The morphology of juvenile stages of *Bubophilus aluconis* Nattress and Skoracki, 2009 (Acari: Syringophilidae) with a description of a male

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**ABSTRACT.** The morphology of juvenile and adult stages of the quill mite *Bubophilus aluconis* Nattress and Skoracki, 2009 parasitizing the Long-eared Owl *Asio otus* (Linnaeus) (Aves: Strigiformes) in Poland is described and illustrated. Poland is a new location and *A. otus* is a new host species for *B. aluconis*. A description of the male is presented for the first time for this quill mite species.

**Key words:** Acari, Syringophilidae, ectoparasites, *Bubophilus, Asio otus*

**Introduction**

The quill mites of the family Syringophilidae (Acari: Prostigmata: Cheyletoidea) are diverse group of permanent and highly specialized bird ectoparasites inhabiting the feather quills. They live and reproduce inside the flight, rectrices and covert feathers feeding on soft tissue fluids of their hosts by piercing the calamus wall with their long and flexible chelicerae [1]. Transmission of these mites is mainly vertical, from parents to their offspring. The horizontal transfer, from one adult host to another during molt is also possible. Although, we have little data about pathogenicity and negative impact on condition of birds, some authors suggest that they may be potential enzooctic vectors for pathogens [2].

These mites are mono- or oligoxenous parasites associated with birds of different orders throughout the World. To date this family includes more than 240 species of 52 genera described from all zoogeographical regions [3]. This number of syringophilid species is only a small part of their actual biodiversity, because the wide spectrum of the avian hosts are still largely unexplored. The actual number of the extant syringophilid species is at least 5000 as it was estimated based on species numbers of their potential hosts [4].

The biodiversity of syringophilid mites of the genus *Bubophilus* Philips and Norton, 1978 is still poorly known and presently only three species are known: *B. ascalaphus, B. asiobius* and *B. aluconis* [5,7,8]. All members of this genus are associated exclusively with owls (Strigiformes) (Table 1).

In this paper, we describe of all juvenile stages of *Bubophilus aluconis* parasitising the Long-eared Owl *Asio otus* (Aves: Strigiformes) in Poland. Additionally, Poland is a new location, and the avian species *A. otus* is a new host for *B. aluconis*. A description of the male is presented for the first time for this species.

**Materials and methods**

The description of *Bubophilus aluconis* presented in this paper is based on the material collected from quills of the Long-eared Owl *Asio otus* (Strigiformes: Strigidae). This bird specimen
was found dead in Szczecin City (Poland) in September 2010. All wing feathers and most of body feathers have been examined. Quills of feathers were examined using a dissecting microscope, and opened with a fine scalpel. All mite specimens of this species studied derive from 4 samples of great coverts and 7 samples of body feathers, and of the 12 eggs and 108 individuals: 7 were larvae, 10 protonymphs, 16 tritonymphs, 68 females and 7 males. All mite material is deposited in the collection of M. Skoracki (Department of Animal Morphology, Adam Mickiewicz University, Poznan, Poland).

Mite specimens were mounted in the Faure’s medium. Examination was done under Nomarsky interference-contrast with an Olympus BH2 microscope. Drawings were made with a camera lucida. All measurements are given in micrometers (µm).

**Terminology.** The idiosomal setation follows Grandjean [9] as adapted for Prostigmata by Kethley [10]. The system of nomenclature for leg chaetotaxy follows that proposed by Grandjean [11]. The application of these chaetotaxic schemes to Syringophilidae was recently provided by Bochkov et al. [12] and Skoracki [3].

**Results**

**Description**

The morphology of juvenile and adult stages of the *B. aluconis* are described below and illustrated in Figures 1–33.

**Egg** (Fig. 1).

Oval in shape (length 250–265; width 160–180), whitish in color and with smooth surface.

**Larva** (Figs. 2–7).

<table>
<thead>
<tr>
<th>Mite species</th>
<th>Host species</th>
<th>Host family</th>
<th>Distribution</th>
<th>References</th>
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<tr>
<td><em>B. ascalaphus</em></td>
<td>Strigidae</td>
<td></td>
<td>USA</td>
<td>[5]</td>
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<tr>
<td>Philips and Norton, 1978</td>
<td><em>Bubo virginianus</em></td>
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<td></td>
<td>(Gmelin, 1788)*</td>
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<tr>
<td><em>B. asiobius</em></td>
<td>Strigidae</td>
<td></td>
<td>Poland</td>
<td>[7]</td>
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<tr>
<td>Nattress and Skoracki, 2009</td>
<td><em>Asio otus</em> (Linnaeus, 1758)</td>
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<tr>
<td><em>B. aluconis</em></td>
<td>Strigidae</td>
<td></td>
<td>England</td>
<td>[8]</td>
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<tr>
<td>Nattress and Skoracki, 2009</td>
<td><em>Strix aluco</em> Linnaeus, 1758*</td>
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<td></td>
<td>Strigidae</td>
<td></td>
<td>Poland</td>
<td>Present study</td>
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</table>

* – type host

Total body length 305–335. **Gnathosoma.** Hypostomal apex rounded without protuberances. Lateral hypostomal teeth absent. Stylophore with striae ornamentation slightly constricted posteriorly, not reaching anterior margin of propodonotal shield, 120–125 long. Movable cheliceral digit edentate, 115–120 long. Each medial branch of peritremes not reaching anterior margin of propodonotal shield. **Idiosoma.** Propodonotal shield weakly sclerotized, bearing setae vi, ve, si and c1; setae se on or near this shield. Setae se situated anterior to level of setae c1. Hysteronotal and pygidial shields absent. Curcular striations as in Figs. 2 and 3. **Chaetotaxy of gnathosoma:** ao1, ao2, elcp. **Chaetotaxy and solenidiotaxy of palps:** tibiotarsus: dTi, sul, l”Ti, acm, ul’, ul”, ω; genu: dG; femur: dF; trochanter: setae absent (Figs. 6, 7).

**Legs**. All three pairs of legs subequal in thickness. All legs consist of, apart from the coxal fields (CF), five articulated segments: trochanter (T), femur (F), genu (G), tibia (T), and tarsus (TA). All tarsi with paired claws and rayed empodium. Tarsal setae of legs I: a’ and a” as eupathidia, setae tc’ and tc” filiform. Chaetotaxy and solenidiotaxy of legs: **leg I:** (CF) – 1b; (R) – without setae; (F) – vF, dF; (G) – l’G, σ; (T) – l’T, l”T, vT, dT, φ; (TA) – u”’, u”, vs. a”’, a””, tc’, tc”’, ft, ω; **leg II:** (CF) and (R) – without setae; (F) – vF, dF; (G) – l’G; (T) – l’T, l”T, vT, dT; (TA) – u”’, u”, vs., tc”’, tc””, ω; **leg III:** (CF) and (R) – without setae; (F) – dF; (G)
Protonymph (Figs. 8–13).
Total body length 390–505. **Gnathosoma.** Hypostomal apex rounded without protuberances. Lateral hypostomal teeth absent. Stylophore with striae ornamentation, rounded or slightly constricted posteriorly, not reaching anterior margin of propodonotal shield, 130–135 long. Movable cheliceral digit edentate, 115–120 long. Each medial branch of peritremes with 1 chamber, each lateral branch with 4 chambers (Fig. 13). Decompression opening visible.

**Chaetotaxy of gnathosoma:** ao1, ao2, elcp, n. **Chaetotaxy and solenidiotaxy of palps:** tibiartus: dTi, sul, l’Ti, l”Ti, acm, ul’, ul”; ω; genu: dG; femur: dF, l’F; trochanter: without setae (Figs. 10,11).

**Idiosoma.** Propodonotal shield weakly sclerotized, bearing setae vi, ve, si and c1; setae se on or near this shield. Setae se situated posterior to level of setae c1 or both setae at same transverse level. Hysteronotal and pygidial shields absent. Cuticular striations as in figs. 8 and 9. **Chaetotaxy of idiosoma:** vi, ve, si, se, cl, c2, d1, d2, e2, f1, f2, h2, ps1, ps2, ag1. **Lengths of idiosomal setae:** vi 20–25, ve 30–35, si 55–70, se 90–120, c1 100–130, c2 75–95, d1 75–80, d2 45–55, e2 75–80, f1 40–45, f2 80–100, h2 165–170, ps1 15–20, ps2 15–20, ag1 30–35.

**Legs.** All four pairs of legs subequal in thickness. Tarsal setae a’, a”, te’ and tc” of legs I as
eupathidia. **Chaetotaxy and solenidiotaxy of legs:**

**leg I:** (CF) – 1b; (R) – without setae; (F) – vF, dF; (G) – l’G, dG, σ; (T) – l’T, l’T’, vT, dT, ϕ; (TA) – u”, u”’, vs, a”’, a””, tc”, tc”’, fi, p””, ω;

**leg II:** (CF) and (R) – without setae; (F) – vF, dF; (G) – l’G, dG; (T) – l’T, l’T’, vT, dT; (TA) – u’, u”’, vs, tc’, tc”’, p””, ω;

**leg III:** (CF) – 3b, 3c; (R) – without setae; (F) – dF; (G) – l’G; (T) – l’T, l’T’, dT; (TA) – u’, u”’, tc’, tc”’, p’, p”;

**leg IV:** (CF) and (R) – without setae; (F) – dF; (G) – without setae; (T) – l’T, l’T’, dT; (TA) – u’, u”’, tc’, tc”’.

**Tritonymph** (Figs. 14–19).

Total body length 555–605. **Gnathosoma.** Hypostomal apex rounded without protuberances. Lateral hypostomal teeth absent. Stylophore with weakly visible striae ornamentation, slightly constricted posteriorly, not reaching anterior margin of propodonotal shield, 150–155 long. Movable cheliceral digit edentate, 120–130 long. Each medial branch of peritremes with 1 chamber, each
lateral branch with 4–5 chambers (Fig. 19). Decompression opening visible. Chaetotaxy of gnathosoma: ao1, ao2, elcp, n. Chaetotaxy and solenidiotaxy of palps: tibiotarsus: dti, sul, l’ti, l”ti, acm, ul’, ul”, or; genu: dG; femur: dFI, l”F, vF; trochanter: without setae (Figs. 16, 17).

Idiosoma. Propodonotal shield well sclerotized, bearing setae vi, ve, si, se and c1; all propodonotal setae on margins of this shield. Setae se situated posterior to level of setae c1 or both setae at same transverse level. Hysteronotal and pygidial shields absent. Cuticular striations as in Figs. 14 and 15. Chaetotaxy of idiosoma: vi, ve, si, se, c1, c2, dl, d2, e2, f1, f2, h1, h2, ps1, ps2, ag1, ag2, g1. Lengths of idiosomal setae: vi 20–25, ve 40–50, si 60–85, se 160–170, cl 160–170, c2 150–165, d1 85–90, d2 90–105, e2 90–100, f1 30–40, f2 90–100, h1 40–50, h2 230–250, ps1 20–30, ps2 20–30, ag1 60–75, ag2 60–70, g1 20–25.

Legs. All four pairs of legs subequal in thickness. Tarsal setae a’, a”, tc’ and tc” of legs I as eupathidia. Chaetotaxy and solenidiotaxy of legs:

Figs. 14–19. Babophilus aluconis Nattress and Skoracki, tritonymph. (14) dorsal view; (15) ventral view; (16) palpa in dorsal view; (17) palpa in ventral view; (18) tarsus I in dorsal view; (19) peritremes.

Scale bar: Figs. (14, 15)=100µm; Figs. (16–19)=20µm
Female (Figs. 20–27).
Total body length 590–630. *Gnathosoma.*
Hypostomal apex rounded without protuberances. Lateral hypostomal teeth absent. Stylophore without striae ornament, constricted posteriorly, reaching anterior margin of propodonotal shield, 175–180 long. Movable cheliceral digit edentate, 135–140 long. Each medial branch of peritremes with 1 chamber, each lateral branch with 4 chambers (Fig. 23). Decompression opening visible. Chaetotaxy of gnathosoma: ao1, ao2, elcp, n. Chaetotaxy and solenidiotaxy of palps: tibiotarsus: dTi, sul, l'Ti, l"Ti, acm, ul', ul", ω; genu: dG; femur: dFI, l"F, vF; trochanter: without setae (Fig. 22).
Idiosoma. Propodonotal shield well sclerotized, bearing setae vi, ve, si, se and c1; all propodonotal setae on margins of this shield. Setae se situated posterior to level of setae c1. Hysteronotal shield narrow and apunctate, fused to pygidial shield, bearing bases of setae d1 and terminal setae f1, f2, h1 and h2. Cuticular striations as in Figs. 20 and 21. Chaetotaxy of idiosoma: vi, ve, si, se, c1, c2, d1, d2.
Legs. All four pairs of legs subequal in thickness. Tarsal setae a', a'', tc' and tc" of legs I as eupathidia. Chaetotaxy and solenidiotaxy of legs:

**leg I**: (CF) - 1b; (R) - l'; (F) - vF, dF; (G) - l'G, dG; σ; (T) - l'T, l"T, vT, dT, φ; (TA) - u'', vs, a'', a", te", fc, ft, p", p", ω;

**leg II**: (CF) and (R) - l'; (F) - vF, dF; (G) - l'G, dG; (T) - l'T, l"T, vT, dT; (TA) - u", vs, te".

**leg III**: (CF) - 3b, 3c; (R) - l"'; (F) - dF; (G) - l'G; (T) - l'T, l"T, dT; (TA) - u', u", tc', te'', p', p";

**leg IV**: (CF) - 4b, 4c; (R) - l'; (F) - dF; (G) - l'; (T) - l'T, l"T, dT; (TA) - u', u", tc', tc'', p', p''.

**Male** (Figs. 28–33).

Total body length 515–565. **Gnathosoma.** Each medial branch of peritremes with 1 chamber, each lateral branch with 5–6 chambers (Fig. 29). Length of stylophore and movable cheliceral digit 160–170 and 135 respectively. Chaetotaxy of gnathosoma: as in female.

**Idiosoma.** Propodonotal shield weakly sclerotized, sparsely punctate at lateral margins, bearing bases of setae vi, ve, si and c1, setae se on or near this
shield. Length ratio of setae vi:ve:si 1:2.3:2–4. Hysteronotal shield apunctate, weakly sclerotized in anterior part, striae visible, fused to pygidial shield, bearing bases of setae d1, e2, f2 and h2. Setae d2 about twice as long as d1 and e2. Genital setae g1 situated anterior to level of setae g2, both pairs subequal in length. Pseudanal setae ps1 and ps2 subequal in length. Length ratios of setae ag1:ag2 2:1. Chaetotaxy of idiosoma: vi, ve, si, se, c1, c2, d1, d2, e2, f2, h2, ps1, ps2, ag1, ag2, g1, g2. Lengths of idiosomal setae: vi 20–30, ve 45–55, si 80–100, se 165, c1 180–190, c2 130–140, d1 20–30, d2 40–65, e2 20–25, f2 30, h2 280–320, ag1 85–90, ag2 45–50.


Discussion

Quill mite species, *Bubophilus aluconis* has been known only from type host – *Strix aluco* from England and up to now there were no other data. In our studies we unexpectedly recorded this syringophilid species inside quill feathers of *Asio otus* which is a type host for the other *Bubophilus* species – *B. asiobios*. Both quill mite species can be simply distinguished by the lengths of propodonotal setae vi, ve and si and by their length ratio [7,8]. The mixed quill mite species on *A. otus*, may be a result...
of host switching. Both owl species may coexist in the same kind of habitat e.g., simultaneous nesting in the farm building complexes, or territorial occupation during the breeding period [13].

The scheme of the ontogenesis for the genus *Bubophilus*

Until now, the scheme of ontogenesis has been presented in detail for only *Mironovia lagopus* Bochkov and Skirnisson, 2011. Our studies of the juvenile stages of *B. aluconis* show that the development is similar to the scheme noted for *M. lagopus* [14].

**Gnathosoma.** In all stages the gnathosoma is well developed and represents a compact formation consisting of the acron remnants, palps and the chelicerae. Directed forward the movable cheliceral digits are elongate, retractable and flexible structures transformed into the stylets. The length of these stylets is subequal in all juvenile and adult stages (Table 2). This functional adaptation permits feeding in all developmental stages [15]. In syringophilids, like in other Cheyletoidea, both the cheliceral bases are completely fused to one another and with the infracapitulum, forming a stylophore capsule. The successive growth of the stylophore capsule in the following immature stages is observed (Table 2). Because the gnathosoma is deeply bounded into the idiosoma, the posterior part of the stylophore is represented by the apodeme. This apodeme is constricted in all developmental stages. The bottom of the gnathosomal tube, termed as infracapitulum has a pair of ventral infracapitular setae (*vi*) and a small decompression opening. Setae *vi* are absent in the larval stage. Dorso-lateral parts of the gnathosoma, at the level of the peritremes, bear small supracoxal setae of palps (*elcp*). The

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**Table 2. Comparison of measurements of morphological characters of all stages of *Bubophilus aluconis* based on material from the Long-eared Owl *Asio otus* from Poland**

<table>
<thead>
<tr>
<th></th>
<th>larva (n=7)</th>
<th>protonymph (n=10)</th>
<th>tritonymph (n=10)</th>
<th>female (n=10)</th>
<th>male (n=7)</th>
</tr>
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<tbody>
<tr>
<td>Total body length</td>
<td>305–335</td>
<td>400–505</td>
<td>555–605</td>
<td>590–630</td>
<td>515–565</td>
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<td>Length of stylophore</td>
<td>120–125</td>
<td>130–135</td>
<td>150–155</td>
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<td>Length of chelicerae</td>
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<td>120–140</td>
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<td>90–120</td>
<td>160–170</td>
<td>240–250</td>
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<tr>
<td><em>c1</em></td>
<td>70–75</td>
<td>100–130</td>
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<td>75–95</td>
<td>150–165</td>
<td>220–240</td>
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<td>75–80</td>
<td>85–90</td>
<td>170–190</td>
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<td>60–65</td>
<td>75–80</td>
<td>90–100</td>
<td>180–190</td>
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<td><em>f1</em></td>
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<td>40–45</td>
<td>30–40</td>
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<tr>
<td><em>f2</em></td>
<td>40–45</td>
<td>80–100</td>
<td>90–100</td>
<td>180–190</td>
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<td><em>h1</em></td>
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<td>–</td>
<td>40–50</td>
<td>40–50</td>
<td>–</td>
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<tr>
<td><em>h2</em></td>
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<td>–</td>
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<td>50–55</td>
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<td><em>g2</em></td>
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<td>–</td>
<td>–</td>
<td>50–60</td>
<td>5</td>
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<td>–</td>
<td>60–70</td>
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<tr>
<td><em>ag3</em></td>
<td>–</td>
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<td>–</td>
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infracapitulum, as well as the dorsal surface of the stylophore is smooth. The medio-ventral part of the infracapitulum, namely the hypostome, is formed by the gnathocoxal projections. In syringophilids, the hypostome is almost completely fused with the stylophore [16]. The hypostomal apex takes different shapes in various genera. In Bubophillus its rounded and devoid lateral sclerites termed the lateral hypostomal teeth in all stages. The mouth is flanked by two pairs of adoral setae (ao1 and ao2).

The proper palps are basically similar to leg-like structures. They consist of four segments: trochanter, femur, genu and tibiotarsus, which are provided with mechano- and chemosensory sensilla (Figs. 3A–D and 4A–D). Palps are tactile organs and probably the main appendages determining locality of specific habitat on an avian host [3]. Well defined chaetotaxy is stable for the family, include tigmotactic setae on all free podomers except trochanters, a pair of eupathidia (ul and ul’) and one small solenidion omega (ω) on tibiotarsus. In the ontogenesis, palps of larvae have no setae vF, l”F and l”G (Figs. 6,7), in protonymphs setae vF and l”G are absent (Figs. 10,11), whereas tritonymphs have a full complement of setae (Figs. 16,17). The setae of juveniles (especially dorsal setae) show gradual growth in ensuing stages.

The respiratory structures, like stigmata (respiratory openings) and peritremes (external gutter-like structures) are situated in the middle part of the stylophore. The peritremes are similar in shape and number of chambers in each branch in all developmental stages.

Idiosoma. The idiosoma of syringophilids is divided into propodosoma and hysterosoma by the remnants of the sejugal furrow. Both shields covering the propodonotal and hysteronotal regions are present in adult stages (Figs. 20,32), whereas immature stages possess only weakly developed propodonotal shield (Figs. 2,8,14).

Chaetotaxy of dorsal idiosoma. This species like the most of members of Syringophilinae have filiform smooth setae. It is likely that very long dorsal setae in adult females excepting their tigmotactic function also help to attach them to the host [3]. Dorsal setae show successive growth in length in ensuing immature stages. The propodonotum bears six pairs of setae: vi, ve, si, se, c1 and c2. On the hysteronotum three pairs of hysteronotal setae, d1, d2 and e2, and four pairs of setae situated on the terminal part of the body, f1, f2, h1 and h2 are present. In males, the terminal setation is represented by two pairs of setae f2 and h2. In larvae and protonymphs setae h1 are absent (Figs. 2,8). Tritonymphs have the full complement of dorsal setae (Fig. 14).

Venter of the idiosoma. The ventral side has no sclerites. The intercoxal region comprises two pairs of setae 1a and 3a which are present in all stages. Bubophillus aluconis is a member of neotrichous species where the opisthogastric region bears three pairs of the aggenital setae (ag1–3). In this case, larvae have no aggenital setae, protonymphs possess only setae ag1, and tritonymphs bear the two pairs of the aggenital setae, ag1 and ag2. In adult females, setae ag3 are added (in males, setae ag3 is absent).

Genito-anal region. The anal and genital orifices are coalased. In females it is situated terminally and covered by a pair of distinct valves, whereas in males, it is placed dorso-terminally, and is covered by a pair of small, oval valves (Fig. 32). In Bubophillus, like most genera of syringophilins, the genito-anal region bears two pairs of the pseudanal setae (ps1–2) and two pairs of the genital setae (g1–2). Larvae and protonymphs possess only pseudanal setae (genital setae are absent). In tritonymphs setae g1 are added, and in adults, setae g2 are added.

Legs. All legs of all stages are subequal in thickness and consist of, apart from the coxal fields, five articulated segments, well defined in all stages: trochanter, femur, genu and tibiotarsus. The first and second pairs of the legs are orientated anteriorly, whilst the other two pairs take a posterior direction. Each tarsus bears an empodium at its distal end. It comprises a pair of lateral claws and an empodium bearing numerous tenent hairs (Fig. 24). The paired claws are similar in the shape and size and without basal angle. The empodium is fleshy with numerous tenent hairs in all stages. The coxae are fused with idiosoma and represented by the coxal fields delineated from the idiosomal surface by the coxal apodemes clearly visible in protonymph-adult stages. External surface of the coxal fields is smooth or sparsely punctate.

Chaetotaxy and solenidiotaxy of legs. Leg setae are filiform. Coxal fields (CF). In larval stages only coxal fields I–III appear, whilst in adults the
setae l’RIV are added. Femur (F): In all postembryonic stages femur of legs I and II have one dorsal (dF) and one ventral setae (vF), femur of legs III (in larva and postlarval stages) and IV (in postlarval stages) possess only one dorsal setae (dF). Genua (G): Larvae have on the genua of legs I–III only lateral setae l’G, in protonymph setae dGI–II are added, in tritonymphs setae l’GIV are added. In all known species and their all postembryonic stages, genua of first pair of legs bear a bulb-like solenidion sigma. Tibiae (T): The typical pattern of tibia chaetotaxy for all stages is one dorsal (dT), one ventral (vT), two lateral setae (l’T and l”T) on legs I and II, and the same pattern, except setae l”T (which is absent) on tibia III–IV. All stages have on the tibiae of legs I a cylindrical solenidion phi. Tarsi (TA): On tarsi I and II, cylindrical solenidion omega is present in all stages. Chaetotaxy of tarsus I in tritonymphs and adult stages is represented by ten setae: three ventral (a’, u’ and vS) and seven dorsal – among them four rod-like euphatidial setae a’, a”, tc’ and tc”, two fan-like setae p’ and p” with well developed tines and unpaired setiform fastigial setae f. Tarsus I in larval stage lacks the fan-like setae p, and tectals setae (tc) are hair-like (Fig. 5). In protonymph setae p” are added and tectals setae (tc) are rod-like. In tritonymph setae p’ are added. In protonymphs and adult stages tarsus II bears seven setae: three ventral (u’, u” and vS) and four dorsal setae, one pair of fan-like setae p’, p” and one pair of filiform setae tc’, tc”. Larvae are devoid fan-like setae, in protonymph setae p” are added and in tritonymph setae p’ are added. Tarsus III and IV in tritonymphs and adults possess two setae on the ventral side (u’ and u”) and four setae on the dorsal side (tc’, tc”, p’ and p”). In protonymphs, fan-like setae on tarsus IV are absent. They are also lacking on tarsus III in larval stage.

The scheme of chaetotaxy development of Bubophilus is similar to genus Mironovia. In both genera, the protonymphs possess only setae p” on tarsi I and II, compared to genera like Syringophilus Haller and Colionophilus Kethley, where both setae p’ and p” on tarsi I and II are present [13,17].

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References


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