I —ON THE DISTRIBUTION OF THE ANTS OF THE ETHIOPIAN AND MALAGASY REGIONS

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THE PECULIARITIES OF THE ETHIOPIAN ANT-FAUNA

Owing to the great number of genera and species of ants occurring in Africa south of the Sahara and in Madagascar and the pronounced differences between the two faunas, it will be conducive to clearness if we regard the Ethiopian and Malagasy as representing distinct "Regions," with the limits usually assigned to them by zoogeographers and by the other contributors to the "Scientific Results of the Congo Expedition." For the same reasons, I have listed the Malagasy fauna separately (Part IX). Table I is introduced as a general background for the discussion of the two faunas. It shows the distribution as determined up to date for all the known genera of Formicidæ. A cross is used to indicate the presence; a dot, the absence of a genus; and an S, its occurrence only in the southern portion of a given region. The main data of this table are condensed in numerical form in Tables II and III. the former giving the total number of genera and the number of endemic genera in each region and the number common to the other regions, the latter the total number of genera and number of endemic genera in each of the subfamilies of Formicidæ. A comparison of the figures brings out the following facts.

- 1.—The total number of Ethiopian genera (90, or 33.5% of the 269 known genera), though but little in excess of the number of Papuan (81) and Australian genera (81), is greater than that of any other region, except the Indomalayan (101) and Neotropical (97).
- 2.—The number of indigenous, or precinctive, Ethiopian genera (34, or 38%) is decidedly greater than in any other region, except in the Neotropical (48, or 51%).
- 3.—The Ethiopian fauna has more genera (48) in common with the Indomalayan than with any other region, though it has 34 in common with the Malagasy, 39 with the Papuan, and 34 with the Australian.
- 4.—The Ethiopian fauna has fewer genera in common with the Neotropical (22) than with any other region, except the Nearctic (19). This is important in connection with the theories of a former land-connection between Africa and South America, and is still further emphasized by the fact that most of the 22 common genera are those of cosmopolitan, or "tramp," species.

From Table III the following conclusions may be drawn.

- 1.—The Ethiopian fauna possesses a larger number of ponerine and cerapachyine genera (33) than any other region, though few more than the Indomalayan (31), Papuan (27), Australian (26), and Neotropical (28). The number of endemic ponerine genera in the Ethiopian (15) is much higher than in any other region, except the Neotropical with 12. Since the Ponerinæ are the oldest and most primitive of existing ants we are justified in attributing a high degree of antiquity to the Ethiopian fauna.
- 2.—This fauna possesses a greater representation of doryline genera (3) than in any region, except the Indomalayan, which has the same number.
- 3.—In pseudomyrmine and myrmicine genera the Ethiopian Region, with 38 genera, is inferior only to the Neotropical with 51 genera.
- 4.—In having only 4 dolichoderine genera the Ethiopian Region is inferior to all the regions, except the Malagasy, which has only 2 genera.
- 5.—In formicine genera the Ethiopian (12), is superior to other regions, except the Indomalayan (18), Papuan (12), and Australian (17). It has, however, only three endemic genera as compared with 7 in the Indomalayan, 7 in the Australian, and 4 in the Neotropical.

The differences between the various regions in the number of endemic genera is still further emphasized by the fact that the Palearetic has only 13 endemic myrmicine genera. These are nearly all parasitic, and the only endemic genus of the Nearetic, apart from 4 parasitic myrmicine genera, is *Myrmecocystus!*

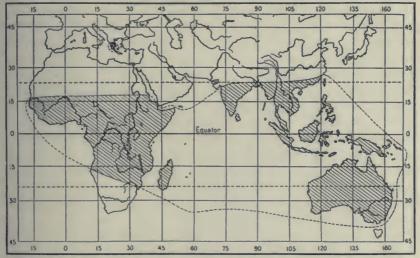
The Ethiopian fauna comprises 10 cosmopolitan genera (Ponera, Pheidole, Crematogaster, Monomorium, Solenopsis, Leptothorax, Tetramorium, Tapinoma, Prenolepis, and Camponotus), 7 tropicopolitan genera (Cerapachys, Platythyrea, Euponera, Leptogenys, Anochetus, Odontomachus, and Cardiocondyla), and 7 paleotropical genera (Phyracaces, Bothroponera, Tetraponera, Oligomyrmex (Map 1), Technomyrmex, Plagiolepis, and Polyrhachis).

The most striking features of the Ethiopian fauna, however, are revealed in a consideration of the number of species and of their peculiarities in the various genera. Owing to the abundant and rapid publication of myrmecological literature within recent years, I am not prepared to give an accurate up-to-date enumeration of the species described for the different zoogeographical regions. Table IV gives the number described down to 1911, as compiled by Prof. Forel. Fully a thousand forms,

¹1911, 'Aperçu sur la distribution géographique et la phylogénie des fourmis.' 1" Congr. Intern. Entom. Bruxelles, (1910), 11, Mém., pp. \$1-100.

mainly from the Ethiopian, Indomalayan, and Neotropical Regions, must have been described since this estimate was made, so that its value for the purposes under discussion is not very great. The Ethiopian species, subspecies, and varieties described down to 1920 are recorded in the list beginning on p. 31, and their number is given in the accompanying table (Table V).

The ponerine and cerapachyine genera confined to the Ethiopian Region are the following: Xymmer, Probolomyrmex, Escherichia, Pseudosphincta, Streblognathus, Paltothyrcus, Glyphopone, Leptopone, Megaponera, Ophthalmopone, Phrynoponera, Asphinctopone, Psectroctena,



Map 1. Distribution of Oligomyrmex, a genus distributed over the tropics and subtropics of the Old World.

Psalidomyrmex, and Cacopone. The species of several of these and other genera (Bothroponera, Phrynoponera, Streblognathus, Paltothyreus, Megaponera, Ophthatmopone, Plectroctena, and Psalidomyrmex) are large, black or dark brown ants, highly predatory and termitophagous, which correspond ethologically with the species of Myrmecia; Bothroponera, and Rhytidoponera in Australia, of Diacamma, Odontoponera, and Bothroponera in the Indomalayan, and of Dinoponera, Paraponera, Emeryella, Ectatomma, Pachycondyla, and Neoponera in the Neotropical Region. An interesting negative peculiarity is the absence in Africa of the whole tribe Ectatommini, which is represented by numerous species of the genera Rhytidoponera, Chalcoponera, Paranomopone, and Wheeleripone in the

Australian and Papuan, and by species of Stictoponera in the Indomalayan, and of Ectatomma and Emeryella in the Neotropical Region.

A fact not brought out in the foregoing tables is the great development of the doryline genera in the Ethiopian Region. All the subgenera of Dorylus but one (Dichthadia) are represented, some of them by numerous species (Dorylus, sens. str.; Anomma). The genus £nictogiton, known only from male specimens, is peculiar to Africa. The genus £nictus, however, though well represented in Africa, has more numerous species in the Indomalayan Region and extends to China, Philippines, and northern Queensland. The genus Dorylus is represented by very few species in India and Indonesia.

The following 14 genera of Pseudomyrminæ and Myrmicinæ are peculiar to the Ethiopian Region: Viticicola, Pachysima, Cratomyrmex, Anergatides, Diplomorium, Bondroitia, Atopomyrmex, Atopula, Macromischoides, Ocymyrmex, Tetramyrma, Rhoptromyrmex, Decamorium, and Microdaceton, nearly all of them monotypic or represented by few species. The remarkable peculiarities of the myrmicine fauna come out strongly in the composition of genera common to the Ethiopian and other regions. Thus, Myrmicaria, though extending to the Philippines and Indonesia, is represented by the largest and most numerous species in equatorial and South Africa. Cataulacus is also represented by more and larger species than in the Malagasy and Indomalayan Region, Crematogaster by numerous subgenera, a few of which (Nematocrema, Sphærocrema) are endemic, and by a much greater number of species, subspecies, and varieties than any other region except, perhaps, tropical America. Monomorium, too, comprises more forms in Africa than are met with anywhere else, with the possible exception of Australia, which contains a considerable number of undescribed species. Pheidole is represented by many species with a peculiar African habitus and especially by the great. development of the megacephala group. The hypogeic and termitophilous ants are represented by species of Diplomorium, Bondroitia, Solenopsis, Aëromyrma, Otigomyrmex, Carebara, and Pædalgus. Africa is, however, very poor in species of Solenopsis, compared with South America, and Meranoplus has very few African species compared with the number found in Australia. The complex of closely allied genera comprising Tetramorium, Rhoptromyrmex, Xiphomyrmex, Decamorium, Triglyphothrix, and Macromischoides has many African species. This is particularly true of Tetramorium, which closely rivals Crematogaster and Monomorium in the number and variety of forms. In other portions of the globe, notably the Nearctic and Neotropical Regions, there are very few species of Tetramorium and Xiphomurmex.

A negative peculiarity of considerable interest in connection with the subfamily Dolichoderinæ is the complete absence in Africa south of the Sahara of *Dolichoderus*, which is so well represented in the Indomalayan, Australian, and Neotropical, and even by a few species in the Palearetic and Nearetic Regions. On the other hand, Africa possesses one endemic genus, *Engramma*. A species of the genus *Semonius* (Map 2) which was supposed to be peculiar to Africa, has recently been



Map 2. Distribution of Semonius in Africa. This genus has recently been recorded from the Indomalayau Region (Singapore).

described from the Indomalayan Region, and further research may show that this region also contains species of Engramma.

Three genera of Formicinæ, *Phasmomyrmex*, the very peculiar, large-eyed *Santschiella*, and *Aphomomyrmex*, which is very closely allied to *Myrmelachista* of the New World, are confined to the Ethiopian Region. Each, however, is represented by a single species. The characteristic complexion of the Ethiopian formicine fauna is due to the great develop-

mend of the genera Acantholepis and Plagiolepis, with the subgenera Anacantholepis and Anoplolepis, the latter with several large and conspicuous species, and of the genera Camponotus and Polyrhachis. Camponotus is characterized by a few endemic subgenera (Myrmopsamma); some striking species of Myrmopiromis, Myrmosericus, and Orthonotomyrmex: an extraordinary development of the species, subspecies, and varieties of the subgenera Myrmoturba and Myrmotrema, especially of the maculatus and foraminosus complexes; and a surprisingly feeble development of other subgenera, such as Colobopsis, which has so many species in the Indomalayan and Papuan Regions. One species of Orthonolomurmex (sericeus) and one of Murmosericus (rufoglaucus) have a very wide distribution, ranging not only over the whole Ethiopian but occurring also in the Indomalayan Region. Polyrhachis, which is represented by numerous subgenera in the Indomalayan, Papuan, and Australian Regions, has species of only two subgenera, Myrma and Cyrtomyrma, in Africa. The genus is absent from Madagascar, but a species of the subgenus Myrmhopla (simplex) occurs as far north as Palestine, so that it would seem that the ancestors of the present Ethiopian species entered the continent by way of the Nile Valley and the Sudan. Prenolepis is poorly represented in Africa. The deserticolous genus Catagluphis belongs properly to the Palearctic fauna and such species as are found in the Ethiopian Region must have come from the Sahara or Arabia. Œcophylla has a peculiar distribution, ranging clear across tropical Africa and through the Indomalayan and Papuan Regions into northern Queensland but not occurring in Madagascar.

Within the Ethiopian Region the distribution of species evidently depends on the distribution of temperature, moisture, and vegetation. It might be interesting to discuss this matter in detail but the data at present available are hardly sufficient. From the synonymic list, in which all the recorded localities for the various forms are cited, it will be seen that many species, subspecies, and varieties are known only from single stations. Some of the large, common, and conspicuous forms, however, such as Megaponera fatens, Paltothyreus tarsatus, Myrmicaria eumenoides, etc., are known to occur throughout the Ethiopian Region. Others, e. g. Pachysima athiops, Vilicicola tessmanni, and several Crematogasters, are so intimately associated with certain host-plants as to be restricted to the range of the latter. Still others, such as the species of Phrynoponera, Psalidomyrmex, Macromischoides, and some species of Polyrhachis and Camponotus, are evidently confined to the rain forests of western equatorial Africa, while a considerable number of species of

Pheidole, Crematogaster, Tetramorium, Monomorium, etc., and the genera Messor and Ocymyrmex (Map 3) are peculiar to the dry savannahs.

The problem of the altitudinal distribution of the Formicidæ in the Ethiopian Region is peculiarly interesting in connection with the circumpolar fauna and the montane faunas in other parts of the World. As there is no general account of the subject, Dr. Bequaert, who collected on Mt. Ruwenzori, has written out for me the following sketch of what is known of the ant-faunas of this and the other high mountains of tropical Africa.



Map 3. Distribution of Ocymyrmes, a genus peculiar to the dry savannahs of East and South Africa.

"The ant-fauna becomes exceedingly poor in the higher alpine and subalpine regions of Central Africa and shows no peculiar forms nor any of the boreal, palearctic, or holarctic elements which are so conspicuous a feature of the flora.\(^1\) Tropical plant and animal life stops at

The fauna of these alpine and subalpine regions of tropical Africa possesses also a few boreal elements, e.g. among the Molluses (Helicida, Vitrinida) and bees (Andrena, Osmia).

about the 1500 m. level-line; between 1500 and 2500 to 3000 m. extends a warm temperate belt, which may conveniently be called the lower mountain region. Its ant-fauna is scanty in species and individuals and includes only a few representatives of the more generally distributed Ethiopian genera. This is shown by the following list of genera of which workers were found by Alluaud and Jeannel on Mt. Kenia, the Aberdare Range, Mt. Kilimanjaro, and Mt. Ruwenzori, between 1500 and 2850 m.1: Bothroponera (1 sp.); Dorylus, sens. str. (2 sp.) and subgen. Anomma (1 sp.); Monomorium (3 sp.); Messor (2 sp.); Pheidole (5 sp.); Oligomyrmex (1 sp.); Crematogas'er (3 sp.); Xiphomyrmex (1 sp.); Engramma (1 sp.): Tapinoma (1 sp.); Technomyrmex (1 sp.); Plagiolepis (1 sp.); Acantholepis (1 sp.); and Camponotus (6 sp.). The number of species represented is very small and most of them also occur at lower altitudes. The absence of certain common Ethiopian genera, such as Paltothyreus, Megaponera, Euponera, Odontomachus, Enictus, Tetraponera, Myrmicaria, Solenopsis, Cataulacus, Œcophylla, and Polyrhachis, is very striking; furthermore, it must be noted that most of the montane ants mentioned above have been found below 2000 m. Indeed, on all Central African mountains reaching above 4000 m. there is between 2000 and 3000 m. a belt of very moist and cool forest, which for many hours of the day is often enveloped in clouds; it is well known that such an environment is very unfavorable to ants and accordingly a few species of Crematogaster and certain driver ants alone enter these cloud forests. On Mt. Kenia and Mt. Ruwenzori, the alpine region above the cloud forest up to the snowline (about 4500 m. in tropical Africa) is mainly covered with a peculiar swampy heath- and bog-formation, which practically excludes ant-life. Mt. Kilimanjaro, Mt. Meru, and the Aberdare Range, owing to their more eastern location, present, however, very different conditions: the usual cloud forest extends from 1800 to 2600 m. on the eastern and to 3000 m. on the western slopes; then begins a rather dry, alpine, steppe formation, with short grass growing in tussocks, where a few species of ants are found, nesting in the soil [Melissotarsus emeryi var. pilipes Santschi (Mt. Kilimanjaro, 2740 m.); Tetramorium squaminode Santschi (Mt. Kilimanjaro, 2600 to 3800 m.); T. cæspitum subsp. altivagans Santschi (Mt. Kinangop, 3100 m.); Engramma ilgi var. stugium Santschi (Mt. Kilimanjaro, 2740 m.); Camponotus maculatus subsp. kersteni (Gerstæcker), a strictly montane ant, known only from Mt. Kilimanjaro, where it is common between 2500 and 3000 m.l. Most of these ants, with the possible exception of the subspecies of T.

¹Genera which were collected in the winged sexual phases only are not included in this and similar lists because such individuals are apt to be carried to higher altitudes than their nesting sites.

cæspitum, are identical with or closely allied to Ethiopian forms of lower altitudes and evidently derived from them.

"Very few ants are known from Mt. Ruwenzori above 1500 m. and they were all collected on the eastern slopes (Uganda). Only the two following species have been recorded thus far: Dorylus brevipennis Emery, at Bujongolo (§; Alluaud and Jeannel), and D. nigricans subsp. burmeisteri var. molesta (Gerstæcker), on the eastern slopes, 1600 m. (8; Alluaud and Jeannel).1 In April and May 1914 I collected altogether five species of ants in the cloud forest region of the western slopes of Mt. Ruwenzori, between 2000 and 2500 m.; unfortunately these specimens are not available for study. None was seen above 3000 m. The scarcity of ants in the Ruwenzori Range was very surprising; most striking among them were the columns of driver ants (Dorylus nigricans), often met with in the bamboo forests at about 2200 to 2500 m. Alluaud and Jeannel comment as follows upon the driver ants of the lower mountain region: 'In the forest of Kenia the Anommas are very abundant and we were even subjected to an invasion of our camp I, at 2400 m., in the lower forests; only fire and barriers of hot ashes succeeded in averting from the tents the columns of thousands of assailants. We have also frequently observed migrations of Anomma in the bamboo forest up to about 3000 m.' Sjöstedt observed driver ants on Mt. Meru, where they also reach 3000 m.

"It is rather unfortunate that no information is forthcoming regarding the ant-fauna of the alpine and subalpine regions of Mt. Cameroon, where ecological conditions are somewhat similar to those of Mt. Ruwenzori and Mt. Kilimanjaro."

^{**}Dorylus nigricans was also taken by the British Museum Ruwenzori Expedition on the eastern slopes, in the Mobuku Valley, between 5000 and 7000 feet.

Table I General Distribution of the Genera of Ants¹

	Ethiopian	Malagasy	Indemalayan	Papuan	Australian	Palearetic	Nearetic	Neotropical
Dorylus	+		+	+		s		
Enictogiton	+							
Eniclus	+		+	+	+	S		
Cheliomyrmex								+
Eciton							S	+
Leptanilla			+			S		
Eusphinctus			+	+	+			
Sphinctomyrmex	?							+
Cerapachys	+	+	+	+	+	S	S	+
Phyracaces	+	+	+	+	+			
Lioponera	?		+	· ·	+	?8		
Acanthostichus			<u> </u>				S	+
Cylindromyrmex								+
Simopone	+	+						٠.
Myrmecia					+			
Mystrium	+	+	+					
Stigmatomma		<u> </u>	+	+	+	S	+	+
<i>Yymmer</i>	+				· .	. 1		ì.
Amblyopone				+	+			
Муороропе		7.	+	+	<u> </u>			
Рагаропета			· .	· .	· .			+
Platythyrea	+	+	+	+	+		S	+
Paranomopone	1	· .	· .		+			
Prionopella	·		+	+				+
Typhlomyrmex								+
Rhopalopone			+	+				+
Vheeleripone			· .	+				١.
Alfaria				<u>'</u> .				+
Stictoponera	•		+	+				΄.
Acanthoponera					+			+
Tolcoponera								+
Chalcoponera			+	+	+			
Rhytidoponera		•		+	+			W
Emeryella								+
Eclalomma					• -		S	+
Thaumatomyrmex				•		•		+

 $^{^{1}+}$ =present; ?=generic reference doubtful; *=introduced genera; S=only in the southern part of the region.

Table I (continued)
General Distribution of the Genera of Ants

	Khiopinn	Madagasy	Indemalayan	Papuan	Australian	Paleuretic	Nearctic	Neotropical
Proceratium			+	+		-	+	
Sy phincta	+					+	+	+
Discothyrea	+		+	+	+		+	· .
Prodiscothyrea			+	1	+			
Probolomyrmex	+		. 1					
Escherichia	+							
Spaniopone								+
Pseudosphineta	+							
Dorylozelus					+			
Centromyrmex	+		+					+
Harpegnathos			+					
Odontoponera			+	+				
Streblognathus	+							
Paltothyreus	+	. 1					. 1	
ilyphopone	+							
Leptopone	+		. 1					
Dinoponera		. 3						+
Diaeamma			+	+	+			
Megaponera	+							
Ophthalmopone	+							
Veoponera		. 1						+
Pachycondyla							S	+
Bothroponera	+	+	+	+	+			
Phrynoponera	+							
Ectomomyrmex	+		+	+	+	+		
Euponera	+	+	+	+	+	+	. 1	+
Pseudoponera	+		+					
Emeryopone	W .		+				. '	
Belonopella	- 18 .						. 1	+
'ryptopone	+		+	+				
Ponera	+	+	+	+	+	+	+	+
Asphinctopone	+							
Frapeziopelta			+	+			. 1	
Plectroclena	+					1		
Myopias	+		+	+				
Psalidomyrmex	+		. 0					
'acopone	+		. 1		. 1			
Onychomyrmex					+			
Leptogenys	- 1/4 +	+	+	+	+	8 .	S	+

Table I (continued) General Distribution of the Genera of Ants

	Ethiopian	Malagasy	Indemalayan	Papuan	Australian	Palearetic	Nearctic	Neotropical
Prionogenys					+			
Anochetus	+	+	+	+	+	S		+
Champsomyrmex		+						
Odontomachus	+	+	+	+	+		S	+
Pseudomyrma							S	+
Tetraponera	+	+	+	+	+	S		
Vilicicola	+							
Pachysima -	+		N					
Hylomyrma	1		8					+
Pogonomyrmex							+	+
Cratomyrmex	+							٠.
Myrmica			+			+	+	V :
Stenamma						+	+	
Sifolinia						+		
A phænogaster •		+	+	+	+	+	+	+
Messor	+		ll '.			+	1	
Novomessor							s	+
Veromessor	1		1			-	S	+
Goniomma	8			- 1		s		
Oxyopomyrmex	16 .					S		0 .
Machomyrma					+			
Ischnomyrmex			+					0 .
Ccratopheidole	9		+				10.00	.1.
Parapheidole	1 .							+
Decapheidole		+		1				i i
Pheidole		1	1			S		+
Epipheidole	+	+	+	+	+		+	+
							+	
Sympheidole	1:	1					+	
Melissotarsus	+	+	1					
Rhopalomastix			+					
Metapone			+		+	•		
Stereomyrmex			+					
Myrmicaria	+	1 : 1	+	+		·		1
Cardiocondyla	+	+	+	+	+	S	S	+
Cremalogaster	+	+	+	+	+	S	+	+
Vollenhoria		+	+	+				
Heteromyrmex			+					
Huberia	+		+	+	++	s	s	+

Table I (continued)
General Distribution of the Genera of Ants

	Ethicpian	Malagasy	Indemalayan	Papuan	Australian	Palearetic	Nearctic	Neotronical
E pixenus						S		
Trichomyrmex			+					
lagioxenus						S		
Wheeleriella			· .			S		
Phacola			M			S		
Paraphacota						S		
Venomyrmex	. 1				. 1			+
Allomerus								+
Megalomyrmex								+
Liomyrmex	11		+	+				
Epiecus		. 1					+	
Anergates					. 1	+		
Inergatides	+							
Pranopella Pranopella								+
'arebarella	0							+
Diplomorium	+							
Bondroitia	+		o .					•
Solenopsis	+	+	+	+	+	+	+	+
Lophomyrmex	Ш.		+					
Prigonogaster			+					
Pheidologeton	?		+	+	+			
Incleus	+		+					0 .
1 ëromyrma	+	+	?					
Oligomyrmex	+	+	+	+	+	S		
Erebomyrma							S	+
'arebara	+		+					+
'adalgus	+		+		. 0			١
'odomyrma				+	+			Η.
ordomyrma				+	+			
Mopomyrmex	11/4			. /				
)ılobocondyla			+	+				
"eralaner	+	+						
Mopula	+							
'aratopula			+					
Brunclla		+		. 1				
Myrmecina	- 1		+	+	+	+	+	
Pristomyrmex			+	+	+	S		
Acanthomyrmcx			+	+				

Table I (continued) General Distribution of the Genera of Ants

	Ethiopian	Malagasy	Indemalayan	Papuan	Australian	Palearctic	Nearctic	Neotropical
Archaomyrmex				+				
Mayriella	1				+	. 0		
Promeranoplus					+			
Meranoplus	+	+	+	+	+			
Prodicroaspis		f .			+			
Calyptomyrmex	+		+	+	+			
Macromischa	10.0							+
Macromischoides	+				. 1			
Leptothorax	+	+	+	· .		+	+	+
Harpagoxenus	b .					+	+	
Myrmoxenus						+	١	
Formicoxenus						+	N .	
E pimyrma					. 1	S		
Symmyrmica	1 . 1						+	
Rogeria	. 1		12	+			× .	+
Lachnomyrmex								+
A psychomyrmex						3		+
Adelomyrmex				+				
Ocymyrmex	+							ш.
Tetramyrma	+							
Lundella							8 .	+
Tetramorium	+	+	+ .	+	+	+	S	+
Rhoptromyrmex	+					. 7	8 .	
Acidomyrmex			+					
Strongylognathus		× .				+		
Xiphomyrmcx	+	+	+	+	+	. 0	+	
Decamorium	+							
Triglyphothrix	+	+	+	+			9 .	
Euletramorium	1 .	+						١.
Ochetomyrmex								+
Wasmannia	*				·	1 . 6		+
Cataulacus	+	+	+	+				
Procryptocerus				. //				+
Zacryplocerus								+
Cephalotes						1		+
Cryptocerus `	1 .						S	+
Basiceros								+
Daceton								+
Acanthognathus					1	y 1	. 19	+

Table I (continued)
General Distribution of the Genera of Ants

	Ethicpian	Malagasy	Indomalayan	Papuan	Australian	Palearetic	Nearetic	Neotronical
Epitritus	+			+	+	S		+
Decetognathus				+	+			
Pentastruma			+					
Rhopalothrix			+	+	+			+
Microdaceton	+							
Epopostruma			. 9	+	+			
Hamyromyrmex								+
Codinmyrmex								+
Strumigenys	+	+	+	+	+	+	+	+
Stegomyrmex				. 1				+
Proalla			+					
Pseudatta		1						+
Blepharidatta		h .						+
Myrmicocrypta								+
1 ptcrostiyma								+
Mycoecpurus								+
Typhomyrmex							S	+
Sericomyrmex								+
Trachymyrmex							+	+
Atta							S	+
Incuretus		100	+					
Dolichoderus			+	.1.		1		
Linepithema	•			+	+	+	+	+
								+
septomyrmex				+	+			
Semonius	+		+		•		:	
Liometopum						S	+	
l'urneria				+	+			
roggattella			. 1		+			
Jorymyrmex							+	+
Araucomyrmex								+
ridamyrmex			+	+	+			+
30thriamyrmex			+	+	+	S	+	
Parelins .							S	+
Azteca					. 1			+
L'ngramma	+							
Гариюта	+	+	+	+	+	+	+	+
l'echnomyrmex	+	+	+	+	+			
Myrmoteras			+		- i			

Table I (continued)
General Distribution of the Genera of Ants

	Ethiopian	Malugasy	Indomalayan	Papuan	Australian	Palearetic	Nearetic	Neotropical
Santschiella	+		T.					
Notoncus					+			
Myrmecorhynchus					+			
Diodontolepis					+			
Melophorus					+			
Prolasius					+			
Lasiophanes								+
Atopodon			+					1
Acropyga	+	. 8	+	+	+			
Rhizomyrma			+	1				+
Pseudaphomomyrmex			+					
A canthole pis	+	+	+		100	S		
Stigmacros					+			
Plagiolepis	+	+	+	+	+	s		
Myrmelachista	1							+
Cladomyrma	•		+					
Aphomomyrmex	+		· .					
Brachymyrmex							+	+
Gesomyrmex			+					i.,
Prenolepis	+	+	+	+	+	+	+	+
Pseudolasius	+		+	+	+			١.
Lasius						+	+	
Myrmecocystus		. 8			•		+	
Cataglyphis	+					s		
Polyergus	T					+	+	
Formica		•				+	+	
Tigantiops		•		•	•			+
Ecophylla	1	•	1	+	+			
Opisthopsis	+	•	+	+	+		. 1	
Notostigma	1	•			+			
Camponolus	1	1			+			
	+	+	+	+		+	+ 1	+
Phasmomyrmex	+	• 1				•	. 0	
Overbeckia ·	•		+					
Calomyrmex		•	+	+	+	•	.)	
Dendromyrmex		• 0				•	. 0	+
Echinopla		. 1	+	+	+		. 1	
Mesoxena	1 :-)	• 1		+		·	. 0	
Polyrhachis	+		+	+	+	S	. 10	

Table II

Total Number of Genera and Number of Endemic Genera in each Region, also Number of Genera Common to other Regions¹

	of	n		C	ener	a Con	nmon	to		
Zoögeographical Regions	Total Number Genera	Number of Endemic Genera	Ethiopian	Malagasy	Indomalayan	Papuan	Australian	Palearctic	Nearctic	Neotropical
Ethiopian	90	34		34	48	39	34	28	19	22
Malagasy	40	4	34		32	29	26	20	18	19
Indomalayan	101	21	48	32		65	51	31	25	29
Papuan	81	4	39	29	65		59	28	23	27
Australian	81	18	34	26	51	59		27	22	24
Palearctic	54	13	28	20	31	28	27		26	20
Nearctic	53	5	19	18	25	23	22	26		36
Neotropical	97	48	22	19	29	27	24	20	36	

Table III

Total Number of Genera and Number of Endemic Genera in Each of the Subfamilies

Zeogeographical Regions	Cerapachyina and Ponerina	Doryline	Pseudomyrminæ and Myrmicinæ	Delichoderinæ	Formicinæ	Totals
Ethiopian	33—15	3-1	38-14	4—1	12-3	90-34
Malagasy	12-1	0()	22-3	2-0	4-0	40-4
Indomalayan	31-2	3-0	42-11	7—1	18-7	101-21
Papuan	27-1	2-0	33-2	7-0	12-1	81-4
Australian	26-5	1-0	29-5	8-1	17-7	81-18
Palearctic	7-0	3-0	31-13	4-0	9-0	54-13
Nearctic	12-0	10	27-4	6-0	7-1	53-5
Neotropical	28-12	2-1	51-28	8-3	8-1	97-48

Excluding introduced genera and the cases where the generic reference is doubtful.

Table IV Number of Species, Subspecies, and Varieties Known from Each Region in 1911 (Forel)

	Geographi	CAL FAUNAS	Species and Races or Subspecies	Valueties
1.	NEOTROPICAL FAUN	[a. South America, except A Patagonia b. Central America	961 506	208 121
11.	ETHIOPIAN FAUNA	(Africa south of the Saharn)	629	125
III.	Malagasy Fauna	(Madagasear, Comoros, Chagos, Seychelles, ctc.)	230	63
IV.	Indomalayan Fauna	(India, Indo-China, Anda- mans, Ceylon, In- donesia, Philip- pines, part of China and Japan)	1165	210
V.	PAPUAN AND OCE- ANEAN FAUNA	(Moluccas, New Guinea, Oceania)	335	42
VI.	Australian Fauna	(Australia, New Caledonia, Tasmania)	380	105
VII.	Paleanctic Fauna	[a. Palearctic proper b. Mediterranean (in- eluding North Africa, Sahara, Asia Minor, etc.)	152 294	116
VIII.	NEARCTIC FAUNA	(North America)	352	105
IX.	Antarctic Fauna	(New Zealand, Patagonia)	27	3
		Total	5031	1256

Table V

Number of Species, Subspecies, and Varieties of Each Genus Hitherto Recorded from the Ethiopian Region and the Belgian Congo

	E	rhiopian Re	GION	В	BELGIAN CON	GO
	Species	Subspecies	Varieties	Species	Subspecies	Varieties
Darglis	41	20	42	26	8	10
.Emclogiton	5		1	5		1
.Eniclus	25	6	7	5	1	1
? Sphinctomyrmex	1	1			I	
Cerapachys	7		3	1	0 11	
Phyracaces	6	1		-3	1	
? Lioponera	2					
Simopone	2					
Mystrium	1	1				
Xymmer	1					
Platythyrea	14	2	5	4		2
Sysphineta	1			· ·		
Discothyrea	3		1			
Probolomyrmex	1			1		
Escherichia	1	8				
Pse utosphineta	1					
Centromyrmex	2	b	2			
Streblognathus	1					
Paltothyreus	1	1	4	1		
Glyphopone	1			1		
Leptopone	1	b				
Megaponera	1		1	1		
Ophthalmopone	5	7		(
Bothroponera	18	3	8	5		3
Plrynoponera	5		5	5		5
Ectomomyrmex	1					
Euponera	17	2	5	4		1
Pse idoponera	2					
Cryptopone	1					
Ponera	17	8	5	3	1	
1 phinclopone	1					
Plectroctena	4	1	2	3		
Myopias	1	1				
Pralulomyrmex	5			3		
Cacopone	1				1 1 2	
Leptogenys	23	6	9	4	1	3
Anochetus	14	1	6	8		1
Odontomachus	2	2	5	2	1	3
Tetra ponera	21	9	9	5	1	3

Table V (continued)

Number of Species, Subspecies, and Varieties of Each Genus Hitherto Recorded from the Ethiopian Region and the Belgian Congo

	Ет	HIOPIAN REC	GION	1	BELGIAN CON	GO
	Species	Subspecies	Varieties	Species	Subspecies	Varieties
Viticicola	1		1	1		1
Pachysima	2			2		
Cratomyrmex	1		2			
Messor	5	7	10			
Pheidole	57	32	31	17	12	7
Melissotarsus	4		1	1		
Myrmicaria	10	5	10	4	3	6
Cardiocondyla	1	1		1		
Crematogaster	SS	56	102	39	25	39
Monomorium	50	25	28 .	15	4	6
Diplomorium	1				1	
Bondroitia	1			1		
Solenopsis	8	4	4	2	2	
Anergatides	1			1		
? Pheidologeton	2	1				
Aneleus	4	3				
Oligomyrmex	6	1	1	1	1	
Aëromyrma	9		1	1		
Carebara	8			5		
Pædalgus	2			1		
Terataner	2					
Atopomyrmex	1	1	2	1	1	2
Atopula	1					
Calyptomyrmex	7		1	1		1
Meranoplus	7	5	2	2	1	
Macromischoides	2	1	4	2	1	4
Leptothorax	6	2		3		
Ocymyrmex	5	5	4			
Tetramorium	50	29	43	10	6	7
Decamorium	1		1			1
Xiphomyrmex	11	2	5	5	1	P
Tetramyrma	1					
Rhoptromyrmex	7	1	2	2	1	2
Triglyphothrix	18	1	6	2		1
*Wasmannia	1					
Cataulacus	25	15	16	10	2	5
Microdaceton	1					
Strumigenys	20	5	3	3	1	2
Epitritus	2					

Table V (continued)

Number of Species, Subspecies, and Varieties of Each Genus Hitherto Recorded from the Ethiopian Region and the Belgian Congo

	Ethiopian Region			Belgian Congo		
	Species	Subspecies	Varieties	Species	Subspecies	Varieties
*Iridomyrmex	1					
Engramma	10	2	2	8	1	2
Tapinoma	10	3	4	1	1	
Technomyrmex	9	2	4	6		1
Semonius	1					
Santschiella	1			1		
Acropyga	1					
Plagiolepis	26	3	8	6	1	1
Acantholepis	20	11	16	5	2	4
Aphomomyrmex	2					
Prenolepis	13		1	5		
Pscudolasius	4		1	3		1
Cataglyphis	2	4	2			
(Ecophylla	2		4	1		3
Camponotus	94	81	76	37	33	19
Phasmomyrmex	1			1		
Polyrhachis	37	17	22	23	9	11
TOTAL	920	389	540	318	122	158

THE PECULIARITIES OF THE MALAGASY ANT-FAUNA

The Malagasy Region includes Madagascar and a number of small neighboring islands known as the Comoros, Seychelles, and Chagos. The ant-fauna of Madagascar was first studied by Forel in a splendid volume in Grandidier's large work on the physical and political history of the island. More recently, the Swiss myrmecologist has contributed data on the ants of the smaller islands. Turning again to Tables I, II, and III, we note the following facts.

- 1.—The Malagasy ant-fauna comprises 40 genera, somewhat less than half the number known from the Ethiopian Region, but only four of these (Champsomyrmex, Parapheidole, Brunella, and Eutetramorium) are endemic, or precinctive.
- 2.—Of the 40 genera, 34 are common to the Ethiopian and 32 to the Indomalayan, so that the affinities appear to be about equally divided between these two regions.

- 3.—The generic affinities with the Papuan and Australian Regions are somewhat less pronounced (29 and 26 respectively), but considerably more than with the Palearctic, Nearctic, and Neotropical (20, 18, and 19 respectively).
- 4.—The subfamily Dorylinæ is completely absent from the Malagasy Region.
 - 5.—The Dolichoderinæ are poorly represented by two genera.
- 6.—The Formicinæ are represented by only four genera (Acanthotepis, Plagiolepis, Prenolepis, and Camponotus).
- 7.—The Malagasy possesses only two genera (Aphænogaster and Vollenhovia) which are not known to occur in the Ethiopian Region.
- 8.—On the other hand, there are 13 genera (Discothyrea, Centromyrmex, Ectomomyrmex, Dorylus, Enictus, Myrmicaria, Carebara, Pædalgus, Calyptomyrmex, Semonius, Pseudolasius, Œcophylla, and Polyrhachis) which occur in the Indomalayan and Ethiopian Regions but are not known to occur in the Malagasy.
- 9.—Three peculiar genera (Simopone, Melissotarsus, and Terataner) are known to occur only in the Ethiopian and Malagasy Regions.

The following remarks on particular genera are of general interest. Of the four endemic, or precinctive, genera, Champsomyrmex, Parapheidole, and Brunella are monotypic and Eutetramorium contains only two species. Champsomyrmex is very close to Odontomachus; Parapheidole seems to be very close to and parasitic on Pheidole; the species of Brunella was originally described as an Aphænogaster, and Eutetramorium, as the name indicates, is allied to Tetramorium. These four genera, therefore, lend nothing very striking to the complexion of the Malagasy ant-fauna. Its distinctive features are due to the peculiar development of species within certain genera which it shares with the faunas of other regions.

Among the Ponerine, the very ancient and primitive genera Simopone with 3 and Mystrium with 5 species show a greater development than elsewhere, though the former occurs also in Africa and the latter both in Africa and the Indomalayan Region. The only known species of Euponera, sensu stricto, (E. sikoræ Forel) is found in Madagasear. Leptogenys is beautifully represented by no less than 16 species, including three species of an endemic subgenus, Machærogenys. The remaining genera of the subfamily show nothing unusual.

Among the Myrmicinæ, we find *Tetraponera* represented by 12 species and *Aphænogaster*, which does not occur in the Ethiopian Region, by 2, one of *Aphænogaster*, sensu stricto, and one of the subgenus

Decomprima. Crematogaster has 21 species, distributed among the following subgenera: Crematogaster, sensu stricto, 11; Orthocrema, 1; Oxygyne, 5; Decacrema, 4. One of the species of Vollenhovia (lævithorax Emery) and the single species of Triglyphothrix, T. striatidens (Emery), are really tropical "tramps" from the Indomalayan Region. Pheidole is well represented by 17 species, some of which have a peculiar habitus. The megacephala group comprises a number of forms as in the Ethiopian Region. Terataner with 5, Xiphomyrmex with 13, and Cataulacus with 8 species are unusually well represented, considering the small size of the territory.

The Dolichoderine, as previously stated, have a very poor representation, *Tapinoma* by only one species, *melanocephalum* (Fabricius), a common tropicopolitan tramp, and *Technomyrmex* by 4 species, 3 of which are confined to Madagascar, while one, *albipes* (Smith), is widely distributed over the Indomalayan and Papuan Regions.

The greatest representation of Formicinæ is furnished by the genera Prenolepis with 11 and Camponotus with 47 species. The latter genus is remarkable on account of the great number of subgenera represented (Camponotus, sensu stricto, with 1; Myrmoturba with 4; Dinomyrmex with 5; Myrmosaga with 7; Myrmosericus with 1; Mayria with 1; Myrmotrema with 2; Colobopsis with 1; Myrmonesites with 6; Myrmopytia with 1; Myrmorhachis with 1; Orthonotomyrmex with 15; Myrmosaulus with 1; and Myrmopiromis with 7 species). The subgenera Mayria, Myrmosaga, Myrmonesites, and Myrmopytia are confined to Madagascar. The single species of Brachymyrmex, B. cordemoyi (Forel), known to occur in the island of Réunion, has been introduced by commerce from South America. In Table VI the Malagasy genera of ants are listed, with the number of known species, subspecies, and varieties. According to Forel, the fauna is made up of groups of species having the following provenience and affinities.

A. Imported Forms

1.	Tropicopolitan forms, imported on various occasions by ships	8
2.	American forms, evidently of recent importation: Brachymyrmex cordemoyi	
	(Forel), Pheidole flavens Roger	2
3.	Of recent importation from Indomalaya: Plagiolepis longipes (Jerdon)	1
1.	Derived from Oceania: Strumigenys godeffroyi Mayr	1
.7.	More or less ancient Indomalayan importations	G
6.	More or less ancient African importations	9
	Total	27

^{1907, &#}x27;La faune malgache des fourmis et ses rapports avec les faunes de l'Afrique, de l'Inde, de l'Australie, etc.' Rev. Suisse Zool , XV, pp. 1–6.

B:-Malagasy Forms

7.	With cosmopolitan affinities (varieties of intercontinental species)	9
8.	With Indomalnyan affinities	10
9.	With Ethiopian affinities	9
10.	With very distinct Australasiatic (Moluccan and Australian) affinities. To	
	these many might be added from the following group which, on the	
	whole, have Molucean and Australian affinities	9
11.	Malagasy forms proper	201
	Total	925

Forel summarizes his views on the Malagasy ant-fauna as follows:

To sum up, the local Malagasy fauna is a fauna of extremely ancient relicts, which have been evolved in certain intercontinental groups (Camponotus, Pheidole, Crematogaster, etc.) to form a very peculiar fauna, the most ancient and primordial affinities of which connect it with the ancient fauna of the Moluccas and Northern Australia. But whereas the Indomalayan genus Polyrhachis has invaded Australasia and Australia, it no more exists in Madagascar than does the subfamily Doryline. Subsequently, invasions from East Africa and India confused the situation; still analysis is possible, although it is sometimes difficult to distinguish the direction of the invasions, especially that of the Malagasy fauna into Africa and India.

Finally, very recent invasions of cosmopolitan and even of American species, introduced, without doubt, by shipping, have still further complicated the situation, especially in the small Malagasy archipelagos and along the coast. Nevertheless, it is on the whole easy in these cases to detect the invasions and to avoid erroneous interpretations. The genus *Brachymyrmex* admits of no doubt, and an eye-witness. M. Vinson, of St. Denys, was able to give me exact information, through M. de Cordemoy, on the invasion of *Plagiolepis longipes* into Réunion some twenty-five years ago.

Table VI Number of Species, Subspecies, and Varieties of Each Genus Hitherto Recorded from the Malagasy Region

	Number of Species	Number of Subspecies	Number of Varieties
Cerapachys	1		
Phyracaces	2		1
Simopone	3		
Mystrium	5		1
Platythyrea	4	1	1
Bothroponera	4	1	
Euponera	4		2
Ponera -	6	3	2
Le ptogenys	16	2	2
Anochetus	2		2
Champsomyrmex	1	,1	
Odontomachus	1	- 10	
Tetraponera	12	4	4
1 pha nogaster ·	3		3
Parapheidole	1		
Pheidole	17	3	S
Melissolarsus	1		
Cardiocondyla	4	1	2
Crematogaster	21	7	6
Vollenhovia	2	1	• •
Monomorium	8	5	
Solenopsis	1		
Aeromyrma	1		
Oligomyrmex	2	• •	
Terataner	5		
Brunella	1		
Meranoplus	2		
Leptothorax	3		
Tetramorium	5	2	1
Xiphomyrmex Trial all all air	13	2	1
Triglyphothrix	1		1
E detramorium	2		• •
Cataulacus	8	• •	
Strumigenys		• •	• •
Tapnoma	.1	2	1
Technomyrmex	1	•	
Acantholepis Plandone	5	1	
Plagiolepis *Brachymyrmex	1		• 1
Prenolepis	11	4	3
	47	16	29
Camponolus	41	10	-17
Total	237	56	70