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THE GENUS TETRAMORIUM MAYR (HYMENOPTERA, FORMICIDAE) IN POLAND – A SURVEY OF SPECIES AND A KEY FOR THEIR IDENTIFICATION

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Abstract.— A taxonomic review is made of 5 species of the genus *Tetramorium* Mayr occurring in Poland: *T. caespitum* (L.), *T. impurum* (Foerst.), *T. moravicum* Kratochvíl, *T. insolens* (F. Smith), and *T. caldarium* (Roger). An identification key is provided, together with information on their biology, geographical ranges and distribution in Poland.

Key words.— ants, *Tetramorium*, taxonomy, zoogeography, biology, fauna, Poland, catalogue, key

INTRODUCTION

The genus *Tetramorium* Mayr belongs to most species rich ant genera: it includes more than four hundred species, distributed mainly in tropics and subtropics (Bolton 1995a,b). About 60 species are known from Palaearctic, mostly from the southern parts.

Modern taxonomic revisions of this genus were carried out by Bolton (1976, 1977, 1979, 1980) for all zoogeographical regions, except Palaearctic. A review by Wang *et al.* (1988) included species from China, and that by Radchenko (1992a,b) species from the former Soviet Union. Some additional data can be found in keys for identifying ants of different countries and parts of Europe (Kutter 1977, Agosti and Collingwood 1987b, Seifert 1996). However, taxonomy of Palaearctic *Tetramorium* species is still far from completion.

While the numerous tropical *Tetramorium* forms are strongly differentiated biologically, in respect of their habitat requirements, food preferences, types of nests, etc. (Bolton 1977, 1980), the life histories of European species are more or less uniform. The latter build nests mainly in the ground, often with a quite large soil mounds, under stones, or – very rarely – in rotten wood. Most are predators or, even more frequently, scavengers; also their diet contains grass seeds, especially in warm and relatively dry regions of Southern Europe. Colonies are fairly large, including sometimes several tens of thousands of workers.

No special taxonomic study of Polish *Tetramorium* ants has been made previously. Only three species were reported from Poland (Pisarski 1975): the native, outdoor, very common and widespread *T. caespitum* and two exotic, introduced forms – *T. guineense* and *T. simillimum* (greenhouse dwellers under Polish conditions). However, apparently both the latter taxa have been apparently misidentified (see below).

This paper comprises two sections. The first provides a catalogue with a taxonomic review of Polish species of the genus *Tetramorium* together with information on their geographical ranges and distribution in Poland, supplemented with notes on their ecology and bionomics. The second consists of a key for identification of species.

MATERIAL AND METHODS

The catalogue was prepared by compiling literature data on the occurrence of particular species in Poland (within the present borders), supplemented by reviewing and verifying the determinations in the ant collections in the Museum and Institute of Zoology of the Polish Academy of Sciences in Warsaw. As in a previous paper on the genus *Myrmica* Latr. (Radchenko *et al.* 1997), the division of the country into geographical regions (Fig. 1) has been adopted following "Katalog Fauny Polski" (see Pisarski 1975). For the taxonomic studies, we also used materials from other museums, including the Zoological Institute of the National Ukrainian Academy of Sciences in Kiev (including Karawajew's collection), the Zoological Museum of the Moscov State University, the Zoological Institute of the Russian Academy of Sciences in Sankt Petersburg, the Natural History Museum in Budapest, and the British Museum of Natural History in London.

We recognize five species of *Tetramorium* from Poland:

1. *T. caespitum* (Linnaeus, 1758)
2. *T. impurum* (Foerster, 1850)

3. *T. moravicum* Kratochvíl, 1941
4. *T. insolens* (F. Smith, 1861)
5. *T. caldarium* (Roger, 1857).

Like in our previous paper on *Myrmica* (Radchenko *et al.* 1997), complete synonymy is given for the less known species only. Otherwise, synonyms cited are those used in the literature concerning the occurrence of a given taxon in Poland; for the remainder see Bolton (1976, 1977, 1979, 1980, 1995a) and Radchenko (1992a,b). Information on the biology of particular species has been compiled from the literature, mainly after Brian *et al.* (1965, 1967), Pisarski (1975), Collingwood (1979) and Seifert (1996).

Figure 1. Polish geographical regions: 1 – Baltic Coast (Pobrzeże Bałtyku), 2 – Pomeranian Lake District (Pojezierze Pomorskie), 3 – Masurian Lake District (Pojezierze Mazurskie), 4 – Wielkopolsko-Kujawska Lowland (Nizina Wielkopolsko-Kujawska), 5 – Mazovian Lowland (Nizina Mazowiecka), 6 – Podlasie, 6a – Białowieska Forest (Puszcza Białowieska), 7 – Lower Silesia (Śląsk Dolny), 8 – Upper Silesia (Śląsk Górny), 9 – Krakowsko-Wieluńska Upland (Wyżyna Krakowsko-Wieluńska), 10 – Małopolska Upland (Wyżyna Małopolska), 10a – Świętokrzyskie Mts (Góry Świętokrzyskie), 11 – Lubelska Upland (Wyżyna Lubelska), 12 – Roztocze, 13 – Sandomierska Lowland (Nizina Sandomierska), 14 – Western Sudeten Mts (Sudety Zachodnie), 15 – Eastern Sudeten Mts (Sudety Wschodnie), 16 – Western Beskidy Mts (Beskidy Zachodnie), 17 – Eastern Beskidy Mts (Beskidy Wschodnie), 18 – Bieszczady Mts (Bieszczady), 19 – Pieniny Mts (Pieniny), 20 – Tatra Mts (Tatry).

Survey of species

Tetramorium Mayr, 1855

Tetramorium Mayr, 1855: 423. Type species: *Formica caespitum* Linnaeus, 1758: 50, by subsequent designation of Girard, 1879: 1016.

Atopula Emery, 1912: 104. Type species: *Atopomyrmex nodifer* Emery, 1901a: 115, by original designation. Synonymy of Bolton, 1976: 359.

Lobomyrmex Kratochvíl, 1941: 84 (as subgenus of *Tetramorium*). Type species: *Tetramorium ferox silhavyi* Kratochvíl, 1941: 84, by monotypy. Synonymy by Bolton, 1976: 359.

Macromishoides Wheeler, 1920: 53. Type species: *Macromisha aculeata* Mayr, 1866: 507, by original designation. Synonymy by Bolton, 1976: 359.

Tetrogmus Roger, 1857: 10. Type species: *Tetrogmus caldarius* Roger, 1857: 12, by monotypy. Synonymy by Roger, 1862: 297.

Triglyphothrix Forel, 1890: cvi. Type species: *Triglyphothrix walchi* Forel, 1890: cvii, by monotypy. Synonymy by Bolton, 1985: 247.

Xiphomyrmex Forel, 1887: 385 (as subgenus of *Tetramorium*). Type species: *Tetramorium kelleri* Forel, 1887: 385, by subsequent designation of Wheeler, 1911: 175. Synonymy by Bingham, 1903: 175; Bolton, 1976: 359.

Tetramorium caespitum (Linnaeus, 1758)

Formica caespitum Linnaeus, 1758: 581.
Tetramorium caespitum: Mayr, 1855: 426.

Note. For a long time in Poland, all outdoor *Tetramorium* ants were considered to be *T. caespitum*. Based on detailed investigation of a large sample of material from different parts of Poland, we distinguished three outdoor *Tetramorium* species (Czechowski *et al.* 1998). The closest relative of *T. caespitum* is *T. impurum*. Workers and females of this pair of species are very simi-

Figure 2. Distribution of *T. caespitum* in Palaearctic.

Figure 3. Distribution of *T. caespitum* in Poland.

lar, and are very difficult to separate; examination of the male genitalia structure (see Key for Identification) is indispensable for correct discrimination between these species.

General distribution (Fig. 2). Widespread, almost entirely transpalaearctic species that has been introduced to North America. Extends from Spain and the North-West African Mediterranean coast up to Baikal region of Russia, to the north reaches central Norway and Sweden, southern Finland and sources of Pechora river. In Siberia its distribution does not extend north beyond the line of Omsk-Tomsk-Angara river although it occurs sporadically in Murmansk District close to Polar Circle, but only in intrazonal, man-made habitats (embankments of roads and railroads). It is fairly common in Caucasus and Turkey, and in Central Asia where it inhabits not very dry, intrazonal biotopes. Data on the occurrence of *T. caespitum* in Japan refers to *T. jacoti* Wheel. (Radchenko, Sanada and Czechowski, in prep.).

Distribution in Poland (Fig. 3). Baltic Coast (Kulmatycki 1922, Jacobson 1940, Koehler 1958, Wengris 1964); Pomeranian Lake District (Kulmatycki 1922, Begdon 1932, Engel 1938, Jacobson 1940, Będziak 1956, Szujecki *et al.* 1978, 1983, Mazur 1983, Pisarski *et al.* 1995); Masurian Lake District (Begdon 1932, Wengris 1977, Mazur 1983, Krzysztofiak 1985); Wielkopolsko-Kujawska Lowland (Kulmatycki 1922, Begdon 1932, Stawarski 1966, Kiełczewski and Wiśniewski 1971, Pawlikowski and Sobieszczyk 1980, Mazur 1983); Mazovian Lowland (Nasonov 1892, 1894, Kulmatycki 1920b, Jakubisiak 1948, Kaczmarek 1963, Czechowski 1975, 1976, 1990, 1991, Czechowski *et al.* 1979, 1990, 1995, Czechowski and Pisarski 1990, Banaszak *et al.* 1978, Pisarski and Czechowski 1978, Pisarski 1981,. 1982, Mazur 1983); Podlasie (Wiąckowski 1957, Pętal 1968a, Mazur 1983); Białowieska Forest (Czechowski *et al.* 1995); Lower Silesia (Goetsch 1942, Stawarski 1961, 1966); Upper Silesia (Scholz 1926, Novotny 1931a, Stawarski 1966); Krakowsko-Wieluńska Upland (Wierzejski 1873, Kulmatycki 1920a, Kaczmarek 1953); Małopolska Upland (Kulmatycki 1920a, Puszkar 1982, Mazur 1983); Świętokrzyskie Mts (Kulmatycki 1920a, Begdon 1958, Krzysztofiak 1984); Lubelska Upland (Minkiewicz 1935, Pisarski 1953, Dobrzańska 1958, Pętal 1961, Honczarenko 1964, Puszkar 1978, Mazur 1983); Roztocze (Pętal 1961, 1964); Sandomierska Lowland (Kulmatycki 1920a, 1920b, Stawarski 1966, Puszkar 1982, Mazur 1983); Western Sudeten Mts (Scholz 1912, Stawarski 1966, Banert and Pisarski 1972); Eastern Sudeten Mts (Stawarski 1966); Western Beskidy Mts (Kulmatycki 1920a, Czechowski 1979, Czechowski and Pisarski 1988); Bieszczady Mts (Parapura and Pisarski 1971, Czechowski 1977); Pieniny Mts (Koehler 1951, Czechowska 1976, Pętal 1980, Woyciechowski 1985); «Lower Silesia and Kłodzka District» (Schilling 1839); «Silesia» (Weigel 1806); «Western and Eastern Prussia» (Brischke 1888).

Questionable locality. Tatry (Wierzejski 1873, J. Łomnicki 1931).

Biology. In spite of its wide distribution, *T. caespitum* is a semixerophilous species which inhabits mainly open, well insolated and dry places, sparingly covered with herb vegetation – especially common in sandy soils on plains. In mountains it is replaced by *T. impurum* and it is absent from high mountains. It avoids wet meadows and woodlands; in relatively humid habitats it nests only in raised, dry and warm patches. In forests *T. caespitum* lives only in open places. It shows synanthropic inclination (fairly abundant in some urban areas). Nests are usually built in a soil, often with small earth mounds or under stones. Colonies, that seem to be normally monogynous, number from several thousands to several tens of thousands of workers. The species is highly polyphagous. Its diet includes mainly dead insects and other invertebrates, and even carcasses of small vertebrates (birds, mice, frogs, etc.), however, being a quite aggressive species, it can also prey on alive, among others soil arthropods; it have permanent underground foraging routes. Essential supplement for its diet are herb and grass seeds, and honeydew of root aphids. Nuptial flights take place in June and July – not later than in early August; usually in morning.

The species common all over Poland, most probably with the exception of high mountains (Tatra).

Tetramorium impurum (Foerster, 1850)

Myrmica impura Foerster, 1850: 48.
Tetramorium impurum: Mayr 1855: 426 (as junior synonym of *T. caespitum*). Revived from synonymy by Kutter 1977: 159.

Note. This species had not been separated from *T. caespitum* for more than 120 years. Only Kutter (1977) and then Seifert (1996) correctly recognized it as a good species, based mainly on the structure of male genitalia (see also *Note* for *T. caespitum*).

General distribution (Fig. 4). Distribution of this species is still poorly known. So far, it has been recorded from Switzerland, the Adriatic Sea coast (Kutter 1977), Germany (Seifert 1996) and southern Poland (Czechowski *et al.* 1998). In all probability, *T. impurum* is a fairly common species in Central and part of Southern Europe.

Distribution in Poland (Fig. 5). Świętokrzyskie Mts (Czechowski *et al.* 1998); Western Sudeten Mts (Czechowski *et al.* 1998); Eastern Sudeten Mts (Czechowski *et al.* 1998); Bieszczady Mts (Czechowski *et al.* 1998); Pieniny Mts (Czechowski *et al.* 1998).

Biology. This species seems to be more xerophilous than *T. caespitum*; it inhabits open and dry habitats of different types, especially in clay soils. Occurs mainly in upland and mountain regions; in lowlands superseded by *T. caespitum*. Probably monogynous. In Poland, alate sexuals were caught from late May(!) till (majority) late September. Nuptial flights usually in late afternoon.

Figure 4. Distribution (known so far) of *T. impurum* in Europe.

Figure 5. Distribution of *T. impurum* in Poland.

In Poland, the species is known from some mountain regions in the southern part of the country.

Tetramorium moravicum Kratochvíl, 1941.

Tetramorium moravicum Kratochvíl, in Novák et Sadil 1941: 86 (workers, diagnosis in key), Kratochvíl, in Kratochvíl et al. 1944: 71 (females, males), Agosti and Collingwood 1987a: 56, 1987b: 278, Seifert 1996: 160 (revived from synonymy).

Tetramorium forte Forel: Bernard 1967: 233, Radchenko 1992b: 51, Atanasov and Dlussky 1992: 152.

Note. *T. moravicum* was described by Kratochvíl [in Novák et Sadil (1941); in a key] from Moravia (the Czech Republic), based on workers. Later Kratochvíl *et al.* (1944) described also females and males and pointed out that workers of this species were very similar to workers of *T. forte* For., and these two species differed in the structure of male genitalia. However, the problem was that females and males of *T. forte* sensu Forel, 1904 were, in fact, females and males of *T. caespitum*. This error of Forel was discussed and corrected by Radchenko (1992b), who considered *T. moravicum* (and *T. taurocaucasicum* Arnoldi, 1968) as junior synonyms of *T. forte*. Recent investigations – based not only on syntype worker specimens of *T. moravicum* but also on a large material from different regions of southern Poland and from Ukraine – clearly revealed that *T. moravicum* is a good species. Its workers are similar to those of *T. forte* in the sculpture of petiolar and postpetiolar node dorsum, but females differ in non-flattened scutum, and males differ by the shape of stipes of genitalia (*T. forte* male genitalia are like *T. caespitum*; see Key for Identification). Agosti and Collingwood (1987a) recorded this species from Bulgaria and the former Yugoslavia. But it is evident from their key (Agosti and Collingwood 1987b) that *T. moravicum* sensu Agosti and Collingwood may be *T. forte* (*T. forte* itself have been treated by these authors incorrectly). This problem can only be solved after examination of suitable material and a complete taxonomic revision of European *Tetramorium* forms.

General distribution (Fig. 6). Until now, *T. moravicum* was known with certainty only from Czechia, Austria (Seifert 1996) and Poland (Czechowski *et al.* 1998). It has been also found in Western Ukraine (Radchenko, unpubl. data).

Distribution in Poland (Fig. 7). Świętokrzyskie Mts (Czechowski *et al.* 1998); Lubelska Upland (Czechowski *et al.* 1998); Sandomierska Lowland (Czechowski *et al.* 1998).

Biology. Xerophilous species, inhabiting sunny, dry open places with low and scarce herb vegetation (its biology is poorly known). In Poland, alate sexuals were caught from mid August till late September.

In Poland, it is recorded only from a few south-east regions of the country.

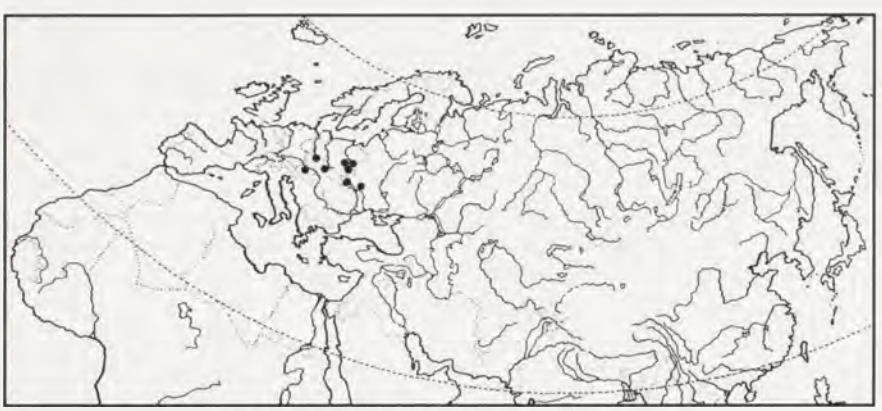

Figure 6. Localities of *T. moravicum* in Europe.

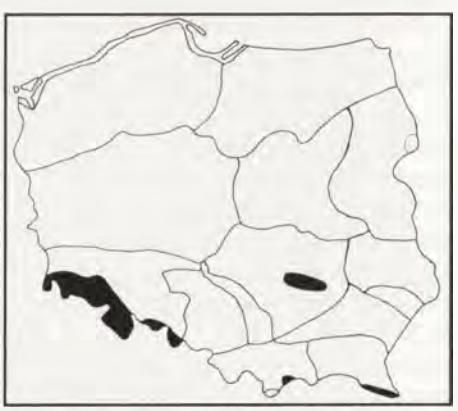

Figure 7. Distribution of *T. moravicum* in Poland.

Tetramorium insolens (F. Smith, 1861)

Myrmica insolens F. Smith, 1861: 47.
Tetramorium insolens: Emery 1901b: 567.
Tetramorium guineense: Pisarski 1957: 285, Czechowski and Czechowska 1997: 51 (misidentification), Wiśniewski 1976: 78 (misidentification).
Tetramorium guinense: Pisarski 1975: 26 (misspelling, misidentification).

Note. The species described by Fabricius (1793) as *Formica guineensis* was trasferred to *Tetramorium* by Mayr (1862), and then this combination has been used by all subsequent authors. Bolton (1977), who studied Fabricius' type specimens of *Formica guineensis*, established that this species belongs to the genus *Pheidole* Westw., and that Mayr's transference of *Formica guineensis* to *Tetramorium* was an error. First available replacement name for *Tetramorium guineense* sensu Mayr 1862 (not for *Formica guineensis* sensu Fabricius 1793) is *Tetramorium bicarinatum* (Nylander, 1846) (originally described as *Myrmica bicarinata*). Hence, *Tetramorium* specimens reported from hothouses in temperate zone and in all publications called *T. guineense* are, in fact – at least in part – *T. bicarinatum*. Another problem connected with this matter is that a species closely related to *T. bicarinatum*, namely *T. insolens* (F. Smith, 1861), is also found in European and North American hothouses. Redescription of the latter and its differentiation from *T. bicarinatum* was given by Bolton (1977) (see Key for Identification). In Poland, only *T. insolens* (*T. guineense* sensu Pisarski 1957, 1975, Wiśniewski 1976, and Czechowski and Czechowska 1997) has been found so far, however the possibility of *T. bicarinatum* occurrence can not be excluded.

Distribution and biology. Both *T. insolens* and *T. bicarinatum* are extremely widespread tropicopolitan tramp-species originating in all probability from the Oriental Region. In temperate zone they inhabit only heated buildings (mainly in botanical and zoological gardens) and have no particular economic importance. In Poland, *T. insolens* (reported as *T. guineense*: Pisarski 1957, Wiśniewski 1976; see Radchenko *et al.* 1998) is known only from the palm house in Poznań (Wielkopolsko-Kujawska Lowland; Fig. 8).

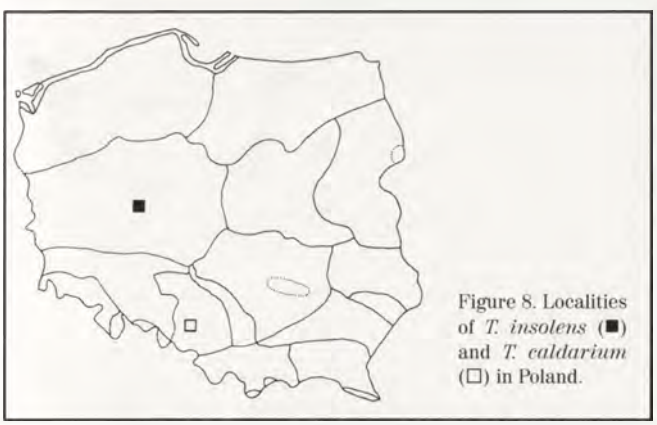

Figure 8. Localities of *T. insolens* (■) and *T. caldarium* (□) in Poland.

Tetramorium caldarium (Roger, 1857)

Tetrogmus caldarius Roger, 1857: 12.
Tetramorium caldarium: Bolton 1979: 169.
Tetramorium simillimum: Pisarski 1957: 285, 1975: 26 (misidentifications), Czechowski and Czechowska 1997: 51 (misidentification).

Note. Roger (1862) synonymized his previously described species *Tetrogmus caldarius* with *Tetramorium simillimum* (F. Smith, 1851), and since then all subsequent authors used the name *T. simillimum* for this species. Bolton (1979) has revived *Tetramorium caldarium* from synonymy and shown differences between this species and closely related *T. simillimum*. Type locality of *T. caldarium* is "Rauden" (Roger 1857); now it is Rudy, distr. Racibórz, province Opole, Upper Silesia, Poland. Pisarski (1957, 1975) mistakenly recognized its type locality as Ruda Śląska – the locality situated in the same region of Poland, about 40 km from Rudy). Bolton (1979, 1980, 1995a) erroneously ascribed the type locality to Germany, since in 1857 this region had belonged to Germany.

Distribution and biology. Both *T. caldarium* and *T. simillimum* are widespread tropicopolitan tramp-species of an African origin. In temperate zone they inhabit hothouses and greenhouses where they have no economic importance. In Poland, *T. caldarium* (reported as *T. simillimum*; see above and Radchenko *et al.* 1998) is known only from the type locality on Upper Silesia (Fig. 8), and since 1857 its occurrence have not been confirmed. *T. simillimum* has not yet been found in Poland, though its occurrence is conceivable.

KEY FOR IDENTIFICATION

(species erroneuosly recorded from Poland, but possibly occurring there, are marked with an asterisk)

1. Workers: frontal carinae short, terminating at the upper level of eyes (Fig. 9) 2
–. Workers: frontal carinae long, projecting far beyond the upper level of eyes (Figs 32 and 33) 4
2. Workers: dorsum of petiolar and postpetiolar nodes coarsely irregulary rugose; space between rugae only finely superficially punctured, dull shining; dorsum of petiolar node at least in front and laterally delineated by a sharp raised rim (Fig. 10). Females: scutum slightly narrowed in front; frontolateral corners of pronotum visible from above (Fig. 11). Males: stipes of genitalia rounded at apex, without concave or flattened apical areas (like in *T. impurum*) (Figs 23–26) ..... ***T. moravicum*** Krat.
– Workers: dorsum of petiolar and postpetiolar nodes varies from entirely smooth and shining to completely densely punctured and irregulary striate or finely rugulose and mat; never with coarse irregular rugae; dorsum of petiolar node not delineated by a sharp raised rim (Figs 13–18). Females: scutum in front not narrowed, frontolateral corners of pronotum invisible from above (Fig. 12) 3

3. Males: stipes of genitalia sharply truncate at the apex, with distinct concave apical area (Fig. 19; see also Figs 20–22). Workers: dorsum of petiolar and postpetiolar nodes never entirely sculptured, usually mainly smooth and shining, sometimes punctured and striated, but at least with a smooth and shining central band (Figs 13–15) ..... ***T. caespitum*** (L.)
–. Males: stipes of genitalia rounded at apex, without concave or flattened apical area (like in *T. moravicum*) (Fig. 23; see also Figs 24–26). Workers: dorsum of petiolar and postpetiolar nodes never mainly smooth and shining, usually entirely densely punctured and irregulary striate or finely rugulose, but often with a smooth and shining central part (Figs 16–18) ..... ***T. impurum*** (Foerst.)
4. Workers: propodeum armed with a pair of long spines (Figs 28 and 30). Females: body larger, more than 5 mm long 5
–. Workers: propodeum armed with a pair of short acute teeth (Figs 31). Females: body very small, less than 3 mm long 6
5. Workers: mandible finely striate; longest hairs arising from frontal carina between antennal insertion and occipital corners shorter than maximum diameter of eye (Fig. 27); petiolar node in profile subsquare, its dorsum horizontal, not sloping upwards posteriorly, anterodorsal and posterodorsal angles approximately on the same level (Fig. 28); gaster always distinctly darker than head and alitrunk ..... ****T. bicarinatum*** (Nyl.)
–. Workers: mandible smooth and shining, only with scattered hair-pits; longest hairs arising from frontal carina between antennal insertion and occipital corners longer than maximum diameter of eye (Fig. 29); dorsum of petiolar node in profile gradually sloping upwards posteriorly, posterodorsal angle is on a slightly higher level than anterodorsal one (Fig. 30); gaster more or less concolourous with head and alitrunk ... ***T. insolens*** (F. Sm.)
6. Workers: frontal carinae strongly developed throughout their length, running unbroken almost to the occipital margin and surmounted along all their length by a narrow raised rim or flange; ground-sculpture of head between frontal carinae strongly granular or reticulate-punctate, the surfaces mat; antennal scrobes broad and conspicuous; sides of head diverging behind the eyes (Fig. 32) ..... ****T. simillimum*** (F. Sm.)
–. Workers: frontal carinae strongly developed to the level of the midlength of eye behind which they become weak, broken, or gradually fade out posteriorly, not surmounted by a raised rim or flange beyond the level of the midlength of eye; ground-sculpture of head between frontal carinae feeble, the surfaces dully shining; antennal scrobes vestigial (Fig. 33) ... ***T. caldarium*** (Rog.)

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Agosti, D. and Collingwood, C. A. 1987b. 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.

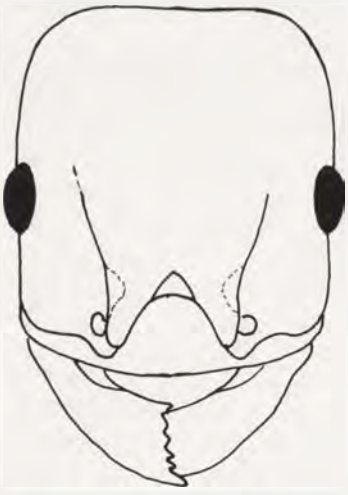


Figure 9. *T. impurum*, worker head, frontal.

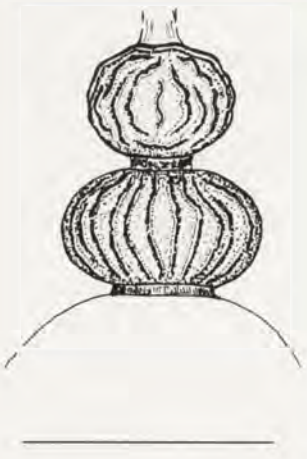
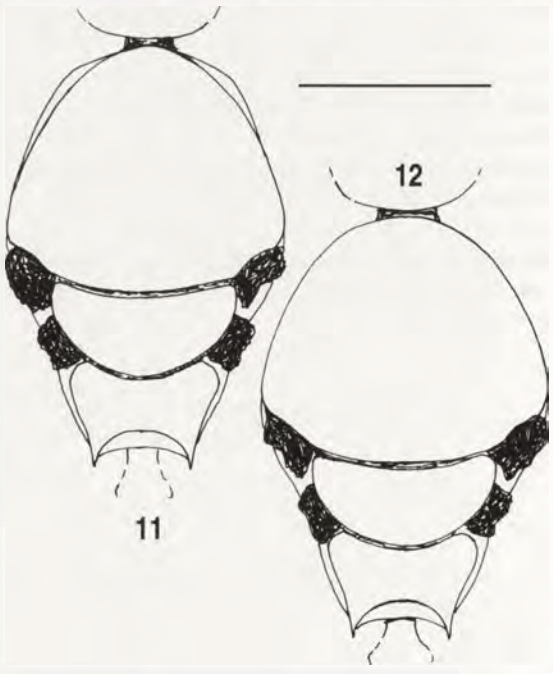
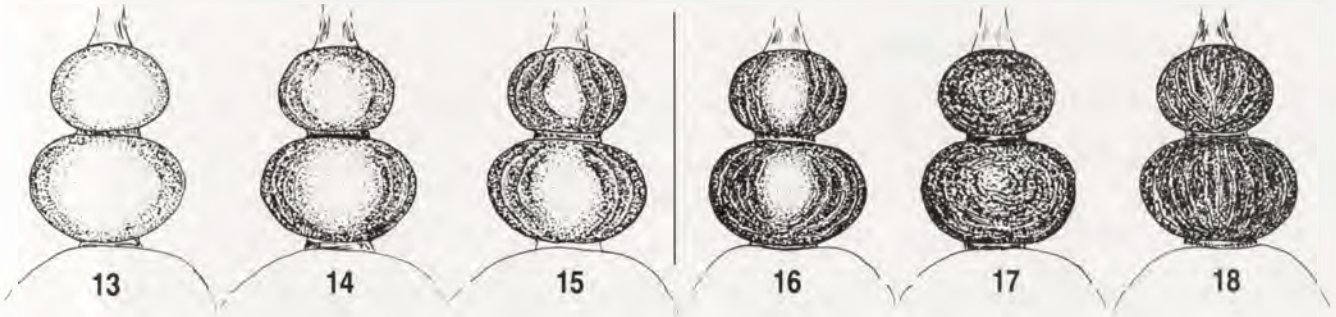


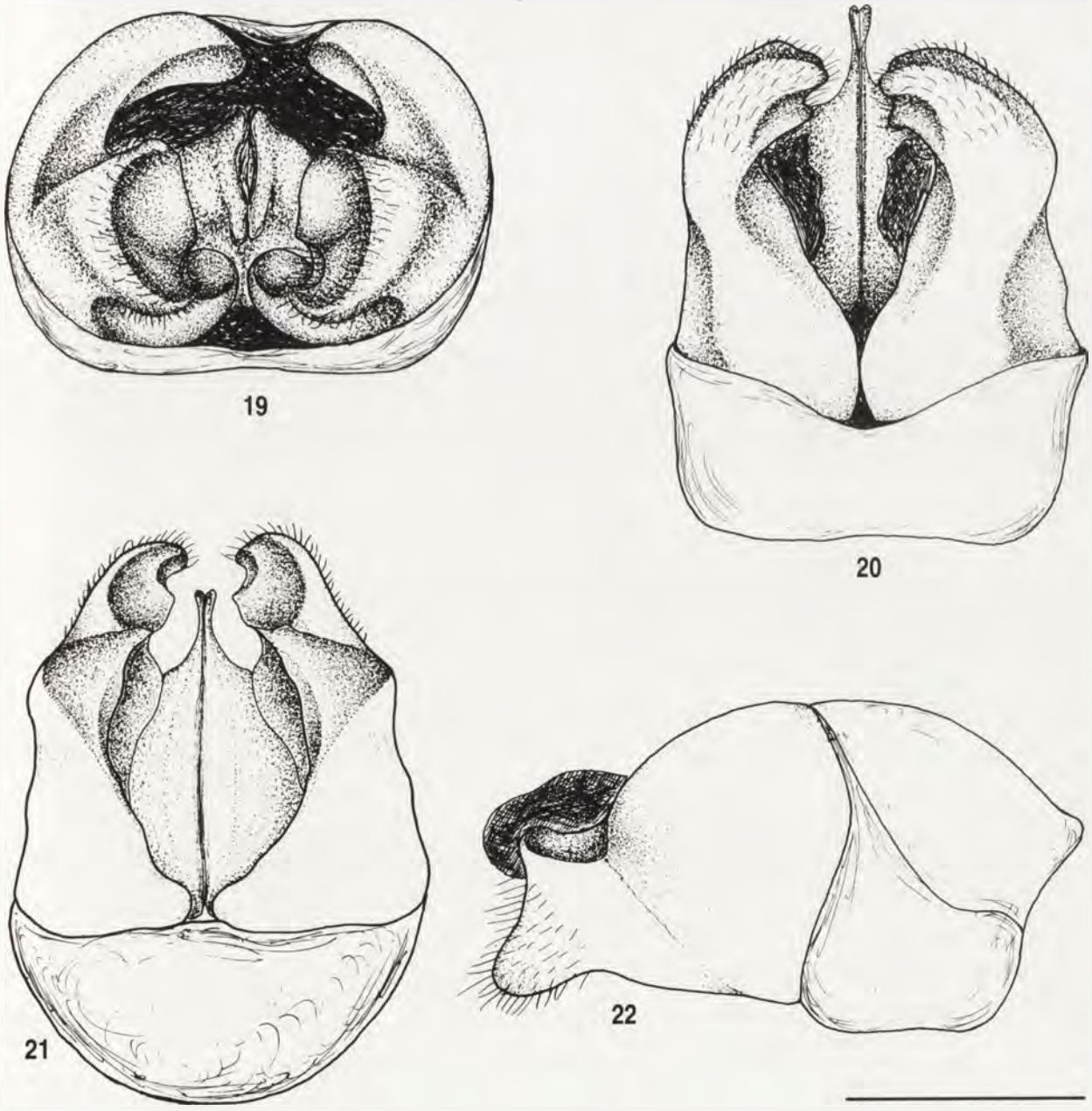
Figure 10. *T. moravicum*, worker petiole and postpetiole, dorsal. (Scale for figures 9 and 10: 1 mm).



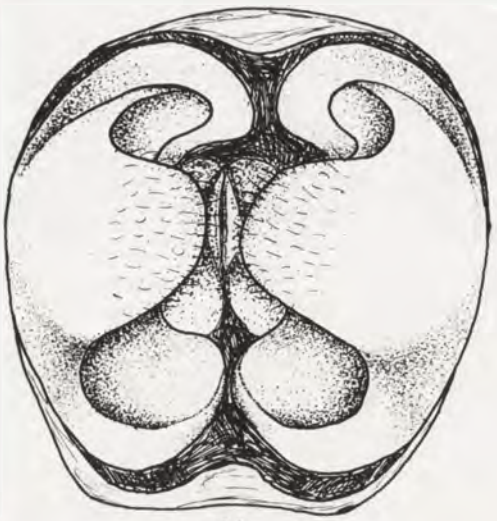
Figures 11 and 12. Female alitrunk, dorsal (scale: 1 mm). (11) *T. moravicum*; (12) *T. caespitum*.

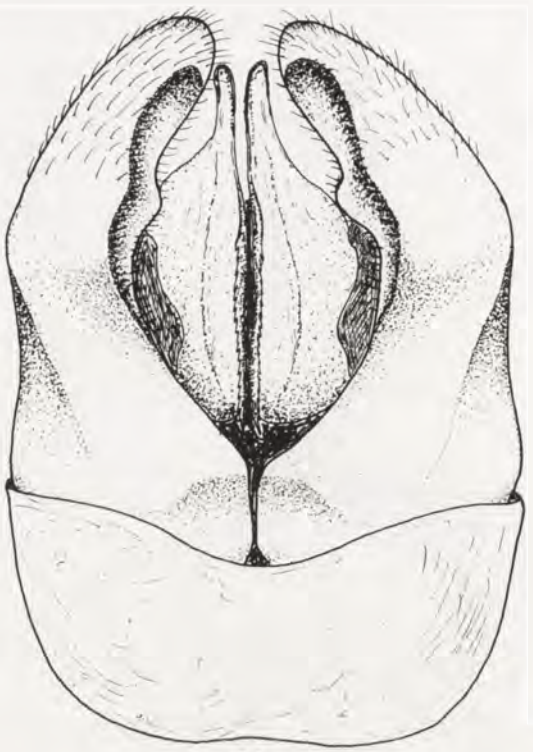


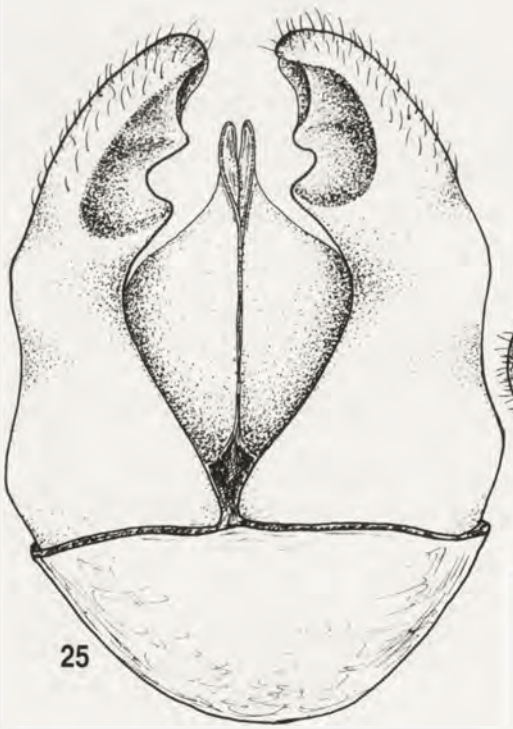
Figures 13–18. Petiole and postpetiole, dorsal (scale: 0.5 mm). (13–15) *T. caespitum*; (16–18) *T. impurum*.

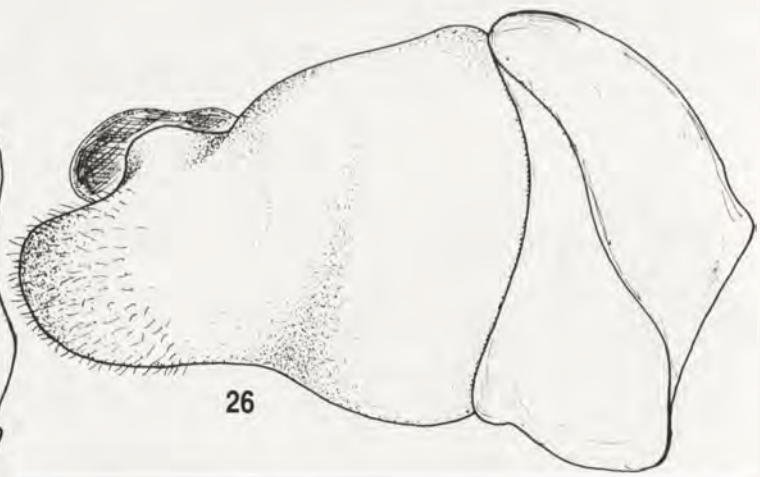


Figures 19–20. *T. caespitum*, male genitalia (scale: 0.5 mm). (19) caudal; (20) ventral; (21) dorsal; (22) lateral.









Figures 23–26. *T. impurum*, male genitalia (scale: 0.5 mm). (23) caudal; (24) ventral; (25) dorsal; (26) lateral.

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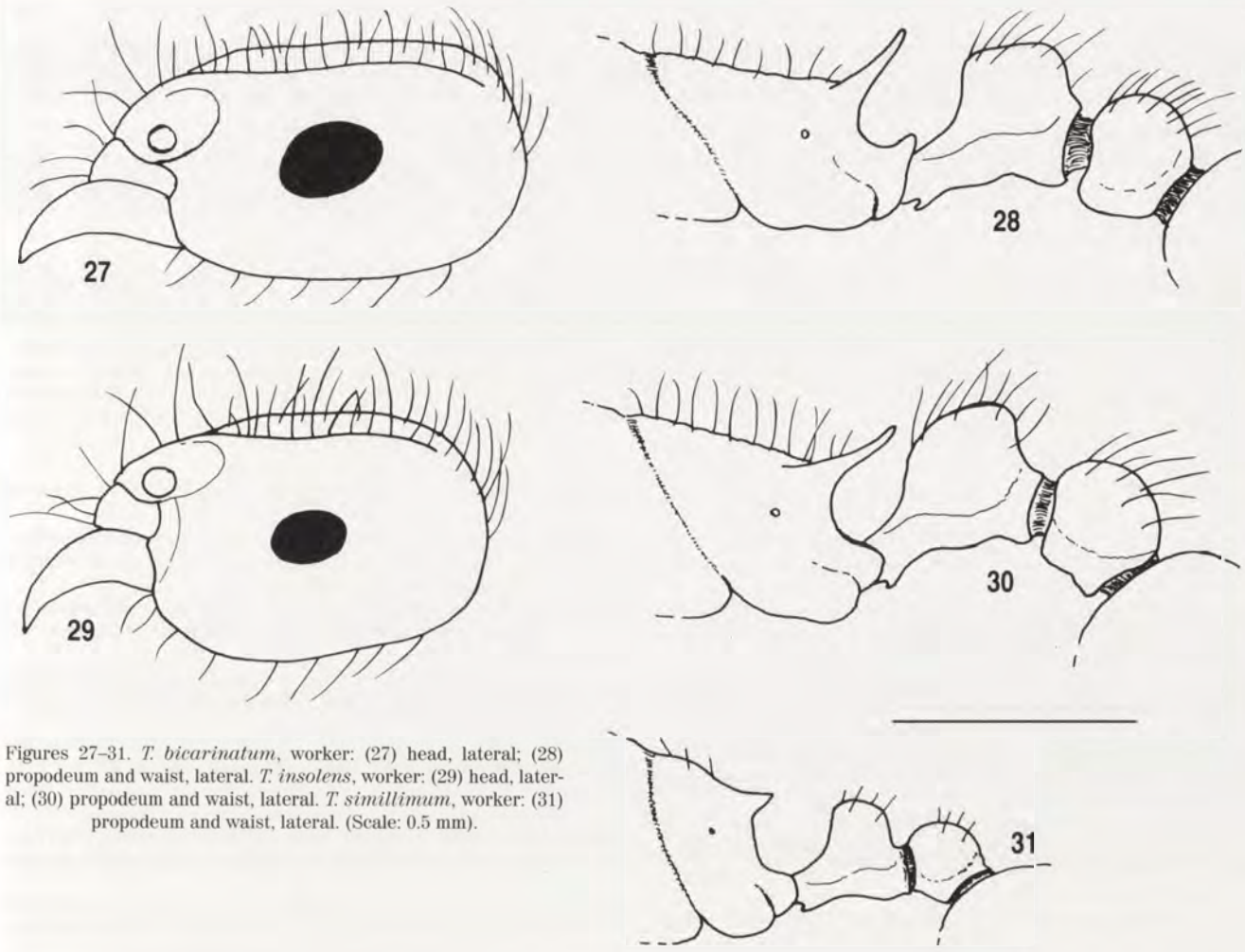
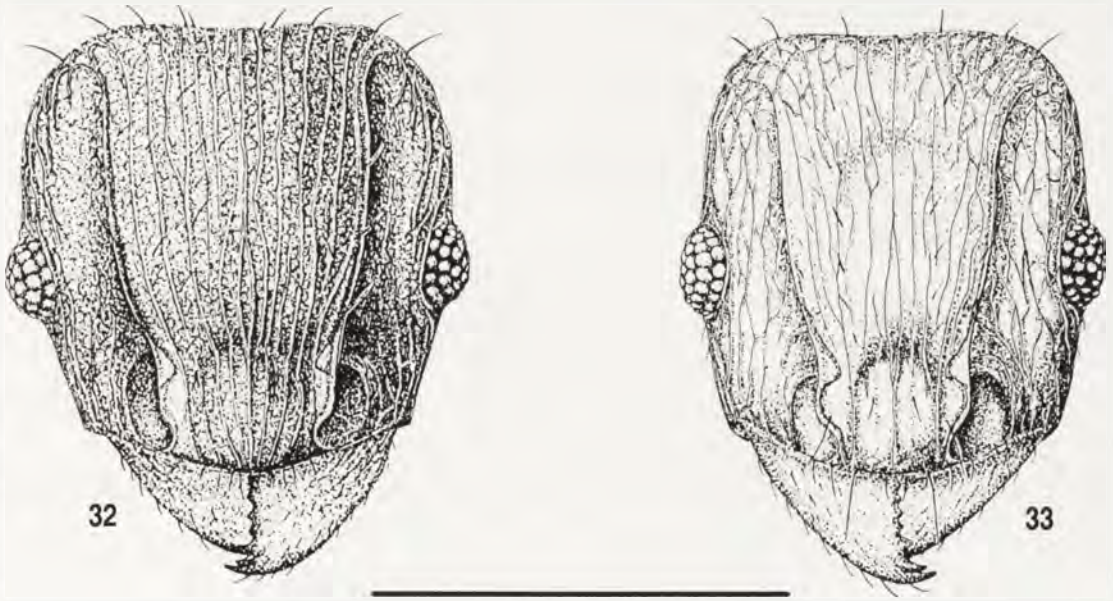


Figures 27–31. *T. bicarinatum*, worker: (27) head, lateral; (28) propodeum and waist, lateral. *T. insolens*, worker: (29) head, lateral; (30) propodeum and waist, lateral. *T. simillimum*, worker: (31) propodeum and waist, lateral. (Scale: 0.5 mm).



Figures 32 and 33. Worker head, frontal (scale: 0.5 mm). (32) *T. simillimum*; (33) *T. caldarium*. (From Bolton 1979).

No	Species \ Region	1	2	3	4	5	6	6a	7	8	9	10	10a	11	12	13	14	15	16	17	18	19	20
1	*Tetramorium caespitum* (L.)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	?
2	*Tetramorium impurum* (Foerst.)												●				●	●			●	●	
3	*Tetramorium moravicum* Krat.												●	●		●							
4	*Tetramorium insolens* (F. Sm.)				●s																		
5	*Tetramorium caldarium* (Rog.)									●s													

Table 1. Distribution of *Tetramorium* species in particular geographical regions of Poland (see Fig. 1): 1 – Baltic Coast, 2 – Pomeranian Lake District, 3 – Masurian Lake District, 4 – Wielkopolsko-Kujawska Lowland, 5 – Mazovian Lowland, 6 – Podlasie, 6a – Białowieska Forest, 7 – Lower Silesia, 8 – Upper Silesia, 9 – Krakowsko-Wieluńska Upland, 10 – Małopolska Upland, 10a – Świętokrzyskie Mts, 11 – Lubelska Upland, 12 – Roztocze, 13 – Sandomierska Lowland, 14 – Western Sudeten Mts, 15 – Eastern Sudeten Mts, 16 – Western Beskidy Mts, 17 – Eastern Beskidy Mts, 18 – Bieszczady Mts, 19 – Pieniny Mts, 20 – Tatra Mts (● – certain data, ? – questionable data, s – only synanthropic occurrence)

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