

A survey of Iberian *Formicidae* (Hymenoptera)

BY

C. A. COLLINGWOOD and I. H. H. YARROW.

London.

This paper presents results from the examination of many thousands of specimens from a number of collections. Chief of these include material obtained by Collingwood (C) from the Central Pyrenees in 1957 and on a journey across Spain to the Sierra Nevada in 1966, by Yarrow (Y) from a series of sixteen collecting trips to Spain, Portugal and Andorra between 1952 and the present time and by Professor H. Franz (F) of the Institut für Bodenforschung, Vienna, who made available his immense material of ants collected during several visits to the Peninsula. We are grateful also to a number of other collectors including H. W. Adams (A), S. C. S. Brown (B), C. Gaspar (G), N. Jessop (J), E. Owen Jones (OJ), R. W. A. Leach (L), H. C. F. Newton (N), R. Price (P), and Prof. Peris Torres (PT) of Madrid University for the loan of interesting specimens collected by J. Alvarez (M), to the Authorities of the Naturhistoriska Riksmuseum, Stockholm, for lending a miscellaneous collection made largely by O. Lundblad and S. Erlandsson (S), to the Authorities of the Helsingfors University Museum for the loan of a specimen of *Formica dusmeti* Emery collected in Algeciras in 1926 by Harald and Håkon Lindberg and finally to L. Weatherill for making available a very interesting collection from Portugal. For future reference, each record listed has the initial letter of the collector or Institution given after it in brackets as indicated above. New provincial records are indicated by an asterisk.

In this work, the *Formica rufa* group species have been dealt with rather fully by Yarrow on account of their increasing importance in the biological control of forest pests. Other species have been examined and annotated by Collingwood. Ceballos (1956) provided a comprehensive catalogue of all Hymenoptera species recorded from Spain and from the Balearic Islands, deliberately avoiding all nomenclatorial

controversies and leaving specialist workers to sort out much of the synonymies for themselves, a highly recommendable procedure considering the huge field covered. At the same time, Schmitz (1955) published a useful list of ants recorded from Portugal with critical comments on some of the species, and Bernard (1956) reviewed and brought up to date those recorded from the Balearic Islands. We have been guided by these lists as far as possible and have been greatly helped by opinions and specimens from Dr. H. Kutter of Switzerland and Dr. C. Baroni-Urbani of Florence. None the less we are well aware that only occasionally does traditional ant nomenclature conform with the precepts of the International Code of Zoological Nomenclature but we do not consider a work of the present kind the place to explore the intricacies of such matters. Accordingly, morphologically distinct entities are here treated as species and their names credited with original date and authorship even when these may be palpably infrasubspecific in origin.

The authors hope that users of this paper will appreciate that it is intended to be complementary to the Formicidae section of the Ceballos catalogue, not to replace it and that species recorded in that work but not confirmed by the very extensive recent collecting may here receive no mention but that this does not necessarily indicate that they dispute the correctness of these earlier inclusions. Several genera (*Typhlopone*, *Manica*, *Oxyopomyrmex*, *Phacota*, *Dolichoderus*, *Lio-metopum*, *Acantholepis*), each listed by Ceballos with a single species, fall into this category as do a number of species belonging to genera otherwise represented in the material studied. And no one who has worked the fringes of the vast unexplored, almost unexplorable, sierras, serras and mountain ranges of the Iberian Peninsula could deny the probability of large additions to the recorded ant fauna in the future.

THE SPECIES

PONERINAE

1. *Euponera* (*Trachymesopus*) *ochracea* (Mayr).

Mallorca *: Coll de Sóller (F).

2. *Ponera* *coarctata* (Latr.).

Barcelona *: Vallirana (F). Castellón *: Begis, Benicarló (F). Córdoba *: Sierra de Córdoba (F). Gerona: Costa Brava (F). Huesca:

Alcubierre (F). Ibiza * (F). Logroño *: Monasterio de Valvanera en Anguiano (F). Madrid: Aranjuez (F). Mallorca: Palma (F). Menorca *: Mahón (F). Murcia *: Sierra de Carrascoy (F). Orense *: Los Peares (F). Oviedo *: Bezanes (F). Covadonga (F). Pontevedra *: Bayona, Islas Cíes del Sur (F). Santander *: Beranga, Jesús del Monte, Potes (F). Tarragona *: Vendrell (F). Teruel *: Río Alfambra (F). Toledo *: Quintanar de la Orden (F).

Portugal.—No locality (S).

All but Madrid and Mallorca are new provincial records. The Franz collections included 24 locations for this species which is evidently widely distributed.

3. *Ponera eduardi* Forel.

Barcelona: San Feliu (F). Cádiz *: Algeciras (F). Gerona: La Junquera (F). Granada *: Sierra Nevada (F). Ibiza *: San Miguel (F). Madrid (F). Murcia *: Murcia (F). Pontevedra *: Mondariz, Pontevedra (F).

Dr. H. Kutter states (pers. comm.) that this species is quite common in South France.

4. *Anochetus ghiliani* (Spin.).

Cádiz: Algeciras (F).

This is the only province from which this species has so far been recorded in Spain.

5. *Stigmatomma denticulatum* Rog.

Málaga *: Málaga (F).

This has also been recorded from the adjacent province of Cádiz.

6. *Sysphincta europea* Forel.

Pontevedra *: Mondariz (F).

This has previously been taken in Sevilla. The last three species are all rare and little known in South Europe.

MYRMICINAE

7. *Myrmica rubra* (L.).

Ávila *: Sierra de Gredos (F). Barcelona: Barcelona (F). Huesca: Torla (F). Lérida: Seo de Urgel (F). Logroño *: Anguiano (F).

Lugo *: Lózara (F). Oviedo: Covadonga (F). Santander *: La Fuente, Pontones (F).

This species is as one would expect more or less confined to the northern provinces but there is an old record for Madrid.

8. *Myrmica ruginodis* Nyl.

Gerona: Cadaqués (F). Huesca: Canfranc (C), Ordesa (F). La Coruña *: Santiago (F). León *: Sierra de la Cabrera (F). Logroño *: Monasterio de Valvanera en Anguiano (F). Lugo *: Guitiriz, Lózara, Sierra de Ancares (F). Madrid *: Sierra de Guadarrama. Orense *: Sierra de Gerez, Verín (F). Oviedo *: Bezanes, Río Narcea (F). Pontevedra *: Pontevedra (F). Santander *: Espinama, Pontones, Saja, Villafufre (F). Teruel *: Sierra de Albarracín (F). Andorra (Y).

9. *Myrmica sulcinodis* Nyl.

Huesca *: Puerto de Portalet (F).

This species is abundant in the high Pyrenees.

10. *Myrmica aloba* Forel.

Ávila *: Sierra de Gredos (F). Cáceres *: Perales del Puerto (F). Gerona: Cassá de la Selva (F). Granada *: Río Monachil (F), Sierra Nevada (C, F). Ibiza: No locality (F). Jaén *: Sierra de Cazorla (F). La Coruña *: Santiago (F). Lugo *: Sierra de Ancares (F). Madrid: El Escorial, Sierra de Guadarrama (F). Murcia *: Sierra de Carras-coy (F). Pontevedra *: Cabo Silleiro, La Guardia, Monte del Testei-ro (F). Segovia *: Riofrío (Y). Teruel *: Sierra de Albarracín (F).

Portugal: Beira Alta, Serra da Estrela, Serra do Gerez (F).

This was described by Forel (1909) as a variety of *M. scabrinodis* with no lobar extension at the bend of the scape. In the large material chiefly collected by Franz, this species has been identified according to the following characteristics. The antennal scape is simply but sharply bent near the base as in *M. sulcinodis* but is somewhat thicker and shorter. Some examples have an indistinct swelling at the bend but this is never angled as in *M. scabrinodis*. The frontal area is distinctly striate and the frontal ridges are more widely spaced and less sinuate than in *M. scabrinodis*. Other features including the thoracic outline and petiole nodes are very similar to that species. It is, however, quite a distinct species on the head characters alone and the male, according to Santschi (1931) and other authors, has the an-

tenal scape equal in length to the following four or five segments as in *M. sabuleti*. Some series are more easily confused with *M. sulcinodis* than with *M. scabrinodis* but can be distinguished by the divergent sharply pointed epinotal spines, the shorter more square petiole outline seen from above and the more divergent frontal laminae (index 82-86 compared with *M. sulcinodis* 88-94).

M. aloba is the only *Myrmica* recorded from N. Africa (Bernard, 1958) and there are examples in the Franz collection from Ost Rif, Spanish Morocco and the High Atlas. These differ in no way from other examples taken in Spain and a queen and worker from Ibiza. Bernard (1956) following Menozzi (1926) only lists *M. rolandi* Bondroit from the Balearic Islands. This form was originally described from the Pyrenees and has been recorded from a wide area in Spain. It has probably been confused with *M. scabrinodis* on the one hand and with *M. aloba* Forel on the other.

11. *Myrmica rugulosa* Nyl.

This was taken in the French Pyrenees above Urdos (C). Ceballos gives records for Sevilla, Ciudad Real and Coruña but there are no examples of this species in the extensive series of *Myrmica* from Spain under review.

12. *Myrmica specioides* Bondroit, 1918.

(Syn. *Myrmica puerilis* Staëcke, 1942.)

Cuenca *: Cañete (Y). Gerona *: Col de Cannes (F). Teruel *: Sierra de Albarracín, Sierra de Cucalón (F).

Franz also collected two workers at Col de Pou in the Pyrénées Orientales, France. These are interesting extensions of the range of this little known species (Collingwood, 1962). According to material in the Bondroit collection in Brussels labelled *M. specioides* and examples in the British Museum from Calais and Paris, *M. puerilis* is identical and the name must therefore fall as a synonym.

13. *Myrmica scabrinodis* Nyl.

Barcelona: Vallirana (F). Cuenca *: Reillo (Y). Gerona: Cassá de la Selva (F). Huesca *: Canfranc, Jaca (C), Torla (F). La Coruña: Santiago (F). León *: Molinaferreira (F). Logroño *: Monasterio de Valvanera en Anguiano (F). Lugo *: Sierra de Ancares (F). Madrid *: Sierra de Guadarrama (Y). Málaga *: Málaga (F). Orense *:

Campo de Becerras (F). Oviedo *: Puerto El Palo, Puerto de Pajares (F). Pontevedra *: Bayona, Islas Cíes del Sur, Isla de Ons, La Guardia (F). Santander *: Puerto de la Braguía, Santoña (F).

The series from Molinaferreira are unusually large and dark. The sculpture is strongly anastomosed and the meso-spinotal furrow very deep.

14. *Myrmica sabuleti* Mein.

Barcelona: Vallirana (F). Castellón *: Begis (F). Gerona *: Olot (F). Granada *: Pinos Genil (C). Guipúzcoa: Tolosa (F). Huesca *: Canfranc, Jaca (C), Ordesa (Y). Puerto de Portalet (F). Torla (Y). La Coruña *: La Coruña (F). Lérida *: Seo de Urgel (F). Navarra *: Roncesvalles (F). Oviedo *: Bezanes, Puerto de Pajares (F). Palencia *: Las Arenas (Y). Pontevedra *: Bayona, Mondariz (F). Santander *: Beranga, Villaescusa (F). Segovia *: La Granja (Y). Zaragoza *: Zuera (F).

Outside the immediate vicinity of the Pyrenees, the female castes are characterized by a rather narrow lobar extension of the scape, the few males present are typical. This species is evidently common at least throughout North Spain.

15. *Myrmica schencki* Em.

Huesca *: Canfranc (C). León *: Molinaferreira (F).

This ant has not hitherto been recorded from Spain where it must evidently be rather uncommon. Franz had one worker among a short series of large dark *M. scabrinodis* from Molinaferreira as already described. The colony at Canfranc was found under a stone. Both sets of specimens are quite typical.

16. *Myrmica lobicornis* Nyl.

León *: Sierra de la Cabrera, Sierra de Son (F). Logroño *: Monasterio de Valvanera en Anguiano, Sierra Cebollera (F). Madrid: Sierra de Guadarrama (F), (C). Oviedo *: Teverga (F). Santander *: Espinama (F). Teruel *: Sierra de Albarracín (F). Zaragoza *: Sierra del Moncayo (F).

The Spanish form outside the Pyrenees is remarkable for the minute development of the tooth on the antennal scape. This is almost obsolete in some specimens such as the series from the Sierra de Guadarrama and so contrasts with examples from Scandinavia, where de-

velopment of the scape progress if relatively enormous, that it is difficult to regard the extreme as belonging to one species. Kutter (1961) placed *M. lobicornis* from Switzerland into three morphologically distinguishable groups of workers but found the males to be constant. This is probably the most variable of the European *Myrmica* species but paradoxically one of the easiest to determine.

17. *Stenamma westwoodii* West.

Barcelona: Barcelona (F). Cádiz *: Algeciras, Grazalema (F). Córdoba *: Córdoba (F). Logroño *: Monasterio de Valvanera en Aguiar (F). Madrid *: Aranjuez (F). Málaga *: Málaga (F). Pontevedra *: Moraña (F). Santander *: Beranga, Jesús del Monte, La Fuente, Monte de Candino en Castro-Urdiales, Villaescusa, Villafufre (F).

All except Barcelona are new records. This cryptic species is not easy to find but the intensive sampling methods of Franz have revealed a remarkable number of new records.

18. *Stenamma sardoum* Emery.

Tarragona *: Sierra de Montsant (F).

A single specimen in the Franz collection is ascribed to this species; the petiole node has a flattened rounded dorsal area instead of the peak-like profile of *S. westwoodii*. The specimen is also larger than typical examples of *S. westwoodii* with a broader head.

19. *Aphaenogaster (Attomyrma) subterranea* (Latr.).

Barcelona: Vallirana (F). Huesca *: Jaca (C). Mallorca *: Coll de Sóller (F). Menorca *: Mahón (F). Santander *: Potes (F). Tarragona *: Sierra de Montsant (F).

These including the Balearic Islands are all new provincial records. The Jaca colony was found under a large stone as is typical for this subterranean species.

20. *Aphaenogaster (Attomyrma) subterraneoides* Emery.

Castellón *: Begís (F).

21. *Aphaenogaster (Attomyrma) dulcinea* Santschi.

Huelva *: Ayamonte (F). Jaén *: Cazorla (F). Madrid *: El Pardo (F). Málaga *: Málaga (F). Murcia *: Sierra de Espuña (F).

A. dulcinea is evidently a good species. It differs from *A. pallida*

and *A. leveillei* Emery by the presence of distinct but small epinotal teeth and from *A. subterraneoides* by its pale colour and shorter funicular segments. Ceballos lists *A. pallida* from Spain and also *leveillei* and *dulcinea* as varieties of *A. pallida*. These probably all refer to the same species i. e. *dulcinea*. Emery (1908) gave conflicting descriptions of *A. leveillei* as a consequence of which it may have been wrongly recorded from Spain. Schmitz includes *A. leveillei* in his list of Portuguese ants.

22. *Aphaenogaster (Attomyrma) strioloides* Forel.

Alicante *: Alcoy (Y). Ciudad Real *: Santa Cruz de Mudela (F).

This more or less reddish species has the general form of *A. gibbosa* but is without suberect hairs on scapes and tibiae. It has previously been recorded only from Seville in Spain.

23. *Aphaenogaster (Attomyrma) gibbosa* (Latr.).

Gerona: Gerona (F). Granada: Pinos-Genil (C). Huelva *: Ayamonte (F). Huesca *: Canfranc, Jaca (C), Torla (F). Madrid: Aranjuez (F). Torrelodones (C), Villalba (F). Orense *: Los Peares (F). Oviedo *: Los Ferreros (F). Pontevedra *: Bayona, Isla Cies del Norte, Isla Cies del Sur, La Guardia, Sierra de Grova (F). Sevilla: Carmona, Sierra Morena (F). Tarragona *: Sierra de Montsant (F). Zaragoza *: Embalse de Yesa, Sierra de Alcubierre (F).

Portugal.—Beira Alta *: Mangalde (Y). Tras os Montes: Aligo (W).

This is a common South European species. The colour varies among individuals in the same colony from dark testaceous to black. Ceballos lists the variety "*levior*" Forel based on pale coloured individuals but this is a taxonomically useless distinction. One colony at Jaca was attacked by *Myrmica sabuleti* workers sharing the same stone.

24. *Aphaenogaster (Attomyrma) striativentris* Forel.

Sevilla: Carmona (F).

This appears to be a good species, although originally described by Forel as a variety of *A. gibbosa* from Sevilla and so listed by Ceballos. The mesonotum is less humped than in *A. gibbosa* and the first gaster segment is distinctly striated and not smooth. The only previous record for this species was also from Sevilla where Forel originally discovered it.

25. *Aphaenogaster testaceopilosa* (Lucas).

Alicante: Alicante (C). Ávila *: Sierra de Gredos (Y). Badajoz: Badajoz (N). Cádiz: Vejer de la Frontera (Y). Ciudad Real: Fernán Caballero (M). Córdoba: Sierra de Córdoba (F). Huelva *: Ayamonte (F). Jaén: Menjíbar (C). Madrid: Alcalá de Henares (M), Aranjuez (F), Meco (M), Sierra de Guadarrama (Y), Vaciamadrid (F). Málaga: Ronda (Y). La Coruña: Santiago (J). Sevilla: Sierra Morena (F). Tarragona: Tarragona (G). Valencia: Jaraco (G). Zaragoza: Zaragoza (C).

Portugal.—Algarve: Faro; Portimao (Y). Alto Alentejo: Redondo (Y). Baixo Alentejo: Ferreiro (F), Palma (L). Estremadura: Buçaco, Lisboa (W). Tras Os Montes: Alijo (W).

The European form of *A. testaceopilosa* Lucas is usually referred to *senilis* Mayr which Bernard (1958) treats as a distinct species. *A. senilis* is said to differ from *A. testaceopilosa* in the higher steeper petiole node and less sculptured head, but it has not been possible to distinguish the two from the present collections. The few males available correspond to the description of *A. senilis* as given by Santschi (1933) but available descriptions of authentic *A. testaceopilosa* are too imprecise for certain distinction. Both names are listed by Ceballos for Spain and both occur in literature on the North African fauna e. g. Cagniant (1962).

26. *Aphaenogaster gemella* (Roger).

There are a few examples in the Franz collection from Menorca. Goetsch (1942) refers to *A. testaceopilosa* carrying leaves into its nests at Blanes in Gerona province. However, according to Bernard (1958) only *A. gemella* of this group of species is vegetarian. No doubt Goetsch's record refers to this species which has not hitherto been recorded in Spain apart from the Balearic Islands where it is not uncommon.

27. *Aphaenogaster iberica* Emery.

Cádiz *: Guadiaro (L). Ciudad Real: Santa Cruz de Mudela (F). Cuenca *: Reillo (Y). Granada *: Baza (C). Huesca *: Huesca (Y). Jaén *: Mengíbar (C), Sierra de Cazorla (F). Madrid: Aranjuez, El Escorial, Sierra de Guadarrama, Villalba (F). Málaga: Málaga (F). Murcia: Alhama de Murcia (P), Sierra de Carrascoy, Sierra de Espuña (F). Segovia *: La Granja, Prádena, Revenga, Riofrío (Y). Zaragoza: Daroca (Y).

Portugal.—Algarve: Monchique (Y). Baixo Alentejo: Setubal (L). Estremadura: Arrabida, Buçaco (W).

This species has a wide distribution in Spain and Portugal but has not yet been recorded outside these countries. It has close affinities with the Italian *A. spinosa* from which it principally differs in the more elongate head. Together with *A. campana*, *praedo*, *semipolita* and *spinosa* the female castes are at once distinguished from the *A. testaceo-pilosa* group by the four segmented instead of the distinctly five segmented antennal club. Yet Emery (1908) described *A. iberica* as a variety of *A. senilis* from which it clearly differs in a number of important characters.

28. *Aphaenogaster angusta* Santschi.

Alicante *: Alicante (C). Murcia *: Alhama de Murcia (P).

This is similar to *A. iberica* but with the petiole less peaked, the body more diffusely sculptured and the epinotal spines straighter and shorter.

29. *Messor barbarus* (L.).

Alicante *: Alicante (C). Barcelona: San Feliú (B), Sitges (Y). Cádiz: Algeciras (F, Y), Jerez (Y). Cuenca *: Motilla del Palancar (Y). Gerona: Cassá de la Selva (F). Granada: Baza (C). Huelva: Ayamonte (Y). Madrid: Aranjuez (C), El Escorial (F), Meco; Montarco (M), Torrelodones, Viciamadrid (F). Málaga: Fuengirola (S), Nerja, Ronda (Y), Torremolinos (M). Mallorca: Felanitx (F). Murcia: Alhama de Murcia (P), Jumilla (F), Lorca (Y). Oviedo *: Puente los Fierros (F). Sevilla: near Sevilla (F), Los Palacios (Y). Tarragona: Sierra de Montsant (F). Toledo *: Quintanar de la Orden (F). Valencia *: Valencia (M). Zaragoza: Jaulin; Río Riquel (F).

Portugal.—Algarve: Monchique (Y); Baixo Alentejo: Ferreiro (F), Palma (L). Estremadura: Lisboa (W).

The Mallorca record supports an earlier one of Saunders (1901) of which there are examples in the Oxford University Museum. Bernard (1956) remarks on the apparent absence of this species from the Balearics.

30. *Messor capitatus* (Latr.).

Almería *: Chercos (F). Burgos *: Hontoria del Pinar (F). Cádiz *: Guadiaro (S). Cuenca *: Buenache (M), Motilla del Palancar,

Reillo (Y). Huesca *: Jaca (C, Y). Madrid: Vaciamadrid, Villalba (F). Mallorca: Palma (F). Orense *: Barco de Valdeorras (F). Santander *: Espinama, Potes, Valle de Valdeón (F). Segovia *: La Granja (Y). Valencia *: Serra (F). Zaragoza: Sierra de Alcubierre (F).

Portugal.—Tras Os Montes: Aligo (W).

This species is abundant in inland areas whereas *M. barbarus* tends to be more frequent near the coast. *M. capitatus* is similar to *M. barbarus* but may be easily distinguished by the uniformly black head and bluntly angled epinotum. *M. capitatus* var. *grandiceps* Stitz recorded from Córdoba would appear to be a trivial variation from the description given by Stitz (1916).

31. *Messor bouvieri* Bondroit.

Almería *: Sierra de Almagro (F). Barcelona: San Feliú (B). Cádiz *: Vejer de la Frontera (Y). Granada *: Baza (C), Sierra Nevada (Y). Huesca *: Ordesa (Y). Ibiza: Sierra Grossa (F). La Coruña: Corrubedo (F). Madrid: Aranjuez (C), Valdemoro, Villalba (F). Málaga: Fuengirola (L), Ronda (Y). Menorca: Mahón, Pico Toro (F). Murcia: Jumilla, Sierra de Espuña (F). Pontevedra *: Islas Cies del Norte, Isla Cies del Sur, Isla de Ons, Ría de Vigo (F). Valencia: Valencia (M). Zaragoza *: Zaragoza (F).

Portugal.—Alto Alentejo: Redondo (Y). Estremadura: Arrabida, Lisboa (W). Minho: Ancora (Y).

This widely distributed species is characterised by its small general size, long anteriorly curved subcephalic hairs and near absence of standing hairs on the first gaster segment. Bernard (1958) uses the name *M. sancta* but *bouvieri* Bondroit seems to be the correct name for the European form which is uniformly shining black by contrast with *M. sancta* from N. Africa which is more or less reddish. Schmitz (1955) refers to this form as *M. sanctus bouvieri* in this list for Portugal. Wheeler (1936) used the name *M. instabilis* for the Balearic records, no doubt following Bondroit who referred to it as *M. instabilis* var. *bouvieri*. *M. instabilis*, however, as C. Baroni Urbani has kindly pointed out, is an Indian species with different characteristics.

32. *Messor hispanica* Santsch.

Mallorca *: Palma (B).

This closely resembles *M. bouvieri* in its small size and abundant

long gula hairs but is distinguished by numerous erect hairs on the dorsum of the gaster.

33. *Messor maroccana* Emery.

Portugal.—Estremadura *: Vila de Miraflores (J).

This is an interesting extension of the range of this North African species distinguished from the similarly bicoloured *M. meridionalis* André by its smaller size and very shining head.

34. *Messor lobicornis* Forel.

Pontevedra *: Bayona, Cabo Silleiro, Isla Cies del Sur (F).

Portugal.—Tras Os Montes *: Aligo (W).

These are first records for Spain and Portugal of this North African species. The worker is small and dark with strongly developed subcephalic hairs as in *M. bouvieri* from which it is distinguished by its very short antennal segments and pronounced epinotal spines.

35. *Messor structor* (Latr.).

Gerona: Junquera (S). Granada *: Casa de Capo (M), Granada (C), Sierra Nevada (F). Ibiza: Ibiza (F). Madrid: Alcalá de Henares, Aranjuez, Barajas (M). Mallorca *: Felanitx (F). Menorca: Pico Toro (F). Murcia *: Jumilla (F). Segovia *: La Granja (Y). Valencia: Bétera (P T), Serra (F). Zaragoza: Zaragoza (C).

Portugal.—Estremadura: Lisboa (W).

Bernard (1954), (1956), distinguishes *M. rufitarsis* Fab. from *M. structor* by the more square head in the large worker and the development of additional short thick hairs on the frons. He further differentiates them geographically, *M. rufitarsis* being the more eastern species and *M. structor* confined to areas west of the Rhone; he includes both in the species list for the Balearics (Bernard, 1956).

36. *Goniomma tunetica* Forel.

Portugal.—Baixo Alentejo *: Setubal (L). Estremadura *: Lisboa (W).

This is a first record for Portugal of this little known species. According to C. Baroni Urbani, to whom an example was referred, it corresponds with *tunetica* Forel var. *nitidifrons* Santschi from North Africa.

37. *Goniomma blanci* (André).

Madrid *: El Escorial, Sierra de Guadarrama (F).

These two single separate workers appear to be typical examples of *G. blanci*. This is a first record for Spain of this species hitherto only known from South France. The eyes are more closely set to the mandibles than in *G. hispanicum*.

38. *Pheidole pallidula* (Nyl.).

Barcelona: Barcelona (Y). Cáceres: Perales del Puerto (F). Cádiz: Algeciras (F). Castellón *: Jérica (G), Sierra de Vallibona, Vinaroz (F). Córdoba: Sierra de Córdoba (F). Gerona: Cadaqués (F), Lloret de Mar (L). Huesca: Jaca (C), Torla (F). Ibiza: (F). Madrid: Aranjuez, El Escorial, Torreldones (F). Mallorca: Felanitx (F). Menorca: Mahón (F). Murcia: Alhama de Murcia (P), Jumilla (F). Pontevedra *: Bayona, Islas Cies del Sur, Isla de Ons, La Guardia, Pontevedra, Ría de Vigo (F). Santander *: Potes (F). Tarragona *: Tarragona (G), Vendrell (F). Teruel *: Río Alfambra, Sierra de Cucalón (F). Zaragoza: Sierra de Alcubierre, Zaragoza (F).

Portugal.—Baixa Alemtejo: Ferreiro do Alemtejo (F). Estremadura: Buçaco (W). Minho: Braga (W).

This very abundant South European species is probably to be found in every province of Spain. *Thorictus grandicollis* Germ. a myrmecophilous beetle was found in several nests in the Pyrénées Orientales.

39. *Crematogaster (Acrocoelia) scutellaris* (Ol.).

Cádiz: Grazalema (F), Guadiaro (L). Castellón *: Sierra de Vallibona (F). Córdoba: Sierra de Córdoba (F). Gerona: Cadaqués (F). Granada: Pinos-Genil (C). Huesca *: Boltaña (Y). Madrid: El Escorial (F). Málaga: Málaga (F). Mallorca: Coll de Sóller, Felanitx (F). Menorca: Mahón, Tirantnou (F). Pontevedra *: Pontevedra (F). Santander *: Potes (F). Segovia *: Revenga (Y). Zaragoza: Sierra de Alcubierre (F).

Portugal.—Baixo Alemtejo: Ferreira do Alemtejo (F).

40. *Crematogaster (Acrocoelia) auberti* Emery.

Almería *: Almería (M). Burgos *: Segovia road (Y). Cádiz: Algeciras (L, F). Castellón: Jérica (G). Ciudad Real: Santa Cruz de Mudela (F). Gerona: Gerona (F). Granada: Pinos-Genil (C). Huesca *:

Ansó (Y). León: Sierra de Son (F). Madrid: Vaciamadrid (F). Málaga: Fuengirola (L), Ronda (C). Murcia *: Jumilla, Sierra de Espuña (F). Pontevedra *: Bayona, Ría de Vigo (F). Toledo *: Quintanar de la Orden (F). Zaragoza: Embalse de Yesa, Leciñena, Río de Riquel (F).

Portugal.—Estremadura: Arrabida, Buçaco (W), Minho *: Serra do Gerez (Y).

There are several named varieties of this species including a darker more sculptured form, *iberica* Forel. Probably the series of workers from Sierra de Son, León, corresponds to this but apart from larger size and deeper colour including dark scapes, no definite structural differences are detectable between these and the rest including some from Port La Nouvelle fringing the Pyrénées Orientales.

41. **Crematogaster (Acrocoelia) laestrygon** Emery.

Mallorca: Palma (F).

The Balearic race has been referred by some authors to *submaura* Lomnicki.

42. **Crematogaster (Orthocrema) sordidula** (Nyl.).

Córdoba: Sierra de Córdoba (F). Ciudad Real: Santa Cruz de Mudela (F). Gerona: Gerona (F). Granada *: Sierra Nevada (F). Ibiza *: Sierra Grossa (F). Jaén: Sierra de Cazorla (F). Madrid: Aranjuez (F). Málaga *: Málaga (F). Murcia *: Lorca (L). Sierra de Espuña (F). Pontevedra *: Isla de Ons, Pontevedra (F). Tarragona: Sierra de Montsant (F).

This abundant but unobtrusive little South European species has not hitherto been recorded from the Balearics.

43. **Monomorium (Xeromyrmex) salomonis** (L.).

Cádiz: Guadiano (L). Mallorca: Palma (B). Menorca: Mahón (F).

44. **Monomorium (Xeromyrmex) subopaca** (F. Smith).

Alicante *: Alicante (C). Ibiza: Ibiza (F). Málaga: Estepona, Fuengirola (L).

Both the above species occur in several provinces in South Spain. *M. subopaca* from Ibiza confirms an old record of a single worker from the Balearics taken by Eidmann (Bernard, 1956) in Mallorca.

45. *Solenopsis fugax* (Latr.).

Huesca *: Canfranc (C), Torla (F).

46. *Solenopsis monticola* Bernard.

Castellón *: Benicarló (F). Gerona *: Cadaqués (F). Huesca *: Castiello de Jaca (C), Torla (Y). Lérida *: Begós (F). Tarragona *: Vendrell (F).

47. *Solenopsis nicaeensis* Bernard.

Huesca *: Jaca (C).

48. *Solenopsis latro* Forel.

Granada *: Sierra Nevada (F). Madrid *: Aranjuez (F). Murcia *: Murcia (F). Orense *: Los Peares (F). Pontevedra *: Beluso, Cabo Silleiro, Isla Cies del Norte (F).

49. *Solenopsis fairchildi* Wheeler.

Castellón *: Sierra de Vallibona (F). Córdoba *: Sierra de Córdoba (F). Mallorca: Coll de Sóller, Palma (F). Menorca: Mahón, Pico Toro (F).

50. *Solenopsis lusitanica* Emery.

Madrid *: Vaciamadrid (F).

Portugal.—Estremadura: Buçaco (W), Castelo de Vide, Fátima (F).

51. *Solenopsis orbula* Emery.

Castellón: Sierra de Vallibona (F). Huelva: Ayamonte (F). Madrid: Sierra de Guadarrama, Torreloz (F). Tarragona *: Sierra de Montsant (F).

The identification of the *Solenopsis* species above is necessarily tentative pending a proper revision of this difficult group. Bernard (1946) made some attempt to clarify the situation with respect to the French species and I have been guided as far as possible by his descriptions and keys.

S. monticola replaces *S. fugax* in the Southern mountains according to Bernard. It is chiefly distinguished from *S. fugax* by the more pronounced meso-epinotal furrow. Specimens compare with examples from Briançon, the Alpes-Maritimes and Latour de Carol in the Pyrénées Orientales (C). *S. nicaeensis* is distinguished by the more pro-

nounced clypeal teeth as well as distinct meso-epinotal furrow. These species differ from the others named in the relative abundance of long body hairs. *S. latro* is distinguished by its small size, very distinct meso-epinotal furrow, short very blunt clypeal teeth and more rectangular head. *S. fairchildi*, described by Wheeler (1936) as a race of *S. latro* from Mallorca, has pronounced curved clypeal teeth and the specimens so named above seem to correspond well in other features with his description. It has the same long head as *S. orbula* but a more distinct meso-epinotal groove. *S. lusitanica* is a small short-headed species. Males in the Portuguese series collected by Weatherill are much smaller than those of *S. fugax*, have a more rounded head and differ in sculptural details from that species. Other specimens taken by Franz near Banyuls and in the Mont Canigou Valley in the Pyrénées Orientales, are referable to *S. rugosa* Emery and *S. banyulensis* Bernard respectively.

52. *Myrmecina graminicola* (Latr.).

Barcelona *: Vallirana (F). Cádiz *: Algeciras (F). Castellón *: Vallibona (F). Córdoba *: Sierra de Córdoba (F). Gerona *: Cadaqués (F). Guipúzcoa *: Tolosa (F). La Coruña *: Noya, Outes, Punta de la Estaca de Bares, San Saturnino (F). Lérida *: Begós (F). Madrid *: Madrid (F). Mallorca *: Coll de Sóller, Felanitx (F). Menorca *: Mahón (F). Orense *: Los Peares (F). Oviedo *: Bezanes (F). Pontevedra *: Bayona, Isla Cíes del Norte, Isla de Ons, Montes del Testeiro (F). Santander *: Beranga, Espinama, Jesús del Monte, La Fuente, Marrón, Monte Candina en Castro Urdiales, Pontones, Villafufre, Villaescusa (F). Sevilla *: Sierra Morena (F). Tarragona *: Sierra de Montsant (F).

Portugal.—Estremadura *: Fatima (F).

This long list of locality records from the Franz collection is remarkable in that it provides the first record for Spain and the Balearics. *M. graminicola* was also taken in several places in the Pyrénées Orientales.

53. *Temnothorax recedens* (Nyl.).

Barcelona: San Feliú (B). Cádiz: Algeciras (F). Castellón *: Benicarló, Sierra de Vallibona (F). Córdoba *: Sierra de Córdoba (F). Granada: Baza (C). Huesca *: Canfranc (C). Ibiza: Sierra Grossa (F). Madrid *: Torreldones (F). Málaga: Estepona (F). Mallorca:

Felanitx, Palma (F). Menorca: Pico de Toro (F). Zaragoza: Sierra de Alcubierre (F).

This appears to be common on the Balearic Islands where Bernard (1956) pointed out that it was the only recorded *Leptothoracine* ant despite the abundance of a number of *Leptothorax* species on the surrounding mainlands.

54. *Leptothorax acervorum* (Fab.).

León*: San Félix de las Lavanderas, Sierra de Son (F). Lugo*: Sierra de Ancares (F). Santander*: Picos de Europa (F). Teruel: Sierra de Albarracín (F).

55. *Leptothorax muscorum* (Nyl.).

This has not been recorded from Spain. In France it is restricted to the north and higher mountain areas, and was found in 1957 above Urds in the Basses Pyrénées (C).

56. *Leptothorax boeticus* Emery.

Madrid: Aranjuez (F). Zaragoza*: Sierra de Alcubierre (F).

This is a large, deeply sculptured species with a massive globular petiole node. It belongs to the *L. rottenbergi* species group.

57. *Leptothorax angustulus* (Nyl.).

Mallorca: Coll de Sóller (F). Zaragoza*: Jaulín (F).

The Mallorca record is of particular interest as it confirms a very old record (Roger, 1863) that was ignored by Bernard (1956).

58. *Leptothorax corticalis* (Schenck).

Tarragona*: Sierra de Montsant (F).

Portugal.—Beira Alta*: Serra da Estrela (F).

The only representatives in the Franz collection were three queens; these have extremely short spinotal spines and pale antennal clubs with the body rather dark.

59. *Leptothorax nylanderii* (Foerst.).

Barcelona: Montserrat (F). Gerona*: Olot (F). Huesca*: Castiello de Jaca (C). La Coruña*: Outes, Santiago (F). Logroño*: Monasterio de Valvanera en Anguiano (F). Lugo*: Sierra de Ancares (F). Madrid*: Sierra de Guadarrama (F). Navarra*: Orbaiceta (F).

Pontevedra *: Isla Cíes del Sur, Mondariz, Moraña (F). Santander *: Jesús del Monte, Potes, Villafufre, Villaverde de Pontones (F).

Portugal.—Serra do Gerez (F).

This bark inhabiting species appears to be abundant in the north west provinces. The only previous record for Spain is from Barcelona.

60. *Leptothorax lichtensteini* Bondroit.

Gerona *: Gerona. Ibiza *: San Miguel (F). León: Molinaferreira (F). Madrid *: El Escorial, Sierra de Guadarrama (F). Orense *: Casayo en Carballeda, Los Peares, Sobrado (F). Pontevedra *: Pontevedra (F). Tarragona *: Sierra de Montsant (F). Teruel: Sierra de Albarracín, Sierra de Cucalón (F). Zaragoza *: Botorrita, Río Huerva (F).

This south European species is very similar to *L. nylanderi*. The head is less sculptured and the alitrunk less massive with a more well-defined meso-epinotal suture, sharper epinotal spines and narrower petiole node, compared with *L. nylanderi*. There are corresponding differences in the male and queen. Bernard (1956) regards *L. lichtensteini* and *L. parvula* Sch. as different species, but *L. parvula* is probably in part a synonym of *L. lichtensteini* and in part of *L. nylanderi* of which it was described as a smaller paler variety. *L. lichtensteini* is abundant in the Alpes-Maritimes where it was wrongly diagnosed as *L. nylanderi* (Collingwood, 1956). Unlike *L. nylanderi* it lives in rock crevices. It is interesting to note the occurrence of *L. lichtensteini* in the Balearics as well as the previously recorded *L. angustulus*.

61. *Leptothorax cervantesi* Santschi.

Madrid *: El Pardo, Rascafría (F). Pontevedra *: Pontevedra (F).

This is a rather dark bicoloured species with angled petiole node and no meso-epinotal impression. It appears to be rather close to *L. exilis* Em. and *L. niger* For.

62. *Leptothorax exilis* Emery.

Málaga *: Málaga (F). Zaragoza *: Sierra de Alcubierre (F).

63. *Leptothorax niger* Forel.

Pontevedra *: Playa de la Lanzada (F). Zaragoza: Zuera (F).

64. *Leptothorax tuborum* (Fab.).

Almería *: Sierra Cabrera (F). Granada: Sierra Nevada (C). Huesca *: Jaca (C). Monte Perdido, Ordesa, Puerto de Portalet en Sallent de Gállego (F). Lugo *: Sierra de Ancares (F). Madrid: Puerto de Navacerrada (C), Sierra de Guadarrama (F). Santander *: Espinama, Potes (F). Zaragoza *: Sierra de Moncayo (F).

This would be called variously *L. tuborum* or *L. nigriceps* or even perhaps *L. melanocephalum* Em. according to the amount of dark colour on head and gaster. Structurally, however, the series examined in this collection are comparable with the consistently pale *L. tuborum* of England. The pale form grades insensibly into what might be called *L. nigriceps* in South Scandinavia. Bernard (1956) and van Boven (1959) attempt to distinguish between the two and Bernard questions the name *tuborum* since the type specimen has been lost and the original description did not provide sufficient information.

65. *Leptothorax nigrita* Emery.

Gerona *: Olot (F). Huesca *: Castiello de Jaca (C).

This superficially resembles *L. niger* in being uniformly dark reddish brown to black but has the petiole node more massive and the epinotal spines distinctly longer. This species also occurred at La Tour de Carol in the Pyrénées Orientales (C) which may be a first record for France.

66. *Leptothorax unifasciatus* (Latreille).

Huesca *: Canfranc (C). León: Molinaferreira (F). Madrid: Rascafría (C). Orense *: Peña Trevinca (F). Pontevedra *: Montes del Testeiro, Moraña (F).

Portugal.—Alto Alentejo: Castelo de Vide, Serra do Gerez (F).

These vary in colour. In one series for example the antennal club varies from quite pale to dark brown and the brown band across the gaster is quite indistinct in some of the paler specimens. Sadil (1939) distinguished a similarly variable coloured form on characters in the queen as the variety *obenbergeri* Sadil in Czechoslovakia.

67. *Leptothorax interruptus* (Schenck).

Lugo *: Sierra de Ancares (F).

Hitherto this has only been recorded for Spain from the Sierra

Nevada (Cagniant, 1961) but has probably previously been overlooked since it is one of the more widely distributed European species.

68. *Leptothorax luteus* Forel.

Ávila *: Puerto de Menga (F). Jaén *: Sierra de Cazorla (F). Madrid: Torreldones (C). Murcia *: Sierra de Espuña (F). Pontevedra *: Pontevedra (F). Santander *: Potes (F).

69. *Leptothorax rabaudi* Bondroit.

Cádiz: Sierra del Pinar (F). Castellón *: Sierra de Vallibona (F). Córdoba *: Sierra de Córdoba. Tarragona *: Sierra de Montsant (F).

70. *Leptothorax berlandi* Bondroit.

Gerona *: Cadaqués (F). Huesca *: Canfranc (C). León *: Sierra de la Cabrera, Sierra de Són (F). Madrid *: Rascafría (C). Oviedo *: Mt. Reres (F). Pontevedra *: Moraña (F). Teruel *: Sierra de Albarracín (F). Zamora *: Lago de Sanabria (F).

71. *Leptothorax tristis* Bondroit.

Granada: Sierra Nevada (F).

72. *Leptothorax massiliensis* Bondroit.

Málaga *: Málaga (F). Zaragoza *: Sierra de Alcubierre (F).

73. *Leptothorax racovitzae* Bondroit.

Cádiz *: Tarifa (F). Granada *: Sierra Nevada (C). Huesca *: Canfranc (C).

Portugal.—Estremadura *: Buçaco (W).

The six species listed above all have pale antennal clubs and uninterrupted dorsal thoracic profile. They are difficult to distinguish and may well have alternative names in the literature. *L. rabaudi* is distinct through its right angled petiole crest when viewed in profile. *L. berlandi* is a montane species of rather similar appearance but with the petiole more upright and sharply domed and a more sculptured head. Bernard (1956) considered this to be a synonym of *L. rabaudi* but the specimens so named are clearly distinct. *L. racovitzae* is distinguished by its longer, curved epinotal spines. *L. tristis* is slightly darker in body colour and has long straight epinotal spines. *L. massiliensis* is a smaller species and has the head much more smoothly sculp-

tured and shining compared with the other species. *L. luteus* is distinctly clear yellow in colour with relatively longer appendages and alitrunk.

74. *Anergates atratulus* (Schenck).

Madrid *: Sierra de Guadarrama (C).

One physogastric queen was discovered in the middle of a nest of *Tetramorium caespitum* above Navacerrada. This is the only record for Spain and it is rare in France.

75. *Epimyrmica vandeli* Santschi.

Huesca *: Canfranc (C).

One queen and three workers of this rare parasite were taken in a nest of the host species *Temnothorax recedens* in moss on a wooded rocky slope. This species has hitherto only been recorded from Morocco, and from Toulouse and St. Raphael in South France.

76. *Formicoxenus nitidulus* (Nyl.).

Madrid *: Puerto de Navacerrada (C).

This was taken with *Formica dusmeti* as host, a first record for Spain as well as a new host record. It is evidently rare in Spain since Yarrow failed to find it in more than 400 nests of the *Formica rufa* group investigated. Bernard (pers. commun.) considers it to be rare in France but it was also found with *Formica lugubris* at Font-Romeu (C) and at Canigou (C, F) in the Pyrénées Orientales.

77. *Strongylognathus testaceus* (Schenck).

Huesca *: Jaca (C).

This species occurred with its host, *Tetramorium caespitum* L. under a stone. Bernard (1946) records it from Barèges in the Pyrénées Centrales and it was also found both at Font-Romeu in the Pyrénées Orientales and above Urdos in the Pyrénées Basses (C).

78. *Tetramorium hispanicum* Emery.

Cádiz *: Algeciras (F). Castellón *: Montes de Vallibona (F). Córdoba: Sierra de Córdoba (F). Guadalajara: Cutamilla (M). Lugo *: Becerreá (F). Madrid: Navacerrada (M), Sierra de Guadarrama (F), Torrelodones (C), Vaciámadrid (F). Zaragoza *: Sierra de Alcubierre (F).

Portugal.—Estremadura *: Buçaco, Lisboa (W).

This distinctive species is characterised by the coarsely sculptured wide, angled petiole node. It is reminiscent of *T. ferox* Ruzsky from south east Europe but the petiole node is thicker and not indented above as in that species. The queen, about 6 mm long, is small compared with *T. caespitum* but the workers are on average slightly larger than in that species.

This species also occurs in the Pyrénées Orientales (C, F). Wheeler (1936) recorded this ant as *T. ruginodis* from the Balearics but Bernard (1956) makes no mention of it from there. The name *T. ruginodis* Stitz (1916) has been more commonly used for this species and other names likely to prove synonyms are *T. caespitum* var. *fortis* Emery, 1908, *T. caespitum* var. *pyrenaicum* Rösler (1936) from the Pyrenees and *T. silvestrianum* Emery from Barcelona. The descriptions of all these are the same and confusion has arisen in that some specimens have the first gaster segment faintly striated.

79. *Tetramorium caespitum* (L.).

Cuenca *: Huete (M). Granada *: Sierra Nevada (C). Huesca: Canfranc, Jaca (C), Monte Perdido (F), Torla (Y). La Coruña: Malpica de Bergantiles, Punta de la Estaca de Bares, Santiago (F). León *: Molinaferreira, Puerto de Pajares (F). Lugo: Valle de Lózar (F). Málaga *: Málaga (F). Mallorca: Palma (B). Navarra *: Roncesvalles (F). Oviedo *: Bezanes, Peña Santa (F). Pontevedra *: Bayona, Isla Cíes del Sur, Monte del Testeiro (F). Teruel: Sierra de Albarra-cín (F). Zamora *: Lago de Sanabria (F). Zaragoza *: Sierra de Alcubierre, Sierra de Moncayo, Zaragoza (F).

Portugal.—Baixo Alentejo: Palma (L). Beira Alta: Serra da Estrela (Y), Serra de las Penhas Dorhadas (F). Estremadura: Buçaco (W). Tras os Montes: Aligo (W).

80. *Tetramorium meridionale* Emery.

Ibiza (F). Mallorca *: Coll de Sóller (F). Sevilla: Los Palacios (F).

There is also a large series of unusually pale yellowish workers in the Franz collection from Menorca * (Mahón), which may be another species. The characteristic lateral striae on the occiput are very distinct however.

81. *Tetramorium semilaevis* André.

Alicante *: Alicante (C). Cáceres *: Perales del Puerto (F). Cá-

diz *: Tarifa (F). Ciudad Real: Almuradiel (C). Granada *: Sierra Nevada (F). Huelva *: Ayamonte (F). Huesca *: Jaca, Torla (Y). Jaén *: Sierra de Cazorla (F). Madrid: Aranjuez (C), Sierra de Guadarrama (F). Málaga *: Estepona (F). Mallorca: Felanitx (F). Murcia *: Sierra de Carrascoe. Pontevedra: Bayona, Pontevedra (F). Santander *: Monte de Candina en Castro Urdiales, Villaverde de Pontones (F). Segovia *: La Granja, Revenga (Y). Soria *: Herreros (Y).

Portugal.—Alentejo Baixo: Ferreiro (F). Estremadura: Buçaco (W).

82. *Cardiocondyla batesi* Forel.

Murcia *: Alhama de Murcia (P).

83. *Cardiocondyla elegans* Emery.

Castellón *: Jérica (G). Lérida *: Seo de Urgel (F).

Both species are unocommon. There are previous records from Sevilla province and *C. batesi* has also been recorded from Ciudad Real.

DACELINAE

84. *Strumigenys baudueri* (Emery).

Madrid *: Madrid (F). Málaga *: Málaga (F).

This little Dacetine ant is rare in the South Mediterranean. The only previous record for Spain is from La Coruña.

DOLICHODERINAE

85. *Iridomyrmex humilis* (Mayr).

Barcelona: San Feliú (B). Madrid *: Alarcón (M), Aranjuez (F). Mallorca: Palma (B). Murcia *: Murcia (M). Oviedo *: Bezanes (F). Pontevedra *: Bayona (F). Santander *: Saja, Santander (F). Soria *: Soria (OJ). Tarragona *: Ebro (C). Valencia *: Saler (G).

Portugal.—Douro: Oporto (W). Estremadura: Arrabia, Cintra (W).

This South American species is still steadily encroaching on the Mediterranean coast; it is disconcerting to record it from as far inland as Madrid and Soria.

86. *Bothriomyrmex meridionalis* (Roger).

La Coruña *: Corme (F).

87. *Bothriomyrmex laticeps* Emery.

Huesca *: Jaca (C).

The Huesca series of workers resemble some from Cahors in South France (C). The specimens are small with a defined frontal triangle and distinctly emarginate, short head. They appear to be referable to *laticeps* Emery first described as a race of *B. corsicus* Santschi from material collected in the Pyrenees.

88. *Tapinoma erraticum* (Latr.).

Cádiz: Tarifa (F). Granada *: Baza (C), Sierra Nevada (F). Huesca *: Canfranc, Jaca (C), Torla (Y). La Coruña *: Corme, Santiago (F). Madrid: Torreldones (C). Oviedo *: Puente los Fierros (F). Pontevedra *: Bayona, Isla Cies del Sur, Pontevedra (F). Santander *: La Fuente, Potes, Saja, Santoña (F). Segovia: La Granja (Y). Tarragona: Sierra de Montsant (F), Tarragona (G). Teruel *: Sierra de Albarracín (F). Zaragoza: Zuera (F).

Portugal.—Tras os Montes: Aligo (W).

89. *Tapinoma nigerrimum* (Nyl.).

Barcelona: San Feliú (F). Burgos *: Segovia road (Y). Tarifa (Y). Cuenca: Buenache (M), Cañete (Y). Gerona: Cassá de la Selva (F). Granada: Granada (M), Sierra Nevada (F). Huelva *: Gibralfaró (Y). Huesca *: Boltaña (Y), Jaca (C), Zuera (F). Ibiza: Sierra Grossa (F). Lugo *: Val de Lózá (F). Madrid: Aranjuez (C), Casa de Campo (M), El Escorial, El Pardo, Sierra de Guadarrama (F), Torreldones (C), Vallecas (M). Málaga *: Fuengirola (L), Ronda (Y). Menorca: Mahón (F). Murcia *: Cieza (F), Puerto Lumbreras (Y). Orense *: Los Peares (F). Santander *: Puerto del Escudo (F). Segovia *: Prádena (Y). Sevilla: Carmona, Los Palacios (F).

Portugal.—Baixo Alentejo: Beja (Y). Estremadura: Monchique (Y). Tras Os Montes: Aligo (W).

This is the more abundant of the two species especially in the south. The larger workers are easy to distinguish but some nests contain only small workers. These may be separated from *T. erraticum* by the deeper clypeal notch and more angled epinotum. In Segovia province,

Yarrow found *T. nigerrimum* frequently nesting at the foot of old fence posts.

Franz took a few workers from Sierra de Espuña in Murcia which have the clypeus and antennal scape clear yellowish brown instead of dark brown or more usually, uniform dark with the rest of the body as in *T. nigerrimum* which they otherwise resemble. Santschi also recorded a subspecies *ibericum* which is only distinguished in the male by darker genitalia.

90. *Tapinoma simrothi* Krausse.

Cádiz: Guadiaro (S). Pontevedra *: Isla Cies del Sur (F). Tarragona *: Ebro (C).

Franz also took some workers in the Rhone delta in Southern France. Bernard (1958) suggests that this may be an invasive oriental species. Numerous examples from Afghanistan named as this species (Collingwood, 1961) differ from the Mediterranean species and appear to be the same as the "subspecies", *karawaievi*, Em. The two populations are undoubtedly specifically distinct.

FORMICINAE

91. *Plagiolepis pygmaea* (Latr.).

Barcelona *: San Feliú (B), Vallirana (F). Cádiz: Algeciras (F). Castellón *: Montes de Vallibona (F). Girona: Cadaqués (F). Huelva *: Gibraleón (Y). Huesca *: Jaca (C), Torla (Y). Jaén *: Sierra de Cazorla (F). Lugo *: Villalba (F). Madrid: Aranjuez, El Escorial, Torreloz, Vaciamadrid (F). Málaga: Málaga (F). Mallorca: Finca Lavermea, Palma (F). Menorca *: Mahón, Pico de Toro (F). Murcia *: Alhama de Murcia (P), Sierra de Espuña (F). Orense *: Sierra de Gerez (F). Pontevedra *: Bayona, Pontevedra (F). Santander *: La Fuente (F). Segovia *: Marugán (Y). Tarragona *: Falset, Sierra de Montsant (F). Valencia: Játiva (F). Zaragoza: Sierra de Alcubierre (F).

Portugal.—Estremadura: Buçaco (W).

92. *Plagiolepis barbara* Santschi.

Alicante: Alicante (C). Ciudad Real *: Santa Cruz de los Cáñamos (F). Córdoba *: Sierra de Córdoba (F). Granada *: Sierra Nevada (F). Madrid *: Aranjuez, El Escorial, Sierra de Guadarrama, To-

rrrelodones (F). Mallorca*: Palma (B). Murcia*: Sierra de Carras-
coy (F). Oviedo: Segredal en Siero (F). Sevilla*: Carmona, Sevilla
(F). Zaragoza*: Jaulín (F).

The ants of this genus are very abundant and it is probable that more than one species has been included under *P. pygmaea*. *P. barbara* distinguished by its longer antennal segments, probably has a smaller range restricted to South West Europe and North Africa. It is interesting that both species occur in Mallorca.

93. *Lasius niger* (L.).

Almería*: Chirivel (F). Cádiz: Algeciras (F). Castellón*: Mor-
rella, Vinaroz (F). Cuenca: Cañete (Y). Gerona: Cadaqués (F), Gero-
na (C), Olot (F). Granada: Baza (C), Sierra Nevada (F). Guipúzcoa:
Irún (F). Huesca: Jaca (C), Torla (Y). Ibiza: San Miguel, Sierra
Grossa (F). Jaén*: Mengíbar (C), Sierra de Cazorla (F). La Coru-
ña: Outes, San Saturnino (F). León*: Piedrafitá, Sierra de la Ca-
brera (F). Lérida: Seo de Urgel (F). Lugo*: Guitiriz, Sierra de An-
cares (F). Madrid: Aranjuez (C), Madrid (F). Málaga: Fuengirola
(L). Mallorca: Coll de Sóller, Palma (F). Menorca: Mahón, Tirant-
nou (F). Murcia: Sierra de Espuña (F). Navarra: Pamplona (Y).
Orense*: Los Peares (F). Pontevedra: Bayona, Isla Cies del Norte,
Isla Cies del Sur. Isla de Ons, Mondariz, Montes del Testeiro, Mora-
ña, Playa de La Lanzada, Pontevedra (F). Santander*: Laredo, Pon-
tones (F). Segovia: La Granja (F). Tarragona: Sierra de Montsant
(F). Teruel*: Sierra de Cucalón (F). Vizcaya: Ondárroa (Y). Za-
ragoza: Jaulín (P).

Andorra (Y).

Portugal.—Algarve: Monchique (Y). Beira Alta: Sierra da Es-
trela (F). Estremadura: Buçaco (W).

94. *Lasius emarginatus* (Ol.).

Gerona: Olot (F). Huesca: Castiello de Jaca (C). La Coruña*:
Santiago (F). Madrid*: El Escorial (M). Santander: Beranga* (F).

There are many records in Ceballos' list for *L. emarginatus* yet Wilson (1955) did not include Spain in its geographical range for lack of reliable records. According to the present collection, the species is remarkably uncommon in Spain compared with parts of France. It is interesting also that many of the Spanish series of *L. niger* include bicoloured workers that are difficult to distinguish from *emarginatus*

without careful examination and Yarrow (1967) records similarly coloured workers in the Azores. In South Europe *L. emarginatus* often occurs in the neighbourhood of streams or in damp shade and it is probably less tolerant of aridity than *L. niger*. Indeed, to judge by the present survey, *L. niger* is probably the commonest ant in Spain, although in normal collecting one tends to overlook it in favour of more exotic species.

95. *Lasius alienus* (Foerster).

Cádiz *: Algeciras (F). Castellón *: Vallibona, Vinaroz (F). Guipúzcoa: Irún (F). Huesca: Canfranc (C); Puerto del Portalet (F). León *: Sierra de la Cabrera (F). Madrid: El Pardo, Torrelodones, Valdemoro (F). Málaga: Estepona (F). Murcia *: Murcia (F). Oviedo *: Picos de Europa (F). Pontevedra *: Isla Cies del Sur (F). Santander *: Mogro (F). Tarragona *: Sierra de Montsant (F). Teruel *: Sierra de Albarracín (F).

Portugal.—Baixo Alentejo: Ferreiro do Alentejo (F). Estremadura: Fátima (F).

This also is much less abundant in Spain than *L. niger*. It was common on mountain pasture above Canfranc and similar places in the French Pyrenees. Bernard (1956) refers to a large reddish race in Mallorca but there are no such examples in the present collections.

96. *Lasius brunneus* (Latreille).

Huesca *: Castiello de Jaca (C). La Coruña *: Cerneda, Tambre (F). León *: Sierra de la Cabrera (F). Logroño *: Monasterio de Valvanera en Anguiano (Y). Lugo *: Sierra de Ancares (F). Navarra *: Alsasua, Orbaiceta (F). Orense *: Verín (F). Oviedo *: Bosqués de Muniellos (F). Santander *: Espinama, Villafufre (F). Teruel *: Camarillas (F).

This is well distributed in North and Central Spain. Its habitat is normally restricted to trees, as at Castiello de Jaca for example where I found it colonising poplar trees.

97. *Lasius (Dendrolasius) fuliginosus* (Latreille).

Burgos *: Puerto de Carrales (F). Huesca *: Castiello de Jaca (C). Madrid: Sierra de Guadarrama (F).

98. *Lasius* (*Chthonolasius*) *umbratus* (Nyl.).

Huesca: Canfranc (C), Los Arañones, Jaca, Torla (Y). Lugo*: Valle de Lózara (F). Oviedo*: Cabo Vidio, Oviedo (F). Santander*: Alto de los Tornos (F). Soria*: Sierra Cebollera (F).

99. *Lasius* (*Chthonolasius*) *rabaudi* Bondroit.

Huesca*: Castiello de Jaca, Jaca (C, Y). Madrid*: Sierra de Guadarrama (F). Pontevedra*: Isla de Ons (F).

100. *Lasius* (*Chthonolasius*) *mixtus* (Nyl.).

Lugo*: Guitiriz, Sierra de Ancares (F). Madrid*: Sierra de Guadarrama (F). Santander: Jesús del Monte, Monte de Candina en Castro Urdiales (F). Zaragoza*: Sierra de Alcubierre (F).

101. *Lasius* (*Chthonolasius*) *affinis* (Schenck).

Huesca*: Castiello de Jaca (C), Torla (Y). Pontevedra*: Mondariz, Pontevedra (F).

Wilson (1955) synonymised both *L. mixtus* and *L. affinis* as trivial variants of *L. umbratus*. However, evidence has now accumulated to show that both should be regarded as independent species (Collingwood, 1963). *L. affinis* is characterised by its large average size, high indented petiole scale, flattened scape, long body hairs and absence of standing tibia or scape hairs. It is similar to *L. bicornis* in the worker caste but easy to distinguish by the more angular emargination of the scale and the more abundant and evenly distributed hairs on the gaster as Schenck (1852) indicated in his original description. The species typically nests in rotten wood and a fine series of alate queens, males and workers was obtained in such a situation in Huesca province by Yarrow. The Franz series consists of a few workers. This is a first record for Spain. The other species in this subgenus including the rare *L. carnolicus* have all been recorded from North Spain but do not appear to be at all common.

102. *Lasius* (*Cautolasius*) *flavus* (Fab.).

Ávila*: Puerto de Menga (F). Cáceres*: Perales del Puerto (F). Granada*: Monachil (F), Sierra Nevada (C). Guipúzcoa: Irún (F). Huesca*: Canfranc, Jaca (C). La Coruña: Malpica, Santiago (F). León*: Puerto del Palo, Sierra de la Cabrera (F). Logroño*: Monasterio de Valvañera en Anguiano (F). Lugo*: Sierra de Ancares,

Valle de Lózara (F). Madrid *: Barajas (M), Navacerrada, Sierra de Guadarrama (C), (Y), Torreldones (F). Málaga *: Málaga (F). Oviedo: Avilés, Oviedo, Río Narcea (F). Pontevedra *: Islas Cíes del Norte, Isla Cíes del Sur, Lamosa, Montes del Testeiro (F). Santander *: Beranga, La Fuente, Mogro, Puerto del Escudo, Saja (F). Segovia *: Marugán (Y). Teruel *: Sierra de Albarracín (F). Zaragoza: Botorrita, Sierra de Alcubierre (F).

Portugal.—Beira Alta: Penhas Dorhadas (F). Minho: Serra do Gerez (F).

103. *Camponotus herculeanus* (L.).

Huesca: Ordesa (F).

This species is uncommon in the Pyrénées as compared with the Alps. It was also taken on Mt. Canigou in the Pyrénées Orientales (C, F).

104. *Camponotus ligniperdus* (Latr.).

Gerona: Cassá de la Selva (F). Huesca: Bujaruelo (F), Canfranc (C), Ordesa, Torla (Y). Navarra *: Burguete (F).

Andorra (Y).

This is common in suitable localities throughout the Pyrénées. Ceballos also gives an old record for Madrid province.

105. *Camponotus vagus* (Scop).

Albacete: Alborea (F). Castellón *: Jérica (G). Huesca *: Jaca (Y). Pontevedra *: Ría de Vigo (F).

Portugal.—Minho *: Serra de Gerez (Y).

106. *Camponotus fallax* (Nyl.).

Huesca *: Jaca (Y). Madrid: Puerto de Navacerrada (C).

Individual workers were taken on trees in Huesca province. Ceballos records this as *C. caryae* Fitch from Gerona and Madrid. A specimen from Portugal was also identified in the Stockholm Museum, taken by O. Lundblad but without exact locality.

107. *Camponotus (Myrmosericus) cruentatus* (Latreille).

Ávila *: Sierra de Gredos (Y). Barcelona: San Feliú (B). Cáceres *: Perales del Puerto (F). Cádiz: Vejer de la Frontera (Y). Cuenca *: Alarcón (M). Las Torcas en la Ciudad Encantada, Motilla (Y). Gero-

na *: Cassá de la Selva, Collsuspina (F); La Junquera (Y). Huesca *: Arguis, Torla (Y). Madrid: El Pardo (F), Sierra de Guadarrama (Y), Torrelodones (F). Málaga: Ronda (Y). Pontevedra *: Bayona, La Guardia, Ría de Vigo (F). Santander *: Potes (F). Segovia: Marugán (Y). Tarragona: Montblanch (F). Teruel *: Albarracín (Y). Zamora *: Zamora (Y).

Portugal.—Estremadura: Buçaco (W).

108. *Camponotus (Myrmosericus) micans* (Nyl.).

Huelva: Gibraleón (Y). Madrid: El Pardo (F), Montarco (M). Málaga: Ronda (Y). Sevilla: Los Palacios (Y).

Portugal.—Alto Alemtejo: Elvas (Y). Baixo Alemtejo: Beja (Y). Palma: Setubal (L).

This is widely distributed in South Spain. It is evidently listed by Ceballos as *C. rufoglaucus* Jerdon.

109. *Camponotus (Tanaemyrmex) aethiops* (Latreille).

Barcelona: San Feliú (B). Gerona: Collsuspina, Gerona (F). Huesca *: Jaca (C), Torla (Y). La Coruña: Corrubedo (F). Logroño: Monasterio de Valvanera en Anguiano (F). Lugo *: Sierra de Ancares (F). Madrid: El Escorial (G), Sierra de Guadarrama (F). Murcia *: Puerto Lumbreras (Y). Navarra *: Roncal (Y). Oviedo *: Puente de los Fierros (F). Pontevedra *: Isla Cies del Norte, Isla Cies del Sur, Isla de Ons, Pontevedra, Ría de Vigo (F). Santander *: Santoña (F). Soria *: Cabrejas del Pinar (Y). Tarragona *: Sierra de Montsant (F). Teruel *: Aliaga (F). Zaragoza: Embalse de Yesa (F).

110. *Camponotus (Tanaemyrmex) marginata* (Latr.).

Madrid *: El Escorial (M).

111. *Camponotus (Tanaemyrmex) pilicornis* (Roger).

Barcelona: San Feliú (B). León *: Sierra de la Cabrera (F). Madrid: Sierra de Guadarrama (F) (A) (C). Pontevedra *: La Guardia (F). Segovia *: Marugán (Y). Tarragona: Sierra de Montsant (F). Zaragoza: Sierra de Alcubierre (F).

Portugal.—Douro: Villa Nova de Gaia (W). Estremadura: Buçaco (W).

This species was also recorded by Roger (1863) from the Balearic Islands but this old record was not listed by Bernard (1956).

112. *Camponotus (Tanaemyrmex) massiliensis* Forel.

Gerona: Cassá de la Selva (F). Murcia: Sierra de Espuña (F).

113. *Camponotus (Tanaemyrmex) sylvaticus* (Ol.).

Albacete *: Alpera (F). Alicante *: Altea (F), Benidorm (Y). Almería: Sierra Alhamilla (F). Barcelona: Montesquiú (Y). Gerona: Cadagüés (F). Granada *: Sierra Nevada (Y). Huesca *: Ordesa (F). Murcia: Sierra de Carrascos, Sierra de Espuña (F). Pontevedra *: Bayona, La Guardia, Ría de Vigo, Sierra de Porriño (F). Sevilla: Sevilla (Y). Valencia: Jaraco, Saler (G). Zaragoza *: Lecínena, Sierra de Alcubierre, Zuera (F).

Portugal.—Alto Alentejo: Elvora (Y). Estremadura: Arrabida (W).

114. *Camponotus (Tanaemyrmex) catalana* Emery.

Portugal.—Alto Alentejo *: Arrabida (W).

This species resembles *C. sylvaticus* but has the microsculpture denser rendering the body matt. The hind tibial bristles are also stouter; although described by Emery as a variety of *C. sylvaticus*, it appears to be a good species. This form is listed by Ceballos from several provinces in S. Spain and is recorded by Schmitz from Portugal.

115. *Camponotus (Tanaemyrmex) barbaricus* Emery.

Cádiz: Guadiaro (S). Málaga *: Fuengirola (S).

The form of *C. barbaricus* occurring in Spain is referred to the variety *baetica* Emery said to be smaller and more slender than the typical species from North Africa but no structural differences are suggested that would support a taxonomic distinction.

The species in this subgenus in Europe are all ground dwellers. Despite their robust form they are fugitive and non-aggressive, disappearing below ground quickly when a nest is disturbed.

116. *Camponotus foreli* Emery.

Cádiz: Guadiaro (S). Madrid: Vaciamadrid (F). Málaga: Marbella (F). Zaragoza *: Jualín (F).

This species is widely distributed in Spain and also occurs locally in France. It combines characteristics of both the subgenera *Tanaemyr-*

mex and *Myrmentoma* having a deep meso-epinotal furrow but smoothly rounded epinotum and projecting clypeus.

117. *Camponotus (Myrmentoma) sicheli* Mayr.

Almería *: Adra (F). Mallorca: Palma (B).

The example taken by Brown at Palma is clear red as in the colour form described as *rufa* Karawiev. The other specimens are considerably darker.

118. *Camponotus (Myrmentoma) lateralis* (Ol.).

Cádiz *: Algeciras (F). Córdoba *: Sierra de Córdoba (F). Granada *: Pinos Genil (C). Huesca *: Castiello de Jaca (C). Ibiza: Ibiza (F). León *: Cármenes. Madrid: Sierra de Guadarrama (F). Mallorca: Felanitx (F). Menorca: Tirantnou, Mahón (F). Pontevedra *: Río Umia (F). Sevilla: Sierra Morena (F). Tarragona: Sierra de Montsant (F).

Portugal.—Alto Alemtejo: Castelo de Vide (F). Minho: Serra do Gerez (Y).

119. *Camponotus (Myrmentoma) figaro* Emery.

Portugal.—Estremadura *: Buçaco (W).

This has the worker pronotum more or less testaceous or reddish. It resembles *C. dalmaticus* Nyl. of south east Europe but has hairs on the antennal scape as in *C. lateralis* which are absent in *C. dalmaticus*.

120. *Camponotus (Myrmentoma) merula* Losana.

Alicante: Jijona (G). Cádiz: Guadiaro (S). Cuenca: Cañete (Y). Gerona *: Cadaqués, Cassá de la Selva, Olot (F). Granada: Pinos Genil (C). Huesca *: Arguis, Biescas, Torla (Y). León *: Cármenes (Y). Mallorca *: Palma (F). Murcia: Sierra de Espuña (F). Pontevedra *: Isla Cies del Sur, Isla de Ons (F). Santander *: Santoña (F). Zaragoza *: Embalse de Yesa (F), La Almunia (G).

Portugal.—Estremadura *: Buçaco (W). Minho *: Ameria (Y).

This is a first record for the Balearic Islands and for Portugal. Ceballos appears to have listed this species as *C. picco-foveolata* but we have followed Bernard (1958) in using the name *C. merula* for the black shining species with angled epinotum.

121. *Camponotus (Colobopsis) truncatus* (Spin.).

Gerona: Lloret del Mar (G). Huesca*: Ansó (Y). Málaga: Ronda (Y). Valencia*: Bétera (PT). Zaragoza*: Aula Dei (PT).

This rather unobtrusive tree inhabitant does not appear in Ceballos' list and has probably been overlooked.

122. *Cataglyphis albicans* (Roger).

Alicante*: Alicante (C). Gerona*: Lloret de Mar (L). Granada*: Puebla de Don Fadrique (Y). Huesca*: Jaca (Y). Valencia*: Valencia (Y).

123. *Cataglyphis iberica* Emery.

Cuenca*: Las Torcas en la Ciudad Encantada, Reillo (Y). Madrid: Aranjuez (C), El Escorial (F), Torreloredones (C). Pontevedra*: Playa de la Lanzada (F). Segovia*: La Granja (Y). Zaragoza*: Aula Dei (PT).

Portugal.—Estremadura: Lisboa (W). Minho: Braga (W), Serra do Gerez (Y). Tras os Montes: Aligo (W).

124. *Cataglyphis rosenhauri* Emery.

Madrid*: Aranjuez (F), Meco (M).

125. *Cataglyphis viaticoides* (André).

Granada*: Granada (M). Jaén*: Menjíbar (C). Málaga: Ronda (Y).

Santschi (1929) provided a good working key in this revision of *Cataglyphis*. The distinguishing characters are rather slight but appear to be consistent as far as the present examples are concerned and the above are treated as good species although they have usually been listed as subspecies or varieties of *C. albicans*.

126. *Cataglyphis (Monocampus) viaticus* (Fab.).

Badajoz: Mérida (G). Cádiz: Guadialo (L). Córdoba (A). Granada: Baza (L), Huétor-Santillán (G), Monachil (F), Pinos Genil (C). Jaén: Menjíbar (C). Sevilla: Carmona (F).

The examples from Carmona, Cádiz and Menjíbar are clear bright red and correspond to the variety "*velox*" Santschi.

127. *Cataglyphis (Monacambus) hispanica* Forel.

Cáceres: Perales del Puerto (F). Ciudad Real: Almuradiel (G) (C). Jaén: Menjíbar (C), Jaén (A).

Portugal.—Beira Alta: Mangalde (Y), Serra da Estrela (F). Tras os Montes: Aligo (W).

This large species is akin to *C. viaticus* but quite distinct by the thicker petiole node, gula hairs and more profuse body hairs. The dark variety "*nigroides*" Santschi is the commoner form but probably a normal colour variation since both the reddish form (G) and the dark form (C) occurred at Almuradiel.

128. *Cataglyphis (Monocambus) cursor* (Fonscolombe).

Ciudad Real: Almuradiel (G). Gerona *: Cassá de la Selva (F), La Junquera (S). Murcia *: Alhama de Murcia (P). Santander: Puerto del Escudo (F).

This ant was also taken in several places in the Pyrénées Orientales. Like the other *Cataglyphis* species, this is a typical ground-nester, usually found by the side of sandy tracks or in bare soil. One colony, however, was found under a stone at Villefranche de Conflent.

129. *Proformica depilis* Santschi.

Murcia *: Murcia (OJ).

130. *Proformica nasuta* (Nyl.).

Huesca *: Jaca (C) (Y). Santander *: Puerto del Escudo (F).

131. *Proformica* sp.

Granada: Río Guarnon (F). Sierra Nevada-Albergue de la Universidad (F) (C).

These series of workers differ from the known European forms *P. nasuta*, *P. depilis* and *ferreri* Bond, in that the scapes and tibiae have abundant scattered long standing hairs; the head is finely but distinctly longitudinally striate and the clypeus has the front border slightly emarginate. The body hairs are more profuse and the alitrunk more sculptured than in *P. nasuta*. A full description will be given elsewhere. *P. depilis* is characterised by its shining integument and absence of dorsal hairs in the alitrunk.

132. *Proformica ferrerii* Bondroit.

Jaén: Menjíbar (C). Madrid: Aranjuez (C).

133. *Formica subrufa* Roger.

Alicante *: Benidorm (Y). Almería *: Gérgal (M). Ávila *: Sierra de Gredos (Y). Cádiz *: Guadiaro (S). Cuenca *: Motilla (Y). Gerona: Lloret de Mar (S) (C). Málaga *: Ronda (Y). Teruel *: Aliaga (F). Portugal.—Estremadura: Arrabida (W).

134. *Formica cinerea* Mayr.

Huesca: Canfranc (Y), Castiello de Jaca (C), Jaca, Los Arañones (Y). Guipúzcoa *: Irún (F).

Bernard (1952) suggested that the Central Pyrenean form of *F. cinerea* was a distinct species and has described it (Bernard, in press) under the name of *F. torrentium* Bernard. Dr. H. Kutter has kindly sent me an extract from the description. The worker is said to be less size-variable than in alpine *F. cinerea*, the queen has the mesonotum proportionately broader and the male has slight but distinct differences in the shape and colour of the genitalia. Among queens examined from Denmark, Sweden and Switzerland, the mesonotum is slightly broader than long and probably this character has little taxonomic value. *Formica fusca* and *F. lemni* queens vary considerably in body width especially in polygynous nests. *F. cinerea* is normally polygynous but may also occur in monogynous single colonies (Collingwood, 1961). Bernard's species must stand or fall on the constancy of the male characters. Those from Huesca are certainly *F. cinerea* according to his distinction and similar to Scandinavian specimens. The workers, the only caste represented from Spain, appear indistinguishable from series taken in Scandinavia and Labouheyre in the French Landes. The Castiello workers were taken from a typical many-cratered nest in lare soil at the base of popular trees.

135. *Formica decipiens* Bondroit.

Huesca: Sarvisé, Torla (Y). Lérida *: Seo de Urgel (F). Teruel *: Aliaga (F).

This also occurred abundantly in France in the lower valleys of the Pyrénées Orientales and specimens were obtained from Vernet les Bains, Amélie les Bains, Villefranche de Conflent and Latour de Carol (C). Yarrow also took the species at Laruns in the Basses Pyrénées. Staer-

cke in Schmitz (1955) notes its occurrence at Banyuls where the only recorded male was captured (but unfortunately not described). Its known distribution is very localised as apart from the places given above, it has only been recorded from Ciudad Real and Barcelona provinces in Spain. It is probable that *F. decipiens* has also been listed under such names as *fusco-rufibarbis*, *cinereo-rufibarbis* etc. It is rather like *F. lemani* in general appearance with the same colour and disposition of bristles on the thorax in both worker and queen but may be immediately distinguished by the silky pubescence which is specially thick on the gaster. The queens are more robust in form than those of *F. lemani* and four out of seven taken from one nest had from one to four irregularly disposed long gula hairs, thus linking the species to *F. cinerea*. This ant was found nesting in banks, walls and under stones. Colonies were populous and aggressive. Workers were seen freely attacking neighbouring *F. rufibarbis* and at Latour de Carol were surrounding and destroying a *Formica cordieri* queen.

136. *Formica lemani* Bondroit.

Gerona: Cadaqués. Granada*: Sierra Nevada (C). Huesca*: Canfranc (C), Ordesa, Puerto del Portalet en Sallent de Gállego (F). Navarra*: Puerto Ibañeta, Roncesvalles (F). Oviedo*: Peña Santa, Puerto de Pajares (F). Santander*: Corisco (F).

This species is common throughout the Pyrénées above 1500 m. in France. The only previous records for Spain are from Tarragona and Gerona provinces.

137. *Formica fusca* L.

Ávila*: Sierra de Gredos (F). Huesca: Canfranc, Ordesa (C, Y, F). Lugo*: Sierra de Ancares, Valle de Lózara (F). Madrid: Fuenfria (F), Puerto de Navacerrada (C), Sierra de Guadarrama (F). Oviedo: Puerto el Palo (F). Pontevedra*: Isla de Ons, Mondariz, Pontevedra (F). Segovia: La Granja (Y). Zaragoza: Embalse de Yesa (F).

Portugal.—Minho: Serra do Gerez (Y).

138. *Formica pyrenaea* Bondroit.

Huesca: Los Arañones (Y). León*: Molinaferreira (F). Madrid: El Escorial (F). Oviedo*: Nueva (F).

Portugal.—Beira Alta: Serra da Estrale (F).

This is closely similar to *F. cunicularia* but uniformly black with

only the thoracic sutures and base of the mandibles more or less brownish and the petiole scale less tapered in profile. In appearance it is like a finely pubescent *F. fusca* and is the least well defined of this species group.

139. *Formica cunicularia* Latreille.

Barcelona: Arenys del Mar (G), Montesquiu (Y), Ciudad Real*: Almuradiel (G), Cuenca*: Cañete (Y). Gerona: Cassá de la Selva (F). Granada: Baza, Sierra Nevada (C). Huesca: Castiello de Jaca (C), Canfranc (Y), Jaca (C), Los Arañones (Y). Madrid: Aranjuez (F), El Escorial (G), Sierra de Guadarrama (F). Murcia*: Murcia (A). Orense: Los Peares (F). Oviedo: Puerto el Palo (F). Palencia*: Aregios (Y). Pontevedra: Isla de Ons, Playa de la Lanzada (F). Santander*: La Fuente, Potes (F). Teruel: Sierra de Albarracín (F). Zaragoza: Epila (Y).

Portugal.—Beira Alta: Serra da Estrela (Y). Tras os Montes (W).

140. *Formica gerardi* Bondroit.

Ávila*: Sierra de Gredos (F). Gerona*: Cassá de la Selva (F). Granada: Sierra Nevada (F). Orense*: Barco de Valdeorras (F), Sobradelo (F). Santander*: Santoña (F). Zaragoza*: Sierra de Alcu-bierre (F).

Portugal.—Estremadura: Buçaco (W).

This species is described by Bondroit (1919) as brown-black, very matt with short grey pubescence; anterior of head, sutures, antennae and legs lighter and with sparse hairs on head, gaster and pronotum. It is in effect like a dark *F. rufibarbis*. The dorsal thoracic hairs in these examples are less concentrated on the pronotum than in *F. rufibarbis*, more scattered over the whole thorax, finer and fewer in number. The main structural difference between the two species is in the shape of the epinotum which is relatively lower and less massive in *F. gerardi*, having the ratio of length of dorsal surface to height as 8:10 instead of about 7:10. Bondroit (1918) further described another form from Portugal as *F. tombeuri* but his own description reads almost the same as for *F. gerardi* and it is difficult to see how he differentiated them. Schmitz (1953) lists *F. gerardi* but not *F. tombeuri* from Portugal and neither is given by Ceballos for Spain. The Franz collection includes a series of workers from Banyuls, the type locality.

141. *Formica rufibarbis* Fab.

Huesca: Castiello de Jaca, Canfranc, Jaca, Monte Perdido (C. F. Y). La Coruña *: Cayon (F). León *: Armada, Vegamián (M). Lérida *: Lérida (Y). Lugo *: Valle de Lózara (F). Madrid: Aranjuez, El Escorial (F). Navarra: Puerto Ibañeta (F). Oviedo: Puerto de Pajares (F). Santander *: Puerto de la Braquía (F). Teruel: Sierra de Albarracín (F). Zaragoza: Zaragoza (F).

Andorra (Y).

Portugal.—Minho: Serra do Gerez (Y). Tras os Montes: Chaves (Y).

142. *Formica gagates* L.

Barcelona: Vallirana (F). Castellón *: Begis (F). Huesca *: Jaca (C).

This species appears to be more or less confined to the Pyrenean foothills in Spain. It was found in several places in the Pyrénées Basses but does not seem to occur in the Pyrénées Orientales.

143. *Formica sanguinea* Latr.

Granada *: Sierra Nevada (Y). Huesca *: Canfranc (C). León *: Lillo (M), Puerto de Pajares (Y). Lérida *: Lérida (Y). Logroño: Lumberras (Y). Lugo *: Villalba (Y). Madrid *: Cercedilla, Navacerrada (M). Oviedo *: Cabo Vidio (F), Puerto de Tarna (Y). Teruel: Sierra de Albarracín (F).

Portugal.—Beira Alta: Serra da Estrela, Torre (Y). Minho: Serra do Gerez (Y).

Examples of this species from Spain and the Pyrénées Orientales are characterised by the vivid yellowish red colour of the head and thorax. Forel (1909) described such examples as the variety "*flavovirubra*" but they are not otherwise different from series from other parts of Europe.

144. *Formica exsecta* Nyl.

Huesca *: Canfranc (Y). León *: Boñar, Puerto de la Magdalena (Y). Logroño: Lumberras, Puerto de Piqueras (Y). Lugo *: Sierra de Ancares (F). Madrid *: Sierra de Guadarrama (F) (C). Santander *: La Fuente (Y). Zaragoza *: Sierra de Moncayo (F).

This species is also recorded from Teruel. Bondroit (1918) described series taken in the Pyrenees as a distinct species *F. dalcqui*.

However, Kutter (1957) examined his types and concluded that they were not separable from *F. exsecta*. The Spanish examples and also series taken above Urdos in the Pyrenees Basses are not structurally different from examples from England but the Scandinavian populations appear to become progressively more hairy to the north, probably exhibiting a south-west north-east clinal trend. Some Spanish *F. exsecta* found by Yarrow were nesting among pine others in more open places; those taken above Urdos were found nesting in a grassy roadside bank opposite a dense beech wood.

145. *Formica rufa* L.

Burgos *: Puerto de Carrales (F). Huesca *: Bujaruelo (F), Jaca-Ordesa road (Y), Parque Nacional de Ordesa (F, Y), Sallent de Gállego (P T), Torla (Y), Valle de Oza (P T). León *: Piedrafita (Y), Sierra de Son (F). Lérida *: Las Bordas, South end of Viella tunnel, Valle de Arán (Y). Logroño: Monasterio de Valvanera en Anguiano (F). Lugo *: Sierra de Ancares (F). Madrid: Sierra de Guadarrama (Y), Valle de la Fuenfría (F). Navarra *: Orbaiceta (F). Oviedo *: Monte Montero (F), Pola de Siero, Puerto de Leitariegos (Y). Palencia *: Puerto de Piedras Luengas (Y). Santander: Enterriás, Espinama, Picos de Europa (Y). Segovia: La Granja de San Ildefonso, road from La Granja to Puerto de Navacerrada (Y), Sierra de Guadarrama (F). Soria *: Covalada, Herreros, Navaleno (Y). Zaragoza *: Sierra de Moncayo (F).

Portugal.—Minho *: Above Caldas beneath larch trees, Serra do Gerez (Y).

Formica rufa is essentially a woodland species and unlike *F. nigricans* and *F. cordieri* it is never found far from trees. Its distribution is therefore somewhat in the hands of man, and forest clearance quickly exterminates it. Reafforestation does not guarantee its return, or not for very many years and one might guess that its distribution in Spain was once much wider than it is today. Biologically there are two kinds of *F. rufa*, or so it seems, though they cannot be separated on structural characteristics. One kind occupies a single nest, often for very many years, has one or only a few queens and does not produce daughter nests, at any rate not within its own foraging area. The second kind behaves quite differently and has many, not infrequently hundreds of queens in its nests; daughter nests are produced apparently with the greatest of ease and are tolerated even within a few feet of each

other. In Spain most *rufa* colonies consists of several or many nests and belong to the second kind mentioned above but occasionally one does find isolated nests which perhaps belong to the other kind or may be the beginning or the end of a group of nests. In spring and early summer one can discover with very little disturbance if a nest contains many laying females but to satisfy oneself that a nest contains a single female, or only a few females is a very different matter and the excavation required may do considerable damage. Another species which produces many daughter nests is *F. polycytena* Foerst., but this has been found in Spain only in one area in Lérida Province (Ceballos & Ronchetti, 1966) though it is recorded in France from the central Pyrénées (Kneitz and Emmert, 1962) and from the eastern Pyrénées (Ovazza, 1950). Many individuals of Spanish *F. rufa* show extensive red markings on the head, ranging from a patch enclosing the ocelli to an almost entirely red frons and vertex. The thorax also is often entirely red without any trace of the usual dusky blotch but this condition is not uncommon in other parts of Europe (Yarrow, 1955). The species is rather easily recognised by the absence of long fringing hairs round the back of the head and by the almost hairless outer edge of the hind tibiae. On the French side of the Pyrénées, *F. rufa* and the species *F. nigricans* and *F. cordieri* extend, in suitable situations from the Atlantic to the Mediterranean.

146, 147. ***Formica nigricans* Emery and *F. cordieri* Bondroit.**

No satisfactory method has yet been discovered for separating the workers of these two species, if indeed they are distinct species, and since most records are based on workers one can do no more than list the distribution of the two together. However, a number of queens have been examined and as these are very easily distinguished it is possible to give a second distribution list. This indicates that the two species are equally spread over the northern half of Spain.

1. Distribution based on workers:

Ávila *: Barco (Y). Barcelona: Montesquiu (Y). Burgos *: Hontoria de Pinar, Mambrillas de Lara, Puerto del Escudo, Soncillo, Villorobe, 10 km. south of Burgos (Y). Gerona: San Juan de las Abadesas (Y). Huesca: Ansó, Biescas (Y), Canfranc (C, Y), Castiello de Jaca (C), Jaca (C, Y), Ordesa, Sallent (Y), Puerto de Arguis (P T), Torla, Yésero (Y). La Coruña: Carballo (Y). León *: Cármenes, Boñar (Y), Molinaferreira (F), Portilla de la Reina, Puerto de la Magdalena,

Puerto de San Glorio, Puerto de Somiedo (Y), Sierra del Telcno (F). Lérida: South end of Viella tunnel (Y). Logroño: Lumbreras, Monasterio de Valvanera en Aguiano, Puerto de Piqueras, road to Monasterio de Valvanera, Sierra Cebollera (Y), Sierra de la Demanda (F, Y). Lugo *: Baamonde, Corgo, Guitiriz, Mondoñedo, Ribadeo, West of Guitiriz (Y). Madrid: Cercedilla (P T), El Escorial (F), Sierra de Guadarrama (Y). Navarra *: Burguí, Roncal (Y). Oviedo *: Avilés, Cadavedo, Covadonga, Navia, Pola de Siero (Y). Palencia *: Puerto de Piedras Luengas (Y). Pontevedra *: near Pontevedra (Y). Santander: Enterrías, Espinama, La Fuente (Y), Peña Vieja (F), Picos de Europa (Y). Segovia *: La Granja de San Ildefonso (P T, Y), road from La Granja to Puerto de Navacerrada (Y). Soria *: Abéjar, Cidones, Herreros, Navaleno, Pineda de Almazán (Y). Teruel: between Teruel and Caspe, Gea de Albarracín, Sierra Alta (Y). Vizcaya *: Munguía, Ondárroa (Y). Zaragoza *: Río Riquel, Sierra de Moncayo (F).

Andorra: Canillo (Y).

2. Distribution based on females:

F. nigricans.

Burgos *: Puerto del Escudo (Y). Huesca: Jaca (C, Y). León *: Lillo (M), Puerto de Pajares (Y). Lugo *: Baamonde (Y). Madrid: Cercedilla (M). Orense *: Alto de Rodicio (Y). Oviedo *: Pola de Siero (Y).

F. cordieri.

Huesca: Castiello de Jaca (C), Jaca (C, F), Sierra de Moncayo (F). Oviedo *: Pola de Siero (Y). Segovia *: La Granja (BM). Zaragoza *: Sierra de Moncayo (F).

Formerly known as *F. pratensis* or *rufa* var. *pratensis* these species favour much more open country than does *F. rufa* and may be found in fields, road-side banks, bare cliff edges and similar treeless places though they may be found in scrub woodland also. At La Granja the nests may be found in open places in the forest. In the nests the queens are few in number, a fact which considerably complicates species recognition. The workers are very much darker and much more hairy than other Spanish *rufa*-group ants and have a fringe of long hairs around the back of the head. It is possible that workers of *cordieri* are

darker and even more hairy than those of *nigricans* (Betrem, 1960, Gösswald et al., 1961) and the queens of *cordieri* are at once recognized by having very long outstanding hairs (not bristles) here and there on the antennal scapes, thorax, legs and scale. In open country the nests are often thatched with much finer material than is used by the woodland and forest nesting species.

Kutter (1964) has suggested and Betrem (1965) has formally proposed that the old name *pratensis* Retzius be restored for the species *nigricans* as used in this paper and that *nigricans* Emery should be the correct name for *cordieri* Bondroit.

148. *Formica lugubris* Zetterstedt.

Gerona: Collada de Tosas, c. 1800 m. (Y).

Andorra.—Serrat, c. 2000 m. (Y).

This is a boreo-alpine species which with *F. aquilonia* Yarrow replaces *F. rufa* in the higher levels of most European mountain ranges. It is known from several localities on the French side of the Pyrenees (Urdos in the Basses Pyrénées (C), several places in the Cautarets-Gavarnie region of the Hautes Pyrénées (Kneitz and Emmert, 1962) Font-Romeu and Hospitalet (C) and Canigou (F) in the Pyrenees Orientales. Ceballos & Ronchetti (1966) record it from Lérida and Gerona Provinces. One might expect to find it high up in the Parque Nacional de Ordesa but in several visits there I have failed to discover it. *F. aquilonia* is not known from the Pyrenees. The workers of *lugubris* are hairy like *nigricans* and *cordieri* and have the thorax darkened but brownish, not jet black like those species and the dark patch grades into the red instead of being abruptly differentiated. The queens have both thorax and gaster very shining and the back of the head and scale have abundant long hairs. Without a microscope *lugubris* is not very easily distinguished from *nigricans* and *cordieri*. The nests have many queens and daughter nests are tolerated in close proximity, factors which make this species an excellent erradicator of forest pests.

149. *Formica dusmeti* Emery.

León*: Molinaferreira, Sierra del Teleno (F). Logroño*: Sierra Cebollera (Y). Madrid: Puerto de Navacerrada (C, Y), Sierra de Guadarrama (Y). Orense*: near Orense (F). Segovia: above P. de Navacerrada, road from La Granja to Puerto de Navacerrada (Y).

Sierra de Guadarrama, Valle de Fuenfria (F). Soria *: Casarejos, Pineda de Almazán (Y). Teruel *: Geo de Albarracín, Tramacastilla (Y). Zaragoza *: Sierra de Alcubierre (F).

Portugal.—Beira Litoral: Juguerias (Santschi, 1932 a), Soure. Douro Litoral: Leca (BM), Santo Tirso (Schmitz, 1950). Minho *: Oporto (OJ). Ribatejo: Santarem (Santschi, 1932 a).

F. dusmeti is the Iberian counterpart of the Eurasian *F. truncorum* and it is rather a matter of opinion whether one considers it a subspecies of the latter or a full species in its own right. It is found only south of the Pyrenees and records from Norway (Forel, 1911, Wheeler, 1913) and from Russia (Lomnicki, 1925) are based on misidentifications. The nearest *truncorum* records are from the Alps. *F. dusmeti* is very much less hairy than *truncorum*, indeed, the antennal scapes, the eyes and the legs are almost bare whereas in *truncorum* these parts are very noticeably hairy. There are conspicuous differences in the punctuation too, especially in the queens. Furthermore, *dusmeti* nests contain very many laying queens thus contrasting, strongly with *truncorum* nests which usually have few. *F. dusmeti* is easily distinguishable from all other Iberian wood-ants by the shape of the clypeus (though this can be seen only under a microscope), by the almost entirely red head and thorax of the worker and by the brownish-red head, thorax, and base of the abdomen of the queen. Only the very smallest workers are at all darkened on head and thorax. The males are distinct from other *rufa*-group ants by their yellow legs and genitalia. Nesting sites are very variable and they may be in tree stumps, beneath rocks, large stones or among heather or dwarf juniper bushes. The dome of twigs may be *rufa*-like, more or less covering the underground nest or may be at the side or a rock or stump or it may be built up among the stems and lower branches of shrubby plants. It is interesting that *dusmeti* was until now the only one of this group of ants recorded from Portugal and that it has never yet been found in the Pyrenees. Records of this species from the Costa Brava region (Goetsch, 1942) are open to considerable doubt because although this author collected in many parts of Spain he never mentioned "*pratensis*" from anywhere and one cannot but suspect that some at least of his *dusmeti* records must refer to this common species. Some older records of both *dusmeti* and *pratensis* noted in Ceballos (1956) from the southern half of Spain (Ciudad Real, Granada, Málaga, Cádiz) have not been confirmed by the fairly extensive explorations made in recent years by Dr. Franz

and myself. The supposed record from Córdoba attributed to Emery in Ceballos (1956) seems to be without foundation.

150. *Polyergus rufescens* (Latreille).

Santander *: Espinama, Potes (F). Soria *: Covaleda (Y).

This slave making species is evidently very local in Spain where the only previous record is from Oviedo province. Bernard (1946) refers to it without data in the Pyrenees Centrales, and Ovazza (1950) records it from the Pyrénées Orientales where it was also found at Vernet les Bains (C). Here a queen was present in the midst of a large populous colony of *Formica gerardi* under a flat stone.

SUMMARY.

The taxonomy, habits and ranges of 150 species of *Formicidae* taken in the Iberian Peninsula and Balearics are discussed. Over 600 new provincial records are given. These include 6 first records for Andorra, 11 for Portugal, 19 for Spain and 8 for the Balearics. The *Formica rufa* group species are given special treatment because of the growing importance of these ants in the control of forest pest. A list of first records for these countries is given below.

ANDORRA.

Myrmica ruginodis Nyl.
Lasius niger (L.).
Camponotus ligniperdus (Latr.).
Formica rufibarbis Fab.
Formica nigricans Em. and/or
F. cordieri Bondr.
Formica lugubris Zett.

PORTUGAL.

Ponera coarctata (Latr.).
Messor labicornis Forel.
Messor maroccana Emery.
Goniomma tunetica Forel.
Leptothorax corticalis (Schenk).
Leptothorax racovitzae Bond.

Tetramorium hispanica Em.
Camponotus fallax (Nyl.).
Camponotus figaro Emery.
Formica sanguinea Latr.
Formica rufa L.

SPAIN.

Myrmica specioides Bondroit.
Myrmica schencki Em.
Aphaenogaster subterraneoides Em
Messor lobicornis Forel.
Gonomyia blanci (André).
Solenopsis monticola Bernard.
Solenopsis nicacensis Bernard.
Myrmecina graminicola Latr.
Leptothorax rabaudi Bondroit.
Leptothorax tristis Forel.
Leptothorax berlandi Bondroit.
Leptothorax massiliensis Bondroit.
Epimyrma vandeli Sants.
Anergates atratulus (Schenck).
Strongylognathus testaceus
(Schenck).
Formicoxenus nitidulus Nyl.
Lasius affinis (Schenck).
Proformica sp.
Formica gerardi Bondroit.

BALEARICS.

Euponera ochracea (Mayr.).
Aphaenogaster subterranea (Latr.).
Crematogaster sordidula (Nyl.).
Leptothorax lichtensteini Bond.
Messor hispanica Em.
Myrmecina graminicola (Latr.).
Plagiolepis barbara Sants.
Camponotus merula Losana.

References.

- ANDRÉ, E.
1881. *Species des Hyménoptères d'Europe et d'Algérie. II. Les fourmis.* Beaune.
- BERNARD, F.
1946. Notes sur les Fourmis de France. II. Peuplement des montagnes méridionales. *Ann. Soc. ent. Fr.*, t. CXV, págs: 136:
1954. Fourmis moisseuses nouvelles ou peu connues des montagnes d'Algérie et revision des *Messor* de group *structor* Latr. *Bull. Soc. Hist. nat. Afr. N.*, t. LXXXV, págs. 354-65.
1956. Revision des Fourmis paléarctiques du genre *Cardiocondyla* Emery. *Bull. Soc. Hist. nat. Afr. N.*, t. LXXXVII, págs. 299-306.
1956. Revision des *Leptothorax* (Hyménoptères, Formicides) d'Europe occidentale. *Bull. Soc. zool. Fr.*, t. LXXXI, págs. 151-65.
1956. Remarques sur le peuplement des Balears en Fourmis. *Bull. Soc. Hist. nat. Afr. N.*, t. XLI, págs. 254-66.
1958. Résultats de la concurrence naturelle chez les Fourmis terricoles de France et de l'Afrique du Nord. *Bull. Soc. Hist. nat. Afr. N.*, tomo LXXXIX, págs. 300-56.
- BETREM, J. G.
1960. Ueber die Systematik der *Formica rufa*-Gruppe. *Tijdschr. Ent. Amsterdam*, t. CIII, págs. 51-81.
1965. Sulla sistematica di alcune specie del gruppo *Formica rufa*. *Collana Verde*, t. XVI, págs. 80-85.
- BONDROIT, J.
1918. Les Fourmis de France et de Belgique. *Ann. Soc. ent. Fr.*, t: LXXXVII, págs. 1-174.
1919. Les Fourmis de France et de Belgique. Supplement. *Ann. Soc. ent. Fr.*, t. LXXXVIII, págs. 299-305.
- BOVEN VAN, J. K. A.
1955. *Lasius (Chthonolasius) affinis* Schenck, Fauna Neerl. nov. spec. (Hymenoptera, Formicidae). *Natuurh. Maandbl. Maastricht*, t. XLIV, págs. 6-10.
1959. Koninklijke Nederlandse Natuurhistorische Vereeniging *Hymenoptera VI Aculeata, Formicidae*. *Wet. Meded. K. ned. natuurh. Vereen.*, t. XXX, págs. 1-32.
- CAGNIANT, H.
1961. Étude des fourmis récoltées par le Professeur H. Janetschek dans la Sierra Nevada. *Bull. Soc. Hist. nat. Afr. N.*, t. LII, págs: 104-116:
1962. Étude de quelques Fourmis Marocaines. *Bull. Soc. Hist. nat. Afr. N.*, t. LIII, págs. 83-118.

CEBALLOS, G.

1956. Catálogo de los Himenópteros de España. *Edit. Inst. esp. Ent. (Formicidae)*, págs. 295-321.

CEBALLOS, P.

1966. Estudio objetivo del Grupo *Formica rufa* en España. *Bol. Serv. Plagas Forestales*, año IX, págs. 171-175.

CEBALLOS, P., & RONCHETTI, G.

1966. Le Formiche del Gruppo *Formica rufa* sui pirenei orientali Spagnoli, nelle province di Lérida e Gerona. *Mem. Soc. ent. ital. Genova*, t. XLV, págs. 153-168.

COLLINGWOOD, C. A.

1956. Ant hunting in France. *Entomologist London*, t. LXXXIX, págs. 105-8.
 1960. The 3rd Danish Expedition to Central Asia. Zoological Results 27 *Formicidae* (Insecta) from Afghanistan. *Vidensk. Medd. naturh. Foren. Kjob.*, t. CXXIII, págs. 51-79.
 1961. Ants in Finland. *Ent. Rec. London*, t. LXXIII, págs. 190-5.
 1962. *Myrmica puerilis* Staercke, 1942 an ant new to Britain. *Entomologist's Mon. Mag. London*, t. XCVIII, págs. 18-20.
 1963. The *Lasius* (*Chthonolasius*) *umbratus* complex in North Europe. *Entomologist London*, t. XCVI, págs. 145-158.

EMERY, C.

1908. Beiträge zur Monographie der Formiciden des paläarktischen Faunengebietes (*Hymenoptera*). *Deuts. ent. Z.*, págs. 165-205, 305-338, 437-465, 549-558, 663-686, 695-712.
 1916. Fauna entomologica Italiana-*Formicidae*. *Boll. Soc. ent. ital. Genova*, t. XLVII, págs. 79-275.
 1924. Formiche di Spagna. *Boll. Lab. Zool. Portici*, t. XVII, pag. 164.
 1925. Revision des espèces paléarctiques du genre *Tapinoma*. *Rev. suisse Zool. Genève*, t. XXXII, págs. 45-64.

FOREL, A.

1909. Fourmis d'Espagne. *Annls. Soc. ent. Belg.*, t. LIII, págs. 103-6.
 1911. Sur le genre *Metapone* n. g., nouveau groupe des Formicides et sur quelques autres formes nouvelles. *Rev. suisse Zool. Genève*, t. XIX, págs. 445-459.

GOETSCH, W.

1942. Beiträge zur Biologie spanischer Ameisen. *Eos, Madrid*, t. XVIII, págs. 175-241.

GÖSSWALD, K., SCHMIDT, G., KLOFT, W., BAGGINI, A., PAVAN, M., RONCHETTI, G.

1961. Recherche morfologico-biometriche sulla differenziazione del "gruppo *Formica nigricans*" e sulla sua diffusione in Italia (*Hym. Formicidae*). *Collana Verde*, t. VII, págs. 12-27.
- KNEITZ, G., & EMMERT, W. A.
1962. Waldameisenfunde (*Formicidae*, Gen. *Formica*) im Franzoesischen Zentralmassiv und den Pyrenäen. *Waldhygiene*, t. IV, págs. 220-227.
- KUTTER, H.
1957. Zur Kenntnis schweizerischer *Coptoformica* Arten (*Hym. Form.*). *Mitt. Schweiz. ent. Ges.*, t. XXX, págs. 1-24.
1961. Der individuelle Insektenpass als taxonomische Platzkarte, ein Vorschlag. *Mitt. Schweiz. ent. Ges.*, t. XXXIII, págs. 238-44.
1964. *Formica nigricans* Em. (*cordieri* Bond.) bona species? *Mitt. Schweiz. ent. Ges.*, t. XXXVII, págs. 138-150.
- LOMNICKI, J.
1925. Uebersicht der polnischen Arten der Gattung *Formica* L. *Bull. ent. Pologne*, t. III (1924), págs. 151-182.
- OVAZZA, M.
1950. Contribution à la connaissance des fourmis des Pyrénées Orientales recoltées de J. Hanson. *Vie et Milieu*, t. I, págs. 93-4.
- ROGER, J.
1859. Beiträge zur Kenntnis der Ameisenfauna der Mittelmeerländer. *Berl. ent. Z.*, t. III, págs. 225-259.
1863. Verzeichniss der Formiciden-Gattungen und Arten. *Berl. ent. Z.*, tomo VII, págs. 1-65.
- RÖSZLER, P.
1936. Beiträge zur Kenntnis der Ameisenfauna der Mittelmeerländer. *Tijdschr. Ent. Amsterdam*, t. VII, págs. 9-57.
- SANTSCHI, F.
1919. Fourmis d'Espagne et des Canaries. *Bol. Soc. esp. Hist. nat.*, t. XIX, págs. 241-8.
1925. Fourmis d'Espagne et autres espèces paléarctiques, *Eos, Madrid*, tomo I, págs. 340-60.
1929. Révision des *Cataglyphis*. *Rev. suisse Zool. Genève*, t. XXXVI, págs. 25-70.
1930. Notes sur le genre *Myrmica* Latreille. *Rev. suisse Zool. Genève*, tomo XXXVIII, págs. 335-55.
1931. Fourmis du Bassin Méditerranéen Occidental et de Maroc recoltées par MM. Lindberg. *Comment. Biol. Soc. Sci. Fenn. Helsingfors*, t. III, págs. 1-13.
1932. Liste des fourmis d'Espagne recuillies par M. J. M. Dusmet. *Bol. Soc. ent. Esp.*, t. XV, págs. 69-74.

- 1932 a. Fourmis du Portugal. *Mem. Est. Mus. zool. Univ. Coimbra*, número LIX, págs. 1-3.
1933. Étude sur le genre *Aphaenogaster* Mayr. *Rev. suisse Zool. Genève*, t. XL, págs. 389-400.
- SCHENCK, C. F.
1852. Beschreibung nassauischer Ameisenarten. *Jahrb. nassau Ver. Naturk.*, t. VIII, págs. 3-149.
- SCHMITZ, H.
1955. Ein Verzeichnis portugiesischer Ameisen (*Formicidae*, *Hymenoptera*). *Broteria*, t. XXIV, págs. 27-37.
- STITZ, H.
1916. Ameisen aus den westlichen Mittelmeergebiet und von den Kanarischen Inseln. *Mitt. zool. Mus. Berlin*, t. VIII, págs. 335-353.
1939. *Formicidae*. *Die Tierwelt Deutschlands*. Jena, t. XXXVII, págs. 1-428.
- WHEELER, W. M.
1913. A Revision of the ants of the Genus *Formica* (Linné) Mayr. *Bull. Mus. Comp. Zool. Harvard*, t. LIII, págs. 379-565.
1936. Ants of the Balearic Islands. *Folia myrmecol. termitol. Berlin*, t. I, págs. 1-6.
- WILSON, E. O.
1955. A monographic revision of the ant genus *Lasius*. *Bull. Mus. Comp. Zool. Harvard*, t. CXIII, págs. 1-199.
- YARROW, I. H. H.
1954. British ants allied to *Formica fusca* L. (*Hym. Formicidae*). *Trans. Soc. Br. Ent.*, t. XI, págs. 229-244.
1965. The British ants allied to *Formica rufa* L. *Trans. Soc. Br. Ent.*, t. XII, págs. 1-48.
1967. On the *Formicidae* of the Azores. *Bol. Mus. munic. Funchal*, núm. XXI, art. 97, págs. 24-32.