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OCCURRENCE OF NOVEL CHLAMYDIAL SPECIES IN WILD AND SYNANTHROPIC BIRDS

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Background

According to a recent taxonomic revision, the *Chlamydiaceae* family consists of the single genus *Chlamydia*, which currently includes nine species (1). However, diagnostic tests carried out in recent years in Italy, Germany and France (2-5) for the detection of chlamydiae in some avian species (poultry, pet birds and wild birds) yielded unexpected results and provided evidence of the existence of microorganisms that do not belong to any *Chlamydia* species known to date.

Two new chlamydial species, recovered from poultry and from pigeons and psittacine birds, were thus recently proposed with the denomination of *C. gallinacea* and *C. avium* (6), respectively. The novel organisms can be identified by two different real-time PCRs, which are specific for either species (7, 8).

Aim

In order to investigate the occurrence of **novel chlamydial species** in wild birds, a retrospective study was carried out on **81 archival samples** by applying two different real-time PCRs, either specific for *C. gallinacea* or for *C. avium*, on *Chlamydiaceae*-positive samples obtained from **wild and synanthropic birds** originally tested from 2009 to 2013.

Materials and Methods

Chlamydiaceae-positive DNA from archival samples tested from 2009 and 2013

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Chlamydiaceae-specific 23S real-time PCR (ref. 9)

↙ ↘

C. psittaci-specific *ompA* real-time PCR (ref. 10)

C. gallinacea and *C. avium*-specific real-time PCR (ref. 7-8)


Flamingo


Great tit


Green sandpiper


Herring gull


Hooded crow


Magpie

Host	ID	Year	PCR Real-Time *Chlamydiaceae*	PCR Real-Time *C. psittaci*	PCR Real-Time *C. avium*	PCR Real-Time *C. gallinacea*
Flamingo	240417	2013	+	-	-	-
Great tit	112019	2013	+	+		
Green sandpiper	196900	2013	+	-	-	-
Herring gull	110244/1	2011	+	-	-	-
Herring gull	240438	2013	+	-	-	-
Hooded crow	63635	2009	+	-	-	-
Hooded crow	66103	2009	+	-	-	-
Hooded crow	100776	2010	+	-	-	-
Hooded crow	136027	2010	+	-	-	-
Hooded crow	247770/15	2013	±	-	-	-
Hooded crow	247770/17	2013	±	-	-	-
Hooded crow	247770/19	2013	±	-	-	-
Hooded crow	247770/24	2013	±	-	-	-
Hooded crow	247770/36	2013	+	-	-	-
Hooded crow	247770/37	2013	±	-	-	-
Hooded crow	247770/39	2013	±	-	-	-
Hooded crow	247770/40	2013	±	-	-	-
Hooded crow	247770/41	2013	±	-	-	-
Magpie	205315	2010	+	-	+	-
Magpie	214137/1	2010	+	-	-	-
Magpie	214137/2	2010	+	-	-	-
Magpie	214137/3	2010	+	-	-	-
Mallard	198786/1	2011	+	-	-	-
Mallard	198786/2	2011	+	-	-	-
Mallard	222823/1	2013	+	-	-	-
Mallard	222823/2	2013	+	-	-	-
Mallard	283911/1	2013	+	-	-	-
Mallard	283911/2	2013	+	-	-	-
Mallard	283911/3	2013	+	-	-	-
Mallard	283911/4	2013	+	-	-	-
Mallard	283911/5	2013	+	-	-	-
Pigeon	48558	2010	+	-	+	-
Pigeon	155757/1	2010	+	-	+	-
Pigeon	127625	2010	+	-	-	-
Pigeon	22151	2012	+	-	+	-
Pigeon	43160	2012	+	-	+	-
Pigeon	97203/1	2013	+	-	+	-
Pigeon	97203/2	2013	+	-	+	-
Turtle dove	306118	2013	+	+		

Results

(data have been summarized in Table 1)

- Out of the 81 DNA samples, **39 tested positive** with the *Chlamydiaceae*-specific real-time PCR
- Among the 39 *Chlamydiaceae*-positive samples:
  - **seven** (6 from pigeons, 1 from a magpie) tested positive with the *C. avium*
  - **two** (1 from a great tit, 1 from a turtle dove) tested positive for *C. psittaci*
  - **none** tested positive for *C. gallinacea*
- Few (n=8) of the 39 positive samples were poorly amplified with the 23S real-time PCR (Ct > 35), thus the specific real-time PCR did not allow the identification of species
- Overall, *Chlamydiaceae* organisms other than the known species were detected in the majority (22/39) of samples from several species (mallard, hooded crow, herring gull, green sandpiper)


Mallard


Pigeon


Turtle dove

Conclusions

- *C. avium* was detected in a magpie, which suggests that this novel chlamydia may infect avian species other than pigeons and psittacine birds
- *C. gallinacea*, which has been reported only in poultry so far, was not detected in our samples
- No *C. avium* nor *C. gallinacea* nor *C. psittaci* *Chlamydiaceae* DNA was detected in a high number of samples from several bird species

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