

A NEW SPECIES OF *TOWNSENDIA* WILLISTON (DIPTERA: ASILIDAE)
FROM FLORIDA WITH NOTES ON ITS ASSOCIATION WITH
PERDITA GRAENICHERI TIMBERLAKE (HYMENOPTERA: ANDRENIDAE)

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Abstract.—A new species of asilid fly belonging to the genus *Townsendia* is described and figured. Flies were collected in association with a species of ground-nesting bee, *Perdita graenicheri* Timberlake at the Archbold Biological Station, Highland County, Florida. Behavioral observations of flies and speculation on their occurrence near bee burrows are given.

Key Words: Asilidae, Andrenidae, *Townsendia*, *Perdita*, ground-nesting

A detailed study of the small (4–5 mm), gregarious, ground-nesting bee, *Perdita graenicheri* Timberlake, was conducted at the Archbold Biological Station (ABS), Highlands County, Florida in 1989 (Norden et al. 1992). During that study, a very small species of *Townsendia* (Diptera: Asilidae) was often observed perching on vegetation near bee nest openings. The flies appeared to be watching the bees as they entered or exited their burrows. Specimens of the fly were collected, and later were determined to be a new species. During a second trip to the Station, 10–17 August 1992, additional flies were collected and observations were made on their behavior.

MATERIALS AND METHODS

Study site.—Nesting *Perdita graenicheri* were found at several ABS sites. Deyrup (pers. comm.) noted that *Townsendia ar- enicola*, n. sp. is the most common asilid in the scrub and nearby open xeric areas. We found that, the fly was often abundant in

association with the bees on the sunny, exposed sand at the northeastern end of Lake Annie. All of our (BNN & KVK) observations and collections were made at this site.

Behavioral observations.—Flies were found only on sunny days and were observed throughout the day (0800–1700 h, EST) during both still and breezy conditions. Sand surface temperatures ranged between 38–52°C. Notes were taken of perch selection, behavior of the flies at perches and flight behavior. Selected blades of grass and twigs (perches) were occasionally removed from the area and the subsequent changes in asilid behavior were recorded. Observation time totaled ca. five hours and included approximately 30 different flies.

RESULTS

Flies used a series of perches having one or more bee nest openings located roughly in their center. Flights from these perches were short (ca. 5–15 cm) in distance, and about 1–5 cm above the sand. Flights were

more hovering than darting in nature. Flies always positioned themselves atop their perches in a horizontal position with the head facing in the direction of a bee nest. Removal of perches seemed to temporarily confuse flies who would attempt to land where a perch had previously been located. Only occasionally would flies land on the sand near bee nest openings. Movement between perches appeared to increase during particularly windy days.

Since flies were much smaller than the stockier bees, we doubted that adults preyed on bees but we watched closely for any foraging behavior. We observed no obvious attempt by the flies to chase or to attack bees or other insects in the vicinity. However, one specimen in the ABS collection was pinned with its presumptive prey, a species of frit fly (Diptera: Chloropidae). Small ants were occasionally followed for a short distance from the perch, as were other *T. arenicola* that flew near a perched individual.

Most of the flies observed were females and they appeared to be watching the *Perdita* burrow openings. They turned their heads from side to side, as if to scan the area around the burrow. In 1992, two females were observed entering burrows only seconds after the female bees exited. Since little is known about the biology of these flies, we (Norden et al. 1992) suggested that these fly larvae might feed upon the bee larvae and that adult flies were entering nests to oviposit. Though information on the dietary habits of asilid larvae are sparse (Woods 1981), observations suggest that they are predaceous on soil-dwelling insects.

However, the bees were still provisioning their nests during these observations, and bee larvae probably were not present yet. Melin (1923) suggested that some asilid larvae may feed on non-insect diets. If this is so then a pollen mass of *P. graenicheri* could provide sufficient food for one or more *T.*

arenicola larvae. It is also plausible that the larvae are general opportunists, feeding on both pollen and bee larvae.

Though we are uncertain of the significance of the association of *T. arenicola* with bee burrows, three other asilids sometimes frequent vertebrate burrows. Lavigne (1968) reported (as *Asilus*) *Machimus formosus* (Hine) and *M. gilvipes* (Hine) in badger and ground squirrel burrows, and Bullington and Beck (1991) reported *M. polyphemi* Bullington & Beck in gopher tortoise burrows. Large burrows of such vertebrates probably serve as important retreats from harsh environmental conditions, oviposition and larval developmental sites, and/or mating sites for these flies. Mating pairs of *M. gilvipes* often alight and rest on the walls of burrows (Lavigne 1968). Perhaps females of *T. arenicola* select perches near burrows or other land marks to attract mates.

Townsendia Williston

Townsendia Williston, 1895: 107. *Townsendia minuta* Williston. Type Locality, Mexico.

Diagnosis.—Small flies, 3–4 mm long, head much wider than high, broad in lateral view; eyes with anterior facets unusually large; face narrow, vertex shallow and wide, front strongly divergent; wings basally narrow with only four posterior cells, anal angle and alulae absent, and vein M_3 absent with only four posterior cells.

The genus *Townsendia* Williston is restricted to the New World, with eight species from Mexico (Martin 1966), two from the United States (Williston 1895, Back 1909), and one from Puerto Rico (Curran 1926). Both species found in the United States were described from a single female (Back 1909). The type locality for *T. nigra* Back is New Jersey and that for *T. pulcherrima* Back is Texas. Martin (1966) referred to two undescribed species from the United States, one from Arizona and the

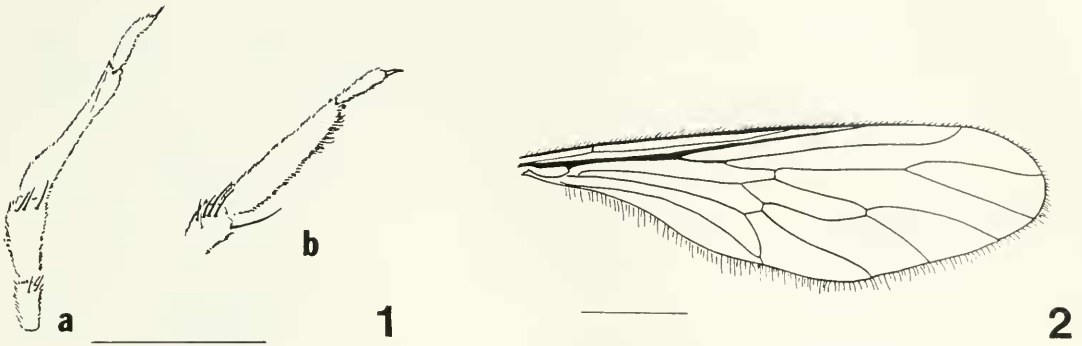


Fig. 1. Right antenna of male *Townsendia arenicola*, n. sp., a. dorsal view, b. lateral view. Scale = 0.2 mm.

Fig. 2. Right wing of *Townsendia arenicola*, n. sp. Scale = 0.4 mm.

other from Florida. The following new species from Florida is probably the one referred to by Martin.

DESCRIPTION OF SPECIES

Townsendia arenicola Scarbrough,

NEW SPECIES

Figs. 1-5

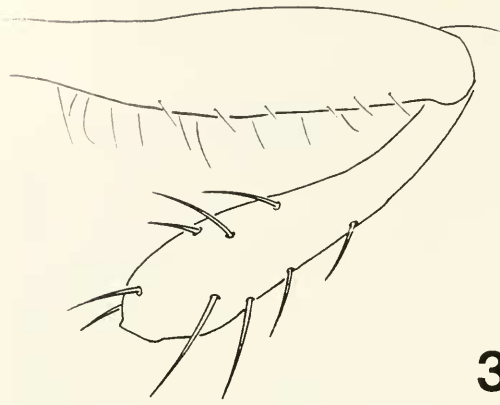
Male.—Head and thorax dark brown to black; abdomen dark brown with a slight tint of orange. Length, body 2.7–3.4 mm; wing 2.1–2.4 mm. Face, front, and occiput gray to slightly yellowish-gray tomentose; a small, light brownish tomentose spot present adjacent to each posterior ocellus. Oral margin of face with a row of six to seven short, thick, yellowish bristles. Palpus and short proboscis with short, fine yellowish vestiture. Front narrow basally, wide above with strongly divergent sides, one to two dark brown setae present; basally, three long grooves present, with the outer two divergent beyond the sides of ocellar tubercle, the middle groove about twice as deep as the other two. Antenna with brown vestiture, basal two segments combined about two-thirds as long as flagellum; flagellum flat laterally with a median constriction anteriorly, basal width slightly greater than apical width, ventral margin slightly narrowed to apex; stylus one-half as long as and two-thirds as

wide as flagellum, with a short, lateroapical spine, the latter one-fourth to one-third as long as stylus. Vertex shallow, three to four times wider than front basally. Occiput dorsally with six to seven short, brown post-ocular bristles, laterally and ventrally with shorter, thinner, yellow bristles.

Thorax mostly gray to slightly yellowish gray tomentose; scutum medially with a wide brown stripe that extends posteriorly to supra-alar bristles. A large lateral brown spot and sometimes a much smaller, less distinct brownish tomentose spot present on each side of median stripe. Vestiture on thoracic dorsum sparse, of short, thin, brown bristles; posteriorly dorsum with one, rarely two pairs of long dorsocentral bristles and three pairs of thick lateral bristles. Scutellum flat, margin with four to six long, brown setae, each alternating with one to two shorter setae. Pleuron usually with two thick, brown tergosternal bristles, sometimes a weaker pale seta also present. Halter basally brown, knob entirely and stalk partly yellowish.

Wing iridescent, often largely yellowish, with dense microtrichiae. Veins R_4 and R_5 widely divergent with R_4 ending before and R_5 well behind wing apex. Apically cell d and basally cell m_1 unusually narrow; cell m_1 at wing margin contrastingly wide, with veins M_1 and M_2 strongly divergent.

Coxae usually dark brown, sometimes



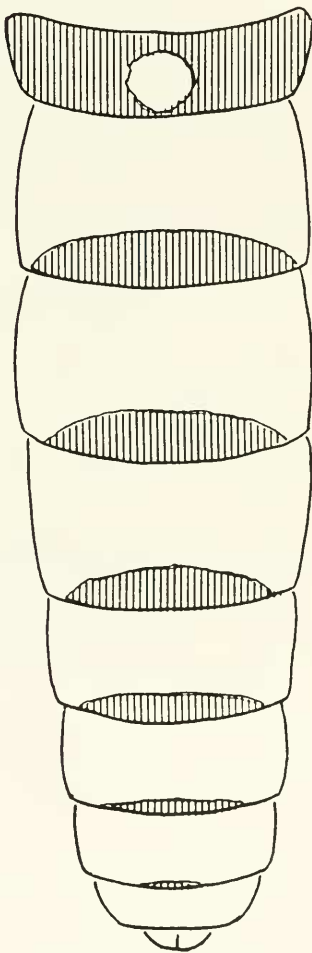
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apices narrowly yellowish, with yellowish vestiture. Trochanters, fore- and midfemora, fore- and midtibiae, and basal three to four tarsomeres of all tarsi yellow to slightly brownish yellow; fore- and midfemora ventrally with a long, thin, yellowish seta, seta below forefemora thickest and longest; all femora dorsoapically with two to three brown bristles. Hindfemora and hindtibiae largely yellow-brown to brown, usually yellow basally; hindfemora only slightly clavate with several long, thin, brownish or yellowish setae posteroventrally. Tibiae and tarsi with several thick, yellowish bristles; hindtibiae strongly clavate, sometimes posteriorly with two or three brown bristles. Apical segment of each tarsus brown; basotarsomere of hind tarsi swollen, remaining tarsomeres more slender.

Abdomen shiny, basal two and apical two to three segments dark reddish brown or orangish brown, with mostly brown vestiture; tergite 1 mostly and tergites 2-6 apically with a dense gray tomentose band, each band in succession from tergite 2 to 6 decreasing in width, making band on tergite 2 the widest and that on tergite 6 narrowest; sternites sparsely gray tomentose. Sternite 8 apically with abundant black setae.

Terminalia dark brown to black. Epanandrium undivided dorsally, sides dome-like and covering most of terminalia laterally, apical corners strongly pointed. Gonostylus flat, long, digitate. Hypandrium medially with a deep emargination and abundant, short, pale setae. Aedeagus as in Figure 1d.

Female.—Differs from the male as follows. Length, body 3.2–4.3 mm; wing 2.6–2.7 mm. Hind legs yellow to light brownish yellow; hind tibiae only slightly clavate, apical three tarsomeres of all tarsi yellowish brown to brown with the apical segment



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←

Figs. 3-4. 3. Left femur and left tibia of male *Townsendia arenicola*, n. sp. Scale = 0.4 mm. 4. Abdomen of *Townsendia arenicola*, n. sp. Scale = 0.4 mm.

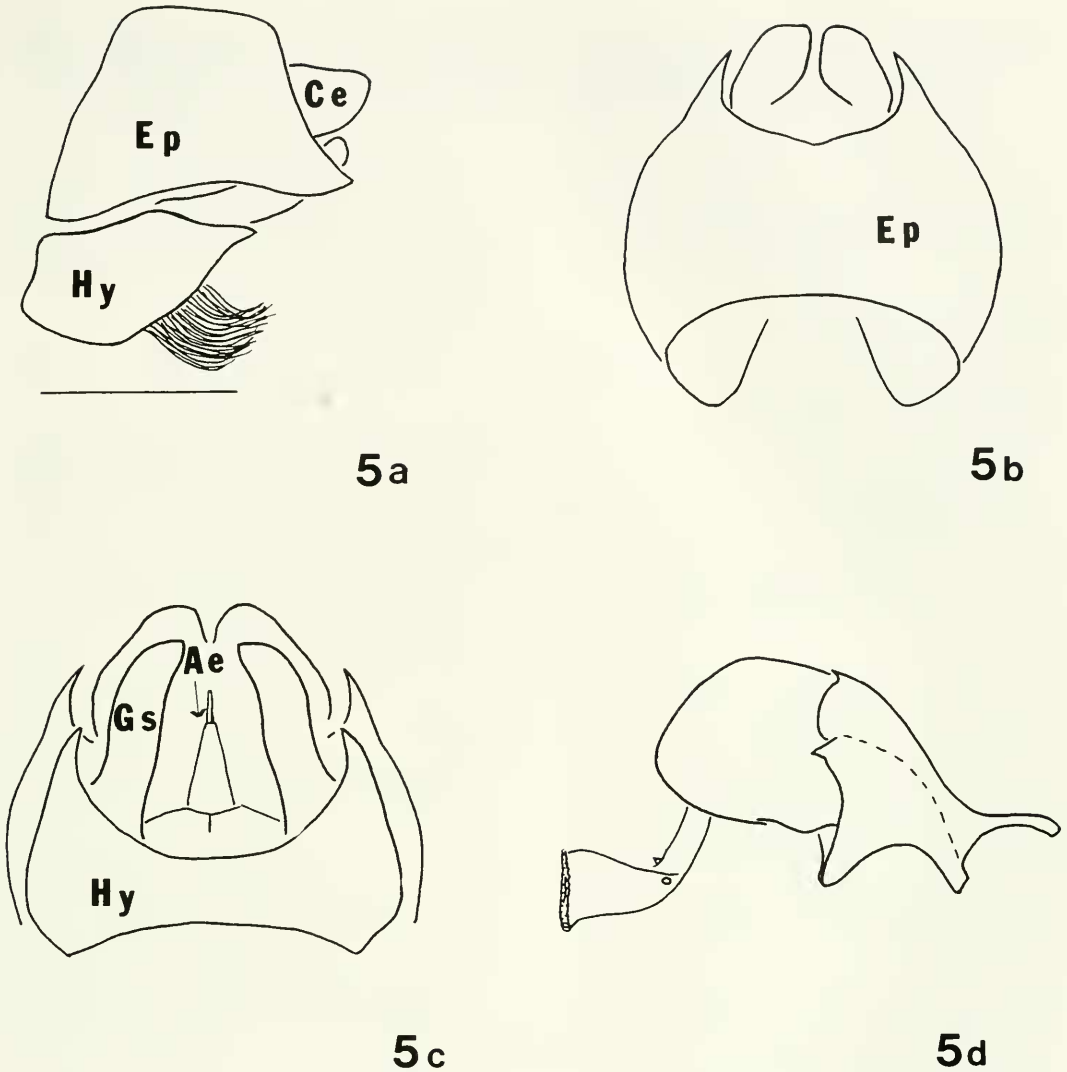


Fig. 5. Male terminalia of *Townsendia arenicola*, n. sp., a. lateral, b. dorsal, and c. ventral views; d. aedeagus, lateral. Scale = 0.4 mm. Abbr. Ae = Aedeagus, Ep = Epandrium, Ce = Cercus, Hy = Hypandrium, Gs = Gonostylus.

dark brown. Wings almost entirely iridescent yellow. Abdomen shiny with all of segments 1 and 9, narrow base of segment 2, and narrow apex of segment 8, dark brown to black or sooty blackish yellow, remaining segments contrastingly lighter, often partially sooty, usually brownish yellow to yellow. Sternite 8 narrowly divided medially with incision reaching apical third. Spermatheca long, extending posteriorly to apical margin of segment 3; apically each sper-

matheca tubular, darkly sclerotized, loosely coiled one and one-half times, darkly sclerotized, with apex slightly tapered; base of each ductus separate, not fused, and about as wide in diameter as spermatheca. Terminalia apically with eight black acanthopore spines.

Holotype ♂ FLORIDA: Archbold Biol. Sta., LK Placid, Highlands Co., Rosemary shrub, 21.VI.1988, M. Deyrup; allotype ♀, same data except 18.VI.1992. Paratypes, 23

♂ 27 ♀, same location, along various trails, firelanes, sand surfaces, and on a flowering *Paronychia chartacea*, 1 with chloropid prey, 4.VI-8.IX.89-92, B. Norden/M. Deyrup.

Voucher material.—Holotype ♂ & allotype ♀, deposited in the National Museum of Natural History, Smithsonian Institution (USNM); paratypes in the National Museum of Natural History, the Archbold Biological Station, and the Towson State Museum of Zoology.

Etymology.—Latin *arenicola*, meaning frequenting or living in sandy areas, referring to the habitat of the species.

Remarks.—*Townsendia arenicola*, n. sp. is easily separated from other known species in this genus by the wide gray tomentose bands on the apical margins of abdominal tergites 2–6, and by the dense gray and brown tomentose pattern on the scutum. The general color of the abdomen of females of *T. arenicola* and *T. pulcherrima* are essentially identical, but the latter species lacks the gray tomentose bands. In addition, the antennal spine of *T. pulcherrima* is subapical, short, and hidden in the long pubescence, whereas this spine in *T. arenicola* is apical, long and exposed. In females of *T. niger*, the abdomen is wholly blackish with the sides beyond the middle strongly tapered to a pointed apex. In *T. arenicola*, the abdomen is much lighter in color, largely brownish yellow to yellow, with parallel sides and a broad, rounded apex. It also differs from *T. niger* in having only sparse, short vestiture on the front, ocellarium and scutum. In both *T. pulcherrima* and *T. niger*, the vestiture of the head and scutum is much longer and more abundant than in *T. arenicola*. The former species have three to five prominent tergo-sternal bristles whereas *T. arenicola* has only two such bristles.

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