

A Comparison of the Hylean and Congo-West African Rain Forest Ant Faunas

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COLLECTION

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Introduction

The ants—Formicidae—are one of the world's truly spectacular animal families. They make up in numbers what they lack in individual size, and their activity rates and ubiquity in tropical countries bespeak their powerful role as transformers of energy in warm-country ecosystems. Unfortunately, we still lack quantitative data on biomass and energy transfer for tropical ants, and even in the temperate zone such information is exceedingly scarce and local, and remains largely unchecked. This is a pity, because collectors' impressions of ant distribution and abundance over the earth indicate a very interesting state of affairs. There is no doubt that temperature is a very important factor controlling the occurrence of ants. But the temperature limitation does not work in a straightforward way. Ants occur to and above the treeline in the Arctic and on most of the world's highest mountain chains, but they are absent above about 2300 meters in closed-canopy broadleaf forest everywhere, and specifically in the tropics. This fact never ceases to

surprise me as I start hopefully into lush forest (after considerable trouble to get there!) at say, 2300 to 2500 meters in the Colombian Andes, in the Nilgiri Hills of southern India, or in the Ankaratra of central Madagascar. Even at 2100 meters in most tropical mountain forest, ants are exceedingly scarce, and in any one locality are represented by very few species. Yet at much higher altitudes (of 3500 or even 4000 meters) on treeless slopes of the Andes or the Himalayas, ants may be locally abundant. This suggests that radiant heat controls distribution; that is, cool shady mountain forests just don't provide enough warmth to allow ants to forage efficiently, or their larvae to develop fast enough, or both, while high-altitude or high-latitude open situations may offer sufficient radiant energy, even if in a brief seasonal burst, to do the trick (see review by Brian, 1965:68-69). All this suggests controlled-environment experiments that are beyond the scope of this paper.

We may say that the great lowland rain forests of Africa and South America appear to demonstrate by their fulsome and diverse ant faunas that temperature is probably not a serious limiting factor there. Yet we should not be too sure of this, because some sun-baked thorn-scrub, savanna, and even shrub semidesert environments, both in and out of the tropics, have astonishingly rich ant complements. This leads again to an appeal for quantitative data on colony density, species diversity, and eventually, biomass, for the different major habitat types over the world. All caveats considered, though, it is clear that the tropical forests have at least the greatest *diversity* at both the genus and species levels.

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It seems likely that evolution of most genera has prevailingly proceeded from a forest base into more open (xeric) habitats, some older opinions to the contrary notwithstanding. We should be cautious about this, however, because for ants wet forest areas are also in some degree "species sinks," as Jago here finds for his grasshoppers (p. 191 herein). We should also remember Wilson's (1959) findings for Melanesian ponerine ants, where many stocks apparently have moved from continental or large-island bases outward via "marginal" (more open, hence drier) habitats, and eventually occupied peripheral forested island areas.

The main rain forests of South America and Africa today are, except for interruptions caused by human activity, distributed in relatively continuous blocs. These blocs may have been somewhat subdivided during dry periods in the past (Moreau 1966, Vanzolini and Williams 1970), but their respective ant faunae are remarkably widespread within them as now known. Thus, the fauna of Guyana predicts to a remarkable degree that of the Rio Beni in lowland Bolivia, and the species list of south Cameroon is similar to that of the gallery forests of northern Angola. This is not to say that all species occur everywhere; actually, many of them have a very spotty distribution within this broad area. Of course many also extend far beyond the forest proper.

In order to consider the geography of ants, certain characteristics of the family need to be understood. All true ants are social and live in groups, normally representing the offspring of one or more queens, or sexually developed females. Workers are genetically females, but arrive at the adult stage as neuters after differential influences, probably mainly in the kind and quality of food they receive, affect them during development. In most ant species, the queens are produced in winged form together with winged males; copulation usually takes place during or after a nuptial flight of one or both sexes at a distance from the nest. This nuptial flight may offer great opportunity for dispersal by wind of fertile winged queens, yet the very nature of most flights as far as they are known also seems to militate against wide dispersal because of the rapidity with which the queens, once fecundated, drop to the substrate and actively divest themselves of their wings. Probably a certain amount of habitat selection is practiced by most newly fertilized

queens, but it is hard to know how much of this occurs before the queen alights. Flying queens have been taken at above 900 meters in airplane traps, and also in shipboard traps at sea, but these queens have not been tested for nest-founding ability. A large minority of ant species have wingless queens (e.g., all army ants), or the queen is lacking and is replaced by worker reproductives. In still other species (e.g., at least some *Monomorium*, *Crematogaster*, *Rhoptromyrmex*, and known parasitic forms), the queen may have wings at some stage, yet may be unable to found a colony without the assistance of workers of her own or another species. Such species of course have reduced ability to colonize new areas across sea barriers.

Another obvious possibility for long-distance oversea transport is rafting. A number of kinds of ants, especially in the tropics, make their nests in preformed plant cavities, such as hollow twigs, burrows of wood-boring insects, hollow nuts or capsules, leaf-bases and the like. Often these nest cavities can be closed off to the outside by carton or sawdust plugs, or even by the plug-shaped heads of specialized soldiers. No doubt nests so barricaded can last for long periods of inclemency, for the brood can be eaten when starvation threatens, and adult workers and queens can often live a long time without food or free water. One can imagine a tree floating in the ocean with branches on the light side held well out of the water and bearing twigs containing numerous ant colonies. Such trees might make the voyage across the Atlantic in a matter of a few months in the Equatorial Current if the winds held fair (see Darlington 1957:17). I have no doubt that the voyage has been made safely on numerous occasions. Establishment of the voyagers on a foreign shore is a more difficult matter, in the face of potential competitors and predators, but the possibility still cannot be eliminated.

The third important way that ants are transferred between continents is of course through human commerce. In the tables below, tramp-species distributions are discounted for obvious reasons, but one thing about such distributions should be mentioned. If we consider the known or probable origin of tramp ant species, and the new places to which they go, a trend is obvious. Most of them originate in the Old World tropics or subtropics and establish themselves in the New World, Australia, or assorted oceanic islands. The reverse

tendency, from the Americas to the Old World, does show itself (with species such as *Iridomyrmex humilis* and *Solenopsis geminata*), but this is obviously a weaker counter-current. The position of Australia, New Zealand, and smaller Oceanic islands in the cross-exchange hierarchy is even lower than that of the Americas, and in fact the "emigration potency" of each of the areas conforms to a Darlingtonian scheme, whereby those lands with a combination of large area and favorable (i.e., warm) climate produce animal species that tend to dominate and spread into lands increasingly smaller in area and less favorably endowed with climate.

The possibility exists that the current of tramps outward from tropical Africa-Asia is merely a reflection of (1) shipping practices, with ant-laden ballast going mainly from Europe to the New World, and (2) the longer time that Old World ants have had to adapt to humanly disturbed environments, which are mostly the kinds of places in which tramp species are found as immigrants. However, arguments can be made for the reverse movement of materials likely to carry ants, and some of the effective tramp species do not seem to be particularly anthropophilic in their home countries. As we shall see, the ant distribution data tend to support the conclusion that the prevailing direction of tramp flow is largely independent of human influence. This whole question is open to experimental study that has never been properly started.

Noting that ants had apparently arrived in central Polynesia before man, but had not reached eastern Polynesia until carried there by him (Wilson and Taylor 1967), we may characterize the ants' colonizing capability over the oceans as only slightly poorer than that of the bats, and better than that of the Trichoptera, Isoptera, and some other insect orders (see Zimmerman 1948).

World Distribution of the Ant Genera

Table I shows the distributions of the genera of living ants, taking into account published revisions and some of my own projections, many of them from my manuscripts toward a reclassification of the Formicidae. Naturally, those subfamilies and tribes that have been most studied in recent years, whether or not they have been published on, are those in which I consider the genera here listed to

be relatively firmly established. In those groups of genera not yet closely studied, particularly among the Myrmicinae, there are a number of amalgamations yet to come. I might for example point to *Lordomyrma* and *Rogeria* as genera doubtfully distinct from one another and from *Stenammas*, and the separation of *Tetramorium* from *Xiphomyrmex* and *Triglyphothrix* comes perennially into question. Small genera such as *Promeranoplus*, *Prodicroaspis*, *Romblonella*, *Willowsiella*, and *Tetramyrma* remain unsatisfactorily defined; the relationships of *Leptothorax* to *Podomyrma*, *Atopula* and relatives in the Oriental-Australian and Ethiopian regions on the one hand, and to the *Macromischa* in the Caribbean area on the other, are still unclear. *Leptothorax* and *Mychothorax* may be species-groups within one genus, or they may be two genera. The New World *Iridomyrmex* almost certainly does not belong to that genus, but it is still not clear how it fits in with the other New World Tapinomini. The neotropical *Tapinoma* apparently provide a similar case. The *glaber* group of *Iridomyrmex* may really belong to *Turneria*. The Attini are probably over-split, and 5-6 or even fewer genera could well distill out from the current 10. In the Cephalotini, I may be a bit impulsive in recognizing only *Procryptocerus* and a much-enlarged *Cephalotes*, but it does seem a less tortured arrangement than the one we have inherited, with latter-day nomenclatural juggling, from Emery and Wheeler. A number of genera of Ponerini subside back into *Pachycondyla*, whence they originally came. The slowly multiplying genera of Leptanillinae are all listed with doubt; so little is known about them that their taxonomy must be arbitrary. The genera and subgenera of Dacetini that I introduced in 1948 and 1953 have suffered casualties, mainly because the flood of species of this tribe found since 1950 have included connecting forms, particularly among the short-mandibulate genera. It seems that even more genera in this group will sink as Berlese funnel collecting increases around the world, even though some bizarre new genera are still turning up from time to time.

I should acknowledge the obvious; my list excludes all subgenera on principle. I will also agree that after closer study a few of these subgenera might possibly be worth resurrecting as good genera, but I have found the subgeneric category so weak and so inconsistent in application, and so

productive of taxonomic confusion and wasted effort, that for me the burden of proof is on those who would use it.

Many social-parasitic "satellite" genera of important taxa such as *Myrmica*, *Leptothorax*, *Monomorium*, and *Pheidole* are not listed in the table, either because their taxonomic distinctness is *prima facie* questionable, or because despite great modification they seem to represent relatively sporadic and evanescent offshoots of their host genera. Such parasites apparently often undergo a particularly rapid kind of "degenerative" evolution leading to confusing "reduction convergences" that arise at places remote from one another on the globe, so their zoogeographical significance is more than ordinarily doubtful.

The disposition of genera and subgenera that may be familiar to the myrmecological reader, but not named in the zoogeographical tables, can be traced through the alphabetical list in the Appendix. Names, even obvious ones, probably have been omitted by inadvertance despite the protracted effort I have made to include all of those current within recent decades. I would appreciate hearing of omissions so that I can correct my list for a new distribution to taxonomists.

The columns in the tables give first the "conventional" zoogeographical regions, subdivided into appropriate compass directions (N, E, S, W). The arrangement is intended to show as nearly as is possible in a linear array, the principal Tertiary-Quaternary faunal-exchange connections among the regions, according to the conception of P. J. Darlington (1957). It should be emphasized, though, that the entries in the tables are based on the available data, including many unpublished records, and not a priori on Darlington's or any other zoogeographical theory.

Neotropical, S: Chile, Argentina, southeastern Brazil, Bolivian highlands, coastal and Andean Peru.

Neotropical, N: Central and northern Brazil, Amazonian lowlands of Bolivia and Peru, northern South America, Central America north into the Mexican states of Tamaulipas and Michoacan, West Indies.

Nearctic, S: North America south of about 40° N, except for the higher mountains of the United States; Mexican Plateau and the high mountains south to about 19° N.

Nearctic, N: North America north of about 40° N, and higher elevations in the United States south of 40°.

Palaearctic, N: Europe north of the Pyrenees, Alps and Black Sea; highlands of Central Asia and Tibet south to Burma; Mongolia and eastern USSR; central and eastern China and Japan north of about 34°.

Palaearctic, S: Mediterranean lands, including the Sahara; Asia Minor and northern Arabia, Iran and Afghanistan; lowland deserts of Central Asia south of the Aral Sea and the Tien Shan. In the Far East, typical southern Palaearctic elements, such as *Messor* and *Cataglyphis*, are present, but here the northern Palaearctic is customarily considered to merge directly into the Oriental Region.

Ethiopian, N: Africa from the southern Sahara (about 15° N) to about the Zambezi River (15° S); extreme southwestern Arabia.

Ethiopian, S: Africa from the Zambezi southward.

Malagasy: Madagascar with the Comoro Islands, Mauritius, and Reunion.

Oriental, W: India, Ceylon, and Pakistan south of the Pamir and Himalayas.

Oriental, E: China from the Tsinling Mountains and the Tibetan Scarp southward and eastward; Burma through Southeast Asia and the East Indies to Timor and Celebes; southern Japan, Formosa, Philippines.

Australian, N: New Guinea and nearby islands, including the Moluccas, Bismarck Archipelago, and Solomons; rest of Melanesia, Micronesia, and Central Polynesia (Samoa, etc.); northern half of the Northern Territory, Cape York Peninsula, and the Gulf of Carpentaria in Australia; New Caledonia. The ant fauna of Farther Polynesia is entirely man-introduced.

Australian, S: Continental Australia south of about 20° S; Tasmania, New Zealand, and nearby islands.

The entries themselves are intended to convey by code two biotic modes: "M" or "m" (for *mesic*) signifies the moister kinds of forest habitats, those with closed canopies. "X" or "x" refers to more xeric or open habitats—open woodland, savanna, thorn forest, semidesert, desert, and the like. The emphasis, as befits the title of this paper and the general topic of the symposium, is deliberately placed on the comparison between African and South American rain forests. It should be borne in mind that the biotic formations around the world between these two provinces are predominantly graded or clinal with reference to almost any single diagnostic character, be it plant or animal taxonomic, plant-physiognomic, or whatever. Furthermore, the "diagnostic" characteristics and "indicator" taxa tend to be distributed discordantly one from another, each according to its own ecological valency. For these reasons, any partitioning of the earth's surface

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into biogeographical regions is bound to be arbitrary and misleading to some degree. If, in spite of these serious difficulties, the typological mind persists in drawing zoogeographical lines "for convenience," then it is clear that the finer the subdivisions used, the more will be the information contained in the scheme. Fineness of subdivision unfortunately soon runs into practical difficulty in a table, and the resulting compromise usually ends up something like what I offer below.

One more characteristic that I have tried to show through the entries is the "importance," for the genus concerned, of its occurrence in a particular habitat in a particular zoogeographical region. This importance is indicated by either an upper-case "M" or "X," or lower-case "m" or "x." If a genus barely enters a region outside its main range,

a letter is entered in the appropriate column in lower case. The same holds for a genus that is very rare and sporadic (i.e., relict) in one region as compared to another. An example is *Prionopelta*, (see Table 1) which is very common in rain forest in parts of tropical America and Melanesia, has extralimital occurrences in northern Florida and south-eastern Australia, and is rarely collected in different parts of tropical Africa. This convention is not intended for important comparisons between genera; the closely related genera *Prionopelta* and *Amblyopone*, for example, are both rated "M" in the northern neotropical region, but as far as we now know, *Prionopelta* is 2-3 orders of magnitude more abundant and much more continuously distributed than is *Amblyopone* in this same region.

TABLE 1. World Distribution of the Ant Genera

Genus	Neotropical		Nearctic		Palearctic		Ethiopian		Malagasy	Oriental		Australian	
	S	N	S	N	N	S	N	S		W	E	N	S
MYRMECIINAE													
<i>Nothomyrmecia</i>	-	-	-	-	-	-	-	-	-	-	-	-	X
<i>Myrmecia</i>	-	-	-	-	-	-	-	-	-	-	-	mx	MX
PONERINAE													
<i>Amblyopone</i>	M	M	Mx	Mx	-	MX	MX	-	-	Mx	M	Mx	MX
<i>Mystrium</i>	-	-	-	-	-	-	m	-	M	-	m	mx	-
<i>Myopopone</i>	-	-	-	-	-	-	-	-	-	-	M	M	-
<i>Prionopelta</i>	M	M	m	-	-	-	m	m	m	-	M	M	m
<i>Onychomyrmex</i>	-	-	-	-	-	-	-	-	-	-	-	M	m
<i>Apomyrma</i>	-	-	-	-	-	-	mX	-	-	-	-	-	-
New Genus A.	-	-	-	-	-	-	M	-	-	-	-	-	-
<i>Paraponera</i>	-	M	-	-	-	-	-	-	-	-	-	-	-
<i>Acanthoponera</i>	M	M	-	-	-	-	-	-	-	-	-	-	-
<i>Heteroponera</i>	M	M	-	-	-	-	-	-	-	-	-	M	Mx
<i>Rhytidoponera</i>	-	-	-	-	-	-	-	-	-	-	m	MX	MX
<i>Ectatomma</i>	X	MX	-	-	-	-	-	-	-	-	-	-	-
<i>Aulacopone</i>	-	-	-	-	-	M	-	-	-	-	-	-	-
<i>Gnamptogenys</i>	Mx	MX	x	-	-	-	-	-	-	m	M	M	-
<i>Proceratium</i>	m	Mx	M	M	m	M	m	-	m	-	M	M	m
<i>Discothyrea</i>	M	M	m	-	-	-	Mx	M	-	-	M	M	M
<i>Typhlomyrmex</i>	M	M	-	-	-	-	-	-	-	-	-	-	-
<i>Platythyrea</i>	m	M	m	-	-	-	Mx	mX	-	Mx	Mx	MX	MX
<i>Probolomyrmex</i>	-	M	-	-	-	-	M	M	-	-	M	-	x
<i>Sphinctomyrmex</i>	M	-	-	-	-	-	MX	-	-	mx	m	MX	MX
<i>Cerapachys</i>	m	M	x	-	-	x	M	M	Mx	Mx	M	MX	MX
<i>Simopone</i>	-	-	-	-	-	-	M	M	M	-	M	M	-
<i>Cylindromyrmex</i>	M	Mx	-	-	-	-	-	-	-	-	-	-	-
<i>Acanthostichus</i>	MX	M	X	-	-	-	-	-	-	-	-	-	-
<i>Thaumatomyrmex</i>	M	M	-	-	-	-	-	-	-	-	-	-	-
<i>Harpegnathos</i>	-	-	-	-	-	-	-	-	-	MX	M	-	-

TABLE I. World Distribution of the Ant Genera—Continued

Genus	Neotropical		Nearctic		Palearctic		Ethiopian		Malagasy	Oriental		Australian	
	S	N	S	N	N	S	N	S		W	E	N	S
<i>Centromyrmex</i>	Mx	Mx	-	-	-	-	MX	M	-	MX	M	-	-
<i>Dinoponera</i>	m	M	-	-	-	-	-	-	-	-	-	-	-
<i>Streblognathus</i>	-	-	-	-	-	-	-	X	-	-	-	-	-
<i>Paltothyreus</i>	-	-	-	-	-	-	MX	MX	-	-	-	-	-
<i>Megaponera</i>	-	-	-	-	-	-	X	X	-	-	-	-	-
<i>Odontoponera</i>	-	-	-	-	-	-	-	-	-	M	M	-	-
<i>Pachycondyla</i>	Mx	MX	mx	-	-	-	Mx	MX	MX	MX	MX	MX	MX
New Genus B	-	-	-	-	-	-	M	-	-	-	-	-	-
New Genus C	-	-	-	-	-	-	M	-	-	-	-	-	-
New Genus D	-	-	-	-	-	-	M	-	-	-	-	-	-
<i>Ophthalmopone</i>	-	-	-	-	-	-	X	X	-	-	-	-	-
<i>Hagensia</i>	-	-	-	-	-	-	-	X	-	-	-	-	-
<i>Euponera</i>	-	-	-	-	-	-	-	-	M?	-	-	-	-
<i>Brachyponera</i>	-	-	-	-	-	-	MX	MX	-	MX	MX	MX	X
<i>Cryptopone</i>	-	m	M	-	-	M	-	m	-	-	M	M	M
<i>Simopelta</i>	m	M	-	-	-	-	-	-	-	-	-	-	-
<i>Belonopelta</i>	-	M	-	-	-	-	-	-	-	-	-	-	-
<i>Emeryopone</i>	-	-	-	-	-	-	-	-	-	-	M	-	-
<i>Ponera</i>	-	m	M	M	m	Mx	-	-	-	-	M	M	m
<i>Hypoponera</i>	M	Mx	MX	-	-	M	Mx	Mx	Mx	Mx	M	M	MX
<i>Plectroctena</i>	-	-	-	-	-	-	Mx	MX	-	-	-	-	-
<i>Psalidomyrmex</i>	-	-	-	-	-	-	M	-	-	-	-	-	-
<i>Asphinctopone</i>	-	-	-	-	-	-	M	-	-	-	-	-	-
<i>Leptogenys</i>	Mx	MX	MX	-	-	-	MX	MX	MX	MX	MX	MX	MX
<i>Prionogenys</i>	-	-	-	-	-	-	-	-	-	-	-	M	-
<i>Odontomachus</i>	Mx	MX	MX	-	-	Mx	MX	MX	MX	MX	MX	MX	mX
ECITONINAE													
<i>Eciton</i>	M	M	-	-	-	-	-	-	-	-	-	-	-
<i>Labidus</i>	mx	MX	x	-	-	-	-	-	-	-	-	-	-
<i>Nomamyrmex</i>	Mx	Mx	x	-	-	-	-	-	-	-	-	-	-
<i>Neivamyrmex</i>	MX	MX	MX	-	-	-	-	-	-	-	-	-	-
<i>Cheliomyrmex</i>	-	M	-	-	-	-	-	-	-	-	-	-	-
<i>Leptanilloides</i>	-	M	-	-	-	-	-	-	-	-	-	-	-
LEPTANILLINAE													
<i>Leptanilla</i>	-	-	-	-	-	X	-	-	-	-	X	M?	X
<i>Leptomesites</i>	-	-	-	-	-	-	-	-	-	M?	-	-	-
<i>Phaulomyrma</i>	-	-	-	-	-	-	-	-	-	-	M?	-	-
<i>Scyphodon</i>	-	-	-	-	-	-	-	-	-	-	M?	-	-
<i>Noonilla</i>	-	-	-	-	-	-	-	-	-	-	M	-	-
DORYLINAE													
<i>Dorylus</i>	-	-	-	-	-	X	MX	MX	-	MX	MX	-	-
<i>Aenictus</i>	-	-	-	-	-	mx	Mx	Mx	-	MX	M	Mx	m
<i>Aenictogiton</i>	-	-	-	-	-	-	M	-	-	-	-	-	-
PSEUDOMYRMECINAE													
<i>Pseudomyrmex</i>	Mx	MX	MX	-	-	-	-	-	-	-	-	-	-
<i>Tetraponera</i>	-	-	-	-	-	X	MX	MX	MX	MX	MX	MX	mx
MYRMICINAE													
<i>Myrmica</i>	-	-	Mx	MX	MX	MX	-	-	-	m	-	-	-
<i>Manica</i>	-	-	-	MX	MX	MX	-	-	-	-	-	-	-

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TABLE 1. World Distribution of the Ant Genera—Continued

Genus	Neotropical		Nearctic		Palearctic		Ethiopian		Malagasy	Oriental		Australian	
	S	N	S	N	N	S	N	S		W	E	N	S
<i>Hylomyrma</i>	M	M	-	-	-	-	-	-	-	-	-	-	-
<i>Pogonomyrmex</i>	X	X	X	X	-	-	-	-	-	-	-	-	-
<i>Ephebomyrmex</i>	MX	X	X	-	-	-	-	-	-	-	-	-	-
<i>Aphaenogaster</i>	-	MX	MX	MX	mx	MX	-	-	MX	MX	M	MX	MX
<i>Messor</i>	-	-	-	-	x	X	X	X	-	X	X	-	-
<i>Veromessor</i>	-	-	X	x	-	-	-	-	-	-	-	-	-
<i>Goniomma</i>	-	-	-	-	-	X	-	-	-	-	-	-	-
<i>Oxyopomyrmex</i>	-	-	-	-	-	X	-	-	-	-	-	-	-
<i>Pheidole</i>	MX	MX	MX	X	x	MX	MX	MX	MX	MX	MX	MX	MX
<i>Proatta</i>	-	-	-	-	-	-	-	-	-	-	M	-	-
<i>Stenammas</i>	-	M	Mx	Mx	Mx	Mx	-	-	-	-	m	-	-
<i>Rogeria</i>	Mx	Mx	-	-	-	-	-	-	-	-	-	MX	-
<i>Lordomyrma</i>	-	-	-	-	-	-	M	-	-	M	M	M	m
<i>Lachnomyrmex</i>	m	M	-	-	-	-	-	-	-	-	-	-	-
<i>Geognomicus</i>	-	-	-	-	-	-	M	-	-	-	-	-	-
<i>Dacotinops</i>	-	-	-	-	-	-	-	-	-	-	M	M	-
<i>Adelomyrmex</i>	-	M	-	-	-	-	M	-	-	-	-	M	-
<i>Prodicroaspis</i>	-	-	-	-	-	-	-	-	-	-	-	M	-
<i>Promeranoplus</i>	-	-	-	-	-	-	-	-	-	-	-	M	-
<i>Calyptomyrmex</i>	-	-	-	-	-	-	Mx	M	-	-	M	M	-
<i>Mayriella</i>	-	-	-	-	-	-	-	-	-	-	M	M	Mx
<i>Meranoplus</i>	-	-	-	-	-	-	X	X	X	MX	M	MX	MX
<i>Podomyrma</i>	-	-	-	-	-	-	-	-	-	-	-	MX	MX
<i>Dilobocondyla</i>	-	-	-	-	-	-	-	-	-	-	M	M	-
<i>Terataner</i>	-	-	-	-	-	-	M	-	M	-	-	-	-
<i>Atopomyrmex</i>	-	-	-	-	-	-	X	X	-	-	-	-	-
<i>Poecilomyrma</i>	-	-	-	-	-	-	-	-	-	-	-	M	-
<i>Atopula</i>	-	-	-	-	-	x	M	-	-	Mx	x	-	-
<i>Brunella</i>	-	-	-	-	-	-	-	-	M?	-	-	-	-
<i>Ireneopone</i>	-	-	-	-	-	-	-	-	m	-	-	-	-
<i>Peronomyrmex</i>	-	-	-	-	-	-	-	-	-	-	-	M?	M?
<i>Vollenhovia</i>	-	-	-	-	-	-	-	-	-	M	Mx	M	-
<i>Rhopalomastix</i>	-	-	-	-	-	-	-	-	-	M	M	-	-
<i>Metapone</i>	-	-	-	-	-	-	-	-	MX	M	M	M	MX
<i>Melissotarsus</i>	-	-	-	-	-	-	MX	-	m	-	-	-	-
<i>Liomyrmex</i>	-	-	-	-	-	-	-	-	-	-	M	M	-
<i>Leptothorax</i>	MX	MX	MX	MX	MX	MX	Mx	Mx	M	Mx	-	M	-
<i>Harpagoxenus</i>	-	-	-	Mx	Mx	-	-	-	-	-	-	-	-
<i>Tetramorium</i>	-	-	-	-	X	X	MX	MX	MX	MX	MX	MX	-
<i>Xiphomyrmex</i>	-	-	X	-	-	-	M	MX	MX	M	M	MX	X
<i>Decamorium</i>	-	-	-	-	-	-	-	X	-	-	-	-	-
<i>Rhoptromyrmex</i>	-	-	-	-	-	-	M	X	-	MX	MX	M	-
<i>Triglyphothrix</i>	-	-	-	-	-	-	MX	MX	-	MX	MX	M	-
<i>Eutetramorium</i>	-	-	-	-	-	-	-	-	M	-	-	-	-
<i>Teleutomyrmex</i>	-	-	-	-	X	-	-	-	-	-	-	-	-
<i>Anergates</i>	-	-	-	-	X	-	-	-	-	-	-	-	-
<i>Strongylognathus</i>	-	-	-	-	X	X	-	-	-	-	-	-	-
<i>Macromischoides</i>	-	-	-	-	-	-	M	-	-	-	-	-	-
<i>Tetramyrma</i>	-	-	-	-	-	-	-	X	-	-	-	-	-
<i>Monomorium</i>	-	MX	MX	x	-	X	MX	MX	MX	MX	MX	mX	mX
<i>Huberia</i>	-	-	-	-	-	-	-	-	-	-	-	-	MX
<i>Chelaner</i>	-	-	-	-	-	-	-	-	-	-	-	MX	MX
<i>Hagioxenus</i>	-	-	-	-	-	X	-	-	-	X	-	-	-
<i>Sylophopsis</i>	-	-	-	-	-	-	M	MX	-	-	-	-	-

TABLE I. World Distribution of the Ant Genera—Continued

Genus	Neotropical		Nearctic		Palearctic		Ethiopian		Malagasy	Oriental		Australian	
	S	N	S	N	N	S	N	S		W	E	N	S
<i>Anillomyrma</i>	-	-	-	-	-	-	-	-	-	M?	m?	-	-
<i>Diplomorium</i>	-	-	-	-	-	-	MX	MX	-	-	-	-	-
<i>Paedalgus</i>	-	-	-	-	-	-	MX	-	-	M?	-	-	-
<i>Allomerus</i>	M	M	-	-	-	-	-	-	-	-	-	-	-
<i>Megalomyrmex</i>	MX	MX	-	-	-	-	-	-	-	-	-	-	-
<i>Nothidris</i>	MX	-	-	-	-	-	-	-	-	-	-	-	-
<i>Oxyepoecus</i>	MX	M	-	-	-	-	-	-	-	-	-	-	-
<i>Solenopsis</i>	MX	MX	MX	MX	MX	MX	X	X	-	MX	MX	M	MX
<i>Carebara</i>	MX	M	-	-	-	-	X	X	-	MX	MX	-	-
<i>Carebarella</i>	X?	m	-	-	-	-	-	-	-	-	-	-	-
<i>Pheidologeton</i>	-	-	-	-	-	-	MX	MX	-	MX	MX	M	-
<i>Oligomyrmex</i>	MX	MX	X	-	-	X	MX	MX	M	MX	MX	MX	MX
<i>Tranopelta</i>	MX	M	-	-	-	-	-	-	-	-	-	-	-
<i>Brownidris</i>	MX	-	-	-	-	-	-	-	-	-	-	-	-
<i>Adlerzia</i>	-	-	-	-	-	-	-	-	-	-	-	-	X
<i>Machomyrma</i>	-	-	-	-	-	-	-	-	-	-	-	-	X
<i>Anisopheidole</i>	-	-	-	-	-	-	-	-	-	-	-	-	X
<i>Trigonogaster</i>	-	-	-	-	-	-	-	-	-	X	X	-	-
<i>Lophomyrmex</i>	-	-	-	-	-	-	-	-	-	MX	MX	-	-
<i>Stereomyrmex</i>	-	-	-	-	-	-	-	-	-	X?	-	-	-
<i>Xenomyrmex</i>	-	X	X	-	-	-	-	-	-	-	-	-	-
<i>Myrmecina</i>	-	m	Mx	-	M	Mx	-	-	-	M	M	M	-
<i>Pristomyrmex</i>	-	-	-	-	-	-	M	m	m	MX	M	M	M
<i>Acanthomyrmex</i>	-	-	-	-	-	-	-	-	-	M	M	M	-
<i>Perissomyrmex</i>	-	M	-	-	-	-	-	-	-	-	-	-	-
<i>Ocymyrmex</i>	-	-	-	-	-	-	x	X	-	-	-	-	-
<i>Myrmicaria</i>	-	-	-	-	-	-	mX	mX	-	MX	MX	-	-
<i>Cardiocondyla</i>	-	-	-	-	-	X	mX	X	X	MX	MX	MX	X
<i>Ochetomyrmex</i>	MX	MX	mx	-	-	-	-	-	-	-	-	-	-
<i>Romblonella</i>	-	-	-	-	-	-	-	-	-	-	MX	MX	-
<i>Willowskiella</i>	-	-	-	-	-	-	-	-	-	-	-	M?	-
<i>Creमतogaster</i>	MX	MX	MX	MX	-	MX	MX	MX	MX	MX	MX	MX	MX
<i>Stegomyrmex</i>	M	M	-	-	-	-	-	-	-	-	-	-	-
<i>Phalacromyrmex</i>	M	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tatuidris</i>	-	M	-	-	-	-	-	-	-	-	-	-	-
<i>Basiceros</i>	m	M	-	-	-	-	-	-	-	-	-	-	-
<i>Aspididris</i>	m	M	-	-	-	-	-	-	-	-	-	-	-
<i>Creightonidris</i>	-	M	-	-	-	-	-	-	-	-	-	-	-
<i>Octostruma</i>	m	Mx	-	-	-	-	-	-	-	-	-	-	-
<i>Rhopalothrix</i>	M	M	-	-	-	-	-	-	-	-	-	m	M
<i>Eurhopalothrix</i>	M	Mx	x	-	-	-	-	-	-	-	M	M	m
<i>Cataulacus</i>	-	-	-	-	-	-	MX	MX	MX	MX	MX	-	-
<i>Daceton</i>	-	M	-	-	-	-	-	-	-	-	-	-	-
<i>Acanthognathus</i>	M	M	-	-	-	-	-	-	-	-	-	-	-
<i>Orectognathus</i>	-	-	-	-	-	-	-	-	-	-	-	M	M
<i>Epopostruma</i>	-	-	-	-	-	-	-	-	-	-	-	-	MX
<i>Mesostruma</i>	-	-	-	-	-	-	-	-	-	-	-	-	X
<i>Trichoscapa</i>	-	-	-	-	-	X	X	-	-	X	X	-	-
<i>Colobostruma</i>	-	-	-	-	-	-	-	-	-	-	-	M	MX
<i>Microdaceton</i>	-	-	-	-	-	-	Mx	MX	-	-	-	-	-
<i>Strumigenys</i>	MX	MX	Mx	-	-	-	MX	MX	M	MX	M	M	MX
<i>Neostruma</i>	M	Mx	-	-	-	-	-	-	-	-	-	-	-
<i>Smithistruma</i>	Mx	Mx	MX	MX	-	MX	Mx	MX	-	-	M	-	-
<i>Kyidris</i>	-	-	-	-	-	-	-	-	M	-	M	-	-

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TABLE I. World Distribution of the Ant Genera—Continued

Genus	Neotropical		Nearctic		Palearctic		Ethiopian		Malagasy	Oriental		Australian	
	S	N	S	N	N	S	N	S		W	E	N	S
<i>Serrastruma</i>	-	-	-	-	-	-	Mx	Mx	M	-	-	-	-
<i>Glomyromyrmex</i>	M	M	-	-	-	-	M	-	-	-	-	M	-
<i>Dorisidris</i>	-	X	-	-	-	-	-	-	-	-	-	-	-
<i>Dysedrognathus</i>	-	-	-	-	-	-	-	-	-	-	M	-	-
<i>Epitritus</i>	-	-	-	-	-	MX	M	-	-	M	M	-	-
<i>Pentastruma</i>	-	-	-	-	-	-	-	-	-	-	M?	-	-
<i>Micostruma</i>	-	-	-	-	-	-	M	M	-	-	-	-	-
<i>Quadristruma</i>	-	-	-	-	-	-	X?	-	-	-	-	M	-
<i>Tingimymex</i>	-	M	-	-	-	-	-	-	-	-	-	-	-
<i>Procryptocerus</i>	MX	MX	-	-	-	-	-	-	-	-	-	-	-
<i>Cephalotes</i>	MX	MX	X	-	-	-	-	-	-	-	-	-	-
<i>Apterostigma</i>	m	M	-	-	-	-	-	-	-	-	-	-	-
<i>Cyphomyrmex</i>	MX	MX	X	-	-	-	-	-	-	-	-	-	-
<i>Mycocepurus</i>	MX	MX	-	-	-	-	-	-	-	-	-	-	-
<i>Myrmicocrypta</i>	MX	MX	-	-	-	-	-	-	-	-	-	-	-
<i>Mycetarotes</i>	MX	-	-	-	-	-	-	-	-	-	-	-	-
<i>Trachymyrmex</i>	MX	MX	MX	X	-	-	-	-	-	-	-	-	-
<i>Sericomyrmex</i>	MX	MX	-	-	-	-	-	-	-	-	-	-	-
<i>Acromyrmex</i>	MX	MX	X	-	-	-	-	-	-	-	-	-	-
<i>Atta</i>	MX	MX	X	-	-	-	-	-	-	-	-	-	-
DOLICHODERINAE													
<i>Aneuretus</i>	-	-	-	-	-	-	-	-	-	M	-	-	-
<i>Leptomymex</i>	-	-	-	-	-	-	-	-	-	-	-	Mx	Mx
<i>Dolichoderus</i>	Mx	Mx	MX	MX	MX	MX	-	-	-	MX	MX	M	MX
<i>Monoceratoclinea</i>	-	-	-	-	-	-	-	-	-	-	-	M	-
<i>Linepithema</i>	-	M?	-	-	-	-	-	-	-	-	-	-	-
<i>Semonius</i>	-	-	-	-	-	-	X?	mX	-	-	M?	-	-
<i>Axinidris</i>	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Liometopum</i>	-	-	X	X	-	X	-	-	-	-	mX	-	-
<i>Turneria</i>	-	-	-	-	-	-	-	-	-	-	-	X	MX
<i>Froggattella</i>	-	-	-	-	-	-	-	-	-	-	-	-	X
<i>Iridomyrmex</i>	MX	M	X	X	-	-	-	-	-	-	MX	MX	MX
<i>Dorymyrmex</i>	X	X	X	X	-	-	-	-	-	-	-	-	-
<i>Forelius</i>	X	x	X	x	-	-	-	-	-	-	-	-	-
<i>Neoforelius</i>	X	-	-	-	-	-	-	-	-	-	-	-	-
<i>Bothriomyrmex</i>	-	-	-	-	-	X	-	-	-	X	X	X	X
<i>Azteca</i>	M	MX	-	-	-	-	-	-	-	-	-	-	-
<i>Engramma</i>	-	-	-	-	-	-	M	-	-	-	-	-	-
<i>Tapinoma</i>	MX	MX	MX	MX	-	mX	mX	mX	X?	mX	MX	X	-
<i>Echphorella</i>	-	-	-	-	-	-	-	X	-	-	-	-	-
<i>Technomyrmex</i>	-	-	-	-	-	-	Mx	MX	M	MX	M	M	MX
<i>Anillidris</i>	X?	-	-	-	-	-	-	-	-	-	-	-	-
<i>Zatapinoma</i>	-	-	-	-	-	-	-	-	-	X?	-	X	-
FORMICINAE													
<i>Myrmoteras</i>	-	-	-	-	-	-	-	-	-	M	Mx	-	-
<i>Oecophylla</i>	-	-	-	-	-	-	MX	-	-	MX	MX	MX	-
<i>Gesomyrmex</i>	-	-	-	-	-	-	-	-	-	mx	Mx	-	-
<i>Myrmecorhynchus</i>	-	-	-	-	-	-	-	-	-	-	-	-	Mx
<i>Melophorus</i>	-	-	-	-	-	-	-	-	-	-	-	-	X
<i>Notoncus</i>	-	-	-	-	-	-	-	-	-	-	-	-	MX
<i>Pseudonotoncus</i>	-	-	-	-	-	-	-	-	-	-	-	-	MX
<i>Prolasius</i>	-	-	-	-	-	-	-	-	-	-	-	-	Mx

TABLE I. World Distribution of the Ant Genera—Continued

Genus	Neotropical		Nearctic		Palearctic		Ethiopian		Malagasy	Oriental		Australian	
	S	N	S	N	N	S	N	S		W	E	N	S
<i>Lasiophanes</i>	MX	-	-	-	-	-	-	-	-	-	-	-	-
<i>Acropyga</i>	m	M	-	-	-	m	M	-	-	MX	MX	MX	MX
<i>Aphomomyrmex</i>	-	-	-	-	-	-	M	M	-	-	-	-	-
<i>Cladomyrma</i>	-	-	-	-	-	-	-	-	-	M	M	-	-
<i>Brachymyrmex</i>	MX	MX	MX	MX	-	-	-	-	-	-	-	-	-
<i>Myrmelachista</i>	MX	MX	-	-	-	-	-	-	-	-	-	-	-
<i>Pseudaphomomyrmex</i>	-	-	-	-	-	-	-	-	-	-	M	-	-
<i>Plagiolepis</i>	-	-	-	-	mx	MX	MX	MX	MX	MX	MX	X	X
<i>Anoplolepis</i>	-	-	-	-	-	-	MX	MX	-	MX	X	X	-
<i>Acantholepis</i>	-	-	-	-	-	X	MX	MX	-	MX	MX	M?	-
<i>Stigmacros</i>	-	-	-	-	-	-	-	-	-	-	-	-	MX
<i>Prenolepis</i>	-	MX	MX	MX	-	MX	-	-	-	MX	mx	-	-
<i>Euprenolepis</i>	-	-	-	-	-	-	-	-	-	-	M	M	-
<i>Paratrechina</i>	MX	MX	MX	MX	-	MX	MX	MX	MX	MX	MX	MX	MX
<i>Pseudolasius</i>	-	-	-	-	-	-	MX	MX	-	Mx	Mx	M	-
<i>Lasius</i>	-	-	MX	MX	MX	MX	-	-	-	-	MX	-	-
<i>Acanthomyops</i>	-	-	MX	MX	-	-	-	-	-	-	-	-	-
<i>Myrmecocystus</i>	-	-	X	X	-	-	-	-	-	-	-	-	-
<i>Teratomyrmex</i>	-	-	-	-	-	-	-	-	-	-	-	-	M
<i>Cataglyphis</i>	-	-	-	-	-	X	x	-	-	-	-	-	-
<i>Proformica</i>	-	-	-	-	-	MX	-	-	-	-	-	-	-
<i>Formica</i>	-	-	MX	MX	MX	MX	-	-	-	-	mx	-	-
<i>Polyergus</i>	-	-	X	X	X	X	-	-	-	-	-	-	-
<i>Rossomyrmex</i>	-	-	-	-	-	X	-	-	-	-	-	-	-
<i>Gigantiops</i>	-	M	-	-	-	-	-	-	-	-	-	-	-
<i>Santschiella</i>	-	-	-	-	-	-	M	-	-	-	-	-	-
<i>Opisthopsis</i>	-	-	-	-	-	-	-	-	-	-	-	MX	x
<i>Notostigma</i>	-	-	-	-	-	-	-	-	-	-	-	M	MX
<i>Camponotus</i>	MX	MX	MX	MX	MX	MX	MX	MX	MX	MX	MX	MX	MX
<i>Phasmomyrmex</i>	-	-	-	-	-	-	M	-	-	-	-	-	-
<i>Overbeckia</i>	-	-	-	-	-	-	-	-	-	-	M	-	-
<i>Dendromyrmex</i>	-	M	-	-	-	-	-	-	-	-	-	-	-
<i>Calomyrmex</i>	-	-	-	-	-	-	-	-	-	-	-	MX	X
<i>Echinopla</i>	-	-	-	-	-	-	-	-	-	M	M	M	-
<i>Polyrhachis</i>	-	-	-	-	-	X	MX	MX	-	MX	MX	MX	MX
<i>Forelophilus</i>	-	-	-	-	-	-	-	-	-	-	M	-	-

Faunal Relationships Among the Main Tropical Areas

Given the data array in the table above, our problem is to extract from it the faunal differences and similarities among the three major regions of the earth that contain most of the mesic tropical forest. In the New World, most of such forest is found in the northern half of South America; with extensions north and south. In Africa, the main mesic tropical forests are in the Congo and along the underside of the West African bulge. A fragmented

"Oriental-Australian" belt stretches from southwestern India to northeastern Australia and the Melanesian chains. In addition, Madagascar has a strip of wet tropical forest in the east that is nearly a thousand miles long from north to south. I shall not discuss Madagascar further, except to say that its incompletely known ant fauna, while rich in endemic species, contains relatively few genera, most of them occurring in both tropical Africa and in the Oriental region. In the lists given below, tramp species spread by human commerce are listed only for their assumed native homelands.

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The first thing we count are the genera that occur in all three regions: Neotropical, Ethiopian, and Oriental-Australian (i.e., "tropicopolitan" genera). For the moment, we shall accept the fact that the Oriental merges gradually into the Australian region within the tropics; in other words, they are not separated by a cold-temperature barrier. (The genera indicated by an asterisk (*) occur now outside the tropics in the Northern Hemisphere, or are represented there by Tertiary fossils.) Then we count those genera shared by each pair of major tropical regions, but not occurring in the third region (Table 2).

"Tropicopolitan" Genera
(total: 29)

*Amblyopone	*Hypoconera	*Strumigenys
*Prionopelta	*Leptogenys	*Smithistruma
*Proceratium	*Odontomachus	Glamyromyrmex
*Discothyrea	*Pheidole	(including
*Platythyrea	Adelomyrmex	Codiomyrmex)
Probolomyrmex	*Leptothorax	*Tapinoma
Sphinctomyrmex	*Monomorium	Acropyga
*Cerapachys	*Solenopsis	*Paratrechina
Centromyrmex	Carebara	*Camponotus
*Pachycondyla	*Oligomyrmex	
*Cryptopone	*Crematogaster	

Ethiopian and Oriental-Australian Genera
(total: 30)

Mystrium	*Tetramorium	*Epitritus
Simopone	*Xiphomyrmex	Quadristruma
*Brachyponera	*Rhoptromyrmex	Semonius
*Dorylus	Triglyphothrix	Technomyrmex
*Aenictus	Paedalgus	*Oecophylla
*Tetraopone	Pheidologeton	*Plagiolepis
Lordomyrma	*Pristomyrmex	Anoplolepis
Calypatomyrmex	Myrmecaria	*Acantholepis
Meranoplus	*Cardiocondyla	Pseudolasius
Atopula	*Cataulacus	*Polyrhachis

Neotropical and Oriental-Australian Genera
(total: 12)

*Heteropone	*Stenamma	Rhopalothrix
*Gnamptogenys	Rogeria	*Dolichoderus
*Ponera	*Myrmecina	Iridomyrmex
*Aphaenogaster	*Eurhopalothrix	*Prenolepis

Ethiopian and Neotropical Genera
(none)

TABLE 2. Genera of Ants Known to be Shared between Different Pairs of the Main Tropical Mesic Forest Areas of the Earth (The totals entered above the diagonal include the 29 genera shared by all three areas; those below the diagonal exclude the widespread 29.)

Region	Ethiopian	Neotropical	Oriental-Australian
Ethiopian	—	29	59
Neotropical	0	—	41
Oriental-Australian	30	12	—

As we move from Africa toward Australia, the number of genera shared by subregions decreases with increasing distance. Thus, if we compare Africa with just the Australian region, we find that they have only 22 genera in common. And if we exclude the 10 African genera that enter only the northern part of the Australian region, the number of genera shared by sub-Saharan Africa and the main part of the Australian continent drops to 12. So we see that the Oriental-Australian region and South America compared on the one hand, and Africa with Australia on the other, have a similar level of generic sharing.

ENDEMIC GENERA

The genera endemic to the four main regions make up an interesting category. In counting, I include as "endemic" to the neotropical region those genera centered in the American tropics, but with a few species entering the southern nearctic region. Also, those genera that extend from Africa into the Malagasy region, but not beyond, are considered Ethiopian endemics in these counts.

Neotropical	65	Oriental	22
Ethiopian	31	Australian	32

About 10 more genera occur only in the Australian region and the eastern part of the Oriental region.

As one might expect, the neotropical region shows the highest endemism, and the Oriental the lowest, in consonance with their differing degrees of geographical isolation.

The Ethiopian and Australian regions have about the same number of endemic genera, but in

Africa more of the genera seem to be tied to the closed-canopy forest, they tend to have fewer species, and they seem more often than not to have evolved from derivative rather than primitive relatives. In Australia, more of the endemic genera seem to have radiated into drier vegetational zones, and radiation has been more extensive; also, they have in general a more primitive complexion than do Ethiopian-region endemics. If these impressions can be trusted, I think they add to the general picture of the Ethiopian fauna being relatively younger than the Australian.

SPECIES-GROUP RELATIONSHIPS

A brief look at distribution of species and species-groups shows us quickly that the Africa-South America distributional gap is as clearcut at these levels as it is at genus level. Even tropicopolitan genera tend to be represented by different species groups in Africa and South America, and, except for obvious tramps, I do not know of a single *species* that is shared by these two continents. The few shared species groups that might be cited are mostly those with a high proportion of twig- or other plant cavity-inhabiting species, such as the "*Nesomyrmex*" group of *Leptothorax*, and doubtfully some groups in *Camponotus*, *Crematogaster*, and *Monomorium*; relationships in these last three genera are still very uncertain. Still other genera with a strong twig- or tree trunk-inhabiting component (e.g., *Pseudomyrmex*, *Tetraponera*, *Cataulacus*, *Procryptocerus*, *Cephalotes*, *Azteca*, *Cylindromyrmex*, *Simopone*, *Myrmelachista*) occur on one side of the Atlantic or the other, but not on both sides, showing that this ocean has been a formidable barrier even to the most likely rafting taxa.

In contrast, there is a great deal of sharing of species groups, and even of species, between the Ethiopian and Oriental regions. As taxonomic revision proceeds, these ties are certain to get stronger, because quite a number of species in several genera (e.g., *Pachycondyla*, *Brachyponera*, *Odontomachus*, *Tetramorium*, *Monomorium*, *Camponotus*) appear to be distinguishable only by their distribution east or west of the Indian Ocean. The Oriental-Australian and neotropical regions also share some species groups, and even one species (*Pachycondyla stigma*), if it is not a tramp.

Fossil Ant Faunas Compared with Modern Ones

The fossil remains of ants so far have come almost entirely from the Northern Hemisphere, and there chiefly from localities now within the Temperate Zone. The earliest known ant is *Sphecomyrma freyi* from the Cretaceous of New Jersey, placed in a distinct subfamily, and quite different from any living member of the Formicidae. Eocene ant fossils are few and incomplete or poorly preserved, and tell us little. By Oligocene-Miocene times, though, fossilization overtook two major and several minor assemblages of ants that we can recognize as related to genera and species alive today.

The Oligocene Baltic Amber contains insect remains trapped in the transformed resin of pine-like trees that formed mild climate forests in what is now north-central Europe (Wheeler 1914). The Florissant Shales of central Colorado and similar deposits scattered through the western United States entombed their rich insect remains in the sediments of shallow lakes (Carpenter 1930). In addition, we have fragmentary faunules in amber (Sicily, Chiapas, Burma, etc.) and in shales in southeastern Europe and elsewhere. From these Tertiary beds we have samples totaling over 20,000 specimens worth studying, and these represent nearly 200 species, including a few that have been examined but not yet described.

The best and most informative sample (Wheeler 1914) is that from the Baltic Amber (Oligocene). From the biogeographical point of view, Baltic Amber ants sort into four groups:

1. Extant genera still most prominent in the temperate Northern Hemisphere, and nearly limited to it, chiefly *Myrmica*, *Stenamma*, *Liometopum*, *Lasius* and *Formica*.

2. Living genera now widespread in the North Temperate Zone and more or less so in the tropics: *Ponera*, *Aphaenogaster*, *Leptothorax*, *Dolichoderus*, *Prenolepis*, *Camponotus*.

3. Living genera now found chiefly in the tropics and South Temperate regions (in some cases in the warmer parts of North Temperate Zone): *Platythyrea*, *Gnamptogenys*, *Pachycondyla*, *Tetraponera*, *Vollenhovia*, *Oligomyrmex*, *Monomorium*, *Iridomyrmex*, *Oecophylla*, *Gesomyrmex*, *Pseudolasius*, *Plagiolepis*.

The affinities of category 3 are predominantly Old World. Seven of these 12 genera (including true *Iri-*

domyrmex) are today restricted to the Old World, except for tramps. The remaining five are found in both Old World and New. All 12 now occur in the Oriental-Australian regions, but only eight are in the Ethiopian region.

4. Extinct genera (19), most of them allied to genera now living in the Oriental and Australian regions. Again here the relationships to the Ethiopian region are not quite as strong as they are to the Oriental-Australian, and links to the neotropical region are much weaker.

The Sicilian Amber ants, a small middle Miocene assemblage studied by Emery (1891), comprise only a few genera, such as *Cataulacus*, *Oecophylla*, and *Sicilomyrmex*, predominantly of Old World tropical affinities. The report of male *Crematogaster* in the Sicilian Amber by Emery was later retracted by him.

The Miocene Florissant Shale (Carpenter 1930), and similar but less productive western North American beds, such as Ruby Basin (Montana) and Latah (Washington State) have yielded thousands of specimens, mostly winged queens and males, from shallow-water lacustrine deposits. These are predominantly genera such as *Lasius*, *Formica*, *Liometopum*, and *Protazteca* (the last related to *Iridomyrmex*), with a sprinkling of other ponerine, pseudomyrmecine, myrmicine, dolichoderine, and formicine genera, some of them now extinct. Affinities are on the whole with genera occurring in the same region today, as well as with some now found only farther south in the American tropics. *Crematogaster* is absent from these sedimentary beds, and *Pheidole* is represented only by two doubtful winged queen specimens from Florissant.

The Chiapas Amber of southern Mexico is supposed to be Miocene in age. Though it contains a few ants, none has yet been formally described. I have examined most of the available samples (about 110 specimens), and of these about half are fragmentary, badly decomposed or otherwise in such poor condition that their genus, and often even their subfamily, cannot be determined with certainty. Fairly common among identifiable remains are males of three or more species of ectatommine Ponerinae, and light-colored workers of what seems to be one species of *Azteca*. A few workers represent the *pyramicus* group of *Dorymyrmex*, and there are a few poor examples of *Camponotus* and possibly of *Lasius*. A winged queen lacking a

head and pronotum is *Pachycondyla* (= *Trachymesopus*) *stigma* or something very close to it, and some winged myrmicines appear to be attine males resembling those of *Mycetosoritis*. Two shrunken and distorted workers resemble *Stenammas*, and three workers in fair condition could well be minors of *Pheidole*; this last identification is fairly firm, but the specimens need to be recut and studied in detail. There is also a winged male, unfortunately with the dorsal side largely obscured by bubbles, that is almost certainly a *Crematogaster*; the wing venation agrees very well with that of many recent species of that genus, and the petiole, postpetiole and gastric base, while obscured and twisted, are apparently crematogastrine in form. The antennal pedicel is short and subglobular.

The Chiapas Amber faunule is not too different from what we might expect of a small resin-trapped sample of ants found in southern Mexico today. The specimens of greatest interest are the possible *Crematogaster* and *Pheidole*. The finding of *Crematogaster* workers and *Pheidole* soldiers or winged forms is needed to confirm these identifications. Meanwhile, for me at least, the presence of these two genera in the Miocene of tropical Mexico must be considered likely, unless the amber dating is questioned.

Taken all together, Tertiary fossil faunas of the Northern Hemisphere are an interesting mixture. Certain species of *Ponera*, *Dolichoderus*, *Liometopum*, *Formica*, *Lasius*, and *Prenolepis* of Amber times (Oligocene-Miocene) can often be matched rather closely to species of these genera existing today in the North Temperate Zone. At least, it can be claimed that they often represent the same species groups. This fact has been used to call ant evolution "stagnant since the Miocene" (Mayr 1942:140), an opinion that ignores important extinctions and geographical contractions of many ant genera since mid-Tertiary times, and also overlooks the world-wide expansion since then of now-dominant genera such as *Pheidole*, *Crematogaster*, *Tetramorium*, and *Camponotus*, whose combined species certainly number in the thousands. These expansions are worth outlining here.

Pheidole, with hundreds of described and undescribed species, is a dominant genus in tropical rain forest, warm semidesert, and some mild temperate areas in most parts of the earth. It does not seem to be represented in any pre-Miocene deposits, but

has been reported from the Florissant Shale (Carpenter 1930) based on two winged females. Now I have found three (minor?) workers in the Chiapas Amber that may well be a species of *Pheidole*. Due to the indifferent preservation of both amber and shale specimens, especially the latter, these identifications should be regarded with reserve, as has already been stated above.

Pheidole today has many species that forage intensively on the trunks, branches, and foliage of herbs, shrubs, and trees; and some of these in all main distribution areas live under tree bark or in the epiphytes growing on the trees. One would expect it to have been caught in the resin had it been present in the Baltic Amber forests. In some rain forests (e.g., lowland Costa Rica) I have found *Pheidole* to be far and away the dominant ant genus collected by beating understorey foliage. I think we can assume that *Pheidole* was absent, or at least very rare, in the Northern Hemisphere through middle Miocene times. If this genus arose in Africa or South America during the Tertiary, it has had a spectacularly explosive evolutionary history since the Miocene.

Crematogaster, another dominant and widespread myrmicine genus, also has a blank fossil history up to the Miocene. Like *Pheidole*, it must have spread mainly since the mid-Tertiary, since the only known fossil is a single male in the Chiapas Amber. The distribution of *Crematogaster* is especially interesting when compared with that of the dolichoderine genus *Iridomyrmex*. Although these two genera are of course not at all closely related, they have entered a very similar adaptive zone. Both have many species that form powerful, populous colonies. The colonies often attend Homoptera on plant stems and foliage, and they form long, often dense columns from nest to food source. According to species, the nests may be situated in the ground, in termite nests, in natural plant cavities, in rotting logs or tree trunks, or in epiphytes. *Crematogaster* tends to build primary or auxiliary nests of carton in shrubs or trees, whereas this tendency is weak or absent in most *Iridomyrmex*. Both genera have defensive secretions emitted from the gastric apex. These secretions repel other arthropods and also become gummy on exposure to air, so that they can glue an arthropod enemy's antennae and limbs together if it gets smeared with the stuff. Both *Crematogaster* and *Iridomyrmex* have the

waist and gaster so constructed that the latter can be raised vertically, and even thrust forward above the head, in order to direct the tip of the gaster against a potential foe. The structural modifications that allow this acrobatic defense system are quite different in detail, and the method of application is also very divergent: *Crematogaster* holds its drop of viscous poison on the end of its flexible (and often spatulate) sting, while *Iridomyrmex*, effectively lacking a sting, simply extrudes its gluey poison through an orifice under the tip of the gaster. Thus, while the two systems of defense are obviously very different in evolutionary origin, they apparently have converged to do much the same kind of job.

In view of their adaptive convergence, it is easy to see why *Crematogaster* and *Iridomyrmex* are distributed over the earth in such a complementary pattern. Unfortunately, the taxonomy of both these genera is at present chaotic. The *Iridomyrmex* of the New World differs from that of the Old World in both internal and external gastric structure of the worker caste, and they cannot be considered as congeneric. In my opinion, the New World *Iridomyrmex* species are very close to *Forelius*, and through *Forelius* they apparently connect with the *Dorymyrmex* complex of species, which is also confined to the New World. The situation requires a thorough revision utilizing karyotypic and other cryptic characters. Work is in progress, but for now I have no definitive arrangement to offer. At any rate, the true *Iridomyrmex* of the Old World and the "*Iridomyrmex*"-*Forelius*-*Dorymyrmex* complex of the Americas appear to be cognate lineages within tribe Tapinomini, and it makes little difference if we consider them together as one taxon for purposes of contrast to *Crematogaster*.

The genus *Crematogaster* forms a tribe, isolated and distinct among the Myrmicinae, and up to now with no identifiable relatives in that subfamily. The genus has been split into subgenera, but these are apparently only species groups, and some of them weak at that. The species-level taxonomy is difficult, due to the great number of species, the close relationships among them, and their considerable variability, which is often allometric. Unfortunately, some of the most irresponsible and profligate descriptive publication ever visited upon the ants has left *Crematogaster* a taxonomic shambles. Buren, Kempf, and one or two other myrmecolo-

gists have begun to sift through this trash-heap in an effort to sort out the names—one to a species; but it will be a long time until these workers can bring enough order for us to make fairly accurate species lists. More than 900 names (species, subspecies, and varieties) have been proposed, but I doubt that more than half of these will prove to be valid species. The nearctic fauna, which through the revisionary efforts of Buren (1968) is probably somewhere near being worked out, numbers about 25 species. Tropical America should have at least another 50, possibly more. From the existing literature, I would guess the real numbers of species in Africa with Madagascar to be about 175, in the southern palearctic about 15, in the Oriental region about 125, in Melanesia about 50, and in Australia about 30. Interestingly, *Crematogaster* fails to reach Fiji, New Zealand, or Polynesia; it is not yet known from Chile, and in Argentina it is sparsely represented only in the north.

The weight of distribution of *Iridomyrmex* in the Old World regions is just the opposite: Africa and palearctic, 0; Oriental, about 5, in the eastern part only; Melanesia, 25–30; Australia, about 80. *Iridomyrmex* does not reach far into the Pacific, although a few tramp species have been carried into New Zealand and Polynesia by man. It is interesting to note that as one goes from north to south on the Australian continent, *Crematogaster* seems to become less abundant generally and less varied, while *Iridomyrmex* species tend to become more dominant and diverse; it seems fair to say that the latter is the overall dominant ant genus in southern Australia. In New Guinea, the two genera are much more evenly balanced. The New World *Iridomyrmex* counterparts are most abundant and diverse, with perhaps some 40 species, in southern South America, mostly in Argentina, Chile, and southeastern Brazil. They are modestly represented in the Andes and on the dry west coast of South America, and three or four species reach northward into the drier and warmer sections of the nearctic region. Notably, members of this complex are very poorly represented in the Amazonian and Central American rain forest, even if we allow that the handful of "*Tapinoma*" species known from these areas may really belong to the "*Iridomyrmex*"-*Forelius-Dorymyrmex* complex.

Going back to the Tertiary, it is clear from the Baltic Amber that *Iridomyrmex* was a dominant

genus in the Oligocene. The five *Iridomyrmex* species recognized by Wheeler (1914) comprised well over half of the nearly 12,000 specimens that he and other specialists determined from that formation. In the Florissant Shale, *Iridomyrmex* occurs in much reduced numbers, but the related genus *Protazteca* was dominant (more than a quarter of the approximately 5600 specimens), and the subfamily Dolichoderinae still represented 63 percent of the total specimens, a proportion not significantly changed from the 64 percent of the Baltic Amber. In both the Baltic Amber and the Florissant Shales, the Formicinae make up about one-third (32%) of the individuals, and the Myrmicinae 5 percent or less, though the latter subfamily shows a considerable diversity of genera and species in both formations. This pattern compared with the modern distribution implies the massive replacement of the Dolichoderinae, primarily by genera of the Myrmicinae, in the Northern Hemisphere since the Miocene. The myrmicine taxa most widely involved in this replacement were *Pheidole*, *Crematogaster*, and *Tetramorium*, with *Myrmica* prominent in the cooler regions.

This hypothesis runs directly counter to that put forward by Haskins (1939:158–162), which has the Dolichoderinae and Formicinae, with their thin, flexible integuments, replacing the relatively heavily armored Myrmicinae and Ponerinae. Haskins' evolutionary scheme rests on two questionable assumptions, the first of which is that such species as *Iridomyrmex humilis* (the "Argentine Ant") are "world-conquerors." He believes that *I. humilis* "undertook a campaign of expansion which has left almost no part of the tropical world which is inhabited by humans unknown to it." Apparent victories in the struggle for territory have been won by the Argentine Ant, but only in lands with a more or less warm-temperate, especially a winter-rainfall or Mediterranean-type climate. In the last 20 years, in fact, *I. humilis* has arrived at an apparently rather stable distribution in its adopted countries, and this distribution describes a well-defined double belt around the earth, lying mainly outside the tropics. The chief mortal enemy that *I. humilis* is supposed to be vanquishing is *Pheidole megacephala*, a myrmicine which, however, now appears to be holding the line at the midlength of the Florida peninsula, in midcoastal Queensland, and elsewhere at the outer boundaries of the tropics.

Within the tropics, *P. megacephala* excludes *I. humilis* everywhere in culture areas except in the South American uplands in which *I. humilis* and its relatives are endemic. *I. humilis* has done no better against the imported Fire Ant (*Solenopsis invicta*, a myrmicine), which has successfully invaded Argentine Ant strongholds in the southern United States and flourished there (see also Fluker and Beardsley 1970).

Haskins' second assumption (1939:45,159) is that the dolichoderines and formicines, because of their often thinner and more flexible integument, have greater sensory contact with the environment, and somehow, in connection with this, are more adaptable in their relationships with the outside world. Inasmuch as the relationship between integumental thickness and actual density of sensory receptors remains to be established, this assumption is unwarranted. Furthermore, it is not a foregone conclusion that myrmicine integuments are prevailing thicker than those of dolichoderines and formicines; in fact, the situation has never been properly surveyed.

Regardless of these considerations, the evidence of zoogeography and paleontology rather conclusively reverses the hypothesis that the Dolichoderinae are today evolutionary winners and the Myrmicinae evolutionary losers.

Tetramorium is the central genus of a complex also including the extant genera *Xiphomyrmex*, *Triglyphothrix*, *Macromischoides*, *Rhoptrymyrmex*, and *Strongylognathus*. Of these genera, *Xiphomyrmex* (worker-queen antennae 11-merous and sting with a rounded-spatulate appendage) is only weakly differentiated from *Tetramorium* and *Triglyphothrix* (worker antennae 12-merous, sting appendage perpendicular to shaft and sharply dentiform or pennant-shaped). *Triglyphothrix* is distinguished mainly by its branched pilosity. All of these characters may show exceptions or intergradient conditions, and only a careful revision will tell whether the three genera deserve separate status. At any rate, no member of the tetramoriine complex is native to the New World except *Xiphomyrmex spinosus*, a perfectly typical member of this genus that occurs widely in the Sonoran arid lands of North America (Brown 1957, 1964). How this single tetramoriine reached its present range, so far from any of its congeners, we can only guess. The tetramoriines are apparently unrepresented in

Tertiary deposits, but they are very common now (in places co-dominant) throughout the southern palearctic and Africa, and are common and diverse over much of the Oriental, Malagasy, and northern Australian regions, though poorly represented in the southern Australian region. The present and fossil distributions suggest that *Tetramorium* and its offshoots represent another group that has radiated and spread mainly or entirely since the middle of the Tertiary.

Camponotus, the largest and certainly one of the most important living ant genera, probably contains over a thousand valid species. It is also the most widespread and ecologically tolerant genus, reaching as it does Chile and central Argentina, the Arctic Circle, Mauritius, central Polynesia, New Zealand, and Tasmania. A single species is present in the Baltic Amber, where it constitutes only about 1 percent of the identified formicid specimens. In Miocene formations, *Camponotus* is still not abundant in individuals, but several species are present. Since species of this genus usually attend Homoptera and are very frequent foragers on trees and shrubs, one would expect good representation in the amber deposits. The pattern of evolution suggested for *Camponotus* by the fossil record and present distribution is one of a slow but continuous radiation and expansion from a modest beginning made during or just before the Oligocene.

Conclusions and Summary

1. The ant faunas of sub-Saharan Africa and the neotropical region, including those of their rain forests, are very different from one another at both the species group and generic levels. They share only 29 genera, all are widespread in the tropics, and most of them are also in the Northern Hemisphere now or in Tertiary deposits.

2. Analysis of distributions of ant genera suggests the hypothesis that at least from mid-Tertiary times, evolution of world-dominating new taxa has proceeded mainly from combined tropical Africa-southern Asia. Warm-country dominant taxa, such as *Pheidole* and *Crematogaster*, probably originated in this area, and have spread explosively over the rest of the earth from about the Miocene. *Camponotus*, which arose earlier in the Tertiary, may also fit this pattern in a general way.

3. Dominant Old World genera, such as *Dorylus*, *Tetramorium*, *Acantholepis*, *Anoplolepis* and *Polyrhachis*, are in earlier stages of the same kind of spread. *Monomorium* is distributed in a pattern intermediate between these genera and *Camponotus*.

4. Genera or genus groups well represented in the neotropical and Indo-Australian regions, and absent or very rare in Africa, are the peripheral relicts of older taxal waves that are now being replaced from the central Old World tropics.

5. Contrary to an earlier hypothesis, it appears that genera of Myrmicinae, especially *Pheidole* and *Crematogaster*, now have the upper hand as expanding world-dominant taxa at the expense mainly of the Dolichoderinae, which are contracting toward the periphery of the ant-inhabited world. The Formicinae appear to be holding their own.

6. Generic distributions offer no encouragement to the hypothesis of extensive direct exchanges among the southern landmasses, except that the impoverished New Zealand ant fauna shows clear signs of having been derived from Australia by transoceanic immigration.

7. The total evidence for the ants tends to support the proposition that all of the living genera could have evolved and reached their present distributions since the beginning of the Tertiary and within a geographical frame of reference substantially like that of today. Fossil and present distributions of ant taxa fit well the Darlingtonian zoogeographical model based on vertebrate and coleopteran patterns.

References

- Brian, M. V. 1965. Social insect populations. vii + 135 pp. Academic Press, London and New York.
- Brown, W. L., Jr. 1957. Is the ant genus *Tetramorium* native in North America? *Brev. Mus. Comp. Zool. Harv.* 72:1-8.
- . 1964. Solution to the problem of *Tetramorium lucayanum* (Hymenoptera: Formicidae). *Entomol. News* 75:130-132.
- Buren, W. F. 1968. A review of the species of *Crematogaster*, sensu stricto, in North America (Hymenoptera, Formicidae), Part II: Descriptions of new species. *J. Georgia Entomol. Soc.* 3:91-121.
- Carpenter, F. M. 1930. The fossil ants of North America. *Bull. Mus. Comp. Zool. Harv.* 70:1-66, 11 pl.
- Darlington, P. J., Jr. 1957. Zoogeography: The geographical distribution of animals. xiv + 675 pp. John Wiley and Sons, New York.
- Emery, C. 1891. Le formiche dell'ambra siciliana nel museo mineralogico dell'Università di Bologna. *Mem. R. Accad. Sci. Inst. Bologna* (5)1:141-165, pl. 1-3.
- Fluker, S. S., and J. W. Beardsley. 1970. Sympatric associations of three ants: *Iridomyrmex humilis*, *Pheidole megacephala*, and *Anoplolepis longipes* in Hawaii. *Ann. Entomol. Soc. Amer.* 63:1290-1296.
- Haskins, C. P. 1939. Of ants and men. vii + 244 pp. Prentice-Hall, Inc. New York.
- Mayr, E. 1942. Systematics and the origin of species. 334 pp. Columbia Univ. Press, New York.
- Moreau, R. E. 1966. The bird faunas of Africa and its islands. ix + 424 pp. Academic Press, New York and London.
- Vanzolini, P. E., and E. E. Williams. 1970. South American anoles: The geographic differentiation and evolution of the *Anolis chrysolepis* species group (Sauria, Iguanidae). *Arq. Zool., São Paulo* 19:1-298.
- Wheeler, W. M. 1914. The ants of the Baltic Amber. *Schrift. Phys.-ökon Ges Königsberg* 55[1915]:1-142.
- Wilson, E. O. 1959. Adaptive shift and dispersal in a tropical ant fauna. *Evolution* 13:122-144.
- Wilson, E. O., and R. W. Taylor. 1967. The ants of Polynesia (Hymenoptera: Formicidae). *Pacific Insects Monogr.* 14: 1-109.
- Zimmerman, E. C. 1948. *Insects of Hawaii, I: Introduction.* xii + 206 pp. Univ. Hawaii Press, Honolulu.

Appendix: Generic and Subgeneric Names Proposed in the Family Formicidae

Some readers will find that familiar names have not been included in the zoogeographical table. The omissions are accounted for in the list below, in which I have tried to set down every available generic and subgeneric name that has ever been proposed for the Formicidae. The equality sign (=) indicates synonymies, both those long recognized by myrmecologists and a good many more "projected synonymies" that have never been proposed anywhere formally in print. It should be understood that almost all of the synonyms listed, whether widely accepted or here projected, are subjective

ones. For this reason, I make no distinction between them, except that I have placed a question mark (?) after especially controversial cases. As already explained in the body of the text preceding Table 1, more projected synonyms could easily be added to this list. I have not made such additions because the information available now does not allow a reasonable guess as to how these cases will be settled.

Certain of the projected synonyms will doubtless be unacceptable to someone, and some of them will probably be rejected when more evidence is in. But

I do not think that any of them are completely unreasonable in the light of our present information. The main reason why these provisional decisions have been made here is that they greatly shorten and simplify the zoogeographical tables and the conclusions based on the tables. It does not make a great deal of difference whether, for example, the Cephalotini contain two genera or four; this tribe is a tightly knit, obviously monophyletic

New World lineage. On the other hand, it is important that the diverse elements I here include in *Pachycondyla* (e.g., *Mesoponera*, *Trachymesopus*, *Myopias*, *Trapeziopelta*, *Neoponera*, *Bothroponera*, *Pseudoponera*, *Wadeura*, *Ectomomyrmex*) should be recognized as very closely related, even if characters are eventually found to split this group into two or more formal genera.

Acalama M. R. Smith 1948 = *Vollenhovia*
 Acamatus Emery 1894 = *Neivamyrmex*
 Acanthidris Weber 1941 = *Rhopalothrix*
 Acanthoclinea Wheeler 1935 = *Dolichoderus*?
 Acanthognathus Mayr 1887
 Acantholepis Mayr 1861 [preoccupied]
 Acanthomyops Mayr 1862
 Acanthomyrmex Emery 1892
 Acanthoponera Mayr 1862
 Acanthostichus Mayr 1887
 Acidomyrmex Emery 1915 = *Rhoptromyrmex*
 Acrocoelia Mayr 1852 = *Crematogaster*
 Acromyrmex Mayr 1865
 Acropyga Roger 1862
 Acrostigma Emery 1891 = *Podomyrma*
 Acrostigma Forel 1902 = *Stigmacros*
 Adelomyrmex Emery 1897
 Adformica Lomnicki 1925 = *Formica*
 Adlerzia Forel 1902
 Aenictogiton Emery 1901
 Aenictus Shuckard 1840
 Aeromyrma Forel 1891 = *Oligomyrmex*
 Aethiopocone Santschi 1930 = *Sphinctomyrmex*
 Agroecomymex Wheeler 1910 [fossil only]
 Alaopone Emery 1881 = *Dorylus*?
 Alfaria Emery 1896 = *Gnamptogenys*
 Alistruma Brown 1948 = *Colobostruma*
 Alloformica Dlussky 1969 = *Proformica*
 Allomerus Mayr 1877
 Allopheidole Forel 1912 = *Pheidole*
 Amauomyrmex Wheeler 1929 = *Pheidologeton*
 Amblyopone Erichson 1842
 Amblyopone Dalla Torre 1893 [emendation] =
 Amblyopone
 Ameghinoa Viana and Haedo Rossi 1957 [fossil only]
 Ammomyrma Santschi 1922 = *Dorymyrmex*?
 Amyrmex Kusnezov 1953
 Anacantholepis Santschi 1914 = *Plagiopis*
 Anacanthoponera Wheeler 1923 = *Heteroponera*
 Ancylognathus Lund 1831 = *Eciton*
 Ancyridris Wheeler 1935 = *Lordomyrma*?
 Andragathus Emery 1922
 Aneleus Emery 1900 = *Oligomyrmex*

Anergates Forel 1874
Anergatides Wasmann 1915 = *Pheidole*?
Aneuretus Emery 1892
Anillidris Santschi 1936
Anillomyrma Emery 1913
Anisopheidole Forel 1914
Anochetus Mayr 1861 = *Odontomachus*
Anomma Shuckard 1840
Anonychomyrma Donisthorpe 1947 = *Iridomyrmex*?
Anoplolepis Santschi 1914
Anoplomyrma Chapman 1963 = *Polyrhachis*
Antillaemyrmex Mann 1920 = *Leptothorax*?
Aphaenogaster Mayr 1853
Aphantolepis Wheeler 1930 = *Technomyrmex*
Aphomyrmex Emery 1899
Aphomyrmex Ashmead 1905 = *Pseudaphomyrmex*
Apomyrma Brown, Gotwald and Léviex 1971
Aporomyrmex Faber 1969 = *Plagiopis*
Apsychomyrmex Wheeler 1910 = *Adelomyrmex*
Apterocrema Wheeler 1936 = *Crematogaster*
Apterostigma Mayr 1865
Aratromyrmex Stitz 1938 = *Liomyrmex*
Araucomyrmex Gallardo 1919 = *Dorymyrmex*?
Archaeomyrmex Mann 1921 = *Myrmecina*
Archaeatta Gonçalves 1942 = *Atta*
Archimyrmex Cockerell 1923 [fossil only]
Archiponera Carpenter 1930 [fossil only]
Arctomyrmex Mann 1921 = *Adelomyrmex*
Arnoldidris Brown 1950 = *Orectognathus*
Arotropus Provancher 1881 = *Amblyopone*
Asemorhoptrum Mayr 1861 = *Stenamma*
Asphinctopone Santschi 1914
Aspididris Weber 1950
Asymphyomyrmex Wheeler 1915 [fossil only]
Atopodon Forel 1912 = *Acropyga*
Atopogyne Forel 1911 = *Crematogaster*
Atopomyrmex Ern. André 1889
Atopula Emery 1912
Atta Fabricius 1804
Attomyrma Emery 1915 = *Aphaenogaster*
Attopsis Heer 1850 [fossil only]
Aulacomyrma Emery 1921 = *Polyrhachis*
Aulacopone Arnoldi 1930

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- Austrolasius* Faber 1969 = *Lasius*
Axinidris Weber 1941
Azteca Forel 1878
Aztecum Bertkau 1879 [emendation] = *Azteca*

Barbourella Wheeler 1930 = *Gnamptogenys*
Basiceros Schulz 1906
Belonopelta Mayr 1870
Biconomyrma Kusnezov 1952 = *Dorymyrmex*?
Bisolenopsis Kusnezov 1953 = *Solenopsis*
Blepharidatta Wheeler 1915 = *Ochetomyrmex*
Bondroitia Forel 1911 = *Diplomorium*
Borgmeierita Brown 1953 = *Glamyromyrmex*
Bothriomyrmex Emery 1869
Bothroponera Mayr 1862 = *Pachycondyla*
Brachymyrmex Mayr 1868
Brachyponera Emery 1901
Bradoponera Mayr 1868 [fossil only]
Bradyponera Mayr 1886 = *Pachycondyla*
Bregmatomyrma Wheeler 1929
Brownidris Kusnezov 1957
Bruchomyrma Santschi 1922 = *Pheidole*?
Brunella Forel 1917 [preoccupied]
Brysha Santschi 1925 = *Brachymyrmex*

Cacopone Santschi 1914 = *Plectroctena*
Calomyrmex Emery 1895
Calyptites Scudder 1878 [fossil only]
Calyptomymex Emery 1887
Campomyrma Wheeler 1911 = *Polyrhachis*
Camponotus Mayr 1861
Campostigmacros McAreavey 1957 = *Stigmacros*
Camptognatha Gray 1832 = *Eciton*
Cardiocondyla Emery 1869
Cardiopheidole Wheeler 1914 = *Pheidole*
Carebara Westwood 1840
Carebarella Emery 1905
Carebarelloides Borgmeier 1937 = *Carebarella*
Cataglyphis Foerster 1850
Cataulacus Fr. Smith 1853
Caulomyrma Forel 1915 = *Leptothorax*?
Cautolasius Wilson 1955 = *Lasius*
Centromyrmex Mayr 1866
Cephalomorium Forel 1922 = *Pheidole*
Cephalomyrma Karavaiev 1935 = *Polyrhachis*
Cephalomyrmex Carpenter 1930 [fossil only]
Cephalotes Latreille 1802
Cephaloxys Fr. Smith 1864 = *Smithistruma*
Cepobroticus Wheeler 1925 = *Megalomyrmex*
Cerapachys Fr. Smith 1857
Ceratopachys Schulz 1906 [emendation] = *Cerapachys*
Ceratobasis Fr. Smith 1860 = *Basiceros*
Ceratopheidole Pergande 1895 = *Pheidole*
Chalcoponera Emery 1897 = *Rhytidoponera*
Chalepoxenus Menozzi 1923 = *Leptothorax*?

Champsomyrmex Emery 1891 = *Odontomachus*
Chapmanella Wheeler 1930 = *Euprenolepis*
Chariomyrma Forel 1915 = *Polyrhachis*
Chariostigmacros McAreavey 1957 = *Stigmacros*
Chelaner Emery 1914
Cheliomyrmex Mayr 1870
Chelystruma Brown 1950 = *Glamyromyrmex*?
Chronoxenus Santschi 1920 = *Bothriomyrmex*?
Chrysapace Crawley 1924 = *Cerapachys*
Chthonolasius Ruzsky 1912 = *Lasius*
Cladomyrma Wheeler 1920
Clarkistruma Brown 1948 = *Colobostruma*
Codiomyrmex Wheeler 1916 = *Glamyromyrmex*?
Codioxenus Santschi 1931
Colobocrema Wheeler 1927 = *Crematogaster*
Colobopsis Mayr 1861 = *Camponotus*
Colobostruma Wheeler 1927
Commateta Santschi 1929 = *Gnamptogenys*
Condylodon Lund 1831 = *Pseudomyrmex*
Condylomyrma Santschi 1928 = *Camponotus*
Conomyrma Forel 1913 = *Dorymyrmex*?
Conothoracoides Strand 1935 = *Pheidole*
Conothorax Karavaiev 1935 = *Pheidole*
Coptoformica Mueller 1933 = *Formica*
Corynomyrmex Viehmeyer 1916 = *Monomorium*
Cosmaecetes Spinola 1853 = *Dorylus*
Cosmaegetes Dalla Torre 1893 [variant spelling of
Cosmaecetes] = *Dorylus*
Crateropsis Patrizi 1948 = *Oligomyrmex*?
Cratomyrmex Emery 1892 = *Messor*
Creightonidris Brown 1949
Crematogaster Mayr 1861 [emendation] = *Crematogaster*
Crematogaster Lund 1831
Croesomyrmex Mann 1920 = *Leptothorax*?
Cryptocephalus Lowne 1865 = *Meranoplus*
Cryptocerus Latreille 1804 = *Cephalotes*?
Cryptopone Emery 1892
Ctenopyga Ashmead 1905 = *Acanthostichus*
Cyathocephalus Emery 1915 = *Cephalotes*?
Cyathomyrmex Creighton 1933 = *Cephalotes*?
Cylindromyrmex Mayr 1870
Cyphoidris Weber 1952 = *Lordomyrma*?
Cyphomania Weber 1938 = *Cyphomyrmex*
Cyphomyrmex Mayr 1862
Cyrtomyrma Forel 1915 = *Polyrhachis*
Cyrtostigmacros McAreavey 1957 = *Stigmacros*
Cysias Emery 1902 = *Cerapachys*

Dacetinops Brown and Wilson 1957
Daceton Perty 1833
Dacetum Agassiz 1846 [emendation] = *Daceton*
Dacryon Forel 1895 = *Podomyrma*?
Decacrema Forel 1910 = *Crematogaster*
Decamera Roger 1863 = *Myrmelachista*
Decamorium Forel 1913

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- Decapheidole Forel 1912 = Pheidole
Dendrolasius Ruzsky 1912 = Lasius
Dendromyrmex Emery 1895
Deromyrma Forel 1913 = Aphaenogaster
Descolemyrma Kusnezov 1951 = Mycocepurus
Diabolus Karavaiev 1926 = Dolichoderus
Diacamma Mayr 1862
Diagyne Santschi 1923 = Solenopsis
Diceratoclinea Wheeler 1935 = Dolichoderus
Dichothorax Emery 1895 = Leptothorax
Dichthadia Gerstaecker 1863 = Dorylus?
Dicroaspis Emery 1908 = Calyptomyrmex
Dilobocondyla Santschi 1910
Dimorphomyrmex Ern. André 1892 = Gesomyrmex
Dinomymrma Ashmead 1905 = Camponotus
Dinoponera Roger 1861
Diodontolepis Wheeler 1920 = Notoncus
Diplomorium Mayr 1901
Diplorhoptrum Mayr 1855 = Solenopsis
Discothyrea Roger 1863
Dodecamyrmica Arnoldi 1968 = Myrmica
Dodous Donisthorpe 1946 = Pristomyrmex
Doleromyrma Forel 1907 = Iridomyrmex
Dolichoderus Lund 1831
Dolichorhachis Mann 1919 = Polyrhachis
Donisthorpea Morice and Durrant 1914 = Lasius
Dorisidris Brown 1948
Doronomyrmex Kutter 1945 = Leptothorax?
Dorothea Donisthorpe 1948 = Vollenhovia
Dorylozelus Forel 1915 = Leptogenys
Dorylus Fabricius 1793
Dorymyrmex Mayr 1866
Drepanognathus Fr. Smith 1858 = Harpegnathos
Drymomyrmex Wheeler 1915 [fossil only]
Dyclona Santschi 1930 = Cardiocondyla?
Dyomorium Donisthorpe 1947 = Vollenhovia
Dysedrognathus Taylor 1968
- Echinopla Fr. Smith 1857
Eciton Latreille 1804
Ecpheorella Forel 1909
Ectatomma Fr. Smith 1858
Ectomomyrmex Mayr 1867 = Pachycondyla
Elaeomyrmex Carpenter 1930 [fossil only]
Elasmopheidole Forel 1913 = Pheidole
Electromyrmex Wheeler 1910 [fossil only]
Electropheidole Mann 1921 = Pheidole
Electroponera Wheeler 1915 [fossil only]
Emeryella Forel 1901 = Gnamptogenys
Emeryia Forel 1890 = Cardiocondyla
Emeryopone Forel 1912
Emplastus Donisthorpe 1920 [fossil only]
Eneria Donisthorpe 1948 = Strumigenys
Engramma Forel 1905
Enneamerus Mayr 1868 [fossil only]
- Eoformica Cockerell 1921 [fossil only]
Eomonocombus Arnoldi 1968 = Cataglyphis
Eoponera Carpenter 1929 [fossil only]
Ephebomyrmex Wheeler 1902
Epiatta Borgmeier 1950 = Atta
Epimyrma Emery 1915 = Leptothorax?
Epipheidole Wheeler 1904 = Pheidole
Eplitritus Emery 1869
Epixenus Emery 1908 = Monomorium
Epoecus Emery 1892 = Monomorium
Epopostruma Forel 1895
Equessimessor Santschi 1936
[emendation of Equestrimessor] = Monomorium
Equestrimessor Santschi 1919 = Monomorium
Erebomyrma Wheeler 1903 = Oligomyrmex
Ericapelta Kusnezov 1955 = Amblyopone
Erimelophorus Wheeler 1935 = Melophorus
Eriopheidole Kusnezov 1952 = Pheidole
Escherichia Forel 1910 = Probolomyrmex
Eubothroponera Clark 1930 = Platythyrea
Eucrema Santschi 1918 = Crematogaster
Eucryptocerus Kempf 1951 = Cephalotes?
Eulithomyrmex Carpenter 1935 [fossil only]
Eumecopone Forel 1901 = Pachycondyla
Euophthalma Creighton 1930 = Solenopsis
Euponera Forel 1891
Euprenolepis Emery 1906
Eurhopalothrix Brown and Kempf 1960
Eusphinctus Emery 1893 = Sphinctomyrmex
Eutetramorium Emery 1900
Evelyna Donisthorpe 1937 = Polyrhachis
Examblyopone Donisthorpe 1949 = Prionopelta
- Florencea Donisthorpe 1937 = Polyrhachis
Forelifidis M. R. Smith 1954 = Oxyepoecus
Forelius Emery 1888
Forelomyrmex Wheeler 1913 = Pogonomyrmex
Forelophilus Kutter 1931
Formica Linnaeus 1758
Formicina Shuckard 1840 = Lasius
Formicium Westwood 1854 [to Siricoidea; fossil only]
Formicoxenus Mayr 1855 = Leptothorax?
Froggattella Forel 1902
Fulakora Mann 1919 = Amblyopone
- Gallardomyrma Bruch 1932 = Pheidole
Gauromyrmex Menozzi 1933 = Vollenhovia
Geognomicus Menozzi 1924
Gesomyrmex Mayr 1868
Gigantiops Roger 1862
Glamyromyrmex Wheeler 1915
Glaphyromyrmex Wheeler 1915 [fossil only]
Glyphopone Forel 1913 = Centromyrmex
Glyptomymrma Forel 1885 = Myrmicocrypta
Gnamptogenys Roger 1863

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- Gonepimyrmex Bernard 1948 = Leptothorax?
 Goniomma Emery 1895
 Goniathorax Emery 1896 = Leptothorax?
 Granisolenopsis Kusnezov 1957 = Solenopsis
 Gymnomyrmex Borgmeier 1954
- Hagensia Forel 1901
 Hagiomyrmex Wheeler 1911 = Polyrhachis
 Hagiostigmacros McAreevey 1957 = Stigmacros
 Hagioxenus Forel 1910
 Halmamyrmecia Wheeler 1922 = Myrmecia
 Harnedia M. R. Smith 1949 = Cephalotes?
 Harpagoxenus Forel 1893
 Harpegnathos Jerdon 1851
 Hedomyrmex Forel 1915 = Polyrhachis
 Hemiopatica Roger 1862 = Polyrhachis
 Hendecapheidole Wheeler 1922 = Pheidole
 Hendecatella Wheeler 1927 = Oligomyrmex
 Heptacondylus Fr. Smith 1857 = Myrmecaria
 Heptastruma Weber 1934 = Rhopalothrix
 Hercynia Enzmann 1947 = Ochetomyrmex
 Heteromyrmex Wheeler 1920 = Vollenhovia
 Heteroponera Mayr 1887
 Hexadacton Brown 1948 = Epopostruma
 Hincksidris Donisthorpe 1944 = Myrmelachista
 Hiphopelta Forel 1913 = Pachycondyla
 Holcomyrmex Mayr 1878 = Monomorium
 Holcoconera Mayr 1887 = Gnamplogenys
 Holcoconera Cameron 1891 = Cylindromyrmex
 Holopone Santschi 1924 = Eciton
 Hoplomyrms Gerstaecker 1858 = Polyrhachis
 Huberia Forel 1890
 Hylidris Weber 1941 = Pristomyrmex
 Hylomyrmex Forel 1912
 Hypercolobopsis Emery 1920 = Camponotus
 Hypochira Buckley 1866 = Formica?
 Hypoclinea Mayr 1855 = Dolichoderus?
 Hypocryptocerus Wheeler 1920 = Cephalotes?
 Hypocylindromyrmex Wheeler 1924 = Cylindromyrmex
 Hypopomyrmex Emery 1891 [fossil only]
 Hypoponera Santschi 1938
- Icothorax Hamann and Klemm 1967 = Leptothorax?
 Idrisella Santschi 1937 = Pheidologeton
 Imhoffia Heer 1849 [Formicinae incertae sedis; fossil only]
 Irene Donisthorpe 1938 = Polyrhachis
 Ireneella Donisthorpe 1941 [Myrmecinae incertae sedis]
 Ireneidris Donisthorpe 1943 = Monomorium
 Ireneopone Donisthorpe 1946
 Iridomyrmex Mayr 1862
 Irogera Emery 1915 = Rogeria
 Ischnomyrmex Mayr 1862 = Pheidole
 Isholcomyrmex Santschi 1936 [variant spelling of
 Isolcomyrmex] = Monomorium
 Isolcomyrmex Santschi 1917 = Monomorium
- Isopheidole Forel 1912 = Pheidole
 Janetia Forel 1899 = Pogonomyrmex
 Johnia Karavaiev 1927 = Polyrhachis
 Karavaievia Emery 1925 = Camponotus
 Karawajewella Donisthorpe 1944 = Dolichoderus
 Kyidris Brown 1949
- Labauchena Santschi 1930 = Solenopsis
 Labidogenys Roger 1862 = Strumigenys
 Labidus Jurine 1807
 Lachnomyrmex Wheeler 1910
 Lampromyrmex Mayr 1868 = Monomorium
 Laparomyrmex Emery 1887 = Liomyrmex
 Lasiophanes Emery 1895
 Lasius Fabricius 1804
 Lecanomyrmex Forel 1913 = Oligomyrmex
 Leonomyrmex Arnoldi 1968 = Leptothorax?
 Lepidopone Bernard 1952 = Asphinctopone
 Lepisiota Santschi 1926 = Acanthomyrmex
 Leptalea Spinola 1851 [variant spelling of
 Leptalea] = Pseudomyrmex
 Leptalea Erichson 1839 = Pseudomyrmex
 Leptanilla Emery 1870
 Leptanilloides Mann 1923
 Leptogenys Roger 1861
 Leptomesites Kutter 1948
 Leptomyrmex Motschulsky 1863 = Pheidole
 Leptomyrmex Mayr 1862
 Leptomyrmula Emery 1912 [fossil only]
 Leptopone Arnold 1916 = Centromyrmex
 Leptothorax Mayr 1855
 Leucotaphus Donisthorpe 1920 [fossil only]
 Lilidris Kusnezov 1957 = Solenopsis?
 Limnomyrmex Arnold 1948 = Leptothorax?
 Linepithema Mayr 1866
 Liometopum Mayr 1861
 Liomyrmex Mayr 1865
 Lioconera Mayr 1878 = Cerapachys
 Lithomyrmex Carpenter 1930 = Eulithomyrmex
 Lithomyrmex Clark 1928 = Amblyopone
 Lobognathus Enzmann 1947 = Veromessor
 Lobomyrmex Kratochvil 1941 = Tetramorium
 Lobopelta Mayr 1862 = Leptogenys
 Lonchomyrmex Mayr 1867 [fossil only]
 Loncyda Santschi 1930 = Cardiocondyla?
 Lophomyrmex Emery 1892
 Lordomyrmex Emery 1897
 Lundella Emery 1915 = Hylomyrmex
- Machaerogenys Emery 1911 = Leptogenys
 Machaeromyrmex Forel 1916 = Cataglyphis
 Machomyrmex Forel 1895
 Macromischa Roger 1863 = Leptothorax?
 Macromischoides Wheeler 1920
 Macropheidole Emery 1915 = Pheidole

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- Malacomyrma* Emery 1922 = *Acropyga*
Manica Jurine 1807
Manniella Wheeler 1921 = *Camponotus*
Martia Forel 1907 = *Oxyepoecus*
Mayria Forel 1878 = *Camponotus*
Mayriella Forel 1902
Mayromyrmex Ashmead 1905 = *Eciton*
Megalomyrmex Forel 1885
Megaloponera Emery 1877 = *Megaponera*
Megaponera Mayr 1862
Melissotarsus Emery 1877
Melophorus Lubbock 1883
Meranoplus Fr. Smith 1853
Mesanopolepis Santschi 1926 = *Anoplolepis?*
Mesocrema Santschi 1928 = *Crematogaster*
Mesomyrma Stitz 1911 = *Dilobocondyla*
Mesoponera Emery 1901 = *Pachycondyla*
Mesostruma Brown 1948
Mesoxena Fr. Smith 1860 = *Echinopla*
Messor Forel 1890
Metacylindromyrmex Wheeler 1924 = *Cylindromyrmex*
Metapone Forel 1911
Mianeuretus Carpenter 1930 [fossil only]
Miccostruma Brown 1948
Microbolbos Donisthorpe 1948 = *Leptogenys*
Microdacetone Santschi 1913
Micromyrma Dufour 1857 = *Tapinoma*
Mictoponera Forel 1901 = *Gnamptogenys*
Miomyrmyrmex Carpenter 1930 [fossil only]
Mitara Emery 1913 = *Monomorium*
Moellerius Forel 1893 = *Acromyrmex*
Monacis Roger 1862 = *Dolichoderus*
Monoceratoclinea Wheeler 1935
Monocombus Mayr 1855 = *Cataglyphis*
Monomarium Fr. Smith 1859 = *Aphaenogaster*
Monomorium Mayr 1855
Morleyidris Donisthorpe 1944 = *Polyrhachis*
Mycetarotes Emery 1913
Mycetophylax Emery 1913
Mycetosoritis Wheeler 1907
Mychothorax Ruzsky 1904 = *Leptothorax?*
Mycocephalus Forel 1893
Myopias Roger 1861 = *Pachycondyla*
Myopopone Roger 1861
Myrafant M. R. Smith 1950 = *Leptothorax*
Myrma Billberg 1820 = *Polyrhachis*
Myrmacantha Emery 1920 = *Phasmomyrmex?*
Myrmachaphe Santschi 1926 = *Camponotus*
Myrmamblys Forel 1912 = *Camponotus*
Myrmammophilus Menozzi 1924 = *Leptothorax*
Myrmapatetes Wheeler 1929 = *Odontomachus*
Myrmaphaenus Emery 1920 = *Camponotus*
Myrmatopa Forel 1915 = *Polyrhachis*
Myrmecia Fabricius 1804
Myrmecina Curtis 1829
Myrmecinella Wheeler 1922 = *Xenomyrmex*
Myrmecocystus Wesmael 1338
Myrmecopsis Fr. Smith 1865 = *Opisthopsis*
Myrmecorhynchus Ern. André 1896
Myrmegis Rafinesque 1815 = *Atta*
Myrmelachista Roger 1863
Myrmentoma Forel 1912 = *Camponotus*
Myrmepinotus Santschi 1921 = *Camponotus*
Myrmepomis Forel 1912 = *Camponotus*
Myrmespera Santschi 1926 = *Camponotus*
Myrmetaerus Soudek 1925 = *Leptothorax?*
Myrmeurynota Forel 1912 = *Camponotus*
Myrmex Guérin 1845 = *Pseudomyrmex*
Myrmhopla Forel 1915 = *Polyrhachis*
Myrmica Latreille 1804
Myrmicaria Saunders 1841
Myrmicites Foerster 1891 [fossil only]
Myrmicium Heer 1870 [fossil only] = *Promyrmicium*
Myrmicocrypta Fr. Smith 1860
Myrmisolepis Santschi 1921 = *Camponotus*
Myrmobranchys Forel 1912 = *Camponotus*
Myrmocamelus Forel 1914 = *Camponotus*
Myrmocladoecus Wheeler 1921 = *Camponotus*
Myrmodirhachis Emery 1925 = *Camponotus*
Myrmogigas Forel 1912 = *Camponotus*
Myrmogonia Forel 1912 = *Camponotus*
Myrmolophus Emery 1920 = *Camponotus*
Myrmomalis Forel 1914 = *Camponotus*
Myrmonesites Emery 1920 = *Camponotus*
Myrmopalpella Staercke 1934 = *Camponotus*
Myrmopelta Santschi 1921 = *Camponotus*
Myrmophyma Forel 1912 = *Camponotus*
Myrmopiromis Wheeler 1921 = *Camponotus*
Myrmoplatypus Santschi 1921 = *Camponotus*
Myrmoplatys Forel 1916 = *Camponotus*
Myrmopsamma Forel 1914 = *Camponotus*
Myrmopytia Emery 1920 = *Camponotus*
Myrmorhachis Forel 1912 = *Phasmomyrmex?*
Myrmosaga Forel 1912 = *Camponotus*
Myrmosaulus Wheeler 1921 = *Camponotus*
Myrmosericus Forel 1912 = *Camponotus*
Myrmosphincta Forel 1912 = *Camponotus*
Myrmostenus Emery 1920 = *Camponotus*
Myrmotarsus Forel 1912 = *Camponotus*
Myrmotemnus Emery 1920 = *Camponotus*
Myrmoteris Forel 1893
Myrmothrinax Forel 1915 = *Polyrhachis*
Myrmothrix Forel 1912 = *Camponotus*
Myrmotrema Forel 1912 = *Camponotus*
Myrmoturba Forel 1912 = *Camponotus*
Myrmoxenus Ruzsky 1902 = *Leptothorax?*
Myrmoxygenys Emery 1925 = *Camponotus*
Myrmus Schenck 1853 = *Strongylognathus*
Mystrium Roger 1862
Myrtoteras Matsumura 1912 = *Odontomachus*

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- Neaphomus* Menozzi 1935 = *Myrmelachista*?
Neivamyrmex Borgmeier 1940
Nematocrema Santschi 1918 = *Crematogaster*
Neoamblyopone Clark 1927 = *Amblyopone*
Neoatta Gonçalves 1942 = *Atta*
Neocolobopsis Borgmeier 1928 = *Camponotus*
Neocrema Santschi 1918 = *Crematogaster*
Neoforelius Kusnezov 1953
Neoformica Wheeler 1913 = *Formica*
Neomyrma Forel 1914 = *Manica*
Neomyrmamblys Wheeler 1921 = *Camponotus*
Neophyracaces Clark 1941 = *Cerapachys*
Neoponera Emery 1901 = *Pachycondyla*
Neostruma Brown 1948
Nesolasius Wheeler 1935 = *Pseudolasius*
Nesomyrmex Wheeler 1910 = *Leptothorax*?
Nimbamyрма Bernard 1952 = *Oligomyrmex*?
Nomamyrmex Borgmeier 1936
Noonilla Petersen 1968
Nothidris Ettershank 1966
Nothomyrmecia Clark 1934
Nothomyrmica Wheeler 1910 [fossil only]
Nothosphinctus Wheeler 1918 = *Sphinctomyrmex*
Notomyrmex Emery 1915 = *Chelaner*
Notoncus Emery 1895
Notostigma Emery 1920
Novomessor Emery 1915 = *Aphaenogaster*
Nycteresia Roger 1861 = *Labidus*
Nylanderia Emery 1906 = *Paratrechina*
Nystalomyrma Wheeler 1916 = *Aphaenogaster*
- Ochetomyrmex* Mayr 1877
Octella Forel 1915 = *Oligomyrmex*
Octostruma Forel 1912
Ocymyrmex Emery 1886
Odontomachus Latreille 1804
Odontomyrmex Ern. André 1905 = *Pristomyrmex*
Odontopelta Emery 1911 = *Leptogenys*
Odontoponera Mayr 1862
Oecodoma Latreille 1818 = *Atta*
Oecophthora Heer 1852 = *Pheidole*
Oecophylla Fr. Smith 1860
Oedaleocerus Creighton 1930 = *Solenopsis*
Oligomyrmex Mayr 1867
Onychomyrmex Emery 1895
Ooceraea Roger 1862 = *Cerapachys*
Ophthalmopone Forel 1890
Opisthopsis Emery 1893
Opisthoscyphus Mann 1922 = *Gnamptogenys*
Orectognathus Fr. Smith 1853
Oreomyrma Wheeler 1914 = *Manica*
Orthocrema Santschi 1918 = *Crematogaster*
Orthonotomyrmex Ashmead 1906 = *Camponotus*
Orthonotus Ashmead 1905 = *Camponotus*
Otomyrmex Forel 1891 = *Cataulacus*
- Overbeckia* Viehmeyer 1915
Oxyepocus Santschi 1926
Oxygyne Forel 1901 = *Crematogaster*
Oxyopomyrmex Ern. André 1881
- Pachycondyla* Fr. Smith 1858
Pachysima Emery 1912 = *Tetraoponera*
Paedalgus Forel 1911
Palaeatta Borgmeier 1950 = *Atta*
Paltothyreus Mayr 1862
Paracolobopsis Emery 1920 = *Camponotus*
Paracrema Santschi 1918 = *Crematogaster*
Paracryptocerus Emery 1915 = *Cephalotes*?
Paraenictus Wheeler 1929 = *Aenictus*
Paraformica Forel 1915 = *Cataglyphis*
Paraholcomyrmex Emery 1915 = *Monomorium*
Parameranoplus Wheeler 1915 [fossil only]
Paramycetophylax Kusnezov 1956 = *Mycetophylax*
Paramyrmamblys Santschi 1926 = *Camponotus*
Paramyrmica Cole 1957 = *Myrmica*
Paranamyрма Kusnezov 1954 = *Solenopsis*
Paraneuretus Wheeler 1915 [fossil only]
Paranomopone Wheeler 1915 = *Heteroponera*
Paraparatrechina Donisthorpe 1947 = *Paratrechina*
Paraphacota Santschi 1919 = *Monomorium*
Parapheidole Emery 1915 = *Pheidole*?
Paraplagiolepis Faber 1969 = *Plagiolepis*
Paraponera Fr. Smith 1859
Paraprionopelta Kusnezov 1955 = *Amblyopone*?
Parasima Donisthorpe 1948 = *Tetraoponera*
Parasyscia Emery 1882 = *Cerapachys*
Paratopula Wheeler 1919 = *Atopula*
Paratrechina Motschulsky 1863
Parectatomma Emery 1911 = *Gnamptogenys*
Parholcomyrmex Emery 1915 [emendation of
Paraholcomyrmex]
- Pedetes* Bernstein 1861 = *Odontomachus*.....
Pentastruma Forel 1912
Perissomyrmex M. R. Smith 1947
Peronomyrmex Viehmeyer 1922
Petraeomyrmex Carpenter 1930 [fossil only]
Phacota Roger 1862 = *Monomorium*?
Phalacromyrmex Kempf 1960
Pharaophanes Bernard 1952
 [nomen nudum] = *Monomorium*
Phasmomyrmex Stitz 1910
Phaulomyrma G. C. and E. W. Wheeler 1930
Pheidolacanthinus Fr. Smith 1864 = *Pheidole*
Pheidole Westwood 1840
Pheidologeton Mayr 1862
Phidole Bingham 1903 [variant spelling of *Pheidole*]
Phrynoponera Wheeler 1920 = *Pachycondyla*
Phyracaces Emery 1902 = *Cerapachys*
Physatta Fr. Smith 1857 = *Myrmicaria*
Physocrema Forel 1912 = *Crematogaster*

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- Pityomyrmex* Wheeler 1915 [fossil only]
Plagiolepis Mayr 1861
Planimyrmex Viehmeyer 1914 = *Aphaenogaster*
Platystruma Brown 1953 = *Smithistruma*
Platythyrea Roger 1863
Plectroctena Fr. Smith 1858
Podomyrma Fr. Smith 1859
Poecilomyrma Mann 1921
Pogonomyrmex Mayr 1868
Polyergus Latreille 1804
Polyhomoa Azuma 1950 = *Kyidris*
Polyrhachis Fr. Smith 1857
Polyrhachis Shuckard 1840 [nomen nudum]
Ponera Latreille 1804
Poneracantha Emery 1897 = *Gnamptogenys*
Poneropsis Heer 1867 [fossil only]
Prenolepis Mayr 1861
Prionogenys Emery 1895
Prionomyrmex Mayr 1868 [fossil only]
Prionopelta Mayr 1866
Pristomyrmecia Emery 1911 = *Myrmecia*
Pristomyrmex Mayr 1866
Proatta Forel 1912
Probolomyrmex Mayr 1901
Procerapachys Wheeler 1915 [fossil only]
Proceratium Roger 1863
Procryptocerus Emery 1887
Prodicroaspis Emery 1914
Prodimorphomyrmex Wheeler 1915 [fossil only]
Prodiscothyrea Wheeler 1916 = *Discothyrea*
Proformica Ruzsky 1903
Prolasius Forel 1892
Promeranoplus Emery 1914
Promyopias Santschi 1914 = *Centromyrmex*
Promyrmex Forel 1912 = *Liomyrmex*
Promyrmecia Emery 1911 = *Myrmecia*
Promyrmecium Baroni Urbani 1971
 [fossil only; incertae sedis]
Propodomyrma Wheeler 1910 = *Vollenhovia*
Proscopomyrmex Patrizi 1946 = *Strumigenys*
Prosopidris Wheeler 1935 = *Cardiocondyla*
Protamblyopone Clark 1927 = *Amblyopone*
Protaneuretus Wheeler 1915 [fossil only]
Protazteca Carpenter 1930 [fossil only]
Protholcomyrmex Wheeler 1922 = *Chelaner*
Protoformica Dlussky 1967 [fossil only] = *Formica*?
Protomognathus Wheeler 1905 = *Harpagoxenus*
Psalidomyrmex Ern. André 1890
Psammyrma Forel 1912 = *Dorymyrmex*
Pseudaphomyrmex Wheeler 1920
Pseudoatta Gallardo 1916 = *Acromyrmex*?
Pseudocamponotus Carpenter 1930 [fossil only]
Pseudocolobopsis Emery 1920 = *Camponotus*
Pseudocryptopone Wheeler 1933 = *Ponera*
Pseudocryptomyrma Emery 1921 = *Polyrhachis*
Pseudodichthadia Ern. André 1885 = *Labidus*
Pseudolasius Emery 1886
Pseudomyrma Guérin 1844 = *Pseudomyrmex*
Pseudomyrmex Lund 1831
Pseudoneoponera Donisthorpe 1943 = *Pachycondyla*
Pseudonotoncus Clark 1934
Pseudopodomyrma Crawley 1925 = *Podomyrma*?
Pseudoponera Emery 1901 = *Pachycondyla*
Pseudosphincta Wheeler 1922
 [variant spelling of *Pseudosysphincta*]
Pseudostigmacros McAreavey 1957 = *Stigmacros*
Pseudosysphincta Arnold 1916 = *Discothyrea*
Pteroponera Bernard 1949 = *Ponera*
Pyramica Roger 1862 = *Strumigenys*

Quadristruma Brown 1949

Raptiformica Forel 1913 = *Formica*
Renea Donisthorpe 1947 = *Prionopelta*
Rhachiocrema Mann 1919 = *Crematogaster*
Rhinomyrmex Forel 1886 = *Camponotus*
Rhizomyrma Forel 1893 = *Acropyga*
Rhogmus Shuckard 1840 = *Dorylus*?
Rhopalomastix Forel 1900
Rhopalomyrmex Mayr 1868 [fossil only]
Rhopalopone Emery 1897 = *Gnamptogenys*
Rhopalothrix Mayr 1870
Rhoptromyrmex Mayr 1901
Rhytidoponera Mayr 1862
Rogeria Emery 1894
Romblonella Wheeler 1935
Rossomyrmex Arnoldi 1928

Santschiella Forel 1916
Schizopelta McAreavey 1949 = *Chelaner*
Scrobopheidole Emery 1915 = *Pheidole*
Scyphodon Brues 1925
Selenopone Wheeler 1933 = *Ponera*
Semonius Forel 1910
Sericomyrmex Mayr 1865
Serrastruma Brown 1948
Serviformica Forel 1913 = *Formica*
Shuckardia Emery 1895 = *Dorylus*
Sicelomyrmex Wheeler 1915 [fossil only]
Sicilomyrmex Wheeler 1926 [fossil only;
 emendation] = *Sicelomyrmex*
Sifolinia Emery 1907 = *Myrmica*
Sima Roger 1863 = *Tetraoponera*
Simopelta Mann 1922
Simopone Forel 1891
Smithistruma Brown 1948
Solenomyrma Karavaiev 1935 = *Vollenhovia*
Solenops Karavaiev 1930 = *Oligomyrmex*
Solenopsis Westwood 1840
Sommimyrmex Menozzi 1925 = *Myrmica*?
Spalacomyrmex Emery 1889 = *Centromyrmex*

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- Spaniopone Wheeler and Mann 1914 = Gnamptogenys
 Spelaemyrmex Wheeler 1922 = Oligomyrmex
 Sphaerocrema Santschi 1918 = Crematogaster
 Sphecomyrma Wilson, Carpenter and Brown 1967
 [fossil only]
 Sphegomyrmex Imhoff 1852 = Dorylus
 Sphinctomyrmex Mayr 1866
 Spinomyrma Kusnezov 1952 = Dorymyrmex?
 Sporocleptes Arnold 1948 = Oligomyrmex
 Stegomyrmex Emery 1912
 Stegopheidole Emery 1915 = Pheidole
 Stenamma Westwood 1840
 Stenomyrmex Mayr 1862 = Odontomachus
 Stenothorax McAreevey 1949 = Adlerzia
 Stereomyrmex Emery 1901
 Stictoponera Mayr 1887 = Gnamptogenys
 Stigmatos Forel 1905
 Stigmatomma Roger 1859 = Amblyopone
 Stigmomyrmex Mayr 1868
 Stiphromyrmex Wheeler 1915 [fossil only]
 Streblognathus Mayr 1862
 Strongylognathus Mayr 1853
 Strumigenys Fr. Smith 1860
 Sulcomyrmex Kratochvil 1941 = Tetramorium
 Syllophopsis Santschi 1915
 Symbiomyrma Arnoldi 1930 = Myrmica
 Symmyrma Wheeler 1904 = Leptothorax?
 Sympheidole Wheeler 1904 = Pheidole
 Synsolenopsis Forel 1918 = Solenopsis
 Syntaphus Donisthorpe 1920 [fossil only]
 Syntermitopone Wheeler 1936 = Pachycondyla
 Syscia Roger 1861 = Cerapachys
 Sysphincta Mayr 1865
 [emendation of Sysphingta] = Proceratium
 Sysphingta Roger 1863 = Proceratium
 Talaridris Weber 1941 = Rhopalothrix
 Tammotoca Santschi 1929 = Gnamptogenys
 Tanaemyrmex Ashmead 1905 = Camponotus
 Tapinolepis Emery 1925 = Anoplolepis
 Tapinoma Foerster 1850
 Tapinoptera Santschi 1925 = Tapinoma
 Tatuidriss Brown and Kempf 1968
 Technomyrmex Mayr 1872
 Teleutomyrmex Kutter 1950
 Temnothorax Mayr 1861 = Leptothorax
 Terataner Emery 1912
 Teratomyrmex McAreevey 1957
 Termitopone Wheeler 1936 = Pachycondyla
 Tetramorium Mayr 1855
 Tetramyrma Forel 1912
 Tetraponera Fr. Smith 1852
 Tetrogmus Roger 1857 = Tetramorium
 Thaumatomyrmex Mayr 1887
 Theryella Santschi 1921 = Stenamma
 Thlipsepinotus Santschi 1928 = Camponotus
 Tingimyrmex Mann 1926
 Tomognathus Mayr 1861 = Harpagoxenus
 Trachymesopus Emery 1911 = Pachycondyla
 Trachymyrmex Forel 1893
 Trachypheidole Emery 1915 = Pheidole
 Trachyponera Santschi 1928 [lapsus calami for
 Trachymesopus] = Pachycondyla
 Tranetera Arnold 1952 = Terataner?
 Tranopelta Mayr 1866
 Tranopeltoides Wheeler 1922 = Crematogaster
 Trapeziopelta Mayr 1862 = Pachycondyla
 Trichomelophorus Wheeler 1935 = Melophorus
 Trichomyrmex Mayr 1865 = Monomorium
 Trichoscapa Emery 1869
 Tricytarus Donisthorpe 1947 [Myrmicinae incertae sedis]
 Triglyphothrix Forel 1890
 Trigonogaster Forel 1890 [preoccupied]
 Turneria Forel 1895
 Typhlatta Fr. Smith 1857 = Aenictus
 Typhlomyrmex Mayr 1862
 Typhlopone Westwood 1839 = Dorylus?
 Typhloteras Karavaiev 1925 = Centromyrmex
 Veromessor Forel 1917
 Viticicola Wheeler 1920 = Tetraponera
 Vollenhovia Dalla Torre 1893
 [emendation] = Vollenhovia
 Vollenhovia Mayr 1865
 Wadeura Weber 1939 = Pachycondyla
 Wasmannia Forel 1893 = Ochetomyrmex
 Weberidris Donisthorpe 1948 = Calyptomyrmex
 Weberistruma Brown 1948 = Smithistruma
 Wessonistruma Brown 1948 = Smithistruma
 Wheeleria Forel 1905 = Monomorium
 Wheeleriella Forel 1907 = Monomorium
 Wheelerimyrmex Mann 1922 = Megalomyrmex
 Wheeleripone Mann 1919 = Gnamptogenys
 Willowsiella Wheeler 1934
 Woitkowskia Enzmann 1952 = Neivamyrmex
 Xenhyboma Santschi 1919 = Monomorium?
 Xenophaenogaster Baroni Urbani 1964
 = Monomorium?
 Xenometra Emery 1917 = Cardiocondyla
 Xenomyrmex Forel 1884
 Xeromyrmex Emery 1915 = Monomorium
 Xiphocrema Forel 1913 = Crematogaster
 Xiphomyrmex Forel 1887
 Xiphopelta Forel 1913 = Pachycondyla
 Xymmer Santschi 1914 = Amblyopone
 Zacryptocerus Ashmead 1905 = Cephalotes?
 Zasphectus Wheeler 1918 = Sphinctomyrmex
 Zatapinoma Wheeler 1928
 Zealleyella Arnold 1922 = Anoplolepis