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## Comments to distribution of several Greek *Tetramorium* MAYR, 1855 species (Hymenoptera: Formicidae)

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**Abstract:** Based on studied material three *Tetramorium* species are recorded from Greece for the first time: *Tetramorium indocile* SANTSCHI, 1927, *Tetramorium staerckei* KRATOCHVÍL, NOVÁK & SNOFLÁK, 1944 and *Tetramorium sulcinode* SANTSCHI, 1927. Additionally, distribution records of recently revised members of the *Tetramorium caespitum* group are reexamined and assigned to proper taxa. *Tetramorium rhodium* EMERY, 1922 is recorded from the East Aegean Islands for the first time.

**Key words:** ants, faunistics, Greece, new records.

### INTRODUCTION

There are 100 *Tetramorium* MAYR, 1855 species known from Palearctic (BOLTON 2018). Mediterranean species, due to their intraspecific variability, are considered as one of the most taxonomically challenging taxa. Very often, their determination requires studies on nest samples and investigating of sexual forms (SALATA & BOROWIEC 2017, WAGNER *et al.* 2017). Majority of Greek taxa of the *Tetramorium* genus have been included in several modern revisions (Csősz *et al.* 2007, Csősz & SCHULZ 2010, SALATA & BOROWIEC 2017, WAGNER *et al.* 2017). Thus, their determination, at least to species-group level, is facilitated. Below we list three new species for Greek fauna, members of lately revised *T. chefketi* species-group (Csősz *et al.* 2007): *T. sulcinode* SANTSCHI, 1927; and *T. caespitum* species-group (WAGNER *et al.* 2017): *T. indocile* SANTSCHI, 1927 and *T. staerckei* KRATOCHVÍL, NOVÁK & SNOFLÁK, 1944. As the *Tetramorium caespitum* group, one of the most difficult taxonomically object in myrmecology, was revised recently (WAGNER *et al.* 2017), we reexamined our Greek samples of taxa previously labeled as *Tetramorium* cf. *caespitum*. Except *Tetramorium hungaricum* RÖSZLER, 1935, the most distinct species from this group recorded from Macedonia,

Peloponnese, Thessaly and Thrace (BOROWIEC & SALATA 2012, 2017; BRAČKO *et al.* 2016), and properly identified *Tetramorium impurum* (FÖRSTER, 1850) recorded from Thrace (BRAČKO *et al.* 2016) we found members of five other species in the material. Because our attempt is to delimitate a real distribution range of Greek species and revise ant checklist, we add new distribution data for *T. rhodium* EMERY, 1922, a member of *T. chefketi* species-group, as well.

## MATERIAL AND METHODS

Majority of investigated material comes from samples collected by authors, deposited in the Department of Biodiversity and Evolutionary Taxonomy, University of Wrocław (DBET). We supported our study with the material deposited in the Natural History Museum of Crete (NHMC). The main method, applied in our sampling of Greek *Tetramorium* ants, was direct sampling (hand collecting). Ant nests and individual specimens were collected on the ground, in leaf litter and under stones. Nests were searched in rock crevices, under rocks and directly in the soil. All specimens were preserved in pure 75% ethanol. Images of ant specimens were taken using a Nikon SMZ 1500 and Nikon SMZ 18 stereomicroscopes, Nikon D5200 photo camera and Helicon Focus software. General distribution is defined after Borowiec (2014) and unpublished data from the Database and Collection of Greek Ants (DCGA) deposited at the University of Wrocław.

## RESULTS

### *Tetramorium rhodium* EMERY, 1922

*Tetramorium caespitum* var. *rhodia* EMERY, 1924: 277 (= *Tetramorium caespitum caespitum* var. *rhodia* EMERY, 1915: 3 unavailable name).

New material: **East Aegean Islands:** Lesbos, near Ahladeri (39,15958 N/26.29292 E), 9 m, 10 VI 2015, 14g, 40w, 8m, leg. L. Borowiec (DBET); Lesbos, M. Pythariou (39.17322 N/25.96195 E), 99 m, 8 VI 2015, 2m, leg. L. Borowiec (DBET); Lesbos, 3.4 km NE of Skalochori (39.27923 N/26.10926 E), 292 m, 9 VI 2015, 26g, 71w, 14m, leg. L. Borowiec (DBET); Lesbos, road Sykaminia-Vigla (39.35468 N/26.30483), 395 m, 12 VI 2015, 6w, leg. L. Borowiec (DBET).

Comments: Described from Greece: Dodecanese, Rhodes, Kattavia vicinity. In the revision of the *Tetramorium chefketi* group it was raised to species rank and recorded also from Cyprus and western Turkey – Izmir and Denizli provinces (Csósz *et al.* 2007). New to the East Aegean Islands.

### *Tetramorium sulcinode* SANTSCHI, 1927

*Tetramorium caespitum* var. *sulcinode* SANTSCHI, 1927: 53.

New material: **Dodecanese:** Nisyros, rd. Nikia-Avlaki (36,5697 N/27.1872 E), 290 m, 5 VI 2005, leg. M. Chatzaki, 4w (NMHC, DBET).

Comments: *Tetramorium sulcinode* SANTSCHI, 1927 was described from Kyrgyzstan (Sokuluk west of Bishkek). In revision of *Tetramorium chefketi* group it was restored to species rank and recorded also from Afghanistan, Pakistan and Turkmenistan (Csósz *et al.* 2007). Recently, it was collected in Chuy and Issyk-Kul provinces of Kirgystan (BOROWIEC *et al.* 2009). On AntWeb resources there are also specimens of this species collected in Russia (CASENT0235354, Stavropolskij Kraj, Neftekumsk) and Turkey (CASENT0906720, Mersin Prov., Silifke). New to Greece. Locality on Nisyros is the westernmost for this species.



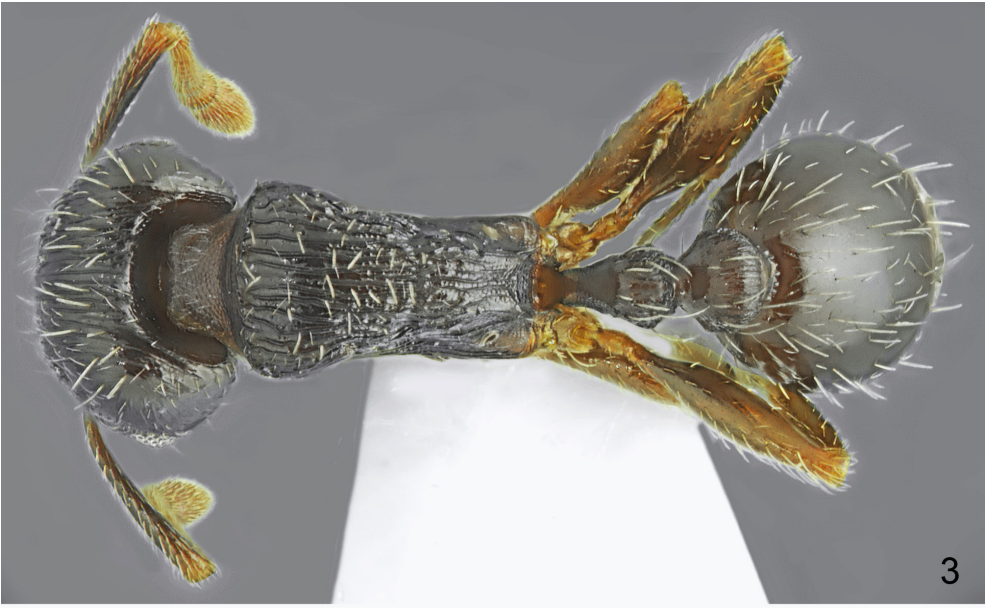
Figs. 1–2. *Tetramorium rhodium* EMERY, worker: 1. dorsal; 2. lateral (photo L. Borowiec).

*Tetramorium caespitum* group

*Tetramorium caespitum* (LINNAEUS, 1758)

*Formica caespitum* LINNAEUS, 1758: 581.

Revised material: **Epirus**: Preveza, near K. Kotsanopoulo (39.19554 N/20.72153 E), 95 m, 30 VIII 2016, 1g, 1w, leg. L. Borowiec (DBET); **Macedonia**: Pieria distr., Olympus Mts., Fotina-Petra rd. loc. 1 (40.21229 N/22.31785 E), 249 m, 7 IX 2012, 3w, leg. L. Borowiec (DBET); Pieria distr., Olympus Mts., Litochoro-Faragi Enipeas (40.10449 N/22.49286 E), 322 m, 31 VIII 2012, 1w, leg. L. Borowiec (DBET); Pieria distr., Pieria Mts., 1.8 km



Figs. 3–4. *Tetramorium sulcinode* SANTSCHI, worker: 3. dorsal; 4. lateral (photo L. Borowiec).

E of Rizomata (40.35607 N/22.23148 E), 668 m, 5 IX 2012, 5w, leg. L. Borowiec (DBET); **Peloponnese:** Argolida, near Skotini (37.79238 N/22.41455 E), 910 m, 27 VIII 2013, 2w, leg. L. Borowiec (DBET); Korinthia, near Sarandapiho (38.0275 N/22.39346 E), 1389 m, 1 IX 2013, 3g, 2w, leg. L. Borowiec (DBET); Korinthia, near Tarsos, (37,99267 N/22,3701 E), 940 m, 1 IX 2013, 1w, leg. L. Borowiec (DBET); **Thessaly:** Larissa, Ossa Mts., Spilia vic. (39.80038 N/22.64921 E), 822 m, 9 VI 2012, 4w, leg. L. Borowiec (DBET).

Comments: Ants were collected under stones on lowland and mountain pastures, roadsides, in stream valley with *Platanus* forest, coniferous forest, deciduous forest, and in gorge with deciduous forest.

### *Tetramorium immigrans* SANTSCHI, 1927

*Tetramorium caespitum* var. *immigrans* SANTSCHI, 1927: 54.

Revised material: **Crete:** Chania, Kato Daratso n. Chania (35,5 N/23,96666 E), 23 m, 7 V 2011, leg. L. Borowiec (DBET); Rethymno, near Argiroupolis (35.28333/24.33333 E), 197 m, 13 V 2013, leg. L. Borowiec (DBET); **Dodecanese:** Rhodes, Kolymbia, Hotel Kolymbia Star and vic. (36.2437 N/28.15649 E), 10 m, 3 V 2015, 25w, leg. L. Borowiec (DBET); **Ionian Islands:** Korfu, Korfu town (39.62667 N/19.915 E), 10 m, 3 VIII 2002, 1w, leg. G. Bračko (GB); **Macedonia:** Halkidiki, Kassandra, Elani (40.05 N/23.35 E), 281 m, 28 VIII 2009, 6w, leg. L. Borowiec (DBET); Halkidiki, Kassandra, Siviri (40.03333 N/23.35 E), 6 m, 24 VIII 2009, 12w, leg. L. Borowiec (DBET); Halkidiki, Kassandra, Siviri-Elani road (40,03333 N/23.35 E), 41 m, 29 VIII 2009, 4w, leg. L. Borowiec (DBET); Kavallas, Nestos river near Komnina (41,169 N/24.6966 E), 100 m, 10 X 1999, 2w, leg. E. Nikolakakis (NHMC, DBET); Pieria distr., Aliko (40.37636 N/22.6316 E), 2 m, 29 VIII 2012, 1w, leg. L. Borowiec (DBET); Pieria distr., Pieria Mts., 2.3 km N Elatochori (40.33972 N/22.25685 E), 748 m, 3 IX 2012, 1w, leg. L. Borowiec (DBET); Pieria distr., Paralia Katerini (40.26148 N/22.59515), 5 m, 28 VIII 2012, 1w, leg. L. Borowiec (DBET); **Peloponnese:** Korinthia, Korinthos (37.93918 N/22.94795), 36 m, 4 IX 2013, 4w, leg. L. Borowiec (DBET); **Thessaly:** Larissa, Mt. Ossa, Kokkino Nero (39.83389 N/22.79379), 3 m, 3 V 2017, 10w, leg. L. Borowiec (DBET); Larissa, Ossa Mts., Spilia vic. (39.80038 N/22.64921), 822 m, 6 IX 2012, 4w, leg. L. Borowiec (DBET); **Thrace:** Evros, N of Avandas loc. 1 (40.94276 N/25.91075 E), 97 m, 31 VIII 2015, 23w, leg. L. Borowiec (DBET); Evros, N of Avandas loc. 3 (40.97921 N/25.91529 E), 151 m, 31 VIII 2015, 18w, leg. L. Borowiec (DBET).

Comments: *Tetramorium immigrans* SANTSCHI, 1927 was described from Chile, based on introduced specimens. Initially defined as subspecies of *T. caespitum* was later considered as its junior synonym (BOLTON 1979). WAGNER *et al.* (2017) raised it to the species rank and recorded it from 23 European and western Asiatic countries and USA. In most cases it is known only from urban areas. It suggests that *T. immigrans* is a tramp species of unknown origin. Our material from Greece confirmed this hypothesis, as most samples were collected in urban areas and tourist resorts. Only few samples were collected in semi-natural environments. WAGNER *et al.* (2017) noted this species from the East Aegean Islands - Samos, Crete – Preveli, Macedonia – Thassos Island, and Peloponnese – Korintos. Our data indicates that it is a common species in the whole Greece.

### *Tetramorium impurum* (FÖRSTER, 1850)

*Myrmica impura* FÖRSTER, 1850: 40.

Revised material: **Ionian Islands:** Kefalonia, Enos Mts. loc. 2 (38.15273 N/20.6393 E),

1336 m, 25 VI 2014, 2w, leg. L. Borowiec (DBET); Kefalonia, Enos Mts. loc. 3 (38.14105 N/20.65708 E), 1571 m, 25 VI 2014, 1w, leg. L. Borowiec (DBET); **Macedonia:** Drama, Partheno Dasos (41.5056 N/24.4288), 995 m, 7 X 1999, 4w, leg. E. Nikolakakis (NHMC); Halkidiki, Stagira-Neochori rd. (40.51666 N/23.7 E), 512 m, 3 IX 2009, 3w, leg. L. Borowiec (DBET); **Thrace:** Evros, N of Avandas loc. 2 (40.94644 N/25.90533 E), 101 m, 31 VIII 2015, 98w, leg. L. Borowiec (DBET).

Comments: According to revision by WAGNER *et al.* (2017) *Tetramorium impurum* is widespread in Europe, especially in mountains. From Greece it was recorded previously only from Macedonia and Thrace (BRACKO *et al.* 2016), and WAGNER *et al.* (2017) noted this species from Epirus – Metsovo, Ionian Islands – Kefalonia, Mt. Aenos and Peloponnese – Saidona. Revised material confirmed its occurrence in Ionian Islands, Macedonia and Thrace.

#### *Tetramorium indocile* SANTSCHI, 1927

*Tetramorium caespitum* var. *indocile* SANTSCHI, 1927: 53.

New material: **Crete:** Rethymno, Ambelaki (35.26666 N/24.46666 E), 455 m, 10 V 2013, 1w, leg. L. Borowiec (DBET); Rethymno, road to Preveli Beach loc. 2 (35.16666 N/24.46666 E), 48 m, 7 V 2013, 2w, leg. L. Borowiec (DBET); Rethymno, Spili (35.21666 N/24.53333 E), 537 m, 9 V 2013, 1w, leg. L. Borowiec (DBET); **Dodecanese:** Karpathos, Agios Nikolaos (35.63563 N/27.15231 E), 205 m, 20 V 2014, 1w, leg. S. Salata (DBET); **Macedonia:** Pieria distr., Olympus Mts., Leptokaria-Karia rd. (39.99038 N/22.4392 E), 803 m, 2 IX 2012, 2w, leg. L. Borowiec (DBET); Pieria distr., Olympus Mts., Litochoro-Olympus rd. (40.11131 N/22.4688 E), 887 m, 30 VIII 2012, 6w, leg. L. Borowiec (DBET); Pieria distr., Olympus Mts., Litochoro-Ag. Ioannis rd. (40.08993 N/22.48833 E), 575 m, 31 VIII 2012, 1w, leg. L. Borowiec (DBET); Pieria distr., Vria-Ritini rd. (40.28462 N/22.30565 E), 388 m, 5 IX 2012, 1w, leg. L. Borowiec (DBET).

Comments: *Tetramorium indocile* SANTSCHI, 1927 was described from Kazakhstan and Kyrgyzstan. Csósz *et al.* (2014) raised this variety to species rank and recorded it from several countries from Spain to Kyrgyzstan. WAGNER *et al.* (2017) noted additional records from 12 European and Asian countries and concluded that the distribution center of this species is in Central Asia. New to Greece.

#### *Tetramorium staerckeii* KRATOCHVIL, 1944

*Tetramorium staerckeii* var. *gregori* KRATOCHVIL in: KRATOCHVIL, NOVÁK & SNOFLÁK, 1944: 66

New material: **East Aegean Islands:** Lesbos, Kalloni salines (39.21687 N/26.26662 E), 3 m, 10 VI 2015, leg. L. Borowiec (DBET).

Comments: *Tetramorium staerckeii* KRATOCHVIL, NOVÁK & SNOFLÁK, 1944 was described from Hungary, but for many years was considered a synonym of *T. impurum*. WAGNER *et al.* (2017) restored its species rank and listed from Austria, Bulgaria, Czech Republic, Hungary, Kyrgyzstan, Republic of Macedonia, Romania, SW Russia, Serbia, Slovakia and Turkey. Authors of the revision noted also that it is the most salt-tolerant species of the *caespitum* complex. Our observations from Lesbos confirmed this assumption. Ants were collected in saline fields with patches of crystalline salt on the soil surface. New to Greece.



Figs. 5–6. *Tetramorium indocile* SANTSCHI, worker: 5. dorsal; 6. lateral (photo L. Borowiec).

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Figs. 7–8. *Tetramorium staerckeii* KRATOCHVIL, worker: 7. dorsal; 8. lateral (photo L. Borowiec).

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