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## Revision of the European species of the *Bibio lautaretensis*-group (Diptera, Bibionidae)

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As a result of revision of type material of the 3 described species of the group and study of new material from the mountains of southern Norway, the Alps, the Massif Central and the Pyrenees, all the European forms of the group are considered to belong to one and the same species, *Bibio lautaretensis* VILLENEUVE, 1924, with *B. crassipes* DUDA, 1930 and *B. benesi* PECINA, 1962 as new synonyms. The variability of *B. lautaretensis* is discussed in relation with its boreo-alpine distribution in the mountainous ranges of Europe.

Keywords: Diptera, Bibionidae, *Bibio*, taxonomy, distribution

### INTRODUCTION

The *lautaretensis*-group of species is a morphologically well characterised group, recognizable by the small size, rather massive habitus, and stout building of legs, especially front tarsi. It was first referred to as the *lautaretensis*-group by PECINA (1962) who included 3 species with largely separated distributions: *Bibio lautaretensis* VILLENEUVE, 1924 in the Alps, *B. crassipes* DUDA, 1930 in Fennoscandia and *B. benesi* PECINA, 1962 in the Tatra.

In contrast to many other *Bibio*, the species of this group usually do not present mass occurrences, and imagines are apparently very rarely encountered in the alpine environment where they live. As a consequence, the first description by VILLENEUVE was published as late as 1924, and apart from their original description, these 3 species have practically never been referred to in the literature and are very rare in entomological collections. *B. lautaretensis* is still known only from the type-locality, while *B. crassipes* is known from 2 localities and 3 female specimens only. A second locality for *B. benesi* has been published only very recently by BUREŠ & PECINA (1993) who record this species from the diet of nestlings of the Water Pipit (*Anthus spinoletta*) in the Czech Republic.

The discovery by LG of what could be the unknown male of *B. crassipes* in the mountains of southern Norway on one hand, and the difficulty encountered by JPH in trying to identify newly collected material from the Swiss Alps, the Massif Central and the Pyrenees on the other hand, decided us to undertake a comparative study of the flies of this group.

## MATERIAL AND METHODS

The type material of the 3 described species has been examined by JPH, together with all other specimens available. Genital structures have been studied after maceration in caustic potash.

Type material investigated: *B. lautaretensis* VILLENEUVE: ♂ holotype, 2 ♀ ♀ paratypes, in collection VILLENEUVE, at the Institut royal des Sciences naturelles de Belgique, Brussels (IRSN). *B. crassipes* DUDA: ♀ holotype, 2 ♀ ♀ paratypes, in the collections of the Zoological Museum of the University, Helsinki (ZMH). *B. benesi* PECINA: ♂ holotype, ♀ allotype, in the collections of the National Museum of Natural History, Department of Entomology, Prague (NMP). The remaining material is deposited partly in the Museum d'Histoire Naturelle, Neuchâtel (MHNN), partly in the Zoologisk Museum, Bergen (ZMB).

## REDESCRIPTION

*Bibio lautaretensis* VILLENEUVE, 1924 (Figs 1-15)

*Bibio lautaretensis* VILLENEUVE, 1924: Encycl. ent. (B II), Dipt. 1: 5 [description]

DUDA, 1930: Fliegen pal. Reg. II<sub>1</sub>: 4. Bibionidae: 63, fig. 27-28 [redescription, key]

PECINA, 1962: Čas. Čs. spol. ent. 59: 78, fig. 7 [comparative notes, keys]

*Bibio crassipes* DUDA, 1930: Fliegen pal. Reg. II<sub>1</sub>: 4. Bibionidae: 50, fig. 22-23

[description of ♀, same species as *lautaretensis* VILLEN. ?] **syn. nov.**

PECINA, 1962: Čas. Čs. spol. ent. 59: 78 [comparative notes, keys]

*Bibio benesi* PECINA, 1962: Čas. Čs. spol. ent. 59: 75, fig. 1-6 [description] **syn. nov.**

Material examined 31 specimens (13 ♂ ♂, 18 ♀ ♀).

FINLAND. Ok: Suomussalmi, 27.VI.1917, 1 ♀, Hellén 620 [holotype of *B. crassipes* DUDA labelled "*crassipes* n.sp. ♀ d. Duda" and "type" in DUDA's handwriting]; Sb: Kuopio, 15.VI.1865, 1 ♀, LUNDSTROEM 820; same data, 1 ♀, PALMÉN 694 [2 paratypes of *B. crassipes* DUDA labelled "*crassipes* ♀ ? vel *lautaretensis* Vill. ♀ d. Duda" in DUDA's handwriting]; tip of abdomen of holotype and first paratype cleared in potash, conserved in glycerin in microvial attached to the same pin as specimen; all in MZH.

FRANCE. Hautes-Alpes: Col du Lautaret, 30.VI.1903, 1 ♂ 2 ♀ ♀, J. VILLENEUVE [♂ holotype and 2 paratypes of *B. lautaretensis* VILLENEUVE, labelled "*Bibio lautaretensis* Typ. Villen." in VILLENEUVE's (?) handwriting; one of the additional labels of one of the ♀ ♀ paratypes with "L. Vorderb. gez". (= left fore leg drawn) in DUDA's handwriting: the figure 27 of DUDA's monograph (1930) was obviously made after this specimen]; tip of abdomen of holotype and second paratype cleared in potash, conserved in glycerin in microvial attached to the same pin as specimen; all in IRSB; Puy-de-Dôme: Puy-Gros, 1500-1700 m, sweeping, 19.VI.1983, 1 ♀, J. BRUNHES, MHNN; Pyrénées-Orientales: 12-13 km WNW Les Bouillouses, 2040-2160 m, sweeping, 22.VI.1991, 1 ♂, J.-P. HAENNI, MHNN.

NORWAY. Bv: Hol, Nygård, 1000 m, 28.VI.1967, 1 ♀, A. LØKEN, ZMB; HOi: Voss, 4 km E Mjølfjell, Malaise trap, 8.VI-13.VII.1985, 8 ♂ ♂ 4 ♀ ♀, L. GREVE, ZMB, MHNN; same data, 8-29.VI.1986, 4 ♀ ♀, L. GREVE, ZMB.

SLOVAKIA. Slovakia sept.: Vysoké Tatry, Furkotská dolina, 1800m, 28.VI.1960, 1 ♂ 1 ♀, K. BENEŠ [♂ holotype and allotype of *B. benesi* PECINA; ♂ labelled "*Bibio* Geoffr. *benesi* sp.n. P. Pecina det." probably in *Pecina*'s handwriting and "Holotypus"; ♀ same but "Allotypus"]; tip of abdomen of holotype and allotype cleared in potash, conserved in glycerin in microvial attached to the same pin as specimen; both in NMP.

SWITZERLAND. GR: National Park, Munt la Schera, 2100m, Barber trap, 17-30.VI.1980, 1 ♂ 1 ♀, P. VERMOT; same data, sweeping, 14.VII.1980, 1 ♂ 1 ♀, J.-P. HAENNI, MHNN.

*Type locality*

France, Hautes-Alpes: Col du Lautaret.

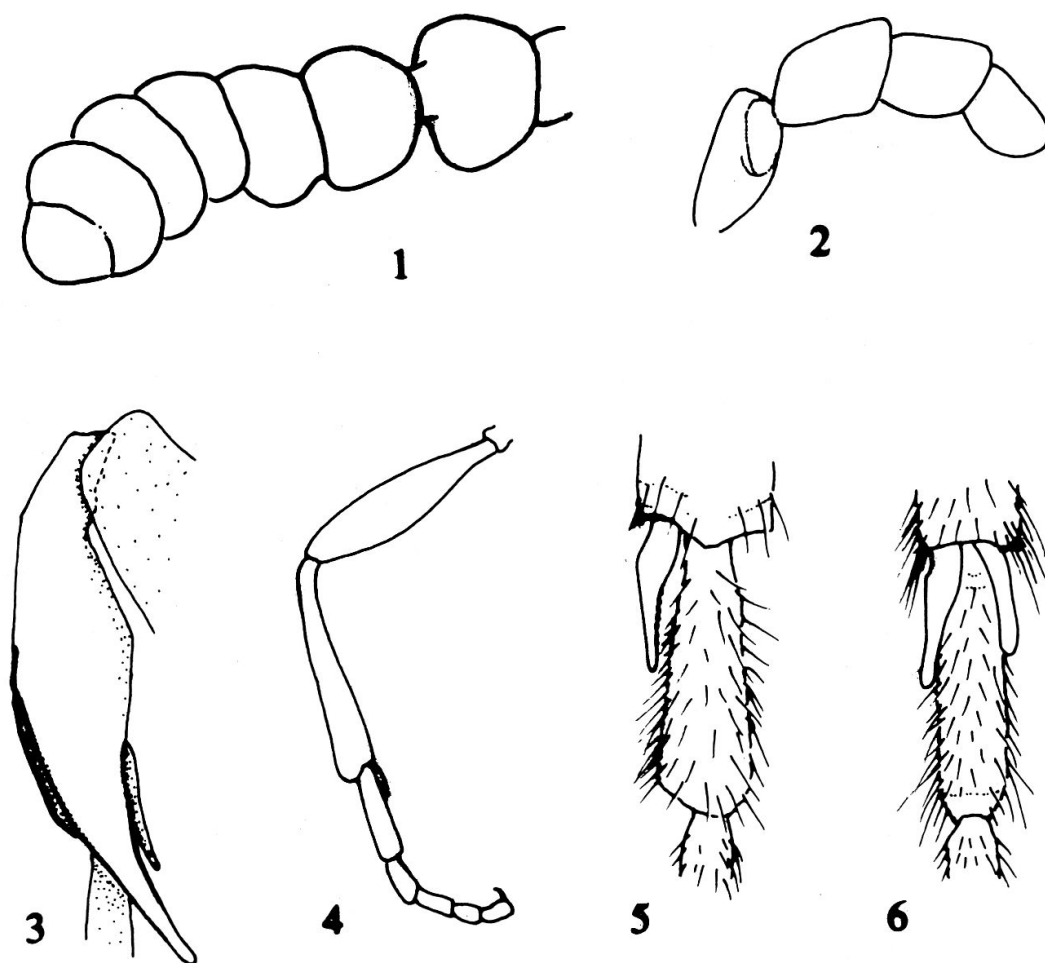
*Diagnosis*

Easily recognizable from the other European species of *Bibio* by the following combination of characters: small size (one of the smallest European species); flagellum of antenna 6-segmented, with last segment hardly separated from penultimate; legs shortened and stout, especially the fore tarsi with first segment conical, 4-5 times as long as wide at apex; wings short with pterostigma depigmented in male, light brown in female and hind veins inapparent or very faint.

*Description*

*Male*: 3-4.5 mm. Shining brownish-black in general colour, more brownish on pleurae, legs fuscous to brown, wings light greyish with pterostigma and hind veins inapparent.

*Head*: black with dense dark pilosity on lower face, sparser and shorter pilosity on eyes where it is slightly longer than the 2 basal antennal segments. Anten-



Figs 1-6. *Bibio lautaretensis* VILLENEUVE, ♂ holotype.

1. Right antenna (anterior view); - 2. left palpus (anterior view); - 3. left fore tibia (posterior view); - 4. left hind leg (posterior view); - 5. right hind metatarsus (posterior view); - 6. left hind metatarsus (ventral view).

nae (Fig. 1) with flagellum 6-segmented; segments well separated except last one short, indistinctly separated from penultimate segment. Palpi (Fig. 2) slightly longer than antennae, 5-segmented, first segment very short, 2 to 5 of more or less same length, segment 3 inflated, about 1.5 times as broad as other segments.

Thorax shining black, with coarse fuscous-brownish pilosity; pronotum rugulose, rather strongly punctulate; mesonotum smooth on disc, finely wrinkled and sparsely punctulate anteriorly and on sides, paratergites fuscous; pleurae brownish-black, finely wrinkled.

Wings 4-5 mm, more or less translucent, usually with a faint greyish, milky or pale yellowish tinge; pterostigma present but discolored, a slight brownish tinge may be present along vein  $R_1$ ; anterior veins brownish, posterior veins translucent, not contrasting with membrane. Halteres brown.

Legs fuscous to brown, more or less infuscated, with fuscous-brownish pilosity; posterior femora widening nearly from base; posterior spur of fore tibiae (Fig. 3) strong, about half as long as tibia itself, anterior spur thin, half as long as posterior one; hind tibiae (Fig. 4) somewhat sinuous, hardly widening towards apex, bearing patches of sensitive sensilla in an irregularly arranged row on postero-dorsal surface. Tarsi stout and thick; fore metatarsi nearly as long as fore tibiae, conical, widened towards apex, about 4-5 times as long as broad at apex, about as long as the 2 following tarsal segments; metatarsi of mid and hind legs somewhat shorter than the 2 following segments; hind metatarsi (Figs 5-6) not thickened but slightly widened towards apex, more than half as wide as tibiae at apex, 3-4 times as long as wide.

Abdomen shining black, with tergites and sternites finely wrinkled transversally. Pilosity fuscous black.

Hypopygium (Figs 7-10). Posterior indentation of sternite 9 shallow; tergum 9 strongly emarginated at posterior margin, with a deep, U- or V-shaped median emargination; gonostyles clasper-like, arched, ending in a smooth tip.

*Female:* 3.5-4.5 mm. Brownish-black in general colour, shining, with fuscous pilosity, legs fuscous brownish, wings slightly greyish or yellowish tinged, with hardly contrasting pterostigma and veins.

Head (Figs 11-12) black, shining, with frons somewhat warty between the eyes, pilosity fuscous; antennae and palpi as in male, but somewhat stouter.

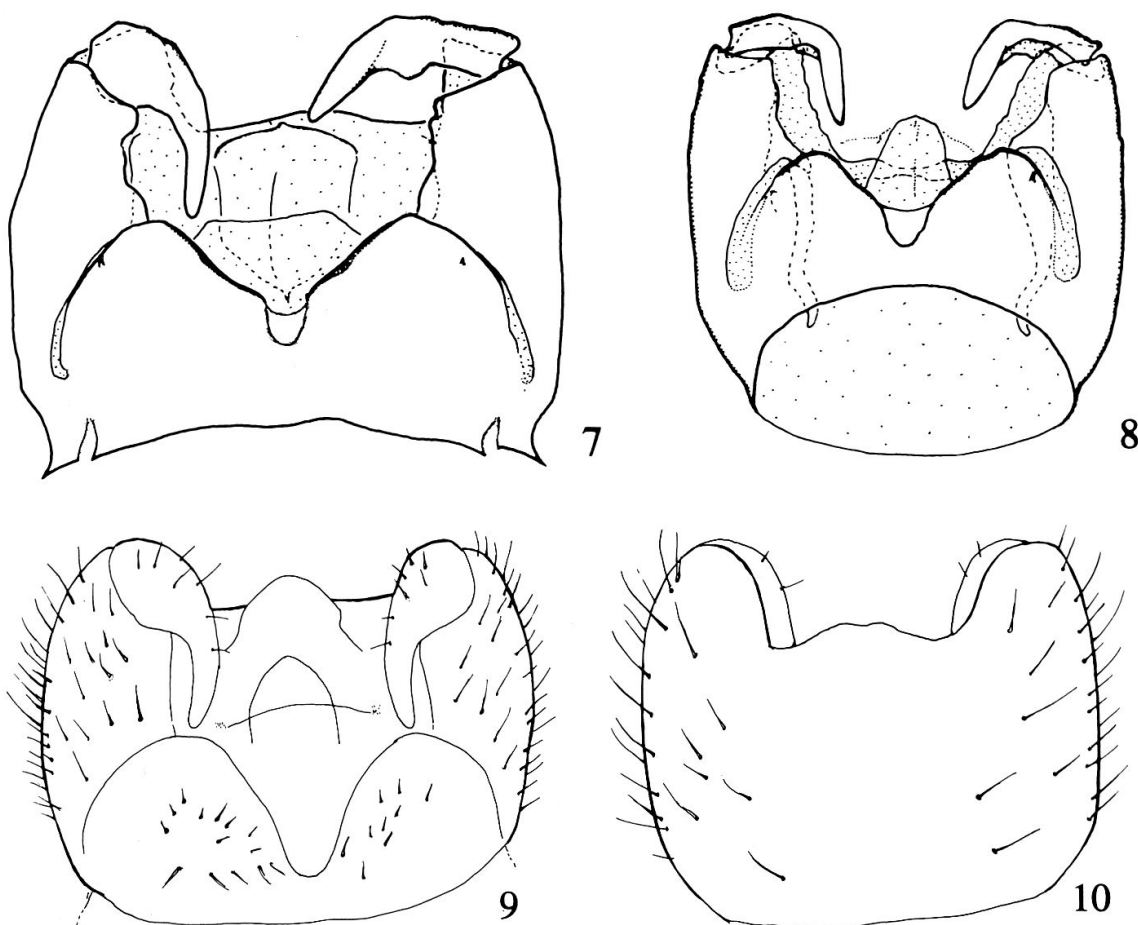
Thorax shining, not wrinkled, with fuscous pilosity that is somewhat shorter than in male.

Wings 4-5 mm, with pterostigma light brownish, anterior veins brown, hind veins slightly yellowish, hardly contrasting with wing membrane. Halteres brownish.

Legs: as in male but with generally shorter pilosity; hind tibiae (Fig. 13) slightly sinuous, with very obvious patches of sensillae in an irregular row on postero-dorsal surface. Hind metatarsi 3-4 times as long as wide.

Abdomen brownish black on both dorsal and ventral surfaces, shining, with short fuscous pilosity.

Genitalia (Figs 14-15). Sternite 8 with a deep, narrow, slightly sinuous posterior incision; tergite 9 short, divided medially; cerci elongate, rounded apically.



Figs 7-10. *Bibio lautaretensis* VILLENEUVE, ♂ hypopygium.

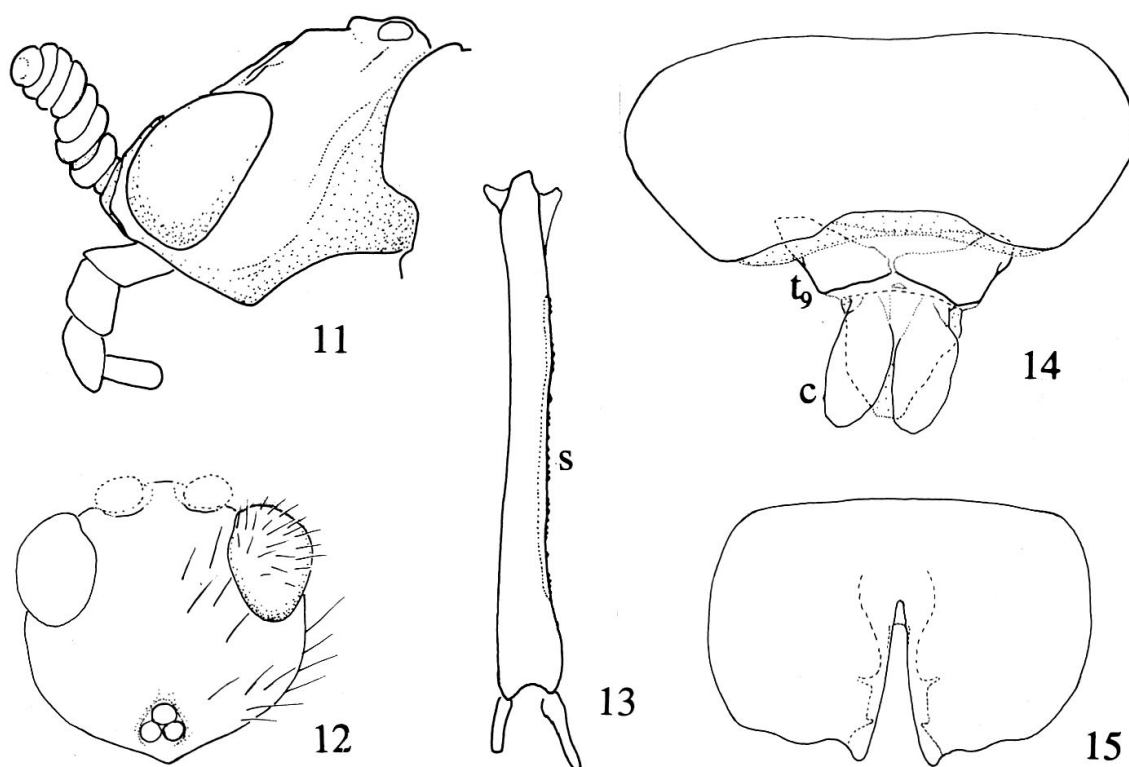
7. Holotype, French Alps, (dorsal view); - 8. holotype of *B. benesi*, High Tatra (Slovakia), (dorsal view); - 9. South Norway (dorsal view); - 10. South Norway (ventral view).

### Distribution

As far as known, supposedly largely disjunct populations of *Bibio lautaretensis* are present at high altitudes in the following mountainous ranges of Europe: the Pyrenees, the Massif Central, the Alps, the Jeseník mountains (Sudeten), the Tatra and Southern Scandinavia. Records are known from France, Switzerland, Czech Republic, Slovakia and Norway. Low altitude records also exist from Finland and will be discussed further. The species is by no mean common and widespread since it has been recorded till now from only 10 localities.

### Ecology

*B. lautaretensis* appears to be restricted to high subalpine and low alpine level in practically all the known localities. In Central and Western Europe, the altitudes range from 1500 to 2200 m, in Scandinavia from about 700 to 1000 m. The species was caught in birch-forest (*Betula* mixed with *Juniperus* and *Calluna* and isolated *Pinus silvestris*) in Southern Norway, in *Nardus stricta*-meadow intermixed with



Figs 11-15. *Bibio lautaretensis* VILLENEUVE, ♀ allotype.

11. Head (side view); - 12. head (dorsal view); - 13. hind tibia (posterior view; s: sensilla); - 14. tip of abdomen (dorsal view; c: cerci; t9: tergite 9); - 15. sternite 8 (ventral view, diagrammatic).

Ericaceae-heath and isolated trees above the upper forest border-line in Swiss Eastern Alps, in *Rhododendron*-heath above the forest border-line in the Pyrenees (HAENNI, 1994) and in an alpine meadow above upper tree border-line in the High Tatra (PECINA, 1962) and the Jeseník Mts (BUREŠ & PECINA, 1993). Precise ecological informations are lacking for other localities, but according to their altitude, they probably feature similar conditions.

From a phenological point of view, the captures range from second decade of June until middle of July with a peak by the end of June.

PECINA (1962) reports that the specimens from the Tatra mountains were collected on grasses, on a cold day with little snowfalls, some pairs in copula. The species is probably a cold stenotherm. This could explain its apparently surprising presence at low altitudes in Finland. The specimens from Kuopio have been caught on "*Eriophora*, *Carices*, *Equiseta* etc" on rocking marshland or quaking bog (notebook of LUNDSTROEM for n° 820 of his collection, LINDBERG, in litt.) that is in a cold biotope.

As for the apparent rarity of this species, it is interesting to notice however that no less than 56 specimens (mainly females) have been found in 3 samples obtained by the neck ring method from nestlings of one nest of Water Pipit (*Anthus spinoletta*) in an alpine meadow on the southern slope of Mt. Praděd in Moravia (BUREŠ & PECINA, 1993)



## DISCUSSION

*B. lautaretensis* appears to be rather variable in coloration, like many other *Bibio* species. Colour of body varies from brownish to blackish, while that of legs varies from light fuscous to brownish. Tinge of wing and more or less marked pterostigma and hind veins are also somewhat variable. On the other hand, the true colour of pilosity is often very difficult to appreciate, varying according to the angle of vision, appearing dark when viewed upon the integument and fuscous when observed obliquely upon a light surface. Shape of antennae and palpi may also vary to a certain extent on pinned specimens, partly due to the weak sclerotization of these structures. In female sex, ornamentation of frons is also variable from rather smooth to more wrinkled and somewhat warty.

In describing *crassipes*, the second species of the group, DUDA (1930) was aware of this fact, since the heading of the species in his monograph of the family in *Die Fliegen der palaearktischen Region* is “*crassipes* n. sp., ♀, ob = *lautaretensis* Villen.?” On the other hand, PECINA (1962), when describing the third species of the group, *benesi*, considered these forms as good species and gave a key for their separation. However, the discriminating characters used by this author are mainly very subtle differences in coloration of body and pilosity. When comparing material of *benesi* with *lautaretensis* and *crassipes*, JPH could not see any constant character to distinguish these forms. Even the compared length to width of fore metatarsi does not allow to separate safely the populations despite of PECINA’s (1962) indication. The specimens from the Tatra have indeed more darkened legs, but this is by no mean sufficient to consider them as belonging to a distinct species.

It is not surprising that isolated populations present a beginning of differentiation, but the differences are so tiny that there is no justification for their elevation to a specific or even subspecific status. There is little doubt that other undiscovered populations of *lautaretensis* might be present in other mountainous European ranges. The species is very probably more regularly distributed, in isolated populations, at convenient altitudes in the Alps for example. To give a specific or even subspecific status to all these forms would lead to an unnecessary taxonomic puzzle. We consider that *B. lautaretensis* is a relict boreo-alpine species largely distributed in Europe, with widely separated populations that have begun to segregate but that are still conspecific, contrarily to the opinion expressed by BUREŠ & PECINA (1993).

The only specimen presenting marked morphological differences is the holotype of *crassipes* from Suomussalmi (Eastern Finland, at low altitude) which differs from all known female specimens of *lautaretensis* by the still more bulky habitus of legs, especially anterior tarsi. The 2 female paratypes of this species, also from low altitude in Finland (Kuopio), are in fact more different from the holotype than from the females of other populations and may be not conspecific with the holotype of the species. DUDA (1930) himself had noticed this fact since the holotype of *crassipes* is labelled by his hand “*crassipes* n. sp. d. Duda” while the 2 paratypes are labelled “*crassipes* ♀ ? *vel lautaretensis* ♀ Villen. d. Duda”. Should additional material of this form, including males, be collected in the future, it will be possible to consider if the female holotype of *crassipes* is a distinct species which does not belong to *lautaretensis* in contrary to the other Fennoscandian specimens.

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## RÉSUMÉ

*Révision des espèces européennes du groupe de Bibio lautaretensis (Diptera, Bibionidae).* - Sur la base de l'étude des types des 3 espèces décrites et de matériel nouveau des montagnes du Sud de la Norvège, des Alpes, du Massif Central et des Pyrénées, toutes les formes européennes du groupe sont considérées comme appartenant à une seule et même espèce, *Bibio lautaretensis* VILLENEUVE, 1924, avec comme synonymes nouveaux *B. crassipes* DUDA, 1930 et *B. benesi* PECINA, 1962. La variabilité de *B. lautaretensis* est discutée en relation avec sa distribution boréo-alpine dans les régions montagneuses d'Europe.

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