Photo. Hugh Main.

Ergatandromorph of M. scabrinodis, Nyl.

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Some Notes on the Genus Myrmica, Latr.

(With one plate and several figures.)

By H. St. J. K. DONISTHORPE, F.E.S., F.Z.S.

The type of the genus *Myrmica*, Latreille[1] is, as pointed out by Wheeler,[2] the *Formica rufa*, L. Emery[3] considers the *F. rubra*, L., to include both *M. laevinodis*, Nyl., and *M. ruginodis*, Nyl., in which he is no doubt correct. It is impossible to say which of the two Linnæus[4] really meant, so the name *rubra* must be dropped.

In *Myrmica* the antennæ are thirteen jointed in the male, and twelve jointed in the female and worker. There are two nodes to the pedicle, the petiole and post-petiole; the ♀ and ☿ are armed with a sting, and no ocelli are present in the latter. The larvæ never spin cocoons, the pupæ being always naked.

The following characters will separate *Myrmica* from all our other genera in the *Myrmicinae*:—

Mandibles broad, three cornered, and toothed on the inner side; petiole rounded, post-petiole not armed with a spine beneath; club of antennæ more than two jointed; epinotum armed with spines; eyes large, prominent; three last joints of the funiculus of the antennæ together much shorter than the rest. The forewings with one submarginal cell divided by a transverse nerve which enters the cell and half divides it.

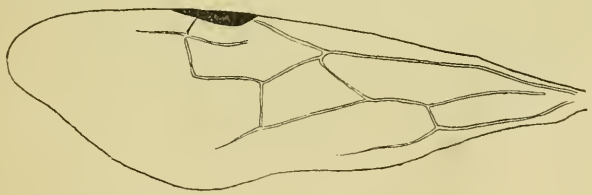

Fig 1

Typical Myrmica wing.
Forewing of M. ruginodis ♂.

[1] *Hist. Nat. Crust. et Insect*, iv., 1802, p. 131.
[2] *Ann. New York Acad. Science*, xxi., 1911, p. 168.
[3] *Deutsch. Ent. Zeitschr.*, 1908, p. 169.
[4] *Syst. Nat.*, ed. x., 1758, p. 580.

This is the usual form of the forewings in *Myrmica*, but Nylander[5] describes and figures the forewing of a *laevinodis* ♂ in which the nerve entirely divides the cell. I possess a ♂ of this species, taken by B. S. Harwood at Sydmonton, in which the right forewing is exactly as in Nylander's figure. Hallett sent me another ♂, which he had captured near Cardiff, in which both forewings differ from the typical form. As Wheeler[6] remarks, the wings in ants are sometimes highly variable in detail, even in ♂ ♂ and ♀ ♀ reared from the same mother.

Myrmica species, in common with some other ants, possess the power of stridulating. In this genus it is caused by rubbing the post-petiole against the first gastric segment, which is furnished with a file composed of very fine transverse ridges. On this subject Wheeler[7] writes—"Stridulation, at least among the *Myrmicinae* . . . . is an important means of communication, which Bethe has completely ignored, and even Forel and other myrmecologists have failed to appreciate. It readily explains the rapid congregation of ants on any particle of food which one of their number may have found, for the excitement of finding food almost invariably causes an ant to stridulate and thus attract other ants in the vicinity. It also explains the rapid spread of a desire to defend the colony when the nest is disturbed." Swinton[8] records the stridulation of *M. ruginodis* at Guildford, Sharp,[9] in a paper on stridulation in ants, refers to *M. scabrinodis*, and Janet[10] describes the stridulation in *Myrmica* and gives some very beautiful figures of the apparatus by which the sound is caused.

The ants of this genus are common to the Nearctic and Palæarctic regions. The geographical distribution of our species will be found under each. Their British distribution has not yet been accurately determined, but such as is known will be given in the hope that some of our entomologists may be able to supply me with further records. To mark the distribution in the British Isles I have adopted the Watsonian system of counties and vice-counties.

I shall also give a list of such myrmecophiles as have occurred with each species, chiefly in Britain. I may here mention that species of the genus *Myrmica* are the winter hosts of beetles of the genus *Atemeles*, and that the "wood-louse" *Platyarthrus hoffmanseggi*, and the Collembola *Cyphodeirus* (*Beckia*) *albinus*, are common to all our species. Species of *Myrmica* both keep Aphides in their nests, and also seek others, to milk them, on their proper food plants. These plant lice are perhaps most cultivated by *M. laevinodis*. When these ants carry each other, the one that is carried is not held under the body as in *Formica*, but lies over the back with the ventral surface uppermost, the legs and antennæ being folded up.

I have found the winged forms from June to October, but September is the usual month for the marriage flight. The winged sexes at this time are often so numerous as to give the impression of a cloud of smoke in the air. Farren White[11] records a flight of *M. laevinodis*

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[5] *Acta Soc. Fennicae*, V. 2, 1846, p. 943, pl. xviii., fig. 4.
[6] *Ants*, 1910, p. 24.
[7] *Science*, N.S., xviii., 1903, p. 832.
[8] *Ent. Mo. Mag.*, xiv., 1878, p. 187.
[9] *Trans. Ent. Soc. Lond.*, ii., 1893, p. 206.
[10] *Ann. Soc. Ent. France*, 1893, p. 161, etc.
[11] *Ants and Their Ways*, 1895, p. 76.

near Stonehouse, in which the ants had the appearance of curling smoke. As soon as the male and female are joined in the air, they fall together to the ground. Dalglish[12] has recorded these ants swarming and dropping like rain on to a green-house. Crawley tells me that on one occasion he was in a hammock in his garden reading, and thought at first it had begun to rain, by the pattering on the leaves of the trees, caused by *Myrmica* males and females falling down together. Bond[13] described a combat of ants which occurred near Hornsey in the summer of 1828. This, however, was clearly a marriage flight of *Myrmica*. He says that they met in mid-air and always fell to the ground in pairs, one black and the other red. The former were of course the males, the latter the females. The males die shortly after the marriage flight, but Lord Avebury[14] kept males of *M. ruginodis* alive from August till the following spring, one living till May, and Janet[15] had males living from October till the following April.

The females are capable of founding their colonies alone. This was first demonstrated by Lord Avebury[16], who succeeded in rearing a brood from eggs laid by females in captivity. In this experiment the workers reared remained about six weeks in the egg, a month in the larval state, and 25 to 27 days as pupæ. Janet[17] gives the times occupied for the development of *Myrmica* workers as—eggs 22-24 days, larvæ 30-71 days, and pupæ 18-22 days; total 71-117 days. The brood are arranged in different heaps according to size, as is the habit in some other ants. In observation nests the eggs and young larvæ are generally kept in the damper chambers, and the pupæ in the dryer.

Many females may be present in the same nest (Wasmann's[18] Secondary Pleometrose), which is caused by the re-seeking of their own colony by ♀ ♀, which have been fertilized near their own nest. This is especially the case with *M. laerinodis*, which often possesses large and populous colonies. Crawley observed a fine colony of this species near Oxford, which extended over a large area. *M. ruginodis* and *M. laerinodis* are far the most war-like, and sting much more severely than our other species, *M. scabrinodis* is more cowardly, but it robs other ants' nests, carrying off a worker which is killed and devoured. Forel[19] records that he has often seen it enter a nest of *Lasius flavus*. Crawley noticed in Nottinghamshire, where a number of both *M. scabrinodis* and *L. flavus* nests occurred on a lawn, that, at the entrances to the former nests, an accumulation of a yellow refuse occurred, which kept increasing. On examination it proved to be composed of vast quantities of the heads of *L. flavus*. These two species have often been recorded as living close together. Gould[20] wrote as long ago as 1747—"Very often the Red Ants reside in a distinct part of the Yellow Ant-Hills." Smith[21] says that *M.*

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[12] *Nat. Notes*, 1896, p. 261.
[13] *Ent. Mag.*, iv., 1837, p. 221.
[14] *Ants, Bees and Wasps*, 1882, p. 33.
[15] *Obs. sur les Fourmis*, 1904, p. 40.
[16] *l.c.*, pp. 32-33.
[17] *l.c.*, pp. 36-37.
[18] *Biol. Centralb.*, xxxv., 13., 1910, p. 454.
[19] *Fourmis de la Suisse*, 1874, p. 381.
[20] *An Account of English Ants*, 1747, p. 11.
[21] *Trans. Ent. Soc. Lond.*, 2., iii., 1855, p. 116.

scabrinodis lives frequently in the same hillock as *L. flavus*. White[22] mentions finding *M. scabrinodis* in one half of a *L. flavus* nest, and under the same stone. Donisthorpe[23] records similar instances in the Isle of Wight. This year Fryer sent me specimens of the *Myrmica* from a colony situated on the top of a large *L. flavus* mound 1ft. 4in. high at Woodington Wood. *M. sulcinodis* and *M. lobicornis* have smaller colonies, they are more local, and fewer nests occur in the same area.

The habits of some of our species are evidently different from what they are in Switzerland. Forel[24] says that *M. scabrinodis* nearly always occurs in dry arid regions, *M. sulcinodis* is exclusively an alpine species and *M. lobicornis* chiefly so. *M. scabrinodis* often occurs in very wet places with us. Bouskell sent me several nests from Kerry, which occurred in the bogs, and were all but covered with water, *M. sulcinodis* and *M. lobicornis*, as will be seen, occur in Surrey and other parts in the south of England. As an instance of tenacity of life I may mention a specimen of *M. ruginodis* which C. Best Gardner had in his possession this year, which lived without a head for 21 or 22 days. This is not quite a record for an ant, as Miss Fielde[25] kept a decapitated *Camponotus pennsylvanicus* for 41 days, which walked about until two days before its death.

As the identification of species of this genus appears to present considerable difficulty, and as I am constantly having specimens sent to me to name, I have worked out a table which I hope will enable beginners to name these insects more easily. I may mention that I have looked up all Nylander's original descriptions, to satisfy myself that his species are correctly recognised.

♂

1.	Scape of antennæ less than half the length of the funiculus	= *scabrinodis*.
	Scape of antennæ not less than half the length of the funiculus – – –	2
2.	Scape of antennæ abruptly bent at base	= *lobicornis*.
(1)	Scape of antennæ evenly rounded – – – – – – – – – – – – –	3
3.	Frontal area longitudinally striate	= *sulcinodis*.
(2)	Frontal area not striate – – – – – – – – – – – – – – – – –	4
4.	Posterior tibiæ with long suberect hairs	= *laevinodis*.
(3)	Posterior tibiæ with sbort decumbent hairs – – – –	= *ruginodis*.

♀ and ☿

1.	Scape of antennæ abruptly bent at base	2
	Scape of antennæ evenly curved – – – – – – – – – – – – – –	4
2.	Scape of antennæ ridged or toothed	3
(1)	Scape of antennæ not ridged nor toothed – – – – – –	= *sulcinodis*.
3.	Scape of antennæ with strong transverse ridge at bend ..	= *lobicornis*.
(2)	Scape of antennæ with more or less developed lateral tooth at bend – – – – – – – – – – – – – – –	= *scabrinodis*.
4.	Epinotal spines longer than their basal width, transversely striate between	= *ruginodis*.
(1)	Epinotal spines not longer than their basal width, smooth between – – – – – – – – – – – – – –	= *laevinodis*.

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[22] *l.c.*, p. 240.
[23] *Ent. Rec.*, 1902, p. 16.
[24] *l.c.*
[25] *Biol. Bull.*, vii., 1904, p. 301.

I do not propose to give a full description of each species, but only to point out the most important characters.

1. **Myrmica lævinodis**, Nyl., Acta soc. sc. Fennicæ, ii., 3, 1846, p. 927, ☿ ♀ ♂.

Myrmica laevinodis, Curtis, Trans. Linn. Soc., xxi., 1854, p. 213.

Myrmica longiscapus, Curtis, Trans. Linn. Soc., xxi., 1854, p. 213.

Myrmica longiscapus, Smith, Trans. Ent. Soc. Lond., 2nd Ser., iv., 1855, p. 122.

In the ☿ and ♀ the scape is cylindrical near the base and evenly and gradually curved; the club of the antennæ more or less distinctly four jointed; the frontal area is smooth and shining; the petiole is somewhat rugose; the post-petiole smooth and shining; the spines of the epinotum are not longer than their basal width, and the space between is smooth and shining. The rugosity of the body is less than in all the rest of the genus. In the ♂ the scape of the antennæ is as long as half the funiculus and is gradually curved near the base; the club is more or less distinctly five jointed; the frontal area is smooth and shining, or slightly shagreened; the intermediate and posterior tibiæ, especially the latter, are furnished with long suberect hairs.

The distribution of this species, according to Emery[26] is North and Central Europe, further south in mountains; North Asia to East Siberia and Manchuria, also in Japan. Wheeler[27] states it has recently been introduced into the United States. In 1908 he found three colonies in Massachusetts, and gives good reasons to show it is not indigenous to North America. Smith[28] describes and figures a gynandromorphous specimen which combines characters of the male, female, and worker. It was captured by Chappell in Dunham Park, Cheshire, who presented it to B. Cooke[29], who also recorded it.

Wasmann[30] describes an ergatandromorph, in which only the colour of the head is that of the worker, and the ocelli are smaller than is usual in the male. In other respects the species is a normal male. I have found males in the nests in June, males and winged females in August, and at large in September.

The British distribution as far as is at present known to me, is as follows:—

ENGLAND.—Cornwall, Devon, Somerset S., Wilts. N., Dorset, I. of Wight, Hants., Sussex, Kent, Surrey, Essex, Middlesex, Berks., Oxford, Bucks., Suffolk, Norfolk, Cambs., Hunts., Glosts. W., Monmouth, Hereford, Worcester, Warwick, Lincoln, Leicester, Notts., Cheshire, Lancs. S., Yorks. N.E., Yorks. S.W., Durham, Westmoreland and L. Lancs.

SCOTLAND.—Dumfries, Ayr, Haddington, Fife and Kinross, Perth, Elgin, Easterness, Clyde Isles, Ebudes Mid.

IRELAND.—Antrim, Armagh, Monaghan, Donegal, Meath, Dublin, Galway W., Cork S., Kerry.

WALES.—Glamorgan.

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[26] *Deutsch. Ent. Zeitschr.*, 1908, p. 170.
[27] *Journ. Econom. Ent.*, I., 6, 1908, pp. 337-339.
[28] *Ent. Ann.*, 1874, p. 147, Plate [I.], fig. 3.
[29] *Yorks. Nat.*, viii., 1882, p. 30.
[30] *Stettin. Ent. Zeitg.*, LI., 1890, p. 299.

It is widely distributed, but decidedly local. Crawley tells me it was not uncommon in Nottinghamshire, and near Oxford. I have recently received a number of specimens from Glamorgan, sent to me by Best Gardner and Hallett.

The following Myrmecophiles have occurred with this species in Britain :—

Coleoptera :—*Atemeles emarginatus*, Pk. Bournemouth (*Donisthorpe*).

Atemeles paradoxus, Gr. Champion[31] records its capture at Folkestone and comments on its similarity to its hosts.

Drusilla canaliculata, F. Guestling (*Collett*)[32], Wicken Fen (*Donisthorpe*).

Myrmedonia collaris, Pk. This beetle and its larvæ occurred in some numbers with this ant at Wicken Fen (*Donisthorpe*[33]).

Staphylinus stercorarius, Ol. South Shields (*Bold*[34]); in nest of "red ants," Allerston, Yorks (*Hey.*[35]).

Heteroptera :—*Myrmedobia coleoptrata*, Fall. ♂ and ♀ of this bug occurred in nests at Lee (*Douglas*[36]).

Diptera :—*Phora conformis*, Wood. Two specimens in the galleries in a nest under a stone at Rannoch (*Donisthorpe*[37]).

Ichneumonidae :—*Pezomachus aquisgranensis* var. *neesii*, Först. In a nest under a stone at Sandown, I. of W. (*Donisthorpe*[38].)

Microcryptus nigro-cinctus, Gr. In company with the *Myrmedonia* at Wicken Fen mentioned above (*Donisthorpe*[39]). Wasmann[40] records it with the same ant in Holland.

Proctotrupidae :—*Gonatopus distinctus*, Kieff. New Forest (*Donisthorpe*[41]).

Acarina :—*Uroplitella ovatula*, Berl. In some numbers, Box Hill (*Donisthorpe*)[42].

2. **Myrmica ruginodis**, Nyl., Acta soc. sc. Fennicæ, ii., 3, 1846, p. 929. ☿ ♀ ♂.

Fig. 2

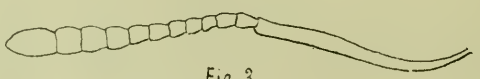

Fig. 3.

Antennæ of M. ruginodis.

Fig. 2 ♂. Fig. 3 ☿.

[31] *Ent. Mo. Mag.*, viii., 1871, p. 84.
[32] *Ent. Mo. Mag.*, xx., 1883, p. 41.
[33] *Ent. Record*, 1900, p. 263.
[34] *Zool.*, 1861, p. 7409.
[35] *Natural.*, 1895, p. 270.
[36] *Ent. Week. Intell.*, No. 248, 1861, p. 109.
[37] *Ent. Record*, 1912, p. 36.
[38] *Ent. Record*, 1908, p. 284.
[39] *Ent. Record*, 1902, p. 17.
[40] *Tijdschr. v. Entom.*, xli., 1898, p. 17.
[41] *Ent. Record*, 1909, p. 291.
[42] *Ent. Record*, 1911, p. 170.

Myrmica vagans, Curtis, Trans. Linn. Soc., xxi., 1854, p. 213.

The characters in this species are similar to those of the preceding, except that in the ♀ and ☿ the epinotal spines are considerably longer and the space between is transversely rugose. The body is more rugose, the nodes of the pedicle being longitudinally wrinkled. The post-petiole is not, or scarcely, shining. The chief difference in the ♂ appears to be the fact that the tibiæ are only furnished with short decumbent hairs. The antennæ are said by Smith[43] to be longer, but in this character *laevinodis* seems to vary. On the whole *ruginodis* is a little the larger of the two in all three castes.

Forel[44] describes intermediate forms between the two species, in which the length of the spines is intermediate, etc., under the name of *laevinodo-ruginodis*. Some specimens sent me to examine by Hallett from Glamorgan, had the spines shorter than in ordinary *ruginodis*, but the space between rugose, etc. These may be called *laevinodo-ruginodis*, Forel.

Distribution.—North and Central Europe; Asia, not as far East as *laevinodis*.

I have taken males and winged females in the nests in July and August, and at large in September. I found, however, several winged females in a nest at Tiree in the Mid Ebudes in April this year. These specimens would have passed the winter in the nest, not having been able to leave for a marriage flight the year before. Forel[45] records finding a winged female of *laevinodis* in a nest at Vaux in April, 1868.

British distribution :—ENGLAND.—Cornwall, Devon, Somerset S., Wilts. N., I. of Wight, Hants. S., Sussex, Kent, Surrey, Essex, Middlesex, Berks., Oxford, Bucks., Suffolk, Norfolk, Hunts., Glosts. W., Worcester, Warwick, Staffs., Lincoln, Leicester, Notts., Cheshire, Lancs., Yorks. N.E., Yorks. S.W., Yorks. Mid., Durham, Northumberland, Westmoreland, Cumberland.

SCOTLAND.—Dumfries, Ayr, Renfrew, Lanark, Peebles, Berwick, Haddington, Edinburgh, Linlithgow, Fife, Kinross, Sterling, Perth S., Perth Mid., Kincardine, Elgin, Easterness, Westerness, Main Argyle, Dumbarton, Clyde Isles, Ebudes Mid., Sutherland E., Caithness, Hebrides, Orkneys, Shetlands.

IRELAND.—Derry, Armagh, Monaghan, Donegal, Louth, Dublin, Kildare, Wexford, Westmeath, Mayo W., Galway, Cork S., Kerry.

WALES.—Glamorgan, Carnarvon, Anglesey.

This is the only ant I have any record for from Caithness. Morice[46] recorded that it was the only ant he could find in the Shetlands, and all specimens sent to me from there by Waterston have proved to be this species. Johnson[47] records it from Clare Island up to 1500ft., and Hull has sent it to me, taken at West Allendale up to 1900ft. Crawley found it carrying seeds of the Blue Cornflower (*Centaurea cyanus*) in his garden at Seaton, Devon. When I stayed with him there I had the pleasure of seeing the ants carrying these seeds. They

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[43] *Trans. Ent. Soc. Lond.*, 2, iii., 1855, p. 119.
[44] *Fourmis de la Suisse*, 1874, p. 78.
[45] *l.c.*, p. 414.
[46] *Ent. Mo. Mag.*, 1894, p. 260.
[47] *Proc. R. Irish Acad.*, xxxi., 1911, p. 3.

carried them from quite a long distance to their nest. Sernander[48] in his monograph on European Myrmecochorous Seeds, shows that these seeds are also attractive to ants of the genus *Formica*.

The following Myrmecophiles have occurred with this species in Britain :—

Coleoptera.—*Atemeles emarginatus*, Pk. New Forest, Porlock, etc. (*Donisthorpe*).

Drusilla canaliculata, F. Largo Links (*Evans' MS.*); Aviemore, and carrying dead *ruginodis* in its jaws, Chiddingfold (*Donisthorpe*[49]).

Lamprinus saginatus, Gr. Tubney (*Walker*[50]); with *Myrmica sp.*? Nethy Bridge (*Beare*[51]).

Staphylinus stercorarius, Ol. Rannoch on several occasions (*Walker*[52]).

Diptera.—*Microdon mutabilis*, L. Crawley[53] and I found a small larva of this fly in a nest at Porlock. The only record, I believe, with a *Myrmica*.

Ichneumonidæ.—*Pezomachus aquisgranensis*, Först. Bentley Woods, Suffolk (*Morley*[54]).

Proctotrupidæ.—*Ceraphron sp.*? Buddon Wood, Leicestershire (*Donisthorpe*[55]).

Collembola.—*Smynthurus caecus*, Tull. Six specimens in a nest, 1,200ft., near Leadhills, Lanarkshire (*Evans*[56]).

Acarina.—*Laelaps myrmecophilus*, Berl. Dartmouth (*Donisthorpe*[49, 57]) *Hypopi*. Parfit[58] records the early stages of an *Acarus* on the abdomen and antennæ of the ants in a nest near Exeter.

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[48] *Kungl. Svensk. Vetensk. Handl.*, 41, 7, 1906, p. 143.
[49] *Ent. Record*, 1900, pp. 238 and 335.
[50] *Ent. Mo. Mag.*, 1905, p. 181.
[51] *Ent. Mo. Mag.*, 1911, p. 139.
[52] *Ent. Mo. Mag.*, 1900, p. 25.
[53] *Ent. Record*, 1912, p. 35.
[54] *Brit. Ichneum.*, ii., 1907, p. 186.
[55] *Ent. Record*, 1908, p. 106.
[56] *Ann. Scot. Nat. Hist.*, 1901, p. 155.
[57] *Ent. Record*, 1909, p. 20.
[58] *Ent. Mo. Mag.*, xviii., 1881, p. 43.

(*To be concluded.*)

An Old Essex Collection.

By the Rev. G. H. RAYNOR, M.A.

(*Continued from Vol. xxiv., p. 293.*)

My friend, Mr. E. E. Bentall, who owns the collection under review, has now heard from Mr. Andrew Marriage, to whom the cabinet recently belonged, that it was formed by Mr. Alfred Greenwood who was a good naturalist and a brother of Mr. Marriage's late mother-in-law, Mrs. Robert Warner, into whose possession the collection came.

The cabinet itself is a wonderfully good piece of work.

Whether Mr. Greenwood was a well-known entomologist, or not, I am unable to say, but his name does not appear in the very interesting list of entomologists living in the year 1860 published in the *Entomologists' Annual* for that year.