AN ANALYTICAL KEY TO THE GENERA OF THE FAMILY FORMICIDÆ, FOR THE IDENTIFICATION OF THE WORKERS.

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(Translated by WILLIAM MORTON WHEELER.[1])

SINCE the publication by Mayr, in 1865, of the volume on the Formicidæ of the voyage of the *Novara*, no comprehensive work has appeared which could be of service in the identification of the genera of this family. The number of these genera has increased considerably in the mean time, and the definitions formerly given by Mayr for a number of them are no longer exact, as their characters have been modified by the discovery of new species. Moreover, certain genera have been subdivided, others fused together; and all of this is to be found scattered about in a host of detached publications, so that it is almost impossible for any one who is not a consummate specialist to find his way about in the labyrinth.

I originally began, for my own personal use, to construct analytical tables for the workers of the subfamilies Myrmicinæ and Ponerinæ; but I now believe that I would render a service to entomologists by publishing these tables, after having revised and completed them. I have added tables of the genera of the other subfamilies, together with a table of the characters of the subfamilies themselves, likewise in analytical form.

[1] For the present authorized translation Professor Emery has carefully revised the tables of the Myrmicinæ, Dolichoderinæ, and Camponotinæ, of his "Clef Analytique des Genres de la Famille des Formicides, pour la Determination des neutres" (*Ann. Soc. Entomol. Belgique*, tome xl (1896), pp. 172–189), and has, moreover, permitted me to translate the as yet unpublished German table for the Dorylinæ and Ponerinæ which he has been preparing for *Das Thierreich*. The work has thus been brought up to date and cannot fail to be of great service to myrmecologists the world over. — W. M. WHEELER.

I trust that these tables will facilitate the labor of identification and enable those who are beginning to study the exotic ants to find their way more easily. I am well aware of the fact that one may find one's self in doubt at certain bifurcations of the path. How is one to know, *e.g.*, whether the worker is dimorphic, when one has only a single specimen of the species? I have made no use of such characters except when I had nothing better to present, and then I have tried to reinforce them as much as possible with accessory characters. Sometimes I have cited characters peculiar to the males and females, as these are often the most important in distinguishing certain genera, the workers of which present only feeble or insignificant differences. Nevertheless, I decline to attempt for the present an analysis of the sexual forms, which are still too imperfectly known.

In the enumeration of the segments of the abdomen I include the one or two constituting the pedicel, so that the segment following this, and usually designated by other authors as the first abdominal, is for me the third in the Myrmicinæ, the second in the Camponotinæ, etc.; the last visible segment is, therefore, always the sixth in the females and workers, the seventh in the males. In the male I designate as "subgenital lamina" what is usually, but improperly, called the hypopygium and is in reality the ventral lamina of the eighth segment. For the anatomy of the gizzard and the poison apparatus I would refer the reader to the works of Forel, Dewitz, and myself.[1]

Having adopted the dichotomic form for the identification of the genera, it follows that the order cannot express their natural affinities; but this can lead to no inconvenience in a

[1] Forel, A. Études myrmécologiques en 1878. Anatomie du Gésier des Fourmis, *Bull. Soc. Vaudoise Sc. Nat.*, vol. xv (1878), pp. 339–362, Pl. XXIII; Der Giftapparat und die Analdruesen der Ameisen, *Zeitschr. f. wiss. Zool.*, Bd. xxx, Suppl. (1878), pp. 28–68, Taf. III–IV.

Dewitz, H. Ueber Bau und Entwickelung des Stachels der Ameisen, *Zeitschr. f. wiss. Zool.*, Bd. xxviii (1877), pp. 527–556, Taf. XXVI.

Emery, C. Ueber den sogenannten Kaumagen einiger Ameisen, *Zeitschr. f. wiss. Zool.*, Bd. xlvi (1888), pp. 378–412, Taf. XXVII–XXIX.

In the plates will be found figures of all the forms of the gizzard in the Dolichoderinæ.

work the aim of which is essentially practical. I have marked with an asterisk the names of the genera represented in the Palearctic fauna.[1]

CHARACTERS OF THE SUBFAMILIES.

I. Cloacal orifice in the shape of a slit; sting well developed or rudimental.

§ Sting developed, though sometimes very small, but capable nevertheless of being exserted from the abdomen. The first two segments of the abdomen usually modified, either forming together a two-jointed pedicel, or the first alone (petiole) forming the pedicel, the second (postpetiole) being merely constricted posteriorly and articulating with a spheroidal surface of the third segment, which is usually transversely striated (stridulatory organ); rarely the second segment is not appreciably modified.

† Nymphs usually enveloped in a cocoon; pedicel consisting of a single segment, more rarely of two, but in this case the frontal carinæ are very close to each other and do not cover the insertions of the antennæ (Dorylinæ) or the mandibles are linear and denticulate (Myrmecia).

a. Frontal carinæ very close to each other, almost vertical, not at all covering the antennal insertions (except Acanthostichus); abdominal pedicel of one or two segments. In the male the genitalia are completely retractile and the subgenital lamina is usually (perhaps always) furcate; cerci absent

1st subfamily, DORYLINÆ

b. Frontal carinæ separated or close together; in the latter case they are dilated anteriorly to form an oblique or horizontal lamina, covering in part the insertion of the antennæ; abdominal pedicel of a single segment (except Myrmecia); copulatory organs of the male incompletely retractile; subgenital lamina never furcate (except in Paraponera); cerci nearly always present . . 2d subfamily, PONERINÆ

†† Nymphs naked; pedicel of two segments; rarely the postpetiole is attached to the following segment over its whole extent. Frontal carinæ usually separated from each other. In the male the copulatory organs are almost always exserted (being entirely retractile only in certain genera of the group Solenopsidii); cerci nearly always present (except Anergates)

3d subfamily, MYRMICINÆ

[1] In addition, I have indicated by heavy type, in the translation, the names of all genera known to be represented in the ant fauna of the United States.—W. M. WHEELER.

§§ Sting rudimentary (except Aneuretus); abdominal pedicel consisting of a single segment; no constriction between the second and third segments of the abdomen; the poison glands are often rudimental and there are anal glands which secrete an aromatic product of characteristic odor (Tapinoma-odor). Nymphs without a cocoon
4th subfamily, DOLICHODERINÆ

II. Cloacal orifice round, terminal, surrounded by a fringe of hairs; sting transformed into a sustentacular apparatus for the orifice of the poison vesicle, which has a peculiar structure — called by Forel "pulviniferous vesicle" (*vessie à coussinet*). Abdominal pedicel consisting of a single segment; no constriction between the second and third segments. Nymphs rarely naked, most frequently enclosed in a cocoon. Male genitalia not retractile
5th subfamily, CAMPONOTINÆ

1st and 2d Subfamilies: DORYLINÆ *and* PONERINÆ.

1. Eyes large, three ocelli, mandibles slender, denticulate; postpetiole campanulate, narrower than the succeeding segment (Australian)
Myrmecia Fab.

Of a different conformation 2

2. Antennæ 6-jointed; first joint of hind tarsi dilated (African)
Melissotarsus Emery

Antennæ with more than six joints; tarsi simple 3

3. Postpetiole hardly wider than the petiole, and much narrower than the anterior border of the following segment, and on this account appearing as the second segment of the abdomen 4

Postpetiole of a different conformation 6

4. Antennæ 12-jointed (neotropical) . . . . . **Eciton** Latr.

Antennæ 9–10-jointed 5

5. Hind legs without spurs, funiculus not club-shaped (Asia, Africa, Australia) . . . . . Ænictus Shuckard

Hind legs with spurs; last antennal joint separated off as a club (Asia, Australia) . . . . . Cerapachys F. Smith
(Subgenera Oöceræa and Cysias)

6. Postpetiole shorter than the following segment and somewhat narrower, but not distinctly separated from the latter; mesoëpinotal suture obsolete, promesonotal suture distinct; pygidium 3-pointed; antennæ 7–12-jointed; no eyes (Asia, Africa) . . . . . Dorylus Fabr.

Postpetiole as in the preceding; mesoëpinotal suture distinct, promesonotal suture obsolete; antennæ 12-jointed (neotropical)
Cheliomyrmex Mayr

Of a different conformation 7

7. The frontal carinæ, which are fused with each other and with the clypeus, form a plate projecting out over the mandibles; the antennæ are inserted close to the anterior margin of this structure . . . 8

Frontal carinæ of a different conformation 9

8. Antennæ 12-jointed; abdomen stretched out straight (Africa) Probolomyrmex Mayr

Antennæ 9-jointed, tip of the abdomen deflected down and forward (America, Africa, Australia) . . . . . Discothyrea Roger

9. Frontal carinæ very close to each other; antennæ inserted very near the oral margin. Tip of abdomen strongly deflected downward 10

Frontal carinæ of a different conformation, or the tip of the abdomen not deflected 11

10. Clypeus in front projecting in the middle; petiole nodiform (America, Europe, Australia) . . . . . * **Sysphincta** Roger

Clypeus not projecting in front; petiole scale-like (America, Europe) * **Proceratium** Roger

11. Abdomen straight and constricted behind each segment; pygidium impressed or furcate (South America, Australia) Sphynctomyrmex Mayr

Abdominal segments not constricted 12

12. Body cylindrical with an elongated head, usually with one ocellus on the vertex 13

Of a different conformation 14

13. Antennæ 12-jointed (neotropical) . . . . Cylindromyrmex Mayr

Antennæ 11-jointed (Africa) . . . . . Simopone Forel

14. Petiole inserted behind on the postpetiole throughout its whole breadth; antennæ 12-jointed 15

Petiole constricted off from the postpetiole, and separate . . . 21

15. Middle and hind tibiæ without spurs, claws very large, eye well developed (Australia) . . . . . Onichomyrmex Emery

Middle and hind tibiæ spurred; eye very small 16

16. Pygidium with a row of prickles on its lateral border; petiole square; antennæ robust (South America) . . . . Acanthostichus Mayr

Pygidium without prickles on its border 17

17. Very small (at most 2½ mm.); funiculus with a 4-jointed club, only one spur well developed on the middle and hind legs (South America, Australia) . . . . . Prionopelta Mayr

Larger, middle and hind tibiæ each with two spurs 18

18. Integument shining 19

Integument at least in part opaque, densely sculptured 20

19. Antennæ very thick, the whole funiculus club-like (Asia, Australia) Myopopone Roger

Antennæ with filiform funiculus, but slightly thickened towards its tip. (Australia) . . . . . Amblyopone Erichson

20. Mandible blunt at its tip or with a spatulate dilatation (Madagascar, India) . . . . . Mystrium Roger

Mandible pointed at its tip (America, Europe, Asia, Australia) * **Stigmatomma** Roger

21. Mandibles inserted on the anterior corners of the head 22
Mandibles inserted in the middle of the anterior border of the head 55
22. Frontal carinæ approximated and almost perpendicular, not covering the insertions of the antennæ. Postpetiole strongly constricted off from the following segment 23
Frontal carinæ more or less dilated, and covering the insertions of the antennæ at least in part; antennæ always 12-jointed 26
23. Petiole sharply margined laterally; last joint of antenna not particularly large (Asia, Australia, Africa) . . . . Phyracaces Emery
Petiole not margined laterally 24
24. Last antennal joint much longer than the penultimate joint, forming a one-jointed club (Asia, Australia, Africa) . Cerapachys F. Smith
The last two or three joints of the antenna form an indistinctly separated club (India) . . . . . Lioponera Mayr
25. Frontal carinæ farther from each other than from the sides of the head. Mandibles with very long thorn-like teeth (South America) Thaumatomyrmex Mayr
Frontal carinæ nearer to each other than to the sides of the head; mandibles of a different conformation 26
26. Mandibles slender, when closed first strongly converging, then directed straight forward, beak-like, below with a powerful tooth, eye very large, placed anteriorly (India) . . . . . Harpegnathus Jerdon
Mandibles of a different conformation 27
27. Middle legs with two simple spurs; hind legs with a simple and a pectinate spur (America, Africa, Asia) . . . Centromyrmex Mayr
Spurs of the middle and hind legs of like structure 28
28. Claws pectiniform 29
Claws not pectiniform 30
29. Mandibles slender with a few large teeth along the medial border (Australia) . . . . . Prionogenys Emery
Mandibles slender and toothless, or broader with dentate edges (warm regions of the whole world) . . . . . **Leptogenys** Roger
30. Antennal fovea continued back into a groove which bends around the eye and is capable of enclosing the antennal scape and a portion of the funiculus (South America) . . . . . Paraponera F. Smith
Of a different conformation 31
31. Margin of clypeus denticulate; pronotum on either side with a tooth-like projection (India) . . . . . Odontoponera Mayr
Clypeus not denticulate 32
32. Frontal carinæ not broadened into lobes anteriorly, but only slightly dilated, widely separated from each other; middle and hind legs with well-developed median spur; lateral spur, when present, very small 33
Frontal carinæ converging posteriorly and there usually closely approximated. Anteriorly they are dilated to form a horizontal lobe . 39
33. Antennæ with 3-jointed club; claws simple 34

Antennæ without a differentiated club; claws usually toothed or split 35

34. Petiole distinctly pedunculate; thorax above with distinct sutures (South America) . . . . . Typhlomyrmex Mayr

Petiole not pedunculate; thorax above without sutures (New Guinea) Rhopalopone Emery

35. Third abdominal segment strongly fornicate dorsally, so that its posterior margin is directed downward, or even somewhat forward; thoracic dorsum without sutures 36

Of a different conformation 37

36. Eye small; third abdominal segment strongly deflected (South America) Alfaria Emery

Eyes larger; third abdominal segment but slightly deflected (southern Asia) . . . . . Stictoponera Mayr

37. Promesonotal suture obsolete, or distinct as a deep depression, which does not, however, interrupt the sculpture of the integument (South America) . . . . . Ectatomma F. Smith

Promesonotal suture distinct and sharply cutting through the sculpture of the integument 38

38. Antennal fovea elongated backwards as a groove; epinotum with teeth or spines; hind coxa unarmed (South America, Australia) Acanthoponera Mayr

Antennal fovea not elongated posteriorly; epinotum unarmed; hind coxa unarmed (Australia) . . . . . Rhytidoponera Mayr

Antennal fovea not elongated; epinotum unarmed; hind coxa with a spine (South America) . . . . . Holcoponera Mayr

39. Episternum of mesothorax hollowed out; petiole behind with two teeth or spine (India and Australia) . . . . . Diacamma Mayr

Episternum of mesothorax not hollowed out 40

40. Medial spur of the middle and hind legs alone developed, the lateral spur is lacking, or very small (Trapeziopelta) 41

Both spurs of the middle and hind legs well developed 47

41. Integument smooth or sculptured, without pubescence 42

Integument delicately sculptured; at least the abdomen pubescent 45

42. Clypeus in the middle with a slender projecting lobe; lateral spur small but distinct (Malasia and Papuasia) . . . . Trapeziopelta Mayr

Clypeus without a lobe 43

43. Mandible sickle-shaped, flat and pointed (Africa) Psalidomyrmex André

Mandible slender, with a few teeth on the medial border . . . 44

44. Mandible obtuse at the end (Africa) . . . Plectroctena F. Smith

Mandible pointed, its medial border with two teeth (Ceylon) Myopias Roger

45. Clypeus in front with a needle-shaped process (South America) Belonopelta Mayr

Clypeus without a point in front 46

46. Antenna with a 4-jointed club (Asia and Papuasia) Cryptopone Em.
Antenna without a club, or with an indistinctly marked off 5-jointed club (warm and temperate regions of the whole world) * **Ponera** Latr.

47. Clypeus flat, separated from the frontal carinæ by a scarcely perceptible suture or not at all; body opaque, with fine gray pubescence (warm regions of the whole world) . . . . . Platythyrea Mayr
Clypeus separated off by a distinct suture 48

48. Anterior border of clypeus with two teeth 49
Clypeus not bidentate 50

49. Epinotum with two teeth; petiole pointed above (Africa) Streblognathus Mayr
Epinotum unarmed; petiole not pointed (South America) Dinoponera Roger

50. Clypeus in the middle with a raised piece margined on either side (Africa) . . . . . Paltothyreus Mayr
Clypeus arched or carinate 51

51. Cheek in front of the eye with a longitudinal carina 52
Cheek without a carina 53

52. Claws dentate (Africa) . . . . . Megaponera Mayr
Claws simple (South America) . . . . . Neoponera Emery

53. Eye in the middle or behind the middle of the side of the head (Africa) . . . . . Ophthalmopone Forel
Eye in front of the middle of the side of the head 54

54. Mesoëpinotal suture obsolete or not impressed; mesonotum not arched in profile (warm regions of the whole world) **Pachycondyla** F. Smith
Mesoëpinotal suture impressed; mesonotum distinctly arched in profile . . . . . Euponera Forel

55. Antennal foveæ confluent with each other behind the frontal carinæ; petiole prolonged above into a thorn-like point (warm regions of the globe) . . . . . **Odontomachus** Fabricius
Antennal foveæ not confluent behind 56

56. Antennal fovea bordered by a carina laterally behind the eye; head not emarginate posteriorly; petiole pointed (Madagascar) Champsomyrmex Emery
Antennal fovea without a lateral keel behind the eye; head always emarginate posteriorly; petiole usually not pointed * Anochetus Mayr

3d Subfamily: MYRMICINÆ.

1. Clypeus not prolonged back between the frontal carinæ,[1] which are closely approximated to each other; antennæ 12-jointed (tribe Pseudomyrmii) 2

[1] In some species of Pseudomyrma the clypeus seems to be continued back narrowly between the frontal carinæ, but this prolongation is the equivalent of the frontal area; it is often distinct from the clypeus.

Clypeus almost always prolonged between the frontal carinæ, which are more or less separated; in the opposite case, the antennæ are 11-jointed 3

2. Clypeus suddenly descending in front, or as if inflected or subtruncated, usually armed with teeth at the level of this inflection; rarely it is uniformly sloping and deeply emarginate at the anterior border (Africa, Asia, Oceanica) . . . . . Sima Roger

Clypeus neither inflected nor dentate, not or only feebly emarginate (America) . . . . . **Pseudomyrma** Guerin

3. Antennæ 7-jointed, without a distinct club (13-jointed in the male); frontal carinæ, as usual, distant from the lateral borders of the head; thorax spinose (tribe Myrmicarii) . . . . Myrmicaria Saunders

Antennæ of a different conformation (when 7-jointed, the last joint is enlarged or forms part of a differentiated club, or the scape may be enclosed in a deep groove, or the thorax is without spines) . . 4

4. Antennal fovea or groove placed at the side of the head; the carina formed by its dorsal margin (and which does not correspond to the frontal carina of other ants) passes outside of the eye; posterior angles of the head pointed or prolonged or denticulate; antennæ 11-jointed in all the sexes (tribe Cataulacii) . Cataulacus F. Smith

Of a different conformation 5

5. The antennal fossæ terminate behind on the sides of the head, pass above the eye and are sufficiently deep to conceal the whole antennal scape; antennæ 11-jointed, without differentiated club; gizzard fungiform, of peculiar structure (tribe Cryptocerii) (America) . . . 6

Antennal fossæ differently placed, or the antennæ of a different conformation; gizzard of the usual form 7

6. Antennal foveæ approximated in front, diverging strongly behind, not reaching the sides of the head except at their extremities Procryptocerus Emery

Antennal foveæ covered throughout their length by the lateral border of the head . . . . . **Cryptocerus** Fabricius

7. Postpetiole articulated to the dorsal surface of the following segment (tribe Crematogastrii) . . . . . ***Crematogaster** Lund

Postpetiole inserted at the anterior end of the following segment . 8

8. Head cordiform, emarginate behind, with the posterior angles strongly rounded and devoid of spines; last joint of antennæ very much smaller than the preceding joint (tribe Dacetii) 9

Head of a different conformation 15

9. Antennal foveæ short; antennæ 11-jointed 10

Antennal foveæ as long as the scape 11

10. Only the last joint of the antennæ longer than the preceding joint Daceton Perty

Last two joints of the antennæ longer than the preceding Acanthognathus Mayr

11. Antennal foveæ shallow, at the medial side of the eye; antennæ 5-jointed, the third much elongated . . . Orectognathus F. Smith
Of a different conformation 12
12. Antennal foveæ placed at the dorsal or medial side of the eyes . 13
Antennal foveæ placed at the lateral side of the eyes 14
13. Antennæ 6-jointed . . . . . * **Strumigenys** F. Smith
Antennæ 4-jointed . . . . . * Epitritus Emery
14. Antennæ 6-jointed . . . . . Epopostruma Forel
Antennæ 7–8-jointed . . . . . Rhopalothrix Mayr
Antennæ 12-jointed . . . . . Ceratobasis F. Smith
15. Antennæ 11-jointed, without distinct club, or a club consisting of a single joint (tribe Attii, America) 16
Club of several joints, or the antennæ not 11-jointed 20
16. Frontal carinæ very close to each other and dilated at the anterior extremity; clypeus not distinctly prolonged between them . . 17
Frontal carinæ separated, embracing the posterior extremity of the clypeus 18
17. Integument opaque and even, bristling with long, fine hairs Apterostigma Mayr
Integument bristling with tubercles and spines, with hooked and scale-like hairs . . . . . Myrmicocrypta F. Smith
18. No erect hairs on the body; antennal foveæ usually prolonged to the posterior corners of the head . . . . . **Cyphomyrmex** Mayr
Body bearing erect hairs 19
19. Integument even, bearing only delicate oblique hairs Sericomyrmex Mayr
Integument rough, bearing stiff or hooked hairs . . **Atta** Fabricius
20. The shallow antennal foveæ bordered laterally by an abrupt carina; antennæ 11-jointed, with a club of three joints, the last of which is decidedly predominant 21
Of a different conformation 22
21. Clypeus transversely arched, almost straight in a longitudinal direction Ochetomyrmex Mayr
Clypeus arched both longitudinally and transversely Wasmannia Forel
22. Club of the antennæ 2-jointed, the last joint much larger than the other (tribe Solenopsidii and the genus Phacota) 23
Antennal club of a different conformation or indistinct 28
23. Antennæ 9-jointed (10-jointed in the female and 13-jointed in the male)[1]; no dimorphism among the workers . Carebara Westwood
Antennæ 12-jointed . . . . . Adelomyrmex Emery
Antennæ 10- or 11-jointed 24

[1] Professor Forel refers to the genus Oligomyrmex Mayr, the worker of which is unknown, an undescribed Australian species with strongly dimorphic workers. The antennæ are 9-jointed, as in Carebara worker and in Oligomyrmex female.

24. Antennæ 10-jointed 25
Antennæ 11-jointed 26
25. Dimorphism of the workers usually but slightly marked, or, in the opposite case, the head of the worker major is subquadrate or broader than long (antennæ 10- to 11-jointed in the female)
* **Solenopsis** Westwood
Dimorphism of the workers very marked; head of the worker major elongated (antennæ 11-jointed in the female) . Aëromyrma Forel
26. Thoracic sutures indistinct . . . . . * Phacota Roger
Mesoëpinotal suture strongly marked 27
27. Ninth antennal joint conspicuously longer than the eighth, though much shorter and especially narrower than the tenth
Diplomorium Mayr
Ninth joint of the antennæ not distinctly longer than the eighth; workers polymorphic; soldiers with enormous heads
Pheidologeton F. Smith
28. Antennal foveæ deep, capable of containing the whole scape, and placed along the sides of the head 29
Antennal foveæ less deep or differently placed 30
29. Antennæ 9-jointed (10-jointed in the male as in Tetramorium); mesonotum with a blade-like posterior edge and usually armed with spines
Meranoplus F. Smith
Antennæ 11-jointed, the last joint very large . Calyptomyrmex Emery
30. Erect hairs on the body trifid . . . . . * Triglyphothrix Forel
Hairs not trifid 31
31. Posterior border of the clypeus raised in the form of a trenchant ridge which borders the antennal foveæ in front 32
Posterior border of the clypeus not forming a ridge 38
32. Mandibles pointed, without apical border . * Strongylognathus Mayr
Mandibles with dentate apical border 33
33. Portion of the clypeus in front of the antennal insertion narrow, but not reduced to a mere ridge (antennæ of the male 10-jointed) (forming with the four preceding genera the tribe Tetramorii) . . . 34
Portion of the clypeus in front of the antennal insertion reduced to a trenchant ridge (antennæ of male 13-jointed) 37
34. Antennæ 12-jointed 35
Antennæ 11-jointed 36
35. Epinotum armed with spines or teeth . . . . * **Tetramorium** Mayr
Epinotum rounded, unarmed . . . . . Rhophomyrmex Mayr
36. Thoracic dorsum deeply impressed at the mesoëpinotal suture
Dacryon Forel
Thoracic dorsum scarcely or not at all impressed at the mesoëpinotal suture . . . . . **Xiphomyrmex** Forel
37. Antennæ 11-jointed . . . . . Pristomyrmex Mayr
Antennæ 12-jointed 38

38. Petiole pedunculate in front; dimorphism of the workers very marked Acanthomyrmex Emery
Petiole not pedunculate in front; no appreciable dimorphism in the workers . . . . . * **Myrmecina** Curtis
39. Antennæ 7–10-jointed, the last joint very large; thorax without spines or teeth; eyes present . . . . . Allomerus Mayr
Antennæ 10–12-jointed; when there are ten, the eyes are wanting or the epinotum is armed with two spines 40
40. Without eyes 41
With eyes, sometimes small, but quite distinct 43
41. Antennæ 12-jointed, without distinct club; insects very small * Leptanilla Emery
Antennæ 10–11-jointed, with 3-jointed club 42
42. Postpetiole armed with a spine on its lower surface Liomyrmex Mayr
Postpetiole unarmed; size very small *Monomorium decamerum* Emery
43. Antennæ 11-jointed 44
Antennæ 12-jointed (10-jointed in *Pheidole perpusilla* Emery) . . 55
44. Thorax and petiole without any trace of teeth or spines; pronotum never angular 45
Metanotum nearly always armed with teeth or spines; when they are absent, the pronotum has angular humeri 48
45. Clypeus bidentate in front 46
Clypeus unarmed 47
46. Petiole distinctly pedunculate in front . . . . * **Monomorium** Mayr
Petiole not pedunculate . . . . . **Xenomyrmex** Forel
47. Thorax unarmed, impressed in the region of the mesoëpinotal suture Vollenhovia Mayr
Thorax armed with spines and without an impression at the meso-epinotal suture . . . . . Stereomyrmex Emery
48. Eyes prolonged obliquely downwards and forwards Oxyopomyrmex André
Eyes round or oval 49
49. Thoracic dorsum profoundly impressed at the mesoëpinotal suture 50
Thoracic dorsum little or not at all impressed 52
50. Humeri of pronotum rounded . . . . . Huberia Forel
Humeri of pronotum angular 51
51. Antennal club 3-jointed, at least as long as the remainder of the funiculus . . . . . Lophomyrmex Emery
Club indistinct, the last three joints much shorter than the remainder of the funiculus . . . . . Podomyrma F. Smith
52. Frontal carinæ as long as the antennal scape . * **Tomognathus** Mayr
Frontal carinæ much shorter than the scape 53
53. Workers strongly dimorphic; integument shining, petiole pedunculate Machomyrma Forel[1]

[1] This group was established by Professor Forel as a subgenus of Liomyrmex; it has seemed to me to deserve elevation to the rank of a genus.

Workers not dimorphic 54

54. Petiole scarcely pedunculate in front, postpetiole armed below with a spine,[1] integument in great part smooth and shining
* Formicoxenus Mayr

Petiole with a short peduncle, postpetiole unarmed below; body in great part opaque . . . . . * **Leptothorax** Mayr

55. Workers dimorphic, usually without forms intermediate between the large-headed soldiers and the workers; antennal club 3-jointed, longer than the remainder of the funicle (4-jointed in *Ph. granulata* Pergande); sting very feeble . . . . . **Pheidole** Westwood

Workers monomorphic or dimorphic; in the latter case the extreme forms are connected by intermediates, and the antennal club is usually indistinct or shorter than the remainder of the funiculus 56

56. Petiole armed with spines above[2] 57

Petiole without a spine 58

57. Petiole with one spine . . . . . Lordomyrma Emery

Petiole with two spines . . . . . Atopomyrmex André

58. The last three joints of the antennæ are much shorter than the remainder of the funiculus and do not form a very distinct club 59

The last three joints of the antennæ form together a club about as long as the rest of the funiculus 63

59. Thoracic dorsum impressed at the mesoëpinotal suture; promesonotal suture usually distinct 60

Thoracic dorsum without any trace of suture or impression . . . 62

60. Posterior spurs pectinated . . . . . * **Myrmica**

Posterior spurs simple or absent 61

61. Middle of clypeus projecting in an angle; epinotum unarmed, with a median impression which can receive the petiole; integument in great part shining (America) . . . . . Megalomyrmex Forel

Middle of clypeus angular in front; epinotum armed with spines; antennæ thick (Madagascar) . . . . . Eutetramorium Emery

Clypeus of a different conformation, epinotum usually armed with teeth or spines (always without spines in Holcomyrmex)
* **Stenamma** Westwood
* Holcomyrmex Mayr[3]

62. Posterior spurs simple; petiole very long (Africa) Ocymyrmex Emery

Posterior spurs pectinated (America) . . . . **Pogonomyrmex** Mayr

[1] In *F. corsicus* Emery, the worker of which is unknown, the postpetiole of the female has only an obtuse tooth.

[2] In *Atopomyrmex ceylonicus* and *nodifer* the node of the petiole is merely angular in front.

[3] All the characters of the genus Holcomyrmex are found singly in one or the other forms of the genus Stenamma as I have defined this genus in my work on the ants of North America (*Zool. Jahrb. Syst.*, Bd. viii, p. 297). The teeth of the clypeus are indistinct in *H. muticus* Emery.

63. Clypeus armed with two ridges, which project forward in the form of teeth, rarely without teeth, but then the epinotum is quite unarmed; mesoëpinotal suture marked . . . . . * **Monomorium** Mayr
Clypeus of a different conformation; rarely 2-toothed, but then the mesoëpinotal suture is indistinct 64
64. Inferior angles of the pronotum pointed . . . . . Rogeria Emery
Inferior angles of the pronotum rounded 65
65. Postpetiole campanulate, attached throughout by means of its whole posterior surface to the following segment; thoracic dorsum with neither suture nor impression . . . . . **Macromischa** Roger
Postpetiole distinctly constricted posteriorly 66
66. The abdomen, seen from the side, is triangular; its anterior angle attached to the postpetiole; epinotal spines recurved forwards Trigonogaster Forel
Of a different conformation 67
67. Without erect hairs, petiole pedunculate, with a rounded node; postpetiole usually very large . . . . . * Cardiocondyla Emery
With erect hairs; which are usually clavate and microscopically denticulate . . . . . * **Leptothorax** Mayr

The following genera are not included in this table: * Anergates Forel and **Epœcus** Emery, parasitic ants, which have no workers; Trichomyrmex Mayr, Tranopelta Mayr, * Oligomyrmex Mayr, Rhopalomastix Forel, Cratomyrmex Emery, of which the workers are unknown; and finally Pheidolacanthinus F. Smith, which was insufficiently characterized by its author and is unknown to me in nature.

4th Subfamily: DOLICHODERINÆ.[1]

1. Sting well developed; petiole with a long peduncle in front Aneuretus Emery
Sting rudimental; petiole squamiform or nodiform, not pedunculate in front 2
2. Chitinous integument stiff and brittle, often strongly sculptured; thorax and scale often spinose or angular; gizzard without a calyx and with delicate cuticle, not furnished with cilia at the entrance * **Dolichoderus** Lund
Integument thin and flexible, finely sculptured; thorax and petiole never spinose; gizzard of a different conformation 3
3. Body very slender; legs and antennæ much elongated, large or medium-sized species; gizzard without a calyx, furnished with cilia at the entrance (Australia) . . . . . Leptomyrmex Mayr

[1] The genera of the Dolichoderinæ are in large part established on anatomical characters (structure of the gizzard) and the wing neuration; this renders the identification of isolated workers very difficult.

Body less slender ; species nearly always small ; gizzard with a reflected calyx 4

4. Eyes very large, occupying one-third the side of the head
Turneria Forel

Eyes much smaller 5

5. Cloacal orifice apical ; petiole very low, without a distinct scale
Technomyrmex Mayr

Cloacal orifice inferior 6

6. Scale of petiole very small and strongly inclined, or even altogether absent 7

Scale more or less inclined, but well developed 9

7. Maxillary palpi 2–4-jointed, labial palpi 2–3-jointed ; in the anterior wing of the female and male the transverse nervure joins the external branch of the cubital nervure (Europe, India, Australia)
* Bothriomyrmex Mayr

Maxillary palpi 6-jointed, labial 4-jointed 8

8. Scale of petiole small but distinct in the worker (well developed in the female) ; in the anterior wing the transverse vein joins the external branch of the cubital vein ; there is no closed cubital cell in the male, one only in the female ; no discoidal cell ; gizzard with a convex, 4-lobed calyx (a monotypic American genus) **Forelius** Emery

Scale rudimental or none ; the transverse vein joins the cubital at the point of bifurcation ; a single closed cubital cell, usually a single discoidal ; gizzard with a depressed calyx without lobes
* **Tapinoma** Foerster

9. Metanotum bearing a conical projection more or less distinctly developed ; wings as in Forelius (American species) **Dorymyrmex** Mayr

Metanotum of a different conformation ; wings with a discoidal cell 10

10. Gizzard very short, with a great reflected calyx ; no ocelli, stature but slightly variable . . . . . Iridomyrmex Mayr

Gizzard at least as long as broad ; stature highly variable ; ocelli usually present in the large workers 11

11. Thorax not impressed at the mesoëpinotal suture ; no remarkable dimorphism in the workers ; wings with two closed cubital cells
* **Liometopum** Mayr

Thorax impressed at the mesoëpinotal suture ; workers often remarkably dimorphic ; with a single closed cubital cell ; transverse vein meeting the bifurcation of the cubital (American species)
Azteca Forel

The genus Linepithema Mayr, of which only the male is known, is not included in the above table.

5th Subfamily: CAMPONOTINÆ.

1. Mandibles long, linear, denticulate; eyes very large Myrmoterus Forel
   Mandibles of a different conformation 2
2. Antennæ 11-jointed, or less 3
   Antennæ 12-jointed 10
3. Clypeus projecting forward above the mandibles, eyes lateral, enormous, antennæ 8-jointed . . . . . Gesomyrmex Mayr
   Of a different conformation 4
4. Last joints of the antennæ forming a differentiated club; antennæ 9–10-jointed . . . . . Myrmelachista Roger
   Antennæ without a differentiated club 5
5. Frontal carinæ separated from each other by a greater distance than from the lateral borders of the head 6
   Frontal carinæ closer to each other than to the lateral borders of the head 7
6. Eyes reniform, very large . . . . . Dimorphomyrmex Er. André
   Eyes oval, of medium size . . . . . Aphomomyrmex Emery
7. Maxillary palpi 2-jointed, labial palpi 3-jointed . . Acropyga Roger
   Maxillary palpi 6-jointed, labial palpi 4-jointed 8
8. Metanotum and scale more or less 2-toothed or 2-spined * Acantholepis Mayr
   Metanotum and scale unarmed 9
9. Antennæ 11-jointed (Old World species) . . . * Plagiolepis Mayr
   Antennæ 9-jointed, exceptionally 11-jointed; thorax short and thick-set (American species). . . . . **Brachymyrmex** Mayr
10. Eyes very large, occupying nearly the whole of the sides of the head Gigantiops Roger
    Eyes occupying less than one-half of the sides of the head . . . 11
11. Prothorax with an angular crest on either side; mesonotum prominent, in the form of a boss; gizzard as in Plagiolepis Notoncus Emery
    Thorax of a different conformation 12
12. Antennæ inserted some distance behind the clypeus; gizzard with long straight sepals 13
    Antennæ inserted very near the posterior edge of the clypeus . . 20
13. Maxillary palpi 5-jointed; petiole elongate, narrow; stature variable, but not dimorphic in the form of the head . Œcophylla F. Smith
    Maxillary palpi 6-jointed; petiole short, squamiform or nodiform, often spinose or dentate 14
14. Dimorphism clearly marked in the size, form, and often in the sculpture of the head; stature usually very variable . . * **Camponotus** Mayr
    No marked dimorphism in the workers 15
15. Eyes placed towards the posterior angles of the head Opisthopsis Emery
    Eyes on the sides of the head 16

16. Thorax and petiole without spines or teeth 17
Thorax and petiole, or the latter alone more or less spinose or dentate 18
17. Body thickset; head rounded behind (Australia, Papuasia)
Calomyrmex Emery
Body slender; head narrowed behind (America)
Dendromyrmex Emery
18. Body thickset; thorax without spines, its anterior angles rounded; petiole prolonged into a point on either side . Echinopla F. Smith
Body less thickset; thorax usually dentate or spinose (when this is not the case the body is shining jet black, and the scale of the petiole is quadridentate) 19
19. In profile, the mesonotum occupies the bottom of a deep cleft overarched by the metanotum; eyes supported laterally by a lobe of the head in the form of a blinder (œillère) . . . Hemioptica Roger
Mesonotum not depressed; eyes usually free, rarely with a distinct blinder . . . . . * Polyrhachis F. Smith[1]
20. The last 4 to 5 antennal joints distinctly differentiated to form a club
Myrmecorhynchus Er. André
No differentiated club 21
21. Calyx of gizzard reflected and surrounded by a muscular ring as in Plagiolepis (Australia, New Zealand, Chile). Melophorus Lubbock
Sepals of calyx distinct and little or not at all reflected (except * Prenolepis, none of these genera are found in Australia or Chile) . 22
22. Clypeal fovea distinctly separated from the antennal fovea
* **Prenolepis** Mayr
Clypeal fovea confluent with the antennal fovea, or feebly separated in Pseudolasius 23
23. Joints 2–5 of the funiculus shorter or not longer than the succeeding joints; ocelli usually absent 24
Joints 2–5 of the funiculus longer than the succeeding joints; ocelli distinct 25
24. Mandibles long, with oblique dentate blades; dimorphism very marked; head large in the worker major; clypeal fovea slightly separated from the antennal fovea (Sunda Islands and Moluccas)
Pseudolasius Emery
Mandibles shorter, with less oblique blades; dimorphism scarcely or not at all perceptible (holarctic region) . . . * **Lasius** Fabricius
25. 4th joint of maxillary palpi nearly twice as long as the 5th
* **Myrmecocystus** Wesmael
4th joint of the maxillary palpi a little longer than the 5th . . . 26
26. Mandibles with the apical margin broad and denticulate * **Formica** Linne
Mandibles narrow and pointed . . . . . * **Polyergus** Latreille

[1] *P. simplex* Mayr has been found in Palestine. Mr. Edward Saunders sent me a specimen the provenience of which appears to be authentic.

ADDENDA.

Since the manuscript of the preceding paper was received, Professor Emery has made some changes in the subdivision of the genus Cerapachys.[1] He now divides this genus into five subgenera as follows: (1) Cerapachys (*sensu stricto*), with 12-jointed antennæ; (2) Parasyscia, with 11-jointed antennæ; (3) Oöceræa, with 10-jointed antennæ; (4) Syscia, with 9-jointed antennæ and the basal segment of the gaster but little longer than the postpetiole; (5) Cysias, with 9-jointed antennæ and the basal gastric segment very large. The more homogeneous genus Phyracaces is not cut up into subgenera.

In another recent paper[2] Emery describes a new genus, Ænictogiton, based on a male specimen of a peculiar doryline ant from the Congo (*A. forsiceps* Emery). As the name indicates, this insect is allied to Ænictus.

As a further addition, I may mention that Forel[3] has very recently described a remarkable new genus of Ponerinæ from Haiti under the name Emeryella. It resembles the extraordinary genus Mystrium in the structure of its mandibles. In other respects it is allied to Ectatomma. The following is a translation of Forel's diagnosis:

"**Emeryella** gen. nov.

"Mandibles, at first sight, very similar to those of the genus Mystrium, but without the two rows of teeth along their inner borders. They are linear, slightly depressed, longer than the head, feebly curved inwards, especially at their distal half, the basal half being nearly straight. Their bases are a little longer than their tips, which are obliquely truncated. There are only three teeth on the mesial border; the first is very broad, short, and obtuse, and not far from the base; the second, situated in the middle, is short and obtuse; the third is still smaller, and near the tip. The mandibles are nowhere canaliculated. They are inserted, like those of Mystrium, on the widely separated anterior angles of the head, so that they enclose a large empty space.

[1] Note mirmecologiche, *Rendiconto delle Sess. della R. Accad. delle Scienze dell' Istituto di Bologna* (Nov. 17, 1901), pp. 3–15.

[2] Note sulle Doriline, *Bull. della Soc. Ent. Ital.*, anno xxxiii, trim. 1 (1901), pp. 43–63.

[3] Variétés myrmécologiques, *Ann. Soc. Ent. Belg.*, tome xlv (1901), pp. 334–382.

"Apart from the above, all the characters are very similar to those of Ectatomma, especially of the subgenus Gnamptogenys. Antennæ 12-jointed. Eyes large, lateral. Frontal carinæ widely separated, short. Clypeus rounded behind. Promesonotal suture only slightly visible. Mesometanotal suture very deep, constricted. Pedicel of the abdomen like that of Gnamptogenys. Middle and hind legs with but a single spur, which is pectinated. Tarsal claws bidentate.

"This genus is undoubtedly very closely related to Ectatomma; but the structure of the mandibles is so peculiar and recalls so forcibly the group of Mystrium and Myrmecia that I feel fully justified in establishing the genus."

The type of the genus Emeryella is *E. Schmitti* Forel.

W. M. WHEELER.