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ORIGINAL ARTICLE

IDENTIFICATION OF HARD TICKS FROM BUFFALO *BUBALUS BUBALIS* (LINNAEUS, 1758) IN IRAQ



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ABSTRACT

Ticks (Acari: Ixodidae) are ectoparasites that infest livestock in every geographic region of the world and are vectors of several viral, bacterial, and protozoan pathogens to both animals and humans. There is little information available about tick presence in Buffalo *Bubalus bubalis* (Linnaeus, 1758) (Artiodactyla, Bovidae) in Iraq. The current study determined the species of ticks parasitizing Buffalo in some central and southern regions included: Baghdad (Al Fathelia), Karbala (Al-Hussainia), Wasit (Kut and Al-Suwairah), Al-Qadisia (Al-Diwaniyah, Al-Saniya, Al-Mihnawea, and Afak), Thi Qar (Al-Nasiriyah and Al-chibayish), Missan (Amara and Qalaat Salih) and Basrah (Al-Haretha, Al-Madena and Al-Deer). A total of 150 Buffalo were examined for ixodid ticks with an infestation rate 66.66%. A total of 172 Specimens of hard ticks were isolated including 104 (58.4%) males and 68 (39.53%) females. The current results revealed to eight species of ixodid ticks belong to the genus *Hyalomma* as follow: *H. truncatum* Koch, 1844 (50.66%), *H. excavatum* Koch, 1844 (24%), *H. anatolicum* Koch, 1844 (16%), *H. marginatum* Koch, 1844 (8%), *H. impeltatum* Schulze & Schlotke, 1930 (8%), *H. rufipes* Koch, 1844 (5.33%), *H. scupense* Schulze, 1919 (4%), *H. dromedarii* Koch, 1844 (2.66%) respectively. The prevalence of these species in buffaloes was also discussed with previous studies in Iraq and the worldwide. As the current results suggested that buffaloes are considered a new host for three species of them in Iraq the following are: *H. truncatum*, *H. impeltatum*, and *H. rufipes*.

Keywords: Al Diwaniyah, Buffalo, Hard Ticks, *Hyalomma*, Iraq.

INTRODUCTION

Ticks have considerable medicinal and veterinary significance since they are necessary hematophagous ectoparasites of birds, reptiles, and especially mammals (Mehlhorn and Armstrong, 2010). The bacterial, protozoal, spirochaetal, rickettsial, and viral species carried by ticks infect both humans and domestic animals and cause a number of diseases. Ticks are crucial for both livestock and people (Akhtar *et al.*, 2011; Ullah *et al.*, 2020). One of the most prevalent ectoparasites of livestock in the tropics and subtropics is called *Hyalomma* sp. This

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parasite reduces milk supply, results in weight loss, increases mortality, necessitates the use of acaricides, and physically harms the leather industry (Mulugeta *et al.*, 2010).

Ticks are obligate hematophagous ectoparasites that have negative effects on human and veterinary health; further promotes the spread of the virus that causes Crimean-Congo hemorrhagic fever in people and the deadly protozoa *Theileria annulata* in animals (Hurtado *et al.*, 2018; Kumar *et al.*, 2020).

Ticks can be found worldwide and prefer humid and temperate climates; they typically attach to their host's legs, underarms, and abdomen (Nuttall, 1905). Hard Ticks (Ixodidae), the largest ticks' family, contains 713 valid species (Barker and Murrell, 2004). There are two general types of Asian water buffalo, wild and domestic. Water buffalo are well adapted to swamps and areas subject to flooding, and number of buffalo is of great value due to their high economic importance (Abid and Fazaa, 2007). On the other hand, the life cycle of Ixodid ticks is influenced by a number of intrinsic and extrinsic factors (Shah-Fischer and Say, 1989).

The aim of this study is to diagnose the species of hard ticks that infest buffalo in the areas of abundance of buffaloes in the Central, and the Southern of Iraq.

MATERIALS AND METHODS

Study area: The current study was conducted in some areas where buffalo breeding abounds in Iraq's central and southern regions belongs to their province as follow: Baghdad (Al Fathelia), Karbala (Al-Hussainia), Wasit (Kut and Al-Suwairah), Al-Qadisia (Al- Diwanayah, Al- Saniya, Al-Mihnawea, and Afak), Thi Qar (Al-Nasiriyah and Al-chibayish), Missan (Amara and Qalaat Salih) and Basrah (Al-Haretha, Al-Madena and Al-Deer).

Specimens' collection and processing: To make it easier to remove ticks from the skin at various body sites on each animal, including the ear, side of the neck, leg, foot, entire tail, including the tail brush, and half of the lower perineum and entire upper perineum, ticks were collected using cotton dipped in ethyl alcohol and tweezers. Collecting ticks were placed separately in small bottles containing 70% ethanol, labeled and transported to the laboratory in the "Iraq Natural History Research Center and Museum INHM" for diagnosis.

The ticks were processed in the laboratory with a 10% potassium hydroxide solution (KOH) for transparent (Soulsby, 1982); specimens were diagnosed by taxonomic references (Mohammad, 1996; Walker *et al.*, 2014); were photographed by digital camera (Samsung SM-N770F).

RESULTS

A total of 172 (68 females and 104 males) hard ticks specimens were isolated from 150 buffalo with infestation rate (66.66/100%), from total number (150) buffalo in Central and South regions of Iraq as: Baghdad (Al Fathelia), Karbala (Al-Hussainia), Wasit (Kut and Al-Suwairah), Al-Qadisia (Al- Diwanayah, Al- Saniya, Al-Mihnawea, and Afak), Thi Qar (Al-Nasiriyah and Al-chibayish), Missan (Amara and Qalaat Salih) and Basrah (Al-Haretha, Al-Madena and Al-Deer). The current study revealed to eight species of hard ticks with infestation rates as follow: *H. truncatum* (50.66%), *H. excavatum* (24%), *Hyalomma*

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anatolicum (16%), *Hyalomma marginatum* (8%), *H. impeltatum* (8%), *Hyalomma rufipes* (5.33%), *H. scupense* (4%), *H. dromedarii* (2.66%) respectively. (Tab. 1, Pls 1-8). A total of 178 specimens of Hard ticks were isolated including (104 males and 68 females) (Tab. 2). Some animals were infested with more than one species of hard ticks (mix infestations), as is the case in the Al- Diwanayah region which shows Include infestation with three species of ticks (*Hyalomma anatolicum*, *H. truncatum* and *H. marginatum*) and Al-Nasiriyah City which shows include infestation with two species of ticks (*Hyalomma dromedarii* and *H. rufipes*).

Table (1): Species of Hard ticks isolated from Buffalo in some areas of Iraq.

Species of Hard ticks Isolate	Total number of Buffalo	Number of infested specimens	%
<i>Hyalomma truncatum</i>	150	76	50.66
<i>H. excavatum</i>		36	24
<i>H. anatolicum</i>		24	16
<i>H. marginatum</i>		12	8
<i>H. impeltatum</i>		12	8
<i>H. rufipes</i>		8	5.33
<i>H. scupense</i>		6	4
<i>H. dromedarii</i>		4	2.66

Table (2): The total number of isolated males and females according to the species of hard ticks.

Species of Hard ticks Isolate	No. of Males	No. of females	Total	%
<i>Hyalomma truncatum</i>	46	30	76	44.18
<i>H. excavatum</i>	16	20	36	20.93
<i>H. anatolicum</i>	18	6	24	13.95
<i>H. marginatum</i>	10	2	12	6.97
<i>H. impeltatum</i>	6	6	12	6.97
<i>H. rufipes</i>	8	0	8	4.65
<i>H. scupense</i>	2	4	6	3.48
<i>H. dromedarii</i>	4	0	4	2.23
Total	104	68	172	

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Plate (1): (A) *H. truncatum* male, dorsal view [1. Cervical fields with unclear depression. 2. Conscutum with dark coloured (appears smooth and shiny), 3. Lateral grooves elongated, 4. Two posterior ridges; caudal depression (present and deep), 5. Central festoon with dark coloured. 6. Posteromedium groove absent. 7. Paramedian grooves absent]; (B) *H. truncatum* male, ventral view [8. Spiracle areas have sparse setae. 9. Adanal plates shape has square ends. 10. Subanal plates are (distinct and small)].

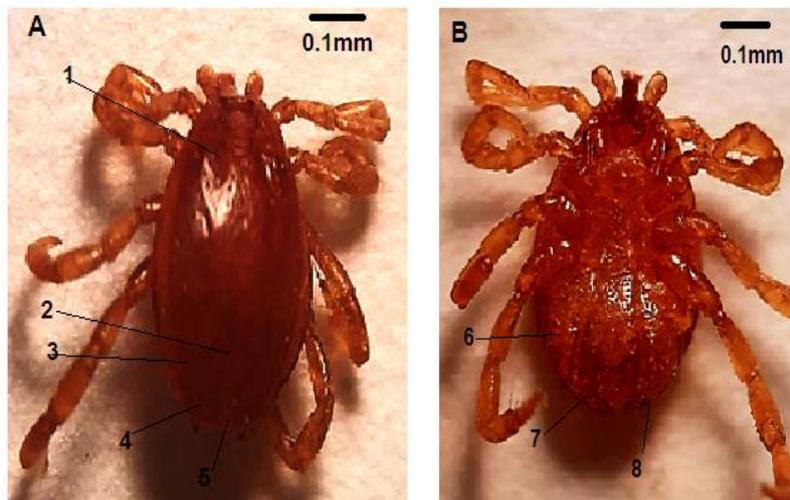


Plate (2): (A) *H. excavatum* male, Dorsal view [1. Cervical fields with apparent depression, 2. Posteromedian with groove, 3. Lateral grooves (short), 4. Paracentral festoons with joined anteriorly, 5. Central festoon (pale)]; (B) *H. excavatum* male, Ventral view [7. Spiracle areas with sparse setae, 8. Adanal plates shape with square ends, 9. Subanal plates (distinct)].

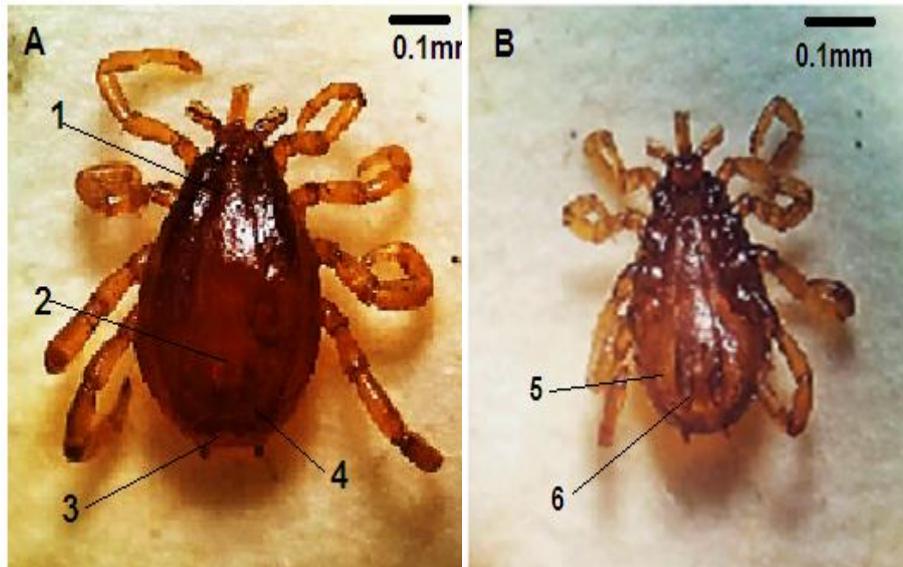


Plate (3): *H. anatolicum* male; (A), Dorsal view: 1. Cervical fields depression apparent, 2. Posteromedium groove present (long and narrow), 3. Central festoon dark, 4. Paracentral festoons separate anteriorly, (B) ventral View: 5. Spiracle areas have sparse setae, 6. Adanal plates shape has a round end.

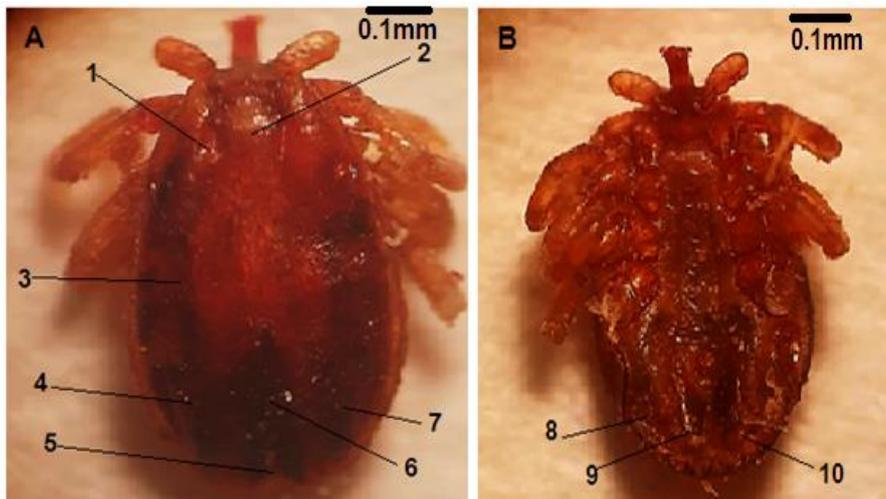


Plate (4): *H. marginatum*, male: (A) Dorsal view: 1. Cervical fields depression apparent, 2. Conscutum dark, 3. Lateral grooves long, 4. Two posterior ridges; caudal depression present (but shallow), 5. Central festoon dark, 6. Posteromedium groove present, 7. Paramedian grooves small, (B) Ventral view: 8. Spiracle areas have sparse setae, 9. Adanal plates shape has square ends, 10. Subanal plates distinct but small.

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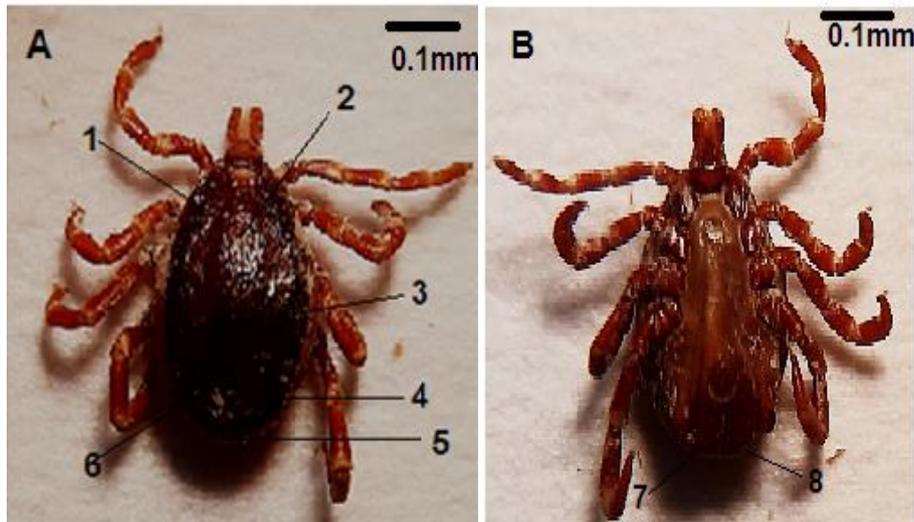


Plate (5): (A). *H. impeltatum* male, (dorsal view), [1. Cervical fields depression apparent, 2. Conscutum dark, 3. Lateral grooves long, 4. Two posterior ridges, Caudal depression present, 5. Central festoon pale, 6. Posteromedium groove present, (B). *H. impeltatum* male, (Ventral), 7. Adanal plates shape has a square ends, 8. Subanal plates distinct].

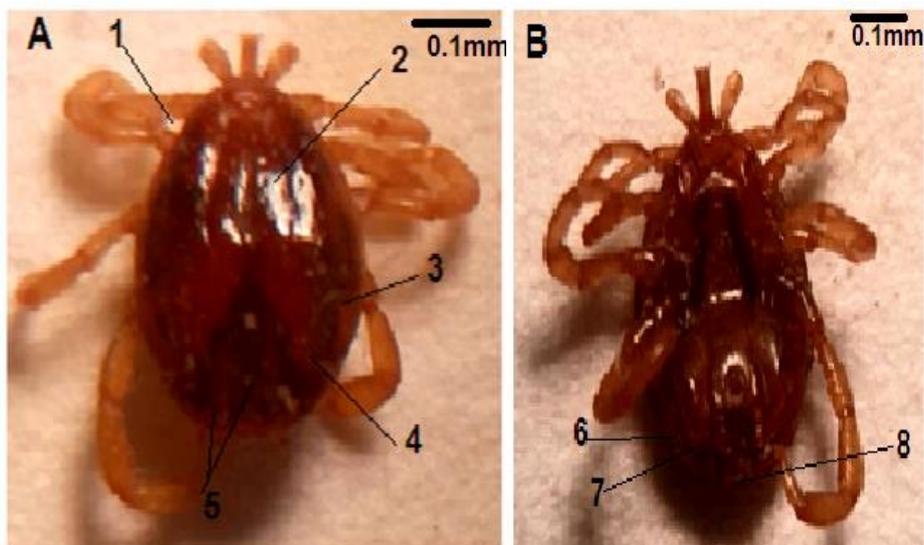


Plate (6): *H. rufipes* male; (A) Dorsal view: 1. Cervical fields depression not apparent, 2. Conscutum dark, 3. Lateral grooves short, 4. Posterior ridges absent; caudal depression absent, 5. Posteromedium groove absent; paramedian grooves absent, (B) Ventral view: 6. Spiracle areas have dense setae, 7. Adanal plates shape has square ends, 8. Subanal plates distinct.

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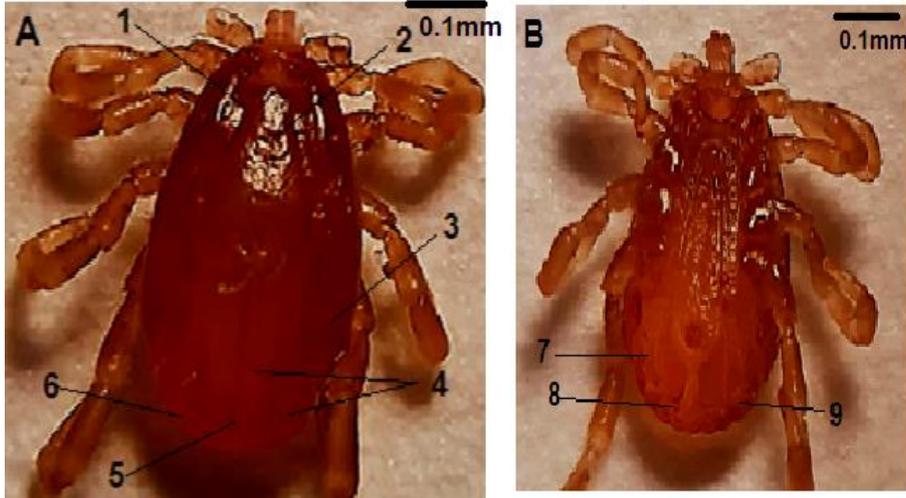


Plate (7): (A). *H. scupense* male, (Dorsal view), [1. Cervical fields depression apparent (but small), 2. Conscutum dark, 3. Lateral grooves long, 4. Four posterior ridges, 5. Posteromedium groove present, 6. Paramedian grooves large, (B). *H. scupense* male, (Ventral view), 7. Spiracle areas have sparse setae, 8. Adanal plates shape has square ends, 9. Subanal plates distinct].

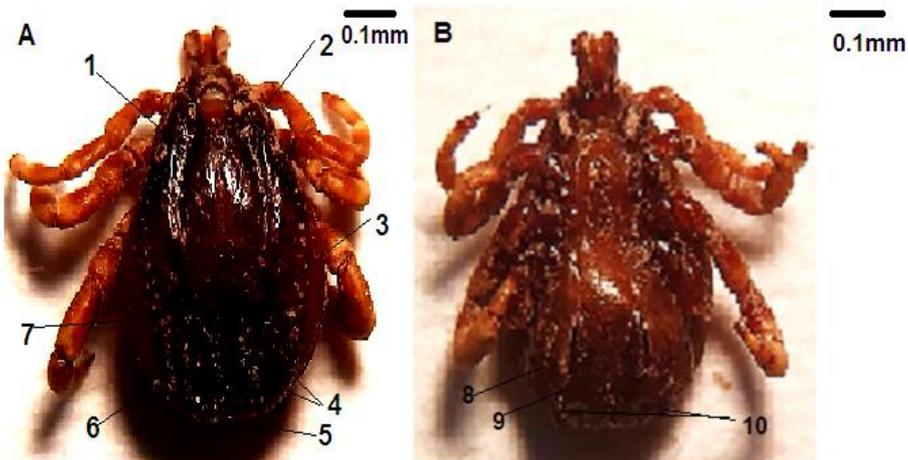


Plate (8): *H. dromedarii*, male; (A) Dorsal view: 1. Cervical fields depression apparent, 2. Posteromedium groove present (long and narrow), 3. Central festoon dark, 4. Paracentral festoons separate anteriorly, (B) Ventral view: 1. Spiracle areas have sparse setae, 2. Adanal plates shape has a round end.

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DISCUSSION

The current study recorded Buffalo infested rate with *Hyalomma* spp. (66.66% /100) from total number 150 buffaloes; these percentages are lower than those reported by Tarash (1982), who discovered 94.2% of the *Hyalomma* spp. in Basra's Al-Dehab Al-Abiad Village, higher than those reported by Al- Mawla (2001), who discovered 46% of *Hyalomma* species in Mosul, and lower than those reported by Abdul Hussein and Awad (2005) estimated of 73.6% of the *Hyalomma* in Basra. The results presented above are consistent with those obtained by Mustafa *et al.* (2019), when three different species of ticks were recorded parasitizing buffalos in Samarra, all of which belong to the genus *Hyalomma* include: *H. anatolicum*, *H. scupense* and *H. turanicum*. The reason for the genus *Hyalomma* dominance and spread is that it can survive in environments with low humidity and harsh climatic conditions due to its high tolerance (Kettle, 1995).

The results of the current study showed that buffaloes were infested with eight species of ticks, all of which belongs to the genus *Hyalomma*, namely: *H. truncatum* (50.66%), *H. excavatum* (24%), *H. anatolicum* (16%), *H. marginatum* (8%), *H. impeltatum* (8%), *H. rufipes* (5.33%), *H. scupense* (4%), *H. dromedarii* (2.66%) respectively. The key clinical findings documented in this study included weight loss, mucous membrane pallor, lymph node enlargement, and a staring coat.

The current study found that *Hyalomma truncatum* had the highest infestation rate 50.66% and *Hyalomma dromedarii* had the lowest infested rate 2.66%. While disagreed with Falih and Hamza (2022) who recorded four species of *Hyalomma* included: *H. anatolicum* 45.66% represented the highest percentage of collected ticks in buffaloes, *H. marginatum* 31.21%, *H. dromedarii* 16.76%, and *H. scupense* 6.35% represented the lowest percentage of collected ticks in buffaloes in Dhi-Qar and Al-Muthanna Province. Shubber (2014) recorded five species of *Hyalomma* include: *H. anatolicum*, *H. dromedarii*, *H. excavatum*, *H. scupense*, and *H. turanicum* in the Middle and South of Iraq. This study found mix infestation on a single host, which is consistent with Ahmad *et al.* (2021) who revealed to be infested by one or more species of ectoparasites. These differences could be due to the differences in a mount of samples, or the presence of suitable climates, or movement of animals from one area to another.

According to the sex, the current study, recorded male population (104 specimens) more than females (68 specimens) in terms of infestation. Disagreed with Sayin *et al.* (2003) who revealed to female ticks to have a higher distribution than "male ticks". Aktas *et al.* (2004) also found that the female ticks' population of *Hylomma* species was more than the male tick population. The current study revealed to mix infestation of two species of hard ticks in some regions, this result agrees with Ahmad *et al.* (2021) who cleared this important topic that decreased their level production, due to irritability, anemia, and raising the cattle and buffalo morbidity ratio.

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CONCLUSION

This comprehensive survey provides basic data on the infestation of buffalo by hard ticks species in the areas of abundance of buffaloes in many regions of Center and Southern Iraq as follow: Baghdad (Al Fathelia), Karbala (Al-Hussainia), Wasit (Kut and Al-Suwairah), Al-Qadisia (Al- Diwanayah, Al- Saniya, Al-Mihna-wea, and Afak), Thi Qar (Al-Nasiriyah and Al-chibayish), Missan (Amara and Qalaat Salih) and Basrah (Al-Haretha, Al-Madena and Al-Deer). The current study results revealed to eight species of hard ticks belong to genus *Hyalomma* as: *H. truncatum*, *H. excavatum*, *H. anatolicum*, *H. marginatum*, *H. impeltatum*, *H. rufipes*, *H. scupense*, *H. dromedarii*. As the current results showed that buffaloes are considered a new host for three species of them in Iraq; they are which include the following : *H. truncatum*, *H. impeltatum*, and *H. rufipes*.

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CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

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تشخيص القراد الصلب من الجاموس (*Bubalus bubalis* (Linnaeus, 1758) في العراق

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مركز بحوث و متحف التاريخ الطبيعي / جامعة بغداد، بغداد، العراق

تأريخ الاستلام: 2023/1/14، تأريخ القبول: 2023/3/13، تأريخ النشر: 2023/6/20

الخلاصة

القراد (Acari: Ixodidae) طفيليات خارجية تصيب الماشية في كل منطقة جغرافية في العالم وهي ناقلات للعديد من مسببات الأمراض الفيروسية والبكتيرية والأولية لكل من الحيوانات والبشر. هناك القليل من المعلومات المتاحة حول انواع القراد التي تصيب الجاموس (*Bubalus bubalis* (Linnaeus, 1758) في العراق. حددت الدراسة الحالية أنواع القراد المتطفلة على الجاموس في بعض المناطق الوسطى والجنوبية مثل: بغداد، كربلاء، الكوت، الديوانية، الناصرية، العمارة والبصرة. تم فحص إجمالي 150 جاموس بحثاً عن القراد الصلب وكانت نسبة الإصابة 66.66%. حيث تم عزل 172 عينة من القراد الصلب منها 104 (58.4%) ذكور و 68 (39.53%) اناث. أظهرت النتائج الحالية أن ثمانية أنواع من القراد الصلب تصيب الجاموس تنتهي إلى جنس ال *Hyalomma* على النحو التالي: (*H. truncatum* (50.66%)، *H. excavatum* (24%)، *H. anatolicum* (16%)، *H. marginatum* (8%)، *H. impeltatum* (8%)، *H. rufipes* (5.33%)، *H. scupense* (4%) و *H. dromedarii* (2.66%) على التوالي. كما تمت مناقشة انتشار هذه الأنواع في الجاموس مع دراسات سابقة في العراق والعالم. حيث أن النتائج الحالية تعتبر الجاموس عائل جديد لثلاثة أنواع منها في العراق ضمت: *H. truncatum*، *H. rufipes* و *impeltatum*.