

ORIGINAL ARTICLE

Haematozoa of some Reptiles in the Middle of Iraq

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ABSTRACT

A collection of reptile's encountered 9 species of reptiles was collected in the middle of Iraq and examined for blood parasites. The turtle *Mauremys caspica* was found infected with *Haemogregarina stepanowi* with infection rate 2.6% which was reported for the first time in Iraq, and both of *Cyrtopodion scaber* and *Hemidactylus flaviviridis* were infected with *Plasmodium* sp. with infection rate of 1.3% for each species. The results were discussed with the pertinent literature. **Keywords:** reptiles, Haematozoa, Iraq, *Plasmodium* sp., *Haemogregarina stepanowi*.

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INTRODUCTION

Reptile fauna of Iraq comprises a little more than 100 species [1-10] with an ongoing trend to increase in the species number with continuous recording and describing new species especially from Iraqi Kurdistan. On the other hand, literature dealing with the parasites of herpetofauna of Iraq was few, scanty and dealing mostly with gastrointestinal helminthes such as [11-18]. The only published work on blood parasite of reptiles was that of [19].

The present work aimed to determine the specific identity of haematozoan parasites in some reptilian species collected in the middle of Iraq.

MATERIALS AND METHODS

Study area: The middle area of Iraq falls within the ecoregion Tigris Euphrates Alluvial salt marsh (PA0906) which is characterized by marshlands and seasonally inundated plains with a subtropical, hot, and arid climate [20]. The study area includes Baghdad, Babel, Kerbala, Najaf, Diwaniya and Wasit provinces which fall within the ecoregion 441 Lower Tigris and Euphrates.

Reptile collection and blood sampling: collection of specimens was carried out during the period January to December 2015. Specimens were collected through field trips to rural areas of middle of Iraq provinces. Most of reptile species were captured by hand, while some of them by insect net. Few drops from the tail of larger specimens were taken to make blood smears, while it was taken from the coccygeal vein as suggested by [21] in the smaller specimens; or in examining the turtles according to [22]. Smears were air dried, fixed in absolute ethanol or methanol, and stained with Giemsa's stain for one hour at strength of 1:10 at pH 7.2. The identification was made according to suitable literatures and keys.

Material examined: a total of 76 specimens belong to 9 species, 9 genera, 7 families, and 3 orders were examined. The taxonomic list of the species collected was as follows:

Order Testudines

Family Emydidae

Mauremys caspica (Gmelin, 1774) Caspian pond turtle

Family Trionychidae

Rafetus euphraticus (Duadin, 1802) Euphrates softshell turtle

Order Sauria

Family Agamidae

Uromastix microlepis (Blanford, 1875) Spiy tailed lizard

Family Gekkonidae

Cyrtopodion scaber (Heyden, 1827)

Hemidactylus flaviviridis Ruppel, 1840

Family Lacertidae

Ophisops elegans Ménétriés, 1832

Family Scincidae

Mabuya aurata (Linnaeus, 1758)

Family Varanidae

Varanus griseus (Duadin, 1803) Desert monitor

Order Serpentes

Family Typhlopidae

Typhlops vermicularis Merrem, 1820 Blind snake

RESULTS AND DISCUSSION

Examination of blood smears confirmed infection of *Mauremys caspica* with *Haemogregarina stepanowi* (Apicomplexa: Haemogregarinidae) and infection of *Cyrtopodion scaber* and *Hemidactylus flaviviridis* with *Plasmodium* sp. (Apicomplexa: Plasmodiidae) according to parasites morphological and staining characters.

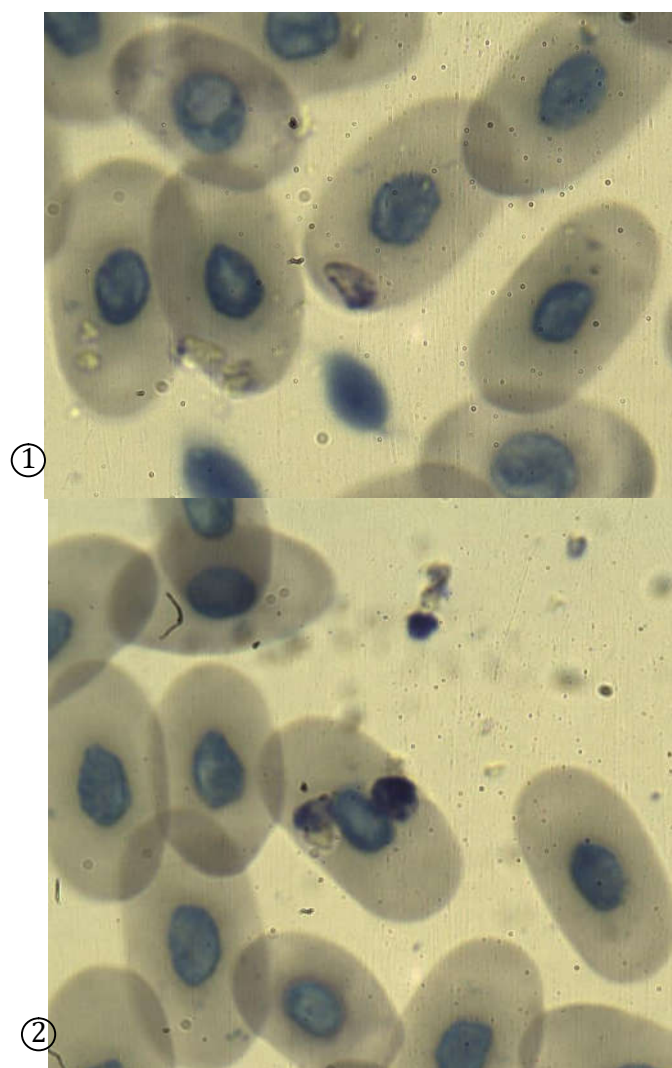
Table 1 summarizes the results on examining reptile specimens in the middle of Iraq. It would show that 3 reptilian species acquired infection of blood parasites. The total infection of this collection of reptiles counts to 5.3%. This is rather low when compared with other works for example Davis and Sterret [23] who found an infection rate of 52.2% in Georgia, USA and this situation may reflects the difference in vector potentiality for infection of reptiles, being low in our region while it was high in their collection sites. However, infection with *H. stepanowi* represents only 2.6% of the total although haemogregarines are considered to be the most widely distributed blood parasite and their species are usually reported in turtles living in freshwater habitats [24]. This is also in contradiction with [22] who found that 58.3% of *M. caspica* examined in Iran were infected with same haematozoan. This is rather hard to understand since the number examined turtles in this study was higher as they examined only 12 turtles while 27 turtles were examined in this work; and their collection sites (Kermanshah and Samangan) situated almost near the Iraq-Iran border line just beside the middle region of Iraq, the general present collection site. This may because that the two regions belong to two different ecoregions. Our collection sites fall within the Tigris-Euphrates Alluvial Salt Marsh (PA0906) ecoregion which characterized by marshlands and seasonally inundated plains with subtropical, hot, and arid climate, while the Iranian collection sites fall within the Zagros Mountains Forest Steppe (PA0446) ecoregion which characterized by extensive mountain-forest-steppe ecoregion that has a semi-arid temperate climate with an annual precipitation ranging from 400mm to 800mm [20]. It is obvious that more investigations regarding this issue are needed including examination of more turtle specimens as well as new collection sites. Recording *H. stepanowi* from *M. caspica* in this study represents the first record of this parasite in Iraq.

Table 1: reptile species, no. examined, no. infected, percent of infection and parasite species.

Reptile species	No. examined	No. infected	% infection	<i>H. stepanowi</i>	<i>Plasmodium</i> sp.
<i>Mauremys caspica</i>	27	2	7.4	+	-
<i>Rafetus euphraticus</i>	2	-	-	-	-
<i>Uromastix microlepis</i>	4	-	-	-	-
<i>Cyrtopodion scaber</i>	19	1	5.3	-	+
<i>Hemidactylus flaviviridis</i>	11	1	9.1	-	+
<i>Ophisops elegans</i>	6	-	-	-	-
<i>Mabuya aurata</i>	4	-	-	-	-
<i>Varanus griseus</i>	1	-	-	-	-
<i>Typhlops vermicularis</i>	2	-	-	-	-

Species of *Plasmodium* were frequently found in reptiles among a wide range of vertebrate classes [25]. Reptiles have been seen infected mainly in tropical countries primarily lizards and some snakes [26]. It could be found endoerythrocytic as in the case of the present study (fig.1&2) or sometimes exoerythrocytic as in myeloid cells and lymphoid macrophage cells [27]. Ayala [28] reviewed the world literature on *Plasmodium* of squamate reptiles reporting 54 valid species. In this study, plasmodial infections were found in *C. scaber* and *H. flaviviridis* which both belong to the family Gekkonidae. They represent only 2.6% of the total examined sample. No literature was available from Iraq and adjacent

countries to compare, but Schall [29], in California, found that one-third to 40% of the male lizards were infected, whereas only 15-30% of the female lizards had infection with percentage infected increases with age.



Figs. 1&2: *Haemogregarina stepanowi* in peripheral blood of *Mauremys caspica*

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