

Supplementary data

Table A. Examples of novel avian DNA viruses reported between 2012 and 2014 (as of 21 October 2014) [38, 41-54].

Virus (avian species)	Place	Clinical significance
<i>Adenoviridae: Aviadenovirus</i>		
Gull adenovirus [Herring gull (<i>Larus argentatus</i>) & lesser black-backed gull (<i>Larus fuscus</i>)]	The Netherlands	Histological, virological (electron microscopy) & molecular evidence of infection in dead gulls (cloacal bursa).
Turkey adenoviruses 4 & 5 (Turkey)	4: Northern Ireland; 5: UK & Hungary	Unknown
<i>Adenoviridae: Siadenovirus</i>		
South Polar skua adenovirus [South Polar skua (<i>Catharacta maccormicki</i>)]	Lake King Sejong, King George Island, Antarctica	Molecular detection in dead South Polar skuas (heart, trachea, lung, liver, intestine & kidney).
Chinstrap penguin adenovirus 1 [Chinstrap penguin (<i>Pygoscelis antarctica</i>)]	Narebski Point, King George Island, Antarctica	Molecular detection in dead penguin (heart, trachea, lung, liver, liver, intestine & kidney).
Gouldian finch adenovirus 1 [Gouldian finches (<i>Erythrura gouldiae</i>)]	Hungary & Ohio, USA	Histological & molecular evidence of infection in healthy & diseased Gouldian finches with variable clinical signs (feces, liver & kidney).
<i>Adenoviridae: Atadenovirus</i>		
Psittacine adenovirus HKU1 [Mealy Parrots (<i>Amazona farinose</i>)]	Hong Kong, China	Detection in Mealy Parrots (lung, kidney, liver, spleen, & cloacal swab) co-infected with <i>Chlamydophila psittaci</i> during

an outbreak of avian chlamydiosis and human psittacosis.

Circoviridae: Gyrovirus

Gyrovirus 4 [Chicken]

Hong Kong

Molecular detection in chickens (skin & meat) with possible epidemiological link with humans who have fecal shedding of gyrovirus 4.

Herpesviridae: Mardivirus

Phasianid herpesvirus [Moutian peacock pheasant (*Polyplectron inopinatum*), Malayan peacock pheasant (*Polyplectron malacense*) & Congo peafowl (*Afropavo congensis*)]

Bronx Zoo, New York, USA

Molecular detection in dead birds (liver) with histological findings of multifocal necrotizing hepatitis, splenitis & enteritis.

Herpesviridae: Iltovirus

Psittacid herpesvirus 3 [Bourke's parrot (*Neopsephotus bourkii*)]

California, USA

Histological, virological (electron microscopy) & molecular evidence of infection in an outbreak of respiratory disease among parrots (lung).

Papillomaviridae: Papillomavirus

Pygoscelis adeliae papillomavirus 1 [Adélie penguins (*Pygoscelis adeliae*)]

Cape Crozier, Ross Island, Antarctica

Molecular detection in healthy penguins during breeding season (feces).

Parvoviridae: Aviparvovirus

Pigeon parvovirus [Pigeon]

Hong Kong

Molecular detection in healthy pigeons (feces).

Polyomaviridae: Polyomavirus

NZ budgerigar polyomavirus [Budgerigars (<i>Melopsittacus undulatus</i>)]	North Island, New Zealand (2012)	Molecular detection in healthy and diseased budgerigars with feather abnormalities (blood).
<i>Poxviridae: Avipoxvirus</i>		
Feral pigeonpox viruses 1 & 2 [Feral pigeon (<i>Columba livia</i>)]	Port Elizabeth, South Africa	Histological & molecular evidence of infection in pigeons with pox lesions around the eyes.
Flamingopox virus [Flamingo (<i>Phoenicopterus minor</i>)]	Kimberley, South Africa	Histological & molecular evidence of infection in Flamingo with pox lesions on the legs and feet.
Laughing dovepox viruses 1 & 2 [Laughing dove (<i>Spilopelia senegalensis</i>)]	South Africa (1: Cape Town; 2: Port Elizabeth)	Histological & molecular evidence of infection in doves with pox lesions.
Penguinpox virus [Penguin (<i>Spheniscus demersus</i>)]	Cape Town, South Africa	Histological & molecular evidence of infection in penguins with pox lesions around the eyes.
Pigeonpox viruses 1, 2, 4, & 5 [Racing pigeon (<i>Columba livia domestica</i>)]	South Africa (1: Stellenbosch, 2 & 4: Cape Town, 5: Pineview)	Histological & molecular evidence of infection in pigeons with pox lesions.
Rock pigeonpox viruses 1 & 2 [Rock pigeon (<i>Columba guinea</i>)]	Cape Town, South Africa	Histological & molecular evidence of infection in pigeons with pox lesions.
Speckled pigeonpox virus 1 [Juvenile rock pigeon (speckled) (<i>Columba guinea</i>)]	Cape Town, South Africa	Molecular evidence of infection in pigeons with severe lesions on the beak and eyes.
Penguinpoxvirus strains SC & ES [Magellanic penguins (<i>Spheniscus magellanicus</i>)]	Brazil (SC: Florianópolis, Santa Catarina State; ES: Vila Velha, Espírito Santo State)	Histological & molecular evidence of infection in penguins with cutaneous pox lesions, bronchopneumonia, esophagitis, cardiomegaly & hepatosplenomegaly.

Others

Cyanoramphus nest-associated circular K & X South Island, New Zealand Molecular detection in dead parakeets (tissues & nesting DNA viruses [Yellow-crowned parakeet materials])
(*Cyanoramphus auriceps*)

Faecal-associated gemycircularvirus-1b, 1c, 3, New Zealand (Chatham Islands, May be a myco-like virus (feces).
5-10, &12 [Blackbird (*Turdus merula*, 1b, 1c, & Canterbury, and/or South Island)
9); Chatham Island warbler (*Gerygone
albofrontata*, 3, 5, & 6); Mallard duck (*Anas
platyrhynchos*, 7); Chatham Island black robin
(*Petroica traverse*, 8); European starling (*Sturnus
vulgaris*, 10); Ostrich (*Struthio camelus*, 12)]

Abbreviations: UK, the United Kingdom; USA, the United States of America.

Table B. Examples of novel avian RNA viruses reported between 2012 and 2014 (as of 21 October 2014) [37, 50, 55-75].

Virus (avian species)	Place	Clinical significance
<i>Astroviridae: Avastrovirus</i>		
Group 1 avian astroviruses [Lesser whistling duck (<i>Dendrocygna javanica</i>) & northern shoveler (<i>Anas clypeata</i>)]	Hong Kong & Cambodia	Molecular detection in healthy birds (feces and/or cloacal swabs).
Group 2 avian astroviruses [Pond heron (<i>Ardeola</i> sp.), common greenshank (<i>Tringa nebularia</i>), black-faced spoonbill (<i>Platalea minor</i>), rock dove (<i>Columba livia</i>) & spotted dove (<i>Spilopelia chinensis</i>)]	Hong Kong & Cambodia	Molecular detection in healthy birds (feces and/or cloacal swabs).
Group 3 avian astroviruses [Common wild duck species (<i>Anas</i> sp.)]	Hong Kong	Molecular detection in healthy ducks (feces).
Sanderling astrovirus [Sanderling (<i>Calidris alba</i>)]	Delaware Bay, New Jersey, USA	Molecular detection in healthy sanderlings (feces).
<i>Caliciviridae: Nacovirus</i>		
Turkey & chicken nacoviruses [Turkey & chicken]	Brandenburg & Saxony, Germany & the Netherlands	Molecular detection in chickens with histological findings of enteritis & hepatomegaly with foci of intrahepatic necrosis & inflammation, & turkeys with enteritis & rickets (feces).
<i>Coronaviridae: Gammacoronavirus</i>		
Duck coronavirus DK2012-CoV [Duck]	China	Molecular detection in dead ducks (feces).

Guinea fowl coronavirus [Guinea fowl (<i>Numida meleagris</i>)]	France	Molecular detection in guinea fowls with fulminating disease (X disease) (liver, spleen, pancreas, intestine & kidney).
Coronaviridae: Deltacoronavirus		
White-eye coronavirus HKU16 [Japanese white-eye (<i>Zosterops japonicus</i>)]	Hong Kong	Molecular detection in dead white-eyes (rectal swabs).
Sparrow coronavirus HKU17 [Tree sparrow (<i>Passer montanus</i>)]	Hong Kong	Molecular detection in dead sparrows (rectal swabs).
Magpie robin coronavirus HKU18 [Oriental magpie-robin (<i>Copsychus saularis</i>)]	Hong Kong	Molecular detection in dead magpie-robins (rectal swabs).
Night heron coronavirus HKU19 [Black-crowned night heron (<i>Nycticorax nycticorax</i>)]	Hong Kong	Molecular detection in dead herons (rectal swabs).
Wigeon coronavirus HKU20 [Eurasian wigeon (<i>Anas penelope</i>)]	Hong Kong	Molecular detection in dead wigeons (rectal swabs).
Common moorhen coronavirus HKU21 [Common moorhen (<i>Callinula chloropus</i>)]	Hong Kong	Molecular detection in dead common moorhens (rectal swabs).
Ruddy turnstone coronavirus [Ruddy turnstone (<i>Arenaria interpres</i>)]	Delaware Bay, New Jersey, USA	Molecular detection in healthy turnstones (rectal swabs).
Flaviviridae: Flavivirus		
Tembus virus ZJ-6 [Pekin duckling (<i>Anas</i>)]	Zhejiang, China	Molecular detection in ducklings with egg drop syndrome

platyrhynchos]

& histological findings of hemorrhagic hepatic & cerebral necrosis in ducklings (cloacal swabs, feces, brain & ovary).

JS804 virus (Goose)

Jiangsu, China

Molecular detection in geese with egg drop syndrome & histological findings of hemorrhagic hepatic, cerebral, & ovarian lesions, splenomegaly & ruptured ovarian follicles with peritonitis. (brain, spleen & ovary)

Orthomyxoviridae: Orthomyxovirus

Cygnets River virus [Muscovy duck (*Cairina moschata*)]

Cygnets River, Kangaroo Island,
South Australia

Histological, virological (culture) & molecular evidence of infection in an outbreak of fatal disease in Muscovy ducks (liver, brain, lung, spleen & intestine) coinfecting with *Salmonella enterica* serovar Typhimurium.

Paramyxoviridae: Avulavirus

Avian paramyxovirus 11 [Common snipe (*Gallinago gallinago*)]

France

Molecular detection in healthy snipes (cloacal swabs).

Picobirnaviridae: Picobirnavirus

Turkey picobirnavirus [Commercial turkey (*Meleagris gallopavo*)]

North Carolina, USA

Molecular detection in turkeys with enteric diseases (intestine).

Picornaviridae: Aalivirus

Aalivirus

Aalivirus A [Pekin duck (*Anas platyrhynchos*)]

China

Molecular detection in diseased ducks (feces).

<i>Picornaviridae: Avisivirus</i>		
Turkey avisivirus 1 [Commercial turkey (<i>Meleagris gallopavo</i>)]	Hungary	Molecular detection in healthy & diseased turkeys with enteric and/or stunting syndrome (feces).
<i>Picornaviridae: Kobuvirus</i>		
SZAL6-KoV/2011/HUN [European roller (<i>Coracias garrulus</i>)]	Hungary	Molecular detection in healthy rollers (feces).
<i>Picornaviridae: Kunsagivirus</i>		
Greplavirus A [European roller (<i>Coracias garrulus</i>)]	Hungary	Molecular detection in healthy rollers (feces).
<i>Picornaviridae: Megrivirus</i>		
Mesiviruses-1& 2 (Pigeon)	Hong Kong & Hungary	Molecular detection in healthy pigeons (feces).
<i>Picornaviridae: Orthoturdivirus</i>		
Gallivirus [Broiler chicken (<i>Gallus gallus domesticus</i>) & turkey (<i>Meleagris gallopavo</i>)]	Delaware & North Carolina, USA	Molecular detection in chickens and turkeys with runting-stunting enteritis (feces).
Turkey picornavirus [Turkey (<i>Meleagris gallopavo</i>)]	Hungary	Molecular detection in healthy & diseased turkeys with enteric and/or stunting syndrome (feces).
<i>Picornaviridae: Sapelovirus</i>		
Quail picornavirus [Common quail (<i>Coturnix coturnix</i>)]	Hungary	Molecular detection in dead quails (feces).
<i>Picornaviridae: Sicinivirus</i>		
Sicinivirus 1 [Broiler chickens (<i>Gallus gallus domesticus</i>)]	Ireland (2013)	Molecular detection in healthy chickens (feces).
<i>Reoviridae: Orbivirus</i>		

Sathuvachari virus [Starlings (<i>Brahminy myna</i>)]	Vellore, Tamil Nadu, India	Molecular detection in healthy starlings.
<i>Reoviridae: Orthoreovirus</i>		
Duck-pathogenic orthoreovirus [Pekin duck (<i>Anas platyrhynchos</i>)]	China	Histological, virological (culture) & molecular evidence of infection in an outbreak of fatal disease among Pekin ducks with depression & leg weakness (liver).
<i>Reoviridae: Rotavirus</i>		
Group G pigeon rotavirus (Pigeon)	Hong Kong	Molecular detection in healthy pigeons (feces).
<i>Rhabdoviridae: unclassified genus</i>		
Farmington virus (Unidentified wild bird)	Farmington, Connecticut, USA	Unknown, originally isolated from an unidentified wild bird captured during an outbreak investigation of Eastern equine encephalitis.

Abbreviations: USA, the United States of America.