Zootaxa 1546: 63–68 (2007)
www.mapress.com/zootaxa/

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

Ptiliola flammifera (Młynarski) reinstated as a species distinct from *P. kunzei* (Heer) (Coleoptera: Ptiliidae)

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Abstract

Ptiliola flammifera (Młynarski) is recognised as a species distinct from *P. kunzei* (Heer). Apart from differences in the structure of the aedeagus, both species can be separated by the pronotal surface and the apical fringe of the elytra. The male of *P. flammifera* carries a distinct tuft of hairs on the metaventrite, absent in *P. kunzei*. Currently, *P. flammifera* is only known from Poland and the Netherlands. A key for the identification of all three Palaearctic *Ptiliola* species is presented. A lectotype is designated for *Trichopteryx kunzei* Heer, 1841.

Key words: Ptiliidae, featherwing beetle, *Ptiliola*, Palaearctic region, identification key, lectotype designation

Introduction

The ptiliid genus *Ptiliola* Haldeman, 1848, includes minute beetles measuring about 0.6 mm. For a long time it was named *Nanoptilium* Flach, 1889, and treated as a subgenus of *Ptiliolum* Flach, 1888. Generic rank was attributed by Besuchet (1971), based on elytral structure, spermathecal morphology and the pygidium, which in *Ptiliola* is ornated with a single spine only. *Ptiliola* was erected by Haldeman (1848) for the four species of Gillmeister's "IV. Gruppe" [= fourth group] of *Trichopteryx*, the only ptiliid genus then recognized (Gillmeister 1845). Amongst them is *Trichopteryx nana* Stephens, 1830 (listed as a *nomen oblitum* by Johnson (2004) and generally considered a senior synonym of *Trichopteryx kunzei* Heer, 1841), that was designated as the type species of the genus *Ptiliola* by Motschulsky (1869). Biström and Silfverberg (1979) argued that *Ptiliola* was the valid name of the genus, and that it had to replace the junior synonym *Nanoptilium*, which by original monotypy has *Trichopteryx kunzei* Heer as type species.

In the Palaearctic region two valid species are currently recognised (Johnson 2004): *Ptiliola kunzei* (Heer, 1841) and *P. brevicollis* (Matthews, 1860). Both species have also been reported from North America (Johnson 1990; Sörensson 2003). The first one is considered a true Holarctic element, while *P. brevicollis* is of uncertain origin (Sörensson 2003).

Nanoptilium flammiferum and *N. aequisetum*

Młynarski (1985) described two new species in his treatment of the Polish species of *Ptiliola* (then *Nanoptilium*). He recognized *P. flammifera* (Młynarski, 1985) and *P. aequiseta* (Młynarski, 1985) in addition to *P. kunzei* and *P. brevicollis*. Judging from the original descriptions and especially the pronotal shapes figured, both species should be very close to *P. kunzei*. The species were separated from *P. kunzei* by the type of male metasternal pubescence, subtle differences in pronotal shape and characteristics of the apical fringe of the

Accepted by V. Gusarov: 2 Jul. 2007; published: 9 Aug. 2007

elytra. Some of these characters are unconventional in ptiliid taxonomy. There are no records published of those two species since.

Recently, Johnson (2003) concluded that both "species" should be considered forms and therefore synonyms of *P. kunzei*. His judgement was based on careful consideration of the original descriptions, which do not mention differences in the male genitalia nor spermathecae, and the observation that "male European specimens of *Ptiliola kunzei* seen by me have pubescence characters of *aequiseta*". Unfortunately, type specimens of both species were not accessible for study.

Recently, I got hold of several specimens of a *Ptiliola* species different from *P. brevicollis* and *P. kunzei*, that matches the description of *P. flammifera*. Close examination revealed additional differential characters in pronotal structure and aedeagus indicating that *P. flammifera* should be reinstated as a proper species.

Depositories

cMS	Collection M. Sörensson, Lund, Sweden
cOV	Collection O. Vorst, Utrecht, The Netherlands
MHNG	Muséum d'Histoire Naturelle, Genève, Switzerland (G. Cuccodoro)
RMNH	National Museum of Natural History, Naturalis, Leiden, The Netherlands (A. van Assen)
WML	World Museum Liverpool, United Kingdom (G. Knight)
ZMAN	Zoological Museum, Amsterdam, The Netherlands (B. Brugge)

***Ptiliola flammifera* (Młynarski, 1985)**
(Figs. 1, 4, 5, 7, 10)

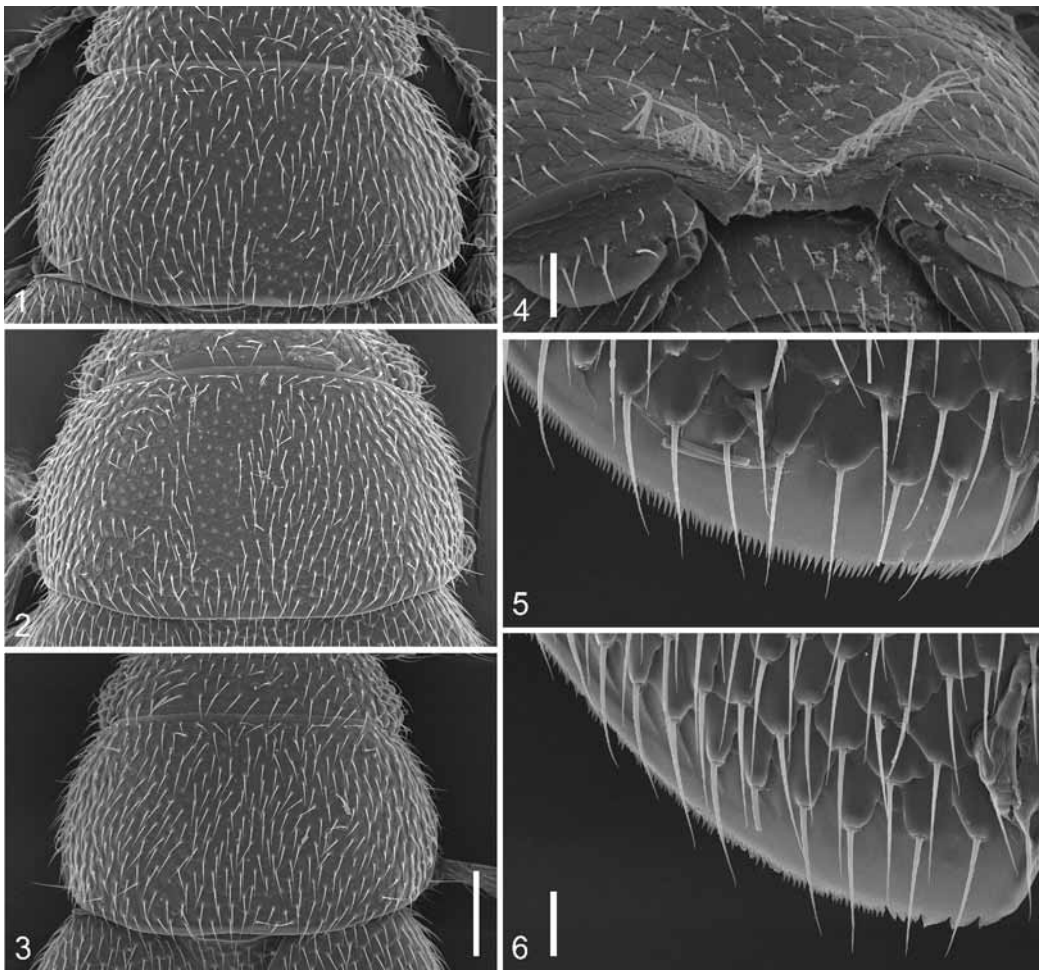
Material studied. THE NETHERLANDS: Prov. of Gelderland: 2 exx, De Imbosch, Nieuwe Aanleg, UTM GT024723, 7.vi.2002 (♀), 28.viii.2002 (♂), carcass of Highland cattle in *Pinus* plantation, O. Vorst (cOV); 2 exx, De Imbosch, Veertien Bunder, UTM GT0472, 30.viii.2002 (♂), 19.xi.2002 (♀), carcass of wild boar in mixed forest, O. Vorst (cOV); ♀(cf *P. flammifera*), Doorwerth, 2.iv.1923, Van der Wiel (ZMAN); ♀, Loenen, Loenermark, UTM GT049742, 7.vi.2002, carcass of Highland cattle in dense *Pseudotsuga* stand, O. Vorst (cOV); 6 exx, Worth-Rhederzand, Tunnekes, UTM KC947701, 18.iv.2003 (♀), 9.v.2003 (2 ♂♂ [Figs. 1, 4, 5, 7, 10], 3 ♀♀), carcass of Highland cattle in open *Pinus* forest, O. Vorst (cOV).

Diagnosis. Very similar in general shape and overall appearance to *P. kunzei*. Size (labrum to apex of elytra): 0.60–0.66 mm (average 0.63 mm, N = 7).

Pronotal pubescence is less dense than in *P. kunzei*; reticulation on the pronotum is somewhat coarser and less pronounced, especially towards the frontal margin (Figs. 1, 2). As a result, the overall appearance of the pronotum, when studied under reflecting light, is more shiny. The same is true for the dorsal surface of the head.

The apical margin of elytra ornated with a regular 2.5-3.0 µm long fringe (Fig. 5). In *P. kunzei* the fringe is finer and more dense, measuring only 1.5-2.0 µm; towards the suture the fringe is fused to form a few characteristic brush-shaped structures (Fig. 6). The structure of the elytral fringe is best studied by transmitted light microscopy at high magnification (300 X) with the object in a matrix (e.g. water or a resin), or by scanning electron microscopy. Spermatheca is very similar to that of *P. kunzei*.

Male aedeagus is smaller than in *P. kunzei* (Figs. 7, 8); the aedeagal sclerites are differently shaped, in ventral view more stout, in lateral view more curved than in *P. kunzei* (Figs. 10, 11). Male metaventrite (in Coleoptera this structure is—erroneously—known as metasternum, cf Beutel & Leschen 2005) is smoothly excavated, apically bordered by a distinct tuft of erect hairs (Fig. 4); the excavation and the tuft are absent in *P. kunzei*.



FIGURES 1–6. Scanning electron micrographs of *Ptiliola flammifera* (1, 4, 5), *P. kunzei* (2, 6) and *P. brevicollis* (3). 1–3. Pronotum, scale bar 50 μm; 4. Male metaventrite, scale bar 20 μm; 5, 6. Apical fringe of elytra, scale bar 10 μm.

Although no syntypic material was studied, the identity of this species seems without doubt. The tuft of hairs on the metaventrite in the male (Fig. 4) and the structure of the apical fringe of the elytra (Fig. 5) closely match the figures in the original description (Młynarski 1985).

Bionomics. The amount of material at hand does not allow drawing firm conclusions about the ecological preferences of *P. flammifera*, but it seems to be generally associated with decaying organic material. Although all Dutch records are from carcasses of larger mammals this result is biased by the fact that little other potential habitats were sampled from these localities. In Poland, the species has been reported from decaying hay and horse droppings (Młynarski 1985). Possibly a forest species.

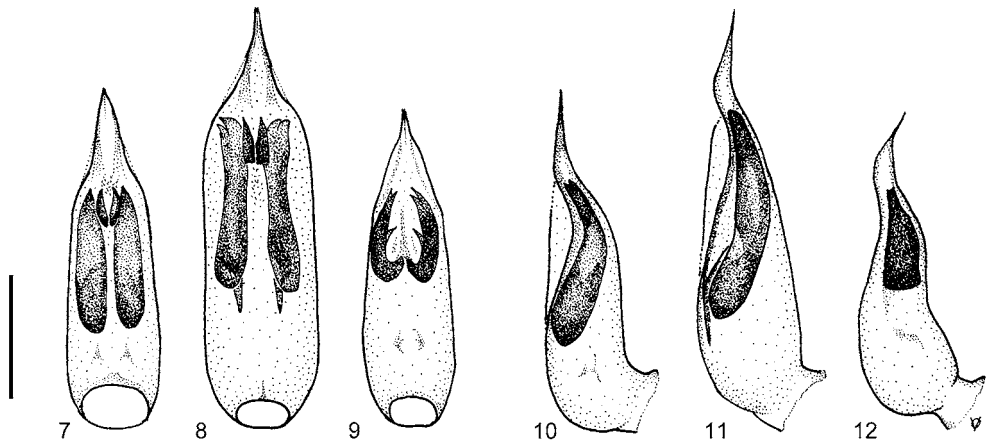
Distribution. So far only known from Poland (Młynarski 1985) and the Netherlands, but probably of wider distribution.

***Ptiliola kunzei* (Heer, 1841)**
(Figs. 2, 6, 8, 11)

Type material. Lectotype (by present designation)**:** ♀: [no original label], "Lectotypus / *Trichopteryx kunzei* Heer, 1841 / design. O.Vorst 2007" (WML, Collection F. Chevrier). **Paralectotypes:** 2 exx: [no original label], "Paralectotypus / *Trichopteryx kunzei* Heer, 1841 / design. O.Vorst 2007" (WML, Collection F. Chevrier).

Additional material studied. THE NETHERLANDS: Prov. of Drenthe: 2 ♀♀, Anderen, Eexterveld, UTM LD4647, 29.v.2005, cattle dung in grazed heath land, O. Vorst (cOV); 2 ♂♂ [Figs. 2, 6, 8, 11], 2 ♀♀, Dwingeloosche Heide, UTM LD2452, 6.ix.2003, cattle dung in grazed heath land, Vorst (cOV); 2 ♀♀, Uffelte, Oosterzand, UTM LD1554, 26.viii.2006, cattle dung in grazed heath land, Vorst (cOV); Prov. of Gelderland: ♀, Apeldoorn, Kerkhoven (RMNH); Prov. of Utrecht: ♀, Doorn, .viii.1888, Neervoort van de Poll (RMNH); Prov. of Zuid-Holland: ♂, Den Haag, v [May], Everts (RMNH); Prov. of Noord-Brabant: ♂, Westelbeers, Landschotsche Heide, 11.vi.2006, horse dung in forest, Vorst (cOV); Prov. of Limburg: ♂, Neercanne, 17.x.1950, Excursion St. Pietersberg (RMNH); 1 ♂ 2 ♀♀, St. Pietersberg, 23.iii.1950, Excursion St. Pietersberg (RMNH); 2 ♂♂, Weert, .vi.1919, MacGillavry (ZMAN). **GERMANY:** Niedersachsen: 3 exx, Aldrup, 25.vi.1959 (♂), 28.iv.1962 (♀), 6.x.1962 (♂), Kerstens (RMNH); Saarland: ♀, Nennig, 8.vi.1996, heap of decaying hay, Vorst (cOV). **SWITZERLAND:** Genève: ♂, 3 exx, La Plaine, 19.ix.1983, rotting plant material, Besuchet (MHNG); Vaud: ♂, ♀, 6 exx, Bussigny, 6.vi.1953, horse droppings, Besuchet (MHNG). **LATVIA:** Valga Distr.: ♀, Mežmuiža, Rauza River, UTM MD3959,14.vi.2005, river bank in *Alnus* forest, Vorst (cOV). **FINLAND**: Oulu Prov.: ♂, 2 ♀♀, Hiidenportti National Park, UTM PL0286, 2.viii.2006, decaying boletes in mixed forest, Vorst (cOV); Prov. of Western Finland: ♂, 2 ♀♀, Lahdenkylä, UTM MJ1070, 4.viii.2006, horse droppings in forest, Vorst (cOV).

Remarks. Heer (1841) attributed *Trichopteryx kunzei* in his "Fauna Coleopterorum Helvetica" to Chevrier, who, however, never published this manuscript name. The type locality was cited as Genf (= Geneva). No syntypic material of this species could be traced in the collections of the Eidgenössische Technische Hochschule Zürich (M. Schmid, personal communication), where the Heer collection is preserved, nor in MHNG (G. Cuccodoro, personal communication). In the Chevrier collection, kept at WML, there are three unlabelled specimens standing as *Ptilium kunzei*. From Chevrier's catalogue that accompanies his collection it becomes clear that these should be treated as syntypes. The entry under "Kunzei Mihi" reads: "G. HFH.", where "G." is used as shorthand for Geneva and "HFH." most likely stands for Heer's Fauna Helvetica. The three specimens are conspecific and fit the current interpretation of *Trichopteryx kunzei*. A female specimen, whose identity could be confirmed by the apical fringe of the elytra, is herewith designated as lectotype.



FIGURES 7–12. Aedeagi of *Ptiliola flammifera* (7, 10), *P. kunzei* (8, 11) and *P. brevicollis* (9, 12) in ventral (7–9) and lateral (10–12) view. Scale bar 50 μm.

***Ptiliola brevicollis* (Matthews, 1860)**
(Figs. 3, 9, 12)

Material studied. THE NETHERLANDS: Prov. of Groningen: ♂ [Figs. 3, 9, 12], 4 ♀♀, Overschild, Schildmeer, UTM LE5506, 18.ix.2004, heap of decaying grass, Vorst (cOV); Prov. of Overijssel: ♀, Fort-

mond, Duursche Waarden, UTM LD0306, 24.iv-14.v.1998, window trap at river meadow, Vorst (cOV); ♀, Weerribben, Woldakkers, UTM GU0153, 31.viii.2001, heap of old hay and reeds, edge of *Alnus* forest, Vorst (cOV); Prov. of Limburg: ♀, Urmond, UTM FS9552, 22.viii.2000, heap of horse manure, forest edge, Vorst (cOV). **GERMANY:** Saarland: 2 ♀♀, Nennig, 8.vi.1996, heap of decaying hay, Vorst (cOV). **LATVIA:** Krāslava Distr.: 1 ex, Šķeltiņi, 1.viii.1995, A. Barševskis (cOV). **POLAND:** Śląsk Voivodship: ♀, "Silesia, Teschen" [= Cieszyn], Th. von Wanka (RMNH). **SWEDEN:** Uppland: ♂, Storvreta, 30.x.1993, A. Lindelöw (cMS).

Key to the Palaearctic species of *Ptiliola*

1. Smaller, length (labrum to elytral apex) usually less than 0.59 mm; pronotum less transverse, sides more rounded, posterior angles little defined (Fig. 3). Male: aedeagal sclerites not reaching half the length of the aedeagus, strongly sclerotized (Figs. 9, 12); metaventrite simple ..... *P. brevicollis* (Matthews)
- Larger, length usually more than 0.59 mm; pronotum more transverse, sides less rounded, somewhat narrowed anteriad (Figs. 1, 2). Male: aedeagal sclerites larger, more than half the length of the aedeagus, sclerotization weaker (Figs. 7, 8, 10, 11); metaventrite simple or ornated with a tuft of hairs (Fig. 4) 2
2. Apical fringe of elytra regular and somewhat wider (Fig. 5) (this character is best appreciated by transmitted light microscopy). Pronotal reticulation somewhat coarser and less pronounced, especially towards the frontal margin (Fig. 1); as a result the overall appearance of the pronotum, when studied under reflecting light, more shiny. Male: aedeagus smaller; aedeagal sclerites in ventral view more stout (Fig. 8); metaventrite smoothly excavated, apically bordered by a distinct tuft of erect hairs (Fig. 4) .... *P. flammifera* (Młynarski)
- Apical fringe of elytra more narrow, towards the suture fused to form a few brush-shaped extensions (Fig. 6). Pronotal reticulation somewhat finer and more pronounced (Fig. 2); as a result the overall appearance more dull. Male: aedeagus larger; aedeagal sclerites in ventral view more slender, somewhat contracted in the middle (Fig. 7); metaventrite simple..... *P. kunzei* (Heer)

Discussion

The present study shows that the recently synonymized *Ptiliola flammifera* is a valid species distinct from *P. kunzei*. Młynarski (1985) used somewhat unconventional characters when describing *P. flammifera* and *P. aequiseta*, including the apical fringe of the elytra. At the same time other, widely accepted ones, like the excavation of the male metaventrite and aedeagal and spermathecal characters were ignored. The main reason for this apparently is that he based his studies on slide mounted rather than dry-mounted specimens, a method which is unusual for European workers. Only in material prepared this way the apical fringe of the elytra is easily observed.

Ptiliola aequiseta, the second species described by Młynarski (1985), seems to be correctly synonymized with *P. kunzei* (Johnson 2003). It is clear from the original description that the supposed differences from *P. kunzei* are much more subtle than in *P. flammifera*. The pronotal shape and the apical fringe of the elytra are described as identical in both species. The slight differences mentioned are in pubescence of both male and female metaventrite only (Młynarski 1985). The genitalia were not illustrated.

Acknowledgements

I would like to thank A. van Assen (RMNH), B. Brugge (ZMAN), G. Cuccodoro (MHNG), G. Knight (WML) and M. Sörensson (Lund) for the loan of material; J. Goud and C. van den Berg (RMNH) for preparing the scanning electron micrographs, and A. ten Hoedt, J. Potkamp and H. van Dijk of Vereniging Natuurmonumenten for giving permission to study the beetle fauna at "Veluwezoom" and providing assistance afield.

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