



New records for chewing lice of the genus *Dennyus* Neumann, 1906 (Phthiraptera: Amblycera) on two swifts from Saudi Arabia

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Abstract

Background

Very little is known about the chewing lice fauna of Saudi Arabia especially from swifts (Apodidae). Swifts are common resident and migratory birds throughout Saudi Arabia. Two chewing lice genera are known for parasitising swifts throughout the world: *Dennyus* Neumann, 1906 and *Eureum* Nitzsch, 1818, none of which have been recorded from the Kingdom before.

New information

Two species of resident wild swifts were examined for chewing lice for the first time in Saudi Arabia. Two rare lice species were identified: *D. (Dennyus) hirundinis* (Linnaeus, 1761) and *Dennyus* sp. (Phthiraptera: Amblycera: Menoponidae) infesting the common swift *Apus apus* (Linnaeus, 1758) and African palm swift *Cypsiurus parvus* (Lichtenstein, 1823), respectively. The described chewing lice species are considered as new country records. They will be added to the Saudi Arabia parasitic fauna. Taxonomical and

ecological remarks were provided for the identified chewing lice through this work, along with notes on swift/chewing lice interaction.

Keywords

ectoparasites, wild birds, chewing lice, new record

Introduction

Swifts (Apodiformes: Apodidae) are one of the fastest bird groups in the world and includes around 113 species (Gill et al. 2021). Some species can fly with a speed of about 111.96 km/h (Henningsson et al. 2010). They are insectivorous birds that catch small insects during their fast-flying (Chantler 2010). Their flying mechanism and piercing vision make catching and examining this group of birds challenging. In Saudi Arabia, there are six recorded species of swifts, all of Palearctic and Afrotropical origin (Gill et al. 2021).

The multiple origins of birds of Saudi Arabia reflects the diversified avifauna of the Kingdom, but with such great diversity, the birds' ectoparasites of the country are far from understood, especially the chewing lice (Nasser et al. 2020). The number of chewing lice species, recorded in the last decade in Saudi Arabia, is not representative of the great avifauna of the country (El-Ahmed et al. 2012, Al-Ahmed et al. 2014, Alahmed et al. 2015, Shobrak et al. 2015, Nasser et al. 2015, Nasser et al. 2015, Nasser et al. 2016, Alahmed et al. 2017). In Saudi Arabia, swifts have never been examined for chewing lice, but worldwide, there are two chewing lice genera that are known to infest swifts: *Dennyus* and *Eureum* (Price et al. 2003). Several lice species are expected to be associated with Saudi Arabia's swifts (Table 1).

Chewing lice species of the genus *Dennyus* occur on swifts with low prevalence (Price and Clayton 1997). Harrison 1916 tried to clarify the status of this genus and he reported six valid species of it across the world, but the genus today includes 49 species belonging to four subgenera: *Collodennyus* Ledger, 1970, *Ctenodennyus* Ewing, 1930, *Dennyus* sensu stricto Neumann, 1906 and *Takamatsua* Uchida, 1926 (Clayton et al. 2006, Valim 2013). From a taxonomic point of view, *Dennyus* is characterised by a characteristic head shape that lacks oesophageal sclerite, prothorax very narrow and the hind femora with a patch of spine on the ventral face, also the 6th and 8th abdominal sternites with spiny patches; it resembles the genus *Myrsidea* even in male genitalia (Ferris 1916). The genus *Dennyus* has never been recorded before in the Middle East. Therefore, exploration of such neglected ectoparasites of a special bird group, such as swifts, is essential to describe parasite diversity in the region (Adly et al. 2019, Adly et al. 2020).

Through the present work, the aim is to update the knowledge about the chewing lice infesting the swifts of Saudi Arabia and add two new records of chewing lice to the Kingdom's parasitic fauna.

Materials and methods

Two species of swifts: the African palm swift, *Cypsiurus parvus* and the common swift, *Apus apus* were examined for chewing lice. One African palm swift was examined in Sabia, Jazan (17°8'1"N; 42°37'17"E) and three common swifts were examined at Aja Mountain, Ha'il (27°28'58"N; 41°36'50"E); however, only the African palm swift and one common swift were infested with lice. A standard mist net: (mesh: 1.8 cm × 0.12 mm and size: 2 m × 15 m) was used for capturing the examined birds. The live caught birds were first inspected visually, then a fumigation chamber was used for chewing lice collection using chloroform as a fumigant for 3 min (Clayton and Drown 2001). Following fumigation, lice were removed by ruffling over on to a white surface. The captured birds were immediately released safely at the place of capture. The collected chewing lice were preserved in 95% ethyl alcohol, then cleared using lactic acid for 2 days. Finally, specimens were mounted by using Puri's media (Nasser et al. 2019). Chewing lice species identification was done according to Kellogg and Paine (1914), Ewing (1930), Thompson (1948). A S-EYE YW500 camera5mp was used in specimens' photographs. Photoshop Lightroom 5 (Adobe Systems Inc., San Jose, CA) was used to prepare final images (Nasser et al. 2015). All specimens are kept in Ha'il University Zoological Collection. Samples were measured using microscopic software according to the provided illustration (Fig. 1). Measurements are abbreviated as follows: Head Length = HL; Head Width = HW; Head Index = HI; Thorax Length = TL; Abdomen Length = AL; Total Length = TOL. Ecological and taxonomic remarks on recorded lice species are included.

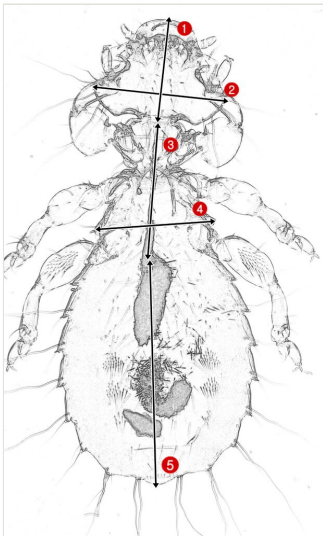


Figure 1. [doi](#)

Illustrative model of genus *Dennyus* showing the way by which each measurement were taken; 1. Head Length = HL; 2. Head Width = HW; 3. Thorax Length = TL; 4. Thorax Width = TW and 5. Abdomen Length = AL.

Table 1.

Summary of swift species (Apodiformes) encountered in Saudi Arabia with their expected associated chewing lice, according to Price et al. (2003).

Swift species	Louse species
Alpine swift, <i>Tachymarptis melba</i> (L., 1758)	<i>Dennyus (Dennyus) vonarxi</i> Büttiker, 1954
Common swift, <i>Apus apus</i> (L., 1758)	<i>Dennyus (Dennyus) hirundinis</i> (L., 1761) <i>Eureum cimicoides</i> Burmeister, 1838
Little swift, <i>Apus affinis</i> (JE Gray, 1830)	<i>Dennyus (Dennyus) hirundinis</i> (L., 1761) <i>Eureum cimicoides</i> Burm., 1838
Pallid swift, <i>Apus pallidus</i> Shelley, 1870	<i>Dennyus (Dennyus) hirundinis</i> (L., 1761)
White-rumped swift, <i>Apus caffer</i> (Lichtenstein, 1823)	<i>Dennyus (Dennyus) hirundinis</i> (L., 1761) <i>Eureum pygostyli</i> Mokhehle, 1951
African Palm-Swift, <i>Cypsiurus parvus</i> (Lichtenstein, 1823)	<i>Dennyus (Dennyus) cypsiurus</i> Thompson, 1948

Taxon treatments

Dennyus sp.

Material

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Phthiraptera; family: Menoponidae; genus: *Dennyus*; specificEpithet: sp.; country: Saudi Arabia; stateProvince: Sabia, Jazan; eventDate: February/2018; individualCount: 1; lifeStage: 1 nymph; recordedBy: Kholoud A. Al-Shammery

Description

Head roughly triangular, third wider than long, antenna along with a large fourth segment, temple rectangular without any chitinisation, gula weakly developed, with a row of relatively long seta; prothorax small broader than long, meso and meta thorax equal in length with acute lateral margin, meta thorax with two small spine-like seta on each lateral margin; forelegs with flattened enlarged femora and large coxa, as characteristic of the genus, hind femora with patch medium-sized brush; abdomen rectangular without pigmentation, first segment with transverse characteristic chitinisation, lateral margin rounded with five very small thorns like seta on segment III-V; segment IV and V with a clear ventral brush; male terminalia much narrower (Fig. 2).

Measurements: Female HL: 0.39; HW: 0.53; HI: 0.74; TL: 0.53; AL: 0.95; TOL: 1.87 ± 0.2.

Distribution

Afrotropical



Figure 2. [doi](#)

Nymph of *Dennyus* sp.; upper left: Head; lower left: Genital region; right side: close up to the body; the scale bar is only applicable to the full body image.

Ecology

Local host: African palm swift *Cypsiurus parvus* (Lichtenstein, 1823).

Known hosts: *Cypsiurus parvus* (Lichtenstein, 1823), African palm swift.

Notes

From my examination and description, as well as the host/parasite association, this species could be *D. (Dennyus) cypsiurus* and, in this case, it will be the first record from Saudi Arabia. Not much is known about that species. The collected samples were found on the body feathers near the anus of the host.

Dennyus (Dennyus) hirundinis Linnaeus, 1761

Nomenclature

***Dennyus (Dennyus) hirundinis* (L., 1761:479)**

Pediculus hirundinis Linnaeus, 1761:479

Nirmus truncatus Olfers, 1816:91

Nitzschia burmeisteri Denny, 1842:202

Nitzschia tibialis Piaget, 1880:576

Dennyus africanus Büttiker, 1954:159

Dennyus clayae Nakagawa, 1959a:164

Dennyus maritimus Buttiker, 1954:160

Nitzschia minor Kellogg & Pame, 1914:242

Dennyus minutus Buttiker, 1954:160

Dennyus truncatiformis Mokhehle, 1951:341

Material

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Phthiraptera; family: Menoponidae; genus: *Dennyus*; subgenus: *Dennyus*; specificEpithet: *hirundinis*; country: Saudi Arabia; stateProvince: Aja Mountain, Ha'il; eventDate: February 2018; individualCount: 1; sex: 1 female; lifeStage: 1 adult; recordedBy: Kholoud A. Al-Shammery

Description

Head trilobed triangular in shape, maxillary palp protruding out of the head, antenna very short, temple rectangular with characteristic highly chitinized out line, gula well developed with lateral row of four black spin-like seta and characteristic chitinization surrounding; thorax clearly divided, prothorax small quadrat shape, meso and meta thorax highly chitinized on lateral margin with acute ends; fore legs with large coxa and enlarged rounded femora, mid and hind legs slightly equal in length, ventral side of hind femora covered with elongated brush of short seta; abdomen elongated oval in shape with highly chitinized lateral margin with acute ends and two small thorn-like seta, the ventral brush appears in segment IV and V; the body of this species is highly pigmented (Fig. 3).



Figure 3. [doi](#)

Female of *Dennyus (Dennyus) hirundinis* Linnaeus; upper left: Head; lower left: Genital region; right side: close up to the body; the scale bar is only applicable to the full body image.

Measurements: Female HL: 0.47; HW: 0.64; HI: 0.73; TL: 0.57; AL: 1.94; TOL: 2.98 ± 0.2 .

Distribution

Dennyus (Dennyus) hirundinis distribution: Palaearctic: Asia (Afghanistan, China, India, Malaysia, Sri Lanka, Thailand); Europe (England, Germany, Scotland, Spain, Switzerland, Turkey); Afrotropical: Africa (Cameroon, Cape Verde, Congo, Kenya, Nigeria, Somalia, South Africa, Zimbabwe).

Ecology

Local host: only one sample was collected from common swift, *Apus apus*.

Known hosts: *Apus apus* (L., 1758), common swift (type host); *Aerodramus unicolor* (Jerdon, 1840), Indian swiftlet; *Apus alexandri* Hartert, 1901, Alexander's swift; *Apus pallidus* (Shelley, 1870), Pallid swift; *Apus barbatus* (Sclater, 1866), African swift; *Apus bradfieldi* (Roberts, 1926), Bradfield's swift; *Apus pacificus* (Latham, 1801), fork-tailed swift; *Apus acuticauda* (Jerdon, 1864), dark-rumped swift; *Apus affinis* (Gray, 1830), little swift; *Apus horus* (Heuglin, 1869), Horus swift; *Apus caffer* (Lichtenstein, 1823), white-rumped swift.

Notes

This report constitutes a new geographical record of *D. (Dennyus) hirundinis* from Saudi Arabia. This species is found throughout the body of the host; the collected sample was found feeding on the eye fluid of the host during the night.

Discussion

Recently, several publications have focused on the taxonomic status of chewing lice infesting domestic, resident, migratory and exotic birds of Saudi Arabia (El-Ahmed et al. 2012, Al-Ahmed et al. 2014, Alahmed et al. 2015, Shobrak et al. 2015, Nasser et al. 2015, Nasser et al. 2015, Nasser et al. 2016, Alahmed et al. 2017). Although these works greatly improve our knowledge of the chewing lice fauna of Saudi Arabia, they represent very small steps in a long path to achieving a comprehensive understanding of the real status of such an interesting insect group throughout the country. Many bird groups have never been examined for chewing lice and a huge number of lice species wait to be recorded in Saudi Arabia for the first time or described even as a new species (Nasser et al. 2016). One such neglected group is swifts; this paper represents the first study of swift lice in Saudi Arabia. Although the swifts are very common birds in many parts of the Kingdom, catching them alive is a very difficult task that limits our ability to study their ectoparasites, including chewing lice.

There are two genera of chewing lice that are known to infest swifts, neither of which had been previously recorded from Saudi Arabia before. The current study represents the first

published records of *Dennyus* species from Saudi Arabia and the region. Therefore, the record of *D. (Dennyus) hirundinis* and unidentified *Dennyus* nymph are considered an addition to Saudi Arabia's parasitic fauna. Although *Dennyus* spp. are generally characterised by high degrees of host specificity (Tompkins and Clayton 1999), some of its species are recorded from several swift species (Price et al. 2003, Clayton et al. 2006); such facts prevent the identification of an unidentified species of chewing lice here as *D. (Dennyus) cypsiurus* Thompson, 1948 which is already known to infest African palm swift. There are likely more species of *Dennyus* waiting to be recorded from Saudi Arabia as additional louse samples from swifts become available (Gill et al. 2021).

The two species of swifts that have been examined in this work (the African palm swift, *C. parvus* and the common swift, *A. apus*) are considered migratory birds (Jennings 2010). This fact raises a lot of questions about the impact of bird migration on chewing lice and if migratory birds are transferring lice species to resident and domestic birds. To answer such questions we must, first, obtain a clearer understanding of the chewing lice fauna of both resident and migratory species within Saudi Arabia. The new records reported here help with this task.

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References

- Adly E, Nasser M, Soliman D, Gustafsson DR, Shehata M (2019) New records of chewing lice (Phthiraptera: Amblycera, Ischnocera) from Egyptian pigeons and doves (Columbiformes), with description of one new species. *Acta Tropica* 190: 22-27. <https://doi.org/10.1016/j.actatropica.2018.10.016>
- Adly E, Nasser M, Soliman DE, AlAshaal SA, Kenawy MA, Gustafsson DR, Alghamdi KM, Shehata M (2020) Analysis of phoretic relation between chewing lice and hippoboscids flies of *Columba livia*. *Veterinary Parasitology: Regional Studies and Reports* 22: 100496. <https://doi.org/10.1016/j.vprsr.2020.100496>
- Alahmed A, Shobrak M, Kheir S, Nasser M (2015) Little known chewing lice (Phthiraptera) infesting crab plover *Dromas ardeola* Paykull, 1805 (Charadriiformes: Dromadidae) from the Red Sea. *Acta Tropica* 150: 171-175. <https://doi.org/10.1016/j.actatropica.2015.07.025>
- Alahmed A, Aldryhim Y, Shobrak M, Nasser M (2017) A new species of the genus *Amyrsidea* (Phthiraptera: Amblycera: Menoponidae) parasitizing domestic chickens in Saudi Arabia. *Zootaxa* 4238 (2): 253-257. <https://doi.org/10.11646/zootaxa.4238.2.5>

- Al-Ahmed A, Shobrak M, Nasser ME (2014) Chewing lice (Phthiraptera: Amblycera, Ischnocera) from red sea gulls with new host-parasite records. *Zootaxa* 3790 (4): 567-576. <https://doi.org/10.11646/zootaxa.3790.4.5>
- Chantler P (2010) *Swifts: a guide to the swifts and treeswifts of the world*. Bloomsbury Publishing
- Clayton DH, Drown DM (2001) Critical evaluation of five methods for quantifying chewing lice (Insecta: Phthiraptera). *Journal of Parasitology* 87: 1291-1300. <https://doi.org/10.2307/3285290>
- Clayton DH, Price RD, Johnson KP (2006) Two new species of *Dennyus* (Collodennyus) chewing lice (Phthiraptera: Amblycera: Menoponidae) from swiftlets (Apodiformes: Apodidae). *Proceedings of the Entomological Society of Washington* 108 (2): 306-311.
- El-Ahmed A, Nasser MG, Shobrak M, Dik B (2012) First records of the chewing lice (Phthiraptera) associated with European bee eater (*Merops apiaster*) in Saudi Arabia. *Journal of the Egyptian Society of Parasitology* 240 (1411): 1-9.
- Ewing HE (1930) The taxonomy and host relationships of the biting lice of the genera *Dennyus* and *Eureum*, including the descriptions of a new genus, subgenus, and four new species. *Proceedings of the United States National Museum* 77 (2843): 1-16. <https://doi.org/10.5479/si.00963801.77-2843.1>
- Ferris GF (1916) Some generic groups in the mallophagan family Menoponidae. *The Canadian Entomologist* 48 (9): 301-311. <https://doi.org/10.4039/Ent48301-9>
- Gill F, Donsker D, Rasmussen P (2021) IOC World Bird List. Retrieved January 14, 2021 11 (1).
- Harrison L (1916) The genera and species of Mallophaga. *Parasitology* 9: 1-165. <https://doi.org/10.1017/S003118200005989>
- Henningson P, Johansson LC, Hedenström A (2010) How swift are swifts *Apus apus*?. *Journal of Avian Biology* 41: 94-98. <https://doi.org/10.1111/j.1600-048X.2009.04850.x>
- Jennings MC (2010) *Atlas of the breeding birds of Arabia*. 25th Edition. Senckenberg Gesellschaft für Naturforschung and King Abdulaziz City for Science and Technology, 3-751 pp.
- Kellogg VL, Paine JH (1914) Mallophaga from birds (mostly Corvidae and Phasianidae) of India and neighbouring countries. *Records of the Indian Museum* 10: 217-243. <https://doi.org/10.5962/bhl.part.5626>
- Nasser M, Azzam AA, Shobrak M, Aldryhim Y (2015) Identification key for chewing lice (Phthiraptera: Amblycera, Ischnocera) infesting the Indian peafowl (*Pavo cristatus*) with one new country record and new host record for Saudi Arabia. *Turkish Journal of Zoology* 39 (1): 88-94. <https://doi.org/10.3906/zoo-1312-44>
- Nasser M, Alahmed A, Ansari M, Adly E, Shobrak M (2019) An analysis of osprey/ chewing lice interaction, with a new record for Saudi Arabia. *African Entomology* 27 (1): 178-184. <https://doi.org/10.4001/003.027.0178>
- Nasser M, Adly E, AlAhmed A, Shobrak M (2020) Host habitat and position on host affecting the evolution of chewing lice (Phthiraptera): Phylogenetic analysis of Ischnocera in Saudi Arabia. *Journal of Insect Biodiversity and Systematics* 6 (1): 101-112.
- Nasser MG, Al-Ahmed A, Ansari MJ, Shobrak MY (2015) Chewing lice (Phthiraptera) infesting breeding Suliformes (Aves: Aequornithes) of the Arabian Peninsula. *African Invertebrates* 56 (3): 709-717. <https://doi.org/10.5733/afin.056.0313>

- Nasser MG, Alahmed A, Shobrak M (2016) New host/ parasite record for very rare chewing louse *Cuculotogaster arabicus* (Clay, 1938) (Phthiraptera: Ischnocera) on endemic mountain partridges of Arabian Peninsula. Parasitology Research 115 (11): 4433-4436. <https://doi.org/10.1007/s00436-016-5219-7>
- Price RD, Clayton DH (1997) Two new species of *Dennyus* (Ctenodennyus) lice (Phthiraptera: Menoponidae) from swiftlets (Apodiformes: Apodidae). Journal of the Kansas Entomological Society 70 (1): 4-10.
- Price RD, Hellenthal RA, Palma RL, Johnson KP, Clayton DH (2003) The chewing lice: World checklist and biological overview. Illinois Natural History Survey, USA
- Shobrak M, Alahmed A, Palma R, Almalki M, El-Den Nasser MG (2015) New records of species of *Saemundssonina* (Insecta: Phthiraptera: Philopteridae) infesting breeding terns in the Arabian Peninsula, with notes on their phylogeny and ecology. Parasitology Research 114 (7): 2587-2597. <https://doi.org/10.1007/s00436-015-4463-6>
- Thompson GB (1948) Two new species of *Dennyus* (Mallophaga) from palm swifts. Boletín de Entomología Venezolana 7 (1-2): 1-5.
- Tompkins DM, Clayton DH (1999) Host resources govern the specificity of swiftlet lice: size matters. Journal of Animal Ecology 68: 489-500. <https://doi.org/10.1046/j.1365-2656.1999.00297.x>
- Valim MP (2013) Three new species of *Dennyus* neumann, 1906 (Phthiraptera, Amblycera, Menoponidae) parasitic on swifts (Aves, Apodiformes, Apodidae) in Brazil. Papis Avulsos de Zoologia 53 (30): 415-429. <https://doi.org/10.1590/S0031-10492013003000001>