

ECOLOGICAL AND TAXONOMIC NOTES ON *LEPTOTHORAX NADIGI* KUTTER, 1925 (HYMENOPTERA, FORMICIDAE) – AN ANT SPECIES NEW TO POLAND

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Abstract.— Information is given on the biology of *Leptothorax (Myrafant) nadigi* Kutter, a species new to Poland, and on its occurrence in the Pieniny Mts (the Western Carpathians). Morphological differences between workers of this species and those of the similar species *L. (M.) corticalis* (Schenck) and *L. (M.) bulgaricus* Forel are described.



Key words.— ants, *Leptothorax nadigi*, ecology, taxonomy, Poland

Leptothorax (Myrafant) nadigi was described by Kutter (1925) on the basis of workers and females from Chur (the Rhaetian Alps) in Switzerland, and for more than fifty years the species has been known only from its type locality. Later, Kutter (1977) recorded two new localities: Bellwald (the Bern Alps) in Switzerland and Briançon (Provence) in southern France. Espadaler and Franch (1978) and then Espadaler (1984) reported it from Huesca in Spain; in the former paper morphological differences between *L. nadigi* and *L. corticalis* (Schenck) were presented, and in the latter one the male was described. In 1982 (12–14.09), Bernhard Seifert (pers. comm.) found the discussed species in the Nature Reserve “Tshervena Stena” close to the locality of Dobrostan in the Bulgarian Rodopy Mts at 1500 m a.s.l.

Several new findings of *L. nadigi* are also reported by Andreas Schulz (pers. comm.):

– Turkey (north Turkey), Burnuk, leg. D. Agosti (no detailed data);

– Turkey, Gümüşhane, Erzincan-Kelkit, 2100 m a.s.l., 4.06.1986, leg. Besuchet, Löbl and Burchardt;

– Turkey, Artvin, sous Pirnalli, massif du Karkal Dagı, 1250 m a.s.l., 11.06.1986, leg. Besuchet, Löbl and Burchardt;

– Turkey, Kastamonu, Seydiler, 40 km N Kastamonu, 1200 m a.s.l., 8.07.1989, leg. A. Schulz;

– Turkey, Erzurum, 5 km SW Aydogdu, 20 km SW Göle, 1400 m a.s.l., leg. A. Schulz.

– Spain, Sierra de Guardarrama, 20 km SE Segovia, 1300 m a.s.l., 6–18.05.1991, leg. A. Schulz;

Most recently, Seifert (1996), based upon his own identification of specimens collected

(independently) by Czechowska and Woyciechowski in the Pieniny Mts, recorded *L. nadigi* from Poland.

The hitherto known localities of *L. nadigi* are shown on Fig. 1.

Leptothorax nadigi Kutter, 1925

Leptothorax nadigi Kutter, 1925: 409 (worker, female), Switzerland, Chur; Espadaler 1984: 136 (male). See also: Stitz 1939: 178, Kutter 1977: 132, Espadaler 1978: 161, Agosti and Collingwood 1987: 275

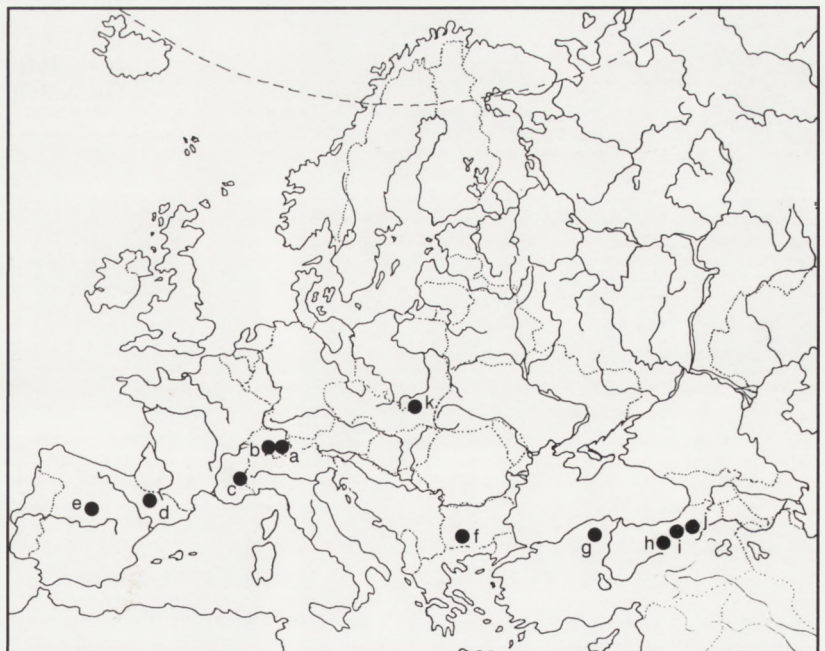


Figure 1. Localities of *L. nadigi* (except the place of Burnuk(?), N Turkey, that is impossible to location). (a) Chur; (b) Bellwald; (c) Briançon; (d) Huesca; (e) Segovia; (f) Dobrostan; (g) Kastamonu; (h) Gümüşhane; (i) Artvin; (j) Erzurum; (k) Pieniny.

(in key), Seifert 1996: 123 (in key), Czechowski and Czechowska 1997: 51.

Leptothorax corticalis (Schenck): Koehler 1951: 33 (part., examined) (misidentification).

Leptothorax bulgaricus Forel: Czechowska 1976: 132 (misidentification), Woyciechowski 1985: 291 (misidentification).

In the 1970 and then in the 1990, Czechowska collected a certain number of nest samples of *L. nadingi* in the Pieniny Mts (the Western Carpathians), 49°25'N, 20°23'E, southern Poland (see Fig. 1); at first, they were erroneously identified as those of *L. bulgaricus* (Czechowska 1976). The same mistake was made by Woyciechowski (1985), who had found a few single workers in the Pieniny. Earlier, specimens of *L. nadingi* from the same region had been found and erroneously determined, at least some of them, as *L. corticalis* by Koehler (1951) (examined material in the Museum and Institute of Zoology, PAS, Warsaw).

The Pieniny Mts are the northernmost locality for *L. nadingi*. Their climate and geological structure differ from those of the neighbouring mountain ranges. The Pieniny are built of Jurassic and Cretaceous limestone. The climate is mild and precipitation relatively low. The mean annual air temperature at the foot of the Pieniny (420 m a.s.l.) is 6.3°C and the total annual precipitation ranges between 690 and 850 mm. The lowest monthly temperatures are in January and February (from -6.7 to -5.2°C), the highest are in June, July and August (from 13.7 to 16.4°C) (Kostrakiewicz 1982).

Hitherto existing data on ecology and biology of *L. nadingi* are very scant. Kutter (1925) found these ants in dry stalks of the herbaceous plant *Laserpitium* sp. (Umbelliferae). Espadaler and Franch (1978) collected



Figure 2. Trzy Korony Mt. (the Central Pieniny Mts) – strips of xerothermic grasslands running down the slope (photo W. Czechowska).

their colonies from under the bark of decaying pine stumps, and Espadaler (1984) from under the bark of a living pine tree in a dense pine forest. According to the Seifert's unpublished data, the four *L. nadingi* nests found by him were situated in the bark of pine stubs, 10–30 cm above the soil surface; the habitat was a semidry grassland with several old pine trees on limestone. The largest colony consisted of about 250 workers. Three nests were single-queened and another one contained three dealate gynes (their reproductive status was not investigated).

Early studies in the Pieniny Mts (Koehler 1951, Czechowska 1976, Woyciechowski 1985) did not contribute much to this knowledge because the number of nests and individuals recorded then was insignificant. It was only the most recent investigations, carried out in the Pieniński Park Narodowy (the Pieniny National Park), which provided a possibility of a closer study of the habitat requirements of the species under discussion; 78 colonies of *L. nadingi* were found there between 1994 and 1997.

In the Pieniny Mts, *L. nadingi* occurs in xerothermic grasslands (*Origano-Brachypodietum*). This association develops on warm and dry slopes with a south-facing aspect, on soil rich in calcium carbonate (Pancer-Kotejowa and Zarzycki 1976). The majority of the nest samples collected (59) are from grasslands on the slopes of Trzy Korony, the highest summit in the Pieniny Centralne (the Central Pieniny Mts; 982 m a.s.l.). The microclimate in this part of the range is more severe and patches of xerothermic grassland, in the form of long strips separated by woodland, run from the summit down the massif (Fig. 2). *L. nadingi* occurs less abundantly in the Pieniny Zachodnie (the Western Pieniny Mts), where the climate is milder and where xerothermic and lichenaceous grasslands cover large areas of the south-facing slopes of small elevations (Fig. 3). There, *L. nadingi* colonies were found on the following mountains: Podskalnia Góra (7 nests), Goła Góra (4 nests), Zameczysko



Figure 3. Zameczysko Mt. (the Western Pieniny Mts) – the slope to a greater extent covered with xerothermic grasslands (photo W. Czechowska).



Figure 4. *Cynanchum vincetoxicum* (photo W. Czechowska).



Figure 5. A tuft of dry stems of *Cynanchum vincetoxicum* – the typical place of *L. nadigi* nesting (photo W. Czechowska).

and Długa Grapa (3 nests each), Macelowa Góra (2 nests). The height of these mountains is from 621 to 802 m a.s.l.

In the Pieniny Mts, *L. nadigi* nests inside dry empty stems of various herbaceous plants, most frequently in *Vincetoxicum hirsutinaria* (= *V. officinale*; Asclepiadaceae). This plant forms thick tufts encircled, at the foot, by wisps of dead stems filled with air (Figs 4 and 5). It grows in xerothermic grasslands all over the Pieniny National Park. During the flowering period it is frequently visited by ants of the genera *Leptothorax* Mayr and *Myrmica* Latr. Nests of *L. nadigi* were also found in stems of *Laserpitium latifolium* (see also Kutter 1925) and *Libanotis montana*

(Umbelliferae), of *Echium vulgare* (Boraginaceae) of *Digitalis grandiflora* (Scrophulariaceae), of *Carduus glaucus* (Compositae), and of *Stachys germanica* (Labiatae).

L. nadigi colonies in the Pieniny were single-queened and contained from several dozen to about 100 workers. These observations, together with Seifert's results, suggest that the discussed species is either functionally monogynous or facultatively polygynous. Alate sexuals were observed from 8 August to 1 September.

L. nadigi may be confused with *L. corticalis* or *L. bulgaricus*. To prevent possible misidentifications, we present the following comparison:

L. nadigi vs. *L. corticalis*

L. nadigi

- Petiole relatively low, with distinct peduncle, its anterior surface slightly concave; petiolar node with truncate dorsum (Fig. 6).
- Apical antennal club distinctly darker than the rest of funiculus.
- Central part or at least narrow longitudinal strip on head dorsum smooth and shining (Fig. 9).

L. corticalis

- Petiole relatively high, without distinct peduncle, its anterior surface nearly straight; petiolar node not truncate, in profile triangular (Fig. 7).
- Apical antennal club concolourous with the rest of funiculus.
- Head dorsum entirely densely striated and punctured, dull (Fig. 10).

L. nadigi vs. *L. bulgaricus*

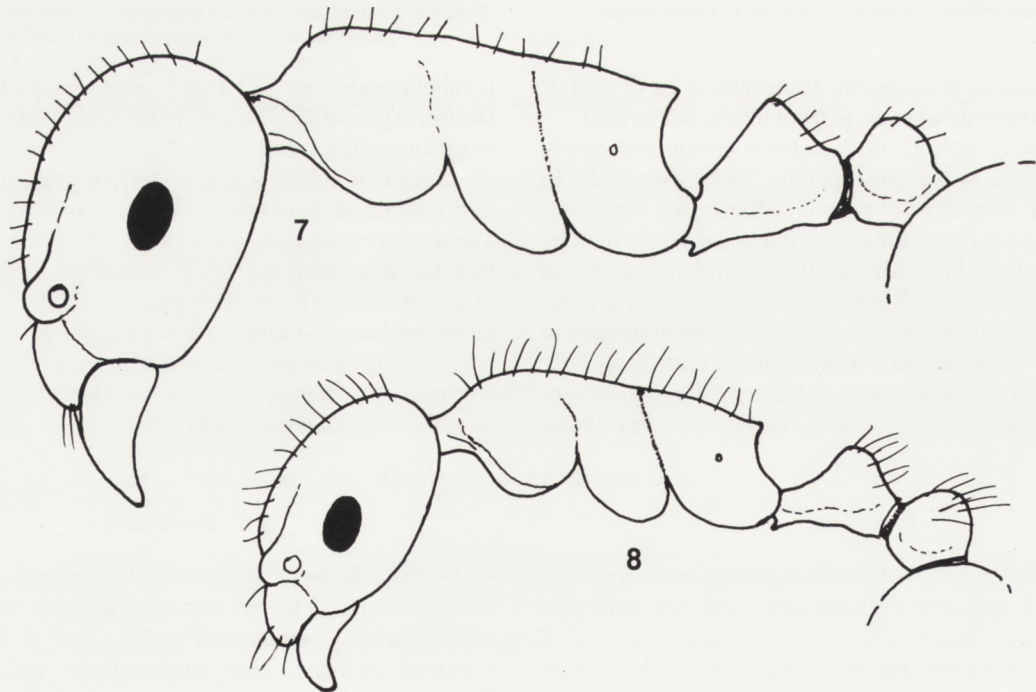
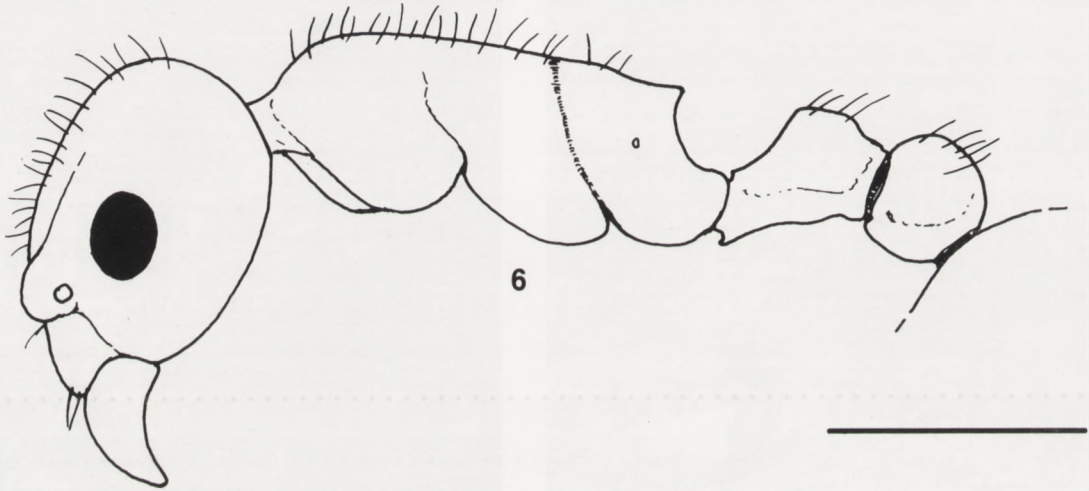
(HW – maximum width of the head, without eyes)

L. nadigi

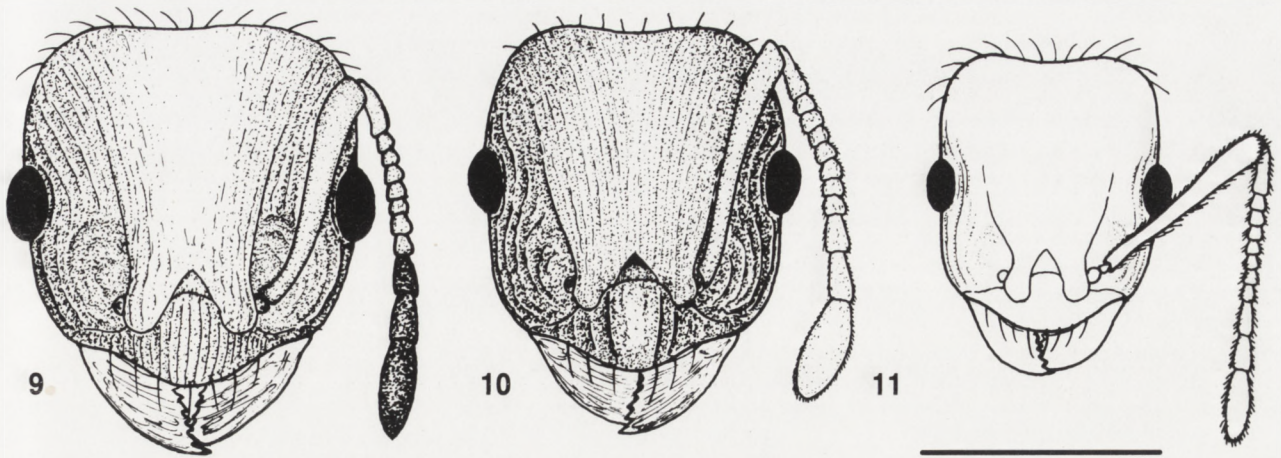
- Only central part of head dorsum smooth and shining, remaining surface densely striated and punctured (Fig. 9).
- Head dorsum reddish-brown, distinctly darker than ochraceous-yellow mesosoma.
- Apical antennal club distinctly darker than the rest of funiculus.
- Larger: HW > 0.60 mm.
- Longest hairs on mesosoma dorsum distinctly shorter than maximum diameter of eye (Fig. 6).

L. bulgaricus

- Head dorsum smooth and shining, striae present only on its lateral parts (Fig. 11).
- Both head and mesosoma bright yellow.
- Apical antennal club concolourous with the rest of funiculus.
- Smaller: HW < 0.55 mm.
- Longest hairs on mesosoma dorsum not shorter than maximum diameter of eye (Fig. 8).



Figures 6–8. Worker body (head, alitrunk and pedicel), lateral. (6) *L. nadigi*; (7) *L. corticalis*; (8) *L. bulgaricus*. (Scale: 0.5 mm).



Figures 9–11. Worker head, frontal. (9) *L. nadigi*; (10) *L. corticalis*; (11) *L. bulgaricus*. (Scale: 0.5 mm).

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REFERENCES

Agosti, D. and C. A. Collingwood. 1987. A provisional list of the Balkan ants (Hym., Formicidae) with a key to the worker caste. 2. Key to the worker caste, including the European species without the Iberian. *Mitteilungen der Schweizerischen Entomologischen Gessellschaft*, 60: 261–293.

Czechowska, W. 1976. Myrmekofauna Pienińskiego Parku Narodowego (Hymenoptera, Formicidae). *Fragmenta Faunistica*, 21: 115–144.

Czechowski, W. and W. Czechowska. 1997. Formicidae. In: J. Razowski (ed.). *Wykaz Zwierząt Polski*. 5. Kraków, pp. 50–56.

Espadaler, X. and J. Franch. 1978. *Leptothorax nadigi* Kutter, 1925 en España. *Boletín de la Asociación Española de Entomología*, 1(1977): 161–162.

Espadaler, X. 1984. *Leptothorax nadigi* Kutter, 1925 y *Gonomma blanchi* (André, 1881): descripción de los machos. *Boletín de la Asociación Española de Entomología*, 8: 135–141.

Koehler, W. 1951. *Fauna mrówek Pienińskiego Parku Narodowego*. Warszawa, 55 pp.

Kostrakiewicz, L. 1982. Zarys fizjografii Pienin. Klimat. In: *Przyroda Pienin w obliczu zmian*. *Studia Naturae*, B, 30: 53–69.

Kutter, H. 1925. Eine neue Ameise der Schweiz. *Mitteilungen der Schweizerischen Entomologischen Gessellschaft*, 13: 409–412.

Kutter, H. 1977. *Insecta helvetica Fauna*. 6. Hymenoptera, Formicidae. Zürich, 298 pp.

Pancer-Kotejowa, E. and K. Zarzycki. 1976. Zarys fizjografii i stosunków geobotanicznych Pienin oraz charakterystyka wybranych biotopów. *Fragmenta Faunistica*, 21: 21–49.

Seifert, B. 1996. *Ameisen: beobachten, bestimmen*. Augsburg, 352 pp.

Stitz, H. 1939. *Hautflüger oder Hymenoptera*. I. Ameisen oder Formicidae. *Die Tierwelt Deutschlands*, 37, 428 pp.

Woyciechowski, M. 1985. Mrówki (Hymenoptera, Formicidae) Małych Pienin – Karpaty. *Acta Zoologica Cracoviensia*, 28: 283–296.

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