

## Prevalence of *Haemoproteus columbae* Infection in *Columba livia* in North of Iran

<sup>1</sup>M.R. Youssefi, <sup>2</sup>A. Gerami sadeghian and <sup>3</sup>B. Esfandiari

<sup>1</sup>Department of Veterinary Parasitology, Islamic Azad University, Babol Branch, Babol, Iran

<sup>2</sup>Veterinary Parasitology, Veterinary Faculty, Tehran University of Iran

<sup>3</sup>Pasteur Institute of Iran, Amol Research Center, Iran

**Abstract:** Pigeons of the order Columbiformes are ubiquitous birds and can be found in every town and city around the globe. *Columba livia* is a species that descends from wild rock pigeons, which live in Mediterranean Europe. This study was carried out from May to August 2010 on 103 pigeons from Gonbad, Golestan province, in North of Iran. Blood smears were stained with 5% giemsa and examined by immersion. Of the 103 birds, 18 (17.47%) were found to be infected with *Haemoproteus columbae* and many were infected with *Pseudolynchia canariensis*, which are vectors for *H. columbae*. The pigeons examined in this study were found to be free of other parasites and no clinical disorders were determined before sacrificing.

**Key words:** Pigeons • *Columba livia* • *Haemoproteus columbae* • *Pseudolynchia canariensis* • Iran

### INTRODUCTION

Many bird species form well-defined local populations in different parts of their distribution. This is true, especially for birds showing high levels of philopatry to the natal sites. Usually, they are not fully isolated from neighboring populations, yet they show specific features in plumage, size, microhabitat, food, behavior, song, etc [1]. The 320 species of doves and pigeons of the Columbidae are a cosmopolitan assemblage of primarily fructivorous and graminivorous birds. One species, the common pigeon *Columba livia*, is exceptionally numerous and can reach pest proportions in some urban environments. This cosmopolitan species has long been domesticated and forms sources of both recreation and food over much of its distribution. *Columba livia* is a species that descends from wild rock pigeons, which live in Mediterranean Europe [2].

In 1890, Kruse described *Haemoproteus columbae* (Protozoa: Apicomplexa, Haemoproteina) from gametocytes in erythrocytes in the peripheral circulation of *C. livia* (the only stages of this parasite seen in the blood) and this species became the accepted type of the genus *Haemoproteus* [3]. Unfortunately, no haplotype was designated. In 1907, de Beaufort-Aragao worked out the sporogonic cycle of *H. columbae* in the hippoboscids

fly, *Lynchia brunnea*, a cycle confirmed by Adie in 1915 and which was typical of haemosporidian sporogonic development. This life cycle was accepted as the typical one for all haemoproteids until the work of Fallis and Wood in 1957 (and subsequently many others) demonstrated that ceratopogonids were the more usual vectors for the other species of this genus; in fact, seven of the 10 life cycles known utilize ceratopogonids as the intermediate host [4]. Subsequent to Kruse's description of *H. columbae*, a number of authors described six additional species from the family [3].

The aim of this study was to determine the frequency of *Haemoproteus columbae* parasites in wild pigeons in North of Iran.

### MATERIALS AND METHODS

This study was carried out from May to August 2010 on 103 pigeons from Gonbad, Golestan province, North of Iran. The pigeons were caught from 3 localities and brought to the Parasitology Laboratory of the Veterinary Faculty, Tehran University. The places and the dates of capture were recorded and blood smears were prepared from each pigeon after sacrifice. Blood smears were air dried and fixed by methyl alcohol and stained with 5% giemsa stain and examined by immersion. Gametocytes of *Haemoproteus columbae* were photographed.

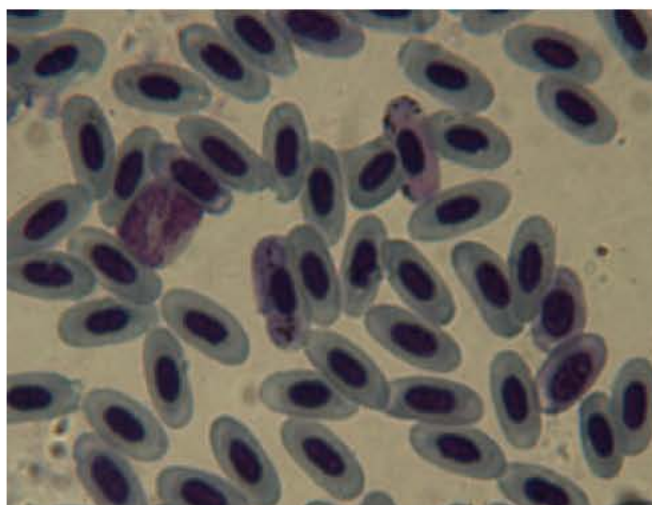


Fig. 1: *Haemoproteus columbae* Micro and Macro gametocytes in the blood of the *Columbia livia*, (Photo by: M.R. Youssefi)

## RESULTS

Of the 103 birds, 18 (17.47%) were found to be infected with *Haemoproteus columbae* and many were infected with *Pseudolynchia canariensis*, which are vectors for *H. columbae*. On stained blood smears, only gametocytes of *H. columbae* were seen inside red blood cells (Figures 1). Infected erythrocytes were counted in a microscopic area on all positive blood smears. Of the 18 positive blood smears, in 17.47% (18/103) 1-2 erythrocytes, in 5.82% (6/103) 3-5 erythrocytes and in 1.94% (2/103) more than 5 erythrocytes were observed to be infected with gametocytes of *H. columbae*. Usually one gametocyte was seen in infected red blood cells.

## DISCUSSION

The investigation of prevalence of blood parasites in pigeons and other birds in Costa Rica [5], Alaska, [6] and Japan [7] revealed rates lower than 10%; in the United States [8], Colombia [9], Bulgaria [10] and in Queensland [11]. Australia, the prevalence rates ranged from 20 to 32% for *Haemoproteus* sp. Baker, in his review of the hippoboscids as vectors, shows that the actual transmission of *Haemoproteus* has only been definitely shown for 3 species of which *H. columbae* is one [13].

*Haemoproteus columbae* occurs in pigeons associated with human settlements. Throughout the world prevalence of *H. columbae* in feral pigeons in different geographical locations vary from 14 to 100% [12].

MC Laughlin in Brazil examined 35 pigeons from which 24 of them (65.8 %) were infected. The infections ranged from 14 lights, 11 moderate to 2 heavy cases. (Less than 10 to more than 500 parasitized cells per 10,000 red blood cells) [13].

Our negative age-prevalence relationship indicated that birds are infected at an early age and this may be because older birds have acquired immunity due to high intensity infections as young birds. Alternatively, it may reflect age differences in exposure to vectors, although this hypothesis was rejected by Sol *et al.* in their study of *Haemoproteus* infection in feral pigeons [14]. There are many studies on blood parasites of pigeons in Turkey. For example, Yunus *et al.* [15] reported that *H. columbae* is present in high proportions in pigeons in Ankara and Tolgay *et al.* examined 98 blood samples collected from pigeons from a local zoo and found that 74% (73/98) of the pigeons were infected with blood parasites [15]. Marques [16] in 2007 showed the prevalence of ectoparasites and endoparasites in 58 free-living pigeons (*Columba livia*) in urban areas of Lages, in the state of Santa Catarina, Brazil. The Quick Panoptic and Giemsa methods detected 67.24% (39/58) and 46.55% (27/58) of *Haemoproteus* sp, respectively [16].

In conclusion, this study showed that more researches are needed on the economic impact of louse infestations in pigeons; on the possibility of cross infection of *Haemoproteus* and *Plasmodium* between pigeons, chickens, turkeys and ducks; and on the role of pigeons in disseminating parasites to humans and wild birds in Iran.

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