

## Lice of the genus *Philopterus* Nitzsch (Phthiraptera: Ischnocera: Philopteridae) parasitic on hosts of the genus *Emberiza* (Passeriformes: Emberizidae)

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### INTRODUCTION

We have recently become aware of the description of a new louse species of *Penenirmus* Clay & Meinertzhagen by Touleshkov (1961) in a paper that had inadvertently been omitted from the world checklist published by Price et al. (2003). In that paper, *Penenirmus blagoveshtchenskyi* Touleshkov, 1961 was described from the type host *Emberiza calandra* Linnaeus, 1758 from Bulgaria. The illustrations and description of this louse species make it obvious that it is not a *Penenirmus* but is actually a member of *Philopterus* Nitzsch, 1818. Thus, it is not surprising that Touleshkov found his new species to be quite different from other *Penenirmus* with which he was familiar. Subsequently, Złotorzycka (1964) described *Philopterus cumulatus* (as *Docophorus cumulatus*) from the same type host, *Emberiza calandra*. We have studied two paratypes (male and female) of Złotorzycka's species, as well as many additional specimens from its type host, and have concluded that *P. cumulatus* is conspecific with *Philopterus blagoveshtchenskyi* (Touleshkov, 1961). However, because of date priority, *P. cumulatus* becomes a junior synonym of *P. blagoveshtchenskyi*. These results led us to a reconsideration of the first-described species of *Philopterus* associated with a species of *Emberiza* as its type host—i.e., *P. citrinellae* (Schrank, 1776) from *Emberiza citrinella* Linnaeus, 1758—and a comparison of this louse species with all the other *Philopterus* species described from *Emberiza* hosts.

This paper includes: (1) a redescription of *Philopterus citrinellae*, (2) an analysis of the validity of all other louse species currently placed in the genus *Philopterus* and parasitic on a member of the genus *Emberiza* (see Price et al. 2003, p. 342), (3) a number of new synonymies, and (4) new host records for *P. citrinellae*. The redescription of *P. citrinellae* is given here to provide a basis for future comparisons with *Philopterus* lice from other *Emberiza* species and from other closely related host taxa. As a result of this study, *P. citrinellae* is now the only species of *Philopterus* known to parasitise species of the

**Abstract** All species of the louse genus *Philopterus* described from hosts in the passerine genus *Emberiza* have been reviewed and compared with the earliest described and valid species: *P. citrinellae*. A redescription of *P. citrinellae* is given, supported by measurements and illustrations of pertinent features. Nine new junior synonymies of *P. citrinellae* are proposed and discussed. The new synonyms and their respective type hosts are: *Philopterus zohrae* Ansari, 1955 from *Emberiza bruniceps*; *Penenirmus blagoveshtchenskyi* Touleshkov, 1961 from *Emberiza calandra*; *Docophorus cumulatus* Złotorzycka, 1964 from *Emberiza calandra calandra*; *Docophorus residuus* Złotorzycka, 1964 from *Emberiza schoeniclus schoeniclus*; *Philopterus indefinitus* Fedorenko & Volkov, 1980 from *Emberiza spodocephala*; *Philopterus topicalis* Fedorenko & Volkov, 1980 from *Emberiza elegans*; *Philopterus parvulus* Fedorenko & Volkov, 1980 from *Emberiza rutila*; *Philopterus sibiricus* Fedorenko & Volkov, 1980 from *Emberiza leucocephalos*; and *Philopterus frontosus* Fedorenko, 1985 from *Emberiza aureola*. In addition, four new host records for *P. citrinellae* are included.

**Keywords** Phthiraptera; Philopteridae; *Philopterus*; lice; redescription; new synonymies; *Emberiza*; new host-lice records

genus *Emberiza*. The morphological orientation for a specimen of *Philopterus* may be found in Price & Hellenthal (1998, p. 783). All measurements are in millimetres. Host taxonomy follows that of Dickinson (2003). The specimens examined are deposited in the K. C. Emerson Entomology Museum, Oklahoma State University, Stillwater, Oklahoma, USA. (KCEM), the Natural History Museum, London, England (NHML), and in the United States National Museum of Natural History, Smithsonian Institution, Washington, DC, USA (USNM).

## SYSTEMATICS

### Order Phthiraptera

### Suborder Ischnocera

### Family Philopteridae Burmeister, 1838

### Genus *Philopterus* Nitzsch, 1818

### *Philopterus citrinellae* (Schrank, 1776)

Fig. 1–4

*Pediculus citrinellae* Schrank, 1776: 116. Type host: *Emberiza citrinella* Linnaeus, 1758.

*Pediculus pyrrhulae* Schrank, 1776: 117. Type host: *Pyrrhula pyrrhula europaea* Vieillot, 1816.

*Pediculus chloridis* Schrank, 1776: 118. Type host: *Carduelis chloris chloris* (Linnaeus, 1758).

*Ricinus emberizae* De Geer, 1778: 74. Type host: *Emberiza citrinella*.

*Nirmus globifer* Olfers, 1816: 91. Type host: *Emberiza citrinella*.

*Philopterus communis* Nitzsch, 1818: 290. Type host: *Emberiza citrinella*.

*Philopterus citrinellae* (Schrank, 1776); Clay & Hopkins, 1954: 227, text fig. 8–11, pl. 10, fig. 4.

*Philopterus zohrae* Ansari, 1955: 58. Type host: *Emberiza bruniceps* Brandt, 1841. **New synonymy.**

*Penenirmus blagoveshtchenskyi* Touleshkov, 1961: 199, fig. 1–4. Type host: *Emberiza calandra* Linnaeus, 1758. **New synonymy.**

*Docophorus cumulatus* Złotorzycka, 1964: 410, fig. 3e, pl. 1, photos 3–4. Type host: *Emberiza calandra calandra*. **New synonymy.**

*Docophorus residuus* Złotorzycka, 1964: 422, fig. 5j, pl. 4, photo 13. Type host: *Emberiza schoeniclus schoeniclus* (Linnaeus, 1758). **New synonymy.**

*Philopterus indefinitus* Fedorenko & Volkov, 1980: 73, fig. 1. Type host: *Emberiza spodocephala* Pallas, 1776. **New synonymy.**

*Philopterus topicalis* Fedorenko & Volkov, 1980: 75, fig. 2. Type host: *Emberiza elegans* Temminck, 1835. **New synonymy.**

*Philopterus parvulus* Fedorenko & Volkov, 1980: 76, fig. 3a–c. Type host: *Emberiza rutila* Pallas, 1776. **New synonymy.**

*Philopterus sibiricus* Fedorenko & Volkov, 1980: 77, fig. 3d–e. Type host: *Emberiza leucocephalos* S. G. Gmelin, 1771. **New synonymy.**

*Philopterus frontosus* Fedorenko, 1985: 11, pl. 1, fig. 1–4. Type host: *Emberiza aureola* Pallas, 1773. **New synonymy.**

*Philopterus citrinellae* (Schrank, 1776); Price et al., 2003: 213.

*Philopterus cumulatus* (Złotorzycka, 1964); Price et al., 2003: 213.

*Philopterus frontosus* Fedorenko, 1985; Price et al., 2003: 214.

*Philopterus indefinitus* Fedorenko & Volkov, 1980; Price et al., 2003: 214.

*Philopterus parvulus* Fedorenko & Volkov, 1980; Price et al., 2003: 215.

*Philopterus residuus* (Złotorzycka, 1964); Price et al., 2003: 216.

*Philopterus sibiricus* Fedorenko & Volkov, 1980; Price et al., 2003: 216.

*Philopterus topicalis* Fedorenko & Volkov, 1980; Price et al., 2003: 216.

*Philopterus zohrae* Ansari, 1955: 58; Price et al., 2003: 217.

**DESCRIPTION:** *Male:* As in Fig. 1. Dorsioanterior head plate (= clypeal signature) as in Fig. 2; length, 0.22–0.23. Preconal head length, 0.17–0.20. Metanotal margin with 15–19 setae. Abdominal tergal setae: segment II, 13–19, plus 1 seta at each medioanterior corner; III, 15–21; IV–V, 15–23; VI, 17–21; VII, 15–20; VIII, 10–15. Sternal setae: II, 6–9; III–VI, 8–13; VII–VIII, 2. Genitalia as in Fig. 3. Dimensions: temple width, 0.40–0.48; head length, 0.45–0.52; prothorax width, 0.24–0.30; pterothorax width, 0.34–0.45; abdominal width at IV, 0.51–0.63; total length, 1.20–1.53; genitalia length, 0.20–0.25; genitalia width at parameres, 0.08–0.09.

*Female:* Head and thorax as for male. Dorsioanterior head plate length, 0.24–0.28. Preconal head length, 0.20–0.23. Metanotal margin with 17–20 setae. Posterior abdomen as in Fig. 4. Abdominal tergal setae: II, 14–18, plus 1 seta at each medioanterior corner; III–VI, 20–23; VII, 18–22; VIII, 13–16. Sternal setae: II, 8–10; III–VI, 11–14; VII, 4. Subgenital plate posterior margin with 4–6 longer slender setae on each side and sparse very short setae medially. Dimensions: temple width, 0.43–0.57; head length, 0.47–0.58; prothorax width, 0.25–0.33; pterothorax width, 0.37–0.50; abdominal width at IV, 0.55–0.75; total length, 1.40–1.82.

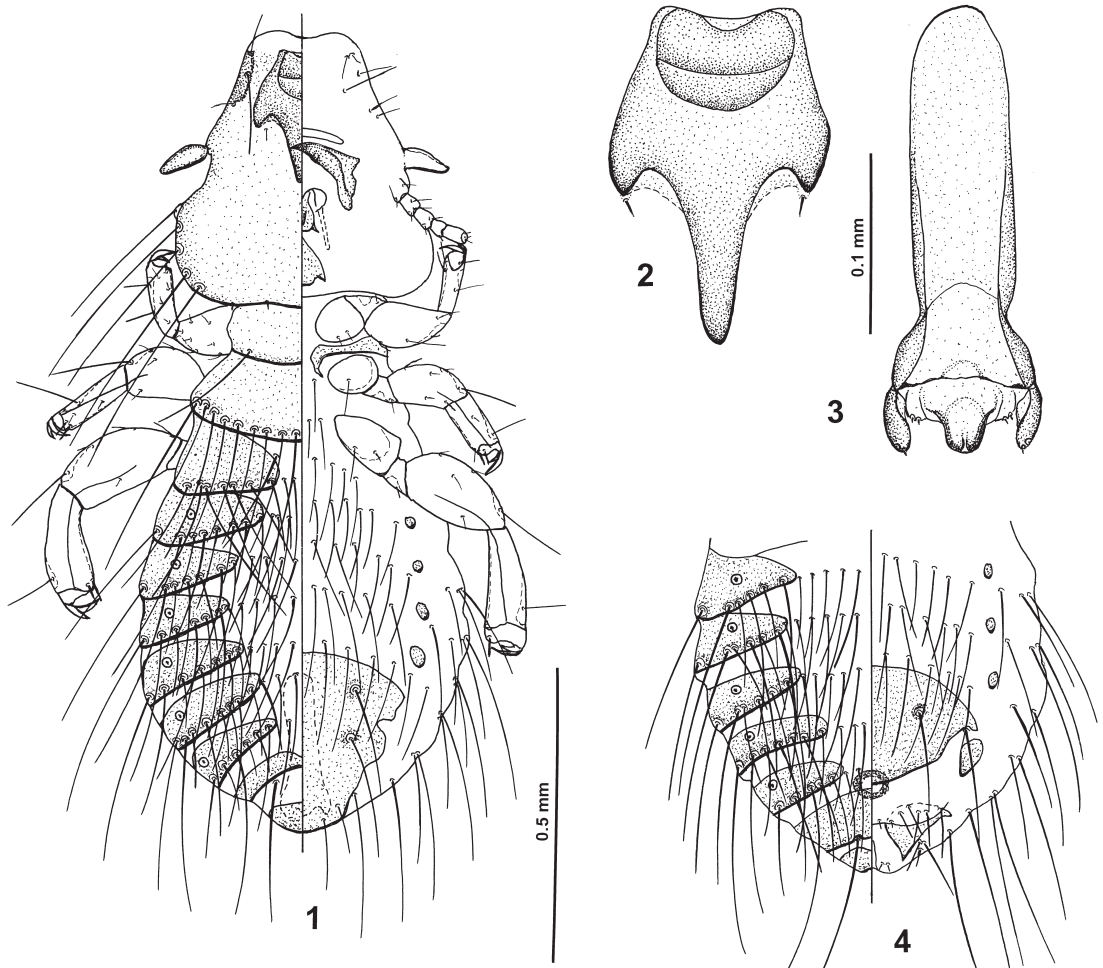


Fig. 1–4 *Philopterus citrinellae*. 1, Dorsal and ventral views of male; 2, dorsoanterior head plate (= clypeal signature) of male; 3, male genitalia; 4, dorsal and ventral views of female abdominal segments IV–X.

#### MATERIAL EXAMINED

Ex *Emberiza citrinella*: 1♂, 2♀, Ireland, Oct 1945 (NHML); 3♂, 2♀, Ushant, France, Apr 1947 (NHML); 1♂, 2♀, Hodonin-Zbrod, Czech Republic, 7 May 1950 (NHML); 1♀, Ljubliani, Yugoslavia, 24 Feb 1959, S. Brelih (USNM); 2♂, 1♀, same locality, 2 Mar 1959, S. Brelih (KCEM; USNM); 1♀, Hel, Poland, 29 Mar 1965, leg. Busse (KCEM); 1♂, Mogilno, Poland, 5 Mar 1967 (KCEM); 1♂, Bantry, County Cork, Ireland, no date (NHML).

Ex *Emberiza aureola*: 3♂, 9♀, Nepal, Mar 1937 (NHML); 3♂, 5♀, Fair Isle, Great Britain, 3 Jul 1951, K. Williamson (NHML).

Ex *Emberiza calandra*: 1♂, 1♀, Todhead, near Kinneff, Kincardineshire, Scotland, 15 Jun 1909,

J. Waterston (NHML); 3♂, 4♀, Ushant, France, Apr 1935 (NHML); 1♂, 3♀, Asia Minor, May 1935 (NHML); 1♂, 1♀, South Uist, Scotland, Dec 1935 (NHML); 1♀, Renfrenshire, Scotland, 17 Apr 1937, P. A. Clancey (NHML); 11♂, 34♀, Orkney, Scotland, Aug 1938 (NHML); 4♂, 5♀, North Uist, Scotland, Aug 1941 (NHML); 1♀, Jordanów, Poland, 8 Apr 1951, J. Złotorzycka (KCEM) [paratype of *Docophorus cumulatulus*, 4/y/2–17]; 3♀, Palestine, Apr 1953 (NHML); 1♂, Beth-Jubrin, Israel, 11 Mar 1958 (NHML); 1♂, Wrocław, Poland, 20 Mar 1961, J. Złotorzycka (KCEM) [paratype of *Docophorus cumulatulus*, 4/y/18].

Ex *Emberiza cia* Linnaeus, 1766: 5♂, 19♀, Morocco, Dec 1938 (NHML). **New host record.**

Ex *Emberiza cioides castaneiceps* F. Moore, 1856: 1♀, Chin Chup Myun, Kyunggi-do Prov., Korea, 28 Aug 1965 (USNM). **New host record.**

Ex *Emberiza cirius* Linnaeus, 1766: 8♂, 7♀, Cornwall, England, Mar 1944 (NHML); 2♂, 1♀, same locality, Jan 1945 (NHML); 3♂, 4♀, same locality, Mar 1946 (NHML). **New host record.**

Ex *Emberiza elegans*: 1♂, 1♀, Tsunoshima, Japan, 13 Apr 1965 (KCEM); 1♀, Kuang Nung, Kyunggi-do Prov., Korea, 9 Apr 1966 (KCEM).

Ex *Emberiza rutila*: 3♂, 4♀, Pangla, Lampang, Thailand, 2 Feb 1953, R. E. Elbel & H. G. Deignan (USNM); 1♂, Muang Khai, Loei, Thailand, 16 Jan 1955, R. E. Elbel (KCEM); 5♀, same locality, 30 Jan 1955, R. E. Elbel (USNM); 1♀, Chin Chup Myun, Kyunggi-do Prov., Korea, 24 Aug 1964, H. E. McClure (USNM); 1♀, same locality, 16 Aug 1965 (USNM).

Ex *Emberiza rustica* Pallas, 1776: 1♂, Chin Chup Myun, Kyunggi-do Prov., Korea, 15 Aug 1965 (KCEM); 1♀, Kuang Nung, Kyunggi-do Prov., Korea, 13 Apr 1966 (KCEM); 1♂, 1♀, Chin Chup Myun, Kyunggi-do Prov., Korea, 12 Aug 1966 (USNM). **New host record.**

Ex *Emberiza schoeniclus*: 1♀, South Uist, Scotland, Jan 1934 (NHML); 1♂, Renfrenshire, Scotland, 17 Apr 1937, P. A. Clancey (NHML); 6♂, 15♀, Mull, Scotland, Feb 1944 (NHML); 1♀, Sweden, Sep 1946 (NHML); 1♂, South Uist, Scotland, Sep 1953 (NHML); 1♀, Midlothian, Scotland, 27 Apr 1962, leg. Eskgrove (NHML); 1♀, Hel, Poland, 6 Apr 1965, leg. Busse (KCEM).

Ex *Emberiza spodocephala*: 2♂, 2♀, Imphal, Manipur, India, 13 Jan 1952 (NHML); 1♂, Asahigaoka, Yamanashi, Japan, 15 Aug 1964, H. E. McClure (KCEM).

## DISCUSSION

Schrank (1776) published the first descriptions of lice from *Emberiza* and *Loxia* hosts, which are now recognised as belonging to the genus *Philopterus*, i.e., *Pediculus citrinellae*, *Pediculus curvirostrae*, *Pediculus pyrrhulae*, and *Pediculus chloridis*. However, those descriptions do not contain sufficient information to identify and separate the taxa involved. Therefore, in regard to the above names, we accept the synonymies established by Clay & Hopkins (1954, pp. 227–232), who discussed in detail the problems associated with the recognition of Schrank's four nominal species as valid taxa. Clay & Hopkins (1954, p. 232) concluded that one valid

species with two subspecies should be recognised: *Philopterus citrinellae citrinellae* (Schrank) with *Emberiza citrinella* as type host, and *Philopterus citrinellae curvirostrae* (Schrank) with *Loxia curvirostra* Linnaeus, 1758 as type host. In addition, they concluded that both *Pediculus pyrrhulae* Schrank from *Pyrrhula pyrrhula europoea* and *Pediculus chloridis* Schrank from *Carduelis chloris chloris* are junior synonyms of *P. citrinellae citrinellae*. Considering that the differentiation given by Clay & Hopkins (1954, p. 231) between the two subspecies is 100% of specimens for males and 95% of specimens for females, Price et al. (2003, p. 213) opted to recognise each subspecies as a full species and listed them as such in their checklist. Clay & Hopkins (1954, p. 232) gave the total length of the female of *P. citrinellae* as 2.67 mm. This is most likely an error in transcription, as the total length for the females in our study ranges between 1.40 and 1.82 mm. Other than this discrepancy, all other dimensions cited by Clay & Hopkins (1954, p. 232) are within the ranges of our material.

The nine males and nine females from *Emberiza citrinella* that we have studied agree well with the interpretation of *Philopterus citrinellae* by Clay & Hopkins (1954). A further 200 specimens we have examined from 10 additional host species also fit our concept of *P. citrinellae*. It is worth noting that the dimensional ranges for females are wider than the equivalent ranges for males. However, most of the 144 females examined are at the top of the range (total length 1.70 mm or more), some measuring between 1.60 and 1.70 mm, and only a few below 1.60 mm in total length. Considering (1) the uniform morphology of the specimens examined, (2) the narrower dimensional ranges among the males studied, and (3) the high probability that further collecting from many species of *Emberiza* from which *Philopterus* lice are still unknown will widen even more the host range of *P. citrinellae*, we believe that a subdivision of the available samples into more than one species is, at present, unwarranted.

Our finding that a male-female pair of paratypes of *Philopterus cumulatus*, as well as many additional specimens from the type host *Emberiza calandra*, are conspecific with *P. citrinellae* implies that both *P. blagoveshtchenskyi* and *P. cumulatus* should be regarded as junior synonyms of *P. citrinellae*. In addition to the three species mentioned above, there are seven further species of *Philopterus* from *Emberiza* hosts recognised as valid by Price et al. (2003): one described by Ansari (1955), one by Złotorzycka (1964), four by Fedorenko & Volkov (1980), and

one by Fedorenko (1985). Because of our experience with other louse taxa described by these authors, with their philosophy to describe new taxa primarily based on host association rather than on meaningful morphological differences, we felt that it was advisable to check the status of those seven species.

Ansari (1955, p. 58) described *Philopterus zohrae*, only based on the holotype male and the allotype female, both collected from *Emberiza bruniceps*. His description includes five dimensions for each sex, plus the statement that the new species "...is similar to *Philopterus fringillae*, but differs considerably in male genitalia and its components.", but no illustrations or details to support his statement. In typical fashion, Ansari (1956, p. 396) described *P. zohrae* as a "sp. nov." a second time, rewording the text quoted above from his earlier paper, but not including the dimensions. Finally, Ansari (1958, p. 61) described *P. zohrae* as a "sp. nov." for the third time, repeating the text and dimensions from his first paper, but also adding several line drawings (Ansari 1958, fig. 76–83), plus setal counts for the pterothorax and the abdomen. The description and dimensions of the holotype male and allotype female given by Ansari (1955, 1958) agree well with our specimens of *P. citrinellae*, with the logical conclusion that *P. zohrae* is indeed a junior synonym of *P. citrinellae*.

Besides describing the new species *Philopterus cumulatus* discussed above, Złotorzycka (1964) described the new species *Philopterus residuus* from *Emberiza schoeniclus*, based on a single female and a single nymph. The original description by Złotorzycka (1964, p. 422, pl. 4, photo 13) includes dimensions, a comparison with the head of *P. cumulatus*, and a photograph of the entire female holotype of *P. residuus*. The poor condition of this holotype, with the abdomen filled by black gut contents, prevents its detailed study and makes us wonder how the description of a new species could have been justified by this single adult specimen. Although we have not been able to examine the female holotype of *P. residuus*, we have examined 27 *Philopterus* lice from the type host, including one female (from Hel, Poland) slide-mounted and identified by Złotorzycka as *P. residuus*. Nothing in the original description of *P. residuus*, or in the specimens we have studied, is sufficiently at variance from our concept of *P. citrinellae* as described in this paper and in Clay & Hopkins (1954). Therefore, we regard *P. residuus* as a junior synonym of *P. citrinellae*.

Fedorenko & Volkov (1980) published descriptions of four new species of *Philopterus* from as many species of *Emberiza* hosts (see above for

details). Their text descriptions are supported by a series of simplified illustrations of dorsoanterior head plates, male and female subgenital plates, some abdominal tergites, male genitalia, and chaetotaxy of female terminalia. These drawings show no differences of significant taxonomic value from those included here for the same features (Fig. 1–4), and, therefore, they all agree with our concept of *P. citrinellae*. In addition to our comparison of those descriptive details, we have been able to examine specimens from the type hosts of three of the four species described by Fedorenko & Volkov (1980) (see above under Material examined). Therefore, our conclusion is that all four species named by Fedorenko & Volkov (1980) represent junior synonyms of *P. citrinellae*.

Fedorenko (1985) described three new species of passerine *Philopterus*, with one of them—*P. frontosus* (p. 11)—based on a single female taken from *Emberiza aureola*. The text description is supported by simple drawings of the head outline, a trabecula, the dorsoanterior head plate, and the chaetotaxy of the female terminalia. We believe that the features represented by figures of the holotype published by Fedorenko (1985, pl. 1, fig. 1–4) fall within the range of variation of *P. citrinellae*. Furthermore, we have been able to examine 20 *Philopterus* lice from *E. aureola*, the type host of *P. frontosus*, which we have identified as *P. citrinellae*. Therefore, we propose that *P. frontosus* be regarded as a junior synonym of *P. citrinellae*.

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