

A review of the European Harpirhynchidae (Acari, Prostigmata) with the description of a new species

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Abstract

Records of the European Harpirhynchidae Dubinin, 1957 (Acari, Prostigmata) are summarized and briefly discussed. This family is represented in Europe by 23 species belonging to three subfamilies, Harpirhynchinae (18 species recorded), Harpypalpinae Fain, 1972 (4 species recorded), and Ophioptinae Southcott, 1956 (1 species recorded). A new species *Harpirhynchus dusbabeki* sp. nov. from the bearded tit *Panurus biarmicus* (L., 1758) (Passeriformes, Timaliidae) in Slovakia is described. This new species differs morphologically from the two similar congeneric species, *H. nidulans* Nitzsch, 1818 and *H. galeridae* Fain, Bochkov et Mironov, 1999, by having setae 3a and two setae on both genua I and II.

Key words

Harpirhynchus dusbabeki sp. nov., Harpirhynchidae, mites, systematics, European fauna, parasites of birds and snakes

Introduction

Mites of the family Harpirhynchidae Dubinin, 1957 (Acari, Prostigmata) are permanent highly specialized parasites of birds and snakes (Bochkov *et al.* 1999, Bochkov 2002). This mite family has a worldwide distribution and includes approximately 83 species belonging to 14 genera in three subfamilies: Harpirhynchinae Dubinin, 1957 (56 species in ten genera), Harpypalpinae Fain, 1972 (10 species in two genera), and Ophioptinae Southcott, 1956 (17 species in two genera) (Bochkov *et al.* 1999). Mites of the first two subfamilies are associated with neognathous birds (Moss and Wojcik 1978, Bochkov *et al.* 1999) inhabiting the feather follicles and epidermis. Some species of the subfamily Harpirhynchinae and all harpypalpines create voluminous cutaneous cysts located mainly at the base of the wings and on the breast (Moss 1979; Fain 1994, 1995; Literák *et al.* 2005). Mites of the subfamily Ophioptinae are associated with snakes of the families Colubridae and Elapidae, and live under the host's scales (Fain 1964, 1965; Beron 1974; Lizaso 1980 [1981]). Most acarologists considered the Ophioptidae to be a separate family (see Bochkov 2002 for references), however, a recent cladistic analysis of the family Harpirhynchidae (Bochkov *et al.* 1999) does not support harpirhynchid monophyly with respect to the family Ophioptidae. Surprisingly, the analysis revealed a sister relationship between the subfamily Harpypalpinae,

represented by parasites of passerines, and ophioptid mites. It was supposed that the ancestor of the subfamily Ophioptinae switched from passerine birds to snakes at some point in the past, given that several snakes prey on nestlings and adult birds, and most of these prey are small passerine birds (Lombert and Moss 1983, Bochkov *et al.* 1999, Bochkov 2002).

Taking into consideration a high host-specificity of harpirhynchids (Moss 1979, Bochkov *et al.* 1999), the number of the described species in this family is dramatically small. According to the assessment of Moss and Wojcik (1978), the actual number of harpirhynchid mites (excluding Ophioptinae) could exceed 2,500 species. Several taxonomical revisions of harpirhynchid mites were published by Fain (1964, 1994, 1995). However, only a few taxonomical works have been published after these revisions (Fain *et al.* 1999; Bochkov 2000a, b; Bochkov and Galloway 2001, 2004; Skoracki *et al.* 2004).

In the present paper we summarize data about the European Harpirhynchidae and describe a new species, *Harpirhynchus dusbabeki* sp. nov. from the bearded tit *Panurus biarmicus* (L., 1758) (Passeriformes, Timaliidae) in Slovakia. This new species was collected from subalar cutaneous cysts in bearded tits at several European locations but misidentified as *Harpirhynchus nidulans* Nitzsch, 1818 (Henry *et al.* 2004, Literák *et al.* 2005).

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Materials and methods

Wild bearded tits were mist-netted, ringed, examined for the presence of cutaneous cysts and released back to the wild during ornithological bird banding activities. An ornithological bird banding program was conducted by Alfred Trnka in Slovakia. The removed cysts and the material contained inside were stored in 70% ethanol. Mites removed were cleared in lactophenol and mounted in Hoyer's medium. Drawings were

made with a phase contrast Zeiss microscope with a camera lucida. The leg and idiosomal chaetotaxy of the species descriptions follows Grandjean (1939, 1944). The universal setal nomenclature of idiosoma proposed by Grandjean (1939) was adopted for Prostigmata by Kethley (1990). Palpal setation terminology follows Fain (1994). All measurements are given in micrometres (μm) and were taken as follows: body length = maximum length of the body up to the anterior extremity of the palpal tibia; body width = maximum width taken at bor-

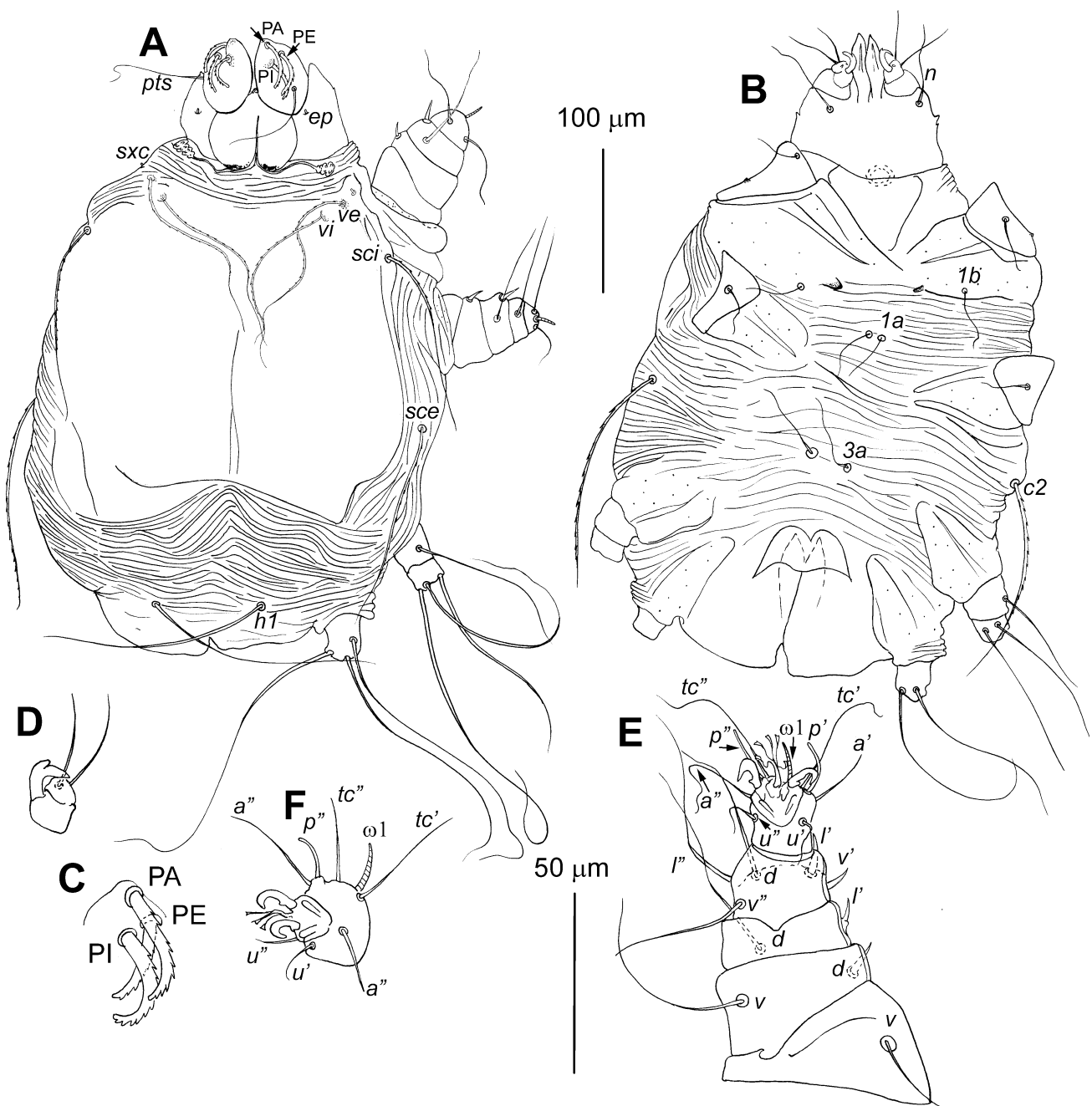


Fig. 1. *Harpirhynchus dusbabeki* sp. nov., female: A – dorsal view; B – ventral view; C – palpalae; D – palpal genu and tarsus, dorsal view; E – leg I in ventral view; F – tarsus II in ventral view. Scale bars: A and B = 100 μm , C-E = 50 μm

der of extension; gnathosomal length = length taken ventrally from the gnathosomal base to the anterior extremity of the palpal tibia; gnathosomal width = maximum width taken at border of extension; length of propodonal shield = maximum length measured in the median line of the shield; width of propodonal shield = maximum width taken at border of extension. The scientific names of birds follow the checklist of Dickinson (2003).

Results

Family Harpirhynchidae Dubinin, 1957

Subfamily Harpirhynchinae Dubinin, 1957

Genus *Harpirhynchus* Měglin, 1878

Harpirhynchus dusbabeki sp. nov. (Figs 1 and 2)

Harpirhynchus nidulans Nitzsch, 1818 – Henry *et al.* (2004): 34 (misidentification), Literák *et al.* (2005): 26 (misidentification)

Female (holotype, Fig. 1): Body, including gnathosoma, 440 long (410–470 in 10 paratypes), 275 wide (270–320). Gnathosoma 90 long (85–110), 115 wide (110–120). Palps about 65 long and 30 wide. Palpalae PA, PI and PE pectinate, subequal in length, 25–30 long (Fig. 1C). Setae *pts* about 75 long. Gnathosomal base ventrally with setae *n* and *m* or setae *m* absent. Idiosoma saccate, 350 long (320–400). Propodonal shield 205 long in midline (155–180), 235 at maximum width (230–265) (Fig. 1A). Ventral surface of idiosoma striated transversely, without scales or verrucosities (Fig. 1B). Setal lengths: barbed setae are *vi* 130 (125–155), *ve* 125 (120–130), *sci* 145 (130–165), *sce* 140 (120–155), and *c2* 145 (120–145); smooth setae are *h1* 220 (200–260), *1a* 50 (50–55), *1b* 50 (48–65), and *3a* 65 (65–70). Setae *pg* absent. Setation of legs I, II (including solenidia) (Fig. 1E, F): Coxal field 2 (*1a*, *1b*), trochanter 1 (*v*)-1 (*v*), femur 2 (*d*, *v*)-2 (*d*, *v*), genu 2 (*d*, *l'*)-2 (*d*, *l'*), tibia 5 (*d*, *l'*, *l''*, *v'*, *v''*)-5 (*d*, *l'*, *l''*, *v'*, *v''*), tarsus 9 (*tc'*, *tc''*, *p'*, *p''*, *a'*, *a''*, *u'*, *u''*, *ω1*)-8 (*tc'*, *tc''*, *p'*, *p''*, *a'*, *a''*, *u'*, *u''*, *ω1*). Solenidia *ω1* I and II slightly curved, about 15 long. Legs III with two segments. Coxal fields III bearing setae *3a*. Preapical segment of legs III with 2 setae, dorsal seta about 130 long, and ventral setae about 70 long. Apical segment of legs III bearing 5 long setae. Legs IV with one segment bearing 5 long setae, among them 2 ventral setae distinctly shorter than other 3 setae situated dorsally or dorso-laterally.

Male (10 paratypes, Fig. 2): Body, including gnathosoma, 285–310 long, 235–260 wide. Gnathosoma 70–75 long, 90–95 wide. Palps 45–60 long and 25–30 wide. Palpalae PA, PI and PE pectinate, subequal in length, 20–25 long (Fig. 2C). Setae *pts* 50–65 long. Gnathosomal base ventrally, maximum with setae *n* and *m*. In most specimens setae *m* absent. Idiosoma saccate, 210–260 long. Propodonal shield 150–180 long in midline, 170–200 at maximum width, bearing short filiform setae *vi* 11–12 long and genital setae *g1* about 4, *g2*-*g3* about 6 long (Fig. 2A). Genital aperture situated in anterior half of propodonal shield. Distances between setae

g1-*g1* and *g3*-*g3* about 10, *g2*-*g2* 20 (Fig. 2D). Aedeagus straight, about 145. Ventral surface of idiosoma striated transversely, without scales or verrucosities (Fig. 2B). Setal lengths: Barbed setae are *ve* 90–110, *sci* 95–120, *sce* 90–120, and *c2* 100–120; smooth setae are *1a* and *1b* about 55, *3a* 50–70. Leg structure and setation as in female. Solenidia *ω1* I and II slightly curved, about 15 long.

Type material

Female holotype (T-H-5), 30 female and 30 male paratypes from *Panurus biarmicus* (Passeriformes, Timaliidae) (ex cutaneous cysts localized on the skin below the wings of a single adult male), Slovakia, Pusté Úľany, 48°14'N, 17°35'E, 7 July 2003, coll. A. Trnka. Holotype and most paratypes deposited in the Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia. Additional paratypes in: Department of Animal Morphology, A. Mickiewicz University, Poznań, Poland; Institute of Parasitology, Academy of Sciences of the Czech Republic, České Budějovice, Czech Republic; Institut Royal des Sciences Naturelles Belgique, Brussels, Belgium; University of Michigan Museum of Zoology, Ann Arbor, U.S.A.

Etymology

This species is dedicated to Dr František Dusbábek (Institute of Parasitology, Academy of Sciences of the Czech Republic), for his long-life study of mites.

Differential diagnosis

This new species shares some features with the genus *Harpyrhynchoides* Fain, 1972, i.e. the presence of setae *3a* in both sexes and only five setae on the apical segment of legs IV. The female of this species clearly differs from representatives of this genus by the saccate idiosoma and the palpalae being subequal in length, and males differ by the genital aperture being situated in the anterior half of the propodonal shield.

In females of all species of the genus *Harpyrhynchoides*, the idiosoma is rhomboid or ovate, the palpalae differ from each other in length and numbers of teeth; in males, with one exception, the genital aperture is situated in the posterior third of the propodonal shield. The only species of the genus *Harpyrhynchoides* with the genital aperture situated in the anterior half of the propodonal shield is *H. agapornis* Fain, 1972. This species possesses, however, all other characteristics of the genus *Harpyrhynchoides* and differs, in addition from the new species, by the presence of only four setae on the apical segment of legs IV (vs 5 in *H. dusbabeki*), by the presence of setae *pg* in females (absent in *H. dusbabeki*), and by the presence of three setae on genua I and II (vs 2 in *H. dusbabeki*). *H. dusbabeki* differs from two species known in the genus *Harpirhynchus*, namely *H. nidulans* and *H. galeridae* Fain, Bochkov et Mironov, 1999 by the presence of setae *3a* and by the presence of two setae on genua I and II. In both species listed above setae *3a* are absent. In *H. nidulans*, genua I and II are without setae or bear one seta, whereas in *H. galeridae*,

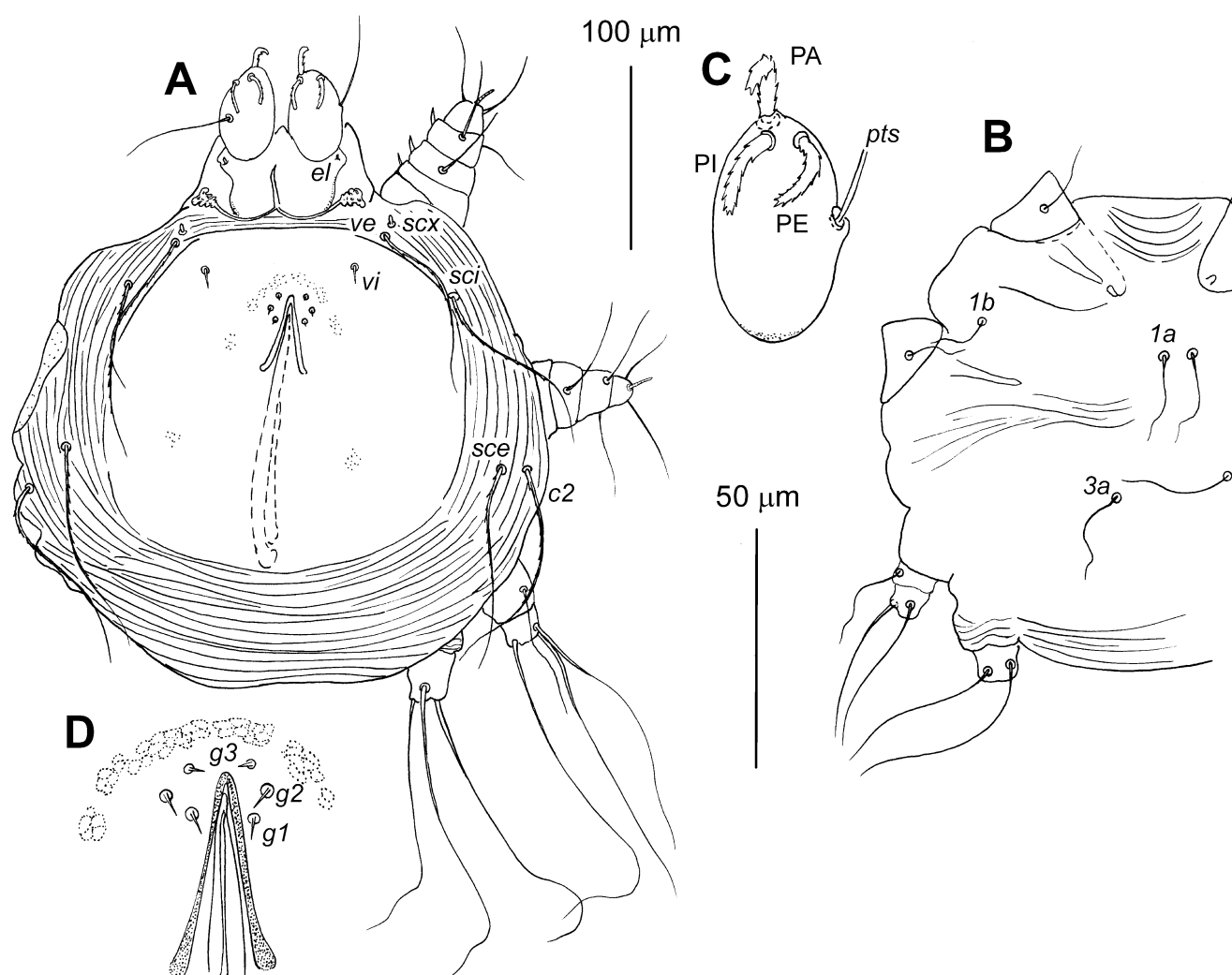


Fig. 2. *Harpirhynchus dusbabeki* sp. nov., male: **A** – dorsal view; **B** – ventral view; **C** – palp, dorsal view; **D** – genital aperture. Scale bars: A and B = 100 µm, C and D = 50 µm

genua I and II each bear three setae. The new species additionally differs from *H. nidulans* by the stable presence of only five setae on the apical segment of legs IV and from females of *H. galeridae* by the presence of two setae on the basal segment of legs III. In most specimens of *H. nidulans*, the apical segments of legs IV bear seven setae, and females of *H. galeridae* have only one seta on the basal segment of legs III.

Discussion

The family Harpirhynchidae is represented in the European fauna by 23 species of all three subfamilies. In addition, the records of three more species are highly probable because of their hosts are represented in Europe (see Table I). In Europe, these mites have been recorded from birds of nine different orders and are represented by 18 species belonging to five

genera, namely *Harpirhynchus*, *Harpyrhynchoides*, *Neharpyrhynchus* Fain, 1972, *Harpyrhynchiella* Fain, 1972 (monotypic), and *Anharpyrhynchus* Fain, 1972 (monotypic). Three additional species of this subfamily are known from hosts present in the European fauna, *Harpirhynchus galeridae* Fain, Bochkov et Mironov, 1999, *H. brevis* Ewing, 1911, and *Harpyrhynchoides anatum* Fain, 1976. Taking into consideration a significant host specificity of these mites (Moss and Wojcik 1978, Bochkov *et al.* 1999), the future records in Europe are highly probable. New collections of two harpirhynchine species, *H. brevis* and *Harpyrhynchoides cylindripalpus* Fritsch, 1954 would be extremely valuable because these species are known only from poor descriptions and the type series are lost. Moss (1979) recorded *H. brevis* and *H. cylindripalpus* from several hosts in North America and Europe that belong to different passerine genera and families. Unfortunately, Moss' collection is not available and his published host list did not have any additional information. Recent examination of

Table I. Harpirhynchid mites (Harpirhynchidae) of the European fauna

Mite taxa	Host species	Host order and family	Locality	Reference
Harpirhynchinae Dubinin, 1957				
<i>*Harpirhynchus galeridae</i> Fain, Bochkov et Mironov, 1999	<i>Galerida cristata</i> L., 1758	Passeriformes, Alaudidae	Azerbaijan, unknown locality	Fain <i>et al.</i> (1999), Moss (1979)
<i>Harpirhynchus nidulans</i> Nitzsch, 1818	<i>Carduelis chloris</i> (L., 1758)	Passeriformes, Fringillidae	Germany, Switzerland	Nitzsch (1818), Fain (1995)
“	<i>Coccothraustes coccothraustes</i> (L., 1758)	Passeriformes, Fringillidae	Germany, Czech Republic	Fritsch (1954), Literák <i>et al.</i> (2005)
“	<i>Fringilla coelebs</i> L., 1758	Passeriformes, Fringillidae	Germany	Fritsch (1954)
“	<i>Locustella lanceolata</i> (Temminck, 1840)	Passeriformes, Sylviidae	unknown locality	Moss (1979)
“	<i>Corvus corone</i> L., 1758	Passeriformes, Corvidae	unknown locality	Moss (1979)
<i>Harpirhynchus dusbabeki</i> sp. nov.	<i>Panurus biarmicus</i> (L., 1758)	Passeriformes, Timaliidae	France, Austria, Croatia, Slovakia, Czech Republic, Poland	present study, @Henry <i>et al.</i> (2004), @Literák <i>et al.</i> (2005)
<i>*Harpyrhynchoides anatum</i> Fain, 1976	<i>Anas querquedula</i> L., 1758	Anseriformes, Anatidae	Zoo of Antwerp	Fain (1976, 1994)
<i>Harpyrhynchoides alectoris</i> Fain, 1972	<i>Alectoris graeca</i> (Meisner, 1804)	Galliformes, Phasianidae	Zoo of Antwerp	Fain (1972, 1994)
“	<i>Alectoris rufa</i> (L., 1758)	Galliformes, Phasianidae	Spain	Fain <i>et al.</i> (1999)
<i>Harpyrhynchoides capellae</i> Fritsch, 1954	<i>Gallinago gallinago</i> (L., 1758)	Charadriiformes, Scolopacidae	Germany	Fritsch (1954)
“	<i>Lymnocyrtus minimus</i> (Brünnich, 1764)	Charadriiformes, Scolopacidae	France	Fain <i>et al.</i> (1999)
<i>Harpyrhynchoides columbae</i> Fain, 1972	<i>Columba livia</i> Gmelin, 1789	Columbiformes, Columbidae	Belgium	Fain (1972, 1994)
<i>Harpyrhynchoides alaudinus</i> Bochkov, 2000	<i>Alauda arvensis</i> L., 1758	Passeriformes, Alaudidae	Russia (Moscow Prov.)	Bochkov (2000a), @Oudemans (1939)
“	unknown host	Passeriformes, Alaudidae	France	@Mégnin (1877, 1878)
<i>!Harpyrhynchoides cylindripalpus</i> Fritsch, 1954	<i>Fringilla coelebs</i> L., 1758	Passeriformes, Fringillidae	Germany	Fritsch (1954)
<i>Harpyrhynchoides parazumpti</i> Fain, Bochkov et Mironov, 1999	<i>Corvus monedula</i> L., 1758	Passeriformes, Corvidae	Moldavia	Fain <i>et al.</i> (1999)
<i>Harpyrhynchoides rubeculinus</i> Černý et Sixl, 1971	<i>Erithacus rubecula</i> (L., 1758)	Passeriformes, Muscicapidae	Austria, France	Černý and Sixl (1971), Fain <i>et al.</i> (1999)
<i>Harpyrhynchoides tracheatus</i> Fritsch, 1954	<i>Buteo buteo</i> (L., 1758)	Falconiformes, Accipitridae	Germany, Luxemburg	Fritsch (1954), Fain (1994)
<i>Harpyrhynchoides asio</i> Fain, 1972	<i>Asio otus</i> (L., 1758)	Strigiformes, Strigidae	Belgium	Fain (1972, 1994)
<i>Harpyrhynchoides tyto</i> Fain, 1972	<i>Tyto alba</i> (Scopoli, 1769)	Strigiformes, Tytonidae	Belgium	Fain (1972, 1994)
<i>Harpyrhynchoides herodius</i> Boyd, 1968	<i>Ardea cinerea</i> L., 1758	Ciconiiformes, Ardeidae	The Netherlands	Fain (1994)
<i>Neharpyrhynchus hippolae</i> Bochkov, 2000	<i>Hippolais icterina</i> (Vieillot, 1817)	Passeriformes, Sylviidae	Russia (Novgorod Prov.)	Bochkov (2000b)
<i>Neharpyrhynchus pilirostris</i> (Berlese et Trouessart, 1889)	<i>Passer domesticus</i> (L., 1758)	Passeriformes, Passeridae	France, Germany	Berlese and Trouessart (1889), Fritsch (1954), Lawrence (1959)
“	& <i>Aegithalos caudatus</i> (L., 1758)	Passeriformes, Aegithalidae	unknown locality	Moss (1979)
<i>Neharpyrhynchus plumaris</i> (Fritsch, 1954)	<i>Fringilla coelebs</i> L., 1758	Passeriformes, Fringillidae	Germany, Russia (Novgorod Prov.)	Fritsch (1954), Bochkov (2000b)
“	<i>Carduelis chloris</i> (L., 1758)	Passeriformes, Fringillidae	Germany	Fritsch (1954)
“	<i>Carduelis cannabina</i> L., 1758	Passeriformes, Fringillidae	Germany	Fritsch (1954)
“	<i>Muscicapa striata</i> (Pallas, 1764)	Passeriformes, Muscicapidae	Germany	Fritsch (1954)
“	<i>Parus palustris</i> L., 1758	Passeriformes, Paridae	unknown locality	Moss (1979)
“	<i>Parus ater</i> L., 1758	Passeriformes, Paridae	unknown locality	Moss (1979)

Cont. of Table I

“	& <i>Aythya ferina</i> (L., 1758)	Anseriformes	Germany	Fritsch (1954)
<i>Harpyrhynchiella reductus</i> (Fritsch, 1954)	<i>Apus apus</i> (L., 1758)	Apodiformes, Apodidae	Germany, The Netherlands	Fritsch (1954), Fain (1995)
<i>Anharpyrhynchus monstrosus</i> (Fritsch, 1954)	<i>Garrulus glandarius</i> (L., 1758)	Passeriformes, Corvidae	Germany, Belgium	Fritsch (1954), Fain (1995)
“	<i>Corvus monedula</i> L., 1758	Passeriformes, Corvidae	unknown locality	Moss (1979)
Species incertae sedis				
¹ <i>Harpyrhynchus brevis</i> Ewing, 1911	<i>Turdus migratorius</i> L., 1766	Passeriformes, Turdidae	unknown locality	Moss (1979)
“	<i>Loxia curvirostra</i> L., 1758	Passeriformes, Fringillidae	unknown locality	Moss (1979)
Harpyalpinae Fain, 1972				
<i>Harpypalpus longipes</i> (Fritsch, 1954)	<i>Troglodytes troglodytes</i> (L., 1758)	Passeriformes, Troglodytidae	Germany	Fritsch (1954)
“	<i>Parus major</i>	Passeriformes, Paridae	Poland, unknown locality	Skoracki <i>et al.</i> (2004), Moss (1979)
“	<i>Parus caeruleus</i> L., 1758	Passeriformes, Paridae		Moss (1979)
“	<i>Carduelis spinus</i> (L., 1758)	Passeriformes, Fringillidae	unknown locality	Moss (1979)
“	<i>Pyrrhula pyrrhula</i> (L., 1758)	Passeriformes, Fringillidae	unknown locality	Moss (1979)
“	<i>Nucifraga caryocatactes</i> (L., 1758)	Passeriformes, Corvidae	unknown locality	Moss (1979)
<i>Harpypalpus holopus</i> (Berlese et Trouessart, 1889)	<i>Passer domesticus</i> (L., 1758)	Passeriformes, Passeridae	Italy, Belgium	Berlese and Trouessart (1889), Fain (1972), Fain <i>et al.</i> (1999)
“	<i>Luscinia svecica</i> (L., 1758)	Passeriformes, Muscicapidae	unknown locality	Moss (1979)
<i>Harpyalpoides lesickii</i> Skoracki, Bochkov et Sikora, 2004	<i>Coccothraustes coccothraustes</i> L., 1758	Passeriformes, Fringillidae	Poland	Skoracki <i>et al.</i> (2004)
<i>Harpyalpoides lukoschusi</i> Lombert and Moss (1983)	<i>Turdus merula</i> L., 1758	Passeriformes, Turdidae	The Netherlands, Poland	Lombert and Moss (1983), Skoracki <i>et al.</i> (2004)
Ophioptinae Southcott, 1956				
<i>Ophioptes beshkovi</i> Beron, 1974	<i>Coluber najadum dahlia</i> Schinz, 1833	Serpentes, Colubridae	Bulgaria	Beron (1974)

“The same species as previous, *no record but highly likely to occur in Europe, †species in need of redescription, &record in need of confirmation, @originally determined as *Harpyrhynchus nidulans* Nitzsch, 1818.

North American passerines (Bochkov and Galloway 2001, 2004) has not revealed these “mystic” species. The majority of the harpirhynchine species listed in Table I are monoxenous or oligoxenous. Two species known from different hosts, *H. nidulans* and *Neharpyrhynchus plumaris* Fritsch, 1954, are probably primarily associated with birds of the family Fringillidae. The records of *H. nidulans* from larks (Méglin 1877, 1878; Oudemans 1939) and from bearded tits (Henry *et al.* 2004, Literák *et al.* 2005) should refer to *Harpyrhynchoides alaudinus* Bochkov, 2000a and *H. dusbabeki* sp. nov., respectively. *Neharpyrhynchus plumaris* is recorded from several passerine birds (Fritsch 1954, Moss 1979, Bochkov 2000b) and, therefore, its record from *Aythya ferina* (L., 1758) in Germany (Fritsch 1954), a species of the order Anseriformes phylogenetically distant from passerines, is probably the result of accidental contamination.

The subfamily Harpyalpinae includes ten species in two genera *Harpypalpus* Dubinin, 1957 and *Harpyalpoides* Fain,

1972 associated exclusively with passeriform birds (Bochkov *et al.* 1999). This subfamily is represented in Europe by two species from each genus (Table I). The actual host ranges of these species remain poorly known.

Almost all species of the subfamily Ophioptinae, which includes 17 species in two genera, *Ophioptes* Sambon, 1928 (15 species) and *Afrophioptes* Fain, 1962 (2 species) are recorded from tropical or subtropical localities. Only *Ophioptes beshkovi* Beron, 1974 a parasite on *Coluber najadum dahlia* Schinz, 1833 has been recorded from Europe (Beron 1974) (Table I).

Most of the harpirhynchids are limited in distribution to Eurasia, but *Harpyrhynchus nidulans*, *H. brevis*, *Harpyrhynchoides coturnix* Fain, 1972, *H. cylindripalpus*, *Harpypalpus holopus* Berlese et Trouessart, 1878, and *H. longipes* (Fritsch, 1954) have also been recorded from North American and African passerines (Moss 1979), and *Anharpyrhynchus monstrosus* (Fritsch, 1954) was collected from Australian passer-

ines (Domrow 1991). However, the conspecificity of non-Eurasian findings to Eurasian species is still in need of confirmation.

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