

Clinical cases of multiple parasitism in Ravens (*Corvus corax*, Linnaeus, 1958)

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Abstract. Four *Corvus corax* were referred with anorexia, coughing, gasping, and diarrhoea. They were kept together in an outdoor aviary at the “Centro di Recupero della Fauna Selvatica, località Valcorrente, Belpasso, Catania, Sicily”. On faecal flotation eggs of *Capillaria spp.*, tapeworm and gapeworm (*Singamus trachea*) have been observed. The patients have been treated with fenbendazole (25 mg/kg) and praziquantel (10 mg/kg) administered orally, and with supportive therapy. Also diet has been changed and force feeding was performed in lacking-appetite patients. At 30-day follow-up all ravens, had gained weight. Multi-parasitic infection has occurred because ravens have come in contact with intermediate hosts in the open area of the aviary. Therefore, it was suggested to better housing the ravens. To our knowledge this was first clinical description of multiple parasitic infection in imperial ravens in Sicily.

Keywords: Corvidae, *Corvus corax*, parasites, Sicily, Italy.

INTRODUCTION

Common raven (*Corvus corax*) is one of the largest living passeriformes. While some authors recognized 11 subspecies (Marzluff, 2009) others merely recognize eight subspecies (Clements et al., 2015). In the Mediterranean basin, only 4 subspecies could be found: the eastern *C. c. laurencei* (Hume, 1873) the north-African *C. c. tingitanus* (Irby, 1874), the *C. c. corax* (Linnaeus, 1758) and the *C.c. hispanus* (Hartert & Kleinschmidt, 1901). In Italy the common raven is rare, and the last population estimate censused less than 15.000 units with 3000.-6000 nesting pairs (Bricchetti & Massa, 1984; Bricchetti & Meschini, 1993; Bricchetti, 1995; Fornasari et al., 2010). The common raven are very adaptable animals, and they may live in wooded areas, or in rocky cliffs, where it feeds and nests. The common ravens are omnivorous and their diet can varies according to latitude, season and local availability of food (Temple, 1974; Engel & Young, 1989; Nogales & Hernández, 1997; Kristan et al., 2004). In addition, the common raven is one of the few species of *Corvidae* that actively prey other animals (Gaston & Elliot, 1996). Common raven is a basically bashful animal, but may also be bred in captivity, in fact in the past this animal were frequently breed as a domestic pet. Currently, in Italy the possession of these birds as pets is ruled by the law number 157/92, which thus prohibits the capture and detention without captive birth certificates and bird ringing. Because of their habit of living even in areas populated by humans, and the possibility to breed them in accordance to specific norms, obviously they might become spreaders of zoonotic

pathogens, in fact, several parasites have been found in *Corvidae* (Khalil et al 2011; Dipineto et al. 2013). In this paper four cases of multiple parasitic infections in Common Ravens are described; the birds have been confiscated by authorities and then held at a wildlife rehabilitation centre in Sicily (Centro di Recupero della Fauna Selvatica, of Valcorrente, Belpasso, Catania).

CLINICAL CASES

Five common ravens (*C. corax*, average weight of 855 ± 59.72 g) have been visited with varied symptoms. They were kept together in an outdoor aviary at the “Centro di Recupero della Fauna Selvatica, of Valcorrente, Belpasso, Catania, Sicily” from several years, after being confiscated by authorities, because they were illegally detained. The ravens were initially 5, all abducted by Authorities from animals smugglers. The ravens were housed in a large aviary. This aviary was divided in two parts by a metal net, without the possibility of access between the two. In a part were housed a couple of ravens (A1, A2); in the other one the others ravens (B1, B2 and B3). One week before the beginning of the study, on physical examination, an adult male has been found death with rodenticide intoxication signs. Several toxicological test have been performed on biologic samples from the death raven, but all of them were negative.

The first patient (A1, adult male, body weight 840 g) appeared relatively inactive, anorexic and cachectic (BCS=2). The second raven (A2, adult female, body weight 940 g, BCS=2) presented coughing and gasping, diarrhoea, but appetite was full preserved. The third raven (B1, adult male, body weight 800 g, BCS=2) had watery diarrhoea but appetite was preserved. Clinical signs of the fourth raven (B2, adult female, body weight 840gr, BCS=2) were diarrhoea, coughing and gasping; the appetite was preserved.

Faecal flotation have been performed, by using magnesium sulphate solution (Flot-tasol®, Ricco Alete, Italy). On microscopic observation have been diagnosed multiple parasite in all the 4 ravens. Eggs of *Capillaria spp.* (Fig 1) and of tapeworm (Fig. 2) have been observed in faeces of A1. Eggs of *Capillaria spp.*, of tapeworm and of gapeworm (*Singamus trachea*, Fig. 3) have been observed in faeces of A2. Eggs of *Capillaria spp.* have been observed in faeces of B1, whereas eggs of *Capillaria spp.*, of tapeworm and of gapeworm (*Singamus trachea*) have been observed in faeces of B2. Because of the symptomatology and results of parasitological examinations, we decided to hospitalize the animals in warmed cages, in order to better perform the treatments.

The patients have been treated with fenbendazole (Panacur®, Intervet, Italy), administered orally at a dose of 25 mg/kg every 24 hours for 5 days, in addition with 10 mg/kg PO of praziquantel (Droncit®, Bayer, Germany) in a single administration, repeated after one week. A fluid supportive therapy was performed in all the ravens, administering 10 mL/kg of ringer solution (SALF, Italy) subcutaneously every 12 hours, combined with a Vitamin B complex (Stimulfos®, Teknofarma, Italy), with a dose of 1 mg/kg (Harrison & Lightfoot 2006). For the first week of hospitalization 1mL/kg of 5% glucose solution (SALF, Italy) was added to fluid therapy. However, pending the outcome of toxicology tests, Vitamin K (Konaktion®, Roche, Italy) was administered intramuscularly at dose of 0.3 mg/kg every 24 h for 7 days. Also diet has been changed and force feeding (Carnivore critical care®, Oxbow, USA) was performed in inappetent patients; others were feeding with mix diet (peas, eggs, meat, worms, kitten food, Gage & Duerr, 2007; Les Stocker, 2013). The ravens were hospitalized for 30 days. A1 and

Fig. 1 – Egg of *Baruscapillaria resecta* discovered on fecal floatation of *Corvus corax*.

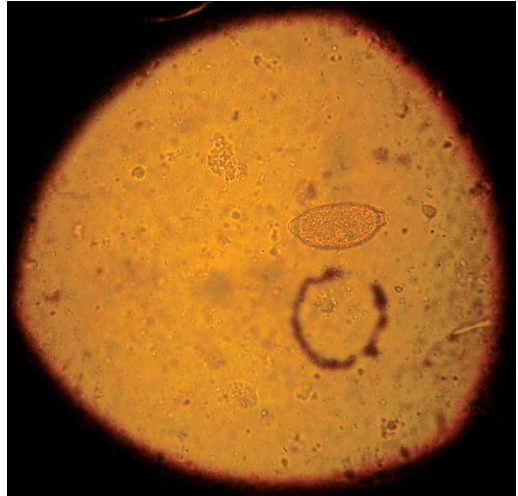


Fig. 2 – Egg of *Schistotaenia spp.* discovered on fecal floatation of *Corvus corax*.



Fig. 3 – Egg of *Singamus trachea* discovered on fecal floatation of *Corvus corax*.



B2 specimens after 7 days of treatment did not present more respiratory symptoms and faecal score was improved. At 30-day follow up all four ravens had gained weight: A1 = 1250 g, A2 = 1120 g, B1 = 1040 g, B2 = 1000 g. On physical examination, patients were active, voracious and had even started to sing constantly, so they were sent back to aviary, asking keepers to improve the hygienic conditions of the aviary.

CONCLUSION

Rodenticide toxicosis in birds is not rare. Signs are really vague, and include anorexia, weakness, and lethargy; suddenly after bleeding begins. Typically, no microscopic lesions are noted. The animal will have widespread haemorrhage into body cavities, joints, skin, CNS, or other tissues. Rodenticide can be detected typically in liver tissue (Murphy, 2007). Luckily in the fifth raven found dead, the samples were negative. While waiting the results (a few days), antagonist therapy (K Vitamin) had been started, which in any case would have not affected the health of the patients. Since the toxicology results were negative, other etiopathogenetic options were likely infectious diseases. In fact, parasitological examinations shown cestodes and nematodes infections. Capillarids are quite common findings in wild birds. Some capillarids have a narrower host range and as *Eucoleus frugilegi* (Moravec, 2000) that infects a range of species in the family *Corvidae*. Moreover, in accordance with existing literature, eggs of *Capillaria* found in *Corvidae* are often attributable to *Baruscapillaria spp.* (*Baruscapillaria resecta*, Bernard, 1989; Barus & Sergejeva, 1990). Birds dead from capillariasis may not show any clinical signs (Pinto et al., 2004), and they are usually found suddenly dead. Capillarids colonization causes inflammation, dilatation of the crop or oesophagus, with ulceration, exudation, and plaques (Hurst et al., 1979). Diagnosis is made with faecal floatation and eggs are easily recognized by the distinctive bipolar plugs (Tamaru et al. 2015). Fenbendazole, febantel, and levamisole are greatly efficacious for treatment of capillariasis. Countless cestodes may infect *Corvidae*, and cestodes may be found in phylogenetically different hosts. An example is that the eggs of *Schistotaenia spp.* aspecies-specific cestodes infecting grubs, was previously signalled in ravens (Rausch, 1983). Cestodes infections in wild birds are commonly asymptomatic, but if clinical signs are present, they are aspecific, such as emaciation, weakness, diarrhoea, changes in feeding behaviour (Atkinson et al., 2008). Interpretation of clinical signs may be mystified with helminthic or protozoan infections. The presence of eggs, proglottids, or fragments during faecal floatation is diagnostic. *Singamus trachea* is a common parasite of wild birds and it was described in *Corvidae* and it often cause a respiratory syndrome, compatible with clinical findings of two (A2 and B2) hospitalized ravens (Atkinson et al., 2008). Zoonotic potential of raven parasites was described but actually debatable (Khalil et al., 2011). It is possible to affirm that multi-parasitic infection has occurred because ravens have come in contact with intermediate hosts in the open area of the aviary. In fact, discussing with the keepers, we know that the ravens ate often bugs or mice they could find in passing into the aviary. Therefore, it was suggested to better housing the ravens, improving the condition of the cages. After necessary changes, after 3 months follow up, the ravens were perfectly healthy. To our knowledge this was first clinical description of multiple parasitic infection in imperial ravens in Sicily Island.

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RIASSUNTO

Casi clinici di parassitosi multiple in Corvi comuni (*Corvus corax*, Linnaeus, 1758)

Quattro corvi imperiali (*Corvus corax*) sono stati portati a visita con una sintomatologia aspecifica (anoressia, tosse e respire disпноico e diarrea). I corvi vivevano in una grande voliera all'aperto, divisa in due parti da una rete metallica. Erano ospitati presso il Centro di Recupero della Fauna Selvatica, località Valcorrente, Belpasso (CT), Sicilia. Inizialmente i corvi erano cinque, ma un soggetto era morto con una sintomatologia riferibile ad un'intossicazione con rodenticidi. Alla visita clinica i corvi erano cachettici, disidratati e alcuni di loro inappetenti e con diarrea acquosa. Aspettando i test tossicologici, sono stati effettuati gli esami parassitologici. I test parassitologici hanno dato positività per *Capillaria* spp., per cestodi e per *Singamus trachea*. Conseguentemente i corvi sono stati trattati con praziquantel e con febendazolo; i risultati della terapia si sono notati già dopo la prima settimana di trattamento. Inoltre i corvi sono stati trattati (in attesa del tossicologico), con vitamina K, oltre a fluidoterapia di supporto, e alimentazione forzata. Al follow up dopo un mese, la sintomatologia si era completamente risolta. Presumibilmente, i corvi sono entrati in contatto con degli ospiti intermedi all'interno della voliera, per questo si è chiesto ai keepers di migliorare le condizioni igieniche sanitarie della stessa. Per conoscenza degli autori si tratta del primo report di parassitosi multiple in dei corvi imperiali in Sicilia.

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