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Investigation of ectoparasites on domestic pigeon (*Columba livia domestica*) in Karbala province, Iraq

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Ectoparasitic arthropods inhabiting the skin or feathers of avian hosts utilize them for shelter and sustenance, considerably affecting animal health and flock productivity. This study investigated the prevalence, diversity, and intensity indices of ectoparasites infesting domestic pigeons (*Columba livia domestica*) in Karbala Province, Iraq. The survey was conducted from January 2025 to June 2025 across five districts representing northern, central, and southern geographical zones. A total of 100 domestic pigeons, comprising 63 males and 37 females, were purchased from local markets and clinically examined. Ectoparasites were collected manually, preserved in 70 % ethyl alcohol, cleared in 10 % potassium hydroxide solution, mounted in Canada balsam, and morphologically identified under a digital stereomicroscope. A total of 481 ectoparasites were collected from the 100 pigeons, revealing an exceptionally high overall prevalence of 99 % and a mean abundance of 4.81 parasites per bird. Seven distinct chewing lice species were identified within the recovered parasitic community, which was significantly dominated by *Campanulotes bidentatus* (54.89 %), followed by *Hohorstiella lata* (23.91 %) and *Columbicola columbae* (17.26 %). The remaining species included *Columbicola tschulyschman* (0.83 %), *Columbicola bidentatus* (0.42 %), *Myrsidea* sp. (2.49 %), and *Colpocephalum turbinatum* (0.21 %). Statistical analysis via the Chi-square test revealed no significant association between ectoparasite prevalence and host sex ($\chi^2 = 1.72$; $P = 0.19$). Multiple-species infestations were highly common, with 63 % of the pigeons harboring more than one ectoparasite species, distributed as single (34 %), double (44 %), and triple (19 %) infections. The calculated mean intensity varied among species, with *Hohorstiella lata* (8.214) and *Campanulotes bidentatus* (6.947) displaying the highest values. Clinically, infested pigeons exhibited poor, rough feather conditions and restlessness. These findings demonstrate that domestic pigeons in Karbala serve as major reservoirs for diverse chewing lice, highlighting the potential risks for parasite transmission to other avian hosts, including poultry. Consequently, there is an immediate need to enhance local management practices through regular ectoparasiticide applications, improved loft sanitation, and periodic surveillance to effectively protect avian health.

Keywords: chewing lice, ectoparasites, Iraq, prevalence, pigeon health, *Columba livia domestica*.

Дослідження ектопаразитів домашнього голуба (*Columba livia domestica*) у провінції Кербела, Ірак

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Ектопаразитарні членистоногі, які заселяють шкіру або пір'я птахів-господарів, використовують їх як притулок і джерело живлення, що суттєво впливає на здоров'я тварин і продуктивність. У цьому дослідженні вивчали поширеність, видове різноманіття та індекси інтенсивності ектопаразитів, які інвазують домашніх голубів (*Columba livia domestica*) у провінції Кербела, Ірак. Моніторинг проводили з січня по червень 2025 року в п'яти районах, що представляють північні, центральні та південні географічні зони. Загалом було придбано на місцевих ринках та клінічно обстежено 100 домашніх голубів, серед яких було 63 самці та 37 самок. Ектопаразитів збирали вручну, консервували у 70 %-му етиловому спирті, просвітлювали у 10 %-му розчині гідроксиду калію, монтували в канадський бальзам та ідентифікували за морфологічними ознаками під цифровим стереомікроскопом. Усього від 100 голубів було зібрано 481 ектопаразита, що засвідчило надзвичайно високу загальну поширеність інвазії на рівні 99 % за середнього показника ураженості 4,81 паразита на одного птаха. У структурі виявленого паразитоценозу ідентифіковано сім окремих видів пухоїдів, серед яких суттєво домінував *Campanulotes bidentatus* (54,89 %), на другому місці за чисельністю був *Hohorstiella lata* (23,91 %), на третьому – *Columbicola columbae* (17,26 %). Решта видів була представлена *Columbicola tschulyschman* (0,83 %), *Columbicola bidentatus* (0,42 %), *Myrsidea* sp. (2,49 %) та *Colpocephalum turbinatum* (0,21 %). Статистичний аналіз за допомогою критерію Хі-квадрат не виявив вірогідного зв'язку між поширеністю ектопаразитів та статтю господаря ($\chi^2 = 1,72$; $P = 0,19$). Поліінвазії (змішані інвазії) були дуже поширеними: 63 % голубів мали одночасно більше одного виду ектопаразитів, які розподілялися на моноінвазії (34 %), двокомпонентні (44 %) та трикомпонентні (19 %) інвазії. Розрахована середня інтенсивність варіювала залежно від виду паразитів, причому найвищі значення зафіксовано для *H. lata* (8,214) та *C. bidentatus* (6,947). Клінічно в інвазованих голубів відзначали незадовільний, скуйовджений стан пір'яного покриву та підвищену збудливість. Отримані результати свідчать про те, що домашні голуби в Кербелі слугують потужним резервуаром для різноманітних пухоїдів, що створює потенційні ризики передачі паразитів іншим видам птахів, зокрема комерційним. Відповідно, існує нагальна потреба в удосконаленні місцевих методів ведення голубівництва шляхом регулярного застосування ектопаразитицидів, покращення санітарного стану місць їх утримання та проведення періодичного моніторингу для забезпечення ефективного захисту здоров'я птахів у регіоні.

Ключові слова: пухоїди, ектопаразити, Ірак, поширеність, здоров'я голубів, *Columba livia domestica*.

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Introduction

Ectoparasites, especially chewing lice (Phthiraptera: Amblycera and Ischnocera), are among the most common parasites affecting pigeons worldwide. These organisms are obligate and permanent ectoparasites, completing their entire life cycle directly on the host. Infestations can cause severe irritation, feather destruction, anemia, reduced fitness, and impaired welfare, particularly under poor hygienic and suboptimal management conditions [1, 2].

Several chewing lice genera, including *Campanulotes*, *Hohorstiella*, and *Columbicola*, have been widely reported in pigeons across different geographical regions. The prevalence and intensity of these infestations are influenced by multiple factors, such as host age, sex, season, environmental conditions, and husbandry practices [3, 4]. Furthermore, domestic pigeons may act as reservoirs for ectoparasites that can readily spread to other avian species, including commercial poultry, thereby raising important economic and veterinary concerns [5, 6].

Avian hosts are seriously affected by ectoparasites, which are well-known to cause nuisance, anemia, and general debility. Many of these parasites play an important role as vectors in the transmission of a wide range of infectious diseases. Consequently, ectoparasitic infestations lead to slowed growth rates, emaciation, a loss in productivity, and increased susceptibility to other infectious illnesses. Moreover, the costs associated with treatment and prevention create a significant economic burden and might eventually result in a higher mortality rate among the pigeons [7, 8].

Several studies have documented a high prevalence of ectoparasitic infestations in domestic pigeons across Asia, Africa, and South America, often exceeding 70–100 % [9–13]. Mixed infestations involving multiple lice species are commonly reported, indicating favorable ecological conditions for parasite survival and transmission [8, 14]. Despite this global evidence, significant regional variations in parasite diversity and infestation patterns remain poorly understood, particularly in Middle Eastern countries.

In Iraq, information regarding the ectoparasites of domestic pigeons remains limited and fragmented, with most available studies restricted to specific localities or small sample sizes [15–17]. In Karbala Province, comprehensive and updated data on the prevalence, species composition, and infestation intensity of chewing lice in domestic pigeons are notably lacking, despite the widespread practice of pigeon keeping. Previous studies in the region have reported high infestation rates and the presence of multiple lice species, including newly recorded species in both domestic pigeons and migratory birds [18, 19], emphasizing the need for continued surveillance.

The aim of the study

Therefore, the present study aimed to investigate the prevalence, diversity, and infestation indices of ectoparasites affecting domestic pigeons (*Columba livia domestica*) in Karbala Province, Iraq. Understanding the ectoparasite fauna and infestation dynamics is essential for improving pigeon health, developing effective local control strategies, and reducing the risk of parasite transmission to other avian hosts.

Materials and methods

Study location

The study was conducted in Karbala Governorate, a major city in central Iraq located approximately 100–105 km southwest of Baghdad, near the Euphrates River. Karbala serves as the administrative capital of the governorate. Five regions were randomly selected across three geographical zones of the governorate: the northern zone (Al-Hur and Al-Hussainiya), the central zone (Karbala city center), and the southern zone (Al-Hindiya and Ayn Tamr).

Study design and Collection

A multi-stage sampling strategy was used for bird sampling from five districts of Karbala Province, Iraq, extending from January 2025 till June 2025. Five sites were selected from each district for bird sampling. The sites selected for rock pigeon sampling included urban areas, agricultural areas, industrial areas, and rural areas. Three birds were purchased from different markets resulting in collected samples from each district, with a total of 100 birds from five districts. Data related to health status (healthy/weak) and sex (male/female) were also recorded [20].

Ectoparasites identification

The live birds were examined using the naked eye for the collection and quantification of ectoparasite loads by following the methods previously described [21]. The chewing lice were collected using forceps and placed in capped tubes containing 70 % ethyl alcohol, with the tubes numbered to match the corresponding bird. Next, the lice were transferred to a 10 % potassium hydroxide (KOH) solution and kept for 24–48 hours until they became transparent. Then, they were washed with distilled water, passed through a graded alcohol series of 70–99 %, and mounted onto slides using Canada balsam.

The specimens were examined under a microscope [21], followed by their identification based on morphological characteristics using established identification keys [20] under a stereomicroscope (×400: Dino-Lite USB Digital Microscope AM7115MZT, magnification: 10×–220×, resolution: 5.0 Megapixels).

Statistical analysis

The resulting data were analyzed using the SPSS statistical software (version 20). The prevalence, health status in relation to sex, intensity, mean abundance, relative abundance, and mean intensity with standard error were described.

Results and discussion

A total of 100 pigeons were examined (63 males and 37 females). The overall prevalence of ectoparasite infection was 99 %, with 99 birds found infected and only

1 bird uninfected. The types of ectoparasites identified are *Campanulotes bidentatus*, *Colpocephalum turbinatum*, *Columbicola bidentatus*, *Columbicola columbae*, *Columbicola tschulyschman*, *Hohorstiella lata*, and *Myrsidea* sp. Male pigeons showed a prevalence of 100 % (63/63), whereas females recorded 97.3 % (36/37).

The associations between parasitic prevalence and different factors (health status, sex) were determined using the Chi-square test with the help of SPSS Version 20.0. The level of significance was set at $P \leq 0.05$. The chi-square test showed no statistically significant association between infection status and sex ($\chi^2 = 1.72$; P-value = 0.19), as detailed in ***Table 1***.

Table 1
Prevalence of ectoparasitic infestation in domestic pigeons based on host sex

Host Infection Status	Male (n=63)	Female (n=37)	Total (n=100)
Infected			
- Number of birds	63	36	99
- Proportion (%)	63.60	36.40	100.00
Non-infected			
- Number of birds	0	1	1
- Proportion (%)	0.00	100.00	100.00
Total			
- Number of birds	63	37	100
- Proportion (%)	63.00	37.00	100.00
Statistical Analysis	$\chi^2 = 1.72$	P-value = 0.19	

Mean Parasite Abundance and Infestation Structure were comprehensively evaluated. A total of 481 ectoparasites were collected from the 100 examined pigeons, giving an overall mean abundance of 4.81 parasites/bird. Multiple-species infestations were highly common among the sampled population, with 63 % of the birds harboring more than one ectoparasite species simultaneously. The complete breakdown of the infestation characteristics, including single, double, and triple infection rates, is consolidated in ***Table 2***.

Table 2
General characteristics and structure of ectoparasitic infestation in domestic pigeons (n=100)

Epizootic Parameter	Value / Distribution
Total number of collected parasites	481
Overall mean abundance (parasites/bird)	4.81
Infestation type distribution:	
- Single infection	34%
- Double infection	44%
- Triple infection	19%
Multiple-species infestation rate (≥ 2 species)	63%

Regarding the Parasite Species Composition, seven ectoparasite species were identified. *C. bidentatus* was the most prevalent species (54.89 %), followed by *H. lata* (23.91 %) and *C. columbae* (17.26 %). Complete data regarding the number and prevalence of ectoparasites by host sex are presented in ***Table 3***.

The epizootic indices calculated for each isolated chewing lice species are displayed in ***Table 4***. The overall mean intensity reached 4.859±0.371 parasites per infested bird. The highest mean intensity levels were recorded for *H. lata* (8.214) and *C. bidentatus* (6.947).

Table 3
Species composition, abundance, and sex-based distribution of ectoparasites collected from domestic pigeons

No	Parasite type	Male (No)	%	Female (No)	%	Total (No)	%
1	*Campanulotes bidentatus*	127	53.59	137	56.15	264	54.89
2	*Colpocephalum turbinatum*	1	0.42	0	0.00	1	0.21
3	*Columbicola bidentatus*	2	0.84	0	0.00	2	0.42
4	*Columbicola columbae*	30	12.66	53	21.72	83	17.26
5	*Columbicola tschulyschman*	3	1.27	1	0.41	4	0.83
6	*Hohorstiella lata*	64	27.00	51	20.90	115	23.91
7	*Myrsidea* sp.	10	4.22	2	0.82	12	2.49
	Total	237	100	244	100	481	100

Table 4
Epizootiologic indices and infestation intensity of identified ectoparasite species

No	Parasite Type	Total Parasites	Infected Hosts	Relative Abundance (%)	Mean Intensity ± SE
1	*Campanulotes bidentatus*	264	38	54.89	6.947±0.520
2	*Colpocephalum turbinatum*	1	1	0.21	1.000±0.200
3	*Columbicola bidentatus*	2	2	0.42	1.000 ± 0.141
4	*Columbicola columbae*	83	40	17.26	2.075±0.195
5	*Columbicola tschulyschman*	4	2	0.83	2.000±0.235
6	*Hohorstiella lata*	115	14	23.91	8.214±0.318
7	*Myrsidea* sp.	12	2	2.49	6.000±0.370
	Total	481	99	100	4.859±0.371

The taxonomic verification of the recovered lice communities was supported by digital microscopy. Key diagnostic structures and gender-specific traits of *H. lata* are illustrated in ***Figure 1***, showcasing distinct morphological differences between the male and female specimens.

Similarly, the most dominant chewing louse found in this study, *C. bidentatus*, was morphologically analyzed to confirm identification. ***Figure 2*** illustrates the visual documentation of both male and female structures for this species.

Furthermore, representatives of the genus *Columbicola* were verified, with *Columbicola columbae* being heavily represented. The typical elongated body contours and sexual dimorphism traits of *Columbicola columbae* are captured in ***Figure 3***.

The relatively rare species *Colpocephalum turbinatum* was also morphologically assessed, with its distinctive body markers and specialized structures for both female and male specimens depicted in ***Figure 4***.

Additionally, another species of the same genus, *Columbicola tschulyschman*, was morphologically examined. The distinct visual profiles and gender-specific traits of both male and female individuals of *Columbicola tschulyschman* are documented in ***Figure 5***.

Finally, the recovered specimens of *Myrsidea* sp. were analyzed under the Dino-Lite digital microscope, showing characteristic broad abdominal segments. The specific appearance of the male and female individuals is detailed in ***Figure 6***.

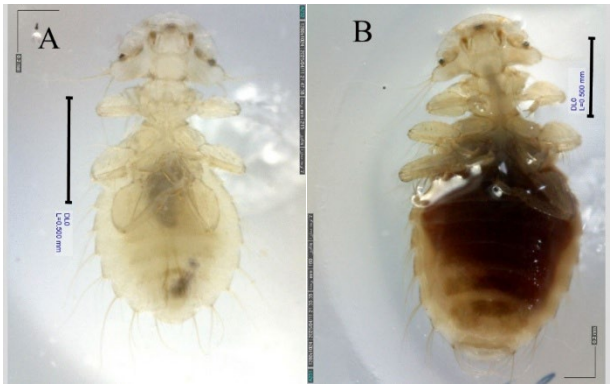

Figure 1. Morphological features of *Hohorstiella lata* collected from domestic pigeons in Karbala Province, Iraq: A – male; B – female. Scale bar = 0.500 mm.

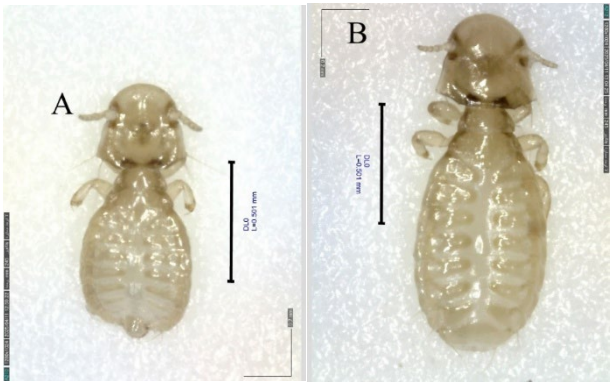

Figure 2. Morphological features of *Campanulotes bidentatus* collected from domestic pigeons in Karbala Province, Iraq: A – male; B – female. Scale bar = 0.501 mm.

Figure 3. Morphological features of *Columbicola columbae* collected from domestic pigeons in Karbala Province, Iraq: A – male; B – female. Scale bar = 0.501 mm.

Figure 4. Morphological features of *Columbicola turbinatum* collected from domestic pigeons in Karbala Province, Iraq: A – female (Scale bar = 0.900 mm); B – male (Scale bar = 1.002 mm).

Figure 5. Morphological features of *Columbicola tschulyschman* collected from domestic pigeons in Karbala Province, Iraq: A – male (Scale bar = 0.531 mm); B – female (Scale bar = 0.531 mm).

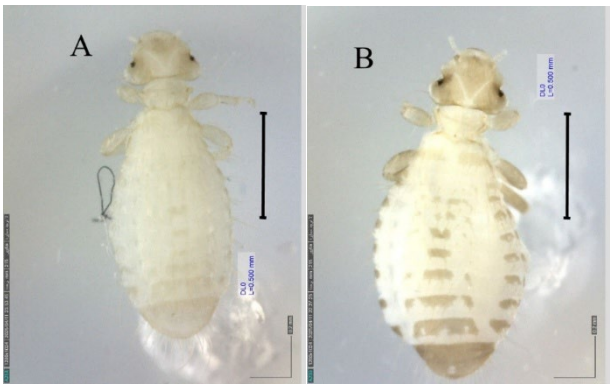

Figure 6. Morphological features of *Myrsidea* sp. collected from domestic pigeons in Karbala Province, Iraq: A – male (Scale bar = 0.531 mm); B – female (Scale bar = 0.500 mm).

Chewing lice (Phthiraptera: Ischnocera and Amblycera) are permanent, obligate, and host-specific ectoparasites commonly found in birds [19]. The current study revealed a very high prevalence of ectoparasitic infestation (99 %) among domestic pigeons in Karbala Province, Iraq, as summarized in ***Table 1***. This level of infestation is consistent with the range reported in several regional and international studies, confirming that pigeons serve as important reservoirs for diverse ectoparasite communities. Similar high prevalence has been documented in Pakistan (90.5 %) [3], Iran (86.85 %) [7], and Egypt (100 %) [12]. Such persistently high rates imply that lice and other ectoparasites find favourable habitats in pigeon husbandry practices, dense populations, untreated conditions, and environmental factors.

In contrast, the current study referred to high prevalence in domestic pigeons which characterized by preening ability in a captive population that were infested with *Columbicola columbae* or *Campanulotes bidentatus* or both, and the prevalence of lice could preen normally decreased by 50 %. These data indicate the possibility for birds to clear themselves of feather lice, and perhaps other ectoparasites, by preening due to birds spend more time preening than wild birds, and less likely than wild birds to be reinfested [22].

Although infection prevalence in the current study was high across both sexes, the statistical analysis indicated no significant association between sex and infection status ($P = 0.19$). This finding is in agreement with studies conducted in Bursa province, Turkey [23] and Nigeria [6], which also reported no sex-related differences. However, some studies have shown higher prevalence in females [4] or males [11], implying that regional variations in the environment, size of samples, behaviour, or physiology may be responsible for sex-based differences.

The total parasite load (481 parasites) and mean abundance (4.81 parasites/bird) observed in this study reflect a moderate but widespread level of infestation, with the full structural breakdown of these metrics detailed in ***Table 2***. Within this population, single infection was found in 34 % of birds, double infection in 44 %, and triple infection in 19 %. The presence of double and triple infestations further highlights the complexity of lice community structure on pigeons [24, 25]. Multiple infections were common, with 63 % of birds harboring more than one ectoparasite species. Such co-infections are well documented and may arise from shared microhabitats on the plumage, host overcrowding, and poor hygiene [14, 24].

The dominant parasite species identified in the collected population was *Campanulotes bidentatus*, representing 54.89 % of the total ectoparasite population, as documented in ***Table 3***. A similar dominance of *Campanulotes* spp. has been reported in Iraq [17], Pakistan [3], and Egypt [12]. This species' success may be linked to its strong host specificity, efficient reproductive capability, and ability to utilize various feather regions. The second most abundant species, *Hohorstiella lata* (23.91 %), has also been frequently recorded in regional surveys [16, 18], indicating that it has adapted well to the pigeon populations in the area. *Columbicola columbae* accounted for 17.26 % of the total count, which is highly consistent with its role as one of the most globally common pigeon lice [1, 26].

Mean intensity values varied significantly among the recovered species, as shown in ***Table 4***, with *Hohorstiella lata* displaying the highest mean intensity (8.214), followed by *Campanulotes bidentatus* (6.947). High intensity levels indicate strong population establishment in infested hosts and may contribute to clinical effects such as feather damage, irritation, weight loss, and reduced productivity [24, 27]. The lower intensities observed for *Columbicola tschulyschman*, *Columbicola bidentatus*, and *Colpocephalum turbinatum* reflect their relatively rare occurrence in the studied population, consistent with previous reports describing these species as less common or opportunistic components of the avian ectoparasite fauna [20, 26].

The predominance of chewing lice (Ischnocera and Amblycera) aligns with global patterns in pigeon ectoparasitism, as these lice possess strong host specificity and spend their entire life cycle on the host. Their feeding on feathers and skin debris can lead to irritation, restlessness, and decreased fitness, especially in young or nutritionally stressed birds [1, 22]. The high mixed-infestation rate observed in the present study may further contribute to compounded pathological effects, as demonstrated in similar studies [12, 25].

Overall, this study's high frequency, varied ectoparasite community, and notable intensities highlight the necessity of better domestic pigeon management and control initiatives in Karbala Province. To lower infestation pressure, it is crucial to apply ectoparasiticides on a regular basis, maintain better loft hygiene, and conduct periodic surveillance. Moreover, given the potential of pigeons to act as reservoirs for parasitic infections that may affect other bird species, including poultry, effective control strategies will also have broader implications for local avian health.

Conclusions

The present study demonstrates that domestic pigeons (*Columba livia domestica*) in Karbala Province, Iraq, are heavily infested with a diverse community of ectoparasites, with an overall infection rate of 99 % and a total collection of 481 parasites (mean abundance: 4.81 parasites/bird). This indicates that all pigeons within the study area are equally susceptible regardless of sex ($\chi^2 = 1.72$; $P = 0.19$). Among the seven chewing lice species identified, *Campanulotes bidentatus* was highly dominant (54.89 %), followed by *Hohorstiella lata* (23.91 %) and *Columbicola columbae* (17.26 %). Furthermore, multiple-species infestations were remarkably common, affecting 63 % of the birds. Considering the role of pigeons as potential reservoirs for ectoparasites, there is an urgent need to improve pigeon management practices, including the regular application of ectoparasiticides, enhanced loft hygiene, and continuous monitoring to reduce the burden of infestation.

DECLARATIONS

Ethical Statement

The authors declare that all experimental procedures involving live birds in this study fully comply with generally accepted norms of humane treatment of animals and the principles of bioethics. The experimental parts of the work were performed in strict accordance with the national legislation of Iraq and the guidelines of the Institutional Ethics Committee of the College of Veterinary Medicine, University of Kerbala, under the official approval number: UOK.VET.MI.2025.124. During the investigation, all domestic pigeons (Columba livia domestica) were handled humanely, and the birds were provided with appropriate monitoring and care, alongside the complete minimization of any stress, pain, or discomfort factors during the collection of ectoparasites.

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Conflict of interest

The authors state that there is no conflict of interest.

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Declaration of AI and AI-assisted technologies

The author declare that no artificial intelligence or AI-assisted technologies were used in the preparation of this manuscript.

References

1. Clayton, D. H., Bush, S. E., & Johnson, K. P. (2015). *Coevolution of life on hosts: Integrating ecology and history*. The University of Chicago Press.
2. Baldwin-Brown, J. G., Villa, S. M., Vickrey, A. I., Johnson, K. P., Bush, S. E., Clayton, D. H., & Shapiro, M. D. (2021). The assembled and annotated genome of the pigeon louse *Columbicola columbae*, a model ectoparasite. *G3: Genes, Genomes, Genetics*, 11 (2). https://doi.org/10.1093/g3journal/jkab009
3. Ahmed, H., Naz, M., Mustafa, I., Khan, M. R., Asif, S., Afzal, M. S., Arshad, M., Naveed, M., Ali, S., & Simsek, S. (2017). Impact of epidemiological factors on the prevalence, intensity and distribution of ectoparasites in pigeons. Journal of Parasitic Diseases, 41 (4), 1074–1081. https://doi.org/10.1007/s12639-017-0936-0
4. Tayyub, M., Ali, S., Javid, A., & Imran, M. (2023). Prevalence and diversity of ectoparasites in wild rock pigeon (*Columba livia*) in Punjab region, Pakistan. *Brazilian Journal of Biology*, 83, e246887. https://doi.org/10.1590/1519-6984.246887
5. Ali, M., Ibrahim, R., Alahmadi, S., & Elshazly, H. (2020). Ectoparasites and intestinal helminths of pigeons in Medina, Saudi Arabia. *The Journal of Parasitology*, 106 (6), 721–729. https://doi.org/10.1645/20-64
6. Nwadike, C. C., Agbata, D. O., Okeke, J. J., Okeke, O. A., Nnatuanya, I. O., Afoemezie, P. I., Udeh, N. P., & Irikannu, K. C. (2023). Ectoparasites and gastrointestinal helminth of domestic pigeons in Awka, southeastern Nigeria. *The Bioscientist Journal*, 11 (1), 1–7. https://bioscientistjournal.com/index.php/The_Bioscientist/article/view/132
7. Jahantigh, M., Esmailzade dizaji, R., & Teymoori, Y. (2015). Prevalence of external parasites of pigeon in Zabol, southeast of Iran. *Journal of Parasitic Diseases*, 40 (4), 1548–1551. https://doi.org/10.1007/s12639-015-0725-6
8. Ekinci, A., İpek, D. N. S., & İçen, H. (2024). Ectoparasites of domestic pigeons (*Columba livia domestica*) in Diyarbakir province in Türkiye. *Advances in Biology & Earth Sciences*, 9, 53–57. https://doi.org/10.62476/abes9s53
9. Rezaei, F., Hashemnia, M., Chalechale, A., Seidi, S., & Gholizadeh, M. (2014). Prevalence of ectoparasites in free-range backyard chickens, domestic pigeons (*Columba livia domestica*) and turkeys of Kermanshah province, west of Iran. *Journal of Parasitic Diseases*, 40 (2), 448–453. https://doi.org/10.1007/s12639-014-0524-5
10. Saikia, M., Bhattacharjee, K., Sarmah, P. C., Deka, D. K., & Mushahary, D. (2017). Prevalence of ectoparasitic infestation of pigeon (*Columba livia domestica*) in Assam, India. *Journal of Entomology and Zoology Studies*, 5 (4), 1286–1288. https://www.entomoljournal.com/archives/2017/vol5issue4/PartQ/5-3-314-675.pdf
11. Castro, J., Naupay, A., Orozco, K., Rodríguez, S., Díaz, Y., Navarro, J., & Purca, N. (2018). Ectoparásitos de *Columba livia* Linnaeus, 1758 (Aves: Columbiformes) del distrito de Carmen de La Legua, Callao, Perú. *The Biologist*, 15 (2), 425–435. https://doi.org/10.24039/rtb2017152200
12. Adly, E., Nasser, M., Soliman, D. E., AlAshaal, S. A., Kenawy, M. A., Gustafsson, D. R., Alghamdi, K. M., & Shehata, M. (2020). Analysis of phoretic relation between chewing lice and hippoboscid flies of Columba livia. *Veterinary Parasitology: Regional Studies and Reports*, 22, 100496. https://doi.org/10.1016/j.vprsr.2020.100496
13. Hernández-Martínez, M. C., Parra-Arango, J. L., Góngora-Orjuela, A., Walteros-Casas, H. A., & Chaparro-Gutiérrez, J. J. (2021). Identificación de ecto y endoparásitos en palomas domésticas (*Columba livia*) del área urbana de Villavicencio, Meta, Colombia. *Revista MVZ Córdoba*, 26 (3), e2157. https://doi.org/10.21897/rmvz.2157
14. Elmacıoğlu, S., Yaman, M., Zerek, A., Akküçük, Ş., Karagöz, M., & Erdem, İ. (2018). Ectoparasites of domestic pigeons (Columba livia domestica) in Antakya region. *Turkish Journal of Veterinary Research*, 2 (2), 23–27. https://dergipark.org.tr/en/pub/tjvr/article/431009
15. Abdullah, S., Mohammed, A., & Saeid, N. (2018). Study of ecto and haemo parasites in domestic pigeons (*Columba livia domestica*) in Sulaimani province, Kurdistan region/Iraq. *Journal of Zankoy Sulaimani - Part A*, 20 (1), 37–44. https://doi.org/10.17656/jzs.10640
16. Issa, A. R., Mero, W. M. S., Hasan, D. L., & Hameed, M. A. (2021). The prevalence of parasites in the domestic pigeons (*Columba livia domestica*) in Zakho City, Kurdistan-Iraq. *Baghdad Science Journal*, 18 (2), 0210. https://doi.org/10.21123/bsj.2021.18.2.0210
17. Al-Badrani, M. A., & Al-Muffti, S. A. (2023). Survey and prevalence of lice infestation the pigeons (*Columba livia domestica*) in Kurdistan Region-Iraq. *Rafidain Journal of Science*, 32 (1), 1–8. https://doi.org/10.33899/rjs.2023.177282
18. Alali, F., Alhaitami, I., Jawad, R. A., & Jawad, M. (2020). Identification of two new species of chewing lice in pigeon (*Columba livia domestica*) in Kerbala Province, Iraq. *AIP Conference Proceedings*, 2290 (1), 020037. https://doi.org/10.1063/5.0027457
19. Jassem, M. I., Alali, F. A., Al-Ashbal, H. N., Jawad, M. H., & Alhesnawi, A. Sh. (2023). Prevalence of chewing lice species on migratory birds in Razzaza lake. *Iraqi Journal of Veterinary Sciences*, 37 (2), 479–485. https://doi.org/10.33899/ijvs.2022.134464.2434
20. Adams, R. J., Price, R. D., & Clayton, D. H. (2005). Taxonomic revision of Old World members of the feather louse genus *Columbicola* (Phthiraptera: Ischnocera), including descriptions of eight new species. *Journal of Natural History*, 39 (41), 3545–3618. https://doi.org/10.1080/00222930500393368
21. Dik, B., & Kandir, E. H. (2021). Ectoparasites in some wild birds (Aves) in Turkey. *Progress in Nutrition*, 23 (Supplement 2), e2021261.
22. Bush, S. E., & Clayton, D. H. (2023). Does Preening behavior reduce the prevalence of avian feather lice (Phthiraptera: Ischnocera)? *Journal of Parasitology*, 109 (3), 145–147. https://doi.org/10.1645/23-2
23. Şenlik, B., Güleğen, E., & Akyol, V. (2005). Ectoparasites of domestic pigeons (*Columba livia domestica*) in Bursa province. *Türkiye Parazitoloji Dergisi*, 29 (2), 100–102.

24. Salem, H. M., Yehia, N., Al-Otaibi, S., El-Shehawi, A. M., Elrys, A. A. M. E., El-Saadony, M. T., & Attia, M. M. (2022). The prevalence and intensity of external parasites in domestic pigeons (*Columba livia domestica*) in Egypt with special reference to the role of deltamethrin as insecticidal agent. *Saudi Journal of Biological Sciences*, 29 (3), 1825–1831. https://doi.org/10.1016/j.sjbs.2021.10.042
25. Hatem, A. N. (2025). Some aspects of infestation of chewing lice parasitizing chickens and pigeons in Basrah Province, Iraq. *Basrah Journal of Veterinary Research*, 24 (2), 46–58. https://doi.org/10.23975/bjvr.2025.158646.1210
26. Eren, G., Özkoç, Ö. Ü., & Açici, M. (2022). Contributions to the knowledge of the diversity of the chewing lice fauna in Turkey. *Turkish Journal of Zoology*, 46 (6), 444–455. https://doi.org/10.55730/1300-0179.3099
27. Musa, S., Afroz, S. D., & Khanum, H. (2012). Occurence of ecto- and endo parasites in pigeon (*Columba livia* Linn.). *University Journal of Zoology, Rajshahi University*, 30, 73–75. https://doi.org/10.3329/ujzru.v30i0.10758

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