

A REVISION OF THE CZECHOSLOVAK FORMS OF THE GENUS
MYRMICA LATR. (HYM.)*)

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The investigation of the ants in our country is not yet by far a closed chapter. Though the faunistic survey of the ant fauna of Czechoslovakia had advanced, especially in the last pre-war years, to such an extent that the number of forms ascertained till the end of 1941 in the territory of Bohemia, Moravia, Slovakia and former Carpathian Russia reached (according to KRATOCHVÍL, 1944, p. 32) the number of 116, i. e. more than double the forms listed by SOUDEK in 1922, there still remain many regions of our country, not only in Slovakia but also in Bohemia and Moravia, entirely unexplored so that even this number cannot be considered final. The task before us consists, however, not only in continuing the faunistic survey but also in carrying out a thorough taxonomic study of our forms of ants. It is well-known that the taxonomic knowledge of the ant fauna of Central Europe has still many gaps in spite of the many monographs published on the subject, and thus existing faunistic reports lose in value. This is especially true with regard to the study of ants in our country, as owing to its unusually favourable geographic position it harbours not only forms known and more or less current in other parts of Central Europe but also a number of forms of Southern and Eastern Europe, which are not common in Central Europe, and often unknown to the authors of foreign monographs on the Central European fauna (STITZ, 1939). Some recent investigations have shown that there are among the latter not only forms already known and described from elsewhere (*Myrmica deplanata* RUSZ., *Leptothorax sordidulus* MÜLL., *Messor semirufus meridionalis* ANDRÉ, etc.), but also new forms not yet known to science (*Strongylognathus kratochvili* ŠIL., *Sysphincta fialai* KRAT., *Tetramorium ferox šilhavyi* KRAT., *Tetramorium moravicum* KRAT., *T. stderckei* var. *gregori* KRAT., *Bothriomyrmex corsticus mohelensis* NOV., *Leptothorax unifasciatus* var. *obenbergeri* SAD., etc.), as they either had been overlooked by our myrmecologists or mistakenly placed to already known forms of Central Europe. Ten years ago Dr. J. KRATOCHVÍL (1944, p. 52) drew attention to the necessity of a revision of our

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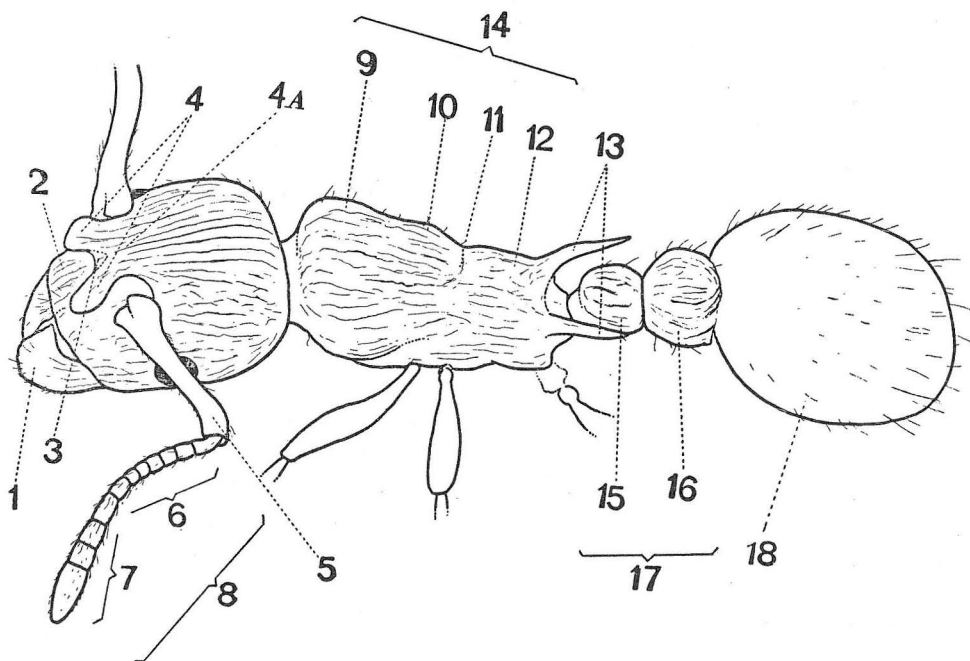
ants, and he himself revised our representatives of the genera *Sysphincta* ROG., *Ponera* LATR., *Stenamma* WESTW., *Solenopsis* WESTW., *Myrmecina* CURT., *Tetramorium* MAYR., *Tapinoma* FÖRST., *Plagiolepis* MAYR., and partly *Leptothorax* MAYR., and of the genus *Formica* L. the species *Formica cinerea*. After him VLADIMÍR NOVÁK revised our representatives of the genera *Leptothorax* Mayr., *Bothriomyrmex* EM., and partly *Aphaenogaster* MAYR., and *Strongylognathus* MAYR.

Already earlier, in 1939, I had worked in a similar way our representatives of the genera *Messor* FOR. and *Myrmica* LATR. Later, however, it proved necessary to repeat this revision on a larger scale for the genus *Myrmica* LATR. owing to the unusual manifoldness and wealth of its forms and the intricacy of its taxonomy. The limited working possibilities and the difficulties connected with procuring the necessary material and literature during the war and shortly after it made it impossible to finish this paper until the beginning of this year.

1. Some Remarks on the Taxonomy of the Genus *Myrmica* LATR.

The representatives of the genus *Myrmica* LATR. are distributed almost throughout the whole of the palearctic (paleoboreal) and nearctic (neoboreal) regions; they have their centre of distribution in Eastern Europe and Siberia. In Czechoslovakia they belong to the most common ants. We find them in all habitats from peat-bog to dry stony steppe, in the mountains as well as in the lowlands. The great areal distribution and the considerable adaptability to the environment are in most species of this genus the cause of a considerable geographical and ecological variability to which should be added the nest and individual variability differing from species to species and affecting not only the specimens of different nests but also specimens coming from the same nest. Not only size, colouring and sculpture of the chitine are variable, but also the shape of taxonomically important parts of the body such as the segments of the pedicel, the epinotal spines, the antennal scapes, etc. As it is on these characters that the diagnoses of the different forms are established, the taxonomy of this genus is unusually difficult and intricate. Up till now almost 100 species, subspecies and varieties of this genus have been described from the palearctic region alone, but the taxonomic evaluation of many of them is more than problematic, and taken in quite a different sense by different authors. Especially C. EMERY (1908, 1916), A. FOREL (1915), J. BONDROIT (1918), G. MÜLLER (1923), B. FINZI (1926), STÄRCKE (1927), more recently F. SANTSCHI (1931), W. KARAWAJEW (1929, 1934) and K. ARNOLDI (1934) have contributed to the knowledge of the palearctic forms of the genus. Though the publications of these authors and especially the recent papers of F. SANTSCHI, W. KARAWAJEW and K. ARNOLDI, dealing also with the question of the variability of the representatives of the genus *Myrmica* LATR. (the papers of the last two authors deal almost exclusively only with forms living in the European part of the USSR) solved many intricate questions of the taxonomy of

this genus and contributed to the recognition of further representatives, they nevertheless suffer many and identical mistakes. The fundamental mistake found in the publications except in the three publications last mentioned is that on the whole they stress little the variability so important just in this genus, nor do they either emphasise it in the descriptions or in the figurings which are generally made only after one specimen; besides the figures of the different taxonomically important parts of the body such as heads, antennal scapes, segments of the pedicel, etc. are drawn in different positions so that it is difficult to use them for determination. In order to avoid these mistakes common to all descriptions and studies of the genus *Myrmica* LATR. I first made a thorough preliminary investigation of the largest possible material from all parts of Czechoslovakia and then tried in the descriptions given below of the Czechoslovak forms of the genus to use only those characters which can be considered more or less constant, and the other, less constant characters I either have not used at all or I specially mention their variability. For the same reason I add to the descriptions of the different forms the figures of whole series of antennal scapes, segments of the pedicel, etc. in order to



Body outline of the worker of *Myrmica sabuleti* MEIN.

1. — mandibles, 2. — epistom, 3. — frontal area, 4. — frontal laminae, 4 A. — fore-head, 5. — antennal scape, 6. — funicular joint, 7. — antennal club, 8. — funiculus, 9. — pronotum, 10. — mesonotum, 11. — mesoepinotal suture, 12. — epinotum, 13. — epinotal spines, 14. — thorax, 15. — petiole, 16. — postpetiole, 17. — pedicel, 18. — gaster.

show how in one and the same form they may change owing to intraspecific variability often to forms quite different from the forms usually considered typical and often also invariable. My investigations carried on for a number of years showed me clearly that many forms of the genus *Myrmica* are in fact so variable that the usual characteristics of most of the species represent often only a kind of geometrical average of the most different forms occurring more or less commonly within the same species, and that many of the lower taxonomic units (subspecies, varieties) represent in fact only extremes of one on the whole continuous evolutionary series. This applies e. g. to the species *M. scabrinodis* NYL., very common in Czechoslovakia and unusually variable, and also to other species, e. g. *M. sabuleti*, *M. lobicornis*, etc., whose different variation deviations were described by many foreign authors as subspecies, races and varieties, and which are considered constant, though they are often only very variable ecological varieties produced by the unusually sensitive reaction of these species to the environment. Many other forms on the other hand (e. g. *M. sabuleti* MEIN.) regarded because of their similarity with other forms as their varieties or subspecies prove to be sufficiently constant in their deviating characters to be regarded as independent species as it was pointed out e. g. already by STÄRCKE in the above-mentioned species *M. sabuleti*.

2. Material and Method

As basis for the present paper I used the results of the examination of almost a thousand samples of colonies from Bohemia, Moravia, Slovakia and former Carpathian Russia in my own collection and in the collections of Dr. VL. NOVÁK, Dr. J. SAMŠIŇÁK, Dr. M. ZÁLESKÝ and in the entomological collections of the National Museum in Prague. Especially Dr. M. ZÁLESKÝ's "Formiciade Czechoslovakiae" provided a rich material; it contains collections of almost all our myrmecologists from the twenties of this century until 1939 from the whole territory of our country, and formed the basis for its author's writing of the IIIrd part of the Prodrömus of our Hymenoptera. I thank Professor J. OBENBERGER, Director of the Zoological Department of the National Museum for making it possible for me to revise all the material of this collection and all the other material of the genus *Myrmica* deposited at present in the collections of the Entomological Section of the National Museum in Prague. For providing foreign comparative material I am indebted especially to Dr. H. KUTTER of Flawill in Switzerland.

I carried out the usual investigation with a Zeiss binocular microscope at 60 \times magnification; the special investigation and drawings by means of microscope at 100 \times to 200 \times magnification. The drawings were made with Abbé's drawing apparatus, the drawings of the heads as well as of the pedicels, antennal scapes of workers, antennae of males in the original at 100 \times natural size, of the copulation organs of the males (volsels) at 200 \times natural size.

In order to maintain a certain uniformity the following rules were observed in drawing the different, taxonomically important parts of the

body, especially the antennal scapes of the workers, a uniformity which, as already mentioned above, was in earlier publications not always sufficiently observed, though without it it is not possible to identify the different forms reliably according to the figures because the shape of the scape changes considerably with the slightest change of position; the same applies to a lesser extent also to the other parts of the body, especially to the pedicel.

The heads of workers were drawn as far as possible in the same position in which also the biometrical measuring has to be carried out, i. e. in a horizontal position (assuming that the tubus of the microscope is in a vertical position). In this position the connecting line of the anterior margins of the eyes passes approximately through the middle of the frontal laminae, i. e. through the apex of the triangular area frontalis. In any other position the measurements of the head and thus also shape of the frontal laminae are distorted, and the figures as well as the numerical values lose their significance.

The antennal scapes of the workers are drawn only in two fundamental positions, which I have designated a, b. To facilitate the manipulation in the observation and drawing of the antennal scapes in these two fundamental positions it is best to detach the whole (right!) antenna from the head and to attach it with the funiculus to a small cardboard so that the scape projects upwards perpendicularly to the surface of the cardboard. When we impale the cardboard on an entomological pin we can comfortably examine the scape from all sides, and at the same time we obtain a permanent preparation of the antenna, which we can use again at any time we like.

We get the scape into position *a* when we place it relatively to ourselves in such a position that the proximal (shorter) part of the scape anterior to the bend or break is turned in the direction towards us. The distal (longer) part of the scape must here occupy a horizontal position (assuming that the tubus of the microscope is in a vertical position).

Provided that the scape is situated relatively to us so that the bend or break lies below, we get the scape into position *b* when we turn it out of position *a* around the distal (longer) part of the scape 90° to the left.

When we observe the scape of the right antenna without separating the latter from the head, by turning the antenna by about 90° from the head, then position *a* gives a top view of the scape, position *b* a posterior view from the gaster of the animal.

The joints of the pedicel are figured once in profile from the left side and once from above. In order that the shape of the joints of the pedicel may not be changed by the perspective it is necessary that the epinotal spines fuse in side view, this being a guarantee of the right position. In a view from above both joints of the pedicel must be clearly distinct, in the petiole the neck and its connection to the lower part of the epinotum must be visible.

The biometrical measuring was carried out with a micrometric ocular, provided with a centesimal micrometric scale, in connection with the microscope with a $100\times$ magnification. STÄRCKE and after him

ARNOLDI introduced the biometric method in the taxonomy of ants. In principle it means the numerical expression of the variability by means of standard measurements of the most diverse parts of the body. Most frequently the measurements of the head are used. For this purpose we make all in all four measurements of the head (after ARNOLDI). We measure the length of the head (from the posterior margin of the head to the anterior margin of the epistome), the width of the head (at the anterior margins of the eyes), the width of the forehead (the narrowest part between the frontal laminae), and the width of the frontal laminae (the widest span of the frontal laminae anterior to the head). By means of the figures thus obtained we then calculate the corresponding indices. The index of the head equals the width of the head divided by the length of the head, taken $100\times$; the frontal index equals the width of the forehead divided by the width of the head $100\times$; and the index of the frontal laminae equals the width of the forehead divided by the width of the frontal laminae $100\times$. Experience showed me that in one and the same species the index of the head varies most, and it is thus less reliable for ascertaining a certain form, also because its accuracy is especially dependent on the exact holding of one and the same position in measuring. The frontal index and the index of the frontal laminae characterise far better the different forms; in the same species these indices vary only within relatively narrow limits, and the accuracy of their measurements depends less on maintaining one and the same position of the head.

The determination after the index of the head, the frontal index and the index of the frontal laminae is of course the more reliable the greater the number of specimens thus measured is, as we take the averages of the measurements. This method cannot be used in all cases for a reliable determination of the different forms. While certain forms differ from each other very characteristically in the values of the different indices (e. g. *M. laevinodis* — *M. sulcinodis*, *M. schencki* — *M. lobicornis*, *M. rugulosa* — *M. balcanica*, *M. scabrinodis* — *M. sabuleti*, etc.), it is not possible to distinguish reliably from each other with a lesser number of measurements other forms (as e. g. *M. laevinodis* — *M. ruginodis*, *M. scabrinodis* — *M. balcanica*, etc.).

The drawings of the volsels of males, appended to the last page of this paper, were all made after preparations in Canada balsam. For the use of the male genitalia as distinguishing features and their preparation see R. CLAUSEN, 1938, and VL. NOVÁK, 1944, p. 111. Here I only wish to mention that in examining the different separated parts of the male copulation appendices, e. g. of the volsel, embedded in Canada balsam it is necessary to ensure that they have the right position, i. e. that we observe them always under the same angle. This we achieve when for investigation we always take the volsel of the same half of the copulation organ and arrange it always in the same position; if necessary we exclude by light pressure on the covering glass before the balsam dries the possibility of the volsel rising freely in the balsam and thus changing its shape in perspective (a precaution which neither VL. NOVÁK, 1944, p. 119, nor A. WEBER, 1948, p. 281, took consistently).

3. Revision of the Czechoslovak Forms of the Genus

Myrmica LATR.Genus *Myrmica* (LATREILLE) MAYR

LATREILLE, Hist. nat. Crust. Ins. 4, 1802, p. 131.

MAYR, Verh. Zool. Bot. Ver. Wien 5, 1855, p. 396.

For the characterisation of the genus see e. g. NOVÁK—SADIL, 1939, p. 74, SOUDEK, 1922, p. 21, STITZ, 1939, pp. 63, 65. Genus distinguished from the other genera of the family *Myrmicidae* LEP. especially by the fact that the tibiae of the middle and hind pairs of the legs carry a relatively long, distinctly pectinate spur; that in a side view the petiole carries below a blunt, forward directed spine; that the last three segments of the funiculus are when taken together shorter than the rest of the funiculus, that the epinotum lies at the level of the pronotum.

Subgenus *Neomyrna* FOREL

FOREL, Rev. Suisse Zool., 22, 1914, p. 275.

M. (N.) rubida LATR.

(Figs. I 1—4, VIII 1, IX 1, XI 1)

LATREILLE, Hist. nat. Fourm. 1802, p. 267.

I consider it unnecessary to redescribe in detail this very well-known species, and therefore I refer the reader to its brief description in the appended "Key". As I have been able to ascertain again in a great number of specimens from the whole territory of Czechoslovakia, this ant shows only a very small variability of the specific characters (figs. I 1—4). Distributed in the climatically more temperate parts of the palearctic region, from the Alps to eastern Siberia (the Apennines, Asia Minor, the Caucasus). Mountain species. According to KUTTER it is still abundant in the Swiss Alps (Zermatt) at an altitude of 2400 m. On the whole abundant in the mountain regions of Czechoslovakia. To the localities listed in ZÁLESKÝ's Prodrómus (1939, p. 202) and KRATOCHVÍL's supplements (1940, p. 243) the following new ones have to be added:

Žďárské vrchy 11-7-43 (leg. SADIL), Karlovarská vysočina 29-6-48 (SADIL), Beerenhügel near Chomutov 2-9-46 (SADIL), Děčín-Hřensko 2-8-50 (SAMŠIŇÁK), Lomnický štít in the Tatra 19-7-51 (SCHOŘ).

Subgenus *Myrmica* LATR. sensu str.*M. (M.) laevinodis* NYL.

(Figs. I 5—9, VIII 2—4, IX 2—3, X 1, XI 2)

NYLANDER, Act. Soc. Sc. Fennicae 2, 1846, p. 927.

This species and the following one are morphologically very well distinguished from the other representatives of this genus, so that I need not give their detailed description anew, and can again refer the reader for their description to the appended "Key". Less variable species than many other representatives of the genus. The variability concerns especially the size, the colouring, and some details of the sculpture. — Distributed throughout the whole of Europe to the east it reaches eastern Siberia, Manchuko and Japan. On the whole very abundant in Czechoslovakia.

M. (M.) rubra L.

(Figs. I 10, 11, VIII 5—6, IX 4, X 2, XI 3)

LINNÉ, *Systema Naturae* (ed. 10) 1, 1758.
 (*M. ruginodis* NYLANDER, 1846, pp. 929, 930).

More widely variable species than the preceding one. Distributed in the same area, but reaching more often into the mountains. Also very abundant in Czechoslovakia. Many specimens from Czechoslovakia, especially from higher sites (Šumava, Českomoravská vrchovina), larger than usual, considerably coarsely sculptured and of a darker colouring (dark rusty brown to blackish brown). (I use the name of *M. rubra* L. for this ant instead of the designation *M. ruginodis* NYL. hitherto used and also more current in Czechoslovakia for the reasons given by SANTSCHI (1931, p. 339). The species *M. rubra* described by LINNÉ was divided in 1846 by NYLANDER into the two independent species *M. laevinodis* and *M. ruginodis*

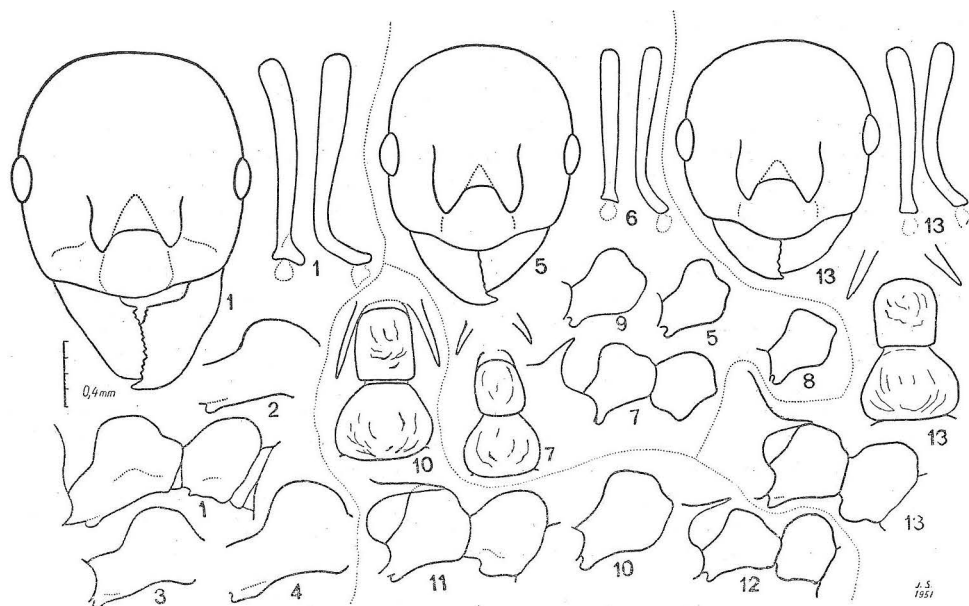


Fig. I. — Heads, antennal scapes and pedicels of the workers of: 1—4 *M. (N.) rubida* LATR., 5—8 *M. (M.) laevinodis* NYL., 10—12 *M. (M.) rubra* L., (12 var. *microgyna* BRIAN), 13. *M. (M.) r.* var. *mutata* n. var.

Designed according to exemplars from these localities:

1. — Karlovarská vysočina 1948 (Sadil), 2. — Pec — Krkonoše (Samšiňák), 3. — Beerenhügel near Chomutov 1946 (Sadil), 4. — Žďárské vrchy 1943 (Sadil), 5. — Borová Lada in the Šumava 1948 (Sadil), 6. — Sedlčany 1936 (Sadil), 7. — Litoměřice 1948 (Sadil), 8. — Pavlovce in Slovakia 1947 (Novák), 9. — Purberg near Chomutov 1948 (Sadil), 10. — Čertovo jezero in the Šumava 1947 (Novák), 11. — Borová Lada in the Šumava 1948 (Sadil), 12. — Sobotka (Samšiňák), 13. — Kotelné jámy in the Krkonoše 1926 (Obenberger).

without any attention being paid to LINNÉ's original designation *rubra*; this is entirely against the rules of the priority law. Though EMERY (1908, p. 169), who was the first to publish a monograph on the genus *Myrmica*, re-introduced the designation *rubra*, yet he did so in such a way that he subordinated the species *M. laevinodis* and *M. ruginodis* described by NYLANDER as subspecies to a collective, more or less constant species *M. rubra* L. EMERY's conception was used in Czechoslovakia by SOUDEK and after him by other Czechoslovak myrmecologists, recently e. g. by ZÁLESKÝ (1939, p. 203) which write *M. rubra laevinodis* and *M. rubra ruginodis*, though abroad NYLANDER's original binominal designations of *M. laevinodis* and *M. ruginodis* are used. Only quite recently, after SANTSCH's admonition, the designation *M. rubra* L. began to be used for *M. ruginodis* and the latter designation to be placed as synonym. According to SANTSCH's view NYLANDER separated from LINNÉ's original *Formica rubra* first the species *M. laevinodis* and then chose for the remaining species, really LINNÉ's *F. rubra*, the designation *ruginodis*.

***M. (M.) r. var. ruginodo-laevinodis* FOR.**

FOREL, Fourmis Suisse, 1874, pp. 77—79.

(*M. laevinodis* var. *ruginodo-laevinodis* DONISTHORPE, 1915, p. 115).

(? *M. laevinodis* var. *ferganensis* KARAWAJEW, Revue Russe d'Ent. 1915, p. 503).

Specimens bearing simultaneously characters of *M. laevinodis* as well as of *M. rubra* (*ruginodis*) and representing according to the prevailing opinion different stages of transition between these two species are very abundant in nature and even often more abundant than the two typical forms, as I indeed verified from my own finds. According to EMERY (1917, pp. 26—29) they are hybrid forms. In ZÁLESKÝ's Prodrömus this form is not listed at all from Czechoslovakia, though it was reported already by SOUDEK (1924) from the Moravian Karst, and later by SADIL (1943, p. 12) and KRATOCHVÍL (1944, p. 39). Already W. ZDOBNITZKY (1910, p. 12: *Rasse rubra ruginodis* NYL. sowie Übergänge...) referred to this form.

The latest investigations of M. V. and A. D. BRIAN of the Department of Zoology of the University of Glasgow (Observations on the Taxonomy of the Ants *Myrmica rubra* L. and *M. laevinodis* NYL., Tr. Ent. Soc. London 1949, p. 393) appear to bring about a radical change in the views on these transitional forms. On the basis of a detailed biometric investigation of a large material of workers, females and males of the two near species *M. rubra* and *M. laevinodis* and on the basis of experimental sociological studies these two authors ascertained that the transitional category *ruginodo-laevinodis* established by FOREL is not justified, as in these apparently transitional forms we have only morphologically different specimens of one species, *M. rubra* L. The authors consider it proved that the species *M. rubra* L. is an incompletely dimorphic species existing in two varieties occurring together in different localities, between which there are morphological transitions, which the authors designate as var. *macrogyna* and var. *microgyna*. Both these varieties differ from each other especially by the way in which they spread in nature, and according to the authors they are characterised as follows:

var. *macrogya* BRIAN: Females and males larger, colonies as a rule monogynous (containing one female), with relatively large, aggressive workers, the average worker head-width less than the average female head-width, colony reproduction by dissemination of fertile females which found colonies either alone or in small aggregates.

var. *microgya* BRIAN: Females and males smaller colonies polygynous (containing several females) with relatively small and docile workers, the average worker head-width similar to the average female head-width, fertile females return to their nest (and possibly other nests) and colonies reproduce by fission.

M. (M.) rubra L. var. mutata n. var.

(Fig. I 13)

Form ascertained by me unfortunately only in one specimen (worker) in the material of ants deposited in the collections of the National Museum in Prague, labelled Kotelné Jámy, Krkonoše 15-6-1926 Bohemia, Dr. OBENBERGER. I am well aware that to establish a new form on the basis of the deviating characters of one ♀ is a very problematical thing, especially in such a variable genus as the genus *Myrmica* LATR. Nevertheless the characters by which this specimen is distinguished from *M. laevinodis* as well as from *M. rubra* deserve being described, and in view of the fact that they are entirely beyond the usual range of variability of these forms the new form ought also to be designated. The future faunistic survey of the Krkonoše (Giant's Mountains) and perhaps also of other Czechoslovak regions will show whether it is really a new form with constant characters or perhaps only a rare deviation of a pathological nature.

♀ Head clearly wider than in *M. rubra*, of approximately the same shape as in some specimens of *M. schencki* EM. (index 90,3) forehead narrower (i. 44,6), frontal laminae more divergent (i. 92,6). Antennal scape shorter and broader than in the type, more curved at the base than in *M. rubra* or *M. laevinodis*. Thorax in dorsal view from above more robust than in the two preceding forms, somewhat broader. Epinotal spines shorter (approximately as in *M. laevinodis*), very divergent in dorsal view. The epinotal area between them not shiny, with traces of faint transversal wrinkles. In lateral view the petiole is on the whole reminiscent of *M. rubra*, except for its anterior face being less concave, sloping steeply downwards; the latter feature makes it somewhat reminiscent of the petiole in *M. sulcinodis*. Less sculptured than is the rule in *M. rubra*. Head rusty brown, thorax and pedicel lighter, rusty yellow, gaster dark brown. Length of the body 4,8 mm.

M. (M.) sulcinodis NYL.

(Figs. II 1—5, VII 7, IX 5—6, X 3, XI 4)

NYLANDER, Act. Soc. Sc. Fennicae 1846, p. 934.

CURTIS, Tr. Linn. Soc. London 1854, p. 214.

I give in the Key the more detailed description of this species morphologically well distinguished from the other representatives of this genus.

On the whole little variable species, nevertheless the shape of the epinotal spines as well as the sculpture, the colouring, and especially the shape of the petiole — which is a specially important character in distinguishing this species from the other representatives of this genus — are subject in this form within certain, relatively narrow limits to variability. As I prove in the appended figures (fig. II 2—5), the petiole has not in lateral view the anterior face always straightly truncate as reported in the literature (EMERY 1908, p. 173); instead its anterior face is sometimes considerably concave (fig. II 5). Nevertheless the petiole is also in these cases higher, shorter, and has anteriorly a less developed neck than that of all related species (*M. bergi*, *M. rubra*).

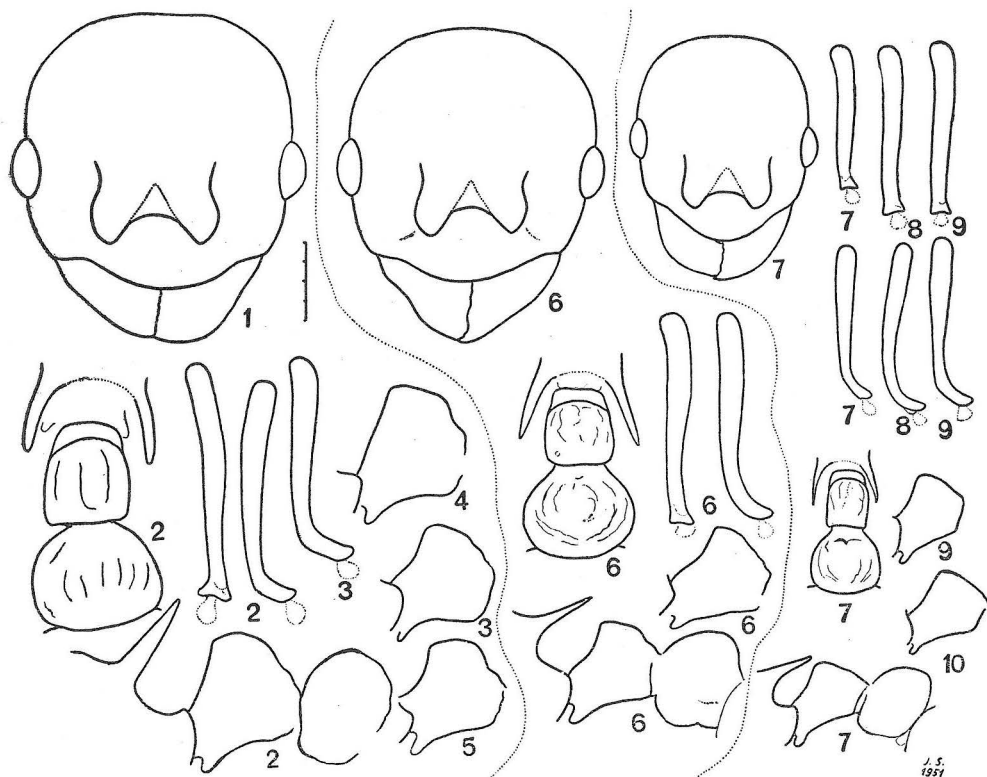


Fig. II. — Heads, antennal scapes and pedicels of the workers of: 1—5. *M. (M.) sulcinodis* NYL., 6. — *M. (M.) bergi* RUZS, 7—10. — *M. (M.) rugulosa* NYL.

Designed according to exemplars from these localities: 1. — Somotor 1937 (Hoffer), 2. — Borová Lada in the Šumava 1948 (Sadil), 3. — Špičák in the Šumava 1947 (Novák), 4. — Smračenská dolina in the Tatry 1947 (Brčál), 5. — Modrava in the Šumava (Samšínák), 6. — Třeboň 1939 (Novák), 7. — Kožlovce in Slovakia 1948 (Novák), 8. — Březenec near Chomutov 1948 (Sadil), 9. — Trhoviště in Slovakia 1948 (Novák), 10. Sobotka (Samšínák).

The usual colouring is in this species given in the literature as a rule as follows: head brown to blackish brown, thorax and pedicel rusty red, gaster dark brown to blackish brown. According to my observations most specimens of *M. sulcinodis* show in Czechoslovakia a darker colouring. The head is blackish brown, thorax and pedicel dark rusty red, gaster except the basal part blackish brown, and by this they approaches the variety further mentioned. Species distributed almost throughout the pale-arctic region more southerly in the mountains. In Czechoslovakia it occurs perhaps in all mountain and foothill regions, but is here not very abundant. To the localities listed in ZÁLESKÝ's Prodrómus (1939, p. 203) the following localities must be newly added: Zelená Lhota near Klatovy, 20-8-1946 (leg. NOVÁK), Kotelné jámy in the Krkonoše, 6-VII-1951 (leg. SADIL), Smračenská Dolina in the Vysoké Tatry 21-8-1947 (leg. BRČÁL). On the other hand the locality Třeboň (leg. NOVÁK) has to be struck out, as this find belongs to the related species *M. bergi* RUZS.

***M. (M.) sulcinodis* NYL. var. *nigripes* RUZS.**

RUZSKY, Berlin, Ent. Zeitschr. 1896, p. 73.

♀. (After RUZSKY.) Thorax rusty, red, head, pedicel and gaster blackish brown, antennae and legs brown. Sculpture still stronger and more regularly pronounced than in the type. Node of the petiole a little shorter.

♂. Darker and more strongly sculptured than in the type. Petiole more strongly longitudinally rugose, postpetiole closely punctate, dull.

Distribution: southern Russia and western Siberia.

The specimens of *M. sulcinodis* collected in the Šumava appear to belong to this variety; I have from there also males. The colouring of the workers is on the whole darker than in the type, the head is black, the thorax dark rusty brown, the segments of the pedicel blackish, the gaster, not excepting even the basal part, dark brown to black. Males somewhat more strongly sculptured than in the type.

Variety distributed certainly also in other places of Czechoslovakia.

Finds: Příbram—Květná 1936 (ŠÍPEK), Špičák 16-6-1947 (NOVÁK), Schätzova Mýt, Modrava 2-8-1948 (SAMŠIŇÁK), Borová Lada near Vimperk 8 and 9-8-1948 (SADIL).

***M. (M.) bergi* RUZS.**

(Figs. II 6, VIII 8, IX 7, X 4, XI 5)

RUZSKY, Zool. Jahrb. Syst. 1902, p. 473.

♀. Head of the same shape as in *M. sulcinodis*. Antennal scape somewhat less curved at the base, pedicel less robust. Petiole, in lateral view, somewhat lower than in *M. sulcinodis* and more elongated anteriorly so that anteriorly a distinct neck is formed. Its anterior face is slightly concave, the upper face is falling more straightly backwards so that above in front of the petiole a more distinct angle is formed. Sometimes the petiole viewed laterally is somewhat truncate above. Viewed from above the petiole is considerably narrower than the postpetiole, its upper face

(node) is distinctly shorter than it is wide (in *M. sulcinodis* the petiole viewed from above is only a little narrower than the postpetiole and its upper face is a rule as long as it is wide). Epinotal spines relatively long, thin and sharp (thinner and at the ends sharper than in *M. sulcinodis*). Less coarsely sculptured. Wrinkles on the head lower, less prominent than in *M. sulcinodis*, especially more finely developed in the frontal area. Reticulate wrinkles on the sides of the head less visible, chitine between the wrinkles shiny, frontal area either partly striate or smooth and shiny (in *M. sulcinodis* only dull). Petiole above more faintly irregularly rugose, postpetiole very finely rugose and striate, summit of the postpetiole often smooth, faintly shiny. Colouring of the body rusty brown, head somewhat darker, gaster brown to dark brown. Length of the body in our specimens: ♂ 4,6—5 mm, ♀ 6,2 mm, ♂ 5,5 mm.

Species with its centre of distribution in marshy (boggy) lowlands on the northern shore of the Caspian Sea. From here it spreads to the west, crosses the Volga (Sarepta, Astrakhan), and penetrates the steppes of the eastern Caucasus (Terek). FOREL (1903, p. 375) and EMERY (1908, p. 172) report it also from Transcaucasia and Turkestan. According to ARNOLDI (1934, p. 160) FOREL's report on the occurrence of this form in Transcaucasia refers, however, not to *M. bergi* but to *M. rugulosa*. CRAWLEY (1921) found *M. bergi* also in Mesopotamia, and described it after its deviating character as *M. bergi* var. *fortior*. *M. bergi kamyschiensis* (ARNOLDI) KARAWAJEW penetrates farther to the west than *M. bergi*; it was found in 1931 by MEDVEDEV on the very margin of the steppes of the southern Ukraine in swamps on the banks of the Sivash. The known localities of this form enumerated by ARNOLDI are: the Crimea, the Strait of Kertch, Kamysch-Burun, Sivash.

The find made on 14. 8. 1939 in the vicinity of Třeboň by VL. NOVÁK proves that *M. bergi*, or perhaps its form *M. bergi kamyschiensis*, penetrates from the western Ukraine still farther to the west. As VL. NOVÁK did not know the description of *M. bergi* he determined his find after the similar characters as *M. sulcinodis*. Later the find was redetermined by ZÁLESKÝ, again as *M. sulcinodis* NYL. Unfortunately I have not yet been able to obtain comparative material of *M. bergi* from the USSR, and thus I designate the find provisionally as *M. bergi* RUZS., though it is quite possible that it is a new geographical race of this taxonomically and biologically very characteristic species.

The find is listed in ZÁLESKÝ's Prodrömus (1939, p. 203) with the species *M. sulcinodis* NYL.: Třeboň (near the ponds Opatovice and Svět) leg. NOVÁK.

M. (M.) rugulosa NYL.

(Figs. II 7—10, VIII 9, IX 8, X 5, XI 6)

NYLANDER, Act. Soc. Sc. Fennicae 1849, p. 32.

MAYR, Verh. zool. bot. Ver. Wien 1855, p. 405.

For the description see the appended Key. Species according to my observations and in contradiction to the observations of K. V. ARNOLDI relatively little variable. ARNOLDI (1934) and KARAWAJEW (1929, 1932,

1934) described from the USSR a whole series of forms (subspecies and varieties) of this species, which often differ from each other only in the measurements of the head of the workers and in the different relative length of the various segments of the antennae of the males. Though in this respect also our specimens show some variation deviations I do not think it is necessary to pay any special attention to them, still less to describe them as deviations from the type, partly because I regard them only as on the whole inconstant and variable ecologic varieties and partly because I have not yet received the necessary comparative material from the USSR, and thus cannot exclude on the basis of this material the forms already described by ARNOLDI and KARAWAJEW from the detailed description. — Species distributed almost throughout the palearctic region, though nowhere very abundant. In Czechoslovakia distributed throughout the whole of the country.

M. (M.) sabuleti MEIN.

(Figs. III 1—13, VIII 21—23, IX 9—13, X 6, XI 7)

MEINERT, Dansk. Vidensk. Selsk. (Nat. Afd.) 1860, p. 327.

(*M. scabrinodis* var. *bessarabica* NASSONOV 1889, p. 36.

M. granulinodis RUZSKY 1905.

M. scabrinodis s. str. FOREL 1915, p. 29.

M. scabrinodis BONDROIT 1918, p. 101.)

♂ Head distinctly longer than wide (i. 85,6), anteriorly as a rule narrower than posteriorly so that it is roughly triangular in shape, forehead narrow (i. 36,8), frontal laminae narrow and strongly divergent (i. 66,5). Antennal scape at the base broken in a right, more rarely in an obtuse angle and extended on the outer side of the break in a lateral lobe forming together with the rest of the extended part of the scape viewed from above a broad, approximately oval formation with a somewhat raised margin in the direction towards the proximal part of the scape; thus when the scape is viewed laterally (in position *b*) it appears to be provided on the dorsal part of the break with a broad, blunt tooth. Pedicel massive. Petiole viewed from above broad, only a little narrower than the postpetiole, of a more square than rectangular outline; viewed laterally relatively high and as if truncated at the top, and anterior face only slightly concave. Posterior face of the petiole behind the truncated top as a rule sloping steeply in the direction backwards (towards the gaster of the animal). Postpetiole viewed from above of approximately spherical shape.

Mostly large, coarsely sculptured specimens. Head coarsely longitudinally rugose, wrinkles considerably prominent and distant from each other, chitine between them mostly without special sculpture. The longitudinal wrinkles predominate also on the sides of the head. Frontal area smooth and shiny or partly grooved. Sculpture of thorax and pedicel coarse and conspicuous. Thorax coarsely wavily longitudinally rugose, petiole above irregularly or longitudinally coarsely rugose, postpetiole a little less coarsely rugose and grooved, wrinkles viewed from above arcuate in the direction towards the margins of the postpetiole, top of the postpetiole more longitudinally rugose.

Size (in our specimens) ♀ 4—5,5 mm, ♀ 5,8—6,5 mm, ♂ 4,8—5,3 mm.

Colouring of the body rusty brown, exceptionally dark brown. Anterior of the head and forehead as a rule darker, brown to blackish brown, gaster except the basal part and tip brown to dark brown.

More variable species than *M. rugulosa*, but less variable than the following species *M. scabrinodis*. The variability of the shape of the antennal scape deserves special attention. As can be seen from the appended fig. III the shape of the antennal scape changes in this species quite con-

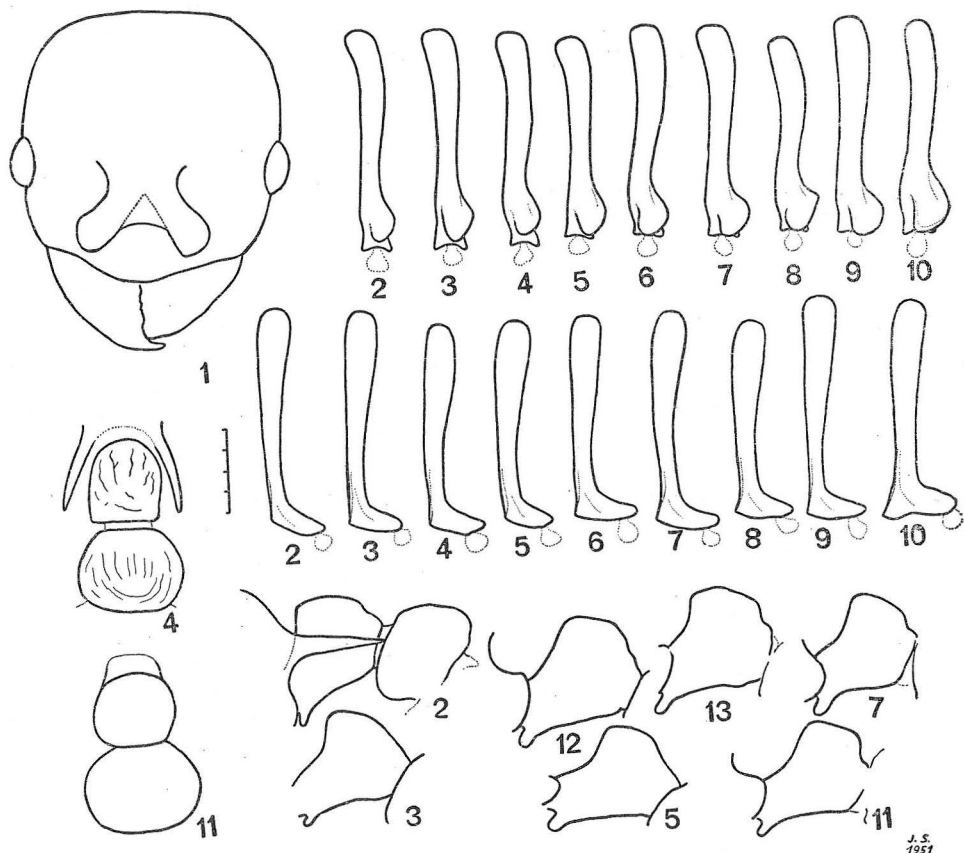


Fig. III. — Head, antennal scapes and pedicels of the workers of *M. sabuleti*: 1—6. typical form, 7—9. transition to var. *lonae* FINZ, 10. var. *lonae* FINZ.

Designed according to exemplars from these localities: 1. — Pouzdřany (Hoffer), 2. — Mohelno 1941 (Novák), 3. — Kovačov near Parkán 1938 (Záleský), 4. — Ostrý in the Šumava 1946 (Novák), 5. — Jimramov in the Českomoravská vrchovina 1943 (Sadil), 6. — Méchenice near Davle 1943 (Novák), 7. — Jizera Mountains (Samšíňák), 8. — Zahradky near Jindřichův Hradec 1937 (Záleský), 9. — Méchenice 1943 (Novák), 10. — Milešovka 1939 (Novák), 11. — Purberg near Chomutov 1946 (Sadil), 12. — Vír in the Českomoravská vrchovina 1943 (Sadil), 13. — Bělčice-Blatná 1941 (Novák).

siderably. In an extreme case, when the extension at the break is least developed (fig. III 2—4), the scape viewed laterally is reminiscent of the scape in *M. scabrinodis*. In the opposite case, when the extension at the break is specially strongly developed, of the scape in *M. schencki* or *M. lobicornis* (fig. III 10). This shape of the scape, which in my opinion occurs in *M. sabuleti* only as an extreme case of variability and is not accompanied by other morphological deviations in the specimens concerned (there occur also transitions between this and the normal shape of the scape in *M. sabuleti*) led B. FINZI to the description of his *M. scabrinodis* subsp. *lonae*. As such a shape of the scape belongs to *M. sabuleti* and not to *M. scabrinodis*, I subordinated for this reason in the Key of NOVÁK—SADIL for the determination of Central European ants in 1939 FINZI's new form to the species *M. sabuleti* and designated it as *M. sabuleti* var. *lonae* FINZ. As I have not seen any of the specimens according to which the description of *M. sc.* subsp. *lonae* was established, I cannot say anything definite about this form. I reject, however, the view that it is a higher taxonomic unit than a subspecies. Besides, also the distribution of this form in the area of distribution of the type does not correspond to the geographical-taxonomic conception of this category.

Species often mistaken for the following species *M. scabrinodis* NYL., though these two species distinctly differ from each other, by the characters of ♀♀ as well as by the characters of ♂♂.

FOREL (1915, p. 29) who as I believe had no first-hand knowledge of the original description of MEINERT of this form comparing *M. sabuleti* with *M. scabrinodis*, writes that the extension at the break of the scape is in this form less developed than in *M. scabrinodis*, and that ♀♀ in *M. sabuleti* are as a rule somewhat smaller. In ♂♂ he does not find any features which would distinguish it from *M. scabrinodis*. This is just the opposite of what MEINERT (1860, p. 327) and later EMERY (1895, p. 314) write. Already BONDROIT (1918, p. 102) noted this incompatibility, but he, too, did not know MEINERT's description for it is clear from his description of *M. sabuleti* (p. 102) and *M. scabrinodis* (p. 101) that he regarded the species *M. schencki* EM. as *M. sabuleti* and the species *M. scabrinodis* NYL. as *M. sabuleti* MEIN. Also SOUDEK was misled by FOREL's mistake and writes in the description of this form as follows (1922, p. 44): "the worker resembles almost so as to be indistinguishable the preceding one (*M. scabrinodis*), only the lobe on the antenna is somewhat smaller and shorter". But he correctly distinguishes ♂♂ of the two forms mentioned: "♂ also resembles the preceding one, from which it is distinguished by the long antennal scape which equals the length of the following 5 funicular joints and is somewhat curved at the base." Most of the later Czechoslovak and foreign authors, among ours e. g. ZÁLESKÝ (1939, p. 204), distinguish *M. sabuleti* from *M. scabrinodis* only by the unequal length of the antennal scape in ♂♂, while considering the ♀♀ morphologically more or less identical; FINZI (1926, p. 101) on the contrary rightly says when comparing ♀♀ *M. sabuleti* and ♀♀ *M. scabrinodis*: "fronte un po più stretta, lobo dello scapo tempre più sviluppato, testa striata più profondamente, statura maggiore." Then, however, he remarks that these

characters are not absolutely constant, and that there occur many morphological transitions to *M. scabrinodis*. A little later W. KARAWAJEW (1934, pp. 79, 82) tried to define more accurately the morphological differences in ♀♀ of these two forms, and he gave also their first accurate figurings. I supplement his observations in the description given above of ♀♀ of *M. sabuleti* and in the following description of ♀♀ of *M. scabrinodis*. Concerning ♂♂ of this form, they are distinctly distinguished from ♂♂ of *M. scabrinodis* not only, as hitherto stated, by the different length of the antennal scapes but, as my own observations show, also by the different shape of the petiole (for details see the appended Key of the males of the Czechoslovak forms of the genus *Myrmica*). Thus it is not true that they have "Stielchenknoten wie bei *M. scabrinodis*", as STITZ (1939, p. 96) writes.

Species distributed all through Europe. Also found in Transcaucasia. Farthest north it was ascertained by W. KARAWAJEW in Sweden (in the islands of Gotland and Öland). In Czechoslovakia distributed everywhere, here and there even more abundant than *M. scabrinodis*.

***M. (M.) sabuleti* var. *lonae* FINZI**
(Fig. III 10)

FINZI, Boll. Soc. Adriat. Sc. Nat. Trieste 1926, p. 103.

(*M. scabrinodis* var. *scabrinodo-lobicornis* FOREL 1874, p. 77.

M. scabrinodis var. *salina* RUZSKY 1905, p. 687.)

Enlargement at the break of the scape specially strongly developed so that in lateral view the scape is provided in the place of the break with a distinct, rather widely projecting, broad, blunt tooth. The other characters as in the type. Form showing numerous transitions to normal *M. sabuleti*. Ascertained in Switzerland, Italy (Vesuvius), Roumania, Czechoslovakia and the USSR. It appears to occur more frequently in mountains. In Czechoslovakia the only find so far is: Milešovka, 14-VIII-1937 (NOVÁK). Transitional forms are found far more frequently: Závist near Prague (RODT), Zahrádky near Jindřichův Hradec (ZÁLESKÝ), Jizera Mts. (SAMŠIŇÁK), Doksy (SAMŠIŇÁK), Purberg near Chomutov (SADIL), Karlovarská vysočina (SADIL).

***M. (M.) scabrinodis* NYL.**

(Figs. IV 1—12, VIII 10—19, IX 14—20, X 7, XI 8—9)

NYLANDER, Act. Soc. Sc. Fennicae 1846, p. 930.

(*M. sabuleti* FOREL 1915, p. 29

M. specioides BONDROIT 1918, p. 100

M. scabrinodis var. *sancta* KARAWAJEW 1926)

Species related to the preceding one.

♀ Head of approximately the same measurements as in *M. sabuleti* (i. 84,3), but in contradistinction to the latter as a rule of a squarer shape, with more or less parallel cheeks. Forehead broader (i. 38,7), frontal laminae broader and less divergent (i. 73,9). Antennal scape at the base as a rule broken in an obtuse, more rarely in a right angle, and on the

outer side of the break viewed from above extended into a small lobe forming with the remaining extended part of the scape an oval extension of variable shape, but always considerably less developed than in *M. sabuleti*.

Epinotal spines as a rule thinner and shorter than in *M. sabuleti*. Pedicel less massive. Petiole viewed from above distinctly narrower than the postpetiole, viewed laterally lower than in *M. sabuleti*, with the summit gradually sloping backwards in the direction towards the postpetiole and

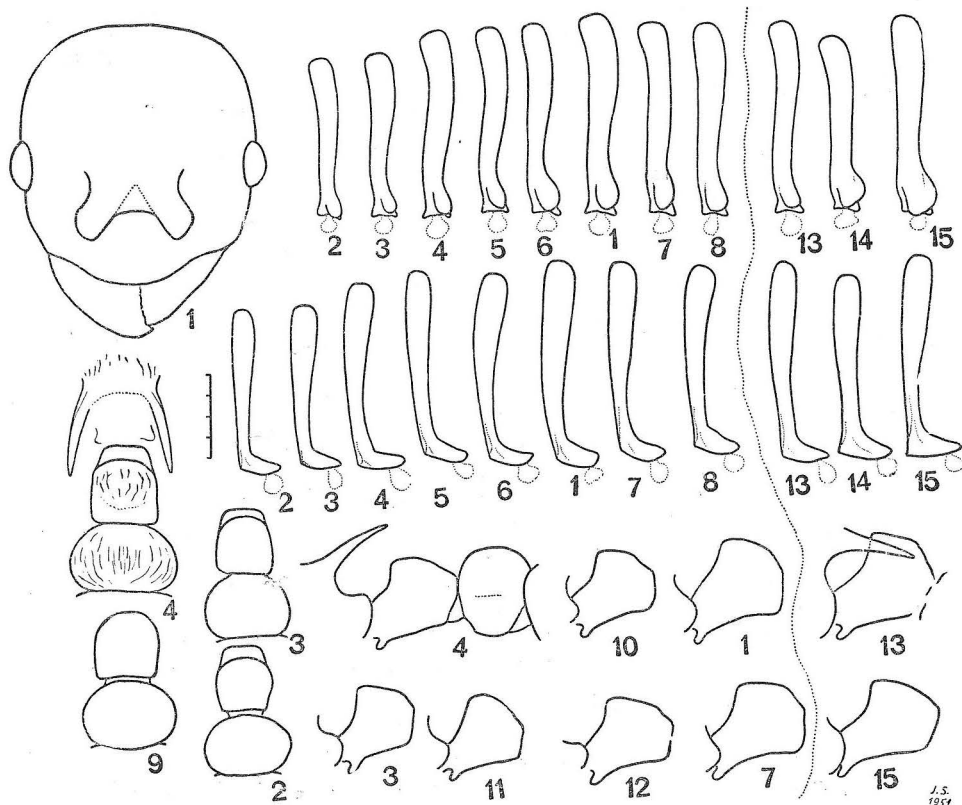


Fig. IV. — Head, antennal scapes and pedicels of the workers of *M. scabrinodis*: 1—12. typical form, 3. var. *rugulosoides* For from Switzerland, 13—15. var. *scabrinodisabuleti* of autor.

Designed according to exemplars from these localities: 1. — Agay-Var (France) 1927 leg. Obenberger, 2. — Trenčanské Teplice (Richter), 3. — Rôche (Switzerland) 1918 (Kutter), 4. — Dubodice in Slovakia 1936 (Korbel), 5. — Jindřichův Hradec (Záleský), 6. — Rusava (Fiala), 7. — Vizzavone (Island Corsica) (Hetschko), 8. — Zahradky near Jindřichův Hradec 1937 (Záleský), 9. — Třebsko near Březnice 1941 (Novák), 10. — Bělčice-Blatná 1941 (Novák), 11. — Děčín (Samšiňák), 12. — Třeboň 1939 (Novák), 13. — Nová Říše near Telč 1938, (Záleský), 14. — Příbram 1936 (Šípek), 15. — Borotín in Bohemia 1939 (Novák).

with the anterior face more concave. Viewed from above the postpetiole is not spherical, but is distinctly broader than long, of oval shape.

Mostly smaller, more weakly sculptured specimens. Head in larger specimens coarsely longitudinally rugose, almost as in *M. sabuleti*, in smaller specimens the longitudinally rugosity is considerably finer, the wrinkles are little prominent and especially in the frontal region lying more closely together. Chitine between the wrinkles closely and finely punctate, especially on the sides of the head behind the eyes. The longitudinal rugosity almost disappears on the sides of the head and forms an irregular reticulation. Frontal area as a rule smooth and shiny. Sculpture of the thorax and pedicel less pronounced than in *M. sabuleti*. Thorax more finely wavy longitudinally rugose, petiole above irregularly reticulate, rarely longitudinally rugose. Postpetiole slightly rugose and grooved. Summit of the postpetiole more finely and closely rugose than in *M. sabuleti*.

Size (of our specimens): ♂ 4,2—5 mm, ♀ 5,5—6 mm, ♂ 4,2—4,6 mm.

Colouring of the body rusty brown, somewhat lighter and more uniform than in *M. sabuleti*. Head as a rule concolor with the thorax, gaster a little darker than the pedicel, brown to dark brown (in contradistinction to this the specimens of *M. scabrinodis* from France, Agay-Var, leg. Dr. OBENBERGER, resemble by their colouring more *M. sabuleti*, the head is in these specimens darker than the thorax, the gaster dark brown).

Very variable species, much more variable than *M. sabuleti* and many other species of this genus. The shape of the antennal scape is specially variable, and in extreme cases it approaches the shape of the scape in *M. sabuleti*. The same applies to the shape of the different joints of the pedicel, to the sculpture, colouring and size. All these deviations from the normal shape, which can be regarded as different stages of transitions to *M. sabuleti*, I regard as hybrids between *M. scabrinodis* and *M. sabuleti* and propose for them the designation *M. scabrinodis* var. *scabrinodo-sabuleti* (see below). For the description of the male see appended Key.

Species distributed in most of the palearctic region, which deserves a thorough investigation with regard to its tendency of forming different geographical and ecological deviations. According to STITZ (1939, p. 67) *M. scabrinodis* is lacking in many Italian islands. Nevertheless KUTTER found this form also in Sicily, and it has been reported also from Sardinia. In the collections of the National Museum in Prague is deposited a find from Corsica (Vizzavone, leg. A. HETSCHKO). Species distributed everywhere in Czechoslovakia, here and there replaced by the related species *M. sabuleti*, in extremely dry steppe localities of Central Bohemia, southern Moravia and Slovakia by the species *M. balcanica*.

***M. (M.) scabrinodis* var. *rugulosoides* FOR.**

(Fig. IV 3)

FOREL, Am. Schweiz 1915, p. 29.

KUTTER, Schweiz. ent. Anz. 1924, pp. 8, 15.

Form described by FOREL after specimens from the peat-bogs at the mouth of the Rhône in Switzerland. According to FOREL's own description this form is distinguished from the typical *M. scabrinodis* by the following

characters: "L. (Length 4—4.3 mm. Ganz ähnlich wie die var. *sabuleti**), aber Knickungsstelle des Fühlerschaftes ohne Zähnchen, etwas verdickt. Entspricht ungefähr der Figur b und c in Emery's Palaearktischen Ameisen. Hinterleib bräunlich, der Rest rötlich."

Dr. H. KUTTER from Flawil in Switzerland was so kind as to send me at my request in February 1949 one specimen (cotype) of this form collected by him in 1918 (see fig. IV 3). After examination I can only confirm SANTSCHI's (1931, p. 342) and especially STÄRCKE's opinion that this form differs from the typical *M. scabrinodis*, apart from the weakly developed expansion at the break of the scape, only by its lighter colouring and by the somewhat less coarsely pronounced sculpture, so that it cannot be regarded as the typical form somewhat modified by the environment, i. e. as a weak ecological variety of *M. scabrinodis*. After comparing the form in question with many specimens of *M. scabrinodis* from Czechoslovakia I have to state that a similarly configurated antennal scape and a simply expanded break-part, without a properly developed lateral expansion, occur also in many other specimens of *M. scabrinodis* from widely different places of Czechoslovakia, though in the other characters they differ considerably from var. *rugulosoides*. The same applies to the other characters listed in FOREL's and later descriptions of this form, i. e. the weaker sculpture and the lighter, yellowish colouring. The coarseness or fineness of the sculpture is not only in this species but also in the other representatives of the genus *Myrmica* as a rule directly dependent on the size of the specimen. The smaller the specimen the finer the sculpture and vice versa. In view of the fact that var. *rugulosoides* is a smaller form of *M. scabrinodis* (the size of Kutter's specimen is 4.2 mm), the weaker sculpture in this form is a matter of course. Also the lighter colouring, i. e. the insufficient pigmentation of the chitine, can be explained by the unfavourable influence of the environment (moist peat-bog), which seems to prevent the perfect colouring of the specimen during its development, and can finally become hereditary. A similar colouring as var. *rugulosoides* show. e. g. normal specimens of *M. scabrinodis* collected by SAMŠIŇÁK in the Šumava (Pancíř) and by NOVÁK on the Milešovka. From the above it is evident that this form can hardly be regarded as a constant deviation, still less as a species as does e. g. BONDROIT (1918, p. 102) or FINZI (1926, p. 94), who described from Italy and the Balkans even a new form of this species, *M. rugulosoides* var. *striata* (1926, p. 96). ZÁLESKÝ (1939, p. 205) reports from Czechoslovakia *M. sc. var. rugulosoides* FOR., and regards this species as subspecies (sic!) of *M. scabrinodis*. But he, too, does not see clearly in which way this form differs from *M. scabrinodis* and what its correct taxonomic position is, for he writes: "Under FOREL's conception *rugulosoides* I place *Myrmicae* whose colonies are composed of very small specimens, of always more or less light colouring, with a very small, inconspicuous lobe on the curvature of the scape. In view of the well-known variability of *scabrinodis* FOREL's description is not quite sufficient..." As far as I had

*) Should be *scabrinodis*. As already said FOREL regarded the species *M. scabrinodis* as var. *sabuleti*.

the opportunity to examine these specimens determined by ZÁLESKÝ as *rugulosoides* I saw that they are to a great extent typical *M. scabrinodis*, whereas the specimens redetermined by ZÁLESKÝ as *M. scabrinodis* of the same collection of ZÁLESKÝ's are partly larger specimens of *M. scabrinodis* and partly specimens of *M. sabuleti*.

M. (M.) scabrinodis var. scabrinodo-sabuleti n. var.

(Figs. IV, 13—15, VIII, 17—19.)

Form combining characters of *M. scabrinodis* and *M. sabuleti*. Probably a hybrid form. From widely different places of Czechoslovakia. As examples I give the following finds: Nová Říše near Telč 6—7—1938 (ZÁLESKÝ). Scape of the workers of the same shape as in *M. scabrinodis*, petiole viewed laterally of the same shape as in *M. sabuleti* (fig. IV 13). — Příbram 1936 (ŠÍPEK). Scape of the workers of the same shape as in *M. sabuleti*, petiole viewed laterally of the same shape as in *M. scabrinodis* (fig. IV 14). — Borotín 28—8—1939 (NOVÁK). Scape of the workers of the same shape as in *M. sabuleti*, with a specially strongly developed lateral lobe; petiole viewed laterally of the same shape as in the typical *M. scabrinodis*. Scape of the male very short, equalling in length the following two funicular joints of the same shape as in the males of *M. scabrinodis* (figs. IV 15, VIII 18). — The possibility of the origin of hybrids between *M. scabrinodis* and *M. sabuleti* is best proved by ŠAMŠIŇÁK's find from the vicinity of Sobotka (noc. 747 of his collection, fig. VIII 17); ŠAMŠIŇÁK succeeded in finding in one swarm males which according to the length of the antennal scape belong partly to the species *M. scabrinodis* and partly to the species *M. sabuleti*.

M. (M.) balcanica n. sp.

(Figs. V 1—18, 11, VIII 24, IX 21, X 8.)

(? *M. rugulosoides* EMERY 1916, p. 50, MÜLLER 1923, pp. 42, 43

? *M. rugulosoides* var. *striata* FINZI 1926, p. 96 part.).

Species representing morphologically a transition between *M. scabrinodis* and *M. rugulosa*, closer to the species *M. rugulosa* NYL.

♂ Head either of the same shape or a little longer than in *M. scabrinodis* (i. 84.5), forehead broader (i. 40.6), frontal laminae broader and less divergent (i. 78.3). Scape at the base rather curved than broken so that when viewed laterally (in position *b*) it is somewhat reminiscent of the scape of *M. rugulosa*. Viewed from above the scape is slightly extended at the summit of the break, in extreme cases where the extension is more strongly developed it is reminiscent of the scape in *M. scabrinodis*. In contradistinction to *M. rugulosa* the scape is in this position in the place of the break as a rule somewhat broader than in the middle of its length.

The epinotal spines are as a rule thinner than in *M. scabrinodis*, sharp. Petiole viewed from above slimmer than in *M. scabrinodis*, elongated rectangular, its upper face distinctly longer than wide, viewed laterally low, above delimited by a gentle curve, anteriorly slightly concave. Postpetiole viewed from above distinctly differing from the postpetiole in *M. scabrinodis*

by its globular shape. The whole shape of the pedicel in *M. balcanica* is thus reminiscent of the shape of the pedicel in *M. rugulosa* NYL.

Sculpture more weakly developed than in *scabrinodis*. Head more finely longitudinally rugose, chitine between the wrinkles richly punctate, especially on the sides of the head. Petiole above finely reticulate rugose; postpetiole above as a rule more finely sculptured than in *M. scabrinoides*, sometimes smooth to shiny at the top.

Smaller specimens, ♀ 4—4,8 mm, ♀ 5,5 mm, ♂ 4,2 mm. Same colouring as *M. scabrinodis*.

Relatively very variable species. The variability is found chiefly in the shape of the scape, the measurements of the head, and the shape of the

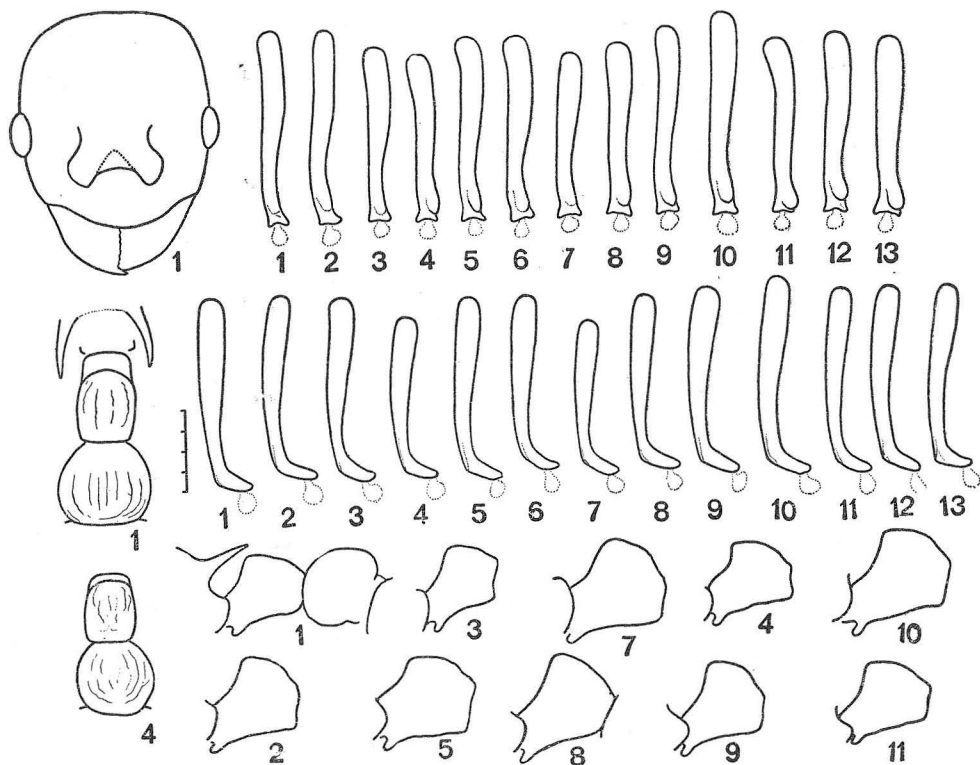


Fig. V. — Head, antennal scapes and pedicels of the worker of *M. balcanica*: 1—8. typical form, 9—13. var. *scabrinoides*.

Designed according to exemplars from these localities: 1. — Pavlovské vrchy (Hills of Pavlov) in Moravia (Sadil), 2. — Konjić in Yugoslavia 1938 (Novák). 3. — Vinařická hora near Kladno 1943 (Sadil), 4. — Srbsko near Beroun 1938 (Novák), 5. — Hradiště near Litoměřice 1948 (Sadil), 6. — Hradiště near Litoměřice 1950 (Sadil), 7. — Katovka near Zákolany 1943 (Sadil), 8. — Ljulin in Bulgaria 1935 (Táborský), 9. — Praha-Bohnice 1938 (Sadil), 10. — Oblík near Louny 1938 (Sadil), 11. — Praha-Hlubočepy 1938 (Sadil), 12. — Liteň near Beroun 1938 (Trkal), 13. — Praha-Zlíchov (Šustera).

petiole, which approaches in some cases that of the petiole in *M. rugulosa*, in other cases the shape of the petiole in *M. scabrinodis*. But the range of this variability and the relatively constant shape of the frontal laminae as well as the distribution of this form exclude the possibility of its being a hybrid of *M. scabrinodis* and *M. rugulosa*.

Species bound by its occurrence mostly to extreme warm and dry localities (stony steppes), with its centre of distribution as proved by the finds obviously in SE Europe (Balkans).

The distribution of this as it seems typical steppe species in Bohemia appears to correspond to the former extent of our steppes as it was recently established by V. LOŽEK on the basis of finds of recent and fossil molluscs (Studie českých stepí na základě nálezů recentních i fossilních měkkýšů — Praha, 1949), and this correspondence is closer than that of some others of our steppe ants (*Plagiolepis pygmaea*, *Solenopsis fugax*, *Myrmica depilata moravica*, etc.), which either exceed this area (*Solenopsis*) or are restricted with their occurrence to only a part of it (e. g. *M. d. moravica* whose finds indicate that it is bound with its occurrence solely to the limestone steppe area between Prague and Beroun). As I have pointed out already earlier for the species *Plagiolepis pygmaea* and *M. d. moravica* (SADIL, 1937, p. 111, 113) this can be explained on the one hand by the unequal ecological valence of the ants mentioned and on the other hand by their unequal relict age.

Finds: Czechoslovakia: Praha-Hlubočepy 1936 (Kult); 24—4—49 (Sadil), Lišnice near Beroun 14—8—41 (Farský), Šárka near Prague 14—8—43 (Sadil), Vinařická hora near Kladno 26—3—43 (Sadil), Katovka near Zákolany 20—6—43 (Sadil), Hradiště near Litoměřice 13—6—48 (Sadil), 20—8—50 (Zedníček), Chomutov 2—8—51 (Sadil), Brno-Hády 5—7—36 (Hoffer), Pavlovské vrchy 15—7—38 (Sadil), Slov. Nov. Mesto 27—7—36 (Hoffer), Somotor 21—7—51 (Sadil) — Yugoslavia: Petrovo Selo in Croatia 26—7—38 (Novák), Vlasenica in Serbia 30—6—38 (Novák), Konjić 4—7—38 (Novák) — Bulgaria; Ljulin 6—35 (Táborský).

Species hitherto apparently mistaken, not only in Czechoslovakia, either for *M. rugulosa* or for *M. scabrinodis*. I believe it to be close to EMERY's *M. rugulosoides* (1916, p. 50) reported by MÜLLER (1923, pp. 42, 43) from the vicinity of Terst and from Dalmatia.

***M. (M.) balcanica* var. *scabrinodoides* n. var.**

(Figs. V 9—13, VIII 37, IX 34, XI 10—11.)

Very variable form representing a transition between *M. balcanica* and *M. scabrinodis* NYL. Antennae as a rule of the same shape as in *M. balcanica*, but the joints of the pedicel either of the same shape as in *M. scabrinodis* or of shapes approaching this. There occur, however, also specimens in which on the contrary the shape of the pedicel corresponds to that of the pedicel in *M. balcanica* while the antennal scape corresponds in shape to the scape in *M. scabrinodis*. However, the joints of the pedicel are more coarsely sculptured than in the type. For a more detailed taxonomic evaluation of these forms it is necessary to

wait for the further faunistic survey, which will offer a richer material. In my opinion we have here on the one hand hybrids of *M. balcanica* and *M. scabrinodis*, and on the other hand new forms not yet described more accurately. I may, however, mention here that several specimens of this form which I collected in May 1938 at Bohnice near Prague (colony under a stone in a grassy ditch at the side of the road) were redetermined by B. FINZI in 1939 as *M. wesmaeli* BONDR. (BONDROIT, Ann. Soc. ent. France, 1918, p. 106), a determination which I cannot but regard today as entirely erroneous, as it clearly appears from BONDROIT's own description of *M. wesmaeli* that this form, when the author compares it with *M. sulcinodis* and lists the morphological differences distinguishing it from this species, resembles rather this species (*M. sulcinodis*) than *M. scabrinodis* or possibly *M. rugulosa*. BONDROIT: "... Pétiole assez court, angle antérieur du noeud à peu près droit... Corps d'un brun roux assez foncé, rembruni à la tête et au gaster... Diffère de *M. sulcinodis* par la forme du scape, les épines moins fortes, le pédoncule moins rugueux..." SANTSCHI (1931, p. 340) is also of the same opinion, and considers this form a variety of *M. sulcinodis*. Consequently the find of *M. wesmaeli* BONDR., recorded in ZÁLESKÝ's Prodrómus (1939, p. 205) has to be struck out, and the find has for the present to be attributed to the form *M. balcanica* var. *scabrinodoides* given above in the title.

The same applies to the find reported there of *M. wesmaeli* at Oblík near Louny. Concerning the find of *M. wesmaeli* in the Mt Šumava (leg. Soudek) given by FINZI (1926, p. 98) it will apparently be necessary to attribute also this find to another form, perhaps to the species *M. pilosiscapus* BONDR. mentioned below.

Finds: Praha-Bohnice 5—38 (Sadil), Oblík near Louny 9—8—38 (Sadil), Liteň near Beroun 2—5—38 (Trakal), Praha-Hlubočepy 24—4—49 (Sadil), Šárka near Prague 14—8—43 (Sadil), Popice near Brno 18—7—38 (Sadil), Okoř near Noutonice 13—6—43 (Sadil), Kylešovice in Silesia 4—9—37 (Ing. Palásek).

***M. (M.) pilosiscapus* BONDR.**

(Figs. VI 1—7, VIII 25—28, IX 22—26, X 9, XI 12.)

BONDROIT, Ann. Soc. ent. Belg. 1919, p. 146.

♀ (After BONDROIT). « Semblable intermédiaire entre *specioides* et *scabrinodis*. Un peu plus colorée que la première, la partie geniculée du scape, sensiblement moins développée que chez *scabrinodis*, se rapproche plutôt de *specioides*, la sculpture est beaucoup plus rude que chez cette dernière, l'aire frontale luisante, les épines plus fortes, le noeud du pétiole plus développé. »

Species distributed according to BONDROIT in the subalpine region of Central Europe, ascertained in Belgium, Germany, France (Jura, the Pyrenees), Switzerland, Great Britain and in Corsica. FINZI (1926, p. 102) and after him SANTSCHI (1931, p. 343) do not ascribe the value of a species to this form and designate it as a mere variety of the species *M. scabrinodis* NYL. SANTSCHI, who examined specimens (cotypes) of this form

from the Jura (Pontarlier), even doubts whether this form can at all be regarded as a variety (« c'est à peine si cette forme mérite être considérée comme variété... »), and finds as the only character in which this form differs from the typical *scabrinodis*:... « Les ♀♀ sont en général plus foncées, surtout le gastre, les rides du front sont un peu plus fortes... »

I consider this view incorrect. Dr. H. KUTTER sent me in 1949 two specimens (♀♀) of this form collected by him in Switzerland (Arosa), the same which had been examined earlier also by FINZI. After examining them I can only confirm that this form differs markedly from *M. scabrinodis* in several characters so that it can scarcely be identified with it. These differences, which are roughly defined, already in BONDROIT's description

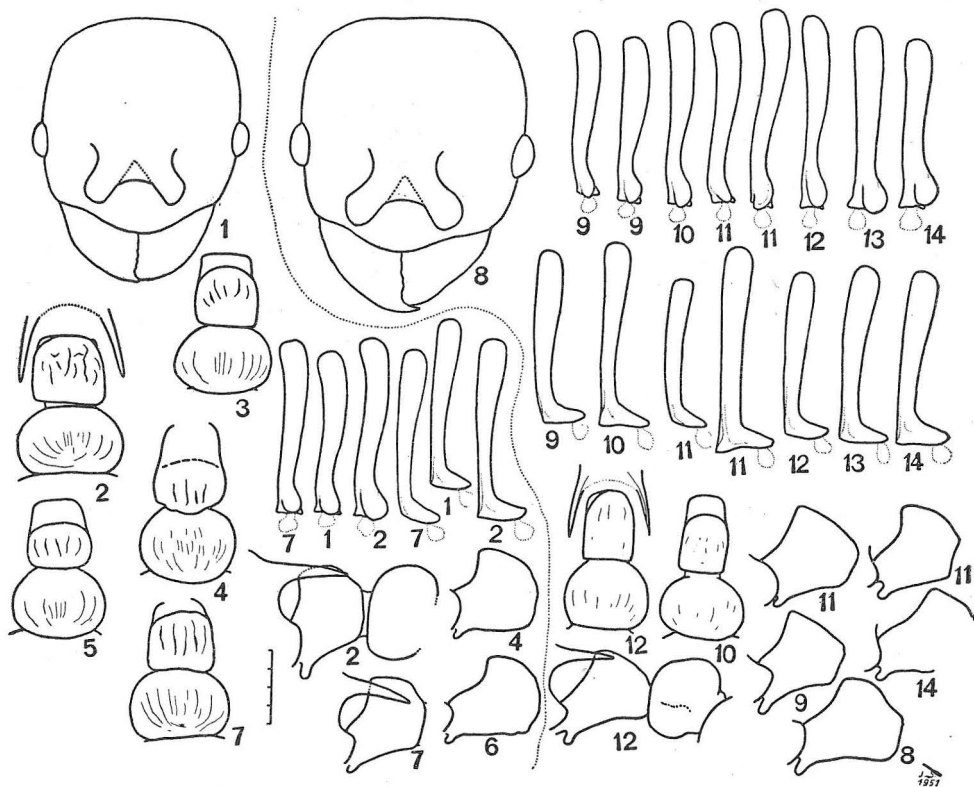


Fig. VI. — Heads, antennal scapes and pedicels of the workers of: 1—7. *M. pilosiscapus* BONDROIT, 8—14. *M. slovaca* n. sp.

Designed according to exemplars from these localities: 1. — Šumava (Samšínák), 2. — Šumava (Samšínák), 3. — Borová Lada in the Šumava 1948 (Sadil), 4. — Borová Lada 1948 (Sadil), 5. — Borová Lada 1948 (Jurčiček), 6. — Borová Lada 1948 (Sadil), 7. — Arosa in Switzerland 1918 (Kutter), 8. — Somotor 1937 (Hoffer), 9. — Dolní Almach in Slovakia 1937 (Babala), 10. — Chorovce in Slovakia 1948 (Novák), 11. — Berehovo (U. S. S. R.) (Záleský), 12. — Somotor 1937 (Hoffer), 13. — Slovenské Nové Mesto 1934 (Hoffer), 14. — Bačovo in Bulgaria (Hoberlandt).

cited above, appear entirely to have escaped FINZI as well as SANTSCHI. Already earlier, in the description of the species *M. sabuleti*, I mentioned that BONDROIT mistakenly regarded this form as *M. scabrinodis* NYL., as can be seen not only from his description of the species *M. scabrinodis* in the Ann. Soc. ent. France 1918, p. 101, but also from the figuring of the pedicel ♀♀ and scapi ♂♂ of this species in the Ann. Soc. ent. Belge 1919. This mistake was also the reason why he described the real species *M. scabrinodis* as a new species, *M. specioides*. When we take into account this fundamental mistake of BONDROIT's (in his time easily understandable as most of the then myrmecologists as already pointed out here did not know at all what *M. sabuleti* and what *M. scabrinodis* were owing to their ignorance of MEINERT's description), and when we replace in Bondroit's description of the species *M. pilosiscapus* cited above the designation *specioides* by *scabrinodis* and *scabrinodis* by *sabuleti*, then only does this description fit. According to this *M. pilosiscapa* would form a transition between *M. scabrinodis* and *M. sabuleti*, differing from the former species by the darker colouring, the more coarsely pronounced sculpture, and by the somewhat higher petiole truncated above; from the latter species by the scape being less extended at the break. I supplement this somewhat imperfect description below by a more detailed description made partly after the specimens sent me by KUTTER and partly after specimens collected by me, Samšiňák and Novák in the Mt Šumava. I add also the description of the male (see appended Key for determining the males of the Czechoslovak forms of the genus *Myrmica*). From the analysis of the characters of ♀♀ as well as of ♂♂ of this form it clearly follows that it is not a variety of *M. scabrinodis* but an independent species.

♀ Head of approximately the same shape as in *M. scabrinodis* (i. 84,7), forehead somewhat narrower (i. 37,5), frontal laminae a little more divergent (i. 71,2). Antennal scape at the base broken under a right, more rarely under an obtuse angle and on the outer part of the break extended into a lateral lobe forming together with the remaining extended part of the scape viewed from above (position a) an oval extension of on the whole constant shape, in the development in about the middle between the size of this extension in *M. scabrinodis* and *M. sabuleti*, but in contradistinction to both these forms the extension in *M. pilosiscapus* is a little wider compared with its length so that its proximal (in position a: lower) outline is rather semicircular than semi-elliptical. Epinotal spines strong and long, pedicel massive. Petiole viewed from above distinctly narrower than the postpetiole, more square than rectangular in outline, its upper face as a rule as long as wide, but in some cases strikingly shorter than wide (figs. VI, 4 and 5), viewed laterally relatively high (about the same height as in *M. sabuleti*), anteriorly shortly pedunculate, truncated above, its anterior face as a rule strongly concave so that a characteristic sharp edge is formed anteriorly above. Postpetiole viewed from above more of an oval shape (about the same as in *M. scabrinodis*).

Mostly large, coarsely sculptured specimens. Head coarsely longitudinally rugose; longitudinal rugosity predominant also on the sides of the head, chitine between the wrinkles similarly as in *M. scabrinodis* closely and

finely punctate, frontal area partly grooved, partly smooth and shiny. Thorax coarsely wavily longitudinally rugose, petiole above irregularly or more or less longitudinally coarsely rugose, postpetiole above coarsely rugose and grooved. Size (in our specimens): ♀ 4,5—5,2 mm, ♀ 5,5—6,2 mm, ♂ 5,3—5,5 mm. Colouring as a rule darker than in *M. scabrinodis*. Head dark rusty brown, thorax and pedicel only a little lighter, gaster above dark brown. Some specimens specially dark, with traces of dark brown to blackish brown spots on the mesonotum and epinotum; head dark to blackish brown; and the segments of the pedicel, especially the postpetiole more strongly brownish. In Czechoslovakia in several places in the Mt Šumava also extremely dark specimens were found, whose colouring is blackish brown (about the same as in some specimens of *M. lobicornis*), and only the mandibles, antennae and limbs are lighter, rusty brown.

Species of higher sites, living in peat-bogs. In Czechoslovakia so far ascertained in the Mt Šumava, though it must be assumed that it will be found also in our other mountain regions. I have not found it in Záleský's collection and searched for it in vain also in the field in some peat-bogs of the Ore Mountains (Sv. Šebastian, Hora sv. Kateřiny).

Finds: Borová Lada near Vimperk, 5, 8 and 9—VII—1948 (Jurčíček, Sadil); Weitfällerské slatě near Modrava 20—VI—1947 (Novák), Ostrý 8—1946 (Novák), Mt Šumava without designation of the locality (Šamší-
ňák).

M. (M.) slovac n. sp.

(Figs. VI 8—14, VIII 35—36, IX 35, X 10, XI 13.)

The measurements of the head, the shape of the frontal laminae, the configuration of the antennal scapes, the shape of the pedicel, and the sculpture show it to be a transition between *M. sabuleti* and *M. rugulosa*.

♀ Head distinctly longer than broad (i. 86,8), forehead narrow (i. 23,7), frontal laminae narrow and strongly divergent (i. 54,3). Antennal scape on the whole of similar configuration as in *M. sabuleti*. The oval extension at the break of the scape viewed from above is, however, narrower than in *M. sabuleti*. Epinotal spines strong, of medium length, at the end strongly pointed. Pedicel slim, considerably less massive than in *sabuleti*, reminiscent in shape of the scape in *M. rugulosa*.

Smaller specimens with less pronounced sculpture than in *M. sabuleti*. Head in the frontal region less coarsely longitudinally rugose, longitudinal rugosity on the sides of the head replaced by a faint reticulate sculpture, chitine between the wrinkles finely punctate. Thorax coarsely longitudinally rugose, petiole above finely reticulate rugose, postpetiole finely rugose and grooved, above as a rule smooth and shiny. Size (in our specimens): ♀ 4,0—4,8 mm, ♀ 5,0—5,8 mm, ♂ 5,2—5,5 mm.

Relatively rather variable species. The antennal scapes are especially variable, less so the shape of the pedicel and the sculpture. A specially remarkable instance of the variability of the antennal scape in this species is figured in fig. VI 11. We have here specimens coming from the same nest, some of which have the antennal scape, when viewed laterally, slightly broken and only slightly lobate so that it is reminiscent of the scape in

M. scabrinodis, the others strongly broken and with a somewhat raised proximal margin of the lobate extension so that viewed laterally it is reminiscent of the scape in *M. sabuleti*. Petiole on the whole of constant shape, though cases have also been recorded where the summit of the petiole is truncate so as to be reminiscent of the petiole not in *M. rugulosa* but in *M. sabuleti* (figs. VI, 8, 11, 14). All these cases can be explained by regarding this form as the result of a long crossing between *M. sabuleti* and *M. rugulosa*. In this case the question remains, however, unanswered why this form resulting from the crossing of two on the whole common species distributed throughout the whole of Europe has, as shown by the finds, a geographically rather narrowly delimited area of occurrence, and why it does not also occur elsewhere. It is just as difficult to account for other circumstances, why e. g. by the crossing between one form (*M. rugulosa*) with a frontal index varying between 78,9—83,5 and another with a frontal index varying between 28,7—38,4 a form resulted with a frontal index varying between only 27,3—29,6.

Species as indicated by the finds having apparently its centre of distribution in SE Europe (the Balkans) and from there penetrating to Czechoslovakia. It is very probable that it was collected already several times, but because of its superficial likeness to the species *Myrmica sabuleti* identified with the latter. I think so because also the specimens of *M. slovaca* which I found in Záleský's collection were redetermined by Záleský as *M. sabuleti* (partly also as *M. scabrinodis*).

Finds: Czechoslovakia: Chomutov 1—VIII—1951 (Sadil); Somotor VIII—37 (Hoffer), Slov. Nové Mesto 1—VIII—34 (Hoffer), Dolní Almás 1937 and 20—VII—38 (Babala), 1938 (Záleský), Chorovce 1—VI—48 (Novák) — U S S R: Berehovo (former Carpathian Russia) (Záleský). — Bulgaria: Bačkov 8—VII—38 (Hoberlandt).

M. (M.) schencki EM.

(Figs. VII 1—4, VIII 29, 38, IX 27—29, X 11, XI 14.)

EMERY, Zool. Jahrb. Syst. 1895, p. 315.

For a more detailed description of this characteristic species see the appended "Key". Very variable species, especially in size, colouring and sculpture. The shape of the pedicel and of the antennal scape is far less variable. Though I examined a relatively rather rich material of this species from widely different places of Czechoslovakia I did not find any deviation from the type which would have been constant in its characters and which could have been described as a lower taxonomic unit. I am convinced that the varieties, described by foreign authors, of this species — as e. g. *M. schencki* var. *kutteri* FINZI (1926, p. 111) and *M. sch.* var. *obscura* FINZI (1926, p. 111) as well as the varieties described by KARAWAJEW and Arnoldi—cannot either be regarded constant for similar reasons, but only as deviations produced by changes of the environment. Thus e. g. var. *kutteri* FINZI differs from the type only by being somewhat larger (FINZI gives the length of worker of this form with 5—5,2 mm; the specimen sent me by Kutter loc. Zermatt — Switzerland VII—1917 has a length of 5,7 mm), by

having a somewhat more coarsely pronounced sculpture, and a somewhat darker colouring. All these characters are, as I found, very variable in representatives of the genus *Myrmica* and especially in *M. schencki*, and no special taxonomic importance can be attached to them. Many of our specimens of e. g. *M. schencki* are of a similar size as var. *kutteri*, though they do not agree with it in colouring. Smaller specimens have on the other hand sometimes a still darker colouring than this variety. The same applies to sculpture. The variety *obscura* FINZI reported by FINZI also from our country. (*M. Tatra*, Ungheria settentrionale leg. dott. Szabo) differs from the type by its smaller size (3—4 mm), more coarsely pronounced sculpture, the postpetiole smooth and shiny above, and the darker colouring (blackish brown to black, except the mandibles and limbs, which are rusty yellow).

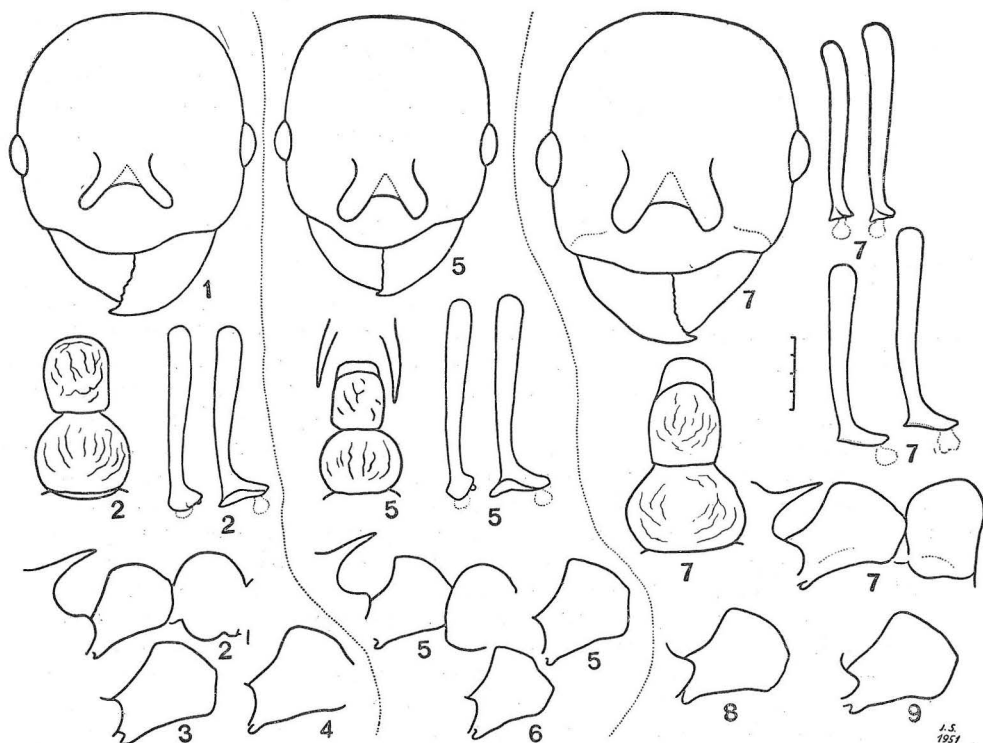


Fig. VII. — Heads, antennal scapes and pedicels of the workers of: 1—4. *M. schencki* EM., 5—6. *M. lobicornis* NYL. (6. r. *arduennae* BONDR), 7—9. *M. deplanata moravica* SOUD.

Designed according to exemplars from these localities: 1. — Sokolac near Sarajevo in Yugoslavia 1938 (Novák), 2. — Sedlčany 1938 (Sadil), 3. — Košice 1938 (Pultr), 4. — Zermatt in Switzerland 1917 (Kutter), 5. — Beerenhügel near Chomutov 1946 (Sadil), 6. — Borová Lada in the Šumava 1948 (Sadil), 7. — Praha-Hlubočepy 1937 (Sadil), 8. — Pavlovské vrchy in Southern Moravia, southern slope of the Kotelná 1938 (Sadil), 9. — Mohelno 1939 (Sadil).

The characters of this form occur in many specimens of *M. schencki* from the most diverse places of Czechoslovakia; in other features these specimens differ, however, from that form. Thus many larger and smaller specimens of *M. schencki* from Czechoslovakia have the postpetiole above smooth and shiny, although these specimens are just as dark as normally coloured specimens and have also the normal size of 4,2—5,5 mm, so that the postpetiole smooth or possibly shiny above is only a common case of the variability of the sculpture of this species. A specially interesting example of the high variability of this species with regard to size, colouring and sculpture is given by the colony of *M. schencki* found on 18—VII—1936 by Hoffer in Brno (Palackého vrch). Some specimens of this colony are tiny, about 4,2 mm, long, very dark, with the postpetiole smooth and shiny above, so that they correspond roughly to the description of *M. sch.* var. *obscura*; other specimens from the same colony attain a size of about 5,3 mm, are lighter coloured, and the top of the postpetiole is rugose.

Species distributed throughout almost the whole of the palearctic region. In Czechoslovakia found almost everywhere, though nowhere specially abundant. At higher altitudes replaced by the following species.

M. (M.) lobicornis NYL.

(Figs. VII 5, VIII 30—32, IX 30—32, X 12, XI 15.)

NYLANDER, Acta Soc. Sc. Fennicae 1846, p. 932.

Species very close to the preceding one. Head longer (i. 86,3), forehead broader (i. 29,5), frontal laminae broader and less divergent (i. 63,5). Antennal scape almost indistinguishable from the scape of *M. schencki* except for the tooth-shaped projection at the break of the scape, the scape viewed laterally being as a rule longer than in this species. Epinotal spines as a rule shorter than in *M. schencki*. Pedicel more massive. The petiole viewed from above has the upper face as a rule shorter than in *M. schencki*, viewed laterally it is shorter and as a rule higher, the neck in front is minimally developed, the anterior face of the petiole is placed more perpendicularly, the upper face is as a rule plane, tilted slantingly backwards or slightly convex (rarely truncate so that the indication of a "node" is formed); in the place where anteriorly the upper and the anterior face of the petiole intersect an acute, almost right, angle is formed. Viewed from above the postpetiole is shorter and broader than in *M. schencki*, rather of an oval than of a spherical shape. Sculpture more pronounced than in *M. schencki*. The joints of the pedicel are especially more strongly sculptured. Colouring as a rule rather darker than in *M. schencki*, but nevertheless also variable though to a lesser degree than in the preceding species. Head and gaster as a rule brown to blackish brown, thorax and segments of the pedicel somewhat lighter, brown to reddish brown.

Size in our specimens: ♂ 4,3—4,8 mm, ♀ 5,8—6,2 mm, ♂ 5 mm.

Very variable species. Variable in contradistinction to the preceding species not only in size, colouring and sculpture but also in the shape of the various taxonomically important parts of the body, e. g. the petiole. On the basis of these deviations a total of 15 forms (subspecies, races and varieties)

have so far been described from the palearctic region by different authors, but in my opinion most of these forms can scarcely be considered constant nor can they be regarded as more than different ecological varieties of this species. Though I examined the characters of a relatively fairly numerous material of ♀♀ (and partly also of ♂♂) from the most different places of Czechoslovakia I could ascertain in the territory of Czechoslovakia only two more pronounced deviations, which up to a certain degree can be called constant and identified with already described forms.

M. (M.) lobicornis r. arduennae BONDROIT.

(Fig. VII 6)

BONDROIT, Ann. Soc. ent. France 1918, p. 105.

♀ Petiole in contradistinction to the type truncate above. Sculpture somewhat coarser, colouring somewhat darker, brown to blackish brown, though there occur also specimens in which the colouring of the thorax and of the segments of the pedicel is somewhat lighter (reddish brown) than the colouring of the head and gaster.

Form ascertained in Belgium and Italy.

Czechoslovak finds so far: Borová Lada near Vimperk 8—8—48 (Sadil), Vír in the Českomoravská vrchovina 10—7—43 (Sadil), Sedlčany 6—7—37 (Sadil), Karlovarská vrchovina 6—48 (Sadil).

M. (M.) lobicornis var. lissahorensis STÄRCKE

STÄRCKE, Tijdschr. Ent. 1927, p. 79.

♀ Colouring in contradistinction to the type lighter. Head, thorax and segments of the pedicel rusty brown (approximately as in *M. scabrinodis* or *M. sabuleti*), gaster dark brown.

Form described from the Bezkyds. Lacking in ZÁLESKÝ's Prodrömus.

Czechoslovak finds so far: Lysá Hora (type), Kyčera (A. Hetschko).

M. (M.) deplanata RUZS. subsp. moravica SOUDEK

(Figs. VII 7—9, VIII 33, 34 IX 33, X 13, XI 16.)

RUZSKÝ, Formicar. Imp. Ross. 1905, p. 700.

SOUDEK, Čas. mor. zem. musea, Brno 1922. — Čas. mor. zem. musea, Brno 1927. — Ent. Rec. 1925, p. 35.

SADIL, Ent. listy (Folia entomologica), Brno 1940.

Form distinguished from our other representatives of the genus *Myrmica* especially by its larger size, shape of the antennal scape, shape of the thorax (thorax in one piece, without meso-epinotal incision), and shape of the petiole. For a more detailed description see the appended "Key". Distinguished from the type especially by the measurements of the head and the larger size. Very little variable species. The variability concerns principally size, coloration, and some minor details of the sculpture.

Type distributed almost throughout the region of the South Russian steppes, from the Don Basin (Provalje) and Stalingrad to the Caucasus (Terek). Then var. *plana* described by Karawajew (1929, p. 208) is

distributed farther to the west, in the southern Black Sea steppes (Askania Nova).

Finds of subsp. *moravica* in Czechoslovakia: Pavlovské Vrchy in Southern Moravia 3—4—1921 (Soudek), 1936 (Kratochvíl), 1938 (Sadil), Mohelno (Southern Moravia) 8—7—39 (Novák), 16—7—39 (Sadil), 1940 (Kratochvíl), Morkůvky near Hustopeč 1939 (Gregor), Praha-Hlubočepy 20—5—1936 (Sadil), 1937 (Novák), 1940 (Kratochvíl), Prokop Valley near Prague 20—4—39 (Sadil), 1939 (Novák), Velká Chuchle near Prague 19—8—48 (Sadil), Srbsko near Beroun 13—10—40 (Novák), Baba near Somotor 21—VII—51 (Sadil). Yugoslavia: Split (Kratochvíl).

The form is bound in its occurrence to dry, stony steppe. The finds at Somotor and at Split in Yugoslavia show that the area of this form is much larger than SOUDEK (1922, p. 16) assumed.

4. Results of the biometrical-measurements of the Czechoslovak forms of the genus *Myrmica* LATR.

(See ARNOLDI, Vorläufige Ergebnisse einer biometrischen Untersuchung einiger *Myrmica*-Arten aus dem europäischen Teile der USSR, Folia Zool. et Hydrobiol. (Riga) 1934, p. 151.)

| | Index of head | Index of forehead | Index of frontal laminae |
|------------------------|------------------|-------------------|--------------------------|
| <i>M. laevinodis</i> | 79,5 (77,1—81,7) | 49,4 (47,2—51,7) | 92,7 (90,7—96,1) |
| <i>M. rubra</i> | 77,5 (75,3—82,7) | 48,3 (47,2—49,6) | 91,3 (87,9—94,9) |
| <i>M. sulcinodis</i> | 84,7 (84,3—85,5) | 42,8 (40,9—45,0) | 91,4 (89,7—92,7) |
| <i>M. bergi</i> | 84,1 (80,1—86,5) | 43,8 (43,1—44,3) | 90,3 (88,7—92,3) |
| <i>M. rugulosa</i> | 80,2 (78,9—83,5) | 52,7 (49,1—54,0) | 95,4 (92,7—96,1) |
| <i>M. sabuleti</i> | 85,6 (82,1—87,5) | 36,8 (28,7—38,4) | 66,5 (49,0—69,4) |
| <i>M. scabrinodis</i> | 84,3 (82,1—89,6) | 38,7 (36,3—40,4) | 73,9 (67,1—75,9) |
| <i>M. balcanica</i> | 84,6 (80,2—88,1) | 40,6 (38,0—46,5) | 78,3 (69,9—86,9) |
| <i>M. pilosiscapus</i> | 84,7 (82,3—89,4) | 37,5 (36,8—39,3) | 71,2 (70,0—74,2) |
| <i>M. slovacae</i> | 86,8 (83,7—91,0) | 28,7 (27,3—29,6) | 54,3 (51,9—56,4) |
| <i>M. schencki</i> | 88,4 (84,8—93,1) | 24,5 (23,0—25,8) | 63,3 (56,0—68,2) |
| <i>M. lobicornis</i> | 87,8 (86,0—90,7) | 28,7 (26,6—31,0) | 65,5 (62,3—70,6) |
| <i>M. d. moravica</i> | 88,1 (86,5—90,6) | 31,9 (29,9—34,2) | 70,1 (67,8—75,4) |

5. Key for the Determination of Workers (or also females) of the genus *Myrmica* LATR.

- 1—a Epinotum without spines, only with two scarcely visible tubercles. Large specimens (♂♂ of our specimens 5,2—7,7 mm, ♀♀ 10—10,5 mm). Dorsum thorax of the thorax strongly depressed, saddle-shaped. Head distinctly longitudinally grooved (somewhat more weakly at the top), frontal area also longitudinally grooved. Promesonotum closely and finely grooved. Antennal scape at the base suddenly arcuately bent. Antennal clubs 5-jointed. Mandibles broad, with 14—8 teeth of which the last two are especially large. Petiole with slender neck bearing below a short spine. The postpetiole is spherical and has below a quite small tooth. The two segments of the

pedicel are sculptured only on the sides, at the top they are almost smooth and shiny. Colouring rusty to rusty brown, gaster above blackish brown. In higher sites. Nests in the soil, with typical, crater-shaped entrance built of particles of the soil.

Subgenus *Neomyrma* FOR. — *N. rubida* LATR. (Figs. I, 1—4, XI 1)

- b Epinotum with two well visible spines. Smaller specimens (♂♂ in our specimens 3,8—6 mm, ♀♀ 5,3—6,8 mm). Promesonotum at least partly more coarsely rugose. Subgenus *Myrmica* LATR., 2.

2—a Antennal scape in lateral view (position b) at the base either gently arcuately bent or bent more or less suddenly in an obtuse angle (without a break!). In any case, however, the scape is simply bent without any outgrowths or protuberances at its bend. Viewed from above (position a) the scape is in the place of the bend distinctly narrower than in the middle of its length (figs. I—II). Forehead broad (i. 40,9—54,0), frontal laminae little divergent (i. 87,9—96,1), at the ends rather pointed than rounded. 3.

- b Antennal scape at the base broken in an obtuse or right angle. In the place of the break it is somewhat widened and has a lateral lobe or special winged outgrowth, tooth like protuberance, etc. When the scape is simply broken (without widenings or outgrowths at the break), it is in the place of the break (in position a) at least as broad as in the middle of its length (fig. III). In *M. balcanica* in this position the scape is sometimes in the place of the break narrower than in the middle of its length, nevertheless, in lateral view, it is distinctly broken and not bent as in case a (Fig. V 1). Besides, the forehead is in this species just as in the following ones narrower than in the ants to which a leads. — Forehead narrower (i. 23,0—46,5), frontal laminae more divergent (i. 49,0—86,9), rounded at the ends. 7.

3—a Antennal scape at the base gently arcuately bent, viewed from above almost straight (fig. I 6). 4.

- b Antennal scape at the base more strongly bent (curved), or also bent in knee-shape (fig. II). 5.

4—a Top of the petiole in lateral view somewhat pointed, only moderately rounded, petiole relatively low. Epinotal spines short, about as long as their distance from the base, directed more upwards. Area between them as a rule smooth and shiny. Sculpture fine, body on the whole smooth and feebly shiny. Thorax irregularly rugose, on the epinotum usually some transverse wrinkles. Petiole above almost smooth, post-petiole smooth and feebly shiny. Colouring of the body rusty brown or darker, head most often darker above, gaster with the exception of its basal part brown to blackish brown. In meadows, gardens and groves. Nests in the soil, in earth heaps, under stones, in dead wood (tree-stumps), etc. *M. laevinodis* NYL.

- b Top of the petiole viewed laterally more or less truncate, rounded on the sides, petiole relatively high. Epinotal spines longer than their

distance from the base, lying more horizontally. Area between them transversally rugose. Sculpture coarser. Thorax sharply rugose, especially on the pronotum and mesonotum. Also the petiole and postpetiole rugose above. Colouring rusty brown or darker (specimens also occur with a dark rusty brown to blackish brown colouring). Occurrence and nesting similar to that of the preceding species, also occurring in very moist places (peat-bogs).

M. rubra L.

- 5—a Head relatively narrow, distinctly longer than wide (i. 78,9—83,5), forehead specially broad (i. 49,1—54,0), frontal laminae little divergent (i. 92,7—96,1). Upper face of the petiole in lateral view almost plane, viewed from above much longer than broad, petiole in this position elongated rectangular, postpetiole of spherical shape. Sculpture slightly pronounced. Head longitudinally rugose, on the sides reticulate, chitine between the wrinkles, especially on the sides of the head, closely and finely punctate. Petiole smooth, dull, postpetiole above smooth, on the sides weakly rugose. In warm, dry places, at the edge of forests, etc. Nests in the soil under stones. Smaller specimens ♂ 3,0—4,5 mm, ♀ 5,3—5,5 mm.

M. rugulosa NYL.

- b Head broader (i. 80,1—85,5), forehead narrower (i. 40,9—45,0), frontal lamellae more divergent (i. 88,7—92,7). Petiole of different shape. Sculpture, especially of the segments of the pedicel, coarser. Larger specimens: ♂ 4,5—5,6 mm, ♀ 6—6,2 mm. 6.

- 6—a Petiole and postpetiole coarsely longitudinally rugose. Big, coarsely sculptured ants. Head longitudinally, on the sides reticulate, coarsely rugose; coarse rugosity predominates also in the frontal region; chitine between the wrinkles dull. Frontal area entirely or at least partly coarsely longitudinally grooved, epinotal spines long and strong, viewed from above their points are somewhat bent inwards and blunt at the ends. Petiole massive, in lateral view relatively short and considerably high; its anterior face almost plane, more rarely more strongly concave. Its upper face longer than wide. Colouring as a rule dark brown, with a particular reddish tinge. Head blackish brown, thorax and pedicel dark rusty red, gaster except the basal part blackish brown. Length in our specimens: ♂ 4,5—5,6 mm, ♀ 6—6,2 mm. In mountains. Nests in the soil, under stones, in peat-bogs, etc.

M. sulcinodis NYL.

- b Petiole considerably less coarsely irregularly rugose, postpetiole finely arcuately rugose, at the top almost smooth, dull. Somewhat smaller and less coarsely sculptured specimens. Wrinkles on the head lower, forehead closely and finely longitudinally rugose. Reticulate rugosity on the sides of the head less visible. Chitine between the wrinkles shiny. Frontal area partly grooved, the remaining part smooth and shiny. Epinotal spines long and thin, at the ends sharply pointed. Petiole less massive, in lateral view longer and lower, its

upper face viewed from above rather short than broad. Colouring rusty brown, head somewhat darker, gaster brown to dark brown. Length: ♂ 4,6—5 mm. ♀ 6,2 mm. *M. bergi* RUZS.

7—a Scape at the base simply broken or, viewed from above, extended on the outer side of the break into a lateral lobe parallel to the length axis of the scape (figs. III, IV, V, and VI). When this lobe is specially strongly developed the lobe in a lateral view of the scape has at the most the shape of a very blunt, short, tooth-shaped protuberance sitting on the break. 8.

b Scape in the place of the break provided with a peculiar, winged outgrowth or tooth-shaped protuberance perpendicular to the length axis of the scape; in a lateral view of the scape this outgrowth has the shape of a sharp tooth or wedge sitting on the break (fig. VII). When the outgrowth is specially developed, it has in a lateral view of the scape the shape of a crescent or wing (figs. VII 2, 5). 12.

8—a Scape at the base either simply broken or (viewed from above) provided on the outer side of the break with a slight, oval extension (fig. V). Petiole viewed from above elongated, of a rectangular shape, anteriorly imperceptibly narrowing. Upper face of the petiole distinctly longer than broad. Postpetiole viewed from above as a rule distinctly of spherical shape. Forehead broad (i. 38,0—46,5), frontal laminae little diverging (i. 69,9—86,9). Sculpture slightly developed. Head rather finely longitudinally rugose, chitine between the wrinkles, especially on the sides of the head, closely and finely punctate; thorax more coarsely longitudinally rugose; petiole above as a rule finely reticulate rugose; postpetiole as a rule above with a smooth and shiny area. Colouring rusty brown, gaster dark. Nests in specially warm and dry localities (rocky steppes, at the foot of rocks, etc.); in the soil under stones. *M. balcanica* n. sp.

b Oval extension on the break of the scape more strongly developed, or also enlarged into a big lateral lobe. 9.

9—a Pedicel slim, petiole viewed from above elongated rectangular, its upper face considerably longer than wide. Weakly sculptured specimens. Head in the frontal region coarsely longitudinally rugose, on the sides reticulate, chitine between the wrinkles finely punctate. Petiole above finely reticulate or longitudinally rugose, postpetiole above smooth and shiny. Forehead very narrow (i. 27,3—29,6), frontal laminae strongly divergent (i. 51,9—56,4). So far only from Bohemia, southern Slovakia and Bulgaria.

M. slovaca n. sp.

b Pedicel more massive. Petiole shorter and broader. Sculpture coarser. Forehead somewhat broader (i. 28,7—40,4), frontal laminae less divergent (i. 49,0—75,9). 10.

10—a Oval extension at the break of the scape as a rule much more slightly developed (figs. IV and VI 1—7). Forehead broader (i. 36,3—40,4), frontal laminae less divergent (i. 67,1—75,9). 11

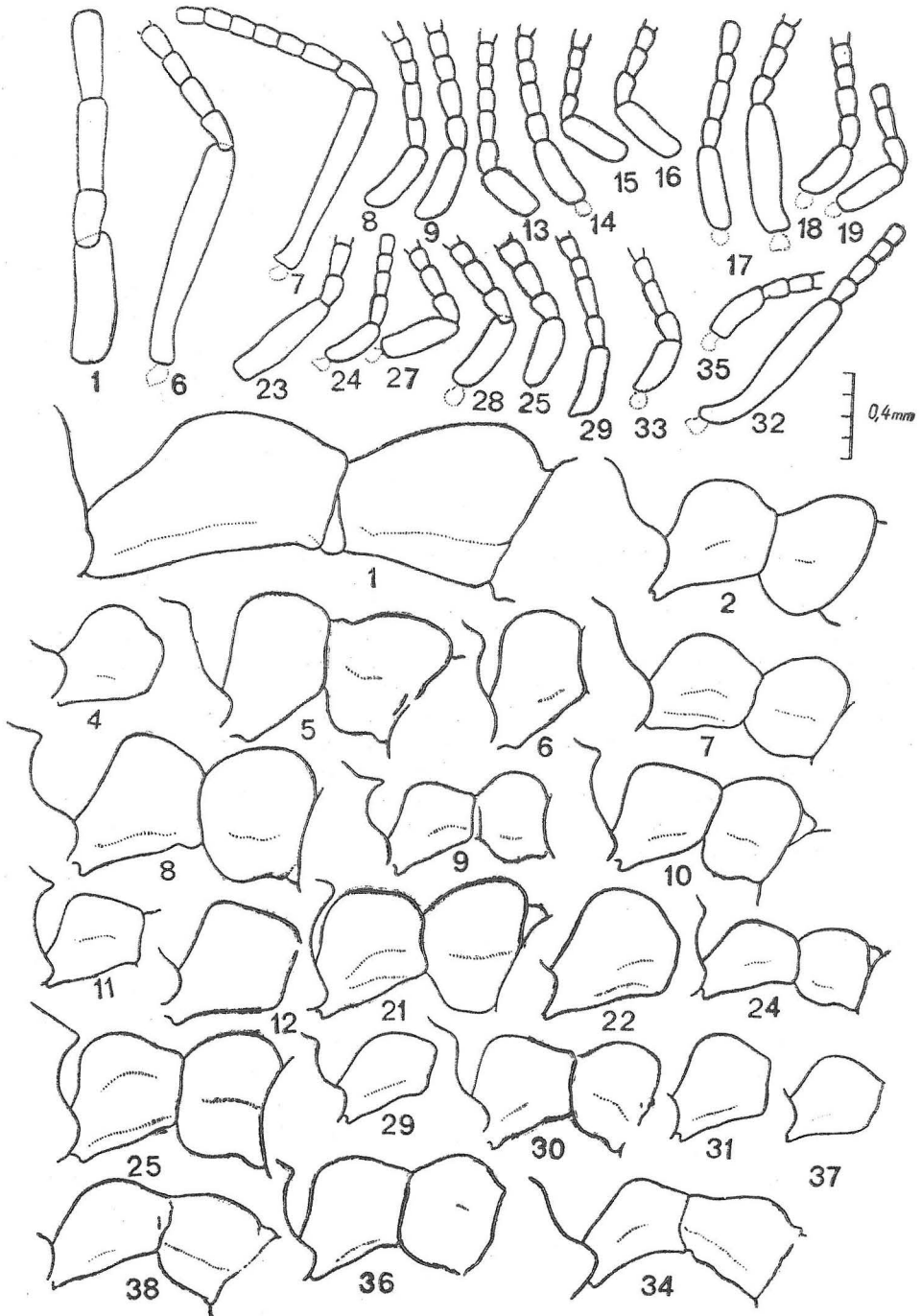
- b Oval extension at the break of the scape as a rule more strongly developed, always provided with a lateral lobe, sometimes specially big (fig. III). Forehead narrower (i. 28,7—38,4), frontal laminae more divergent (i. 49,0—69,4). *M. sabuleti* MEIN.
- 11—a Petiole in lateral view lower with the top as a rule gradually sloping posteriorly in the direction towards the postpetiole, rarely truncate, with concave anterior face. Oval extension at the break of the scape as a rule narrower, its proximal outline more semi-elliptic. Sculpture less coarse and pronounced. Petiole above irregularly reticulate, rarely longitudinally rugose, postpetiole slightly rugose and grooved. Colouring of the body lighter, rusty brown. Head as a rule of the same colour as the thorax and pedicel; gaster a little darker. On the whole abundant species. Nests in the soil, under stones. *M. scabrinodis* NYL.
- b Petiole in lateral view as a rule higher and somewhat shorter, truncata above or sloping more steeply arcuately posteriorly; the anterior face as a rule strongly concave so that anteriorly above a characteristic sharp edge is formed. The oval extension at the break of the scape is compared with its length somewhat broader so that its proximal outline is rather semicircular than semi-elliptic (figs. VI 1—7). Sculpture coarse and pronounced. Petiole above irregularly or more or less longitudinally coarsely rugose, postpetiole above coarsely rugose and grooved. Colouring of the body darker. Head dark rusty brown, thorax and pedicel slightly lighter, gaster above dark brown. In many specimens the colouring of the body is specially dark. The head is dark rusty brown to blackish brown, the segments of the pedicel are more definitely brown, on the mesonotum and epinotum are dark brown to blackish brown spots; gaster dark brown to black. Some specimens are even of an entirely blackish brown colouring. In mountains in peat-bogs. *M. pilosiscapus* BOND.
- 12—a Forehead broader (i. 26,6—34,2), frontal laminae less divergent (i. 62,3—75,4). 13.
- b Forehead narrower (i. 23,0—25,8), frontal laminae more divergent (i. 56,0—68,2). For shape of the segments of the pedicel see fig. VII 2—4. Colouring rusty brown or rusty reddish brown, head and gaster brown to blackish brown. Fairly abundant species, nests in the soil, under stones, most frequently at sandy edges of forests. *M. schencki* EM.
- 13—a Thorax in one piece, in lateral view without distinct mesoepinotal incision. Epinotal spines relatively short. At the break of the scape there is only a small, sharp, tooth-shaped protuberance. Petiole in lateral view longer, its anterior face placed considerably slantingly, its upper face sloping far backwards in the direction towards the postpetiole. Top of the postpetiole shifted far posteriorly. Sculpture of the postpetiole finer, on top a smooth and shiny area. Colouring

lighter or darker reddish brown. Head above darker, gaster dark brown to blackish brown. Larger specimens: ♂ 4,8—6 mm, ♀ 6—6,8 mm. Nests only in particularly warm and dry localities (rocky steppe). *M. deplanata moravica* SOUD.

- b Thorax in lateral view with distinct meso-epinotal incision. Epinotal spines longer. Outgrowth at the break of the scape larger and broader (approximately as in *M. schencki*). Petiole in lateral view shorter, its anterior face as a rule placed more perpendicular, its upper face sloping more steeply backwards in the direction towards the postpetiole. Top of the postpetiole less distinct and situated medially. Sculpture of the postpetiole above coarse, without smooth and shiny area. Colouring as a rule darker. Smaller specimens: ♂ 4,3—4,8 mm, ♀ 5,8—6,2 mm. Rather abundant species, more at higher altitudes. *M. lobicornis* NYL.

6. Key for the Determination of Males of the Genus *Myrmica* LATR.

The males of the genus *Myrmica* LATR. belong to the least known ants. The reason for this must be sought especially in the circumstance that in nature we find them only in the restricted, relatively short swarming-time, therefore relatively more rarely than workers and females; hence because of the wealth of species and their forms the males of many forms of this genus are either not known at all or known only very imperfectly. The distinction of the males of the different species and forms is made more difficult by their still greater resemblance to each other than is the case with the workers, and by their variability, which in many taxonomically important characters attains a still wider range than in the workers. For these and similar reasons no absolutely accurate and suitable key for the determination of the males of the genus *Myrmica* LATR., has been given so far. Unfortunately I had not at my disposal so numerous a material of males as would be needed for filling this sensible gap; notwithstanding the rich material of workers I had at my disposal of many forms only one or only a few males; but even so I was able to determine that a large part of the characters hitherto considered typical for one or the other form are subjected to so much variability that their use in determination is either very difficult or in many cases worthless. This applies to the characters of the sculpture as well as e. g. to the relative lengths of the different funicular joints, to the shape of the epinotum, to the pilosity of the different parts of the body, etc. Concerning the male genitalia, even these I found even after separating them and examining the different appendices, not to show sufficient deviating characters for any reliable distinction to be made between the various, especially taxonomic lower forms, as can be seen from the drawings of the volsellae of male genitalia made by N. A. WEBER (1948, p. 281). On the other hand I found that in most cases the shape of the petiole can be used to distinguish the different forms of this genus in the males as in the workers; according to my observations the shape of the



petiole is much less subjected to variability than e. g. the shape of the different segments of the antennae. On the basis of the characters observed and of those used earlier which can be considered constant I have tried to compile the table for the determination of the males of the Czechoslovak forms of the genus which I give below.

- 1—a Antennae without distinct club. Funicular joints except the first at least three times longer than wide. Mandibles with 14 teeth. Segments of the pedicel strongly elongated (fig. VIII 1). Scape a little shorter than the first two funicular joints. Larger specimens, length of the body in our specimens 9.5—10 mm.

Subgenus *Neomyrna* FOR. — *N. rubida* LATR.

- b Antennae with distinct 4—5-jointed clubs; funicular joints at the most about twice as long as wide. Mandibles with 4—8 teeth. Segments of the pedicel shorter. Scape at least as long as the first two funicular joints. Smaller specimens, length of the body 4.5—6 mm.

Subgenus *Myrmica* LATR. 2.

- 2—a Scape of the antennae approximately as long as or a little shorter than half the funiculus 3.

- b Scape of the antennae considerably shorter than half the funiculus 6.

- 3—a Scape at the base slightly curved, as long as half the funiculus (fig. VIII 6) (volsella fig. IX 3—4) 4.

- b Scape at the base bent (curved), shorter than half the funiculus 5.

- 4—a Petiole in lateral view lower, above sharper, more rounded into an angle, with the anterior face more concave (figs. VIII 2—4). Tibiae of the middle and hind pairs of legs with long, projecting hairs

M. laevinodis NYL.

Fig. VIII. — Antennal scapes and pedicels of the males of: 1. — *Neomyrna rubida*, 2, 4. *Myrmica laevinodis*, 5—6. *M. rubra*, 7. *M. sulcinodis*, 8. *M. bergi*, 9. *M. rugulosa*, 10—19. *M. scabrinodis* (17—19. *M. sc.* var. *scabrinodo-sabuleti*), 21—23. *M. sabuleti*, 24. *M. balcanica*, 37. *M. b.* var. *scabrinodoides*, 25, 27, 28. *M. piloscapus*, 29, 38. *M. schencki*, 30—32. *M. lobicornis*, 33—34. *M. deplanata moravica*, 35—36. *M. slovacica*.

Designed according to exemplars from these localities: 1. — Karlovarská vysočina 1948 (Sadil), 2. — Purberg near Chomutov 1948 (Sadil), 4. — Litoměřice 1948 (Sadil), 5. — Šárka near Praha 1948 (Sadil), 6. — Březeneč near Chomutov 1948 (Sadil), 7. — Borová Lada in the Šumava 1948 (Sadil), 8. — Třeboň 1939 (Novák), 9. — Mohelno 1939 (Sadil), 10. — Třeboň 1939 (Novák), 11. — Sobotka (Samšíňák), 12. — Čermníky near Chomutov 1946 (Sadil), 13. — Bělčice-Blatná 1941 (Novák), 14. — Dol. Almáš in Slovakia 1937 (Babala), 15. — Kroměříž (Fiala), 16. — Radotín near Praha 1941 (Novák), 17. — Sobotka (Samšíňák), 18. — Borotín 1939 (Novák), 19. — Příbram 1936 (Šípek), 21. — Minice near Kralupy 1943 (Sadil), 22. — Purberg near Chomutov 1946 (Sadil), 23. — Bělčice-Blatná 1941 (Novák), 24. Hradiště near Litoměřice 1950 (Sadil), 25. — Borová Lada in the Šumava 1948 (Sadil), 27. — Šumava (Samšíňák), 28. — Borová Lada in the Šumava 1948 (Jurčiček), 29. — Třeboň 1939 (Novák), 30. — Berenhügel near Chomutov 1946 (Sadil), 31. — Bořetín 1937 (Novák), 32. — Praha-Krč 1942 (Novák), 33. — Praha-Hlubočepy 1937 (Sadil), 34. — Hlubočepy 1951 (Sadil), 35. — Chomutov 1951 (Sadil), 36. — Chomutov 1951 (Sadil), 37. — Hlubočepy 1951 (Sadil), 38. — Zákolany 1951 (Sadil).

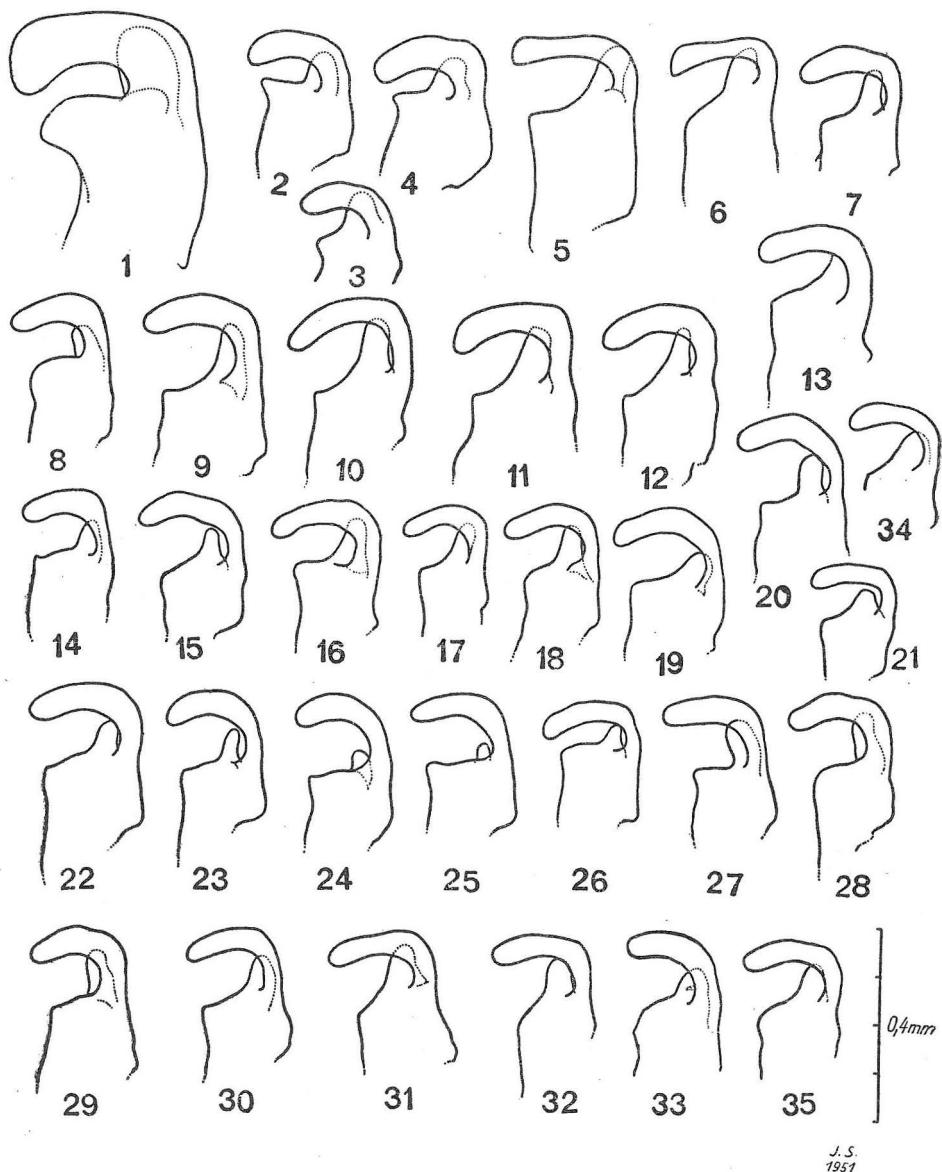


Fig. IX. — Volsellae of male genitalia of Czechoslovak *Myrmica*-species: 1. — *Neomyrma rubida*, 2.—3. — *Myrmica laevinodis*, 4. — *M. rubra*, 5.—6. — *M. sulcinodis*, 7. — *M. bergi*, 8. — *M. rugulosa*, 9.—13. — *M. sabuleti*, 14.—20. *M. scabrinodis*, 21. — *M. balcanica*, 22.—26. — *M. pilosiscapus*, 27.—29. — *M. schencki*, 30.—32. — *M. lobicornis*, 33. — *M. deplanata moravica*, 34. — *M. balcanica* var. *scabrinoides*, 35. — *M. slovacica*.

- b Petiole in lateral view higher, above broadly rounded, with the anterior face less concave (figs. VIII 5—6). Tibiae of the middle and hind pairs of legs without long, projecting hairs.

M. rubra L.

- 5—a Petiole in lateral view relatively low, massive, above broadly rounded. Viewed from above it does not show anteriorly any indication of a sharper edge. Scapes at the base curved in an arc (fig. VIII 7) (volsella fig. IX 5—6) *M. sulcinodis* NYL.

- b Petiole in lateral view higher, anteriorly above more rounded in an angle so that when viewed from above a sharper edge shows anteriorly. Scapes at the base more sharply (more in an angle) curved (figs. VIII 30—32). (Volsella figs. IX 30—32)

M. lobicornis H.

- 6—a Scape of the antennae as long as approximately the first 2—3 funicular joints 7.

- b Scape of the antennae distinctly longer than the first 3 funicular joints 13.

- 7—a Second funicular joint relatively thin and long, distinctly much longer than the preceding first joint (fig. VIII 29, 33). Postpetiole in lateral view elongated posteriorly, distinctly longer than high 8.

- b Second funicular joint stronger, only slightly longer than or as long as the preceding first joint. Postpetiole of normal shape 9.

- 8—a Petiole in lateral view above somewhat rounded into an angle (fig. VIII 33, 34). Postpetiole elongated far posteriorly. Length of the body about 6 mm.

M. deplanata moravica SOUD.

- b Petiole in lateral view above broadly arcuately delimited (figs. VIII 29, 38). Postpetiole shorter. Length of the body about 5—5,4 mm

M. schencki EM.

- 9—a Petiole in lateral view relatively low, above delimited somewhat arcuately into an angle (fig. VIII, 9, 24, 37) 10.

Designed according to exemplars from these localities: 1. — Pancíř in the Šumava 1936 (Sadil), 2. — Borová Lada in the Šumava 1948 (Sadil), 3. — Nedvězí near Po-lička 1941 (Sadil), 4. — Březeneč near Chomutov 1948 (Sadil), 5.—6. — Borová Lada in the Šumava 1948 (Sadil), 7. — Třeboň 1939 (Novák), 8. — Sobotka (Samšínák), 9. — Oleško (Novák), 10. — Chomutov 1946 (Sadil), 11. — Koleč near Slaný 1943 (Sadil), 12. — Purberg near Chomutov 1948 (Sadil), 13. — Bělčice-Blatná 1941 (Novák), 14. — Čermníky near Chomutov 1946 (Sadil), 15. — Bělčice-Blatná 1941 (No-Šebastian 1951 (Sadil), 16. — Zlíchov 1918 (Šustera), 17. — Okoř 1951 (Sadil), 18. — 1939 (Novák), 19. — Dolní Almach in Slovakia 1937 (Babala), 20. — Borotín 1939 (Novák), 21. — Hradiště near Litoměřice 1950 (Novák), 22. — Borová Lada in the Šumava 1948 (Jurčíček), 23.—25. — Šumava (Samšínák), 26. — Borová Lada 1948 (Sadil), 27. — Peřimov 1938 (Záleský), 28. — Telnice 1937 (Novák), 29. — Třeboň 1939 (Novák), 30. — Bořetín 1937 (Záleský), 31. — Praha-Krč 1942 (Novák), 32. — the same, 33. — Praha-Hlubočepy 1951 (Sadil), 34. — Okoř 1951 (Sadil), 35. — Chomutov 1951 (Sadil).

- b Petiole in lateral view higher than in case a, above differently delimited 11.
- 10—a The lengthened upper and anterior faces of the petiole (in lateral view) form an angle which is almost a right angle. The second funicular joint is distinctly longer than the first one (fig. VIII 9)
M. rugulosa NYL.
- b The lengthened upper and anterior faces of the petiole form a much more obtuse angle. The second funicular joint is as long as the first one (fig. VIII 24)
M. balcanica n. sp.
(In var. *scabrinodoides* the upper and anterior sides of the petiole form sometimes a right angle similarly as in *M. rugulosa*; but in this case the top of the petiole is more broadly arcuately delimited than in that species) (see fig. VIII 37).
- 11—a Petiole in lateral view high, above broadly arcuately delimited. Its anterior face somewhat concave (fig. VIII 25). Pedicel more massive; petiole viewed from above only slightly longer than wide.
M. pilosiscapus BONDR.

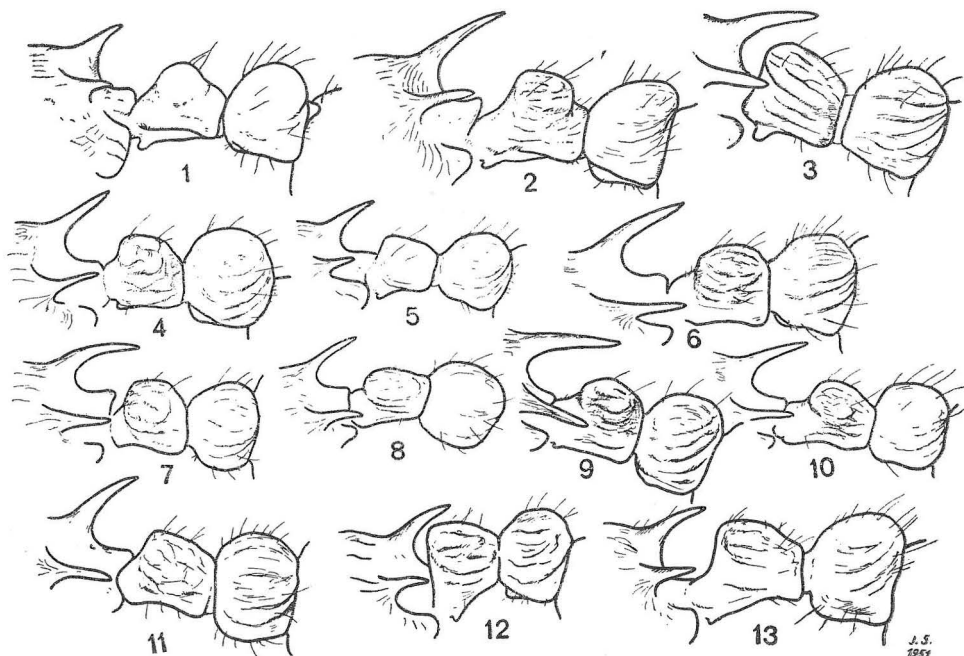


Fig. X. — Pedicel-articles of the workers of the Czechoslovak *Myrmica*-species, viewed from the left side and a little from above: 1. — *Myrmica laevinodis*, 2. — *M. rubra*, 3. — *M. sulcinodis*, 4. — *M. bergi*, 5. — *M. rugulosa*, 6. — *M. sabuleti*, 7. — *M. scabrinodis*, 8. — *M. balcanica*, 9. — *M. pilosiscapus*, 10. — *M. slovaca*, 11. — *M. schencki*, 12. — *M. lobicornis*, 13. — *M. deplanata moravica*.

- b Petiole in lateral view a little lower than in case *a* (fig. VIII 36). Pedicel slimmer, petiole viewed from above distinctly much longer than wide *M. slovacae* n. sp.
- c Anterior and upper face of the petiole in a lateral view intersect under an approximately right angle whose top is, in contradistinction to cases *a* and *b*, very moderately rounded (fig. VIII 8, 10—12) 12.
- 12—a Petiole in lateral view higher, its anterior face longer than the upper face so that the place where the two faces of the petiole intersect is shifted somewhat posteriorly (fig. VIII 8) *M. bergi* RUSZ.
- b Petiole in lateral view lower, its anterior face approximately as long as or shorter than the upper face, so that the place where the two faces of the petiole intersect is shifted anteriorly (fig. VIII 10—12) *M. scabrinodis* NYL.
- 13 Petiole in lateral view relatively short and high, of a massive aspect; above broadly arcuately rounded; its anterior face usually only slightly concave (fig. VIII 21, 22). Scape approximately as long as the following 4—5 funicular joints *M. sabuleti* MEIN.

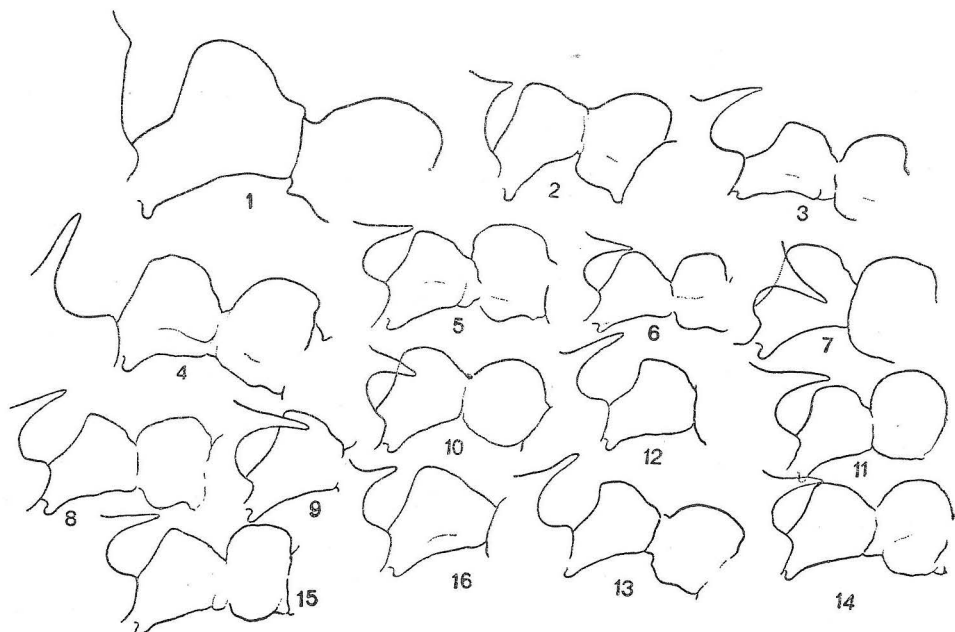


Fig. XI. — Pedicels of females: 1. — *Neomyrma rubida*, 2. — *Myrmica laevinodis*, 3. — *M. rubra*, 4. — *M. sulcinodis*, 5. — *M. bergi*, 6. — *M. rugulosa*, 7. — *M. sabuleti*, 8.—9. — *M. scabrinodis*, 10.—11. — *M. balcanica* var. *scabrinoides*, 12. — *M. pilosiscapus*, 13. — *M. slovacica*, 14. — *M. schencki*, 15. — *M. lobicornis*, 16. — *M. deplanata moravica*.

Designed according to exemplars from these localities: 1. — Tatry, Lomnický štít 1951 (Schoř), 2. — Třebsko near Březnice 1941 (Novák), 3. — Borová Lada 1948 (Sadil), 4. — Schätzova Mýt 1948 (Samšíňák), 5. — Třeboň 1949 (Novák), 6. — Chomutov 1951 (Sadil), 7. — Radotín 1941 (Novák), 8. — Lnáře 1941 (Novák), 9. — Svatý Šebestian 1951 (Sadil), 10. — Zlíchov 1918 (Šustera), 11. — Okoř 1951 (Sadil), 12. — Borová Lada 1948 (Sadil), 13. — Chomutov 1951 (Sadil), 14. — Hradiště near Lito-měřice 1948 (Sadil), 15. — Borová lada 1948 (Sadil), 16. — Hlubočepy 1951 (Sadil).

Literature cited

- ARNOLDI: Vorläufige Ergebnisse einer biometrischen Untersuchung einiger Myrmica-Arten aus dem europäischen Teile der USSR. — *Fol. Zool. Hydrobiol.* (Riga) 1934.
- BONDROIT: Les fourmis de France et de Belgique. — *Ann. Soc. ent. France* 1918.
— *Supplément aux Fourmis de France et de Belgique.* — *Ann. Soc. ent. France* 1919.
— *Notes diverses sur les Fourmis d'Europe.* — *Ann. Soc. ent. Belg.* 1919.
- CLAUSEN: Untersuchungen über den männlichen Copulationsapparat der Ameisen, speziell der Formicinae. — *Mitt. Schweiz. ent. Ges.* 1938.
- CURTIS: On the genus *Myrmica* and other indigenous ants. — *Tr. Linn. Soc. London* (1854) 1855.
- DONISTHORPE: British Ants, their Life-history and Classification. — Plymouth 1915.
— Generic names & c., of the British Formicidae. — *Ent. Rec.* 1937.
— British ants as at present known, with some remarks, and a list of the same. — *Ent. Rec.* 1946.
- EMERY: Beiträge zur Kenntnis der nordamerikanischen Ameisenfauna. — *Zool. Jahrb.* 1895.
— Beiträge zur Monographie der Formiciden des paläarktischen Faunengebietes. — *Deutsch. Ent. Zeitschr.* 1908.
— *Fauna entomologica italiana.* — *Boll. Soc. ent. Ital.* (1915) 1916.
— *Formiche ibride.* — *Rend. Acc. Sc. Inst. Bologna* 1917.
- FINZI: Le forme europee del genere *Myrmica* Latr. — *Boll. Soc. Adriat. Sc. Nat. Trieste* 1926.
- FOREL: Les fourmis de la Suisse. — *N. Denkschr. allg. Schweiz. Ges. ges. Naturw. Zürich* 1874.
— Die Ameisen der Schweiz (Faun. insect. Helvetiae). — *Beilage z. Mt. Schweiz. ent. Ges.* 1915.
- KARAWAJEW: Myrmekologische Fragmente II. — *Mém. Ac. Sc. Ukraine (Travaux du musée zoologique)* 1929.
— *Formicidae Ukrainae.* — *Trav. Inst. Zool. Biol. Ac. Sc. Ukraine* 1934, 1936.
- KRATOCHVÍL: Doplněk nalezišť k Záleského Prodrumu mravenců (Addition to the Záleský's Prodrum of ants). — *Sb. ent. odd. Nár. Musea v Praze* 1940.
— Mravenci mohelenské rezervace. Rozbor taxonomický, faunisticko-oekologický, sociologický a zoogeografický. (The ants of the Mohelno-reservation.) — *Archiv des Verbandes für Natur- und Heimatschutz in Mähren, Band 6. Mohelno—Brno* 1944.
- KUTTER: *Myrmica scabrinodis* Nyl. var. *rugulosoides* For. — *Schweiz. ent. Anz.* 1924.
- LATREILLE: Histoire naturelle des fourmis. — Paris 1802.
- MAYR: *Formicina austriaca.* — *Verh. zool. bot. Ver. Wien* 1855.
- MEINERT: Bidrag til de danske Myrers Naturhistorie. — *Dansk. Vidensk. Selsk. (Nat. Afd.)* 1860.
- MÜLLER: Le formiche della Venezia Giulia e della Dalmazia. — *Boll. Soc. Adriat. Sc. Nat. Trieste* 1923.
- NOVÁK: Příspěvek k poznání mravenců sev. Čech (A contribution to the knowledge of the ants of North-Bohemia). — *Čas. Čes. Spol. ent. Praha* 1939.
— K taxonomii mravenců rodů *Bothriomyrmex* a *Leptothorax* (A contribution to the taxonomy of ants of the gen. *Bothriomyrmex* and *Leptothorax*). — *Archiv des Verbandes für Natur- und Heimatschutz in Mähren, Band 6. Mohelno.* — Brno 1944.
- NOVÁK-SADIL: Dodatek k poznání mravenců hadcové stepi u Mohelna (Une addition à la connaissance des fourmis de la steppe de serpentine près de ville de Mohelno). — *Čas. Čes. Spol. ent. Praha* 1939.
— Klíč k určování mravenců střední Evropy se zvláštním zřetelem k mravenčí zvláštnosti Čech a Moravy. (Key to the ants of Central-Europe especially of Bohemia and Moravia). — *Ent. listy (Folia entomologica).* — Brno 1941.

- NYLANDER: Adnotationes in monographiam formicarum borealium Europae. — Act. Soc. Fennic. (1846) 1847.
- RUZSKÝ: Beiträge zur Ameisenfauna des östlichen Rußland. — Arb. Ges. Naturf. Kasan (1895) 1896.
- Neue Ameisen aus Rußland. — Zool. Jahrb. 1902.
 - Die Ameisen der Umgebung des Aralsees. — Taschkent 1902.
 - Formicarii Imperii Rossici. — Arb. naturf. Ges. Kais. Univ. Kasan 1905.
- SADIL: Mravenec *Myrmica moravica* Soudek u Prahy (*Myrmica moravica* Soudek an ant new for Bohemia). — Čas. Nár. Musea v Praze 1939.
- Příspěvek k soupisu českých mravenců (Contribution à la liste des fourmis de la Bohême). — Čas. Čes. Spol. ent. Praha 1939.
 - Několik kritických poznámek o mravenci *Myrmica moravica* Soudek (Einige kritische Bemerkungen über die Ameise *Myrmica moravica* Soudek). — Ent. listy (Folia entomologica) Brno 1940.
 - Příspěvek k poznání mravenčí zvířeny Českomoravské vysočiny (Ein Beitrag zur Kenntnis der Ameisenfauna der Böhmischo-mährischen Höhe). — Ent. listy (Folia entomologica) Brno 1945.
- SANTSCHI: Notes sur le genre *Myrmica* Latr. — Rev. Suisse Zool. 1931.
- SOUDEK: *Myrmica moravica* n. sp., relikt fauny praeglaciální (*Myrmica moravica* n. sp., a relic of the praeglacial fauna). — Čas. morav. zem. Musea, Brno 1922.
- Four new European ants. — Ent. Rec. 1925.
 - Příspěvek k poznání moravských mravenců III. (Contribution to the Knowledge of the Moravian Ants). — Čas. morav. zem. musea, Brno 1922.
 - Mravenci — soustava, zeměpisné rozšíření, oekologie a určovací klíč mravenců žijících na území Československé republiky (Key to the Czechoslovak ants). — Praha 1922.
- STÄRCKE: Beginnende Divergenz bei *Myrmica lobicornis* Nyl. — Tijdschr. Ent. 1927.
- STITZ: Ameisen (Dahl, Tierwelt Deutschlands). — Jena 1939.
- WEBER: A revision of the North-American ants of the genus *Myrmica* Latr. with a synopsis of the palaearctic species II. — Ann. Ent. Soc. America 1948.
- ZÁLESKÝ: Formicoidea. Prodrómus našeho blanokřídlého hmyzu (Prodrómus hymenopterorum partiae nostrae) III. — Sb. ent. odd. Nár. Musea v Praze 1939.
- ZDOBNITZKI: Beitrag zur Ameisenfauna Mährens. — Zeitschr. Mähr. Landesmuseum, Brno 1910.