Western North American Naturalist 79(4), © 2019, pp. 496–499

Expect the unexpected: a new ant from a backyard in Utah

JOHN T. LONGINO[1,*] AND DOUGLAS B. BOOHER[2,3]

[1]*Department of Biology, University of Utah, Salt Lake City, UT 84112*
[2]*Department of Animal Biology, University of Illinois, Urbana, IL 61801*
[3]*Georgia Museum of Natural History, Athens, GA 30602*

ABSTRACT.—Urban centers are not where one expects to find new species. Yet, we report here a newly recognized ant, ***Strumigenys ananeotes* sp. nov.,** in an urban yard in Salt Lake City, Salt Lake County, Utah, USA. The genus *Strumigenys* is a major radiation of litter ants that are found primarily in the wet tropics and subtropics. They are extremely rare in western North America, known only from sites hundreds of kilometers south and west of Salt Lake City. The new species is related to species from southern Arizona and is presumed native. We propose that it is normally restricted to moist, subterranean microhabitats in an otherwise arid region, but that anthropogenic activity has created an urban forest with summer conditions similar to eastern deciduous forest. *Strumigenys ananeotes* may now have a greatly expanded habitat and visibility, a case of a native species benefiting from human development rather than being displaced.

RESUMEN.—Los núcleos urbanos no son lugares donde esperamos encontrar nuevas especies. En este trabajo reportamos una hormiga recientemente identificada (***Strumigenys ananeotes* sp. nov.**) en un jardín urbano de Salt Lake City, Condado de Salt Lake, Utah, E.U. Dentro del género *Strumigenys*, se encuentran una radiación importante de hormigas que habitan principalmente, en los trópicos y subtrópicos húmedos. Estas hormigas, son muy raras en el oeste de América del Norte, siendo sólo conocidas en sitios a cientos de kilómetros al sur y al oeste de Salt Lake City. Esta nueva especie se encuentra emparentada con especies del sur de Arizona de donde es presumiblemente nativa. Proponemos que, la distribución de estas hormigas se restringe a microhábitats subterráneos húmedos, dentro de las regiones áridas. Pero la actividad antropogénica, ha creado bosques urbanos con condiciones estivales similares al bosque caducifolio oriental. Las *Strumigenys ananeotes* poseen actualmente un hábitat y una visibilidad más amplios, representando así, un caso donde una especie nativa se beneficia del desarrollo humano en lugar de ser desplazada.

New species discovery in the current era typically involves travel to exotic locales that have been poorly sampled, or the parsing of known entities into multiple cryptic species. Among insects, ants are one of the better-studied groups, and the taxonomy is in a relatively advanced state. In the United States, where ant diversity is of the same order of magnitude as bird diversity, new species are still being found but at a much lower rate than in tropical regions. As such, the last place one would expect to find a new ant species is in the urban core of a major United States city. We report here such a discovery, and suggest that we are seeing an unusual interaction of native biota with the novel human-built environment.

Strumigenys species are specialist micropredators feeding primarily on Collembola (springtails) within leaf litter, rotting wood, and soil that they inhabit (Brown and Wilson 1959, Bolton 2000). There are over 800 species and they are globally distributed, primarily in wet tropical and subtropical mesic forests (Bolton 2000). In North America, there is also a major radiation in mesic eastern deciduous forests, with 45 species east of the Mississippi River.

Western North America is sharply different. In the western United States the genus is very rare, with only a few species known from small areas in Arizona and California. When known, the colonies are deeply hidden in moist microhabitats. *Strumigenys arizonica* is a commensal inside nests of the fungus-growing ant *Trachymyrmex arizonensis* (Gray et al. 2018) and is known only from southeastern Arizona. *Strumigenys chiricahua* is known from a worker in a Berlese sample and a nest collected in a subterranean rotten root, also just

*Corresponding author: john.longino@utah.edu

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from southern Arizona. *Strumigenys californica* is known from a few scattered records in Los Angeles and Monterey Counties, California, with little biological data. *Strumigenys reliquia* is known from riparian oak woodland in the Sacramento Valley, California, where a few specimens have been collected in samples of sifted litter. There are also sparse records of introduced species *S. membranifera*, *S. mixta*, and *S. silvestrii*, but these are also restricted to southern Arizona and California, typically in irrigated areas. The endemic Arizona and California species are thought to be relicts of a more mesic period in western North America (Ward 1988).

Salt Lake City, Utah, is in the Intermountain West, on the eastern edge of the Great Basin bioregion, in an area of strong continental climate. Winters are cold, and summers are hot and dry. Salt Lake City is hundreds of kilometers from the nearest record of *Strumigenys*, and there are certainly no previous records of the genus in Utah (e.g., Allred 1982). It is far beyond the expected range of this largely tropical and subtropical genus. Therefore, it came as a shock to discover a native *Strumigenys* species in an urban backyard in Salt Lake City.

OBSERVATION

The senior author lives in a dense urban neighborhood in Salt Lake City, Salt Lake County, Utah, USA, near the University of Utah campus. It is an older neighborhood ("The Avenues") that has been developed as housing since the late 1800s. The houses are surrounded by small yards, with the typical mix of lawns and ornamental plantings. Regular summer irrigation keeps the city green. There are many street trees, and the Salt Lake Valley is now filled with a large urban forest. This forest is about 150 years old, replacing the native sagebrush/grassland habitat that was largely treeless. The senior author has a small raised-bed garden, with potting soil about 20 cm deep. On the evening of 13 August 2018, just after dark, he was closely examining the surface of this garden, and observed 4 *Strumigenys* workers. Other foraging ants in the vicinity were *Tetramorium immigrans*, *Brachymyrmex depilis*, *Solenopsis molesta*, and *Formica neoclara*. The next night, several liters of soil were excavated to a depth of approximately 10 cm beneath where the foragers had been seen. A total of 66 workers (a few with small larvae) and 6 winged queens were scattered in the soil.

Beyond the surprise of finding the first *Strumigenys* in Utah, the expectation was that this would be an introduced species: one of the globally distributed tramp species or one of the many eastern United States species. The garden bed was filled with purchased potting soil, making human introduction a likely scenario. The morphology of these specimens was carefully compared with all known *Strumigenys* species, using the global revision of Bolton (2000). Attention was paid not only to the eastern United States species, but similar species throughout the world. The Utah specimens are a previously undescribed species morphologically close to *S. arizonensis* and *S. chiricahua*, and thus are presumably native.

DISCUSSION

Strumigenys is abundant in sites that offer warm, moist foraging environments. Native habitats in northern Utah are warm in the summer, but when it is warm the surface litter is extremely dry, even in forested riparian corridors. This new species is likely a relict, like *S. reliquia* and others, that had retreated to subterranean microsites and thus escaped detection by entomologists. But human activity has created what is effectively a temperate broadleaf deciduous forest. The summer irrigation creates many square kilometers of habitat with warm, moist leaf litter and garden soil. This species may be experiencing a Renaissance, reemerging after a long retreat belowground. In this case, the creation of an urban forest was not a disruption or displacement of its native habitat, but an expansion.

Human-altered habitats are dominated by introduced species. In Salt Lake City, the trees are introduced, and starlings swarm restaurant patios. Among ants, the introduced species *T. immigrans* is the dominant sidewalk ant. An ant species that shares the microhabitat of *Strumigenys* is *Ponera pennsylvanica*, which is common under lawns in Salt Lake City. This is a widespread, relatively abundant species in eastern deciduous forest that is potentially a recent arrival in the West (Branstetter and Longino 2019). But the new *Strumigenys* is an unusual case in which massive habitat change has revealed a formerly cryptic species and possibly allowed it to flourish.

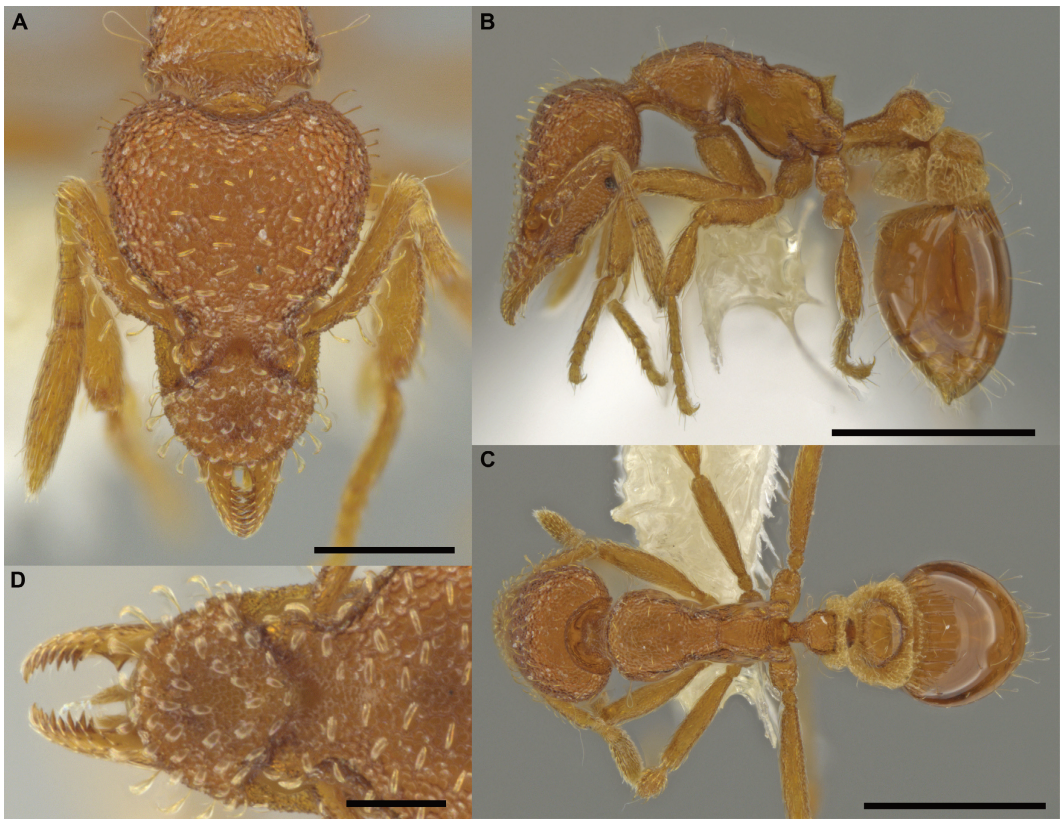

Fig. 1. *A,* Holotype worker *Strumigenys ananeotes*, face view, scale 0.2 mm. *B,* Lateral view, scale 0.5 mm. *C,* Dorsal view, scale 0.5 mm. *D,* Non-type worker (unique specimen identifier CASENT0645965), mandibular dentition, scale 0.1 mm.

Although undocumented, surely this species is not rare. If it were, it would be an odd coincidence that one of the rare occurrences happened to be in the backyard of a myrmecologist. This and other species of *Strumigenys* in western North America may be more widespread and abundant than we think, escaping detection due to their small size, cryptic habits, and previously subterranean microhabitats. We hope that this discovery will encourage naturalists to don headlamps and hand lenses and head out into the backyard on warm summer nights.

TAXONOMY

Strumigenys ananeotes, new species
(Fig. 1)

TYPES.—Holotype worker: USA, Utah, Salt Lake Co.: Salt Lake City, 40.77100 −111.85419 ±20 m, 1410 m, 13–14 Aug 2018, urban garden, nest in soil (J. Longino #10240) [California Academy of Sciences, unique specimen identifier CASENT0645955]. Paratype workers, alate queens: same data as holotype, distributed to Harvard Museum of Comparative Zoology, United States National Museum, University of Georgia Collection of Arthropods, Monte L. Bean Life Science Museum, and Natural History Museum of Utah.

ETYMOLOGY.—Meaning "newly emerged."

DIAGNOSIS.—*Strumigenys* can be divided into 2 morphologically distinct groups: species with long linear mostly edentate mandibles, or species with short triangular mandibles with numerous teeth along most of their length. All species having ranges centrally located in the United States belong to the latter group, formerly known as the genus *Smithistruma.* These species are very similar in morphology and size, but have distinct pilosity and tooth patterns that separate species. *Strumigenys*

ananeotes can be distinguished from all other North American species by tooth morphology alone. It is the only species in North America having the first 7 teeth alternating between similarly sized large and small pointed teeth. The basal-most tooth is small or missing, which gives a count of 8 or 7 for the teeth of alternating sizes. *Strumigenys ananeotes* is most similar to the western species *S. chiricahua*, eastern species *S. hyalina*, and Mexican species *S. dispalata*. In *S. chiricahua*, the first 3 teeth increase in size and do not completely overlap when the mandibles are closed, whereas in *S. ananeotes*, the large teeth overlap the opposing smaller teeth when the mandibles are closed. *Strumigenys hyalina* has similarly alternating large and small teeth, but the larger teeth decrease in size apically such that tooth 7 is only about half the length of tooth 1; in *S. ananeotes*, tooth 7 is only slightly smaller than tooth 1. In *S. dispalata*, teeth do not alternate in size, and tooth 2 is longer than tooth 3 and tooth 4. There are also differences in the shape of the spatulate setae on the anterior margin of the clypeus. In *S. ananeotes* the setae are apically truncated and have irregular margins; in *S. hyalina*, they are also truncate but with evenly flat apical margins; in *S. chiricahua*, they are relatively narrower and evenly rounded along the anterior margins. *Strumigenys ananeotes* is also easily distinguished from other western species. In *S. arizonica*, the first and fourth mandibular teeth are subequal in length and shorter than the second, third, and fifth teeth. In *S. californica*, the first 6 teeth gradually and slightly decrease in size. *Strumigenys reliquia* has simple-to-subflagellate hairs on the clypeus. The only other species with similar mandibular teeth is the introduced species *S. margaritae*. It also has teeth that alternate in size, but the smaller teeth are blunt and not pointed as in *S. ananeotes*. However, in other characters, *S. margaritae* bears little resemblance to *S. ananeotes*.

ACKNOWLEDGMENTS

We thank Nalini Nadkarni for insisting on the garden. This work was supported by National Science Foundation grant DEB-1354739 (Project ADMAC).

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Received 20 February 2019
Revised 31 May 2019
Accepted 18 June 2019
Published online 29 October 2019