

Original Article



Diversity of Chewing Lice on Swampen Birds (*Porphyrio porphyrio*) in Al-Diwaniyah City, Iraq

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Abstract

Introduction: Chewing lice are common bird ectoparasites and can have substantial impacts on their host's health, behavior, and ecology. The swampen (*Porphyrio porphyrio*) is a wetland bird species in Iraq, but data on the chewing lice infesting these birds are lacking; thus, this study was conducted to identify and morphologically characterize the chewing lice infesting *P. porphyrio* in Al-Diwaniyah city, Iraq.

Methods: Seventy-eight birds (35 males and 43 females) were examined for chewing lice using standard parasitological techniques. Lice samples were collected, identified using a taxonomic key, and the distribution patterns and infestation rates among hosts were analyzed.

Results: The prevalence of infestation was 62.82%. Five species of lice were described, *Incidifrons fulicae*, *Rallicola porphyroides*, *Fulicoffula gallinulae*, *Ardeicola* sp., and *Pseudomenopon pilosum*. Infestation prevalence was higher in females (65.11%) than in males (60%), which may be attributed to physiological and behavioral factors, such as incubation and hormonal activity. Pattern infestations were observed with single-species infestation in 24 birds, double-species infestation in 18 birds, and triple infestation in 7 birds, suggesting a complex host-parasite relationship.

Conclusion: The present study documents chewing lice infesting *P. porphyrio* birds in Al-Diwaniyah city wetlands and emphasizes the ecological and health importance of these infestations. Periodic surveillance of avian ectoparasites in ecologically sensitive wetlands is advocated to provide broader insights into their significance for biodiversity conservation and the management of bird health.

Keywords: *Porphyrio porphyrio*, Chewing lice, Al-Diwaniyah city, Iraq

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Introduction

The swampen (*Porphyrio porphyrio*) is a distinctive waterbird belonging to the Rallidae family, widely distributed across wetlands, marshes, and reed beds worldwide. In Iraq, this species inhabits marshlands and freshwater ecosystems, particularly in Al-Diwaniyah city, where wetlands provide vital breeding and foraging grounds. *P. porphyrio* is recognized for its vivid purplish-blue plumage, robust red bill and frontal shield, and long reddish legs, adaptations that enable it to navigate dense aquatic vegetation and shallow waters efficiently. The bird exhibits complex behaviors, including strong territoriality during breeding, communal roosting, and a diet that ranges from plant matter to small aquatic organisms, reflecting its ecological importance in wetland environments (1).

Among the threats facing swampen bird populations are infestations by ectoparasites, notably chewing lice, which are permanent, host-specific parasites that complete their entire life cycle on the host's body. Chewing lice possess specialized mouthparts adapted for biting and feeding on feathers, skin debris, and, in some instances, blood exudates. Their presence can lead to a range of pathological effects, including feather damage,

skin irritation, dermatitis, and reduced thermoregulatory efficiency, which in turn may compromise the bird's physical fitness, reproductive success, and ability to evade predators (2). In cases of heavy infestation, chewing lice can also predispose birds to secondary infections and contribute to declines in overall health (3). Additionally, infested birds often display altered behaviors, such as increased preening, restlessness, and distraction from essential activities such as foraging or nesting (4).

Despite the ecological importance of swampen birds and the potential health effects of chewing lice, to my knowledge, no studies have examined the ectoparasites of these birds in Iraq. Therefore, this study aims to isolate and identify the chewing lice parasitizing these birds, morphologically describe each species, document the prevalence of infestation among males and females, and elucidate patterns of infestation involving single and mixed species.

Materials and Methods

A total of 78 swampen individuals, including 35 males and 43 females, were captured from the wetlands of Al-Diwaniyah city, Iraq, between September 2024 and March 2025. The birds were caught using mist nets and handled in



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accordance with ethical guidelines to minimize stress and harm. Each bird was placed in a clean containment unit.

Visual inspection was conducted by parting feathers manually, especially in the breast, flank, and vent regions, where lice commonly reside. Lice were gently collected with fine tipped forceps and immediately preserved in 70% ethanol. For morphological examination, specimens were cleared in 10% KOH solution, dehydrated through an ethanol series (5), and mounted on slides and examined under a light microscope.

Identification was performed using morphological features such as head shape, antennae segmentation, thoracic and abdominal sclerites, and mandible structure, which were used as primary taxonomic characters (6).

The infestation rate was calculated as the percentage of parasitized birds among the total number of birds examined. Infestations were further classified by the number of louse species per bird into single-species, dual-species, and triple-species infestations. Sex-related differences in infestation were analyzed descriptively (7).

Results

A total of 78 individuals of swamphen birds, including 35 males and 43 females, were examined for the presence of chewing lice. The examination revealed that 49 birds were infested, representing an infestation rate of 62.82%. Five different species of chewing lice were identified in Table 1 and Figures 1-5.

Detailed Morphological Description of the Isolated Chewing Lice Species

Incidifrons Fulicae

The body length ranges from approximately 1.8 to 2.2

mm, classifying it as a medium-sized species of chewing louse within its genus. The head is sub-trapezoidal, broad across the temples, which are notably widened laterally an adaptation believed to increase mandible leverage during feeding. The antennae are five-segmented; in males, the third segment is distinctly enlarged, possibly serving a role in mating or host detection. The mandibles are heavily constructed and robust, typical of ischnoceran lice that



Figure 2. *Rallicola porphyrioides*(40x)



Figure 3. *Fulicoffula gallinulae* (40x)



Figure 4. *Ardeicola* sp. (40x)



Figure 1. *Incidifrons fulicae* (40x)



Figure 5. *Pseudomenopon pilosum* (40x)

Table 1. Distribution of chewing lice species isolated from swamphen birds

Scientific Name	Number of Infested Birds	Prevalence (%)
<i>Incidifrons fulicae</i>	14	28.57
<i>Rallicola porphyrioides</i>	12	24.48
<i>Fulicoffula gallinulae</i>	10	20.40
<i>Ardeicola</i> sp.	8	16.32
<i>Pseudomenopon pilosum</i>	5	10.20

feed on feather debris and skin. The prothorax is slender, while the meso- and metathorax are broader and heavily sclerotized, providing attachment support. The abdomen is oval, with eight pairs of long lateral setae—one pair on each side of tergites II to IX—and a denser concentration toward the anterior segments, likely enhancing anchorage on the host's feathers. This species prefers to inhabit the ventral and lateral areas of the host, especially the breast and flanks, where dense feathers provide optimal concealment and feeding conditions.

Rallicola Porphyrioides

The adult is (1.6-2.0 mm) in length. Its head is elongated with the lateral margins almost parallel; its temples are narrow and rounded. The anterior margin is straight or slightly concave, and in keeping with the adaptation to travel between feather shafts. The antennae are five segmented and characterized by little sexual dimorphism. The thoracic segments are all fused into a continuous, considerably sclerotized dorsal plate, which increases the body's rigidity during movement. The abdomen is cylindrical with incision late tergites and 6-7 pairs of rather long, slender lateral setae (on tergites III, V, VIII), aiding in stabilization between the feather barbs. The species is mainly associated with ornamental feathers and the plumage of the wing, especially at the bases of the feathering, where it receives protection and a suitable food source.

Fulicoffula Gallinulae

The size of the adult is (1.4 to 1.8 mm). The head is short and broad, and the temples are rounded, with an anterior margin that is straight or slightly convex, which is morphological to enable the attachment to a firm surface close to the skin. The antennae are not very long and are equal in males and females. Prothorax is slender compared to the more meso- and metathorax, which are rectangular in shape and wider to allow a stronger articulation point of the legs. It is broadest in the middle region of the body, it bears 7-8 pairs of fine lateral setae on tergites III to IX, these variously augmented with serried marginal setae on tergal plates. Such patterns in the setae probably enable safe placement in plumage. The species occur in the areas of greatest comfort and security ventral plumage, the underside of the wing, and the breast.

Ardeicola sp.

Adult forms of the discussed species reach a length of 1.5-1.9 mm. The extremity of the head is peculiarly long and narrow. It has very nearly parallel sides, with a decided furrow at the temples, peculiarities of structure which fit it to pass between closely appressed feather barbs. The front margin is rounded. Antennae are five-segmented, slender, and even the third segment, which is of exceptional length, is somehow believed to increase the sensitivity of touch.

The prothorax shows a great narrowness. The abdomen is slender, elongated, and has five to six pairs of short spine-like lateral setae, which are predominant on tergites 2 to 7. It is suspected that these scaled setae reduce friction when moving in avian feathers. Solely adjusted to primary and secondary wing feathers, the species lives along the rachis, remains hidden, and eats unmolested.

Pseudomenopon Pilosum

This is the largest of the isolated lineages, and the full-grown specimens are at an average of (2.0-25 mm). Its head is rectangular and enlarged, with straight lateral margins, and its mandibles are highly chewing-adapted. The 5-segment antennae have gracious sexual dimorphism. The thorax is sub-quadrate and wide, providing a solid foundation, and the legs are fastened to it. The abdomen is firm and extensively sclerotized, with thick, rough lateral setae, up to 10 pairs on tergites II-IX, especially at the distal segments. This setting is thought to help with anchorage in downy feather areas. The species is found throughout the host, particularly in the feather areas, where it is abundant, hides well, and feeds efficiently.

Infestation Rate by Bird Sex

The thorough examination of 78 swampen birds (35 males and 43 females) revealed that 49 individuals (62.82%) were infested with chewing lice. The infestation rates for males and females were 60% and 65.11%, respectively. They are reported in Table 2.

Infestation Pattern

Infestation patterns observed among individuals in a population of 78 parasitized swampen birds were heterogeneous, with infestations unevenly distributed across louse species. A total of 24 individuals (48.97%) were infested with one species, 18 (36.73 %) had dual-species infestations, and 7 (14.28 %) had triple-species infestations, as shown in Table 3.

Discussion

In the current study, the infestation rate of chewing lice

Table 2. The prevalence of chewing lice according to the sex of the bird

Sex	No. examined	No. infested	(%)
Males	35	21	60
Females	43	28	65.11
Total	78	49	62.82

Table 3. Pattern of lice infestation in the examined birds

Infestation Type	N0. infested	(%)
Single-species	24	48.97
Dual-species	18	36.73
Triple-species	7	14.28

in swampen birds in the wetlands of Al-Diwaniyah city, Iraq, was significantly high (62.82%). This is higher than the prevalence (45%) reported for a similar species isolated in northern India by (8) and its lower than the (27.70%) reported by Songsaeng in Thailand, who investigated ectoparasites in seven species of water birds, including *Porphyrio porphyrio*. In that study, four species of chewing lice were identified: *Menacanthus stramineus*, *Menacanthus pallidulus*, *Eshiopterus* sp., and *Philopterus* sp.(9). These regional differences could be explained by ecological differentiation, bird density, sampling time, and the severity of wetland degradation. In the current study, the high incidence is likely due to the combined effects of environmental factors, such as high humidity, dense vegetation, and the congregation of these birds, which provide favorable conditions for ectoparasite transmission. Furthermore, ground foraging and prolonged nesting in dense reed beds are other features of the behavioral ecology of these birds that could contribute to their increased susceptibility to ectoparasites.

Five species of chewing louse were determined in the current study: *Incidifrons fulicae*, *Rallicola porphyrioides*, *Fulicoffula gallinulae*, *Ardeicola* sp., and *Pseudomenopon pilosum*. These findings are consistent with global data on rallid birds; hence, confirming the specificity of host adherence to the genus *Rallicola porphyrioides*, which is known to be associated with *Porphyrio porphyrio*, and further reinforcing host fidelity (6). On the other hand, *Pseudomenopon pilosum*, with a wide host range and being able to parasitize a variety of avian families, implies the potential ecological flexibility of the parasite and goes hand in hand with previous records of it infesting *Egretta garzetta* in Iraq (10), thus potentially being relevant to interspecific transmission under the shared wetland conditions. Equally, finding *Ardeicola* sp. can indicate, on the one hand, an incidental transfer, and, on the other hand, a weak host-parasite association. The diversity of lice on *P. porphyrio* in the current study is moderate by comparison; records report up to six species in mixed assemblages on *Porphyrio madagascariensis* in South Africa (11), versus the two species observed on Rallidae in Hungary (12). The variation can be caused by host phylogeny, migration patterns, or environmental factors, judging by what is observed.

Infestation prevalence varied by sex, with females having a higher prevalence (65.11%) than males (60%). Such an observation aligns with a broader trend of female-biased ectoparasitism in birds, identified by (13) and (14), and various biological factors may contribute to this disparity. Females are more likely to sit on nests during the breeding season and thus spend less time preening, thereby increasing their exposure to ectoparasites. Also, hormonal changes, especially an increase in estrogen levels, can suppress immune responses; therefore, females are more likely to be infected. These physiological and

behavioral traits may act additively to inflate the parasite load in the female.

Regarding the infestations pattern, single infestations were most common in birds, followed by double infestations and then triple infestations. The current results support the findings of (15-17) who observed that single infestation were more common than mixed infestations, a phenomenon linked to competitive influences between parasites. Mixed infestations may also be due to birds being collected during the winter, when temperatures were lower, and to the lice's need for warmth and body heat to complete their life cycle. In addition, the communal nature of birds living in groups facilitates the spread of lice between individuals. Furthermore, weakened immunity following infestation with one type of louse may increase the incidence of infestation with other types (18-22).

Conclusion

This study provides the first comprehensive record of chewing lice infesting the swampen (*Porphyrio porphyrio*) in Al-Diwaniyah wetlands, revealing a notably high infestation prevalence of 62.82%. The identification of five lice species underscores the ecological suitability of this bird as a host and reflects a diverse ectoparasitic community within its habitat.

The higher infestation rates in females suggest that behavioral and physiological factors, particularly incubation duties and hormonal activity, may increase vulnerability to lice. Moreover, the presence of single, double, and triple species infestations indicates a complex parasitic structure shaped by host ecology and interspecific interactions among lice.

These findings highlight the importance of sustained monitoring of avian ectoparasites in wetland ecosystems, both to deepen understanding of parasite biodiversity and to support effective conservation and bird-health management strategies.

Competing Interests

The author declares that he has no competing interests.

Ethical Approval

Not applicable.

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