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ORIGINAL ARTICLE

Haemtozoa of Resident Urban Birds of Iraq

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ABSTRCT
A survey for blood parasites of some Iraqi resident urban birds was undertaken at Baghdad City (middle), Sulaimaniya City (north), and Diwaniya City (south). Results were compared with those previously recovered for birds collected from rural areas and it is found that infection rates for birds of urban areas is remarkably less than those recovered from rural areas.
Key Words : Haematozoa, Haemoproteus, Leucocytozoon, Plasmodium, microfilaria.

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INTRODUCTION

Iraq has rather a wide range of geological diversity, from the peaks of Kurdistan Mountains that exceeds 3600 m above sea level in the north to the deserts and semi-deserts in the west and the great Mesopotamian marshes in the south; these contribute to the wide biological as well as avifaunal diversity. The Forth National Report to the Convention of Biological Diversity, 2010 [1] 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 of Iraqi birds are rather partially known beginning from the study of [2] 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, [3] 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 1/4th 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 [4; 5; 6; 7, 8, 9 ; 10; 11;12] . 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 is to examine blood of resident birds collected at urban sites of Iraq mainly and to compare the present results with previous findings.

MATERIALS AND METHODS

A total of 299 resident birds belonging to 5 genera and 6 species were mist-netted or captured from urban areas in Baghdad (Middle of Iraq), Sulaimaniya (North) and Diwaniya (South) during March, 2010 to October 2011. Thin blood smears were made immediately from each bird, air dried, fixed in absolute methanol or ethanol, and stained with Giemsa's stain at strength 1:10 at pH 7.2 for one hour. The taxonomic parameters of both parasites and blood cells, used in identification, were determined following the methods of [13] as modified by [14 ; 4].

RESULTS AND DISCUSSION

The resident birds were chosen as a subject of this study to ensure avoiding the result overlap of infections in migratory birds whether they acquired the infection at their original home territories, on their way during migration or here in Iraq. Table 1 showed that the examined birds harbored infection with 7 parasites identified to the species level, 3 to genus level and one case was positive for microfilaria. All parasites were previously reported from Iraq [2; 3 ; 4; 15]. The Rock pigeon *Columba livia* acquired the higher number of parasite species among the other hosts with 4 species including *Haemoproteus columbae, H. turtur, Leucocytozoon marchouxi* and *Plasmodium relictum*. This may reflects that high host-

parasite adaptation may contribute to this fact. Moreover, the steadily expanding in the distribution range within Iraqi urban settlements for *Streptopelia senegalensis* during recent years [16] contribute to raise the infection rates for all regions. This bird acquires two haemoproteids *H. columbae* and *H. turtur* and ranked third (2 species of parasites) with rather high infection rate which most probably related to its smaller sample size. Pigeons of the order Columbiformes are ubiquitous birds and can be found in virtually every town and city around the globe [17]. *Haemoproteus turtur* was originally described from the turtle dove *Streptopelia turtur* (Aves: Columbidae)) [18]. It was then frequently reported from other columbid birds in many parts of the world [19; 20]. This is also true for Iraq, since its recording for the first time by [15] from rock doves in Baghdad City, it is recorded in this study from two additional hosts, *Streptopelia decaocto* and *S. senegalensis*. Its recording for Iraq by [21] proved to incorrect since [15] have the chronological priority.

House sparrow ranked second with 3 parasite species. This is not surprising since the bird has a worldwide distribution but mostly confined to human settlements areas as a synanthropic species. Table 2 summarizes the results of examination of the present collection of urban birds. This would show that 23 out of 299 (7.7%) were infected with either *Haemoproteus, Leucocytozoon, Plasmodium*, or microfilaria. This is rather low rate when compared with earlier studies conducted in Iraq which deal with birds collected mainly from rural areas. For example, [2] reported 19.7% of infection, while [4] found 22.9% of his bird collection was infected. This is may be related to the fact that birds of rural areas acquired more parasite species and higher infection rates. The authors agree with the conclusion of [22] who referred to the reduced presence of parasite vectors in urban compared to rural areas as the reason for the low parasitemia in urban birds. In addition, urban areas may provide increased food and water resources, which can enhance immune capacity to resist infection and the ability to eliminate parasites. Also, [23] pointed out that the biological differences, between rural and urban dwelling birds, could be attributed to the urban ecological conditions. However, except for the black-winged stilt *Himantopus himantopus*, table 2 showed that total infection rates with haematozoa in birds collected in rural areas, far exceed that those belong to urban hosts. This is in general agreement with [23, 17 and 22]. The black winged stilt *H. himantopus* is the only waterfowl species among birds of the present study. The vector potentiality of urban water bodies seems high as those of rural areas. This may explain, partially, the relatively equal infection rates for this bird in both cases. In regard to collection sites, table 3 showed no conclusive differences in the infection rates among examined birds, except for the infection with *Haemoproteus columbae* which showed rather noticeable differences, most likely related to smaller sample size. This may reflect that ecosystems in the three sites have somewhat closely related environmental factors.

Table 1: A host-parasite relationship with the infection rate of each parasite recorded in this study.

Bird name	Parasite name	% infection
Columba livia	*Haemoproteus columbae*	4.4
	Haemoproteus turtur	1.1
	Leucocytozoon marchouxi	2.2
	Plasmodium relictum	1.1
Streptopelia decaocto	*Plasmodium marchouxi*	4.5
S. senegalensis	*Haemoproteus columbae*	6.25
	Haemoproteus turtur	6.25
Pycnonotus leucogenys	*Leucocytozoon sp.*	7.1
	Plasmodium sp.	2.4
Passer domesticus biblicus	*Haemoproteus passeris*	2.1
	Leucocytozoon fringillinarum	5.3
	Plasmodium sp.	1.1
Himantopus himantopus	*Leucocytozoon toddy*	8.8
	Microfilaria	2.9

Table 2: A comparison of total infection rates with blood parasites between the examined bird hosts of this study (urban) and some previous studies (rural) carried out in Iraq.

Bird name	No. examined	No. infected	% total infection	% infection in previous works	Source of information
Columba livia	91	7	7.7	25	[2]
Streptopelia decaocto	22	1	4.5	50	[2]
S. senegalensis	16	2	12.5	-	-
Pycnonotus leucogenys	42	2	4.8	-	-
Passer domesticus biblicus	94	8	8.5	25	[4]
				33.3	[2]
Himantopus himantopus	34	3	8.8	9.1	[2]

Table 3: Results of examining blood smears of birds according to collection sites.

Collection site/Host	Parasite name	No. examined	No. infected	% infection
Baghdad				
Columba livia	*Haemoproteus columbae*	49	1	2
	H. turtur	49	1	2
	Leucocytozoon marchouxi	49	1	2
	Plasmodium relictum	49	1	2
Streptopelia decaocto	*Plasmodium marchouxi*	18	1	5.6
	H. turtur	18	1	5.6
Streptopelia senegalensis	*H. columbae**	11	1	9.1
	*H. turtur**	11	1	9.1
Pycnonotus leucogenys	*Leucocytozoon* sp.	36	1	2.8
	Plasmodium sp.	36	1	2.8
Passer domesticus biblicus	*Haemoproteus passeris*	54	2	3.7
	Leucocytozoon fringillarum	54	3	5.6
	Plasmodium sp.	54	-	-
Himantopus himantopus	*Leucocytozoon toddi*	15	1	6.7
Sulaimaniya				
Columba livia	*Haemoproteus columbae*	16	1	6.2
Streptopelia decaocto	-	4	-	-
S. senegalensis	-	2	-	-
Diwaniya				
Columba livia	*Haemoproteus columbae*	26	1	3.8
Sterptopelia senegalensis	-	3	-	-
Pycnonotus leucogynes	-	6	-	-
Passer domesticus biblicus	*Leucocytozoon fringillinarum*	40	2	5
Himantopus himantopus	Microfilaria	19	2	10.5

*Double infection

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