

First Asian record of the parasitic ant, *Leptothorax goesswaldi* KUTTER, 1967 (Hymenoptera: Formicidae)

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Abstract

The first record of *Leptothorax goesswaldi* KUTTER, 1967 in Asia is presented and the place and circumstances of the finding in East Kazakhstan are described. The distribution of the social parasites of *Leptothorax* MAYR, 1855 in the Palaearctic is discussed.

Key words: Hymenoptera, Formicidae, social parasite, Central Asia.

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Introduction and results

Social parasitic ants of *Leptothorax* MAYR, 1855 have been found in Europe and North America. Very little, however, is known on their occurrence in Asia, though the host species of the European social parasites have been recorded there. In fact, there are so far two social parasites of *Leptothorax* known from east of the Urals: *Harpagoxenus sublaevis* (NYLANDER, 1849) until the far east of Russia and *Harpagoxenus zaisanicus* PISARSKI, 1963, from Mongolia and South Siberia, a slave maker with *Leptothorax muscorum* (NYLANDER, 1846) (see KUPYANSKAYA 1990, RADCHENKO 1994). The present contribution reports a new species for the continent. The inquiline ant *Leptothorax goesswaldi* KUTTER, 1967 is a workerless, permanent parasite in the nests of *Leptothorax acervorum* (FABRICIUS, 1793). It had been described from Saas-Fee (Switzerland) and is known from the Alps (Swiss Valley and French Briançonnais, KUTTER 1967, BUSCHINGER 1974, KLUMP 1988) and from South Sweden (BUSCHINGER 1997, P. Douwes, in litt.).

Since 1998 the University of Greifswald, together with the Academies of Sciences of Kyrgyzstan and Kazakhstan, have conducted annual scientific expeditions to the mountains of Central Asia. In 2001, one of these expeditions went from Almati (South-East Kazakhstan) along the Kazak-Chinese border to the North. The aim was to visit the Tabagatai and the Saur Mountains, two isolated mountain ranges north of the Dzungarian Gate, which connects the warmer Kazak steppes to the colder Chinese-Mongolian steppes. In this region, the separation between the West and East Palaearctic runs along the Dzungarian Alatau (south of the Dzungarian Gate), across the Dzungarian Gate itself and the Saur Mountains. The expedition therefore travelled along the eastern parts of the West Palaearctic. While the Dzungarian Alatau belongs to the warm Central Asian Tianshan Range, the Tabagatai and Saur Mountains count to the cold mountain system of the Siberian Altai.

On 8 August 2001 the first author collected one gyne of *Leptothorax goesswaldi* in a nest of *Leptothorax acervorum*. The nest was found in the southern part of the Ta-

bagatai Mountains (N 47° 08', E 082° 22'), on a high plateau (1900 m a.s.l.) below the Pik Sarymobe, north-east of the town Makanshi (Fig. 1). The nest was beneath a stone on a south-east exposed slope with steppe vegetation. This is the easternmost record of *L. goesswaldi*, which has a (so far known) European distribution. The specimen together with some of its hosts are preserved in the collection of the first author at the Department of Zoology of the University of Greifswald.

Some other findings of ants prove that this region is the border between West and East Palaearctic elements of the ant fauna. Thus, the Tabagatai-Saur Mountain region yielded *Formica bruni* KUTTER, 1967 and *Formica foreli* BONDROIT, 1918 – two West-Palaearctic faunal elements – and *Myrmica koreana* ELMES, RADCHENKO & KIM, 2001, a probably East-Palaearctic faunal element.

Discussion

The former genus *Doronomyrmex* KUTTER, 1945 in Europe comprises three closely related species that all are workerless social parasites of the same host species, *Leptothorax acervorum*.

Leptothorax kutteri BUSCHINGER, 1966 ("1965") is the smallest among them, and it is facultatively polygynous, living in colonies of the host species alongside one or several functional queens of the latter. *Leptothorax pacis* (KUTTER, 1945) also coexists with *L. acervorum* queens in the host nests; although it remains uncertain whether more than one *L. pacis* queen can reproduce within one host colony. The life habits of *L. goesswaldi* are the most unusual within this group of very similar species, and they are unique among all social parasitic ants: The species is strictly monogynous and kills the host queens, often one after the other, in polygynous *L. acervorum* colonies. The mated young queen penetrates a host colony in August, and then remains in this colony without showing damaging behaviour until after hibernation. In spring she begins to bite off the antennae of the *L. acervorum* queens. Such mutilated queens may survive for several days or even weeks, but eventually die



Fig. 1: Partial map of Europe and Western Asia including all findings of *Leptothorax goesswaldi* KUTTER, 1967. The dot indicating an erroneous record in South Tyrol (BUSCHINGER 1971) is crossed out.

because they are unable to solicit food any longer. During this time the *L. goesswaldi* queen develops her ovaries and begins to lay eggs. The parasitized colony probably does not survive for more than two or three years, after which the last host workers have died (KLUMP 1988, BUSCHINGER & KLUMP 1988).

The ranges of the three workerless parasites of *L. acervorum* overlap, and sometimes two of them are syntopic. In addition, the range of the slave maker *Harpagoxenus sublaevis* also includes the ranges of the three inquiline, and the most frequent host species of *H. sublaevis* is also *L. acervorum*. Among the three workerless parasitic species, *L. kutteri* had until now the largest known range (BUSCHINGER 1971, 1997, 1999), extending from the western Alps (Briançon) through the Swiss Alps (Swiss Valley) to the Austrian Tennengebirge, and north to Germany (near Nuremberg) and to Scandinavia (South Sweden, Öland, Finland, Estonia). *L. kutteri* has also been found in Russia, near the White Sea (V.E. Kipyatkov, in BUSCHINGER 1997).

Leptothorax pacis apparently has a smaller range, in the Alps from the Briançonnais through the Swiss Alps to Austria, the easternmost known locality being the Triglav Mountains in Slovenia. It has also been found in Estonia (BUSCHINGER 1997).

Finally, *Leptothorax goesswaldi* had previously been found only in the French Alps (near Briançon) and in the Swiss Valley, apart from one record from southern Sweden (BUSCHINGER 1997, P. Douwes, in litt.). Since it is practically impossible to expunge an error once it has been published, we take advantage of the opportunity here to state once again that, in contrast to BUSCHINGER (1971), *L. goesswaldi* has not been found in South Tyrol (Italy, Schludersbach / Dobiacco). The misidentification has already been corrected by BUSCHINGER (1999) (see also Fig. 1).

Not much is known about the ant fauna of the Tabagatai and Saur Mountains. Future findings will clarify the distribution of Western and Eastern faunal elements. Hence, the new record of *Leptothorax goesswaldi* from East Kazakhstan is extremely remarkable. The apparent lack of the three inquilines of *L. acervorum* in Asia, and the rarity of its slave maker, *Harpagoxenus* sp. (one record, compris-

ing only four workers, from Mongolia), has been suspected to reflect insufficient search by myrmecologists (BUSCHINGER 1997). Now, the record of *L. goesswaldi* reported here is a small but hopeful step forward. We believe that many more parasitic Formicoxenini can be found in the various parts of temperate Asia.

Acknowledgements

We sincerely thank Michael Stachowitsch (Vienna, Austria) for improving the language. We are especially grateful to Alexander Radchenko (Kiev, Ukraine) and Jürgen Heinze (Regensburg, Germany) for helpful comments. Roland Schultz wants to thank Bernhard Seifert (Görlitz, Germany) and Alexander Radchenko for the repeated assistance with the determination of Central Asian ants. The expedition was funded by the German Academic Exchange Service (DAAD).

Zusammenfassung

Der Erstfund von *Leptothorax goesswaldi* KUTTER, 1967 in Asien wird dargestellt und Fundort und Fundumstände in Ost-Kasachstan werden beschrieben. Die Verbreitung der Sozialparasiten von *Leptothorax* MAYR, 1855 in der Paläarktis wird diskutiert.

References

- BUSCHINGER, A. 1971: Zur Verbreitung der Sozialparasiten von *Leptothorax acervorum* (FABR.) (Hym., Formicidae). – Bonner Zoologische Beiträge 22: 322-331.
- BUSCHINGER, A. 1974: Zur Biologie der sozialparasitischen Ameise *Leptothorax goesswaldi* KUTTER (Hym., Formicidae). – Insectes Sociaux 21: 133-144.
- BUSCHINGER, A. 1997: Socially parasitic formicoxenine ants from Western Europe – a review (Hymenoptera, Formicidae). – Proceedings of the International Colloquia on Social Insects, V.E. KIPYATKOV (Ed.), Sotium, St. Petersburg, Vol. 3-4: 1-9.
- BUSCHINGER, A. 1999: Bemerkenswerte Ameisenfunde aus Südtirol (Hymenoptera: Formicidae). – Myrmecologische Nachrichten 3: 1-8.
- BUSCHINGER, A. & KLUMP, B. 1988: Novel strategy of host-colony exploitation in a permanently parasitic ant, *Doronomyrmex goesswaldi*. – Naturwissenschaften 75: 577-578.
- KLUMP, B. 1988: Zur Biologie der sozialparasitischen Ameise *Leptothorax goesswaldi* KUTTER: Sexual- und Koloniegründungsverhalten (Insecta; Hymenoptera: Formicidae). – Unpublished Diploma-thesis, Technische Hochschule Darmstadt, 55 + XII pp.
- KUPYANSKAYA, A.N. 1990: Ants (Hymenoptera, Formicidae) of the USSR Far East. – Vladivostok, Far East Branch of Academy of Sciences USSR: 258. [in Russian].
- KUTTER, H. 1967: Beschreibung neuer Sozialparasiten von *Leptothorax acervorum* F. (Formicidae). – Mitteilungen der Schweizerischen Entomologischen Gesellschaft 40: 78-91.
- RADCHENKO, A.G. 1994: Identification table for the ants (Hymenoptera, Formicidae) of southern Siberia. – Trudy Sapovednika "Daurckii" 3: 95-118. [in Russian]