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Revision of European *Pseudacteon* Coquillett (Diptera, Phoridae)

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Abstract. European species of *Pseudacteon* Coquillett (1907) are reviewed. *Pseudacteon claridgei* sp. n. is described from France and *P. tubiceroides* sp. n. from Hungary. *P. palpatus* Schmitz is synonymised with *P. brevicauda* Schmitz and *P. lusitanus* Schmitz is synonymised with *P. lundbecki* Schmitz. A new key to the European species is provided.

Key words. Diptera, Phoridae, key, new species, new synonyms.

Introduction

The genus *Pseudacteon* Coquillett (1907) is increasingly becoming the subject of research on account of the habits of the larvae as parasitoids of ants. However, our knowledge of the European species is currently chaotic. The only key (Schmitz 1938) has proved to be more of a hindrance than a help in the recognition of the species. This is because most of the latter have been poorly characterised, and usually then only sufficiently for unequivocal recognition in one sex, and the characters employed in the key (e.g. haltere colour and costal indexes) are far more variable than had been realised. Furthermore these tiny flies (typically around 1.5 mm long) have traditionally been mounted on micropins. This not only impedes the perception of critical details but has also meant that some type specimens have not survived intact, if at all.

These tiny flies are evidently somewhat variable but, apart from the widespread *P. formicarum*, good series of each species are lacking. The occasional partial or complete development of vein 2 (R_{2+3}) was reported by Schmitz (1938). While it is axiomatic that every specimen is unique, the variation in these flies is such that a typologist might be tempted to assign every specimen to its own species! Of particular interest, therefore, is variation between the two sides of the same fly. Thus the palp bristles can vary in size and number. For example the small bristle in the basal half of the palp in Fig. 2 was absent from the palp on the other side of the same specimen. Likewise the apical bristle of the other palp was subequal to the preapical bristle. It is necessary, therefore, to use one's experience of the family as a whole in order to exercise judgement with regard to the significance of the variation encountered in the far from adequate series of specimens that are currently available for study. More so than usual, therefore, the conclusions reported below should be regarded as working hypotheses only.

On a world basis species recognition in this genus is based upon the females in the first instance. Males should no longer be named before they have been associated with their females, unless they possess some obvious feature that is not subject to

sexual dimorphism. The variety of forms exhibited by the female abdominal terminalia has proved to be invaluable in the recognition of the numerous Neotropical species (Borgmeier 1969). It is unfortunate, therefore, that the European species all possess ovipositor segments of essentially the same form.

In the present study all specimens have been mounted on slides, mostly in Berlese Fluid but some remounted museum specimens in Euparal (Disney 1994). Critical pinned specimens from museum collections have been remounted on slides after treatment in Barber's Fluid for 24 hours (Disney 1983).

Type specimens and other voucher material are deposited in the following museums: Museum Koenig, Bonn (ZFMK), Natural History Museum, London (NHM), University Museum, Oxford (UMO), Zoological Museum, Helsinki (ZMH) and University Museum of Zoology, Cambridge (UMZC).

Notes on Species

Pseudacteon brevicauda Schmitz

Pseudacteon brevicauda Schmitz 1925: 23, Holotype female, Germany: Schönebeck a. d. Elbe, Prov. Sachsen (apparently lost).

Pseudacteon palpatus Schmitz 1938: 169, Holotype female, Portugal: Landim (Famalicão) Caldas, 26 June 1938 (ZFMK) [Examined]. Syn. nov.

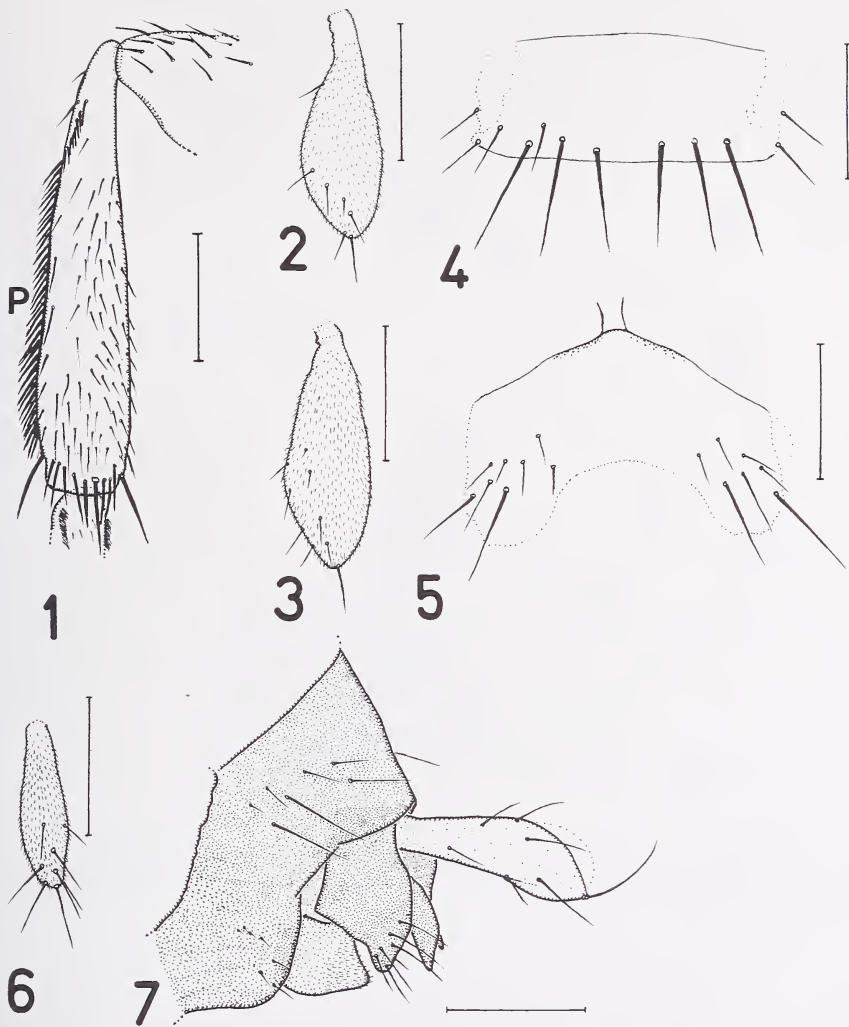
Donisthorpe (1927) reported this species from England, his specimens being identified by Schmitz. Collin also collected this species in England and I have previously used his specimens (in UMO) as voucher material for this species (Disney 1983), after remounting two males from Woodditton Wood (10 July 1952) to compare with freshly caught material of both sexes. I have now remounted a further male and three females from the Collin Collection. I have also remounted the female holotype of *P. palpatus* and find it to be indistinguishable from the females of *P. brevicauda*. Schmitz (1938) distinguished *P. palpatus* on the basis of the haltere being entirely dark, in contrast to distal two thirds of the knob of the haltere of *P. brevicauda* being variably pale. This difference, however, proves to be the two ends of a single spectrum of variation. Several specimens are intermediate. I therefore herewith synonymise *P. palpatus* with *P. brevicauda*. Critical features are depicted in Figs 1–7.

Material examined: Female holotype of *P. palpatus* from Portugal (see above); 2 females, 4 males, Yugoslavia, Slovenia, 13 July – 1 August 1958, R. L. Coe (NHM – BM1958–417); 1 female, 2 males, England, Woodditton Wood, 14 July 1951, 10 July 1952, 1 female Chippenham Fen 26 June 1950, 1 female, 1 male Barton Mills, 6 July 1953, J. E. Collin (UMO); 3 females, England, Surrey, Juniper Top, grid ref. 51/1852, 10 July 1978, R. H. L. Disney (UMZC); 3 females, 3 males, England, New Forest, Keeping Copse, grid ref. 41/399009, 26 June – 3 July 1984, G. Forrester (UMZC).

Natural history: Recorded ant hosts are *Myrmica ruginodis* Nylander (Donisthorpe 1927) and *M. scabrinodis* Nylander (Disney 1979).

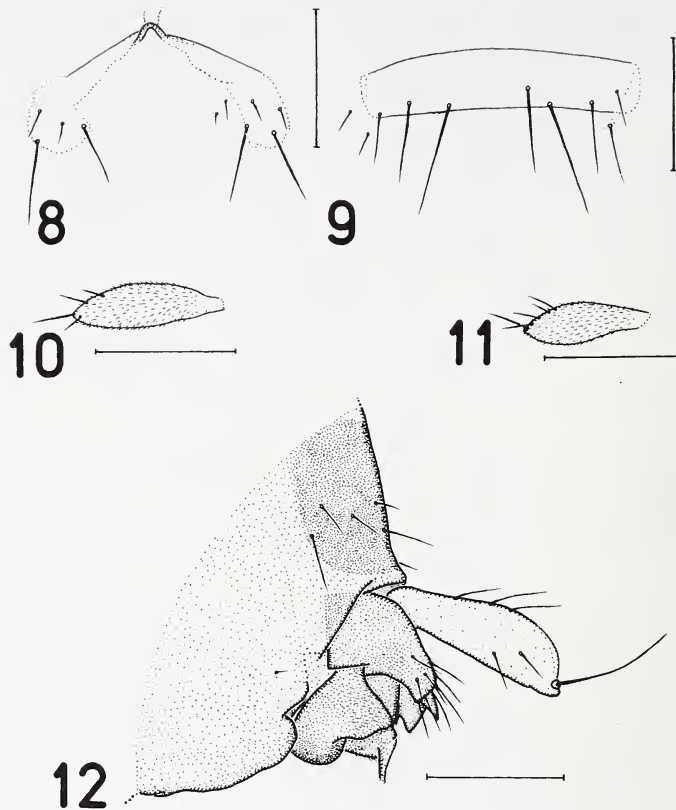
Pseudacteon claridgei sp. n.

Female (Figs 8–10): Frons brown. Width at level of front margin of anterior ocellus about 1.8–1.9x distance between this ocellus and supra-antennal bristles, and



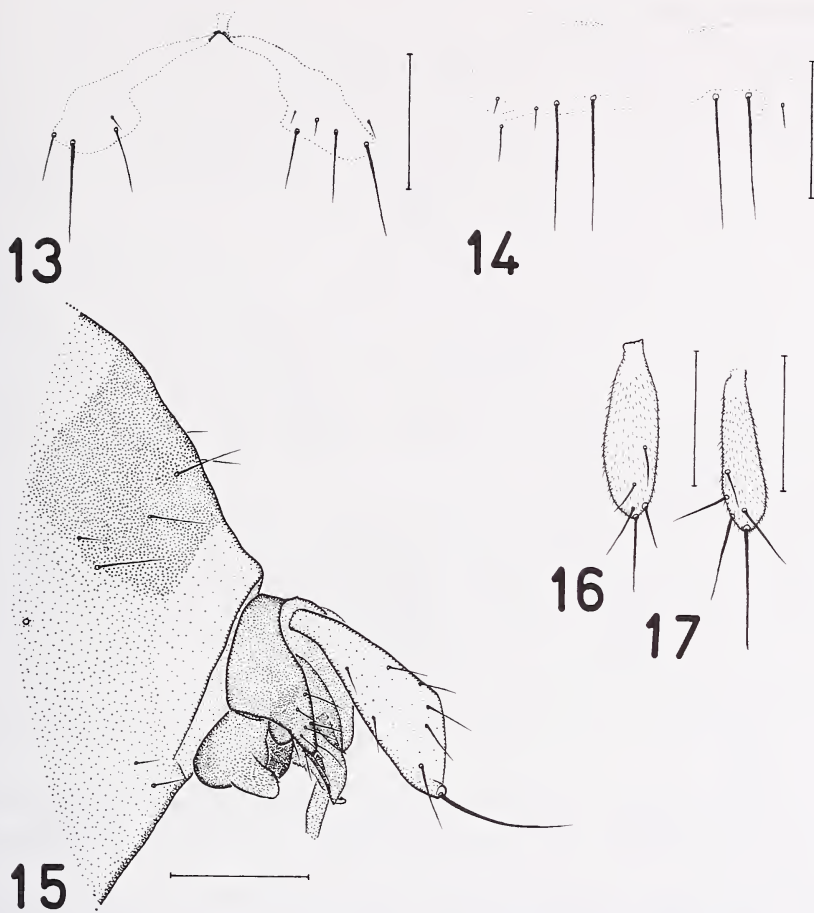
Figs 1–7: *Pseudacteon brevicauda*. 1 – posterior face of hind tibia of female (p = dorsal longitudinal hair palisade), 2–3 – palps of two different females, 4 – female abdominal sternite 6, 5 – female abdominal tergite 6, 6 – male palp, 7 – left face of male hypopygium (Scale bars = 0.1 mm).

at level of these SA's only about 1.1–1.2x this distance. Apart from pair of SA bristles and pair of ocellar bristles, with 2–4–4–4 bristles; the two middle rows being concave towards the front (one specimen has a supernumerary bristle to give a formula of 2–1–4–4–4). With 18–28 hairs plus 2 on ocellar triangle. Eyes with lowest ommatidia a little larger than uppermost. The somewhat pear-shaped third antennal segment and arista light brown. Palp pale, very lightly tinged brown, and as Fig. 10.



Figs 8–12: *Pseudacteon claridgei*. 8 – female abdominal tergite 6, 9 – female abdominal sternite 6, 10 – female palp, 11 – male palp, 12 – male left face of abdominal segment 6 and hypopygium (Scale bars = 0.1 mm).

Proboscis pale yellow apart from dark tip to glossa. Thorax brown. Each side of scutum with a short humeral bristle, two longer bristles on notopleuron, a longer intra-alar, an even longer post-alar and a weaker pre-scutellar dorsocentral bristle. Scutellum with an anterior pair of weak bristles and a posterior stronger pair ($>1.6x$ as long as anterior pair). Abdominal tergites brown with minute sparse hairs only. T2–T5 all very much broader than long, but progressively narrowing from T2 onwards. Tergite 6 as Fig. 8. Venter greyish brown and segments 1–5 bare. Sternite 6 brown and as Fig. 9. Coxae to tibiae of all legs largely pale brown and tarsi pale straw yellow. Basitarsus of front leg shorter than segment 5. Mid tibia with near-dorsal longitudinal hair palisade extending about two thirds of length and comprising 20–22 modified hairs. Hind femur with 3–6 long hairs below basal half and 5–7 long anteroventral hairs in outer half. Hind tibia with 7–8 differentiated posterodorsals before the stronger pre-apical. Wings as Fig. 35, being about 0.9 mm long and the costal index being 0.37–0.40. Haltere brown.



Figs 13–17: *Pseudacteon fennicus*. 13 – putative female, abdominal tergite 6, 14 – the same, sternite 6, 15 – male, left face of abdominal segment 6 and hypopygium, 16 – putative female, palp, 17 – male palp (Scale bars = 0.1 mm).

Male (Figs 11–12, 35): Head and thorax similar to female, but palps as Fig. 11. Abdomen with brown tergites with minute, sparse hairs only; those at rear of T6 being only a little stronger (Fig. 12). Venter greyish brown and bare below. Hypopygium as Fig. 12, being pale brown with a pale straw-yellow anal tube very lightly tinged brown. Legs similar to female, except hairs below basal half of hind femur shorter and finer. Wing as Fig. 35, the length being about 0.9 mm and the costal index 0.36–0.37. Haltere brown.

Etymology: The species is named after the collector, Professor Michael Claridge. Material examined: Holotype female, France, Vaucluse, nr. Carpentras, Bédoin, 20 July – 3 August 1982, M. F. Claridge (UMZC). 2 female, 2 male paratypes, as holotype.

Pseudacteon fennicus Schmitz

Pseudacteon fennicus Schmitz 1927: 100, Lectotype male, Finland: Helsingfors, 14.8, Hellén (ZMH – 755 spec. type No. 8116), but one wing on slide (ZFMK) [Examined].

I have remounted two male cotypes on slides. One had a wing missing, but I found this wing on a slide in the Museum Koenig. I have designated this male as the lectotype. The female has not been described. The probable female is described below. Critical features are depicted in Figs 15 and 17.

Putative female of this species (Figs 13–14, 16, 36): Head and thorax as male, except antennae a little smaller and palps as Fig. 16. Abdominal tergites 2–5 brown, clearly very much broader than long, only gradually narrowing from T2 to T5, and with very few minute hairs only. Tergite 6 ill-defined but with bristle-like hairs (Fig. 13). Venter brown with paler transverse, intersegmental, bands. Some minute hairs on segment 5 below but with bristles on an ill-defined sternite 6 (Fig. 14). Ovipositor segments similar to other European species. Legs similar to male. Wing as Fig. 36, the length being 0.9–1.0 mm, the costal index 0.46–0.47. Costal cilia 0.06 mm long. Haltere largely brown.

Material examined: Lectotype (see above), male paratype, Finland, Nystad, 15. 8, Hellén (ZMH – 129 spec. type No. 8115); putative female, Poland, Bialowieska, Starodrzew, 18 July 1986, E. Durska (UMZC); male, Sweden, Fagersta, open mire, 18 July 1998, S-O. Ulefors (UMZC); male, Yugoslavia, Slovenia, Rokovo Dolina, River Rak, 25 July 1958, R. L. Coe (NHM – BM1958–417).

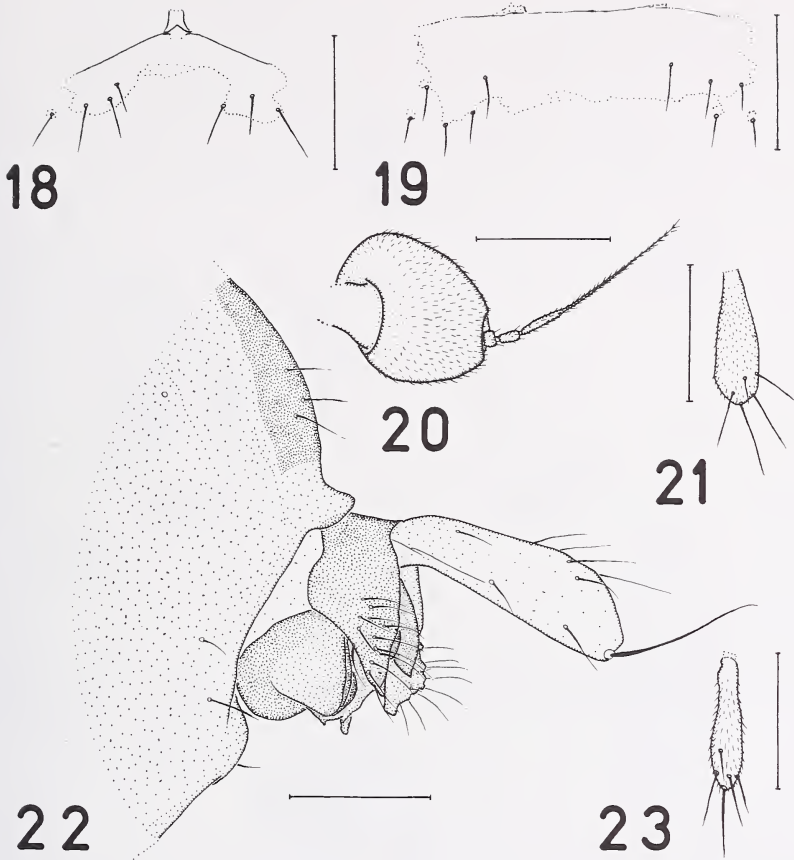
Pseudacteon formicarum (Verrall)

Phora formicarum Verrall 1877: 258, Holotype female, England, Kent, Farnborough, High Elms (apparently lost).

This species is not only widespread in the lowlands of England but also in Europe, and I have a good series of slide mounted specimens. Critical features are depicted in Figs 18–23.

Material examined: 8 males, 3 females, England, Cambridge, June, July, August, October, 1985–1988, including females attacking *Lasius flavus*, R. H. L. Disney (UMZC – 18–24, 18–39); male, Essex, Waltham Abbey, 21–28 May 1982, D. Henshaw (UMZC – 7–127); female, Romford, 27 June 1980, D. A. Smith (UMZC – 6–175); female, Berkshire, Silwood Park, 24 July 1979, T. R. E. Southwood (UMZC – 7–2); 2 females, Surrey, Juniper Hall (grid ref. 51/1752), 9–14 July 1978, R. H. L. Disney (UMZC – 4–26, 4–30); 4 males, 2 females, Norfolk, Norwich, U. E. A., 28 June – 7 July 1976, 10–18 June 1976, I. F. G. McLean (UMZC – 2–26, 2–27); 1 male, 1 female, Germany, Köln-Flittard, April – July 1977, June 1978, M. Boness (UMZC – 2–38, 5–57); 4 females, Italy, Levanto, Ligurian Coast, nr. La Spezia, 4 July 1996, attacking *Lasius emarginatus*, A. Weissflog (UMZC – 14–30); 1 male, Poland, Gdansk, gorki Wschodnie, salt meadow, 18 August 1977, R. Szadziewski (UMZC – 6–38); 1 male, Bialowieska, 17 June 1987, E. Durska (UMZC – 8–74).

Natural history: Recorded hosts are *Formica sanguinea* Latreille*, *Lasius alienus* Foerster*, *L. flavus* Fabricius, *L. fuliginosus* (Latreille)*, *L. niger* Linn., *L. umbratus* (Nylander)*, *Myrmica lobicornis* Nylander*, *Tapinoma erraticum* (Latreille)* (Disney 1994) and *Lasius emarginatus* (Olivier) (see above). However, Schmitz



Figs 18–23: *Pseudacteon formicarum*. 18 – female abdominal tergite 6, 19 – female abdominal sternite 6, 20 – male, third antennal segment, 21 – female palp, 22 – left face of male abdominal segment 6 and hypopygium, 23 – male palp (Scale bars = 0.1 mm).

(1924) cautioned that some of Donisthorpe's records (indicated with *, see Disney 1994 for details) might have been for *P. lundbecki*, which has only now been recorded from England for the first time (see below).

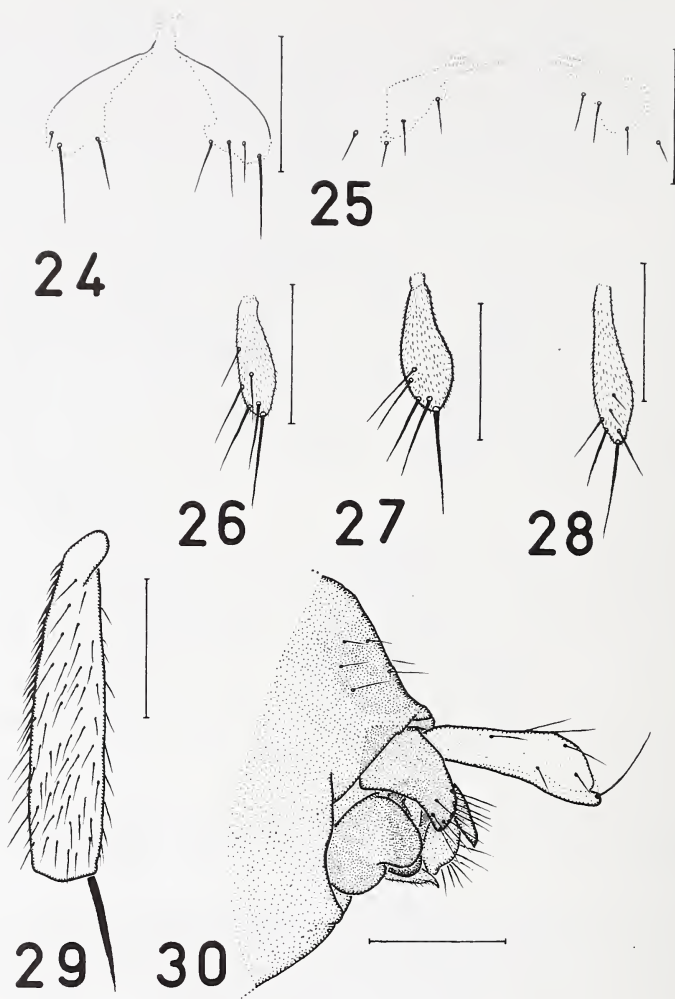
Pseudacteon lundbecki Schmitz

Pseudacteon lundbecki Schmitz 1924: 138, Holotype male, The Netherlands: Sittard (apparently lost).

Pseudacteon formicarum Lundbeck, 1922: 426, nec (Verrall 1877). Schmitz 1938: 376.

Pseudacteon lusitanus Schmitz 1938: 166, Holotype female, Portugal: Landim (Famalicao) Caldas. [male paratype examined] Syn. nov.

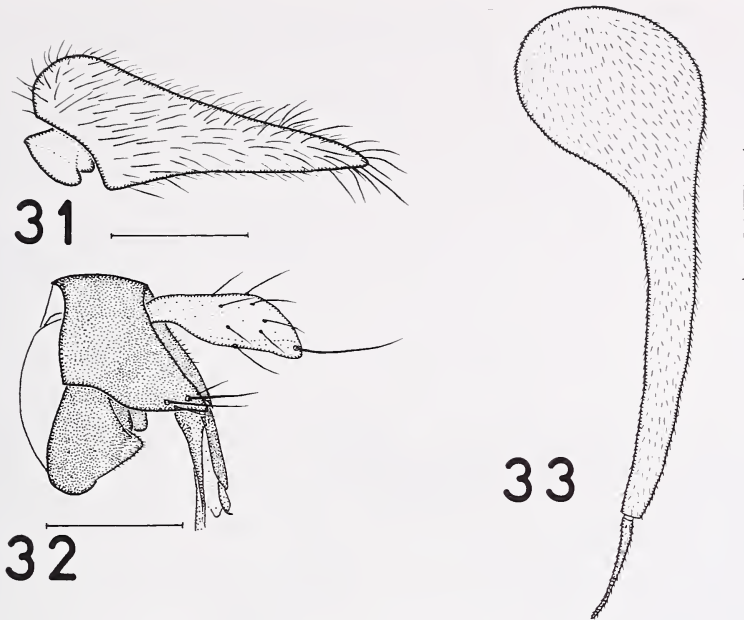
The voucher material from the Schmitz Collection (ZFMK) comprises a male from Valkenburg (the Netherlands) and a male of *P. lusitanus* from the type locality in Portugal. Schmitz (1938) noted that the hair palisade of the mid tibia of *P. lusitanus* does not quite reach the middle. However, the same is true for the specimen of



Figs 24–30: *Pseudacteon lundbecki*. 24 – female abdominal tergite 6, 25 – female abdominal sternite 6, 26–28 – male palps of three different specimens, 29 – male, anterior face of mid tibia, 30 – male, left face of abdominal segment 6 and hypopygium (Scale bars = 0.1 mm).

P. lundbecki from Valkenburg. When considered along with males from England and France it is evident that this hair palisade extends from 0.46 to 0.51x the length of the mid tibia in the males of what is clearly a single variable species. In the only available female it just exceeds 0.5x the length. Having failed to find a reliable distinction between the two species, I herewith formally synonymise *P. lusitanus* with *P. lundbecki*. Critical features are depicted in Figs 24–30.

Material examined: Male, The Netherlands, Valkenburg, H. Schmitz (ZFMK – 337); male holotype of *P. lusitanus*, Portugal, Landim, Caldas, 28 July 1938 (ZFMK); male, England, Essex, Waltham Abbey, May 1982, D. Henshaw (UMZC – 12–18);



Figs 31–33: 31–32 – *Pseudacteon tubiceroides* male. 31 – antenna, 32 – left face of hypopygium. 33 – *Tubicera algeriae* Coomer, male third antennal segment and arista (Scale bars = 0.1 mm).

male and female, France, Charnay (LG 781/2101), 20 August – 5 September 1991, P. Withers (UMZC – 25–53); male, Poland, Solnisko, Gdansk gorki Wschodnie, 18 August 1977, R. Szadziewski (UMZC – 6–38); male, Yugoslavia, Slovenia, Rokovo Dolina, River Rak, 25 July 1958, R. L. Coe (NHM – BM1958–417).

Natural history: Some of the early host records attributed to *P. formicarum* may have been misidentifications of this species (see above). *P. lusitanus* was reported parasitising *Lasius niger* by Schmitz (1938).

Pseudacteon tubiceroides sp. n.

This species is immediately distinguished from all other Palaearctic species by its elongated third antennal segment that lacks an arista. In this it resembles six Neotropical species (Borgmeier 1969), in which this feature is characteristic of both sexes. The male antenna of *Tubicera* Schmitz is also elongated, but with a small apical arista (Fig. 33). However, its mesopleura are hairy, the palps are ovoid and the apical tube is higher than long (Coomer 1999). In the other species of *Pseudacteon* with elongated third antennal segments, sexual dimorphism of these antennae tends to involve at most only slight differences in size. Therefore, despite having no female, I am describing and naming this species as the unknown female is not likely to be confused with any other European species.

Male only known (Figs 31–32): Frons brown and with 2 supra-antennal bristles and 2–2–4–4 bristles plus 2 ocellars. *Pseudacteon* species typically have 2–4–4–4 frontal bristles, apart from the SA's and ocellars (Borgmeier 1963); the pre-ocellar row concave towards front. With 18–20 hairs plus 2 on ocellar triangle. Lowest ommatidia of eye distinctly larger than uppermost. Third antennal segment pale yellowish brown and as Fig. 31. Palps pale straw yellow with 4–5 small bristles, the almost apical being the strongest. Proboscis pale yellow with tip of glossa slightly darkened. Thorax brown and with chaetotaxy as *P. claridgei* (see above). Abdominal segment 1–6 as *P. claridgei* except T2–T6 are relatively longer and there are conspicuous hairs at rear of segment 6 below. Hypopygium brown, with a pale yellow anal tube that gradually darkens a little towards base, and as Fig. 32. Legs pale yellowish brown, the front pair being palest. Front basitarsus only slightly shorter than segment 5 (ratio 0.8–0.9 : 1). Mid tibia with a near-dorsal longitudinal hair palisade. Hairs below basal half of hind tibia only weakly differentiated from adjacent hairs of anterior face, but 3–5 hairs of anteroventral row of outer half are strongly differentiated. Wing 0.9 mm long. Costal index 0.35. Costal ratios 1.58 : 1. Costal cilia 0.04 mm long. Vein 4 (first thin vein) almost straight. Vein 7 very pale. With two axillary bristles. Haltere mainly brown.

Eymology: The name refers to the resemblance of the antennae to those of *Tubicera* Schmitz.

Material examined: Holotype male, Hungary, Lajos-fords, ex *Russula furcata* (Lambark ex Fries) Fries [a synonym of *R. heterophylla* (Fr.) Fr.], coll. 24 July, emerged 25 September 1967, A. Dely-Draskovits (UMZC – 21–127).

Natural history: The rearing of a single male from a fungus is unexpected. Perhaps a parasitised ant had taken refuge in a crevice in the fungus sporophore. Until an association with *Russula heterophylla* is confirmed by further records, I will favour this hypothesis.

Key to European *Pseudacteon*

1. Females 2
- Males 7
2. Third antennal segment tapered and lacking an arista (as Fig. 31)
 Hitherto unknown female of *tubicerooides* sp. n.
- Third antennal segment subglobose to pear shaped and arista present (e.g. Fig. 20) 3
3. Mid tibia with a near-dorsal longitudinal hair palisade, in basal half at least (e.g. Fig. 29),
 as on hind tibia (e.g. Fig. 1) 4
- Mid tibia without such a palisade [abdominal sternite 6 as Fig. 19. Palp as Fig. 21]
 *formicarum* (Verrall)
4. Palps variably enlarged but with weak, hair-like, bristles (Figs 2–3). Abdominal sternite 6
 variably developed but when complete about two fifths as long as broad and with 6–8
 differentiated bristles at rear margin (Fig. 4) *brevicauda* Schmitz
- Palps significantly smaller and frequently with stronger bristles. Sternite 6 otherwise
 5
5. Near-dorsal longitudinal hair palisade of mid tibia extends two-thirds of length of latter,
 there being >20 modified hairs in this palisade. Abdominal sternite 6 with at least four long
 bristle-like hairs (Figs 9 and 14) 6

- This palisade typically about half, or less, of length of mid tibia, there being <20 modified hairs in this palisade (as Fig. 29). Abdominal sternite 6 with short hairs only (Fig. 25) *lundbecki* Schmitz
- 6. Wing as Fig. 35. Palps small with short hair-like bristles only (Fig. 10). Abdominal sternite 6 more clearly defined (Fig. 9) *claridgei* sp. n.
- Wing as Fig. 36. Palps larger with longer and more robust bristles, the apical one being strongly developed (Fig. 16). Abdominal sternite 6 less clearly developed (Fig. 14)..... putative female of *fennicus* Schmitz
- 7. Third antennal segment tapered and lacking an arista (Fig. 31) *tubiceroides* sp. n.
- Third antennal segment subglobose to pear shaped and arista present (e.g. Fig. 20) 8



Figs 34–37: *Pseudacteon*, right wings. 34 – *P. brevicauda* male, 35 – *P. claridgei* male, 36 – putative female of *P. fennicus*, 37 – *P. lundbecki* male.

8. Mid tibia with a near-dorsal longitudinal hair palisade, in basal half at least (Fig. 29), as on hind tibia (e.g. Fig. 1) 9
 – Mid tibia without such a palisade. [Hypopygium as Fig. 22] *formicarum* (Verrall)
9. Vein 4 (first thin vein) more evenly curved at each end (Figs 36–37). Apical bristle of palp strongly differentiated and relatively long (Figs 17 and 26–28) 10
 – Vein 4 more strongly curved forwards at base than at distal end (Figs 34–35). Apical bristle of palp less strongly differentiated and relatively short (Figs 6 and 11) 11
10. Near-dorsal longitudinal hair palisade of mid tibia extends about two thirds of the length of latter, there being >20 modified hairs in this palisade. Wing as Fig. 36. Hypopygium as Fig. 15 *fennicus* Schmitz
 – This palisade typically not quite reaching middle of tibia, there being <20 modified hairs in this palisade (Fig. 29). Wing as Fig. 37. Hypopygium as Fig. 30 *lundbecki* Schmitz
11. Palps relatively small and with short, fine, bristles (Fig. 11). Hypopygium as Fig. 12. Wing as Fig. 35 *claridgei* sp. n.
 – Palps variably but relatively larger and with longer bristles (Fig. 6). Hypopygium as Fig. 7. Wing as Fig. 34 *brevicauda* Schmitz

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Zusammenfassung

Europäische Arten von *Pseudacteon* Coquillett (1907) werden einer Revision unterzogen. Beschrieben werden *Pseudacteon claridgei* sp. n. aus Frankreich und *P. brevicauda* Schmitz aus Ungarn. *P. palpatus* Schmitz wird zum Synonym von *P. brevicauda* Schmitz und *P. lusitanus* Schmitz von *P. lundbecki* Schmitz. Ein neuer Schlüssel der europäischen Arten wird erstellt.

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