

## Detection of *Haemoproteus columbae* in Feral Pigeons in Sulaimani Province, Iraqi Kurdistan Region

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### Abstract

A total of 145 apparently healthy feral pigeons were collected during the period extending from 7<sup>th</sup> of May to 30<sup>th</sup> October 2016 in districts and sub-districts in Sulaimani province in order to investigate the prevalence rate of blood parasites infection. It was found that 46 out of 145 feral pigeon were infected with *Haemoproteus columbae* at a total rate of 31.72%. The prevalence rate of female infections with *H. columbae* was higher 34.43% than the males 29.76%. It was found that the prevalence rate of infection with *H. columbae* in males of feral pigeon collected from Chamchamal district recorded the highest rate 44.11% of infection, while male pigeons in Sytak and females in Kalar were found to be not infected 0%.

**Keywords:** Feral pigeon, *Haemoproteus columbae*, prevalence rate, Sulaimani province-Iraq.

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التحري عن الطفيلي *Haemoproteus columbae* في الحمام الوحشي في محافظة السليمانية،

إقليم كردستان - العراق

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### الخلاصة

تم جمع إجمالي 145 حمام وحشي أصحاء ظاهرياً خلال الفترة الممتدة ما بين 7 أيار إلى 30 تشرين الأول عام 2016 من الأفضية والنواحي في محافظة السليمانية من أجل التقصي عن معدل انتشار عدوى طفيليات الدم. وقد وجد أن 46 من أصل 145 حمام وحشي كانت مصابة بالطفيلي *H.columbae* بمعدل إجمالي 31.72%. وكان معدل انتشار العدوى بطفيلي *H.columbae* في الإناث 34.43% أعلى من الذكور 29.76%. وقد تبين أن معدل انتشار الإصابة بطفيلي *H.columbae* في ذكور الحمام الوحشي الذي تم جمعها من قضاء جمجمال سجلت أعلى معدل للإصابة 44.11%، في حين لم تسجل أية إصابة 0% في ذكور الحمام في سينك والإناث في كلار 0. الكلمات المفتاحية: حماسة الوحشية، *H.columbae*، معدل انتشار، السليمانية - إقليم العراق.

### Introduction

Feral pigeon (*Columba livia*, Gmelin, 1789) is a free living form of domestic pigeon accompanies human settlements worldwide. It is adapted well to the urban environment (1). Several species of parasites occur in pigeons throughout their global range, in among these are the haemosporidid, *Haemoproteus columbae* Kruse and its vector pupiparanl louse fly *Pseudolynchia canariensis* (Marquart) (2, 3). The Fourth National Report to the Convention of Biological Diversity, 2010 (4) revealed that a preliminary checklist of the

birds of Iraq includes 417 bird species of which 182 are considered passage migrants to Iraq and an additional 27 are vagrant species, 18 species of these are considered to be of conservation concern. Haematozoa in Iraqi birds are rather partially known beginning from the study of (5) who were the first to report on the blood parasites of some Iraqi birds and gave information on 77 species of birds and described two new species. Two years later, (6) casually reported *Haemoproteus columbae* in rock dove in Mosul area. Between the years 1990 to 2004 a series of 9 papers had been published surveying blood parasites of nearly 1/4<sup>th</sup> of the total number of avian species of Iraq, recording 30 new records, 44 new host records, and 7 new species, this includes studies of (7, 8, 9, 10, 11, 12, 13, 14, 15). After that, no work had been done on this matter. All mentioned studies took the rural birds as their subjects. The aim of this work was to detect blood parasites through examine blood of feral pigeons collected at Sulaimani province, Kurdistan Region of Iraq and to compare the present results with previous findings.

### Materials and methods

Feral pigeons (Fig. 1) were randomly collected from different districts (Sulaimani center, Chamchamal and Kalar) and sub districts (Sytak, Arbat and Sangaw) of Sulaimani province/Iraq from the 7<sup>th</sup> May to 30<sup>th</sup> October 2016.



Fig. (1) Picture of feral pigeon (*Columba livia*)

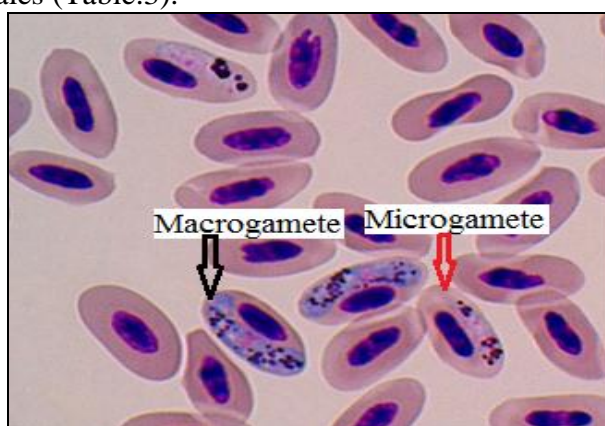
- **Description of study area:** Sulaimani is the biggest Governorate of Kurdistan Region, located north east of Iraq on a border with Iran of geographic coordinate latitude and longitude 35°33'40" N and 45°26'14" E respectively. The elevation of Sulaimani center is about 830 meters above sea level and its geographic location imposed a dry and warm summer for the period of June, July, and August, with temperature of 31.5°C as an average summer temperature (16).
- **Collection and staining of blood and identification of protozoa:** Blood samples were taken directly from the brachial vein in live pigeons after its disinfection with 70% ethyl alcohol by pricking with the help of sterilized disposable lancet and taking a small drop of blood (17) then the blood smear were prepared as suggested by (18), then slides were examined under a light microscope in higher magnification (40× and 100×) for the detection of blood protozoa. Identification was based on the morphology as described by (19, 20, 21).

Chi square test was used to analyze the parasitic infection using SPSS programme. The differences were considered significant at  $P < 0.05$ . Photos were taken with iPhone 6 (s) model MKQR2AH/A, camera 12- megapixel.

### Results

The study showed that *Haemoproteus columbae* was the only parasite species that infect the feral pigeons with a prevalence rate of 31.72% (Table.1). Also the results

revealed that the prevalence rate of infection with *H. columbae* was higher in female pigeons (34.43%) than the male pigeons (29.76%) with non-significant difference between both sexes ( $\chi^2 = 0.355$ ,  $P=0.551$  Table.2). The mature gametocyte encircled the erythrocyte nucleus to form a halter-shaped look and occupied over a half of the erythrocyte cytoplasm, macrogametocyte (female) had pigment granules dispersed throughout the cytoplasm while microgametocyte (male) had then clustered into a mass, these morphological descriptions were similar with those described by (19, 20, 21). The results of examination of 145 pigeons collected from different locations of Sulaimani province showed that Chamchamal recorded the highest prevalence rate of infection in males 44.11% and females 23.53%, while Sytak recorded a rate of 22.22% infection in females, then came Sangaw at a rate of 20% for both sexes, followed by Arbat at a rate of 11.42% for both sexes, and Sulaimani city at a rate of 7.40% for both sexes, while in Kalar was 6.25% for males and no infection was recorded for females (Table.3).



**Fig. (2)** Giemsa-stained blood smear reveals the presence of intra- erythrocytic forms morphologically compatible with *Haemoproteus gametocytes* (Macrogamete: black arrow, Microgamete: red arrow) which have a halter-like appearance (1000X).

**Table (1)** Prevalence rate of infection with *Haemoproteus columbae* in feral pigeons

No. of Exam. samples	No. of (+ve)	%
145	46	31.72

**Table (2)** Prevalence rate of infection with *Haemoproteus columbae* in feral pigeons according to sex

Sex	No. of Exam sample	No. of (+ve)	%
Male	84	25	29.76 a
Female	61	21	34.43 a
<b>Total</b>	145	46	31.72

Values with same superscripts within a column was non-significant ( $P>0.05$ ).

**Table (3)** Prevalence rate of infection with *Haemoproteus columbae* according to locations

Location	No. of exam. samples	No. of +ve males	%	No. of +ve females	%
Sulaimani	27	2	7.40	2	7.40
Sytak	18	0	0	4	22.22
Arbat	35	4	11.42	4	11.42
Chamchamal	34	15	44.11	8	23.53
Kalar	16	1	6.25	0	0
Sangaw	15	3	20	3	20

## Discussion

*Haemoproteus columbae* occurs in pigeons associated with human settlements throughout the world (3, 22). The prevalence of *H. columbae* in feral pigeons in different geographical locations varies from 14 to 100% (23, 24, 25, 26). The results showed that *H. columbae* was the only parasite species that infects the feral pigeons at a rate of 31.72% this may be related to that this parasite is endemic in this area with a high host-parasite adaptation and to smaller sample size, indicating poor management and control efforts in either the animal or the immediate environment where infection or re-infection (directly or indirectly) may emanate, and this was higher than the results recorded by (27, 28, 29), this may be due to the variation in the methods of studies, abundance of the intermediate host and management system, and to difference in geographical distributions and to sample size taken in different studies. Also the results showed that the males prevalence rate of infection was lower 29.76% than the females infection 34.43% and this may be due to the female sex hormones that are associated with lower means parasitic burden, also may involve behavioral aspect or some physiological conditions intrinsic to the Species that may make the host more or less susceptible to the parasite (28). The results of prevalence of different locations revealed that Chamchamal had recorded the highest prevalence rate of infection in both males and females while Kalar recorded the lowest prevalence rate and this may be due to the difference in geographical climatic conditions and to the vector with abundance of it and the husbandry practice of pigeons (27). **Conclusion**, From the study it was clear that *Haemoproteus columbae* was the only blood parasite found in feral pigeons (*Columba livia*) in Sulaimani province and this study was the first investigation carried out in this area.

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