

***Strumigenys baudueri* (Insecta: Formicidae), a second species of this cryptic ant genus reported from South Tyrol (Italy)**

Abstract

Strumigenys baudueri (Emery, 1875) is reported for the first time from South Tyrol, Italy. Workers from two locations were captured from soil core samples using the Berlese method. The individuals originated from a cultivated vineyard and a dry grassland of low altitude in the Adige/Etsch Valley and were previously misidentified and reported as *Strumigenys argiola* (Emery, 1869).

Keywords: soil fauna,
myrmecology, dry grassland

Introduction

Strumigenys baudueri (EMERY, 1875) is an ant species that belongs to the Myrmicinae subfamily and the Attini tribe (WARD et al. 2015) with eight species recorded in Europe (JANICKI et al. 2016; GUENARD et al. 2017; ANTWEB 2023). It is a small-bodied species with carnivorous feeding habits bound to the soil and litter layer (SEIFERT 2018). It has a trap-jaw mandible, to efficiently hunt small invertebrates, as typical for this genus (HÖLDOBLER & WILSON 1990; LARABEE & SUAREZ 2014). Due to its concealed life form, little is known about its autecology and the species is being under-recorded throughout its distribution range (SEIFERT 2018). The natural habitat of *S. baudueri* is not well-known (SEIFERT 2018), but it is commonly found in sunny meadows, deciduous forests, and green urban areas (ARCOS & GARCIA 2024), especially at elevations below 500 m a.s.l. Nevertheless, an exceptional finding has also been reported at higher elevations (1600 m a.s.l.; KARAMAN et al. 2015).

Strumigenys baudueri has a Turano-Mediterranean chorotype, with a known species distribution ranging from Morocco to Armenia (GUÉNARD et al. 2017). In Italy, the species is reported from the major islands (SCHIFANI et al. 2021) and central and northern Italy (SCHIFANI 2022) with no records so far reported from the Alps.

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Fig. 1: Pictures of *Strumigenys baudueri* workers collected from soil core samples (Photos by Elia Nalini).

This ant species was already mistaken with *Strumigenys argiola* in Switzerland (BORCARD et al. 1997; BARONI URBANI 1998) and the same happened in our study area (see GUARIENTO et al. 2023), where specimens of *S. baudueri* were misidentified and reported as *S. argiola*. This contribution is also an *errata corrige* for two out of five sites where *S. argiola* was reported in GUARIENTO et al. (2023).

Methods and Results

The records originate from the Biodiversity Monitoring South Tyrol (hereafter referred to as BMS project; HILPOLD et al. 2023), a biodiversity monitoring program that surveys a variety of habitats using several sampling methods, including soil core sampling, beating, sweeping, and pitfall trapping, performed on over 320 single sampling sites. Pitfall traps were installed at each site twice a year, two in late spring/early summer and two in late summer/early autumn. Four soil core samples (10×10 cm and max. 15 cm deep) per site were taken during late spring and summer months. Soil samples were transported to the laboratory and invertebrates were extracted by heat in a modified Kempson apparatus (KEMPSON et al. 1963). For more details on collection methods used in the BMS project see HILPOLD et al. (2023). All samples from 20 sites included in the project and appearing to be suitable biotopes for the species (such as extensive dry grasslands N=10 and steep vineyards N=10) were screened with no additional findings. With all sampling methods, only four workers (Fig. 1) of *Strumigenys baudueri* were collected with soil core samples at two different sites in Gargazzone/Gargazon and Nalles/Nals on 31.05.2021 (Fig. 2, Table 1).

Table 1: Site and discovery details. *Strumigenys baudueri*: Information on record location and circumstances. Average ± standard deviation of the monthly precipitation and temperature of each site exported from the CRESPI et al. (2021) gridded dataset (years 1980–2020).

Site	Nalles / Nals	Gargazzone / Gargazon
Habitat	Steep cultivated vineyard	Dry grassland/former vineyard
Exposition	S	SW
Latitude	46.54519	46.57537
Longitude	11.19592	11.21777
Elevation (m a.s.l.)	404	322
Collection method	Soil core	Soil core
Specimen	3 workers	1 worker
Date	31.05.2021	31.05.2021
Mean annual precipitation (mm/m ²)	754.9 ± 146.1	752.8 ± 145.1
Min. and max. annual precipitation	511.8; 1069.2	500.1; 1099.8
Mean annual temperature (°C)	11.8 ± 7.6	12.4 ± 7.6
Min. and max. annual temperature	-2.9; 46.5	-2.3; 46.5



Fig. 2: Pictures of the discovery sites: steep cultivated vineyard and dry grassland / former vineyard (Photos: Eurac Research/BMS Team).

Since weather conditions might affect the success in collecting some ant species (DELSINNE et al. 2018; COSTA-SILVA et al. 2019), we report temperature and precipitation of the sampling day and from the two days before from the nearest meteorological station in Gargazzone/Gargazon (<https://weather.provinz.bz.it/download-data.asp>; Table 2) that seem to point to a rather warm and dry weather at the time of collection.

Table 2: Weather variables two days before and at the day of discovery (in bold) from the nearest weather station in Gargazzone/ Gargazon (<https://weather.provinz.bz.it/download-data.asp>)

Day	29.05.21	30.05.21	31.05.21
Min. temperature (°C)	10.2	5.2	7.5
Max. temperature (°C)	24.0	26.0	26.1
Precipitation (mm/m ²)	0.0	0.0	0.0

The species were identified using a stereo microscope (Leica M125c with 120 magnification) and the identification keys of SEIFERT (2007, 2018). Pictures were taken with a planar achromatic lens 10× mounted through extension tubes on a Canon 1300D camera for frontal view, while lateral view pictures were taken by using a Laowa 2.5–5× lens mounted on the same camera. From pictures we also measured morphological traits using the open-source software Fiji (SCHINDELIN et al. 2012; Table 3).

Table 3: Linear morphometry values of the four *Strumigenys baudueri* specimens. Specimen ID refers to the code for each collected individual. Each value (µm) is an average of three replications with the standard error reported after each ±. Measurement abbreviations: CL: cephalic length; CW: cephalic width; SL: scape length; ML: mesosoma length; MW: mesosoma width; PeL: petiolar length. For measurement details see SEIFERT (2018).

Specimen ID	CL	CW	SL	ML	MW	PeL
205_WYS_3_1	504.9 ± 2.4	381.6 ± 0.3	276.8 ± 1	540.3 ± 5.7	224.6 ± 0	206.8 ± 2.3
205_WYS_3_2	576.3 ± 1.2	405.2 ± 1.4	287.8 ± 4.2	587 ± 1.6	246.5 ± 2.5	227.6 ± 1.2
205_WYS_3_3	570.4 ± 1.5	397.7 ± 0.9	281.3 ± 2.2	614.8 ± 0.6	253.8 ± 1.1	226 ± 1.0
070_PAC_3_1	541.6 ± 0.4	394.9 ± 0.2	288.4 ± 2.2	557.6 ± 1.2	235.4 ± 0.8	235.4 ± 2.0

For the two sites where the species was recorded, we also provide the list of syntopic ant species (Table 4) and of vascular plant species observed on site (Table A1 in the Appendix) to provide all available information on the site.

Table 4: List of ant species occurring syntopically with *Strumigenys baudueri*.

Ant species	Gargazzone / Gargazon	Nalles / Nals
<i>Aphaenogaster subterranea</i>		X
<i>Camponotus aethiops</i>	X	X
<i>Camponotus piceus</i>	X	
<i>Formica cunicularia</i>		X
<i>Lasius casevitzii</i>	X	
<i>Lasius emarginatus</i>	X	X
<i>Pheidole pallidula</i>	X	X
<i>Plagiolepis pygmaea</i>	X	X
<i>Ponera testacea</i>		X
<i>Solenopsis fugax</i>	X	
<i>Tapinoma subboreale</i>	X	X
<i>Tetramorium caespitum</i>		X

Discussion

The presence of *Strumigenys bauduerei* in South Tyrol represents the second northernmost record of the species so far (BORCARD et al. 1997) and one of the few occurring within the Alpine arch. Interestingly, the two sites in which the species was collected are vineyards (one active and one abandoned with now a clear dry grassland character). The capture probability remains very low, with only 0.5% of soil core samples recording the species (two of 400 single soil core samples of the entire BMS project) and no pitfall trap records from the BMS project or other recent studies that used both pitfall traps and soil core samples in extensive and dry grasslands in South Tyrol at suitable elevations (GLASER 2004; GUARIENTO et al. 2020). The best method for capturing workers of this genus is still the use of soil or litter samples (FELLNER et al. 2009; HOLECOVÁ et al. 2015; PURKART et al. 2021). With the only exception of *Aphaenogaster subterranea*, syn-topic ant communities are dominated by xerothermophilic species (e.g., *Camponotus piceus*, *C. aethiops*, *Pheidole pallidula*) at both sites. Furthermore, the co-occurrence of *Strumigenys bauduerei* with other endogean (*sensu* ORTUÑO et al. 2014) species (such as *Ponera testacea* and *Solenopsis fugax*) was previously reported by MARKÓ (2008), suggesting a possible overlap in microhabitat between these three species. Similar to *Strumigenys argiola*, *S. bauduerei* seems to inhabit a wide range of habitats from sunny grasslands to leaf litter in deciduous forests and green urban areas (ARCOS & GARCÍA 2024). However, almost nothing is known about their abundance in different habitats, their nest structure, and underground foraging behavior. These new records seem to further underline the adaptability of *S. bauduerei* to inhabit different habitats and land use types and that the species is likely under-recorded in its entire distribution range.

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Riassunto

Strumigenys bauduerei (Emery, 1875) è segnalata per la prima volta nella provincia autonoma di Bolzano–Alto Adige. La specie è stata trovata usando campioni di suolo ed estrattori Berlese che contenevano operaie. I record, prima erroneamente determinati come *S. argiola*, provengono da un vigneto e una prateria xerica differenti delle quote basse nella valle dell'Adige.

Zusammenfassung

Strumigenys bauduerei (Emery, 1875) wird erstmals aus Südtirol gemeldet. Die Arbeiterinnen wurden aus Bodenproben gesammelt. Die Nachweise, anfangs als *S. argiola* fehlbestimmt, stammen aus einem Weinberg und ein Trockenrasen in den tieferen Lagen des Etschtals.

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Appendix

Table A1: Vascular plants recorded as syntopic with *Strumigenys baudueri*.

Plant species	Gargazzone / Gargazon	Nalles / Nals	Plant species	Gargazzone / Gargazon	Nalles / Nals
<i>Acer negundo</i>		X	<i>Lolium perenne</i>		X
<i>Achillea millefolium</i> agg.	X	X	<i>Medicago lupulina</i>		X
<i>Ailanthus altissima</i>	X		<i>Medicago minima</i>		X
<i>Ajuga genevensis</i>		X	<i>Ostrya carpinifolia</i>	X	
<i>Allium oleraceum</i>		X	<i>Petrorhagia saxifraga</i>	X	X
<i>Arenaria serpyllifolia</i>	X		<i>Phleum phleoides</i>	X	
<i>Arrhenatherum elatius</i>		X	<i>Plantago lanceolata</i>		X
<i>Artemisia vulgaris</i>		X	<i>Poa annua</i>		X
<i>Asplenium adiantum-nigrum</i>	X		<i>Poa trivialis</i>		X
<i>Asplenium trichomanes</i>	X		<i>Potentilla argentea</i>	X	
<i>Atocion armeria</i>			<i>Potentilla inclinata</i>	X	
<i>Bellis perennis</i>		X	<i>Potentilla reptans</i>		X
<i>Bothriochloa ischaemum</i>	X	X	<i>Prunus spinosa</i>		X
<i>Brachypodium pinnatum</i> agg.		X	<i>Quercus pubescens</i>	X	X
<i>Bromus sterilis</i>		X	<i>Rosa canina</i>		X
<i>Campanula patula</i>	X		<i>Rubus</i> sp.	X	X
<i>Carex hirta</i>	X		<i>Sanguisorba minor</i>		X
<i>Carex spicata</i>		X	<i>Saponaria ocymoides</i>		X
<i>Centaurea stoebe</i>		X	<i>Scorzonera austriaca</i>		X
<i>Cichorium intybus</i>		X	<i>Securigera varia</i>		X
<i>Clematis vitalba</i>		X	<i>Senecio vulgaris</i>		X
<i>Clinopodium vulgare</i>		X	<i>Setaria</i> sp.		X
<i>Convolvulus arvensis</i>	X	X	<i>Setaria viridis</i>	X	
<i>Crataegus monogyna</i>	X		<i>Silene latifolia</i>		X
<i>Elymus repens</i>		X	<i>Silene vulgaris</i>		X
<i>Erigeron annuus</i>	X	X	<i>Sonchus oleraceus</i>		X
<i>Euphorbia cyparissias</i>	X		<i>Stachys recta</i>		X
<i>Festuca</i> sp.	X		<i>Stellaria media</i> agg.		X
<i>Filago lutescens</i>	X		<i>Taraxacum</i> sp.		X
<i>Fragaria vesca</i>		X	<i>Trifolium arvense</i>	X	
<i>Fraxinus ornus</i>	X	X	<i>Trifolium repens</i>		X
<i>Fumaria vaillantii</i>		X	<i>Valerianella</i> sp.		X
<i>Galium mollugo</i>		X	<i>Verbascum chaixii</i>	X	
<i>Geranium pyrenaicum</i>		X	<i>Veronica hederifolia</i>		X
<i>Geranium rotundifolium</i>		X	<i>Veronica persica</i>		X
<i>Hedera helix</i>		X	<i>Vicia angustifolia</i>	X	X
<i>Hieracium pilosella</i>		X	<i>Vicia hirsuta</i>	X	X
<i>Koeleria macrantha</i>	X		<i>Viola arvensis</i>		X
<i>Lathyrus sphaericus</i>	X		<i>Vitis vinifera</i>	X	
<i>Lathyrus sylvestris</i>		X			