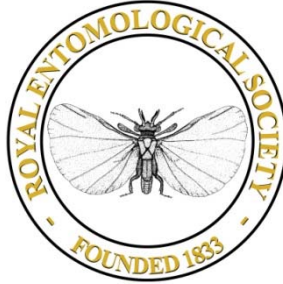


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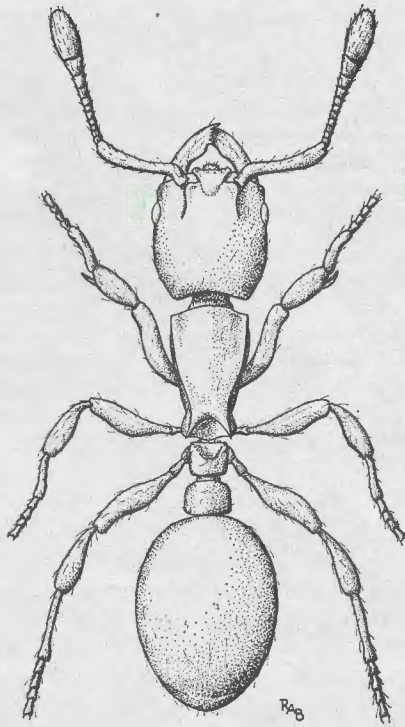
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HANDBOOKS FOR THE IDENTIFICATION OF BRITISH INSECTS



HYMENOPTERA FORMICIDAE

By

BARRY BOLTON AND CEDRIC A. COLLINGWOOD

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HANDBOOKS FOR THE IDENTIFICATION OF BRITISH INSECTS

The aim of this series of publications is to provide illustrated keys to the whole of the British Insects (in so far as this is possible), in ten volumes, as follows :

- | | |
|------------------------------------|------------------------|
| I. Part 1. General Introduction. | Part 9. Ephemeroptera. |
| „ 2. Thysanura. | „ 10. Odonata. |
| „ 3. Protura. | „ 11. Thysanoptera. |
| „ 4. Collembola. | „ 12. Neuroptera. |
| „ 5. Dermaptera and
Orthoptera. | „ 13. Mecoptera. |
| „ 6. Plecoptera. | „ 14. Trichoptera. |
| „ 7. Psocoptera. | „ 15. Strepsiptera. |
| „ 8. Anoplura. | „ 16. Siphonaptera. |
- II. Hemiptera.
III. Lepidoptera.
IV. and V. Coleoptera.
VI. Hymenoptera : Symphyta and Aculeata.
VII. Hymenoptera : Ichneumonoidea.
VIII. Hymenoptera : Cynipoidea, Chalcidoidea, and Serphoidea.
IX. Diptera : Nematocera and Brachycera.
X. Diptera : Cyclorrhapha.

Volumes II to X will be divided into parts of convenient size, but it is not possible to specify in advance the taxonomic content of each part.

Conciseness and cheapness are main objectives in this series, and each part is the work of a specialist, or of a group of specialists. Although much of the work is based on existing published keys, suitably adapted, much new and original matter is also included.

Parts are issued, separately paged and priced, as they become available.

A second (revised) edition of *A Check List of British Insects*, by G. S. Kloet and W. D. Hincks, is being issued as an extra, eleventh, volume in this series.

The Society is indebted to the Royal Society for a grant towards the cost of initiating this series of *Handbooks*.

A list of parts so far published appears on the inside and outside back covers.

HYMENOPTERA

Family FORMICIDAE

By BARRY BOLTON and CEDRIC A. COLLINGWOOD

INTRODUCTION

THE British Isles, including the Channel Islands, have 44 known, indigenous **ant** species at the present time. The distribution of these species in the two areas is as follows:

- Indigenous to British Isles: 41 species
- Indigenous to Channel Islands: 19 species
- Indigenous to British Isles but not in Channel Islands: 25 species
- Indigenous to Channel Islands but not in British Isles: 3 species.

In addition to these 44 indigenous species there are also ten exotic forms, mostly well known "tramp" species, which are commonly introduced and capable of living quite successfully in permanently heated buildings, hot-houses and the like. These ten species are included in the Key to Species and are marked * in the list below. The three species found only in the Channel Islands are marked † in this list. Species which have been recorded in Britain on very few occasions as casual introductions are not included in the list or keys.

Family FORMICIDAE

Subfamily PONERINAE

Tribe Ponerini

- Ponera coarctata* (Latreille)
- Hypoponera punctatissima* (Roger)

Subfamily MYRMICINAE

Tribe Myrmicini

- Myrmica lobicornis* Nylander
- Myrmica rubra* (L.)
- Myrmica ruginodis* Nylander
- Myrmica sabuleti* Meinert
- Myrmica scabrinodis* Nylander
- Myrmica schencki* Emery
- Myrmica specioides* Bondroit
- Myrmica sulcinodis* Nylander
- Sifolinia karavajevi* (Arnoldi)

Tribe Lepto thoracini

- Formicoxenus nitidulus* (Nylander)
- Leptothorax acervorum* (F.)
- Leptothorax interruptus* (Schenck)
- Leptothorax nylanderi* (Foerster)
- Leptothorax tuberum* (F.)
- †*Leptothorax unifasciatus* (Latreille)

Tribe Tetramoriini

- Anergates atratulus* (Schenck)
- Strongylognathus testaceus*
(Schenck)
- Tetramorium caespitum* (L.)
- **Tetramorium guineense* (F.)
- **Tetramorium simillimum*
(F. Smith)

Tribe Solenopsidini

- **Monomorium pharaonis* (L.)
- Solenopsis fugax* (Latreille)

Tribe Pheidolini

- **Pheidole megacephala* (F.)
- Stenammina westwoodi* Westwood

Tribe Myrmeciniini

- Myrmecina graminicola* (Latreille)

Tribe Crematogastrini

- **Crematogaster scutellaris* (Olivier)

Subfamily DOLICHODERINAE

Tribe Tapinomini

- **Iridomyrmex humilis* (Mayr)
- Tapinoma erraticum* (Latreille)
- **Tapinoma melanocephalum* (F.)

Subfamily FORMICINAE

Tribe Camponotini

**Camponotus* species

Tribe Formicini

Formica aquilonia Yarrow*Formica cunicularia* Latreille*Formica exsecta* Nylander*Formica fusca* L.*Formica lemani* Bondroit*Formica lugubris* Zetterstedt*Formica pratensis* Retzius*Formica rufa* L.*Formica rufibarbis* F.*Formica sanguinea* Latreille*Formica transcaucasica* Nasonov

Tribe Lasiini

Lasius alienus (Foerster)*Lasius brunneus* (Latreille)†*Lasius emarginatus* (Olivier)*Lasius flavus* (F.)*Lasius fuliginosus* (Latreille)*Lasius mixtus* (Nylander)*Lasius niger* (L.)*Lasius umbratus* (Nylander)**Paratrechina longicornis*

(Latreille)

**Paratrechina vividula* (Nylander)

Tribe Plagiolepidini

†*Plagiolepis vindobonensis*

Lomnicki

The keys in this Handbook have been constructed primarily upon material in the British Museum (Natural History), supplemented by specimens from a number of private collections. Use has been made of previous studies on the British fauna and also of more recent revisions of genera and species groups by various authors. These are mentioned in the notes on the species and included in the references. Previously published keys to British ants, include those of Donisthorpe (1927), Sweeney (1950), Morley (1953) and Collingwood (1958*a*, 1964).

The keys to the workers, queens and males are presented separately. Therefore, the notes on the biology and distribution of species which are normally incorporated within the keys in the Handbook series are here collated into a separate section (p. 16). Very brief biological notes are given in the actual keys only when immediately relevant. More detailed information on the distribution of the British ant species is given in Collingwood & Barrett (1964).

ACKNOWLEDGMENTS

We would like to express our thanks to Mr. R. A. Bourne, who drew figures 1-6 and the front cover illustration, which are designed to illustrate the various parts of the ants referred to in the keys, and to Mr. E. Jarzembowski who drew figures 57-65.

KEY TO SPECIES

- 1 Gaster with six visible tergites and sternites when pedicel is one-segmented (petiole only), but with five visible segments when petiole is 2-segmented (petiole plus postpetiole); male genitalia present and usually visible, projecting from gastral apex; sting or acidopore structures absent **Males** (p. 12)
- Gaster with five segments when pedicel is of one segment, but with four visible segments when the pedicel is two-segmented; projecting genitalia absent, gaster ending in a sting (Ponerinae, Myrmicinae), an acidopore (Formicinae), or a simple transverse groove (Dolichoderinae) **2**
- 2 Alitrunk with flight sclerites present; wings present in young individuals although lost in queens of mature colonies, however wing remnants are then often visible projecting from beneath the tegulae **Queens** (p. 8)
- Alitrunk without flight sclerites; wings not developed **Workers** (p. 3)

Workers

Note. The species *Sifolinia karavajevi* (Arnoldi) and *Anergates atratulus* (Schenk) do not have a worker caste.

- 1 Pedicel of a single segment, the petiole, which is usually well developed as an erect node or scale but more rarely may be reduced and overhung by the first gastral segment so that it is not visible in dorsal view (figs. 2, 19, 20, 55, 56) 2
- Pedicel distinctly of two segments, the petiole and postpetiole (figs. 3, 8, 10, 16, 24, 26, 33, 34, 35) [subfamily MYRMICINAE] 5
- 2 Gaster with a distinct constriction between the first and second segments, equipped apically with a well-developed sting (fig. 19). Eyes minute, their maximum diameter less than the basal width of the scape in full-face view, and eyes situated in front of the middle of the sides of the head (fig. 17). Mandibles armed with 2-3 teeth apically, followed by a row of small or minute denticles (fig. 18) [subfamily PONERINAE] 3
- Gaster without a constriction between first and second segments; sting absent (figs. 55, 56). Eyes larger, their maximum diameter greater than the basal width of the scape in full-face view, often greater than the maximum width of the scape (figs. 49, 52). If the eyes are only slightly greater than the basal width of the scape then they are situated behind the middle of the sides of the head (fig. 53). Mandibular armament not as above 4
- 3 Subpetiolar process in profile with an acute angle posteroventrally and with a fenestra or thin-spot anteriorly which is translucent (fig. 19). Maxillary palpi with two segments **Ponera coarctata** (Latreille)
- Subpetiolar process in profile a simple lobe, without an acute posteroventral angle and lacking an anterior fenestra or thin-spot (fig. 20). Maxillary palpi with one segment. [Generally in heated buildings] .. **Hypoponera punctatissima** (Roger)
- 4 At the ventral apex of the gaster the hypopygium produced into a conical structure bearing a circular acidopore at its apex, usually distinct in lateral view; the acidopore surrounded by a fringe of hairs (fig. 55) [subfamily FORMICINAE] 28
- Apex of gaster without the hypopygium developed as above; acidopore absent, the gaster terminating in a transverse slit bounded by the pygidium and hypopygium (fig. 56) [subfamily DOLICHODERINAE] 50
- 5 Mandibles falcate, edentate or at most with a single minute denticle close to the apex (fig. 21). [*Dulotic association in nests of* **Tetramorium caespitum**]
- Mandibles triangular or subtriangular, dentate **Strongylognathus testaceus** (Schenk) 6
- 6 Propodeum unarmed, rounded, without teeth or spines (figs. 24, 26) 7
- Propodeum armed with a pair of spines or teeth (figs. 8, 10, 33) 8
- 7 Antennae with 10 segments, the two apical segments of which form a club (fig. 27). Integument of head and alitrunk mostly shining, with scattered small punctures. [*Often associated with nests of* **Formica** or **Lasius species**]
- Antennae with 12 segments, the three apical segments forming a club (fig. 28). Integument of head and alitrunk everywhere finely and very densely reticulate-punctate. [*Introduced species; in heated buildings etc.*]
- **Monomorium pharaonis** (L.)
- 8 Antennae with 11 segments 9
- Antennae with 12 segments 11
- 9 Postpetiole attached on dorsal surface of first gastral segment so that the gaster may be reflexed over the alitrunk. Petiole dorsoventrally flattened, without a node (fig. 29). Sting spatulate. Mesonotum anteromedially with a short, weakly raised, longitudinal carina. [*Imported with cork from South Europe*]
- **Creumatogaster scutellaris** (Olivier)
- Postpetiole attached to anterior surface of first gastral segment, the gaster not capable of reflexion over the alitrunk. Petiole not dorsoventrally flattened, with a developed node (figs. 31, 32). Sting not spatulate. Mesonotum without a longitudinal carina anteromedially 10
- 10 Postpetiole in profile with a long, acute ventral process; subpetiolar process an acute lamina (fig. 31). Dorsa of head and alitrunk smooth and highly polished, without rugose sculpturation. [*In nests of* **Formica rufa** and *its allies*]
- **Formicoxenus nitidulus** (Nylander)

- Postpetiole in profile with a minute anteroventral tooth; subpetiolar process an acute, triangular denticle (fig. 32). Dorsa of head and alitrunk sculptured, with fine longitudinal rugulation **Leptothorax acervorum** (F.)
- 11 Ventral surface of head with a pair of strong, longitudinal carinae, one on each side. Anterior clypeal margin strongly bidentate or bituberculate (fig. 7), often with a third, smaller tubercle between the outer pair. Petiole in profile a subrectangular mass without a differentiated node, weakly bituberculate above (fig. 8)
Myrmecina graminicola (Latreille)
- Ventral surface of head without a pair of longitudinal carinae. Anterior clypeal margin not bidentate nor bituberculate. Petiole in profile with a differentiated node, not bituberculate above 12
- 12 Lateral portions of clypeus with their posterior margins raised into a transverse ridge in front of the antennal insertions (figs. 9, 11). In dorsal view the antero-lateral corners of the pronotum angulate. Sting with a triangular, lamelliform appendage apicodorsally [genus *Tetramorium*] 13
- Lateral portions of clypeus not raised into a transverse ridge in front of the antennal insertions. In dorsal view the anterolateral corners of the pronotum rounded. Sting without a triangular, lamelliform appendage apicodorsally 15
- 13 Frontal carinae extended back upon the head by a pair of longitudinal ridges which almost reach the occipital margin (fig. 11). Gaster usually darker in colour than head and alitrunk. [*Introduced species*] 14
- Frontal carinae relatively short, not extended back by longitudinal ridges until close to occipital margin (fig. 9). Colour usually uniform dark brown or blackish-brown **Tetramorium caespitum** (L.)
- 14 Body hairs numerous, long and acute. Dorsum of alitrunk coarsely reticulate-rugose. Larger species, head width behind eyes greater than 0.75 mm. [*Introduced species; in hothouses, etc.*] **Tetramorium guineense** (F.)
- Body hairs sparse, thick and blunt. Dorsum of alitrunk finely and principally longitudinally rugose with numerous punctures. Smaller species, head width behind eyes less than 0.65 mm. [*Introduced species; in hothouses, etc.*]
Tetramorium simillimum (F. Smith)
- 15 Monomorphic. Head not massively developed, the occipital margin not impressed. Mandibles with numerous teeth. Head and pronotal dorsum sculptured, often strongly so. Straight-line length of antennal scapes less than maximum length of head from mid-point of clypeus to mid-point of occipital margin 16
- Dimorphic. *Major worker* (soldier) with huge head which has the occipital margin strongly impressed (fig. 12). Mandibles strong, equipped with two teeth apically and a single tooth basally, these separated by a long diastema (fig. 13). *Minor worker* with occipital margin not impressed, the head of normal size (fig. 14). Mandibles multidentate. Head and pronotal dorsum unsculptured, smooth and shining. Straight-line length of antennal scapes distinctly greater than the maximum length of the head from mid-point of clypeus to mid-point of occipital margin. [*Introduced species, in hothouses, etc.*] **Pheidole megacephala** (F.)
- 16 Median portion of clypeus narrow, longitudinally bicarinate. Eyes relatively very small, in full-face view the maximum length of the eye distinctly less than the greatest thickness of the antennal scape (fig. 15). Petiole in profile with a very long anterior peduncle and a bluntly subconical node (fig. 16)
Stenamma westwoodi Westwood
- Median portion of clypeus broad, convex, sculptured but not longitudinally bicarinate. Eyes relatively larger, in full-face view the maximum length of the eye distinctly greater than the greatest thickness of the antennal scape. Petiole in profile with a short peduncle, the node not subconical 17
- 17 Tibial spurs of middle and hind legs simple or absent. Antennal scapes lacking long, curved hairs. Body hairs relatively stout and blunt. Smaller species, total length less than 3.5 mm., head width behind eyes less than 0.75 mm. [genus *Leptothorax*] 18
- Tibial spurs of middle and hind legs strongly developed and pectinate. Antennal scapes with long, curved hairs. Body hairs relatively fine, acute. Larger species total length greater than 3.5 mm., head width behind eyes greater than 0.75 mm. [genus *Myrmica*] 21

- 18 Antennal club approximately the same colour as the remainder of the funiculus, not infuscated. Metanotal groove feebly impressed so that the dorsal outline of the alitrunk in profile is interrupted and not a continuous convexity (fig. 33)
Leptothorax nylanderi (Foerster)
- Antennal club distinctly darker in colour than the remainder of the funiculus, infuscated, often strongly so. Metanotal groove absent (figs. 34, 35) 19
- 19 Propodeal spines in dorsal view short, each one only as long as approximately half the distance separating its base from the base of its twin; spines not curved towards one another along their length (fig. 35) **Leptothorax tuberum** (F.)
- Propodeal spines in dorsal view long, each one almost or quite as long as the entire distance separating its base from the base of its twin, spines usually somewhat curved towards one another along their length (fig. 34) 20
- 20 Predominant sculpture of mediodorsal area of head a very fine longitudinal striation
Leptothorax interruptus (Schenck)
- Predominant sculpture of mediodorsal area of head a fine reticulate-puncturation. [*Channel Islands only*] **Leptothorax unifasciatus** (Latreille)
- 21 Antennal scape in profile evenly downcurved basally, the curve either gradual or quite sudden but never with an abrupt, almost right-angular bend, nor with the dorsal margin at the bend armed with a ridge, thickening or other outgrowth (fig. 36) 22
- Antennal scape in profile suddenly and abruptly downcurved basally, the bend almost or quite right-angular and with the dorsal margin at the bend usually armed with a ridge or other outgrowth (figs. 37-40) 24
- 22 Frontal triangle with a few rugae traversing its length. On the dorsal alitrunk at least the mesonotum and propodeum strongly longitudinally sulcate
Myrmica sulcinodis Nylander
- Frontal triangle smooth, without rugae traversing its length. On the dorsal alitrunk the mesonotum and propodeum rugose. If the rugae are predominantly longitudinal then some transverse rugules are present 23
- 23 In profile the petiole node with the dorsal surface sloping backwards from the anterodorsal angle, the dorsal surface curving evenly into the posterior face, the two not separated by a posterodorsal angle (fig. 41) **Myrmica rubra** (L.)
- In profile the petiole node with the dorsal surface flat or somewhat convex behind the anterodorsal angle, the surface not sloping backwards; the dorsal surface separated from the posterior face by a posterodorsal angle which is usually distinct (fig. 42)
Myrmica ruginodis Nylander
- 24 In dorsal view the antennal scape with a transverse raised ridge or flange at the bend which is seen as a conspicuous dentiform prominence in profile (figs. 39, 40) . . 25
- In dorsal view the antennal scape without a transverse raised ridge, without a dentiform prominence in profile. The scape in profile is either only acutely angled or has a massive outgrowth at the bend (figs. 37, 38) 26
- 25 Transverse ridge at bend in antennal scape projecting as a massively developed, lamelliform flange, the frontal carinae closely approximated to accommodate this structure (fig. 39). Postpetiole in profile relatively low and thick, less than 1.40 times higher than long (fig. 43) **Myrmica schencki** Emery
- Transverse ridge at bend in antennal scape not projecting as a massively developed lamelliform flange, usually only a relatively low ridge (fig. 40). Frontal carinae not closely approximated. Postpetiole in profile relatively high and narrow, more than 1.40 times higher than long (fig. 44) **Myrmica lobicornis** Nylander
- 26 Node of petiole in profile with the dorsal surface curving evenly into the posterior surface, the posterodorsal angle absent (fig. 45) **Myrmica specioides** Bondroit
- Node of petiole in profile with the dorsal surface truncate and separated from the posterior surface by a posterodorsal angle (fig. 46) 27
- 27 Antennal scape at the bend with a massively developed extension (fig. 38)
Myrmica sabuleti Meinert
- Antennal scape at the bend without an extension, merely sharply angled, or with a small, inconspicuous extension (fig. 37) **Myrmica scabrinodis** Nylander
- 28 Antennae with 11 segments. [*Channel Islands only*]
Plagiolepis vindobonensis Lomnicki
- Antennae with 12 segments 29

- 29 Antennal insertions situated some distance behind the posterior clypeal margin, a distance usually greater than the basal width of the scape. Mandibles with teeth regularly decreasing in size from apex to basal angle (fig. 47). [*A number of species sometimes introduced with timber*] **Camponotus** species
- Antennal insertions very close to or contiguous with the posterior clypeal margin. Mandibles with the third tooth from the apex smaller than the second and the fourth (fig. 48) 30
- 30 Ocelli absent. Dorsum of alitrunk with very stout, thick, bristle-like hairs which are distinctly arranged in pairs. Eyes at or in front of the middle of the sides of the head (fig. 49) [*genus Paratrechina*] 31
- Ocelli present, generally distinct but may be indistinct in some species. When hairs are present on dorsal alitrunk they are not bristle-like and are not distinctly arranged in pairs. Eyes behind middle of sides of head (figs. 52-54) 32
- 31 Antennal scapes with numerous hairs projecting at an angle from the long axis of the shaft. [*Introduced species; in hothouses, etc.*] **Paratrechina vividula** (Nylander)
- Antennal scapes without hairs projecting from the shaft. [*Introduced species; in hothouses, etc.*] **Paratrechina longicornis** (Latreille)
- 32 Orifice of propodeal spiracle a narrow, elongate ellipse or slit, inclined from the vertical in profile, situated well in front of the point at which the sides of the propodeum round into the declivity (fig. 50) [*genus Formica*] 33
- Orifice of propodeal spiracle circular, subcircular or broadly oval, situated at or actually on the curved surface where the sides of the propodeum round into the declivity (fig. 51) [*genus Lasius*] 43
- 33 Anterior clypeal margin with a distinct median impression or notch (fig. 52) **Formica sanguinea** Latreille
- Anterior clypeal margin without a median impression or notch 34
- 34 With the head in full-face view the occipital margin very deeply excised **Formica exsecta** Nylander
- With the head in full-face view the occipital margin not excised, varying from shallowly concave to feebly convex 35
- 35 Eyes without minute hairs arising between the facets. With the head in full-face view the occipital margin and corners without standing hairs 36
- Eyes with minute hairs arising between the facets. With the head in full-face view either the occipital margin or the corners or both with standing hairs 41
- 36 In fully adult specimens the alitrunk uniform brown or black, without red areas 37
- In fully adult specimens the alitrunk bicoloured, black or brown with varying areas of red; more rarely the alitrunk completely red 39
- 37 Ventral surface of head with a single pair of hairs (may be lost by abrasion). Pubescence on dorsum of gaster very sparse, the individual components widely separated. Pronotal dorsum with a number of long hairs, some of which are generally curved anteriorly **Formica transcaucasica** Nasonov
- Ventral surface of head without hairs. Pubescence on dorsum of gaster dense, the individual components closely approximated, often forming a dense, greyish coat. Pronotal dorsum without hairs or with short hairs present which may be inclined forwards but are not curved anteriorly 38
- 38 Ventral surfaces of middle and hind femora with a number of hairs. Pronotal dorsum usually with numerous short hairs **Formica lemani** Bondroit
- Ventral surfaces of middle and hind femora without hairs. Pronotal dorsum usually without hairs, occasionally with a few present **Formica fusca** L.
- 39 Ventral surface of head with standing hairs. Frontal triangle virtually unsculptured, much more shining than clypeus **Formica rufa** L.,
- Ventral surface of head without standing hairs. Frontal triangle sculptured and dull, not or only slightly more shining than clypeus 40
- 40 Dorsal margin of petiole with standing hairs. Pronotum and mesonotum with numerous standing hairs **Formica rufibarbis** F.
- Dorsal margin of petiole without standing hairs. Pronotum and mesonotum usually without standing hairs but occasionally with 2-3 on the former, very rarely also with hairs on the latter **Formica cunicularia** Latreille

- 41 With the alitrunk in profile the propodeal dorsum strongly sloping upwards posteriorly so that the posteriormost point of the dorsum is the highest. Area of head between frontal carinae dead matt, almost without sculpture
 Formica pratensis Retzius
- With the alitrunk in profile the propodeal dorsum either more or less flat or feebly convex but not as above. Area of head between frontal carinae somewhat shining, sculptured, with fairly easily seen punctures 42
- 42 Standing hairs extending down the sides of the head to below the eyes and prominent in full-face view. Long hairs arise over the entire surface of the mesopleuron
 Formica lugubris Zetterstedt
- Standing hairs not extending down the sides of the head to below the eyes. Long hairs on mesopleuron mostly restricted to the lower-anterior portion
 Formica aquilonia Yarrow
- 43 Either antennal scapes or tibiae of middle and hind legs or both with pubescence and also with projecting erect or suberect hairs 44
- Antennal scapes and tibiae of middle and hind legs with pubescence but without projecting erect or suberect hairs 46
- 44 Eyes relatively small, their maximum diameter 0.17 times the head width or less. More approximately the maximum diameter of the eye distinctly less than the length of the apical antennal segment (fig. 53). Colour uniform yellow or light yellow-brown **Lasius umbratus** (Nylander)
- Eyes relatively large, their maximum diameter 0.20 times the head width or more. More approximately the maximum diameter of the eye about equal to the length of the apical antennal segment (fig. 54). Colour uniform brown or dark brown, or bicoloured 45
- 45 Alitrunk and petiole yellowish red, contrasting strongly with the darker brown head and gaster. Long hairs on antennal scapes mostly subdecumbent. [*Channel Islands only*] **Lasius emarginatus** (Olivier)
- Entirety of head and body uniform brown or dark brown. Hairs on antennal scapes mostly erect or suberect **Lasius niger** (L.)
- 46 Colour shining black, usually jet-black. Occipital margin of head strongly emarginate in full-face view **Lasius fuliginosus** (Latreille)
- Colour yellow to dark brown, or bicoloured. Occipital margin of head not emarginate in full-face view although weakly concave in some 47
- 47 Eyes relatively large, their maximum diameter 0.20 times the head width, or more. More approximately the maximum diameter of the eye about equal to the length of the apical antennal segment. Colour uniform medium to dark brown or with the alitrunk lighter brown than the gaster 48
- Eyes relatively small, their maximum diameter 0.17 times the head width, or less. More approximately the maximum diameter of the eye less than the length of the apical antennal segment. Colour uniform clear yellow or light yellow-brown 49
- 48 Alitrunk and petiole lighter in colour than gaster, the two strongly contrasting. Curved portion of occipital corners lacking standing hairs in full-face view, very rarely with one or two present. Scale of petiole distinctly indented dorsally
 Lasius brunneus (Latreille)
- Alitrunk, petiole and gaster uniform dark brown. Curved portion of occipital corners with standing hairs in full-face view. Scale of petiole not normally indented dorsally **Lasius alienus** (Foerster)
- 49 Dorsal surface of gaster with long erect hairs, greater than 0.08 mm. in length or about 0.60 times the maximum width of the hind tibia. Scale of petiole usually not indented dorsally **Lasius flavus** (F.)
- Dorsal surface of gaster with short erect hairs, not exceeding 0.05 mm. in length or about 0.30 times the maximum width of the hind tibia. Scale of petiole usually emarginate dorsally **Lasius mixtus** (Nylander)
- 50 Scale of petiole well developed, distinct, inclined forwards but not reduced nor overhanging dorsally by the first gastral segment. [*Introduced species; in heated buildings, etc.*] **Iridomyrmex humilis** (Mayr)
- Scale of petiole reduced or vestigial, the petiole overhanging dorsally by the first gastral segment, usually invisible in dorsal view [genus *Tapinoma*] 51
- 51 Median portion of clypeus with a deep notch or impression in the anterior margin. Colour uniform brown or blackish-brown **Tapinoma erraticum** (Latreille)

- Median portion of clypeus with the anterior margin straight or very slightly concave, without a notch or impression. Head and usually also alitrunk brown or blackish, gaster and appendages yellow. [*Introduced species; in heated buildings, etc.*]
Tapinoma melanocephalum (F.)

Females (Queens)

- 1 Pedicel of a single segment, the petiole, which is usually well developed but may be reduced and overhung by the first gastral tergite (figs. 19, 55, 56) 2
- Pedicel of two segments, the petiole and postpetiole (figs. 31, 32, 41–46) [subfamily MYRMICINAE] 5
- 2 Gaster with a distinct constriction between the first and second segments, equipped apically with a well developed sting (fig. 19) [subfamily PONERINAE] 3
- Gaster without a constriction between first and second segments; sting absent 4
- 3 Subpetiolar process in profile with an acute angle posteroventrally and with a fenestra or thin-spot anteriorly (fig. 19) **Ponera coarctata** (Latreille)
- Subpetiolar process in profile a simple lobe, without an acute angle posteroventrally and lacking an anterior fenestra or thin-spot (fig. 20)
Hypoponera punctatissima (Roger)
- 4 At the ventral apex of the gaster the hypopygium produced into a conical structure bearing a circular acidopore at its apex; the acidopore generally surrounded by a fringe of hairs (fig. 55) [subfamily FORMICINAE] 30
- Apex of gaster without the hypopygium developed as above, acidopore absent, the gaster terminating in a transverse slit bounded by the pygidium and hypopygium (fig. 56) [subfamily DOLICHODERINAE] 52
- 5 Mandibles edentate. Either entire mandible elongate and falcate or the mandible with only an apical tooth, the remainder of the margin without teeth 6
- Mandibles dentate, equipped with an apical and two or more preapical teeth 7
- 6 Antennae with 12 segments. Mandibles elongate, falcate. Anterior clypeal margin without a deep median notch. [*Dulotic association in nests of Tetramorium caespitum*] **Strongylognathus testaceus** (Schenck)
- Antennae with 10 or 11 segments. Mandibles short, not falcate, edentate except for the apical tooth. Anterior clypeal margin with a deep median notch (fig. 57). [*Permanent social parasite in nests of Tetramorium caespitum*]
Anergates atratulus (Schenck)
- 7 Antennae with 10 segments, the two apical antennomeres forming a club. [*Often associated with nests of Formica or Lasius species*]. . **Solenopsis fugax** (Latreille)
- Antennae with 11 or 12 segments, club if present not of two segments 8
- 8 Antennae with 11 segments 9
- Antennae with 12 segments 11
- 9 Postpetiole attached to dorsal surface of first gastral segment. Petiole dorsoventrally flattened, without a node. Sting spatulate. [*Imported with cork from South Europe*] **Crematogaster scutellaris** (Olivier)
- Postpetiole attached to anterior surface of first gastral segment. Petiole not dorsoventrally flattened, with a distinct node. Sting not spatulate 10
- 10 Postpetiole with a long, acute ventral process. Dorsal surfaces of head and alitrunk smooth and highly polished, unsculptured. [*In nests of Formica rufa and its allies*]
Formicoxenus nitidulus (Nylander)
- Postpetiole without a long, acute ventral process. Dorsal surfaces of head and alitrunk sculptured **Leptothorax acervorum** (F.)
- 11 Propodeum armed with a pair of spines or teeth 12
- Propodeum unarmed, rounded. [*Introduced species; in heated buildings, etc.*]
Monomorium pharaonis (L.)
- 12 Ventral surface of head with a pair of strong longitudinal carinae, one on each side. Anterior clypeal margin strongly bidentate or bituberculate, often with a third, smaller, tubercle between the outer pair . . **Myrmecina graminicola** (Latreille)
- Ventral surface of head without a pair of longitudinal carinae. Anterior clypeal margin not bidentate or bituberculate 13
- 13 Lateral portions of clypeus with their posterior margins raised into a ridge in front of the antennal insertions [genus *Tetramorium*]. 14
- Lateral portions of clypeus not raised into a ridge in front of antennal insertions

- 14 Frontal carinae extended back upon the head by a pair of longitudinal ridges which almost reach the occipital margin. Head and alitrunk yellow or yellow-brown
15
— Frontal carinae relatively short, not extended back by longitudinal ridges until close to the occipital margin. Head and alitrunk black or black-brown
Tetramorium caespitum (L.)
- 15 Basal one-quarter to one-third of first gastral tergite with fine longitudinal costulation radiating from the junction of postpetiole and gaster. Dorsum of postpetiole coarsely rugose, not punctulate. [*Introduced species; in hothouses, etc.*]
Tetramorium guineense (F.)
- Basal one-quarter to one-third of first gastral tergite without costulae, this area usually finely punctulate. Dorsum of postpetiole finely and very densely punctulate, with only one or two very fine rugules. [*Introduced species; in hothouses, etc.*] **Tetramorium simillimum** (F. Smith)
- 16 Tibial spurs of middle and hind legs simple or absent, never pectinate 17
- Tibial spurs of middle and hind legs strongly developed, distinctly pectinate [genus *Myrmica*] 23
- 17 Median portion of clypeus narrow, longitudinally bicarinate, the carinae diverging anteriorly. Petiole in profile with a long anterior peduncle and a bluntly subconical node **Stenamma westwoodi** Westwood
- Median portion of clypeus broad, not bicarinate. Petiole in profile not as above
18
- 18 Mandibles distinctly longitudinally rugose or striate, their apical (masticatory) margins dentate throughout, without a diastema between the preapical and basal teeth. Mesoscutum sculptured, usually longitudinally so. Basal portion of first gastral tergite not punctulate 19
- Mandibles not longitudinally rugose or striate, mostly smooth and shining with scattered punctures. Apical (masticatory) margins of mandibles with a large apical and preapical tooth, behind which there is a diastema separating them from the basal (fig. 13). Mesoscutum unsculptured, shining. Basal portion of first gastral tergite densely punctulate. [*Introduced species; in hothouses, etc.*]
Pheidole megacephala (F.)
- 19 First gastral tergite without standing hairs. Postpetiole with a massively developed ventral process. [*Permanent social parasite in nests of Myrmica sabuleti and M. scabrinodis*] **Sifolinia karavajevi** (Arnoldi)
- First gastral tergite with standing hairs. Postpetiole without a massively developed ventral process [genus *Leptothorax*] 20
- 20 Antennal club approximately the same colour as the remainder of the funiculus, not infuscated **Leptothorax nylanderi** (Foerster)
- Antennal club infuscated, much darker in colour than the remainder of the funiculus
21
- 21 Propodeal spines in dorsal view long, each one almost or quite as long as the entire distance separating its base from the base of its twin
Leptothorax interruptus (Schenek)
- Propodeal spines in dorsal view short, each one only as long as approximately half the distance separating its base from the base of its twin, or less 22
- 22 Mesoscutellum longitudinally striate or rugose, almost or quite as strongly sculptured as the mesoscutum. Propodeal spines short but not reduced to small triangular teeth **Leptothorax tuberum** (F.)
- Mesoscutellum mostly smooth and shining, at most with a few weak, longitudinal striae, the mesoscutellum distinctly less strongly sculptured than the mesoscutum. Propodeal spines usually reduced to a pair of small, triangular teeth. [*Channel Islands only*] **Leptothorax unifasciatus** (Latreille)
- 23 Antennal scape in profile evenly downcurved basally, the curve either gradual or sudden but never with an abrupt, almost right-angular bend, nor with the dorsal margin at the bend armed with a ridge or other outgrowth (fig. 36) 24
- Antennal scape in profile suddenly and abruptly downcurved near the base, the bend almost or quite right-angular and with the dorsal margin at the bend usually armed with a ridge or other outgrowth (figs. 37-40) 26
- 24 Frontal triangle with a few rugae traversing its length. Upper halves of sides of petiole and postpetiole in profile strongly longitudinally sulcate
Myrmica sulcinodis Nylander

- Frontal triangle smooth, without rugae traversing its length. Upper halves of sides of petiole and postpetiole in profile not longitudinally sulcate. 25
- 25 In profile the petiole node with the dorsal surface sloping backwards from the anterodorsal angle; the dorsal surface curving evenly into the posterior face, the two not separated by a posterodorsal angle (fig. 41) **Myrmica rubra** (L.)
- In profile the petiole node with the dorsal surface flat or somewhat convex behind the anterodorsal angle, the surface not sloping backwards; the dorsal surface separated from the posterior face by a posterodorsal angle which is usually distinct (fig. 42) **Myrmica ruginodis** Nylander
- 26 In dorsal view the antennal scape with a transverse raised ridge or flange at the bend which is seen as a conspicuous dentiform prominence in profile (figs. 39, 40) 27
- In dorsal view the antennal scape without a transverse raised ridge, without a dentiform prominence in profile. The scape in profile either only acutely angled or with a massive outgrowth at the bend (figs. 37, 38) 28
- 27 Transverse ridge at bend in antennal scape projecting as a massively developed, lamelliform flange, the frontal carinae closely approximated to accommodate this structure (fig. 39). Postpetiole in profile relatively low and thick, less than 1.40 times higher than long (fig. 43) **Myrmica schencki** Emery
- Transverse ridge at bend in antennal scape usually only a relatively low ridge. Frontal carinae not closely approximated. Postpetiole in profile relatively high and narrow, more than 1.40 times higher than long (fig. 44) **Myrmica lobicornis** Nylander
- 28 Node of petiole in profile with the dorsal surface curving evenly into the posterior surface, the posterodorsal angle absent (fig. 45) **Myrmica specioides** Bondroit
- Node of petiole in profile with the dorsal surface truncate and separated from the posterior surface by a posterodorsal angle (fig. 46) 29
- 29 Antennal scape at the bend with a massively developed extension (fig. 38) **Myrmica sabuleti** Meinert
- Antennal scape at the bend without an extension, merely sharply angled, or with a small, inconspicuous extension (fig. 37) **Myrmica scabrinodis** Nylander
- 30 Antennae with 11 segments. [*Channel Islands only*] **Plagirolepis vindobonensis** Lomnicki
- Antennae with 12 segments 31
- 31 Antennal insertions situated some distance behind the posterior clypeal margin, a distance usually greater than the basal width of the scape. Mandibles with teeth decreasing in size from apex to basal angle (fig. 47). [*A number of species sometimes introduced with timber*] **Camponotus** species
- Antennal insertions very close to or contiguous with the posterior clypeal margin. Mandibles with third tooth from apex smaller than second or fourth (fig. 48) 32
- 32 Eyes at or in front of the midlength of the sides of the head [*genus Paratrechina*] 33
- Eyes behind the midlength of the sides of the head 34
- 33 Antennal scapes with numerous hairs projecting at an angle from the long axis of the shaft. [*Introduced species; in hothouses, etc.*] **Paratrechina vividula** (Nylander)
- Antennal scapes without hairs. [*Introduced species; in hothouses, etc.*] **Paratrechina longicornis** (Latreille)
- 34 Orifice of propodeal spiracle a narrow, elongate ellipse or slit, inclined from the vertical, situated well in front of the point at which the sides of the propodeum round into the declivity (fig. 50) [*genus Formica*] 35
- Orifice of propodeal spiracle subcircular or broadly oval, situated at or actually on the curved surface where the sides of the propodeum round into the declivity (fig. 51) [*genus Lasius*] 45
- 35 Anterior clypeal margin with a distinct median impression or notch **Formica sanguinea** Latreille
- Anterior clypeal margin without a median impression or notch 36
- 36 Eyes with numerous short hairs projecting between the facets 37
- Eyes without hairs projecting between the facets 40
- 37 With the head in full-face view the occipital margin deeply excised **Formica exsecta** Nylander

- With the head in full-face view the occipital margin not excised, generally feebly convex, more rarely very shallowly concave 38
- 38 Mesoscutum and scutellum equally densely sculptured, both matt and dull, with abundant small punctures which are equally spaced on both sclerites
Formica pratensis Retzius
- Mesoscutum much more densely sculptured than the scutellum, the latter shining and with distinctly fewer punctures than the former; the punctures on the scutellum distinctly more widely spaced than on the mesoscutum 39
- 39 Dorsal surface of petiole with long hairs. Long, fine hairs also present in numbers on pronotum, propodeum, anterior face of first gastral tergite and basal one-third of that sclerite **Formica lugubris** Zetterstedt
- Dorsal surface of petiole without long hairs. Long, fine hairs absent from the surfaces noted above although a few short, stout hairs are usually present
Formica aquilonia Yarrow
- 40 Alitrunk uniform black or blackish-brown 41
- Alitrunk bicoloured, black with varying amounts of red or orange-brown 43
- 41 Ventral surface of head with a few long hairs
Formica transcaucasica Nasonov
- Ventral surface of head without hairs 42
- 42 With the alitrunk in dorsal view, erect hairs present everywhere on pronotum to the tegulae. Femora of middle legs with a number of long hairs ventrally
Formica lemni Bondroit
- With the alitrunk in dorsal view, erect hairs on pronotum restricted to anterior portion, not occurring on the sides. Femora of middle legs at most with one or two hairs ventrally in the basal quarter of the length, usually lacking hairs
Formica fusca L.
- 43 Curved portion of first gastral tergite where the anterior face meets the dorsum, without hairs. Frontal triangle unsculptured, smooth and shining
Formica rufa L.
- Curved portion of first gastral tergite where the anterior face meets the dorsum, with hairs. Frontal triangle distinctly sculptured, dull or dully shining 44
- 44 Propodeal dorsum without erect hairs. Mesoscutum usually uniform black, without reddish areas, sometimes with reddish marks near the wing bases
Formica cunicularia Latreille
- Propodeal dorsum with about six erect hairs. Mesoscutum usually distinctly bicoloured, black with reddish areas **Formica rufibarbis** F.
- 45 Orifice of metapleural glands without guard-hairs. Colour black or blackish-brown, shining **Lasius fuliginosus** (Latreille)
- Orifice of metapleural glands with distinct guard-hairs. Colour yellow-brown to dark brown 46
- 46 Tibiae of hind legs and usually also the antennal scapes with standing hairs as well as pubescence 47
- Tibiae of hind legs and antennal scapes with pubescence but without standing hairs 49
- 47 Maximum width of head as great as or greater than the maximum width of the alitrunk. Basal halves of wings infuscated **Lasius umbratus** (Nylander)
- Maximum width of head distinctly less than the maximum width of the alitrunk. Basal halves of wings clear 48
- 48 Long hairs on antennal scapes erect **Lasius niger** (L.)
- Long hairs on antennal scapes decumbent. [*Channel Islands only*]
Lasius emarginatus (Olivier)
- 49 Wings clear, not infuscated basally **Lasius alienus** (Foerster)
- Wings infuscated basally (weakly so in some individuals) 50
- 50 Eyes usually without hairs arising between the facets, rarely with one or two minute hairs at most **Lasius brunneus** (Latreille)
- Eyes with numerous short hairs arising between the facets 51
- 51 Maximum width of head as great as or greater than the maximum width of the alitrunk **Lasius mixtus** (Nylander)
- Maximum width of head less than the maximum width of the alitrunk
Lasius flavus (F.)
- 52 Scale of petiole reduced or vestigial, the petiole overhung dorsally by the first gastral segment, usually invisible in dorsal view [genus *Tapinoma*]. 53

- Scale of petiole well developed, distinct, inclined forward but not reduced nor overhung by the first gastral segment, visible in dorsal view. [*Introduced species; in heated buildings, etc.*] **Iridomyrmex humilis** (Mayr)
- 53 Median portion of clypeus with a deep notch or impression in the anterior margin. Colour uniform brown or blackish-brown **Tapinoma erraticum** (Latreille)
- Median portion of clypeus with the anterior margin straight or very slightly concave, without a notch or impression. Bicoloured, head and alitrunk brown or blackish, gaster and appendages yellow. [*Introduced species; in heated buildings, etc.*] **Tapinoma melanocephalum** (F.)

Males

- 1 Pedicel of two segments, the petiole and postpetiole [subfamily MYRMICINAE] 2
- Pedicel of a single segment, the petiole 27
- 2 Apterous, either ergatoid without flight sclerites or with flight sclerites but no wings, sometimes pupoidal 3
- Alate, always with wings and developed flight sclerites 4
- 3 Antennae with 10 or 11 segments. Alitrunk with flight sclerites but without wings, pupoidal in appearance. Anterior clypeal margin with a median impression or notch (fig. 58). Integument everywhere finely sculptured and dull. [*Permanent social parasite in nests of Tetramorium caespitum*] **Anergates atratulus** (Schenck)
- Antennae with 12 segments. Alitrunk without flight sclerites or wings, ergatoid in appearance. Anterior clypeal margin entire, without a median impression or notch. Integument everywhere smooth and shining. [*In nests of Formica rufa and its allies*] **Formicoxenus nitidulus** (Nylander)
- 4 Antennae with 10 segments, the second funicular segment very long 5
- Antennae with 12 or 13 segments 8
- 5 Mandibles edentate, curved and falcate, narrowing from base to apex. [*Dulotic association in nests of Tetramorium caespitum*] **Strongylognathus testaceus** (Schenck)
- Mandibles dentate, subtriangular, not falcate, not narrowing from base to apex. [*genus Tetramorium*] 6
- 6 Dorsum of postpetiole unsculptured, smooth and shining. [*Introduced species; in hothouses, etc.*] **Tetramorium simillimum** (F. Smith)
- Dorsum of postpetiole sculptured with rugae, striae, punctures or a combination of two or all of these 7
- 7 Frontal carinae extended back to level of the ocelli by a pair of longitudinal ridges (fig. 59). Head and alitrunk yellow-brown in colour. [*Introduced species; in hothouses, etc.*] **Tetramorium guineense** (F.)
- Frontal carinae short, not extended back to level of ocelli. Head and alitrunk black or blackish-brown **Tetramorium caespitum** (L.)
- 8 Antennae with 12 segments 9
- Antennae with 13 segments 12
- 9 Postpetiole attached to the dorsum of the first gastral segment. [*Introduced species; with cork from S. Europe*] **Crematogaster scutellaris** (Olivier)
- Postpetiole attached to anterior surface of first gastral segment 10
- 10 Mandibles bluntly truncated apically, edentate. Mesoscutum with strongly developed, distinctly Y-shaped notauli **Leptothorax acervorum** (F.)
- Mandibles distinctly dentate. Mesoscutum without notauli or with the basal portion of the Y-shape absent 11
- 11 Propodeum armed with a pair of spines. [*Permanent social parasite in nests of Myrmica sabuleti and M. scabrinodis*] **Sifolinia karavajevi** (Arnoldi)
- Propodeum unarmed, smoothly rounded. [*Often associated with nests of Formica or Lasius species*] **Solenopsis fugax** (Latreille)
- 12 Notauli and parapsidal furrows absent. [*Introduced species; in heated buildings, etc.*] **Monomorium pharaonis** (L.)
- Notauli or parapsidal furrows present, or both present 13
- 13 Spurs of hind tibiae simple or absent. On the forewing vein Rs not broken or missing basally (i.e. vein Rs without a free basal abscissa), either Rs arises from Rs + M without a break or continues fused as Rs + M 14

- Spurs of hind tibiae pectinate. On the forewing vein Rs broken or missing basally so that there is a gap between Rs + M and the free basal abscissa of Rs (fig. 64) [genus *Myrmica*] 20
- 14 Mandibles extremely reduced and edentate; non-functional, not capable of closing so that their apical margins oppose one another
Myrmecina graminicola (Latreille)
- Mandibles triangular or subtriangular, always dentate; functional, capable of closing so that their apical margins oppose one another 15
- 15 First funicular segment short, swollen and bulbous. Ocelli huge, situated upon a strong prominence of the head, and the lateral ocelli breaking the outline of the sides of the head posteriorly (fig. 61). [*Introduced species; in hothouses, etc.*]
Pheidole megacephala (F.)
- First funicular segment elongate, not swollen or bulbous. Ocelli small, not situated on a prominence of the head; the lateral ocelli not breaking the outline of the sides of the head posteriorly (fig. 60) 16
- 16 Petiole in profile with a long peduncle anteriorly, followed by a low, rounded node (fig. 63). Propodeum with a pair of small teeth, best seen in profile
Stenamamma westwoodi Westwood
- Petiole in profile with a short, thick peduncle anteriorly which grades into the node, the two not separated (fig. 62). Propodeum in profile rounded or angulate but not armed with small teeth [genus *Leptothorax*] 17
- 17 Anterior portion of mesoscutum between the notauli not sculptured, smooth and shining **Leptothorax nylanderi** (Foerster)
- Anterior portion of mesoscutum between the notauli sculptured 18
- 18 Anepisternum and katepisternum predominantly smooth and shining, with only a few punctures or striae. Mesoscutellum smooth dorsally, at most with faint traces of sculpturation towards the sides 19
- Anepisternum and at least the upper half of katepisternum reticulate-punctate. Mesoscutellum sculptured dorsally apart from a narrow median strip which is usually smooth and shining **Leptothorax interruptus** (Schenck)
- 19 Length of antennal scape (excluding basal constriction or neck) greater than the maximum diameter of the eye **Leptothorax tuberum** (F.)
- Length of antennal scape (excluding basal constriction or neck) less than the maximum diameter of the eye. [*Channel Islands only*]
Leptothorax unifasciatus (Latreille)
- 20 Straight-line length of antennal scape (excluding basal constriction) greater than the width of the head immediately in front of the eyes. (Usually distinctly greater but in *lobicornis* only slightly so) 21
- Straight-line length of antennal scape (excluding basal constriction) markedly and very distinctly less than the width of the head immediately in front of the eyes 24
- 21 Anterior portion of mesoscutum in front of the notauli rugose. Sides of petiole with a number of coarse longitudinal rugae **Myrmica sulcinodis** Nylander
- Anterior portion of mesoscutum in front of the notauli smooth and shining. Sides of petiole smooth, without longitudinal rugae 22
- 22 Antennal scapes with a relatively short, suddenly downcurved portion basally. Mandibles not usually coarsely longitudinally striate. Dorsum of petiole usually with faint, superficial but quite dense puncturation
Myrmica lobicornis Nylander
- Antennal scapes basally shallowly, broadly and very gently curved. Mandibles coarsely and distinctly longitudinally striate. Dorsum of petiole smooth and shining 23
- 23 Area of head between frontal carinae and behind frontal triangle mostly smooth, not longitudinally rugulose. Hind tibiae with relatively sparse, short hairs
Myrmica ruginodis Nylander
- Area of head between frontal carinae and behind frontal triangle finely, longitudinally rugulose. Hind tibiae with a number of long, distinctly projecting hairs
Myrmica rubra (L.)
- 24 Antennal scapes very short, their straight-line length (excluding the basal constriction) about equal to the maximum diameter of the eye. In general the scape about equal in length to the first three funicular segments together 25

- Antennal scapes longer, their straight-line length (excluding the basal constriction) much greater than the maximum diameter of the eye. In general the scape about equal in length to the first five funicular segments together
Myrmica sabuleti Meinert
- 25 Hind tibiae with abundant long, standing hairs, the longest of which are longer than the maximum width of the tibia in side view
Myrmica scabrinodis Nylander
- Hind tibiae with numerous hairs which are however noticeably shorter than the maximum width of the tibia in side view and which tend to be decumbent . . . 26
- 26 Anterior portion of mesoscutum in front of notauli finely longitudinally rugose at least dorsolaterally and laterally. Second funicular segment much longer than first, sometimes almost twice as long. *Myrmica schencki* Emery
- Anterior portion of mesoscutum in front of notauli smooth and shining everywhere, not rugose. Second funicular segment subequal in length with the first
Myrmica specioides Bondroit
- 27 Gaster with a distinct constriction between first and second segments [subfamily PONERINAE] 28
- Gaster without a constriction between first and second segments 29
- 28 Pygidium projecting apically as a down-curved spine. Alate, with full complement of flight sclerites *Ponera coarctata* (Latreille)
- Pygidium not projecting apically as a down-curved spine. Apterous and ergatoid, without flight sclerites *Hypoponera punctatissima* (Roger)
- 29 Dorsal surfaces of alitrunk with pubescence and also with longer hairs; hairs usually also present on dorsum of head behind clypeus [subfamily FORMICINAE] . . . 30
- Dorsal surfaces of alitrunk and also of head behind clypeus with pubescence but without longer hairs [subfamily DOLICHODERINAE] 52
- 30 Antennae with 12 segments. [*Channel Islands only*]
Plagiolepis vindobonensis Lomnicki
- Antennae with 13 segments 31
- 31 Antennal insertions situated well behind the posterior margin of the clypeus, a distance greater than the maximum basal width of the scape. [*A number of species sometimes introduced with timber*] *Camponotus* species
- Antennal insertions situated close to or at the posterior margin of the clypeus . . 32
- 32 Gonopalpi (= cerci) absent. Eyes with their midlength in front of or at the midlength of the sides of the head [genus *Paratrechina*] 33
- Gonopalpi (= cerci) present. Eyes with their midlength behind the midlength of the sides of the head 34
- 33 Antennal scapes with numerous hairs projecting at an angle from the long axis of the shaft. [*Introduced species; in hothouses, etc.*] *Paratrechina vividula* (Nylander)
- Antennal scapes without hairs projecting from the shaft. [*Introduced species; in hothouses, etc.*] *Paratrechina longicornis* (Latreille)
- 34 Orifice of propodeal spiracle a narrow, elongate ellipse or slit, inclined from the vertical, situated well in front of the point at which the sides of the propodeum round into the declivity [genus *Formica*] 35
- Orifice of propodeal spiracle circular, subcircular or broadly oval, situated at or actually on the curved surface where the sides of the propodeum round into the declivity [genus *Lasius*] 45
- 35 Median portion of anterior clypeal margin with a distinct notch or impression
Apical margin of mandibles long, usually with 4-5 teeth
Formica sanguinea Latreille
- Median portion of anterior clypeal margin entire, without a notch or impression.
Apical margin of mandibles short, usually edentate except for the apical tooth; very rarely with one or two teeth on the margin 36
- 36 Eyes with short hairs projecting between the facets 37
- Eyes without short hairs projecting between the facets 41
- 37 With the head in full-face view the occipital margin broadly and deeply excised
Formica exsecta Nylander
- With the head in full-face view the occipital margin not deeply excised; varying from feebly concave to shallowly convex 38
- 38 With the head in full-face view the sides between the eye and the clypeus with decumbent pubescence but without long, projecting hairs which break the outline of the sides *Formica rufa* L.

- With the head in full-face view the sides between the eye and the clypeus with pubescence and also with long, projecting hairs which break the outline of the sides 39
- 39 Straight-line length of antennal scape (excluding basal constriction) equal to or slightly greater than the head length from the mid-point of the clypeus to the mid-point of the occipital margin in full-face view. Sides of mesoscutellum steep, vertical or feebly concave so that very little of the sides can be seen in absolute dorsal view. Hairs arising over entire surface of second gastral tergite
Formica pratensis Retzius
- Straight-line length of antennal scape (excluding basal constriction) less than the head length from mid-point of clypeus to mid-point of occipital margin in full-face view. Sides of mesoscutellum convex, much of the sides visible in absolute dorsal view due to the convexity. Hairs usually confined to anterior half and lateral portions of second gastral tergite40
- 40 Sides of head in front of eye with only 2-3 projecting hairs, all of which arise close to the anterior margin of the eye.....**Formica aquilonia** Yarrow
- Sides of head in front of eye with numerous projecting hairs which arise over the entire surface from eye to clypeus**Formica lugubris** Zetterstedt
- 41 Ventral surface of head with one or two long, standing hairs. Gaster shining, almost devoid of granular or punctulate sculpture; at most with a very feeble, superficial reticulation**Formica transcaucasica** Nasonov
- Ventral surface of head without standing hairs. Gaster dull, with dense granular or punctulate sculpture, or with a very dense distinct reticulation42
- 42 Petiole with short hairs of almost uniform length on the dorsal margin
Formica fusca L.
- Petiole with short hairs and also with long, erect hairs on the dorsal margin43
- 43 Mesoscutellum distinctly more shining than mesoscutum
Formica lemani Bondroit
- Mesoscutellum and mesoscutum both dull, the one not more shining than the other 44
- 44 Legs darker, the femur largely or entirely dark, rarely only slightly infuscated; remainder of leg a brownish-red, coxa and most of tarsus dark, occasionally legs entirely dark.....**Formica rufibarbis** F.
- Legs lighter, frequently entirely pale reddish-yellow, only the coxa and apical tarsal segment dark, more rarely the femur somewhat infuscated
Formica cunicularia Latreille
- 45 Middle and hind tibiae, or antennal scapes, or both with erect or suberect hairs, and also with pubescence46
- Middle and hind tibiae and antennal scapes with pubescence but without erect or suberect hairs48
- 46 Mandibles with an apical tooth and the masticatory margin with 4 or more small teeth, decreasing in size from the apical**Lasius umbratus** (Nylander)
- Mandibles with a single apical tooth, the masticatory margin unarmed47
- 47 Antennal scapes with numerous distinct standing hairs**Lasius niger** (L.)
- Antennal scapes without standing hairs, the long hairs which are present being usually decumbent or subdecumbent. [*Channel Islands only*]
Lasius emarginatus (Olivier)
- 48 Orifice of metapleural gland without guard-hairs ..**Lasius fuliginosus** (Latreille)
- Orifice of metapleural gland with guard-hairs.....49
- 49 Mandibles with a single apical tooth, without a preapical tooth50
- Mandibles with an apical and a preapical tooth.....51
- 50 Apical tooth of mandible situated distal of a cleft in the masticatory margin. Wings fuscous on basal half. Sides of head behind eyes usually without laterally projecting hairs**Lasius brunneus** (Latreille)
- Apical tooth of mandible not situated distal of a cleft in the masticatory margin. Wings clear. Sides of head behind eyes usually with laterally projecting hairs
Lasius alienus (Foerster)
- 51 Mandibles usually with apical plus preapical tooth, followed by an edentate margin. Cross-vein *m-cu* on forewing usually absent (in some present on one wing only, very rarely on both). Wings usually clear, more rarely faintly tinted on the basal half**Lasius flavus** (F.)

- Mandibles usually with apical plus preapical tooth, the margin behind these with at least one more small tooth, sometimes more. Cross-vein *m-cu* on forewing always present (fig. 65). Wings fuscous basally ***Lasius mixtus*** (Nylander)
- 52 Antennal scapes very short, their maximum length (excluding basal constriction) much less than the width of the head in front of the eyes; usually shorter than the second funicular segment. [*Introduced species; in heated buildings, etc.*]
Iridomyrmex humilis (Mayr)
- Antennal scapes long, their maximum length (excluding basal constriction) much greater than the width of the head in front of the eyes. Scape length considerably greater than length of second funicular segment [genus *Tapinoma*] 53
- 53 Median portion of anterior clypeal margin with a semicircular notch or impression. large species, maximum width of head behind eyes greater than 0.65 mm.
Tapinoma erraticum (Latreille)
- Median portion of anterior clypeal margin without a notch or impression. Much smaller species, maximum width of head behind eyes considerably less than 0.65 mm. [*Introduced species; in heated buildings, etc.*]
Tapinoma melanocephalum (F.)

NOTES ON THE SPECIES

Subfamily PONERINAE

Tribe Ponerini

Genus *Hypoponera* Santschi

A fairly large genus of small ponerine ants occurring in virtually all parts of the world but with most species in the tropics and subtropics. Taylor (1967) estimates that the genus contains 100–120 species, many of which are wide-ranging tramp species, and one of which, *H. punctatissima* (Roger), occurs in Britain (fig. 20). Whether it is best to regard *punctatissima* as an endemic or an exotic species in Britain is open to debate, but we follow Collingwood (1964) here and recognize it as an endemic as it has been found on occasion away from human habitations.

It occurs widely but sporadically throughout Britain, forming populous colonies in conservatories, bakehouses and other heated premises but has been recorded in the open in Derbyshire on a coffee waste tip, and in Kent in large numbers deep in a coal mine. Alate females are sometimes swept from plants in July and August. The males of *punctatissima* are ergatoid and wingless and are only to be found in the nests.

Genus *Ponera* Latreille

Recently revised by Taylor (1967), the genus *Ponera* contains some 28 extant species, the vast majority of which are confined to the Indo–Australian zoogeographical region. One species, *coarctata* (figs. 17, 18, 19), is however endemic in Europe and occurs in Southern Britain where it has been recorded from the following counties: Cornwall, Devon, Somerset, Dorset, Isle of Wight, Hants., Glamorgan, Sussex, Kent, Surrey, Herts., Middlesex. An old record of *coarctata* exists for Guernsey but this has not been confirmed in recent years.

Colonies consist of a few individuals and nests are located in warm, sheltered places under stones or moss. The species is most common on the south coast of Britain, more sporadic further north. Each colony usually has two or three queens, and alates have been recorded mostly in August and September.

Subfamily MYRMICINAE

Tribe Myrmicini

Genus *Myrmica* Latreille

The largest myrmicine genus in Britain, with eight presently recognized species. The genus as a whole is principally Holarctic in distribution, with a few species occurring in the Oriental region, and *Myrmica* probably has 40–50 species in all.

The British members of the genus have been previously reviewed by Collingwood (1958b, 1962).

Myrmica lobicornis Nylander (figs. 40, 44). An unobtrusive species, usually occurring in isolated colonies in open woodland, dry pasture, heaths or moorland. Often only single workers are taken foraging. Males and alate queens are developed in the nests in July and mating swarms usually occur in August. The species is widely distributed through England, Wales and Scotland as far north as Sutherland, but has not been recorded from Ireland or the Channel Islands.

Myrmica rubra (L.) (figs. 41, 64). This is an active species, often found on flowers or attending aphids and will sting freely with an effect like stinging nettle. It nests mainly in sheltered areas such as river valleys, loamy pastures and country gardens and is locally abundant in Britain as far north as Sutherland, although not yet recorded from the Channel Islands. Nests are usually constructed under shallow stones or in decayed tree stumps and several queens are generally present in each mature colony, although single mated queens may start new colonies unaided. A mature nest will usually contain a hundred or more workers; males and winged queens are developed in the nests in July and mating flights occur on warm days in early August.

M. rubra is the type-species of the genus *Myrmica*, and Yarrow (1955b) showed that the name was synonymous with *laevinodis*, the name applied to this species in many older publications.

Myrmica ruginodis Nylander (figs. 36, 42). One of the commonest British ant species, especially in the north. Nests are made in tree stumps, under stones in woodland, or in more exposed localities on hills and moorland. Individual colonies are quite populous, with 200 or 300 workers. The nest may have a single normal-sized queen or may have several queens of small size. Males and alate queens fly during August, mating occurring on or near the ground. This species has been recorded throughout the British Isles, including Fair Isle, the Shetland Islands, Orkneys and the Channel Islands.

Myrmica sabuleti Meinert (fig. 38). A local species, but may be common in places. It nests under stones, usually in groups on limestone hillsides and on banks in open but warm sites. Colonies contain several queens. It has been recorded from most counties in England, Wales and Ireland and is present in the Channel Islands but tends to be more local in Scotland where it occurs as far north as Sutherland.

Myrmica scabrinodis Nylander (figs. 37, 46). A small, reddish species nesting in a wide variety of situations ranging from dry banks to tree stumps and sphagnum bogs. Each nest contains usually two or three queens, and mating flights occur during August. It is very common throughout Britain and the Channel Islands but is not yet recorded from Shetland and the Orkneys.

Myrmica schencki Emery (figs. 39, 43). This species nests in sand or rocks and on banks with good insolation in sheltered places. Winged females have been seen running out of nests in August but not apparently flying. New nests have only one founder queen. Its distribution is sporadic and local in south England to Shropshire and South Lines. It has also been recorded from Glamorgan and is present in South Ireland, especially in West Cork and South Kerry near the coast.

Myrmica specioides Bondroit (fig. 45). First recorded from Britain only a few years ago (Collingwood, 1962) under the name of *M. puerilis*, of which *specioides* is the senior synonym, this is actually a local Central European species. It occurs in Britain only on the East Kent coast from Sea-Salter to Sandwich, nesting in sand and dry banks. The only males ever collected in Britain were taken in September on the Deal sandhills.

Myrmica sulcinodis Nylander. A deeply sculptured robust looking ant which generally has a reddish alitrunk contrasting with darker head and gaster. It is a local species, restricted to dry heather moor in north Britain (to Sutherland), nesting under tight flat stones or in exposed peat on south facing slopes. On some moors in northern England and the Scottish highlands it is locally abundant, but is not found in agricultural areas. It is absent from most of the Midland counties and East Anglia, very local in North Wales and is not known from Ireland. It is known to occur locally on some lowland heaths in South England (Surrey, Hants., and Dorset) where nests may occur in damper areas fringing bogland. Alates are found in the nests in July and fly in August; colonies have a single founder queen and usually contain only approximately 150 workers.

Genus *Sifolinia* Emery

The members of this small genus (five species), a satellite of *Myrmica* and probably derived from it, are all permanent social parasites in nests of *Myrmica* species, and have no worker caste. All known species of *Sifolinia* occur in the Palaearctic zoogeographical region.

A single species, *S. karavajevi* (Arnoldi) is known to occur in Britain, and to the present has been recorded from Dorset, South Hants., and Surrey, in nests of *Myrmica scabrinodis* and *M. sabuleti*. It was first recorded by Yarrow (1968) under the name of *S. laurae* Emery, but Kutter (1973) has since shown that this was a misidentification and that the British species is in fact *karavajevi*.

Males and alate queens have been found throughout the summer months in the host's nest but little is known of its mating and dispersal habits.

Tribe Leptothoracini

Genus *Formicoxenus* Mayr

A small genus of ants with only two or three species, closely related to the genus *Leptothorax* and restricted to the Palaearctic region. A single species, *F. nitidulus* (Nylander) occurs in Britain (figs. 30, 31).

It is a small, shining ant which lives as an inquiline within the large mound nests of *Formica rufa* and related species. It nests in very small colonies in hollow twigs in the interior of the nest of the host-species and is

thus difficult to find except on dull, warm days when individuals will frequently walk over the surface of the mound. Males and alate queens may be found from July to late September. Colonies, once present in a *Formica rufa* mound, appear to persist for a very long time in the same mound.

Formicoxenus nitidulus has been found locally in most of the wood-ant areas of England and eastern Scotland but has so far not been recorded from Wales, Ireland or the Channel Islands.

Genus *Leptothorax* Mayr

A large genus with a great number of species, occurring throughout the world with the exception of Australia and New Zealand.

Four species occur in Britain and a fifth is present in the Channel Islands.

Leptothorax acervorum (F.) (fig. 32). This species usually nests in tree stumps and under bark in south Britain, but in north Britain it is more usually found under stones, in peat or in fallen or partially buried twigs. Nests frequently contain more than one queen and intermediate gradations between queen and worker castes are frequent. Workers forage singly and may attack small insects but the species is mainly a scavenger of other dead insects, including other ants. The flight period of *acervorum* is July to August. It is a very common species, especially in the north, and is generally distributed throughout the British Isles to Orkney. It is not known from the Channel Islands.

Leptothorax interruptus (Schenck) (fig. 34). This is a very local species, found only in the New Forest, near Wareham, near the coast of Hayling Island and in Dungeness in Kent. It nests under stones and in heather roots on dry, south-sloping heath. Nests are small, with one or two queens and only 25-100 workers, and have often been found in close proximity to nests of *Tetramorium caespitum*. Absent from the Channel Islands, and little known in Europe although widely distributed, this is one of the rarer members of the genus.

Leptothorax nylanderii (Foerster) (fig. 33). Forming small colonies under bark or in tree stumps, this species is local in inland south England from Devon to Shropshire. Normally only one queen is present in each nest but occasionally two are present. Flight period of the alate forms is in August.

Leptothorax tuberum (F.) (fig. 35). This small yellow species nests in rock crevices in sheltered gulleys on or near the coast. Nests usually have 30-150 workers and normally have only one queen. Alate females and males occur in July and August. It has been recorded from Cornwall, Devon, Somerset, Dorset, Wight, Hants., Sussex, Kent and South Essex, and has also occurred near Avonmouth in Glos. and in Glamorgan. It may be abundant in some parts of the Dorset and South Devon coast.

Leptothorax unifasciatus (Latreille). To the present time the only member of the genus known to occur in the Channel Islands, where it is present on all islands. This species is present in continental Europe but does not occur in Britain.

Tribe Tetramoriini

Genus *Anergates* Forel

This genus contains only the single species, *A. atratulus* (Schenck) (figs. 57,

58), a permanent social parasite in nests of *Tetramorium caespitum*, which is present both in Europe and in the eastern states of the U.S.A. Like *Sifolinia* above, *Anergates* does not have a worker caste. *Anergates* was formerly placed in the tribe Solenopsidini but Ettershank (1966) pointed out its probable derivation from *Tetramorium*.

In Britain this workerless parasite is found in nests of *Tetramorium caespitum* very locally in the New Forest, near Wareham in Dorset and also in South Devon. An established queen in a host's nest has the gaster greatly swollen and may be found in the centre of the host colony. The small, black, virgin queens and dingy, pupoidal males are often developed in large numbers but an individual colony will always die out within one or two years with the death of the host-species, which in parasitized nests are always without queens.

Genus *Strongylognathus* Mayr

A small genus containing about 18 species, all of which are obligate slave-making (dulotic) ants and all of which occur in the Palaearctic region.

In Britain the single species *S. testaceus* (Schenck) (fig. 21) exists in colonies of the host-species, *Tetramorium caespitum*, the original queen of which is killed. *S. testaceus* workers are very conspicuous in the nest of the host as they are yellowish, whilst the host-species is black. Little is known of the habits of *testaceus* but according to observation on the Continent this and allied species may rob adjacent nests of the host-species of their brood, in company with *T. caespitum* (host) workers from the parasitized original colony. The main European species-group (*huberi*-group) of this interesting genus has recently been revised by Baroni Urbani (1969).

In Britain, *testaceus* is found sporadically in the New Forest, Dorset and Devon, but probably also exists elsewhere within the range of the host-species.

Genus *Tetramorium* Mayr

A very large genus with an estimated (roughly) 250–300 species distributed throughout the world with the exception of the Neotropical region, which has no endemic species. The vast majority of species inhabit the Ethiopian region but the genus is also common in the Oriental and Indo-Australian regions. The few European species appear to be originally of African origin, and the genus contains a number of very successful tramp species which occur virtually throughout the world.

Tetramorium caespitum (L.) (figs. 9, 10). This is the only endemic species of the genus in Britain, and is the host of the parasitic genera *Anergates* and *Strongylognathus*. It is a robust, small, dark brown or blackish ant which forms populous colonies on heaths, coastal sand or cliffs, nesting either in the ground or under stones. It is locally abundant on heaths in Devon, Dorset, Hants., Surrey and East Anglia and is sporadically distributed around the coasts of England, Wales and Scotland to Forth. It occurs locally in South Ireland and also on the Channel Islands.

Males and alate queens are much larger than the workers and are present in the nests from early July to August, when the mating flight occurs.

Tetramorium guineense (F.) (figs. 11, 59). A very successful tramp species, ultimately of West African origin but now distributed throughout the world, chiefly by human commerce. It is introduced sporadically into Britain but is

not capable of surviving outside hothouses or constantly heated buildings for any length of time.

Tetramorium simillimum (F. Smith). Another tramp species spread by human commerce, again of African origin. The comments for *guineense* also apply to this species.

Tribe Solenopsidini

Genus **Monomorium** Mayr

A very large genus with a worldwide distribution but with the vast majority of species occurring in the Old World tropics and subtropics. Ettershank (1966) records over 300 named forms. No species are endemic in Britain but one species of African origin, *Monomorium pharaonis* (L.) (figs. 25, 26, 28), is quite commonly introduced. This species is a well-known tramp ant and in parts of the tropics is a common household pest. It is not capable of existing outdoors in Britain but if introduced into a constantly heated building or hothouse it will thrive. Once established it is very difficult to eradicate.

Genus **Solenopsis** Westwood

A large genus with over 250 described forms, the vast majority of which are restricted to the Neotropical region, but virtually every zoogeographical zone has some endemic species. Bernard (1968) records 14 endemic species in Western Europe, one of which occurs in Britain.

Solenopsis fugax (Latreille) (figs. 22, 23, 24, 27). A minute yellow hypogaecic species in which the sexual forms are much larger than the workers. Nests are usually constructed under deep stones and are often linked to those of *Lasius* or large *Formica* species since this ant characteristically preys upon the brood of the larger species. Males and alate queens of *fugax* may be present in nests during August but recorded mating flights have occurred later, in September and October.

In Britain most records of this species are from on or near the coast in Cornwall, Devon, Somerset, Dorset, Wight, Essex and Kent. The species is present in the Channel Islands.

Tribe Pheidolini

Genus **Pheidole** Westwood

An enormous genus, with species recorded from virtually all parts of the world, but mainly in the tropics and subtropics. Britain has no endemic species but one well-known worldwide tramp species is occasionally introduced to this country. This is *Pheidole megacephala* (F.) (figs. 12, 13, 14, 61). The worker caste in this species is dimorphic, with a large-headed major worker and a more normal minor worker, the latter of which is always much more numerous than the former, and may be taken without the former.

The species is unable to survive in Britain outside of hothouses or permanently heated buildings.

Genus **Stenammas** Westwood

The genus *Stenammas* contains 47 named forms, distributed throughout the

Palaeartic and Nearctic regions. A single species occurs in Britain.

Stenammas westwoodi Westwood (figs. 15, 16, 60, 63). This is an unobtrusive, timid species, easily overlooked. It nests under large stones or amongst the roots of trees in shady woodland or hedgerow. Males and alate queens are developed late in summer and have been taken by sweeping vegetation during September and October. Colonies have a single queen with up to about 100 workers.

The species has been recorded locally in most counties in south England to Leicestershire and is also known from Wales and South Ireland, but has not been recorded in the Channel Islands as yet.

Tribe Myrmecini

Genus *Myrmecina* Curtis

Most of the species of this interesting small genus are distributed in the Indo-Australian and Papuan regions, but a few species are present in the Palaeartic and Nearctic regions, one of which occurs in Britain.

Myrmecina graminicola (Latreille) (figs. 7, 8). A dark coloured, deeply sculptured and slow-moving species, often found in the nests of other species, chiefly *Lasius alienus* or *L. flavus*. When disturbed it characteristically curls into a ball. It nests in cliffs, under deep stones in limestone pasture or in open, dry woodland. The flight period of the alates extends from August to October. The species is rather local in south England and has been recorded from Cornwall to Worcestershire and North Hants., and is also known from Glamorgan and Jersey, but has not been found in Ireland.

Tribe Crematogastrini

Genus *Crematogaster* Lund

A very large genus of ants, of worldwide distribution but with only a few species endemic in southern Europe. One of these, *Crematogaster scutellaris* (Olivier) (fig. 29), is sporadically imported into Britain in cork from south Europe and may survive for a time in the neighbourhood of cork bales or on factory premises. The colour of this species is quite distinctive as it has a shining yellowish-red head which contrasts strongly with the darker gaster and alitrunk.

Subfamily DOLICHODERINAE

Tribe Tapinomini

Genus *Iridomyrmex* Mayr

This genus contains over 200 named forms, distributed primarily in the Australasian and Neotropical regions. One well-known tramp species, *Iridomyrmex humilis* (Mayr), originating in South America, is occasionally introduced into Britain where it is capable of surviving in hothouses or permanently heated buildings.

Genus *Tapinoma* Foerster

The 60 or so described species of *Tapinoma* occur throughout the world,

but most appear to be of the Ethiopian and Indo-Australian regions. The Palaearctic region has a number of endemic species, one of which occurs naturally in Britain, along with an introduced species.

Tapinoma erraticum (Latreille). This is the only endemic British species belonging to the subfamily Dolichoderinae. It is a small, black ant superficially reminiscent of *Lasius niger* in appearance and aggressive movements, but it completely lacks body and appendage hairs and is thus easily distinguished from *niger*. *T. erraticum* nests under stones on dry, sandy heath, often building temporary earth solaria for incubating brood in early summer. Males and alate queens are developed in June with flights occurring in early July. It has been recorded from Devon, Dorset, Wight, Hants., Surrey, very locally in East Kent and old records exist for Cornwall and Scilly. It is present on Jersey, Guernsey and Sark in the Channel Islands.

Tapinoma melanocephalum (F.). A well-known, small, tramp species which is occasionally introduced into Britain and is capable of surviving in hothouses and permanently heated buildings. The species is minute and very easily recognized as the head (and usually also the alitrunk) are brown or blackish, whilst the gaster and appendages are yellow.

Subfamily FORMICINAE

Tribe Camponotini

Genus **Camponotus** Mayr

This gigantic genus, the largest of the ant genera, contains about 2000 named forms. This huge assemblage has a worldwide distribution but no endemic species occur in the British Isles or the Channel Islands. A number of species are however imported into Britain, usually on Scandinavian or North American timber. Although very frequent in comparable areas of woodland in their home country, none of the species have become established in apparently suitable wooded areas in Britain.

Tribe Formicini

Genus **Formica** L.

A large, Holarctic genus with several hundred described forms, both living and fossil. Eleven species occur in Britain and three have been recorded in the Channel Islands. Members of four species-groups exist in Britain, and the endemic species of the *fusca*-group and *rufa*-group have been closely studied by Yarrow (1954, 1955a).

Formica aquilonia Yarrow. One of the four species in the British Isles commonly referred to as Wood Ants, *aquilonia* is restricted to the Scottish Highlands and one locality in County Armagh, Ireland, where it may be locally very abundant, often forming **huge** mounds in undisturbed woodland. Alate queens and males are present in the nests in May and June and mating flights occur in June to early July. New colonies are formed by fission from the parent colony, which usually contains large numbers of fertile queens but occasionally after mating flights isolated groups of queens with strayed workers may found fresh nuclei.

Formica cunicularia Latreille. This species is found on Southern heathland and on cliffs and nests under stones and in dry turf banks, never in

stumps. In Britain it is distributed from Cornwall and South Wales to South Lincs., and in the Channel Islands is present upon all main islands. In East Kent and South Essex colonies containing very red workers are frequent. The flight period of this species is July and new colonies are founded by single queens. In mature colonies only one queen is normally present in each nest.

Formica exsecta Nylander. An aggressive species living in small mound nests of heather fragments in open-heath or woodland glades. Flight period occurs in July. Mated queens may found fresh colonies by adoption in a nest of one of the *F. fusca*-group species but in localities where *exsecta* is abundant colony fission is probably more likely. Its present distribution in Britain is very local, including the counties of Cornwall, Devon, Dorset and Hants., and it is also present in the Scottish Highlands.

Formica fusca L. Nests are constructed under stones and in stumps on uncultivated land. Foraging is carried out by single workers and one or more queens may be present in each nest. The mating flight occurs from late June to mid-July. This species is common throughout South Britain and is local in South Ireland. It is also present but rare and local in West Scotland; present in the Channel Islands.

Formica lemani Bondroit. Nests are sited as in the last species, and the flight period of males and alate females is in July. Nests are usually founded by a single queen but mature, populous colonies in moorland may have large numbers of queens. This species is the upland equivalent of the lowland *fusca*, and is abundant in Northern England and Scotland. *F. lemani* is absent in England only in the South-East, below a line approximately from Northants. to Hants.

Formica lugubris Zetterstedt. The so-called Hairy Wood Ant of North England, Scotland, Wales and Ireland. It is found as far south as Derbyshire and Radnorshire, but not further south than this. Mating flights occur in June to mid-July. Large mound-nests of this species may contain many hundreds of laying queens, and the species spreads by colony fission. Occasionally fertile queens with brood and small workers have been found with *F. lemani* workers, indicating that queens may start fresh colonies by a process of temporary social parasitism. This is the most prolific of the British *rufa*-group species and spreads more readily into new plantation areas than the other species.

Formica pratensis Retzius. This species is now almost extinct in England. It used to be quite common in the Bournemouth area but is now only known to occur on a heathland site near Wareham. It is however present in Guernsey and Jersey. Alate queens and males are developed in the nests both in early summer and late in August–September. Nests are usually isolated, not in groups, and have a single or a very few queens.

In his earlier study Yarrow (1955a) referred to this species as *F. nigricans* Emery, but other authors have shown that the British species is *pratensis*.

Formica rufa L. This is the well known large Wood Ant living in leaf and twig litter mounds in England and Wales to Northumberland, in pine and oak woods. It is common in many parts of South England, the Wyre Forest and the South Lake District; it is local in the Midlands and north and not found in Scotland. Alate queens and males are formed early in the year and mating flights occur in May or June. New colonies are formed by the breakaway of queens and workers from the mother nest or more rarely by the

invasion of mated queens into nests of *F. fusca*, where they begin their new colonies as temporary social parasites.

Formica rufibarbis F. A rare species which has been recorded only locally on some Surrey heaths and commons, including Oxshott, Chobham and Weybridge. It is also present on St. Martin's in Scilly. The flight period is from late June to mid-July, and new colonies are usually started by a single queen. In older nests one to four queens may be present.

Formica sanguinea Latreille (fig. 52). A large, aggressive ant which nests in tree stumps or under stones on sunny banks at the edges of woodland and on open heath. It is found in South England, particularly in Surrey, Berkshire, the Wyre Forest and more locally on the Welsh border and in the Central Highlands of Scotland. Queens mate on or in the mother colony in July and make their way individually to nests of one or other species of the *F. fusca*-group in the neighbourhood. The queens enter the *fusca* colony and secure acceptance by appropriating *fusca* worker pupae which hatch out and tend the intruding queen. The *sanguinea* queen finally kills the remainder of the host-species and their queen. Periodically workers of *sanguinea* may leave their nest *en masse* and attack local *fusca* colonies, carrying off their brood, which are then reared in the *sanguinea* colony. Large colonies of *sanguinea* sometimes reproduce by fission, with groups of workers and one or more queens breaking away from the main nest.

Formica transkaucasica Nasonov. A shining black ant which is found nesting only in Sphagnum bogs very locally in the New Forest and Dorset, with an old record for Wight. The flight period is July to early August. Colonies have a single queen and the nest is built up in the form of a small, conical dome of fine grassy fragments in grass tussocks in wet bog.

Tribe Lasiini

Genus *Lasius* F.

This genus contains about 36 species with a holarctic distribution. It has been extensively revised by Wilson (1955), and Collingwood (1957, 1963) and Bourne (1973) have added to our knowledge of the *umbratus*-complex and the British species. Seven species are endemic in Britain and another species occurs in the Channel Islands that is not found elsewhere in the British Isles.

Lasius alienus (Foerster). This species inhabits dry pastures and sandy heaths and is common in many coastal areas. Males and alate queens are developed in July and mating swarms occur in August. It is recorded from Cornwall to Northants, coastal Wales and the Welsh border, the Isle of Man and also very locally in Southern Ireland. In the Channel Islands it is abundant on all islands.

Lasius brunneus (Latreille). A fugitive tree-dwelling species, typically nesting in old oak trees in parkland, but also found occasionally in hedgerows. It has an inland distribution in South England and has been recorded from Essex, Herts., Bucks., Oxford, Berks., Surrey, Northants., Gloucester and Worcs. Alate queens and males may be present in nests in June and July and probably mate within the nest as isolated winged queens taken from the nest may lay fertile eggs within a few days, while several fertile queens may be found in one nest. Isolated queens however may found new nests unaided.

Lasius emarginatus (Olivier). This species is found only in the Channel

Islands where it is locally common on all islands. It nests mostly under rocks in open, dry localities along woodland borders and in wasteland.

Lasius flavus (F.). An earth-mound building ant found in old pasture and open woodland, often with large numbers of colonies in suitable areas. It is one of the most abundant species in the British Isles north to Perthshire and is also found locally in the Scottish Highlands to Caithness; it is present on all the Channel Islands. This species may form huge mating swarms in August and mated queens often crowd together under stones or in insect burrows, so that new colonies may result from either single queens or from groups of queens.

Lasius fuliginosus (Latreille). A shining black conspicuous species which forms populous colonies in old trees, stumps, hedges, old walls and in sand dunes. The nest itself is of carton, macerated wood hardened by secretions from the mandibular glands. The species is widely distributed through Southern England reaching as far north as North Lancashire, Wales, the Isle of Man and a few localities in South Ireland, as well as Jersey and Guernsey in the Channel Islands. Males and alate queens may be developed throughout the summer and mating flights have been observed on various dates from May to late October. Colonies spread over an area by fission and may contain several laying queens, but mated queens often begin new colonies by invading and taking over already established nests of *Lasius umbratus* or *L. mixtus*.

Lasius mixtus (Nylander) (fig. 65). Nests are constructed in the ground, under boulders or amongst roots. It has been recorded from most counties from Cornwall to Inverness and is also present in Wales, South Ireland and Guernsey. It is almost completely subterranean. The flight period is normally during late summer but frequently single wingless queens may be found wandering over the ground in April or May. This species founds new colonies by invasion by the queen of nests of *Lasius niger* or *L. alienus*.

Lasius niger (L.) (fig. 54). An extremely common ant, possibly the most common in Britain, it is found abundantly in England, Wales, Southern England, Scotland as far north as Sutherland, and the Channel Islands of Jersey and Guernsey. Nests are usually constructed under stones or in soil and the species is well-known for its ability to nest under paving stones and concrete in large towns and cities. This is the only indigenous British species which commonly enters houses. Mating flights occur on warm days in August and frequently very large numbers of individuals from numerous nests congregate to form huge mating swarms, the mated queens falling to the ground to found new, single-queen colonies.

Lasius umbratus (Nylander) (fig. 53). This species nests in the base of old trees, in partially buried logs, stumps, and also under boulders. It has been recorded from Cornwall to Forth and is present in Wales but rare in Ireland. The flight period is late August to September and newly mated queens found colonies by invasion of nests of *Lasius niger* or *L. alienus*. A form previously known as *L. rabaudi* but now treated as a synonym of *umbratus* (see Bourne, 1973) is found most commonly in fixed dunes and heath in South-East England and South Wales.

Genus *Paratrechina* Motschoulsky

A genus of worldwide distribution, with about 200 described forms, some

of which are well-known and highly successful tramp species spread by human commerce. Two such species, *P. longicornis* (Latreille) (fig. 49) and *P. vividula* (Nylander) are occasionally introduced into Britain and are capable of surviving in constantly heated buildings or in hothouses, but apparently not outdoors.

Tribe Plagiolepidini

Genus **Plagiolepis** Mayr

About 100 described forms of this Old World genus are known to exist. The majority of the species are tropical in distribution but a few species are present in the Palaearctic region and one of them, *P. vindobonensis* Lomnicki, occurs on the islands of Jersey, Hérn and Sark in the Channel Islands but is absent from Britain and Ireland.

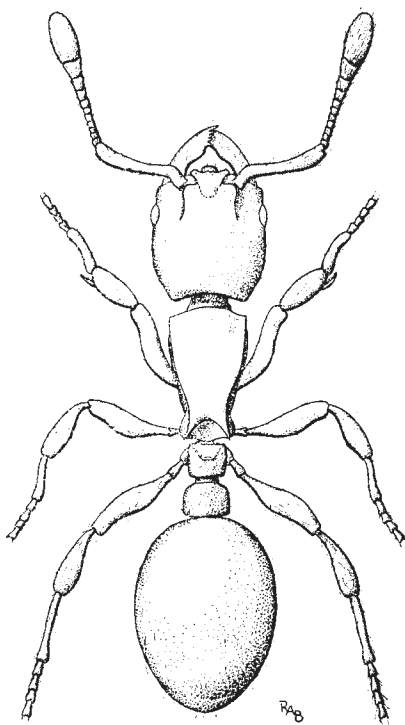
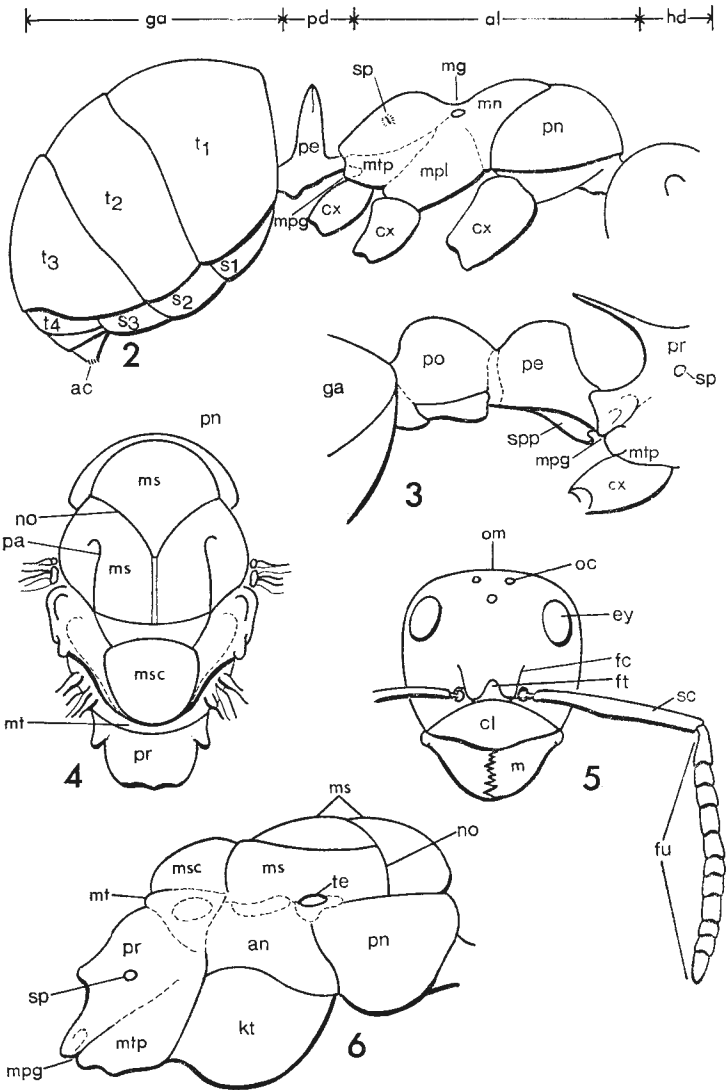
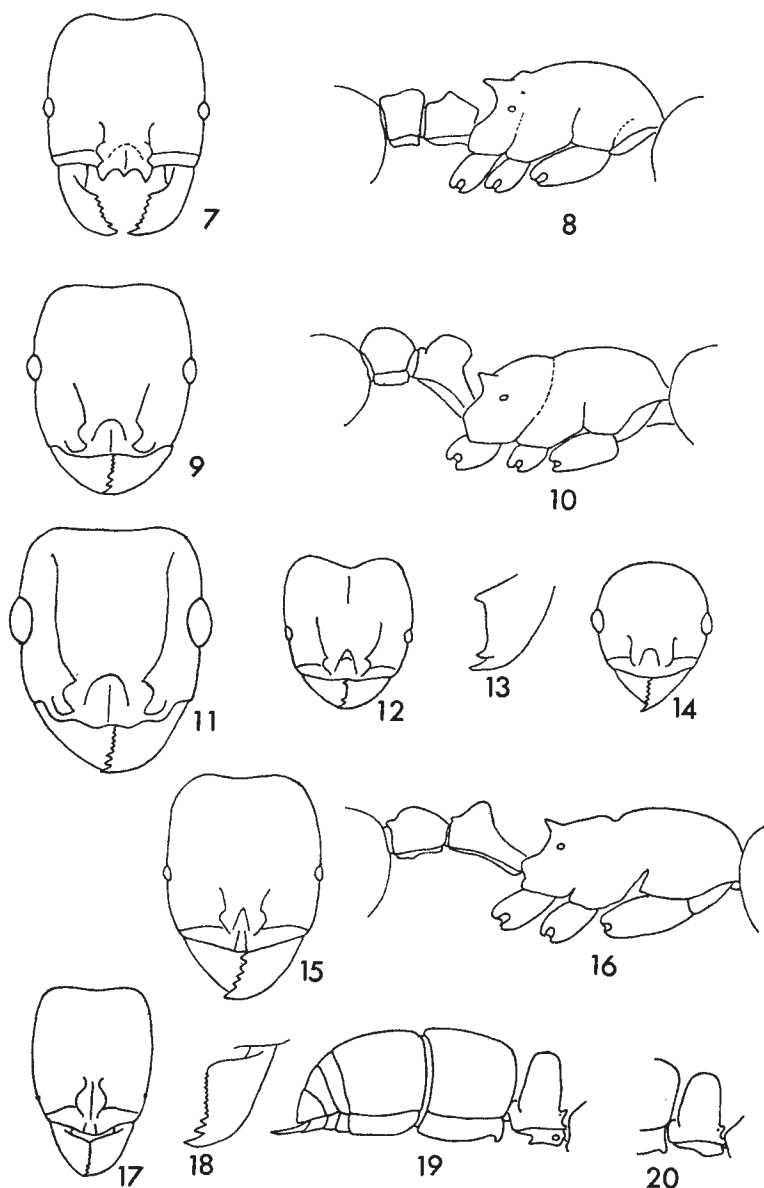


FIG. 1 and cover figure.—Dorsal view of worker of *Myrmecina graminicola*, sculpture and pilosity omitted.

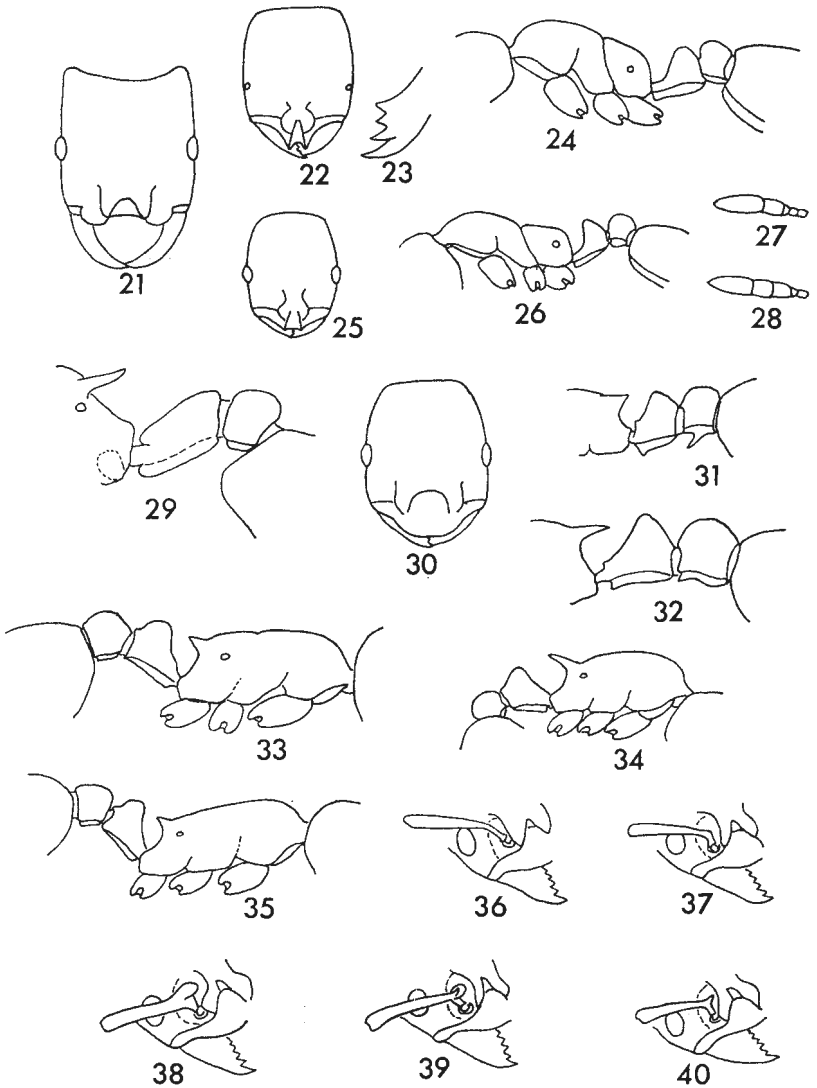


FIGS. 2-6.—Outline drawings of: (2) lateral view of *Formica* species, worker; (3) pedicel area of *Myrmica* species, worker; (4) dorsal alitrunk of *Myrmica* species, male; (5) head of *Formica* species, worker; (6) lateral alitrunk of *Myrmica* species, male. To show parts of body referred to in the keys; sculpture and pilosity omitted.

<i>ac.</i>	acidopore	<i>m.</i>	mandible	<i>pd.</i>	pedicel
<i>al.</i>	alitrunk	<i>mg.</i>	metanotal groove	<i>pe.</i>	petiole
<i>an.</i>	anepisternum	<i>mn.</i>	mesonotum	<i>pn.</i>	pronotum
<i>cl.</i>	clypeus	<i>mpq.</i>	metapleural gland	<i>po.</i>	postpetiole
<i>cx.</i>	coxa	<i>mpl.</i>	mesopleuron	<i>pr.</i>	propodeum
<i>ey.</i>	eye	<i>ms.</i>	mesoscutum	<i>s.</i>	sternite
<i>fc.</i>	frontal carina	<i>msc.</i>	mesoscutellum	<i>sc.</i>	scape of antenna
<i>ft.</i>	frontal triangle	<i>mt.</i>	metanotum	<i>spp.</i>	subpetiolar process
<i>fu.</i>	funiculus of antenna	<i>mtp.</i>	metapleuron	<i>t.</i>	tergite
<i>ga.</i>	gaster	<i>no.</i>	notauli	<i>te.</i>	tegula
<i>hd.</i>	head	<i>oc.</i>	ocellus		
<i>kt.</i>	katapisternum	<i>om.</i>	occipital margin		
		<i>pa.</i>	parapsidal groove		

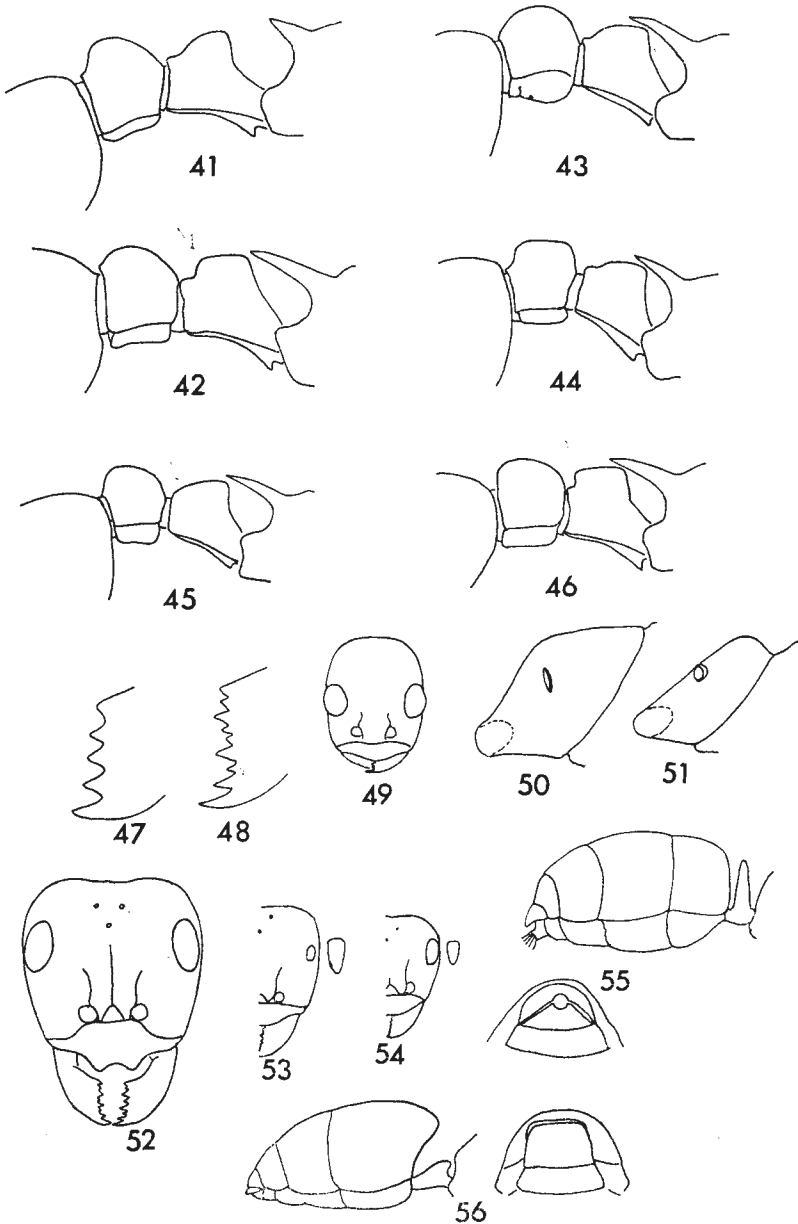


FIGS. 7-20.—Outline drawings of: (7) head of *Myrmecina graminicola* worker; (8) lateral alitrunk and pedicel of same; (9) head of *Tetramorium caespitum* worker; (10) lateral alitrunk and pedicel of same; (11) head of *Tetramorium guineense* worker; (12) head of *Pheidole megacephala* major worker; (13) mandible of *P. megacephala* in major worker and female; (14) head of *P. megacephala* minor worker; (15) head of *Stenammina westwoodi* worker; (16) lateral alitrunk and pedicel of same; (17) head of *Ponera coarctata* worker; (18) mandible of same; (19) lateral petiole and gaster of same, worker and female; (20) lateral petiole of *Hypoponera punctatissima* worker and female. Sculpture and pilosity omitted in all cases.



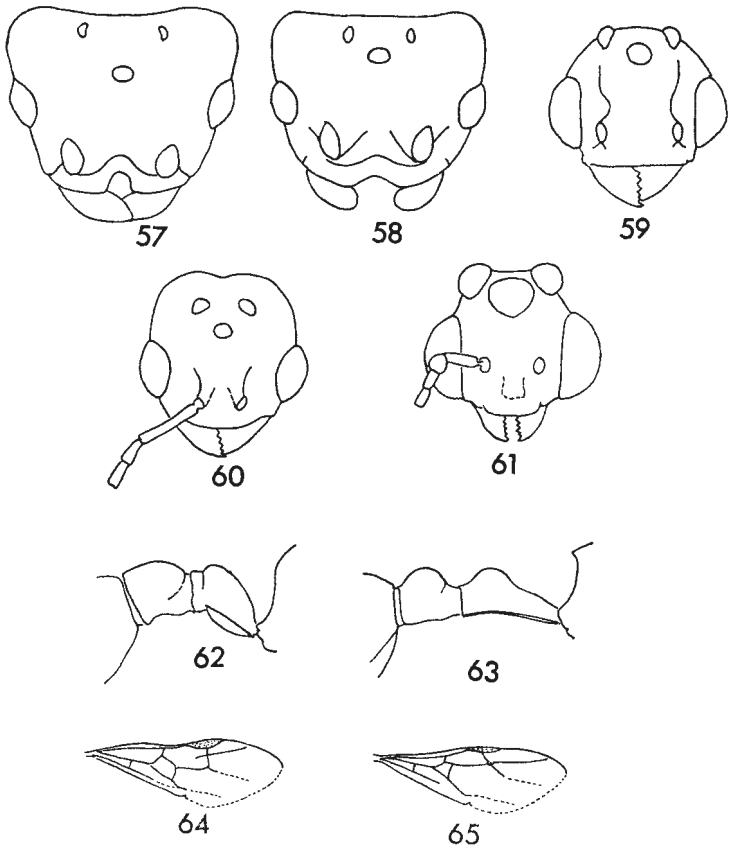
FIGS. 21-35.—Outline drawings of: (21) head of *Strongylognathus testaceus* worker; (22) head of *Solenopsis fugax* worker; (23) mandible of same; (24) lateral alitrunk and pedicel of same; (25) head of *Monomorium pharaonis* worker; (26) lateral alitrunk and pedicel of same; (27) antennal club of *Solenopsis fugax* worker; (28) antennal club of *Monomorium pharaonis* worker; (29) lateral pedicel of *Crematogaster scutellaris* worker and female; (30) head of *Formicoxenus nitidulus* worker; (31) lateral pedicel of same, worker and female; (32) lateral pedicel of *Leptothorax acervorum* worker and female; (33) lateral alitrunk of *Leptothorax nylanderii* worker; (34) same of *L. interruptus* worker; (35) same of *L. tuberum* worker.

FIGS. 36-40.—Anterolateral view of head in *Myrmica* species to show shape of basal scape in worker and female: (36) *M. ruginodis*; (37) *M. scabrinodis*; (38) *M. sabuleti*; (39) *M. schencki*; (40) *M. lobicornis*. Sculpture and pilosity omitted in all cases.



FIGS. 41-46.—Lateral pedicel in workers and females of *Myrmica* species: (41) *M. rubra*; (42) *M. ruginodis*; (43) *M. schencki*; (44) *M. lobicornis*; (45) *M. speciosoides*; (46) *M. scabrinodis*

FIGS. 47-56.—Outline drawings of: (47) mandibular margin in *Camponotus* species worker and female; (48) mandibular margin in *Formica* and *Lasius* species worker and female; (49) head of *Paratrechina longicornis* worker; (50) propodeum to show shape and position of spiracle in *Formica* species; (51) the same in *Lasius* species; (52) head of *Formica sanguinea* worker; (53) left half of head in *Lasius umbratus* worker, offset shows size of apical antennal segment; (54) the same in *Lasius niger* worker; (55) gastral apex in formicine ants, worker and female; (56) gastral apex in dolichoderine ants, worker and female. Sculpture and pilosity omitted in all cases.



FIGS. 57-65.—Outline drawings of: (57) head of *Anergates atratulus* female; (58) the same, male; (59) head of *Tetramorium guineense* male; (60) head of *Stenamamma westwoodi* male; (61) head of *Pheidole megacephala* male; (62) general shape of pedicel in *Leptothorax* species, male; (63) lateral pedicel in *Stenamamma westwoodi* male; (64) forewing in *Myrmica* species male and female; (65) forewing in *Lasius mixtus* male. Sculpture and pilosity omitted in all cases.

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