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PART 11

THE BRITISH ANTS ALLIED TO *FORMICA FUSCA* L.
(HYM., FORMICIDAE)

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For some years it has been evident that certain groups of British ants require revision, especially the *fusca* and *rufa* groups of the genus *Formica*. The present paper is restricted to those species traditionally associated with *F. fusca*. No serious work on these ants has been carried out in this country since Donisthorpe published his book in 1915 with the result that certain name changes are now found to be inevitable and *F. lemani* Bondroit is for the first time recognized as a common ant throughout the greater part of the British Isles. I am indebted to Dr. W. Hellén of the Universitetets Zoologiska Museum, Helsingfors, for the loan of Nylander's type specimen of *F. glebaria* and to Dr. A. Collart of the Institut Royal des Sciences Naturelles, Brussels, for the loan of type specimens from Bondroit's collection. The distribution maps are based upon specimens which I have personally examined, unless otherwise indicated, and I am particularly grateful to Mr. C. A. Collingwood of Evesham for the loan of specimens from many parts of both England and Scotland; I do not look upon these maps as final but they do at least indicate the parts of the British Isles in which the various species are known to occur.

DEFINITION OF THE *FUSCA* GROUP

Emery (1909) placed together those specimens of *Formica* (excluding *sanguinea* and *exsecta*) in which the thorax is narrow, the head distinctly longer than broad and the basal segments of the flagellum not much narrower than the more apical ones. This he called the *fusca* group as distinct from the *rufa* group in which, according to him, the thorax is more robust, the head scarcely longer than broad and the basal segments of the flagellum much narrower than the apical ones. Forel (1913) in Switzerland proposed the subgeneric name *Serviformica* for Emery's *fusca* group but Wheeler (1922) in America declared this to be "utterly untenable." More recently Stitz (1939) in Germany has revived the subgeneric status and has been followed in Great Britain by at least two writers (Collingwood 1951, Morley 1953). In America, on the other hand, Creighton (1950) has clearly shown that the characters used by Emery, Forel and Wheeler have not the value that was formerly accorded them and returns *Serviformica* to the species group level; this he defines at greater length, pointing out that many of the *rufa* group characters apply equally well to the *fusca* group, but that for practical purposes the two groups can be separated by differences of colour.

My own work, based largely on Palaearctic but including some Nearctic species suggests that group characters are to be found in the relative proportions of the segments of the maxillary palps (because of which these

palps appear long and slender in *fusca* group (fig. 6), shorter and stouter in *rufa* group (fig. 5)); in addition, and perhaps worth following up, the upper part of the mesepisternum of the worker runs smoothly into the mesonotum in *fusca* group but is clearly separated by a furrow from it in *rufa* group, this furrow being most pronounced in pseudogynes, common in *rufa* group but rare in *fusca* group. For the time being I propose to retain the species group.

Before leaving the subject of group characters some attention must be paid to Wheeler's (1913) revision of *Formica*; according to him, the *rufa* group species have the 2nd and 3rd flagellar segments longer and more slender than segments 6-8, the *fusca* group only slightly more slender (figs. 1, 2 and 3) but while this distinction applies to many (though not all) Nearctic *rufa* group species and to the Palearctic *F. truncorum* Fabr. (fig. 2) it does not apply to the majority of Palearctic *rufa* group species, in which these basal flagellar segments are shorter and broader, in fact scarcely any longer and very little less broad than the more apical ones.*

The following key will serve to distinguish the subgenera and species groups occurring in the British Isles:

1. Anterior margin of clypeus emarginate. *Raptiformica*
(*F. sanguinea* Latreille)
- Anterior margin of clypeus entire. 2
2. Head distinctly emarginate posteriorly, pronotum angular in profile
. *exsecta* group
- Head never more than slightly emarginate posteriorly, pronotum
rounded in profile 3
3. Maxillary palps short, stout and very hairy, the 5th and 6th segments
not longer than 2nd (fig. 5); ♀ ♂ bicoloured, frontal triangle shining,
often punctate but always very distinct from frons. Eyes of ♂
hairy. *rufa* group
- Maxillary palps long and slender, less hairy than in *rufa* group, the
5th and 6th segments distinctly longer than 2nd (fig. 6); ♀ ♂
bicoloured or black, frontal triangle dull, sculpture not very
different from that of the frons but smooth and somewhat shining
in one piceous black species. Eyes of ♂ bare. *fusca* group

The *fusca* group is represented in the British Isles by five species, viz.: *fusca* Linnaeus, *lemanii* Bondroit, *cunicularia* Latreille, *rufibarbis* Fabricius and *transkaukasica* Nasonov. As my interpretation of these species is at some variance with that of Donisthorpe (1915 and 1927) whose ideas were by no means original but followed the traditional masters, Emery and Forel, I propose to deal with the synonymy in greater detail than would otherwise have been necessary.

1. *Formica fusca* Linnaeus 1758; Schenck 1852, Smith 1858, Andre 1881, Saunders 1896, Donisthorpe 1915, 1927, Stütz 1939, Sweeney 1950.
F. glebaria Nylander 1846 nec Forel, Emery, Wheeler, Donisthorpe, etc. SYN. NOV.

* In ants the flagellum or funiculus is taken to include all antennal segments other than the scape, the term pedicel not being used for the second antennal segment as in certain other groups of Hymenoptera.

- F. fusca* i.sp. Forel 1874.
F. fusca fusca; Emery 1909, 1925, Wheeler 1913, Stärcke 1944.
F. fusca L. ? auct.; Bondroit 1918.
2. *Formica lemami* Bondroit 1917, 1919.
F. fusca; Nylander 1846, Donisthorpe in part 1915, 1927, Holgersen 1944.
F. nigra Linnaeus; Förster 1850.
F. fusca var. *lemami*; Emery 1925.
F. fusca lemami; Holgersen 1944, Stärcke 1944.
F. fusca race *lemami*; Samšínák 1951.
3. *Formica cucicularia* Latreille 1798; Förster 1850, Schenck 1852, Smith 1858 in part.
F. fusca "des pres"; Forel 1874.
F. fusco-rufibarbis; Forel 1874.
F. fusca var. *rubescens* Forel 1904, nec *F. rubescens* Leach 1825, Donisthorpe 1915, 1927.
F. fusca var. *glebaria*; Forel 1904, Donisthorpe 1915, 1927.
F. rufibarbis var. *fusco-rufibarbis*; Donisthorpe 1906, Wasmann 1906.
F. fusca fusca var. *glebaria*; Emery 1909, Wheeler 1913, nec Nylander.
F. fusca fusca var. *rubescens*; Emery 1909, Wheeler 1913.
F. fusca var. *fusco-rufibarbis*; Donisthorpe 1911.
F. fusca subsp. *glebaria*; Emery 1912, 1925.
F. fusca r(ace) *glebaria*; Forel 1915, 1920, Stitz 1939.
F. fusca r(ace) *glebaria* var. *rubescens*; Forel 1915, 1920, Stitz 1939.
F. fusca r(ace) *glebaria* var. *fusco-rufibarbis*; Forel 1915, 1920, Stitz 1939.
F. glebaria; Bondroit 1918, Stärcke 1944.
F. rubescens; Bondroit 1918. SYN. NOV.
F. fusca glebaria var. *rubescens*; Emery 1925, Stitz 1939.
- Note: Thus *glebaria* auctt. including and after Forel 1904 in all its combinations is a synonym of *cucicularia* Latreille. SYN. NOV.
4. *Formica rufibarbis* Fabricius 1793, auctt.
F. rufibarbis Fabricius; André 1881, Wasmann 1905, 1909, Wheeler 1913, Donisthorpe 1914, 1915, 1927, Forel 1915, 1920, Bondroit 1918, Emery 1925, Stitz 1939, Holgersen 1944, Stärcke 1944, Sweeney 1950.
F. obsoleta Linnaeus; Latreille 1798, nec Linnaeus.
F. stenoptera Förster 1850.
F. cucicularia; Smith 1858 in part.
F. fusca r(ace) *rufibarbis*; Forel 1874, Saunders 1896, Donisthorpe 1908.
F. fusca rufibarbis; Emery 1909.
F. fusca subsp. *rufibarbis* Donisthorpe 1911.

5. *Formica transkaucasica* Nasonov 1889; Donisthorpe 1918, Sweeney 1950.
F. gagates Latreille 1798; Smith 1866, nec Latreille.
F. picea Nylander 1846 nec Leach 1825; Donisthorpe 1915, 1927, 1943, Forel 1915, 1920, Emery 1925, Richards 1937.
F. fusca (ace) *gagates*; Forel 1874 in part, Saunders 1896.
F. glabra White 1883 nec Gmelin 1790.
F. fusca picea; Emery 1909, Wheeler 1913.
F. fusca var *picea*; Donisthorpe 1913.

NOTES ON SYNONYMY

1. *Formica fusca* Linnaeus and *Formica lemami* Bondroit.

Unfortunately there is no type specimen of *F. fusca* Linnaeus known to be in existence and the original description "F. cinereo-fusca, tibiis pallidis" does not exclude the possibility of *F. lemami* Bondroit being the real *fusca*. However, in 1761 (Fauna Svecica, 2nd Edition) Linnaeus amplified the description by adding "corpus cinereo-fuscum, pilis cinerascentibus minutissimus vestitum, unde certo modo ad lucem visum, videtur nigrum, alias cinereum," a statement which applies better to the generally accepted *fusca* than it does to *lemami*. It is perhaps not appreciated that this description must apply to a dealated female and not to a worker as generally supposed, for Linnaeus (1761) makes the comment "caput fere thorace angustius," quite inappropriate to *fusca* group workers which have the head considerably wider than the thorax! Since the species generally taken to be *fusca* is known to occur in Southern Sweden I propose to accept this until evidence to the contrary is brought forward. Although described as a species, subsequent workers have treated *lemami* either as a variety or as a subspecies of *fusca*, or like Donisthorpe have declined to recognize it at all. I find no grounds for disagreeing with Bondroit.

Some years ago Dr. Holgar Holgersen of the Stavanger Museum, Norway, told me that he believed the type of *glebaria* Nylander to be a female of *fusca* Linnaeus and not at all the species which modern myrmecologists are accustomed to call *glebaria*. Through the kindness of Dr. W. Hellén of the Universitetets Zoologiska Museum, Helsingfors, I have been able to examine this specimen and I confirm Dr. Holdersen's opinion: *glebaria* Nylander is therefore a direct synonym of *fusca* Linnaeus. Examination of specimens named *fusca* by Nylander, also kindly lent by Dr. Hellén, all prove to be *lemami*; in the light of this knowledge it is understandable how Forel came to misinterpret *glebaria*, for he expected it to have a female with the gaster more pubescent than his *fusca*.

2. *F. cunicularia* Latreille and *F. rufibarbis* Fabricius.

As already mentioned the name *glebaria* Nylander is not available for the species thus interpreted by Forel; it was in fact Forel who contributed most to the confusion which surrounds the bicoloured species of the *fusca* group. Latreille (1798) had recognized two bicoloured species under the names *F. cunicularia* Latreille and *F. obsoleta* Linnaeus, at the same time suggesting that *F. rufibarbis* Fabricius was in all probability a dark variety of the former. A few years later Latreille (1802) united these two species under the name

cunicularia. However, the descriptions leave one in very little doubt that Latreille's species were the two which have come to be known as *glebaria* and *rufibarbis*, the former having ♀ and ♂ largely dark but with red markings, the latter largely red with some dark markings. It was Förster (1850) who first drew attention to the thoracic hairs of "*rufibarbis*" when he very adequately described it as *F. stenoptera*. There can be no question whatever as to the identity of *stenoptera*, though, as I shall shortly demonstrate, the same cannot be said for *rufibarbis* itself. Forel, with an obsession for hybrids produced by cross-breeding "races" of polytypic species could see in *cunicularia* Latreille no more than a transitional form (formes transitoires, formes intermédiaires, Übergangsformen, kreuzungsprodukt) between a black and hairless "race" and a red and hairy "race." (i.e. *fusca* and *rufibarbis*) which he first named *fusca-rufibarbis*, later *fusca* var. *glebaria* Nyl or *fusca* var. *rubescens* Forel, according to whether black or red was dominant. His identification of *stenoptera* Förster with *rufibarbis* Fabricius is somewhat disconcerting when one recalls that Fabricius (1804) was at great pains to make it clear that his *rufibarbis* differed from Latreille's *cunicularia* by having antennae and mandibles entirely black! It is indeed hard to imagine that *rufibarbis* belongs to the *fusca* group at all. What prompted Forel to use this name for a species of which the antennae are red, and why Emery and Wheeler followed him is difficult to comprehend. It is perhaps worth pointing out that *rubescens* Forel 1904 is a homonym, *Formica rubescens* Leach 1825 (= *Polyergus rufescens* Latreille) having priority: furthermore, from Forel's original description it is only too clear that he looked upon *rubescens* as a colour form, an aberration, and as such the name would have no standing in zoological nomenclature.

3. *F. transkauucasica* Nasonov.

As long ago as 1918 Donisthorpe drew attention to a paper by Leach (1825) in which a species *Formica picea* was described, thus antedating *F. picea* Nylander by some twenty-one years: Donisthorpe at the same time pointed out that *F. transkauucasica* Nasonov was the next available name. The validity of Donisthorpe's decision was disputed by Emery (1921) in a short note aimed to remove Leach's species from the sphere of taxonomic recognition, his reason for so doing being that in his opinion there were "certain principles (of nomenclature) which should be applied only *cum grano salis*, i.e. only when they are practical and useful and should be abandoned when they merely create embarrassment and confusion. Such is the principle of priority in zoological nomenclature which certain entomologists have pushed to most regrettable extremes. For my part, I shall continue to designate *Formica picea* by the name which was applied to it by Nylander in 1846." Emery's reputation was such that Donisthorpe gave way, and, except on one occasion (1937) thereafter used Nylander's name. Richards (1937) in his check list of British Aculeates retained the name *picea* Nylander, commenting that "myrmecologists do not appear to have decided what is the next available name for Nylander's species . . ." The position is obviously unsatisfactory and I propose to ignore Emery's "*grano salis*." If myrmecologists decide that this creates "embarrassment and confusion" there are more orthodox ways of obtaining a decision on Leach's names than the one Emery adopted. Since

Nasonov's description of *transkaucasica* (1889) is in Russian and the work inaccessible to most myrmecologists in this country it seems desirable to take this opportunity to publish a translation; I am indebted to Dr. Dirsch of the Commonwealth Institute of Entomology for helping me with this.

♂. Black, mandibles, base of antennae, leg joints and lower part of scale dark brown. Smooth, shining, sparingly punctured and with faint rugosities on head and thorax; no pubescence but with sparse upstanding hairs, on gaster mostly ventrally, rarely on coxae and between antennae; remainder as in *gagates*. 3.5-4.5 mm. Caucasus, near Tiflis.

The spelling *transkaucasica* follows Nasonov 1889, page 21, although later (page 62) he spells it *transcaucasica*. Ruzsky (1905) and Stitz (1939) follow the second spelling but Wheeler (1913), Donisthorpe (1918 et seq.) and Sweeny (1950) prefer *transkaukasica*. While perhaps not of great moment, there seems no good reason for varying from the original, nor for continuing to spell the author's name Nasonov. Probably on account of the difficulty of seeing Nasonov's paper and the fact that it is entirely in Russian, the literature contains a number of references to it all of which differ in a somewhat bewildering manner and all of which prove an absolute obstacle to tracing it in the "World List." Wheeler (1913) gives only half the necessary title, Donisthorpe (1918) gives incorrect volume and page number and Stitz (1939) credits the name of the species to Ruzsky (1905). The title given in the references at the end of the present paper is in accordance with the current issue of the "World List."

DISTRIBUTION

1. *F. fusca* Linnaeus (map A).

Isles of Scilly, Cornwall, Devon, Lundy Island, Somerset, Wiltshire, Dorset, Isle of Wight, Hampshire, Sussex, Kent, Surrey, Middlesex, Essex, Berkshire, Oxfordshire, Buckinghamshire, Suffolk, Norfolk, Cambridgeshire, Bedfordshire, Gloucestershire, Monmouth, Hereford, Worcestershire, Warwickshire, Staffordshire, Shropshire, Glamorgan, Brecon, Radnor, Pembroke, Montgomery, Derbyshire, West Lancashire, Tisee and Eigg Islands.

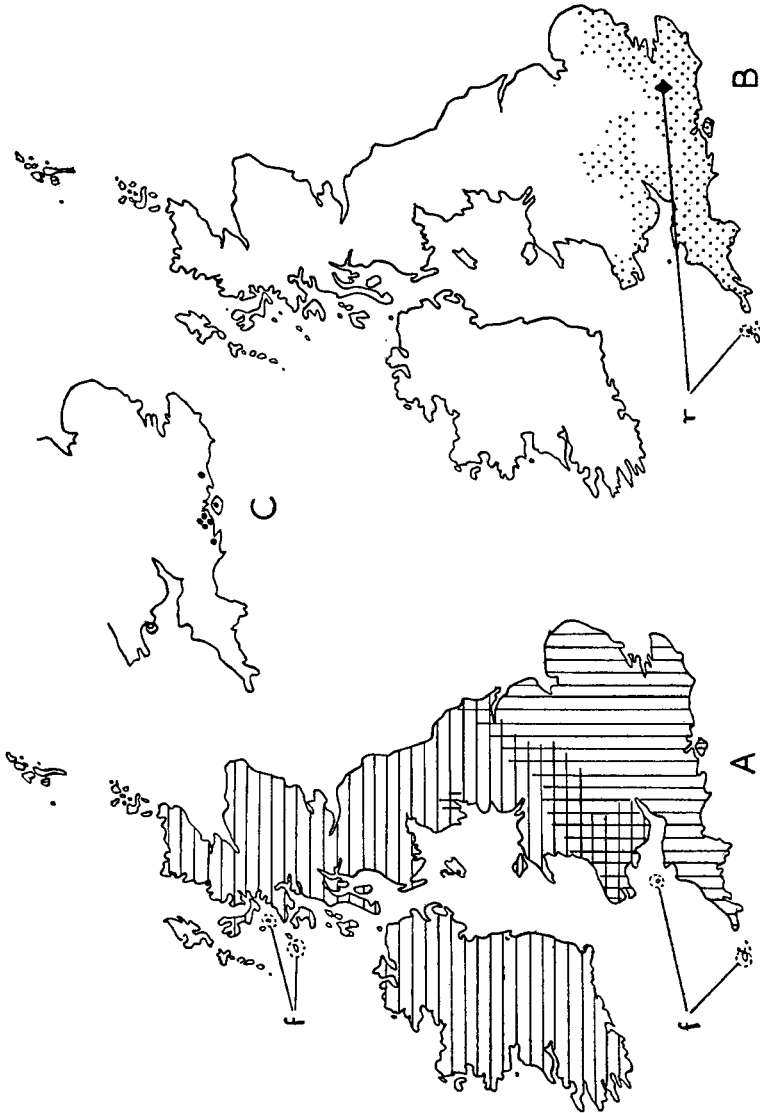
2. *F. lemani* Bondroit (map A).

Monmouth, Warwickshire, Staffordshire, Shropshire, Glamorgan, Brecon, Radnor, Pembroke, Montgomery, Anglesea, Derbyshire, Cheshire, Durham, Northumberland, Westmorland, West Lancashire, Cumberland, (? Isle of Man), Kirkcudbrightshire, Wigtown, Berwick, Fyfe and Kinross, Kincardineshire, Perthshire, Aberdeen, Moray, Inverness, Argyll, Dumbarton, Arran, Skye, Raasay, East and West Ross, East and West Sutherland, Caithness, Hoy Island, Co. Down, Fermanagh, Meath and Clare. The following additional localities in Ireland are on record under *F. fusca* but I have not seen specimens: Co. Derry, Antrim, Armagh, Tyrone, Donegal, Louth, Dublin, Kildare, Wickford, Wexford, Longford, Mayo, Galway, Tipperary, Waterford, Cork, Kerry (Stelfox 1927 and O'Rourke 1950).

3. *F. cunicularia* Nylander (map B).

Cornwall, Devon, Somerset, Dorset, Isle of Wight, Hampshire, Sussex, Kent, Surrey, Essex, Middlesex, Oxford, Monmouth, Worcestershire,

Glamorgan, Pembroke. There are a number of records from more northern counties, from Scotland, and one from Ireland, none of which I am prepared to accept without seeing specimens, since in one instance (Argyll) specimens of *lemani* were identified by Donisthorpe as *rufibarbis*, in another (Lundy



MAP A, Distribution of *F. fusca* Linnaeus (vertical lines and f) and *F. lemni* Bondroit (horizontal lines). B, Distribution of *F. cunicularia* Latreille (dotted) and *F. rufibarbis* Fabricius (r). C, Distribution of *F. transcaucasica* Nasonov.

Island) specimens of *fusca* were identified as *cunicularia* by F. Smith and I have seen a number of confusions in one direction or the other between small individuals of *rufibarbis* and *F. rufa* auctt.

4. *F. rufibarbis* Fabricius (map B).

St. Martin's, Isles of Scilly 1940, Chobham 1887, 1952, 1953, Reigate 1905, Ripley 1908 and Weybridge, Surrey, 1911-25, 1937.

5. *F. transkaucasica* Nasonov (map C).

Bournemouth, Matley Bog, Denny Bog, Ridley Bog, Rhinefields near Brockenhurst, "New Forest" Hampshire. Near Wareham, Dorset. Isle of Wight. Washington, Sussex (Teste Brangham *in lit.*). Donisthorpe's determination of this species from Rhosilli in the Gower Peninsula requires specimens for support, and is probably *lemanii* Bondroit.

NOTES ON THE SPECIES

1. *fusca* Linnaeus and *lemanii* Bondroit.

It appears that *lemanii* replaces *fusca* over the greater part of the British Isles, overlapping it in South and mid Wales, Monmouth, Shropshire, Stafford, Derby, Warwick and possibly also in parts of Lincolnshire, Yorkshire, Cheshire and Lancashire, from which counties further collecting is essential before the full extent of the overlap can be appreciated. In Ireland also the position requires further study since from the material I have seen *fusca* itself appears to be absent, *lemanii* being the sole representative of the group. The somewhat remarkable occurrence of *fusca* on two of the islands off the west coast of Scotland (Eigg and Tiree) yet apparently nowhere on the mainland, may perhaps be explained by the probability that these islands, with Rhum, Muck and the Outer Hebrides, were not ice-covered during the third glacial phase, while the other Inner Isles and the mainland were, though the apparent absence of *fusca* from Ireland is surprising under such circumstances. The occurrence of *lemanii* throughout the mainland of Scotland, in the Orkneys (Hoy Island) and on the Inner Islands of Skye and Raasay at any rate, though not on Eigg and Tiree, suggests that the species reached these parts after the latter had ceased to be connected to the mainland at the end of the second interstadial phase but well before submergence of the Islay-Inishowen landbridge in early postglacial times made entry into Ireland impossible.

The small area in West Lancashire, round Arnside, Grange-over-Sands and Witherslack where *fusca* occurs in apparent isolation may be misleading and it would come as no surprise if the presence of the species were confirmed from the South Lancashire and Cheshire coastal regions; according to Cooke (1879) *fusca* was common in Lancashire and Cheshire but so far I have seen only *lemanii* from those counties. An entry in Donisthorpe's note book records *fusca* from the Isle of Man but I have not seen the specimen and feeling that *lemanii* is at least as likely as *fusca* on this island I prefer to leave the matter open.

In the area of overlap if these two were conspecific subspecies as some authors believe, one would expect to find intermediates due to cross-breeding but this does not appear to me to be the case although I realize such a cross

might be difficult to recognize. Samšišák (1951) describes a *F. fusca* f. *fuscolemani* for colonies in which some of the workers appear to be *lemani*, others *fusca*. In Great Britain I have seen somewhat similar samples of workers though these are not restricted to the areas in which hybridization is possible but occur over the whole of the *lemani* area. Comparatively hairless individuals are not infrequent in samples of otherwise quite normal *lemani* and I think these are in all probability due to abrasion—either in lifetime, not at all an impossibility, considering the hard rocky situations in which the nest is excavated, or after death due to careless handling and mounting. I have never yet seen a fair sized sample which presented any difficulty but single specimens may prove very perplexing; nevertheless, with experience even the most obstinate individual may be correctly placed by means of the sculpture of the frons.

Bernard (1946) has put on record the interesting fact that where *fusca* and *lemani* occur together in the central Pyrenees, the former nests in warmer situations than the latter to the extent that one will be found on the south slopes, the other on the north slopes of the mountains. That they both exhibit some tolerance towards the conditions favourable to each other is demonstrated at any rate in the British Isles, in the area of overlap where the two species may occasionally be found nesting close together. On the whole, however, *lemani* will be found on higher ground, in more rugged and exposed positions while *fusca* will be lower and in more sheltered places; these two species are perhaps only rarely truly sympatric.

It is interesting to know that Donisthorpe received specimens of *lemani* taken in both Hoy Island and Argyll in 1936 (Weathrill 1939) and commented that the workers had bristles on the thorax, a thing new to his experience; he thought they might be *Formica rufibarbis* F. but their state of preservation was such as to make exact identification impossible. Further specimens taken in Hoy in 1938 were sent to Donisthorpe who then named them *F. fusca*.

Stelfox (1927) noted that many of the ♂ *fusca* (= *lemani* Bondroit) taken in Ireland have mandibles with four or five well developed teeth; Donisthorpe (1927) commenting on this stated that although he himself had examined hundreds of ♂ *fusca* he had never encountered one with toothed mandibles and he mentioned André, Emery and Forel as being of similar experience. Wheeler on the other hand was not so explicit, for after having stated that the Baltic amber *Formica flori* Mayr had "completely edentate mandibles like those of the modern *fusca*" (Wheeler 1913) he later (p. 495) wrote of *F. fusca* "the mandibles are often, if not always denticulate" (*op. cit.*). The fact is that toothed mandibles in males of *fusca* group are of quite frequent occurrence, one or both mandibles being affected. In Donisthorpe's own collection many of the male specimens placed under *fusca*, *glebaria* and *rubescens* have toothed mandibles.

On the Continent *lemani* occurs on high ground in Scandinavia, Central and S. Europe, while *fusca* is fairly generally distributed throughout Europe though not reaching the altitudes of *lemani*.

2. *cunicularia* Latreille and *rufibarbis* Fabricius.

Both species are abundant on the Continent though showing a more southerly distribution than *fusca*, and their occurrence in the southern part of the British Isles must be looked upon as representing the edge of their range;

indeed *rufibarbis*, known at the present time in this country from one locality only, appears to be in imminent danger of extinction. My discovery in 1940 of this species in the Isle of Scilly (Yarrow and Guichard 1941) is especially interesting if not a fortuitous introduction. It is extremely difficult to imagine why *rufibarbis* should have been restricted to four localities in Surrey for there are many apparently similar areas of heathland in Hampshire, Dorset and Berkshire. It is of course well known that species on the fringe of their range frequently exhibit striking deviations from their usual behaviour pattern. *F. cucicularia* is much more widely distributed than *rufibarbis* and shows a proclivity for coastal areas where it nests in cliffs and walls as well as beneath stones; on the other hand, it also occurs in sandy places well inland, as at Hampstead Heath, in Oxfordshire and in Worcestershire. Records of *cucicularia sensu* Smith 1858 from Lancashire, Yorkshire, Rutland, Dumfries in Scotland and Ballybunion in W. Ireland I cannot accept until specimens support them; Smith's *cucicularia* from Lundy Island is *fusca* and Donisthorpe's *rufibarbis* from Argyll is *lemani*, and so is Donisthorpe's *fusca* var. *fusco-rufibarbis* (*Ent. Rec.* 1913).

The possibility of these two being conspecific subspecies cannot be overlooked but owing to the extreme rareness of *rufibarbis* in this country one is obliged to turn to the Continent for confirmation or otherwise. The fact that they are sympatric both here and abroad, that the supposed hybrid *fusco-rufibarbis* Forel proves to be *cucicularia* Latreille and that *cucicularia* is timid and hides when the nest is disturbed while the other, under similar circumstances, swarms out and attacks the intruder after the manner of wood ants, must go a long way to uphold their separateness; on the other hand, they are morphologically so very similar that confusion can be well understood though one cannot say the same for the linking of either with *fusca* itself. Donisthorpe (1920) was most irate with Bondroit for saying that *glebaria* and *rubescens* workers occasionally have one or two hairs on the prothorax (Bondroit 1918) and stated "we have examined hundreds of specimens of these two varieties of *fusca* and we have never found them to possess hairs on the pronotum." In his own collection of sixty workers, twenty-two have one or two thoracic hairs.

F. transkaucausica Nasonov.

Whether this species is more widespread in the south of England than is at present believed must remain a matter of conjecture until there has been further collecting in suitable places; it seems not unreasonable to presume that even in the New Forest there are many areas as yet unexplored by myrmecologists, and it is interesting to note that during this passed summer it has been discovered from two new localities; in one of these (Picket Plain) the single occupied nest found was some distance away from the bog itself although on wet ground and was built largely of *sphagnum* among heather stems; another but unoccupied nest was similarly constructed. I am grateful to Mr. C. Colyer for enabling me to see this colony for myself. It is interesting to note that when Farren White knew this species (which he named *F. glabra*) at Bournemouth he was accustomed to find it on heather and gorse and he remarked that Smith's Bournemouth specimens (of supposed *F. gagates*) had been found on the roadside (White 1895 (2nd Edition)). Donisthorpe, who knew the species only at Matley Bog, took great exception

to Bondroit's statement that *picea* had an alpine or subalpine distribution, nesting in "tourbieres and damp meadows" (Donisthorpe 1920: 74), but "tourbieres" should be translated as peat-bogs not as "turf-pits"; he mentioned as exceptional Kutter's record of this species at 1,800 metres in Switzerland making earth nests without a trace of *sphagnum* (Kutter 1917). On the Continent this species is known from Northern Russia, Finland, Sweden, Denmark, Germany, Belgium, France, Switzerland, and Central Asia. Holgersen (1943) has shown that *F. gagatoides* Ruzsky is an abundant species in Norway previously confused under the names *picea* Nylander and *gagates* Letreille; it has very different habits from *transkaucasica*, however, nesting in dry pine woods, etc. It would not surprise me if this species turned up in Scotland where it would almost certainly be confused with *F. lemami*. *F. gagates* has a south-westerly distribution in Europe and is unlikely to be found anywhere in the British Isles; it lives in oak woods.

KEYS TO THE BRITISH SPECIES OF THE *FUSCA* GROUP

FEMALES

1. Underside of head with one or two long hairs,* frontal triangle smooth and shining, 3rd antennal segment short, not much longer than its maximum width (fig. 4); unicolorous black or piceous species.....*transkaucasica* Nasonov
- Underside of head never with such hairs, frontal triangle dull, or if at all shining, then conspicuously sculptured, 3rd antennal segment longer, about twice as long as its maximum width (fig. 3); black or bicoloured species 2
2. Upper part of mesothoracic episternum shining and with conspicuous large punctures, microsculpture superficial and often largely effaced; scale without upstanding bristle-like hairs on upper margin; thorax black 3
- Upper part of mesothoracic episternum matt with copious punctures and pronounced microsculpture; scale with some long bristle-like hairs on upper margin; thorax black with varying amounts of red. . 4
3. Mesonotum and scutellum brilliantly shining, often almost impunctate, gaster shining and with very scanty pubescence; femur 2 with a number of long hairs beneath (sometimes absent, probably due to abrasion but usually one hair remains about half way along the femur); long outstanding hairs arise on pronotum as far back as tegulae.....*lemami* Bondroit
- Mesonotum and scutellum less shining due to punctures and surface sculpture, gaster less shining, more sculptured and more pubescent; femur 2 with at most one or two hairs beneath, these restricted to the basal quarter and never extending midway or farther along the femur; long outstanding hairs on pronotum restricted to anterior part, rarely a few hairs further back.....*fusca* Linnaeus
4. Frontal triangle wider than long; epinotum varying from entirely black to entirely reddish yellow, without any bristle-like hairs on dorsum; mesonotum entirely dark or with red markings near the

wing bases; in the palest examples there are two red marks near the anterior mesonotal margin; pronotum dark with varying amounts of red, in the palest examples almost entirely red; legs varying from dark red-brown to entirely pale. Gaster dark with varying amounts of red on 1st segment and ventrally; exceptionally the whole of the first segment is red. *cunicularia* Latreille**

- Frontal triangle longer than wide; epinotum entirely or almost entirely yellowish-red, in fresh examples with about six upstanding bristle-like hairs on dorsum. Mesonotum with the red colour much developed, so that the two anterior spots of *cunicularia* are extended backwards either as reddish stripes which join approximately between the wing bases or are widened to such an extent that the black colour is obliterated except for three areas, one in the middle of the anterior third of the notum and two lateral stripes above the wing bases; pronotum and scale almost entirely pale, scutellum and postscutellum usually black, the former sometimes red anteriorly, prescutellar lobes red; legs usually pale. *rufibarbis* Fabricius**

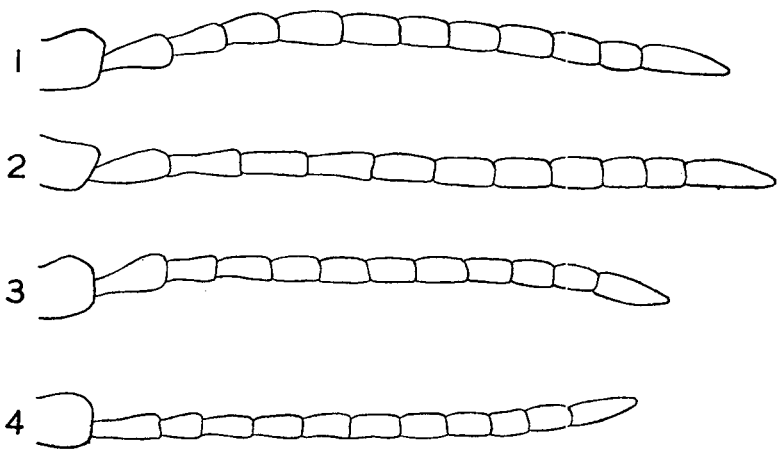


FIG. 1, Flagellum of *F. rufa* Linnaeus. 2, Flagellum of *F. truncorum* Fabricius. 3, Flagellum of *F. fusca* Linnaeus. 4, Flagellum of *F. transkauucasica* Nasonov.

WORKERS

- 1. Underside of head with one or two long hairs,* frontal triangle shining, 3rd antennal segment short, not much longer than its maximum width (fig. 4), thorax with numerous long, fine, anteriorly curved hairs, unicolorous black or piceous *transkauucasica* Nasonov
- Underside of head never with such hairs, frontal triangle dull, 3rd antennal segment longer, about twice as long as its maximum width (fig. 3). In species which have upstanding hairs on thorax, these are stout and bristle-like and not curved forwards. Black or bicoloured species 2

2. Body usually entirely black, cheeks and clypeus rarely somewhat reddish, 2nd gaster segment seen from in front and above somewhat shining, the fine microsculpture wider apart than in following species 3
- Body never entirely black, cheeks, clypeus and parts of thorax always reddish-yellow, 2nd gaster segment seen from in front and above dull due to excessively fine microsculpture 4
3. Pronotum with at most two or three upstanding bristle-like hairs; femur 2 without hairs beneath, sculpture of frons exceedingly fine so that between the two lateral carinae and between the ocelli and the eyes even under high magnification individual punctures are difficult to locate..... *fusca* Linnaeus
- Pronotum with numerous upstanding bristle-like hairs (sometimes much abraded); femur 2 beneath with long hairs (as in ♀); sculpture of frons coarser, punctures readily seen, interspaces more shining..... *lemani* Bondroit
4. Scale with some bristle-like hairs on upper margin; pronotum and mesonotum with abundant upstanding hairs (rarely abraded) sometimes a few similar hairs on epinotum; whole of thorax, epinotum and scale usually of a clear yellowish red, somewhat infuscated in small individuals *rufibarbis* Fabricius
- Scale without any bristle-like hairs on upper margin; pronotum and mesonotum usually without upstanding hairs though not infrequently with two or three on pronotum, rarely with some also on mesonotum; thorax and scale varying between almost entirely dark reddish and pale yellowish red similar to some individuals of *rufibarbis* but in all sized specimens the pronotum and mesonotum are considerably darkened..... *cumicularia* Latreille

MALES

1. Underside of head with one or two long outstanding hairs,* the adpressed pubescence very long; flagellum very long and slender, almost parallel sided, gaster shining with long fine pubescence and finely punctured, the two basal segments almost impunctate in the middle apically..... *transkaucasica* Nasonov

* To those accustomed to the Continental *F. cinerea* which has the underside of the head densely hairy it may seem that something similar should be expected in *F. transkaucasica*; this is not at all so, however, and Wheeler (1913) treated this species in his key as though without such hairs, commenting, however, that in one of two specimens from Tibet he did find one or two hairs and that Emery had also noticed the same in Oriental specimens. I have recently collected a series of 50 workers from one nest, 27 specimens having one or two long hairs; it may be that those without such hairs are abraded.

** I am fully aware that the characters used to separate the sexual forms of *rufibarbis* and *cumicularia* leave a lot to be desired but with the material at my disposal I am unable to do more; the extreme rarity of *rufibarbis* in the British Isles (see under *Distribution*) has made long series of specimens an impossibility but even so comparison with Continental material makes it clear that Donisthorpe's Weybridge females are exceptionally red on the thorax and should not be used as typical; indeed, of the limited material I have seen, only these Weybridge females exhibit the red so completely dominating the black; furthermore, Donisthorpe's specimens are so smothered with tragacanth that finer details of sculpture, pubescence, etc., have been obliterated.

- Underside of head without such hairs, the adpressed pubescence very short; flagellum less parallel sided, segments 3, 4 and 5 usually somewhat wider than the others, gaster scarcely shining, with very short adpressed pubescence, very closely and finely punctured. . . . 2
- 2. Scale with long outstanding bristle-like hairs on apical margin (fig. 8) 3
- Scale with only short fine hairs on apical margin (fig. 7). *fusca* Linnaeus
- 3. Scutellum and gaster somewhat shining, the latter with scanty pubescence *lemani* Bondroit
- scutellum and gaster dull 4
- 4. Legs darker, the femur largely or entirely dark, rarely only somewhat infuscated, remainder of leg of a brownish red, coxa and most of tarsus dark, occasionally legs entirely dark.
- *rufibarbis* Fabricius
- Legs paler, frequently entirely pale reddish yellow, only the coxa and apical tarsal segment dark, more rarely the femur somewhat infuscated. *cunicularia* Latreille

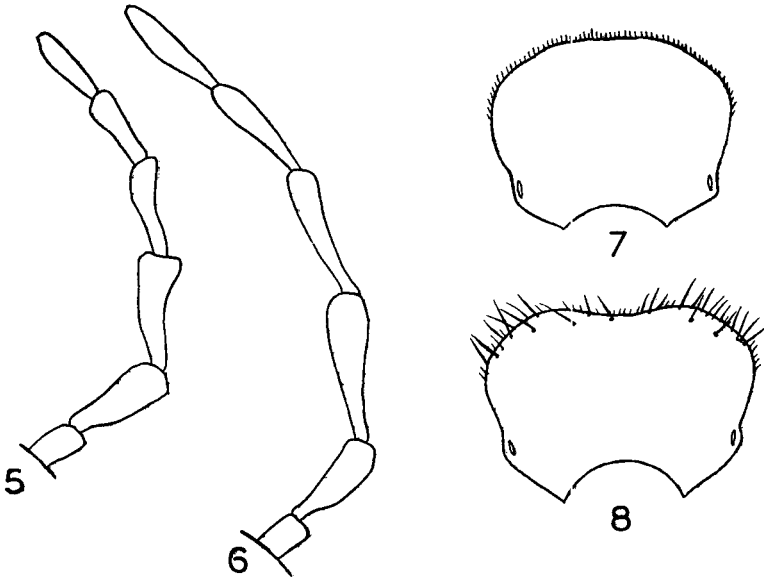


FIG. 5, Maxillary palp of *F. rufa* Linnaeus ♀. 6, Maxillary palp of *F. fusca* Linnaeus ♀. 7, Scale of *F. fusca* Linnaeus ♂. 8, Scale of *F. lemani* Bondroit ♂.

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