Total number of outbreaks per lineage (2006-2015)

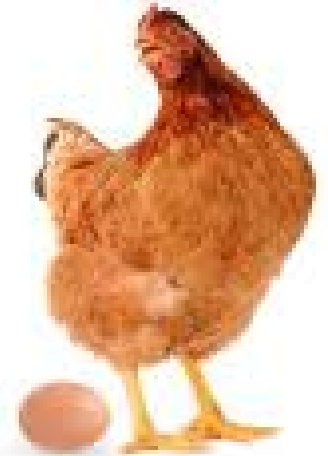
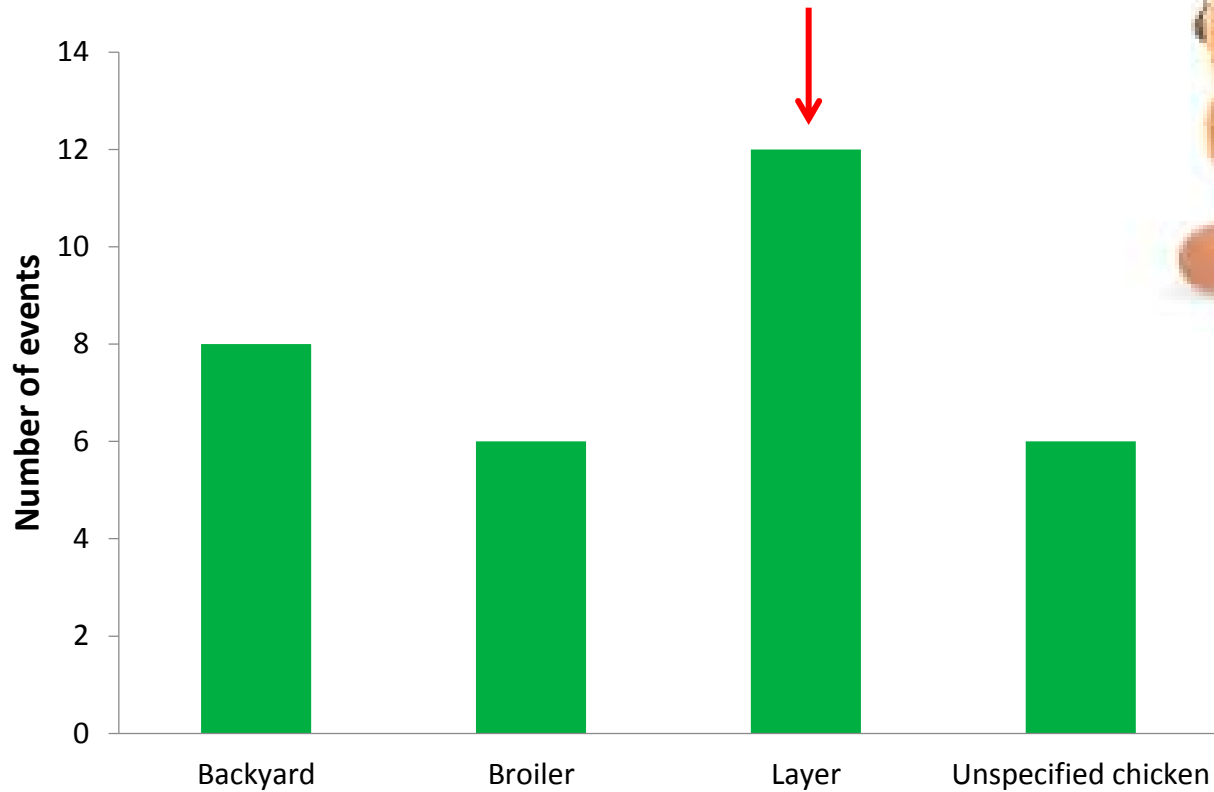


Unclassified = lineage not determined at time of questionnaire submission

Total number of events per species for each lineage (2006-2015)



Type of chicken: total number of events (2006 – 2015)

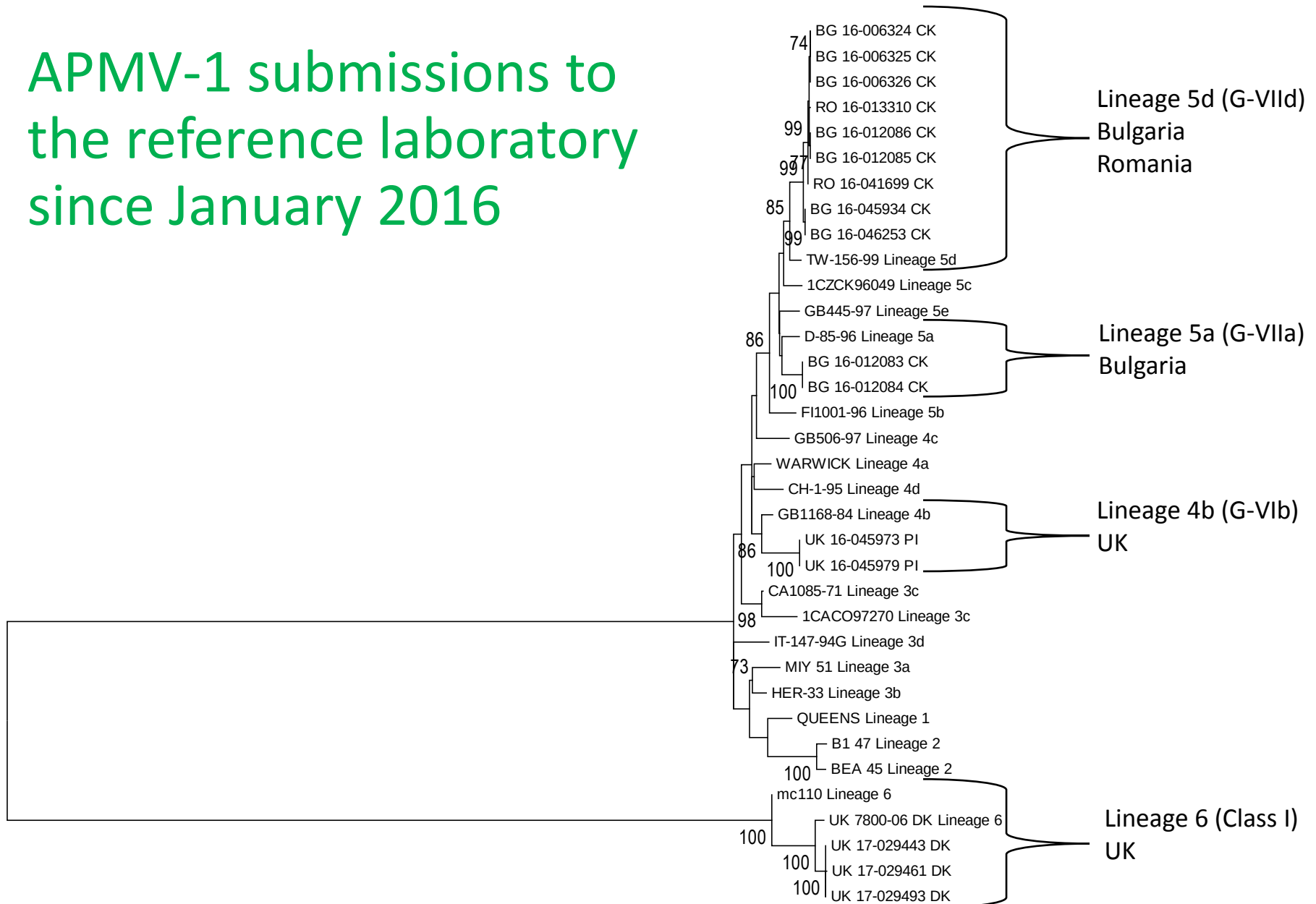


Velogenic APMV-1 – wild birds

- 2007:
 - Pigeon (France) – lineage 4a
 - Starling (Romania) – lineage 5d
- 2010:
 - Turtle dove (Spain) – unclassified
- 2011:
 - Teal and mallard (Croatia) – unclassified
- 2012:
 - Wild birds (Croatia) – unclassified
 - Mallard and wigeon (Denmark) – unclassified
- 2015:
 - Eurasian teal (Denmark) - unclassified



APMV-1 submissions to the reference laboratory since January 2016

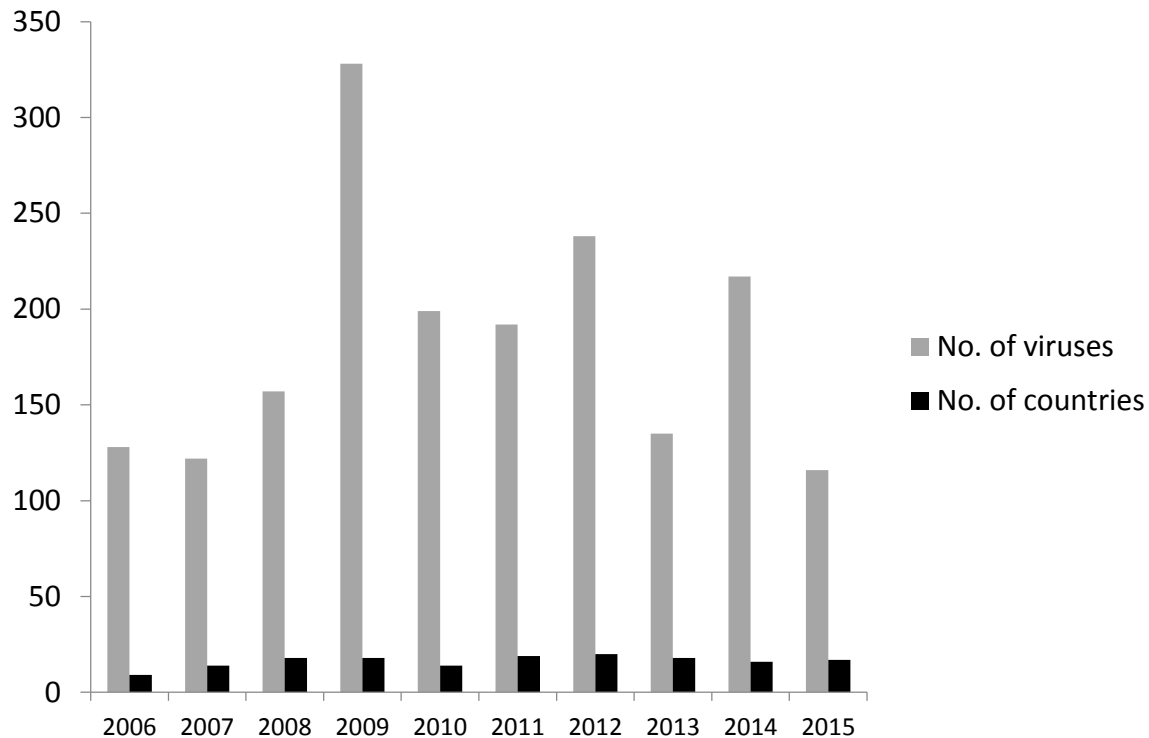




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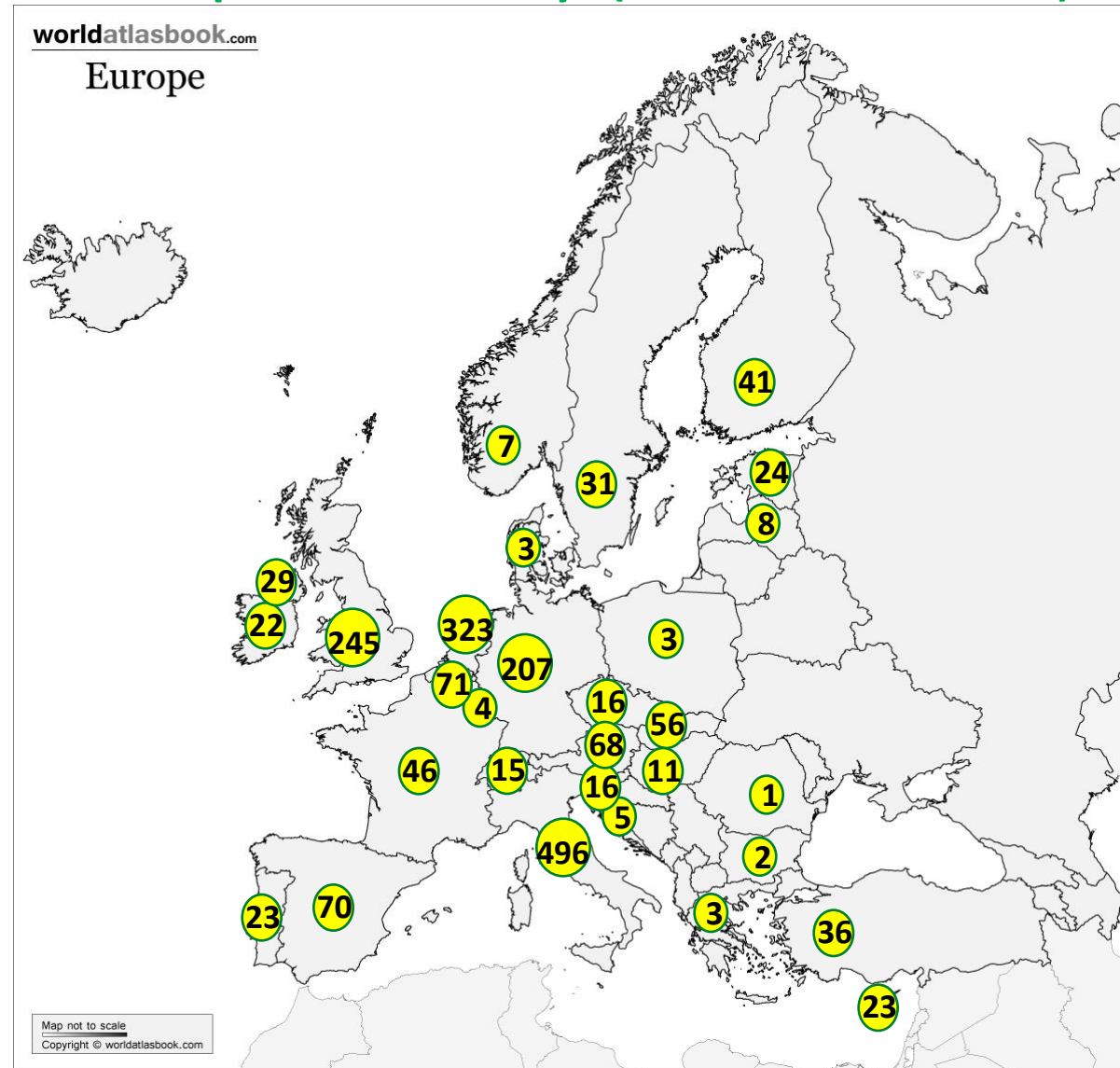
Pigeon paramyxovirus: PPMV-1 (lineage 4b/genotype VIb)

Summary of PPMV-1 in pigeons/doves



Endemic in racing pigeons
despite vaccine

PPMV per country (2006 to 2015)



- Endemic in racing pigeons despite vaccine
- A small number of wild Columbidae species affected (feral pigeon, wood pigeon, collared dove, turtle dove, laughing dove etc)

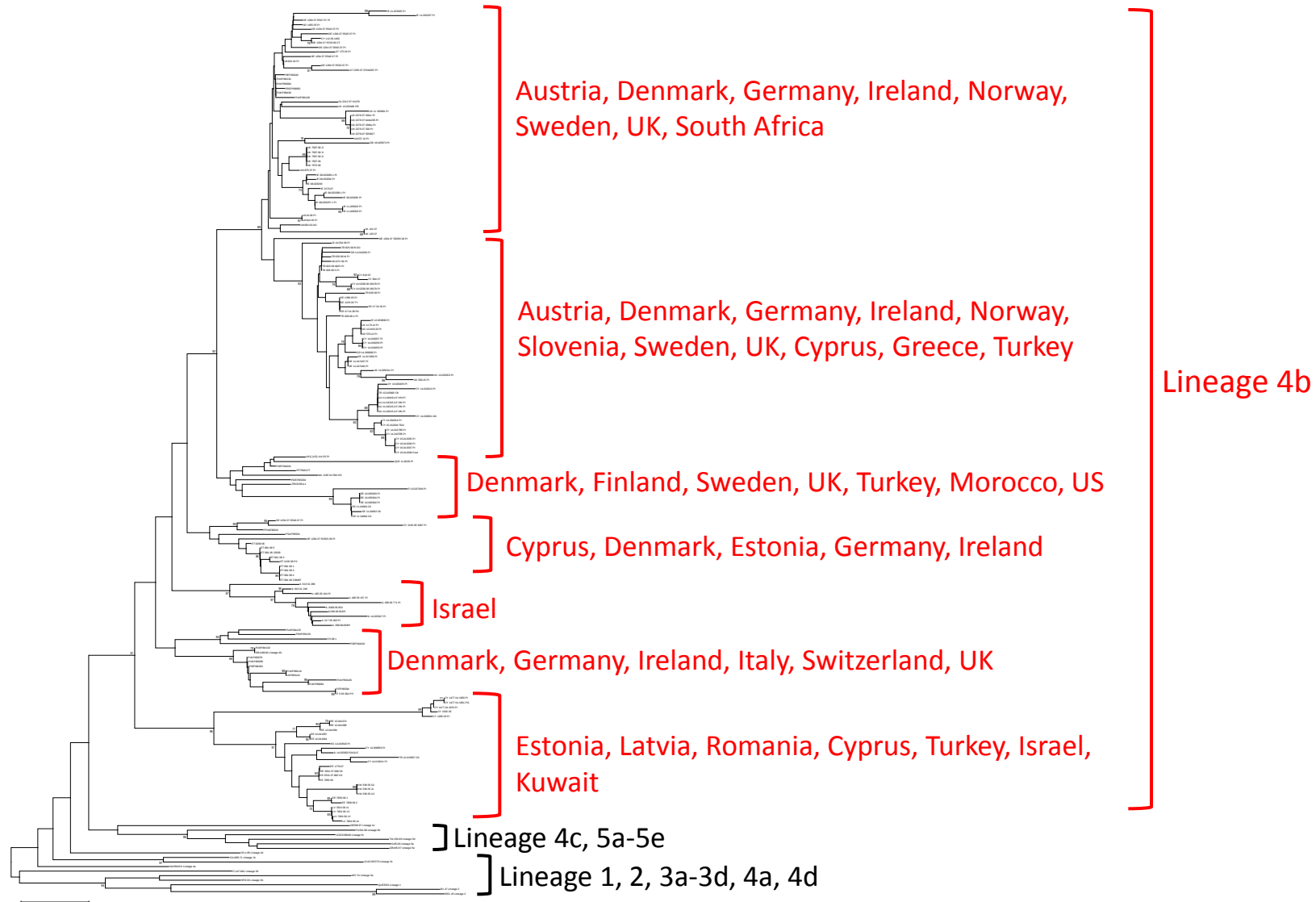
Summary of PPMV-1 (lin 4b/G-VI) in other species

Year	Species	Country
2006	Chicken	Belgium
	Grey Partridge	UK
	Meat pigeon	France
	'Wild waterfowl'	Germany
2007	Chicken	Estonia
	Goshawk*	Belgium
2010	Meat pigeon, breeder pigeon	France
2011	Chicken	Sweden
2012	Eurasian Sparrowhawk	Belgium
2013	Chicken	Turkey
2014	Buzzard, sparrow	Italy
2015	Meat pigeon	France
	Buzzard, Hoopoe, Sparrowhawk, Long-eared owl	Hungary
	'Wild bird'	Cyprus



*lineage/genotype not confirmed

Current PPMV-1 phylogeny



Lentogenic APMV-1 (lineage 1, 2 or 6)

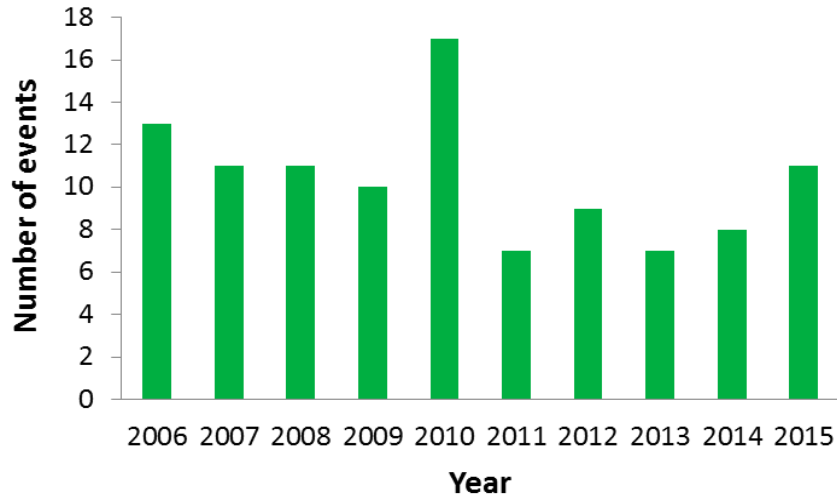
Detections of lentogenic APMV-1

Year	Domestic poultry / captive birds	Wild birds
2006	Turkey (France, Italy, Netherlands, UK), Chicken (Belgium, Italy, Netherlands, Sweden) Pheasant (Belgium, France), Duck (France, Italy, N.Ireland)	Swan (Belgium, Bulgaria, Czech Republic) Mallard (Denmark) Teal (Finland, Italy) Pochard (Finland) Wild ducks (Germany, Greece, Slovakia)
2007	Chicken (Belgium, Germany, Italy, Romania, UK) Turkey (Belgium, France, Romania) Duck (France, Portugal) Partridge/pheasant/guinea fowl (Italy) Parrot (Italy)	Mallard (Belgium, Germany) Mule duck (Bulgaria) Kestrel (Cyprus) Pigeon (Italy, Spain) Turtle dove (Spain) Teal (Norway) Mute swan (Slovakia)
2008	Chicken (Belgium, Germany, Italy, Portugal, Romania) Turkey (Belgium, UK) Ostrich (Germany) Duck (France, Portugal) Quail/pheasant (Germany)	Wild ducks (Croatia) Eurasian teal (Finland) Feral duck (Germany) Mallard (Italy, Spain) Wild birds (Turkey) Turtle dove (Spain)
2009	Chicken (Belgium, Germany, Italy, Netherlands, Romania, Turkey, UK) Turkey (Germany, Italy, UK) Exotic captive bird (Netherlands)	Wild birds (Croatia) Mallard (Finland, France) Wigeon (Finland) Teal (Finland, France) Mule duck (France) Sparrow (Netherlands)
2010	Chicken (Belgium, Estonia, Germany, Italy, Norway, Romania, Slovenia, UK) Turkey (Germany) Goose (Italy) Pheasant (Belgium) Partridge (Bulgaria, Italy) Duck (France, Italy, UK)	Shelduck (Estonia) Mallard (France) Common Gull (Poland) Pigeon (Sweden)

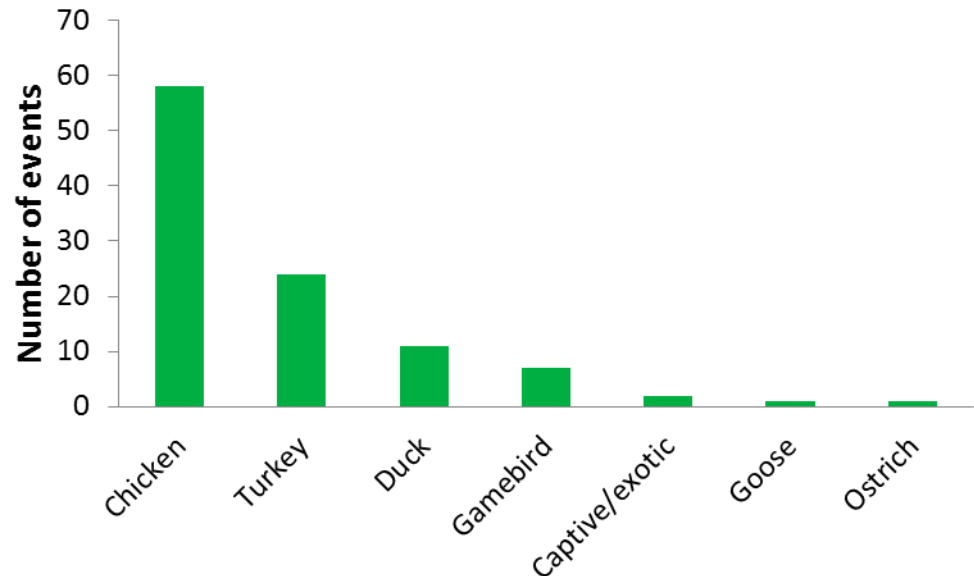
Detections of lentogenic APMV-1

Year	Domestic poultry / captive birds	Wild birds
2011	Chicken (Bulgaria, Estonia, Germany, Italy, Romania, Turkey) Turkey (Germany, Poland)	Wild goose (Bulgaria) Mallard (Latvia)
2012	Chicken (Belgium, Bulgaria, Germany, Italy, Latvia, Luxembourg, Netherlands), Portugal, Romania Turkey (Italy)	Wild duck (Belgium) Garganey (Italy) Swan (Netherlands)
2013	Chicken (Belgium, Cyprus, Finland, Germany, Sweden, Turkey) Turkey (Italy) Duck (Italy) Pheasant (Italy)	Wild duck (Belgium) Mallard (Denmark) Mute swan (Poland)
2014	Chicken (Belgium, France, Germany, Rep. of Ireland, Poland, Romania) Turkey (Rep. of Ireland, Italy) Duck (Denmark)	Wild mallard (Denmark) Kingfisher (Italy) Kestrel (Italy) Swift (Italy) Swan (Netherlands)
2015	Chicken (Belgium, Croatia, Germany, Italy, Rep. of Ireland, UK) Turkey (France, Germany, Italy, Luxembourg) Duck (UK)	Black-headed gull (Croatia) Wild mallard (Italy, Netherlands)

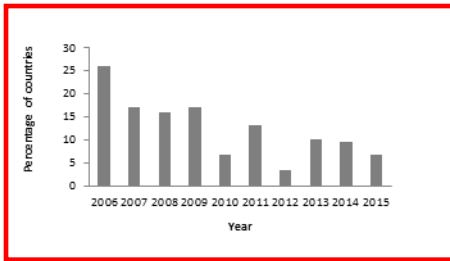
Lentogenic APMV-1 in domestic poultry/captive birds (2006-2015)



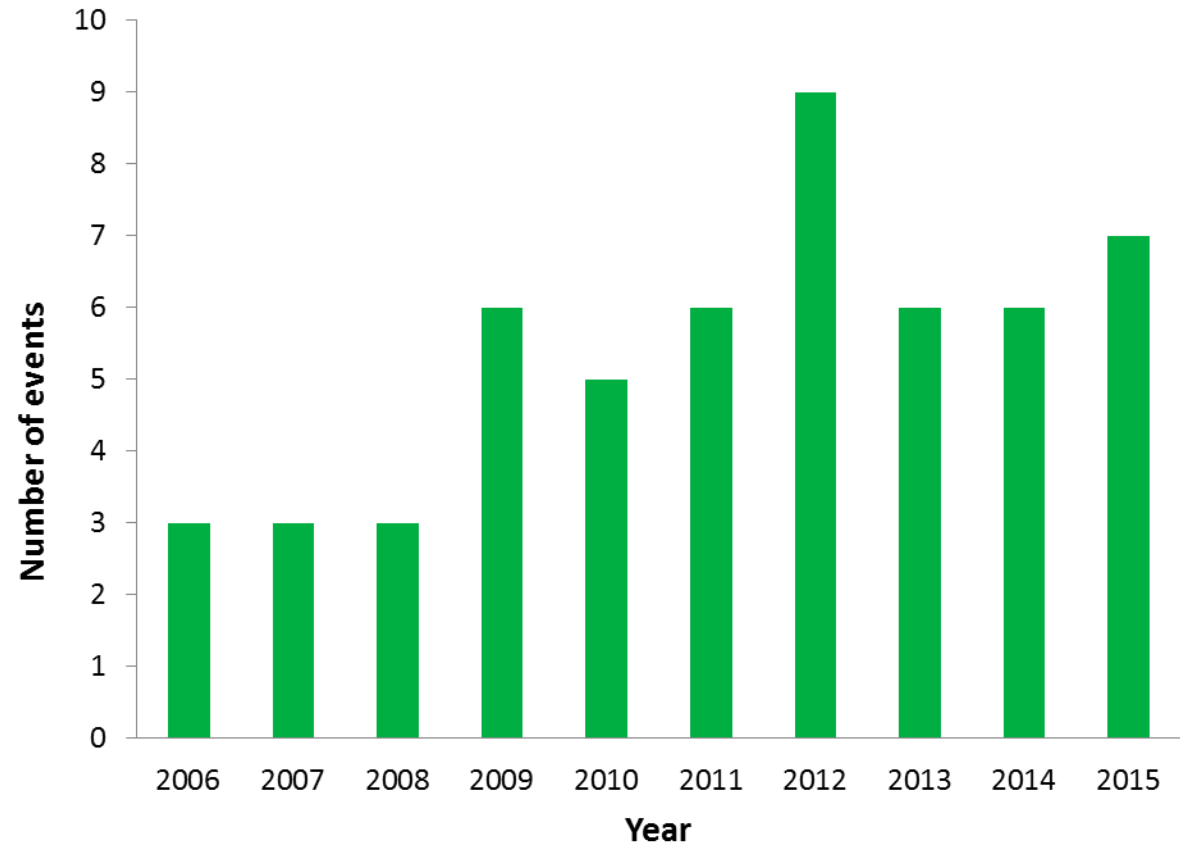
**Lineage 1, 2 or 6
(naturally occurring and
vaccine strains combined)**



Detections of lentogenic APMV-1 (vaccine strains)



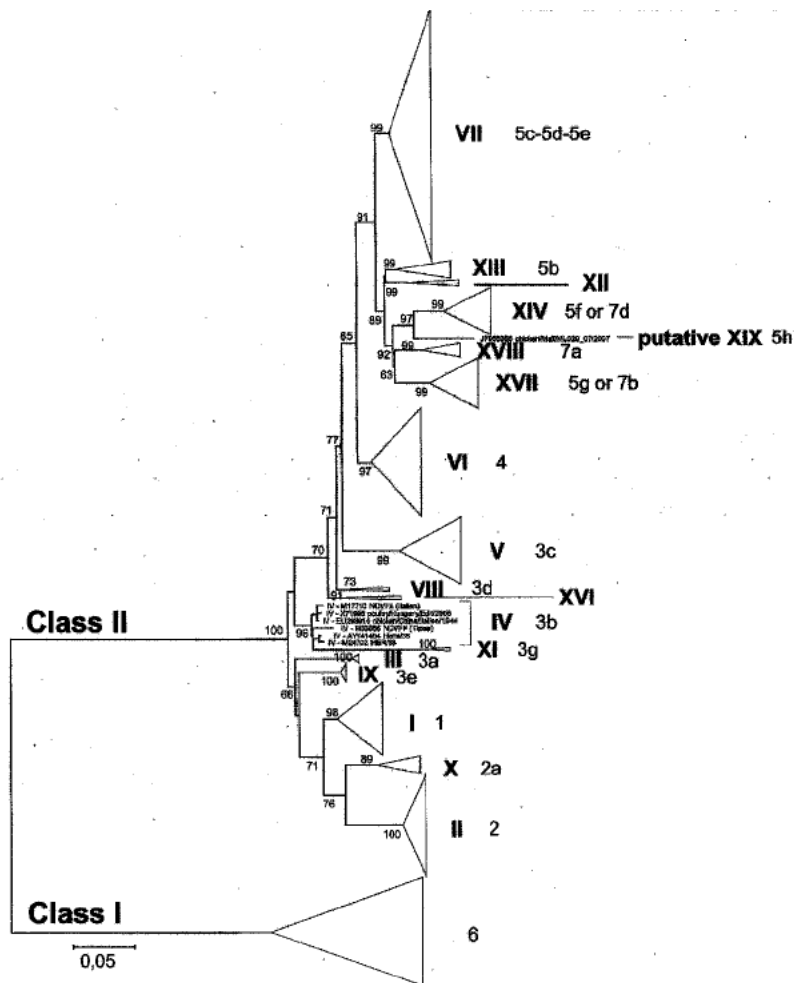
? related



ND Vaccination

- ND vaccine usage in Europe
 - Non-vaccinating countries: Finland, Luxembourg, Norway, Sweden, Switzerland
 - Voluntary vaccination or mandatory vaccination
- Most lentogenic detections occur in vaccinating countries
 - Live vaccines administered
 - Detection of clinical signs in birds pre-disposed to infection (bacterial infection, etc)
- But, why detected in non-vaccinating countries eg. Finland and Sweden?
- ?? import of birds from an environment where they have been exposed to vaccine

Classification of APMV-1



- Multiple classification systems currently in use
 - Lineage system
 - Genotype system
- Makes genetic classification complicated
- Current systems may exclude out-lying novel/new viruses – can't be classified
- ND Nomenclature Group
- Set up to reassess the phylogenetic classification of ND
- Identify metrics that differentiate genotypes/sub-genotypes
- → More up-to-date system that will include previously unclassified viruses
- Progression of this group continues



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Other APMV serotypes

Other APMV serotypes - 2006 to 2015

Year	Domestic poultry / captive birds	Wild birds
2006	APMV-2, APMV-3	APMV-4, APMV-6, APMV-8
2007	APMV-2, APMV-3	APMV-2, APMV-4, APMV-9
2008		APMV-4, APMV-9
2009	APMV-2, APMV-3	APMV-4, APMV-6, APMV-9
2010	APMV-2, APMV-3	APMV-4, APMV-6
2011	APMV-3, APMV-4	APMV-4, APMV-6, APMV-9
2012		APMV-2, APMV-4, APMV-6
2013	APMV-2	APMV-4, APMV-6
2014	APMV-3, APMV-6	APMV-4, APMV-6, APMV-7
2015		APMV-4, APMV-6

Domestic poultry/captive birds: APMV-2,3,4 and 6
Wild birds: APMV-2,4,6,7, 8 and 9

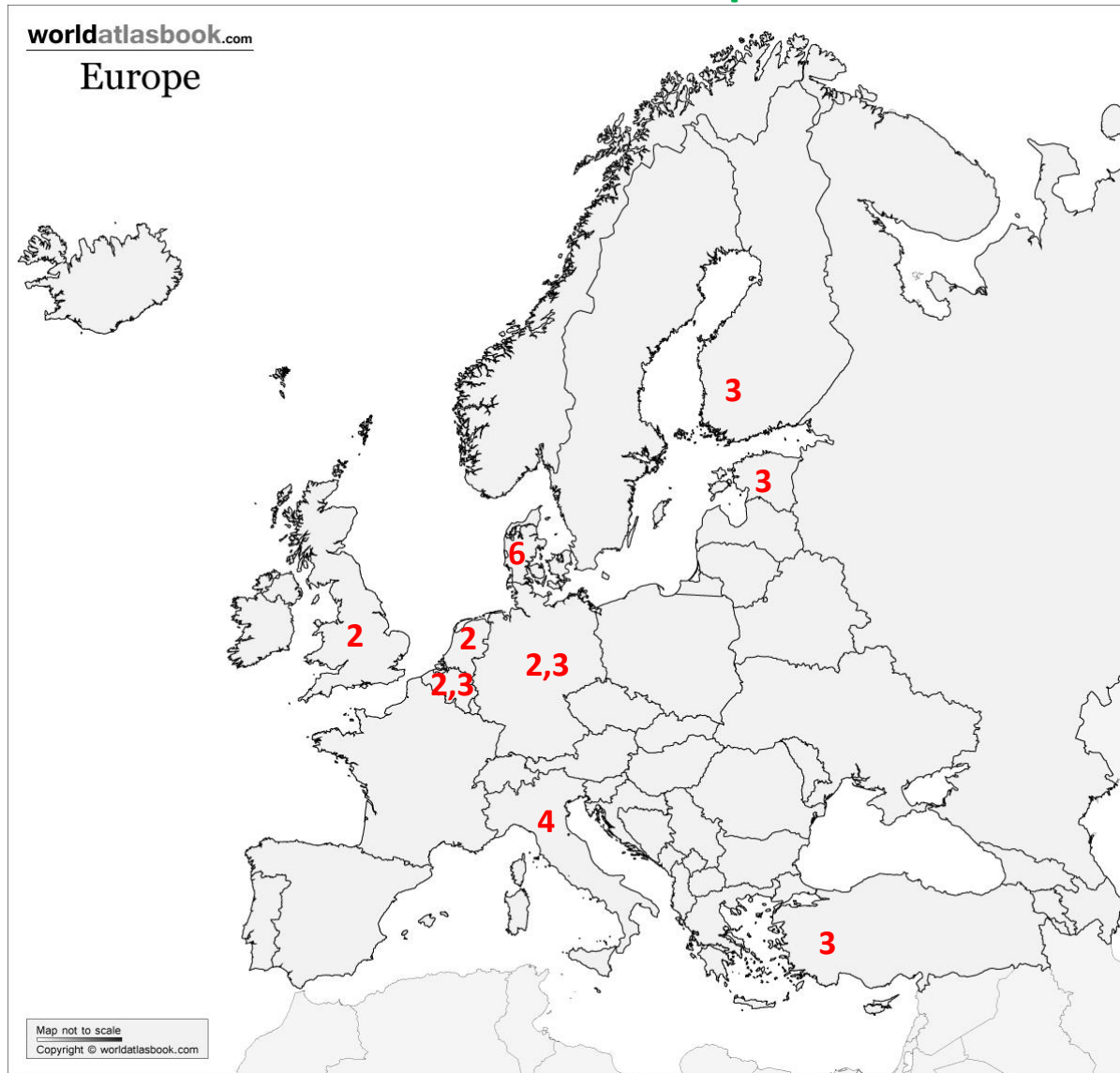
→ Host specificity

Other APMV serotypes

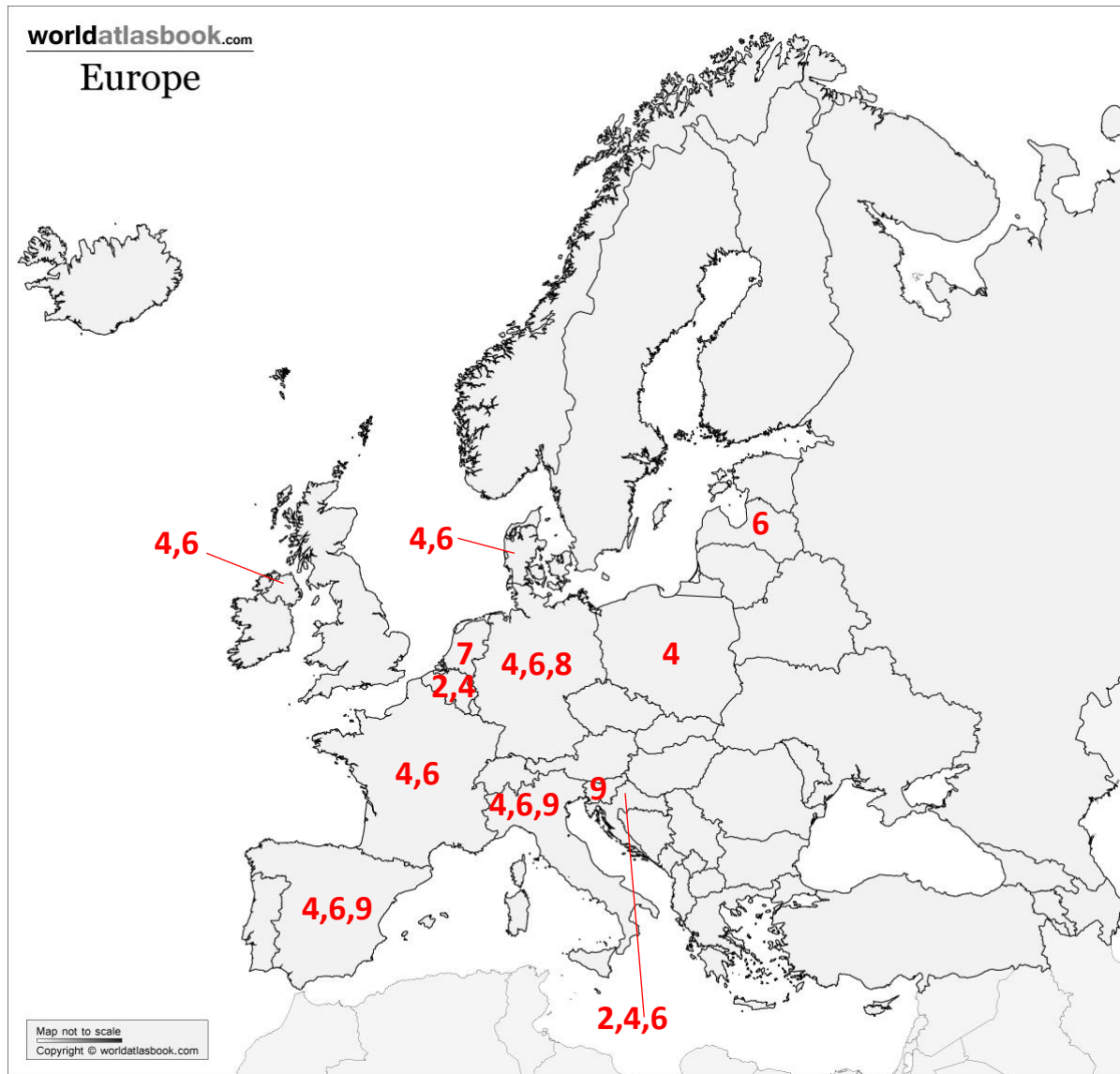
- Less is known about the pathogenicity and virulence of the other serotypes
- Variable virulence (avirulent to virulent)
- Variation in clinical presentation may be useful for differential diagnosis

Serotype	Clinical Observations
APMV-2	Mild respiratory disease and egg production problems (chickens); reduced yield and hatchability (laying turkeys).
APMV-3	Second in significance to NDV for pathogenicity of domestic poultry. Encephalitis and high mortality (caged birds); respiratory disease (turkeys); stunted growth (young chickens); mild respiratory disease and egg production problems (chickens)
APMV-4	Not so well understood - limited/no clinical disease , frequent isolation from waterfowl. Mild interstitial pneumonia and catarrhal tracheitis (experimentally-infected chickens); haemorrhagic enteritis (captive teals)
APMV-6	Apathogenic to chickens; mild respiratory disease and a drop in egg production (turkeys)
APMV-7	Respiratory disease and decreased egg production (turkeys); mild respiratory disease and egg production problems (chickens)
APMV-8	48% seroprevalence in commercial poultry in US (Warke et al., 2008)
APMV-9	First isolated from domestic duck – no visible signs of infection in experimentally infected chickens

Other APMVs – domestic/captive birds



Other APMVs – wild birds



Other APMV - species

Serotype	Domestic/captive birds	Wild birds
2	Chicken, Duck, Goose, Pheasant, Turkey, 'Pet/exotic' birds	Mallard, 'Wild birds'
3	Ostrich, Parakeet, Psittacine, Turkey	
4	Guinea fowl	Feral duck, Garganey, Mallard, Pintail, Porchard, Teal, Wigeon, 'Wild bird'
6	Mallard (poultry)	Mallard, Teal, Wild duck, Wigeon, 'Wild bird'
7		Pigeon
8		'Wild waterfowl'
9		Mallard, Teal

Other APMV in domestic birds – 2006 to 2015

Year	APMV-2	APMV-3	APMV-4	APMV-6
2006	Chicken (UK)	Ostrich (Germany)		
2007	'Pet bird' (Germany)	Parakeat (Germany)		
2008				
2009	Pheasant (UK)	Turkey (Turkey)		
2010	Chicken, turkey, duck, goose, poultry (Netherlands)	Turkey (Finland)		
2011		Turkey (Estonia)	Guinea fowl (Italy)	
2012				
2013	Exotic captive bird (Belgium)			
2014		Psittacine (Belgium)		Mallard –poultry (Denmark)
2015				

Other APMV in wild birds – 2006 to 2015

Year	APMV-2	APMV-4	APMV-6	APMV-7	APMV-8	APMV-9
2006		Teal (Denmark and Italy) Mallard (France)	Mallard (France) Wild duck (Germany, N. Ireland, Latvia)		Wild waterfowl (Germany)	
2007	Mallard (Belgium)	Mallard (France and Spain) Teal (Italy)				Mallard (Spain)
2008		Mallard (France) Feral duck (N. Ireland) Teal (Italy)				Mallard (Slovenia)
2009		Wild bird (Croatia) Duck (Germany)	Wild bird (Croatia) Mallard (Spain)			Mallard (Italy)
2010		Mallard (France) Teal (Poland)	Mallard (France) Teal (France)			
2011		Wigeon, porchard, garganey, pintail (Croatia) Mallard (Italy)	Teal, wigeon (Croatia)			Teal, wigeon, mallard (Croatia)
2012	Wild bird (Croatia)	Wild bird (Croatia) Wild duck (Belgium) Mallard, teal (Denmark)	Wild bird (Croatia) Mallard, teal (Denmark and Italy)			
2013		Mallard, wigeon, teal (Denmark) Teal (Poland)	Mallard, teal (Denmark)			
2014		Mallard, teal (Denmark)	Mallard (Denmark)	Pigeon (Netherlands)		
2015		Mallard (Belgium)	Mallard, wigeon (Denmark)			34

Summary

- Continued threat of ND from countries on the border of the EU
 - Particularly APMV-1 lineage 5d
 - Apparent downward trend for the number of outbreaks each year since 2006
 - Increased vaccination? Improved biosecurity?
 - Are the current vaccines still suitable? Not matched to current strains
-
- Consistent number of detections of PPMV-1 in pigeons and doves each year, BUT no apparent increase in spill-over into domestic poultry
 - Is PPMV-1 evolving to become increasingly host-adapted to pigeons and doves?
 - Is it becoming genetically more distant from APMV-1?
 - Detection of other APMV serotypes varies for domestic/captive and wild birds
 - Greater range of serotypes detected in wild birds
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- Surveillance biases in some of this data can be seen – need for a unified approach to surveillance
 - Urgent need to refresh/re-define the nomenclature system – a definitive system

Acknowledgements

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Thank you for your
attention!

