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XV. *Essay on the Genera and Species of British Formicidæ.*

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[Read December 4th, 1854.]

In offering the present Essay to the notice of the Entomological Society, I beg that it may be considered as an attempt to form a correct census of the number of indigenous species of Ants; this family of insects has hitherto obtained so small a share of indefatigable research, that it will be evident, the present list must not be considered as one which approaches a complete Fauna, but which embodies descriptions merely of all the present known species inhabiting Great Britain. Every care has been bestowed upon their identification with the species described by Nylander, Foerster, and others; and, in most instances, aided by a comparison with typical specimens presented by those eminent Entomologists to the author: possessing these valuable and most efficient aids, I present the following Essay with a greater degree of confidence than I otherwise could have assumed.

Tribe HETEROGYNA.

Family FORMICIDÆ.

The *Formicidæ*, or Ants, is composed of a large group of insects, probably exceeding in the number of its species that of any family of *Hymenoptera*: the *Ichneumonidæ* alone, in my opinion, may probably equal it. It is true that the known British species are few in number, for the metropolis of these insects lays in the tropics, from whence they appear to diverge, gradually becoming less numerous as they approach the frigid regions of the arctic circle. The number of species which inhabit the New World, if we may form a calculation from the observations of an intelligent and indefatigable Naturalist, Mr. W. H. Bates, must, as he justly observes, "exceed all that can be reasonably imagined;" for he continues, "I think it will reach the number of 400 species in the the Valley of the Amazons alone; there appears to be a distinct species of *Myrmica* in every twig and stem in the woods." If such be the case in so limited a district, what must be the number when those which inhabit the vast lands of Africa, India, Southern Europe, and the remaining portions, South and North America,

become known? how few of the species which inhabit the Continent of Australia are yet known to us—what knowledge have we of those of Madagascar and the adjacent islands? New Zealand must also be rich in species belonging to this tribe.

It is, however, our province in this Essay to describe the species which inhabit the United Kingdom of Great Britain, and we have only glanced at those which inhabit other countries, in order to establish our position, of the important part which these insects must perform; and consequently, how beneficial must be results of their economy, in the great scheme of beneficence which caused “the earth to bring forth the living creature after his kind,” “and every thing that creepeth upon the earth after his kind,” “and behold it was very good.”

These interesting insects have at all times attracted the attention of man, and from the remotest periods have served, by their industry and untiring perseverance, to inculcate lessons of the highest moral tendency. The proverb of Solomon is engraven upon the minds of our children from their earliest years; and although the Ants of northern latitudes do not provide their meat in the summer, and gather their food in the harvest, in the general acceptation of this proverb, still such may be the case in other countries. Be that, however, as it may, the words of the great Hierophant inculcate the necessity of using our unceasing endeavours to perform with industry the duties assigned to us, in whatever station of life Providence has placed us.

On the Continent, the Ants have had their monographer in the illustrious Latreille; the “*Histoire Naturelle des Fourmis*,” is the text book of Hymenopterists. Since the publication of this work in 1802, no important work on the Ants of Europe appeared until the publication of Dr. Nylander's Monograph on the Ants of Northern Europe: this work will be acknowledged universally as being the most complete and accurate on the European *Formicidæ*.

In addition, we must also record the labours of Foerster on the *Formicariæ*, and also of Mayr of Vienna; the works of these Entomologists contain descriptions of nearly all the known species of Europe. Mr. Curtis has recently added some species unknown to the authors I have named. Our own countryman, Gould, in 1747, published a valuable treatise on these insects: he describes five species of British Ants; these were all with which he was acquainted, one belongs to the genus *Myrmica*. The great value of this work is the accuracy with which their habits are described; as a proof of which may be mentioned, that Gould particularly

distinguishes the difference in their metamorphosis. Of the red Ants he says, "they do not, like the rest, infold themselves in a tissue or shell;" he also notices "two sizes of workers, and that the red Ants are furnished with a sting; these observations were made previous to the publication of the "Fauna Suecica" of Linnæus.

Of the number of species which inhabit Great Britain, we are, I believe, at present ignorant. The publication of Nylander's work has directed our attention more particularly to this point, and several new species have been discovered, but when the remote and Alpine districts of Scotland shall have been well explored, doubtless many others will be found; I am acquainted with twenty, whilst only thirteen of those given in the Systematic Catalogue by Stephens are indigenous and distinct. My observations on the habits of Ants would add little to what has already been made known by Gould, Huber and others; indeed, so much has been done by the naturalists named, that it will only be necessary, in some points, to add my testimony to the accuracy of the more remarkable peculiarities in their economy, as detailed in the works of the authors alluded to.

As a general rule, we may observe, that it is only the species of the genus *Formica* which in the pupa state are enclosed in a cocoon spun by the larva; those belonging to the genus *Myrmica* do not spin a cocoon. It is a trite remark, that every rule has its exception, and such is the case with these genera. I have occasionally observed, during the months of July and August, pupæ of *Formica fusca* not enclosed in cocoons, and such pupæ in various stages of maturity; I have also observed the same of the pupæ of *F. fuliginosa*, great numbers of which I found in channels constructed under the bark of a decaying birch tree.

The closest observation has not enabled me to trace the larvæ of Ants continuing in that form, "about a year and a quarter," as stated by Gould; indeed, I have never been able to find any larvæ in the nests of *F. rufa*, or *F. fusca*, after the end of autumn; but as regards colonies of *F. flava* and *F. nigra*, larvæ will frequently be found in the depth of winter: these are carried by the workers into the deepest chambers of their dwellings; and it is a remarkable circumstance, that the larvæ of *F. flava*, which pass the winter in that state, are densely covered with pubescence; I have also found numbers of a dark-coloured *Aphis* in chambers apart from the torpid larvæ of the Ants, in the depth of winter. Much attention has been paid to the subject of insects found in Ants' nests, many of those enumerated being merely casual or

accidental visitors ; but that many are in some way highly necessary, or highly conducive to some important point in the economy of the *Formicarium*, is, I think, easily proved. In the first place, I would mention the presence of *Aphides* in the nests of *Formica flava* : of these I have observed great numbers in some colonies, they are kept usually apart from the full-grown larvæ and pupæ, and are eagerly carried off by the Ants, when exposed by the removal of a part of the Ant-hill, or, as may be better observed, by the removal of a stone, when the nest is constructed beneath ; it was in the latter situation that I first discovered *Claviger foveolata*, in 1844, in considerable numbers in the channels or galleries of the *Formicarium*, the *Claviger* was quickly seized upon by the Ants, and carried down into the subterranean labyrinths.

I have also obtained considerable numbers of insects which are imprisoned by Ants, by watching Ant-hills in the spring, and observing all that is carried to them by the Ants : I have secured numbers of *Myrmedonia canaliculata*,—*limbata* and *humeralis*, and also of *Lomechusa emarginata* ; the latter insect is found sometimes in the nests of *F. fusca*, and *F. rufa*, but it is usually much more abundant in the nests of *Myrmica*. In the nest of a species of the latter genus I found a specimen of *Batrisus formicarius*, in Yorkshire. Many other insects will no doubt be met with in nests of *Formicidæ* ; I have only mentioned such as I have seen conveyed there by the Ants themselves, these being doubtless highly beneficial in working out some important phase in their economy ; and it has probably occurred to others as well as to myself, that the aliment obtained from these insects may have some stimulating properties, highly conducive to the development of the sexes — but this point requires careful investigation ; I would observe, however, as bearing upon this supposition, that I never observed an Ant conveying these insects subsequent to the development of the males and females. There is another insect, which belongs, I believe, to the order *Homoptera*—*Dortheisia cataphracta*—which is constantly found in most of the nests of the *Formicidæ* ; these have frequently been mistaken for the young of *Oniscus*, which they greatly resemble in form, but are of a different colour, being snow-white : whether the presence of these insects is in any way conducive to the development of any portion of their economy, I am not prepared to advance an opinion upon, but I have usually observed them in all the nests of the *Formicidæ*.

The *Formicidæ*, as a group, may be characterized as social

insects, living in societies, consisting of males, females, and workers—the males and females winged, the latter only temporarily so : the workers being divided into two classes, one consisting of labourers, which are exclusively occupied in the formation of the nests, or in feeding the young brood ; the second division consists of soldiers or guards, these not only defend the citadel from the attacks of other insects, but also in some species capture and make slaves of others : the only one which does so in this country being the *Formica sanguinea*, which is very abundant in Hampshire, where I once witnessed an attack upon a nest of *Formica fusca*—workers and pupæ were both carried off by the sanguine Ants. On examining a colony of this species, I found workers of *F. fusca*, *F. flava*, and a few individuals of *Myrmica rubra*, all living in community.

Although the *Formicidæ* have been divided into sections, each composed of societies which follow one habit of economy—as mining-Ants, timber-Ants, mason-Ants, &c.—still each species is constantly found under different phases of habit ; the wood-Ant will be found in a decayed tree, or, as I have observed it, in a turf bank : but these deviations are not frequent in this species, which is one of the most constant in habit. The jet-ant, *F. fuliginosa*, is also very constant in forming its habitation in decaying trees, but this also I have found excavating its galleries in a sand-bank ; such deviations give us opportunities of extending our admiration of the wonderful ingenuity constantly shown by these insects, in adapting their habits to the circumstances into which accident sometimes throws them.

Genus FORMICA.

The maxillary palpi 6-jointed ; the labial palpi 4-jointed. *Antennæ*, the scape elongate, usually more than two-thirds of the length of the flagellum : the flagellum 12-jointed in the females and workers, 13-jointed in the males ; the scape in the male not quite half the length of the flagellum ; eyes lateral, ovate ; ocelli 3 in a triangle. Males and females winged, constant in the former, temporary in the latter sex ; the superior wings having one marginal, one submarginal, and one discoidal cell ; eyes of the males large and prominent, genital organs exerted. *Abdomen* composed of 6 segments in the females and workers, and of 7 in the males, the first segment in all the sexes forming a flattened scale : neither of the sexes furnished with a sting.

The pupa enclosed in a silken cocoon spun by the larva.

Sp. 1. *Formica rufa*.

Fœmina.—Rufo-ferruginea—fronte cum occipite, mesothorace supra, scutello et post-scutello, et abdomine supra castaneo-nigris; clypei medio, palpis, antennis, mesothorace, tibiis, tarsisque fusciscentibus; squama lata subtriangulariter fere rotundata margine supero inequali; alis fusco-hyalinis, apicis subhyalinis.

Operaria.—Testaceo vel rufo-ferruginea nuda, levissime cinereo-micans, fronte cum occipite et abdomine castaneo-fuscis; occipite, antennis, tibiis, tarsisque fusciscentibus; squama, abdominis basi et ano rufo-maculatis.

Mas.—Nigro-fuscus, parum cinereo-nitens, sparse pubescens, pedibus rufescentibus; squama subquadrata humili crassa, supra vix vel parum concaviuscula; valvula ventrali pilosula sæpe rufescente.

Formica rufa, Linn. Faun. Suec., No. 1721; Syst. Nat., i. 962, 3; Scop. Ins. Carn., p. 313, 836; Fabr. Ent. Syst., ii. 351, 8; Syst. Piez., 396, 11; Schrank, Ins. Aust., No. 834; Rossi, Faun. Etrus., ii. 113, 836; Don. Brit. Ins., xiv. 76, tab. 496; Latr. Fourm., p. 143, tab. 5, fig. 28, ♀, ♂, ♂; Jurine, Hym., p. 272; St. Farg. Hym., i. 201, 3; Curtis, Brit. Ent., xvi. tab. 752; Zett. Ins. Lapp., 449, 5; Nyland. Mon. Form. Boreal., p. 902, 5; Foerst. Hym. Stud. Form., p. 13, 3.

Formica dorsata, Panz. Faun. Germ., 54, 1, ♀.

Formica obsoleta, Zett. Ins. Lapp., 449, 5, ♂, ♀.

Formica lugubris, Zett. idem, 449, 6, ♂.

Female.—Length $4\frac{1}{2}$ —5 lines. Head as wide as the thorax, fusco-nigro; the sides of the face below the eyes, and the cheeks, rufo-testaceous. Antennæ fuscous, the scape sometimes rufo-fuscous; the mandibles rufo-ferruginous, covered with a short sparing pilosity, the eyes pilose. Thorax rufo-ferruginous, subovate; the disk, scutellum and post-scutellum nigro-fuscous, the scutellum polished; a slightly impressed line on the mesothorax anteriorly, not reaching the middle of the disk, a similar abbreviated line on each side over the insertion of the wings, the latter fusco-hyaline, paler towards their apical margins; the coxæ, trochanters and femora rufo-ferruginous; the tips of the femora, tibiæ and tarsi fusco-ferruginous. Abdomen nigro-fuscous, subglobose, smooth and shining, the scale, base and apex rufo-ferruginous.

Worker.—Length 3—4 lines. Head and thorax rufo-ferruginous; the vertex, and a broad stripe, passing from the vertex of the eyes to the insertion of the antennæ, nigro-fuscous; an impressed line passes from the anterior stemma to the base of the clypeus; the latter has a fuscous stain in the centre, the antennæ of the same colour, the eyes black. Thorax elongate, compressed; a deep strangulation between the meso and metathorax; the prothorax has a fuscous spot above; the metathorax elevated: the abdominal scale sub-rotundate, slightly notched above; the scale, coxæ, trochanters, and base of the femora, rufo-ferruginous; the femora, tibiæ and tarsi dark rufo-testaceous. Abdomen ovate, nigro-fuscous, covered with an obscure cinereous pilosity, a few scattered pale hairs at the apex; beneath nigro-piceous.

Male.—Length 4—5 lines. Nigro-fuscous; head not so wide as the thorax, eyes large, prominent and oblong-ovate; the head and eyes slightly pilose. Thorax elongate-ovate, the scutellum and metathorax shining; wings as in the female; the femora and knees rufo-testaceous. Abdomen as long as the head and thorax, the margins of the segments polished, the apex rufo-testaceous.

This species is perhaps the most generally known of all our indigenous ants, and has hence acquired several popular appellations, as the Pismire, the Hill Ant, the Wood Ant, and the Horse Ant; the latter possibly from its habit of carrying burdens of sticks, leaves, &c. in constructing its nest; it is found in all parts of the kingdom, but I have observed its colonies to be larger and most numerous in the north, particularly in open spaces in fir woods; the nest of this Ant is resorted to by the larvæ of several Coleopterous insects for the purpose of undergoing their transformations. I have found the *Cetonia aurata*, and numbers of pupæ and perfect individuals of *Clythra 4-punctata*, in nests which I have met with in Yorkshire.

Sp. 2. *Formica sanguinea*.

Fœmina.—Rufo-ferruginea, levissime cinereo-micans, fronte cum vertice et abdomine castaneo-fuscis; squama subtriangulariter rotundata, margine supero vel integro vel leviter emarginato; alis a basi ad medium pallide rufescentibus.

Operaria.—Capite, thorace pedibusque sanguineis, clypei marginis leviter emarginato; abdomine castaneo-fusco.

Mas.—Fusco-niger, pedibus pallide rufescentibus, clypeo obsolete emarginato; squama crassa, transversim subrectangulari, supra integra, vel late subemarginata.

Formica sanguinea, Latr. Hist. Nat. Fourm., p. 150, pl. 5, fig. 29, ♂; Jurine, Hym., p. 272; St. Farg. Hym., i. 203, 4; Foerster, Hym. Stud. Form., p. 20, 6, ♀; Smith, Cat. Brit. Hym. Append., 115, ♂, ♀, ♀.

Formica dominula, Nyland. Adno. Mon. Form. Boreal. Eur., p. 905, 6, ♂, ♀, ♀.

Female.—Length 4—4½ lines. Head, thorax, legs and scale of the abdomen of a sanguine red; the face above the insertion of the antennæ and the vertex obscurely fuscous; the inferior margin of the clypeus distinctly notched in the middle: the mesothorax having three indistinct fuscous stripes; the wings have the basal half of a smoky brown, the nervures and stigma fusco-ferruginous. Abdomen slightly red at its extreme base, the apical segment slightly pubescent; the margins of the segments having a few glittering pale hairs.

Worker.—Length 3—4 lines. Very similar to *F. rufa*; but the head, thorax and legs are entirely red; the anterior margin of the clypeus distinctly emarginate; the scale subtriangular, rounded at its superior margin and slightly emarginate in the middle; abdomen as in the female.

Male.—Length 4 lines. Resembles that of *F. rufa*. The legs are entirely red; the flagellum fusco-ferruginous, the extreme base of the scape ferruginous; the anterior margin of the clypeus slightly notched in the middle; the mandibles longitudinally rugose, rufo-piceous towards their apex; the eyes not pilose as in *F. rufa*; the scale sub-emarginate above, or rather transversely entire, having the lateral angles somewhat raised: wings as in the female; abdomen as long as the head and thorax, covered with a changeable sericeous pile.

Var. β . ♀. The head and thorax entirely of a blood red.

Var. β . (♂ major) having the vertex and front fuscous.

The (♂ minor) has the vertex and front, the disk of the prothorax, the coxæ, trochanters and femora, more or less fuscous.

I think there can be no doubt of this species being the *sanguinea* of Latreille. Nylander says that this species as well as his *F. truncicola*, both answer to the description of *sanguinea*; but we must bear in mind at the same time that a figure of the scale is given, and it is much more like that of the present species than that of the worker of *F. truncicola*, and I think Latreille would not have omitted to mention the pubescence with which the latter insect is covered; and, above all, Nylander leans to this opinion: I have therefore adopted Latreille's name.

F. sanguinea occurs plentifully in the fir woods of Hampshire, or rather at their sides. I have always found its colonies in banks, or in stumps of decayed trees. It also occurs at Weybridge. Their societies are not so numerous as those of *F. rufa*; the large workers are very courageous, on disturbing their nest they will seize a finger, and retain their hold until their heads are torn off in removing them; I have found all the sexes in the nest in the month of August.

Sp. 3. *Formica cunicularia*.

Fœmina.—Rufo-ferrugineo, cinereo-micans; palpis, antennarum flagellis abdominisque castaneo-atris; mesothorace maculis tribus longitudinalibus, una antice aliaque laterali utrinque, scutello, post-scutello, mesosterno, tarsis apicis fuscis; squama lata, sub-cordata, vel supra truncata tantum leviter inæquali; alis hyalinis, basi parum fumatis; nervis et stigmatibus fusco-ferrugineis.

Operaria.—Rufo-ferruginea, cinereo-micans; capite supra, palpis, flagellis et abdomine castaneo-atris; thorace supra et pedibus fuscis; squama supra subtruncata vel leviter emarginata.

Mas.—Ater, cinereo-micans, pedibus rufo-testaceis, coxis basi exceptis; oculis nudis, squama supra late concava, valvula ventrali sparse pilosa, disco fere toto subrotundato plane impressiusculo.

Formica cunicularia, Latr. Hist. Nat. Fourm., p. 151; Huber, Rech. Fourm., tab. 2, fig. 11, 12, 13, ♀, ♂, ♂; St. Farg. Hym., i. 203, 5; Lonsana, Fourm. Pied., 10; Nyland. Adno. Mon. Form., 913, 11; Foerster, Hym. Stud. Form., p. 25, 9.

Formica stenoptera, Foerster, idem, p. 26, 10.

Female.—Length 4 lines. Resembles *F. sanguinea*; the anterior margin of the clypeus somewhat angulated, convex above and subcarinate in the middle; the clypeus, face on each side, mandibles and base of the flagellum, rufo-ferruginous; the thorax above sometimes entirely fuscous, sometimes having three fuscous stripes; the claw joint of the tarsi fuscous; the extreme base and apex of the abdomen more or less ferruginous.

Worker.—Length 3—3½ lines. Resembles the *F. rufa*, but has the scape of the antennæ more slender and not thickened at the apex, the flagellum is also more slender; the angular shape above the clypeus is opaque, in *F. rufa* it is polished; the face black above

the insertion of the antennæ, in *F. rufa* it is red on each side as high as the vertex of the eyes : in small individuals, the entire thorax above, the scale above, and the tibiæ and tarsi above, are more or less fuscous ; the margins of the segments of the abdomen are sometimes rufo-piceous, the tip of the abdomen pale.

Male.—Very closely resembles *F. fusca*, but differs from it in the form of the scale, which is transverse, its superior margin being emarginate the entire width ; the angles of the emargination are oblique, the sides being straight—in *F. fusca* the scale is subrotundate and slightly emarginate above ; the antennæ are more slender, the scape longer, and the face less produced before the eyes than in *F. fusca*.

This species may be very correctly called a mining Ant ; it constructs its subterranean dwelling, consisting of long tortuous passages, in banks, preferring those in which there is a mixture of clay. It is found in the London district, but is much more local than *F. fusca* ; I have also found it in the Isle of Wight, at Blackwater, Hants, at Weybridge and Southend ; but it is not a very generally distributed species, being confined to particular localities. I have found all the sexes in the *Formicarium* in the month of August.

Sp. 4. *Formica fusca*.

Fœmina.—Fusco-nigra, nitida, cinereo-micans, mandibulis rufescentibus ; scapis antennarum pedibusque rufo-testaceis ; alis hyalinis, nervis et stigmatibus fuscis ; squama lata subtriangulariter subrotundata ; abdomine ovato, sub-nudo.

Operaria.—Nigra, nitida, valde cinereo-micans ; mandibulis, antennarum scapis, flagellorum basi et pedibus rufo-piceis ; femoribus apice rufo-pallidis ; squama triangulariter subrotundata, supra leviter emarginata.

Mas.—Fusco-niger, nitidus, cinereo-micans, antennis et pedibusque pallide rufescentibus ; squama subrotundata, margine supra emarginata.

Formica fusca, Linn. Faun. Suec., p. 226, 1722 ; Syst. Nat., i. 963, 4 ; Fabr. Ent. Syst., ii. 352, 11 ; Syst. Piez., p. 399, 13 ; Latr. Hist. Nat. Fourm., p. 159, t. 6, f. 32, ♂, ♀, ♂ ; Huber, Rech. Fourm., tab. 2, fig. 8 ♀, 9 ♂, 10 ♂ ; Jurine, Hym., p. 272 ; Zett. Ins. Lapp., p. 448, 4 ; St. Farg. Hym., i. 205, 6 ; Nyland. Adno. Mon. Form., p. 919, 15 ; Foerster, Hym. Stud. Form.

Female.—Length $3\frac{1}{2}$ lines. Fuscous, the head and thorax densely covered with a short fine cinereous pile; the head as wide as the thorax, the scape and base of the flagellum rufo-testaceous; the mandibles fusco-ferruginous; the anterior margin of the clypeus entire: the wings hyaline, the nervures testaceous, the stigma fuscous; legs pale rufo-testaceous, the base and apex of the joints palest. Abdomen ovate, shining and nigro-æneous; sparingly covered with a thin cinereous pile, not visible in long disclosed specimens, the extreme apex ferruginous: the apical margins of the second and third segments narrowly and obscurely rufo-piceous.

Worker.—Length $2-2\frac{1}{2}$ lines. Nigro-fuscous, thinly covered with a fine cinereous pile, the antennæ and mandibles as in the female, the clypeus having in the centre an indistinct longitudinal carina; the thorax of the same form as in *F. rufa*; the scale large, rounded at the sides, and very faintly and minutely notched above; the legs as in the female, the abdomen more globose.

Worker (minor).—The small worker has the antennæ and legs usually much paler than the worker (major).

Male.—Length $3\frac{1}{2}$ lines. Nigro-fuscous, shining and elongate; the scape obscurely testaceous; the tips of the mandibles ferruginous; legs pale rufo-testaceous; the coxæ at their base, and the claw-joint of the tarsi, fuscous. Abdomen subæneous; the margins of the segments slightly rufo-piceous, and submembranaceous; the scale thickened, rounded, and widely emarginate above, very closely resembling the male of *F. cucicularia*.—For the differences see that species.

Sp. 5. *Formica fuliginosa*.

Fœmina.—Nigra, nitidissima; antennis pedibusque pallide rufescentibus; mandibulis rufescentibus; capite magno, subcordato; squama parva, angusta, apice rotundata; marginibus lateralibus sub-parallelis: alis hyalinis, basi ad medium brunnescentibus, nervis et stigmatibus flavido-cinerascentibus.

Operaria.—Piceo-nigra, nitidissima; palpis, antennarum flagellis fere totis tarsisque pallide rufescentibus, tarsi tamen dilutioribus; capite magno sub-cordato; ocellis minutis: clypeo sub-carinato: squama parva subovata, marginibus lateralibus parallelis.

Mas.—Piceo-niger, nitidus; corpore toto sparse pilosulo; articulis pedum et tarsis dilutioribus; occipite concaviusculo; squama exigua sub-quadrata, parum rotundata, alis sicut in fœmina.

Formica fuliginosa, Latr. Hist. Nat. Fourm., p. 140, tab. 5, fig. A—D, ♂, ♀, ♀; St. Farg. Hym., i. 200, 2; Jurine, Hym., p. 273; Losana, Form. Pied., No. 9; Nyland. Adno. Mon. Form., p. 915, 12; Foerster, Hym. Stud. Form., p. 38, 17.

Female.—Length $2\frac{3}{4}$ lines. Of a shining deep nigro-piceous colour; mandibles ferruginous; clypeus smooth and shining; ocelli distinct and glassy; the eyes have a short scattered pubescence; antennæ, palpi and legs testaceous, having a cinereous pilosity; wings hyaline, the basal half smoky; the scale small, oblong, rounded and ciliated above; abdomen oblong ovate, as long as the thorax, about the same width as the head, the apical segment pilose, the extreme apex testaceous.

Worker.—2 lines. Resembling the female, the legs being darker; the scape and apex of the joints of the flagellum fuscous; the mandibles obscure ferruginous; the ocelli very minute; the scale minute, abdomen scarcely as wide as the head, sub-ovate, the extreme apex pilose.

Male.—2 lines. Coloured as in the female; mandibles reddish brown, broadly dilated at their apex; the flagellum and tarsi pale testaceous; the scutellum and metathorax very smooth and shining, wings as in the female: abdomen sub-conical, rounded at the base, pointed at the apex, having some thinly scattered long pubescence.

This species is distributed in all parts of the country, its usual habitat being in decaying trees, posts, &c., in which it forms its tortuous galleries; the perforations are stained black, probably by a peculiar acid discharged by this species. When the *F. rufa* takes up its abode in an old decayed tree all its galleries are of the original colour of the wood, thus proving some peculiarity in the present species. As I observed before I found a colony of this Ant in a sandy bank at Southend. I have found the males and females at the end of July and beginning of August, but I have met with a male in October.

Sp. 6. *Formica umbrata*.

Fœmina.—Nitida, cinerascenti-sericea, pilis brevibus adpersis, pallido-fuscis; partibus oris, antennis, pedibusque pallide testaceis; capite thorace paululum latiori; oculis hirtulis; alis albescenti-hyalinis a basi fere ad medium fusco-umbratis, nervis brunnescentibus, stigmatibus fusco; squama subpentagonali, apice late obtuse-angulatum emarginato.

Operaria.—Pallide rufo-flavescens, oculis parcissime hirtulis; pube corporis sericea subtiliori, pilis brevibus erectis sparsis paullo brevioribus, rigidiusculis.

Mas.—Fusco-niger, nitidus; tenuissime cinerascenti-sericeus et pilosulus; palpis, antennarum flagellis, pedum articulis tarsisque testaceo-pallescentibus; capite sat magno, paululum latiori thorace; oculis hirtulis; alis albescenti-hyalinis; squama petioli subovali apice subangulatim emarginato.

Formica umbrata, Nyland. Addit. Adno. Mon. Form., p. 1048, 17; Smith, Append. Cat. Brit. Hym., p. 116; Foerster, Hym. Stud. Form., p. 39, 18.

Formica brunnea, Smith, Cat. Brit. Hym. p. 2, 4.

Female.—3-3½ lines. Fusco-testaceous, densely covered with a fine cinereous sericeous pile: head a little wider than the thorax, mandibles rugose, rufo-testaceous; the antennæ, the face beneath their insertion, and the legs, pale rufo-testaceous; the eyes thinly covered with short erect hairs; the head posteriorly deeply concave; the basal half of the wings brown; the scale oblong, nearly straight above, the lateral angles rounded, legs stouter and shorter than in *F. flava*: abdomen ovate.

Worker.—Very closely resembling *F. flava*, but is rather larger; the eyes are pubescent, and the scape stouter.

Male.—1½ lin. Resembles *F. flava*; but the eyes are pubescent, the scale emarginate above, and the wings usually clouded at their base; the basal joint of the flagellum stouter and more globose than in *F. flava*.

This species bears a close resemblance to *F. flava*, but is easily distinguished from it, the eyes being pubescent: this cannot be seen unless a high microscopic power be used, then it is visible in all the sexes. The female may be known, if winged, by having the wings brown at their base; if not winged, the size of the head will distinguish it; in *umbrata* it is wider than the thorax, in *flava* it is narrower; the workers are difficult to separate, the head is larger, more shining, and is not covered with a dense pile as in *flava*; the scape also is less attenuated at the base and altogether stouter: the ocelli are very distinct. Of the male, I have only seen a single specimen, this has the nervures fuscous, and the wings smoky at their base; the scale is notched and the eyes pubescent. Nylander says the wings are sometimes hyaline, sometimes smoky at their base; and the scale distinctly emarginate.

I have frequently found the female of this species on Hampstead Heath, but I have not been successful in discovering its *Formica*-

rium; Mr. Dale has taken all the sexes, and from his specimens I have described the female and worker; the male is from Lewes, near Brighton.

Sp. 7. *Formica flava*.

Fœmina.—Pallide fusca, dense flavido-sericea, antennis pedibusque pallide testaceo-cinerascentibus; alis hyalinis, versus basin parum infuscatis, nervis et stigmatibus flavido-cinereis; squama subovali, supra late obtuse angulatim emarginata.

Operaria.—Flavo-testacea, lata, nitida, sericeo-micans sparseque flavido-pilosula; oculis minutis atris ovalibus, ocellis minutissimis; squama parva subovali, supra rotundata vel truncata.

Mas.—Fuscus, nitidissimus; palpis, antenarum flagellis, pedum articulis et tarsis flavido-testaceis; flagellorum articulo primo crassiusculo; fronte media levissime transversim subimpressa; alis subhyalinis, nervis pallide testaceis, quandoque pallide fusciscentibus; squama subquadrata.

Formica flava, De Geer, Ins., ii. 1089, 5, tab. 42, fig. 24; Fabr. Ent. Syst., ii. 357, 34; Latr. Hist. Nat. Fourm., p. 166, tab. 7, fig. 36, ♂ ♀ ♀; St. Farg. Hym., i. 408, 9; Losana, Form. Pied., 17; Nyland. Adno. Mon. Form., 922, 17; Foerster, Hym. Stud. Form.

Formica rubra, Zett. Ins. Lapp., p. 450, 8.

Female.—Length 3 lines. Pale fuscous, the face below the insertion of the antennæ, the palpi, antennæ, scale and legs, of a pale testaceous-yellow; the mandibles usually rather inclined to ferruginous; the teeth which arm their apex and the superior margin of the abdominal scale fuscous; the body densely clothed with a fine yellow cinereous pile; the head not so wide as the thorax, the clypeus very convex, smooth and shining; wings hyaline, sometimes faintly smoky towards their base. Abdomen oblong-ovate, having a fine silky pile; as long as the head and thorax, the margins of the segments narrowly pale testaceous.

Worker.—Entirely pale yellow, the mandibles pale ferruginous, the eyes small and black; in small individuals the ocelli are obsolete, or not distinguishable without a high microscopic power, in larger individuals distinctly visible: head behind slightly concave; the scale subovate, its superior margin nearly straight; abdomen beneath having usually a dark fuscous spot, obsolete in some individuals, after death particularly, but usually present in living ones.

Male.—Dark fuscous, shining, having a sparing cinereous pile, most dense on the head and abdomen; the clypeus smooth and

shining, having a transverse depressed line at its anterior margin; the eyes and ocelli prominent, the latter has the posterior pair elevated on the vertex; wings hyaline, the nervures pale testaceous; the scale nearly square: abdomen slightly pubescent and pointed at the apex.

The female of *F. flava* is very likely to be confounded with the female of *F. nigra*; it may be distinguished by the form of the discoidal cell, which is much narrowed towards the first cubital cell, in *fusca* it is slightly narrowed, or subquadrate; the wings of *fusca* are different, being milky-white; the abdominal scale is also very different to that of *fusca*.

The male of *F. nigra* may be distinguished by its amplitude of wings, which are $2\frac{1}{2}$ lines long, those of *flava* are $1\frac{3}{4}$ lin.

This is probably the most universally distributed species in this country; it is found everywhere, and is well known as the turf Ant; it raises its nests in fields and on banks, and abounds in some of our open moor lands to an incalculable extent.* By diligent search I have little doubt that its two congeneric species, *F. umbrata* and *F. affinis*, will prove to be of frequent occurrence. This Ant constructs its *Formicarium* under stones in fields; and here will be found the interesting *Claviger foveolatus*, in societies formed in banks; its detection is difficult: we are only on the threshold of our investigations of these interesting insects, and some future Monographist will probably double the number of the species at present known to be indigenous.

Sp. 8. *Formica nigra*.

Fœmina.—Fusco-nigrescens, dense undique cinereo-micans, nitida, mandibulis antennis obscure rufescentibus; pedum articulis tarsisque pallide rufescentibus; alis lacteo-albis, nervis et stigmatibus pallide testaceis; squama verticaliter subrectangulari, supra angulis rotundatis et medio subangulatim emarginato.

Operaria.—Fusco-nigra, cinereo-micans, nitida, sparse flavido-pilosula, antennarum scapis et mandibulis rufescentibus; tarsis, pedum articulis pallide testaceis; squama subrectangulari, supra parum vel vix emarginato.

Mas.—Fusco-niger, parum cinereo-micans, nitidus; antennarum flagellis fusciscentibus, articulo primo crassiusculo; squama parva, transversim subrectangulari, supra parum concaviuscula.

* I have found the winged male in the *Formicarium* as late as the 5th of November.

Formica nigra, Linn. Faun. Suec., p. 426, No. 1722; Syst. Nat., i. 963, 4, ♀; Scop. Ent. Carn., p. 834; Fabr. Ent. Syst., ii. 350, 10; Schrank, Ins. Aust., p. 823; Latr. Hist. Nat. Fourm., p. 156, ♂, ♀, ♀; St. Farg. Hym., i. 206, 7; Losana, Form. Pied., 11; Nyland. Adno. Mon. Form. p. 920.

Formica fusca, Foerster, Hym. Stud. Form.

Lasius niger, Fabr. Syst. Piez., p. 415, 1.

Female.—Length $3\frac{1}{2}$ lines. Fuscous, densely covered with cinereous silky pubescence; the head shining; the mandibles, anterior margins of the face on each side of the clypeus, the flagellum and legs rufo-testaceous, the tarsi and joints of the latter palest; the ocelli distinct, and of a glassy brightness, eyes sparingly pilose; the head is narrower than the thorax. Thorax smooth and shining; wings of milky whiteness, hyaline and iridescent, the nervures of a testaceous yellow, costal nervure fuscous; the scale deeply notched above, the lateral angles rounded, the sides nearly straight. Abdomen elongate-ovate, rather longer than the head and thorax; the margins of the segments membranaceous, and narrowly pale testaceous; the silky gloss varying in brilliancy in different lights.

Worker.—Length $1\frac{1}{4}$ — $1\frac{1}{2}$ lines. The head and legs coloured as in the female; eyes not prominent, the ocelli very minute, scarcely distinguishable without a high microscopic power; in small individuals, the thorax similar in form to *F. flava*, abdominal scale small, vertical and subrectangular, minutely notched above. Abdomen ovate, thinly sprinkled with yellow hairs, particularly the apical segments; the margins of the segments obscurely membranaceous, shining and thinly sprinkled with long hairs beneath.

Male.—Length $1\frac{1}{2}$ lin. Dark fuscous, the tubercles at the base of the scape of the antennæ and the tips of the mandibles rufo-testaceous; the basal joint of the flagellum short, obconical, much stouter than the following joints; eyes and ocelli prominent, the vertex slightly concave. The wings, as in the female, more ample than in *F. flava*, the discoidal cell frequently obsolete; the scale small, scarcely emarginate above. Abdomen ovate, the margins of the segments narrowly and obsoletely testaceous.

This Ant is best known in England as the garden Ant; it forms its nest usually in the ground, but not uncommonly in old brick walls, &c.; it is found in woods, fields, gardens, and even in the middle of towns, where I have frequently observed the pave-

ment covered with the glittering winged males and females; and I once noticed some swallows skimming along the pathway, feasting on the Ants, when swarming as I have stated above.

Genus *TAPINOMA*, Foerst.

Maxillary palpi 6-jointed, labial palpi 4-jointed; antennæ inserted in the middle of the face, filiform, eyes placed before the middle, a little within the sides of the head; the abdomen having a scale at its base, substituting the first segment, the scale oblong, decumbent, received into a fovea at the base of the abdomen.

Although the insects which form this genus partake of most of the characters of the genus *Formica*, still all the species which I have seen have the flagellum either filiform or subfiliform, and the decumbent scale forms, apparently, a gradual approach in form to the *Poneridæ*; I have therefore retained Foerster's genus. I am acquainted with five species; one, which appears to be undescribed, I have the pleasure of adding myself; it was captured by Mr. Dale in Wales.

Tapinoma erratica.

Fœmina.—Nigro-fusca, cinerascenti-micans, pilositate abdominis dorso vix conspicua; pedibus fuscis, tibiæ apice tarsisque rufescentibus; metathorace dorso abbreviato, squama oblonga, subrectangula, depressa, fovea basali segmenti secundi recepta, vix conspicua; abdomine thorace latiori ventreque pilositate longiori et magis conspicua prædita.

Operaria.—Nigra, nitida, glabra, angustior, palpis et pedibus fuscis, geniculis tarsisque rufo-pallidis; squama sicut in fœmina; abdomine subrotundato.

Mas.—Niger, nitidus, antennis thorace longioribus; mandibulis multidentatis, apice acutissimo, pedum articulis tarsisque pallide rufescentibus; squama crassa, oblonga, supra rotundata; alis fusco-hyalinis; abdomine oblongo-ovata.

Formica erratica, Latr. Hist. Nat. Fourm., p. 182.

Formica glabrella, Nyland. Addit. Adno. Mon. Form., p. 38 ♀.

Tapinoma collina, Foerster, Hym. Stud. Form., 43, 21, Gen. 2, ♀, ♂.

Female.—Length 2 lines. Not yet found in this country, the above diagnosis is from Foerster's Monograph.

Worker.—Length $1\frac{1}{2}$ lin. Black, elongate, smooth and shining, not pubescent; the scape obscurely ferruginous towards the base, the extreme base of the flagellum rufo-testaceous; the teeth of the

mandibles ferruginous; ocelli not apparent; eyes round, the facets of a crystalline brilliancy. Thorax compressed, metathorax very oblique, smooth and shining, the scale small, elongate, inclining forwards, almost decumbent; legs dark rufo-testaceous, the joints and tarsi pale testaceous; abdomen sub-ovate, produced anteriorly, overhanging and concealing the scale.

Male.—Length 2 lines. Black, the antennæ elongate, reaching to the apical margin of the first segment of the abdomen, the first joint of the flagellum scarcely thicker than the second, all the joints of about equal length, the second and third a little longer than the basal joint; the ocelli prominent, of a glassy brightness, the clypeus convex, the mandibles produced, very stout, the inner margins straight and serrated, their apex terminated by an acute stout incurved tooth. Thorax elongate, rounded anteriorly, smooth and shining, the metathorax rounded posteriorly, sub-opaque, and having a depression or fossulet in the middle above; legs dark rufo-testaceous, the joints and tarsi pale testaceous; wings fusco-hyaline, nervures and stigma fusco-testaceous; scale of the abdomen decumbent, incrassate, rounded at its superior margin, not concealed as in the worker; abdomen elongate-ovate, margins of the segments narrowly and obscurely testaceous.

The insect which I have described as the male I think must be correctly assimilated. The worker and male were both captured by J. C. Dale, Esq., in 1846; the workers in Scotland, the male at Bournemouth. This is a very interesting addition to our Fauna, quite a new form, approaching somewhat to that of *Ponera*, through which we pass to the division which have two nodes to the abdomen, constituting the family *Formicidæ*; the habit of *F. collina* also approaches to that of our British representative of the group *Poneridæ*—*P. contracta*—which is found usually under stones, in which situation Mr. Dale informs me he met with the present species. I have only seen two workers and one male, all captured by and in the collection of Mr. Dale.

Tapinoma polita, n. s.

Operaria.—Rufo-testacea, antennis filiformibus; lævis, tota nitidissima, nuda; antennis, mandibulis, pedum articulis et tarsis pallide testaceis.

Worker.—Rufo-testaceous, smooth and shining; head elongate, the sides slightly curved or rounded, having a few scattered long hairs, slightly emarginate behind; the scape as long as the head,

and of about the same length as the flagellum, the latter nearly filiform, the two apical joints being only slightly thickened. Thorax: smooth and shining, rounded anteriorly, slightly narrowed posteriorly, and strangulated at the junction of the meso- and metathorax, the latter emarginate behind, the emargination extending the entire width, the lateral angles obtuse; the scale of the abdomen decumbent, elongate, slightly narrowed at the base and rounded above. Abdomen ovate, smooth and shining, sprinkled with a few long pale hairs.

The only species which approaches this insect is the *Tapinoma nitens* of Mayr; but that has the scape shorter than the flagellum, and the latter is sub-clavate, the scale is much wider above, and the abdomen dark rufo-fuscous. I have only seen the single example described; it is in the collection of J. C. Dale, Esq., who captured it in Wales.

Fam. 1. PONERIDÆ, Smith.

Genus PONERA, Latr.

Head elongate, flagellum of the antennæ clavate in the females and workers, filiform in the males; inserted before the middle of the face: the maxillary palpi short, subsetaceous, 6-jointed, the labial palpi 4-jointed; the clypeus short, transverse; the ocelli and eyes obsolete in the workers; wings having one marginal, two sub-marginal and two discoidal cells; the abdominal scale sub-nodiform, incrassate; the margins of the second and third segments constricted.

Sp. 1. *Ponera contracta*.

Fœmina.—Elongata, sub-cylindrica, fusca; mandibulis, clypeo, antennis pedibusque pallide rufis; oculis magnis, subovalibus, hirtulis; ocellis distinctis; capite magno, confertim punctulato, sub-opaco; alis hyalinis, nervis subflavescentibus: squama altissima, crassa, antice convexa, postice lævissima concaviuscula; abdomine elongato-ovali, margine parum fusco-testacea.

Operaria.—Fusco-brunnea, sub-nitida, pube cinerascenti subdepressa, pilis sparsis erectis; oculis obsoletis, ocellis nullis.

Mas.—Niger, nitidissimus, pube sericea; pedibus fuscis, tibiis tarsisque rufescentibus; antennis elongatis, scapo minimo, pedicello subgloboso, reliquis articulis cylindricis; oculis valde prominulis, ocellis sat magnis; abdominis segmento primo squama crassa, antice posticeque subconvexa; segmento ultimo processu spiniformi deorsum flexo; alis ut in fœmina.