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ORIGINAL PAPER

New record of *Afrimenopon waar* (Eichler) (Phthiraptera: Menoponidae) from budgerigar *Melopsittacus undulatus* (Psittaciformes: Psittacidae) from Karachi, Pakistan

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Abstract Chewing lice of the species *Afrimenopon waar* (Eichler) were collected from captive budgerigar *Melopsittacus undulatus* (Shaw) in Pakistan. This is the first record of amblyceran lice from this host. It is also the first record of the genus *Afrimenopon* from Pakistani region. The primary host species of *Afrimenopon waar* is the rosy-faced lovebird *Agapornis roseicollis* (Vieillot). The finding of *A. waar* on budgerigars is, most likely, a result of a contamination in captivity. Morphological variation and origin of these lice are discussed.

Introduction

The genus *Afrimenopon* Price is one of 13 amblyceran genera of chewing lice found on members of the avian order Psittaciformes (Price et al. 2003: 23). It is monotypic genus with only a single species, *Afrimenopon waar* (Eichler). This louse species has been originally described by Eichler (1947) from South African rosy-faced lovebird *Agapornis roseicollis* (Vieillot) as *Franciscoloa waar*. Because of the inadequacy of Eichler's original description, Price (1970) consequently provided detailed description of this species and replaced it to the genus *Afrimenopon*.

The budgerigar, *Melopsittacus undulatus* (Shaw), is an abundant wild parrot in Australia, and at the same time, it is one of the most popular bird species kept in aviaries throughout the world. It is one of the few species of parrots, which have self-reproducing captive populations that no longer need to be augmented with wild living birds (Juniper and Parr 1998). The only one known louse species from this parrot determined by Mey (2003) as *Neopsittaconirmus gracilis* Guimarães 1974 from captive budgerigar in Germany (see also Sychra 2005). No species of chewing lice has been described from wild budgerigars yet.

The aim of this paper is to report about chewing lice found on captive budgerigars in Pakistan, present their morphological variation, compare them with specimens of *A. waar* deposited in the Natural History Museum London, update the Price's description of *A. waar* and to document the intra-specific variation for this louse.

Materials and methods

Four females and four males were collected from a captive budgerigar in Karachi, Pakistan. Additional material examined was two males and two females of *A. waar* held in the Natural History Museum in London (NHML). All measurements are in millimetres. Abbreviations for dimensions are TW, temple width; POW, preocular width; HL, head length at midline; PW, prothorax width; PL, prothorax length; MW, metathorax width; ML, metathorax length; AW, abdomen width at level of segment V; AL, abdomen length; GL, male genitalia length (from anterior tip of basal apodeme to posterior end of endomeral plate); GW, male

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genitalia width at lateral ends of parameres; PAL, length of paramere; TL, total length.

Results

All the lice collected from budgerigars belong to the species *Afrimenopon waar* (Eichler 1947), originally described from the rosy-faced lovebird, *Agapornis roseicollis* (Vieillot), its type host.

Afrimenopon waar (Eichler 1947)

Description Male (Fig. 1, 1): head with anterior margin smoothly rounded, dorso-lateral margins not bulged, slightly overlapped by temporal margins; the occipital margin slightly concave, temples more expanded and rounded; preocular slit deep and narrow; hypopharyngeal sclerite (sitophore) weak, less sclerotised on lateral sides (Fig. 1,2); gular plate rounded with setae 4+4, anterior most seta shortest than remaining (0.003 against 0.037); antennae (Fig. 1,3) four segmented, basal and pedicle short, flagellomere I with thumb-like, long projection with five terminal setae, flagellomere II rounded, terminal disc with five to eight microsetae and sensillae.

Prothorax typically oval, with six long, two short setae on each side of the posterior margin; prosternal plate slightly sclerotised with only the posterior margin evident, with pair of minute setae adjacent to indistinct anterior margin (Fig. 1,4); metathorax with straight lateral margin, with 10–11 long setae on posterior margin; two pairs medio-anterior setae present; metasternal plate with five to seven long setae; femur III with two ventral ctenidia.

Abdominal tergites and sternites with number of setae are as in Table 1. Sternite III with two ctenidia at lateral sides, sternite IV with group of two to four short setae at lateral sides. Post-spiracular setae (on lice from budgerigars visible only on segments I and V–VIII): long (0.24–0.32) on II–III and VI–VIII and shorter (0.13–0.20) on I and V. Male genitalia is as in Fig. 1,5. Basal apodeme narrow,

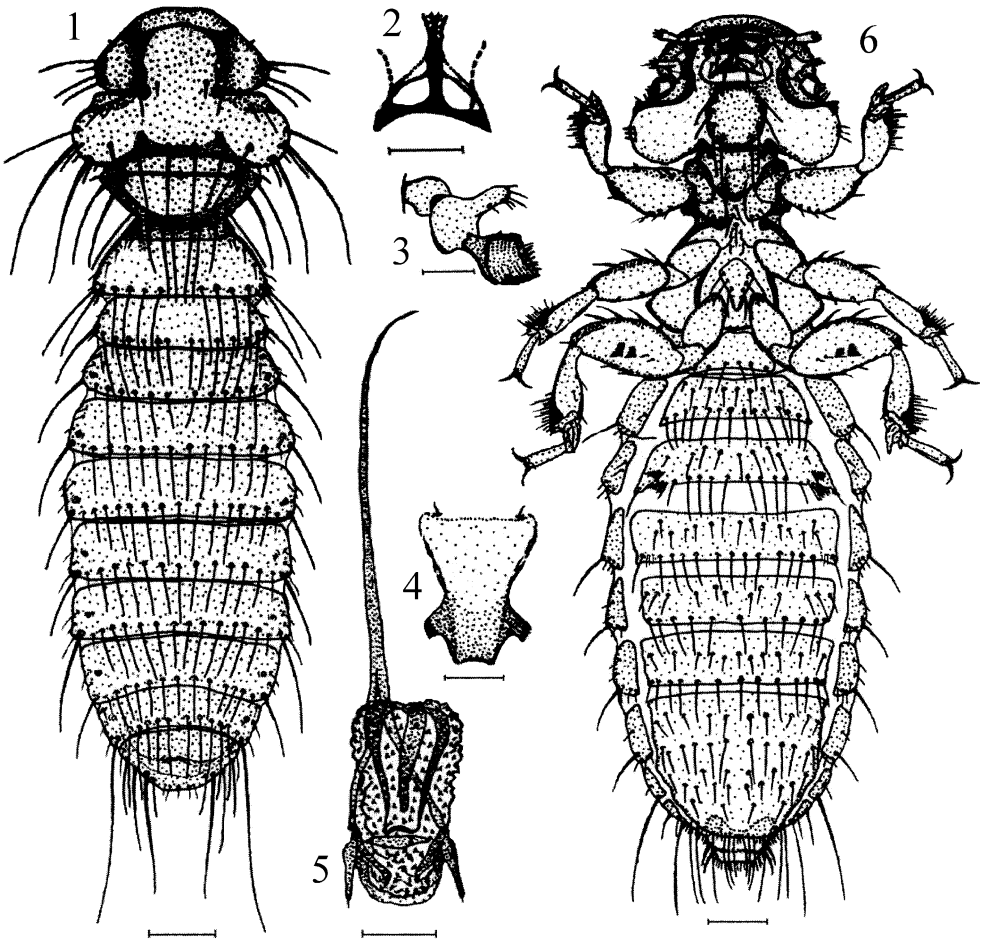

Fig. 1 *Afrimenopon waar* from budgerigars. *1*, Male in dorsal view; *2*, hypopharyngeal sclerite; *3*, antenna; *4*, prosternal plate; *5*, male genitalia; *6*, Female in ventral view. *Scales* 0.025 mm (*2–4*), 0.05 mm (*5*), 0.10 mm (*1*, *6*)

Table 1 Measurements of males and females of *Afrimenopon waar* from budgerigars and lovebirds (in mm)

	MALE				Female		
	Pakistan (n=4)	Africa[a] (n=1)	Africa1[b] (n=1)	Africa2[c] (n=1)	Pakistan (n=4)	Africa[a] (n=1)	Africa2[b] (n=2)
TL	1.36–1.45	1.48	1.53	1.43	1.52–1.53	1.87	1.76–1.78
POW	0.28–0.29	0.30	0.32	0.30	0.28–0.29	0.34	0.33
TW	0.35–0.36	0.36	0.37	0.36	0.38–0.39	0.41	0.41
HL	0.26–0.28	0.28	0.28	0.26	0.27–0.28	0.31	0.29
PW	0.22–0.23	0.26	0.29	0.27	0.26	0.30	0.30–0.31
MW	0.30	0.34	0.35	0.32	0.35	0.42	0.40
AWV	0.36–0.38	–	0.43	0.40	0.50	–	0.55
GL/GW	0.51/0.08	0.55/0.08	0.58/0.09	0.63/0.08			
PAL	0.04–0.05	–	0.06	0.05			

Abbreviations for dimensions are: *TL* total length; *POW* preocular width; *TW* temple width; *HL* head length at midline; *PW* prothorax width; *MW* metathorax width; *AWV* abdomen width at level of segment V; *GL* male genitalia length (from anterior tip of basal apodeme to posterior end of endomeral plate); *GW* male genitalia width at lateral ends of parameres; *PAL* length of paramere

[a] *Afrimenopon waar* from lovebirds *Agapornis roseicollis* according to Price (1970); [b] *A. waar* from Kaokoveld, SW Africa (NHML); [c] *A. waar* from Windhoek, SW Africa (NHML).

needle like and long, reaching up to abdominal segment III, with anterior end pointed and slightly curved; parameres straight, a minute stout microseta present at posterior termination of each paramere; endomeral plate wide, thin outside the paramere posteriorly; penis rod shape, thick with rounded ends, surrounded by lateral sclerites; genital sac present.

Female (Fig. 1,6): mostly as for male. Abdominal tergites and sternites with number of setae are as in Table 2. Sternites VII–X fused, forming a single wide plate; setae of anal fringe: 30 microsetae and 4 (2+2) hyaline, thick setae on dorsal tergite X and 52–55 microsetae on vulval posterior margin of last sternum at ventral side; subgenital plate curved, lateral ends slightly lifted upwards, convex posteriorly, wide laterally than medially, posterior margin with 36 long to median and 12–14 short setae with large to moderate alveoli.

Measurements of *A. waar* from budgerigars are in Table 3.

Remarks The above description, although almost identical to that of Price (1970) for *A. waar*, shows some slight differences in the following characters: (1) hypopharynx differs a little in shape and its thickness (compare Fig. 1,2 and Price's Fig. 1,4); (2) straight lateral sides of metathorax (*A. waar* from lovebirds have lateral sides of metathorax conspicuously concave); (3) more sclerotised prosternal plate; (4) genital sclerites without serration and posterior margin of endomeral plate slightly wavy and roughly convex; (5) Almost all measurements of the specimens examined are smaller than those from type hosts.

Three captive budgerigars examined were parasitised by *A. waar*.

Table 2 The ranges of the numbers of the tergal and sternal setae on metathorax and abdomen of males of *Afrimenopon waar* from budgerigars and lovebirds

	Tergites				Sternites			
	Pakistan (n=4)	Holotype[a] (n=1)	Africa1[b] (n=1)	Africa2[c] (n=1)	Pakistan (n=4)	Holotype[a] (n=1)	Africa1[b] (n=1)	Africa2[c] (n=2)
Metath[d]	10–11	10	14	10	5–6	5	8	5
I	14–15	12	14	13	5	5	6	5
II	12–16	14	17	15	15–22	21	28	16
III[e]	14–17	15	18	16	15–22	19	20	18
IV	15–17	16	18	18	26–31	28	34	29
V	13–17	16	18	18	22–28	27	30	26
VI	14–15	15	17	14	22	20	24	24
VII	13–15	15	16	16	16–21	19	23	19
VIII	9–12	10	11	12	13–16	18	17	16

Footnotes are as in Table 1 except [d] seitae on posterior margin of metanotum and on metasternit; [e] setae between ctenidia.

Table 3 The ranges of the numbers of the tergal and sternal setae on metathorax and abdomen of females of *Afrimenopon waar* from budgerigars and lovebirds

	Tergites			Sternites		
	Pakistan (n=4)	Paratype[a] (n=1)	Africa2[c] (n=2)	Pakistan (n=4)	Paratype[a] (n=1)	Africa2[c] (n=2)
Metath[d]	10–11	10	10	6	6	6–7
I	16–17	16	14–16	5–6	6	5–6
II	18	17	17–20	21–24	25	25–26
III[e]	18	20	17–18	18–20	20	22–23
IV	17–22	21	20–21	31–32	36	35–36
V	18–20	20	20	26–30	29	29–32
VI	18	19	18	26	28	26–30
VII	17	18	16–17	18–25	21	20–23
VIII	11	12	13–14			

Footnotes are as in Table 1 except [d] setae on posterior margin of metanotum and on metasternit; [e] setae between ctenidia.

Material studied Four males and four females ex *Melopsittacus undulatus* (captive birds), niche: head, neck and wing feathers, *PAKISTAN*, Karachi west; 16th October 2001 and 5th January 2002; leg. S. Naz. All deposited at Natural History Museum of the University of Karachi; one male and one nymph ex *Agapornis roseicollis*, Kaokoveld, *SW Africa*, 16th June 1951, Swedish S.A.Exp., Brit. Mus. 1954-318 (NHML); one male and two females ex *A. roseicollis*, 80 m W of Windhoek, *SW Africa*, 6th March 1970, Brit. Mus. 1970-529.

Discussion

This is the first record of amblyceran louse species from budgerigar. At the same time, it is the first record of the genus *Afrimenopon* from the Indian subcontinent and from Pakistan (Lakshminarayana 1979, 1982, 1986). Unfortunately, as in the case of lice of the species *N. gracilis* (Sychra 2005), these lice were collected from captive birds. So we cannot say if the budgerigar is the primary host of *A. waar* or not.

Single known species of *Afrimenopon*, *A. waar*, is originally described from African rosy-faced lovebird. Lovebirds of the genus *Agapornis* appear to be the primary hosts of *Afrimenopon*. These parrots, as well as budgerigars, are very popular cage birds and both have been kept in captivity for a relatively long time. The lack of a close relationship between *Agapornis* and *Melopsittacus* (Collar 1997) and reports of *A. waar* from wild lovebirds suggest that budgerigars could be secondary hosts to *A. waar*. As shows the case of *N. gracilis*, some chewing lice can transfer from one host species to another and can survive and reproduce on new host species and spread over the population of captive birds in aviaries throughout the world (Sychra 2005). The finding of *A. waar* on Pakistani budgerigars, which appear not to have been in direct contact with other parrot species, in particular lovebirds, may be another example of such scenario. In addition, menoponid species are generally more mobile than philopterids, and they can abandon a dead or distressed host in search of a new one (Price et al. 2003). That is why such a transfer is easier and more probable.

As we showed, parrots of the genus *Agapornis* are likely to be the primary hosts of *A. waar*. However, considering that there are only four specimens of single species, *A. waar*, reported by Eichler (1947) and Price (1970), we do not know neither its range of hosts nor geographical distribution. Therefore, it is not possible to absolutely eliminate the possibility that there could be another, yet unknown, primary host for *A. waar* or even that also budgerigar could be the primary host for this louse. In any case, the only way to clarify this interesting case will be to collect and study the chewing lice occurring on wild budgerigars and on other species of *Agapornis* both from the wild and captivity.

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