

A REVIEW OF PROSTIGMATA (ACARIFORMES: TROMBIDIFORMES) PERMANENTLY ASSOCIATED WITH BIRDS

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ABSTRACT: Prostigmatan mites (Acariformes: Prostigmata) permanently parasitizing birds are reviewed at the familial level. Keys to all genera and lists of included species along with verified host records are provided. This ecological group includes about 500 species in 5 families: Cheyletidae (Cheletosomatini, Ornithocheyletiini, and Metacheyletiini), Syringophilidae, Harpirhynchidae (Harpirhynchinae and Harpypalpinae), Cloacaridae (Pneumophaginae), and Ereynetidae (Speleognathinae). The original and reference data on the external morphology, phylogeny, systematics and the host-parasite relationships of these mites are summarized.

KEY WORDS: Prostigmata, birds, mites, symbionts, systematics, host-parasite relationships

INTRODUCTION

Prostigmatic mites (Acari: Acariformes: Prostigmata) permanently associated with birds are potentially very species-rich groups supposedly including about 5000 species (Kethley and Johnston 1975; Moss 1979), but nearly 10 % (about 500 species) of these mites are recognized to date. These mites occupy a great diversity of microhabitats on the host body: skin, quills, intracutaneous layers, and respiratory tract, and are very interesting in the global evolutionary sense as well as in several parasitological aspects, including host-parasite relationships.

This ecological group includes mites of five families belonging to three phylogenetically distant superfamilies: Cheyletidae, Harpirhynchidae, and Syringophilidae of the superfamily Cheyletoidea, Cloacaridae (Cloacaroidea), and Ereynetidae (Tydeoidea) (Mironov and Bochkov 2009). The absence of taxonomic revisions and identification keys for most bird-associated prostigmatans seriously impedes their phylogenetic and ecological investigations.

Most prostigmatic inhabitants of bird are true parasites feeding on live host tissues, but the majority of cheyletids living in feather quills are predators feeding on other quill-inhabiting mites and thus should be considered as commensals or even mutualists.

Taking into consideration the high specificity of permanently parasitizing prostigmatans to avian hosts and their non-random distribution on host taxa (Fain 1994a; Bochkov 2009; Skoracki 2011), data about these mites could be used for the valida-

tion of host phylogeny and in deciphering of the host biogeography. Such investigations were undertaken on various groups of symbionts, including acariform mites, and often showed a high level of phylogenetic congruence between hosts and symbionts (Klassen 1992). Although some investigations conducted on astigmatan mites did not reveal phylogenetically congruent pattern, they provided valuable results for the host biogeography (Bochkov and OConnor 2005). At the same time, as a taxonomically poorly studied group, the prostigmatans permanently associated with birds have never been involved in this kind of investigations.

The data concerning systematics, phylogeny and host-parasite relationships of acariform mites permanently associated with mammals and birds were recently revised (Proctor 2003; Bochkov 2009, 2010), but bird-associated prostigmatans were not considered in these works.

In this paper we provide the family level review of bird-associated prostigmatans, keys to all genera, and check-lists of their species along with verified host records. The data on phylogeny, biology and host-parasite associations of these mites are briefly discussed.

MATERIAL AND METHODS

The materials used in this work were obtained from acarological collections housed in various museums. Data on bird-associated prostigmatan families including numbers of recognized species and genera, hosts, microhabitats, and distribution are summarized in Table 1. Idiosomal and leg seta-

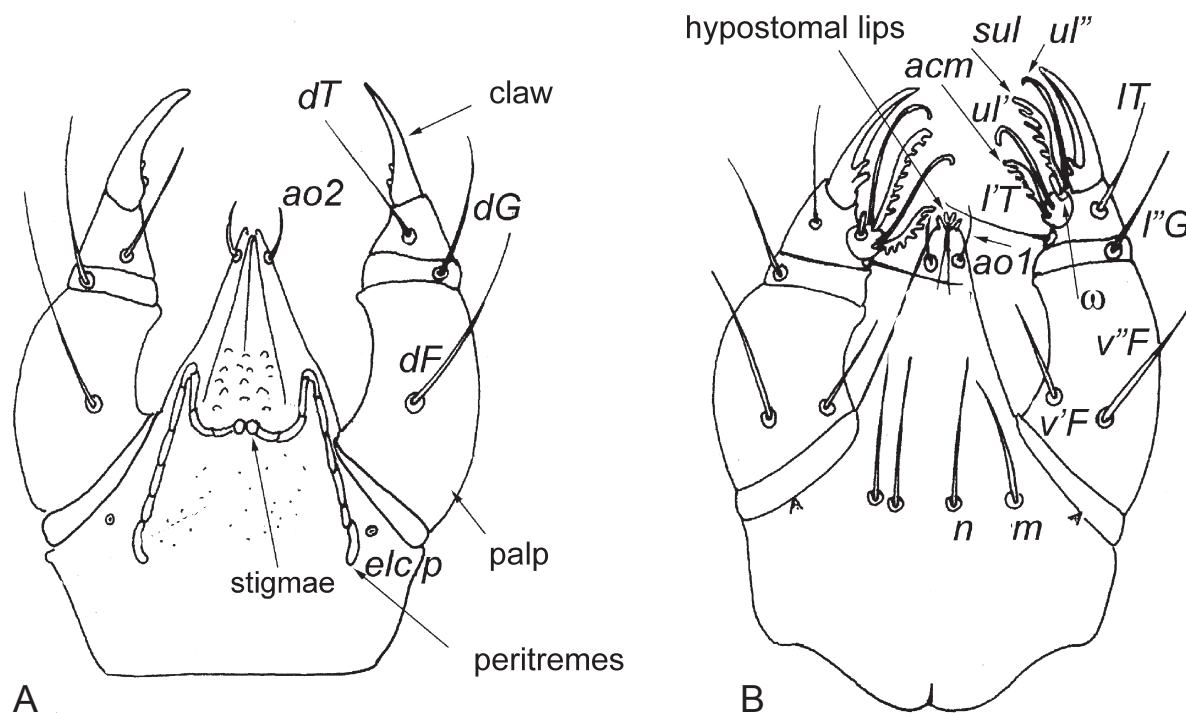


Fig. 1. Scheme of eleutherengone gnathosoma: A — in dorsal view; B — in ventral view (from Bochkov 2009, with minor modifications).

tion of these families is represented in Tables 2–5.

Most of the examined materials are deposited in the following collections: Adam Mickiewicz University (Poznan, Poland); Royal Belgian Institute of Natural Sciences (Brussels, Belgium); Royal Museum for Central Africa (Tervuren, Belgium); Zoological Institute, Russian Academy of Sciences (Saint-Petersburg, Russia).

In the taxonomic part, the gnathosomal setation follows Grandjean (1946), the leg and idiosomal setation follows Grandjean (1939, 1944). The universal setal nomenclature of idiosoma proposed by Grandjean (1939) was adopted for Prostigmata by Kethley (1990). Schemes of external mite morphology are provided in Figs. 1 and 2. The bird systematics follows Clements et al. (2011). Data about all described species of bird-associated prostigmatans are summarized in the Appendix (deposited at Acarina web-site: <http://insects.ummz.lsa.umich.edu/acarina/>).

SYSTEMATICS AND PHYLOGENY

Suborder Trombidiformes Reuter, 1909

Infraorder Prostigmata Kramer, 1887

According to the system of acariform mites proposed by Mironov and Bochkov (2008), the suborder Trombidiformes is separated into four infraorders, Sphaerolichida, Bimichaelida, Oehserichestida, and Prostigmata. Only the infraorder

Prostigmata includes parasitic forms.

Parasites permanently associated with birds belong to two phylogenetically distant parvorders, Eupodina (Ereynetidae) and Eleutherengona (Cheyletidae, Cloacaridae, Harpirhynchidae, and Syringophilidae).

The only possible paleontological record of these bird-associated mites is the finding of eggs on a feather from the Lower Cretaceous period (northeast Brazil) (Martill and Davis 1998). Authors believed that these eggs were laid by feather mites (Astigmata: Psoroptidia). These spherical eggs are more similar to those of Cheyletoidea, than to the strongly elongated eggs of feather mites (Bochkov 2008). Proctor (2003), however, supposed that this feather dropped to water and these eggs were laid by Ostracoda.

Key to families of Prostigmata — permanent parasites of birds

1. Subcapitulum of gnathosoma distinctly developed (Fig. 1). Palps present. At least some of idiosomal and leg setae filiform 2
- Subcapitulum of gnathosoma strongly reduced or absent. Palps absent. Idiosomal and leg setae represented by alveoli or fleshy-like projections ... Cloacaridae Camin, Moss, Oliver et Singer, 1967 (*Pneumophagus* Fain et Smiley, 1989) (Fig. 10)
2. Propodonal setae *si* represented by unmodi-

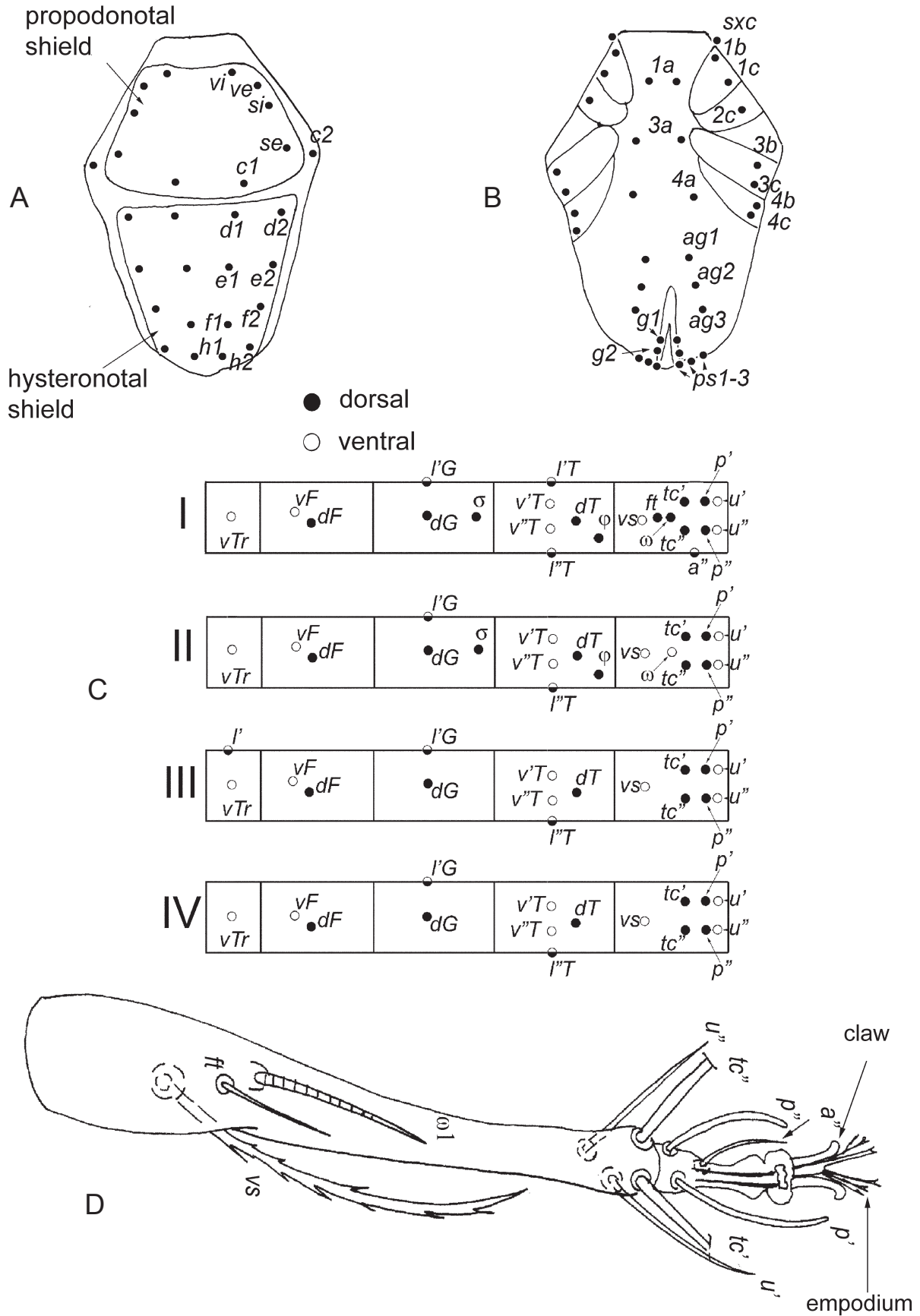


Fig. 2. Scheme of eleutherengone mite: A — idiosoma in dorsal view; B — same in ventral view; C — setation of legs I-IV; D — tarsus I (from Bochkov 2009, with minor modifications).

fied simple setae. Genital papillae absent. Tibia of legs I with or without solenidion φ 3
 — Propodonal setae *si* represented by bothridia (Fig. 11A). Genital papillae present. Tibia of legs I with complicate ereynetal organ (sensory complex, Fig. 12A) Ereyetidae (Speleognathinae)
 3. Distal part of hypostome fused with subcapitulum. Peritremes situated on subcapitulum, not linear. Palpal trochanter, femur and genu not fused. Setae *scx* very small, covered by lateral extensions of propodotum. Tibia and genu I with 1 solenidion each 4
 — Distal part of hypostome not fused with subcapitulum. Peritremes situated at base of subcapitulum, linear. Palpal trochanter, femur and genu fused to each other. Setae *scx* distinctly developed, situated dorsally. Tibia and genu I without solenidion Harpirhynchidae Dubinin, 1957 (Figs. 8, 9)
 4. Subcapitulum not deeply submerged in idiosoma, subcapitular apodeme absent. Claw of palpal tibia present. Palpal tibia and tarsus separated. Setae *4a* present. Setae *a* I absent Cheyletidae Leach, 1815 (Figs. 3–5)
 — Subcapitulum deeply submerged in idiosoma, subcapitular apodeme distinctly developed. Claw of palpal tibia absent. Palpal tibia and tarsus fused. Setae *4a* absent. Setae *a* I present Syringophilidae Lavoipierre, 1953 (Figs. 6, 7)

Parvorder Eleutherengona Oudemans, 1909
Superfamily Cheyletoidea Leach, 1815

The supefamily Cheyletoidea includes currently five families, Cheyletidae, Syringophilidae, Harpirhynchidae, Psorergatidae, and Demodicidae; mites of the three first families are associated with birds (Bochkov 2009). The phylogeny of these mites was recently reconstructed by Bochkov (2002, 2008). There are two main phylogenetic lineages in this superfamily. Lineage I includes the families Cheyletidae and Syringophilidae, whereas lineage II is represented by three families, Harpirhynchidae (Psorergatidae–Demodicidae). The monophyly of lineage I is supported by the following synapomorphies: the peritremes are situated on the rostral part of the stylophore, distinctly segmented, and arch-like or M-shaped; the distal part of the hypostomal apex is fused with the stylophore, and the hypostomal lips are present.

Lineage II could be characterized by the following synapomorphies: the presence of the strongly sclerotized pharyngeal bulb, the absence of adoral setae *ao1* and *ao2*, the palpal tibia-tarsus

is located on the ventral side of the trochanter-femur-genu, the absence of the eupathidia on the palpal tarsus, the absence of the separate hysteronotal shield, the completely fused genital and anal openings in females, the absence of the aggenital setae in both sexes, the absence of setae *ft*, *vsI*, solenidion φ I, σ I, coxal setae *1b* (reversed in Ophioptinae), *3b*, and *4c* (reversed in Harpypalinae).

Family Cheyletidae Leach, 1815

Figs. 3–5

Type genus: *Cheyletus* Latreille, 1796

Diagnosis. Gnathosoma moderately or distinctly developed (1/5–1/3 of idiosomal length). Subcapitulum bearing setae *elc. p, n, ao1* and *ao2*. Peritremes situated on rostral part of stylophore, distinctly segmented, generally M-shaped. Distal part of hypostome fused with stylophore. Hypostomal lips present. Palps linear, consisting of 5 segments, with various projections in some parasitic forms. Palpal tibia with distinct claw. Palpal tarsus strongly reduced. Palpal setation: femur with setae *d, v', v''*, genu — *d, l''*, tibia — *d, lT, l'*, and tarsus with eupathidia *acm, sul, ul', ul''*, and solenidion ω . Eupathidia *acm* and *sul''* comb-like in most predaceous mites and smooth in most parasites. Idiosoma generally rhomb-like or ovate in outline. Bases of trochanters inserted on ventral side of idiosoma. In Cheyletiellini, idiosoma bearing 1 pair of distinctly developed lateral scapular lobes. Eyes absent; or 1 pair of lens-like eyes present on propodotum in some free-living predators. Propodonal shield present, distinctly developed. Hysteronotal and pygidial shields present or absent. Ventral side of idiosoma generally devoid of shields but in males of some predatory forms weakly sclerotized pseudosternal shield present. Opisthosoma moderately developed. In females, anal and genital-ovipore openings situated ventrally, close to posterior end of body or terminally, adnate and covered by pair of folds. In males, aedeagus tube-like or comma-like and pointed apically, genital and anal openings fused (or anal opening absent). In males of free-living forms, genital opening situated terminally or ventro terminally. In parasitic males, genital opening dorsally displaced, and in some bird parasites, it located in anterior part of idiosoma. Distance between coxal fields II and III distinctly shorter than idiosomal width (excluding tribe *Bakini*). In most taxa, 3 pairs of cupules present: *im, ip*, and *ih*. In some parasites, these cupules absent. Idio-

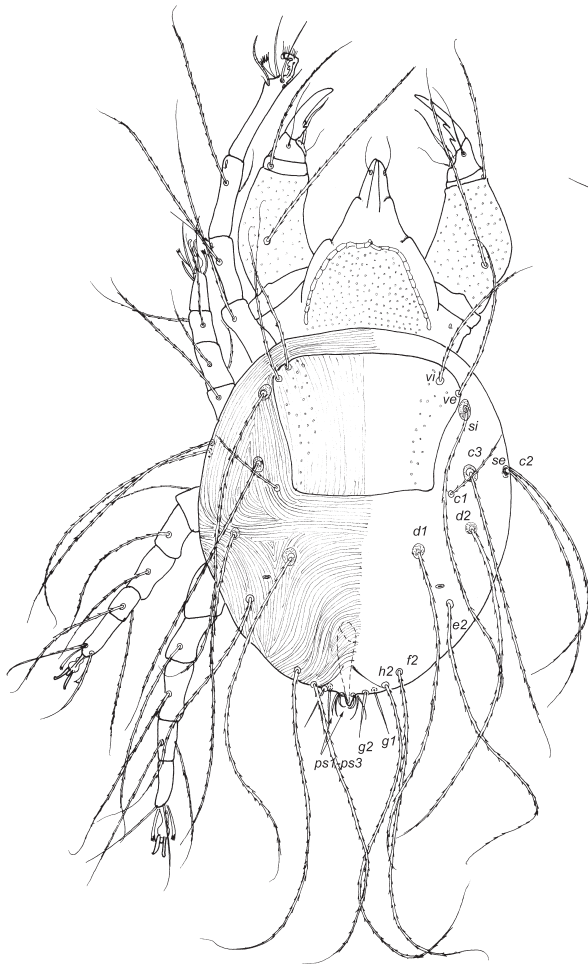


Fig. 3. *Metacheyletoides numidae* (Cheyletidae: Cheletosomatini), male in dorsal view (from Bochkov and Skoracki 2012 with minor modifications).

somal setation (maximum set): *scx*, *vi*, *ve*, *si*, *se*, *c1*, *c2*, *d1*, *d2*, *e1*, *e2*, *f1*, *f2*, *h1*, *h2*, *h3*, *ps1*, *ps2*, *ps3*, *ag1*, *ag2*, *ag3*, *g1*, *g2*. Setae *scx* covered dorsally by extending lateral margins of propodonotum. In males, 2 pairs of aggenital setae, 2 pairs of genital setae, and 3 pairs of pseudoanal setae present. In some taxa idiosomal chaetome neutrichous and many neutrichous dorsal setae strongly modified. In most taxa, legs slender, consisting of 5 articulated segments, and their tarsi having weakly developed pretarsi bearing 2 smooth lateral claws and empodium with tenent hairs. Pretarsi separated from respective tarsi by dorsal knob. Leg length usually 60–70% of idiosomal length. In *Metacheyleletia*, legs IV lost or primordial. In free-living forms, leg coxae distinctly bordered, and in some cases well sclerotized. In many parasitic mites, leg coxae represented exclusively by coxal apodemes. Projections of leg segments present only in some parasitic species. Maximum set of leg setae (paired setae are in parentheses): tarsi I–IV — I, *ft*, (*tc*), *a''*, (*p*), (*u*), *vs*, $\omega 1$; II, (*tc*), (*p*), (*u*), *vs*, $\omega 1$; III,

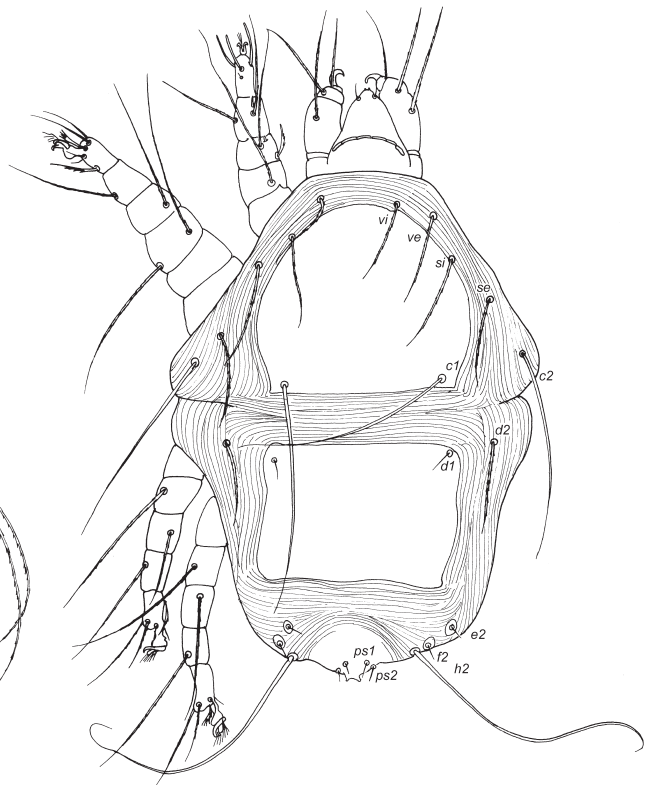


Fig. 4. *Ornithocheyletia chirovi* (Cheyletidae: Ornithocheyletiini), female in dorsal view.

(*tc*), (*p*), (*u*), *vs*, $\omega 1$ (only in males); IV, (*tc*), (*p*), (*u*), *vs*, $\omega 1$ (only in males); tibiae I–IV — I, *d*, (*l*), (*v*), φ ; II, *d*, *l''*, (*v*), φ ; III, *d*, *l''*, (*v*) + φ (only in males); IV, *d*, *l''*, (*v*) + φ (only in males); genua I–IV — I, *d*, *l'*, σ ; II–IV, *d*, *l'*; femora I–IV — *d*, *v*; trochanters I–IV — I, II, IV, *v*; III, *l*, *v*; coxae I–IV — I, *1a*, *1b*, *1c*; II, *2c*; III, *3a*, *3b*, *3c*; IV, *4a*, *4b*, *4c*. Solenidion $\omega 1$ II situated ventrally. Larva, proto- and tritonymphs present; deutonymph absent. Male moulting from protonymph.

Detailed historical reviews of the cheyletid systematics were provided by Volgin (1969) and Bochkov (2009). Therefore we discuss it here very briefly. The excellent taxonomic revision of the family Cheyletidae prepared by Volgin (1969) could be considered as a base of the modern cheyletid systematics. According to his system, the family consisted of ten tribes and the two subfamilies Cheyletinae and Cheyletiellinae. The revision of the family Cheyletidae prepared by Summers and Price (1970) appeared almost simultaneously with the Volgin's monograph but was not so comprehensive. The latter work did not introduce any principal improvements to the cheyletid system and the tribes and subfamilies established by Volgin were unceremoniously ignored by these authors.

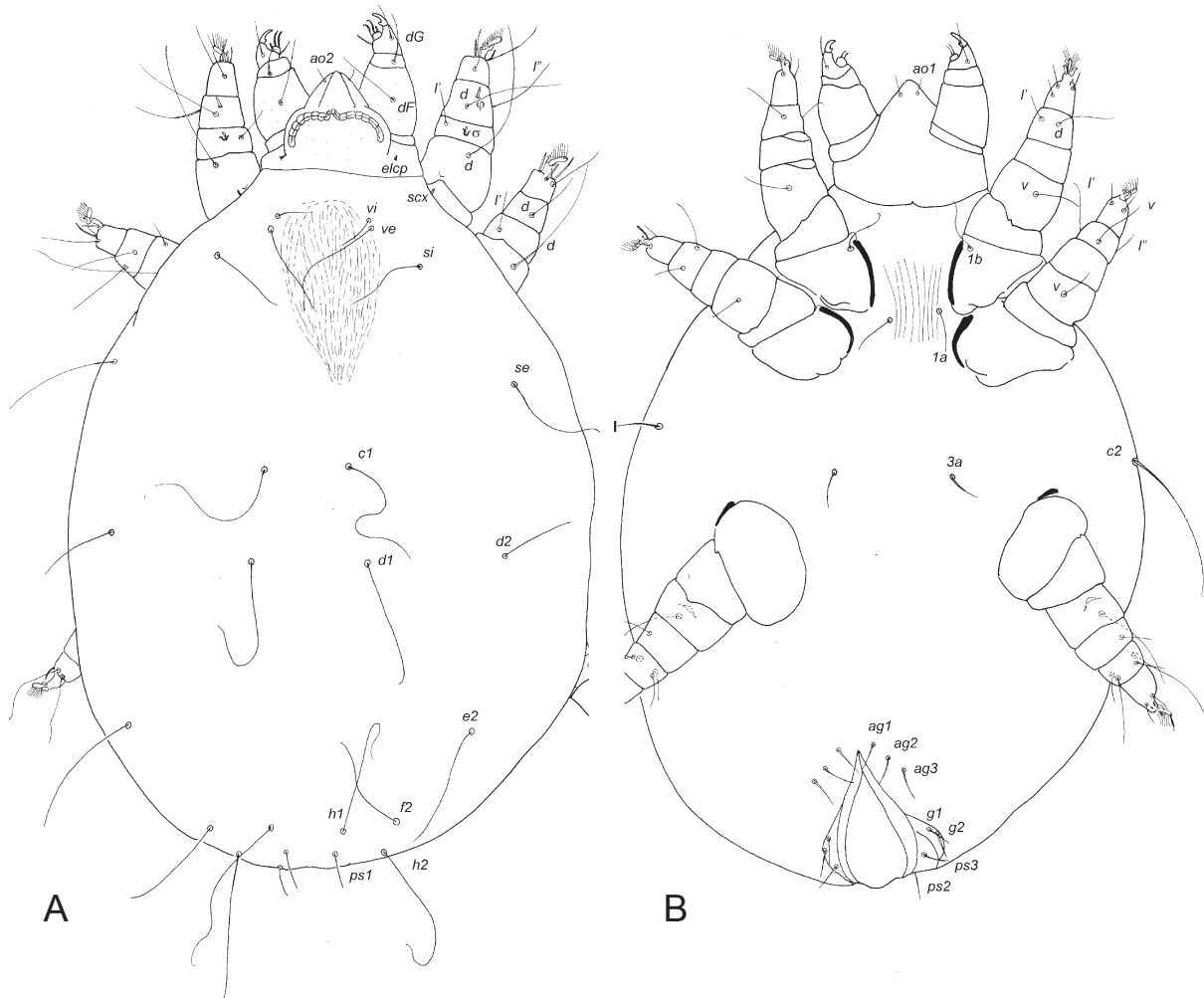


Fig. 5. *Metacheyleletia ngaii* (Cheyletidae: Metacheyleletiini), female: A — in dorsal view, B — in ventral view (from Bochkov and Skoracki 2011 with minor modifications).

Fain et al. (1997) and Gerson et al. (1999) revised the family at the generic level and provided a list of all described species.

The most important synapomorphies of Cheyletidae are the ventral situation of solenidion on tarsi II, male moulting from protonymph, and the absence of setae *a'* of tarsus I (Bochkov 2008).

The attempt of the cladistic analysis of the family Cheyletidae was undertaken by Bochkov and Fain (2001). According to the result of this analysis with some corrections (Bochkov 2004), the family Cheyletidae includes 14 tribes most of which were established by Volgin (1969): Acropsellini, Bakini, Cheletogenini, Cheletosomatini, Chelonotini, Cheyletiini, Cheyletiellini, “Cheyletini”, Cheletomorphini, Metacheyletiini, Niheliini, Ornithocheyletiini, Teinocheylini, and a unnamed tribe represented by the genus *Caudacheles*. The relationships between these tribes remain unresolved. The bird parasites and nidicolous mites belong to the tribes Cheletosomatini, Metacheyletiini, and Ornithocheyletiini.

Key to bird-associated genera of Cheyletidae

1. Legs IV present, normally developed. Idiosoma rhomb-like in outline 2
- Legs IV absent or primordial. Idiosoma ovate in outline (Metacheyletiini Fain, 1980) *Metacheyleletia* Fain, 1972
2. Eupathidium *sul*” comb-like or serrate. Palpal claw widely opened, slightly curved laterally, with basal angle(s). At least some idiosomal setae of females ultralong (excluding normally always long *c2* and *h2*). Male genital opening situated terminally. Tarsi of legs I much longer than wide (Cheletosomatini Volgin, 1969) 3
- Eupathidium *sul*” smooth. Palpal claw strongly curved ventrally and without basal angles. Idiosomal setae of females moderately long (excluding normally always long *c2* and *h2*). Male genital opening situated dorsally. Tarsi of legs I slightly longer than wide (Ornithocheyletiini Volgin, 1969) 8
3. Eupathidium *sul*” smooth or slightly serrate. Setae *c3* present 5

- Eupathidium *sul*” comb-like. Setae *c3* absent 4
 4. Coxal fields III and IV contiguous. Setae *c1* situated on propodonal shield
 *Cheletopsis* Oudemans, 1904
 — Coxal fields III and IV distinctly separated. Setae *c1* situated off propodonal shield
 *Eucheletopsis* Volgin, 1969
 5. Setae *c4* absent. Female hysteronotal shield absent or situated on posterior part of opisthosoma. Setae *e1* and *fl* absent 6
 — Setae *c4* present. Female hysteronotal shield present, situated between levels of setal bases *d2* and *e2*. Setae *e1* and *fl* present
 *Picocheyletus* Bochkov et OConnor, 2003
 6. Eupathidium *sul*” serrate. Palpal claw with 1 basal angle. Tarsal claws on all legs equal or subequal in size 7
 — Eupathidium *sul*” smooth. Palpal claw with several basal angles. Tarsal claws on legs I much smaller than claws of tarsi III–IV
 *Metacheletoides* Fain, 1972
 7. In female, small hysteronotal shield present and setae *h1* short, much shorter than *c2*
 *Cheletosoma* Oudemans, 1905
 — In female, hysteronotal shield absent and setae *h1* long, subequal to *c2*
 *Cheletoides* Oudemans, 1904
 8. Genua III and IV with 1 and without setae, respectively 10
 — Genua III and IV with 2 and with 1–2 setae, respectively 9
 9. Hysteronotal shield present. Trochanters III and IV without setae. Genu IV with 1 seta
 *Ornithocheyla* Volgin, 1964
 — Hysteronotal shield absent. Trochanters III and IV with 2 and 1 setae, respectively. Genu IV with 2 setae *Bakericheyla* Volgin, 1966
 10. Palpal femora without ventral processes. Propodonal shield very small. Setae *c3* present. In females, 2 pairs of aggenital setae present. Solenidion ϕI present. Trochanter IV, femora III and IV with 1 seta each *Neocheyletiella* Baker, 1949
 — Palpal femora with ventral processes. Propodonal shield distinctly developed, covering part of hysteronotum. Setae *c3* absent. In females, aggenital setae absent. Solenidion ϕI absent. Trochanter IV, femora III and IV without setae *Apodicheles* Fain, 1979

Family Syringophilidae Lavoipierre, 1953

Figs. 6–7

Type genus: *Syringophilus* Heller, 1880

Diagnosis. Gnathosoma moderately developed. Subcapitulum deeply inserted into idiosoma, bearing setae *elcp*, *n*, *ao1* and *ao2*; subcapitular apodeme distinctly developed. Peritremes situated on rostral part of stylophore, distinctly segmented, generally M-shaped. Hypostomal lobes fused with stylophore. Hypostomal lips present. In many taxa, female hypostome bearing 1 pair of hyaline protuberances. Palps linear, consisting of 4 segments (tibia and tarsus fused). Palpal tibiotarsus without claw. Palpal setation: femur with setae *d*, *v*, *v*”, genu — *d*, *l*”, tibiotarsus — *d*, *lT*, *l*”, eupathidia *acm*, *sul*, *ul*’, *ul*”, and solenidion ω . Idiosoma strongly elongated. Bases of trochanters inserted on ventral side of idiosoma. Eyes absent. Propodonal shield present. Hysteronotal and pygidial shields present or absent. Ventral side of idiosoma generally devoid of shields. Opisthosoma distinctly developed. Female anal and genital-ovipore openings situated ventrally close to posterior end of body or terminally, adnate, and covered by pair of folds. In males, aedeagus tube-like and pointed apically, genital and anal openings fused (or anal opening absent) and situated dorsally. Distance between coxal fields II and III subequal or about twice as long as idiosomal width. Idiosomal cupules absent. Idiosomal setation (maximum set): *scx*, *vi*, *ve*, *si*, *se*, *c1*, *c2*, *d1*, *d2*, *e2*, *fl*, *f2*, *h1*, *h2*, *ps1*, *ps2*, *ag1*, *ag2*, *ag3*, *g1*, *g2*. Setae *scx* covered dorsally by extending lateral margins of propodonomum. In males, 2–3 pairs of aggenital setae, 2 pairs of genital setae, and 2 pairs of pseudoanal setae present. In some taxa, aggenital setae neutrichous. Legs slender, consisting of 5 articulated segments; their tarsi having weakly developed pretarsi bearing 2 smooth lateral claws and empodium with tenet hairs. Maximum set of leg setae (paired setae are in parentheses): tarsi I–IV — I, *ft*, (*tc*), (*a*), (*p*), (*u*), *vs*, ωI ; II, (*tc*), (*p*), (*u*), *vs*, ωI ; III, (*tc*), (*p*), (*u*), IV, (*tc*), (*p*), (*u*); tibiae I–IV — I, *d*, (*l*), *v*, ϕ ; II, *d*, (*l*), *v*, ϕ ; III, *d*, (*l*); IV, *d*, (*l*); genua I–IV — I, *d*, *l*’, σ ; II, *d*, *l*’; III and IV *l*’, femora I–IV — I and II, *d*, *v*, III and IV *d*; trochanters I–IV, *v*; III; coxae I–IV — I, *1a*, *1b*, *1c*; II, *2c*; III, *3a*, *3b*, *3c*; IV, *4b*, *4c*. Solenidion ωIII situated dorsally. Larva, proto- and tritonymphs present; deutonymph absent. Male moulting from tritonymph.

The detailed discussion of syringophilid systematics is provided in the monograph by Skoracki (2011). Therefore, only the principal works are considered below. The most important review for syringophilid systematics was prepared by Kethley (1970). In the work following this revision,

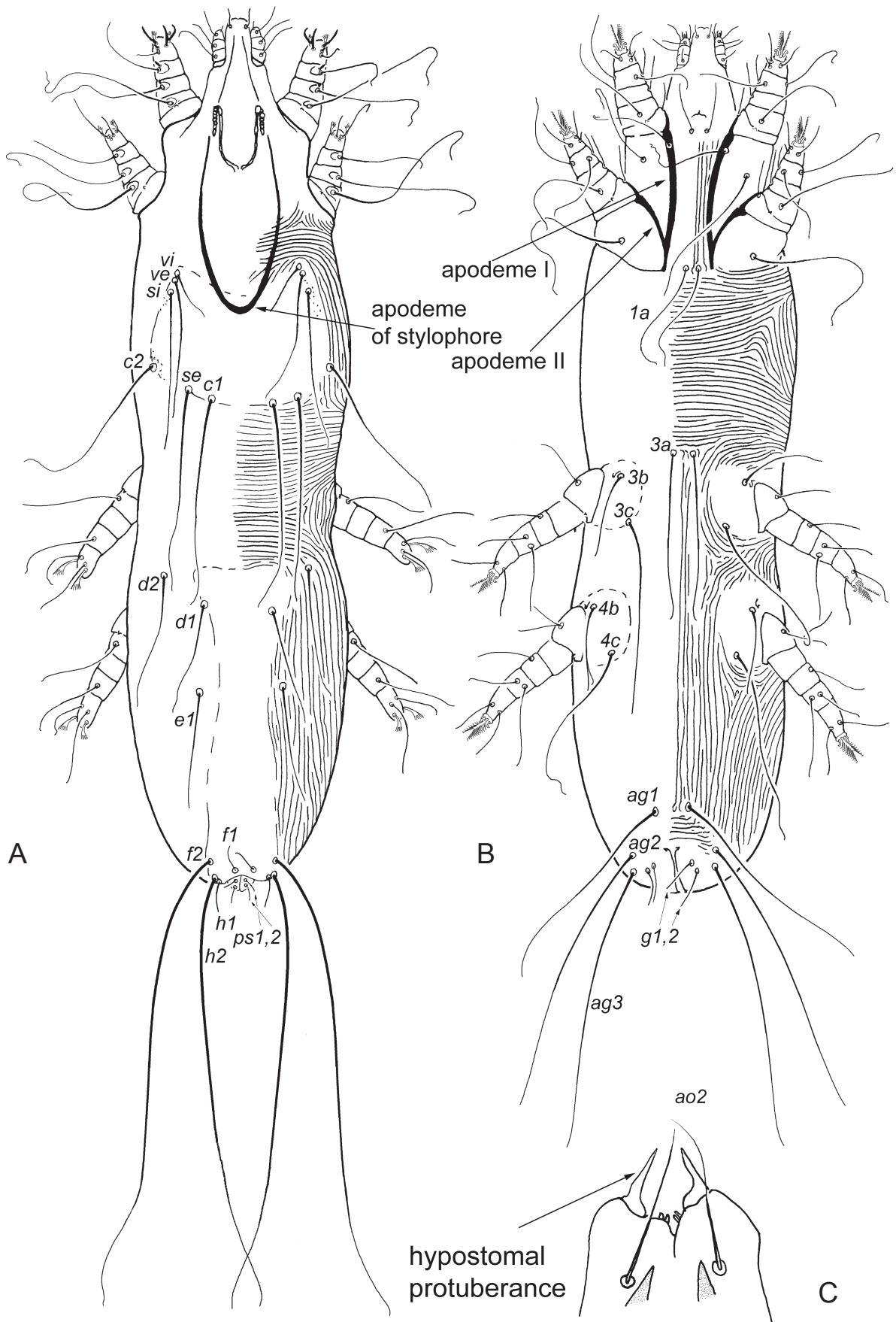


Fig. 6. *Syringophilus bipectinatus* (Syringophilidae: Syringophilinae), female: A — in dorsal view; B — in ventral view; C — *Torotroglia* sp. (Syringophilinae), hypostomal protuberance.

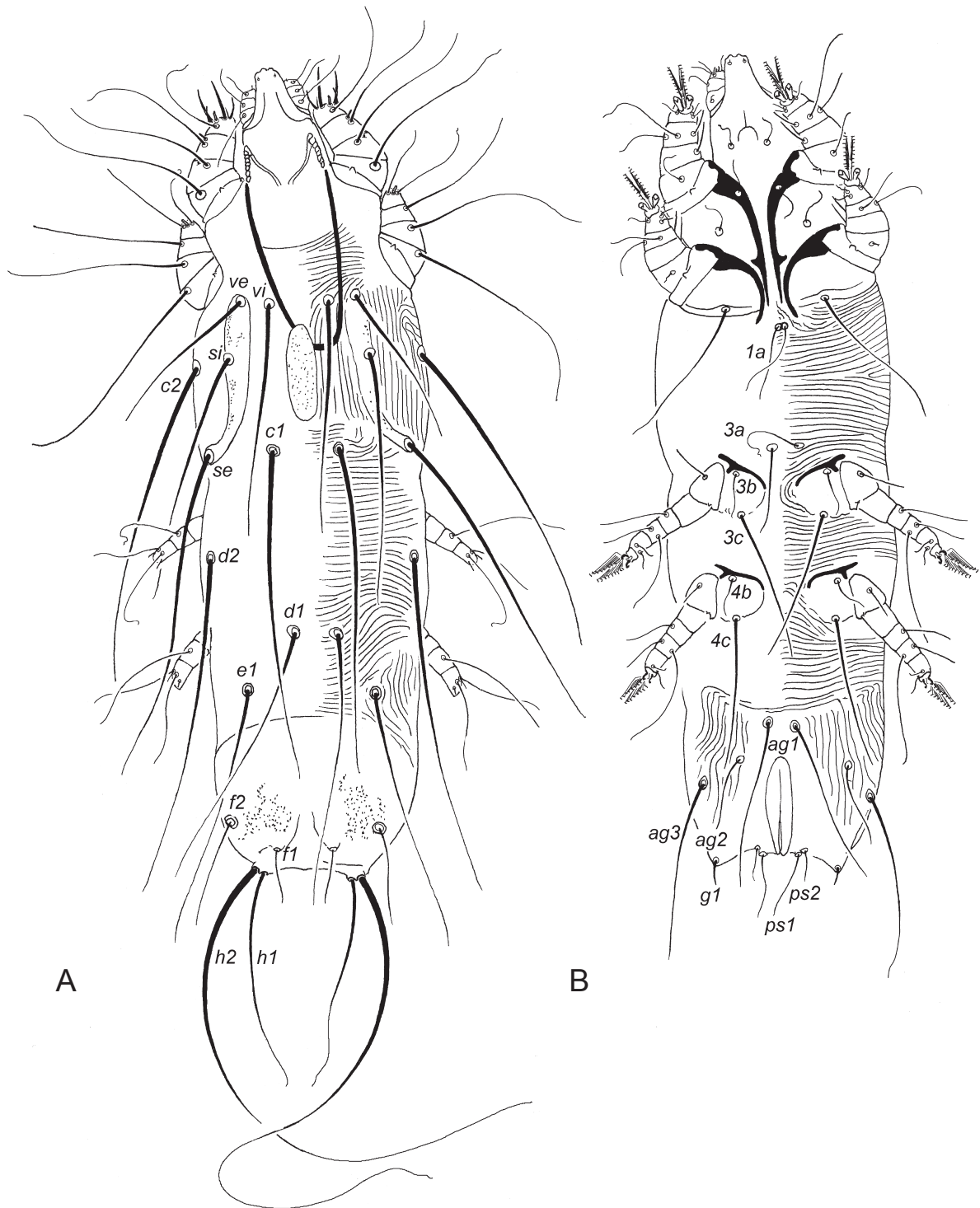


Fig. 7. *Picobia heeri* (Syringophilidae: Picobiinae), female: A — in dorsal view; B — in ventral view.

Johnston and Kethley (1973) proposed the original variant of syringophilid system based on the result of their phenetic analysis. This analysis confirmed all syringophilid genera established by Kethley (1970) and allowed the division of this family into two unequal subfamilies, Syringophiliinae and Picobiinae. The third syringophilid subfamily — Lobatinae was created by Casto (1977)

for the monotypic genus *Cuculiphilus*. This genus was subsequently included in the subfamily Picobiinae (Fain et al. 2000). From the beginning of XXI century, the biodiversity of syringophilids has been studied mainly by A.V. Bochkov and M. Skoracki (with collaborators). To date, this family includes 278 species of 53 genera versus 24 species of 15 genera in Kethley's review (1970). The

modern comprehensive revision of Palaearctic Syringophilidae was recently prepared by Skoracki (2011).

The most distinctive synapomorphies of Syringophilidae are the subcapitulum deeply inserted into the idiosoma; four segmented linear palps, widely separated coxae I–II and III–IV, and the absence of setae *4a* (Bochkov 2008).

Any works on the phylogeny of this family are absent.

Key to genera of Syringophilidae

1. Tibiotarsus of palps truncate on distal margin. Prorals setae *p'* and *p''* of legs I–IV with two minute tines, rod-like. Physogastric forms of females present. Juvenile stages with chaetotaxy reduced to small spinose structures. Body feathers as main habitat. (Picobiinae Johnston et Kethley, 1973) 48
 - Tibiotarsus of palps rounded on distal margin. Prorals setae *p'* and *p''* of legs I–IV multiserrate, fan-like. Physogastric forms of females absent. Setae of body and legs in juveniles well developed. Flight feathers as main habitat. (Syringophilinae Lavoipierre, 1953) 2
2. Setae *vi* present 12
 - Setae *vi* absent 3
3. Setae *dFII* present 9
 - Setae *dFII* absent 4
4. Setae *dFIII* and *dFIV* absent 5
 - Setae *dFIII* and *dFIV* present and replaced ventrally *Terratosyringophilus* Bochkov et Perez 2002
5. Setae *ve* situated anterior to level of setae *si*. Pocket-like structures absent. Stylophore rounded posteriorly 6
 - Setae *ve* and *si* situated at same transverse level. Pocket-like structures in anterior part of propodonotum present. Stylophore constricted posteriorly *Psittaciphilus* Fain, Bochkov et Mironov, 2000
6. Hypostomal apex ornamented by 2 pairs of median finger-like protuberances. Apodemes I and II parallel and fused to each other 7
 - Hypostomal apex smooth. Apodemes I divergent, not fused to apodemes II *Meitingsunes* Glowska et Skoracki, 2010
7. Setal pattern of propodonotal region arranged 2–1–2 8
 - Setal pattern of propodonotal region arranged 2–3 *Neoperisterophila* Skoracki, 2005
8. Legs I and II subequal in size *Peristerophila* Kethley, 1970

- Legs I 1.5 times longer than legs II *Castosyringophilus* Bochkov et Perez, 2002
- 9. Setae *dGII* absent. Apodemes I divergent *Galliphilopsis* Skoracki et Sikora 2004
 - Setae *dGII* present. Apodemes I parallel 10
- 10. Setae *l'RI* and *l'RII* present 11
 - Setae *l'RI* and *l'RII* absent *Aulonastus* Kethley, 1970
- 11. Two pairs of pseudanal setae (*ps1* and *ps2*) present *Neoaulonastus* Skoracki, 1999
 - One pair of pseudanal setae present (*ps2* absent) *Krantziaulonastus* Skoracki, 2011
- 12. Legs with full complement of setae 29
 - Some of leg setae absent 13
- 13. Setae *dGII* present 18
 - Setae *dGII* absent 14
- 14. Setae *vsI* present 15
 - Setae *vsI* absent *Philoxanthorinea* Kethley, 1970
- 15. Setae *l'GIV* absent 17
 - Setae *l'GIV* present 16
- 16. Two pairs of pseudanal setae present *Syringophiloidus* Kethley, 1970
 - One pair of pseudanal setae present (*ps2* absent) *Betasyringophiloidus* Skoracki, 2011
- 17. Apodemes I parallel fused to apodemes II *Apodisyringophilus* Skoracki et OConnor, 2010
 - Apodemes I distinctly divergent, not fused to apodemes II *Apodisyringiana* Skoracki, 2005
- 18. Setae *dFII* present 20
 - Setae *dFII* absent 19
- 19. Setae *dTIII* and *dTIV* present. Propodonotal shield divided longitudinally *Ascetomylla* Kethley, 1970
 - Setae *dTIII* and *dTIV* absent. Propodonotal shield entire *Fritschisyringophilus* Bochkov, Fain et Skoracki, 2004
- 20. Setae *dTIII* present 22
 - Setae *dTIII* absent 21
- 21. Setae *vsII* present. Apodemes I parallel *Neoaulobia* Fain, Bochkov et Mironov, 2000
 - Setae *vsII* absent. Apodemes I divergent *Cuculisyringophilus* Skoracki, 2008
- 22. Setae *vsI* present 24
 - Setae *vsI* absent 23
- 23. Apodemes I parallel. Stylophore constricted posteriorly. Claws strongly recurved *Bochkovia* Skoracki et OConnor, 2010
 - Apodemes I divergent. Stylophore rounded posteriorly. Claws typically opened *Paraniglarobia* Skoracki, 2011
- 24. Setae *vsII* absent, *l'GIV* present 25
 - Setae *vsII* present, *l'GIV* absent *Neosyringophilopsis* Skoracki et Sikora, 2005

25. Lateral hypostomal teeth absent 26
 — Lateral hypostomal teeth present
 *Stibarokris* Kethley, 1970
26. Two pairs of genital setae present (*g1*, *g2*).
 Apodemes I not fused to apodemes II 27
 — One pair of genital setae present (*g2* absent).
 Apodemes I fused to apodemes II
 *Procellariisyringophilus* Kethley, 1970
27. Apodemes I parallel. Stylophore without large
 tip on posterior margin 28
 — Apodemes I divergent. Stylophore with large
 tip on posterior margin *Ciconichenophilus*
 Skoracki et OConnor, 2010
28. Claws small, with basal angle, typically opened
 *Niglarobia* Kethley, 1970
 — Claws large, without basal angle, strongly re-
 curved *Phalarophilus*
 Skoracki, Bochkov et OConnor, 2011
29. Two or 3 pairs of aggenital setae present ... 31
 — Aggenital series with 4–9 pairs of setae 30
30. Coxal fields I and II similar in size and shape.
 Supernumerary setae *vsIII* absent. Legs I thicker
 than II–IV *Torotroglia* Kethley, 1970
 — Coxal fields I and II dissimilar in size and shape.
 Supernumerary setae *vsIII* present. Legs I–IV sub-
 equal *Trypetoptila* Kethley, 1970
31. Three pairs of aggenital setae (*ag1–3*) present
 34
 — Two pairs of aggenital setae present (setae *ag2*
 absent) 32
32. Apodemes I not fused to apodemes II. Claws
 typically opened 33
 — Apodemes I fused to apodemes II. Claws
 strongly recurved *Kethleyana* Kivganov, 1995
33. Hysteronotal shield not fused to pygidial
 shield. Coxal fields of legs I and II are similar in
 size and shape, apodemes of legs III and IV well
 developed *Picisyringophilus*
 Skoracki et OConnor, 2010
 — Hysteronotal shield fused to pygidial shield.
 Coxal fields of legs I and II are dissimilar in size
 and shape. Apodemes of legs III and IV absent
 *Mironovia* Chirov et Kravtsova, 1995
34. Lateral hypostomal teeth absent 35
 — Lateral hypostomal teeth present
 *Colinophilus* Kethley, 1970
35. Peritremes M-shaped 36
 — Peritremes U-shaped *Syringophilus*
 Heller, 1880
36. Coxal fields I and II dissimilar in size and
 shape 39
 — Coxal fields I and II similar in size and shape ..
 37
37. Setae *f2* long (longer than *c1*). Setae *si* and *se*
 situated at same level 38
 — Setae *f2* short (2–3 times shorter than *c1*). Setae
si situated anterior to level of setae *se*
 *Chenophila* Kethley, 1970
38. Claws broadly open *Selenonycha*
 Kethley, 1970
 — Claws strongly recurved *Creagonycha*
 Kethley, 1970
39. Apodemes I divergent 40
 — Apodemes I parallel *Aulobia* Kethley, 1970
40. Apodemes I not fused to apodemes II 42
 — Apodemes I fused to apodemes II 41
41. Propodonal shield divided longitudinally
 *Crotophagisyringophilus* Skoracki, 2008
 — Propodonal shield entire *Syringophilopsis*
 Kethley, 1970
42. Stylophore constricted posteriorly 44
 — Stylophore rounded posteriorly 43
43. Dorsal setae of idiosoma ornamented
 *Blaszakia* Skoracki et Sikora, 2008
 — Dorsal setae of idiosoma smooth
 *Bubophilus* Philips et Norton, 1978
44. Apodemes I strongly divergent. Setae *se* lo-
 cated anterior to the level of setae *c1* 47
 — Apodemes I slightly divergent. Setae *se* located
 posterior to level of setae *c1* 45
45. Setae *f2* situated close to the bases of setae *f1* .
 46
 — Setae *f2* situated distinctly anterior to the level
 of setae *f1* *Charadriphilus* Bo-
 chkov et Chystiakov, 2001
46. Each lateral branch of peritremes reduced to 3
 chambers. Setae *se* and *c1* situated at same trans-
 verse level. In males 2 pairs of aggenital setae pres-
 ent and setae *se* situated distinctly anterior to level of
 setae *c1* ... *Pteroclidisyringophilus* Skoracki, 2011
 — Each lateral branch with 7–12 chambers. Setae
se situated distinctly posterior to level of setae *c1*.
 In males 3 pairs of aggenital setae present and setae
se and *c1* situated at same transverse level
 *Kalamotrypetes* Casto, 1980
47. Setae *si* and *se* situated at same level. All ter-
 minal setae long *Megasyringophilus*
 Fain, Bochkov et Mironov, 2000
 — Setae *si* set distinctly anterior to level of setae
se, setae *f1* and *f2* long, setae *h1* and *h2* short
 *Tinamiphilopsis* Skoracki et Sikora, 2004
48. End of hysterosoma rounded, without opistho-
 somal lobes. Movable cheliceral digit edentate 49
 — End of hysterosoma with pair of opisthosomal
 lobes. Movable cheliceral digit dentate, each with
 3 teeth *Calamincola* (Casto, 1978)

49. Bases of setae *vi* set anterior to level of setae *ve*. Apodemes I divergent, without thorn-like sclerotization in middle part. Genital lobes absent. Physogastric female campanuliform or bulb-shaped outline 50
 — Bases of setae *vi* and *ve* set at same transverse level. Apodemes I parallel, thorn-like sclerotization in middle part. Genital lobes present or absent. Physogastric female worm-shaped in outline *Picobia* Haller, 1878
50. Solenidia *phi* on tibia of leg I absent. Hypostomal apex truncate. Peritremes with clearly or weakly visible chambers in short lateral branches. Propodonal shield entire and shirt-like. Pygidial shield present. Bases of setae *1a–1a* not coalesced. Physogastric females bulb-shaped outline 51
 — Solenidia *phi* on tibia of leg I present. Hypostomal apex rounded. Peritremes with clearly visible chambers in lateral branches. Propodonal shield divided longitudinally into 2 lateral shields, bearing bases of setae *vi*, *ve*, *si* and *se*. Pygidial shield absent. Bases of setae *1a–1a* coalesced. Physogastric females campanuliform outline *Columbiphilus* Kivganov et Sharafat, 1995
51. One pair of genital setae and 2 pairs of pseudoanal setae present *Rafapicobia* Skoracki, 2011
 — Genital setae absent, 2 pairs of pseudoanal setae present *Neopicobia* Skoracki, 2011

Family Harpirhynchidae Dubinin, 1957

Figs. 8–9

Type genus: *Harpirhynchus* Latreille, 1796

Diagnosis. Gnathosoma moderately developed. Subcapitulum bearing setae *elc*, *p*, *n*, and *m*. Peritremes situated at base of stylophore, segmented only in distal parts, straight. Hypostomal lobes not fused with stylophore. Hypostomal lips absent. Palps linear, consisting of 3 articulated segments — trochanter-femur-genu, tibia and rudimentary tarsus. Palpal tibia replaced on ventral surface of trochanter-femur-genu and bearing distinct paraxial claw-like seta. Palpal tarsus strongly reduced. Palpal setation: femur with setae *d*, *v* (only with seta *d* in Harpypalpinae), genu — *d*, *l''*, tibia — *d*, *lT*, and tarsus with 1 seta. Idiosoma flattened dorso-ventrally and rounded outline or sucker-like. Bases of trochanters inserted ventro-laterally. Eyes absent. Propodonal shield present, distinctly developed, fused with remnants of hysteronotal shield. Ventral side of idiosoma devoid of shields in Harpirhynchinae and bearing genital-anal shield in Harpypalpinae. Opisthosoma weakly developed. Female

anal and genital-ovipore openings fused and situated ventrally close to posterior end of body or terminally, covered by pair of folds. In males, aedeagus tube-like or comma-like and pointed apically; genital and anal openings fused (or anal opening absent), dorsally displaced. Distance between coxal fields II and III distinctly shorter than idiosomal width. Idiosomal cupules absent. Idiosomal setation (maximum set observed in Harpypalpinae): *scx*, *vi*, *ve*, *si*, *se*, *c2*, *d1*, *d2*, *e2*, *f1*, *f2*, *h1*, *ps1–3*, *g1*. Setae *scx* situated dorsally, distinctly developed. In males, setae *c1* and 2 pairs of pseudoanal setae present. In females of Harpirhynchinae, idiosoma bearing only setae *scx*, *vi*, *ve*, *si*, *se*, *c2*, *h1*, *ps1*; in harpirhynchine males, 2–3 pairs of pseudoanal setae present. Legs shortened; legs I and II consisting of 5 articulated segments, their tarsi having weakly developed pretarsi bearing 2 smooth lateral claws and empodium with tenet hairs. In Harpypalpinae, legs III and IV normally developed, similar with anterior legs. In Harpirhynchinae legs III and IV strongly reduced, 1–3 segmented. Maximum set of leg setae in Harpypalpinae (paired setae are in parentheses): tarsi I–IV — I, II, (*tc*), *p''*, (*a*), (*u*), *ω1*; III, IV (*tc*), (*a*), (*u*); tibiae I–IV — I, II, *d*, (*l*), (*v*); III, IV, *d*, (*v*); genua I–IV — I, II, *d*, (*l*), (*v*); III, IV, without setae; femora I–IV — I, II, *d*, *v*; III, IV, *v*; trochanters I–IV — *v*; coxae I–IV — I, *1a*, *1c*; II, *2c*; III, *3a*, *3c*; IV, *4c*. Solenidion *ω1* II situated dorsally. Larva, proto- and tritonymphs present; deutonymph absent. Male moulting from protonymph.

This family was revised by Fain (1976, 1994b, 1995) who described most of its taxa. Before this revision only a few particular works concerning these mites were published. Most important of them was a paper by Fritsch (1954) concerning harpirhynchids from Germany.

Within the content of harpirhynchids, Fain (1972) established a new subfamily Harpypalpinae for a single genus *Harpypalpus* with normally developed legs III and IV. Later, Lombert and Moss (1983) described *Harpypalpoides*, the second genus in this subfamily.

Presently, A.V. Bochkov along with collaborators works on the systematics of these mites.

The monophyly of Harpirhynchidae is supported by three unique synapomorphies: the strongly reduced, membranous palpal tarsus, seta *l''G* grouped together with *dG* in the apical part of the palpal trochanter-femur-genu, and modified setae *l'T* of the palpal tibia (Bochkov 2008).

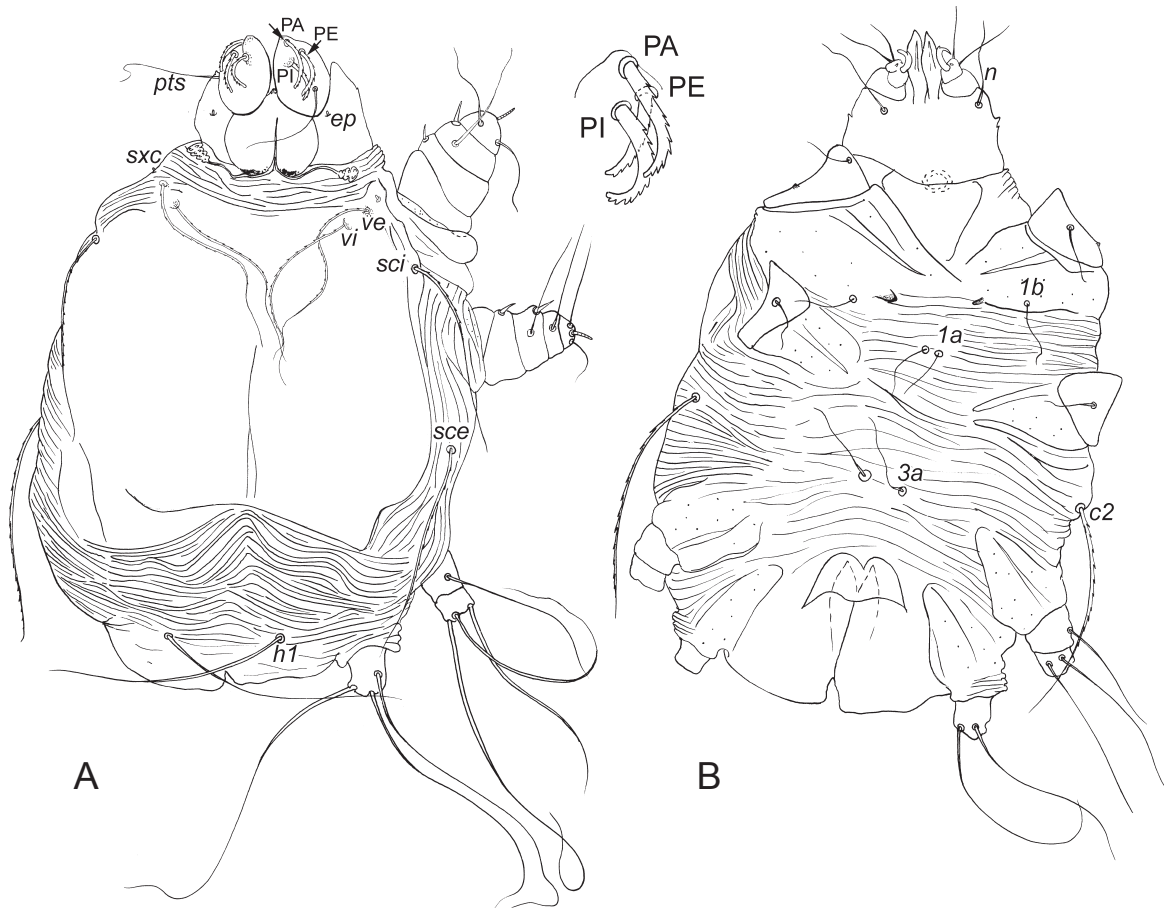


Fig. 8. *Harpirhynchus dusbabeki* (Harpirhynchidae: Harpirhynchinae), female: A — in dorsal view; B — in ventral view; C — palpal apex (from Bochkov and Literak 2006, with minor modifications).

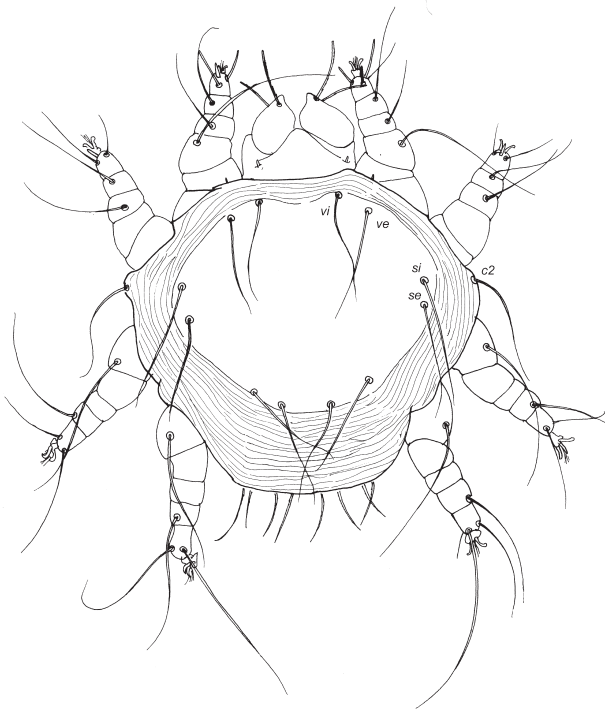


Fig. 9. *Harpypalpoides* sp. (Harpirhynchidae: Harpypalpinae), female in dorsal view.

Bochkov et al. (1999) analysed cladistic relationships of the harpirhynchid genera. In the result of this study, the family Harpirhynchidae has incorporated the family Ophioptidae, which includes parasites of some snakes belonging to the superfamily Colubroidea and was subdivided into three subfamilies: Harpirhynchinae (Harpypalpinae-Ophioptinae). Later on, Bochkov (2008) reconsidered the relationships between harpirhynchid subfamilies using multiple outgroups and reached the same conclusions. The sister relationships between Harpypalpinae and Ophioptinae are supported by the following unique synapomorphies: subcapitular setae *m* and *n* are situated at the same transverse level, setae *v'F* of the palpal femur are absent, the female vulva edged by the sclerotized structures, setae *sxc* are absent in immatures, the genital setae are spur-like and surrounded into the idiosomal cuticle, in immature instars, seta *l''G* of the palpal genu is absent, seta *dG* of the palpal femur is comb-like, most prodorsal setae are absent, the hysterosomal setae are dislocated on the ventral side of the idiosoma, the anal opening is absent, immatures are apode.

Key to genera of Harpirhynchidae

(based on Fain [1995])

1. Most hysteronotal setae absent. Legs III and IV shortened, 1–2 segmented. Pretarsi III and IV absent ... (Harpirhynchinae Dubinin, 1957) 3
 — Most hysteronotal setae present. Legs III and IV normally developed, consisting of 5 articulate segments. Pretarsi III and IV present, each bearing empodium and 2 claws. (Harpypalpinae Fain, 1972) 2
2. Setae *se* situated at level of seta *si* bases. Setae *d2* present *Harpypalpus* Dubinin, 1957
 — Setae *se* situated distinctly posterior to level of seta *si* bases. Setae *d2* absent. *Harpypalpoidea* Lombert et Moss, 1983
3. Setae *dG* and *dF* not filiform or rodlike, but rigid and shorter than palp tibia, with generally strong pectinations. Setae *l''G* similar to other palpalae or rodlike and shortly pectinate 4
 — Setae *dG*, *l''G*, and *dF* of palps filiform, shortly pectinate, longer than palp tibia. *Trichorhynchiella* Fain, 1954
4. Female: Idiosoma rounded, elongate or wider than long. Legs I–II reduced in size, with maximum of 4 articulate segments 6
 — Female: Idiosoma circular or subcircular. Legs I and II well developed, with 5 articulated segments 5
5. In females, setae *dG*, *l''G*, and *dF* of palps similar in shape but *l''G* slightly shorter and narrower than *dG* and *dF*. In males, genital opening situated in anterior quarter of dorsum *Harpirhynchus* Megnin, 1877
 — In females, setae *dG*, *l''G*, and *dF* of palps different in size and shape. In males, genital opening situated in posterior third of dorsum *Harpyrhynchoides* Fain, 1972
6. Idiosoma variable in shape, but not rounded or circular 8
 — Body rounded or circular 7
7. Dorsal shield small. Legs I and II slightly reduced in size, with only 4 free segments (genu and femur fused) and inserted marginally; tarsi I–II with claws and empodium. Legs III normally shaped. Legs IV absent. Propodonal setae smooth. Setae *vi*, *si*, and *se* short and smooth *Perharpyrhynchus* Fain, 1972
 — Dorsal shield very large. Legs I and II strongly reduced in size, lacking claws and empodium; legs I slightly ventral, legs II marginal. Legs III and IV very small, not segmented. Setae *vi*, *si*, and *se* pectinate *Ralliharpirhynchus* Fain, 1972

8. Body not sacciform but either dome-shaped or wider than long and narrowed posteriorly 10
 — Body elongate, sacciform 9
9. Legs I–II moderately reduced. Legs I with 2–4 articulated segments. Legs II with 2–3 articulated segments. *Neharpyrhynchus* Fain, 1972
 — Legs I–II strongly reduced. Legs I with only 1 very short segment. Legs II similar to legs I or absent *Metharpyrhynchus* Fain, 1972
10. Female: Idiosoma wider than long, with 2 broad lateral lobes. Dorsal shield poorly developed. Palpal seta *l''G* absent 11
 — Female: Body dome-shaped, with 2 posterolateral lobes. Dorsal shield distinctly developed. Palpal seta *l''G* present *Anharpyrhynchus* Fain, 1972
11. Female: Setae *ve* and *si* modified into very short spinelets. Lateral lobes situated in anterior third of idiosoma. Legs I and II ventral; bearing claws and empodium *Harpyrhynchiella* Fain, 1972
 — Setae *ve* and *si* normal and pectinate. Lateral lobes situated in middle part of idiosoma. Legs I and II marginal, without claws and empodium *Cypsharpirhynchus* Fain, 1995

Superfamily Cloacaroidea Camin, Moss, Oliver et Singer, 1967

The superfamily Cloacaroidea has been recently established for two families, Cloacaridae and Epimyodicidae (Bochkov and OConnor 2008). This superfamily is characterized by the following synapomorphies: the gnathosoma is shifted ventrally, the chelicerae are devoid of digits and setae, the subcapitular setation is completely lost, the coxal apodemes are longer than half of the body width, in adults, coxal apodemes I are fused into a sternum, and females, genital and anal openings are completely fused to each other.

The relationships of Cloacaridae and Epimyodicidae with other prostigmatic mites are not clear and, therefore, this superfamily is considered as *incertae sedis* within Eleutherengona. These mites are strongly modified for endoparasitic mode of life and have lost many morphological structures present in other Prostigmata. The distinctly separated chelicerae of Cloacaroidea obviously prevent their inclusion in the Cheyletoidea, because all cheyletoid families have completely fused chelicerae with stylet-like movable cheliceral digits. Such characters, as the fusion of the anal and genital openings and the dorsal position of an aedeagus in males indicate the affinity

of these two families with the parvorder Eleutherengona, but are not helpful in clarifying their relationships to other lineages within the parvorder.

Family Cloacaridae Camin, Moss, Oliver et Singer, 1967

Fig. 10

Type genus: *Cloacarus* Camin, Moss, Oliver et Singer, 1967

Diagnosis. Gnathosoma positioned ventrally, strongly reduced, oriented perpendicular to idiosomal axis, retracted into idiosoma, and surrounded ventrally by idiosomal wall. In Cloacarinae, remnants of posterior subcapitulum represented by distinctly sclerotized subcapitular ring, opening anteriorly and located immediately under dorsal surface of idiosoma. Pair of strongly sclerotized, fang-like chelicerae present ventrally. In Pneumophaginae, female gnathosoma devoid of posterior remnants of subcapitulum (subcapitular ring) and internal median apodemes. In males, gnathosoma completely absent. Idiosoma elliptical and distinctly flattened dorso-ventrally. Propodonal shield present and occupying most of propodonal surface, distinctly ornamented in Cloacarinae, and weakly sclerotized and devoid of ornamentation in Pneumophaginae. Opisthosoma distinctly shorter than metapodosoma; opisthosomal striations absent. In females, anal and genital openings fused to each other forming single opening situated ventrally, terminally or dorsally. In females of some genera, lateral walls of genito-anal opening elongated and modified into 1 pair of short, finger-like projections. In *Chelonacarus*, genito-anal opening covered ventrally by pair of triangular sclerotized folds. In males, aedeagus present and genital opening situated dorsally on anterior part of body. Coxae completely fused with ventral surface of idiosoma; only their anterior margins represented by distinct coxal apodemes. Coxal apodemes strongly elongated, longer than half of idiosomal width. In adults, coxal apodemes I fused forming sternum. In Cloacarinae, sternum with internal median keel, at least in anterior half. Keel continuing anteriorly as median apodeme with bifurcate apex. Apices fused anteriorly with subcapitular remnants and associated with sclerites, interpreted here as sigmoid pieces (= capitular apophyses). In females of *Pneumophagus*, anterior parts of coxal apodemes I fused with anterior part of subcapitular remnants. Proximal parts of coxal apodemes I–IV with 2 condyles at trochanteral articulation. Dorsal condyle shifted

onto ventral side of idiosoma due to coxal flattening in these mites. Ventral condyles distinctly smaller than dorsal condyles. Idiosomal setae strongly reduced in size and number. In Cloacarinae, female propodotum with 1–2 pairs of alveoli. Opisthosoma of cloacarine females bearing 2–4 pairs of setae. Setation of male propodotum similar to that of females; opisthosoma with 1 pair of terminal, fleshy setae. In females of *Pneumophagus* propodotum with 1 pair of alveoli, opisthosoma with 3 pairs of short spine-like setae situated dorsally, terminally and ventrally. Pair of alveoli flanking genitor-anal opening dorsally. In males, only 1 pair of short spine-like setae present, situated dorsally on opisthosoma.

Legs I–IV with 3 articulated segments, very short; rudimentary segment inserted proximal to apical segment. Two basal leg segments devoid of setae. Trochanters largest leg segments. Posterior margins of all trochanters with large triangular projection articulated with respective coxal apodemes. In most cloacarids reduced tibiae with 1 spine-like seta, but devoid of setae in *Pneumophagus*, except for 1 seta on tibia I. Tarsi broadly rounded in cloacarines; in *Pneumophagus* tarsi II–IV flattened laterally. Claws absent on all tarsi. In Cloacarinae tarsi I and III each with 8 setae (in *Caminacarus chrysemys* Pence and Casto, 1975, tarsi III with 9 setae), tarsi II — 9 setae, and tarsi IV — 7 setae. Short globose solenidion on tarsi I–III situated ventro-terminally. In *Pneumophagus*; tarsi I–IV bearing 5–9–12–12 setae, respectively. Solenidion absent on all tarsi. Larva unknown. Only 1 nymphal stage known.

The monophyly of the Cloacaridae is strongly supported by the following synapomorphies: the gnathosoma is inserted perpendicular to the idiosomal axis, the subcapitulum is strongly reduced, the palps are completely lost, the opisthosoma is shortened and distinctly shorter than the metapodosoma, the idiosomal striation is absent, there is a sclerotized ventro-marginal sclerotized frame bordering the lateral margins of the idiosoma, the legs are inserted laterally and are strongly shortened and thickened, the femora and genua of all the legs are completely fused, the leg trochanters have distinct basal projection bearing glenoid cavities, and the pretarsal claws are absent.

The family Cloacaroidae includes two subfamilies, Cloacarinae and Pneumophaginae with one species. The latter, bird-associated subfamily was described by Fain and Smiley (1989), and is characterized by the following synapomorphies:

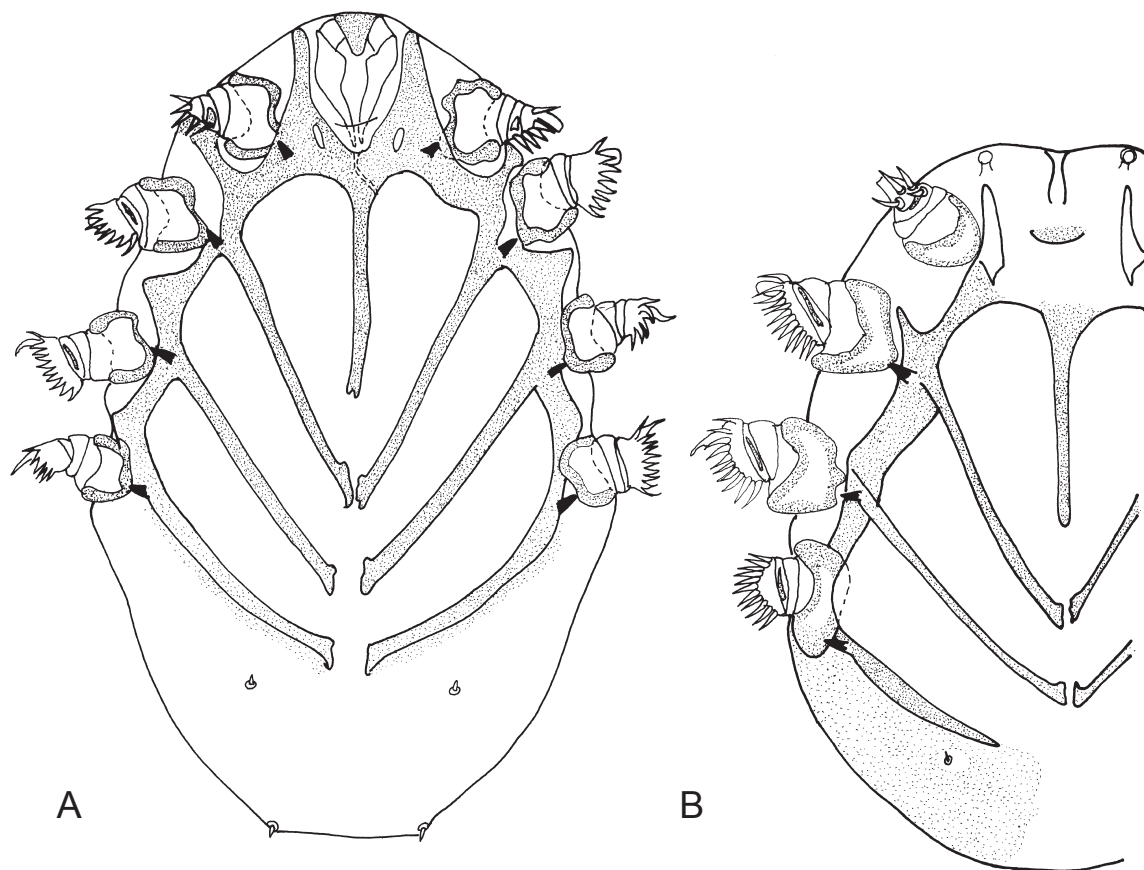


Fig. 10. *Pneumophagus bubonis* (Cloacaridae: Pneumophaginae): A — female in ventral view; B — male in ventral view (from Fain and Summers 1989, with minor modifications).

the gnathosoma of the male is absent, the anterior branches of coxal apodemes I surround the female gnathosoma, the coxal apodemes are fused to each other proximally forming a ventral idiosomal frame, tibiae II–IV are devoid of setae, solenidia are absent on all leg tarsi, tarsi II–IV are flattened laterally, and most of their setae are arranged in a row (Bochkov and OConnor 2008).

Parvorder Eupodina Krantz, 1978
Superfamily Tydeoidea Kramer, 1877

The Tydeoidea includes four families: Tydeidae, Triophtydeidae, Iolinidae and Ereyinetidae (Andre and Fain 2000; Walter et al. 2009). This superfamily has a worldwide distribution, and its members are associated with a wide range of habitats, from soil to the nasal cavities of mammals. Highly specialized blood-sucking bird endoparasites are found only in the family Ereyinetidae (subfamily Speleognathinae) (Fain and van Goe- them 1978, 1986; Domrow 1965, 1969). The phylogeny of the Tydeoidea, based on morphological characters, was reconstructed by Andre and Fain (2000). According to their results, the Ereyinetidae was derived from an ancestral tydeids and is char-

acterized by such autapomorphies as the presence of the ereynetal organ and the double genital discs.

Family Ereyinetidae Oudemans, 1931

Figs. 11–12

Type genus: *Ereynetes* Berlese, 1883

Diagnosis. Chelicerae bases fused to each other and with subcapitulum forming gnathosomal capsule. Movable cheliceral digit short, linear and stylet-like. Palps linear non-raptorial, composed of 4 segments (trochanter, femuro-genu, tibia, tarsus) in Ereyinetinae and reduced to 1–3 segments in Lawrencarinae and Speleognathinae. Claw-like structures correspond to strong ventral setae (*v*) and observed only in Ereyinetinae. Palpal setation, femur-genu with 2 pairs of dorsal setae *dF* and *dG* (in Ereyinetinae, absent in other subfamilies), tibiae with 2 dorsal setae *dT* and *lT* in Ereyinetinae, 1 or without setae in other subfamilies, tarsus with setae *d*, *l*', *l*'', *pζ*, *v*, in Ereyinetinae, reduced to 2–3 setae (*d*, *l*', *l*'') in Lawrencarinae and Speleognathinae, tarsal solenidion ω present in Ereyinetinae and present or absent in other subfamilies. Hypostomal apex with 1–2 pairs of subcapitular setae (*n*, *m*).

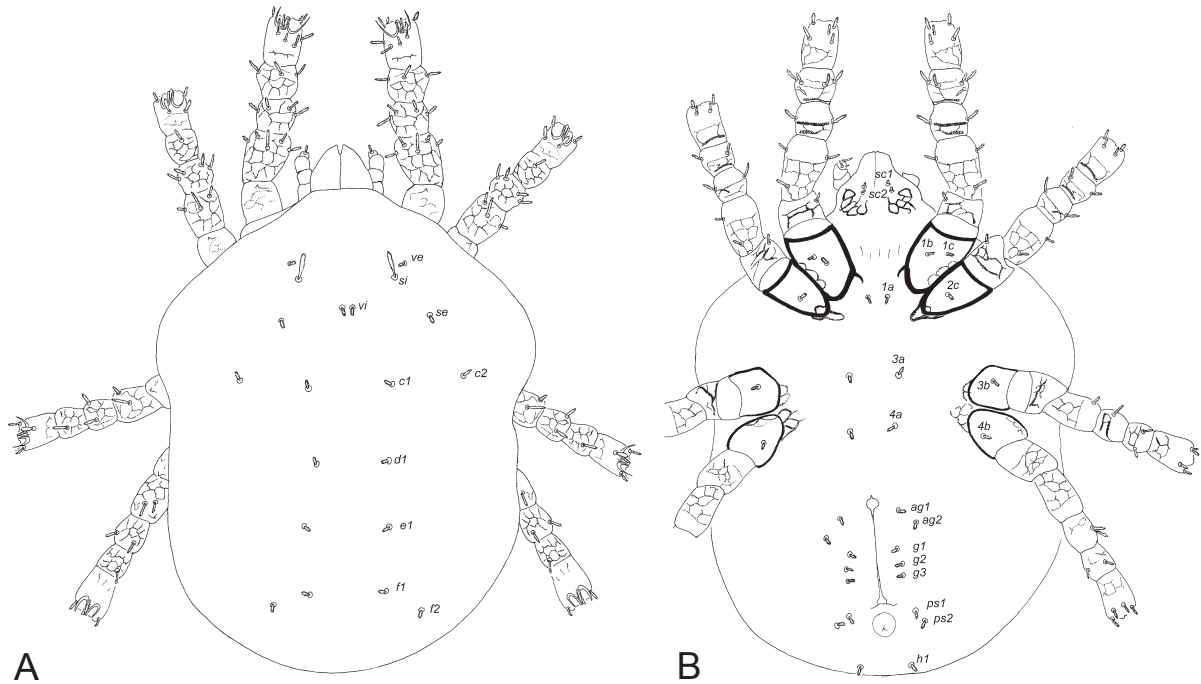


Fig. 11. *Boydaia sturni* (Ereynetidae: Speleognathinae), female: A — in dorsal view; B — in ventral view.

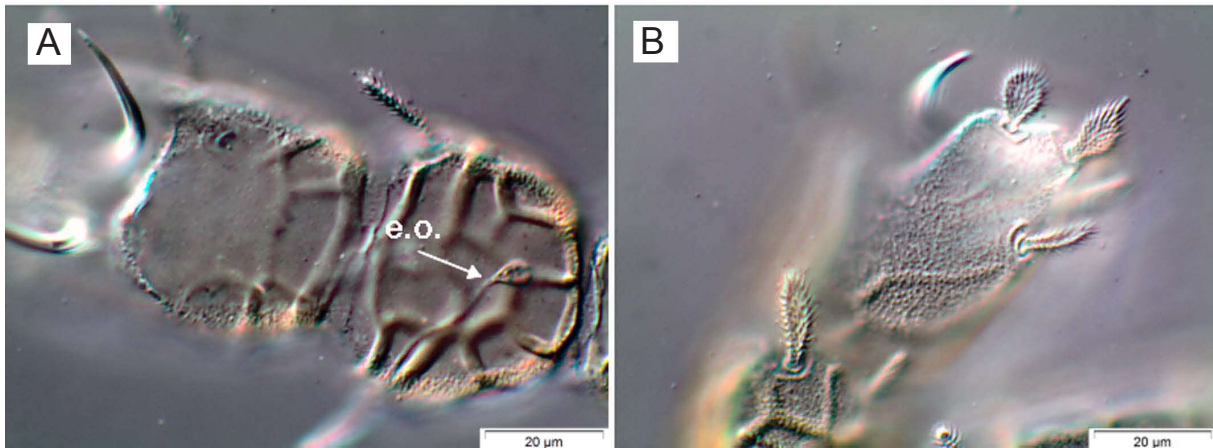


Fig. 12. *Boydaia sturni* (Ereynetidae: Speleognathinae), details of female: A — ereynetidal organ (e.o.); B — tarsus I in dorsal view.

Postcheliceral stigmata obscure. Idiosoma weakly sclerotized, sac-like. Reticulate ornamentation of prodorsum present or absent. Eyes present or absent. Propodonal and hysteronotal shields present in some ereynetines and absent in most of speleognathines and Lawrencarinae. Ventral side of idiosoma without plates. Distance between coxal fields II and III distinctly shorter than idiosomal width. Idiosomal setation (maximum in Ereynetinae): *vi*, *ve*, *si* (= anterior sensilla), *se*, *c1*, *c2*, *d1*, *e1*, *f1*, *f2* (= posterior sensilla), *h1*. Pair of posterior sensilla usually present in free-living species and absent in most parasites. Cupules *im* and *ia* present or absent. Genital opening situated posterior to legs IV, longitudinal. Genital region with

setae: *ag1–5*, *ps1–2*, *g1–5*. Neotrichy of setae *ps* observed only in *Lawrencarus eweri* (Lawrencarinae). In males of Ereynetinae 1–3 pairs of eugenital setae (*eu*) present, in Lawrencarinae and Speleognathinae 1 pair of setae *eu* present or absent. Genital papillae 2 pairs, well developed in Ereynetinae, or reduced in Lawrencarinae and Speleognathinae. Legs long and massive, covered by reticulate ornamentation. Coxal fields of legs I–IV distinctly bordered and well sclerotized. Coxae setation (maximum set) I–IV: I *1a*, *1b*, *1c*; II *2c*; III *3a*, *3b*, *3c*, *3d*; IV *4a*, *4b*, *4c*. Setae *3d* and *4c* absent in Lawrencarinae and Speleognathinae. Trochanters I–IV — I–III *l'*; IV without setae. Femora I–IV — I with 4–7 setae; II (*d*), (*v*); III *v*,

d, l; IV (*d*), (*v*). Femora I, IV divided on basi- and telofemur in Ereynetinae, not in Lawrencarinae and Speleognathinae. Genua I–IV — I (*d*) (*l*); II (*d*), (*l*); III *d*, (*l*); IV *d*, (*l*). Tibiae I–IV — I *d*, (*l*), (*v*); II *d*, (*v*), III *d*, (*v*); IV *d* (*v*). Tibiae I with internal sensory complex (ereynetal organ) where solenidion of tibia I (φI) recessed into inverted sac-like structure with narrow duct that opens near distal margin of segment. Tarsi I–IV — I with 12 setae, solenidion ω present or absent; II with 9 setae, III and IV with 8 setae. Tarsi I–IV with pair of large claws and with setiform median empodium. In development 4 immature instars: larva, protonymph, deutonymph, tritonymph. All nymphs mobile in ontogenesis of Ereynetinae and Lawrencarinae, while in Speleognathinae all nymphs calyptostatic.

The taxonomic content of the family Ereynetidae was reviewed by Fain (1957). He included the family Speleognathidae erected by Womersley (1936) to the Ereynetidae as a subfamily together with the newly created Lawrencarinae.

Within the Ereynetidae, the Speleognathinae form a monophyletic group. Its monophyly is supported by such synapomorphy as calyptostatic nymphs. The subfamily Lawrencarinae is the sister group to Speleognathinae (Andre and Fain 2000).

In 1985, Fain divided the subfamily Speleognathinae into five tribes: Boydaiini, Trispeleognathini, Speleognathini, Speleochirini, and Paraspeleognathopsini. Among them, representatives of the two first tribes are associated with birds. The tribe Boidaiini with the genera, *Boydaia* and *Coboydaia* is characterized by the absence of dorsal shields and eye lenses and by the presence of 3-segmented palps. The tribe Trispeleognathini includes 14 genera of nasal parasites of non-passeriform birds. These genera are characterized by the polymorphic chaetotaxy and 1–3 segmented palps. Additionally, eye lenses and dorsal shields are present in some species.

Key to bird-associated genera of Speleognathinae (Ereynetidae)

1. Chaetotaxy strongly variable, 2 or 3 different types of setae present in same species. Tibiae I–IV with 5–3(2)–3(2)–3(2). Dorsal shield and eye lenses present or absent. Palps with 1–3 segments. (Trispeleognathini Fain, 1980) 3
 — All setae barbed. Tibiae I–IV with 5–3–3(2)–3(2) or 4–2–2–2. Dorsal shield or eye lenses absent. Palps with 3 segments (Boydaiini Fain, 1985) 2

2. Setae on trochanters I and II present. Solenidion on tarsi of palps present. Femur IV with at least 2 setae. Genu IV with at least 3 setae *Boydaia* Womersley, 1953
 — Setae on trochanters I and II absent. Solenidion on tarsi of palps absent. Femur IV with 1 seta. Genu IV with 2 setae *Coboydaia* Fain, 1971
 3. Tarsi I–IV without striated setae 5
 — Tarsi I–IV with striated setae 4
 4. Palps with 1 segment. Eye lenses absent. Number of coxal setae I–IV 1–1–1–1, trochanters without setae *Aureliania* Fain, 1958
 — Palps with 3 segments. One pair of prominent eye lenses present. Number of coxal setae I–IV 2–1–1–0, trochanteral setae 1–1–0–0 *Ophthalmognathus* Dubinin, 1957
 5. Apical or ventro-apical setae of tarsi I–IV normally developed and barbed 6
 — Four apical and 2 ventro-apical setae of tarsi I–IV rod-like microsetae *Psittaboydaia* Fain, 1985
 6. All tarsal setae of legs I–IV barbed 10
 — Only 6–8 apical or ventro-apical setae of tarsi I–IV barbed, other setae smooth 7
 7. Dorsal and ventral setae of idiosoma dentate. Dorsal shield absent 9
 — Ventral idiosoma with filiform setae mixed with striated or dentate setae. Dorsal shield variable ... 8
 8. Dorsal shield present. Pair of eye lenses present *Neastrida* Fain, 1962
 — Dorsal shield and eye lenses absent *Neoboydaya* Fain, 1958
 9. Palps with 3 segments. One pair of eye lenses present. Claws of leg I stronger than claws II–IV. Hypostome with 1 pair of setae. Five pairs of genital setae present. Number of coxal setae I–IV 2–1–1–1 *Trispeleognathus* Fain, 1958
 — Palps with 1 segment. Eye lenses absent. Claws of leg I–IV subequal. Hypostome with 2 pairs of setae. Two pairs of genital setae present. Number of coxal setae I–IV 2–0–1–0 *Pterniboydaia* Fain, 1985
 10. Dorsal and ventral setae of idiosoma either dentate or dorsal setae mainly piliform or narrow with striated base 12
 — Dorsal and ventral setae of idiosoma either exclusively or predominantly barbed 11
 11. Dorsal shield well developed. Palps with 3 segments. Eyes either flat or with prominent lenses *Speleognathopsis* Cooreman, 1954
 — Dorsal shield absent. Palps with 2 segments. Eyes with prominent lenses *Metaboydaia* Fain, 1962

12. Dorsal setae of idiosoma either exclusively or predominantly dentate 14
 — Dorsal setae of idiosoma either exclusively or predominantly filiform 13
13. Dorsal shield absent. Palps with 1 segment. Setae *vi* and *sce* absent. Hypostomal setae absent
 *Meropiboydaia* Fain, 1985
 — Dorsal shield present. Palps with 3 segments. Setae *vi* and *sce* present. Hypostomal setae present
 *Astrida* Fain, 1955
14. Claws of legs III and IV subequal in sizes ... 15
 — Claws either of tarsi III and IV or only of tarsi III unequal and modified; one or both abruptly bent in their apical parts *Ralliboydaia* Fain, 1962
15. Dorsal shield absent. Palps with 3 segments. Eyes with prominent lenses *Phoenicopteriella* Fain, 1970
 — Large dorsal shield present. Palps with 1 segment. Eyes absent *Picinyssus* Fain, 1969

RELATIONSHIPS WITH HOSTS

Microhabitats on the host body

Amongst parasitic acariform mites permanently associated with their hosts, the external morphological adaptations to parasitism were analyzed in feather mites (Psoroptidia) by Mironov (1987) and in mites associated with mammals (Bochkov 2007). According to several external morphological criteria (structures of the gnathosoma, idiosoma, legs, and setation) these authors have recognized different morpho-ecological types (morphoecotypes); representatives of each of them are associated with a particular habitat on the host body. Prostigmatan mites permanently associated with birds, being represented by both ecto- and endoparasites, occupy wide spectrum of microhabitats on the host body: skin, subcutaneous layers, nasal cavities, feather quills, and even bronchi (Table 1). Most of these mites belong to morphoecotypes recognized in feather mites (Mironov 1987).

Skin inhabiting prostigmatans of the families Cheyletidae (Ornithocheyletiini) and Harpirhynchidae (many genera of Harpirhynchinae) correspond to the epidermoptoid morphoecotype (Mironov 1987), which is analogous to the skin morphoecotype of mammal-associated mites (Bochkov 2007). Prostigmatan mites referred to this morphoecotype have the terminally situated gnathosoma, which can possess various apophyses used for attaching, the idiosoma is strongly flattened dorso-ventrally, distinctly developed seta-

tion of the idiosoma and legs, and the male genital opening located dorsally. Their legs are inserted laterally; ambulacra are well developed, at least, on the anterior legs (Fig. 13C). Many representatives of cheyletids spin the group (*Bakericheyla*) or individual (*Ornithocheyletia*) cobweb covers. Such cobweb cover protects mites and their eggs, stabilises the temperature and humidity regime and prevents elimination from the host body (Aki-mov and Gorgol 1990).

Harpirhynchine females of some skin-inhabiting genera, for example, *Neharpyrhynchus*, are quite different morphologically from other skin-inhabiting mites. Their females are attached at the base of calamus of the body covert feathers on the neck or head of avian host. They are oriented parallel to the length of the shaft, with mouthparts inserted in the host skin; their idiosoma is saciform and the eggs are laid in a string; the female opisthosoma, thus, serves as the “stalk” or site of attachment for the eggs (Moss et al. 1979; Bochkov and Literak 2011) (Fig. 13D).

The bird skin almost devoid of glands is not so beneficial substrate as the mammalian skin, therefore, mites of the intracutaneous morphoecotype like Demodicidae and Psorergatidae are absent among bird-associated prostigmatans. Among them, however, mites of the skin-burrowing morphoecotype (analogous to the knemidocoptid morphoecotype in feather mites) belonging to the family Harpirhynchidae are present. In this family, the tendency of transition from the skin surface (ectoparasitism) to intradermal parasitism (endoparasitism) is widely observed and this switches independently happened within several harpirhynchid genera (for example *Harpyrhynchoides*) (Fain 1995). Harpirhynchid females accumulate in the feather follicles, where they develop subcutaneous cysts (Fain 1995; Literak et al. 2005); many of them are strongly morphologically modified. At the same time, harpirhynchid males belonging to skin-burrowing species do not undergo strong morphological modifications. Females of the subfamily Harpypalpinae, forming the subcutaneous cysts (Fig. 13B), are even less specialized than ectoparasitic mites of the subfamily Harpirhynchinae, because their posterior legs are not reduced, and their opisthosomal setation is more reach than in harpirhynchins. In some genera of Harpirhynchinae, cyst-inhabiting species (*Harpirhynchus* or *Harpyrhynchoides*) also do not significantly differ from ectoparasitic (skin-inhabiting) representatives of the family, whereas species of the genera *Anharpy-*

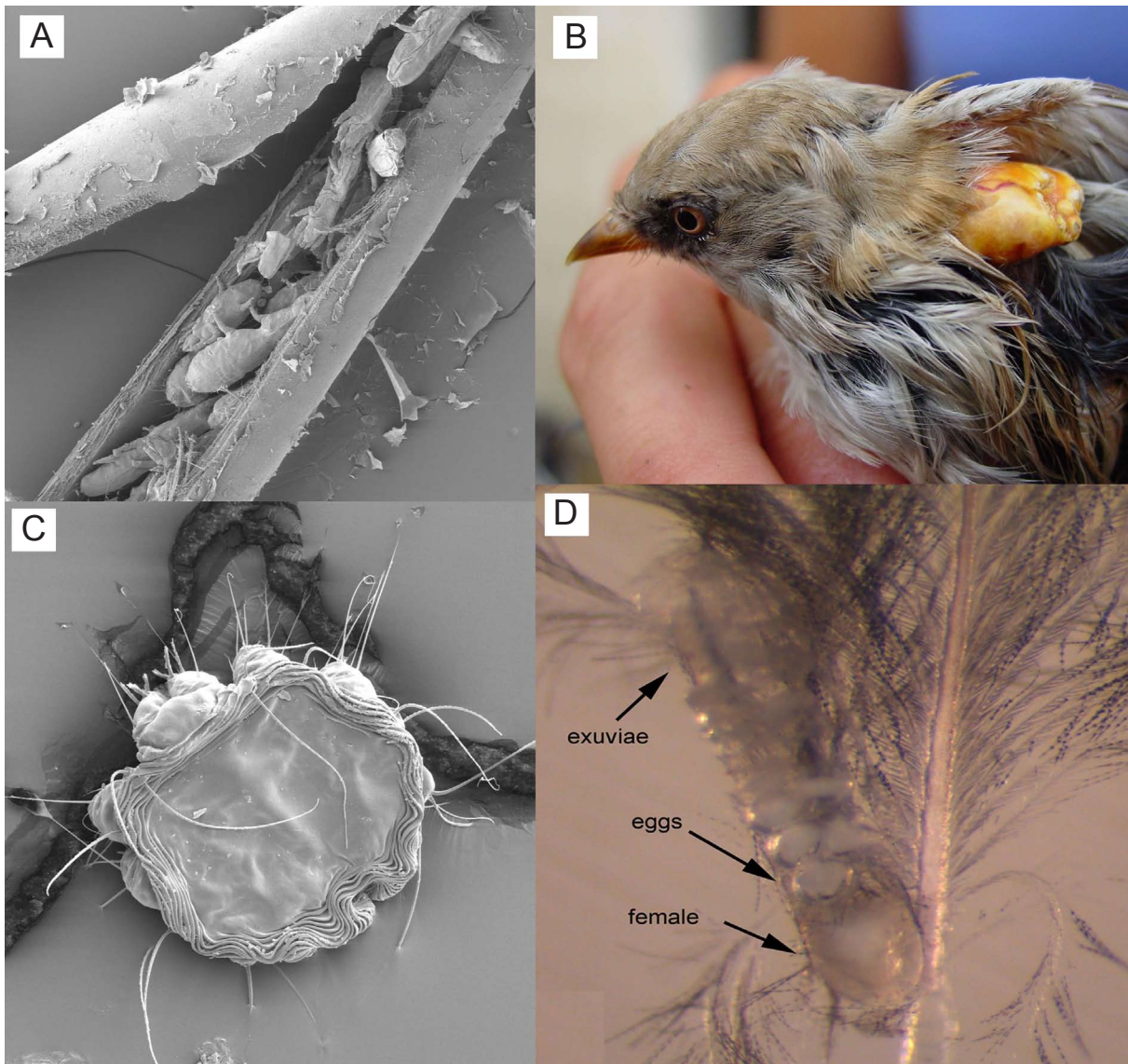


Fig. 13. A — dissected quill with syringophilid mites (SEM photo); B — cyst formed by harpirhynchid mites (photo by I. Literak); C — *Harpirhynchoides* spp. in dorsal view (SEM photo); D — female of *Neharpyrhynchus* sp. attached to bird feather (from Bochkov and Literak 2011, with minor modifications).

rhynchus, *Cypsharpirhynchus*, *Harpyrhynchiella*, and *Trichorhynchiella* are strongly modified being habitually similar with some skin-burrowing mites of the astigmatan subfamily Teinocoptinae (Sarcoptoidea: Sarcoptidae). Their gnathosoma is replaced to the ventral idiosomal surface, the idiosoma is sacciform, the anterior legs are shortened and the posterior legs are strongly reduced or lost; the body and leg setation is very poor.

The parasitic prostigmatans inhabiting quills correspond to the dermoglyphid morphoecotype (Mironov 1987). Among prostigmatan mites this morphoecotype is represented by mites of the family Syringophilidae and cheyletid mites of the tribe Metacheyletini. The idiosoma of these mites is strongly elongated (Syringophilidae) or egg-shaped (*Metacheyletia*) and weakly sclerotized.

Legs are relatively short. In contrast to feather mites which take harborage within quills, many idiosomal and some leg setae of these mites are long or ultralong and control, thus, a significant space around the mite. Mites of the subfamily Syringophilinae are mostly associated with the quills of flight feather, whereas the absolute majority of picobiins inhabit quills of the body feathers (Johnston and Kethley 1973). Females of the latter subfamily are characterized by the physogastry — an extensive enlargement of the female hysterosoma in the process of feeding (Skoracki et al. 2001; Skoracki 2011) — it is unknown for other quill mites.

The predatory mites inhabiting quills belong to the tribe Cheletosomatini (Cheyletidae). These mites do not differ habitually from nidicolous

cheyletids. Even mites of the cheletosomatine genus *Picocheyletus* transferred from a predation to parasitism do not differ morphologically from their predatory relatives. It should be noted, however, that some idiosomal and leg setae of these mites are ultralong, as in parasitic prostigmatans inhabiting quills.

The nasal prostigmatan parasites of birds are represented by the subfamily Speleognathinae (Ereynetidae). These mites belong to the respiratory morphoecotype established by Bochkov (2007) and are not significantly modified in comparison to free-living relatives. Their palps are 1–3-segmented (four-segmented palps in free-living ereynetids), the idiosoma is slightly flattened dorso-ventrally and in some species bears the eyes, the body and leg setae are relatively short, and the legs are well developed, inserted laterally, and bear empodium and paired claws; in males, an aedeagus is absent. An interesting adaptation of parasitic ereynetids is the presence of calyptostatic nymphs. In these mites, the active stages are only larva and adults (Andre and Fain 2001).

The interstitial bird parasites among prostigmatans are represented by a single species *Pneumophagus bubonis* (Cloacaridae) from tissues around bronchi of *Bubo virginianus* (Strigiformes: Strigidae) from USA (Fain and Smiley 1989). This is a typical representative of the interstitial morphoecotype. Among acariform mites permanently associated with vertebrates this morphoecotype is represented by the families Epimyodidae and Cloacaridae (Bochkov 2007). The body of these mites has a slightly elongated and streamlined form; in females, the gnathosoma is almost completely reduced and represented only by chelicerae (absent in males), the legs are thickened and shortened and their segments are telescopic, almost all body setae are absent, and the leg setation is strongly reduced; the coxal apodemes are hypertrophied. Thus, cloacarid mites are almost ideally adapted for moving in friable interstitial tissues.

Thus, bird-associated prostigmatans are represented by four main morphoecotypes: skin (epidermoptid), skin-burrowing (knemidocoptid), quill (dermoglyphid), and interstitial.

In feather mites and mammal-associated Acariformes, the skin-inhabiting forms belong to the ancestral morphoecotype and most other morphoecotypes are its derivations (Mironov 1987; Bochkov 2007). In prostigmatans, the colonization of different microhabitats on the bird body has been realized by free-living mites independently, most-

ly omitting a stage of the skin ectoparasitism. Quill predators and parasites switched to the life in the feather quills originate directly from the nest predation (Bochkov et al. 2008); nasal mites (Speleognathinae) also originated directly from the free-living forms omitting the skin parasitism; interstitial mites (Pneumophaginae) supposedly switched to birds from turtles and the origin of cloacarid parasitism is still not clear (Bochkov and OConnor 2008); only intracutaneous mites (some Harpirhynchidae) originated from ectoparasitic forms inhabiting the skin surface.

This complicated picture of colonization of the avian body by prostigmatan mites could be explained by the absence of the direct phylogenetic links between these mites. Since all bird-associated prostigmatans are true parasites feeding on the live tissues or predators, they did not colonize the feather vexillums (proctophyllodid morphoecotype) or the down feathers (analgid morphoecotype); nor they did occupy the quill walls inhabited by some feather mites (Laminosioptidae).

Host specificity and evolution on birds

Bird systematics. All extant birds (Neornithes) are split into two infraclasses: Palaeognathae (two extant orders, ratites and tinamous), and Neognathae with two cohorts, Galloanserae (landfowls and waterfowls) and Neoaves (other neognaths). The cohort Galloanserae includes two orders, Galliformes and Anseriformes. The cohort Neoaves includes 30 orders (Clements 2011). Taxonomic accounts of all bird orders are provided in Table 6.

Hosts specificity. Most prostigmatans are monoxenous or narrowly oligoxenous parasites and only 8.7–30.5% of species in various groups are associated with host of one family, 1.7–20.6% — with hosts of one order and only 1.1–3.4% — with hosts of various orders. All data about prostigmatan host specificity are summarized in Table 7. Many species records, however, are solitary and the level of host specificity could be overestimated for some species. The most strictly specific symbionts are parasitic Cheyletidae and Syringophilidae, 83% and 70.5% of monoxenous species, respectively; the less specific symbionts are Ereynetidae and Harpirhynchidae — 37% and 62.7%, respectively. It is interesting that some species in the families, represented generally by the highly specific parasites, are associated with wide spectrum of hosts, for example, *Bakericheyla chanayi* (Cheyletidae) (Akimov and Gorgol 1990;

see also Appendix deposited at Acarina web-site: <http://insects.ummz.lsa.umich.edu/acarina/>). In the time of global cataclysms, such generalists ensure the survival of the group when most hosts with specialized parasites undergo extinction.

At the generic level the host specificity of prostigmatan mites is less marked but still significant. In the Cheyletidae, four genera (36%) parasitize birds from one family, the genus *Apodichelles* is associated exclusively with Apodiformes, and six other genera (54%) are associated with birds of two or even more orders. In the Harpirhynchidae, four genera (33%) are associated with hosts of one family, four (33%) — with hosts of one order, and four (33%) — with hosts of various orders. In Syringophilidae, 39 genera (74%) parasitize birds of one order and only 14 genera (26%) are associated with birds of two or even five (*Picobia*) various orders. Finally, in the Ereyneidae, eight genera (50%) are associated with one bird family, and eight (50%) — with birds of various orders (Appendix).

Most prostigmatan families and subfamilies are cosmopolite (Table 1), excluding Pneumocoptinae (Cloacaridae), which is still known from a single record (Fain and Smiley 1989).

To date, prostigmatans are known from birds from 25 of 34 orders belonging to neognathous as well as to paleognathous (Tinamiformes) birds (Table 6). These mites are absent on birds of the orders Cariamiformes, Eurypygiformes, Gavii-formes, Mesitornithiformes, Otidiformes, Phaethoniformes, Sphenisciformes, Struthioniformes, and Trogoniformes. Their absence on Struthioniformes and Sphenisciformes is explainable the external morphological modifications of these hosts (especially feathers), whereas birds of the other orders are insufficiently explored (or not explored at all) for the presence of these mites. However, with a high probability they could also be infected by prostigmatans. Prostigmatans are characterized by a relatively low prevalence and many of unexplored hosts are rare and poorly represented in collections. Moreover, most of museum bird specimens are preserved as dry skins and unavailable for examination on prostigmatans because techniques of their collecting can damage the skins.

The number of described prostigmatans represents only a small fraction of their actual biodiversity because their expected number is estimated as 5000 species (instead of 500 presently known species) based on the data about host specificity and number of their potential hosts (Kethley and

Johnston 1975; Moss et al. 1979). At the same time, it could be stated, based on distribution of these mites, that at least 50% of their extant genera are known to date. For example, among 110 extant passerine families, prostigmatans are recorded on hosts from more than 50 families (Appendix).

Mites of the family Cheyletidae are known from birds of 12 orders, Syringophilidae — from 21 orders, Harpirhynchidae — from 16 orders and Ereyneidae — from 18 orders (Table 6). Moss and Wojcik (1978) also listed Caprimulgiformes as hosts of harpirhynchids but did not provide the full data; therefore these records were not taken here into account.

As it is expected, representatives of all prostigmatan families, excluding Cloacaridae, are recorded mostly from hosts of species-rich orders, i.e. Apodiformes, Charadriiformes, Columbiformes, Coraciiformes, Cuculiformes, Galliformes, Gruiformes, Passeriformes, Pelecaniformes, Pici-formes, Psittaciformes, and Strigiformes.

The only mites of the family Syringophilidae are known to date from palaeognathous birds of the order Tinamiformes; whereas other prostigmatans are still recorded exclusively from Neognathae.

Within the Neognathae, hosts of the more archaic Galloanserae clade are parasitized by most prostigmatan families, excluding Cheyletidae and Cloacaridae on Anseriformes, but the absolute majority of mite species are associated with hosts of the clade Neoaves and with passerines within this clade.

Thus, birds were colonized independently by mites of several prostigmatan phylogenetic lines — three groups of cheyletids (Ornithocheyletiini, Metacheyletiini, and Cheletosomatini), Syringophilidae, Harpirhynchidae, Ereyneidae (Speleognathinae), and Cloacaridae (Pneumocoptinae).

As it was the above mentioned, the superfamily Cheyletoidea, including most bird permanent symbionts, is represented by two main phylogenetic lineages: Cheyletidae–Syringophilidae (I), and Harpirhynchidae (Demodicidae–Psorergatidae) (II) (Bochkov 2008).

The ancestor of lineage I undoubtedly was a predator preying on other arthropods. Most part of the apomorphic modifications of these mites concerns the gnathosomal structures and, probably, serves for more effective preying. At the same time, features of the idiosoma and legs in these mites are relatively archaic and weakly modified, like those in the other predatory family Raphignathidae. The family Syringophilidae originated

from the common ancestor with Cheyletidae, which preyed in bird nests. Syringophilids developed some adaptations to the parasitic mode of life in feather quills (the stylophore surrounded by the idiosoma and the elongate body); they have also lost some structures, which serve for preying and are useless for permanent parasites: the thumb-claw complex, cupules, and the strong sclerotization of the shields. In these mites, some idiosomal setae (*Aa* and *ps3*) have undergone a reduction in parallel to parasitic cheyletoids of lineage II. In Cheyletidae, the parasitism on birds originated independently in three phylogenetic lineages (tribes) (Bochkov and Fain 2001; Bochkov 2004).

Family Cheyletidae. This family is represented by the predators and permanent parasites of the terrestrial vertebrates, birds and small mammals. To date, it includes more 380 species in 72 genera and is the most species-rich grouping comparing to other families of the superfamily Cheyletoidea (Volgin 1969; Summers and Price 1970; Bochkov 2004).

Cheyletids have a worldwide distribution and are known from a wide spectrum of biotopes. They occur in a soil, vegetable debris, in nests of insects, mammals and birds (Volgin 1969). This family includes almost all intermediate stages between free-living predators and highly specialized permanent parasites of vertebrates, birds and mammals (Bochkov and Fain 2001; Bochkov 2004). The obligatory phoresy on certain insects is typical for some predatory cheyletids (Volgin 1969; Klimov et al. 2006). There are several general directions in the cheyletid evolution: predator-dendrophils, predator-entomophils, forms being phoretic on insects and living in their nests, nidicolous predators in vertebrate nests, parasites of birds and mammals (Volgin 1969; Bochkov 2004).

Among bird-associated cheyletids, mites of the tribe Cheletosomatini (six genera) include predators inhabiting the feather quills and prey there on parasitic astigmatic mites and mites of the family Syringophilidae. All representatives of this tribe are morphologically similar to *Acaropsellina*-like mites and probably originated from the common ancestor inhabited bird nests. The monotypic genus *Picocheyletus* was recently described from quills of *Tricholaema hirsuta flavipunctata* from Gabon (Bochkov and OConnor 2003). These mites were collected from quills of the primary and secondary wing feathers. In each infested feather, the rachis was naturally split

ventrally in its basal part, exposing the hollow interior. The mites occupied spaces between septae, one mite per inter-septal space. In addition, from one to four eggs were present in some inter-septal spaces. It should be noted that no other mites or remains of mites were observed inside the quills that might serve as a prey. Some examined specimens contained dark inclusions, similar to hematite inclusions, which usually are visible in blood-feeding cheyletids of the genus *Bakericheyla* (Ornithocheyletiini). Therefore, it can be concluded that these mites are true parasites on the avian host. In this case we see transition to parasitism happened literally in “our presence”. Among other representatives of the tribe, species of the genus *Cheletoides* are associated with galliform birds (Galliformes). A single species of the genus *Eucheletopsis* is recorded from tree swifts of the genus *Hemiprocyne* (Apodiformes: Hemiprocyidae), and two species of the genus *Cheletosoma* are associated with hosts of the orders Gruiformes and Cuculiformes. The genus *Metacheyletoides* includes species from galliform (Galliformes) and cuculiform (Cuculiformes) birds. Mites of the genus *Cheletopsis* are associated exclusively with charadriiform birds (Charadriiformes) (Bochkov et al. 2002; Bochkov and OConnor 2003). Its representatives show variable specificity to their hosts; some species are limited to hosts of one genus, whereas others occur on birds of several charadriiform families.

The tribe Ornithocheyletiini (four genera) is represented by ectoparasites inhabiting the skin surface of birds. Mites of the genus *Neocheyletiella* are mono- or oligoxenous parasites associated with birds of four orders: Passeriformes, Pelecaniformes, Columbiformes, and Strigiformes. Species of the genus *Bakericheyla* are known from birds of three orders, Apodiformes, Coraciiformes, and Passeriformes. Most of these species are highly specific to their hosts and distributed in Africa, but *Bakericheyla chanayi*, however, is known from birds of various families and orders and has a cosmopolitan distribution (Akimov and Gorgol 1990). The genus *Ornithocheyletia* is represented by parasites of six bird orders: Columbiformes, Cuculiformes, Galliformes, Passeriformes, Piciformes, and Psittaciformes. *Ornithocheyletia* species are mostly mono- or oligoxenous parasites. Three species known in the genus *Apodicheles* are restricted to swifts from South-East Asia and Africa (Apodiformes: Apodidae). Thus, mites of the tribe Ornithocheyletiini are

known from representatives of several bird orders, belonging to the two major phyletic lines, Galloanserae (excluding Anseriformes) and Neoaves. It can be hypothesized that the ancestor of this tribe parasitized on a common ancestor of these superorders.

The tribe *Metacheyletiini* includes the only genus *Metacheyletia* with five species inhabiting the feather quills (Bochkov and Skoracki 2011). Three of these species parasitize parrots from the Old and New Worlds, and two species were recorded from quills of passeriform and cuculiform birds in the Tropical Africa. The biology of *Metacheyletia* species is still unknown. Atyeo et al. (1984) believed that these mites are predators because their chelicerae are too short to pierce the quill wall. Moreover, in all cases, these cheyletids were collected together with other mites in those quills. Bochkov and Fain (2001), however, had another opinion and suggested that these mites are parasites. According to these authors, the morphological characters of *Metacheyletia* species are similar to those of other parasitic cheyletids: legs I–III are short, legs IV are reduced, setae of the palpal tarsi are short and smooth, the gnathosoma is relatively small. It is suggested that these mites use for feeding the openings pierced by the adult syringophilids. This hypothesis is supported by the presence of syringophilids in all cases where these mites were found.

Family Syringophilidae. The syringophilid ancestors were, probably, initially predators on other mites inhabiting feather quills. According to the estimation based on the “molecular clock”, the divergence between cheyletids and syringophilids could take place approximately 180–185 million years ago in the Early Jurassic (Dabert et al. 2011). Thus, syringophilids were, probably, associated even with the bird ancestors — theropod dinosaurs, many of which possessed feathers (Mayr et al. 2005).

The host-parasite relationships of syringophilid were analyzed by Kethley and Johnston (1975). According to data of these authors the phylogenetic pattern of these mites and birds are strongly incongruent at the level of mite genera and bird orders. This incongruence could also be explained by the horizontal syringophilid switches on phylogenetically distant hosts. Kethley and Johnston (1975) considered host switches as the main modus in the evolution of this family and even proposed a new term for it — resource tracking. According to their hypothesis, host distribu-

tion of syringophilid species is determined by thickness of the quill walls and mite capability to pierce it.

The second important evolution aspect in syringophilid evolution on their hosts is a distribution of these mites on various types of quills. The wing-feathers, i.e. primaries and secondaries, are probably the ancestral type of the syringophilid habitat. The majority of representatives of the family, including the most archaic ones, were associated with quills of these feathers. The subfamily Picobiinae represented mostly by the dwellers of the body covert feathers was probably originated in wing quills, because representatives of the archaic genus *Calamincola* occupy these microhabitats (Casto 1977). In comparison to syringophilines, picobiines are much more morphologically specialized and possess some advantages, for instance heterosomy, which, probably, allowed them to use more effectively small quills of the body coverts. Thus, picobiines avoided competitions with other syringophilids and formed the second line distributed in parallel with syringophilines on the same hosts. Unfortunately, the biodiversity of this group is yet poorly studied in comparison to Syringophilinae.

Among 48 genera of the subfamily Syringophilinae, 38 genera are restricted to particular avian orders, whereas most of remaining mite genera occur on birds of several orders.

Phylogenetic lineage II of Cheyletoidea is exclusively represented by permanent parasites of vertebrates which can be characterized by the unique palpal structure. All three families of this lineage demonstrate a tendency towards intracutaneous parasitism (a part of Harpirhynchidae, Demodicidae and Psorergatidae) (Bochkov 2009). Skin-inhabiting Harpirhynchidae are relatively slow-moving ectoparasites, which are very often embedded in the host epidermis. By this reason, the reduction tendencies prevailed in the evolution of this mite lineage.

It is presumed from the wide distribution of these mites on birds (Harpirhynchidae) and mammals (Psorergatidae–Demodicidae), that the common ancestor of this branch could occur on the common ancestor of birds and mammals. Transitions from birds, which are hosts of the most archaic representatives of line II (Harpypalpinae), onto mammals, however, can not be excluded during the early phase of mammal evolution (Bochkov 2008). A possible reason for the absence of cheyletoids on recent reptiles (excluding snakes)

may be explained by the peculiarities of their skin structure and molting. Squamata lose the entire external dermal layer or large pieces of it during the molt (Landmann 1986); moreover, they have a multi-layer keratinized epithelium, and skin glands are absent. The high probability of loss of mites during reptile molting seems to have prevented the primary settling of cheyletoid parasites on these hosts. These mites are absent also on crocodylians probably because of their aquatic mode of life. In birds, the skin has undergone significant evolutionary changes comparable to that in of mammals. This probably allowed some cheyletoid mites of the family Harpirhynchidae to transfer to the intradermal parasitism in capsules that is similar to that developed by representatives of Psorergatidae (Literak et al. 2005).

Family Harpirhynchidae. This family includes three subfamilies, two subfamilies, Harpirhynchinae and Harpypalpinae are represented by bird parasites and the subfamily Ophioptinae — by ectoparasites of snakes from the superfamily Colubroidea. The monophyly of this family is strongly approved (Bochkov 2008), and hypothesis about the independent origin of the subfamilies Harpirhynchinae and Harpypalpinae from cheyletoid-like ancestors, proposed by Moss (1979), is groundless.

Mites of the subfamily Harpirhynchinae are known exclusively from Neognathae (Galloanserae and Neoaves). Mites of the most archaic genus *Harpirhynchoides* are known from 14 bird orders (Fain 1994b). Mites of the genera *Neharpirhynchus* and *Metharpirhynchus* parasitize passerines. In addition, the first genus is associated with humming birds (Apodiformes: Trochilidae), and the second genus — with Picidae (Piciformes) (Fain 1995). Mites of the monotypic genus *Anharpirhynchus* are associated with passerine and piciform birds. Another six genera are represented by a few species which are associated with hosts of one order. Mites of two genera, *Harpirhynchus*, and *Trichorhynchiella* are associated with passerines; mites of the genera *Cypsharpirhynchus* and *Harpyrhynchiella* are known from Apodidae (Apodiformes); the genus *Perharpirhynchus* is associated with hosts of the order Charadriiformes; the mites of the genus *Ralliharpirhynchus* are known only from Rallidae (Gruiformes) (Fain 1995).

Mites of the subfamily Harpypalpinae are known from hosts of 11 families, all of them belong to higher passerines.

It looks like a paradox that mites of the more archaic subfamily are associated with the highly evolved hosts. On the contrary, the immature instars of the Harpypalpinae are highly derived in their morphology, because they have lost legs and are characterized by a quite specialized idiosomal setation (Bochkov et al. 1999). Apparently in this case we have two principally different pathways of the morphological evolution in these two subfamilies (Lombert and Moss 1983). In the Harpirhynchinae the progressive characters are represented in adults, whilst in Harpypalpinae they are developed in immatures. Relationships of Passeriformes with other higher Neoaves are not clear (Kurochkin 1993). It is possible that this order represents some earlier separated branch. Certain parasitological data support the hypothesis of the early origin of Passeriformes. Thus, the rather archaic representatives of the families Rhinonyssidae (Mesostigmata) and Ereyneidae (Prostigmata) are associated with Passeriformes (Moss 1979). The feather mite family Proctophyllodidae, mostly restricted to the passerines, is one of most evolved feather mite families but is also characterized by certain archaic features (Mironov 1998). If one admits the hypothesis of earlier origin of Passeriformes the separate phylogenetic position of the Harpypalpinae could be easily explained by their coevolution with passerines.

The subfamily Ophioptinae is a sister lineage to the Harpypalpinae (Bochkov et al. 1999). It was hypothesized that harpypalpine-like ancestor of Ophioptinae switched to parasitism on snakes from passerines. The possibility of this host shift was originally proposed by Kethley (after: Lombert and Moss 1983). Certain snakes feed on nestlings and adult birds. Most of this prey is small passerine birds. The subfamily Ophioptinae is associated exclusively with Colubridae and Elapidae (Bochkov et al. 1999). These two snake families are closely related and represent a group of higher snakes (Rieppel 1988).

Family Cloacaridae (Pneumophaginae). The record of *Pneumophagus bubonis* from the lungs of a single specimen of *Bubo virginianus* by Fain and Smiley (1989) is still enigmatic. As discussed above, these mites exhibiting general cloacarid morphology are clearly distinguished from the Cloacarinae, and their placement into a separate subfamily has a strong morphological support. The distinctions between pneumophagines and cloacarines are stronger than these between cloacarines parasitizing two chelonian orders Pleurodyra and Cryptodyra. Such morphological

distinctions suggest a long history of pneumophagine parasitism on non-turtle hosts. We believe therefore, that this record is not likely to be the result of a host switch from some as yet unexamined turtle species that happened within the lifespan of that individual bird. On the other hand, the knowledge of the diversity and host distribution of pneumophagines is so far limited to this single record. Therefore we can not hypothesize whether this parasitism has an ancient origin, and birds have inherited cloacarids from their common ancestor with turtles or, that seems much more probable, it was the result of an ancient host shift caused by predation by some birds on live or dead turtles (Bochkov and OConnor 2008).

Family Ereynetidae (Speleognathinae).

This family is represented by three subfamilies. Mites of the subfamily Ereynetinae are predators inhabiting humid microhabitats or facultative parasites of mollusc lungs (snails). Mites of the subfamily Lawrencarinae are endoparasites of amphibian nasal cavities. The subfamily Speleognathinae consists of nasal endoparasites of mammals and birds (Andre and Fain 2000). It could be suggested that ereynetine-like ancestor of the subfamily Lawrencarinae switched to parasitism on amphibians from their prey — snails or directly from the soil. In the absence of phylogenetic hypothesis for speleognathine mites, two hypotheses of their host relationships could be proposed. According to the first hypothesis, amniotic vertebrates received these mites from amphibians or directly from the soil. Monophyly of the subfamily Speleognathinae is well grounded, therefore, such transition should have happened on one of these two groups. This host switch must be very ancient because the wide distribution of these mites on avian and mammal orders. An alternative hypothesis suggests the initial parasitism of these mites on a common ancestor of Anamnia and Amniota and extinction of these mites on modern reptiles.

The subfamily Speleognathinae is separated into five tribes, two of them are associated with birds and other three — with mammals (Fain 1985).

Two genera of the tribe Boydaiini, *Boydaia* and *Coboydaia* are mostly associated with passerines. Among 40 species of the first genus, only four species are, probably, secondary associated with non passerine hosts — Caprimulgiformes, Galliformes, Psittaciformes, and Falconiformes. Among five *Coboydaia* spp., only one is associated with humming birds.

The tribe Trispeleognathini includes the remaining 14 genera of bird-associated speleognathines. All of them parasitize non passerine birds, with one exception — *Speleognathopsis onychognathi* (Fain, 1964). Most genera are associated with hosts of a single order: the genus *Trispeleognathus* is associated with Columbigiformes, *Aureliania* — with Strigiformes, *Ophthalmognathus* — with Pelecaniformes, *Psittaboydaia* — with Psittaciformes, *Neastrida* — with Gruiformes, *Neoboydaia* — mostly with Charadriiformes and one species is recorded from Podicipediformes, *Pterniboydaia* — with Galliformes, *Meropiboydaya* — with Coraciiformes, and *Picinyssus* — with Piciformes. Five genera are, however, associated with hosts of various orders: *Astrida* — with Caprimulgiformes, Coraciiformes, and Strigiformes, *Metaboydaia* — with Coraciiformes and Pelecaniformes, *Ralliboydaia* — Gruiformes and Cuculiformes, *Phoenicopterella* — with Anseriformes and Phoenicopteriformes, and *Speleognathopsis* — with Acipitriiformes, Galliformes, Charadriiformes, and Passeriformes.

Biology

Data about the biology of bird-associated prostigmatans are very fragmental and far from complete; almost nothing is known about the biology of Pneumophaginae and Speleognathinae.

All prostigmatans permanently associated with birds possess piercing chelicerae and feed on live host (or prey) tissues. The exception are males of *Pneumophagus bubonis*, their chelicerae are lost but oral opening is still present (Bochkov and OConnor 2008). There are two types of food specialization in skin-inhabiting prostigmatans: lymphophagy (most prostigmatans) and haematophagy (*Bakericheyla*) (Akimov and Gorgol 1990).

Females of these mites lay eggs on (in) the host body. Normally their life-cycle includes active larva, two nymphal stages and adults, females and males; no cases of parthenogenesis were recorded. The immatures of Pneumophagines, however, are still unknown (Bochkov and OConnor 2008) and all nymphal stages of Speleognathinae are calyptostatic (Andre and Fain 2000). The life-cycle of prostigmatans studied in this relationship is short. In free-living cheyletids (*Cheyletus*) the time of life-cycle critically depends from temperature and takes from 10 to 80 days (Akimov and Gorgol 1990). In syringophilids, it takes about 40 days (Kethley 1971). In symbiotic cheyletids and

harpirhynchids these characteristics should probably be similar.

Prostigmatans, being permanent symbionts, colonize new hosts by two main ways — from parents to nestlings and in the time of contacts between adults (particularly during molt of gregarious birds or at breeding time). The first way is especially characteristic for syringophilids (Skoracki 2011). It is worth to note that in syringophilid mites only fertilized females disperse from one host to another, whereas the males never leave the feather quills (Kethley 1971).

The population ecology of bird-associated prostigmatans is weakly studied. They are characterized by relatively low prevalence index (IP). For parasitic cheyletids (*Bakericheyla chanayi* and *Ornithocheyletia* sp.) it was estimated for different seasons and hosts as 0.4–8% (Akimov and Gorgol 1999). According to Kethley (1971) and Skoracki (2011), IP in syringophilids is very low for the wild, non-social, and separately nesting hosts, for example, IP for *Lanius excubitor* parasitized by *Syringophiloides weiszi* is 3.5% (N=508). In the same time IP for *Hirundo rustica* infected with *Syringophiloides hirundus* is 17% (N=208). The data about syringophilid IP on wild birds has been recently summarized and discussed by Skoracki et al. (2010). The highest IP was shown for social and domestic birds, e.g. IP for *Passer domesticus* infested by *Syringophiloides minor* is 82% (N=492), or IP for *Gallus gallus domesticus* is 75% (N=1.500). In various species of the genus *Neharpyrhynchus* demonstrated on the European birds 2–14% IPs (Martinu et al. 2008) and 15–21% on birds in Peru (Literak et al. 2012); mites of the genus *Harpirhynchus dusbabeki* from *Panurus biarmicus* in Europe showed IP 7.4% (N=378) (Literak et al. 2005).

The damage caused by prostigmatans to their avian hosts is markedly varied. Most of these mites do not cause a huge loss of bird condition. Some cyst-forming harpirhynchids are considered as harmful parasites (Moss 1979). At the same time Henry et al. (2004) did not find a markedly negative impact of the lesions by harpirhynchids on the health status of birds infected. According to Literak et al. (2005), the traumatic effect from harpirhynchid cysts was also not too serious and it seems that birds with cysts survived for a long period.

In contrast to some reports about the clinical signs of feather's picking caused by syringophilid mites (mostly *Syringophilus bipectinatus*) in do-

mesticated birds (Rebrassier and Martin 1932; Schwabe 1956; Hwang 1959; Gritschenko 1973; Schmaschke et al. 2003; Principato et al. 2005) Skoracki (2011) found no evidences that quill mites induce the pathological changes in the structure of skin in wild birds, even during heavy infestations. Casto's (1974) observations also indicate that the exit channels and many small holes produced during feeding activity of syringophilids, do not seem to weaken the structure of the feather.

The role of prostigmatan mites as vectors of bird diseases is almost unstudied. It is only known, that syringophilids could be potential vectors of bacterium *Anaplasma phagocytophilum* — an obligate intracellular pathogen (Skoracki et al. 2006).

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Table 1. Summary of taxa number, distribution and host associations of Prostigmata permanently associated with birds

Family (subfamily or tribe)	Species n	Genera n	Host orders	Type of symbiosis
Family Cheyletidae Leach, 1815				
Tribe Cheletosomatini Volgin, 1969	23	6	Apodiformes, Charadriiformes, Cuculiformes, Galliformes, Gruiformes, Piciformes	Predators and parasites (<i>Picocheyletus</i>)
Tribe Ornithocheyletiini Volgin, 1969	54	4	Apodiformes, Columbiformes, Coraciiformes, Cuculiformes, Galliformes, Passeriformes, Pelecaniformes, Piciformes, Psittaciformes, Strigiformes	Parasites
Tribe Metacheyletiini Fain, 1980	5	1	Cuculiformes, Passeriformes, Psittaciformes	?Parasites
Family Syringophilidae Lavoipierre, 1953				
Subfamily Syringophilinae Lavoipierre, 1953	234	48	Accipitriformes, Anseriformes, Apodiformes, Charadriiformes, Ciconiiformes, Columbiformes, Coraciiformes, Cuculiformes, Galbuliformes, Galliformes, Gruiformes, Passeriformes, Pelecaniformes, Phoenicopteriformes, Piciformes, Procellariiformes, Psittaciformes, Pterocliiformes, Strigiformes, Suliformes, Tinamiformes	Parasites
Subfamily Picobiinae Johnston et Kethley, 1973	44	5	Charadriiformes, Columbiformes, Coraciiformes, Cuculiformes, Galliformes, Passeriformes, Piciformes, Psittaciformes, Pterocliiformes	Parasites

Family Harpirhynchidae Dubinin, 1956				
Subfamily Harpirhynchinae Dubinin, 1956	65	10	Accipitriformes, Anseriformes, Apodiformes, Charadriiformes, Ciconiiformes, Coliiformes, Columbi- formes, Cuculiformes, Galliformes, Gruiformes, Passeriformes, Pelecani- formes, Piciformes, Procellariiformes, Psittaciformes, Strigiformes	Parasites
Subfamily Harpypalpinae Fain, 1972	10	2	Passeriformes	Parasites
Family Cloacaridae Camin, Moss, Oliver et Singer, 1967				
Subfamily Pneumophaginae Fain et Smiley, 1989	1	1	Strigiformes	Parasites
Family Ereyнетidae Oudemans, 1931				
Subfamily Speleognathinae Fain, 1957				
Tribe Boydaiini Fain, 1985	45	2	Apodiformes, Caprimulgiformes, Falconiformes, Passeriformes, Psittaci- formes	Parasites
Tribe Trispeleognathini Fain, 1985	28	14	Accipitriformes, Anseriformes, Caprimulgiformes, Charadriiformes, Columbiformes, Coraciiformes, Cuculiformes, Galliformes, Gruiformes, Passeriformes, Pelecaniformes, Phoenicopteriformes, Piciformes, Podicipediformes, Psittaciformes, Strigiformes	Parasites

Table 2.
Setation of gnathosoma

Family/Subfamily	Setae
Cheyletidae	<i>elc. p, n, ao1, ao2</i>
Syringophilinae	<i>elc. p, n, ao1, ao2</i>
Picobiinae	<i>elc. p, n, ao1, ao2</i>
Harpirhynchinae	<i>elc. p, m, n</i>
Harpypalpinae	<i>elc. p, m, n</i>
Cloacaridae (Pneumophaginae)	–
Ereyнетidae (Speleognathinae)	<i>n (sc1), m (sc2)</i>

Table 3.
Setation of palps

Species	Femur	Genu	Tibia	Tarsus
Cheyletidae	<i>d, v', v''</i>	<i>d, l''</i>	<i>d, IT, l'</i>	<i>acm, sul, ul', ul'', ω</i>
Syringophilinae	<i>d, v', v''</i>	<i>d, l''</i>	<i>d, IT, l'</i>	<i>acm, sul, ul', ul'', ω</i>
Picobiinae	<i>d, v', v''</i>	<i>d, l''</i>	<i>d, IT, l'</i>	<i>acm, sul, ul', ul'', ω</i>
Harpirhynchinae	<i>d, v</i>	<i>d, l''</i>	<i>d, IT</i>	1 seta
Harpypalpinae	<i>d</i>	<i>d, l''</i>	<i>d, IT</i>	1 seta
Cloacaridae (Pneumophaginae)	–	–	–	–
Ereyнетidae (Speleognathinae)	–	–	<i>d</i>	<i>d, l', l'', ω</i>

Table 4.
Setation of idiosoma

Species	Setae
Cheyletidae	<i>scx, vi, ve, si, se, c1, c2, d1, d2, e1, e2, f1, f2, h1, h2, ps1-3, ag1-3 (2), g1-2 (2)</i>
Syringophilinae	<i>scx, vi, ve, si, se, c1, c2, d1, d2, e2, f1, f2, h1, h2, ps1-2, ag1-3 (3), g1-2 (2)</i>
Picobiinae	<i>scx, vi, ve, si, se, c1, c2, d1, d2, e1, f1, f2, h1, h2, ps1-2, ag1-3 (3), g1-2 (2)</i>
Harpirhynchinae	<i>scx, vi, ve, si, se, c2, h1, g1 (3)</i>
Harpypalpinae	<i>scx, vi, ve, si, se, c1, c2, d1, d2, e2, f1, f2, h1, ps1-3 (2), g1 (0)</i>
Cloacaridae (Pneumophaginae)	1 pair of propodonotal alveoli (0); 1 pair of alveoli flanking anal-genital opening (0), 3 pairs of opisthosomal spine like setae (1)
Ereynetidae (Speleognathinae)	<i>vi, ve, si, se, c1, c2, d1, e1, f1, f2, h1, ag1-2 (2), g1-3 (3), ps1-2 (2), (eu)</i>

() — number of setae in male

Table 5.
Setation of legs

Family	Tarsus I	Tarsus II	Tarsus III	Tarsus IV
Cheyletidae	<i>ft, (tc), (p), a'', (u), vs, ω</i>	<i>(tc), (p), (u), vs, ω</i>	<i>(tc), (p), (u), vs, ω (M)</i>	<i>(tc), (p), (u), vs, ω (M)</i>
Syringophilinae	<i>ft, (tc), (p), ω (a), (u), vs</i>	<i>(tc), (p), (u), vs, ω</i>	<i>(tc), (p), (u)</i>	<i>(tc), (p), (u)</i>
Picobiinae	<i>ft, (tc), (p), ω (a), (u), vs</i>	<i>(tc), (p), (u), vs, ω</i>	<i>(tc), (p), (u)</i>	<i>(tc), (p), (u)</i>
Harpirhynchinae	<i>(tc), (p), (a), (u), ω</i>	<i>(tc), p'', (a), (u), ω</i>	8 or less	8 or less
Harpypalpinae	<i>(tc), p'', (a), (u), ω</i>	<i>(tc), p'', (a), (u), ω</i>	<i>(tc), (a), (u)</i>	<i>(tc), (a), (u)</i>
Cloacaridae (Pneumophaginae)	5	9	12	12
Ereynetidae (Speleognathinae)	12, ω	8	7	7
Family	Tibia I	Tibia II	Tibia III	Tibia IV
Cheyletidae	<i>d, (l), (v), φ</i>	<i>d, l'', (v)</i>	<i>d, l'', (v)+ φ (M)</i>	<i>d, l'', (v)</i>
Syringophilinae	<i>d, (l), v, φ</i>	<i>d, (l), v</i>	<i>d, (l)</i>	<i>d, (l)</i>
Picobiinae	<i>d, (l), v, φ</i>	<i>d, (l), v</i>	<i>d, (l)</i>	<i>d, (l)</i>
Harpirhynchinae	<i>d, (l), (v)</i>	<i>d, (l), (v)</i>	—	—
Harpypalpinae	<i>d, (l), (v)</i>	<i>d, (l), (v)</i>	<i>d, (v)</i>	<i>d, (v)</i>
Cloacaridae (Pneumophaginae)	1	—	—	—
Ereynetidae (Speleognathinae)	<i>d, (l), (v)</i>	<i>d, l, v</i>	<i>d, l, v</i>	<i>d, l, v</i>
Family	Genu I	Genu II	Genu III	Genu IV
Cheyletidae	<i>d, l', σ</i>	<i>d, l'</i>	<i>d, l'</i>	<i>d, l'</i>
Syringophilinae	<i>d, l', σ</i>	<i>d, l'</i>	<i>l'</i>	<i>l'</i>
Picobiinae	<i>d, l', σ</i>	<i>d, l'</i>	<i>l'</i>	<i>l'</i>
Harpirhynchinae	<i>d, l', (v)</i>	<i>d, l', (v)</i>	—	—
Harpypalpinae	<i>d, (l), (v)</i>	<i>d, (l), (v)</i>	—	—
Cloacaridae (Pneumophaginae)	—	—	—	—
Ereynetidae (Speleognathinae)	<i>(d), (l)</i>	<i>(d), (l)</i>	<i>d (l)</i>	<i>d, (l)</i>
Family	Femur I	Femur II	Femur III	Femur IV
Cheyletidae	<i>d, v</i>	<i>d, v</i>	<i>d, v</i>	<i>d, v</i>
Syringophilinae	<i>d, v</i>	<i>d, v</i>	<i>d</i>	<i>d</i>
Picobiinae	<i>d, v</i>	<i>d, v</i>	—	—

Harpirhynchiane	<i>d, v</i>	<i>d, v</i>	–	–
Harpypalpinae	<i>d, v</i>	<i>d, v</i>	<i>v</i>	<i>v</i>
Cloacaridae (Pneumophaginae)	–	–	–	–
Ereynetidae (Speleognathinae)	7	<i>(d), (v)</i>	<i>d, (v)</i>	<i>d (v)</i>
Family	Trochanter/ coxa I	Trochanter/ coxa II	Trochanter/ coxa III	Trochanter/ coxa IV
Cheyletidae	<i>v/1a, 1b, 1c</i>	<i>v/2c</i>	<i>l, v/3a, 3b, 3c</i>	<i>v/4a, 4b, 4c</i>
Syringophilinae	<i>v/1a, 1b, 1c</i>	<i>v/2c</i>	<i>v/3a, 3b, 3c</i>	<i>v/4b, 4c</i>
Picobiinae	<i>v/1a, 1b, 1c</i>	<i>v/2c</i>	<i>–/3a, 3b, 3c</i>	<i>–/4b, 4c</i>
Harpirhynchinae	<i>v/1a, 1c</i>	<i>v/–</i>	<i>–/3a</i>	<i>–/–</i>
Harpypalpinae	<i>v/1a, 1c</i>	<i>v/2c</i>	<i>v/3a, 3c</i>	<i>v/4c</i>
Cloacaridae (Pneumophaginae)	–	–	–	–
Ereynetidae (Speleognathinae)	<i>l'/1a, 1b, 1c</i>	<i>l'/2c</i>	<i>–/3a, 3b</i>	<i>–/4a, 4b</i>

() — pair of setae; (M) — solenidion of male

Table 6.
Distribution of Prostigmata permanently associated with birds among host orders

Host order (N of extant species)	Mite family				
	Cheyletidae	Harpirhynchidae	Syringophilidae	Cloacaridae	Ereynetidae
Palaeognathae					
Struthioniformes					
Tinamiformes					
Neognathae					
Galloanserae					
Anseriformes					
Galliformes					
Neoaves					
Charadriiformes					
Gaviiformes					
Podicipediformes					
Procellariiformes					
Sphenisciformes					
Phaethontiformes					
Ciconiiformes					
Suliformes					
Pelecaniformes					
Phoenicopteriformes					
Accipitriformes					
Falconiformes					
Otidiformes					
Mesitornithiformes					
Cariamiformes					
Eurypygiformes					
Gruiformes					
Pterocliiformes					
Columbiformes					

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Psittaciformes					
Cuculiformes					
Galbuliformes					
Strigiformes					
Caprimulgiformes					
Apodiformes					
Coraciiformes					
Piciformes					
Trogoniformes					
Coliiformes					
Passeriformes					

Bold — mites unknown

Table 7.
Host-specificity among Prostigmata permanently associated with birds
Number of mites specific to host order, family, genus and species respectively.

Mite family (N of species)	Host specificity				
	To species	To genus	To family	To order	To orders
Cheyletidae (bird-associated, parasites — 59)	49 (83%)	1 (1.7%)	6 (10.2%)	1 (1.7%)	2 (3.4%)
Cheyletidae (bird-associated, predators — 23)	15 (65.2%)	2 (8.7%)	2 (8.7%)	4 (17.4%)	—
Syringophilidae (278)	196 (70.5%)	43 (15.5%)	30 (10.8%)	6 (2.2%)	3 (1.1%)
Harpirhynchidae (bird-associated — 75)	47 (62.7%)	7 (9.3%)	11 (14.7%)	9 (12%)	1 (1.3%)
Cloacaridae (bird-associated — 1)	1 (100%)	—	—	—	—
Ereynetidae (bird-associated — 73)	27 (37%)	8 (11%)	22 (30.1%)	14 (19.2%)	2 (2.7%)

Appendix

Appendix. List of Prostigmata species permanently parasitizing birds and their hosts

Geographical references: The European Region does not include Turkey, which is considered here under the Asiatic Region. In the Australian Region, Oceania does not include Eastern Timor and the Indonesian islands, which are considered under the Asiatic Region. The South American Region includes Central America and islands of the Caribbean Sea.

A few records containing in our opinion doubtfully determined mite species are not included. Bird systematic follows Clements et al. 2011.

Mite species	Host species	Host family	Host order	Locality	References
Cheyletidae Leach, 1815					
Ornithocheyletini Volgin, 1969					
<i>Ornithocheyletia</i> Volgin, 1964					
<i>Ornithocheyletia pinguis</i> (Berlese, 1889)	<i>Turdus merula</i>	Turdidae	Passeriformes	Europe	Berlese 1889
<i>Ornithocheyletia aitkeni</i> Fain, 1972	<i>Turdus fumigatus</i>	Turdidae	Passeriformes	South America	Fain 1972, 1981
<i>Ornithocheyletia dubinini</i> Volgin, 1984	<i>Sturnus vulgaris</i>	Sturnidae	Passeriformes	Europe, North America	Volgin 1964; Smiley 1977; Fain 1981; Skoracki et al. 2004
<i>Ornithocheyletia eulabes</i> Fain, 1881	<i>Gracula religiosa</i>	Sturnidae	Passeriformes	European Zoo (captive)	Fain 1981
<i>Ornithocheyletia lamprocolius</i> Fain, 1972	<i>Lamprolornis chloropterus</i>	Sturnidae	Passeriformes	Africa	Fain 1972, 1981
<i>Ornithocheyletia wauthy</i> Fain et Bochkov, 2002	<i>Lamprocolius</i> sp.	Sturnidae	Passeriformes	Africa	Fain and Bochkov 2002
<i>Ornithocheyletia volgini</i> Smiley, 1970	<i>Petrochelidon pyrrhonota</i>	Hirundinidae	Passeriformes	North America	Smiley 1970; Fain 1981
<i>Ornithocheyletia lukoschusi</i> Smiley, 1970	<i>Hirundo rustica</i>	Hirundinidae	Passeriformes	Europe	Smiley 1970; Fain 1981
<i>Ornithocheyletia mironovi</i> Bochkov et Chirov, 1998	<i>Riparia riparia</i>	Hirundinidae	Passeriformes	Asia	Chirov and Bochkov 1998
<i>Ornithocheyletia phylloscopi</i> Bochkov, Mironov et Gorgol, 1994	<i>Phylloscopus trochilus</i>	Sylviidae	Passeriformes	Europe	Bochkov et al. 1994
<i>Ornithocheyletia leiothrix</i> Fain, 1972	<i>Leiothrix lutea</i>	Leiothrichidae	Passeriformes	European Zoo (captive)	Fain 1972, 1981
<i>Ornithocheyletia garrulax</i> Fain, 1972	<i>Garrulax leucolophus</i>	Leiothrichidae	Passeriformes	European Zoo (captive)	Fain 1972, 1981
<i>Ornithocheyletia lepidus</i> Fain, 1981	<i>Garrulax leucolophus</i>	Leiothrichidae	Passeriformes	European Zoo (captive)	Fain 1981
<i>Ornithocheyletia granatina</i> Fain, 1972	<i>Uraeginthus ianthinogaster</i>	Estrildidae	Passeriformes	European Zoo (captive)	Fain 1972, 1981
<i>Ornithocheyletia orioli</i> Fain et Bochkov, 2003	<i>Oriolus oriolus</i>	Oriolidae	Passeriformes	Africa	Fain and Bochkov 2002
“	<i>Pachyphantes superciliosa</i>	Ploceidae	Passeriformes	Africa	Fain and Bochkov 2002
“	<i>Lybius</i> sp.	Lybiidae	Piciformes	Africa	Fain and Bochkov 2002
“	<i>Indicator indicator</i>	Indicatoridae	Piciformes	Africa	Fain and Bochkov 2002
“	<i>Chrysococcyx klaasi</i>	Cuculidae	Cuculiformes	Africa	Fain and Bochkov 2002

<i>Ornithocheyletia canadensis</i> (Banks, 1909)	<i>Picus viridis</i>	Picidae	Piciformes	North America	Banks 1909; Fain 1981
<i>Ornithocheyletia gersoni</i> Smiley, 1970	<i>Dendrocopos pubescens</i>	Picidae	Piciformes	North America	Smiley 1970; Fain 1981
<i>Ornithocheyletia hallae</i> Smiley, 1970	<i>Columba livia</i>	Columbidae	Columbiformes	Europe, Africa, North America	Smiley 1970, 1977; Fain 1981
<i>Ornithocheyletia hallae similis</i> Fain, 1972	<i>Chalcophaps indica</i>	Columbidae	Columbiformes	European Zoo (captive)	Fain 1972, 1981
<i>Ornithocheyletia geopeliae</i> Fain, 1981	<i>Geopelia striata</i>	Columbidae	Columbiformes	European Zoo (captive)	Fain 1981
<i>Ornithocheyletia columbigallinae</i> Fain et Bochkov, 2002	<i>Columbina</i> sp.	Columbidae	Columbiformes	South America	Fain and Bochkov 2002
<i>Ornithocheyletia lawrenceae</i> Smiley, 1970	<i>Parakeet</i>	Psittacidae	Psittaciformes	North America	Smiley 1970
“	<i>Platycercus elegans</i>	Psittacidae	Psittaciformes	Australia	Womersley 1941; Fain 1981
<i>Ornithocheyletia psittaculae</i> Fain, 1972	<i>Psittacula krameri</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1981
<i>Ornithocheyletia psittaci</i> Fain, 1972	<i>Psittacus erithacus</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1981
<i>Ornithocheyletia psittaci poicephali</i> Fain, 1972	<i>Poicephalus senegalus</i>	Psittacidae	Psittaciformes	Africa	Fain 1981
<i>Ornithocheyletia smileyi</i> Fain, 1972	<i>Myiopsitta monachus</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1981
<i>Ornithocheyletia argentinensis</i> Fain, 1972	<i>Nandayus nenday</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1981
“	<i>Forpus passerinus</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1981
<i>Ornithocheyletia francolini</i> Fain, 1972	<i>Francolinus natalensis</i>	Phasianidae	Galliformes	Africa	Fain 1972, 1981
<i>Neocheyletiella</i> Baker, 1949					
<i>Neocheyletiella rohweri</i> Baker, 1949	<i>Sitta pygmaea</i>	Sittidae	Passeriformes	North America	Baker 1949
<i>Neocheyletiella microrhyncha</i> (Berlese et Trouessart, 1889)	<i>Hirundo rustica</i>	Hirundinidae	Passeriformes	Europe, North America	Berlese and Trouessart 1889 ; Smiley 1970
“	<i>Delichon urbica</i>	Hirundinidae	Passeriformes	Europe	Volgin 1969
“	<i>Riparia riparia</i>	Hirundinidae	Passeriformes	Europe	Volgin 1969
“	<i>Petrochelidon pyrrhonota</i>	Hirundinidae	Passeriformes	North America	Smiley 1970
“	<i>Cecropis abyssinica</i>	Hirundinidae	Passeriformes	Africa	Fain 1980a
“	<i>Psalidoprocne albiceps</i>	Hirundinidae	Passeriformes	Africa	Fain 1980a
<i>Neocheyletiella smallwoodae</i> Baker, 1949	<i>Leucosticte australis</i>	Fringillidae	Passeriformes	Australia	Baker 1949
<i>Neocheyletiella media</i> Fain, 1972	<i>Leiothrix lutea</i>	Timaliidae	Passeriformes	Asia	Fain 1972, 1980a
<i>Neocheyletiella siva</i> Fain, 1972	<i>Minla cyanouroptera</i>	Timaliidae	Passeriformes	European Zoo (captive)	Fain 1972, 1980a
<i>Neocheyletiella amandavae</i> Fain, 1972	<i>Amandava amandava</i>	Leiothrichidae	Passeriformes	European Zoo (captive)	Fain 1972, 1980a

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<i>Neochelytiella megaphallos</i> Lawrence, 1959	<i>Estrilda erythronotos</i>	Estrildidae	Passeriformes	Africa	Lawrence 1959a
<i>Neochelytiella lonchurae</i> Fain et Bochkov, 2002	<i>Lonchura</i> sp.	Estrildidae	Passeriformes	Africa	Fain and Bochkov 2002
<i>Neochelytiella pittae</i> Fain, 1972	<i>Pitta megarhyncha</i>	Pittidae	Passeriformes	European Zoo (captive)	Fain 1972, 1980a
<i>Neochelytiella artami</i> Domrow, 1966	<i>Artamus cyanopterus</i>	Artamidae	Passeriformes	Australia	Domrow 1966, 1970
<i>Neochelytiella avicola</i> Fain, 1972	<i>Ara</i> sp.	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1980a
“	<i>Agapornis fisheri</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1980a
“	<i>Erythrura prasina</i>	Estrildidae	Passeriformes	European Zoo (captive), North America (captive)	Smiley 1977 ; Fain 1980a
<i>Neochelytiella nectarinia</i> Bochkov et OConnor, 2003	<i>Cinnyris jugularis</i>	Nectariniidae	Passeriformes	Asia	Bochkov and OConnor 2003
<i>Neochelytiella aegithali</i> Bochkov et OConnor, 2003	<i>Aegithalos concinnus</i>	Aegithalidae	Passeriformes	Asia	Bochkov and OConnor 2003
<i>Neochelytiella quelea</i> Fain et Bochkov, 2002	<i>Quelea quelea</i>	Ploceidae	Passeriformes	Africa	Fain and Bochkov 2002
“	<i>Streptopelia semitorquata</i>	Columbidae	Columbiformes	Africa	Fain and Bochkov 2002
<i>Neochelytiella ardeola</i> Bochkov et Ochoa, 2005	<i>Ardeola ralloides</i>	Ardeidae	Pelecaniformes	Africa	Bochkov and Ochoa 2005
<i>Neochelytiella athene</i> Fain et Bochkov, 2002	<i>Athene brama</i>	Strigidae	Strigiformes	European Zoo (captive)	Fain and Bochkov 2002
<i>Bakericheyla</i> Volgin, 1966					
<i>Bakericheyla chanayi</i> (Berlese et Trouessart, 1889)	<i>Motacilla alba</i>	Motacillidae	Passeriformes	Europe	Berlese and Trouessart 1889
“	<i>Fringilla coelebs</i>	Fringillidae	Passeriformes	Europe	Baker 1949; Volgin 1966
“	<i>Fringilla montifringilla</i>	Fringillidae	Passeriformes	Europe	Akimov and Gorgol 1990
“	<i>Spinus spinus</i>	Fringillidae	Passeriformes	Europe	Akimov and Gorgol 1990
“	<i>Carduelis carduelis</i>	Fringillidae	Passeriformes	Europe	Akimov and Gorgol 1990
“	<i>Passer montanus</i>	Passeridae	Passeriformes	Europasia	Akimov and Gorgol 1990
“	<i>Passer domesticus indicus</i>	Passeridae	Passeriformes	Asia	Akimov and Gorgol 1990
“	<i>Hirundo rustica</i>	Hirundinidae	Passeriformes	Europe	Akimov and Gorgol 1990
“	<i>Delichon urbica</i>	Hirundinidae	Passeriformes	Europe	Volgin 1969
“	<i>Motacilla flava</i>	Motacillidae	Passeriformes	Europe	Akimov and Gorgol 1990
“	<i>Anthus trivialis</i>	Motacillidae	Passeriformes	Europe	Akimov and Gorgol 1990
“	<i>Oenanthe picata</i>	Muscicapidae	Passeriformes	Asia	Volgin 1969

<i>Bakericheyla chanayi</i> (Berlese et Trouessart, 1889)	<i>Cyanoptila cyanomelana</i>	Muscicapidae	Passeriformes	Asia	Volgin 1969
“	<i>Muscicapa striata</i>	Muscicapidae	Passeriformes	Europe	Volgin 1969
“	<i>Turdus pilaris</i>	Turdidae	Passeriformes	Europe	Akimov and Gorgol 1990
“	<i>Sylvia atricapilla</i>	Sylviidae	Passeriformes	Europe	Akimov and Gorgol 1990
“	<i>Sylvia borin</i>	Sylviidae	Passeriformes	Europe	Akimov and Gorgol 1990
“	<i>Phylloscopus trochilus</i>	Sylviidae	Passeriformes	Europe	Akimov and Gorgol 1990
“	<i>Parus major</i>	Paridae	Passeriformes	Europe	Volgin 1969
“	<i>Paroaria nigrogenis</i>	Emberizidae	Passeriformes	European Zoo (captive),	Fain 1972, 1980b
“	<i>Emberiza citrinella</i>	Emberizidae	Passeriformes	Europe	Akimov and Gorgol 1990
“	<i>Zonotrichia leucophrys</i>	Emberizidae	Passeriformes	North America	Furman and Sousa 1969
“	<i>Zonotrichia atricapilla</i>	Emberizidae	Passeriformes	North America	Furman and Sousa 1969
“	<i>Merops apiaster</i>	Meropidae	Coraciiformes	Asia	Volgin 1969
<i>Bakericheyla faini</i> (Lawrence, 1959)	<i>Cossypha dichroa</i>	Muscicapidae	Passeriformes	Africa	Lawrence 1959a
<i>Bakericheyla subquadra- ta</i> (Lawrence, 1959)	<i>Merops pusillus</i>	Meropidae	Coraciiformes	Africa	Lawrence 1959a
<i>Bakericheyla transvaa- lica</i> (Lawrence, 1959)	<i>Merops pusillus</i>	Meropidae	Coraciiformes	Africa	Lawrence 1959a
“	<i>Merops persicus</i>	Meropidae	Coraciiformes	Africa	Lawrence 1959a
“	<i>Merops apiaster</i>	Meropidae	Coraciiformes	Africa, Asia	Lawrence 1959a; Volgin 1969; Fain 1980b
“	<i>Merops persicus</i>	Meropidae	Coraciiformes	Asia	Volgin 1969
“	<i>Merops nubicoides</i>	Meropidae	Coraciiformes	Africa	Fain 1980b
“	<i>Merops bullockoides</i>	Meropidae	Coraciiformes	Africa	Fain 1980b
<i>Bakericheyla (Apodicheyla)</i> Fain, 1979					
<i>Bakericheyla africana</i> Fain 1979	<i>Cypsiurus parvus</i>	Apodidae	Apodiformes	Africa	Fain 1979a
<i>Bakericheyla benoiti</i> Fain, 1980	<i>Merops bulocki</i>	Meropidae	Coraciiformes	Africa	Fain 1980b
<i>Apodicheles</i> Fain, 1979					
<i>Apodicheles cypsiurus</i> Fain, 1979	<i>Cypsiurus parvus</i>	Apodidae	Apodiformes	Africa	Fain 1979a
<i>Apodicheles apus</i> Fain, 1979	<i>Apus caffer</i>	Apodidae	Apodiformes	Africa	Fain 1979a
<i>Apodicheles collocalia</i> Bochkov et OConnor, 2003	<i>Collocalia esculenta</i>	Apodidae	Apodiformes	Asia	Bochkov and OConnor 2003
Metacheyletiini Fain, 1980					
<i>Metacheyletia</i> Fain, 1972					
<i>Metacheyletia obesa</i> Fain, 1972	<i>Psittacula krameri</i>	Psittacidae	Psittaciformes	Africa	Fain 1972, 1980c

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<i>Metacheyletia longisetosa</i> Ateyo, Kethley et Perez, 1984	<i>Amazona finschi</i>	Psittacidae	Psittaciformes	North America	Ateyo et al. 1984
<i>Metacheyletia amazonae</i> Bochkov et OConnor, 2003	<i>Amazona amazonica</i>	Psittacidae	Psittaciformes	South America	Bochkov and OConnor 2003
<i>Metacheyletia degenerata</i> Fain et Bochkov, 2003	<i>Serinus mozambicus</i>	Fringillidae	Passeriformes	Africa	Fain and Bochkov 2003
<i>Metacheyletia ngaii</i> Bochkov et Skoracki, 2011	<i>Corythaixoides leucogaster</i>	Musophagidae	Cuculiformes	Africa	Bochkov and Skoracki 2011
Cheletosomatini Volgin, 1969					
<i>Cheletosoma</i> Oudemans, 1905					
<i>Cheletosoma tyrannus</i> Oudemans, 1905	<i>Aramus guarauna</i>	Aramidae	Gruiformes	South America	Oudemans 1905
<i>Cheletosoma tauraco</i> Bochkov et Skoracki, 2012	<i>Tauraco leucolophus</i>	Musophagidae	Cuculiformes	Africa	Bochkov and Skoracki 2012
<i>Cheletoides</i> Oudemans, 1904					
<i>Cheletoides uncinatus</i> Heller, 1880	<i>Pavo cristatus</i>	Phasianidae	Galliformes	Europe (domesticated)	Heller 1880 ; Oudemans 1906
<i>Cheletoides chirundensis</i> Fain, 1972	<i>Numida meleagris</i>	Numididae	Galliformes	Africa	Fain 1972, 1979b
<i>Metacheletoides</i> Fain, 1972					
<i>Metacheletoides numidae</i> Fain, 1972	<i>Numida meleagris</i>	Numididae	Galliformes	Africa	Fain 1972, 1979b; Bochkov and Skoracki 2012
<i>Metacheletoides akanyaruensis</i> Fain, 1972	<i>Numida meleagris</i>	Numididae	Galliformes	Africa	Fain 1972, 1979b
<i>Metacheletoides crinifer</i> Fain, 1979	<i>Crinifer zonurus</i>	Musophagidae	Cuculiformes	Africa	Fain 1979b
“	<i>Crinifer piscator</i>	Musophagidae	Cuculiformes	Africa	Fain 1979b
“	<i>Corythaixoides leucogaster</i>	Musophagidae	Cuculiformes	Africa	Fain 1979b
<i>Metacheletoides gisagarensis</i> Fain, 1979	<i>Crinifer zonurus</i>	Musophagidae	Cuculiformes	Africa	Fain 1979b
“	<i>Crinifer piscator</i>	Musophagidae	Cuculiformes	Africa	Fain 1979b
<i>Cheletopsis</i> Oudemans, 1904					
<i>Cheletopsis norneri</i> (Poppe, 1888)	<i>Sterna hirundo</i>	Laridae	Charadriiformes	Eurasia	Poppe 1888 ; Oudemans 1904, 1906 ; Volgin 1969 ; Mironov et al. 1991
“	<i>Sterna repressa</i>	Laridae	Charadriiformes	Africa	Bochkov et al. 2002
“	<i>Phaetusa simplex</i>	Laridae	Charadriiformes	South America	Bochkov et al. 2002
“	<i>Gelochelidon nilotica</i>	Laridae	Charadriiformes	Eurasia, North America	Volgin 1969; Mironov et al. 1991
“	<i>Chlidonias hybrida</i>	Laridae	Charadriiformes	Africa	Bochkov et al. 2002

<i>Cheletopsis norneri</i> (Poppe, 1888)	<i>Tringa totanus</i>	Scolopacidae	Charadrii- formes	Asia	Mironov et al. 1991; Bochkov et al. 2002
<i>Cheletopsis thalasseus</i> Bochkov et OConnor, 2003	<i>Thalasseus sandvicensis</i>	Laridae	Charadrii- formes	North America	Bochkov and OConnor 2003
<i>Cheletopsis larosterna</i> Bochkov et Skoracki, 2012	<i>Larosterna inca</i>	Laridae	Charadrii- formes	South America	Bochkov and Skoracki 2012
<i>Cheletopsis basilica</i> Oudemans, 1904	<i>Tringa totanus</i>	Scolopacidae	Charadrii- formes	Europe	Oudemans 1904
“	<i>Charadrius hiaticula</i>	Charadriidae	Charadrii- formes	Europe	Bochkov et al. 2002
“	<i>Calidris melanotos</i>	Scolopacidae	Charadrii- formes	North America	Bochkov et al. 2002
“	<i>Chlidonias niger</i>	Laridae	Charadrii- formes	North America	Bochkov et al. 2002
<i>Cheletopsis animosa</i> Oudemans, 1904	<i>Tringa totanus</i>	Scolopacidae	Charadrii- formes	Europe	Oudemans 1904
“	<i>Sterna hirundo</i>	Laridae	Charadrii- formes	North America	Bochkov et al. 2002
<i>Cheletopsis anax</i> Oudemans, 1904	<i>Tringa totanus</i>	Scolopacidae	Charadrii- formes	Europe	Oudemans 1904
<i>Cheletopsis mariae</i> Mironov, Bochkov et Chirov, 1991	<i>Actitis hypoleucos</i>	Scolopacidae	Charadrii- formes	Eurasia	Mironov et al. 1991 ; Bochkov et al. 2002
<i>Cheletopsis impavida</i> Oudemans, 1904	<i>Tringa totanus</i>	Scolopacidae	Charadrii- formes	Eurasia	Oudemans 1904; Mironov et al. 1991
“	<i>Tringa stagnatilis</i>	Scolopacidae	Charadrii- formes	Europe	Bochkov et al. 2002
“	<i>Calidris ferruginea</i>	Scolopacidae	Charadrii- formes	Europe	Bochkov et al. 2002
“	<i>Calidris minuta</i>	Scolopacidae	Charadrii- formes	Asia	Mironov et al. 1991
“	<i>Calidris temminckii</i>	Scolopacidae	Charadrii- formes	Asia	Mironov et al. 1991
“	<i>Calidris ruficollis</i>	Scolopacidae	Charadrii- formes	Asia	Mironov et al. 1991
“	<i>Calidris pusilla</i>	Scolopacidae	Charadrii- formes	North America	Bochkov et al. 2002
“	<i>Calidris himantopus</i>	Scolopacidae	Charadrii- formes	North America	Bochkov et al. 2002
“	<i>Nycticryphes semicollaris</i>	Rostratulidae	Charadrii- formes	North America	Bochkov et al. 2002
<i>Cheletopsis daberti</i> Kivganov et Bochkov, 1994	<i>Tringa glareola</i>	Scolopacidae	Charadrii- formes	Europa	Kivganov and Bochkov 1994 ; Bochkov et al. 2002
“	<i>Tringa nebularia</i>	Scolopacidae	Charadrii- formes	Europe	Bochkov et al. 2002
“	<i>Calidris temminckii</i>	Scolopacidae	Charadrii- formes	Europe	Bochkov et al. 2002
“	<i>Calidris himantopus</i>	Scolopacidae	Charadrii- formes	North America	Bochkov et al. 2002

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<i>Cheletopsis charadrii</i> Mironov, Bochkov et Chirov, 1991	<i>Charadrius dubius</i>	Charadriidae	Charadriiformes	Asia	Mironov et al. 1991
<i>Cheletopsis limnodromi</i> Bochkov, Fain et Dabert, 2002	<i>Limnodromus griseus</i>	Scolopacidae	Charadriiformes	North America	Bochkov et al. 2002
<i>Cheletopsis prosobonialis</i> Bochkov, Fain et Dabert, 2002	<i>Prosobonia cancellata</i>	Scolopacidae	Charadriiformes	Australia	Bochkov et al. 2002
<i>Cheletopsis rhynchops</i> Bochkov, Fain et Dabert, 2002	<i>Rynchops flavirostris</i>	Laridae	Charadriiformes	Africa	Bochkov et al. 2002
“	<i>Rynchops niger</i>	Laridae	Charadriiformes	North America	Bochkov et al. 2002
<i>Species inquirrenda</i>					
<i>Cheletopsis magnanima</i> Oudemans, 1904	<i>Tringa flavipes</i>	Scolopacidae	Charadriiformes	South America	Oudemans 1904; Bochkov et al. 2002
<i>Picocheyletus</i> Bochkov et OConnor, 2003					
<i>Picocheyletus tricholaemae</i> Bochkov et OConnor, 2003	<i>Tricholaema hirsuta</i>	Lybiidae	Piciformes	South America	Bochkov and OConnor 2003
<i>Eucheletopsis</i> Volgin, 1969					
<i>Eucheletopsis major</i> Trouessart, 1893	<i>Hemiprocne mystacea</i>	Hemiprocnidae	Apodiformes	Australasia	Trouessart 1893; Oudemans 1906
Harpirhynchidae Dubinin, 1957					
Harpirhynchinae Dubinin, 1957					
<i>Harpirhynchus</i> Megnin, 1877					
<i>Harpirhynchus nidulans</i> (Nitzsch, 1818)	<i>Chloris chloris</i>	Fringillidae	Passeriformes	Europe, North America	Nitzsch 1818; Fain 1995; Moss 1979
“	<i>Coccothraustes coccothraustes</i>	Fringillidae	Passeriformes	Europe, North America	Fritsch 1954; Literak et al. 2005; Moss 1979
“	<i>Fringilla coelebs</i>	Fringillidae	Passeriformes	Europe	Fritsch 1954
“	<i>Corvus corone</i>	Corvidae	Passeriformes	Unknown locality	Moss 1979
“	<i>Locustella lanceolata</i>	Locustellidae	Passeriformes	North America	Moss 1979
<i>Harpirhynchus galeridae</i> Fain, Bochkov et Mironov, 1999	<i>Galerida cristata</i>	Alaudidae	Passeriformes	Asia	Moss 1979; Fain et al. 1999
“	<i>Alauda arvensis</i>	Alaudidae	Passeriformes	Unknown locality	Moss 1979
<i>Harpirhynchus dusbabeki</i> Bochkov et Literak, 2006	<i>Panurus biarmicus</i>	Panuridae	Passeriformes	Europe	Henry et al. 2004; Literak et al. 2005; Bochkov and Literak 2006
<i>Harpirhynchus quasimodo</i> Bochkov et Mertins, 2010	<i>Molothrus ater</i>	Icteridae	Passeriformes	North America	Bochkov and Mertins 2010
<i>Harpyrhynchoides</i> Fain, 1972					
<i>Harpyrhynchoides squamosus</i> (Fain, 1972)	<i>Psittacula cyanocephala</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1994

<i>Harpyrhynchoides kakatoe</i> (Fain, 1972)	<i>Cacatua</i> sp.	Cacatuidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1994
“	<i>Cacatua galerita</i>	Cacatuidae	Psittaciformes	Australia	Domrow 1991
<i>Harpyrhynchoides psittaculae</i> (Fain, 1972)	<i>Psittacula alexandri</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1994
“	<i>Psittacula cyanocephala</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1994
<i>Harpyrhynchoides psittaci</i> Fain, 1972	<i>Psittacus erithacus</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1994
“	<i>Poicephalus senegalus</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1994
<i>Harpyrhynchoides amazonae</i> (Fain, 1972)	<i>Amazona aestiva</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1994
<i>Harpyrhynchoides lawrencei</i> (Fain, 1972)	<i>Nandayus nenday</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1994
<i>Harpyrhynchoides rosellacinus</i> (Lawrence, 1959)	<i>Platycercus eximius</i>	Psittacidae	Psittaciformes	Australia	Lawrence 1959c
“	<i>Glossopsitta concinna</i>	Psittacidae	Psittaciformes	Australia	Domrow 1991
“	<i>Trichoglossus chlorolepidotus</i>	Psittacidae	Psittaciformes	Australia	Filippich and Domrow 1985; Domrow 1991
“	<i>Trichoglossus haematodus moluccanus</i>	Psittacidae	Psittaciformes	Australia	Domrow 1991
“	<i>Lathamus discolor</i>	Psittacidae	Psittaciformes	Australia	Fain 1994b
<i>Harpyrhynchoides metropeliae</i> (Fain, 1972)	<i>Metriopelia ceciliae</i>	Columbidae	Columbiformes	European Zoo (captive)	Fain 1972, 1994
<i>Harpyrhynchoides modestus</i> (Fain, 1976)	<i>Metriopelia ceciliae</i>	Columbidae	Columbiformes	European Zoo (captive)	Fain 1972, 1994
<i>Harpyrhynchoides capitatus</i> (Fain, 1976)	<i>Columbina talpacoti</i>	Columbidae	Columbiformes	European Zoo (captive)	Fain 1972, 1994
<i>Harpyrhynchoides coxatus</i> Fain, 1972	<i>Columbina talpacoti</i>	Columbidae	Columbiformes	European Zoo (captive)	Fain 1972, 1994
“	<i>Columbina cruziana</i>	Columbidae	Columbiformes	European Zoo (captive)	Fain 1972, 1994
“	<i>Columbina squammata</i>	Columbidae	Columbiformes	European Zoo (captive)	Fain 1972, 1994
<i>Harpyrhynchoides columbae</i> (Fain, 1972)	<i>Columba livia</i>	Columbidae	Columbiformes	Europe	Fain 1972, 1994
“	<i>Columba palumbus</i>	Columbidae	Columbiformes	Europe	Fain 1972, 1994
<i>Harpyrhynchoides oenae</i> (Fain, 1972)	<i>Oena capensis</i>	Columbidae	Columbiformes	European Zoo (captive)	Fain 1972, 1994
<i>Harpyrhynchoides oenae lamorali</i> (Fain, 1972)	<i>Turtur tympanistria</i>	Columbidae	Columbiformes	European Zoo (captive)	Fain 1972, 1994
<i>Harpyrhynchoides coturnix</i> Fain, 1972	<i>Coturnix delegorguei</i>	Phasianidae	Galliformes	European Zoo (captive)	Fain 1972, 1994
<i>Harpyrhynchoides alectoris</i> (Fain, 1972)	<i>Alectoris graeca</i>	Phasianidae	Galliformes	European Zoo (captive)	Fain 1972, 1994
“	<i>Alectoris rufa</i>	Phasianidae	Galliformes	Europe	Fain et al. 1999
<i>Harpyrhynchoides numidae</i> Lawrence, 1959	<i>Numida meleagris</i>	Numididae	Galliformes	Africa	Lawrence 1959b
<i>Harpyrhynchoides capellae</i> (Fritsch, 1954)	<i>Gallinago gallinago</i>	Scolopacidae	Charadriiformes	Europe	Fritsch 1954

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<i>Harpyrhynchoides capellae</i> (Fritsch, 1954)	<i>Lymnocryptes minimus</i>	Scolopacidae	Charadriiformes	Europe	Fain et al. 1999
<i>Harpyrhynchoides herodias</i> (Boyd, 1968)	<i>Ardea herodias</i>	Ardeidae	Pelecaniformes	North America	Boyd 1968
“	<i>Ardea cinerea</i>	Ardeidae	Pelecaniformes	Europe	Fain 1994b
“	<i>Butorides virescens</i>	Ardeidae	Pelecaniformes	North America	Boyd 1968
<i>Harpyrhynchoides leptoptilus</i> (Fain, 1976)	<i>Leptoptilos crumeniferus</i>	Ciconiidae	Ciconiiformes	European Zoo (captive)	Fain 1972, 1994
<i>Harpyrhynchoides tracheatus</i> (Fritsch, 1954)	<i>Buteo buteo</i>	Accipitridae	Accipitriiformes	Europe	Fritsch 1954; Fain 1994b
<i>Harpyrhynchoides tyto</i> (Fain, 1972)	<i>Tyto alba</i>	Tytonidae	Strigiformes	Europe	Fain 1972, 1994
<i>Harpyrhynchoides asio</i> (Fain, 1972)	<i>Asio otus</i>	Strigidae	Strigiformes	Europe	Fain 1972, 1994
<i>Harpyrhynchoides anatum</i> (Fain, 1976)	<i>Anas querquedula</i>	Anatidae	Anseriformes	European Zoo (captive)	Fain 1972, 1994
<i>Harpyrhynchoides cristagalli</i> (Berlese et Trouessart, 1889)	<i>Colius striatus</i>	Coliidae	Coliiformes	Africa	Berlese and Trouessart 1889; Lawrence 1959c
“	<i>Colius colius</i>	Coliidae	Coliiformes	Africa	Fain 1994b
<i>Harpyrhynchoides zumpti</i> (Fain, 1972)	<i>Eremopterix leucotis</i>	Alaudidae	Passeriformes	Africa	Fain 1972, 1994
“	<i>Junco hyemalis</i>	Emberizidae	Passeriformes	North America	Bochkov and Galloway 2004
“	<i>Diuca diuca</i>	Emberizidae	Passeriformes	European Zoo (captive)	Fain 1972, 1994
“	<i>Quiscalus quiscula</i>	Icteridae	Passeriformes	North America	Bochkov and Galloway 2001
<i>Harpyrhynchoides alaudinus</i> Bochkov, 2000	<i>Alauda arvensis</i>	Alaudidae	Passeriformes	Europe	Megnin 1877; Oudemans 1939; Bochkov 2000a
<i>Harpyrhynchoides rubeculinus</i> (Cerny et Sixl, 1971)	<i>Erithacus rubecula</i>	Muscicapidae	Passeriformes	Europe	Cerny and Sixl 1971; Fain et al. 1999; Bochkov and Literak 2008
<i>Harpyrhynchoides kirgizorum</i> Fain, Bochkov et Mironov, 1999	<i>Rhodospiza obsoleta</i>	Fringillidae	Passeriformes	Asia	Fain et al. 1999
<i>Harpyrhynchoides vulgaris</i> Bochkov et Galloway, 2004	<i>Carpodacus purpureus</i>	Fringillidae	Passeriformes	North America	Bochkov and Galloway 2004
“	<i>Setophaga ruticilla</i>	Parulidae	Passeriformes	North America	Bochkov and Galloway 2004
<i>Harpyrhynchoides parazumpti</i> Fain, Bochkov et Mironov, 1999	<i>Corvus monedula</i>	Corvidae	Passeriformes	Europe	Fain et al. 1999
<i>Harpyrhynchoides pectinifer</i> (Lawrence, 1959)	<i>Campethera abingoni</i>	Picidae	Piciformes	Africa	Lawrence 1959a
“	<i>Campethera cailliauti</i>	Picidae	Piciformes	Africa	Fain 1994b
<i>Harpyrhynchoides vercammeni</i> (Lawrence, 1959)	<i>Centropus grillii</i>	Cuculidae	Cuculiformes	Africa	Lawrence 1959a

<i>Harpyrhynchoides (Pseudoharpyrhynchus)</i> Fain, Bochkov et Mironov, 1999					
<i>Harpyrhynchoides agapornis</i> (Fain, 1972)	<i>Agapornis roseicollis</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1972, 1994
“	<i>Agapornis pullarius</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1994b
“	<i>Agapornis nigrigenis</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1994b
<i>Harpyrhynchoides cylindripalpus</i> (Fritsch, 1954)	<i>Fringilla coelebs</i>	Fringillidae	Passeriformes	Europe	Fritsch 1954
“	<i>Passerina ciris</i>	Cardinalidae	Passeriformes	European Zoo (captive)	Fain 1994b
<i>Harpyrhynchoides</i> sp.	<i>Puffinus gravis</i>	Procellariidae	Procellariiformes	North America	Foster et al. 1996
<i>Neharpyrhynchus</i> Fain, 1972					
<i>Neharpyrhynchus plumaris</i> (Fritsch, 1954)	<i>Fringilla coelebs</i>	Fringillidae	Passeriformes	Europe	Fritsch 1954; Martinu et al. 2008; Bochkov 2000b
“	<i>Muscicapa striata</i>	Muscicapidae	Passeriformes	Europe	Fritsch 1954
<i>Neharpyrhynchus baile</i> Bochkov, Literak et Capek, 2007	<i>Turdus leucomelas</i>	Turdidae	Passeriformes	South America	Bochkov et al. 2007
<i>Neharpyrhynchus turdi</i> Martinu, Dusbabek et Literak, 2008	<i>Turdus merula</i>	Turdidae	Passeriformes	Europe	Martinu et al. 2008
<i>Neharpyrhynchus chlorospingus</i> Bochkov et Literak, 2011	<i>Chlorospingus pileatus</i>	Emberizidae	Passeriformes	South America	Bochkov and Literak 2011
<i>Neharpyrhynchus hippolae</i> Bochkov, 2000	<i>Hippolais icterina</i>	Acrocephalidae	Passeriformes	Europe	Bochkov 2000b
<i>Neharpyrhynchus mironovi</i> Bochkov et Literak, 2011	<i>Dacnis cayana</i>	Thraupidae	Passeriformes	South America	Bochkov and Literak 2011
<i>Neharpyrhynchus tangara</i> Bochkov et Literak, 2011	<i>Tangara cayana</i>	Thraupidae	Passeriformes	South America	Bochkov and Literak 2011
“	<i>Thraupis episcopus</i>	Thraupidae	Passeriformes	South America	Literak et al. 2012
<i>Neharpyrhynchus novoplumaris</i> (Moss, Oliver et Nelson, 1968)	<i>Certhia familiaris</i>	Certhiidae	Passeriformes	North America	Moss et al. 1968
“	<i>Cardinalis cardinalis</i>	Cardinalidae	Passeriformes	North America	Moss et al. 1968
“	<i>Campylorhynchus brunneicapillus</i>	Troglodytidae	Passeriformes	North America	Moss 1979
“	<i>Spizella passerina</i>	Emberizidae	Passeriformes	North America	Moss 1979
“	<i>Amphispiza bilineata</i>	Emberizidae	Passeriformes	North America	Moss 1979
“	<i>Melospiza fusca</i>	Emberizidae	Passeriformes	North America	Moss 1979
<i>Neharpyrhynchus pari</i> Martinu, Dusbabek et Literak, 2008	<i>Parus major</i>	Paridae	Passeriformes	Europe	Martinu et al. 2008
“	<i>Cyanistes caeruleus</i>	Paridae	Passeriformes	Europe	Martinu et al. 2008

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<i>Neharpyrhynchus pari</i> Martinu, Dusbabek et Literak, 2008	<i>Poecile montanus</i>	Paridae	Passeriformes	Europe	Martinu et al. 2008
“	<i>Poecile palustris</i>	Paridae	Passeriformes	Europe	Moss 1979; Martinu et al. 2008
“	<i>Baeolophus bicolor</i>	Paridae	Passeriformes	North America	Moss 1979
<i>Neharpyrhynchus pilirostris</i> (Berlese et Trouessart, 1889)	<i>Passer domesticus</i>	Passeridae	Passeriformes	Europe, Africa, North America	Berlese and Trouessart 1889; Fritsch 1954; Lawrence 1959a; Fain 1995; Martinu et al. 2008
“	<i>Aegithalos caudatus</i>	Aegithalidae	Passeriformes	Unknown locality	Moss 1979
<i>Neharpyrhynchus schoenobaenus</i> Martinu, Dusbabek et Literak, 2008	<i>Acrocephalus schoenobaenus</i>	Acrocephalidae	Passeriformes	Europe	Martinu et al. 2008
<i>Neharpyrhynchus spinus</i> Martinu, Dusbabek et Literak, 2008	<i>Spinus spinus</i>	Fringillidae	Passeriformes	Europe	Martinu et al. 2008
“	<i>Carduelis cannabina</i>	Fringillidae	Passeriformes	Europe	Fritsch 1954
<i>Neharpyrhynchus trochilinus</i> (Fain, 1972)	Hummingbird	Trochilidae	Apodiformes	South America	Fain 1972, 1995
“	<i>Chrysolampis mosquitus</i>	Trochilidae	Apodiformes	South America	Fain 1995
“	<i>Panterpe insignis</i>	Trochilidae	Apodiformes	South America	Bochkov and Literak 2011
“	<i>Eugenes fulgens</i>	Trochilidae	Apodiformes	South America	Bochkov and Literak 2011
“	<i>Amazilia lactea</i>	Trochilidae	Apodiformes	South America	Bochkov and Literak 2011; Literak et al. 2012
“	<i>Amazilia chionogaster</i>	Trochilidae	Apodiformes	South America	Literak et al. 2012
<i>Metharpyrhynchus</i> Fain, 1972					
<i>Metharpyrhynchus macrohallus</i> Fain, 1972	<i>Lonchura oryzivora</i>	Estrildidae	Passeriformes	European Zoo (captive)	Fain 1972, 1995
<i>Metharpyrhynchus macrohallus</i> Fain, 1972	<i>Lonchura oryzivora</i>	Estrildidae	Passeriformes	European Zoo (captive)	Fain 1972, 1995
<i>Metharpyrhynchus mossi</i> Fain, 1995	<i>Prinia subflava</i>	Cisticolidae	Passeriformes	Africa	Fain 1995
<i>Metharpyrhynchus namibiensis</i> Fain, 1995	<i>Philetairus socius</i>	Ploceidae	Passeriformes	Africa	Fain 1995
<i>Metharpyrhynchoides jynx</i> Fain, 1972	<i>Jynx ruficollis</i>	Picidae	Piciformes	Africa	Fain 1995
<i>Perharpyrhynchus</i> Fain, 1972					
<i>Perharpyrhynchus jacana</i> Fain, 1972	<i>Jacana spinosa intermedia</i>	Jacanidae	Charadrii- formes	European Zoo (captive)	Fain 1972, 1995
<i>Perharpyrhynchus recurvirostra</i> Fain, 1976	<i>Recurvirostra avosetta</i>	Recurvirostridae	Charadrii- formes	European Zoo (captive)	Fain 1976, 1995
<i>Ralliharpirhynchus</i> Fain, 1972					

<i>Ralliharpirhynchus porphyrio</i> (Fain, 1972)	<i>Porphyrio porphyrio</i>	Rallidae	Gruiformes	European Zoo (captive)	Fain 1972, 1995
<i>Ralliharpirhynchus limnocorax</i> (Fain, 1972)	<i>Amaurornis flavirostra</i>	Rallidae	Gruiformes	Africa	Fain 1972, 1995
<i>Harpyrhynchiella</i> Fain, 1972					
<i>Harpyrhynchiella reductus</i> (Fritsch, 1954)	<i>Apus apus</i>	Apodidae	Apodiformes	Europe	Fritsch 1954; Fain 1972, 1995
<i>Cypsharpirhynchus</i> Fain, 1995					
<i>Cypsharpirhynchus cypsiuri</i> (Fain, 1972)	<i>Cypsiurus parvus</i>	Apodidae	Apodiformes	Africa	Fain 1972, 1995
“	<i>Apus affinis</i>	Apodidae	Apodiformes	Africa	Fain 1972, 1995
<i>Anharpyrhynchus</i> Fain, 1972					
<i>Anharpyrhynchus monstrosus</i> (Fritsch, 1954)	<i>Garrulus glandarius</i>	Corvidae	Passeriformes	Europe	Fritsch 1954; Fain 1972, 1995
“	<i>Corvus monedula</i>	Corvidae	Passeriformes	Unknown locality	Moss 1979
“	<i>Cyanocitta cristata</i>	Corvidae	Passeriformes	Unknown locality	Moss 1979
“	<i>Cyanocitta stelleri</i>	Corvidae	Passeriformes	Unknown locality	Moss 1979
“	<i>Phylidonyris novaehollandiae</i>	Meliphagidae	Passeriformes	Unknown locality	Moss 1979
“	<i>Cissomela pectoralis</i>	Meliphagidae	Passeriformes	Unknown locality	Moss 1979
“	<i>Manorina flavigula</i>	Meliphagidae	Passeriformes	Unknown locality	Moss 1979
“	<i>Lichmera indistincta</i>	Meliphagidae	Passeriformes	Unknown locality	Moss 1979
“	<i>Colaptes auratus</i>	Picidae	Piciformes	Unknown locality	Moss 1979
<i>Trichorhynchiella</i> Fain, 1995					
<i>Trichorhynchiella paddae</i> Fain, 1995	<i>Lonchura oryzivora</i>	Estrildidae	Passeriformes	European Zoo (captive)	Fain 1995
Harpyalpinae Fain, 1972					
<i>Harpyalpus</i> Dubinin, 1957					
<i>Harpyalpus holopus</i> (Berlese et Trouessart, 1889)	<i>Passer domesticus</i>	Passeridae	Passeriformes	Europe	Berlese and Trouessart 1889; Berlese 1894; Fain 1972; Fain 1999
“	<i>Luscinia svecica</i>	Muscicapidae	Passeriformes	Unknown locality	Moss 1979
<i>Harpyalpus longipis</i> (Fritsch, 1954)	<i>Troglodytis troglodytis</i>	Troglodytidae	Passeriformes	Europe	Fritsch 1954
“	<i>Parus major</i>	Paridae	Passeriformes	Europe	Moss 1979; Skoracki et al. 2004
“	<i>Cyanistes caeruleus</i>	Paridae	Passeriformes	Unknown locality	Moss 1979
“	<i>Spinus spinus</i>	Fringillidae	Passeriformes	Unknown locality	Moss 1979
“	<i>Pyrrhula pyrrhula</i>	Fringillidae	Passeriformes	Unknown locality	Moss 1979
“	<i>Nucifraga caryocatactes</i>	Corvidae	Passeriformes	Unknown locality	Moss 1979

Appendix

<i>Harpypalpus serini</i> Fain, 1972	<i>Serinus mozambicus</i>	Fringillidae	Passeriformes	European Zoo (captive)	Fain 1972; Fain et al. 1999
<i>Harpypalpus dubinini</i> Fain, 1972	<i>Ploceus intermedius</i>	Ploceidae	Passeriformes	European Zoo (captive)	Fain 1972; Fain et al. 1999
<i>Harpypalpus tiarae</i> Fain, Bochkov et Mironov, 1999	<i>Tiaris canorus</i>	Emberizidae	Passeriformes	European Zoo (captive)	Fain et al. 1999
<i>Harpypalpus spermestes</i> Fain, Bochkov et Mironov, 1999	<i>Spermestes cucullatus</i>	Estrildidae	Passeriformes	Africa	Fain et al. 1999
<i>Harpypalpoides</i> Lombert et Moss, 1983					
<i>Harpypalpoides lukoschusi</i> Lombert et Moss, 1983	<i>Turdus merula</i>	Turdidae	Passeriformes	Europe	Lombert and Moss 1983; Skoracki et al. 2004
<i>Harpypalpoides lesickii</i> Skoracki, Bochkov et Sikora, 2004	<i>Coccothraustes coccothraustes</i>	Fringillidae	Passeriformes	Europe	Skoracki et al. 2004
<i>Harpypalpoides hirundinus</i> (Fain, 1972)	<i>Psalidoprocne</i> sp.	Hirundinidae	Passeriformes	Africa	Fain 1972; Fain et al. 1999
<i>Harpypalpoides namibiensis</i> Fain, Bochkov et Mironov, 1999	<i>Emberiza impetuani</i>	Emberizidae	Passeriformes	Africa	Fain 1999
<i>Species inquirenda</i>					
<i>Harpirhynchus brevis</i> Ewing, 1911	<i>Coccothraustes vespertinus</i>	Fringillidae	Passeriformes	North America	Ewing 1911
<i>Harpirhynchus longipilus</i> Banks, 1905	<i>Loxia</i> sp.	Fringillidae	Passeriformes	North America	Banks 1905
Cloacaridae Camin, Moss, Oliver et Singer, 1967					
Pneumophaginae Fain et Smiley, 1989					
<i>Pneumophagus</i> Fain et Smiley, 1989					
<i>Pneumophagus bubonis</i> Fain et Smiley, 1989	<i>Bubo virginianus</i>	Strigidae	Strigiformes	North America	Fain and Smiley 1989
Syringophilidae Lavoipierre, 1953					
Syringophilinae Lavoipierre, 1953					
<i>Apodisyngiana</i> Skoracki, 2005					
<i>Apodisyngiana haszprunari</i> Skoracki, 2005	<i>Hemiprocne comata</i>	Hemiprocnidae	Apodiformes	Asia	Skoracki 2005a
<i>Apodisyngiana mystaceae</i> Skoracki, 2005	<i>Hemiprocne mystacea</i>	Hemiprocnidae	Apodiformes	Australia	Skoracki 2005a
<i>Apodisyngophilus</i> Skoracki et OConnor, 2010					
<i>Apodisyngophilus collocalius</i> Skoracki et OConnor, 2010	<i>Collocalia esculenta</i>	Apodidae	Apodiformes	Asia	Skoracki and OConnor 2010
<i>Ascetomylla</i> Kethley, 1970					
<i>Ascetomylla gallinula</i> Kethley, 1970	<i>Gallinula chloropus</i>	Rallidae	Gruiformes	Africa	Kethley 1970
<i>Ascetomylla porzanae</i> (Bochkov et Galloway, 2004)	<i>Porzana carolina</i>	Rallidae	Gruiformes	North America	Bochkov and Galloway 2004
<i>Aulobia</i> Kethley, 1970					

<i>Aulobia anthreptes</i> Skoracki et Glowska, 2008	<i>Anthreptes malacensis</i>	Nectariniidae	Passeriformes	Asia	Skoracki and Glowska 2008b
<i>Aulobia cardueli</i> Skoracki, Hendricks et Spicer, 2010	<i>Carduelis psaltria</i>	Fringillidae	Passeriformes	North America	Skoracki et al. 2010a
“	<i>Carduelis carduelis</i>	Fringillidae	Passeriformes	Europe	Skoracki 2011
“	<i>Carduelis spinus</i>	Fringillidae	Passeriformes	Europe, Asia	Skoracki and Bochkov 2010
“	<i>Carduelis flamea</i>	Fringillidae	Passeriformes	Europe	Skoracki 2011
“	<i>Carduelis citrinella</i>	Fringillidae	Passeriformes	Europe	Skoracki 2011
“	<i>Carduelis flavirostris</i>	Fringillidae	Passeriformes	Europe	Skoracki 2011
<i>Aulobia cisticolae</i> Skoracki et Sikora, 2003	<i>Cisticola erythrops</i>	Cisticolidae	Passeriformes	Africa	Skoracki and Sikora 2003
“	<i>Cisticola cantans</i>	Cisticolidae	Passeriformes	Africa	Skoracki and Sikora 2003
“	<i>Cisticola lateralis</i>	Cisticolidae	Passeriformes	Africa	Skoracki and Sikora 2003
“	<i>Cisticola chubbi</i>	Cisticolidae	Passeriformes	Africa	Skoracki et al. 2009a
<i>Aulobia dendroicae</i> Kethley, 1970	<i>Setophaga coronata</i>	Parulidae	Passeriformes	North America	Kethley 1970
“	<i>Setophaga nigrescens</i>	Parulidae	Passeriformes	North America	Skoracki et al. 2010a
<i>Aulobia erythroptera</i> Skoracki et Dabert, 2001	<i>Prinia erythroptera</i>	Cisticolidae	Passeriformes	Africa	Skoracki and Dabert 2001a
<i>Aulobia leucostictus</i> Skoracki, 2011	<i>Leucosticte arctoa</i>	Fringillidae	Passeriformes	Europe	Skoracki 2011
<i>Aulobia nectariniae</i> Skoracki et Glowska, 2008	<i>Cinnyris jugularis</i>	Nectariniidae	Passeriformes	Australia	Skoracki and Glowska 2008b
“	<i>Leptocoma sericea</i>	Nectariniidae	Passeriformes	Australia	Skoracki and Glowska 2008b
<i>Aulobia stachyris</i> (Bochkov, Mironov et Skoracki, 2001)	<i>Stachyridopsis pyrrhops</i>	Timaliidae	Passeriformes	Asia	Bochkov et al. 2001
<i>Aulobia sylviae</i> Bochkov et Mironov, 1998	<i>Sylvia curruca</i>	Sylviidae	Passeriformes	Europe, Asia	Bochkov and Mironov 1998; Glowska et al. 2007; Skoracki and Bochkov 2010
“	<i>Sylvia atricapilla</i>	Sylviidae	Passeriformes	Europe	Bochkov and Mironov 1998
“	<i>Sylvia nisoria</i>	Sylviidae	Passeriformes	Europe	Skoracki 2011
<i>Aulobia sylviettae</i> (Fain, Bochkov et Mironov, 2000)	<i>Sylvietta whytti</i>	Macrosphenidae	Passeriformes	Africa	Fain et al. 2000
<i>Aulobia virens</i> Skoracki et Dabert, 2001	<i>Sylvietta virens flaviventris</i>	Macrosphenidae	Passeriformes	Africa	Skoracki and Dabert 2001a
<i>Aulonastus</i> Kethley, 1970					
<i>Aulonastus albus</i> Skoracki, 2002	<i>Motacilla alba</i>	Motacillidae	Passeriformes	Europe	Skoracki 2002a
<i>Aulonastus anthus</i> Skoracki, 2011	<i>Anthus trivialis</i>	Motacillidae	Passeriformes	Europe	Skoracki 2011

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<i>Aulonastus anthus</i> Skoracki, 2011	<i>Anthus cervinus</i>	Motacillidae	Passeriformes	Europe	Skoracki 2011
<i>Aulonastus emberizicus</i> Skoracki, Hendricks et Spicer, 2010	<i>Ammodramus savannarum</i>	Emberizidae	Passeriformes	North America	Skoracki et al. 2010b
“	<i>Zonotrichia atricapilla</i>	Emberizidae	Passeriformes	North America	Skoracki et al. 2010b
“	<i>Passerculus sandwichensis</i>	Emberizidae	Passeriformes	North America	Skoracki et al. 2010b
<i>Aulonastus euphagus</i> Skoracki, Hendricks et Spicer, 2010	<i>Euphagus cyanocephalus</i>	Icteridae	Passeriformes	North America	Skoracki et al. 2010b
<i>Aulonastus fringillus</i> Skoracki, 2011	<i>Fringilla coelebs</i>	Fringillidae	Passeriformes	Europe	Skoracki 2011
<i>Aulonastus henicorhina</i> Sikora et Skoracki, 2012	<i>Henicorhina leucosticta</i>	Troglodytidae	Passeriformes	South America	Sikora et al. 2012
<i>Aulonastus lanius</i> Skoracki, 2011	<i>Lanius senator</i>	Laniidae	Passeriformes	Europe	Skoracki 2011
<i>Aulonastus loxius</i> Skoracki, 2011	<i>Loxia curvirostra</i>	Fringillidae	Passeriformes	Europe	Skoracki 2011
<i>Aulonastus lusciniiae</i> Skoracki, 2002	<i>Luscinia luscinia</i>	Muscicapidae	Passeriformes	Europe	Skoracki 2002a
<i>Aulonastus pipili</i> Kethley, 1970	<i>Pipilo erythrophthalmus</i>	Emberizidae	Passeriformes	North America	Kethley 1970
<i>Aulonastus pirangus</i> Skoracki, Hendricks et Spicer, 2010	<i>Piranga ludoviciana</i>	Cardinalidae	Passeriformes	North America	Skoracki et al. 2010b
<i>Aulonastus prunellae</i> Bochkov et Mironov, 1999	<i>Prunella modularis</i>	Prunellidae	Passeriformes	Europe	Bochkov and Mironov 1999
<i>Aulonastus sturnellus</i> Skoracki, Hendricks et Spicer, 2010	<i>Sturnella magna</i>	Icteridae	Passeriformes	North America	Skoracki et al. 2010b
<i>Betasyringophiloidus</i> Skoracki, 2011					
<i>Betasyringophiloidus motacillae</i> (Bochkov et Mironov, 1998)	<i>Motacilla flava</i>	Motacillidae	Passeriformes	Europe	Bochkov and Mironov 1998
<i>Betasyringophiloidus phoenicurus</i> Skoracki, 2011	<i>Phoenicurus ochruros</i>	Muscicapidae	Passeriformes	Europe	Skoracki 2011
<i>Betasyringophiloidus saxicolus</i> Skoracki, 2011	<i>Saxicola rubetra</i>	Muscicapidae	Passeriformes	Europe	Skoracki 2011
<i>Betasyringophiloidus schoenicius</i> (Skoracki, 2002)	<i>Emberiza schoenicius</i>	Emberizidae	Passeriformes	Europe, Asia	Skoracki 2002b, 2004a, 2011; Skoracki and Bochkov 2010
<i>Blaszakia</i> Skoracki et Sikora, 2008					
<i>Blaszakia tauracos</i> Skoracki et Sikora, 2008	<i>Tauraco livingstoni</i>	Musophagidae	Cuculiformes	Africa	Skoracki and Sikora 2008
“	<i>Tauraco schalowi</i>	Musophagidae	Cuculiformes	Africa	Skoracki and Sikora 2008
<i>Blaszakia rossae</i> Skoracki et Sikora, 2008	<i>Musophaga rossae</i>	Musophagidae	Cuculiformes	Africa	Skoracki and Sikora 2008
<i>Bochkovia</i> Skoracki et OConnor, 2010					
<i>Bochkovia phalaropi</i> Skoracki et OConnor, 2010	<i>Phalaropus fulicarius</i>	Scolopacidae	Charadrii- formes	North America	Skoracki and OConnor 2010

<i>Bubophilus</i> Philips et Norton, 1978					
<i>Bubophilus ascalaphus</i> Philips et Norton, 1978	<i>Bubo virginianus</i>	Strigidae	Strigiformes	North America	Philips and Norton 1978
“	<i>Bubo africanus</i>	Strigidae	Strigiformes	Africa	Skoracki and Dabert 2002
“	<i>Tyto alba affinis</i>	Tytonidae	Strigiformes	Africa	Skoracki and Dabert 2002
<i>Bubophilus asiobius</i> Skoracki et Bochkov, 2002	<i>Asio otus</i>	Strigidae	Strigiformes	Europe	Skoracki and Bochkov 2002
<i>Bubophilus aluconis</i> Nattress et Skoracki, 2009	<i>Strix aluco</i>	Strigidae	Strigiformes	Europe	Nattress and Skoracki 2009
“	<i>Asio otus</i>	Strigidae	Strigiformes	Europe	Skoracki et al. 2012a
<i>Castosyringophilus</i> Bochkov et Perez, 2002					
<i>Castosyringophilus claravis</i> Skoracki et Glowska, 2008	<i>Claravis pretiosa</i>	Columbidae	Columbiformes	South America	Skoracki and Glowska 2008a
<i>Castosyringophilus forpi</i> Bochkov et Perez, 2002	<i>Forpus cyanopygius</i>	Psittacidae	Psittaciformes	North America	Bochkov and Perez 2002
<i>Castosyringophilus mucuya</i> (Casto, 1980)	<i>Columbina passerina</i>	Columbidae	Columbiformes	North America	Casto 1980a; Bochkov and Perez 2002
“	<i>Columbina squammata</i>	Columbidae	Columbiformes	South America	Bochkov and Fain 2003
“	<i>Columbina talpacoti</i>	Columbidae	Columbiformes	South America	Skoracki and Glowska 2008a
“	<i>Geophaps plumifera</i>	Columbidae	Columbiformes	Australia	Bochkov and Fain 2003
“	<i>Metriopelia melanoptera</i>	Columbidae	Columbiformes	South America	Skoracki and Glowska 2008a
“	<i>Streptopelia decaocto</i>	Columbidae	Columbiformes	Asia	Glowska et al. 2007
“	<i>Brotogeris versicolurus</i>	Psittacidae	Psittaciformes	South America	Bochkov and Fain 2003
“	<i>Trichoglossus haematodus</i>	Psittacidae	Psittaciformes	Asia	Bochkov and Fain 2003
“	<i>Psilopsiagon aymara</i>	Psittacidae	Psittaciformes	South America	Bochkov and Fain 2003
<i>Charadriphilus</i> Bochkov et Chystiakov, 2001					
<i>Charadriphilus gallinago</i> (Bochkov et Mironov, 1998)	<i>Gallinago gallinago</i>	Scolopacidae	Charadriiformes	Europe	Bochkov and Mironov, 1998; Skoracki et al. 2006
<i>Charadriphilus lyudmilae</i> Bochkov et Chystiakov, 2001	<i>Scolopax rusticola</i>	Scolopacidae	Charadriiformes	Europe	Bochkov and Chystiakov 2001
<i>Charadriphilus paraguayae</i> (Skoracki et Sikora, 2002)	<i>Gallinago paraguayae</i>	Scolopacidae	Charadriiformes	South America	Skoracki and Sikora 2002
<i>Charadriphilus ralli</i> Skoracki et Bochkov, 2010	<i>Rallus aquaticus</i>	Rallidae	Gruiformes	Asia	Skoracki and Bochkov 2010
<i>Charadriphilus vanelli</i> Bochkov, Fain et Skoracki, 2004	<i>Vanellus chilensis</i>	Charadriidae	Charadriiformes	South America	Bochkov et al. 2004

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<i>Chenophila</i> Kethley, 1970					
<i>Chenophila branta</i> Kethley, 1970	<i>Branta canadensis</i>	Anatidae	Anseriformes	North America	Kethley 1970
<i>Chenophila kanduli</i> Bochkov, 1998	<i>Anas querquedula</i>	Anatidae	Anseriformes	Europe	Bochkov and Mironov 1998
<i>Ciconichenophilus</i> Skoracki et OConnor, 2010					
<i>Ciconichenophilus phoeniconaias</i> Skoracki et OConnor, 2010	<i>Phoenicopterus minor</i>	Phoenicopteridae	Phoenicopteriformes	Africa	Skoracki and OConnor 2010
<i>Colinophilus</i> Kethley, 1973					
<i>Colinophilus wilsoni</i> Kethley, 1973	<i>Colinus virginianus</i>	Odontophoridae	Galliformes	North America	Kethley 1973
“	<i>Callipepla squamata</i>	Odontophoridae	Galliformes	North America	Casto 1976
<i>Corvitorotrogulus</i> Skoracki et Bochkov, 2010					
<i>Corvitorotrogulus alpha</i> Skoracki et Bochkov, 2010	<i>Corvus frugilegus</i>	Corvidae	Passeriformes	Asia	Skoracki and Bochkov 2010
<i>Creagonycha</i> Kethley, 1970					
<i>Creagonycha lara</i> Kethley, 1970	<i>Larus delawarensis</i>	Laridae	Charadriiformes	North America	Kethley 1970
<i>Creagonycha sterna</i> Kivganov, 1995	<i>Sterna albifrons</i>	Laridae	Charadriiformes	Europe	Kivganov and Sharafat 1995
<i>Creagonycha totani</i> (Oudemans, 1904)	<i>Tringa totanus</i>	Scolopacidae	Charadriiformes	Europe	Oudemans 1904,1906;
“	<i>Tringa glareola</i>	Scolopacidae	Charadriiformes	Europe	Skoracki et al. 2006
“	<i>Calidris temminckii</i>	Scolopacidae	Charadriiformes	Africa, Europe	Skoracki and Dabert 2002; Skoracki et al. 2006
“	<i>Calidris himantopus</i>	Scolopacidae	Charadriiformes	North America	Skoracki et al. 2006
“	<i>Calidris minuta</i>	Scolopacidae	Charadriiformes	Europe, Asia	Bochkov and Mironov 1998; Skoracki et al. 2006
<i>Crotophagisyriingophilus</i> Skoracki, 2008					
<i>Crotophagisyriingophilus io</i> Skoracki, 2008	<i>Crotophaga ani</i>	Cuculidae	Cuculiformes	South America	Skoracki, 2008b
<i>Cuculisyriingophilus</i> Skoracki, 2008					
<i>Cuculisyriingophilus crotophaginus</i> Skoracki, 2008	<i>Guira guira</i>	Cuculidae	Cuculiformes	South America	Skoracki 2008a
“	<i>Crotophaga sulcirostris</i>	Cuculidae	Cuculiformes	North and South America	Skoracki 2008a
<i>Cuculisyriingophilus chirovi</i> (Bochkov et Mironov, 1998)	<i>Cuculus canorus</i>	Cuculidae	Cuculiformes	Asia	Bochkov and Mironov 1998
<i>Fritschisyriingophilus</i> Bochkov, Fain et Skoracki, 2004					
<i>Fritschisyriingophilus lonchurae</i> Bochkov, Fain et Skoracki, 2004	<i>Lonchura punctulata</i>	Estrildidae	Passeriformes	Asia	Bochkov et al. 2004
<i>Galliphilopsis</i> Skoracki et Sikora, 2004					
<i>Galliphilopsis bochkovi</i> Skoracki et Sikora, 2004	<i>Tragopan</i> sp.	Phasianidae	Galliformes	Asia	Skoracki and Sikora 2004b

<i>Galliphilopsis colinus</i> Skoracki et Sikora, 2011	<i>Colinus cristatus</i>	Odontophoridae	Galliformes	South America	Skoracki and Sikora 2011
<i>Galliphilopsis francolinus</i> Skoracki et Sikora, 2004	<i>Francolinus levaillantoides</i>	Phasianidae	Galliformes	South Africa	Skoracki and Sikora 2004b
<i>Galliphilopsis lophurus</i> Skoracki et Sikora, 2004	<i>Lophura leucomelanos</i>	Phasianidae	Galliformes	Asia	Skoracki and Sikora 2004b
<i>Galliphilopsis szeptyckii</i> Skoracki et Sikora, 2011	<i>Coturnix pectoralis</i>	Phasianidae	Galliformes	Australia	Skoracki and Sikora 2011
“	<i>Coturnix coturnix</i>	Phasianidae	Galliformes	Asia	Skoracki and Sikora 2011
“	<i>Coturnix chinensis</i>	Phasianidae	Galliformes	Asia	Skoracki and Sikora 2011
“	<i>Alectoris barbara</i>	Phasianidae	Galliformes	Europe	Skoracki and Sikora 2011
<i>Kalamotrypetes</i> Casto, 1980					
<i>Kalamotrypetes colinastes</i> Casto, 1980	<i>Colinus virginianus</i>	Odontophoridae	Galliformes	North America	Casto 1980b
<i>Kalamotrypetes cracidus</i> Skoracki et Sikora, 2011	<i>Penelope sp.</i>	Cracidae	Galliformes	South America	Skoracki and Sikora 2011
<i>Kethleyana</i> Kivganov, 1995					
<i>Kethleyana gelochelidoni</i> Kivganov, 1995	<i>Gelochelidon nilotica</i>	Laridae	Charadriiformes	Europe	Kivganov and Sharafat 1995
<i>Krantziaulonastus</i> Skoracki, 2011					
<i>Krantziaulonastus buczekae</i> (Skoracki, 2002)	<i>Sturnus vulgaris</i>	Sturnidae	Passeriformes	Europe	Skoracki 2002a, 2011
<i>Krantziaulonastus galbulicus</i> (Skoracki, 2008)	<i>Jacamaralecyon tridactyla</i>	Galbulidae	Galbuliformes	South America	Skoracki 2008c
<i>Krantziaulonastus oryzivorus</i> Skoracki, 2011	<i>Lonchura oryzivora</i>	Estrildidae	Passeriformes	Asia	Skoracki 2011
<i>Krantziaulonastus lonchurus</i> Skoracki, 2011	<i>Lonchura punctulata</i>	Estrildidae	Passeriformes	Asia	Skoracki 2011
<i>Krantziaulonastus yoyomi</i> Glowska et Skoracki, 2011	<i>Dinemellia dinemelli</i>	Ploceidae	Passeriformes	Africa	Glowska and Skoracki 2011b
<i>Megasyringophilus</i> Fain, Bochkov et Mironov, 2000					
<i>Megasyringophilus aquilus</i> Skoracki, Lontkowski et Stawarczyk, 2010	<i>Aquila rapax</i>	Accipitridae	Accipitriformes	Africa	Skoracki et al. 2010d
“	<i>Aquila pomarina</i>	Accipitridae	Accipitriformes	Europe	Skoracki et al. 2010d
“	<i>Accipiter nisus</i>	Accipitridae	Accipitriformes	Asia	Skoracki and Bochkov 2010
<i>Megasyringophilus cyanocephala</i> Fain, Bochkov et Mironov, 2000	<i>Psittacula cyanocephala</i>	Psittacidae	Psittaciformes	Asia	Fain et al. 2000
“	<i>Psittacula eupatria</i>	Psittacidae	Psittaciformes	Asia	Bochkov and Fain 2003
“	<i>Psittacula krameri</i>	Psittacidae	Psittaciformes	Asia	Bochkov and Fain 2003

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<i>Megasyringophilus dubinini</i> Bochkov et Fain, 2003	<i>Trichoglossus ornatus</i>	Psittacidae	Psittaciformes	Asia	Bochkov and Fain 2003
<i>Megasyringophilus eos</i> Skoracki, 2005	<i>Eos bornea</i>	Psittacidae	Psittaciformes	Asia	Skoracki 2005c
<i>Megasyringophilus geoffroyus</i> Skoracki, 2005	<i>Geoffroyus geoffroyi</i>	Psittacidae	Psittaciformes	Australia	Skoracki 2005c
<i>Megasyringophilus kethleyi</i> Fain, Bochkov et Mironov, 2000	<i>Aratinga jandaya</i>	Psittacidae	Psittaciformes	South America	Fain et al. 2000
“	<i>Aratinga pertinax</i>	Psittacidae	Psittaciformes	South America	Bochkov and Fain 2003
“	<i>Brotogeris versicolurus</i>	Psittacidae	Psittaciformes	South America	Bochkov and Fain 2003
<i>Megasyringophilus platycercus</i> Bochkov et Fain, 2003	<i>Platycercus eximius</i>	Psittacidae	Psittaciformes	Australia	Bochkov and Fain 2003
<i>Megasyringophilus rhynchopsittae</i> Bochkov et Perez, 2002	<i>Rhynchopsitta pachyrhyncha</i>	Psittacidae	Psittaciformes	North America	Bochkov and Perez, 2002
<i>Megasyringophilus trichoglossus</i> Fain, Bochkov et Mironov, 2000	<i>Trichoglossus</i> sp.	Psittacidae	Psittaciformes	South America	Fain et al. 2000
“	<i>Trichoglossus euteles</i>	Psittacidae	Psittaciformes	Asia	Skoracki 2005c
“	<i>Trichoglossus chlorolepidotus</i>	Psittacidae	Psittaciformes	Australia	Skoracki 2005c
<i>Meitingsunes</i> Glowska et Skoracki, 2010					
<i>Meitingsunes aldwelli</i> Glowska et Skoracki, 2010	<i>Geotrygon frenata</i>	Columbidae	Columbiformes	South America	Glowska and Skoracki 2010
<i>Meitingsunes columbicus</i> Skoracki, 2011	<i>Columba oenas</i>	Columbidae	Columbiformes	Asia	Skoracki 2011
“	<i>Columba livia</i>	Columbidae	Columbiformes	Europe	
“	<i>Columba palumbus</i>	Columbidae	Columbiformes	Europe	
<i>Meitingsunes zenadourae</i> (Clark, 1964)	<i>Zenaida macroura</i>	Columbidae	Columbiformes	North America	Clark 1964b
“	<i>Zenaida asiatica</i>	Columbidae	Columbiformes	North America	Casto 1976
“	<i>Zenaida auriculata</i>	Columbidae	Columbiformes	South America	Skoracki and Sikora 2002
“	<i>Columba livia</i>	Columbidae	Columbiformes	North America, Africa	Casto 1976 Bochkov and Mironov 1998
<i>Meitingsunes tympanistris</i> Skoracki et Dabert, 2002	<i>Turtur tympanistris</i>	Columbidae	Columbiformes	Africa	Skoracki and Dabert 2002
<i>Mironovia</i> Chirov et Kravtsova, 1995					
<i>Mironovia phasiani</i> Chirov et Kravtsova, 1995	<i>Phasianus colchicus</i>	Phasianidae	Galliformes	Asia	Chirov and Kravtsova 1995
<i>Mironovia coturnae</i> Bochkov, Fain et Skoracki, 2004	<i>Coturnix coturnix</i>	Phasianidae	Galliformes	Europe	Bochkov et al. 2004
<i>Mironovia rouloul</i> Skoracki et Sikora, 2004	<i>Rollulus rouloul</i>	Phasianidae	Galliformes	Asia	Skoracki and Sikora 2004b

<i>Mironovia lagopus</i> Bochkov et Skirnisson, 2011	<i>Lagopus muta</i>	Phasianidae	Galliformes	Europe	Bochkov and Skirnisson 2011
“	<i>Lagopus lagopus</i>	Phasianidae	Galliformes	Europe	Skoracki and Sikora 2011
<i>Neoaulobia</i> Fain, Bochkov et Mironov, 2000					
<i>Neoaulobia agapornis</i> Fain, Bochkov et Mironov, 2000	<i>Agapornis nigrigenis</i>	Psittacidae	Psittaciformes	Africa	Fain et al. 2000
“	<i>Agapornis fischeri</i>	Psittacidae	Psittaciformes	Africa	Bochkov and Fain 2003
“	<i>Agapornis personatus</i>	Psittacidae	Psittaciformes	Africa	Bochkov and Fain 2003
“	<i>Agapornis roseicollis</i>	Psittacidae	Psittaciformes	Africa	Bochkov and Fain 2003
“	<i>Agapornis taranta</i>	Psittacidae	Psittaciformes	Africa	Bochkov and Fain 2003
<i>Neoaulobia aratingae</i> Fain, Bochkov et Mironov, 2000	<i>Aratinga jandaya</i>	Psittacidae	Psittaciformes	South America	Fain et al. 2000
<i>Neoaulobia krafti</i> Skoracki, 2005	<i>Cacatua tenuirostris</i>	Cacatuidae	Psittaciformes	Australia	Skoracki 2005c
<i>Neoaulobia mexicana</i> Bochkov et Perez, 2002	<i>Aratinga canicularis</i>	Psittacidae	Psittaciformes	North America	Bochkov and Perez 2002
“	<i>Aratinga pertinax</i>	Psittacidae	Psittaciformes	South America	Bochkov and Fain 2003
<i>Neoaulobia mironovi</i> Bochkov et Perez, 2002	<i>Amazona finschi</i>	Psittacidae	Psittaciformes	North America	Bochkov and Perez 2002
<i>Neoaulobia psittaculae</i> Fain, Bochkov et Mironov, 2000	<i>Psittacula cyanocephala</i>	Psittacidae	Psittaciformes	Asia	Fain et al. 2000
<i>Neoaulobia puylaerti</i> (Skoracki et Dabert, 1999)	<i>Poicephalus senegalus versteri</i>	Psittacidae	Psittaciformes	Africa	Skoracki and Dabert 1999b
“	<i>Loriculus pusillus</i>	Psittacidae	Psittaciformes	Asia	Skoracki 2005c
“	<i>Loriculus philippens</i>	Psittacidae	Psittaciformes	Asia	Skoracki 2005c
<i>Neoaulonastus</i> Skoracki, 2004					
<i>Neoaulonastus aegithalos</i> Skoracki, 2011	<i>Aegithalos caudatus</i>	Aegithalidae	Passeriformes	Europe	Skoracki 2011
<i>Neoaulonastus bisetatus</i> (Fritsch, 1958)	<i>Sylvia communis</i>	Sylviidae	Passeriformes	Europe	Fritsch 1958; Skoracki 2011
“	<i>Sylvia curruca</i>	Sylviidae	Passeriformes	Europe, Asia	Skoracki 2011
“	<i>Sylvia atricapilla</i>	Sylviidae	Passeriformes	Europe	Skoracki 2011
“	<i>Acrocephalus scirpaceus</i>	Acrocephalidae	Passeriformes	Europe	Skoracki 1999a
“	<i>Acrocephalus paludicola</i>	Acrocephalidae	Passeriformes	Europe	Skoracki 2011
“	<i>Acrocephalus dumetorum</i>	Acrocephalidae	Passeriformes	Asia	Skoracki 2011
“	<i>Acrocephalus arundinaceus</i>	Acrocephalidae	Passeriformes	Europe	Skoracki 2011
“	<i>Acrocephalus palustris</i>	Acrocephalidae	Passeriformes	Africa	Skoracki et al. 2011b
<i>Neoaulonastus caligatus</i> Skoracki, 2011	<i>Hippolais caligata</i>	Acrocephalidae	Passeriformes	Europe	Skoracki 2011

Appendix

<i>Neoaulonastus chrysocolaptes</i> Skoracki et OConnor, 2010	<i>Chrysocolaptes lucidus</i>	Picidae	Piciformes	Asia	Skoracki and OConnor 2010
<i>Neoaulonastus picidus</i> Skoracki, 2011	<i>Picus canus</i>	Picidae	Piciformes	Europe	Skoracki 2011
“	<i>Dendrocopos leucotos</i>	Picidae	Piciformes	Europe	Skoracki 2011
“	<i>Dendrocopos major</i>	Picidae	Piciformes	Europe	Skoracki 2011
<i>Neoaulonastus remizus</i> Skoracki, 2011	<i>Remiz pendulinus</i>	Remizidae	Passeriformes	Europe	Skoracki 2011
<i>Neoaulonastus riparius</i> Skoracki, 2011	<i>Riparia riparia</i>	Hirundinidae	Passeriformes	Europe	Skoracki 2011
<i>Neoaulonastus zosterops</i> Skoracki, Antczak et Riegert, 2009	<i>Zosterops senegalensis</i>	Zosteropidae	Passeriformes	Africa	Skoracki et al. 2009a
<i>Neoperisterophila</i> Skoracki, 2005					
<i>Neoperisterophila regiusi</i> Skoracki, 2005	<i>Cicinnurus regius</i>	Paradisaeidae	Passeriformes	Australia	Skoracki 2005b
<i>Neosyringophilopsis</i> Skoracki et Sikora, 2005					
<i>Neosyringophilopsis acanthizus</i> Skoracki et Sikora, 2005	<i>Acanthiza inornata</i>	Acanthizidae	Passeriformes	Australia	Skoracki and Sikora 2005
<i>Neosyringophilopsis aegithali</i> (Bochkov, Mironov et Skoracki, 2001)	<i>Aegithalos caudatus</i>	Aegithalidae	Passeriformes	Europe	Bochkov et al. 2001; Skoracki 2004b; Nattress and Skoracki 2009
<i>Neosyringophilopsis garrulaxi</i> (Bochkov, Mironov et Skoracki, 2001)	<i>Garrulax affinis</i>	Leiothrichidae	Passeriformes	Asia	Bochkov et al. 2001
<i>Neosyringophilopsis locustellus</i> (Skoracki, 2004)	<i>Locustella naevia</i>	Locustellidae	Passeriformes	Europe	Skoracki 2004b
“	<i>Locustella luscinioides</i>	Locustellidae	Passeriformes	Europe	Skoracki 2004b
<i>Neosyringophilopsis lonchurus</i> Skoracki, 2008	<i>Spermestes cucullatus</i>	Estrildidae	Passeriformes	Africa	Skoracki 2008c
<i>Neosyringophilopsis phylloscopi</i> (Bochkov, Mironov et Skoracki, 2001)	<i>Phylloscopus collybita</i>	Phylloscopidae	Passeriformes	Europe	Bochkov et al. 2001
“	<i>Phylloscopus trochilus</i>	Phylloscopidae	Passeriformes	Europe	Skoracki 2004b
<i>Neosyringophilopsis troglodytis</i> (Fritsch, 1958)	<i>Troglodytes troglodytes</i>	Troglodytidae	Passeriformes	Europe	Fritsch 1958; Nattress and Skoracki 2007
“	<i>Troglodytes aedon</i>	Troglodytidae	Passeriformes	North America	Bochkov and Galloway 2001
<i>Niglarobia</i> Kethley, 1970					
<i>Niglarobia cursoriae</i> Skoracki, Dabert et Schmaschke, 2006	<i>Cursorius temminckii</i>	Glareolidae	Charadriiformes	Africa	Skoracki et al. 2006
<i>Niglarobia ereuneti</i> Kethley, 1970	<i>Calidris pusilla</i>	Scolopacidae	Charadriiformes	North America	Kethley 1970

<i>Niglarobia helleri</i> (Oudemans, 1904)	<i>Tringa ochropus</i>	Scolopacidae	Charadrii- formes	Europe	Oudemans 1904, 1906; Kethley 1970
	<i>Tringa flavipes</i>	Scolopacidae	Charadrii- formes	South America	Skoracki and Sikora 2002
	<i>Tringa stagnatilis</i>	Scolopacidae	Charadrii- formes	Europe	Skoracki et al. 2006
	<i>Arenaria interpres</i>	Scolopacidae	Charadrii- formes	North America	Skoracki et al. 2006
<i>Niglarobia rhinoptili</i> Fain, Bochkov et Mironov, 2000	<i>Smutsornis africanus</i>	Glareolidae	Charadrii- formes	Africa	Fain et al. 2000
<i>Niglarobia trouessarti</i> (Oudemans, 1904)	<i>Aramus guarauna</i>	Aramidae	Gruiformes	South America	Oudemans 1904, 1906; Kethley 1970
<i>Paraniglarobia</i> Skoracki, 2011					
<i>Paraniglarobia skorackii</i> (Bochkov et Galloway, 2004)	<i>Tringa melanoleuca</i>	Scolopacidae	Charadrii- formes	North America	Bochkov and Galloway 2004
<i>Paraniglarobia calidridis</i> (Bochkov et Mironov, 1998)	<i>Calidris minuta</i>	Scolopacidae	Charadrii- formes	Asia	Bochkov and Mironov 1998
<i>Peristerophila</i> Kethley, 1970					
<i>Peristerophila accip- itridicus</i> Skoracki, Lontkowski et Stawarc- zyk, 2010	<i>Accipiter nisus</i>	Accipitridae	Accipitri- formes	Asia	Skoracki and Bochkov 2010
“	<i>Terathopius ECAUDATUS</i>	Accipitridae	Accipitri- formes	Africa	Skoracki et al. 2010d
<i>Peristerophila columbae</i> (Hirst, 1920)	<i>Columba livia</i>	Columbidae	Columbif- formes	North America, Europe, Asia	Kethley 1970 Bochkov and Mironov 1998; Nattress and Skoracki 2009; Skoracki 2011
“	<i>Zenaidura auriculata</i>	Columbidae	Columbif- formes	South America	Skoracki and Sikora 2002
“	<i>Buteo jamaicensis</i>	Accipitridae	Accipitri- formes	North America	Casto 1976
<i>Phalarophilus</i> Skoracki, Bochkov et OConnor, 2011					
<i>Phalarophilus fulcarius</i> Skoracki, Bochkov et OConnor, 2011	<i>Phalaropus fulcarius</i>	Scolopacidae	Charadrii- formes	North America	Skoracki et al. 2011c
<i>Philoxanthorhea</i> Kethley, 1970					
<i>Philoxanthorhea anoa</i> Kethley, 1970	<i>Anous tenuirostris</i>	Laridae	Charadrii- formes	North America	Kethley 1970
<i>Philoxanthorhea clarki</i> Kivganov, 1995	<i>Sternula albifrons</i>	Laridae	Charadrii- formes	Europe	Kivganov and Sharafat 1995
“	<i>Sterna hirundo</i>	Laridae	Charadrii- formes	Europe	Skoracki et al. 2006
“	<i>Larus canus</i>	Laridae	Charadrii- formes	Europe	Bochkov and Mironov 1998
<i>Philoxanthorhea dubinini</i> Bochkov et Mironov, 1998	<i>Gelochelidon nilotica</i>	Laridae	Charadrii- formes	Asia	Bochkov and Mironov 1998
“	<i>Chlidonias leucopterus</i>	Laridae	Charadrii- formes	Africa	Skoracki et al. 2006

Appendix

<i>Picisyringophilus</i> Skoracki et OConnor, 2010					
<i>Picisyringophilus kratos</i> Skoracki et OConnor, 2010	<i>Picoides pubescens</i>	Picidae	Piciformes	North America	Skoracki and OConnor 2010
<i>Procellariisyringophilus</i> (Kethley, 1970)					
<i>Procellariisyringophilus bulwerius</i> (Kethley, 1970)	<i>Bulweria bulwerii</i>	Procellariidae	Procellariiformes	North America	Kethley 1970
<i>Psittaciphilus</i> Fain, Bochkov et Mironov, 2000					
<i>Psittaciphilus amazonae</i> Fain, Bochkov et Mironov, 2000	<i>Amazona amazonica</i>	Psittacidae	Psittaciformes	South America	Fain et al. 2000
“	<i>Amazona aestiva</i>	Psittacidae	Psittaciformes	South America	Bochkov and Fain 2003
<i>Psittaciphilus fritschi</i> Fain, Bochkov et Mironov, 2000	<i>unidentified parrot</i>	Psittacidae	Psittaciformes	unknown locality	Fain et al. 2000
<i>Pteroclidisyringophilus</i> Skoracki, 2011					
<i>Pteroclidisyringophilus re</i> (Skoracki et OConnor, 2010)	<i>Pterocles senegallus</i>	Pteroclididae	Pterocliiformes	Africa	Skoracki and OConnor 2010
<i>Selenonycha</i> Kethley, 1970					
<i>Selenonycha baltoda</i> Kethley, 1970	<i>Charadrius wilsonia</i>	Charadriidae	Charadriiformes	North America	Kethley 1970
<i>Selenonycha chardriiformicus</i> Skoracki, 2011	<i>Larus genei</i>	Laridae	Charadriiformes	Africa	Skoracki 2011
“	<i>Charadrius placidus</i>	Charadriidae	Charadriiformes	Asia	Skoracki 2011
“	<i>Chroicocephalus ridibundus</i>	Laridae	Charadriiformes	Europe	Skoracki 2011
“	<i>Philomachus pugnax</i>	Scolopacidae	Charadriiformes	Europe	Skoracki 2011
<i>Stibarokris</i> Kethley, 1970					
<i>Stibarokris dastychi</i> Glowska et Skoracki, 2011	<i>Phalacrocorax carbo</i>	Phalacrocoracidae	Suliformes	unknown locality	Glowska and Skoracki 2011a
<i>Stibarokris langei</i> Bochkov et Mironov, 1999	<i>Ciconia ciconia</i>	Ciconiidae	Ciconiiformes	Europe	Bochkov and Mironov 1999; Skoracki 2011
<i>Stibarokris phalacrus</i> Kethley, 1970	<i>Phalacrocorax auritus</i>	Phalacrocoracidae	Suliformes	North America	Kethley 1970
<i>Stibarokris phoeniconias</i> Skoracki et OConnor, 2010	<i>Phoenicopterus minor</i>	Phoenicopteridae	Phoenicopteriformes	Africa	Skoracki and OConnor 2010
“	<i>Phoenicopterus ruber</i>	Phoenicopteridae	Phoenicopteriformes	European Zoo (captive)	Glowska and Skoracki 2011a
<i>Syringophiloidus</i> Kethley, 1970					
<i>Syringophiloidus agelaius</i> Bochkov, Skoracki, Hendricks et Spicer, 2011	<i>Agelaius phoeniceus</i>	Icteridae	Passeriformes	North America	Bochkov et al. 2011
<i>Syringophiloidus artamus</i> Skoracki, 2004	<i>Artamus leucorhynchus</i>	Artamidae	Passeriformes	Asia	Skoracki 2004a
“	<i>Artamus fuscus</i>	Artamidae	Passeriformes	unknown	Skoracki 2004a
<i>Syringophiloidus bombycillae</i> Skoracki, 2002	<i>Bombycilla garrulus</i>	Bombycillidae	Passeriformes	Europe	Skoracki 2002b; Skoracki 2004a

<i>Syringophiloidus carolae</i> Skoracki, Flannery et Spicer, 2009	<i>Cardinalis cardinalis</i>	Cardinalidae	Passeriformes	North America	Skoracki et al. 2009b
“	<i>Melanerpes formicivorus</i>	Picidae	Piciformes	North America	Skoracki et al. 2009b
<i>Syringophiloidus carpodaci</i> Bochkov et Apanaskevich, 2001	<i>Carpodacus erythrinus</i>	Fringillidae	Passeriformes	Europe, Asia	Bochkov and Apanaskevich 2001; Skoracki 2011
<i>Syringophiloidus coccothraustes</i> Skoracki, 2011	<i>Coccothraustes coccothraustes</i>	Fringillidae	Passeriformes	Europe	Skoracki 2011
<i>Syringophiloidus cypsiuri</i> Fain, Bochkov et Mironov, 2000	<i>Cypsiurus parvus</i>	Apodidae	Apodiformes	Africa	Fain et al. 2000
<i>Syringophiloidus daberti</i> Bochkov, Fain et Skoracki, 2004	<i>Passerina ciris</i>	Cardinalidae	Passeriformes	North America	Bochkov et al. 2004
<i>Syringophiloidus delichonum</i> Bochkov, 2001	<i>Delichon urbicum</i>	Hirundinidae	Passeriformes	Europe	Bochkov 2001
<i>Syringophiloidus dendrocittae</i> Fain, Bochkov et Mironov, 2000	<i>Dendrocitta vagabunda</i>	Corvidae	Passeriformes	Asia	Fain et al. 2000
<i>Syringophiloidus erythrurus</i> Skoracki, 2004	<i>Erythrura trichroa</i>	Estrildidae	Passeriformes	Europe	Skoracki 2004a
<i>Syringophiloidus glandarii</i> (Fritsch, 1958)	<i>Garrulus glandarius</i>	Corviidae	Passeriformes	Europe	Fritsch 1958; Bochkov 2001
“	<i>Pica pica</i>	Corviidae	Passeriformes	Asia	Skoracki 2004a
“	<i>Corvus monedula</i>	Corviidae	Passeriformes	Asia	Skoracki and Bochkov 2010
“	<i>Corvus frugilegus</i>	Corviidae	Passeriformes	Asia	Skoracki and Bochkov 2010
<i>Syringophiloidus graculae</i> Fain, Bochkov et Mironov, 2000	<i>Gracula religiosa</i>	Sturnidae	Passeriformes	Asia	Fain et al. 2000
<i>Syringophiloidus hirundinis</i> Skoracki, Moller et Tryjanowski, 2003	<i>Hirundo rustica</i>	Hirundinidae	Passeriformes	Europe	Skoracki et al. 2003
<i>Syringophiloidus jackowiaki</i> Bochkov, Skoracki, Hendricks et Spicer, 2011	<i>Poecile carolinensis</i>	Paridae	Passeriformes	North America	Bochkov et al. 2011
<i>Syringophiloidus klimovi</i> Skoracki et Bochkov, 2010	<i>Chloris chloris</i>	Fringillidae	Passeriformes	Asia	Skoracki and Bochkov 2010
<i>Syringophiloidus microcerculus</i> Sikora et Skoracki, 2012	<i>Microcerculus marginatus</i>	Troglodytidae	Passeriformes	South America	Sikora et al. 2012
<i>Syringophiloidus minor</i> (Berlese, 1887)	<i>Passer domesticus</i>	Passeridae	Passeriformes	North America, Europe, Asia	Kethley 1970; Skoracki 2011
“	<i>Passer hispaniolensis</i>	Passeridae	Passeriformes	Asia	Glowska et al. 2007
“	<i>Passer montanus</i>	Passeridae	Passeriformes	Europe	Bochkov and Mironov 1998

Appendix

<i>Syringophiloidus molothrus</i> Skoracki, Flannery et Spicer, 2009	<i>Molothrus ater</i>	Icteridae	Passeriformes	North America	Skoracki et al. 2009b
<i>Syringophiloidus montanus</i> Skoracki, 2002	<i>Passer montanus</i>	Passeridae	Passeriformes	Europe	Skoracki 2002b
<i>Syringophiloidus oriolus</i> Skoracki, 2004	<i>Oriolus oriolus</i>	Oriolidae	Passeriformes	Europe	Skoracki 2004a
“	<i>Oriolus chinensis</i>	Oriolidae	Passeriformes	Asia	Skoracki 2011
<i>Syringophiloidus parapresentalis</i> Skoracki, 2011	<i>Turdus merula</i>	Turdidae	Passeriformes	Europe, Asia	Skoracki 2011
“	<i>Turdus pilaris</i>	Turdidae	Passeriformes	Europe	Skoracki 2011
“	<i>Turdus iliacus</i>	Turdidae	Passeriformes	Europe	Skoracki 2011
“	<i>Turdus atrogularis</i>	Turdidae	Passeriformes	Asia	Skoracki 2011
<i>Syringophiloidus petronicus</i> Skoracki, 2011	<i>Petronia petronia</i>	Passeridae	Passeriformes	Europe	Skoracki 2011
<i>Syringophiloidus philomelosus</i> Skoracki, 2011	<i>Turdus philomelos</i>	Turdidae	Passeriformes	Asia	Skoracki 2011
<i>Syringophiloidus presentalis</i> Chirov et Kravtsova, 1995	<i>Sturnus vulgaris</i>	Sturnidae	Passeriformes	Europe, Asia	Chirov and Kravtsova 1995; Skoracki 2011
<i>Syringophiloidus seiuri</i> (Clark, 1964)	<i>Seiurus aurocapilla</i>	Parulidae	Passeriformes	North America	Clark 1964b; Bochkov and Galloway 2001
“	<i>Helmitheros vermivorum</i>	Parulidae	Passeriformes	North America	Clark 1964b
“	<i>Melospiza melodia</i>	Emberizidae	Passeriformes	North America	Clark 1964b
“	<i>Quelea erythrops</i>	Ploceidae	Passeriformes	Africa	Skoracki and Dabert 2002
“	<i>Ploceus baglafecht</i>	Ploceidae	Passeriformes	Africa	Skoracki and Dabert 2002
“	<i>Ploceus superciliosus</i>	Ploceidae	Passeriformes	Africa	Skoracki and Dabert 2002
“	<i>Melospiza lincolnii</i>	Emberizidae	Passeriformes	North America	Bochkov et al. 2011
“	<i>Oreothlypis ruficapilla</i>	Parulidae	Passeriformes	North America	Bochkov et al. 2011
<i>Syringophiloidus serini</i> Bochkov, Fain et Skoracki, 2004	<i>Serinus mozambicus</i>	Fringillidae	Passeriformes	Africa	Bochkov et al. 2004
<i>Syringophiloidus sialius</i> Skoracki, Flannery et Spicer, 2009	<i>Sialia mexicana</i>	Turdidae	Passeriformes	North America	Skoracki et al. 2009b
“	<i>Spizella breweri</i>	Emberizidae	Passeriformes	North America	Bochkov et al. 2011
<i>Syringophiloidus stawarczyki</i> Skoracki, 2004	<i>Euphonia cyanocephala</i>	Fringillidae	Passeriformes	South America	Skoracki 2004a
<i>Syringophiloidus tarnii</i> Skoracki et Sikora, 2002	<i>Pteroptochos tarnii</i>	Rhinocryptidae	Passeriformes	South America	Skoracki and Sikora 2002
<i>Syringophiloidus thryothorus</i> Skoracki, Flannery et Spicer, 2009	<i>Thryothorus ludovicianus</i>	Troglodytidae	Passeriformes	North America	Skoracki et al. 2009b

<i>Syringophiloidus weiszii</i> Skoracki, Hromada et Tryjanowski, 2001	<i>Lanius excubitor</i>	Laniidae	Passeriformes	Europe	Skoracki et al. 2001b
<i>Syringophiloidus xanthocephalus</i> Bochkov, Skoracki, Hendricks et Spicer, 2011	<i>Xanthocephalus xanthocephalus</i>	Icteridae	Passeriformes	North America	Bochkov et al. 2011
<i>Syringophiloidus zonorichia</i> Bochkov, Skoracki, Hendricks et Spicer, 2011	<i>Zonorichia albicollis</i>	Emberizidae	Passeriformes	North America	Bochkov et al. 2011
<i>Syringophilopsis</i> Kethley, 1970					
<i>Syringophilopsis acrocephali</i> Skoracki, 1999	<i>Acrocephalus scirpaceus</i>	Acrocephalidae	Passeriformes	Europe	Skoracki 1999a
“	<i>Acrocephalus schoenobaenus</i>	Acrocephalidae	Passeriformes	Europe, Africa	Skoracki 2011
“	<i>Acrocephalus palustris</i>	Acrocephalidae	Passeriformes	Europe	Skoracki 2011
<i>Syringophilopsis albicollis</i> Skoracki et Dabert, 2000	<i>Merops albicollis</i>	Meropidae	Coraciiformes	Africa	Skoracki and Dabert 2000
<i>Syringophilopsis blaszaki</i> Skoracki et Dabert, 1999	<i>Anthus trivialis</i>	Motacillidae	Passeriformes	Europe	Skoracki and Dabert 1999a Bochkov and Galloway 2001
<i>Syringophilopsis borini</i> Bochkov et Mironov, 1999	<i>Sylvia borin</i>	Sylviidae	Passeriformes	Europe, Asia	Bochkov and Mironov 1999; Skoracki 2004b, 2011
<i>Syringophilopsis caligatus</i> Skoracki, 2011	<i>Hippolais caligata</i>	Acrocephalidae	Passeriformes	Europe	Skoracki 2011
<i>Syringophilopsis certhiae</i> Skoracki, Hendricks et Spicer, 2011	<i>Certhia americana</i>	Certhiidae	Passeriformes	North America	Skoracki et al. 2011a
<i>Syringophilopsis corvinae</i> Skoracki et Sikora, 2003	<i>Corvinella corvina</i>	Laniidae	Passeriformes	Africa	Skoracki and Sikora 2003
<i>Syringophilopsis dendroicae</i> Bochkov et Galloway, 2001	<i>Setophaga coronata</i>	Parulidae	Passeriformes	North America	Bochkov and Galloway 2001
“	<i>Setophaga graciae</i>	Parulidae	Passeriformes	North America	Skoracki et al. 2008
“	<i>Cardellina pusilla</i>	Parulidae	Passeriformes	North America	Skoracki et al. 2008
<i>Syringophilopsis dicruri</i> Skoracki, Hromada et Wamiti, 2011	<i>Dicrurus adsimilis</i>	Dicruridae	Passeriformes	Africa	Skoracki et al. 2011b
<i>Syringophilopsis elongatus</i> (Ewing, 1911)	<i>Agelaius phoeniceus</i>	Icteridae	Passeriformes	North America	Kethley 1970
“	<i>Euphagus carolinus</i>	Icteridae	Passeriformes	North America	Clark 1964b
“	<i>Euphagus cyanocephalus</i>	Icteridae	Passeriformes	North America	Skoracki et al. 2008
“	<i>Quiscalus mexicanus</i>	Icteridae	Passeriformes	North America	Casto 1976

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<i>Syringophilopsis elongatus</i> (Ewing, 1911)	<i>Quiscalus quiscula</i>	Icteridae	Passeriformes	North America	Clark 1964b Bochkov and Galloway 2001
“	<i>Pheucticus melanocephalus</i>	Cardinalidae	Passeriformes	North America	Casto 1976
<i>Syringophilopsis emberizae</i> Fain, Bochkov et Mironov, 2000	<i>Sicalis luteola</i>	Emberizidae	Passeriformes	Africa	Fain et al. 2000
<i>Syringophilopsis empidonax</i> Skoracki, Flannery et Spicer, 2008	<i>Empidonax hammondi</i>	Tyrannidae	Passeriformes	North America	Skoracki et al. 2008
“	<i>Empidonax wrightii</i>	Tyrannidae	Passeriformes	North America	Skoracki et al. 2008
<i>Syringophilopsis fringillae</i> (Fritsch, 1958)	<i>Fringilla coelebs</i>	Fringillidae	Passeriformes	Europe, Asia	Fritsch 1958; Bochkov and Mironov 1998; Skoracki 2004b; Skoracki and Bochkov 2010
<i>Syringophilopsis garrulus</i> Skoracki et Dabert, 2002	<i>Garrulus glandarius</i>	Corviidae	Passeriformes	Africa	Skoracki 2011
<i>Syringophilopsis hirundus</i> Skoracki, 2004	<i>Hirundo rustica</i>	Hirundinidae	Passeriformes	Europe, Asia	Skoracki 2004b; Skoracki and Bochkov 2010
<i>Syringophilopsis hylocichlae</i> (Clark, 1964)	<i>Catharus fuscescens</i>	Turdidae	Passeriformes	North America	Clark 1964b
<i>Syringophilopsis icteri</i> Bochkov et Galloway, 2001	<i>Icterus galbula</i>	Icteridae	Passeriformes	North America	Bochkov and Galloway 2001
“	<i>Icterus bullocki</i>	Icteridae	Passeriformes	North America	Skoracki et al. 2011a
<i>Syringophilopsis kazmierski</i> Skoracki, 2004	<i>Ficedula hypoleuca</i>	Muscicapidae	Passeriformes	Europe	Skoracki 2004b; 2011
“	<i>Ficedula parva</i>	Muscicapidae	Passeriformes	Europe	Skoracki 2004b, 2011
“	<i>Phoenicurus phoenicurus</i>	Muscicapidae	Passeriformes	Asia	Glowska et al. 2007
<i>Syringophilopsis kirgizorum</i> Bochkov, Mironov et Kravtsova, 2000	<i>Chloris chloris</i>	Fringillidae	Passeriformes	Europe, Asia	Bochkov et al. 2000; Skoracki 2004b; Nattress and Skoracki 2007; Glowska et al. 2007
“	<i>Carduelis cannabina</i>	Fringillidae	Passeriformes	Asia	Glowska et al. 2007
“	<i>Carduelis carduelis</i>	Fringillidae	Passeriformes	Europe, Asia	Skoracki 2004b; 2011
“	<i>Rhodospiza obsoleta</i>	Fringillidae	Passeriformes	Asia	Bochkov et al. 2000
“	<i>Linurgus olivaceus</i>	Fringillidae	Passeriformes	Africa	Skoracki et al. 2009a
<i>Syringophilopsis kristini</i> Skoracki, Tryjanowski et Hromada, 2002	<i>Lanius minor</i>	Laniidae	Passeriformes	Europe	Skoracki et al. 2002; Skoracki 2011

<i>Syringophilopsis lagonostictus</i> Skoracki et Dabert, 2002	<i>Lagonosticta senegala</i>	Estrildidae	Passeriformes	Africa	Skoracki and Dabert 2002
“	<i>Lagonosticta rufopicta</i>	Estrildidae	Passeriformes	Africa	Skoracki and Dabert 2002
<i>Syringophilopsis melittophagi</i> Skoracki et Dabert, 2001	<i>Merops bulocki</i>	Meropidae	Coraciiformes	Africa	Skoracki and Dabert 2001b
<i>Syringophilopsis mimidus</i> Sikora, Fajfer et Skoracki, 2011	<i>Margarops fuscatus</i>	Mimidae	Passeriformes	North America	Sikora et al. 2011
<i>Syringophilopsis muscicapus</i> Skoracki, 2011	<i>Muscicapa dauurica</i>	Muscicapidae	Passeriformes	Asia	Skoracki 2011
<i>Syringophilopsis nitens</i> Skoracki et Dabert, 2001	<i>Malimbus nitens</i>	Ploceidae	Passeriformes	Africa	Skoracki and Dabert 2001b
“	<i>Quelea erythropus</i>	Ploceidae	Passeriformes	Africa	Skoracki and Sikora 2003
“	<i>Ploceus vitellinus</i>	Ploceidae	Passeriformes	Africa	Skoracki et al. 2011b
<i>Syringophilopsis nucifragus</i> Skoracki, 2011	<i>Nucifraga caryocatactes</i>	Corviidae	Passeriformes	Europe	Skoracki 2011
<i>Syringophilopsis passericus</i> Skoracki, 2011	<i>Passer domesticus</i>	Passeridae	Passeriformes	Asia	Skoracki 2011
<i>Syringophilopsis passerinae</i> (Clark, 1964)	<i>Passerina cyanea</i>	Cardinalidae	Passeriformes	North America	Clark 1964b; Skoracki et al. 2011a
“	<i>Passerina ciris</i>	Cardinalidae	Passeriformes	North America	Skoracki et al. 2011a
<i>Syringophilopsis polioptilus</i> Skoracki, Flannery et Spicer, 2008	<i>Polioptila caerulea</i>	Poliptilidae	Passeriformes	North America	Skoracki et al. 2008
<i>Syringophilopsis rusticus</i> Skoracki, 2004	<i>Hirundo rustica</i>	Hirundinidae	Passeriformes	Europe	Skoracki 2004b
<i>Syringophilopsis sialiae</i> Skoracki, Flannery et Spicer, 2008	<i>Sialia mexicana</i>	Turdidae	Passeriformes	North America	Skoracki et al. 2008
<i>Syringophilopsis sitta</i> Skoracki, Hendricks et Spicer, 2011	<i>Sitta carolinensis</i>	Sittidae	Passeriformes	North America	Skoracki et al. 2011a
<i>Syringophilopsis spinolettus</i> Skoracki, 2004	<i>Anthus spinoletta</i>	Motacillidae	Passeriformes	Europe, Asia	Skoracki 2004b, 2011; Skoracki and Bochkov 2010
<i>Syringophilopsis sturnellus</i> Skoracki, Hendricks et Spicer, 2011	<i>Sturnella neglecta</i>	Icteridae	Passeriformes	North America	Skoracki et al. 2011a
<i>Syringophilopsis sturni</i> Chirov et Kravtsova, 1995	<i>Sturnus vulgaris</i>	Sturnidae	Passeriformes	Europe, Asia	Chirov and Kravtsova 1995; Bochkov and Mironov 1998; Skoracki 2004b, 2011
<i>Syringophilopsis turdi</i> (Fritsch, 1958)	<i>Turdus pilaris</i>	Turdidae	Passeriformes	Europe	Fritsch 1958; Skoracki 2004b

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<i>Syringophilopsis turdi</i> (Fritsch, 1958)	<i>Turdus philomelos</i>	Turdidae	Passeriformes	Europe	Bochkov and Galloway 2001; Skoracki 2004b
“	<i>Turdus atrogularis</i>	Turdidae	Passeriformes	Asia	Skoracki and Bochkov 2010
“	<i>Turdus iliacus</i>	Turdidae	Passeriformes	Europe	Skoracki 2011
“	<i>Turdus migratorius</i>	Turdidae	Passeriformes	North America	Skoracki et al. 2008
“	<i>Turdus albicollis</i>	Turdidae	Passeriformes	South America	Skoracki and Sikora 2003
<i>Syringophilopsis tyranni</i> Bochkov et Galloway, 2004	<i>Tyrannus tyrannus</i>	Tyrannidae	Passeriformes	North America	Bochkov and Galloway 2004
“	<i>Tyrannus verticalis</i>	Tyrannidae	Passeriformes	North America	Skoracki et al. 2008
“	<i>Myiarchus crinitus</i>	Tyrannidae	Passeriformes	North America	Skoracki et al. 2008
“	<i>Myiarchus cinerascens</i>	Tyrannidae	Passeriformes	North America	Skoracki et al. 2008
<i>Syringophilopsis veselovskyi</i> Skoracki, Antczak et Riegert, 2009	<i>Pycnonotus barbatus</i>	Pycnonotidae	Passeriformes	Africa	Skoracki et al. 2009a
“	<i>Chlorocichla flaviventris</i>	Pycnonotidae	Passeriformes	Africa	Skoracki et al. 2011b
“	<i>Eurillas latirostris</i>	Pycnonotidae	Passeriformes	Africa	Skoracki et al. 2011b
<i>Syringophilopsis yosefi</i> Skoracki, Tryjanowski et Hromada, 2002	<i>Lanius</i> sp.	Laniidae	Passeriformes	Africa	Skoracki et al. 2002
<i>Syringophilus</i> Heller, 1880					
<i>Syringophilus bipectinatus</i> Heller, 1880	<i>Gallus gallus</i>	Phasianidae	Galliformes	Worldwide	Skoracki 2011
“	<i>Alectoris rufa</i>	Phasianidae	Galliformes	Europe	Skoracki 2011
“	<i>Ptilopachus petrosus</i>	Phasianidae	Galliformes	Africa	Skoracki and Sikora 2003
<i>Syringophilus numidae</i> Bochkov, 2000	<i>Numida meleagris</i>	Numididae	Galliformes	Africa	Bochkov 2000c
<i>Terratosyringophilus</i> Bochkov et Perez, 2002					
<i>Terratosyringophilus geotrygonus</i> Skoracki et Glowska, 2008	<i>Geotrygon linearis</i>	Columbidae	Columbiformes	South America	Skoracki and Glowska 2008
<i>Terratosyringophilus pioni</i> Bochkov et Perez, 2002	<i>Pionus senilis</i>	Psittacidae	Psittaciformes	North America	Bochkov and Perez 2002
<i>Terratosyringophilus longisoma</i> (Casto, 1979)	<i>Zenaida asiatica</i>	Columbidae	Columbiformes	North America	Casto 1979
“	<i>Zenaida macroura</i>	Columbidae	Columbiformes	North America	Casto 1979
<i>Tinamiphilopsis</i> Skoracki et Sikora, 2004					
<i>Tinamiphilopsis ariconte</i> Skoracki, Sikora et Ozminski, 2012	<i>Rhynchotus rufescens</i>	Tinamidae	Tinamiformes	South America	Skoracki et al. 2012b
“	<i>Nothura boraquira</i>	Tinamidae	Tinamiformes	South America	Skoracki et al. 2012b
“	<i>Nothura minor</i>	Tinamidae	Tinamiformes	South America	Skoracki et al. 2012b

<i>Tinamiphilopsis elegans</i> Skoracki et Sikora, 2004	<i>Eudromia elegans</i>	Tinamidae	Tinamiformes	South America	Skoracki and Sikora, 2004a
<i>Torotroglia</i> Kethley, 1970					
<i>Torotroglia aphelocoma</i> Bochkov, Flannery et Spicer, 2009	<i>Aphelocoma californica</i>	Corvidae	Passeriformes	North America	Bochkov et al. 2009
<i>Torotroglia calcarius</i> Skoracki, 2004	<i>Calcarius lapponicus</i>	Calcariidae	Passeriformes	Europe	Skoracki 2004c
<i>Torotroglia cardinalis</i> Bochkov, Flannery et Spicer, 2009	<i>Cardinalis cardinalis</i>	Cardinalidae	Passeriformes	North America	Bochkov et al. 2009
<i>Torotroglia cardueli</i> Bochkov et Mironov, 1999	<i>Spinus spinus</i>	Fringillidae	Passeriformes	Europe	Bochkov and Mironov 1999; Skoracki 2004c
“	<i>Carduelis cannabina</i>	Fringillidae	Passeriformes	Europe	Skoracki 2004c, 2011
“	<i>Carduelis carduelis</i>	Fringillidae	Passeriformes	Europe	Skoracki 2004c
“	<i>Serinus canaria</i>	Fringillidae	Passeriformes	Europe	Skoracki 2011
“	<i>Loxia curvirostra</i>	Fringillidae	Passeriformes	Europe	Skoracki 2011
“	<i>Loxia leucoptera</i>	Fringillidae	Passeriformes	Europe	Skoracki 2011
“	<i>Loxia pytyopsittacus</i>	Fringillidae	Passeriformes	Europe	Skoracki 2011
<i>Torotroglia coccothraustes</i> Bochkov, Flannery et Spicer, 2009	<i>Coccothraustes vespertinus</i>	Fringillidae	Passeriformes	North America	Bochkov et al. 2009
<i>Torotroglia cyanocitta</i> Bochkov, Flannery et Spicer, 2009	<i>Cyanocitta stelleri</i>	Corvidae	Passeriformes	North America	Bochkov et al. 2009
<i>Torotroglia gaudi</i> Bochkov et Mironov, 1998	<i>Fringilla coelebs</i>	Fringillidae	Passeriformes	Europe	Bochkov and Mironov 1998
“	<i>Fringilla montifringilla</i>	Fringillidae	Passeriformes	Europe	Skoracki 2011
“	<i>Pyrrhula pyrrhula</i>	Fringillidae	Passeriformes	Europe	Skoracki 2011
<i>Torotroglia lullulae</i> Skoracki, Hromada et Kuczynski, 2001	<i>Lullula arborea</i>	Alaudidae	Passeriformes	Europe	Skoracki et al. 2001a
“	<i>Eremophila alpestris</i>	Alaudidae	Passeriformes	Asia	Skoracki 2011
<i>Torotroglia lusciniiae</i> Skoracki, 2004	<i>Luscinia megarhynchos</i>	Muscicapidae	Passeriformes	Europe	Skoracki 2004c
“	<i>Luscinia svecica</i>	Muscicapidae	Passeriformes	Europe	Skoracki 2004c
<i>Torotroglia merulae</i> Skoracki, Dabert et Ehrnsberger, 2000	<i>Turdus merula</i>	Turdidae	Passeriformes	Europe, Asia	Skoracki et al. 2000; Bochkov et al. 2009; Głowska et al. 2007
“	<i>Turdus viscivorus</i>	Turdidae	Passeriformes	Europe	Skoracki 2004c
“	<i>Turdus philomelos</i>	Turdidae	Passeriformes	Europe, Asia	Skoracki 2004c; Głowska et al. 2007
“	<i>Turdus torquatus</i>	Turdidae	Passeriformes	Europe	Skoracki 2011
<i>Torotroglia mima</i> Kethley, 1970	<i>Mimus polyglottos</i>	Mimidae	Passeriformes	North America	Kethley 1970
“	<i>Mimus triurus</i>	Mimidae	Passeriformes	South America	Sikora et al. 2011
“	<i>Mimus patagonicus</i>	Mimidae	Passeriformes	Africa	Sikora et al. 2011

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<i>Torotroglia modularis</i> Nattress et Skoracki, 2007	<i>Prunella modularis</i>	Prunellidae	Passeriformes	Europe	Nattress and Skoracki 2007; Skoracki 2011
<i>Torotroglia piranga</i> Bochkov, Flannery et Spicer, 2009	<i>Piranga ludoviciana</i>	Cardinalidae	Passeriformes	North America	Bochkov et al. 2009
<i>Torotroglia pycnonotus</i> Skoracki, 2011	<i>Pycnonotus xanthopygos</i>	Pycnonotidae	Passeriformes	Asia	Skoracki 2011
<i>Torotroglia rubeculi</i> Skoracki, 2004	<i>Erithacus rubecula</i>	Muscicapidae	Passeriformes	Europe	Skoracki 2004c; Bochkov et al. 2009
<i>Torotroglia villosa</i> (Hancock, 1895)	<i>Phainopepla nitens</i>	Ptiligonatidae	Passeriformes	North America	Kethley 1970
<i>Trypetoptila</i> Kethley, 1970					
<i>Trypetoptila casmerodia</i> Kethley, 1970	<i>Ardea alba</i>	Ardeidae	Pelecaniformes	North America	Kethley 1970
<i>Species inquirenda</i>					
<i>Syringophilopsis hunanensis</i> Liu, 1988	<i>Passer domesticus</i>	Passeridae	Passeriformes	Asia	Liu 1988; Skoracki 2011
Picobiinae Johnston et Kethley, 1973					
<i>Calamincola</i> Casto, 1977					
<i>Calamincola lobata</i> (Casto, 1977)	<i>Crotophaga sulcirostris</i>	Cuculidae	Cuculiformes	North America	Casto 1977
<i>Columbophilus</i> Kivganov et Sharafat, 1995					
<i>Columbophilus alectoris</i> (Fain, Bochkov et Mironov, 2000)	<i>Alectoris</i> sp.	Phasianidae	Galliformes	Africa	Fain et al. 2000; Skoracki 2011
“	<i>Alectoris rufa</i>	Phasianidae	Galliformes	Europe	Skoracki and Sikora 2011
<i>Columbophilus khush-alkhani</i> Kivganov et Sharafat, 1995	<i>Columba livia</i>	Columbidae	Columbiformes	Asia	Kivganov and Sharafat 1995
<i>Columbophilus polonica</i> (Skoracki, Magowski et Dabert, 2001)	<i>Gallus gallus</i>	Phasianidae	Galliformes	Europe	Skoracki et al. 2001; Skoracki 2011
“	<i>Gallus sonneratii</i>	Phasianidae	Galliformes	Asia	Skoracki and Sikora 2011
<i>Columbophilus pteroclesi</i> (Skoracki et OConnor, 2010)	<i>Pterocles senegallus</i>	Pteroclididae	Pterocliiformes	Africa	Skoracki and OConnor 2010
“	<i>Pterocles coronatus</i>	Pteroclididae	Pterocliiformes	Africa	Skoracki and OConnor 2010
<i>Neopicobia</i> Skoracki, 2011					
<i>Neopicobia anthi</i> (Fritsch, 1958)	<i>Anthus trivialis</i>	Motacillidae	Passeriformes	Europe	Fritsch 1958
“	<i>Anthus cervinus</i>	Motacillidae	Passeriformes	Europe	Skoracki 2011
<i>Neopicobia cardinalis</i> (Skoracki, Hendricks et Spicer, 2010)	<i>Cardinalis cardinalis</i>	Cardinalidae	Passeriformes	North America	Skoracki et al. 2010c
<i>Neopicobia carpodacus</i> (Skoracki, Hendricks et Spicer, 2010)	<i>Carpodacus purpureus</i>	Fringillidae	Passeriformes	North America	Skoracki et al. 2010c
<i>Neopicobia ephianura</i> (Skoracki, Glowska et Sikora, 2008)	<i>Ephianura aurifrons</i>	Meliphagidae	Passeriformes	Australia	Skoracki et al. 2008

<i>Neopicobia glossopsitta</i> (Skoracki, Glowska et Sikora, 2008)	<i>Glossopsitta porphyrocephala</i>	Psittacidae	Psittaciformes	Australia	Skoracki et al. 2008
<i>Neopicobia modularis</i> (Skoracki et Magowski, 2001)	<i>Prunella modularis</i>	Prunellidae	Passeriformes	Europe	Skoracki and Magowski 2001
“	<i>Prunella atrogularis</i>	Prunellidae	Passeriformes	Asia	Skoracki 2011
<i>Neopicobia locustella</i> (Skoracki, Bochkov et Wauthy, 2004)	<i>Locustella naevia</i>	Locustellidae	Passeriformes	Europe	Skoracki et al. 2004b
“	<i>Locustella luscinioides</i>	Locustellidae	Passeriformes	Europe	Skoracki 2011
<i>Neopicobia pyrrholaemus</i> (Skoracki et Glowska, 2008)	<i>Pyrrholaemus sagittatus</i>	Acanthizidae	Passeriformes	Australia	Skoracki and Glowska 2008c
<i>Neopicobia troglodytes</i> (Skoracki, Hendricks et Spicer, 2010)	<i>Troglodytes aedon</i>	Troglodytidae	Passeriformes	North America	Skoracki et al. 2010c
<i>Neopicobia zumpti</i> (Lawrence, 1959)	<i>Streptopelia capicola</i>	Columbidae	Columbiformes	Africa	Lawrence 1959a
“	<i>Streptopelia senegalensis</i>	Columbidae	Columbiformes	Africa	Lawrence 1959a
“	<i>Columba livia</i>	Columbidae	Columbiformes	North America	Bochkov et al. 2005
<i>Picobia</i> Haller, 1878					
<i>Picobia biarmicus</i> Skoracki, Bochkov et Wauthy, 2004	<i>Panurus biarmicus</i>	Panuridae	Passeriformes	Europe	Skoracki et al. 2004b
<i>Picobia brotogeris</i> Fain, Bochkov et Mironov, 2000 inc. sedis	<i>Brotogeris jugularis</i>	Psittacidae	Psittaciformes	South America	Fain et al. 2000
<i>Picobia caudati</i> Skoracki et Hebda, 2004	<i>Aegithalos caudatus</i>	Aegithalidae	Passeriformes	Europe	Skoracki and Hebda 2004
<i>Picobia cissa</i> Skoracki, Bochkov et Wauhty, 2004	<i>Cissa chinensis</i>	Corviidae	Passeriformes	Asia	Skoracki et al. 2004b
<i>Picobia cetti</i> Skoracki, 2011	<i>Cettia cetti</i>	Cettidae	Passeriformes	Asia	Skoracki 2011
<i>Picobia chloris</i> Bochkov, Mironov et Kravtsova, 2000	<i>Chloris chloris</i>	Fringillidae	Passeriformes	Asia	Bochkov et al. 2000
<i>Picobia corcoracus</i> Skoracki, Glowska et Sikora, 2008	<i>Corcorax melanorhamphos</i>	Corcoracidae	Passeriformes	Australia	Skoracki et al. 2008
<i>Picobia currucae</i> Skoracki et Magowski, 2001	<i>Sylvia curruca</i>	Sylviidae	Passeriformes	Europe, Asia	Skoracki and Magowski 2001; Skoracki 2011
“	<i>Sylvia hortensis</i>	Sylviidae	Passeriformes	Asia	Glowska et al. 2007
“	<i>Sylvia nisoria</i>	Sylviidae	Passeriformes	Asia	Skoracki 2011
<i>Picobia dinemellia</i> Glowska et Skoracki, 2011	<i>Dinemellia dinemelli</i>	Ploceidae	Passeriformes	Africa	Glowska and Skoracki 2011b
<i>Picobia dryobatis</i> (Fritsch, 1958)	<i>Dendrocopos major</i>	Picidae	Piciformes	Europe	Fritsch 1956; Skoracki et al. 2004b

Appendix

<i>Picobia dryobatis</i> (Fritsch, 1958)	<i>Dendrocopos minor hortorum</i>	Picidae	Piciformes	Europe	Skoracki 2011
“	<i>Dendrocopos leucotos</i>	Picidae	Piciformes	Europe	Skoracki 2011
“	<i>Picoides tridactylus</i>	Picidae	Piciformes	North America, Europe	Skoracki et al. 2010c; Skoracki 2011
“	<i>Picoides scalaris</i>	Picidae	Piciformes	North America	Skoracki et al. 2010c
<i>Picobia dziabaszewskii</i> Głowska, Dragun-Dami- an et Dabert, 2012	<i>Garrulax formosus</i>	Leiotherichidae	Passeriformes	Asia	Głowska et al. 2012
<i>Picobia eremophila</i> Skoracki, 2011	<i>Eremophila bilopha</i>	Alaudidae	Passeriformes	Africa	Skoracki 2011
<i>Picobia galerida</i> Skoracki, 2011	<i>Galerida cristata</i>	Alaudidae	Passeriformes	Europe	Skoracki 2011
<i>Picobia heeri</i> Haller, 1878	<i>Picus canus</i>	Picidae	Piciformes	Europe	Skoracki 2011
“	<i>Picus viridis</i>	Picidae	Piciformes	Europe	Skoracki 2011
<i>Picobia indonesia</i> Skoracki et Głowska, 2008	<i>Aplonis panayensis</i>	Sturnidae	Passeriformes	Asia	Skoracki and Głowska 2008c
<i>Picobia lemi</i> Skoracki, Głowska et Sikora, 2008	<i>Manucodia chalybatus</i>	Paradisaeidae	Passeriformes	Australia	Skoracki et al. 2008
<i>Picobia leucophaeus</i> Skoracki, Hendricks et Spicer, 2010 inc. sedis	<i>Leucophaeus atricilla</i>	Laridae	Charadrii- formes	North America	Skoracki et al. 2010c
<i>Picobia oritis</i> Skoracki, Antczak et Riegert, 2009	<i>Cyanomitra oritis</i>	Nectarinidae	Passeriformes	Africa	Skoracki et al. 2009
“	<i>Cyanomitra olivacea</i>	Nectarinidae	Passeriformes	Africa	Skoracki et al. 2011
<i>Picobia paludicola</i> Skoracki et Kiljan, 2002	<i>Acrocephalus paludicola</i>	Acrocephalidae	Passeriformes	Europe	Skoracki and Kiljan 2002
<i>Picobia phoeniculi</i> Fain, Bochkov et Mironov, 2000	<i>Phoeniculus purpureus</i>	Phoeniculidae	Coraciiformes	Africa	Fain et al. 2000
<i>Picobia poicephali</i> Skoracki et Dabert, 2002 inc. sedis	<i>Poicephalus senegalus</i>	Psittacidae	Psittaciformes	Africa	Skoracki and Dabert 2002
<i>Picobia pycnonoti</i> Głowska, Skoracki et Khourly, 2007	<i>Pycnonotus xanthopygos</i>	Pycnonotidae	Passeriformes	Asia	Głowska et al. 2007
<i>Picobia riparius</i> Skoracki, 2011	<i>Riparia riparia</i>	Hirundinidae	Passeriformes	Europe	Skoracki 2011
<i>Picobia sturni</i> Skoracki, Bochkov et Wauthy, 2004	<i>Sturnus vulgaris</i>	Sturnidae	Passeriformes	Europe	Skoracki et al. 2004b
“	<i>Sturnus cineraceus</i>	Sturnidae	Passeriformes	Asia	Skoracki 2011
<i>Picobia troglodytidus</i> Sikora et Skoracki, 2012	<i>Henicorhina leucophrys</i>	Troglodytidae	Passeriformes	North America	Sikora et al. 2012
<i>Rafapicobia</i> Skoracki, 2011					
<i>Rafapicobia zirmitra</i> Skoracki, 2011	<i>Saxicola rubetra</i>	Muscicapidae	Passeriformes	Europe	Skoracki 2011
<i>Rafapicobia toxostoma</i> Sikora, Fajfer et Skoracki, 2011	<i>Toxostoma curvirostre</i>	Mimidae	Passeriformes	North America	Sikora et al. 2011

<i>Rafapicobia dendrocolaptesi</i> Skoracki et Solarczyk, 2012	<i>Dendrocolaptes platyrostris</i>	Funariidae	Passeriformes	South America	Skoracki and Solarczyk 2012
“	<i>Dendrocolaptes picumnus</i>	Funariidae	Passeriformes	South America	Skoracki and Solarczyk 2012
<i>Rafapicobia lepidocolaptesi</i> Skoracki et Solarczyk, 2012	<i>Lepidocolaptes affinis</i>	Funariidae	Passeriformes	South America	Skoracki and Solarczyk 2012
“	<i>Lepidocolaptes souleyetii</i>	Funariidae	Passeriformes	South America	Skoracki and Solarczyk 2012
Ereynetidae Oudemans, 1931					
Speleognathinae Fain, 1957					
Boydaiini Fain, 1985					
<i>Boydaia</i> Womersley, 1953					
<i>Boydaia sturni</i> (Boyd, 1948)	<i>Sturnus vulgaris</i>	Sturnidae	Passeriformes	Eurasia, Australia, North America	Boyd 1948; Fain 1961a; Fain 1963b; Domrow 1969; Sixl 1972; Pence 1973a, 1975; Zabludovskaya 1998; Knee et al. 2008
“	<i>Acridotheres tristis</i>	Sturnidae	Passeriformes	Australia	Domrow 1969
“	<i>Ampeliceps coronatus</i>	Sturnidae	Passeriformes	Europe	Fain 1971
“	<i>Pastor roseus</i>	Sturnidae	Passeriformes	Asia	Zabludovskaya 1998
“	<i>Passer domesticus</i>	Ploceidae	Passeriformes	North America	Porter and Strandtmann 1952
<i>Boydaia agelaii</i> Fain et Aitken, 1968	<i>Chrysomus icterocephalus</i>	Icteridae	Passeriformes	South America	Fain and Aitken 1968; Fain and Lukoschus 1972
“	<i>Agelaius phoeniceus</i>	Icteridae	Passeriformes	North America	Fain and Aitken 1968; Pence 1973
“	<i>Chrysomus ruficapillus</i>	Icteridae	Passeriformes	European Zoo (captive)	Fain and Aitken 1968
“	<i>Agelaius humeralis</i>	Icteridae	Passeriformes	South America	Dusbabek and Cerny 1970
“	<i>Dives atroviolaceus</i>	Icteridae	Passeriformes	South America	Dusbabek and Cerny 1970
“	<i>Molothrus ater</i>	Icteridae	Passeriformes	North America	Fain and Hyland 1975
“	<i>Quiscalus mexicanus</i>	Icteridae	Passeriformes	North America	Fain and Hyland 1975
“	<i>Spiza americana</i>	Cardinalidae	Passeriformes	North America	Fain and Hyland 1975
<i>Boydaia americana</i> Fain, 1963	<i>Passerina caerulea</i>	Cardinalidae	Passeriformes	European Zoo (captive)	Fain 1963b
“	<i>Cyanocompsa cyanoides</i>	Cardinalidae	Passeriformes	South America	Fain and Aitken 1970
“	<i>Piranga rubra</i>	Cardinalidae	Passeriformes	European Zoo (captive)	Fain 1963b; Pence 1975
“	<i>Ramphocelus carbo</i>	Thraupidae	Passeriformes	South America	Fain and Aitken 1968

Appendix

<i>Boyaia americana</i> Fain, 1963	<i>Tangara gyrola</i>	Thraupidae	Passeriformes	South America	Fain and Aitken 1970
“	<i>Coereba flaveola</i>	Coerebidae	Passeriformes	South America	Fain and Aitken 1968
“	<i>Sporophila americana</i>	Emberizidae	Passeriformes	South America	Fain and Aitken 1970
“	<i>Volatinia jacarina</i>	Emberizidae	Passeriformes	South America	Fain and Aitken 1968
<i>Boyaia bradornis</i> Fain, 1956	<i>Bradornis pallidus griseus</i>	Muscicapidae	Passeriformes	Africa	Fain 1956b, 1971
“	<i>Luscinia luscinia</i>	Muscicapidae	Passeriformes	Europe	Zabludovskaya 1998
<i>Boyaia buphagi</i> Fain, 1961	<i>Buphagus africanus</i>	Buphagidae	Passeriformes	Africa	Fain 1961a
“	<i>Lamprotornis chloropterus</i>	Sturnidae	Passeriformes	Africa	Fain 1963b
<i>Boyaia cecropis</i> Fain, 1969	<i>Cecropis abyssinica</i>	Hirundinidae	Passeriformes	Africa	Fain 1969, 1971
<i>Boyaia cinnyris</i> Fain, 1969	<i>Cinnyris cupreus</i>	Nectariniidae	Passeriformes	Africa	Fain 1969, 1971
“	<i>Chalcomitra senegalensis</i>	Nectariniidae	Passeriformes	Africa	Fain 1969, 1971
<i>Boyaia cyanerpes</i> Fain, 1963	<i>Cyanerpes cyaneus</i>	Thraupidae	Passeriformes	European Zoo (captive)	Fain 1963b
<i>Boyaia cyanerpes hylocichla</i> Fain et Hyland, 1975	<i>Catharus ustulatus</i>	Turdidae	Passeriformes	North America	Fain and Hyland 1975
<i>Boyaia faini</i> Dusbabek et Cerny, 1970	<i>Setophaga cerulea</i>	Parulidae	Passeriformes	South America	Dusbabek and Cerny 1970; Pence 1975
<i>Boyaia formicarii</i> Fain et Aitken, 1970	<i>Formicarius colma</i>	Formicariidae	Passeriformes	South America	Fain and Aitken 1970
“	<i>Formicarius analis</i>	Formicariidae	Passeriformes	South America	Fain and Aitken 1970
<i>Boyaia hirundoae</i> Fain, 1956	<i>Hirundo rustica</i>	Hirundinidae	Passeriformes	Africa, Europe, North America, Australia (introduced)	Fain 1963a; Fain and Hyland 1975; Domrow, 1969; Sixl 1972; Pence 1973a, 1975
“	<i>Stelgidopteryx ruficollis</i>	Hirundinidae	Passeriformes	South America	Fain and Aitken 1968
“	<i>Progne subis</i>	Hirundinidae	Passeriformes	South America	Fain and Hyland 1970
“	<i>Hirundo neoxena</i>	Hirundinidae	Passeriformes	Australia	Domrow 1965
“	<i>Petrochelidon ariel</i>	Hirundinidae	Passeriformes	Australia	Domrow 1969
“	<i>Cecropis abyssinica</i>	Hirundinidae	Passeriformes	Africa	Zumt 1961
“	<i>Hirundo aethiopica</i>	Hirundinidae	Passeriformes	Africa	Fain et al. 1977
<i>Boyaia indica</i> Fain, 1969	<i>Acridotheres tristis</i>	Sturnidae	Passeriformes	European Zoo (captive)	Fain 1969
“	<i>Gracupica contra</i>	Sturnidae	Passeriformes	European Zoo (captive)	Fain 1969
“	<i>Sturnia malabarica</i>	Sturnidae	Passeriformes	European Zoo (captive)	Fain 1969

<i>Boyaia indica</i> Fain, 1969	<i>Temenuchus pagodarum</i>	Sturnidae	Passeriformes	European Zoo (captive)	Fain 1969
“	<i>Lamprotornis chloropterus</i>	Sturnidae	Passeriformes	Africa	Fain 1971
“	<i>Lamprotornis chalybaeus</i>	Sturnidae	Passeriformes	European Zoo (captive)	Fain 1971
“	<i>Lamprotornis superbus</i>	Sturnidae	Passeriformes	European Zoo (captive)	Fain 1971
<i>Boyaia jordani</i> Van Eyndhoven, 1955	<i>Turdus pilaris</i>	Turdidae	Passeriformes	Europe	Van Endhoven 1955
“	<i>Turdus migratorius</i>	Turdidae	Passeriformes	North America	Clark 1967; Pence 1975
“	<i>Turdus viscivorus</i>	Turdidae	Passeriformes	Europe	Zabludovskaya 1998
<i>Boyaia laticoxa</i> Fain et Aitken, 1969	<i>Glyphorhynchus spirurus</i>	Funariidae	Passeriformes	South America	Fain and Aitken 1969, 1970
<i>Boyaia laticoxa philydori</i> Fain et Aitken, 1970	<i>Philydor pyrrhodes</i>	Furnariidae	Passeriformes	South America	Fain and Aitken 1970
<i>Boyaia locustellae</i> Fain, 1970	<i>Locustella luscinioides</i>	Locustellidae	Passeriformes	Europe	Fain 1970
<i>Boyaia loxiae</i> Fain, 1963	<i>Loxia curvirostra</i>	Fringillidae	Passeriformes	Europe	Fain 1963a
“	<i>Icterus galbula</i>	Icteridae	Passeriformes	North America	Fain and Hyland 1975
<i>Boyaia maluri</i> Domrow, 1969	<i>Malurus amabilis</i>	Maluridae	Passeriformes	Australia	Domrow 1969
“	<i>Malurus melanocephalus</i>	Maluridae	Passeriformes	Australia	Domrow 1969
<i>Boyaia mimi</i> Fain et Hyland, 1970	<i>Mimus gilvus</i>	Mimidae	Passeriformes	South America	Fain and Hyland 1970
“	<i>Mimus polyglottos</i>	Mimidae	Passeriformes	North America	Pence 1973a, 1975
<i>Boyaia morenoi</i> Dusbabek et Cerny, 1970	<i>Mimus polyglottos</i>	Mimidae	Passeriformes	South America	Dusbabek and Cerny 1970
<i>Boyaia myzomelae</i> Domrow, 1969	<i>Myzomela sanguinolenta</i>	Meliphagidae	Passeriformes	Australia	Domrow 1969
“	<i>Xanthotis flaviventer</i>	Meliphagidae	Passeriformes	Australia	Domrow 1991
<i>Boyaia nectarinia</i> Fain, 1958	<i>Cyanomitra verticalis</i>	Nectariniidae	Passeriformes	Africa	Fain 1958b, 1963b
<i>Boyaia pheuticola</i> Pence et Costa, 1976	<i>Pheuticus melanocephalus</i>	Cardinalidae	Passeriformes	North America	Pence and Costa 1976
“	<i>Spiza americana</i>	Cardinalidae	Passeriformes	North America	Spicer 1987
<i>Boyaia psalidoprocnei</i> Fain, 1956	<i>Psalidoprocne albiceps</i>	Hirundinidae	Passeriformes	Africa	Fain 1956b, 1971
“	<i>Tachycineta bicolor</i>	Hirundinidae	Passeriformes	North America	Pence 1973a, 1975; Knee et al. 2008
“	<i>Riparia riparia</i>	Hirundinidae	Passeriformes	Asia	Zabludovskaya 1998
<i>Boyaia pycnonoti</i> Fain, 1956	<i>Pycnonotus barbatus</i>	Pycnonotidae	Passeriformes	Africa	Fain 1956b; Fain et al. 1977
“	<i>Pycnonotus goiavier</i>	Pycnonotidae	Passeriformes	Asia	Fain 1963b

Appendix

<i>Boyaia pycnonoti</i> Fain, 1956	<i>Pycnonotus leucogenys</i>	Pycnonotidae	Passeriformes	Asia	Fain 1963b, 1971
<i>Boyaia quisicali</i> Clark, 1960	<i>Quiscalus quiscula</i>	Icteridae	Passeriformes	North America	Clark 1960; Pence 1973a, 1975
“	<i>Quiscalus mexicanus</i>	Icteridae	Passeriformes	North America	Pence 1973a, 1975
“	<i>Molothrus ater</i>	Icteridae	Passeriformes	North America	Pence 1973a, 1975
“	<i>Agelaius phoeniceus</i>	Icteridae	Passeriformes	North America	Pence 1973a, 1975
“	<i>Saltator maximus</i>	Thraupidae	Passeriformes	South America	Fain and Aitken 1970
“	<i>Saltator coerulescens</i>	Thraupidae	Passeriformes	South America	Fain and Hyland 1970
<i>Boyaia rosickyi</i> Dusbabek et Cerny 1970	<i>Passerina cyanea</i>	Cardinalidae	Passeriformes	South America	Dusbabek and Cerny 1970; Pence 1975
<i>Boyaia saxicolae</i> Fain, 1969	<i>Saxicola torquatus axillaris</i>	Muscicapidae	Passeriformes	Africa	Fain 1969
“	<i>Myrmecocichla nigra</i>	Muscicapidae	Passeriformes	Africa	Fain 1969
“	<i>Monticola angolensis</i>	Muscicapidae	Passeriformes	Africa	Fain 1969
<i>Boyaia sinensis</i> Fain et Bafort, 1963	<i>Leiothrix lutea</i>	Leiothrichidae	Passeriformes	Asia	Fain and Bafort 1963
<i>Boyaia spatulata</i> Fain, 1955	<i>Cercotrichas hartlaubi</i>	Muscicapidae	Passeriformes	Africa	Fain, 1955, 1956b
“	<i>Pycnonotus barbatus</i>	Pycnonotidae	Passeriformes	Africa	Fain 1956a, 1956b, 1971
“	<i>Cossypha natalensis</i>	Muscicapidae	Passeriformes	Africa	Fain 1956a, 1956b, 1971
“	<i>Cossypha polioptera</i>	Muscicapidae	Passeriformes	Africa	Fain, 1956b, 1963b
“	<i>Pogonocichla stellata</i>	Muscicapidae	Passeriformes	Africa	Fain 1956a, 1956b, 1971
“	<i>Cercomela tractrac</i>	Muscicapidae	Passeriformes	Africa	Fain 1956a, 1956b, 1971
“	<i>Chloropeta similis</i>	Acrocephalidae	Passeriformes	Africa	Fain 1956a, 1956b, 1971
“	<i>Schistolais leucopogon</i>	Cisticolidae	Passeriformes	Africa	Fain 1956a, 1956b, 1971
“	<i>Melaniparus niger</i>	Paridae	Passeriformes	Africa	Fain 1956a, 1956b, 1971
“	<i>Macronyx croceus</i>	Motacillidae	Passeriformes	Africa	Fain 1956a, 1956b, 1971
“	<i>Tiaris canorus</i>	Emberizidae	Passeriformes	European Zoo (captive)	Fain 1958a
“	<i>Tangara</i> sp.	Thraupidae	Passeriformes	European Zoo (captive)	Fain 1958a
“	<i>Cissomela pectoralis</i>	Meliphagidae	Passeriformes	Australia	Domrow 1969
“	<i>Philemon corniculatus</i>	Meliphagidae	Passeriformes	Australia	Domrow 1969
“	<i>Philemon citreogularis</i>	Meliphagidae	Passeriformes	Australia	Domrow 1969

<i>Boydaia spatulata</i> Fain, 1955	<i>Cyssomela pectoralis</i>	Meliphagidae	Passeriformes	Australia	Domrow 1969
“	<i>Sialia sialis</i>	Turdidae	Passeriformes	North America	Pence 1973c, 1975
“	<i>Pycnonotus barbatus</i>	Pycnonotidae	Passeriformes	Africa	Zabludovskaya 2002
<i>Boydaia synallaxis</i> Fain, Hyland et Aitken, 1969	<i>Synallaxis rutilans</i>	Furnariidae	Passeriformes	South America	Fain, 1969
“	<i>Synallaxis gujanensis</i>	Furnariidae	Passeriformes	South America	Fain, 1969
“	<i>Synallaxis erythrothorax</i>	Furnariidae	Passeriformes	South America	Fain, 1969
“	<i>Empidonax</i> sp.	Tyrannidae	Passeriformes	South America	Fain and Hyland 1970
<i>Boydaia tyrannus</i> Ford, 1959	<i>Tyrannus tyrannus</i>	Tyrannidae	Passeriformes	North America	Ford 1959
“	<i>Myiophobus fasciatus</i>	Tyrannidae	Passeriformes	South America	Fain and Aitken 1968
“	<i>Tyrannus verticalis</i>	Tyrannidae	Passeriformes	North America	Brooks and Strandtmann 1960; Pence 1975
“	<i>Elaenia flavogaster</i>	Tyrannidae	Passeriformes	South America	Fain and Aitken 1968
“	<i>Pyrocephalus rubinus</i>	Tyrannidae	Passeriformes	South America	Fain and Hyland 1970
“	<i>Myiarchus cinerascens</i>	Tyrannidae	Passeriformes	North America	Pence and Casto 1976
“	<i>Tyrannus dominicensis</i>	Tyrannidae	Passeriformes	South America	Dusbabek and Cerny 1970; Fain et al. 1975; Pence 1975
“	<i>Pachyramphus aglaiae</i>	Tityridae	Passeriformes	South America	Fain and Hyland 1970
“	<i>Manacus manacus</i>	Pipridae	Passeriformes	South America	Fain and Aitken 1968, 1970
“	<i>Pipra pipra</i>	Pipridae	Passeriformes	South America	Fain and Aitken 1970c
“	<i>Pipra fasciicauda</i>	Pipridae	Passeriformes	South America	Fain and Aitken 1970
“	<i>Lepidothrix iris</i>	Pipridae	Passeriformes	South America	Fain and Aitken 1970
<i>Boydaia zosteropsis</i> Fain, 1963	<i>Zosterops senegalensis</i>	Zosteropidae	Passeriformes	Africa	Fain 1963b, 1971
“	<i>Zosterops lateralis</i>	Zosteropidae	Passeriformes	Australia	Domrow 1969
<i>Boydaia zumpti</i> Fain, 1955	<i>Eurillas latirostris eugenius</i>	Pycnonotidae	Passeriformes	Africa	Fain 1955, 1956a, 1956b
“	<i>Bleda syndactylus</i>	Pycnonotidae	Passeriformes	European Zoo (captive)	Fain 1971
“	<i>Schoenicola brevirostris</i>	Locustellidae	Passeriformes	Africa	Fain 1958a, 1971
<i>Boydaia crassipes</i> (Berlese et Trouessart, 1889)	<i>Passer domesticus</i>	Passeridae	Passeriformes	Europe, Australia, North America	Berlese and Trouessart 1889; Porter and Strandtmann, 1952; Domrow 1969

Appendix

<i>Boyaia crassipes</i> (Berlese et Trouessart, 1889)	<i>Carduelis carduelis</i>	Fringillidae	Passeriformes	Australia	Domrow 1969
“	<i>Motacilla flava</i>	Fringillidae	Passeriformes	Australia (introduced)	Domrow 1969
“	<i>Lalage sueurii</i>	Campephagidae	Passeriformes	Australia	Domrow 1991
<i>Boyaia psittaci</i> Fain et Mortelmans, 1959	<i>Pionites melanocephalus</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1963b
“	<i>Pionites leucogaster</i>	Psittacidae	Psittaciformes	South America	Fain 1963b
“	<i>Bolborhynchus lineola</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1963b
“	<i>Forpus passerinus</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1971
“	<i>Brotogeris jugularis</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1971
“	<i>Brotogeris versicolurus</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1971
“	<i>Psilopsiagon aymara</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1971
<i>Boyaia aratingae</i> Fain, 1963	<i>Aratinga jandaya</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain 1963b, 1971
<i>Boyaia falconis</i> Fain, 1956	<i>Falco cuvierii</i>	Falconidae	Falconiformes	Africa	Fain 1956b
“	<i>Falco tinnunculus</i>	Falconidae	Falconiformes	Africa	Fain 1963b
“	<i>Falco berigora</i>	Falconidae	Falconiformes	Australia	Domrow 1969
“	<i>Falco sparverius</i>	Falconidae	Falconiformes	North America	Pence and Casto 1976
<i>Boyaia podargi</i> Fain et Lukoschus, 1979	<i>Podargus strigoides</i>	Podargidae	Caprimulgi- formes	Australia	Fain and Lukoschus 1979
<i>Boyaia colini</i> Clark, 1958	<i>Colinus virginianus</i>	Odontophoridae	Galliformes	North America	Clark 1958; Fain and Hyland 1975
<i>Boyaia clarki</i> Fain, 1963	<i>Callipepla squamata</i>	Odontophoridae	Galliformes	European Zoo (captive); North America	Fain 1963b; Pence and Casto 1976
<i>Coboydaia</i> Fain, 1985					
<i>Coboydaia clavata</i> (Fain, 1955)	<i>Ploceus cucullatus</i>	Ploceidae	Passeriformes	Africa	Fain 1955, 1956a, 1963b
“	<i>Ploceus xanthops</i>	Ploceidae	Passeriformes	Africa	Fain 1956a, 1963b, 1971
“	<i>Ploceus pelzelni</i>	Ploceidae	Passeriformes	Africa	Fain 1956a, 1963b, 1971
“	<i>Quelea quelea</i>	Ploceidae	Passeriformes	Africa	Fain. 1956a, 1960, 1963b, 1971; Fain et al. 1977
“	<i>Ploceus baglafecht</i>	Ploceidae	Passeriformes	Africa	Fain 1956a, 1963b, 1971
“	<i>Ploceus vitellinus</i>	Ploceidae	Passeriformes	Africa	Fain et al. 1977
“	<i>Ploceus cucullatus</i>	Ploceidae	Passeriformes	Africa	Fain et al. 1977
“	<i>Euplectes hordeaceus</i>	Ploceidae	Passeriformes	Africa	Fain et al. 1977
“	<i>Euplectes ardens</i>	Ploceidae	Passeriformes	Africa	Fain et al. 1977
“	<i>Euplectes macroura</i>	Ploceidae	Passeriformes	Africa	Fain et al. 1977

<i>Coboydaia clavata</i> (Fain, 1955)	<i>Quelea erythroptus</i>	Ploceidae	Passeriformes	Africa	Fain 1956a, 1960, 1963b, 1971; Fain et al. 1977; Mwase and Baker 2006
“	<i>Vidua chalybeata</i>	Viduidae	Passeriformes	Africa	Fain 1963b, 1971
<i>Coboydaia amandavae</i> (Fain, 1962)	<i>Sporaeginthus subflavus</i>	Estrildidae	Passeriformes	European Zoo (captive)	Fain 1962a
“	<i>Amandava amandava</i>	Estrildidae	Passeriformes	Asia	Fain 1963b
“	<i>Erythrura prasina</i>	Estrildidae	Passeriformes	European Zoo (captive)	Fain 1970
“	<i>Malurus melanocephalus</i>	Maluridae	Passeriformes	Australia	Domrow 1969
<i>Coboydaia nigra</i> (Fain, 1955)	<i>Serinus sulphura- tus shelleyi</i>	Fringillidae	Passeriformes	Africa	Fain 1955, 1956a, 1956b
“	<i>Serinus citrinelloides</i>	Fringillidae	Passeriformes	Africa	Fain 1956b, 1963b, 1971
“	<i>Serinus mozambicus</i>	Fringillidae	Passeriformes	Africa	Fain 1963b, 1971; Fain et al. 1977
“	<i>Serinus burtoni</i>	Fringillidae	Passeriformes	Africa	Fain, 1963b, 1971
“	<i>Carduelis carduelis</i>	Fringillidae	Passeriformes	Europe	Fain 1962b, 1963b, 1971; Sixl 1972
“	<i>Carpodacus mexicanus</i>	Fringillidae	Passeriformes	North America	Fain and Hyland 1975
“	<i>Carpodacus erythrinus</i>	Fringillidae	Passeriformes	Eurasia	Zabludovskaya 1998
“	<i>Fringilla montifringilla</i>	Fringillidae	Passeriformes	Asia	Zabludovskaya 1998
“	<i>Fringilla coelebs</i>	Fringillidae	Passeriformes	Eurasia	Sixl 1972; Zabludovskaya 1998
“	<i>Passer griseus</i>	Passeridae	Passeriformes	Africa	Fain 1963b, 1971
“	<i>Passer montanus</i>	Passeridae	Passeriformes	Asia	Zabludovskaya 1998
“	<i>Passer ammodendri</i>	Passeridae	Passeriformes	Asia	Zabludovskaya 1998
“	<i>Passer hispaniolensis</i>	Passeridae	Passeriformes	Asia	Zabludovskaya 1998
“	<i>Emberiza rutila</i>	Emberizidae	Passeriformes	Africa, Asia	Fain 1963b, 1971; Zabludovskaya 1998
“	<i>Emberiza tristrami</i>	Emberizidae	Passeriformes	Asia	Zabludovskaya 1998
“	<i>Emberiza spodocephala</i>	Emberizidae	Passeriformes	Asia	Zabludovskaya 1998
“	<i>Emberiza pusilla</i>	Emberizidae	Passeriformes	Asia	Zabludovskaya 1998
“	<i>Emberiza rustica</i>	Emberizidae	Passeriformes	Asia	Zabludovskaya 1998
“	<i>Emberiza citrinella</i>	Emberizidae	Passeriformes	Asia	Zabludovskaya 1998

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<i>Coboydaia nigra</i> (Fain, 1955)	<i>Emberiza aureola</i>	Emberizidae	Passeriformes	Asia	Zabludovskaya 1998
“	<i>Spizella passerina</i>	Emberizidae	Passeriformes	North America	Fain and Hyland 1975
“	<i>Euphonia violacea</i>	Fringillidae	Passeriformes	South America	Fain and Aitken 1968
“	<i>Anthus spinoletta</i>	Motacillidae	Passeriformes	North America	Pence 1973
“	<i>Anthus trivialis</i>	Motacillidae	Passeriformes	Eurasia	Zabludovskaya 1998
<i>Coboydaia nigra icteri</i> (Fain et Hyland, 1970)	<i>Icterus spurius</i>	Icteridae	Passeriformes	South America	Fain and Hyland 1970
	<i>Icterus galbula</i>	Icteridae	Passeriformes	North America	Fain and Hyland 1970
<i>Coboydaia nigra motacillae</i> (Fain, 1969)	<i>Motacilla flava</i>	Motacillidae	Passeriformes	Africa, Eurasia	Fain 1969, 1971; Zabludovskaya 1998
“	<i>Motacilla aguimp</i>	Motacillidae	Passeriformes	Africa	Fain 1969, 1971
“	<i>Motacilla capensis</i>	Motacillidae	Passeriformes	Africa	Fain 1969, 1971
“	<i>Anthus trivialis</i>	Motacillidae	Passeriformes	Europe	Fain 1963a, 1971
“	<i>Acrocephalus arundinaceus</i>	Acrocephalidae	Passeriformes	Europe	Fain 1963b, 1971
“	<i>Acrocephalus scirpaceus</i>	Acrocephalidae	Passeriformes	Europe	Fain 1963b, 1971
“	<i>Motacilla alba</i>	Motacillidae	Passeriformes	Asia	Zabludovskaya 1998
<i>Coboydaia sturnellae</i> (Clark, 1960)	<i>Sturnella magna</i>	Icteridae	Passeriformes	North America	Clark 1960
<i>Coboydaia (Apodiboydaia)</i> Fain, 1985					
<i>Coboydaia trochila</i> (Fain, 1958)	<i>Chlorestes notata</i>	Trochilidae	Apodiformes	European Zoo (captive)	Fain, 1958a, 1961a, 1963b, 1971
Trispeleognathini Fain, 1985					
<i>Trispeleognathus</i> Fain, 1958					
<i>Trispeleognathus striatus</i> (Crossley, 1952)	<i>Columba livia</i>	Columbidae	Columbiformes	North America, Australia (introduced)	Crossley 1952; Domrow 1969
“	<i>Streptopelia semitorquata</i>	Columbidae	Columbiformes	Africa	Fain 1956a
“	<i>Columbina talpacoti</i>	Columbidae	Columbiformes	South America	Fain and Aitken 1968
“	<i>Leptotila verreauxi</i>	Columbidae	Columbiformes	South America	Amaral 1963
<i>Aureliania</i> Fain, 1958					
<i>Aureliania aureliani</i> (Fain, 1955)	<i>Tyto alba</i>	Tytonidae	Strigiformes	Africa, Australia, South America	Fain 1955; Dusbabek and Cerny 1970; Domrow 1991
<i>Ophthalmognathus</i> Dubinin, 1957					
<i>Ophthalmognathus shoutedeni</i> (Fain, 1955)	<i>Ardeola idae</i>	Ardeidae	Pelecaniformes	Africa	Fain 1955, 1956a
“	<i>Ardea cinerea</i>	Ardeidae	Pelecaniformes	Europe	Dubinin 1957
“	<i>Nycticorax nycticorax</i>	Ardeidae	Pelecaniformes	Africa	Fain 1955, 1956a
“	<i>Nycticorax caledonicus</i>	Ardeidae	Pelecaniformes	Australia	Domrow 1969, 1991

<i>Ophthalmognathus tenorioae</i> Fain et Goff, 1980	<i>Nycticorax nycticorax</i>	Ardeidae	Pelecaniformes	Australia (Hawaii)	Fain and Goff 1980
<i>Psittaboydaia</i> Fain, 1985					
<i>Psittaboydaia psittaculae</i> (Fain, 1962)	<i>Psittacula krameri</i>	Psittacidae	Psittaciformes	Africa	Fain 1962c
“	<i>Aprosmictus erythropterus</i>	Psittacidae	Psittaciformes	Australia	Domrow 1991
“	<i>Platycercus adscitus</i>	Psittacidae	Psittaciformes	Australia	Domrow 1991
<i>Psittaboydaia amazona</i> (Fain et Lukoschus, 1972)	<i>Amazona amazonica</i>	Psittacidae	Psittaciformes	European Zoo (captive)	Fain and Lukoschus, 1972
“	<i>Agapornis roseicollis</i>	Psittacidae	Psittaciformes	Australia (captive)	Domrow 1969
<i>Psittaboydaia (Trichoglossiella)</i> Fain, 1985					
<i>Psittaboydaia trichoglossi</i> (Fain, 1970)	<i>Trichoglossus haematodus</i>	Psittacidae	Psittaciformes	European Zoo (captive); Australia	Fain 1970; Domrow 1969, 1991
“	<i>Psitteuteles versicolor</i>	Psittacidae	Psittaciformes	Australia	Domrow 1969, 1991
<i>Neastrida</i> Fain, 1962					
<i>Neastrida parrae</i> (Fain, 1956)	<i>Actophilornis africanus</i>	Jacaniidae	Gruiformes	South Africa	Fain 1956d
<i>Neoboydaia</i> Fain, 1958					
<i>Neoboydaia philomachi</i> (Fain, 1956)	<i>Philomachus pugnax</i>	Charadriidae	Charadriiformes	Africa, Europe, Australia (introduced)	Fain 1956a, 1956c; Domrow 1969; Zabludovskaya 1998
“	<i>Tringa glareola</i>	Scolopacidae	Charadriiformes	Africa, Australia	Fain 1963b; Domrow 1969
“	<i>Actitis macularius</i>	Scolopacidae	Charadriiformes	South Africa	Fain and Aitken 1968
“	<i>Limosa lapponica</i>	Scolopacidae	Charadriiformes	Australia	Domrow 1969, 1991
<i>Neoboydaia philomachi eroliae</i> Fain et Hyland, 1970	<i>Calidris minutilla</i>	Scolopacidae	Charadriiformes	South America	Fain and Hyland 1970
“	<i>Actitis macularius</i>	Scolopacidae	Charadriiformes	South America	Fain and Hyland 1970
“	<i>Arenaria interpres</i>	Scolopacidae	Charadriiformes	North America	Fain and Hyland 1975
“	<i>Limnodromus griseus</i>	Scolopacidae	Charadriiformes	North America	Fain and Hyland 1975
“	<i>Tringa solitaria</i>	Scolopacidae	Charadriiformes	North America	Fain and Hyland 1975
“	<i>Tringa melanoleuca</i>	Scolopacidae	Charadriiformes	North America	Clark 1964a; Pence 1973a
“	<i>Tringa flavipes</i>	Scolopacidae	Charadriiformes	North America	Clark 1964a
“	<i>Calidris melanotos</i>	Scolopacidae	Charadriiformes	North America	Clark 1964a
“	<i>Gallinago gallinago</i>	Scolopacidae	Charadriiformes	North America Asia	Pence 1973a; Zabludovskaya 1998

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<i>Neoboydaia philomachieroliae</i> Fain et Hyland, 1970	<i>Limnodromus scolopaceus</i>	Scolopacidae	Charadriiformes	North America	Pence 1973a
<i>Neoboydaia philomachithalasseus</i> Fain et Hyland, 1975	<i>Thalasseus maximus</i>	Laridae	Charadriiformes	North America	Fain and Hyland 1975
“	<i>Sterna hirundo</i>	Laridae	Charadriiformes	North America	Fain and Hyland 1975
<i>Neoboydaia galachrisiae</i> Fain, 1961	<i>Glareola cinerea</i>	Glareolidae	Charadriiformes	Africa	Fain 1961b
“	<i>Glareola nuchalis</i>	Glareolidae	Charadriiformes	Africa	Fain 1964b
<i>Neoboydaia colymbiformi</i> Clark, 1964	<i>Podiceps nigricollis</i>	Podicipedidae	Podicipediformes	North America	Clark 1964a
“	<i>Podilymbus podiceps</i>	Podicipedidae	Podicipediformes	North America	Pence 1973a
“	<i>Tachybaptus ruficollis</i>	Podicipedidae	Podicipediformes	Australia	Domrow 1969, 1991
<i>Pterniboydaia</i> Fain, 1985					
<i>Pterniboydaia pternistis</i> (Fain, 1955)	<i>Francolinus afer</i>	Phasianidae	Galliformes	Africa	Fain 1955
“	<i>Francolinus swainsonii</i>	Phasianidae	Galliformes	Africa	Fain 1963
“	<i>Perdix perdix</i>	Phasianidae	Galliformes	Europe	Fain 1962b
<i>Speleognathopsis</i> Cooreman, 1954					
<i>Speleognathopsis galli</i> Cooreman, 1954	<i>Gallus gallus</i>	Phasianidae	Galliformes	North America, Australia	Cooreman 1954; Domrow 1969
“	<i>Numida meleagris</i>	Numididae	Galliformes	Africa, Australia (introduced)	Fain 1956a; Domrow 1969
<i>Speleognathopsis benoiti</i> Fain, 1955	<i>Vanellus crassirostris</i>	Charadriidae	Charadriiformes	Africa	Fain 1955, 1956a
“	<i>Vanellus senegallus</i>	Charadriidae	Charadriiformes	Africa	Fain 1956a
“	<i>Vanellus miles</i>	Charadriidae	Charadriiformes	Australia	Domrow 1969, 1991
“	<i>Elseyornis melanops</i>	Charadriidae	Charadriiformes	Australia	Domrow 1969, 1991
“	<i>Erythrogonys cinctus</i>	Charadriidae	Charadriiformes	Australia	Domrow 1969, 1991
“	<i>Smutsornis africanus</i>	Glareolidae	Charadriiformes	South Africa	Fain et al. 1966
<i>Speleognathopsis charadricola</i> (Fain, 1964)	<i>Charadrius pecuarius</i>	Charadriidae	Charadriiformes	European Zoo (captive)	Fain 1964a
<i>Speleognathopsis onychognathi</i> (Fain, 1964)	<i>Onychognathus walleri</i>	Sturnidae	Passeriformes	Africa	Fain 1964a
<i>Speleognathopsis accipitris</i> (Domrow, 1969)	<i>Accipiter fasciatus</i>	Accipitridae	Accipitriformes	Australia	Domrow 1969, 1991
“	<i>Accipiter cirrocephalus</i>	Accipitridae	Accipitriformes	Australia	Domrow 1969
“	<i>Aquila audax</i>	Accipitridae	Accipitriformes	Australia	Domrow 1969
“	<i>Haliaeetus leucogaster</i>	Accipitridae	Accipitriformes	Australia	Domrow 1969

<i>Speleognathopsis accipitris</i> (Domrow, 1969)	<i>Haliastur sphenurus</i>	Accipitridae	Accipitriformes	Australia	Domrow 1969
“	<i>Milvus migrans</i>	Accipitridae	Accipitriformes	Australia	Domrow 1969
“	<i>Elanus axillaris</i>	Accipitridae	Accipitriformes	Australia	Domrow 1969
<i>Speleognathopsis wai</i> Fain, Vercammen-Grandjean et Wagner, 1966	<i>Rhinoptilus africanus</i>	Glareolidae	Charadriiformes	South America	Fain et al. 1966
<i>Metaboydaia</i> Fain, 1962					
<i>Metaboydaia poffei</i> (Fain, 1955)	<i>Scopus umbretta</i>	Scopidae	Pelecaniformes	Africa	Fain 1955
“	<i>Coracias caudatus</i>	Coraciidae	Coraciiformes	Africa	Fain 1955
<i>Meropiboydaia</i> Fain, 1985					
<i>Meropiboydaia merops</i> (Fain, 1956)	<i>Merops apiaster</i>	Meropidae	Coraciiformes	Africa	Fain 1955, 1956a
“	<i>Merops ornatus</i>	Meropidae	Coraciiformes	Australia	Domrow 1969, 1991
<i>Astrida</i> Fain, 1955					
<i>Astrida caprimulgi</i> Fain, 1955	<i>Caprimulgus fossii</i>	Caprimulgidae	Caprimulgi-formes	Africa	Fain 1956a
“	<i>Bubo africanus</i>	Strigidae	Strigiformes	Africa	Fain 1956b
“	<i>Glaucidium perlatum</i>	Strigidae	Strigiformes	Africa	Fain 1956b
“	<i>Otus senegalensis</i>	Strigidae	Strigiformes	Africa	Fain 1956b
“	<i>Otus spilocephalus</i>	Strigidae	Strigiformes	Asia	Fain 1963b
<i>Astrida (Cerylonyssus)</i> Fain et Aitken, 1970					
<i>Astrida chlorocerylei</i> Fain et Aitken, 1970	<i>Chloroceryle aenea</i>	Alcediniidae	Coraciiformes	South America	Fain and Aitken 1970
<i>Ralliboydaia</i> Fain, 1962					
<i>Ralliboydaia lateralli</i> Fain, 1962	<i>Laterallus melanophaius</i>	Rallidae	Gruiformes	South America	Fain 1962a
	<i>Fulica americana</i>	Rallidae	Gruiformes	North America	Pence 1973a
<i>Ralliboydaia coccyzae</i> (Pence, 1973)	<i>Coccyzus americanus</i>	Cuculidae	Cuculiformes	North America	Pence 1973a
<i>Ralliboydaia porphyronis</i> (Domrow, 1965)	<i>Porphyrio porphyrio</i>	Rallidae	Gruiformes	Australia	Domrow 1965b, 1969
<i>Picinyssus</i> Fain, 1969					
<i>Picinyssus buccanodon</i> Fain, 1969	<i>Buccanodon duchaillui</i>	Lybiidae	Piciformes	Africa	Fain 1969
<i>Phoenicopterella</i> Fain, 1970					
<i>Phoenicopterella mirabilis</i> Fain, 1970	<i>Phoenicopiterus ruber</i>	Phoenicopiteridae	Phoenicopiteriformes	European Zoo (captive)	Fain 1970
<i>Phoenicopterella womersleyi</i> (Fain, 1955)	<i>Dendrocygna viduata</i>	Anatidae	Anseriformes	Africa	Fain 1955, 1956a
“	<i>Sarkidiornis melanotos</i>	Anatidae	Anseriformes	North America	Fain 1956a
“	<i>Aythya affinis</i>	Anatidae	Anseriformes	North America	Clark 1958
“	<i>Anas strepera</i>	Anatidae	Anseriformes	North America	Clark 1958
“	<i>Anas acuta</i>	Anatidae	Anseriformes	North America, Asia	Clark 1958; Zabludovskaya 1998
“	<i>Anas discors</i>	Anatidae	Anseriformes	North America	Fain and Hyland 1975

Appendix

<i>Phoenicopteriella womersleyi</i> (Fain, 1955)	<i>Anas crecca</i>	Anatidae	Anseriformes	Europe	Zabludovskaya 1998
“	<i>Anas querquedula</i>	Anatidae	Anseriformes	Europe	Zabludovskaya 1998