

Some chewing lice (Phthiraptera) species as ectoparasites infested aquatic birds with a new record of three species from Al-Sanaf marsh/ southern Iraq

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Abstract

The present study was carried out to determine additional chewing lice of aquatic birds and additional data on the prevalence of chewing lice in aquatic birds found on the Southern marshes of Iraq. Sixty-nine of different species of aquatic birds were randomly collected and examined for chewing lice in Al-Sanaf marsh, which is located in Thi-Qar province / Southern Iraq, between October 2016 and February 2017, the lice placed in tubes containing 70% ethanol after that they cleared, mounted and identified according to morphological features. Twenty-five (36.23%) out of 69 aquatic birds were infested with chewing lice, a total of six lice species were identified from birds in the current study included *Piagetiella titan* and *Pectinopygus forficulatus* infested White Pelican *Pelecanus onocrotalus*, *Actornithophilus piceus lari* infested Slender-billed Gull *Larus geni*, *Actornithophilus himantopi* infested Black-Winged stilt *Himantopus himantopus*, *Rallicola fulcae* isolated from coot *Fulica atra* and *Rallicola parani* infested moorhen *Gallinula chloropus*. Three lice species: *Pectinopygus forficulatus*, *Rallicola fulcae* and *Rallicola parani* were recorded in current study for the first time in Iraq. We need further investigations of Phthiraptera fauna are very important, not only to complete the list, but also to provide information about parasite-host vector relationships and phylogenetic relation among species.

Keywords: Chewing lice, Aquatic birds, Al-Sanaf marsh, Southern Iraq

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بعض أنواع القمل القارض كطفيليات خارجية متطفلة على الطيور المائية مع تسجيل جديد لثلاثة أنواع من هور السناف/ جنوب العراق

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الخلاصة

أجريت الدراسة الحالية لتسجيل إصابات بالقمل القارض وتحديد نسب الإصابة لأنواع هذا القمل المتطفل على الطيور المائية في أهوار جنوب العراق. تم جمع وفحص تسع وستون طيرا تعود لأنواع مختلفة من الطيور المائية عشوائيا للتحري عن إصابتها بالقمل القارض في هور السناف الواقع في محافظة ذي قار جنوبي العراق خلال المدة بين تشرين الأول ٢٠١٧ الى شباط ٢٠١٨، وضعت عينات القمل في أنابيب تحوي إيثانول ٧٠% بعد ذلك روقت العينات وحملت وشخصت بالاعتماد على صفاتها المظهرية. خمس وعشرون طيرا بنسبة ٣٦,٢٣% من تسع وستون طيرا مائيا مفحوصا كانت مصابة بالقمل القارض وتم عزل ستة أنواع من القمل القارض المتطفل على الطيور في الدراسة الحالية والذي تضمن *Piagetiella titan* و *Pectinopygus forficulatus* من البجع الأبيض *Pelecanus onocrotalus* و *Actornithophilus piceus lari* من النورس مستدق المنقار *Slender-billed Gull Larus geni* و *Actornithophilus himantopi* من الكرسوع أبو مغازل *Himantopus himantopus* و *Rallicola fulcae* عزلت من الغر *Fulica atra* و *Rallicola parani* من هور السناف.

Rallicola parani من دجاج الماء *Gallinule chloropus*. ثلاث أنواع من القمل *Rallicola fulicae* و *Pectinopygus forficulatus* و *Rallicola* سجلت في هذه الدراسة لأول مرة في العراق. إن استكشاف أنواع القمل القارض له أهمية كبيرة ليس فقط لإكمال قائمة الأنواع ولكن أيضاً لمعرفة الحقائق حول العلاقة بين العائل والمضيف وطبيعة النشوء والتطور بين الأنواع.

Introduction

Chewing lice are small wingless insects, that are found as ectoparasites on birds and mammals, they are characterized by their chewing mouth parts (1), and they are permanent obligate ectoparasites feed on feathers and skin scales and cause skin irritation and suck blood, causing decrease in productivity of the host (2), as they deteriorate the quality of the plumage, provoke small holes on feathers, and increase feather breakage (3). Four thousand lice species were recorded on avian species in the world (4), most studies of chewing lice of birds in Iraq were concerned with chewing lice infested domesticated birds as chickens and pigeons (5,6,7). The studies about chewing lice of aquatic birds are very limited. The chewing lice fauna of aquatic birds is almost unknown in Al-Sanaf marsh which located in the western north part of Al-Hammar marsh eastern south of Thi-Qar province /southern Iraq its area is nearly 250 Km², it is used by many aquatic birds such as fish eating-birds, some new records for the aquatic bird louse fauna have been recorded in recent years (8-10).

The present study was carried out to document additional chewing lice of aquatic birds and determination the prevalence of chewing lice in aquatic birds found on the southern marshes of Iraq.

Materials and methods

A total of 69 aquatic birds belonging to five bird species white pelican *P. onocrotalus*, slender-billed gull *L. genei*, black-winged stilt *H. himantopus*, coot *F. atra* and moorhen *G. chloropus* were randomly collected from Al-Sanaf marsh southern Thi-Qar province were examined for the chewing lice infestation. The feathers of each birds were carefully examined, then the birds were placed in nylon bags contain chloroform in cotton pieces for 15 minutes. Then in the laboratory the lice collected and preserved in 70% ethanol, cleared in 10% KOH and washed with distilled water, passed in alcohol series 70, 80, 90 and 99%, mounted on slides in Canada balsam and examined by light microscope (2). The infestation percentage and mean of intensity (11).

Infestation percentage = (number of infested birds / number of examined birds) x 100

Mean of intensity = (number of isolated parasites / number of infested birds)

The identification of the lice species was carried out according to (12-18). The identification of some lice specimens was confirmed by Bilal Dik from Division of Parasitology, Selcuk University, Konya, Turkey. The parasites measured by using light microscope with divided ocular lens and all measurements done in millimeter

Results

Five aquatic bird species were collected from Al-Sanaf marsh and examined, these birds related to three orders and four families (Table 1).

Six different chewing lice species were identified from five aquatic birds: *P. titan* and *P. forficulatus* on white pelican *P. onocrotalus*, *A. piceus lari* on slender-billed gull *L. genei*, *A. himantopi* on black-winged stilt *H. himantopus*, *R. fulicae* on coot *F. atra* and *R. parani* infested moorhen *G. chloropus*. Three lice species *P. forficulatus*, *R. fulicae* and *R. parani* were recorded in the current study for the first time in Iraq (Table 2).

Piagetiella titan

This lice species was isolated from white pelican *P. onocrotalus* (Figure 1).

Pectinopygus forficulatus

This lice species was isolated from white pelican *P. onocrotalus* with prevalence 100% and mean of intensity 53.50 (Figure 2).

The measurements of five males were total body length (3.32-3.54) 3.46 mm, head length (0.66-0.69) 0.67 mm, head width (0.54-0.58) 0.56 mm, thorax length (0.61-0.67) 0.65 mm, thorax width (0.54-0.64) 0.59 mm, abdomen length (2.23-2.60) 2.33 mm, abdomen width (0.71-0.84) 0.80 mm.

Actornithophilus piceus lari

This lice species was isolated from slender-billed gull *L. genei* with prevalence 13.33% and mean of intensity 2.00 (Figure 3).

Actornithophilus himantopi

This lice species was isolated from black-winged stilt *H. himantopus* with prevalence 6.66% and mean of intensity 1.00 (Figure 4).

Table 1: Species of examined aquatic birds for chewing lice in the current study

Order	Family	Common name of bird	Scientific name of bird
Pelecaniformes	Pelecanidae	White Pelican	<i>P. onocrotalus</i>
Charadriiformes	Laridae	Slender-billed Gull	<i>L. genei</i>
	Recurvirostridae	Black-Winged stilt	<i>H. himantopus</i>
Ralliformes	Rallidae	Coot	<i>F. atra</i>
		Moorhen	<i>G. chloropus</i>

Table 2: Aquatic bird species studied, infestation percentage and lice species

Aquatic bird species	No. of examined birds	No. of infested birds	%	Lice species	Mean of intensity
White Pelican <i>P. onocrotalus</i>	2	2	-	<i>P. forficulatus*</i>	-
Slender-billed Gull <i>L. genei</i>	15	2	13.33	<i>A. piceus lari</i>	2.00
Black-Winged stilt <i>H. himantopus</i>	15	1	6.66	<i>A. himantopi</i>	1.00
Coot <i>F. atra</i>	12	7	58.33	<i>R. fulicae*</i>	19.50
Moorhen <i>G. chloropus</i>	25	13	52.00	<i>R. parani*</i>	14.00
Total	69	25	36.23		

* First record in Iraq.

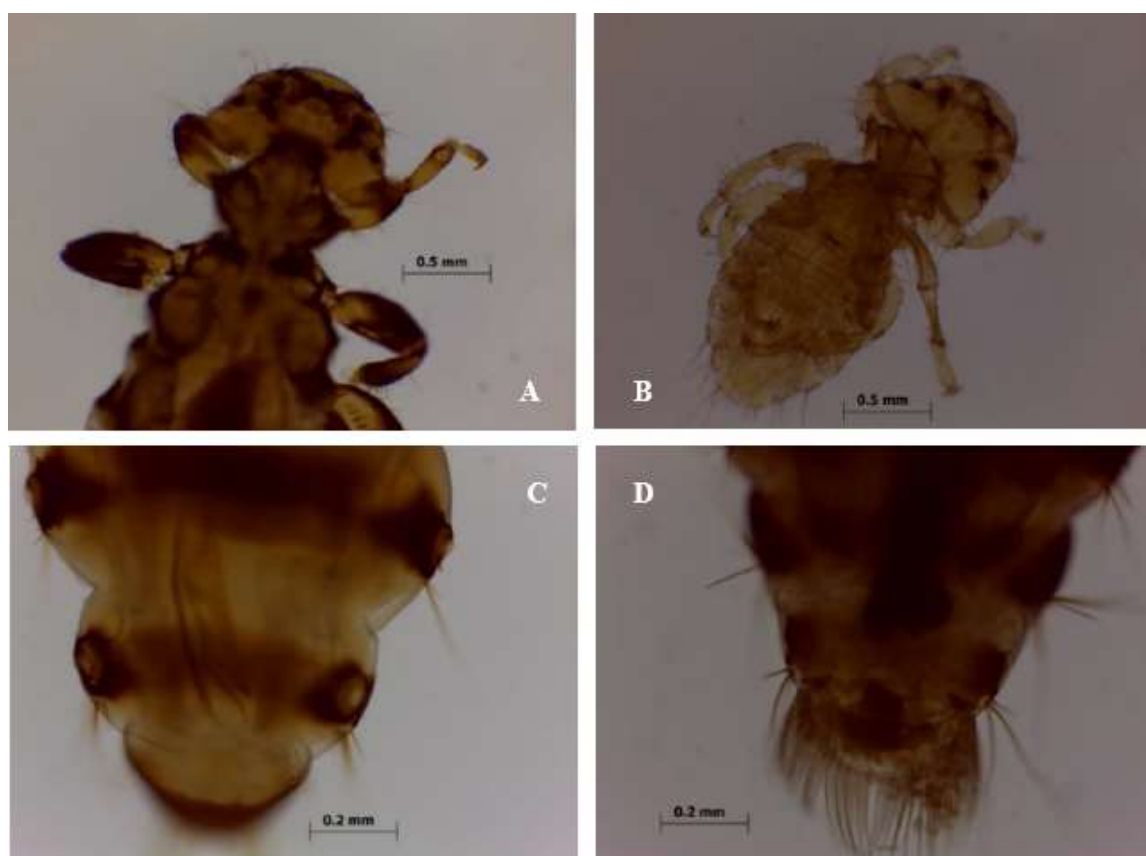


Figure 1: (A) *Piagetiella titan* lice showed anterior end, 40x. (B) larvae, 40x. (C) adult male posterior end, 100x. (D) adult female posterior end, 100x.



Figure 2: (A) *Pectinopygus forficulatus* lice showed adult male, 40x. (B) anterior end, 100x. (C) adult male posterior end, 100x. (D) male genitalia, 400x.



Figure 3: *Actornithophilus piceus lari* showed adult female, 40x.



Figure 4: *Actornithophilus himantopi* showed adult female, 40x.

Rallicola fulicae

This lice species infested *F. atra* with prevalence 58.33% and mean of intensity 19.50 (Figure 5).

The measurements of five males were total body length (1.07-1.25) 1.21mm, head length (0.39-0.49) 0.43 mm, head width (0.31-0.39) 0.33 mm, thorax length (0.20-0.23) 0.21 mm, thorax width (0.29-0.33) 0.32 mm, abdomen length (0.53-0.62) 0.61 mm, abdomen width (0.31-0.45) 0.41 mm. The measurements of five females were total body length (1.13-1.27) 1.25mm, head length (0.40-0.47) 0.42 mm, head width (0.35-0.40) 0.41 mm, thorax length (0.21-0.29) 0.27 mm, thorax width (0.30-0.34) 0.32 mm, abdomen length (0.65-0.70) 0.68 mm, abdomen width (0.45-0.52) 0.50 mm.

Rallicola parani

This species of *Rallicola* genus infested *G. chloropus* with prevalence 52.00 % and mean of intensity 14.00 (Figure 6).

The measurements of five males were total body length (1.53-1.64) 1.61 mm, head length (0.40-0.45) 0.44 mm, head width (0.31-0.36) 0.34 mm, thorax length (0.23-0.28) 0.26 mm, thorax width (0.31-0.34) 0.32 mm, abdomen length (0.89-0.95) 0.94 mm, abdomen width (0.45-0.50) 0.48 mm. The measurements of five females were total body length (1.51-1.58) 1.56 mm, head length (0.41-0.47) 0.44 mm, head width (0.36-0.40) 0.38 mm, thorax length (0.22-0.29) 0.27 mm, thorax width (0.30-0.35) 0.33 mm, abdomen length (0.90-0.96) 0.95 mm, abdomen width (0.46-0.52) 0.50 mm.



Figure 5: (A) *Rallicola fulicae* showed adult male, 100x. (B) Adult female, 100x. (C) Male genitalia, 400x. (D) Female posterior end, 400x.

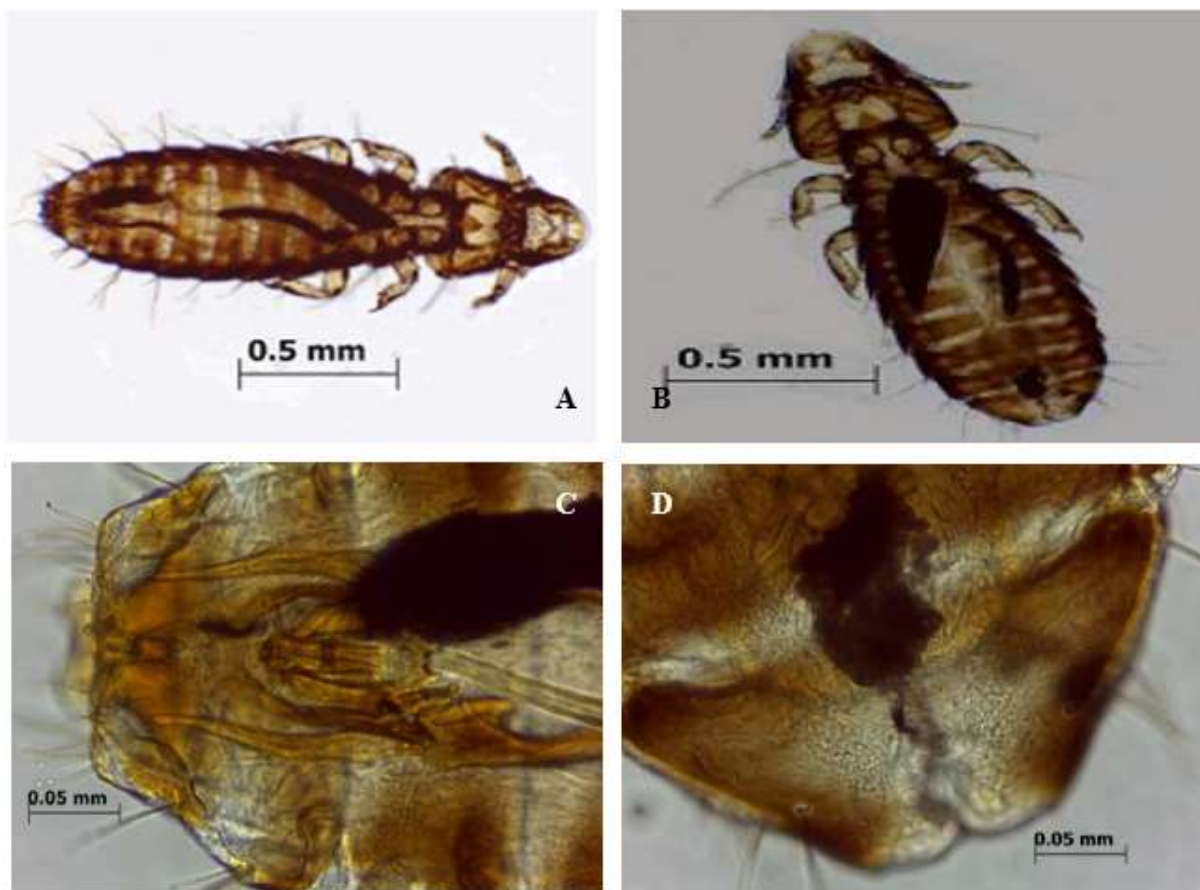


Figure 6: (A) *Rallicola fulicae* showed adult male, 40x. (B) Adult female, 40x. (C) Male genitalia, 400x. (D) Female posterior end, 400x.

Discussion

About 10,711 bird species have been detected in the world (19). The birds in Iraq were very numerous and comprise as many as 385 different species. Among these birds many species of aquatic birds could form an important source of animal protein which can be easily available to marsh people and villagers (20).

The birds infested with different species of ectoparasites which live on skin or feathers permanently or temporary (1). Chewing lice (Phthiraptera: Ichnocera, Amblycera) are obligate ectoparasites, which in general parasitize avian species (4), they had severe effect on birds when they present in large numbers, they can cause feather damage, decrease food consumption, loss body weight, egg production, irritation, restlessness and they can effect on birds indirectly by serving as vector or intermediate hosts of other pathogens as bacteria, viruses, fungi and some helminths (1).

The studies on chewing lice of aquatic birds in Iraq are very limited, therefore the studies on the lice have a big potential for new discoveries to investigate and identify

louse species on aquatic birds and provide data on the chewing lice list. Mohammad (8) recorded *Laemobothrion atrum* on *F. atra* birds, *Ciconiphilus decimfasciatus* on three aquatic bird species *Egretta garzetta*, *Bubulcus ibis* and *Ardeola ralloides*, *Pseudomenopon pilosum* lice on *F. atra* and *G. chloropus* birds, *Ibidoecus bisignatus* lice on *Plegadis falcinellus* birds, *Fulicoffula gallinule* lice on *G. chloropus* birds, *Fulicoffula lurida* lice on *F. atra* birds, *Saemundssonina lari* lice on three aquatic bird species: *L. genei*, *Larus ichthyaetus* and *Larus ridibundus*, *Ardeicola raphidius* lice on *P. falcinellus* birds, *Ardeicola goisagi* lice on *Nycticorax nycticorax* birds, *Quadriceps punctatus punctatus* lice on three aquatic bird species *L. genei*, *L. ichthyaetus* and *L. ridibundus*, *Anaticola crassicornis* and *Anatoecus icterodes* lice on *Anas clypeata* birds.

Four different species of chewing lice related to Menoponidae family have been recorded from Iraq for the first time *A. piceus lari* isolated from *L. genei* birds, *A. himantopi* and *Austromenopon himantopi* infested *H. himantopus* birds, *Colpocephalum leptopygos* isolated from *P. falcinellus* birds (9).

Piagetiella titan isolated from the oral cavity of white pelican *Pelecanus onocrotalus* by Mohammad (10). Three species of chewing lice were recorded for the first time in Iraq during the current study including: *Pectinopygus forficulatus* on White Pelican *P. onocrotalus*, *Rallicola fulicae* on coot *F. atra* and *Rallicola parani* on moorhen *G. chloropus*.

In Iraq *P. titan* lice were isolated from buccal cavity of white pelican by Mohammad (10) and in the present study *P. titan* lice were isolated from buccal cavity and *P. forficulatus* isolated from feathers of the same host. *Piagetiella titan*, are the most common lice species on great white pelican and these two species (*P. titan* and *P. forficulatus*) have been reported on great white pelican previously in Turkey (21) and *P. forficulatus* reported on feathers of white pelican by Dik and Uslu (22-23). The measurements of *P. forficulatus* males agreed with other studies as Dik and Uslu (22).

In the current study two species related to the genus *Rallicola* were isolated, Harrison (24) revealed that the genus *Rallicola* was small to moderate lice in size and had characteristic genitalia with straight (rarely curved) divergent parameres had two small lobes at their bases and a solid median portion, this genus was confined to the Rallidae and it found upon all genera from the large forms such as *Fulica*, *Prophyrio*, *Aramus* and *Ocydromus* down to small species of *Rallus* and *Porzana*.

Rekasi (25) and Vas *et al* (26) reported that the *R. fulicae* infested *F. atra* in Hungary. This lice species isolated in Romania from *F. atra* by Rekasi and Kiss (27-29) and from both *F. atra* and *F. cristata* (Gruiformes: Rallidae) by *R. fulicae* recorded in *F. atra* in Turkey by Dik *et al* (2), Western Australia by Stranger and Palma (30), Denmark by Palma and Jensen (31). Rekasi and Kiss (27) reported that the *Rallicola minutus* infested *G. chloropus* in Romania, while (26) reported that the *R. parani* infested *G. chloropus* in Hungary.

Conclusion

In Iraq further investigations of Phthiraptera fauna are very important, not only to complete the list, but also to provide information about parasite-host vector relationships and phylogenetic relation among species.

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