Records of the Hawaii Biological Survey for 1999. Bishop Museum Occasional Papers 63: 31–33. (2000)

A New Species of *Sigmatineurum* (Diptera: Dolichopodidae) From Seeps in Waimanu Valley on the Big Island of Hawai'i[1]

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Sigmatineurum Parent is a relatively rare endemic Hawaiian hyrophorine genus occurring on all the main islands in the archipelago. Evenhuis & Polhemus (1994) provided the first review of the genus including descriptions of 4 new species, gave observations on their behavior and habitat preferences, and helped define the taxonomic limits of the genus. Since then Evenhuis (1997) further refined the limits of the genus, described an additional 3 species, and provided an updated key to all species. In the present paper, an interesting new species is described from the Kohala Mountains of the Big Island of Hawai'i found on vertical seeps at relatively low elevations (all other species in the genus have been collected on boulders and rocks in the splash zone of mountain streams above 300 m).

Specimens examined in this study are deposited in the Bishop Museum, Honolulu (BPBM). Terminology follows Evenhuis (1997).

Sigmatineurum englundi Evenhuis, **n. sp.** Figs. 1–5

Sigmatineurum new sp.: Englund & Preston, 1999: 13–14, 16, 18, 24, 26.

Diagnosis. Keys to *S. parenti* Evenhuis using the key to species in Evenhuis (1997), but differs from that species by the different setation pattern of the mid leg and the smaller size of the pulvilli of the mid and hind legs.

Figure 1. *Sigmatineurum englundi* Evenhuis, **n. sp.**, female. Photo D.J. Preston & R.A. Englund

1. Contribution 2000-016 to the Hawaii Biological Survey.

Male. Body length: 4.2–6.0 mm. Wing length: 3.2–5.0 mm. *Head*. Front, face, and vertex dark brown with bluish reflections; occiput dark brown to black; clypeus slightly produced, brown, with coppery to brassy reflections; inner eye margins parallel-sided from level of antenna to level of upper margin of clypeus; palp and proboscis brown; antenna brown, flagellomere length ca. 2 × width, arista length slightly less than head height.

Thorax. Mesoscutum and scutellum brown with green reflections, some coppery reflections anterolaterally; notopleural area shining green and brassy; anepisternum with brassy green (anteriorly) and magenta (posteriorly) reflections; remainder of pleura brown, withsome green reflections; thoracic setae black to dark chocolate brown: 5 *dc*; 2 *np*; 1 *ph*; 1 *pa*; 1 *sc*; *ac* absent.

Legs. Brown, green reflections on CI and basal two-thirds of FI and FII. FI predominantly bare, sparse hairs ventrally; TI straight with hairs along ventral surface (MSSC). It1 4 × length of It_2. $It_{2–5}$ unmodified. IItr with small thorn-like process. FII (Fig. 1) with row of small, short, peg-like setae ventrally, single strong setae subapically (MSSC). TII slightly sinuous, with subbasal notch and strong hairs and setae on apical half of ventral surface, setae longest at apical 1/5. IIt1 slightly bowed, with patch of dense setae basally. $IIt_{2–5}$ unmodified. Leg III unmodified except for single strong setae near midlength of TIII (MSSC). Pulvilli of mid and hind legs ca. 1/2 length of claws.

Wing. Subhyaline throughout, pale brown color strongest at extreme base; crossvein m-cu bent slightly at middle, not S-shaped; CuA_1 reaching wing margin as faint trace of vein; CuAx 2.0; halter white.

Abdomen. Dark brown with green and brassy reflections dorsally, reflections brassy green laterally; black hairs posterolaterally on tergite I; sternite 4 process (Fig. 4) small, stublike. Hypopygium brown with pale brown cerci.

Female. As in male except for lack of MSSC, shorter antennal flagellomere, and darker green anepisternum; legs normal, without modifications.

Types. Holotype ♂ (BPBM 16,349) and 3♂,3♀ paratypes from: Hawaiian Islands: Hawai'i: Waimanu Stream, 350 ft [106 m], 11.xii. 98, on seep, R.A. Englund. *Other paratypes*: Hawai'i: 2♂,2♀, Alakahi Stream, 1220 ft [372 m], 9.xii.98, on seep, R.A. Englund; 8♂,4♀, Waimanu Stream, 300 ft [91 m], 11.xii.98, on seep, R.A. Englund; 4♂,11♀, same data except 380 ft [116 m]; 1♂,1♀, Waimanu Stream, Waihīlau tributary, 300 ft [91 m], R.A. Englund; 1♂,1♀, Waimanu Falls, 300–340 ft [91–104 m], on small seeps, M. Richardson (all in BPBM).

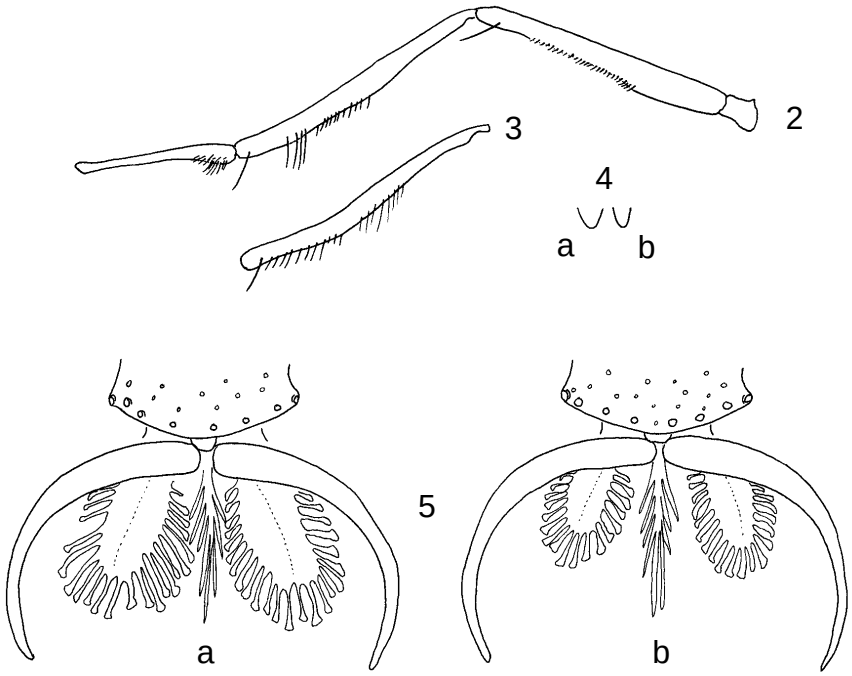
Habitat. Most *Sigmatineurum* species have been collected from boulders in the splash zone in the middle of fast moving mountain streams. It is interesting that this species has only been collected from seeps away from the splash zone of the streams.

The first collection of this species was at roughly the 370 m elevation of Alakahi Stream. The seep was ca. 1 m above the stream bed and measured about 15 m high by 30 m long. Flies were captured all along the length of this seep.

The second set of collections of this species were made in the on the main tributary of the Waimanu Stream (Waihīlau Stream), known as the "Keyhole" area due to the 1000 m sheer valley walls forming a spectacular and almost circular bowl, into which 2 waterfalls plunge from over the cliffs. The combination of the geological formation of this "bowl", the frequent wind, the porous nature of the rock wall, and the amount of water from the falls, makes virtually the entire bottom of this amphitheater a huge seep. The flies were captured at various points throughout the amphitheater at elevations from 91–116 m.

Discussion. There may be a correlation between the seep habitat of this species and the size of the pulvilli of the mid and hind legs (see Fig. 5). Species found on stream boulders have pulvilli subequal in length to the claws, which may be correlated with being able to successfully hold onto substrata when in a riffle habitat. The pulvilli of *S. englundi* has these pulvilli reduced to ca. 1/2 the length of the claws. More study will have to be done on other species to confirm this correlation throughout the genus.

Etymology: This species is named for the Ron Englund, who has continually provided significant observations to the knowledge of *Sigmatineurum* in Hawai'i.



Figures 2–5. 2, *Sigmatineurum englundi* Evenhuis, n. sp., midleg. **3**, *S. parenti* Evenhuis midleg. **4**, *S. englundi* Evenhuis, n. sp., sternite 4 process, **a**: caudal view. **b**: lateral view. **5**, hind claws of *Sigmatineurum* species. **a**: *S. mnemogagnei* Evenhuis; **b**: *S. englundi* Evenhuis, n. sp..

Literature Cited

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