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A new species of *Cladotanytarsus* (*Lenziella*) from Oregon supports the systematic concept of the subgenus (Diptera: Chironomidae)

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Abstract

A new species of the genus *Cladotanytarsus* Kieffer, 1921 and the small subgenus *Lenziella* Kieffer, 1922 is described from Southern Oregon, USA. The adult male of *C.* (*L.*) *glaber* Giłka *et* Puchalski, **sp. nov.**, featuring tibial lobes armed with dense setae and a large globular swelling of the hypopygial inferior volsella, supports the recently defined systematic concept for *Lenziella*. This subgenus is known from seven species distributed in the Northern Hemisphere (1 European, 1 Palaearctic and 5 Nearctic), the males of which are included in an updated identification key.

Key words: Diptera, Chironomidae, Tanytarsini, systematics, new species, USA

Introduction

The Chironomidae are the largest group of aquatic insects and one of the most species-rich dipteran families, including more than 7000 species and *ca.* 550 genera (Pape *et al.* 2011). Among the chironomids there are genera comprising hundreds of species, but also monotypic genera and those known from just a few species. *Cladotanytarsus* Kieffer, 1921, though one of the largest genera within the chironomid tribe Tanytarsini, is still one of the least known. Recently, *Cladotanytarsus* was divided into two subgenera: *Cladotanytarsus s. str.* and *Lenziella* Kieffer, 1922 (Giłka 2011). The latter was redefined on the basis of adult male, female and pupal morphology, with all known species/life stages described or redescribed (Giłka 2011, Giłka & Spies 2012). What systematic studies of *Cladotanytarsus* have so far revealed is that there are considerable disproportions in species richness within the two subgenera: over 60 species of *Cladotanytarsus s. str.* versus 6 species of *Lenziella* described to date (Sæther 1971, Giłka 2011, Puchalski & Giłka 2017). Only two *Lenziella* species, *i.e. C.* (*L.*) *bicornutus* (Kieffer, 1922) and *C.* (*L.*) *amandus* Hirvenoja, 1962 are known to occur in the Palaearctic, whereas four species have so far been recorded in the Nearctic region, all from the USA: *C.* (*L.*) *crusculus* Sæther, 1971, *C.* (*L.*) *latissimus* Giłka, 2011, *C.* (*L.*) *piniger* Giłka, 2011 and *C.* (*L.*) *subletteorum* Giłka, 2011.

In the immense collection of North American *Cladotanytarsus*, entrusted to the present second author by Mary and James Sublette, one more hitherto unknown *Lenziella* species was discovered. Here it is described and included in an updated identification key to the males of this subgenus.

Materials and methods

The specimens examined were slide-mounted in Canada balsam. The illustrations, descriptions and measurements were taken from these slide-mounted individuals. Measurements are in μm; lengths of leg segments and palpomeres were rounded off to the nearest 5 and 1 μm respectively; the leg and venarum ratios (LR, VR) were calculated to the second decimal place. The morphological terminology and abbreviations follow Sæther (1980). The photographs were taken using a Nomarski DIC and LAS Montage multifocus with a Leica DM6000. The

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materials examined are booked to be deposited at the Department of Entomology, University of Minnesota, St. Paul, USA.

Results

Family: Chironomidae Newman, 1834

Subfamily: Chironominae Newman, 1834

Tribe: Tanytarsini Zavřel, 1917

Subtribe: Tanytarsina Zavřel, 1917

Genus: *Cladotanytarsus* Kieffer, 1921

Subgenus: *Lenziella* Kieffer, 1922

Cladotanytarsus (*Lenziella*) *glaber* Giłka *et* Puchalski, sp. nov.

Type material. Holotype, adult male: USA, OREGON, Klamath County, Rocky Point Resort at the Upper Klamath Lake, Recreation Creek (42°28'42"N / 122°05'16"W), 2 June 1982, leg. J.E. Sublette. Paratype: 1 male (same location and date as for holotype).

Derivation of the name. The specific name, derived from the Latin word meaning hairless, refers to the extensive microtrichia-free area of the hypopygial tergite.

Diagnosis. Tibial apices of mid and hind leg with slight lobes armed with dense curved setae; spurs present, variable in shape. Anal tergite with extensive microtrichia-free area at anal point base. Anal point stout, tongue-shaped. Superior volsella abruptly narrowed in distal half and slightly swollen apically. Median volsella with stocky stem bearing 7–8 furcate lamellae. Inferior volsella with distinct dorsomedian ridge and large globular swelling ventrally.

Description. **Adult male** (n = 2).

Colouration (slide-mounted specimens). Eyes black. Antennal pedicel, tentorium, scutal stripes, scutellum, postnotum, sternum and proximal abdominal segments dorsally brown. Head capsule, antennal flagellum, mouthparts, legs and remaining part of abdomen including hypopygium olive green. Wing and haltere pale greenish.

Head. Eyes reniform, broadly separated. Antenna with 13 flagellomeres, AR *ca.* 1.1; plume fully-developed. Frontal tubercles more or less conical, 12–20 µm long, 6–8 µm wide at base. Lengths of palpomeres 2–5 (in µm): 36, 91–99, 111–115, 139–143. Clypeus with 13–18 setae.

Thorax chaetotaxy. Ac 4–7, Dc 8–12, Pa 1, Scts 4.

Wing (Fig. 1A). Slender; length 1815–1845 µm; max. width 495–540 µm. C, R, distal half of M_{1+2} and R_{4+5} with macrotrichia, R_1 with 2–8 macrotrichia, other veins bare. Membrane with macrotrichia in distal half of r_{4+5} and with a few macrotrichia in apical section of m_{1+2}, other cells bare. VR_{Cu} 1.12–1.20.

Legs (Fig. 1B–G). Fore leg tibia with slightly curved spur (Fig. 1B, C), 12–28 µm long. Combs of mid and hind leg tibiae separated, usually vestigial; spurs variable in shape (Fig. 1D–G) and length: *ca.* 16–24 µm long on mid leg and 24–28 µm long on hind leg. Tibial apices of mid and hind leg with slight lobes armed with dense curved setae (Fig. 1D–G). Basitarsus of mid leg with 1–4 sensilla chaetica. For lengths of leg segments and leg ratios see Table 1.

TABLE 1. Leg segment lengths (µm) and leg ratios of male *Cladotanytarsus* (*Lenziella*) *glaber* **sp. nov.**

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR
p_1	720–740	520–530	690–715	390–405	310–325	200–215	120–130	1.30–1.37
p_2	730–740	625–645	310–315	200–215	155–160	110–120	95–105	0.48–0.50
p_3	845–860	875–880	470–480	330–340	280–295	185–190	125–130	0.53–0.55

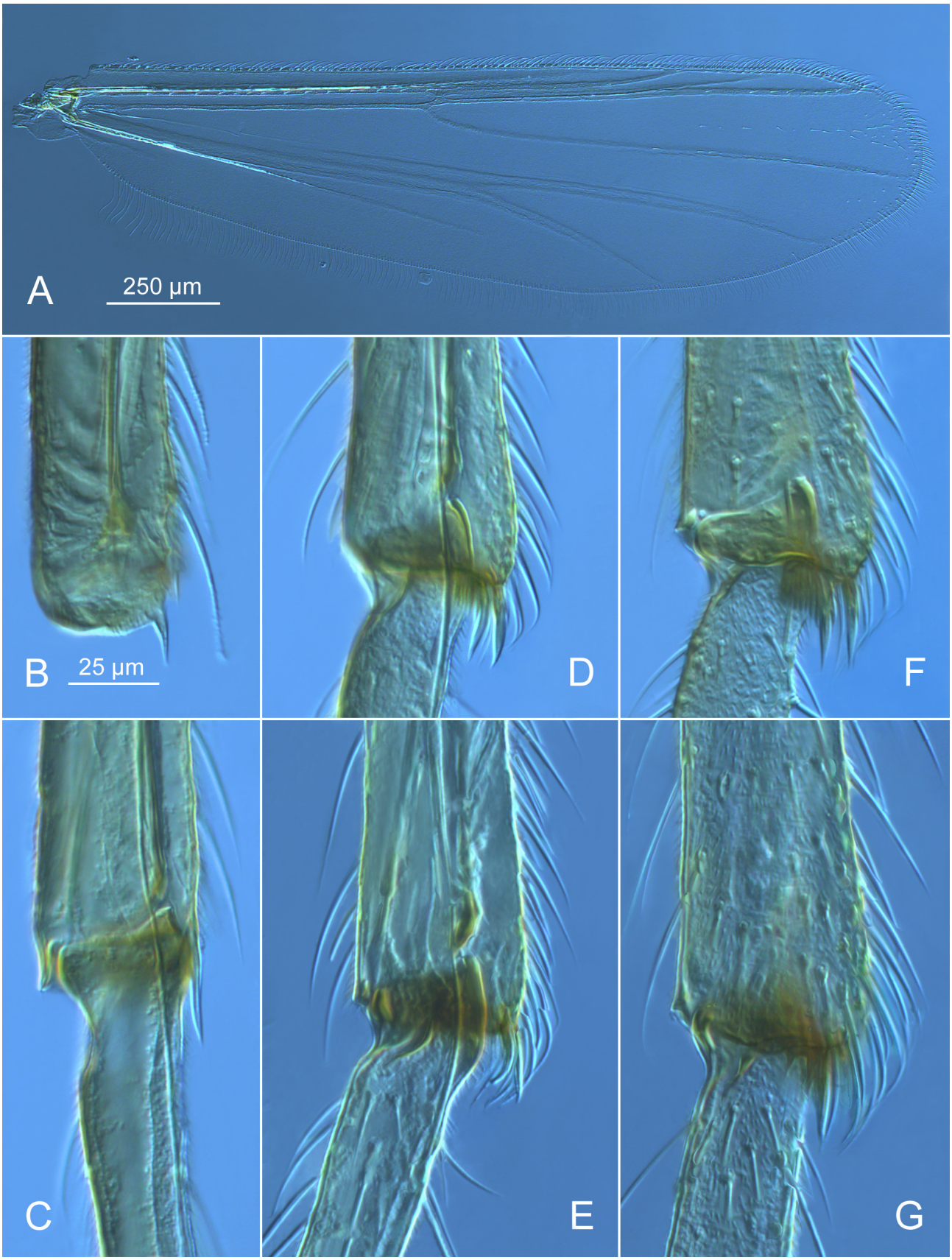

FIGURE 1. *Cladotanytarsus* (*Lenziella*) *glaber* **sp. nov.**, male. **A**—wing; **B**–**G**—tibia apical lobes of fore (B, C), mid (D, E) and hind leg (F, G).

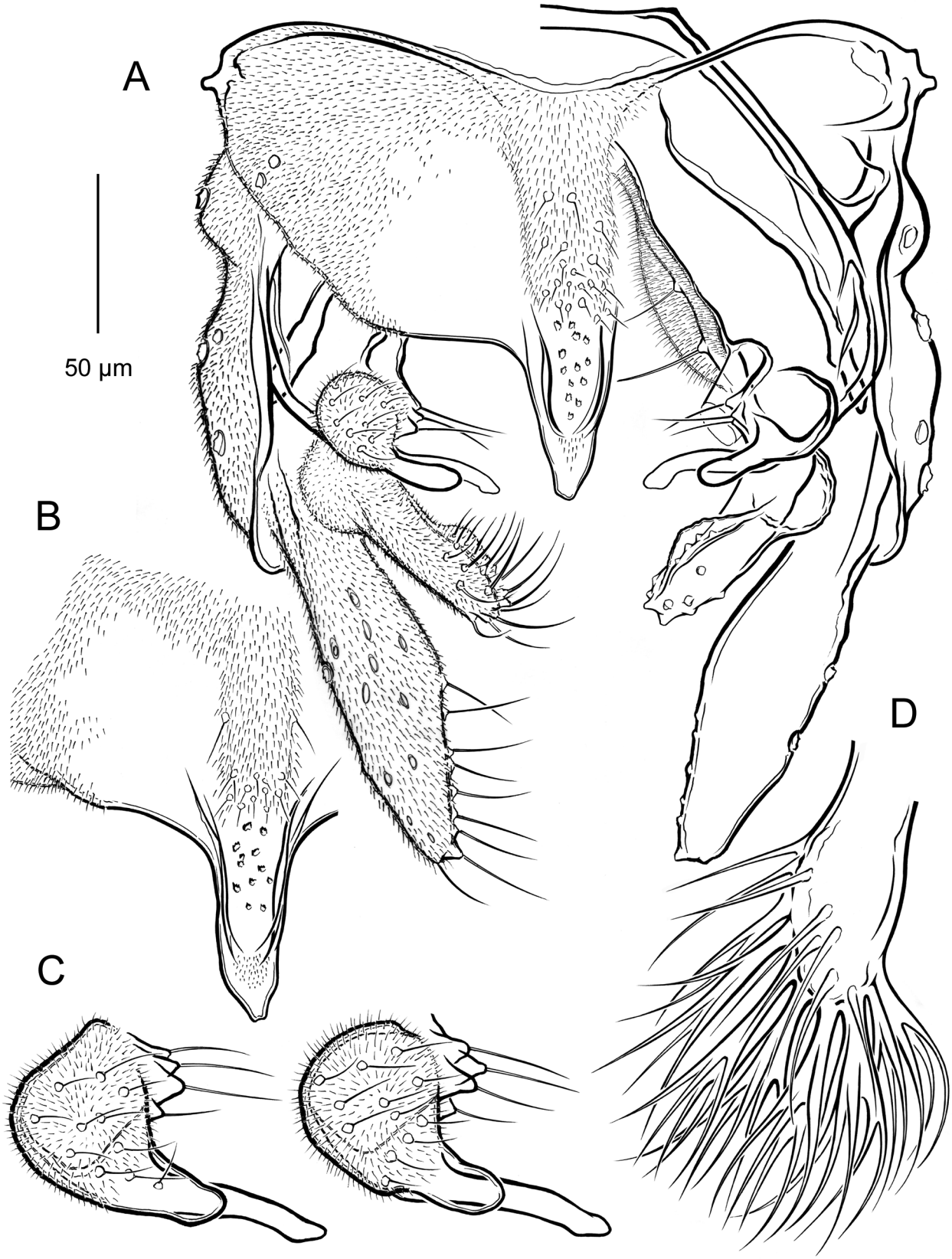

FIGURE 2. *Cladotanytarsus* (*Lenziella*) *glaber* **sp. nov.**, male. **A**—hypopygium, **B**—anal point (variation), **C**—superior volsella and digitus (variation), **D**—median volsella; (C, D—magnified *ca.* 2 times relative to A and B).

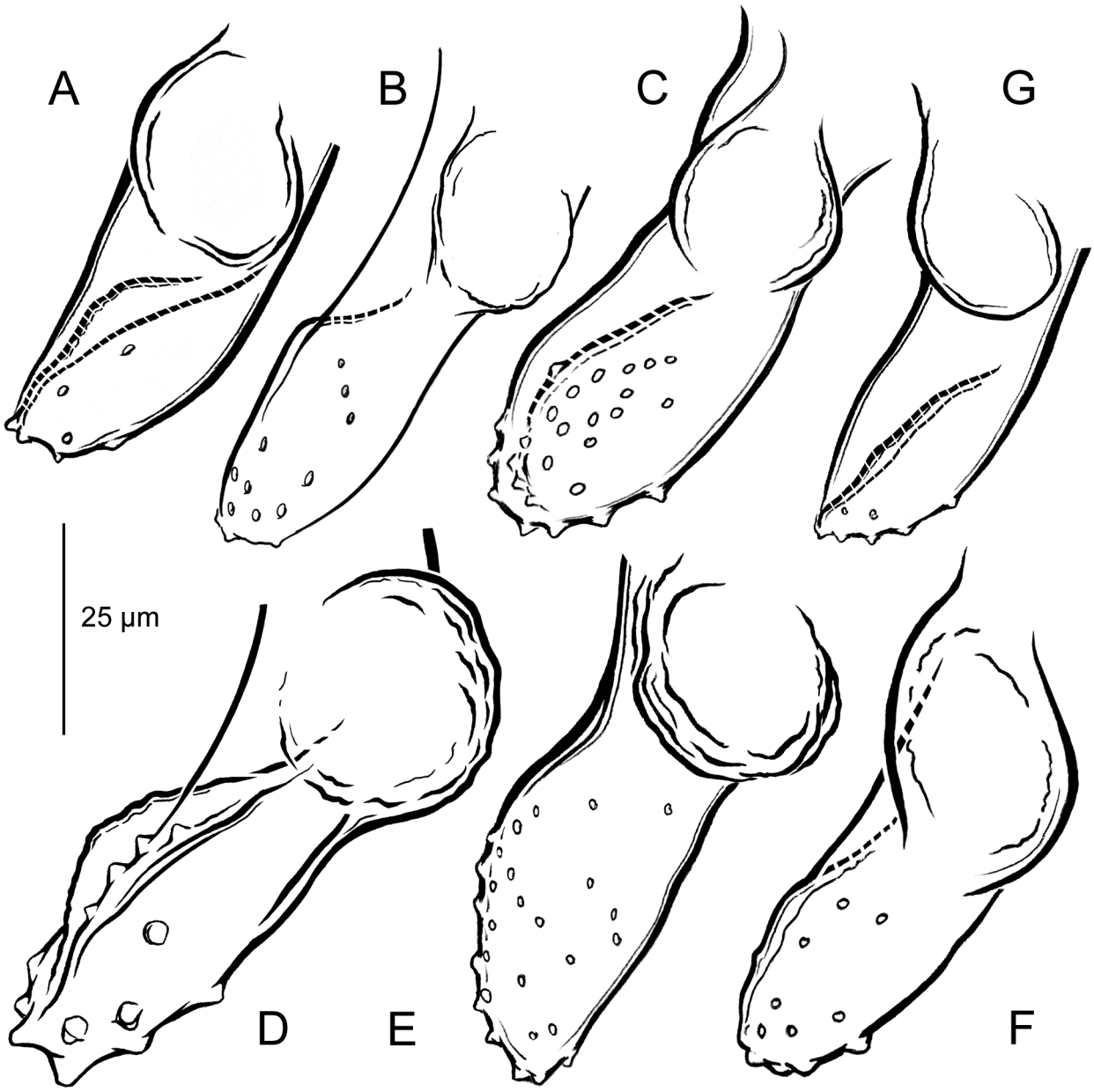

FIGURE 3. Hypopygial inferior volsellae in adult males of known species of the subgenus *Lenziella*. **A**—*C.* (*L.*) *amandus*, **B**—*C.* (*L.*) *bicornutus*, **C**—*C.* (*L.*) *crusculus*, **D**—*C.* (*L.*) *glaber*, **E**—*C.* (*L.*) *latissimus*, **F**—*C.* (*L.*) *piniger*, **G**—*C.* (*L.*) *subletteorum*.

Hypopygium (Fig. 2, 3D). Gonostylus slightly shorter than gonocoxite, 100–120 µm long, stout, broadest at mid length, tapering to tip bearing distinct setal tubercle. Anal tergite with V-type bands, 13–19 median setae arranged irregularly and extensive microtrichia-free area at anal point base (Fig. 2A, B). Anal point stout, tongue-shaped, with transversely cut apex, bearing 12–13 spinulae and well-developed crests (Fig. 2A, B). Superior volsella rounded at base, abruptly narrowed in distal half and slightly swollen apically, covered with dense microtrichia on proximal (swollen) part and with 9–12 setae dorsally; digitus long, with finger-like tip extending far beyond apex of superior volsella (Fig. 2A, C). Median volsella stocky, with stem club-shaped, bearing 7–8 furcate lamellae (Fig. 2D). Inferior volsella with distinct dorsomedian ridge and large globular and wrinkled swelling ventrally (Fig. 2A, 3D).

Discussion

Systematics. *Lenziella* was originally placed at generic rank (Kieffer 1922), later treated as a synonym of the genus *Cladotanytarsus* (Ashe & Cranston 1990), and recently redefined as the subgenus of *Cladotanytarsus*, with the type species *C.* (*L.*) *bicornutus* revalidated (Giłka 2011, Giłka & Spies 2012). As justification for the systematic position of the *Lenziella*, morphological characters of a prior subgeneric value were indicated and analysed in detail (*op. cit.*). These characters pertain 1) to the pupae - with large cephalic tubercles, a strongly granulose sculpture on the frontal apotomes and hemispherical tubercles placed near the base of the thoracic horns, 2) to adult females - with setae under the vagina and extensive labia of the genital apparatus, and 3) to males - with a globular swelling in the hypopygial inferior volsella, which resembles a ball (Fig. 3). This structure, well-visible in the ventral aspect, is particularly well developed in *C.* (*L.*) *latissimus* and *C.* (*L.*) *glaber* (Fig. 3D, E). A somewhat similar, knee-like extension at base of the inferior volsella is known from several species of the subgenus *Cladotanytarsus s. str.* (*cf.* Giłka & Dobosz 2015, Puchalski & Giłka 2017), but it never has the shape of a globular excrescence like that typical of *Lenziella*. A tendency towards the formation of an abruptly narrowed superior volsella is also distinct in some *Lenziella* males, including *C.* (*L.*) *glaber* (*cf.* Fig. 2A, C and Giłka 2011: figs 4F, 11D, 12D, F). Adults of both sexes have apices of the mid and hind leg tibiae armed with lobes bearing dense curved setae, whereas tibial combs and spurs are usually vestigial or absent (*cf.* Fig. 1D–G and Giłka 2011: figs 2C, D; 4B–E; 5, 8, 11, 12: B and C). All the male characters mentioned above were found in *C.* (*L.*) *glaber* and support the subgeneric concept of *Lenziella*.

Updated key to adult males of the subgenus *Lenziella*

1. Anal point trapezoid; hind leg tibia with apical lobe bearing a single stout bristle (Giłka 2011: fig. 8) . . . . . ***C.* (*L.*) *latissimus* Giłka** (USA)
- Anal point subtriangular, lanceolate, tongue- or club-shaped (Fig. 2A, B; Giłka 2011: figs 2, 4, 5, 11, 12); hind leg tibia with apical lobe bearing dense curved setae, without a single stout bristle (Fig. 1F, G; Giłka 2011: figs 2, 4, 5, 11, 12) 2
2. Prominent lobe at base of superior volsella with 4–6 inner setae; anal point spinulae small or absent and replaced with setae; tibial spurs and combs absent (Giłka 2011: fig. 5) . . . . . ***C.* (*L.*) *crusculus* (Sæther)** (USA)
- Small protuberances at base of superior volsella with 3–4 inner setae; anal point spinulae distinct (Fig. 2A, B; Giłka 2011: figs 2, 4, 11, 12); tibial spurs and combs more or less reduced but usually present on mid and/or hind leg (Fig. 1D–G; Giłka 2011: figs 2, 4, 11, 12) 3
3. Superior volsella slightly narrowed in median part and distinctly swollen apically; hind leg tibia with tuft of long and finely curved setae (Giłka 2011: fig. 2) . . . . ***C.* (*L.*) *bicornutus* (Kieffer)** (Palaearctic)
- Superior volsella abruptly narrowed in distal half and slightly swollen apically (Fig. 2A, C; Giłka 2011: figs 4, 11, 12); hind leg tibia with relatively short and/or strongly curved setae (Fig. 1F, G; Giłka 2011: figs 4, 11, 12) 4
4. Hypopygial tergite with extensive microtrichia-free area at base of stout anal point (Fig. 2A, B; Giłka 2011: fig. 4) 5
- Hypopygial tergite with microtrichia on entire surface, anal point slender (Giłka 2011: figs 11, 12) 6
5. Anal point parallel-sided or lanceolate; median volsella slightly-built, stem simple, bearing 5–6 furcate lamellae (Giłka 2011: fig. 4); wing length *ca.* 1.4–1.6 mm . . . . ***C.* (*L.*) *amandus* Hirvenoja** (Europe)
- Anal point tongue-shaped (Fig. 2A, B); median volsella stocky, stem club-shaped, bearing 7–8 furcate lamellae (Fig. 2D); wing length over 1.8 mm. . . . . ***C.* (*L.*) *glaber* sp. nov.** (USA)
6. Stem of median volsella distinctly curved near base, much longer than lamellae (Giłka 2011: fig. 11) . . . . . ***C.* (*L.*) *piniger* Giłka** (USA)
- Stem of median volsella straight or slightly curved apically, as long as lamellae (Giłka 2011: fig. 12) . . . . . ***C.* (*L.*) *subletteorum* Giłka** (USA)

Geographical distribution and ecology. In contrast to the subgenus *Cladotanytarsus s. str.*, which is species-rich (over 60 species described and dozens awaiting description) and common in most of the world's biogeographic realms (except for Antarctica and the Neotropics), the subgenus *Lenziella* is known only from seven species distributed in the Northern Hemisphere (Giłka 2011). Two *Cladotanytarsus* (*Lenziella*) species have so far been recorded in the Palaearctic [*C.* (*L.*) *bicornutus* (Europe, Russian Far East), *C.* (*L.*) *amandus* (NE Europe)], whereas five species are known to occur in the Nearctic region (Sæther 1971, Giłka 2011). Two North American species are confined to Florida [*C.* (*L.*) *latissimus* (found at 2 sites), *C.* (*L.*) *subletteorum* (5 sites)], one swarms in California [*C.* (*L.*) *piniger* (17 sites)], one seems to be widespread in the central and western USA [*C.* (*L.*) *crusculus* (16 sites)], and one is known from a single site in Southern Oregon [*C.* (*L.*) *glaber*] (Fig. 4). Epler (2014) also reports *C.* (*L.*) *latissimus* from Disney World near Orlando in Florida. In contrast to *Cladotanytarsus s. str.* from the

extensive collection of North American *Cladotanytarsus*, consisting of specimens collected over a period of some 90 years and currently being evaluated by the present authors, most species of *Lenziella* are recorded locally or in scattered localities. Among the specimens of *Cladotanytarsus* from this collection, taken from almost 200 localities and belonging to several dozen species, there are only five *Lenziella* species found at a total of 39 localities (Fig. 4).

The immature stages of *Cladotanytarsus* inhabit a variety of lentic and lotic habitats. Some species are limnobiontic, with a narrow range of tolerance/preference for habitat conditions, including the trophic level; they are thus bioindicators of considerable potential (*e.g.* Jacobsen & Bilyj 2007, Puchalski *et al.* 2016). *Lenziella* species are limnophilous, but some of them can inhabit brackish water, including oligohaline marine habitats; *C.* (*L.*) *piniger* is probably one of the most abundant chironomids among the inhabitants of the periodically flooded rice fields in California (Darby 1962, Giłka 2011).

FIGURE 4. Geographical distribution of the examined individuals of Nearctic species of the subgenus *Lenziella*.

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